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ПОКРАЈИНСКИ СЕКРЕТАРИЈАТ ЗА КУЛТУРУ, ЈАВНО ИНФОРМИСАЊЕ И ОДНОСЕ СА ВЕРСКИМ ЗАЈЕДНИЦАМА

МУЗЕЈ ВОЈВОДИНЕ
MUSEUM OF VOJVODINA

C|A|U
Christian-Albrechts-Universität zu Kiel

Project Bordoš – Ten Years of Research

Vol. I

NOVI SAD, 2024

PROJECT BORĐOŠ - INTERNATIONAL AND MULTIDISCIPLINARY ARCHAEOLOGICAL RESEARCH

Tijana Stanković Pešterac

The Project Borđoš started in spring of 2014 as cooperation between the Museum of Vojvodina and the Institute of Pre- and Protohistoric Archaeology, Kiel University. The teams of archaeologists were led by Robert Hofmann, PhD, a researcher at the Institute and Tijana Stanković Pešterac, MA, the head of the Archaeological Department of the Museum (at the time). The Project started as a research of a single Late Neolithic site of Borđoš near Novi Bečej, previously known to archaeologists by scarce data published by the priest Jenő Szentkláray in the 19th century and surface finds collected by an archaeologist-amateur Joca Bakalov in the second half of the 20th century. Since the beginning in 2014, the Project evolved and the research focus narrowed towards the research of the Neolithic sites, first in the vicinity of the site of Borđoš (in the microregion) and then other Neolithic sites, mostly in the regions of Banat and Bačka. Some of these sites were known from different archaeological surveys and excavations and the others had been just discovered by surveys and geophysical prospection.

The project adopts an interdisciplinary approach, where archaeologists employ methods from the natural sciences to uncover various aspects of prehistoric life. This research encompasses fields such as archaeobotany, archaeozoology, geophysics, geomorphology, geology, pedology, physics, and chemistry. Numerous professionals contribute, gathering extensive data. The core archaeological work includes surveys, systematic and non-systematic surface collection, and excavations.

Fig. 2: Drilling

Fig. 1: Geomagnetic prospection

Fig. 3: Measuring of magnetic susceptibility

Leading to Novi Bečej, the main road crosses the Tisza river at the dam. The construction of the dam in 1977 influenced the flow of the river, making it slower, but also affecting the condition of archaeological sites, including the site of Borđoš (Павић, Долинај, Драгићевић, 2009: 36). The archaeologists encountered a great support by the local government of the Novi Bečej's Municipality. When the excavations started and for the next few years, the Municipality assisted the archaeological team.[1] The Cultural Centre of Novi Bečej has also been a valuable support. Before its reconstruction, it was a base for storing and sorting large quantities of the archaeological material gained in the field works. The exhibition *The Secrets of the Ancient Borđoš* (author: Ildiko Medović) was opened there in 2015 and somewhat later, the private collection of Joca Bakalov, purchased by the Municipality, has also been displayed in the permanent exhibition *Novi Bečej Through History* (2018).

Fig. 4: Visual of the exhibition *The Secrets of the Ancient Borđoš*

The first archaeological research within the Project Borđoš started in early spring 2014 with the aim to determine the affiliation of the movable archaeological material, which is located on a large area of the site. Collection of the surface finds was systematic and grid-based. Geomagnetic prospection of the site was done in order to visualize the Neolithic settlement and its structure, covered with a thin layer of arable soil. Core drilling with a diameter of 5 cm enabled determining the content and the depth of the cultural layer. Geoelectrical prospection was carried out above a house in order to determine the depth of the layer and its appearance at different depth levels. The Neolithic settlement covering an area of approximately 7 ha with rectangular burnt houses and a system of trenches around 2 m deep was identified. On the geomagnetic image, below the settlement, towards the southwest, a shallow semicircular trench was identified, cut by an old river bed of the Tisza river. The site appeared rich, according to the surface finds, among which animal bones, stone tools and coarse pottery of the Tisza culture dominated. A small amount of the Bronze Age, Sarmatian and medieval pottery has also been collected, which showed a certain life continuity at the multi-layered site of Borđoš with vertical and horizontal stratigraphy (Medović et al., 2014; Hofmann et al., 2019).

Fig. 5: Miniature figurine, found on the surface in 2014

At that time, it was impossible to predict the growth of the Project. The geomagnetic prospection at the site of Borđoš in the following year (2015) showed that the settlement was even larger - approximately 40 ha. An extensive field work has been carried on an 11 km^2 loess terrace and surrounding floodplains. The surveys throughout the terrace, but also - south of the terrace towards the villages of Taraš and Kumane, and to the north-east, near the economy "Sokolac" (the "castle" of the Dunđerski family), showed the existence of many archaeological sites (23), not only from the Neolithic, but also from other periods (see the Chapter by F. Wilkes in this volume).

A large scale geophysical prospection of archaeological sites on the territory of Vojvodina has never been done before, so it was obvious that it should be executed within this project, with a particular focus on the Neolithic sites. Analysing all data gathered by 2024, it can be said that a completely different perspective on the Neolithic settlements, its structure and development in the territory of Vojvodina, particularly the central and south Banat and east Bačka regions, has emerged.

Due to the fact that the area of the Neolithic settlement at the site of Borđoš is considered to be the soil of the best quality, ploughing has been taking place here for decades. In such way, the excavation of this site can be considered as the rescue archaeology (Stanković Pešterac et al., 2014). Due to the large scale of agricultural works, which consist of the preparation of soil for seed planting (digging, stirring, overturning and ploughing - sometimes up to 60 cm), during ten years of research, it has become obvious that the surface appearance of the loess terrace is changing each year. By 2021 all the vegetation, bushes and trees, as well as some recent buildings, have disappeared. For the site of Borđoš, in particular,

[1] By loaning an off-road vehicle, which was of great help since the site of Borđoš is situated in the arable fields, approximately 7 km away from the main road

the most devastating was the digging of a long trench across the site towards the Tisza River that was used to insert pipes for the irrigation system.

Fig. 6: Trench across the site

This is also the case with other archaeological sites that have been excavated or surveyed within the Project Borđoš. In general, many sites in the territory of Vojvodina are situated below the layers of the arable land, only a few tens of centimetres below the ground, while in the middle of the 20th century they were at much greater depths (Stanković Pešterac et al., 2014). Besides the intensive agricultural activity that includes the use of large technologically advanced machines, global climate changes caused by extensive and unplanned deforestation enable a greater impact of winds as well (Stanković Pešterac, 2023).

Fig. 7: Surface of the site of Borđoš

Since 2014, the field work has been organized every year. It consisted of surveys, which included geophysical prospection (geomagnetic and geoelectrical), core drillings and collection of the archaeological artefacts from the surface, as well as the excavations of different sites in the regions of Banat and Bačka. Due to the Covid-19 pandemic, the survey that was supposed to be realized in March 2020 hasn't been done. The international cooperation was enlarged within the Project Borđoš in 2019, when the *Agreement about an International Cooperation* was signed between the Museum of Vojvodina and Department of Archaeology Conservation and History, University of Oslo. That year, students from the University of Oslo, led by Professor Martin Furholt, PhD, participated in the excavation at the site of Borđoš together with the experts from the Kiel University and the Museum of Vojvodina.

The results, gained in ten years of complex multidisciplinary research, based on the modern archaeological methodology, which implies the use of different technologies and natural sciences, exceeded all expectations. The best conclusions derive from the interpretation of geomagnetic prospection, which enabled many analyses of the Neolithic settlements and its structure, which hasn't been possible prior to this Project. Owing to the large scale surveys, followed by the systematic collection of the surface finds, numerous archaeological sites in the given area have been detected. The excavations have been conducted at four sites - Borđoš (2014-2017, 2019, 2021, and 2022), Prečka (2015), Makaranda (2018) and Žabalj-Nove zemlje (2023), each time with a different, predetermined goal. The Neolithic settlement at the site of Perlek near Bečej, which has been prospected geophysically in 2019 and 2021, was excavated separately from the Project Borđoš. The excavation was organized by the Bečej City Museum, in 2023.

Fig. 8: Excavations of the site of Makaranda

The existence of more than 30 different sites from Prehistory to the Middle Ages has been discovered on the territories of the Central and South Banat District and the South Bačka District (eastern part). The surveys took place at the following sites (30): Borđoš (2014, 2015, 2016, 2022, 2024); the Bronze Age settlement at the site of Borđoš (2019); Prečka (2015, 2016); Makaranda (Site 10) (2015, 2016); Sokolac (2015, 2016); Taraš-Selište (2015, 2019, 2021, 2022); Perlek (2019, 2021); Žabalj-Nove zemlje (2019, 2022, 2024); Titel-Lok (Site 16) (2019, 2022); Aradac-Kameniti vinogradi (2019, 2022, 2024); Opovo-Ugar Bajbuk (2022, 2024); Ajlaš (2015, 2016); Endred (2015, 2016); Mala bara (2015, 2016); Ivanji (2015); Vodice (2015); Bereg (Site 9) (2016); Stara Seločka (2016); Novo Miloševo (2019); Elemir-Orbara (2019); Baranda-Trnovača (2023), Botoš-Talađ (2023), Botoš-Stari vinogradi (2023), Botoš-Živanićeva dolja (2023), Čenta-Mali alas (2023), Čenta-Pavlov špic

(2023), Orlovat-Čurug (2023), Tomaševac-Put za Uzdin (2023); Jarkovac (2024), Šurjan-Stara Sarča (2024).

In ten years, numerous experts (25) from the Museum of Vojvodina, the Kiel University, the University of Oslo, the HTW Berlin (University of Applied Sciences), the Ukrainian Academy of Sciences, the Faculty of Sciences in Novi Sad (the Department of Geography, Tourism and Hotel Management)[2] etc. have been directly involved in the field work, while others operated in their laboratories and offices[3]. The experts from other institutions in Serbia have also participated: the National Museum Zrenjanin, the Bečej City Museum and the National Museum of Pančevo, as well as the Heritage Preservation Institute Zrenjanin (5)[4]. The field work has also included many students of archaeology (65): from the Kiel University, the University of Oslo, the Free University of Berlin, the University of Copenhagen, as well as the Department of Archaeology at the Faculty of Philosophy (the University of Belgrade). In this way, the Borđoš Project represents a kind of school of archaeology. Professor Boban Tripković, PhD, from the Department of Archaeology at the University of Belgrade, has been participating in the Project as a consultant.

Over the years, the results of the Project Borđoš have been presented at different international conferences (the *ArheoVest Symposium* in Timişoara (2014), the annual assemblies of the Serbian Archaeological Society (2017, 2018), the 24th EAA Annual Meeting in Barcelona (2018), the Kiel's University International Open Workshop *Socio-Environmental Dynamics over the Last 15,000 Years: The Creation of Landscapes VI* (2019), the Kiel Conference *Scales of Social, Environmental & Cultural Change in Past Societies* (2023), the 29th EAA Annual Meeting in Belfast, Northern Ireland (2023), etc.) and popular events (the *International Archaeology Day* in the Museum of Vojvodina (2015, 2020, 2023), the *European Heritage Days* in Novi Bečej (2016), the Online Conference *Archaeology 2021 - Evolution of Archaeological Research in Serbia* (2021), etc.).

In 2015, the filming of the documentary *Borđoš, a 7,000 Years Old Mystery* began, produced by Media Art Content, Sabados Service and Aksios Media, in cooperation with the Museum of Vojvodina and colleagues from the Kiel University. It was released in 2018 and presented in: the Museum of Vojvodina (2018, 2022), the Cultural Centre of Novi Bečej (2018), the National Museum Belgrade (the *XVI International Archaeological Film Festival*, 2019), the Museum of Republic of Srpska (the 14th *Review of the Archaeological Film*, 2019), the Museum of Mining and Metallurgy in Bor (2020) (the 15th *Archaeological Film Festival*), the Museum of Croatian Archaeological Monuments Split (the 6th *International Archaeology Film Festival*), at other festivals and TV networks (Pannon RTV, HTV 3, RTV 1, RTS 1, etc.).

Fig. 9: Filming of the excavations in 2017

The results have also been published in scientific publications: Medović, A., Hofmann, R., Stanković-Pešterac, T., Dreibrodt, S., Medović, I. and Pešterac, R. (2014). The Late Neolithic settlement mound Borđoš near Novi Bečej, Serbian Banat, in a multiregional context - Preliminary results of geophysical, geoarchaeological and archaeological research. *Rad Muzeja Vojvodine*, 56, 53-77; Stanković Pešterac, T., Hofmann, R., Medović, A., Dreibrodt, S. and Medović, I. (2014). Multidisciplinary archaeological research at the Late Neolithic site Bordjoš (Borjas) near Novi Bečej (Northern Serbia) - Geoelectrical Prospection of a House. In: Forţiu, S. and Cîntar, A. (Eds.) *ArheoVest I, In Honorem Gheorghe Lazarovici*, 545-563; Hofmann, R., Medović, A., Furholt, M., Medović, I., Stanković Pešterac, T., Dreibrodt, S., Martini, S. and Hofmann, A. (2019). Late Neolithic Multicomponent Sites of the Tisza Region and the Emergence of Centripetal Settlement Layouts. *Prähistorische Zeitschrift*, 94 (1), 1-28; Hofmann, R., Furholt, K., Medović, A., Furholt, M., Wilkes, F., Medović, I., Stanković Pešterac, T., Kühl, T., Schultrich, S., Ramadanski, R. and Martinova, L. (in press - accepted). Neolithic Settlement Structures on the Lower Reaches of the Tisza River, Vojvodina, Serbia: the results of archaeo-magnetic prospection. In: Furholt, K., Depaermentier, M. L. C., Kempf, M. and Furholt, M. (Eds.), *Beyond Heterogeneities. New*

[2] Tijana Stanković Pešterac, Aleksandar Medović, Ildiko Medović, Nikola Mrkšić, Lidija Balj; Robert Hofmann, Martin Furholt, Stefan Dreibrodt, Kata Furholt, Fynn Wilkes, Mila Shatilo, Antonia Höhne, Sarah Martini, Robert Staniuk, Lennart Brandstätter, Sabrina Autenrieth, Till Kühl, Marcel Rodens, Maria Wunderlich, Vasilisa Philipova, Natalie Pickartz, Sebastian Schultrich, Henry Skorna; Zsolt Bereczki; Slobodan Marković; etc.

[3] Darko Radmanović, Marija Ćuković, Ana Olajoš, Dragan Ogar; Sarah Pleuger; Jovica Vasin; etc.

[4] Aleksandar Šalamon, Raško Ramadanski, Miroslav Birclin, Nada Benjocki, Dejan Žigić, Dušica Zvekić Laković; etc.

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Based on some of the results of the Project Borđoš the Master's students Sabrine Autenrieth and Fynn Wilkes from the Kiel University wrote their theses: *The Late Neolithic Settlement of Borđoš, Vojvodina: Interregional Relations and Internal Differentiation* (Autenrieth, 2015) and *Settlement and Landscape Development of the Borđoš Plateau* (Wilkes, 2019).

In her master's thesis, *On-site Geoarchaeology as a Method of Archaeological Hypothesis Testing on Multi-layered Settlement Mounds: An Investigation of Epistemological Possibilities and Their Limitations*, Sarah Martini wrote a chapter related to the site of Borđoš (Martini, 2019).

By now, during these ten years of multidiciplinary research, the Project Borđoš gave extraordinary results, which should be appreciated particularly in the Serbian archaeology.

Fig. 10: Archaeological teams from 2015, 2017, and 2018

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Jenő Szentkláray

NATURAL ENVIRONMENT OF THE SITE OF BORĐOŠ

Tijana Stanković Pešterac

Geographical location and physical characteristics

The site of Borđoš is located in the northern part of Serbia, in the Autonomous Province of Vojvodina, within the Central Banat Administrative District. Banat is a geographical and historical region of 28,522 km^2, divided among three countries (Romania, Serbia, and Hungary), whose boundaries are delineated hydrographically with Danube-Tisza-Maros/Moriš/Mureş-Cerna rivers (Fig. 1). It consists of two landscape units - the Banat Plain and the Banat Mountains. The Banat plain encompasses the lowland area between the Maros/Moriš/Mureş river on the north, the Tisza River in the west, in the east it terminates till the Banat Mountains, while the Danube is its south boundary (Gaudenyi, Milošević, 2023: 46).

The Banat Plain is part of the larger Pannonian Plain, which encompasses regions across Hungary, Serbia, Romania, and Austria. The Pannonian Plain is characterized by its flat terrain and is considered to contain several significant morphological units. The Banat Plain shares geological and ecological features with the surrounding areas, reinforcing the idea that it cannot be fully understood in isolation from the broader Pannonian context (Ćalić et al., 2020). The main rivers of the Pannonian Plain are the Danube, Tisza, Sava, and Drava. The Tisza flows through the middle of the Plain and collects tributaries from almost the entire lowland territory (Rónai, 1985: 415).

The geological structure of Banat, as well as other parts of the Pannonian Plain, is represented by a succession of Neogene and Quaternary sediments that is up to 4 km thick. These sediments vary, in order from older to younger, from lacustrine to marine and again to lacustrine (Neogene), to continental (Quaternary), and predominantly consist of fluvial and eolian sediments - loess and wind-blown sand (Marović et al., 2007).

The Serbian part of Banat has a typical plain morphology: flood plains of the Danube, Tisza, Tamiš, Bega, Karaš, and Nera rivers; adjacent river terraces; loess plateaus; and large wind-blown sand accumulations in the SSE part. In sharp contrast to this relief are the Vršac Mountains, which have a height of 639 m but cover an area of only 122 sq. km in the Serbian part of Banat (Košćal at al., 2005).

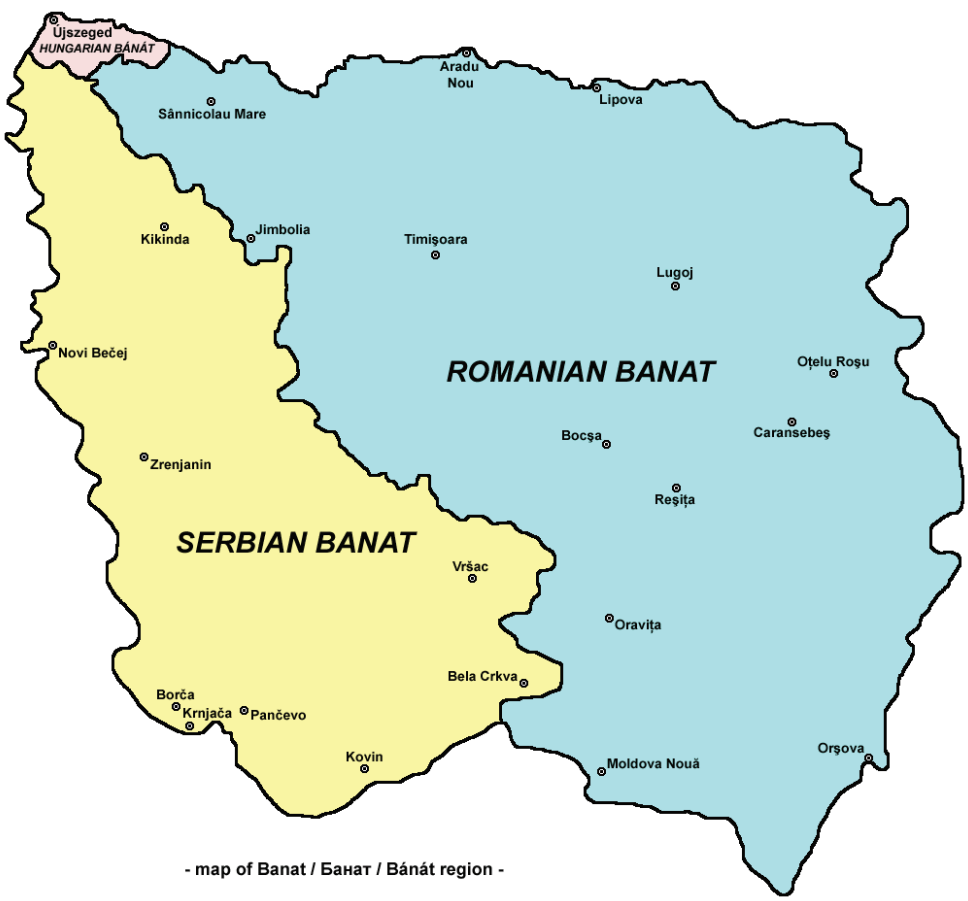


Fig. 1: Geographical location of the Banat region

The site of Borđoš is located on the left bank of the Tisza River, on the south-western edge of a large loess plateau (Košćal et al., 2005). The Late Neolithic settlement is detected below the arable fields, approximately 7 km from the main road that leads to Novi Bečej and crosses the dam on the Tisza River. Historically, the River provided access to water resources, fertile soil for agriculture, and transportation routes.

The relief of the Novi Bečej subregion is characterized by all the elements common to the relief of central Banat and most of Vojvodina. Morphologically, the territory of the municipality consists of a plain, with an absolute elevation ranging from 86 to 76 meters. The plain is gently inclined toward the west, toward the riverbed of the Tisza, and to the south, in the direction of the Tisza's flow. Throughout the entire area, there are very uneven elevation parameters of the relief. The lowest parts of the territory – Tisza's flood plain and old river beds, have an absolute height of 76 to 77 meters. Above them are segments of the Lower and the Higher river terraces. These areas are distributed differently across the regional unit. Higher absolute elevations are observed in the north-eastern, eastern, and south-eastern parts, which are further from the current riverbed of the Tisza.

Climate

Globally speaking, the climate of present-day Banat is primarily the result of the alternation of cyclones and anticyclones, which bring warm and dry weather. It is temperate continental with certain specific characteristics - hot summers, cold winters, while spring and autumn are short. According to data on average monthly air temperatures for individual years, it can be concluded that July is the hottest month of the year, while the lowest average monthly temperatures occur in January. The growing season lasts from early April to the end of September. Winds come from all directions (mostly north-west and south-east), which is characteristic of the entire Vojvodina region (Radivojević, 2014: 7, 8).

Historically, climate was crucial in shaping vegetation, especially during the last glacial and early Holocene periods. Since the arrival of Neolithic farmers, human impact on the landscape has increased (Rónai, 1985: 419). The Holocene climate was highly variable, with significant changes in summer conditions starting around the 7th millennium BP, linked to decreased summer sunlight. However, data on past climate changes remain incomplete, making conclusions difficult (Grabundžija, Russo, 2016).

Geological characteristics

The time of formation of the basic relief forms of Vojvodina is very distant and comes from a long past (Fig. 2). The Pannonian Basin represents a depression that formed at the beginning of the Miocene, when the intensive uplift of the Carpathians, Dinarides, and Alps began. The area between these mountain ranges started to sink, and the newly formed basin was filled by the Pannonian Sea (Hadžić et al, 2005: 430). During the Miocene, in certain parts of the basin, 2,000 to 4,000 meters of marine and lacustrine sediments were deposited, including conglomerates, sandstones, claystones, and clays. From a lithological perspective, with the exception of the horsts, the surface formations include loess, sand, and clay, with variations in the environments in which they were deposited (Hadžić et al, 2005: 432). According to Bukurov, Nejgebauer, and most other researchers, the final forms of the relief of Vojvodina are the result of fluvial and eolian processes. The relief of Vojvodina can be categorized into the following geomorphological units: low mountain forms (Fruška Gora and the Vršac Mountains), sandy areas, loess plateaus, river terraces, and flood plains. Loess is the most widespread and important parent material on which agricultural land in Vojvodina has formed. Geomorphological results support floodplain sediments as the proximal sediment source and suggest that short-distance aeolian transport dominates sediment delivery to loess plateaus (Fenn et al, 2022).

The succession of loess and paleosoil sequences observed in Vojvodina loess plateaus, reflects climatic oscillations during the last more than million years (Marković et al., 2014).

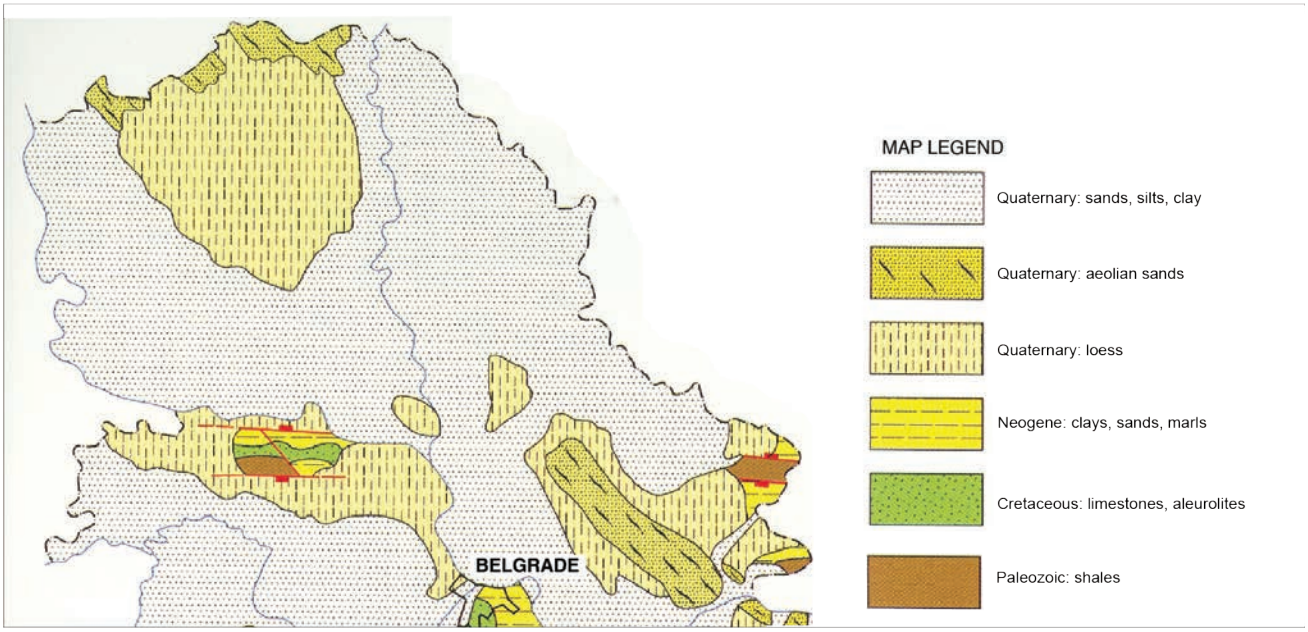


Fig. 2: Geological map of Vojvodina: key features

Rivers determine the topographic features of the lowland's surface. Loess-like sediments cover the greater part of the plains, lying at the river terraces (Rónai, 1985). While the Pleistocene climate facilitated the formation of loess series in the form of plateaus on non-flooded areas of the Pannonian Plain, contemporary morphological and hydrological features were formed during the Holocene (Ćalić, et al., 2020).

Today, it is hard to imagine the appearance of the environment 7,000 years ago. The surrounding nature has been changing through time, and along with the natural processes, one of the crucial reasons for this was diverse human activity.

Hydrological characteristics

Rivers are constantly changing and have played a crucial role in supporting the life of the prehistoric communities. People have always lived by rivers and engaged in a wide range of activities (Haughey, 2009). These anthropogenic activities have influenced the dynamics of rivers and sediments since the Late Pleistocene (with greater effects during the Early and Middle Holocene), in addition to geomorphological factors (Gibling, 2018).

Among the morphological and geological properties of the regions, the ground-water conditions are crucial importance. On a considerable part of the Plain the phreatic ground-water level lies near the surface, in a depth of one metre or less. On the other hand, there are regions where the average depth of the ground-water level is more than 10 m, and the seasonal fluctuation of the water level reaches 4-6 m (Rónai, 1985: 415).

The Tisza River has appeared at the end of the Pleistocene and *wandered* over vast territories during the Holocene period (Rónai, 1985). It represents one of the largest tributaries of the Danube, with a length of 996 km and a catchment area of 157,220 km^2 (Pavić, Dolinaj, Dragićević, 2009: 35; Pavić, 2006). The Tisza catchment area, with its branched river system, currently spans the territories of Romania (47%), Hungary (29%), Slovakia (10%), Ukraine (8%), and Serbia (6%) (Pavić, Dolinaj, Dragićević 2009: 36), Fig. 3. From an economic and ecological perspective, this river is one of the most significant watercourses in Serbia, with a favorable location and good navigational characteristics. Additionally, it is important as a habitat for a diverse and rich array of plant and animal life (Pavić, Dolinaj, Dragićević 2009: 36). The Tisza is considered to be the border between Bačka and Banat regions in Vojvodina, where it has low, gently sloping banks, while on the right bank, the eroded Bačka loess terrace and the Titel plateau create steep banks ranging from several meters to several dozen meters high. In the section of the river flowing through Serbia, the river has a low velocity, which has been particularly influenced by the construction of the dam near Novi Bečej in 1977 (Pavić, Dolinaj, Dragićević 2009: 36).

The Tisza exhibits significant dynamics, especially regarding geomorphology. In its natural state, the Tisza was a meandering river that frequently changed its course, leaving many side branches and oxbow lakes (Borsos, Sendzimir, 2018: 542).

Centuries of river engineering along the Tisza have altered its natural state. The continuous actions of the Hungarians who settled in the Pannonian Plain after 900 AD shaped the landscape, transforming the vast plain into cultivated space where natural, periodic floods temporarily inundated areas up to 30,000 km². It has been recorded that in the Middle Ages (around 1100-1200), works were carried out on the flows of the Danube and Tisza, as well as some of their tributaries - known as flood management or the flood embankment system. Water was channelled into deeper flood areas through small canals created by cutting into these natural formations. Shallow floodplain swamped lakes and oxbow lakes played an important role in the local economy during the Late Middle Ages, serving as natural water reservoirs. The ecological potential of the floodplain, aided by the embankments, involved fishing, orchards, livestock farming, reeds, and occasionally, at higher elevations, soil cultivation. The canals often served as suitable transport routes for timber, reeds, and hay, while water was also utilized by mills. Despite the fact that the Tisza flooded more frequently during this period and the floods were shallower, settlements were not submerged, as they were raised on higher ground - on natural terraces (relics of older floodplain deposits or loess ridges) (Borsos, Sendzimir, 2018: 542, 543).

During Ottoman rule in the 17th and 18th centuries, some areas were intentionally converted into swamps, primarily for military purposes - to facilitate easier defence for border fortifications located on the river's meanders. Long-standing conflicts caused population dispersion, leading to the abandonment of the embankment system and allowing water to penetrate the fields. Additionally, deforestation in the high mountain areas resulted in dangerous floods in the 18th and 19th centuries (Borsos, Sendzimir, 2018: 541).

Demands from landowners for land cultivation and the production of profitable crops such as wheat led to significant river regulation works at the end of the 19th century. According to some sources, large-scale works on the construction of embankments along the Danube and Tisza, organized by the Austro-Hungarian monarchy, began in 1860 and were largely completed by the outbreak of World War I. Due to the industrial revolution at that time, rivers across Europe underwent reshaping. Works known as the Vasarhelyi Plan were implemented with the aim of reducing the length of the Tisza by shortening its meandering bends, cutting off and draining the floodplain with earth embankments that prevented water in the river channels from entering vast areas that had previously been periodically flooded. As a result, the speed of the river increased, and the length of its flow was reduced from 1419 km to 966 km. A large number of cuts were made to eliminate hundreds of meanders (Borsos, Sendzimir, 2018: 543; Kolaković, Kolaković, Kovacs, 2018: 23; Dragović et al., 2005).

Since prehistoric times, the Tisza River has attracted people to settle near it. Along its entire course - from its source in the Carpathians to Stari Slankamen, where it flows into the Danube - a large number of archaeological sites have been documented, which have been studied through Ukrainian, Russian, Romanian, Hungarian, Slovak, and Serbian ac-

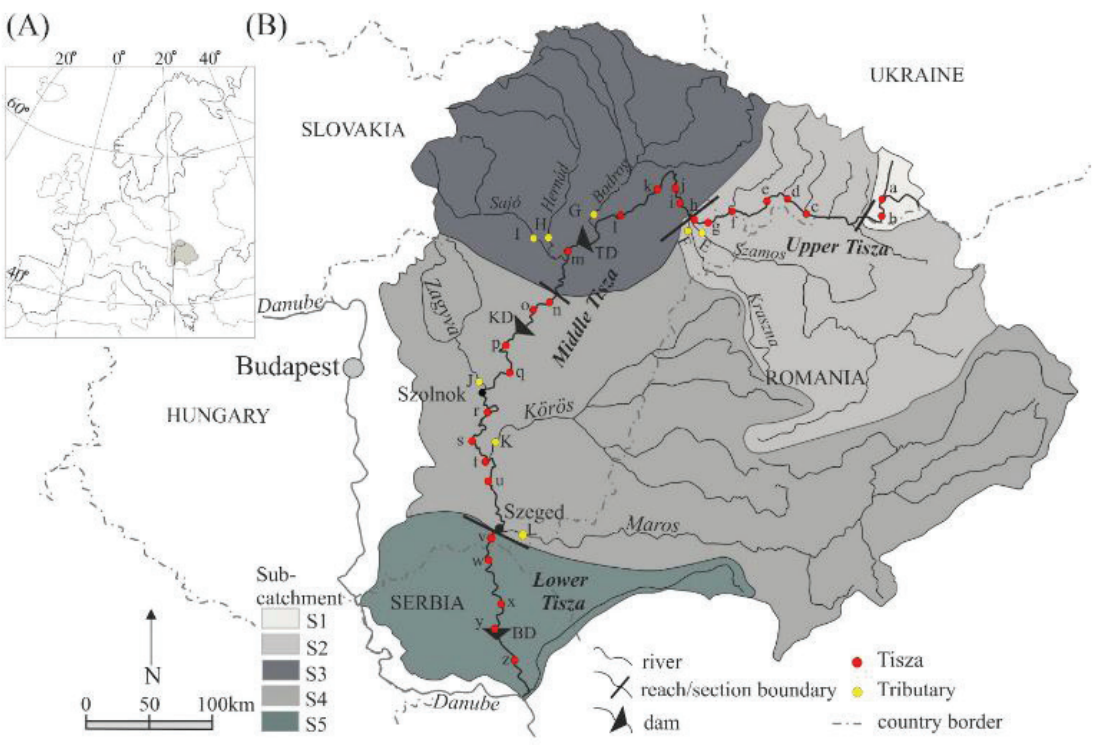


Fig. 3: Tisza River flow (Balla et al., 2022)

ademic literature. When discussing the settlement of human communities in the Tisza River valley, continuity is confirmed by archaeological research of numerous sites from the time of the first farmers to the Middle Ages. Sites along the Tisza have been explored throughout its course, but it is important to consider that this flow has changed throughout history due to natural events or human activities, which must have caused the disappearance or destruction of certain sites. It is known that the area of Vojvodina in the past had different geomorphological and soil characteristics. Numerous watercourses and canals influenced the establishment of settlements on gentle elevations - along loess ridges and plateaus, on dry and well-drained soil, often surrounded by water on almost all sides (Pavić, 2006: 11).

The Tisza River represents a natural barrier but also a natural communication route, connecting the Pannonian Plain with the central Balkan region and serving as one of the main axes of movement, with several side tributaries. The change in the river's course has also impacted the condition of the archaeological sites in its immediate vicinity, including the site of Borđoš.

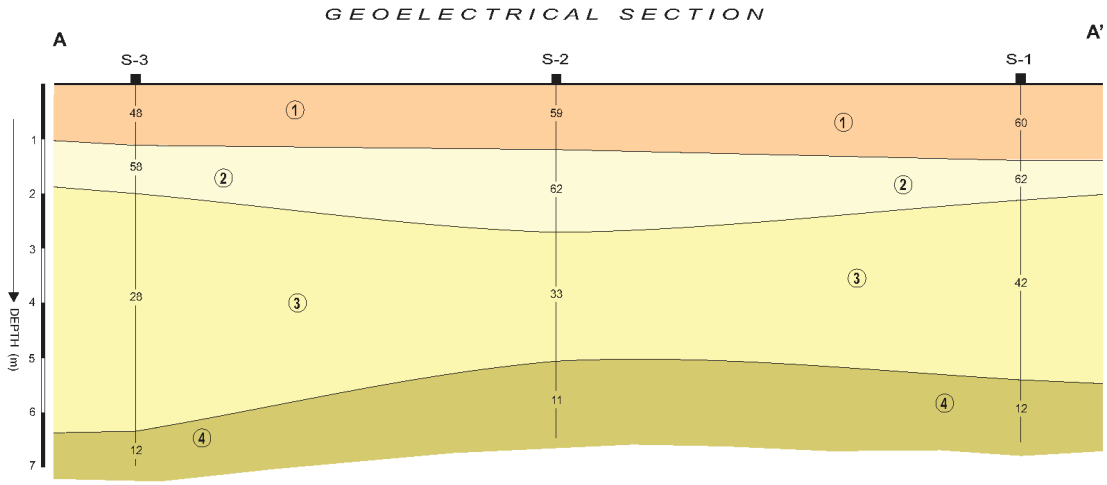
Some pedological characteristics

The soils of Vojvodina have predominantly developed on sedimentary rocks. Loess is the most widespread and important material on which agricultural land in Vojvodina has formed. The mineralogical composition of loess is also favorable. Besides quartz, which is the most abundant, loess contains about 30% $CaCO_3$, which is dispersed in loess in the form of chalk dust. This makes it very active, as it easily dissolves and releases Ca^{++} ions, which neutralize acids and coagulate organic and mineral colloids, creating good soil structure. In addition to quartz and calcite, loess contains a smaller percentage of other primary minerals (feldspats, micas, chlorites, etc.) and secondary minerals that represent a potential source of nutrients for plants, as the chemical breakdown of these minerals releases important biogenic elements. However, the released elements (bases) form various salts with the present acids, and a higher accumulation of these salts can lead to soil salinization, which is unfavorable. Deposited loess provides a good foundation for soil formation; it covers the largest loess terraces in Vojvodina (Bačka, Banat, and Srem), where soils with the most intensive agricultural production have developed (Hadžić et al., 2005) (see the chapter *What's "Salt" Got to Do with It? – Recreating the Economic and Natural Vegetation of the Late Neolithic Borđoš* by Aleksandar Medović in this volume).

The fertile soils of Vojvodina make it favorable for agricultural activities. In this manner, archaeological sites in Vojvodina are mostly situated below arable land, which complicates their preservation. Archaeological finds obtained through surveys and excavations within the Project Borđoš and other projects reflect how past communities adapted to and utilized their environment, impacting the landscape through agriculture, settlement construction, and resource extraction. Modern environmental factors, such as urban development and agriculture using large, technologically advanced machines, represent a serious threat to the site. One of the threats of which we have only recently become aware is global climate change. Its influence on archaeological sites is caused here mostly by extensive and unplanned deforestation, which enables a greater impact from winds (Stanković Pešterac, 2023). In this manner, extensive salvage archaeological research plays a crucial role in protecting the archaeological integrity of the site of Borđoš.

Geophysical prospections and geomorphological analyses

Considering the geographical, geomorphological, geological, and hydrological characteristics of the terrain, as well as the vulnerability of the site due to extensive agricultural activities, geophysical prospection was conducted at the Borđoš site and its surrounding area as part of the Project Borđoš. This included geomagnetic and geoelectrical prospection, as well as core drilling to determine the size, structure, and stratigraphy of the settlement, the thickness of the cultural layer in general, and its stratigraphy. Samples were taken for ^{14}C dating, and geomorphological analyses were carried out (see the chapter *Strategy and Results of Ten Years Interdisciplinary Fieldworks at the Late Neolithic Multi-Component and Multiperiod Settlement Borđoš* by Robert Hofmann et al. and *Results of the Excavations, Geophysical Prospection and Surface Find Collection on and Around the Borđoš Loess Plateau* by Fynn Wilkes in this volume). The results of the geomagnetic prospection provided horizontal images of the Neolithic settlements hidden beneath the fields, while the two methods of geoelectrical prospection, conducted in 2014 and 2015 - geoelectrical mapping and vertical electrical sounding - revealed images at different depth levels. Vertical electrical sounding is conducted to determine the lithological structure of the terrain, along with the depth, position, and outline of the cultural layer (Fig. 4a, 4b) (Stanković Pešterac et al., 2014).



Zone	Resistivity value	Visual representation	Lithological structure
1	48-60 Ωm		Surface layer: humus, humuficated clay, with cultural layer remains
2	58-62 Ωm		Cultural layer: loess clay, burnt wattle-and-daub, archaeological artefacts
3	28-42 Ωm		Debased loess, loess clay
4	11-12 Ωm		Loess clay, dusty clay

Fig. 4a, 4b: Vertical electric sounding – Geoelectrical section

Magnetic susceptibility measurements were carried out with the Bartington MS3 Magnetic Susceptibility Meter in 2018 at the site of Makaranda. The goal was to determine why, during the geomagnetic prospection in 2016 at the site of Makaranda, the magnetic susceptibility values were significantly higher in the house being excavated that year compared to another house located slightly to the south. Measurements were conducted in boreholes that form a profile in House 2; these probes, which have a diameter of 2.5 cm, were manually drilled and reached a depth of 2 m, including measurements taken on the trench profile after excavation. The cores were described, with colours identified according to the Munsell Soil-Colour Charts, and stratigraphy was also defined. Stefan Dreibrodt, PhD, the research associate from the Institute for Ecosystem Research in Kiel (Faculty of Mathematics and Natural sciences) and Natalie Pickartz, a PhD student from the Institute of Geosciences in Kiel (Department of Applied Geophysics), were tasked with establishing a formula that would allow the estimation of daub thickness within a specific object using magnetic susceptibility values, without excavation (research conducted for the thesis *Integrative Quantitative Interpretation of Magnetic Measurements in Archaeological Prospecting*). It has been noted that the thickness of the daub in House 2 is significantly less than in House 1 (around 10 cm); House 1 has a daub thickness of 10-40 cm. This could explain why the magnetic susceptibility values in House 2 were lower compared to the values of the same unit in House 1 obtained during geomagnetic prospection (see the chapter *Results of the Excavations, Geophysical Prospection and Surface Find Collection on and Around the Borđoš Loess Plateau* by Fynn Wilkes in this volume) (Fig. 5a, 5b).

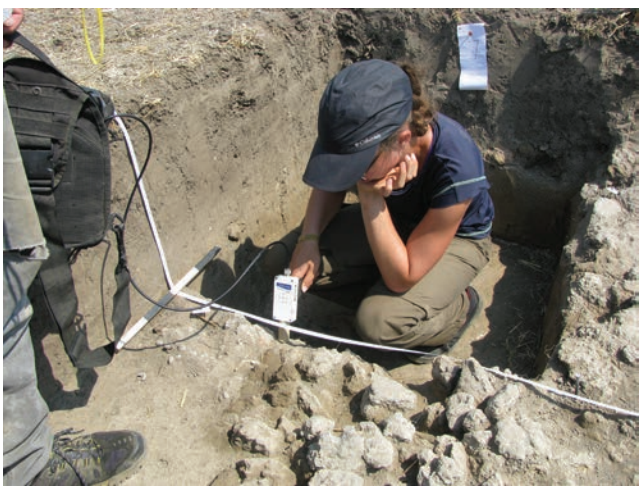


Fig. 5a: Magnetic susceptibility measurement

Fig. 5b: Magnetic susceptibility measurement

During the research, a test borehole with a diameter of 5 cm was drilled at Slano Kopovo, a natural protected area characterized by saline muddy marshes, which occasionally forms a lake that dries up during the summer season. It represents one of the ancient meanders of the Tisza River, formed in the Late Pleistocene or at the beginning of the Holocene, at a time when the Tisza had a large flow in the upper part of the basin due to the melting of glaciers. The increase in evaporation and the withdrawal of water from the lowest land areas during the 17th and 18th centuries led to the accumulation of several centimetres of salt (Marković, Lukač, Kicošev, 1998). As such, Slano Kopovo has potentially favourable conditions for pollen preservation. A core was drilled to a depth of 4 m, and the samples were taken to Kiel for potential palynological analysis. Since palynological analyses can track general climatic and vegetation changes over long periods, they allow for the reconstruction of vegetation, climatic, and geographical conditions during the existence of settlements at Borđoš and Makaranda. Most pollen settles several kilometers from its source, and Slano Kopovo is located 10.1 km from the settlement at Makaranda and 12.7 km from the settlement at Borđoš.

The results of the geomorphological analyses will be presented in a separate publication (Fig. 6).

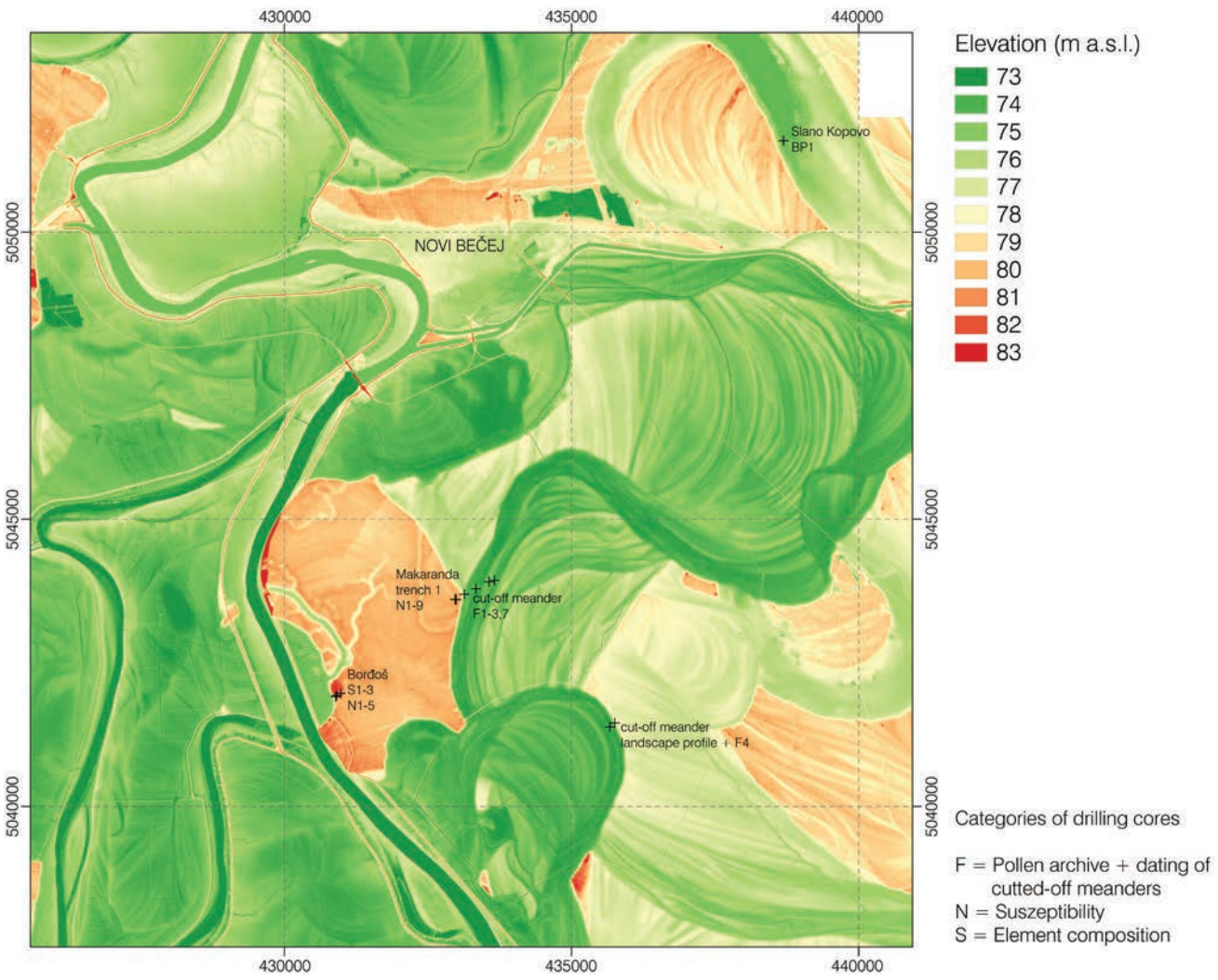


Fig. 6: Digital elevation model with positions of drilling cores at the locations of Borđoš, Makaranda, and Slano Kopovo. Graphic by: Robert Hofmann and Fynn Wilkes

Preservation of the site

On January 20, 2015, a request for initiating the resolution of property rights on the parcels at Borđoš was submitted by the Museum of Vojvodina to the Municipality of Novi Bečej. The aim was to exclude the parcels where the site is located from being leased for agricultural work. Following the damage caused by the excavation of a long trench across the site towards the Tisza River for an irrigation system in spring 2021, a request was also made to establish the Borđoš site near Novi Bečej as an archaeological site to the Heritage Preservation Institute Zrenjanin. Subsequently, on May 28, 2021, the Heritage Preservation Institute Zrenjanin made a decision to register the archaeological site in accordance with Article 29 of the Law on Cultural Properties of the Republic of Serbia (*Official Gazette of the Republic of Serbia*, No. 52/2011 - other laws, 71/94, 65/2011 - other laws, 6/20 - other laws) as a property *that enjoys previous protection*. This registration pertains to part of the site (cadastral parcels 22488, 22491, 22494, and 22496 in state ownership, as well as cadastral parcels 22489, 22493, 22497, and 22498 in private ownership). According to the aforementioned law, a registered property under previous protection must not be damaged, or altered without the relevant Preservation Institute's consent.

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HISTORY OF RESEARCH OF THE ARCHAEOLOGICAL SITE OF BORĐOŠ

Ildiko Medović

At the time of the discovery of the archaeological site of Borđoš near Novi Bečej, the territory of the middle Banat was under the administration of the Austro-Hungarian Monarchy, more precisely the administrative unit of Torontál County. This site is located in the area near Novi Bečej, which has changed its name several times throughout history. In historical and cartographic sources it appeared under the names Turkish Bečej (Törökbecse), Francisdorf, Franjevo, Vranjevo and Vološinovo. Likewise, the name of today's archaeological site of Borđoš, a once-inhabited place, was changed to Borđoš, Borjaš, Burdas or Borgios. The names of the settlements were changed according to the state and administrative centres to which they belonged. From the moment of its discovery until today, the archaeological material from this site has been deposited in various museums in Serbia, Hungary and Romania. The items from the latest research are kept in the Museum of Vojvodina in Novi Sad, while the private collection, created during the eighties and nineties of the 20th century, is on permanent display in the Cultural Centre in Novi Bečej.

The archaeological site of Borđoš is located on a raised loess plateau on the left bank of the Tisza River. During the Prehistoric Period, but also in later periods, the plateau was surrounded by water. Due to constant floods but also in order to shorten the navigation route, the Tisza River was regulated in the mid-nineteenth century. The river flow was shortened by 30-40%. Between the 62nd and 56th kilometres of the river, a canal of 6.302 km length was excavated and named "Borđoš Section no. 96" (Fig. 1). This section was created between 1854-1858 and additional works were carried out from 1897 to 1901 to widen the riverbed (Heincz, 1909). On that occasion, the plateau was cut from its north-eastern side and connected to the main course of the river. Thus, a 6 m high profile was created on both sides of the river. At that intersection, a small part of the plateau remained on the right side – today part of Biserno ostrvo (Pearl Island). The Borđoš section followed the edge of the plateau all the way to the mouth of the river. At the point where the newly excavated canal and the river joined, the water strongly washed the left bank of the plateau (*Vizügyi Közlemények*, 1891) thus creating, depending on the water level, a sharp profile with rich archaeological layers.

Fig. 1: Borđoš Section no. 96

As an archaeological site, Borđoš was first mentioned in 1875 in the report of the priest Arača Jenő (Eugen) Szentkláray, who wrote a short report about it and sent several items to the National Museum in Budapest for the purpose of period identification. His report was published in the archaeological journal *Archaeologiai Értesítő* in which he stated the exact location, described the surroundings, the archaeological artefacts collected on the surface, the few visible graves and the remains of the parish church. He devoted a short part to the history of the place, the origin of the name Borđoš until the revolution in 1848 (Szentkláray, 1875). He later published his broadened knowledge in a booklet called *Torontáli őstelepek a Tisza mentén* about the first Stone Age site in the territory of Torontal County. He closely described the decline of the settlement during the

time of the Turks, the resettlement of residents, and the establishment of a village with streets, a church, and a school. The majority of the booklet is dedicated to describing a prehistoric earthen fortification, and includes details of the movable archaeological items that he either collected or had knowledge of. He meticulously explored analogies, especially related to stone raw materials, and identified Szentgál radiolarite and obsidian. While he focused on prehistoric settlements, he also mentioned other discoveries from various historical periods in the booklet, including the medallions of Emperor Dušan Stefan and Ferdinand II, as well as an Avar salt shaker (Fig. 2) made of horn (Szentkláray, 1877).

Fig. 2: Avar Salt Shaker (drawing: Timea Csajka)

Szentkláray continued his research at the site in the subsequent years. He sent objects to the National Museum of Budapest and wrote brief reports for *Archaeologiai Értesítő* (Szentkláray, 1885), as well as for the Timișoara Museum. The reports were signed by colleagues from the museum (Miletz, 1879; Pontelly, 1880). One of his discoveries was a late Neolithic zoomorphic vessel – aryballos, which has been preserved even today, Fig. 3 (Draşovean & Ciobotaru, 2001).

Fig. 3: Aryballos from the site of Borđoš (Draşovean & Ciobotaru, 2001)

He considered the discovery of an entire Roman vessel to be sensational. It was found on the upper part of the plateau, near the big section, which is now called Bereg. The vessel was filled to the brim with bronze coins. These finds from the Roman period in the Banat region had not been documented before. He described several coins and sent them to the National Museum in Budapest. Those were bronze coins of the emperors Constans, Constantine, Constantine II, Delmatius, and Hannibal (Szentkláray, 1885).

Szentkláray used his position as a priest to gain access to church records, which he used extensively in his research and publications. Today, the Borđoš site is located under the ploughlands, with no visible above-ground traces of objects, except for the chipped pieces of mortar and artefacts. Only one elevation is visible – a mound (tomb) from 1848.

The first archaeologist who showed his interest in the site of Borđoš was Felix Milleker, a curator of the City Museum in Vršac. Starting in 1891, using the data and findings that Szentkláray sent to the Timișoara Museum, Milleker published a series of scholarly articles on the archaeological finds from Borđoš. He focused his research on the Bronze Age period. He published the first hoard (Fig. 4) of the foundry workshop discovered in 1879 in Borđoš, consisting of 74 bronze objects and dating to the Late Bronze Age (Gava-Belegiš group) (Milleker, 1891).

Fig. 4: Borđoš Hoard I in the Publication from 1891

János Reizner (Reizner, 1899) wrote about the second Bronze Age hoard "Borđoš Hoard II" with 38 items discovered in 1898 and then sent to the Szeged museum. After the Second World War, this hoard was returned to Yugoslavia by restitution and then delivered to the Museum of Vojvodina. Today, the hoard is permanently displayed in the Novi Bečej Cultural Centre. Among the objects of Hoard II were objects that did not belong to it, but were published together. One of them was a bronze buckle attributed to the Sarmatian Yazigi from the 1st century (Reizner, 1899, 432, T. III/39 a, b), as well as a type of horse chewing eggbuts called the "Borđoš type" in literature, which were dated back to the Early Iron Age era (Reizner, 1899, 188, T. III/23, 24) (Fig. 5).

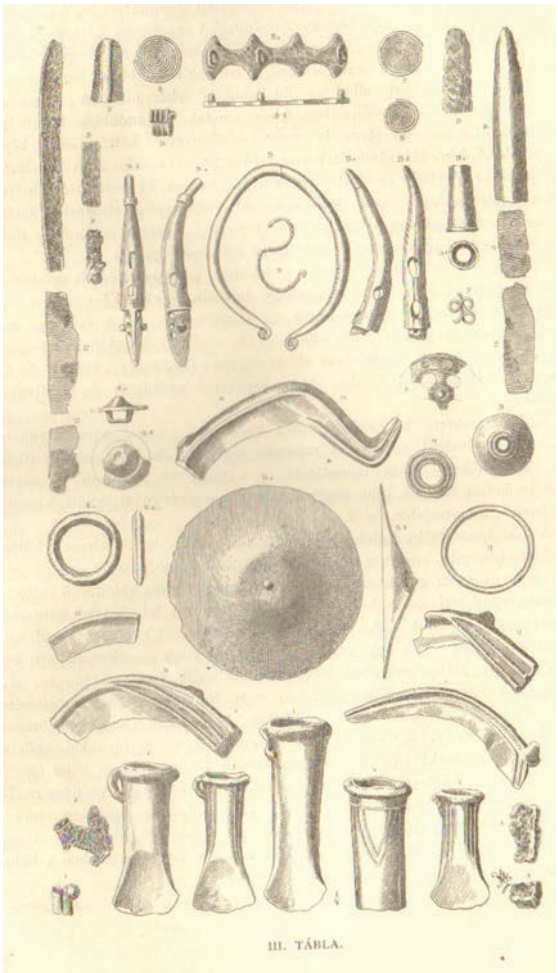

Fig. 5: Borđoš Hoard II

Milleker mentioned another hoard from Borđoš ("Borđoš Hoard III") discovered in 1914. These are the remains of a smaller foundry workshop – a total of six objects, which are in the National Museum of Zrenjanin and have not been published yet (Fig. 6) (Milleker, 1942).

Fig. 6: Borđoš Hoard III

In the late 19th century, Endre Orosz, a Hungarian amateur archaeologist and historical travel writer from the Timișoara Museum, took interest in Borđoš. Orosz made multiple visits to the site, collecting materials and publishing his findings in a booklet titled *A borjasi ős telepek*. His modest publication contained only text. He described in detail the terrain and the movable archaeological material that he found on the surface and in the elevated area of the site. He provided his expert analysis and made analogies to various findings. He also offered his own interpretations regarding the stylistic differences of ceramic artefacts. Additionally, he listed the most frequently found animal species based on osteological findings. He also documented human skeletal burials in the profiles and recorded the stone raw materials used for tools. In his conclusion, Orosz offered insights into the development of Neolithic and Bronze Age settlements, as well as the remains of the Iron Age settlement upon which a medieval settlement was built (Orosz, 1903).

Additionally, Orosz identified seven zones at the Borđoš settlement, which are depicted in a photo based on his descriptions and the old map (Fig. 7).

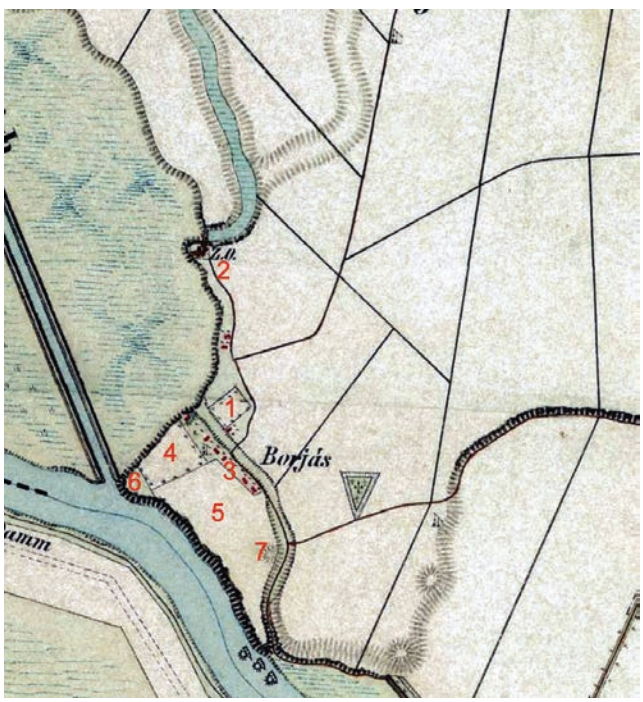

Fig. 7: Photo caption: 1 Land with a brick house (Téglaházi tábla); 2 Pit for making bricks – source of raw material; 3 Surroundings of the farm (Tanya); 4 Tisza or plot to the coast (Feudvar); 5 Liman plot; 6 Profile of the old Tisza; 7 Mound (tomb)

In the same year, he published his booklet, Endre Orosz, with the support of István Berkeszi, organized the first archaeological excavations. They were excavating on the part marked as "Tisza bank", where they registered traces of Neolithic settlements and a Late Bronze Age necropolis. Excavations continued the following year, in 1904. The archaeological material that was taken to the Timișoara museum over the years has disappeared over time, while only stone tools have been preserved.

The pause in the research of the site was caused by major historical events. It wasn't until after the end of World War II, when a sitting figurine was accidentally discovered, that Borđoš was once again mentioned in scientific literature (see Fig. 7/1 in Furholt-Furholt in this volume). Borđoš and Matejski Brod, Neolithic sites near Novi Bečej, were inhabited during the late Neolithic period and are considered the place of origin. A unique 20 cm tall seated figure of a female person sitting on a "throne" and holding a vessel on her knees was found. It is adorned with intricate incised ornaments and is attributed to the Tisza culture. This artefact is currently housed in the National Museum of Serbia in Belgrade (Szekeres, 1995).

Over the past 40 years, amateur archaeologist Joca Bakalov from Zrenjanin, who is an engineer and archaeology enthusiast, has made significant contributions to the promotion of a particular site. His discovery of stone weights for scales from the Bronze Age, which were presented by the Museum of Vojvodina's archaeologist Predrag Medović, PhD, at an international archaeology conference in Berlin, has had a major impact on the scientific community. This find represents the first scale using the Mycenaean measurement system discovered in the continental part of Europe (Medović, 1995) (Fig. 8).

Fig. 8: Scales from the Bronze Age

The discovery of several exceptional finds is attributed to Joca Bakalov, including a Bronze Age plough (Medović, 1993), a Neolithic anthropomorphic figurine (see Fig. 7/2 in Furholt-Furholt in this volume) (Medović, 2006), and a Bronze Age harpoon (Medović, 2010). Bakalov has donated some of his findings to the National Museum in Zrenjanin and the Museum of Vojvodina. In 2015, the Municipality of Novi Bečej purchased the other part of his collection for the establishment of a permanent museum exhibition at the Cultural Centre, through the cooperation of the archaeologists of the Museum of Vojvodina. The exhibition, entitled *Novi Bečej through the Ages*, was realized by the experts of the Museum of Vojvodina.

In addition to traces of human life and activity, sporadic paleontological findings are also associated

with the Borđoš loess plateau. In their publications, the first researchers mentioned fossil remains. From the alluvial deposits of the Tisza near Novi Bečej, pulled out of the river in 1947, was found a skull of the Upper Pleistocene Age with well-preserved tusks (Fig. 9). It belonged to a woolly mammoth (*Mammuthus primigenius*) and today it is part of the geological-paleontological collection of the Provincial Institute for Nature Protection of Serbia in Novi Sad (Marinčić & Nedeljković, 2000).

Contemporary systematic research on Borđoš was started in 2014 and is still ongoing today organized by the Museum of Vojvodina and The Institute of Pre- and Protohistoric Archaeology University of Kiel (Germany). The Museum of Vojvodina looks after the movable findings, while the site itself has been taken care of by the Zrenjanin Institute for the Protection of Cultural Monuments since the mid-20th century.

Fig. 9: Mammoth skull with tusks from Novi Bečej

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BORĐOŠ IN HISTORICAL SOURCES

Ildiko Medović

The earliest written records of the settlement Borđoš can be traced back to 1211 in the oldest written documents of the Hungarian state. These documents were created as a property inventory and tax payment obligations of the population during the reign of the Hungarian king Andrew II (András II). The census was conducted by the Tihany Abbey in Hungary and the document, written in Latin on parchment, is currently kept in the Benedictine monastery in Pannonhalma. László Erdélyi, a Hungarian historian, was a leading expert on the Tihany Scriptures (Fig. 1). In his work, he published the data from the files on the historical names of estates and geographical units. His findings are still relevant today and continue to be subject to new interpretations.

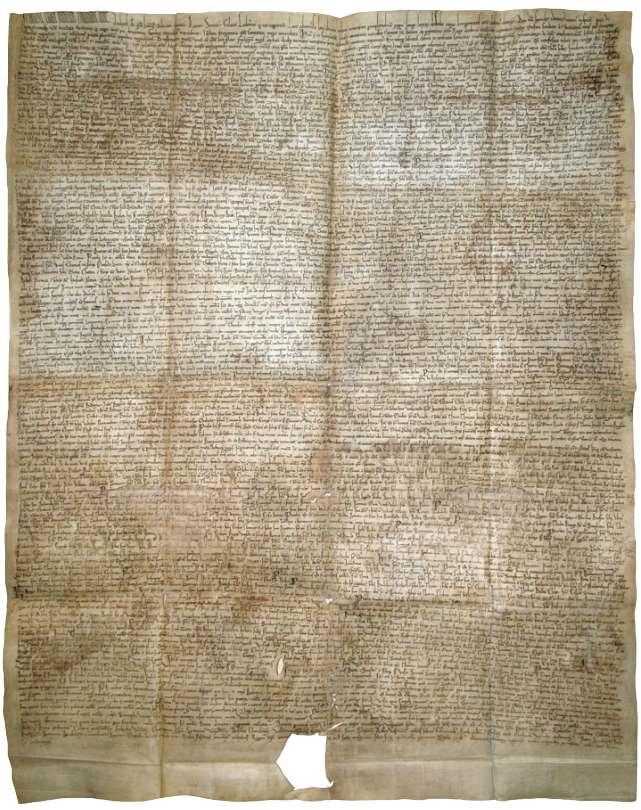

Fig. 1: Original Document of the Tihany Monastery from Pannonhalma (*A tihanyi apátság birtokösszeírása 1211-ből*, 1211)

In the part of the text “ad Ticiam, iuxta cuius ripam in loco, qui dicitur Bureuohul” the toponym Bureuohul was identified by Erdélyi with the place Borjaš, which was located south of Novi Bečej at that time. The place no longer appears under the name Bureuohul in the sources (Kovács, 2015). This toponym in the Hungarian language Borjúól was created by combining two nouns “borjú” calf and the word “ól”, a small place for keeping domestic animals, i.e. corral. This suggests that it refers to a building for keeping calves. Considering the fact that the word “locus” appears before the name of the settlement in the document, we assume that it was a permanent settlement.

The Arača priest Eugen Szentkláray dealt with collecting historical sources about Borđoš during his research work during the 19th century. Having free access to church records, new information was obtained about the place called “Burdas” where in the period between 1332-1337 a Catholic presbytery was located (Szentkláray, 1877). Knowledge was broadened by the Hungarian historian and archivist Dezső Csánki in his work “Historical Geography of Hungary” (Csánki, 1894). In the 14th and 15th centuries, the village of Borđoš was mentioned in papal registers under different names: in 1414, *Bordas*, in 1415, *Boryas*, and in 1341, 1422, 1428, *Borgyas*.

Historians find it challenging to study the circumstances and life of Bečej and its surroundings in the 16th and 17th centuries. The primary sources from that time, such as travelogues, often omitted the information about this area, resulting in very scarce data.

The disappearance of the medieval settlement Borđoš occurred during the Turkish conquest. Szentkláray formulated his assumptions based on the artefacts he found on the site. He described the escape of the inhabitants towards Novi Bečej across the canal surrounding Borđoš. He assumes that the majority of the population ended up in the canal, chased by the enemy. He himself found human bones and weapons dating back around 200-300 years on the high banks of the Tisza River (Szentkláray, 1877).

Data from the population census from the second half of the 16th century speak of the new inhabitants of the village of Borđoš, who, judging by their last name, belonged to the Slavs. It is recorded that around twenty families lived in the settlement in 1567 (Káldy-Nagy, 2000). In the following period, all events related to Turkish Bečej include the Borđoš settlement. The biggest uprising against Turkish rule took place in 1594, but it was unsuccessful, which resulted in the devastation of the entire Banat by the Turks (Ćirković, 2004). For a long period, the place was uninhabited, so it is not on maps or in travelogues (Blaeu, 1664).

A new settlement on Borđoš appeared in the 18th century. On historical maps from the beginning of the 18th century, a settlement was recorded under the name Borgas, (Fig. 2) (Homann, 1717).

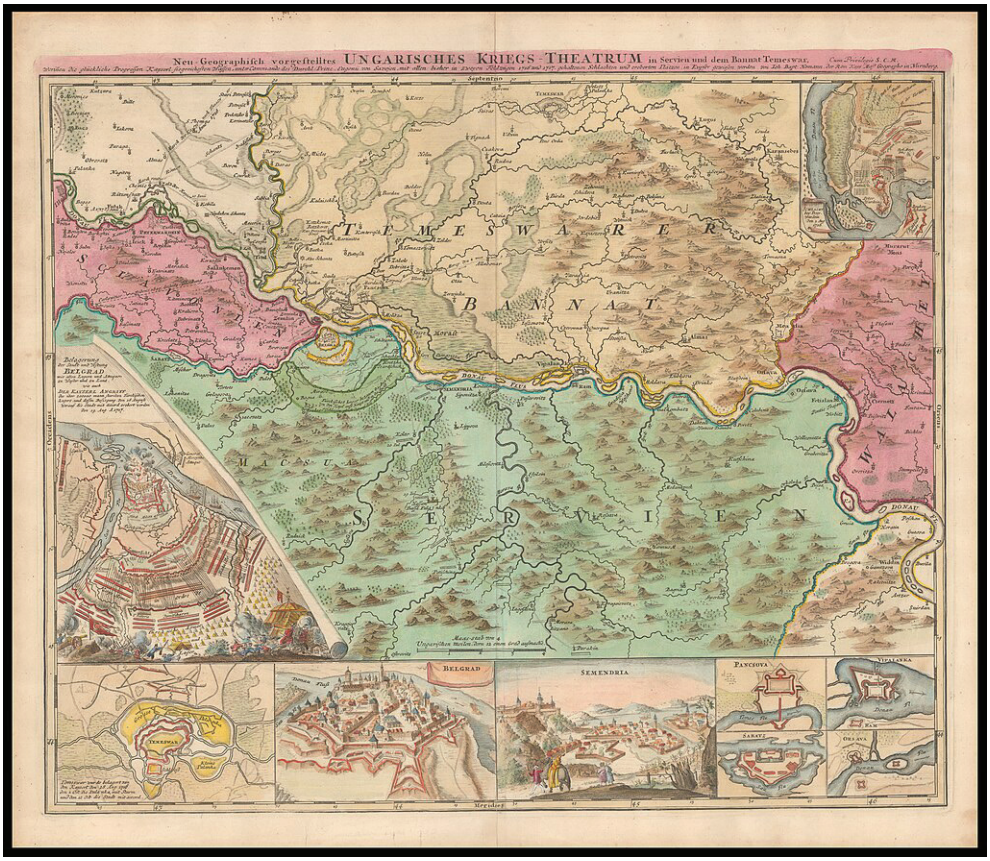

Fig. 2: Settlement named Borgas in 1717

In 1782, the Novi Bečej estate was bought by the Greek merchant János Pál Hadsimihál-Sissányi. The family also had manorial rights for the abandoned settlement of Borjaš-puste. In 1790, the Sissányi family settled farmers from Szeged and Deszk in the empty village, at the foot of the earthen rampart and on the site of the old cemetery. A smaller village was built with two wide streets, a church and a school for about 500 inhabitants (Borovsky, 1912).

The settlement has been mentioned in various sources under different names such as *Borjás*, *Borgos*, *Borgyas*, *Bornyas*, and *Burgios* (Szentkláray, 1877). The name was mainly influenced by the multi-ethnic population of the region, resulting in the most variants in the Hungarian, Serbian, and Latin languages (Fig. 3).

Fig. 3: Borđoš plateau with the village of Borjaš and the Veliki Bereg farms in 1838 (*A Török-Becsei Ármentesítő Társulat Árterének Térképe, Szabályozási Előtti Állapot, 1838-42. Évi Felvételek Után Szerkesztve*, 19th century)

The third and final devastation of the Borđoš settlement is connected to the Great Revolution that took place in 1848-1849. Turkish Bečej and its surrounding areas were the site of significant battles between Serbs and Hungarians. It is believed that during these battles, the residents and the village of Borđoš perished, (Fig. 4) (Mečkić, 1989). The surviving population sought refuge in Turkish Bečej and settled in the area of the village named after their leader, Sissányi. The latest population records indicate that there were 130 houses and 864 inhabitants of Hungarian nationality, who mainly cultivated tobacco (Fényes, 1851).

Fig. 4: Settlement Borđoš on the Map, 1806-1869 (*Second Military Survey of the Habsburg Empire (1819–1869)*, n. d.)

From the moment when the international research of prehistoric Borđoš began (since 2014), one rammed earth house, abandoned and dilapidated, has been preserved in this area. In 2021, that house also disappeared (Fig. 5).

Fig. 5: Last house at the site of Borđoš in 2014

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Beginning of the research of the Borđoš site in 2014

STRATEGY AND RESULTS OF TEN YEARS INTERDISCIPLINARY FIELD-WORKS AT THE LATE NEOLITHIC MULTI-COMPONENT AND MULTI-PERIOD SETTLEMENT BORĐOŠ

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Introduction

Ten years ago, in 2014, we began systematic field research on the Borđoš Loess Plateau, located south of Novi Bečej in Vojvodina, on the left bank of the Tisza River. These researches, carried out in cooperation between the Museum of Vojvodina Novi Sad, Serbia, and the Institute of Pre- and Protohistoric Archaeology, Kiel University, Germany, initially focussed on the micro-region of the Loess Plateau of Borđoš. Meanwhile, the surveys have been extended to the entire lower course of the Tisza and Tamiš Rivers, with the involvement of other regional cooperation partners.

Building on many years of regional research in Central Bosnia (e.g. Müller et al., 2013; Hofmann, 2015) and Vrable (e.g. Furholt et al., 2020), the overall objective of this field research is to comparatively investigate Neolithic settlement processes in the Western Balkan region and the Pannonian Plain. In this way, we aim to shed light on the interplay of local, regional and supra-regional social and environmental factors in the historical configuration of social and political forms of organisation, different degrees of social inequality, different economic systems, and various manifestations of material culture far beyond the narrower geographical scope of the field study.

Looking back on ten years of research, we can confidently say that we were fortunate in choosing this study region. In addition to excellent cooperation, the geographical location of the study region at the intersection between the hilly landscape of the Western Balkans and the predominantly glacial and alluvial landscapes of the Pannonian Plain is particularly advantageous for our surveys. This location, at a geographical transition zone with a dense network of major rivers and their intersections joining here, has facilitated the development of a high degree of cultural diversity from the Neolithic period to the present day. As a result, even in the Neolithic era, this region served as a contact zone for societies influenced by different cultures.

The diversity present in this region offers a valuable opportunity for us to better understand the various lifestyles and material cultures of Neolithic and Copper Age peoples and communities. In regional studies, these societies are often viewed in terms of their connection to larger cultural groups (e.g. Vinča Culture, Tisza Culture). Undoubtedly, this approach significantly hinders our understanding of the social dynamics within these societies.

Between 2014 and 2017, our surveys focussed on the Borđoš Loess Plateau and the large Borđoš site. This site, with a settlement size of 56 hectares and a large population, is undoubtedly one of the one of the most impressive settlements of the Late Neolithic period in southeastern Europe. The formation of large settlements like Borđoš was the result of population aggregation processes that can be traced in large parts of southeastern Europe between 5500 and 4700 BCE. These processes apparently affected the Pannonian Plain in particular on a significant scale. While Fynn Wilkes' chapter (in this volume) takes a micro-regional perspective on the Borđoš Loess Plateau, this article provides an overview of the results of the excavations and surveys carried out at the Borđoš site.

Strategy and Methodology

The research strategy at the Borđoš site and other sites of the Borđoš Loess Plateau relies heavily on a high-resolution archaeomagnetic map. This map was obtained before and during the excavations. At the site of Borđoš, including Mala Bara, a total area of 56 hectares was magnetically surveyed between 2014 and 2019, and the Neolithic settlement was completely recorded, except for parts eroded by the lateral erosion of the Tisza. The magnetic maps show features with excellent contrast to their surroundings, and when combined with the surface relief, they made it possible to identify several components of the settlement, including numerous burnt houses, ditches, and field systems (Medović et al., 2014; Hofmann et al., 2019). Systematic collection of surface finds was employed to differentiate the site in horizontal dimensions. Based on the magnetic plans, selected features were chosen for exemplary excavation or for sampling in test trenches. The research has been focussed on a comparative study of chronology, economy, demography, and internal social differentiation among the various settlement components from the beginning of the study. The magnetic maps were analyzed and interpreted using a methodology that has already been explained elsewhere. In addition to systematic excavations, borehole investigations with a percussion core drilling device were used to examine selected features.

The excavations were conducted and analysed using a methodology that was developed with the participation of the authors for the Late Neolithic

settlement of Okolište in central Bosnia and Trypillia settlements in central Ukraine (Hofmann et al., 2006; Hofmann 2013; Müller et al., 2017). Please take note of the following methodology:

1) Carefully excavating specific examples of different types of features such as houses, ditches, gates, and pits.

2) Conducting test trenches to address chronological questions.

3) Documenting and collecting samples from existing exposures caused by erosion or anthropogenic activities.

4) Excavating in layers, where possible, along natural feature boundaries.

5) Clearly defining and documenting features.

6) Integrating features, findings, and other analysis data using a database.

7) Distinguishing between: a) individual finds recorded by specific coordinates, b) bulk finds recorded within 1-meter grids and within features, and c) samples taken as needed.

8) Systematically documenting architectural remains by recording the weight of burnt daub, as well as the type, dimensions, and surface impressions of timber constructions.

Measurement was conducted in the World Geodetic System WGS 84 using the UTM coordinate system, zone 34N (EPSG 32634). Prior to the field work, reference points were set up, which may deviate by up to 2 meters from this global coordinate system. Lidar data with a 1-meter resolution, used to capture surface relief, was graciously provided by the Serbian Republic Geodetic Authority.

At the Okolište site, a systematic approach was developed under the direction of Johannes Müller and Knut Rassmann (Hofmann et al., 2006). **Features were categorized** into three levels: 'layers' (part of a house, pit, or ditch), 'layer groups' (entirety of a house, pit, or ditch), and 'layer formations' (period of unchanged settlement layout). Remains of the houses were numbered consecutively at the site level (refer to Appendices 1-3 for details). This categorization facilitated a more organised analysis of the archaeological features.

When analyzing fire-damaged houses, we generally assume that the patterns found are not deliberately created, but rather represent potentially functional patterns. However, these patterns may be obscured by depositional and post-depositional processes.

The numbering of excavation trenches does not form coherent blocks due to the progress of the excavation. As a result, **excavation areas** were defined to group related trenches together (see Table 1). The different contexts at the spatial level of these excavation areas are described in the section 'Excavations' (pp. 44-51).

Magnetic Survey

In a detailed survey conducted at the Borđoš site, we examined approximately 56 hectares and identified various settlement components labelled A-G (refer to Fig. 1). Here are the key findings:

A) A tell of approx. 9 ha in size was located in the northern part of the Borđoš site complex. On the tell, two ditches of different dimensions surround a 7 ha settlement area. The tell is made up of anthropogenic deposits reaching 2-3 m in thickness, whose upper (magnetically visible) layers were probably characterised by a centripetal arrangement of houses around a central unbuilt place. In the west, this settlement component was slightly reduced in size by lateral erosion of the Tisza.

B) To the south of the tell, a large horizontal settlement with an almost circular ground plan was situated. Its northwestern edge is reduced in size by lateral erosion of the Tisza River. A bundle of at least four partly intersecting ditches enclose an inner zone of this horizontal settlement with a size of today 13.5 ha. Including the ditch area, the total preserved size of this inner settlement area amounts to 16.2 hectares. Based on a circular ground plan, an original settlement size of 25 hectares can be reconstructed. The ditches, which were probably dug one after the other, along with numerous rectangular anomalies of burnt houses and an overall very heterogeneous structure with numerous smaller anomalies, indicate that this settlement area was inhabited for a longer period. Similar to the upper layers of the tell, the houses are orientated with their longitudinal axis towards the centre of the settlement and often show smaller groups of 2-3 houses.

Another ditch with at least seven gates encloses an outer settlement zone of today 25 hectares. Completing the ground plan by estimating an original round layout yields an estimated original settlement size of 40 ha. A widely undisturbed structure interrupted only by a few rectangular house anomalies indicates (compared to the inner settlement zone) a significantly lower overall settlement activity in this zone.

C) Ca. 60 m south of the tell a twin ditch semicircular structure with a diameter of c. 130 m is cut by the slope to the adjacent Tisza plain, probably representing the remnant of a rondel. The two supposed ditches are each c. 2 m wide and are separated by a distance of c. 7.5 m. In the southern part, an open structure (5-6 m in width), perhaps reflecting a gate, is visible. Apart from a suspected area of erosion, the encircled area displays a few small circular magnetic anomalies (diameter 2-3 m, 15-20 nT) in its central and southern parts. Since these anomalies are irregularly distributed also between the ditches and at the outer side of the enclosure, they might not be related to the earthwork.

D) Beyond a water-bearing channel, immediately to the north of the tell, the site of Mala Bara was located,

as evidenced by surface finds, in the area of which two single burnt houses are visible on the magnetic map.

E) In the south-west of the site there existed a large Late Bronze Age (Gava) horizontal settlement, of which at least 30 hectares still exist today. This settlement was protected by two enormous ditches running in a north-south direction. In its northern part, this settlement overlapped the Late Neolithic horizontal settlement B. Field systems that have not yet been dated and isolated longhouses indicate rather extensive use of this settlement area.

F) To the northeast of the tell A, numerous smaller dot-shaped anomalies (diameter 1-3 m) are visible in the plan of the magnetic survey, which was initially interpreted as a possible Neolithic cemetery. During archaeological research in Areas 12 and 13, they proved to be of recent date. A U-shaped anomaly, measuring 14.5 metres in length and 11.5 metres in width, is of unclear character.

G) The surrounding zone of the settlement that is free of obvious anthropogenic influences.

Surface Collections

Systematic surface collections were conducted in parts of the site in the spring of 2014 and 2015. This survey was made possible by large-scale seismic explorations for gas deposits, which caused a delay in sowing for that year. The surface collections focused on the tell component, the circular enclosure, and the northern section of the horizontal settlement. The collections were carried out in a checkerboard system using squares with a side length of 20 metres. Within each square, surface finds were collected for 10 minutes. Additionally, single-find measurements with XYZ coordinates were taken, including selected finds (such as stone tools, and anthropomorphic and zoomorphic figurines) in squares that were not systematically surveyed.

The analysis of the surface collections shows that the amount of pottery varies between 0-5.5 kg per 40 m² grid square (Fig. 2). The highest pottery densities, averaging 1.7 kg per grid square, were observed in the area of the tell, whilst the densities in the area of the horizontal settlement averaged only 0.84 kg. The average pottery densities in the area of the roundel were even lower, at approximately 0.5 kg per grid square. However, no clear differences were observed concerning the fragmentation of pottery.

Similar differences in surface find densities between the horizontal settlement and the tell can also be observed for other types of artefacts, such as chipped stone tools (see the chapter *Chipped Stone Assemblage of the Late Neolithic Borđoš Site* by Kata Furholt, Ildiko Medović in this volume).

There are different, not mutually exclusive explanations for these differences: Due to a relief-related higher erosion potential, the settlement layers in the tell lay directly on the surface, so many finds are constantly being brought to the surface by intensive agriculture. In contrast, the erosion potential in the area of the horizontal settlement is lower and the Chernozem layer covering the features is still better preserved. As a result, fewer finds are currently coming to the surface here. In addition to the varying degrees of destruction of the surface layers, a higher building density and longer settlement duration in the area of the tell could have led to a greater accumulation of archaeological finds.

Geoelectrical Prospection

As a complementary geophysical method to geomagnetic prospection, geoelectrical prospection was conducted in two areas at the site of Borđoš. This prospection included two methods that involved measuring electrical resistivity (see the chapter *Natural Environment of the Site of Borđoš* by Tijana Stanković Pešterac in this volume). In the spring of 2014, a 10 x 12 m area within the Late Neolithic tell was researched to study the horizontal and vertical dimensions of a specific house feature and to determine the overall thickness of the settlement layers in the tell area (Stanković Pešterac et al., 2014). This research allowed for the quantification of the anthropogenic deposits in the tell area to be 2.6-2.1 metres.

In the summer of 2015, a second area measuring 25 x 20 m was researched using geoelectric methods in the inner zone of the horizontal settlement. The purpose of this investigation was to determine whether there might have been unburnt house remains in areas where there were no house structures indicated on the magnetic map, considering future demographic reconstructions. The investigations revealed a ditch, not visible in the magnetic surveys, running in a north-northwest to south-southeast direction within the investigation area (Fig. 3). This ditch was later filled and built over by House 7. While the results are not conclusive, there are indications that unburnt houses may have existed in the adjacent area to the east.

Drillings

Drilling prospection performed using a percussion drilling system was carried out at the site of Borđoš to answer various questions: 1) In the tell (Component A), they served to clarify stratigraphic sequences and the thickness of anthropogenic deposits. The drilling cores show specific layer sequences resulting from anthropogenic settlement and construction activities, which extend to depths of 2.00-3.00 m below the current terrain surface (Medović et al., 2014; Martini, 2019). Although there are repeated traces of burnt houses, the sequences consist primarily of unburnt material. 2) In the area of the rondel (Component B) drillings were used to clarify the stratigraphy of the ditch and to extract sample material for ^{14}C dating (Hofmann et al., in press). 3) In the horizontal settlement (Component C) an attempt was made to address the question of the unburnt houses in the same area that was investigated by the geoelectrical prospection (Fig. 4). At least one core (BP 81) showed deposits of yellowish sediment, which was preliminarily interpreted as a possible

indicator for the existence of an unburnt house. In Trench 18, we later sought to verify this hypothesis through excavation. 4) In the central part of the horizontal settlement a small mound was researched with complementary drillings and excavaction in the Area 10 (Trench 17).

Excavations

During our fieldworks at the site of Borđoš, excavations were carried out in a total of 23 trenches, which were grouped into 15 excavation areas according to Table 1 (Fig. 5).

Area-id	Trench-id	Site part	Year
0	1	surface collection	2014, 2015
2	2, 3	circular enclosure	2014
3	4, 5, 8, 9	horizontal settlement, inner zone	2014, 2015
4	6, 7, 15, 16	tell settlement	2014, 2016
5	10	horizontal settlement, inner zone	2015
6	11	horizontal settlement, inner zone	2015
7	12	horizontal settlement, outer zone	2015
8	13	Tisza profile, Bronze Age settlement	2014
9	14	horizontal settlement, outer zone	2016
10	17	horizontal settlement, inner zone	2017
11	18, 21	horizontal settlement, inner zone	2019
12	19	northeast of the tell settlement	2019
13	20	northeast of the tell settlement	2019
14	22	horizontal settlement (water pipe)	2020
15	23, 24	horizontal settlement, outer zone	2021, 2022

Table 1: Borđoš, assignment of trenches to excavation areas, year of excavation and short characterisation of the location

Area 2 (Trenches 2 and 3)

The excavations in Area 2 were conducted to explore the circular enclosure (rondel) located south of the tell. This area has been previously described in more detail elsewhere (Hofmann et al., in press). Since no clearly interpretable features were visible on the inner surface of this enclosure in the magnetic plan, the focus of the trenches was on the double ditch. These trenches were situated in the area of the southern entrance to the circular enclosure, which is indicated on the magnetic plan by a 5-6 metre wide passageway. The trenches were located on the eastern side of this gateway, where the ends of the circular ditches are connected by a radial connecting ditch. In summer 2014, two trenches with a total area of 28 m² (each measuring 3.5 x 4 m) were excavated (Fig. 5).

The two circular ditches had V-shaped profiles with U-shaped bases (Fig. 6). The width of the inner ditch was 2.45 meters, and the outer ditch was 2.0 meters. The maximum preserved depth of the inner ditch was 1.1 meters, and that of the outer ditch was 1.0 metres. The connecting trench was smaller, with a width of 0.85 meters at the top and a depth of 0.75 meters. The circular enclosure was located on a westerly exposed slope, and the distinct layers above indicate that the ditches were originally deeper and wider but have been reduced in size due to slope erosion.

The integration of the connecting ditch allowed us to explore the layers in the two circular ditches. Both ditches have distinct layer sequences, which resulted from multiple filling events. One of the earliest backfilling events involved filling a large amount of daub from the interior space of the enclosure into the ditches. This daub is concentrated in the inner ditch, forming a 0.2-metre thick layer. The daub pieces show imprints of logs and split wood planks. Isolated pieces of daub are scattered along the connecting trench and can also be found in the lower backfill of the outer trench. This suggests that both trenches were exposed and backfilled simultaneously.

The upper layers of the burnt construction debris consist of alternating dark, humid layers and thinner yellow “loess” layers. Some of the dark layers have yellow spots mixed in, while others are uniformly humid. At half the height of the ditches, there are very dark, humus-rich deposits in both the inner and outer ditch. It is currently uncertain whether this humus layer is the result of soil formation, indicating a longer interruption of the backfilling process, or if it is simply due to inconsistencies in the filling material. The latter possibility is supported by the absence of this humus layer in the connecting ditch.

Area 3 (Trenches 4, 5, 8 and 9)

The excavations in Area 3 targeted the most complete possible exemplary investigation of the Late Neolithic *House 1* in the horizontal settlement. An anomaly in the north-east of the horizontal settlement near the inner ring of ditches was selected as the object of research, which belongs to the inner zone of the horizontal settlement (Fig. 5). This anomaly, which tended to a rectangular form, had a northeast-southwest orientation with an extension of 9.5 m x 4.5 m and showed a strongly magnetised north-eastern part and a weakly visible south-western part.

The excavation of the house was realised in several steps during the excavation campaigns of 2014 and 2015. In September and October 2014, the central part of the house was researched in trenches 4 and 5. In August 2015, we continued our work in the deeper layers of this central part of the house and excavated the neighbouring north-eastern (trench 8) and south-western (trench 9) parts of the house.

In total, a connected area of 66 m² was excavated in the aforementioned trenches.

The Neolithic features were discovered at a depth ranging from 0.4 to 1.00 meters below the current surface. They were buried under a 0.4-metre thick layer of Chernozem. The cultural layer covered a buried soil (-0.65/100-1.45 m), which transitioned into the underlying natural loess at a depth of 1.45 m.

In the central part of the excavation area, a partly well-preserved burnt daub package of the excavated house was uncovered. It weighs more than 1.4 tons and is partly disturbed by post-Neolithic anthropogenic activities. Across the entire excavation area, several post-Neolithic features were recorded, including two Late Bronze Age cremation burials (Grave 3/1 and 3/2) in squares G 14 and Y-Z9-10 (see the chapter *Ceramic Artefacts* by Ildiko Medović in this volume). Additionally, two pits (3/3 and 3/4) containing Bronze Age material were found in squares C-D/16 and A-E8-10, along with early modern settlement pits (3/1 and 3/2) and postholes (3/5-1 and 3/5-2) in squares A-C/10-12.

In the upper layers, the burnt daub package had a maximum extension of 9.4 x 4.5 m and thus largely matched the size of the magnetic anomaly. Outside the closer house area, the density and size of the fragments declined rapidly. The upper layer of the burnt daub package consisted of rather small fragmented pieces, in which relatively chaotic fragments with flat surfaces, impressions of split wood timbers, some logs and some reed were embedded (Fig. 7a). The generally wide and even distribution of these impressions and surface treatments might indicate that the material represents the remains of a higher situated ceiling rather than the collapse of dumped walls. Imprints of round timbers show the use of timbers with diameters between 0.02 and 0.28 cm. Their abundance distribution shows peaks at 0.02 and 0.09 cm, around 15 cm and >0.2 cm.

In the north-eastern part of the burnt daub package, the upper small-textured layer of burnt daub of collapsed walls covered a massive, intensely burnt and generally rectangular platform, representing a substantial part of the burnt daub mass (35%) of the house (Fig. 7b, 8). This platform had a maximum width of only 3.8 metres in a northwest-southeast

direction and a maximum length of 5.5 metres in a northeast-southwest direction. On its upper side, the intensively chaff-tempered clay of this platform had even surfaces, which were overlaid along the remains of a partition wall by one or two superimposed floor plaster made of sand-tempered clay. As the remains of a supporting substructure, the underside of this platform showed numerous parallel split wood impressions running perpendicular to the longitudinal direction of the house with widths of between 10 and 20 cm (median 12 cm) (Fig. 7b). The thickness of the burnt daub layer of the subfloor amounted to around 5 cm and that of the overlying floor or plaster to several additional centimeters in each case. Assuming an average vertical dimension of the timbers of the substructure of 10 cm, the thickness of the platform should have measured approx. 17-20 cm.

No remains of the platform were found beneath the upper layer of burnt daub in the south-western part of the house burnt daub package. Whether the platform here was destroyed by post-Neolithic activities or whether it never existed requires discussion. The latter possibility, which would imply a different construction of the south-western part of the house or a significantly smaller size of the researched building, seems to be supported by 1) the significantly lower masses of burnt adobe here (Fig. 9a), and 2) the relative rarity of split wood timbers in this part of the house and the higher number of logs. Considering the aforementioned peculiarities, it seems to us a possible scenario that the burnt adobe in the south-western part of the burnt adobe pack, originates from the outwardly collapsed gable wall of the house and therefore does not represent a differently constructed continuation of the house. In this case, the length of the house would only have been around 5.5 metres. In favour of the existence of a differently constructed south-western part of the house and a larger house length of around 9.0 m - which could be the result of a subsequently added room - is the relatively large amount of pottery embedded in the burnt daub.

Ultimately, the only way to clarify the question of the house length is to determine the post pattern in the subsoil, which was, however, only achieved for the central part of the house (see below).

Between 2.9 and 3.1 m from the north-eastern end of the house, the remains of an interior wall 0.12-0.2 m thick were preserved up to a height of 0.3 m. This interior wall contained several imprints of vertical logs with diameters of around 5 cm at intervals of 0.3 to 0.7 metres. The partition wall divided the north-eastern part of the house into two rooms measuring 3 x 4 metres (north-eastern room) and 4 x at least 2.2 metres (south-western room). Depending on how long the house was, it must have been a two-room (2 rooms 3 x 4 m) or a three-room building (three rooms approx. 3 x 4 m). The construction of the SW section which is different could be the result of a subsequently added room.

Within House 1, there were only a few architectural indications of the building's former functions. There were no clear remains of firing installations such as hearths or ovens. However, remains of clay installations of unclear character were documented in several places on the upper side of the platform: in square B11, the rounded edge of a low clay installation (clay box?) was found, largely disturbed by the modern pit 3/1. The remains of an installation in square F13 were similarly fragmentary. In squares C-D/11 the remains of a large pithos were found, whose 15.5-19 mm thick walls were attached to the platform of the house (find-id 4229).

Different tools made of ground stone were mainly concentrated in the north-eastern room of the house (Fig. 9b), indicating a working area that was used intensively for various activities: these include a fragment of a grinding stone runner in squares E-F14, unspecified grinding stone fragments in F11 (find-id 4258) and F12 (find-id 4257), whetstones in squares D15 (find-id 8215) and E14 (find-id 8244), a polishing stone in E13 (find-id 4095) and a boulder in E12 (find-id 4001). In contrast to this concentration of finds, chisel fragments in F11 (find-id 5004), E17 (find-id 8223) and A9 (find-id 9191) show a much wider, more unspecific distribution pattern.

The mapping of pottery vessels (minimum number of individuals according to the summed rim, belly and base percentages) reveals similar characteristics and usage profiles for the two north-eastern rooms: both rooms show certain spatial concentrations of amphorae and pithoi as indicators for food storage (Fig. 9c, g). Coarsely made pots and pans which were probably used for the preparation of food are concentrated in both rooms, although both categories also occur in smaller quantities in the hypothetical south-western room of the house (Fig. 9d, e). In contrast, bowls were very widely and evenly distributed (Fig. 9f). Altogether, the hypothetical south-western room appears to have only a limited pottery repertoire compared to the other two rooms, which might imply a restricted or deviating range of functions.

Underneath the burnt clay platform, a largely sterile grey-brown buried soil was documented in the central part of the researched area (square area A-H/11-13) at a depth between 0.65/1.00 and 1.45 m, which is characterised by a high degree of bioturbation and in which – apart from various post-Neolithic features – no traces of posts were evident at first. Contexts related to the house construction were discovered only in the underlying loess after the excavator had removed this soil (Fig. 10): larger post pits (features 4006, 4007, 4014-4016) were located below the outer limits of the platform at intervals of 0.8-1.6 m; three smaller pits were found at intervals of about 1 m along the partition wall. The width of the house was therefore 4.5 m. The dimensions of the posts were, as far as can be ascertained, >20 cm. In the area of the neighbouring Trenches 8 and 9, the unaltered loess was unfortunately not reached. Therefore, the construction of the house here remains unclear.

Area 4 (Trenches 6, 7, 15 and 16)

The excavations in Area 4 were aimed at the exemplary excavation of a burnt house in the youngest layers of the tell (Fig. 5). The excavation was started in the summer of 2014 (Trenches 6 and 7) and continued in the summer of 2016 (Trenches 15 and 16). The House 5 appeared on the magnetic map as an irregular anomaly 9.2 metres long and 4-6 metres wide. The planar anomaly shows perforations at the edge and an oval area with low magnetic flux density in the centre. During the excavation, we discovered that the package of burnt daub below the topsoil was heavily obscured by numerous pits with modern fillings (Fig. 11).

The analyses of the architectural remains of the House 5 (wood imprints) and the distribution of finds has not yet been completed for Area 4 and the results presented here are therefore only preliminary. Similar to Area 3, the upper layer of small pieces of daub was in the area of the Trenches 6 and 15 superimposing the remains of a poorly preserved platform. This contrasts with the situation in the area of Trench 7, where the upper layer of burnt daub was resting directly on a dense package of ceramics and several grinding stones. Similar to Area 3, no clear remains of a firing installation were found in House 5.

An enormous amount of fine material of high quality was recovered from Area 4, including numerous flint artefacts, ground stone tools, bone tools, and non-pottery ceramic objects, in addition to pottery. So far, 120 kg of pottery has been recorded, the majority of which originates from the burnt debris of House 5 (88 kg) and a much smaller quantity from layers above the house and the surrounding open spaces (18 kg). In addition to large storage vessels (pithoi), the pottery includes the remains of amphorae, pans, pots, un-restricted and restricted bowls and three arybalLoi, many of which are decorated with fluting and stylistically correspond to Late Vinča (D) material. The pottery corresponds in many respects to the material from vessel deposits in the Area 9 (Trench 14). A footed goblet (find-id 7009) shows stylistic characteristics of the Tisza material, and a cylindrical pot corresponds to Proto-Tiszapolgar vessels (find-id 7259).

A total of four loom weights were found in different areas and two spindle whorls in Trench 7. A collection of clay balls (possible sling missiles?) with diameters between 54 and 74 mm and weights between 160 and 400 g originate from Trench 16. A fragment of a clay mask was found in square (find-id 7201).

Three fragments of multiple-perforated clay slabs (thickness 27 and 42 mm, diameter of the perforations 23-35 mm) originate from squares F9 (find-id 15482), F11 and D7 (Fig. 12). A similar object from the Uivar site in the Romanian Banat was interpreted as part of the grate of a pottery kiln (Schier, 2005). Given the find context in the area of a burnt house and the firing of the artefacts at low temperatures, this interpretation cannot be confirmed for the objects from Borđoš. According to our preliminary interpretation, it could rather be a part of the architecture of the building, e.g. to provide ventilation for the rooms. The fragment of a meander-decorated architectural element from square E8 (find-id 15193) testifies to the decoration of the house.

Area 5 (Trench 10)

The excavations carried out in the Area 5 in the summer of 2015 included the investigation of test Trench 10 with House 2 in the east to north-eastern part of the horizontal settlement (Fig. 5). In the magnetic map, the remains of the House 2 were visible as a 9.5 m long and 3.5 m wide anomaly aligned east-northeast to west-southwest. This anomaly has a 6-metre-long eastern part with a high magnetic flux density and a weakly visible western part. Although there is an elongated area of low magnetic flux density in the centre of the house, the anomaly exhibited a planar anomaly in its eastern part, similar to that observed in the Area 3. Trench 10 was located on the northern long side of this house anomaly near the northern corner of the house and covered an area of 4 x 1.8 metres.

The burnt remains of the House 2 were buried under 0.4 to 0.55 m thick top layers (features 10001 and 10002) (Fig. 13). Within these top layers, with growing depth the humus content decreased and the find density increased. The burnt daub and ceramic package of house 2 formed a 0.06-0.2 m thick layer. This house package overlay a 0.75 m thick buried soil, heavily mixed by bioturbation, which transitioned into the in-situ loess (feature 10009) at a depth of 1.4 m below the present terrain surface. While the upper part of this buried soil (feature 10007) still contained relatively many fragments of burnt daub, pottery and bone, the lower part (feature 10008) was sterile.

A total of 90.5 kg of burnt daub was documented in Trench 10 distributed over an area of 3.5 m^2, which reached maximum values of 39 and 32 kg in squares A1 and A2 and had an average density of 25.9 kg/m^2 (Fig. 14a). A substantial proportion of the fragments had semi-flat (weathered) or flat surfaces on their upper side. In addition, there are some impressions of smaller logs, split wood planks and reed, which are particularly frequent in the south of the researched area. In the northern part of the burnt daub package, the undersides of numerous fragments also showed flat surfaces. The burnt daub package overlaid a considerable number of vessels and stone artefacts that were in situ at the time of the house burning, the documentation and reconstruction of which has not yet been completed (Fig. 14b und 14c). Among them are one complete and one fragment of grinding stone under layers both made of a tough fine-grained grey-reddish stone and two fragments of whetstones made of fine reddish sandstone (find-id 10097, 10098). A biconical loom weight was found in square A2 (find-id 10093). Most of the pottery fragments found in situ were parts of large storage vessels, a fine ceramic bowl (10094), and parts of at least one amphora (find-id 10107).

A large number of artefacts indicates that parts of a storage and working area were uncovered in Trench 10. The superimposition of the remains of a house inventory by a massive package of daub indicates that one of the outer walls collapsed inwardly and buried the house inventory still in situ. In contrast to Area 2, we can therefore reconstruct a house without a massive platform. This is also indicated by the smaller quantities of burnt clay.

Area 6 (Trench 11)

The excavations in Area 6 included the investigation of test Trench 11 at House 3 in the eastern part of the horizontal settlement (Fig. 5). The plan of the magnetic survey shows this house as a 13.5 m long and 6.0 m wide, north-east to south-west orientated anomaly. In contrast to the extensive anomaly of the House 1 in Area 3, the House 3 only had a highly magnetised zone along the outer walls over a width of 1.2 -1.5 m, whereas the inner surface of the house only had a very low magnetic flux density. The 3 m long and 1 m wide Trench 11 was located at the north-eastern boundary of this house anomaly to the neighbouring open space.

The burnt remains of House 3 consisted of a 0.1-0.15 m thick layer of burnt adobe (feature-id 11004), which was covered by a dark brown Chernozem layer (0-0.3 m, feature-id 11002), and another medium brown layer containing burnt adobe (11002) (Fig. 15). The burnt remains of House 3 (feature 11004) overlay feature 11005, a largely sterile buried soil that transitioned into the underlying loess (feature-id 11006) starting at a depth of 1 metre below the today's surface.

The burnt daub of the House 3 consisted mainly of chaff-tempered material. A total of 39 kg of burnt daub was documented, which was distributed over an area of 2.3 m² and thus had an average density of 17 kg/m² (Fig. 16). This significantly lower density of the burnt daub compared to the House 1 (there 50-130 kg/m²), in combination with the lack of extensive deposits of burnt daub, indicates a different type of construction for the house, which apparently did not include a massive platform.

Numerous fragments of the burnt daub package showed flat upper surfaces. Some of the fragments showed flat lower surfaces, some imprints of split wood planks and some imprints of reeds. Although the density of the imprints is only moderate, especially on the undersides of the daub fragments, and a construction scheme is not clearly recognisable, we interpret the burnt daub package as the remains of a collapsed exterior wall.

In addition to seven botanical samples, the Trench 11 yielded a moderate quantity of pottery in the total amount of 8 kg, the majority of which originated from the layer above the burnt clay (feature-id 11002, 1.6 kg) and a space for garbage outside the house (feature-id 11003, 3.9 kg).

Area 7 (Trench 12)

The excavations in the Area 7 were realised in the summer of 2015 and included the research of test Trench 12 with House 4 in the eastern part of the exterior zone of the horizontal settlement (Fig. 5). In the magnetic map, the remains of the House 4 were visible as an anomaly orientated east-northeast to west-southwest, 13.4 m long and 6.0 m wide. This anomaly showed approximately 1.5 m wide highly magnetic stripes along its northern, eastern and western outer edge, whereas only smaller areas with a high magnetic flux density are visible on its inner surface. The anomaly resembles very closely the anomaly of the House 3, excavated in the Trench 11. Section 12 was located on the northern longitudinal side of the anomaly and measured 3.8 x 1.5 metres.

The stratigraphic sequence in the Area 7 was very similar to that documented in the Area 6: the 0.1 to 0.15 m thick burnt daub package of the House 4 was covered by a 0.3 to 0.5 m thick layer sequence consisting of a Chernozem (feature 12001; 0.3 to 0.4 m), and a lower layer (feature 12002) of more mineral character. The remains of the house were located on top of a 0.7 to 0.75 m thick buried soil, highly mixed by bioturbation, which transitioned into the natural loess 1.2-1.3 m below the present terrain surface.

The southern part of the section yielded 15.6 kg of burnt daub, which – distributed over an area of 1.48 m² – had an average density of 10.5 kg/m², and a peak value of 12.3 kg in square A1. Compared to the Trench 10, the excavations in Trench 12 yielded only very small quantities of ceramics.

Area 9 (Trench 14)

The excavations in the Area 9 focussed on researching one of the seven settlement gates with inwardly directed sides in the outer ditch of the horizontal settlement. The fieldwork took place during the excavation campaign in August 2016. According to the magnetic map, there is an approximately 8-meter interruption in the width of the outer ditch of the horizontal settlement (Fig. 5, 17). There, 5-6-meter-long gate sides adjoin to form an 8-6-meter-wide funnel-shaped gate passage leading to the interior space of the settlement.

During the excavations, an area measuring 14 x 15 metres was opened up with the excavator in order to detect the upper edges of the trenches. In the zone of Area 9, a 0.4 m thick Chernozem (feature 14001) covered a buried soil (feature 14002) that was highly intermixed by bioturbation and reached down to the loess at a depth of 1.1 metres. Within the Chernozem layer and the buried soil below, deepened features were practically invisible. Since the complete uncovering of the area would have required enormous earth movements due to this difficult excavation situation, the researches below the level 2 were restricted to the actual ditch areas (Fig. 18). The ditches were

researched in several shorter sections to obtain transversal and longitudinal cross sections.

In general, it was possible through the excavation to largely verify the course of the ditches as indicated on the magnetic map. The trenches had V-shaped profiles (Fig. 19). At the upper edge of the loess soil they were approx. 2.3 m wide. Measured from the top edge of the loess to the bottom of the trench, their depth was approx. 1.3 m. However, we assume that the ditches were deepened from the upper edge of the overlying buried soil 14002, but that their outer edges were not visible in this layer due to intensive bioturbation. The actual depth of the ditches is therefore likely to have been around 2 metres and their width around 4 metres.

In the different longitudinal cross-sections through the ditch, the ditch bottom was relatively even. Certain differences in the height of the ditch bottom between different profile sections most likely result from the different extent to which the centre of the ditch was matched. We therefore assume that the trenches were dug in one work step and were not the result of different re-cuttings.

The backfilling of the ditch was dark and very humic in the lower parts. The upper backfill layers were lighter, less humic and repeatedly characterised by band-shaped inclusions of yellow clay. This mixed structure might indicate that the trenches were deliberately backfilled.

A total of 48.6 kg of pottery and 23.5 kg of burnt daub were recovered from Trench 14. The backfill of the trenches yielded 18.45 kg of pottery and 15.2 kg of burnt daub, although these were distributed very differently: 90% of the pottery and 75% of the burnt daub were recovered from the south-eastern section of the ditch, while the find density in the north-western section of the trench was significantly lower. The ditch fill also contained larger bone fragments, including deer antlers and the horn cone of cattle (Fig. 20).

At the south-western end of the southern ditch section of the gate, a large number of vessels were found deposited outside the ditch together with heavily fragmented bones that had been cremated at high temperatures (Fig. 18, 19, 21, 22). The remains of at least 24 vessels, some of which were completely preserved, were recovered in three to four spatially separated groups. These vessels had been dug into the buried soil 14002 (Fig. 19a). As the boundaries of these pits could not be detected due to intensive bioturbation, the vessels were assigned jointly to feature number 14008. A differentiation is made through allocation to the spatial groups 1, 2a, 2b and 3 (Table 2).

	Amphora	**Goblet (Amphoretta)**	**Pot**	**Bowl, conical**	**Bowl, carinated**	**Total**
Group 1	1		1	1	1	4
Group 2a	1				4	5
Group 2b	2				3	5
Group 2a/b			1		1	2
Group 3	1	2		1	2	6
Total	5	2	2	2	11	22
Total (%)	22.7%	9.1%	9.1%	9.1%	50%	100

Table 2: Borđoš. Area 9. Feature 14008. Vessel shape categories in the vessel groups (cremation burials) 1, 2a, 2b und 3

From a typological point of view, the vessels represent a specific selection from the overall spectrum of vessel shapes at the site of Borđoš (see the chapter *Ceramic Artefacts* by Ildiko Medović in this volume). The most common vessel categories are restricted, more or less carinated bowls (50%), amphorae (22.7%) and conical bowls (9.1%). There is also a goblet ('amphoretta'), a pot and an open buckling-wall bowl. As far as stylistic classifications are possible, these are exclusively vessels in the Vinca style, corresponding to ceramics from Vinca-Belo-Brdo, and most show specific decorations made with smoothed fluting.

Approximately 20 grams of highly cremated and fragmented bone material were found in the area where the vessels were deposited. Bone fragments were recovered from amphorae, bowls, and a pot. The amount of bone remains from amphorae (about 3.2 grams) was significantly higher than from other vessel categories (ranging from 0.04 to 0.4 grams). Due to the high degree of fragmentation, it was unfortunately not possible to confirm whether the bones belonged to humans. Despite this limitation, we interpret the deposited vessels as part of four cremation burials, each including specific sets of vessels. Amphorae likely served as urns. The location of the graves seems to be connected to the nearby ditch and the researched gate.

Area 10 (Trench 17)

The excavations realised in the summer of 2017 in Area 10 served to research a small mound in the centre of the Borđoš horizontal settlement, which we interpreted as a possible small tell and communal institution within the Late Neolithic settlement (Fig. 1 and 5). Analogies for that exist, for example, in Polgár-Csőszhalom in the upper Tisza region (e.g. Raczky et al., 2020). The small mound in Borđoš has horizontal dimensions of approximately 70 x 60 metres, rises about 2.3 metres above its surroundings and is partially covered by a now abandoned modern residential building (Fig. 23). Trench 17, measuring 12 x 2 metres, was excavated on the south-western side of this mound.

Our research led us to the conclusion that the mound most likely does not date back to the Late Neolithic period. Instead, it appears that at least the upper parts of the mound were artificially raised in connection with the construction of the modern building and the economic activities associated with its use. In the specific area we researched, the modern heightening amounted to approximately 0.6 metres (Fig. 24). However, because modern activities have caused disturbances in the vicinity of the mound, we cannot entirely rule out the possibility that a pre-existing small mound was further raised to serve as the location for the modern house. Further analysis of a series of drillings in other parts of the mound, as an extension of the trench, may help clarify this issue.

The modern fill covered a 0.3 to 0.65 m thick layer of Chernozem, with features 17005 and 17027. This layer was on top of a horizon up to 0.75 m thick of unburnt Late Neolithic house remains (features 17019-20, 17022-25, 17028-31, 17033-36, and 17039), consisting of yellow clay. It was uncertain whether these remains belonged to a single building or multiple overlying buildings. The Late Neolithic house remains overlay a buried soil (features 17037-38, 17044, 17046, 17050-51, 17054), with a thickness of 0.75 to 1.0 m, transitioning into unaltered loess (feature 17045) at a depth of 2.65 m below the current terrain surface.

The extent of the unburnt Late Neolithic house features in the Area 10 couldn't be accurately determined due to the limited extent of the research area and numerous modern disturbances. The only clear architectural element found on the northeast side of the trench was a large post pit measuring 0.8 meters in diameter and 1.5 meters in depth. The discovery of unburnt buildings is particularly significant, as they are difficult to detect by magnetic survey, and this suggests a higher building density in the settlement than what is visible from the magnetic map. This evidence also helps clarify the age of the mound in the settlement centre.

Area 11 (Trenches 18 and 21)

In the Area 11, the research began with electric resistivity measurements and the drilling of several boreholes. These initial steps provided indications that there might be unburnt houses in the horizontal settlement, which were not visible on the magnetic map. The magnetic map suggested low building density in certain parts of the site, so discovering unburnt houses would have significant implications for estimating the population size in that area. Trenches 18 and 21 were excavated in July and August 2019.

Trench 18 had dimensions of 25 x 2–4 m and was designed to investigate a northwest-southeast directed transect within the area already surveyed through geoelectrical prospection in 2015 (Fig. 5). To the south-east, the burnt house 7 was partly located within the trench. The 4 x 3 m large trench 21 was located 4 m west of trench 18, within the geophysically investigated area.

The presumed remains of unburnt houses could not be verified by excavation in the Area 11. This preliminary conclusion is based on the lack of clear colour differences which might indicate house areas and adjacent open spaces. Whether this situation is the result of the generally extremely intensive bioturbation in Borđoš or whether it reflects the historical reality can only be conclusively assessed once the distribution of finds has been analysed in relation to the magnetic and electric resistivity measurements.

Areas 12 and 13 (Trenches 19 and 20)

In an area north-east of the Borđoš tell, numerous smaller point-shaped anomalies are visible in the magnetic prospection plan, which were considered as a possible burial ground (Fig. 1). To clarify the nature, age and function of these anomalies, two of

these objects were excavated in the Areas 12 and 13 in the summer of 2019 (Fig. 5). An attempt was made to excavate a quarter of the anomaly at each location.

In the case of the Area 12 (Trench 19), no pit was found beneath the humus. Thus, the nature of the anomaly remained unclear. In the Area 13 (Trench 20) two pits (filling features 20005 and 20002) were investigated, both of which contained modern material such as glazed pottery and iron objects. A trampled floor layer perhaps corresponding to a house structure was found on the surface between the pits (feature 20004). Based on this still sparse data, we assume a post-Neolithic (modern) age of the anomalies north-east of the tell.

Area 14 (Trench 22)

In the spring of 2021, the construction of a linear irrigation pipe system (Fig. 5), specifically in Area 14 (Trench 22), led to significant disturbance of the entire horizontal settlement. In response, the Museum of Vojvodina conducted an emergency recovery of archaeological materials along the pipeline. This recovery effort focussed on seven burnt houses (Houses 8-14) and the area of the trenches of the inner ring of ditches. Despite the destruction, the recovery yielded high-quality painted pottery fragments from several house locations. Additionally, a human skull was found in the area of the ditches of the inner zone of the horizontal settlement, with ^{14}C dating indicating a Late Neolithic date.

Area 15 (Trenches 23 and 24)

Area 15 is located at the south-western end of Trench 22 in the intersection of the outer zone of the Late Neolithic horizontal settlement and the Late Bronze Age Gava settlement (Fig. 5). In order to ensure access to the irrigation system's water from the Tisza, an area 10–20 m wide and 26 m long was deeply excavated here, without the participation of archaeologists and, thus, without any proper archaeological documentation. Subsequently, in October 2021 and March 2022, the archaeological features in the northern (Trench 24) and southern (Trench 23) profiles of this pit were documented and partly further excavated in an effort to rescue whatever archaeological information possible.

According to a larger series of sixteen ^{14}C dates, the features from the Area 15 date back to different periods: pit 15/1 (feature 23002), located in the southern profile (Trench 23), is confirmed to belong to the Late Neolithic period. In several subsequent backfilling events between 4900 and 4800 BCE, a complex inventory of Tisza and Vinča pottery, flint artefacts and a large variety of faunal and floral remains was deposited. The report by Kata Furholt et al. in this volume discusses and interprets these features in more detail. Pit 15/6 (features 23008 and 23011) dates to the 3rd millennium with displaced debris from a burnt house and an overlying backfill. The most intensive occupation of the area took place in the Late Bronze Age, to which pits 15/2, 15/4 and 15/7 and a settlement burial (grave 15/1) with five human individuals belong.

Absolute Chronology

From the Borđoš settlement a total of 55 ^{14}C dates were obtained from drillings, excavations and surface finds, which form the basis for the absolute chronology and the internal chronological differentiation of the settlement (Table 3, Fig. 25). For this sample, which is widely distributed within the site, short-lived sample material was used, mostly bones from herbivores. Stratigraphic observations provide A-priority probabilities for the various feature groups based on which chronological models can be calculated using the software oxcal and the function *boundary* (Bronk Ramsey, 2009; Bayliss and Marshall, 2022). The relevant calibration curve, Intcal20 (Reimer et al., 2020), shows a steep curve without major wiggles during the investigation period and is therefore well suited for Bayesian modelling.

Excluding pre-Neolithic dates from drilling core BP1008 and post-Neolithic dates from the Areas 3 and 15, 41, the Neolithic dates were included in a Bayesian model of the Borđoš site. The two samples Poz-90537 and Poz-90687 from the Area 4 were excluded from the analysis as they showed poor agreement with the model. Both samples date too young in their context, which might be explained by their low collagen contents (0.8% and 1.1%). Due to too high age, sample Poz-90685 from the lower backfill of the ditch in the Area 9 also showed a low agreement (A= 56.3%). The situation is similar with the sample Poz-90477 from the debris of the House 2 in the Area 5 (A=60%), which is too old in its context. A possible explanation for the outliers might be the inclusion of older material.

The Bayesian model of the Borđoš site shows a sufficient probability with A_{model} 108.2 and $A_{overall}$ 110.2. The median of the available data suggests a beginning of the settlement activity at the site of Borđoš around 5013 BCE (68.3%: 5043-4967 BCE, 95.4%: 5104-4950 BCE), and an end of settlement around 4643 BCE (68.3%: 4686-4610 BCE, 95.4%: 4704-4534 BCE). The duration of the occupation therefore amounted to about 350 years. In terms of the relative chronology, the site was occupied in the periods Vinča C, C-D and D (Tasić et al., 2016; Whittle et al., 2016) and Tisza III (classical) and IV (late) after the periodization of F. Horvath (Horváth, 2005 [2012]).

The so far oldest samples were taken from the backfill of the **circular enclosure ditch** (component C). A series of six consistent dates from the stratigraphy of the Trenches 2 and 3 date the use of the circular enclosure and its backfilling to the time around 5000 BCE (68.3% 5053-4931, median 5013-4951 BCE). As discussed in more detail elsewhere, some significantly older OSL dates from the same stratigraphy are probably biased by incomplete exposure to light during relatively short-term backfilling processes of the ditches (Hofmann et al., in press-a). Also, two charcoal dates from the mid-7th millennium recovered from the base of the ditch in drilling profile BP1008 are probably the result of an old wood effect (Hofmann et al., in press-a).

Three dates from drilling BP1013 and six dates from the excavation Area 4 are available to determine the absolute chronology of the **tell (Component A)**. The oldest dates from the time between 4952-4758 BCE (68.3%) and 5017-4739 (95.4%) or 4916-4845 (median) are from the middle section of core BP1013 from a depth between 2.00 m and 1.68 m from the present surface. As anthropogenic deposits in this core extend to a depth of 3.00 m, where they overlie a buried soil, it can be assumed that the tell was occupied prior to this time (Medović et al., 2014, 60, Table III). It therefore seems plausible that the beginnings of the settlement mound may date back at least to the time of the circular enclosure and that the tell and the circular enclosure existed for a certain time simultaneously.

In **Area 4 (Trenches 6, 7, 15 and 16)**, six ^{14}C dates were obtained from features of the youngest construction layer of the tell and the levelling horizon below. In distinction from the levelling layer below the House 5, the youngest construction layer of the tell dates to the time around 4714 and 4682 BCE (Median) or between 4736 and 4663 (68.3%) or between 4787 and 4606 (95.4%).

With 26 dates obtained from features and surface finds in the Areas 3, 5, 6, 9, 14 and 15, the **horizontal settlement** represents the best dated settlement component at the site of Borđoš. Six ^{14}C dates were obtained from the **Area 3**. The dates Poz-90477, Poz-90479 and Poz-90578 originate from the burnt debris of the House 1, the two dates Poz-90480 and Poz-90481 from the step surface in the vicinity of the House 1. The date Poz-90476 derives from the transition layer to the topsoil above the burnt clay and was assigned to the Bord 3/4-layer formation. According to our modelling, activities in the Area 3 took place between 4851 and 4706 BCE (median) or between 4927 and 4672 BCE (68.3%) or 5000-4628 (95.4%) over a total period of roughly 150 years.

Three ^{14}C dates were obtained from the **Area 5 (Trench 10)**. The two samples Poz-90539 and Poz-90540 were taken from the burnt debris of the House 2 (feature 10004), whereas sample Poz-90541 was taken from the layer below the floor (feature 10007). According to our model, the construction and use of the house took place between 4870 and 4719 BCE (median) or 4909 and 4684 BCE (68.3%) or 4987 and 4645 BCE (95.4%) over a period with duration of roughly 150 years.

From the **Area 6** two ^{14}C dates were obtained from the **Trench 11**. Sample Poz-90676 originates from the debris of the House 3 and probably dates the use of the house. Sample Poz-90679 was obtained from the buried soil beneath the burnt remains of the house and may date its construction. According to our model, the construction and use of the house took place between 4845 and 4745 BCE (median) or 4913 and 4697 BCE (68.3%) or 4988 and 4628 BCE (95.4%) over a period with duration of roughly 100 years.

Eight ^{14}C dates from the **Area 9** were obtained from the **Trench 14**. The two dates Poz-90683 and Poz-90685 were taken from the base of the southern section of the outer ditch of the horizontal settlement, while the four dates Poz-90685, Poz-90681, Poz-90683 and Poz-90682 were taken from the lower part of the fill of the same ditch. The date Poz-90680 was obtained from the upper backfill of the ditch. The cremation burials are dated by Poz-97241 (pea), Poz-97242 (cereal grain) and Poz-90689 (pea) obtained from botanical macro remains. According to our Bayesian model, the infilling of the southern ditch section took place between 4809 and 4719 BCE (median) or between 4850 and 4674 BCE (68.3%) or between 4916 and 4621 BCE (95.4%). The cremation burials date between 4732 and 4686 BCE (median) or between 4791 and 4659 BCE (68.3%) or between 4887 and 4609 BCE (95.4%). In terms of mean dating, they therefore tend to be younger than both the ditch fill and the houses of the horizontal settlement.

A human skull extracted from the excavated earth in the area of the inner ditch cluster of the horizontal settlement was dated from the **Area 14 (Trench 22)** to confirm its Late Neolithic age. This bone dates to 4824 BCE (median) / 4893 and 4788 BCE (68.3%) or between 4931 and 4726 BCE (95.4%).

A total of eight samples were dated from different sub-layers of the backfill of the Late Neolithic pit 15/1 in the **Area 15, section 23**. According to the modelling of these dates, the pit was backfilled between 4877 and 4803 BCE (median) or between 4916 and 4775 BCE (68.3%) or 4956-4716 BCE (95.4%). The pit thus tends to provide the oldest data from the Borđoš horizontal settlement. Another eight ^{14}C dates from the Area 15 attest human settlement activities in the phases around 2800 BCE and between 1400 and 1200 BCE, which are, however, not discussed in detail here.

Development and Periodization of the Settlement

In connection with the data we collected during surveys and excavations, and based on the available dating, it is possible to establish a periodization of the Borđoš site and to reconstruct the development of this multi-component settlement. We can identify three major phases in the settlement's development.

Phase 1

Between around 5100 and 4900 BCE, during the Borđoš 1 phase, a tell settlement and a nearby rondel were established, possibly as part of a communal facility. The evidence of at least two associated building horizons in drilling core BP1013 of the tell led to a further subdivision into the sub phases Borđoš 1a and 1b.

Phase 2

Between 4900 and 4700 BCE, during the Borđoš 2 phase, the rondel was abandoned, and the settlement area was greatly expanded with the addition of the horizontal settlement. Phase 2 is divided into five sub-phases (2a-e) based on the number of partially overlapping ditches. By estimating the number of ditches in relation to the total settlement length

of occupation, it can be assumed that there was an average duration of 40 years between the renewal of the ditches. However, the presence of an additional ditch in the Area 11, the extent of which is unclear, has not been taken into account. Due to relatively large dating uncertainties in the area of the investigated houses, it is unfortunately not yet possible to understand the internal development of the horizontal settlement with certainty. Nevertheless, the magnetic map indicates significantly higher settlement intensity in the inner zone of the horizontal settlement, suggesting that settlement activities lasted much longer in this area than in the outer zone. Taking into account the generally more recent dating of the ditch fill in the Area 9 and the burials there, it can be assumed with some probability that the settlement was enlarged from 25 to 40 hectares during the Phase 2.

Phase 3

Between approximately 4700 and 4650 BCE, during the Borđoš 3 phase, the horizontal settlement was abandoned, and settlement activities only continued in the area of the tell. It is likely that burial activities still occurred in the area of the outer ditch of the horizontal settlement during this period. The settlement was ultimately abandoned around 4650 BCE.

Conclusions

Ten years of interdisciplinary fieldwork and analyses at the site of Borđoš and the Borđoš Loess Plateau have contributed significantly to the discovery and decifering of previously largely unknown Late Neolithic multi-component settlement patterns and 'centripetal' settlement layouts (Hofmann et al., 2019), through the analyses and preparations for publication are not yet complete. The increased use of magnetic survey and aerial archaeology has meanwhile confirmed that settlements of these types were present in large parts of the southern and eastern Pannonian Plain during the first half of the 5th millennium BCE (e.g. Kalafatić and Šiljeg, 2018; Parkinson et al., 2018; Füzesi et al., 2020; Hofmann et al., in press, accepted).

As we have shown elsewhere, the Late Neolithic multi-component settlements like Borđoš were the result of regional population concentrations in increasingly larger settlements, which began around 4900 BCE at the latest and culminated before 4700 BCE (Hofmann et al., 2019). This historical process of population concentration concerned large parts of the western Balkan region, but was particularly distinct in the Pannonian Plain (e.g. Raczky, 2015; Rassmann et al., 2021; Bánffy et al., 2013 (2016); Parkinson et al., 2018). At the transition to the Copper Age, a period of crises set in, during which many multicomponent settlements experienced a significant decline in population and were later completely abandoned (e.g. Borić, 2015; Hofmann et al., 2019). This transformation of settlement patterns and population scales was accompanied by an increasing exploitation of natural resources (e.g. Hoekman-Sites and Giblin, 2012), which is also manifested at the site of Borđoš by increased numbers of wild animals in the most recent layers of the tell (see the chapter *Insights into Animal Management and Wild Faunal Resource Exploitation at Borđoš During the Late Neolithic* by Sarah Pleuger-Dreibrodt, Darko Radmanović).

No less important is the discovery of the specific 'centripetal' settlement layout of Borđoš, within which the houses are directed toward the perhaps unbuilt center of the settlement. In contrast to the linear settlement layouts of the Western Balkans, we interpret this settlement configuration as an expression of the very specific social organisation of these communities (Hofmann et al., 2019), which focussed more on the demographic negotiation of communal concerns than in other settings. This new settlement organisation might have been the prototype of centripetal and ring-shaped settlement layouts in Transylvania and the region east of the Carpathians (e.g. Hofmann et al., in press-b).

The discovery of human skeletal remains buried in the ditches (Area 22) and cremation burials near the gate at the site of Borđoš (Area 9) shows that the establishment of new settlement structures was likely linked to significant changes in beliefs and ideas. The rarity of early cremation burials with vessel ensembles, similar to those found in contemporaneous inhumations, suggests that settlements like the one at the site of Borđoš had an intermediate character during the transition from the Late Neolithic to the south-east European Copper Age.

One of the starting points of our research, at the site of Borđoš and beyond, concerned the joint occurrence of different ceramic styles (e.g. Vinča, Tisza) in settlements of the Lower Tisza region. Through our excavations we can confirm that this phenomenon affects all spatial levels of such settlements down to individual households and pit inventories in the same way. This confirms that old concepts, such as those of archaeological cultures, do not help us to understand settlements like Borđoš. We imagine settlements like Borđoš as a kind of melting pot, in which people with different origins and integration in differently directed networks lived together. This is confirmed by the first analyses of the rich material culture of Borđoš (see the chapter *Chipped Stone Assemblage of the Late Neolithic Borđoš Site* by Kata Furholt and Ildiko Medović in this volume). This cultural diversity might also be manifested in the diverse architecture of residential buildings and probably also a certain variety of economic strategies within a highly diverse environment (Medović et al., in press; Hofmann et al., in press-a). One of the tasks in the next phase of our project will be to elaborate further the various implications of these transformation processes based on the contextualised data obtained in the last ten years.

laboratory-id	14c date	sample material	N (%)	C (%)	col (%)	trench_id	find-id	feature-id	level	square
Beta-601998	5950 ± 30	bone, human	14.43	40.42		22			0	
KIA-57489	5905 ± 35	bone, sheep/goat/dog				23	23060	23002	2	
KIA-57490	5910 ± 40	bone, scheep/goat/dog?deer				23	23061	23002	2	
KIA-57491	5965 ± 35	bone, sheep/goat				23	23062	23002	4	
KIA-57492	5995 ± 35	bone, dog				23	23063	23002	4	
KIA-57493	4135 ± 35	bone, sheep/goat/dog				23	23064	23008	?	
KIA-57494	5982 ± 34	bone, bos/horse/pig				23	23065	23008	3	
KIA-57495	5995 ± 41	bone, cattle				23	23066	23002	3	
KIA-57496	5998 ± 34	bone, bos/horse/pig				23	23067	23002	1	
KIA-57497	5962 ± 36	bone, bos/horse/pig				23	23068	23002	1	
KIA-57498	3085 ± 32	bone, cattle				23	23069	23001	?	
KIA-57499	3057 ± 31	bone, sheep/goat/dear				23	23070	23001	2	
KIA-57500	3070 ± 30	bone, pig				24	24025	24001	1	
KIA-57501	2982 ± 29	bone, goat				24	24044	24001	3	
KIA-57502	2975 ± 31	bone, cattle				24	24057	24001	3	
KIA-57503	2945 ± 30	bone, human				24	24095	24001	3	
KIA-57504	3094 ± 30	bone, bos/horse/pig				24	24100	24002	1	
Poz-63488	6110 ± 90	charcoal, indetermined				1	1195			
Poz-63490	7690 ± 100	charcoal, indetermined				1	1197			
Poz-63491	7260 ± 180	charcoal, indetermined				1	1198			
Poz-63492	6000 ± 35	charcoal, oak cf.				1	1201			
Poz-63493	6010 ± 35	charcoal, oak or elm				1	1202			
Poz-63509	6270 ± 80	charcoal, oak cf.				1	1196			
Poz-63510	6060 ± 60	charcoal, oak cf.				1	1200			
Poz-90469	6055 ± 35	bone, cattle	1.8	7.1	3.1	3	3066	3009	2	C3
Poz-90470	6110 ± 40	bone, cattle	1.2	6	5	3	3035	3009	3	D2
Poz-90471	6115 ± 35	bone, cattle	0.9	4.7	2.5	2	2091	2023	6	C3
Poz-90472	6100 ± 40	seed/grain, triticum sp., triticum cf. (monococum?)				2	2053	2023	5	B3
Poz-90473	6020 ± 40	bone, cattle	0.8	4.5	2	2	2107	2030	7	C4
Poz-90475	6110 ± 40	seed/grain, prunus				2	2104	2030	7	B3
Poz-90476	325 ± 30	bone, medium herbivor mammal	1.3	5.5	6.6	4	4026	4002	2	C13
Poz-90477	6040 ± 40	bone, cattle	1.8	6.8	4.2	4	4109	4003	4	F12
Poz-90479	5850 ± 35	bone, large herbivor mammal	1.1	7	0.7	9	9186	9009	4b	E10
Poz-90480	5920 ± 40	bone, large herbivor mammal	1.9	7.7	2.2	8	8246	8011	6	D14
Poz-90481	5830 ± 40	bone, medium herbivor mammal	1.8	7.6	2	8	8250	8011	6	E15
Poz-90534	5795 ± 30	bone, large herbivor mammal	2.1	7.9	2.1	6	6033	6003	3	D10
Poz-90535	5840 ± 40	bone, large herbivor mammal	1	5.6	2.4	6	6109	6004	4	C9
Poz-90536	5815 ± 35	bone, cattle	0.4	6.4	1.6	6	6180	6010	5	C9
Poz-90537	5740 ± 35	bone, cattle	2.9	9.4	0.8	16	16482	16013	5	C4
Poz-90538	5875 ± 35	bone, cattle	1.4	7.4	4.8	16	16465	16013	5	B5
Poz-90539	5890 ± 40	bone, large herbivor mammal	1.6	7	2.4	10	10056	10004	3	A3
Poz-90540	5980 ± 40	bone, cattle	2.1	8.5	3.2	10	10127	10004	4	A1
Poz-90541	5955 ± 35	bone, cattle	1.2	6.6	2.3	10	10131	10007	4	A3
Poz-90578	5880 ± 40	seed/grain, cerealia indet., leguminosae sativae indet.				8	8224	8005	5	D15
Poz-90676	5900 ± 40	bone, cattle	1.6	6.6	5.6	11	11030	11004	3	A2
Poz-90679	5950 ± 40	bone, large herbivor mammal	0.7	5.5	0.8	11	11040	11005	6	A2
Poz-90680	5860 ± 120	bone, cattle	1.4	6.7	3.1	14	14065	14004	3	M10
Poz-90681	5910 ± 40	bone, cattle	2.9	10.5	5.1	14	14200	14007	5	M10
Poz-90682	5860 ± 40	bone, cattle	1.1	5.2	1.6	14	14345	14007	8	L4
Poz-90683	5900 ± 35	bone, cattle	1.2	5.1	2.9	14	14392	14007	6	L6
Poz-90685	5990 ± 40	antler, red dear	0.9	4.4	3.6	14	14394	14007	8	L9
Poz-90687	5670 ± 40	bone, cattle	0.4	5.8	1.1	6	6101	6004	4	B9
Poz-90689	5800 ± 40	seed/grain, pisum				14	14154	14008	2c	L2-3
Poz-97241	5850 ± 35	seed/grain, pisum				14	14146	14008	2c	K-L2
Poz-97242	5840 ± 35	seed/grain, cerealia, indetermined				14	14158	14008	2c	K3

Table 3: ^{14}C dates

feature interpretation	layer formation	layer group	layer
surface find ditch area of the horizontal settlement			
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/3	A15-pit 15/6	relocated burnt house debris
pit, fill	Bord 15/3	A15-pit 15/6	relocated burnt house debris
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/2	A15-pit 15/1	pit fill
pit, fill	Bord 15/4	A15-pit 15/2	pit fill
pit, fill	Bord 15/4	A15-pit 15/2	pit fill
grave	Bord 15/4	A15-grave 15/1	undifferentiated
grave	Bord 15/4	A15-grave 15/1	undifferentiated
grave	Bord 15/4	A15-grave 15/1	undifferentiated
grave	Bord 15/4	A15-grave 15/1	undifferentiated
pit, fill	Bord 15/4	A15-pit 15/7	pit fill
circular earthwork, backfilling ditch (BP1008/-158 cm)			
circular earthwork, base ditch (BP1008/-234 cm			
circular earthwork, base ditch (BP1008/-246 cm)			
settlement mound, settlement layer (BP1013/-200 cm)			
settlement mound settlement layer (BP1013/-200 cm)			
circular earthwork, backfilling ditch (BP1008/-200 cm)			
settlement mound, settlement layer (BP_1013/-168 cm)			
ditch, fill	Bord 2/2	A2-outer + connection ditch	upper fill
ditch, fill	Bord 2/2	A2-outer + connection ditch	upper fill
ditch, fill	Bord 2/2	A2-inner ditch	lower fill
ditch, fill	Bord 2/2	A2-inner ditch	lower fill
ditch, fill	Bord 2/2	A2-inner ditch	lower fill
ditch, fill	Bord 2/2	A2-inner ditch	lower fill
layer	Bord 3/4	A3-topsoil	transition
burnt wall debris	Bord 3/2	A3-house 1	wall debris
burnt wall debris	Bord 3/2	A3-house 1	wall debris
ancient surface	Bord 3/2	A3-open space (house 1)	ancient surface
ancient surface	Bord 3/2	A3-open space (house 1)	ancient surface
layer	Bord 4/2	A4-Layer above and beside daub of house 5	n/a
burnt wall debris	Bord 4/2	A4-house 5	burnt house collapse
house platform, burnt	Bord 4/2	A4-house 5	floor finish + platform
levelling layer	Bord 4/1	A4-layer below house 5	n/a
levelling layer	Bord 4/1	A4-layer below house 5	n/a
burnt wall debris	Bord 5/2	A5-house 2	wall debris
burnt wall debris	Bord 5/2	A5-house 2	wall debris
layer	Bord 5/2	A5-house 2	layer below daub
house platform, burnt	Bord 3/2	A3-house 1	platform
burnt wall debris	Bord 6/2	A6-house 3	wall debris
layer	Bord 6/2	A6-house 3+buried humus	n/a
ditch, fill	Bord 9/2	A9-southeastern ditch	upper fill
ditch, fill	Bord 9/2	A9-southeastern ditch	lower fill
ditch, fill	Bord 9/2	A9-southeastern ditch	lower fill
ditch, fill	Bord 9/2	A9-southeastern ditch	lower fill (bottom)
ditch, fill	Bord 9/2	A9-southeastern ditch	lower fill (bottom)
burnt wall debris	Bord 4/2	A4-house 5	burnt house collapse
vessel deposition (cremation graves)	Bord 9/2	A9-vessel depot	vessel depot
vessel deposition (cremation graves)	Bord 9/2	A9-vessel depot	vessel depot
vessel deposition (cremation graves)	Bord 9/2	A9-vessel depot	vessel depot

Table 3: Continued

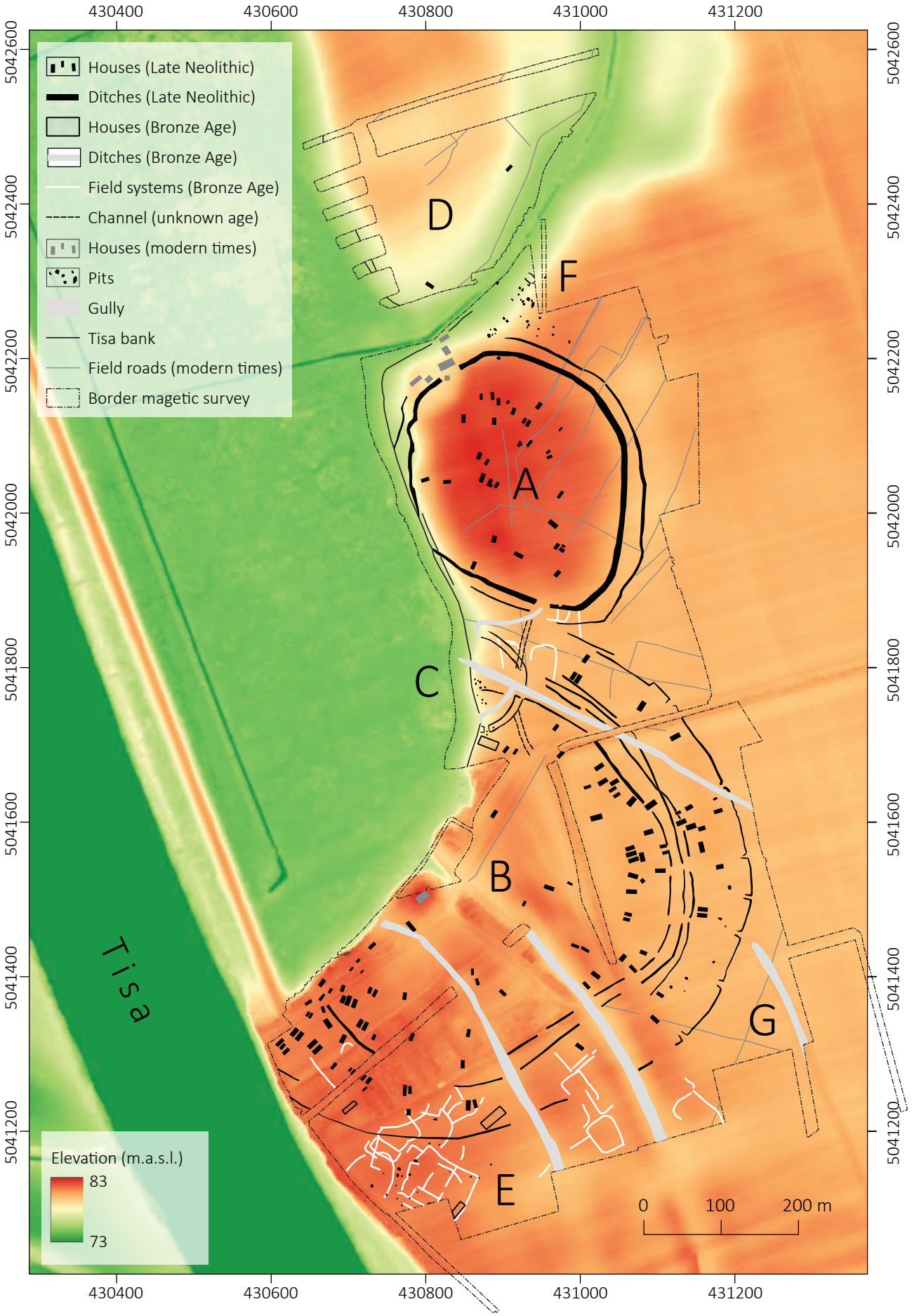


Fig. 1: Interpretation of the magnetic map of Borđoš with labelling of the settlement components (letters). Graphic by: Robert Hofmann

Fig. 2: Mapping of ceramic weights obtained from systematic surface collections. Graphic by: Robert Hofmann

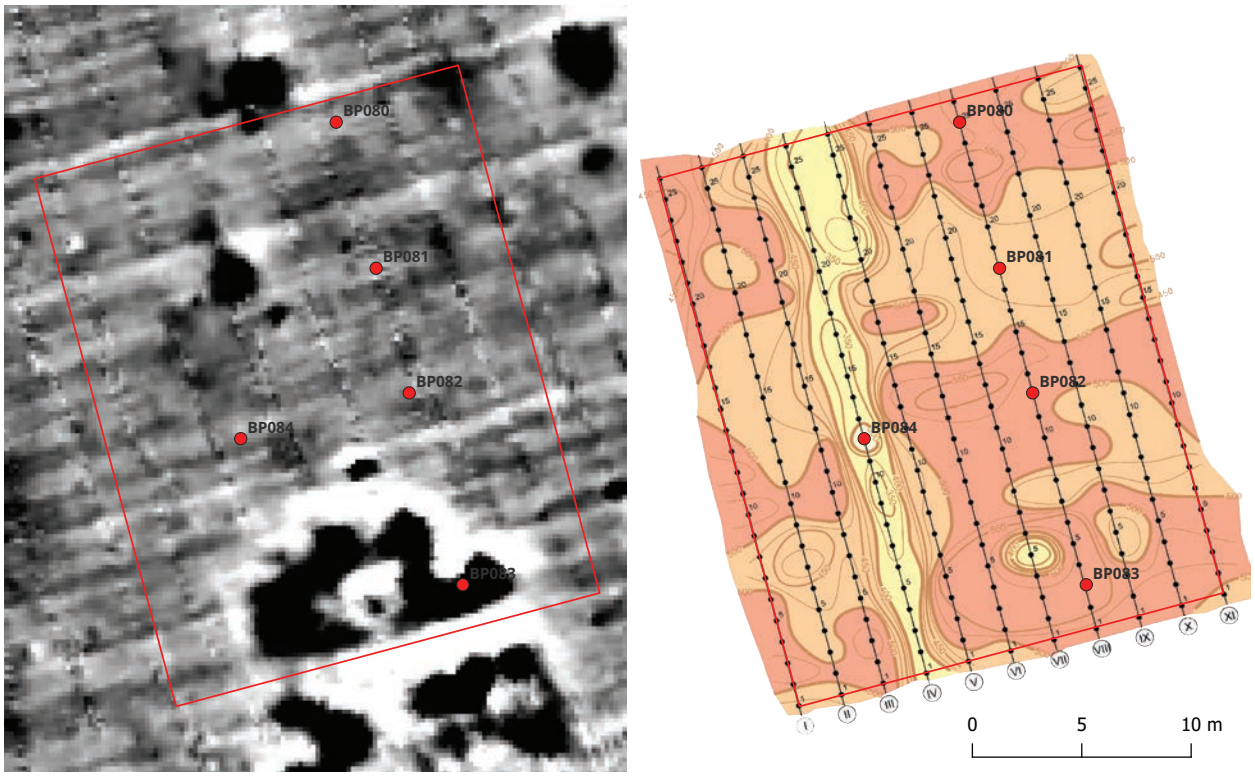


Fig. 3: Comparison of the results of the magnetic survey and electrical resistivity measurements (depth range of 0.75 m) in the area of excavation area 11. In addition, the position of drilling profiles is indicated (Graphic by: Tijana Stanković Pešterac and Robert Hofmann)

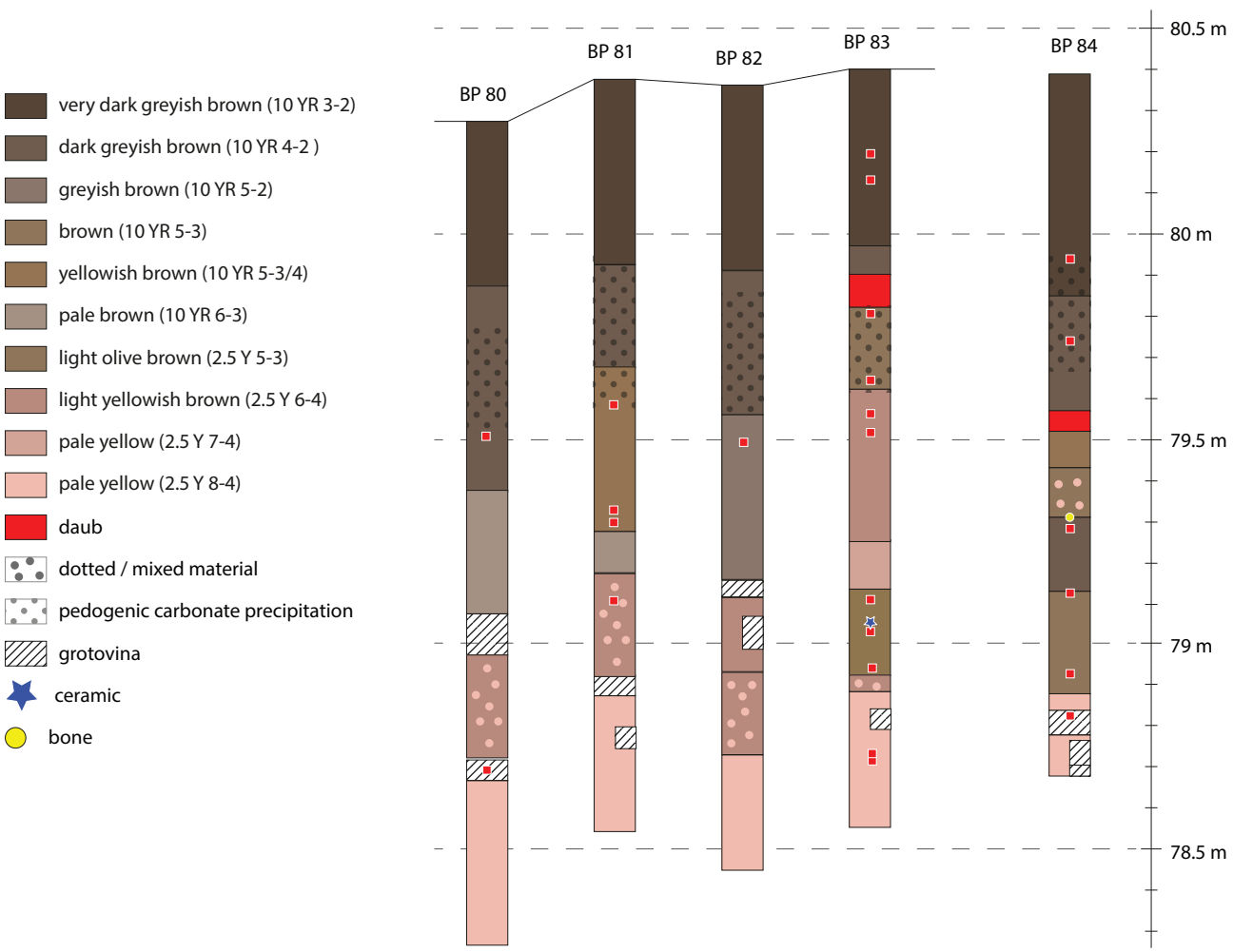


Fig. 4: Graphic representation of the results of borehole prospections in Area 11. Graphic by: Robert Hofmann

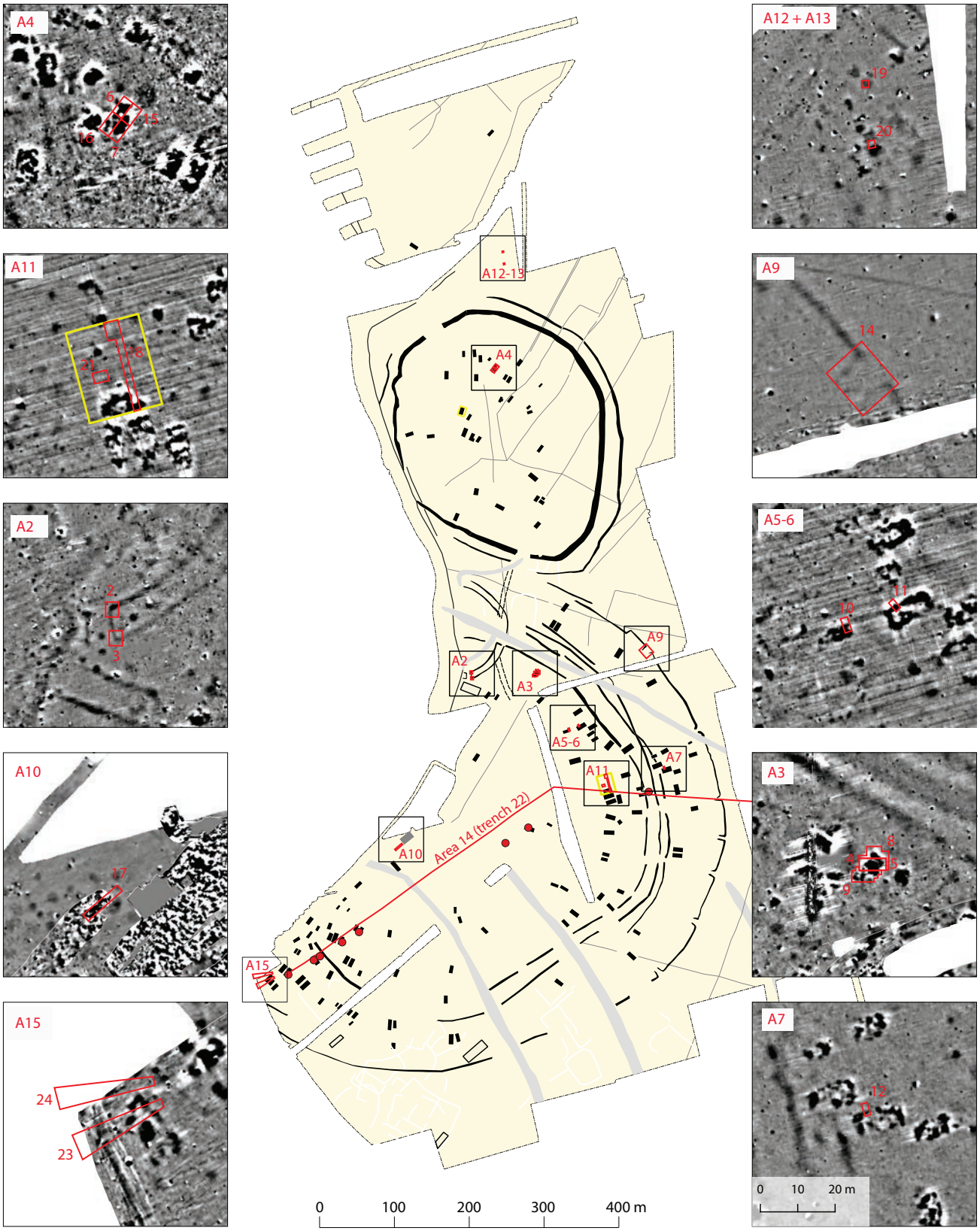


Fig. 5: Location of the excavation areas and trenches. Graphic by: Robert Hofmann

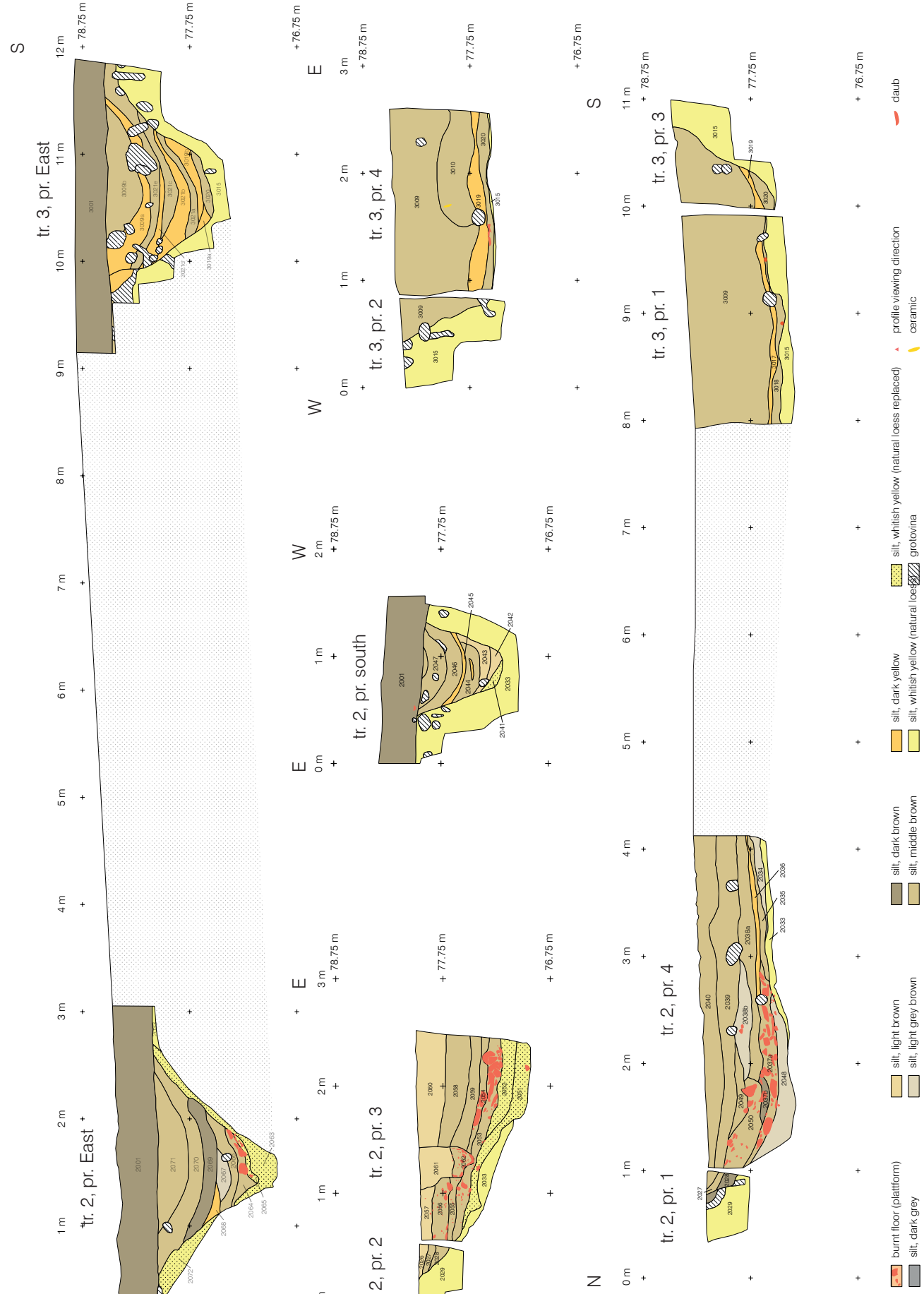


Fig. 6: Cross-sections through the ditches of the rondel in Area 2. Graphic by: Robert Hofmann

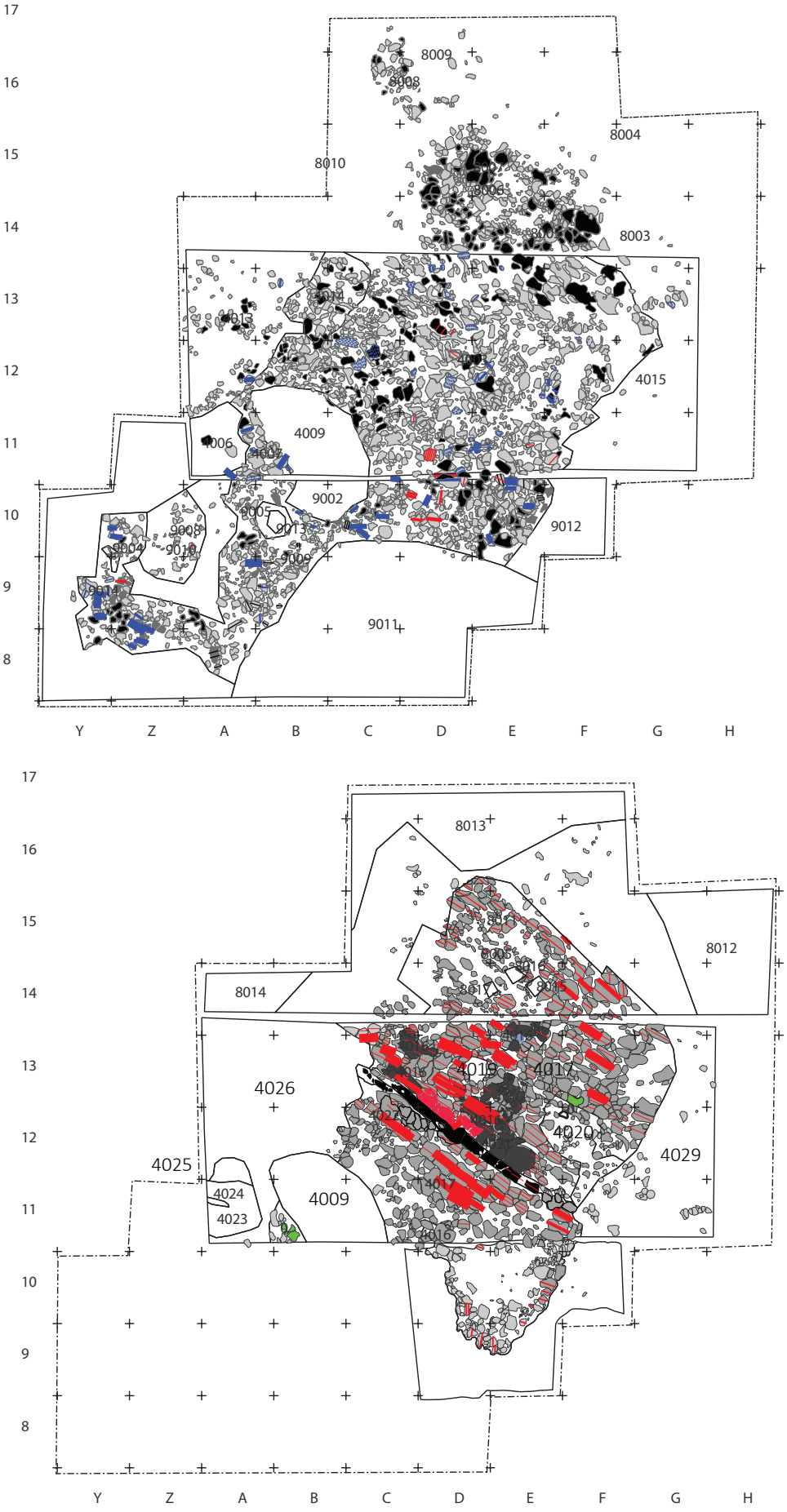


Fig. 7: Plan of House 1 in Area 3 with features, burnt adobe and impressions of timbers in two stages of the excavation. Above (Fig. 7a): Upper layer of burnt adobe. Below (Fig. 7b): Remains of the platform. Graphic by: Robert Hofmann

Fig. 8: Excavated platform and remains of the partition wall in the central part of House 1 (Trench 8, 9)

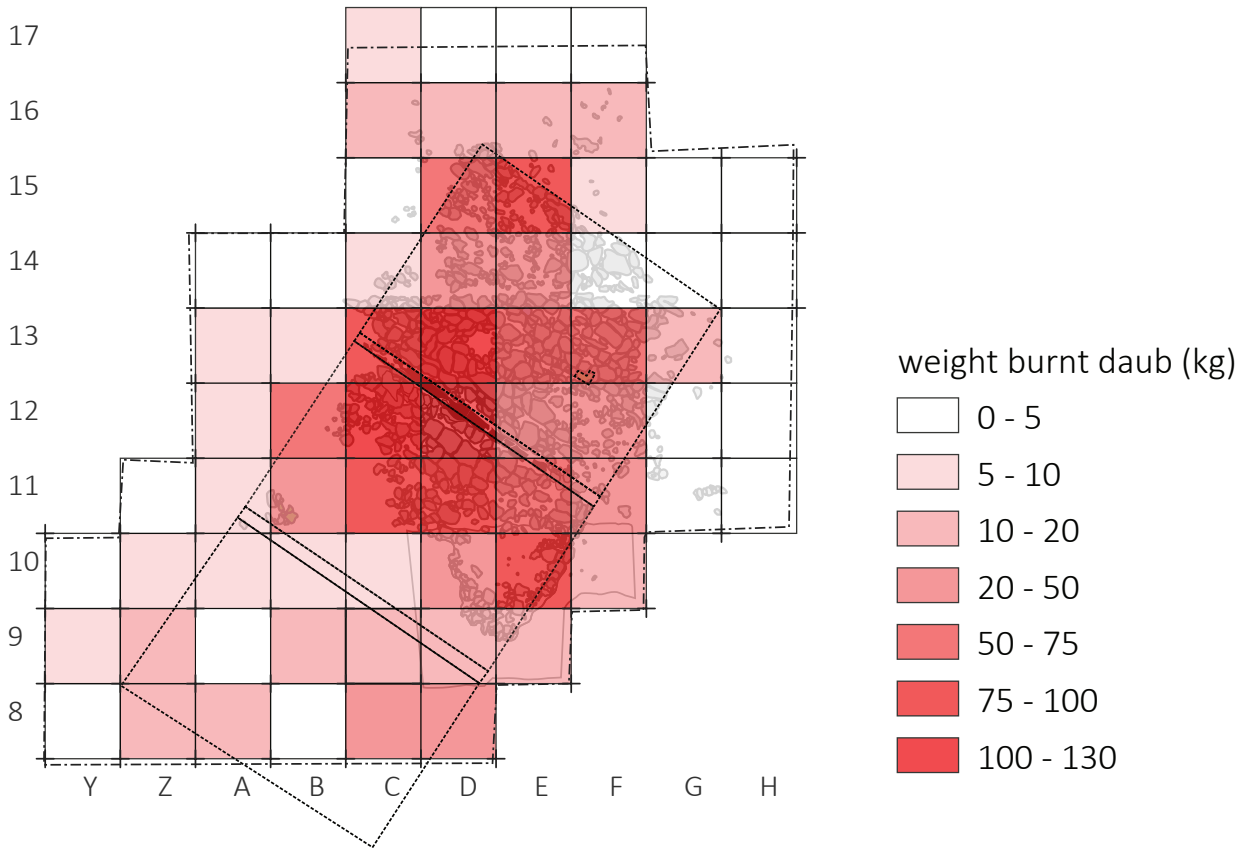


Fig. 9: Distribution of burnt daub and finds in house 1 in Area 3: a) Weight of burnt daub, b) Grindstone artifacts, c) Amphorae (MNI), d) Pots (MNI), e) Pans (MNI), f) Bowls (MNI), g) Other vessel shapes and h) Non-pottery ceramic objects. Graphic by: Robert Hofmann

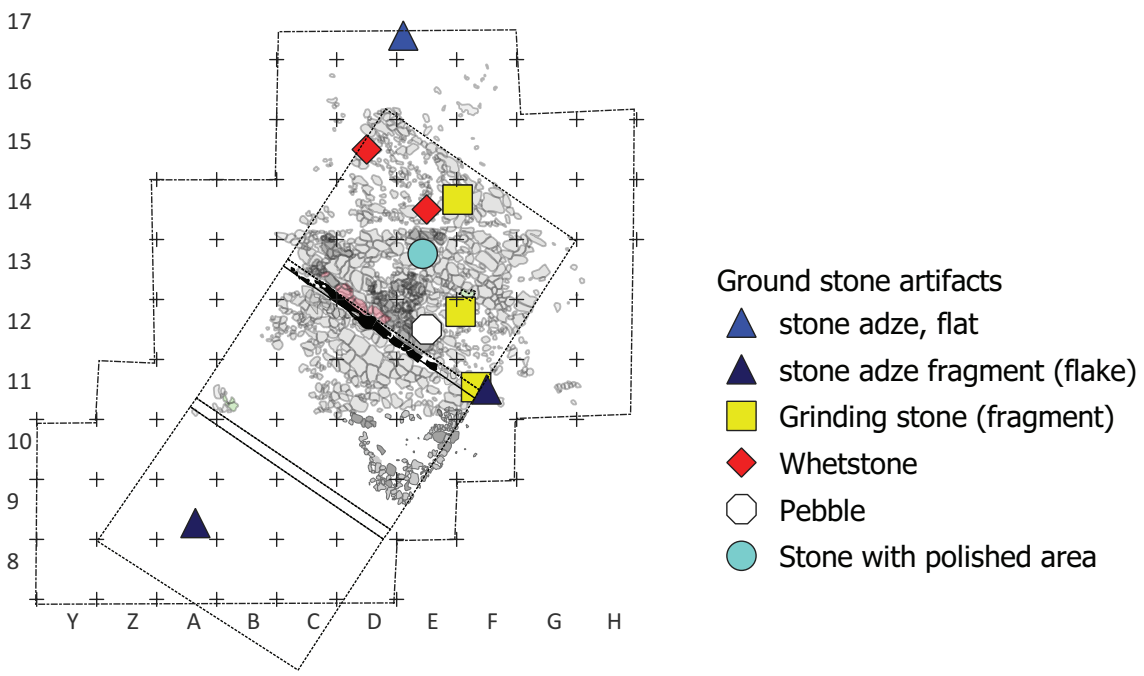


Fig. 9b

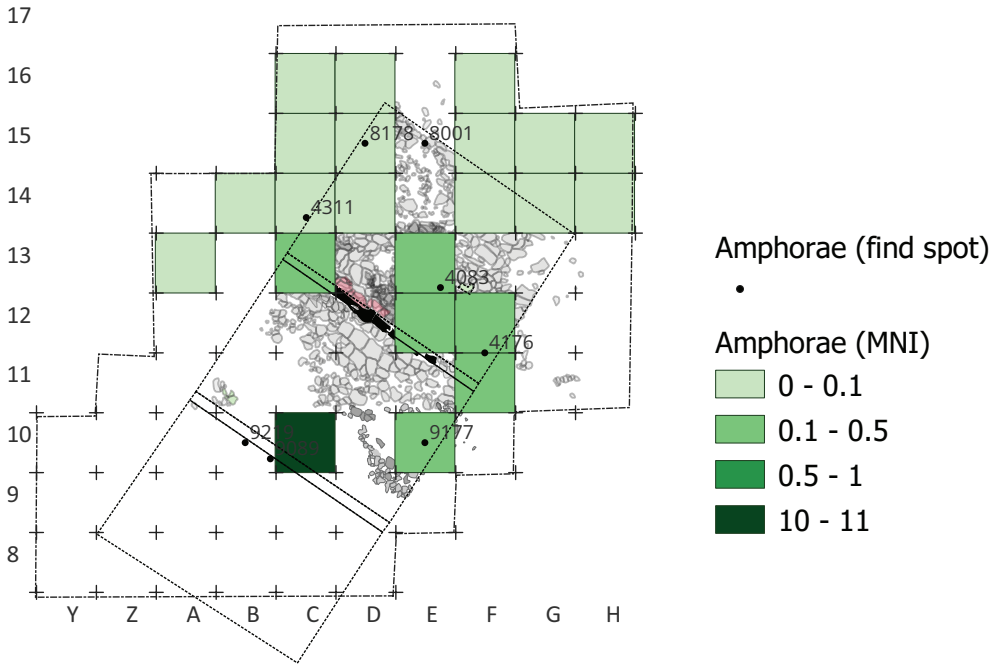

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
8178
8001
4311
4083
4176
9177
Amphorae (find spot)
Amphorae (MNI)
0 - 0.1
0.1 - 0.5
0.5 - 1
10 - 11

Fig. 9c

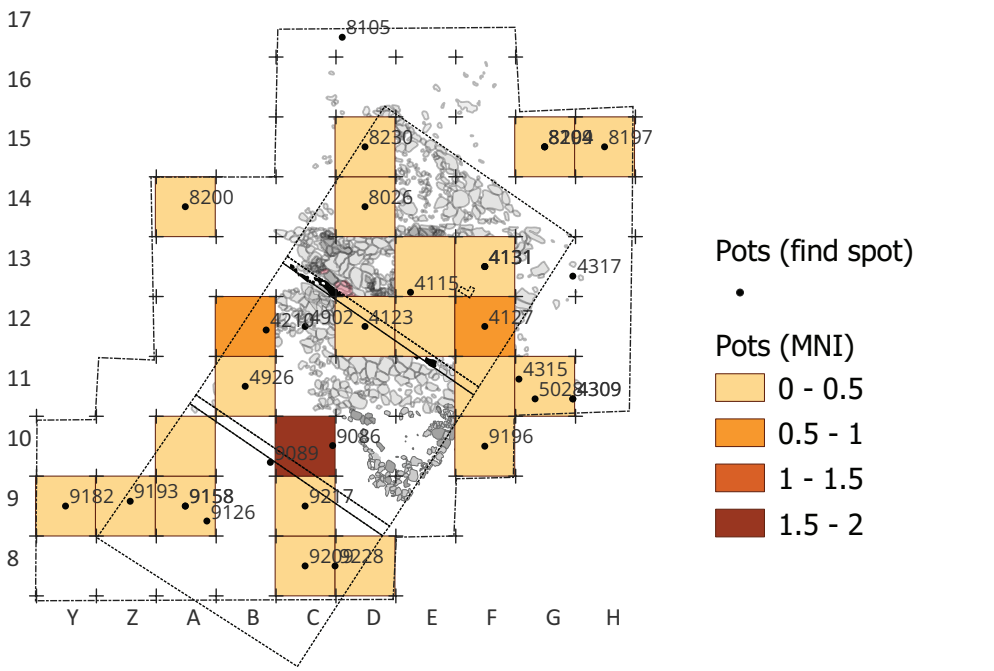

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
8105
8230
8197
8200
8026
4131
4317
4115
4902
4123
4127
4926
4315
4309
9086
9196
9089
9182
9193
9158
9126
9217
Pots (find spot)
Pots (MNI)
0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2

Fig. 9d

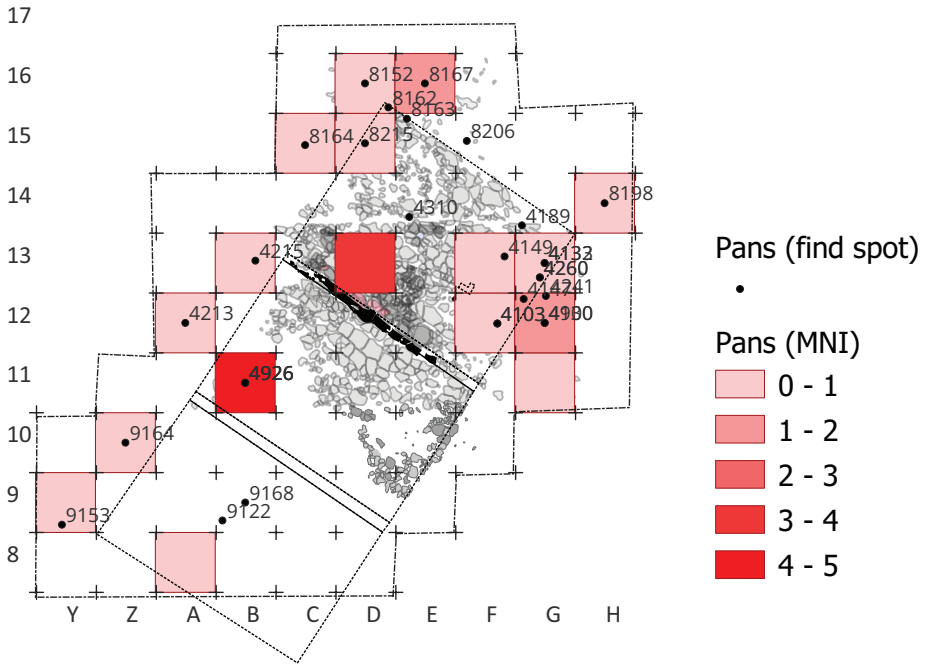

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
8152 8167
8162
8163
8164 8215
8206
8198
4310
4189
4215
4149
4133
4260
4213
4103 4080
4926
9164
9168
9153
9122
Pans (find spot)
Pans (MNI)
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5

Fig. 9e

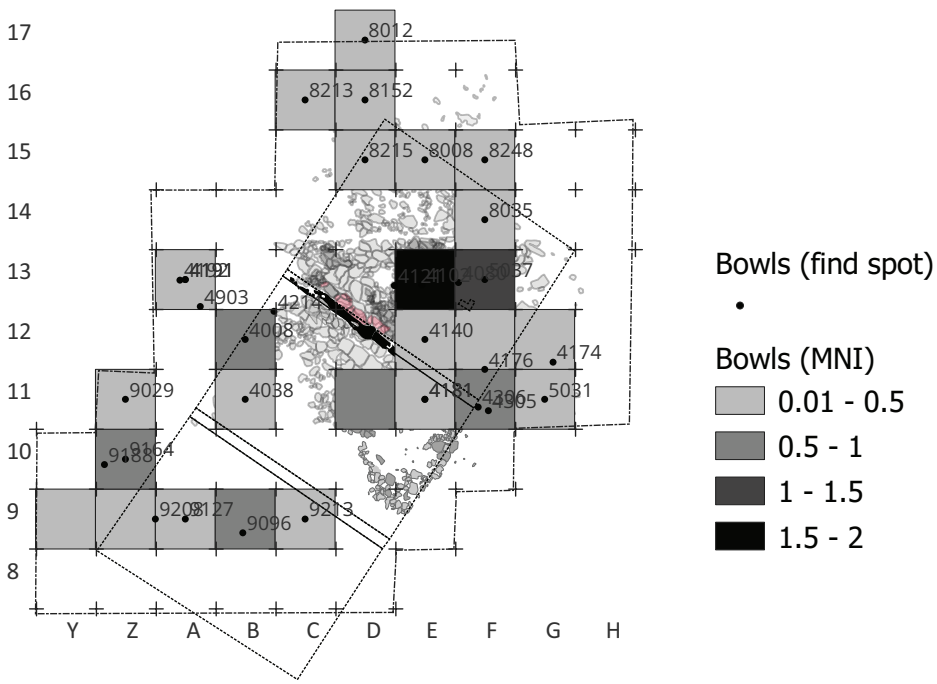

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
8012
8213 8152
8215 8008 8248
8085
4903
4008
4140
4176
4174
9029
4038
5031
9096
9213
Bowls (find spot)
Bowls (MNI)
0.01 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2

Fig. 9f

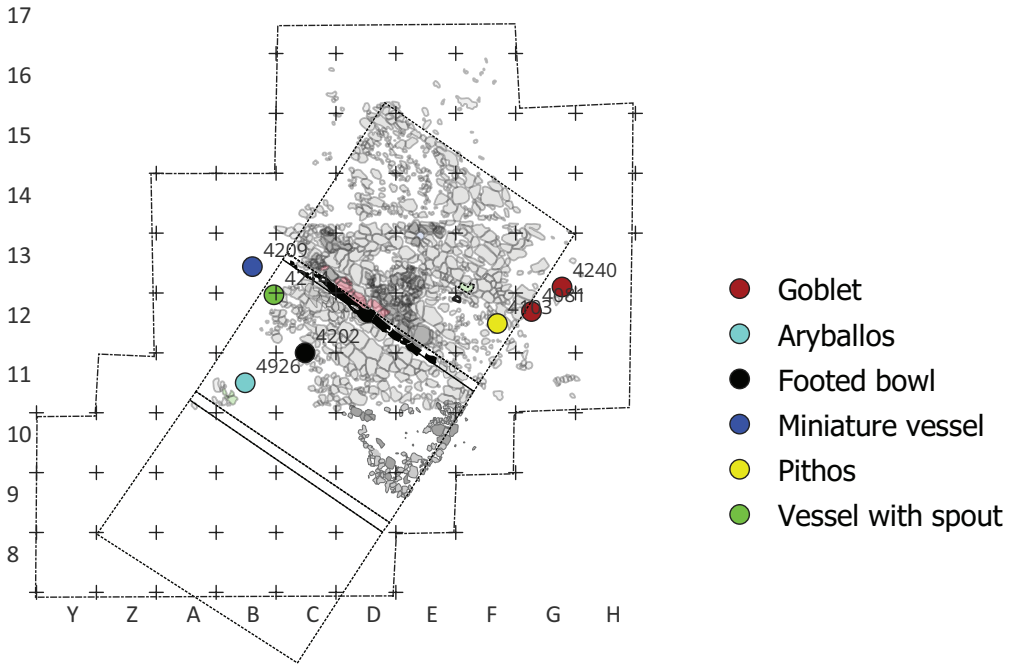

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
4209
4240
4202
4926
Goblet
Aryballos
Footed bowl
Miniature vessel
Pithos
Vessel with spout

Fig. 9g

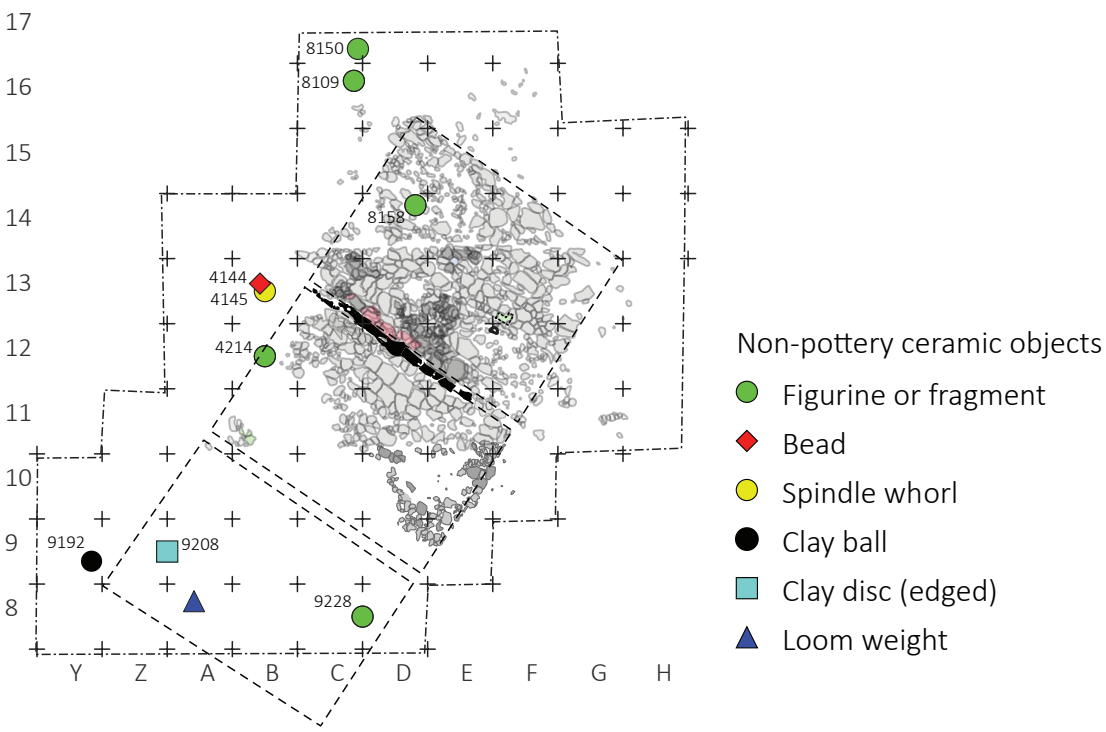

17
16
15
14
13
12
11
10
9
8
Y Z A B C D E F G H
8150
8109
8158
4144
4145
4214
9192
9208
9228
Non-pottery ceramic objects
Figurine or fragment
Bead
Spindle whorl
Clay ball
Clay disc (edged)
Loom weight

Fig. 9h

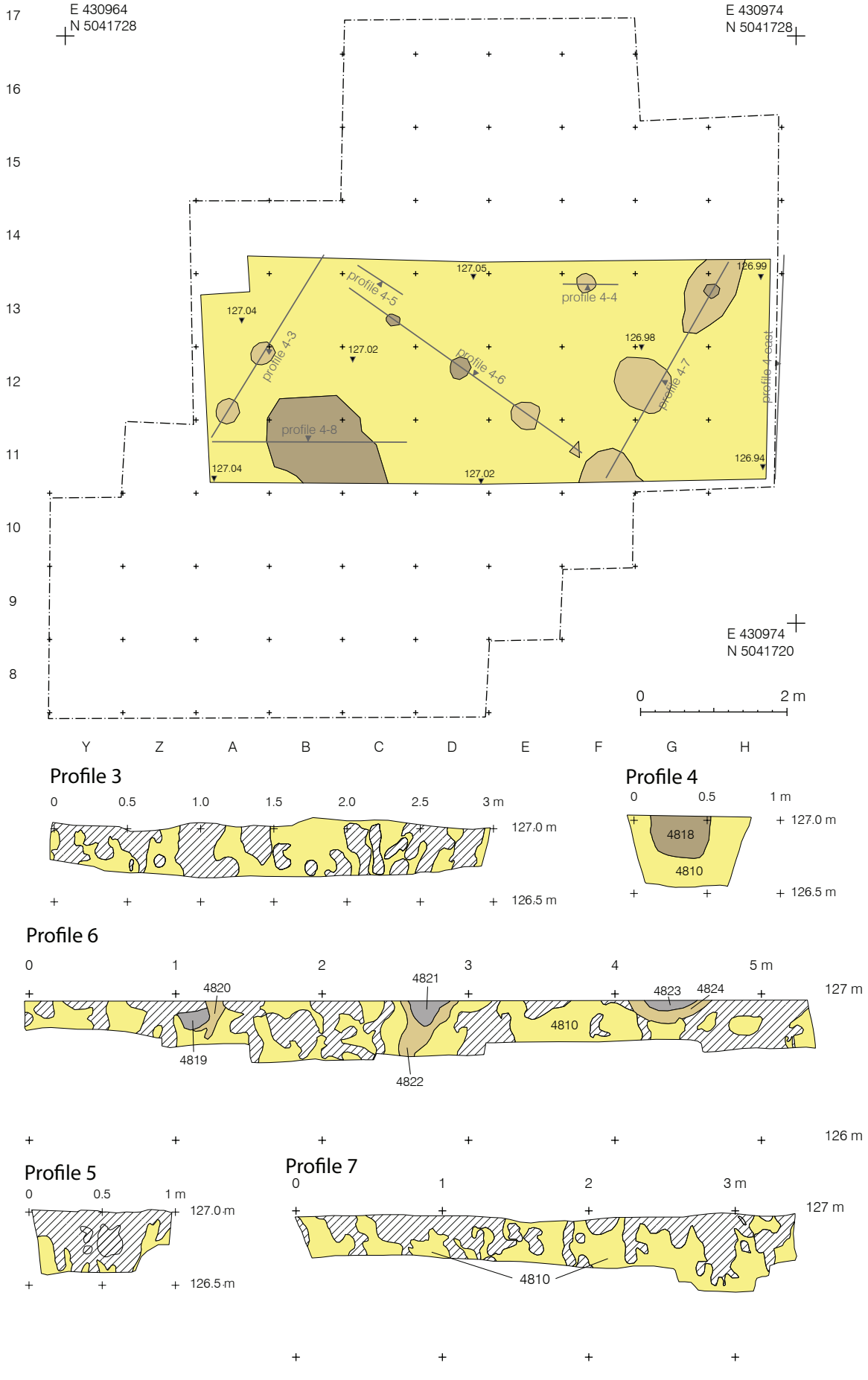


Fig. 10: Remains of construction-related post holes in the loess under the central part of House 1 in Area 3 in the planum and different cross-sections. Graphic by: Robert Hofmann

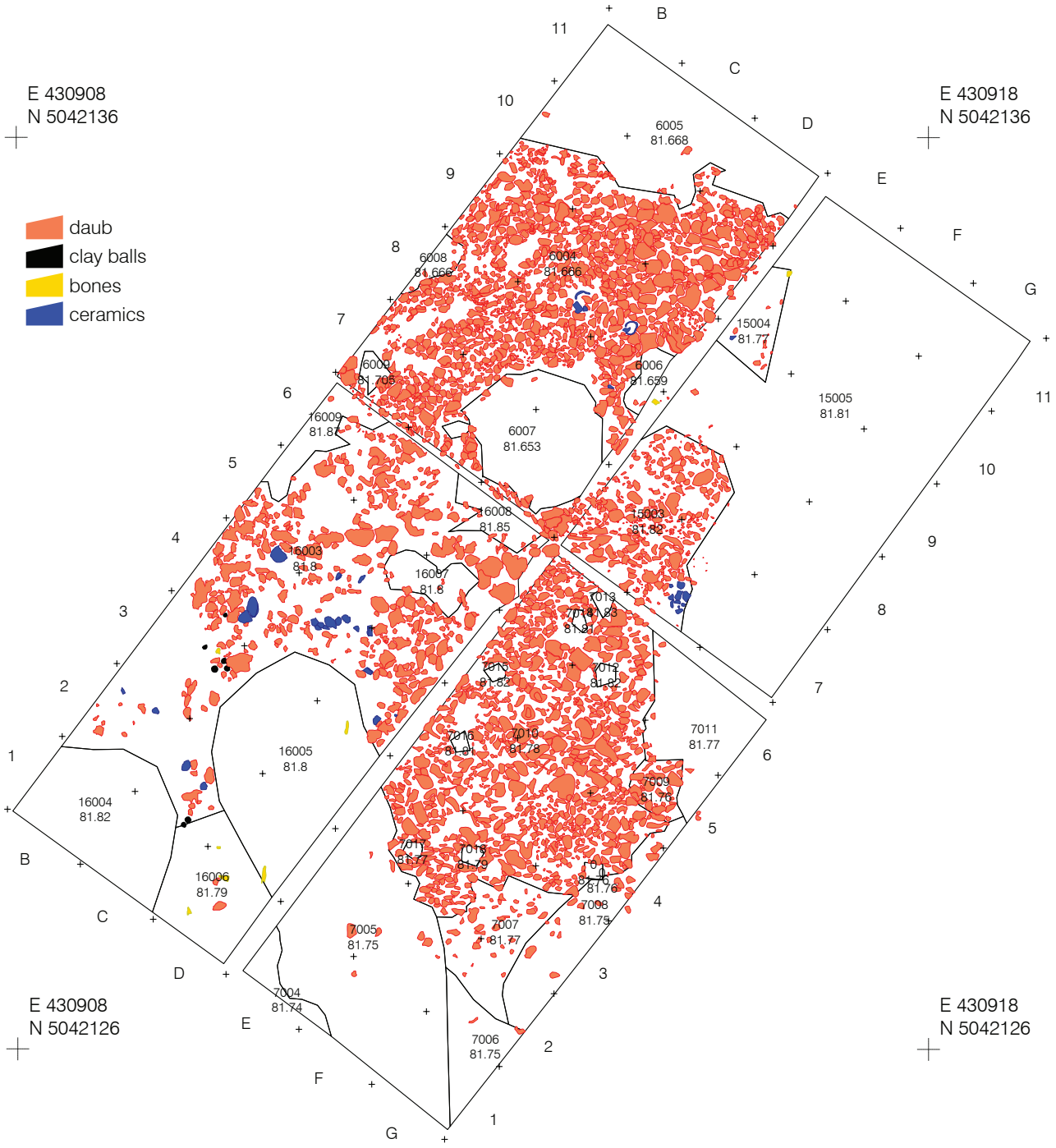


Fig. 11: Plan of House 5 in Area 4, showing the features in the area of the upper layer of the burnt daub. Graphic by: Robert Hofmann

Fig. 12: In-situ-photo of clay balls (sling missiles?) and the fragment of a perforated clay object (window?) in the debris of House 5.

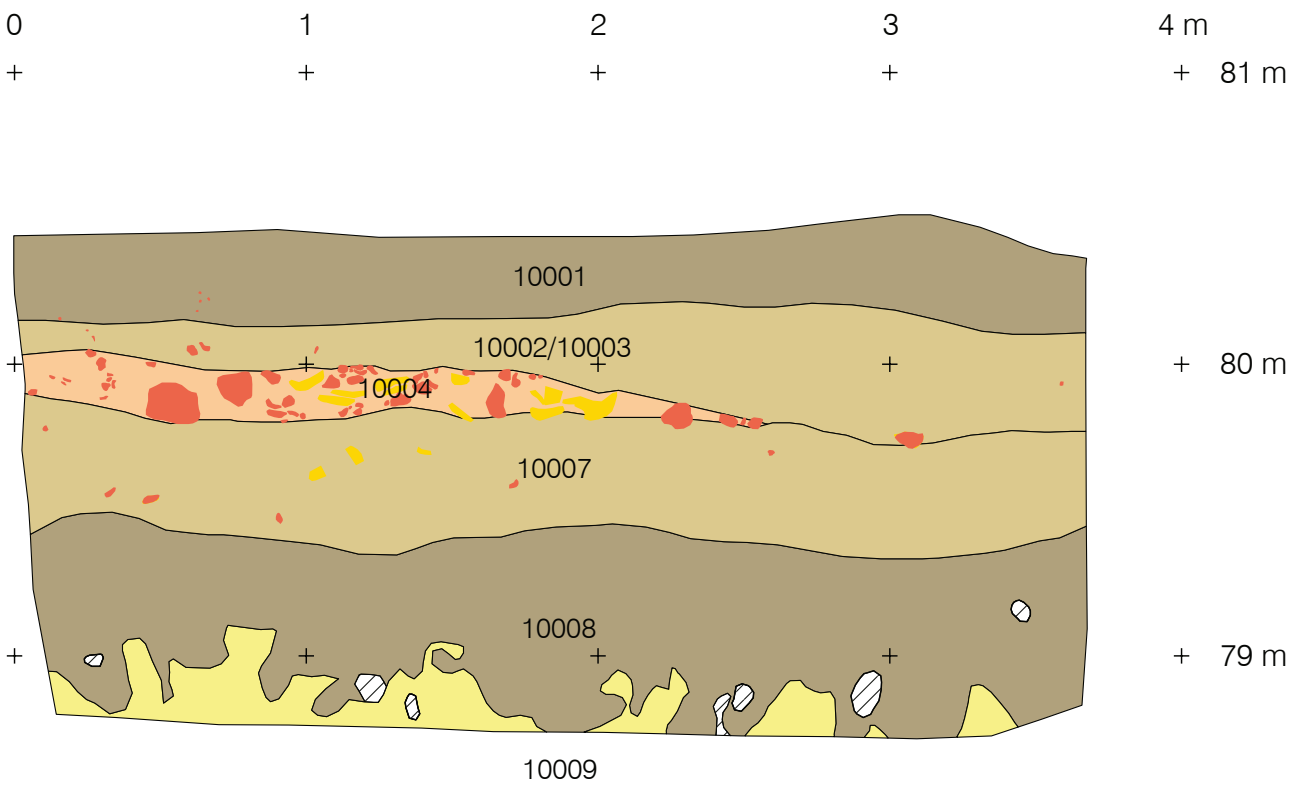


Fig. 13: West profile of Trench 10 with remains of House 2 in Area 5. Graphic by: Robert Hofmann

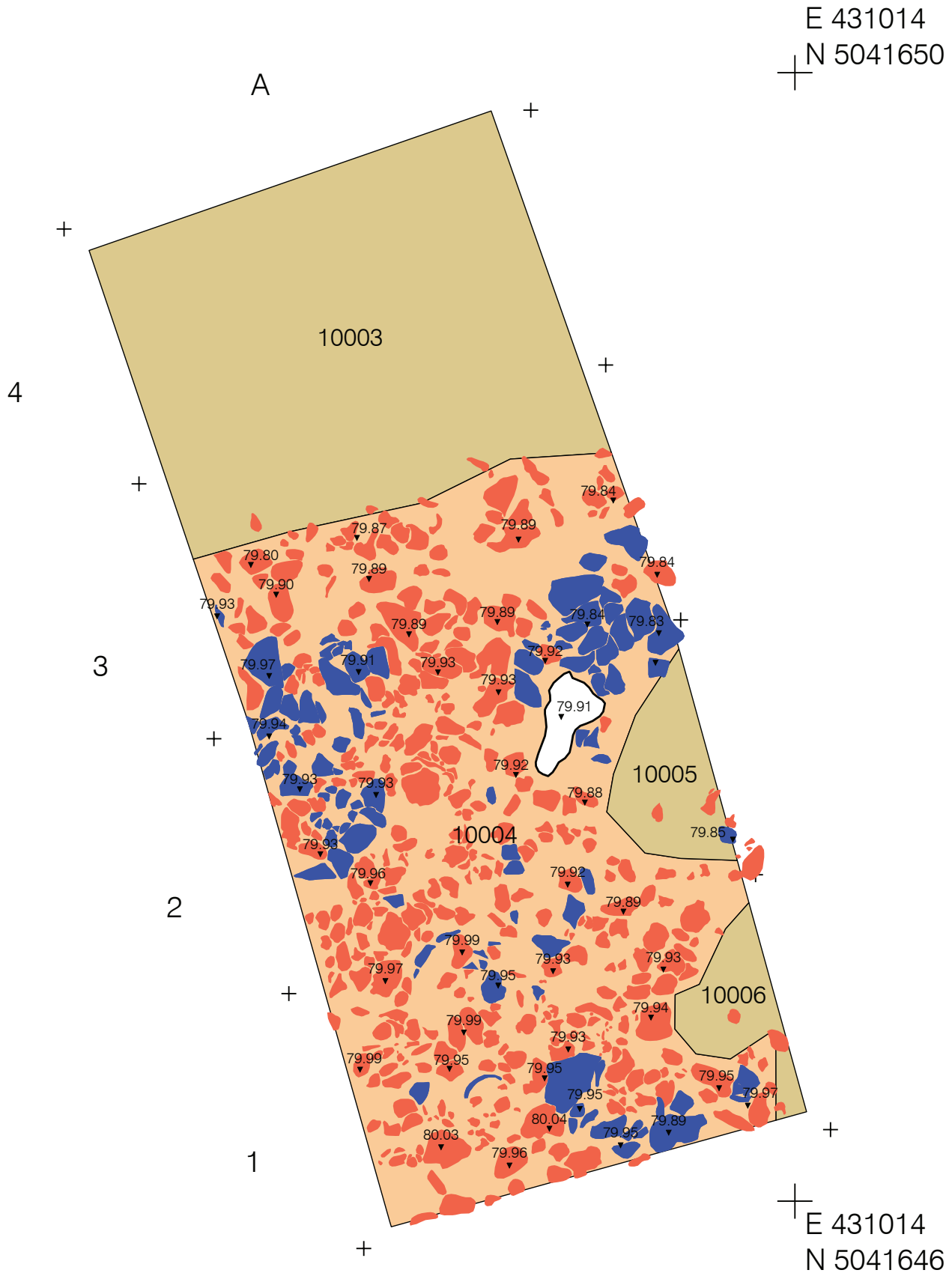
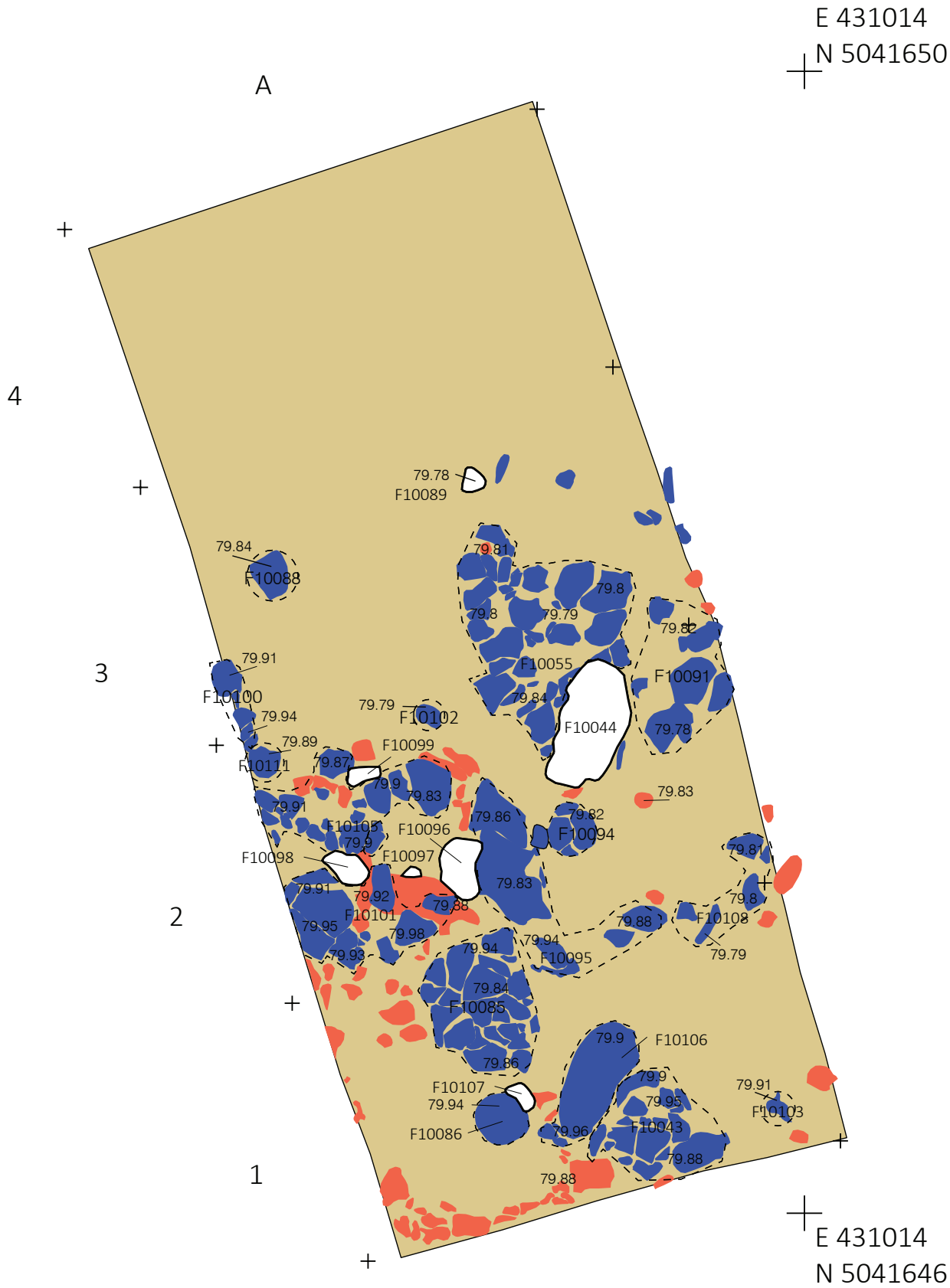


Fig. 14: Features with House 2 in Area 5: a) upper layer of burnt daub, b) photo of the find concentration below the burnt daub, c) graphic representation of the find concentration below the burnt daub. Graphic by: Robert Hofmann

Fig. 14b


E 431014
N 5041650
A
4
3
2
1
79.78
F10089
79.84
F10088
79.81
79.8
79.8
79.79
79.82
F10055
F10091
79.91
F10100
79.84
79.79
F10102
F10044
79.94
79.78
79.89
F10099
F10111
79.87
79.9
79.83
79.83
79.91
79.86
79.82
F10105
F10096
F10094
79.9
F10098
F10097
79.81
79.83
79.91
79.92
79.88
79.8
F10101
79.88
F10108
79.95
79.98
79.94
79.94
F10095
79.93
79.79
79.84
F10085
79.9
F10106
79.86
79.9
F10107
79.91
79.94
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F10103
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79.96
F10043
79.88
79.88
E 431014
N 5041646

Fig. 14c

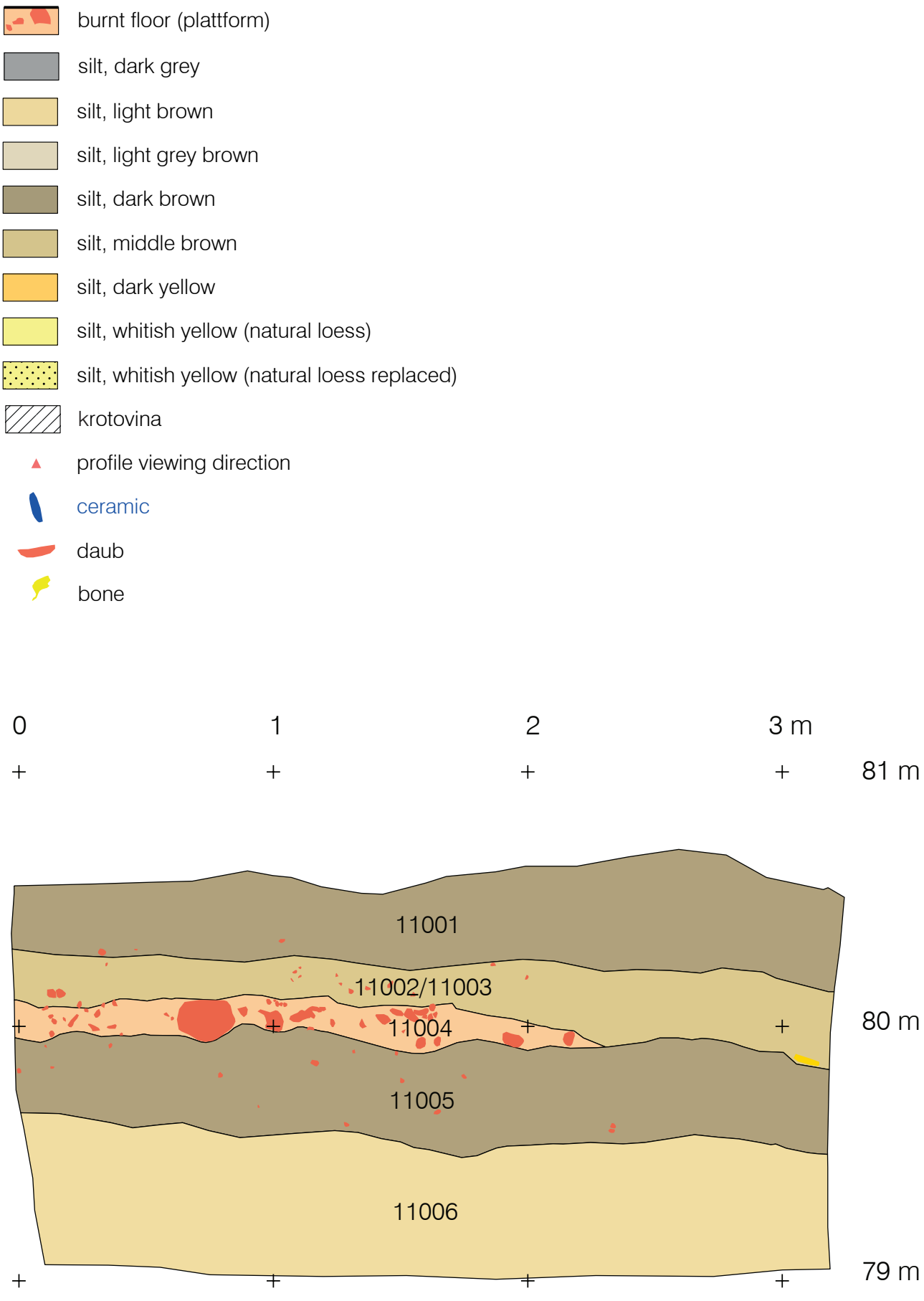


Fig. 15: West profile of Trench 11 with remains of House 3 in Area 6. Graphic by: Robert Hofmann

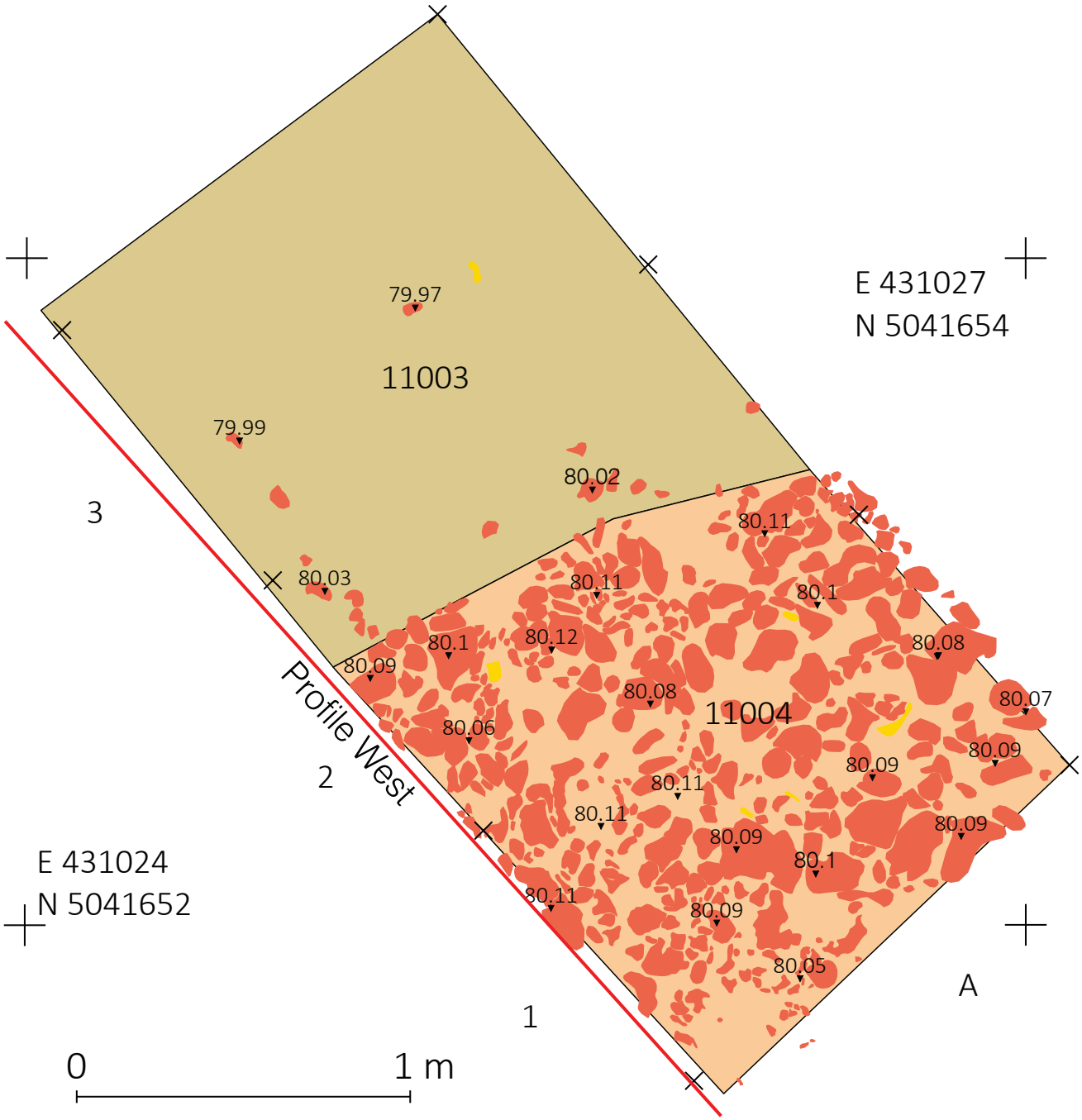


Fig. 16: Features of House 3 in Area 6. Upper layer of burnt daub. Graphic by: Robert Hofmann

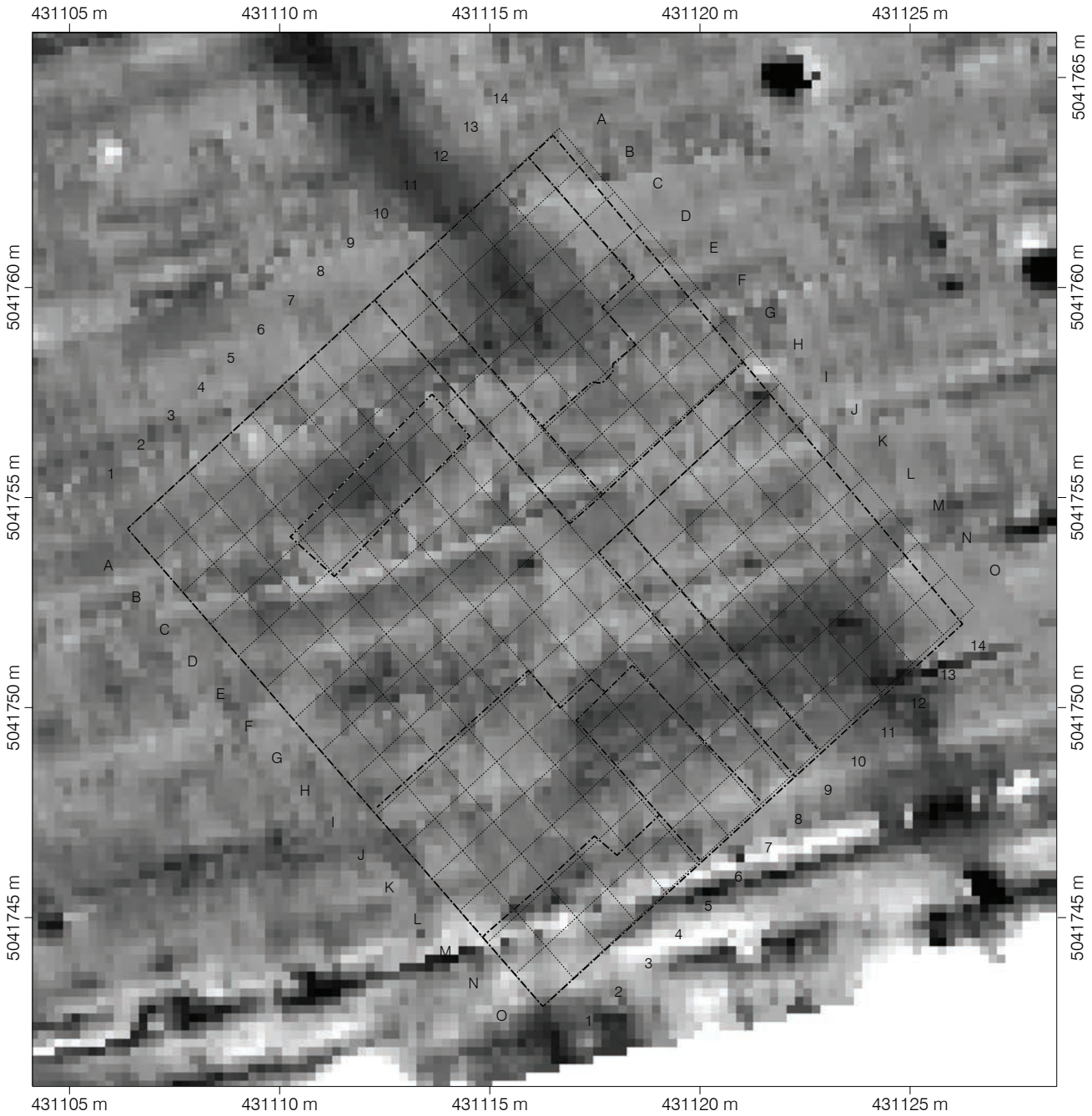


Fig. 17: Magnetic map of the gate examined in Area 9 in the outer ditch of the horizontal settlement. Graphic by: Robert Hofmann

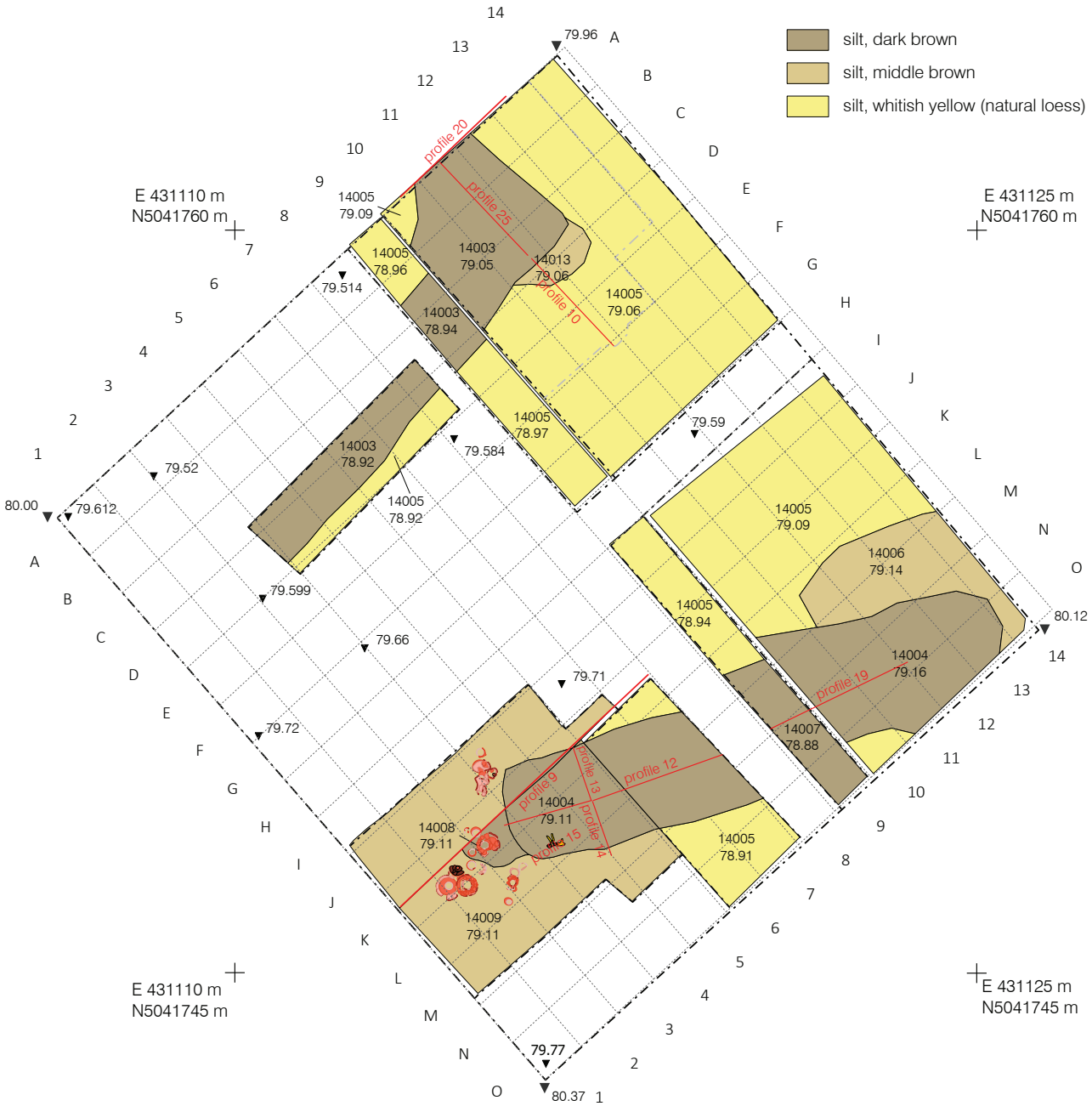


Fig. 18: Plan of the Area 9 showing the upper edge of the ditches in the in-situ loess, the position of the vessel deposit and the position of selected profiles. Graphic by: Robert Hofmann

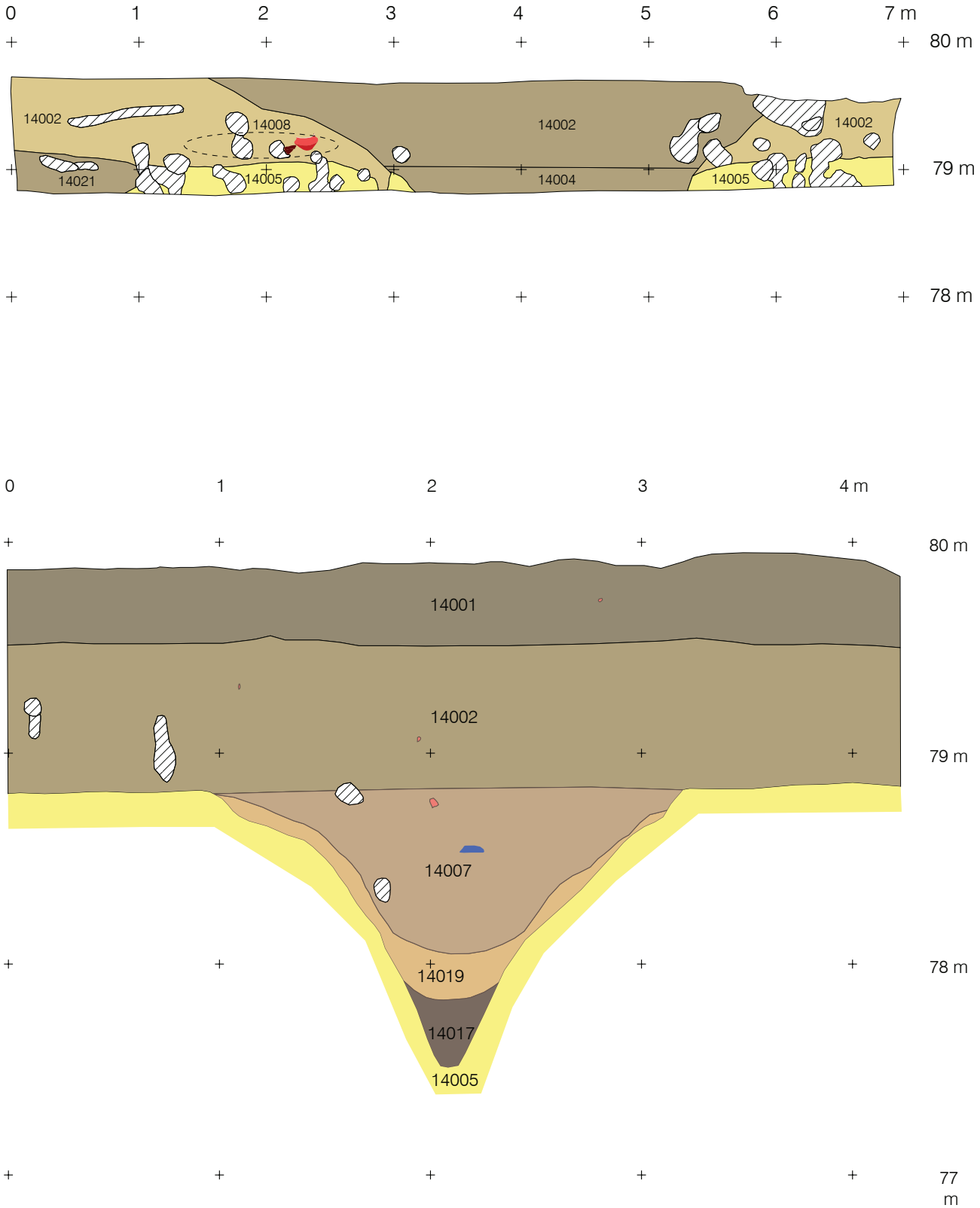
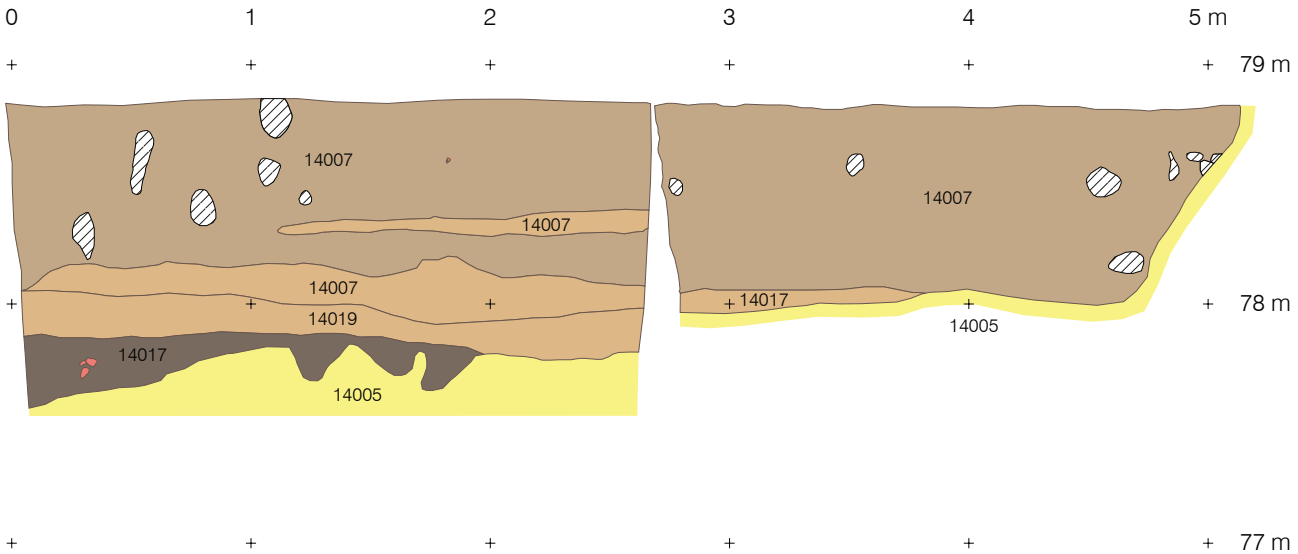


Fig. 19a and 19b: Selected profiles from Area 9. Graphic by: Robert Hofmann



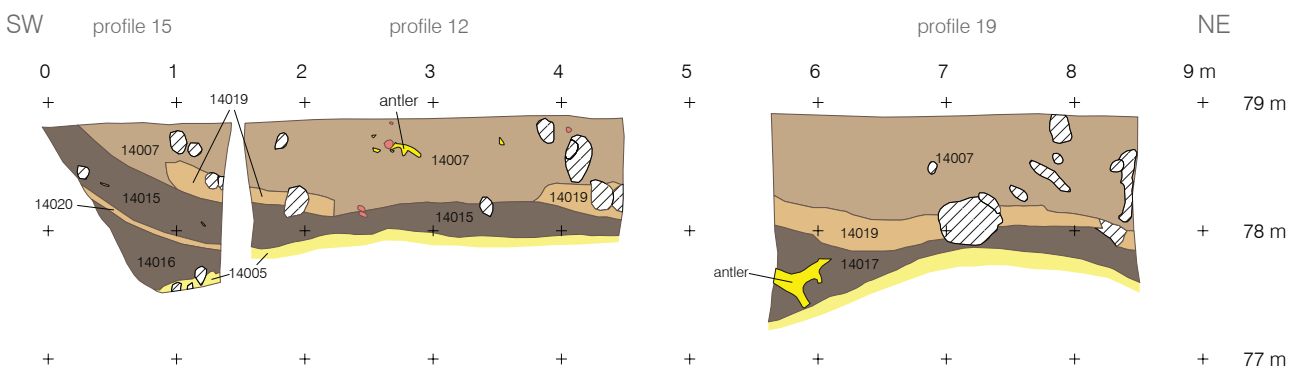


Fig. 19c and 19d: Selected profiles from Area 9. Graphic by: Robert Hofmann

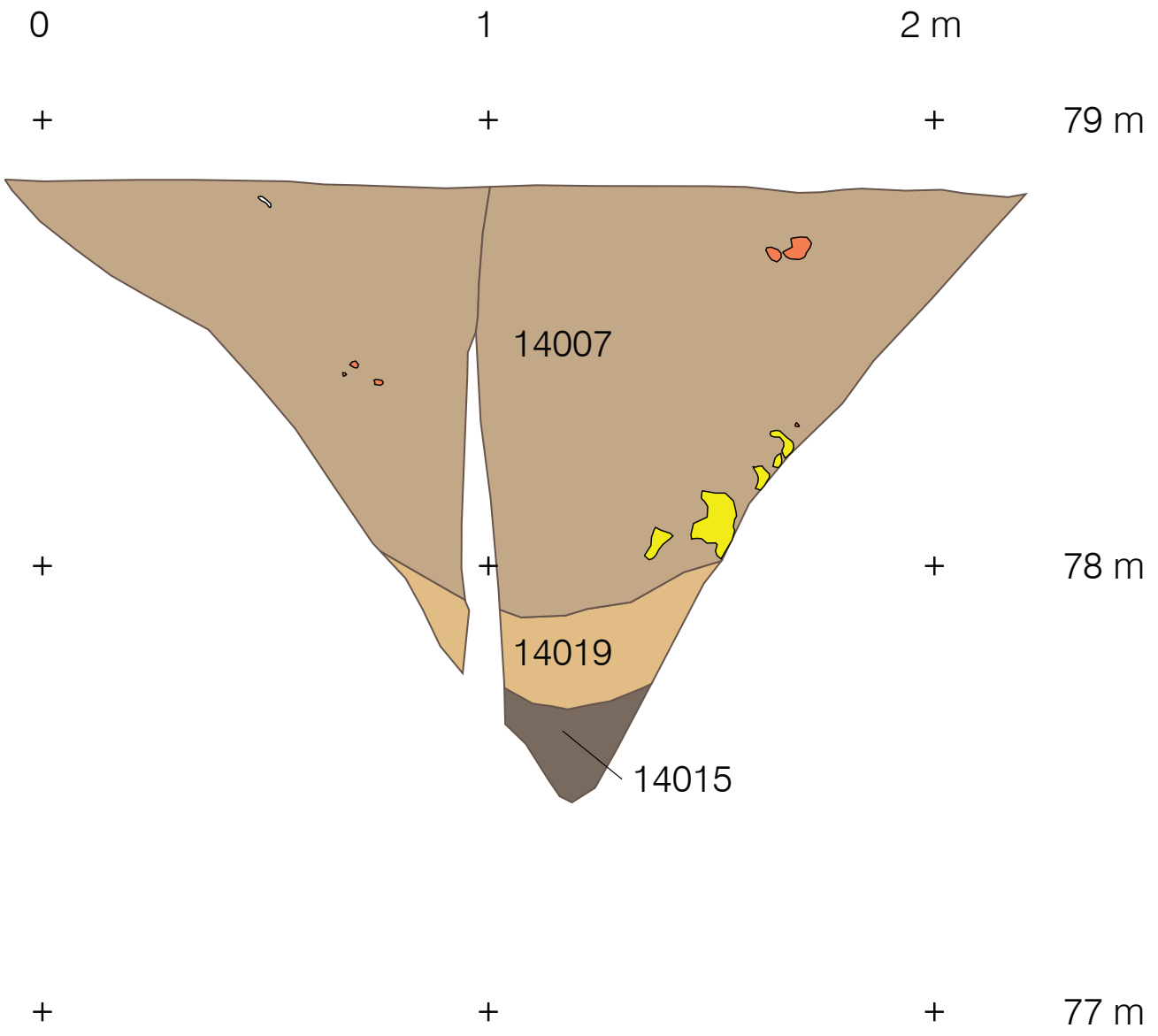


Fig. 19e: Selected profiles from Area 9. Graphic by: Robert Hofmann

Fig. 20: Fragments of antlers and the horn cone of a cow in the backfill of the southern side of the gate in Area 9

Fig. 21: In situ photograph of a part of the vessel groups 2a, 2b and 3 at the end of the southern side of the ditch in Area 9

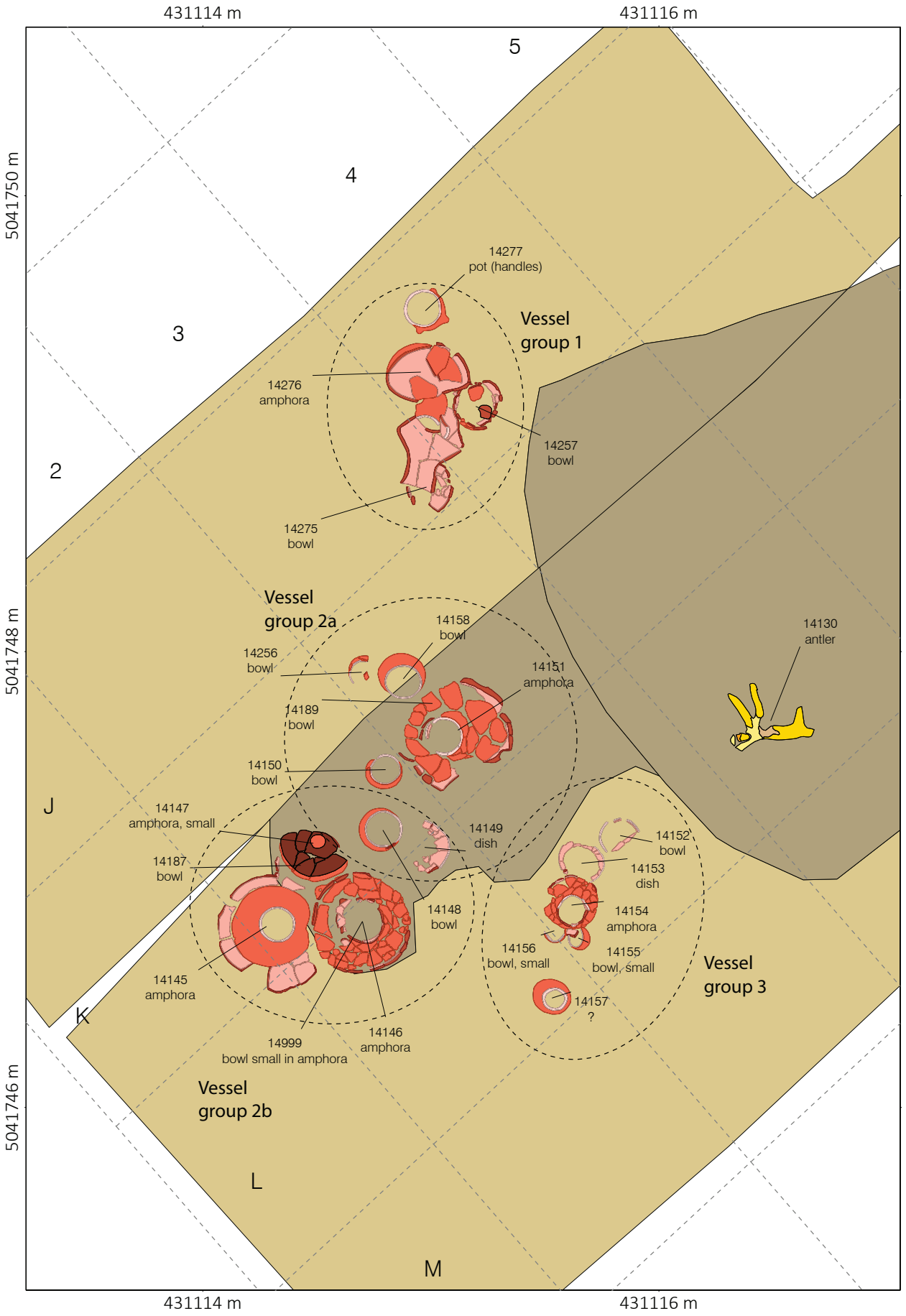


Fig. 22: Plan of vessel groups 1, 2a, 2b and 3 at the end of the southern side of the gate investigated in Area 9. Graphic by: Robert Hofmann

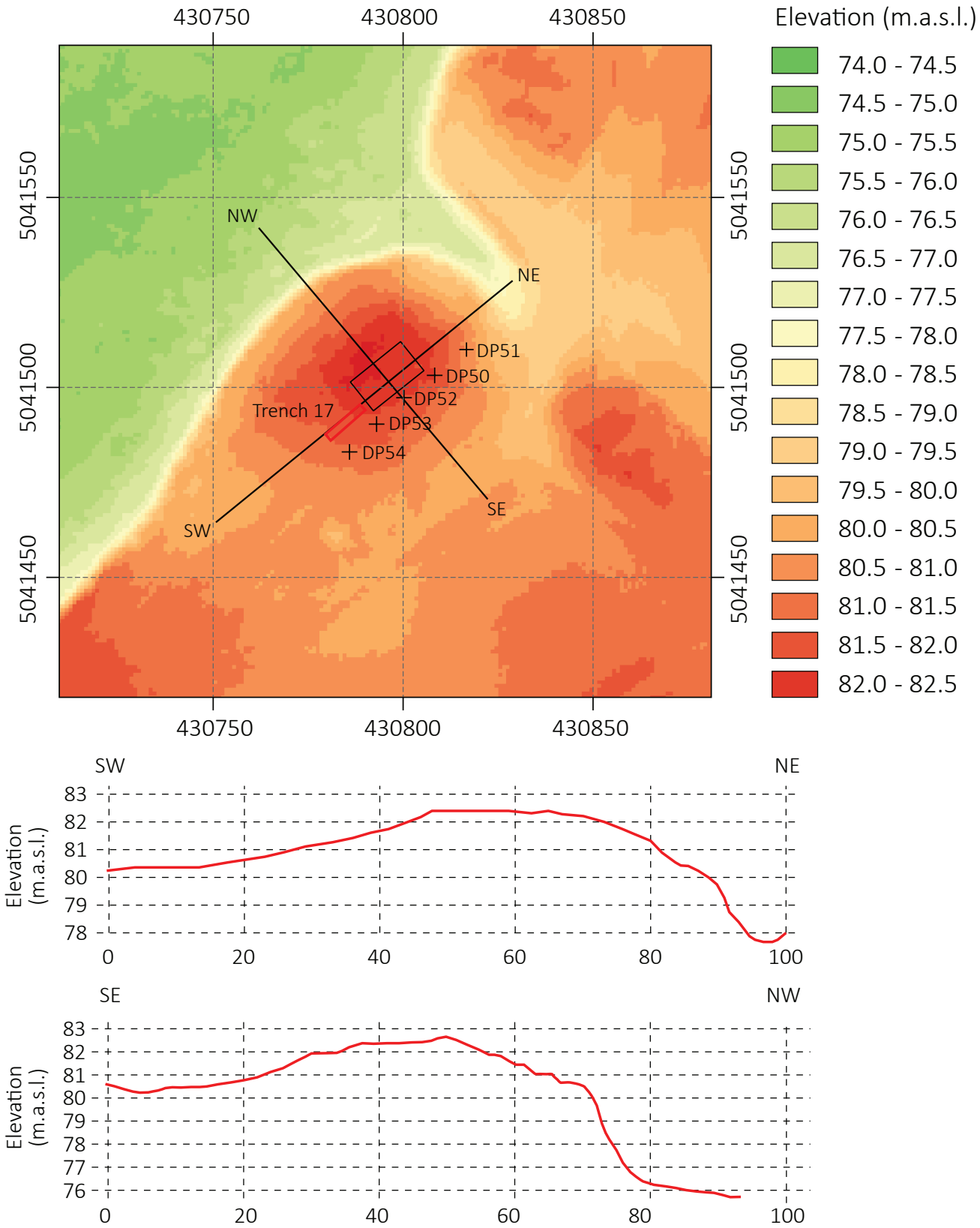


Fig. 23: Digital elevation model of the small mound in the centre of the horizontal settlement with height profiles and location of Area 10 (Trench 17) and drilling points. Graphic by: Robert Hofmann

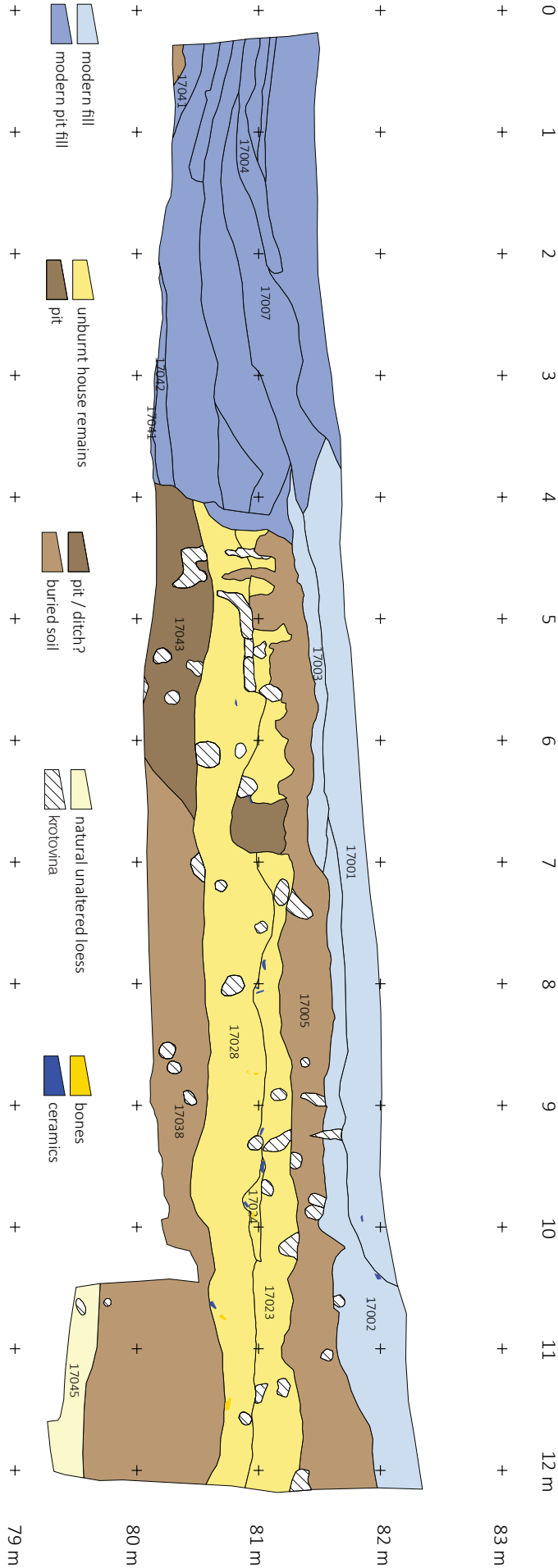


Fig. 24: North-west profile of Trench 17 (Area 10). Graphic by: Robert Hofmann

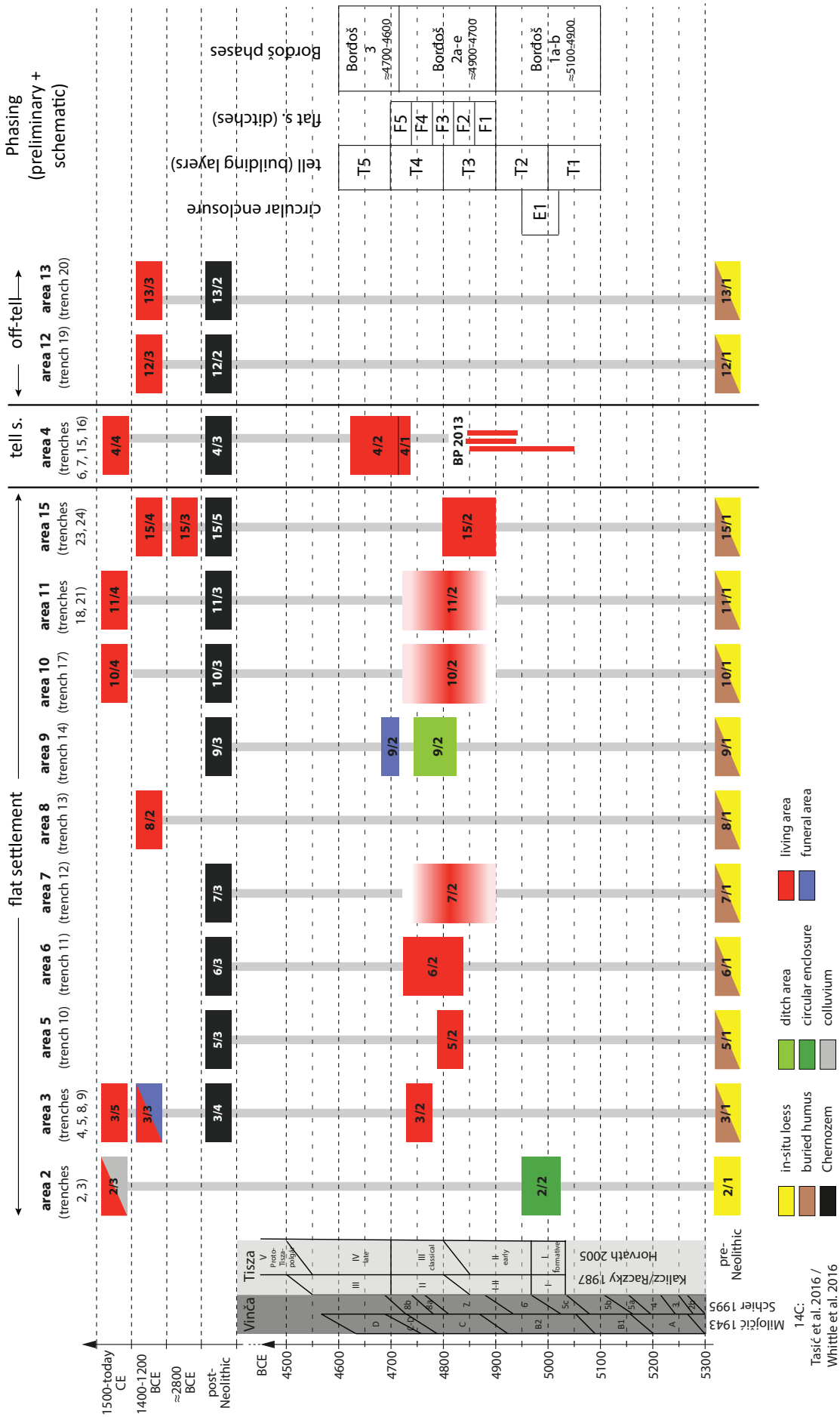


Fig. 25: Graphical representation of the modelled ^{14}C dating probabilities of layer formations from Borđoš and the proposed periodization of the site in comparison to regional Vinča and Tisza chronologies. Graphic by: Robert Hofmann

Layer formation	Description
Bord 2/1	natural Loess and soil in excavation area 2=trenches 2 and 3
Bord 2/2	circular enclosure (construction and use)
Bord 2/3	topsoil in excavation area 2
Bord 3/1	natural Loess and soil in excavation area 3
Bord 3/2	late Neolithic house area (excavation area 3)
Bord 3/3	late Bronze Age pits and urn graves
Bord 3/4	topsoil in excavation area 3
Bord 3/5	early modern pits and posthole in excavation area 3
Bord 4/1	levelling(?) layer below uppermost late Neolithic house
Bord 4/2	uppermost building horizon in area 4 (=trenches 6, 7, 15, 16)
Bord 4/3	topsoil in area 4 (=trenches 6, 7, 15, 16)
Bord 4/4	early modern pits in excavation area 4 ((=trenches 6, 7, 15, 16)
Bord 5/1	natural Loess and soil in excavation area 5 =trench 10
Bord 5/2	late Neolithic house area in excavation area 5=trench 10
Bord 5/3	topsoil in area 5 (trench 10)
Bord 6/1	natural Loess and soil in excavation area 6=trench 11
Bord 6/2	late Neolithic house area in excavation area 6=trench 11
Bord 6/3	topsoil in area 6=trench 11
Bord 7/1	natural Loess and soil in excavation area 7=trench 12
Bord 7/2	late Neolithic house area in excavation area 7=trench 12
Bord 7/3	topsoil in area 7=trench 12
Bord 8/2	Bronze age pits at the Tisza bank=Trench 13
Bord 9/1	natural Loess and soil in excavation area 9=trench 14
Bord 9/2	late Neolithic ditch area in excavation area 9=trench 14
Bord 9/3	topsoil in excavation area 9=trench 14
Bord 10/1	natural Loess and buried soil in excavation area 10=trench 17
Bord 10/2	late Neolithic house area in excavation area 10=trench 17
Bord 10/3	topsoil buried under modern fills in excavation area 10=trench 17
Bord 10/4	modern fill to raise elevation and pits in excavation area 10=trench 17
Bord 15/?	Pit of unknown date in excavation area 15=trench 24
Bord 15/1	natural Loess and soil in excavation area 15=trenches 23 and 24
Bord 15/2	late Neolithic pits in excavation area 15=trenches 23 and 24
Bord 15/3	Chalcolithic pit in excavation area 15=trench 23
Bord 15/4	Bronze Age pits and burial in excvation area 15=trenches 23 and 34
Bord 15/5	Chernozem (or Kolluvium) + pits above buried soil and older pits

Appendix 1: List and description of layer formations defined for the grouping of features from the excavations at the site of Borđoš

Feature-id	Layer formation	Layer group	Layer	Interpretation
2001	Bord 2/3	A2-topsoil	colluvium	colluvium
2002	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2003	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2004	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2005	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2006	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2007	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2008	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2009	Bord 2/3	A2-topsoil	colluvium	layer
2010	Bord 2/2	A2-inner + connection ditch	upper fill	ditch, fill
2011	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2012	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2013	Bord 2/1	A2-in-situ-loess	n/a	in-situ soil
2014	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
2015	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2016	Bord 2/2	A2-connection ditch	upper fill	ditch, fill
2017	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2018	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2019	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2020	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2021	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2022	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2023	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2024	Bord 2/2	A2-inner ditch	lower fill	ditch, fill

Appendix 2: Interpretation of the features documented during the excavations at the site of Borđoš and their affiliation to feature groups

2025	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2026	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2027	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2028	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2029	Bord 2/1	A2-in-situ-loess	n/a	in-situ soil
2030	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2031	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2032	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2033	Bord 2/1	A2-in-situ-loess	n/a	in-situ soil
2034	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2035	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2036	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2037	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2038	Bord 2/2	A2-inner + connection ditch	upper fill	ditch, fill
2039	Bord 2/2	A2-inner + connection ditch	upper fill	ditch, fill
2040	Bord 2/2	A2-inner + connection ditch	upper fill	ditch, fill
2041	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2042	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2043	Bord 2/2	A2-connection ditch	lower fill	ditch, fill
2044	Bord 2/2	A2-connection ditch	upper fill	ditch, fill
2045	Bord 2/2	A2-connection ditch	upper fill	ditch, fill
2046	Bord 2/2	A2-connection ditch	upper fill	ditch, fill
2047	Bord 2/2	A2-connection ditch	upper fill	ditch, fill
2048	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2049	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2050	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2051	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2052	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2053	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2054	Bord 2/2	A2-inner ditch	lower fill	ditch, fill

2055	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2056	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2057	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2058	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2059	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2060	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2061	Bord 2/3	A2-pit	fill	pit, fill
2062	Bord 2/3	A2-pit	fill	pit, fill
2063	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2064	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2065	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2066	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2067	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2068	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2069	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
2070	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2071	Bord 2/2	A2-inner ditch	upper fill	ditch, fill
2072	Bord 2/2	A2-inner ditch	lower fill	ditch, fill
3001	Bord 2/3	A2-topsoil	colluvium	colluvium
3002	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3003	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3004	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3005	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3006	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3007	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3008	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3009	Bord 2/2	A2-outer + connection ditch	upper fill	ditch, fill

3010	Bord 2/2	A2-outer + connection ditch	upper fill	ditch, fill
3011	Bord 2/2	A2-outer ditch	upper fill	ditch, fill
3012	Bord 2/3	A2-posthole	fill	posthole, fill
3013	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3014	Bord 2/3	A2-topsoil ploughing tracks	n/a	ploughing track
3015	Bord 2/1	A2-in-situ-loess	n/a	in-situ soil
3016	Bord 2/2	A2-outer + connection ditch	lower fill	ditch, fill
3017	Bord 2/2	A2-outer + connection ditch	lower fill	ditch, fill
3018	Bord 2/2	A2-outer + connection ditch	lower fill	ditch, fill
3019	Bord 2/2	A2-outer + connection ditch	lower fill	ditch, fill
3020	Bord 2/2	A2-outer + connection ditch	lower fill	ditch, fill
3021	Bord 2/2	A2-outer ditch	upper fill	ditch, fill
4001	Bord 3/4	A3-topsoil	Chernozem	Chernozem
4002	Bord 3/4	A3-topsoil	transition	layer
4003	Bord 3/2	A3-house 1	wall debris	burnt wall debris
4004	Bord 3/2	A3-house 1	installation (storage?)	installation
4005	Bord 3/4	A3-topsoil	transition	layer
4006	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4007	Bord 3/2	A3-house 1	wall debris	burnt wall debris
4008	Bord 3/2	A3-house 1	wall debris	burnt wall debris
4009	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
4010	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
4011	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
4012	Bord 3/4	A3-topsoil	transition	layer
4013	Bord 3/2	A3-open space (house 1)	ancient surface	ancient surface
4014	Bord 3/2	A3-house 1	wall debris	burnt wall debris

4015	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
4016	Bord 3/2	A3-house 1	floor finish	house floor
4017	Bord 3/2	A3-house 1	platform	house platform, burnt
4018	Bord 3/2	A3-house 1	post 1-pipe	posthole, pipe
4019	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4020	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4021	Bord 3/2	A3-house 1	internal wall	partition wall
4022	Bord 3/2	A3-house 1	wall debris	burnt wall debris
4023	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4024	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4025	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4026	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
4027	Bord 3/2	A3-house 1	floor finish	house floor
4028	Bord 3/1	A3-buried soil	n/a	buried humus
4029	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
4030	Bord 3/1	A3-buried soil	n/a	buried humus
4031	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
4032	Bord 3/4	A3-topsoil	transition	layer
4033	Bord 3/2	A3-house 1	wall debris	burnt wall debris
4034	Bord 3/2	A3-house 1	platform	house platform, burnt
4035	Bord 3/1	A3-buried soil	n/a	buried humus
4036	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
4037	Bord 3/1	A3-in-situ-loess	n/a	in-situ-loess
4038	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4039	Bord 3/4	A3-topsoil	transition	layer
4040	Bord 3/2	A3-house 1	undifferentiated	burnt wall debris
4041	Bord 3/1	A3-buried soil	n/a	buried humus
4042	Bord 3/2	A3-house 1	floor finish	house floor
4800	Bord 3/1	A3-buried soil	n/a	buried humus

4801	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
4802	Bord 3/1	A3-buried soil	n/a	buried humus
4803	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
4804	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4805	Bord 3/1	A3-buried soil	n/a	buried humus
4806	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4807	Bord 3/2	A3-house 1	post 2-hole	posthole, fill
4808	Bord 3/2	A3-house 1	post 3-hole	posthole, fill
4809	Bord 3/2	A3-house 1	post 4-hole	posthole, fill
4810	Bord 3/1	A3-in-situ-loess	n/a	in-situ-loess
4811	Bord 3/2	A3-house 1	post 5-hole	posthole, fill
4812	Bord 3/2	A3-house 1	post 6-hole	posthole, fill
4813	Bord 3/2	A3-house 1	post 7-hole	posthole, fill
4814	Bord 3/2	A3-house 1	post 7-pipe	posthole, pipe
4815	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4816	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4817	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
4818	Bord 3/2	A3-house 1	post 6-hole	posthole, fill
4819	Bord 3/2	A3-house 1	post 8-pipe	posthole, pipe
4820	Bord 3/2	A3-house 1	post 9-hole	posthole, fill
4821	Bord 3/2	A3-house 1	post 9-pipe	posthole, pipe
4822	Bord 3/2	A3-house 1	post 9-hole	posthole, fill
4823	Bord 3/2	A3-house 1	post 5-pipe	posthole, pipe
4824	Bord 3/2	A3-house 1	post 5-hole	posthole, fill
4825	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
5001	Bord 3/4	A3-topsoil	Chernozem	Chernozem
5002	Bord 3/4	A3-topsoil	transition	layer
5003	Bord 3/2	A3-house 1	layer above daub	layer
5004	Bord 3/2	A3-house 1	wall debris	burnt wall debris
5005	Bord 3/2	A3-house 1	wall debris	burnt wall debris
5006	Bord 3/2	A3-house 1	layer above daub	layer
5007	Bord 3/2	A3-house 1	layer above daub	layer

5008	Bord 3/2	A3-house 1	layer above daub	layer
6001	Bord 4/3	A3-topsoil	Chernozem	Chernozem
6002	Bord 4/3	A4-topsoil	transition	layer
6003	Bord 4/2	A4-Layer above and beside daub of house 5	n/a	layer
6004	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
6005	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
6006	Bord 4/4	A4-pit 4/1	pit fill	pit, fill
6007	Bord 4/4	A4-pit 4/2	pit fill	pit, fill
6008	Bord 4/4	A4-pit 4/3	pit fill	pit, fill
6009	Bord 4/4	A4-pit 4/4	pit fill	pit, fill
6010	Bord 4/2	A4-house 5	floor finish + platform	house platform, burnt
6011	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
6012	Bord 4/4	A4-pit 4/5	pit fill	pit, fill
6013	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
6014	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
6015	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
6016	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7001	Bord 4/3	A3-topsoil	Chernozem	Chernozem
7002	Bord 4/3	A4-topsoil	transition	layer
7003	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
7004	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7005	Bord 4/4	A4-pit 4/6	pit fill	pit, fill
7006	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7007	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7008	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7009	Bord 4/2	A4-house 5	posthole?	posthole, fill

7010	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
7011	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
7012	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7013	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7014	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7015	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7016	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7017	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
7018	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
8001	Bord 3/4	A3-topsoil	Chernozem	Chernozem
8002	Bord 3/4	A3-topsoil	transition	layer
8003	Bord 3/3	A3-grave 3/1	grave 3/1	grave
8004	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
8005	Bord 3/2	A3-house 1	platform	house platform, burnt
8006	Bord 3/2	A3-house 1	wall debris	burnt wall debris
8007	Bord 3/2	A3-open space (house 1)	ancient surface	ancient surface
8008	Bord 3/3	A3-pit 3/3	pit fill	pit, fill
8009	Bord 3/3	A3-pit 3/3	pit fill	pit, fill
8010	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
8011	Bord 3/2	A3-open space (house 1)	ancient surface	ancient surface
8012	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
8013	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
8014	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
8015	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
8016	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
8017	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
8018	Bord 3/1	A3-buried soil	n/a	buried humus

8019	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
9001	Bord 3/4	A3-topsoil	Chernozem	Chernozem
9002	Bord 3/5	A3-pit 3/1	pit fill	pit, fill
9003	Bord 3/2	A3-house 1	layer above daub	layer
9004	Bord 3/3	A3-grave 3/2	grave 3/2	grave
9005	Bord 3/5	A3-posthole 3/5-1	posthole	posthole, fill
9006	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
9007	Bord 3/5	A3-pit 3/2	pit fill	pit, fill
9008	Bord 3/2	A3-house 1	wall debris	burnt wall debris
9009	Bord 3/2	A3-house 1	wall debris	burnt wall debris
9010	Bord 3/2	A3-house 1	layer	layer
9011	Bord 3/3	A3-pit 3/4	pit fill	pit, fill
9012	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
9013	Bord 3/5	A3-posthole 3/5-1	posthole	posthole, pipe
9014	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
9015	Bord 3/2	A3-house 1	platform	house platform, burnt
9016	Bord 3/1	A3-buried soil	n/a	buried humus
9017	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
9018	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
9019	Bord 3/1	A3-buried soil	n/a	buried humus
9020	Bord 3/3	A3-pit 3/4	pit fill	pit, fill
9021	Bord 3/2	A3-pit 3/5	pit fill	pit, fill
9022	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
9023	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
9024	Bord 3/2	A3-pit 3/5	pit fill	pit, fill
9025	Bord 3/5	A3-posthole 3/5-1	posthole	posthole, fill
9026	Bord 3/2	A3-house 1	posthole?	posthole? (not confirmed)
9027	Bord 3/5	A3-pit 3/2	pit fill	pit, fill

9028	Bord 3/2	A3-open space (house 1)	n/a	unbuild space
10001	Bord 5/3	A5-topsoil	Chernozem	Chernozem
10002	Bord 5/3	A5-topsoil	transition	layer
10003	Bord 5/2	A5-open space (house 2)	n/a	unbuild space
10004	Bord 5/2	A5-house 2	wall debris	burnt wall debris
10005	Bord 5/3	A5-topsoil	transition	layer
10006	Bord 5/3	A5-topsoil	transition	layer
10007	Bord 5/2	A5-house 2	layer below daub	layer
10008	Bord 5/1	A5-buried soil	n/a	buried humus
10009	Bord 5/1	A5-in-situ-loess	n/a	in-situ-loess
11001	Bord 6/3	A6-topsoil	Chernozem	Chernozem
11002	Bord 6/2	A6-house 3	layer above daub	layer
11003	Bord 6/2	A6-house 3	layer above daub	layer
11004	Bord 6/2	A6-house 3	wall debris	burnt wall debris
11005	Bord 6/2	A6-house 3+buried humus	n/a	layer
11006	Bord 6/1	A6-in-situ-loess	n/a	in-situ-loess
12001	Bord 7/3	A7-topsoil	Chernozem	Chernozem
12002	Bord 7/3	A7-topsoil	transition	layer
12003	Bord 7/2	A7-open space (house 4)	n/a	unbuild space
12004	Bord 7/2	A7-house 4	wall debris	burnt wall debris
12005	Bord 7/2	A7-house 4	layer below daub	layer
12006	Bord 7/1	A7-buried humus	n/a	buried humus
12007	Bord 7/1	A7-in-situ-loess	n/a	in-situ-loess
13001	Bord 8/2	A8-pit 8/1	pit fill	pit, fill
14001	Bord 9/3	A9-topsoil	Kolluvium	colluvium
14002	Bord 9/1	A9-buried soil	n/a	buried humus
14003	Bord 9/2	A9-northwestern ditch	upper fill	ditch, fill
14004	Bord 9/2	A9-southeastern ditch	upper fill	ditch, fill

14005	Bord 9/1	A9-in situ-loess	n/a	in-situ-loess
14006	Bord 9/2	A9-pit 9/1	pit fill	pit, fill
14007	Bord 9/2	A9-southeastern ditch	upper fill	ditch, fill
14008	Bord 9/2	A9-vessel depot	vessel depot	vessel deposition (cremation graves)
14009	Bord 9/2	A9-vessel depot	layer below vessels	layer
14010	Bord 9/2	A9-vessel depot	ancient surface	ancient surface
14011	Bord 9/1	A9-buried soil	n/a	buried humus
14012	Bord 9/2	A9-northwestern ditch	lower fill	ditch, fill
14013	Bord 9/2	A9-northwestern ditch	lower fill	ditch, fill
14015	Bord 9/2	A9-southeastern ditch	lower fill	ditch, fill
14016	Bord 9/2	A9-southeastern ditch	lower fill	ditch, fill
14017	Bord 9/2	A9-southeastern ditch	lower fill	ditch, fill
14018	Bord 9/2	A9-southeastern ditch	lower fill	ditch, fill
14019	Bord 9/2	A9-southeastern ditch	upper fill	ditch, fill
14998	Bord 9/2	A9-southeastern ditch	lower fill	ditch, fill
14999	Bord 9/2	A9-northwestern ditch	upper fill	ditch, fill
15001	Bord 4/3	A3-topsoil	Chernozem	Chernozem
15002	Bord 4/3	A4-topsoil	transition	layer
15003	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
15004	Bord 4/4	A4-pit 4/1	pit fill	pit, fill
15005	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
15006	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
15007	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
15008	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris

15009	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
15010	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
15011	Bord 4/4	A4-pit 4/7	pit fill	pit, fill
15012	Bord 4/2	A4-open space (house 5)	waste area	refuse disposal zone (open space)
15013	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
15014	Bord 4/2	A4-house 5	collapsed wall	wall
15015	Bord 4/2	A4-open space (house 5)	waste area	refuse disposal zone (open space)
15016	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
15017	Bord 4/1	A4-layer below house 5	n/a	levelling layer
16001	Bord 4/3	A3-topsoil	Chernozem	Chernozem
16002	Bord 4/3	A4-topsoil	transition	layer
16003	Bord 4/2	A4-house 5	burnt house collapse	burnt wall debris
16004	Bord 4/4	A4-pit 4/8	pit fill	pit, fill
16005	Bord 4/4	A4-pit 4/6	pit fill	pit, fill
16006	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
16007	Bord 4/4	A4-pit 4/9	pit fill	pit, fill
16008	Bord 4/4	A4-pit 4/2	pit fill	pit, fill
16009	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
16010	Bord 4/2	A4-house 5	posthole?	posthole? (not confirmed)
16011	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
16012	Bord 4/2	A4-open space (house 5)	n/a	unbuild space
16013	Bord 4/1	A4-layer below house 5	n/a	levelling layer
17001	Bord 10/4	A10-made up ground	fill	made-up ground
17002	Bord 10/4	A10-made up ground	fill	made-up ground

17003	Bord 10/4	A10-made up ground	fill	made-up ground
17004	Bord 10/4	A10-pit 10/7	pit fill	pit, fill
17005	Bord 10/3	A10-buried topsoil	Chernozem	Chernozem
17006	Bord 10/4	A10-pit 10/7	pit fill	pit, fill
17007	Bord 10/4	A10-pit 10/7	pit fill	pit, fill
17008	Bord 10/4	A10-pit 10/1	pit fill	pit, fill
17009	Bord 10/4	A10-pit 10/2	pit fill	pit, fill
17010	Bord 10/4	A10-pit 10/2	pit fill	pit, fill
17011	Bord 10/4	A10-pit 10/3	pit fill	pit, fill
17012	Bord 10/4	A10-pit 10/3	brick object	pit, construction
17013	Bord 10/4	A10-pit 10/3	pit fill	pit, fill
17014	Bord 10/4	A10-pit 10/4	post-pipe	posthole, pipe
17015	Bord 10/4	A10-pit 10/4	fill posthole	posthole, fill
17016	Bord 10/4	A10-pit 10/5	pit fill	pit, fill
17017	Bord 10/4	A10-pit 10/5	brick object	pit, construction
17018	Bord 10/4	A10-pit 10/5	pit fill	pit, fill
17019	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17020	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17021	Bord 10/2	A10-house 6	posthole?	posthole? (not confirmed)
17022	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17023	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17024	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17025	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17026	Bord 10/4	A10-pit 10/6	pit fill	pit, fill
17027	Bord 10/3	A10-buried topsoil	animal burrow?	animal burrow
17028	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17029	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains

17030	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17031	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17032	Bord 10/2	A10-house 6	post 1-fill	posthole, fill
17033	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17034	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17035	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17036	Bord 10/2	A10-house 6	unburnt house remains	unburnt house remains
17037	Bord 10/1	A10-buried humus	n/a	buried humus
17038	Bord 10/1	A10-buried humus	n/a	buried humus
17039	Bord 10/2	A10-house 6	unbunt wall	wall construction
17040	Bord 10/2	A10-sunken object below house 6	fill	sunken object, fill
17041	Bord 10/4	A10-pit 10/7	pit fill	pit, fill
17042	Bord 10/4	A10-pit 10/7	pit fill	pit, fill
17043	Bord 10/2	A10-sunken object below house 6	fill	sunken object, fill
17044	Bord 10/1	A10-buried humus	n/a	buried humus
17045	Bord 10/1	A10-in-situ-loess	n/a	in-situ-loess
17046	Bord 10/1	A10-buried humus	n/a	buried humus
17047	Bord 10/2	A10-house 6	post 1-fill	posthole, fill
17048	Bord 10/2	A10-house 6	post 1-pipe	posthole, pipe
17049	Bord 10/2	A10-sunken object below house 6	fill	sunken object, fill
17050	Bord 10/1	A10-buried humus	n/a	buried humus
17051	Bord 10/1	A10-buried humus	n/a	buried humus
17052	Bord 10/2	A10-house 6	post 2-fill	posthole, fill
17053	Bord 10/2	A10-house 6	post 2-pipe	posthole, pipe
17054	Bord 10/1	A10-buried humus	n/a	buried humus
23001	Bord 15/4	A15-pit 15/2	pit fill	pit, fill
23002	Bord 15/2	A15-pit 15/1	pit fill	pit, fill

23003	Bord 15/5	A15-pit 15/3	pit fill	pit, fill
23004	Bord 15/1	A15-buried Humus	n/a	buried humus
23005	Bord 15/4	A15-pit 15/4	pit fill	pit, fill
23006	Bord 15/4	A15-pit 15/4	pit fill	pit, fill
23007	Bord 15/5	A15-pit 15/5	pit fill	pit, fill
23008	Bord 15/3	A15-pit 15/6	relocated burnt house debris	pit, fill
23009	Bord 15/5	A15-Chernozem	n/a	Chernozem
23010	Bord 15/1	A15-buried Humus	n/a	buried humus
23011	Bord 15/3	A15-pit 15/6	pit fill	pit, fill
23012	Bord 15/1	A15-in-situ-loess	n/a	in-situ-loess
24001	Bord 15/4	A15-grave 15/1	undifferentiated	grave
24002	Bord 15/4	A15-pit 15/7	pit fill	pit, fill
24003	Bord 15/?	A15-pit 15/8	pit fill	pit, fill
24004	Bord 15/1	A15-buried Humus	n/a	buried humus
24005	Bord 15/1	A15-in-situ-loess	n/a	in-situ-loess

Appendix 2: Continued

house-id	excavation area	trenches	settlement component	extent of excavation	layer formation	length (m)	width (m)	phase	X (UTM34N)	Y (UTM34N)
house 1	3	4, 5, 8, 9	flat s.	complete	Bord 3/2	5.5 or 9		2	430969.99	5041723.49
house 2	5	10	flat s.	partly (test trench)	Bord 5/2	6 or 9.5	3.5	2	431011.99	5041646.30
house 3	6	11	flat s.	partly (test trench)	Bord 6/2	13.5	6.0	2	431030.03	5041652.69
house 4	7	12	flat s.	partly (test trench)	Bord 7/2	13.4	6.0	2	431143.07	5041594.66
house 5	4	6, 7, 15, 16	tell s.	complete	Bord 4/2			3	430914.18	5042131.59
house 6	10	17	flat s.	partly	Bord 10/2	?	?	2	430788.09	5041493.74
house 7	11	18	flat s.	partly		11.8	5.5	2	431064.88	5041566.37
house 8 (object 1)	14	22	flat s.	partly (irrigation ch.)		5.0	2.5	2	430637.19	5041319.94
house 9 (object 2)	14	22	flat s.	partly (irrigation ch.)		13.5	6.0	2	430671.25	5041339.31
house 10 (object 3)	14	22	flat s.	partly (irrigation ch.)		7.0	3.5	2	430679.55	5041344.47
house 11 (object 4)	14	22	flat s.	partly (irrigation ch.)		10.5	5.0	2	430709.27	5041363.28
house 12 (object 5)	14	22	flat s.	partly (irrigation ch.)		7.7	4.4	2	430731.76	5041376.92
house 13 (object 6)	14	22	flat s.	partly (irrigation ch.)		7.3	3.2	2	430927.69	5041496.05
house 14 (object 7)	14	22	flat s.	partly (irrigation ch.)		10.5	?	2	430958.29	5041516.70
house 15	-	-	tell s.	Electrical resistivity investigation 2014		8.5	5.5	3	430870.08	5042074.56

Appendix 3: List of archaeologically and geophysically investigated houses at the site of Borđoš (2014–2023)

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Miniature object made of marble onix, Makaranda

RESULTS OF THE EXCAVATIONS, GEOPHYSICAL PROSPECTIONS AND SURFACE FIND COLLECTIONS ON AND AROUND THE BORĐOŠ LOESS PLATEAU

Fynn Wilkes

Introduction

While the Late Neolithic settlement of Borđoš is the most prominent site situated on the Borđoš loess plateau[1] (Vojvodina, Serbia), ten other archaeological sites have been explored in the area over the last ten years (Fig. 1; Table 1). Since the beginning of the project in 2014 (Hofmann et al., in press; Hofmann et al., 2019; Medović et al., 2014; Stanković-Pešterac et al., 2014; Wilkes, 2019) the Borđoš plateau and its adjacent alluvial loess terraces have been explored by surface find collections and, in some cases, also with geomagnetic prospections and excavations. While some sites have been known to archaeology before, others were surveyed based on the information of local amateur archaeologist Joca Bakalov[2] or have been newly discovered by our team. The focus on sites on and around the Borđoš Plateau lasted from 2014 to 2022 while since then the emphasis has shifted to sites in the southern neighbouring area (Hofmann et al., in press).

The following contribution presents the results of the extensive fieldwork until 2022 and summarizes the results of our activities, as well as implementing additional information about old excavations and surveys on the respective sites. This information is then used to analyse the development of the settlement system between the Early Neolithic and the Middle Ages.

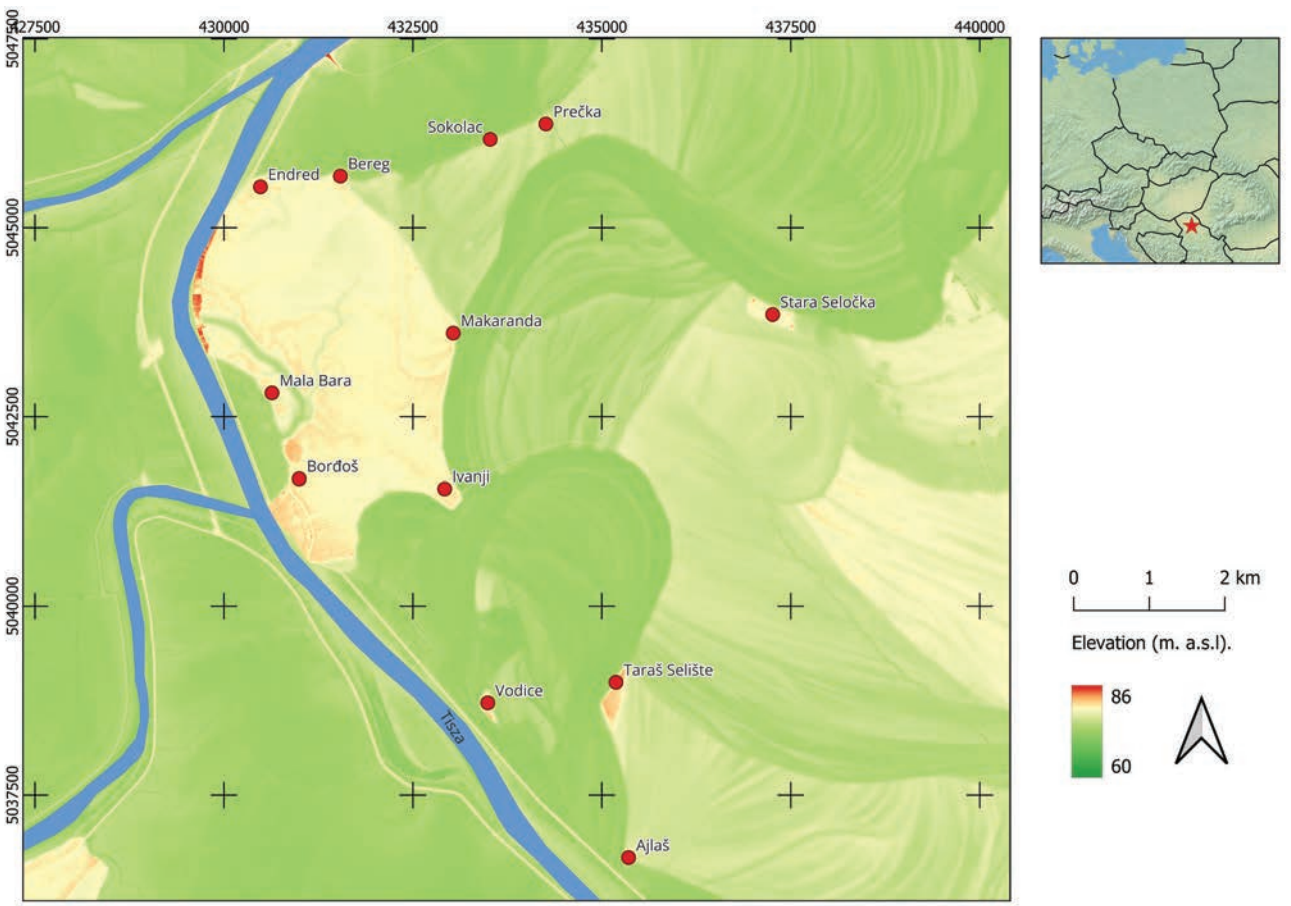

Fig. 1: Digital elevation model (DEM) of the Borđoš loess plateau, its surrounding floodplain and the location of sites surveyed between 2014 and 2024, DEM based on Lidar Data provided by the Republic Geodetic Authority, Serbia

[1] Short: Borđoš plateau

[2] Parts of the Bakalov collection were given to the municipality of Novi Bečej, the National Museum Zrenjanin and the Museum of Vojvodina.

Methodology

During the fieldwork a variety of field methods have been used to explore the sites. A first assessment of the sites has been conducted by surface find collections. This was supplemented at Borđoš, Prečka, Bereg, Makaranda, Taraš-Selište and Mala Bara by conducting a geophysical or archaeomagnetic survey. Based on the results gathered during these surveys targeted drillings and excavations were carried out on three sites (Borđoš, Prečka, Makaranda). The main methods are described in the following paragraphs, giving an overview on the devices and software used and the general implications of using these methods.

The surface surveys involved collecting materials through both systematic and unsystematic methods. The systematic approach utilized a grid system (20 x 20 or 50 x 50 m) to collect and quantify material, providing insights into the distribution and the typo-chronological origin of the material on the site. In contrast, unsystematic surveys gathered material without a grid to understand the scope and general periodization of the site. Both methods aimed to offer a diachronic perspective of the settlement activity on the Borđoš plateau.

For the archaeomagnetic surveys, a pushed magnetometer (MXPDA-Arch, Sensys®) with FEREX® CN 650 sensors and GPS tracking from a Leica® Viva GS 10 device was used. The setup featured a sensor spacing of 0.5 metres, with measurements taken every 0.1 meters to achieve a 0.2 m x 0.2 m grid resolution. Data processing and mapping were conducted using MAGNETO® ARC and QGIS software.

Drilling was carried out with two setups. The first, manual drilling, used a Pürckhauer® soil sampler for rapid soil sampling in 1-metre increments and a 2.8 cm diameter, suitable for verifying archaeological layers during excavation. The second setup, a portable mechanical Vibracore soil sampler (Wacker®), samples soil in 1-metre increments with a 6 cm diameter and there is the possibility to store extracted soil into plastic tubes for laboratory analysis, including geochemical, sedimentological, macro-remain, pollen analysis, and radiocarbon dating.

Excavations took place at Borđoš (2014-2022), Prečka (2015), and Makaranda (2018), employing two systems: natural layer excavation for house excavations and artificial layer excavation for features like postholes. In Prečka and Makaranda, a “chessboard” method was used, with alternating quadrants excavated to maintain a continuous profile. Finds and features were documented with a total station (Leica® TC-407), and recording included photogrammetry and occasional 3D modelling (Structure from Motion [SFM]). In the following there are short descriptions of the excavation outcomes at Prečka and Makaranda.

Surveyed Sites

Ajlaš

The site of **Ajlaš** is situated on a small river terrace north of the modern village of Taraš and close to the sites of Taraš-Selište and Vodice. In 2015 and 2016 surface collections have been conducted. The surface material could be classified in the Early-Middle and Late Neolithic Period, mainly by the presence of pottery with the Barbotine style surface and incised Tisza and Vinča culture ornamentations. Some surface finds also showed typical imprinted and spiral decorations of the Bronze Age.

Bereg

On the northern edge of the Borđoš plateau located on a spur lies the site of **Bereg**. During the surface find collections in 2015, material of the Bronze Age Gava-Belegiš culture was collected as well as individual pieces of medieval material finds. The area was previously known to have yielded Neolithic material, as well as being the site of a medieval village. In 2016, a geomagnetic prospection was carried out on a 4.3 ha area (Fig. 3). The magnetic image shows a system of three ditches which cut the spur of from the rest of the plateau. Two of the ditches are parallel and 200 m long. The outer ditch could have an entrance on the west side. The third ditch appears to be not simultaneous to the other two ditches, due to its nearly 90° turned orientation and the fact that it cuts through the two other ditches. Several round structures inside and outside the trenches may be residential structures or pits related to settlement activity, both enclosed and outside.

Endred

The site of **Endred** is located at the northern edge of the Borđoš plateau. Historical records mention a medieval village or hamlet and a church with the name Endred (1341), Endrewd (1440) and Szentendred (1441) in this area (Dezső 1894, 125–127). The Heritage Preservation Institute Zrenjanin listed the site as Neolithic but during the collection of surface finds in 2015 and 2016 only Bronze Age and Iron Age finds of the Bosut phase, as well as medieval finds have been identified.

Ivanji

On the southern edge of the plateau in a spur location lies the site of **Ivanji**. During the surface collections of finds in 2015 and 2016, a considerable amount of medieval finds was collected. The presence of earlier settlement during the Bronze Age and the Antiquity is indicated by small amounts of finds.

Site	Periods	Fieldwork period	Settlement size (estimate; ha)	Methods
Ajlaš	Early-Middle Neolithic, Late Neolithic, Bronze Age	2015-2016		surface survey
Bereg	Bronze Age, Middle Ages	2015-2016		geomagnetic survey, surface survey
Borđoš	Late Neolithic, Bronze Age, Early Iron Age, Middle Ages	2014-2022	48.4	geomagnetic survey, surface survey, drillings, excavation
Endred	Bronze Age, Iron Age, Middle Ages	2015-2016		surface survey
Ivanji	Bronze Age, Antiquity, Middle Ages	2015		surface survey
Makaranda	Early-Middle Neolithic, Late Neolithic, Bronze Age, Antiquity, Middle Ages	2015-2016; 2018	1.9	geomagnetic survey, surface survey, drillings, excavation
Mala Bara	Early-Middle Neolithic, Late Neolithic, Iron Age, Antiquity, Middle Ages	2015-2016		geomagnetic survey, surface survey
Prečka	Early-Middle Neolithic, Bronze Age, Iron Age, Antiquity, Middle Ages	2015-2016		geomagnetic survey, surface survey, excavation
Sokolac	Bronze Age, Middle Ages	2015-2016		surface survey
Stara Seločka	Early-Middle Neolithic, Late Neolithic, Bronze Age, Iron Age, Middle Ages	2016		surface survey
Taraš-Selište	Late Neolithic, Bronze Age, Middle Ages	2015; 2021; 2024	2.2	geomagnetic survey, surface survey
Vodice	Early-Middle Neolithic, Copper Age, Bronze Age, Middle Ages	2015		surface survey

Table 1: Sites on and around the Borđoš that have been researched between 2014 and 2018. The sites are listed in alphabetical order. Fieldwork period and Methods refer to fieldwork that has been conducted since 2014 by the Borđoš archaeological project.

Mala Bara

In the north, near the main site of the Borđoš plateau, the site of **Mala Bara** is located. The site is separated to Borđoš only by a deep gully. A surface find collection, as well as a magnetic survey (Fig. 4) have been conducted in 2015 and 2016. The surface material shows the Early-Middle Neolithic and Late Neolithic settlement of the area. From the Iron Age through the Antiquity and the medieval period the site was also used. The magnetic image shows various structures. On the southern part of the plateau, there is a round feature of 8 m in diameter. While this can be an outline of a tumulus, these structures are also known from charcoal pits. In the northern part of the magnetic image, some linear structures might belong to fences. The majority of structures are diffuse spots, which might be settlement pits or parts of only lightly burned houses. Undoubtedly, the magnetic image proves the activity of the settlement in this area.

Sokolac

The site of **Sokolac** is situated on the north-eastern side of the plateau and in direct neighbourhood to the site of Prečka. The site is situated on the property of a manor formerly owned by the wealthy Ivanović family, who owned large parts of the Borđoš plateau in the late 19th and early 20th century. Surface find collections were carried out in 2015 and 2016. The material of the surface indicates the Bronze Age and the medieval settlement of this area.

Stara Seločka

On the western side of the river terrace, where the modern town of Kumane is located, lies **Stara Seločka**. In this area of the small plateau there are three burial mounds which were placed at the edge of the terrace and are still elevated 2–3 m over the surrounding surface. In 2016, surface collections of finds were carried out and material from the Early-Middle and Late Neolithic period, as well as from the Iron Age and mostly from the Middle Ages, was found. The burial mounds could belong to the Copper or Bronze Age, although no surface material was collected that could be clearly assigned to that period.

Taraš-Selište

The site **Taraš-Selište** is situated on a river terrace north of the modern village of Taraš. It was discovered in 1947 as a Neolithic and medieval site (Benjocki, 2018). A medieval settlement with a cemetery and church (9th-10th century AD) are known from this area and excavations on the church and three graves have been conducted in 1950 (Benjocki, 2018; Nađ, 1952; Oţa, 2015: 20-22, 76, 305). During the 1950 excavations material of the Vinča culture has been found too (Benjocki, 2018). In the course of 2015 and 2024, a surface survey was carried out, where mostly Late Neolithic Vinča culture and medieval pottery were collected. A bronze spout in the shape of a bull's skull was found at the site, indicating a Late Copper or Early Bronze Age settlement in the area (Medović, 2010: 62 ff.). In 2021 a magnetic survey has been conducted in the northern part of the terrace on an area of 4.9 ha (Hofmann et al., in press). The results show two thirds of a settlement, which is enclosed by three parallel ditches. The settlement area covers 2.2 ha and the ditches, which are roughly 3-5 m in width with the inner ditch having a 112 m diameter, show clear gate areas in the north and south-eastern parts and a potential gate in the south-western part. Up to 17 rectangular anomalies could be identified in the enclosed space, which most likely resemble burned houses. Due to the high amount of medieval pottery and several human bones revealed by ploughing in the eastern part of the surveyed area, it is very likely that parts of the Late Neolithic site have been destroyed by medieval building activity.

Vodice

Vodice is located on a small terrace in the Tisza floodplain between the site of Borđoš and the modern village of Taraš. The local amateur archaeologist Joca Bakalov visited the site extensively. Additional surface find collections were carried out in 2015. The northern part of the terrace is mostly covered with Bronze Age finds. Towards the southern part, in the area around the small pumping station, the medieval, Copper Age and Early Neolithic finds of Starčevo culture dominate.

Excavated Sites

Makaranda

The site of **Makaranda**, located on the east side of the Borđoš plateau approximately 2.5 km from Borđoš, has a mound to the north and a small concrete bunker or machine gun nest on the northeast edge. Surface surveys conducted in 2015 and 2016 identified materials from multiple historical periods (Hofmann et al., in press), with significant finds from the Early-Middle Neolithic Starčevo culture and the Late Neolithic Vinča culture. The Vinča artifacts included parts of various biconic vessels, fluted decorations, and polished pottery. Additionally, the surface finds contain Bronze Age material from the Belegiš culture and a considerable amount of antique period artefacts, including Sarmatian greyish pottery and red-polished terra sigillata imitations. A few medieval pottery fragments were also discovered.

In 2016, a magnetic survey (Hofmann et al., in press) covered 8.5 hectares and revealed various lin-

ear structures, likely indicating past fences or boundary markers (Fig. 5). The survey also identified five rectangular anomalies, which appeared to be remnants of burned housing structures. These anomalies ranged from 86 to 183 m² and were scattered over the area that was explored with a northeast-southwest orientation. In 2018, drilling was performed on two identified anomalies of the house and one linear anomaly. The first drilling transects passed through the house anomaly and revealed a significant layer of burnt daub, 60 cm thick, at a depth of 50 cm. A second transect, in another house anomaly, revealed a strong 1-metre-thick cultural layer containing pottery shreds and charcoal, but no burnt daub. The third transect, which intersected the linear anomaly, revealed a cultural layer with an average depth of 80 cm, with bone fragments, charcoal and pottery fragments. This layer deepened to 1.2–1.5 meters at the location of the linear anomaly, suggesting that some of these linear features might have been shallow ditches.

Excavations took place between August 9th and 19th, 2018, focusing on a 2 x 7 metre trench cut through the middle of one of the house anomalies (Fig. 7 and 8). The primary goals were to date the site and assess its stratigraphy. After removing 30 to 40 cm of topsoil, a layer of burned daub (feature 1001) was uncovered. This daub layer, 10 to 40 cm thick, was identified as the possible floor of the building, with pottery fragments found on top, indicating that the pots were likely placed on this surface. The amount of daub was more concentrated in the central and south-eastern parts of the excavation area compared to the northwest.

The small excavation area provided limited architectural details, but the daub fragments in quadrants A/B 1 exhibited thick wood imprints, suggesting the presence of wall posts that may have collapsed during demolition of the building. Flat-bottomed daub fragments in quadrants A/B 5-7 hinted at walls that collapsed outward. Finds from the excavation included Vinča culture pottery, 14 animal bones, two teeth, three silex tools, and one obsidian object. Notably, two fragments of an anthropomorphic vessel with foot applications were found in the burned daub layer.

Two bones from the daub layer were sent to the Poznań Radiocarbon Laboratory for absolute dating (Poz-112903, 112905; Table 2). The results were inconsistent, with a broad date range of 5287-4842 calBC, which is unlikely for the duration of a single house. Despite this, pottery and the radiocarbon dates suggest that the site was inhabited at some point during Phases B or C of the Vinča culture.

Lab.-Code	Site	Feature	Date (BP)	calAD/BC (68.3%)
Poz-80405	Prečka	T 1 – O 4 – L 9	1380 ± 30	612-669 calAD
Poz-80406	Prečka	T 1 – O 3 – L 8	1155 ± 30	776-972 calAD
Poz-80407	Prečka	T 1 – O 5 – L 6	1315 ± 30	662-772 calAD
Poz-80408	Prečka	T 2 – O 3 – L10	6220 ± 50	5293-5069 calBC
Poz-80409	Prečka	T 1 – O 3 – L 9	1350 ± 30	648-758 calAD
Poz-80410	Prečka	T 1 – O 5 – L 5	1390 ± 30	610-663 calAD
Poz-80411	Prečka	T 2 – O 2 – L 9	5025 ± 35	3941-3715 calBC
Poz-80413	Prečka	T 1 – O 1 – L 8	2900 ± 35	1155-1014 calBC
Poz-112901	Prečka	T 2 – O 2 – L 9	5860 ± 40	4787-4694 calBC
Poz-112903	Makaranda	1001	6220 ± 35	5287-5067 calBC
Poz-112905	Makaranda	1001	6000 ± 35	4938-4842 calBC

Table 2: Radiocarbon dates from the 2015 excavation at Prečka. Feature description: T – Excavation Trench; O – Object/Feature; L – Layer. Except of the bones sampled for Poz-80411, Poz-112901, 112903 and 112905 all analyses were conducted on charred plant remains

Prečka

The **Prečka** site, located on the north-eastern side of the Borđoš Loess plateau near the site of Sokolac, was surveyed in 2015 and 2016 (Hofmann et al., in press). A geomagnetic survey of 23.5 ha in 2015 revealed over 500 small, round anomalies with strong magnetic signals, likely indicating pits filled with pottery or burned material, and possibly prehistoric ovens (Fig. 6). The survey also identified six linear structures and various rectangular and round features, suggesting possible ditches, fences, or burial mounds from different time periods.

Excavations in the summer of 2015 included two trenches (Fig. 9), one 17 x 2.7 m (trench 1) and the other 5.6 x 3.5 m (trench 2), situated roughly 200 m apart based on magnetic anomalies which are interpreted as Early-Middle Neolithic domestic structures. The excavation faced challenges due to extreme heat, which caused rapid soil drying and difficulties in detecting archaeological contexts.

In Trench 1, archaeological contexts appeared at a depth of 50 to 70 cm, consistent with the anomalies of the magnetic recording. The trench revealed several features with mixed Neolithic, Bronze Age, Sarmatian and medieval pottery. It appears that there was significant settlement activity during prehistoric times, and the material was buried during younger periods, when there was another settlement in the area during the early Middle Ages. Although all features contained pottery of Neolithic origin, radiocarbon dates (Pos-80405-80407, 80409-80410; Table 2) and some younger pottery fragments suggest a much more recent dating of the features. Beside a possible housing structure in the western part of the trench (Fig. 10), there was a fully preserved dome oven with a pit located next to it in the middle part of excavation trench 1. In the eastern part, there was a prehistoric structure consisting of several ashy layers, dating to the Bronze Age (Poz-80413; Table 2). The results of trench 1 suggest prehistoric and medieval settlement activity in the area, with earlier materials mixed by erosion or burial into features of younger periods. Trench 2 contained only a small number of finds. In the upper layers, which were 30 to 50 cm deep, and on the south-eastern side of the trench, some human bones and teeth were revealed. Most of the upper layers showed diffuse features that were interpreted as pits. However, at a depth of about 1.8 m, a collapsed dome oven with a cow's skull on top was revealed in the north-western part of trench 2 (Fig. 11). The cow's skull most likely rested on the dome, and both collapsed onto a pan-like dish within the oven. Next to the oven, towards the centre of trench 2, a dark, blackish feature was excavated. However, due to time constraints, only a test drill was conducted to determine the feature's remaining depth. This drilling concluded that the feature extends at least 2 more metres. Samples from the cow's skull and botanical remains from the vicinity of the oven returned absolute date ranges of 5293-5069 and 4787-4694 calBC (Poz-80408, 112901; Table 2). Together with a few pieces of Late Neolithic material, this indicates Late Neolithic (Vinča B-C/Tisza I-III) activity in the area surrounding trench 2. A sample from layer 9, directly above the oven, returned a Copper Age date of 3941-3715 calBC (Poz-80411; Table 2).

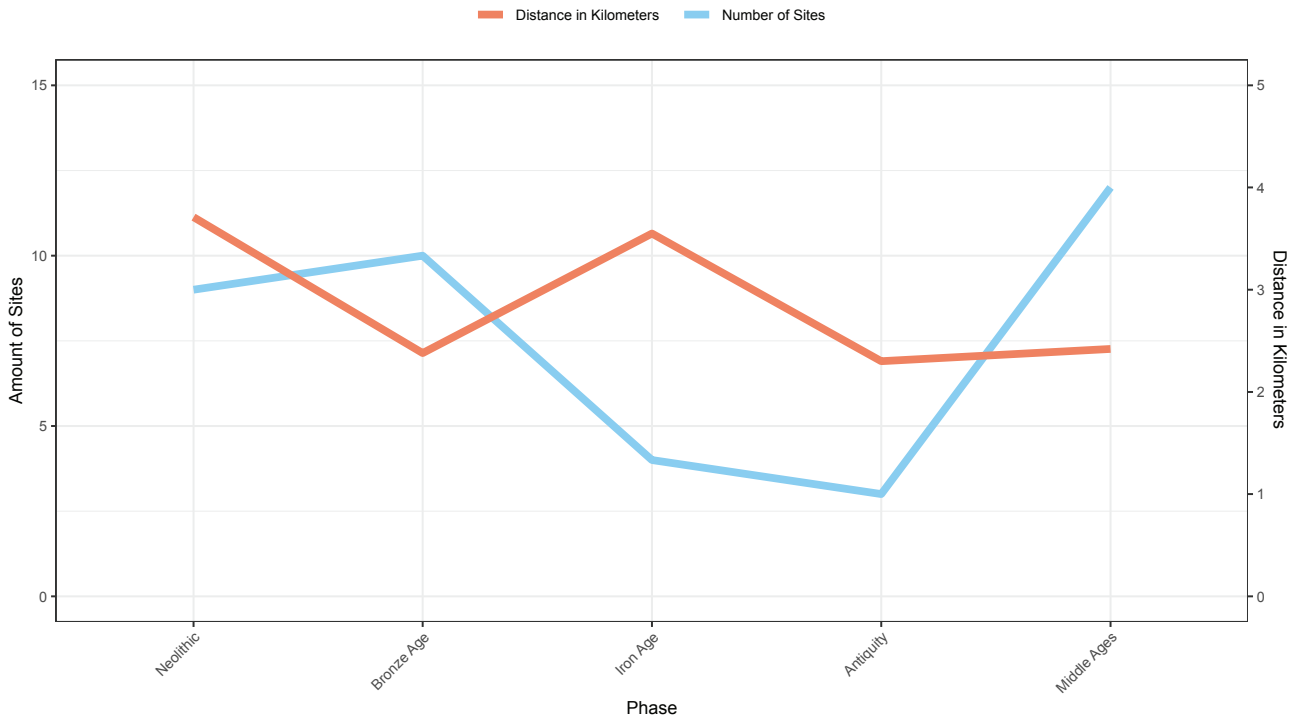

Fig. 2: Settlement development between archaeological periods on and around the Borđoš loess plateau. The blue line indicates the number of sites per period and the red line shows the mean distance between sites for each period.

Undoubtedly, the Borđoš plateau and its surroundings are characterized by a diverse and favourable landscape. On the loess sediments of the plateau itself, high-quality black and brown soils have developed (Nejgebauer, 1953), offering the potential for high agricultural yields (Scheffer et al., 2018: 486–487; Sümegi et al., 2012: 17 f.). The old meanders of the Tisza floodplain (Fig. 1), which were periodically flooded until the construction of levees in early modern times (Borsos and Sendzimir, 2018), encircle the entire plateau. They represent a rich environment suitable for animal grazing, access to building materials and hunting from coastal forests (Gulyás and Sümegi, 2011; Marić, 2017: 61 f.; Sümegi et al., 2012: 17 f.). The Tisza River, while forming a natural water barrier, also provided opportunities for resource transport and long-distance trade, as evidenced by the presence of imported materials like obsidian and various types of flint. Additionally, it served as a source of aquatic resources and fresh water (Gulyás and Sümegi, 2011).

In this context, it is not surprising that the Borđoš plateau has been almost continuously settled from the Early-Middle Neolithic onwards. During the Copper Age there could have been a standstill, and only the material at Vodice shows some pottery from the Late Eneolithic Vučedol group. This is unsurprising, given the general shift in settlement practices between the Late Neolithic and Early Copper Age observed also in other parts of Europe and the Carpathian Basin (e.g., Bánffy et al., 2016; Furholt et al., 2020; Gyucha et al., 2014; Kalicz, 1998; Parkinson, 2006; Vrhovnik, 2019). Around 4500 BCE, there was a decline of tell settlements and a transition to smaller, more dispersed communities (Hofmann et al., 2019: 367 ff; Parkinson et al., 2010: 179 ff.). The strongest settlements activities took place during the Neolithic and Bronze Age, and from the Middle Ages to the Modern Era (Fig. 2). During these periods, the central settlement at Borđoš existed and might have been a major factor in attracting people to the area.

During the Iron Age and Antiquity, the plateau appears to have been sparsely populated, with no large settlements detected during our surveys. However, it should not go unmentioned that there has been a settlement on the opposite bank of the Tisza at Čurug (Trifunović, 2014) and Feudvar near Mošorin (Falkenstein, 2014; Hänsel and Medović, 1991) from this period, so it might be that the settlement centre shifted river banks during the Iron Age and Antiquity. Site density appears to have changed over time from low to moderate density, with site spacing of 2.3 to 3.7 km between periods (Fig. 2). The highest distance between sites can be observed between Neolithic sites, indicating scattered settlements during this time period. This could also be a consequence of the significant concentration of settlements on the Borđoš site in that time period, which could have created a buffer zone in that area, necessary for economic purposes and maintaining the settlement.

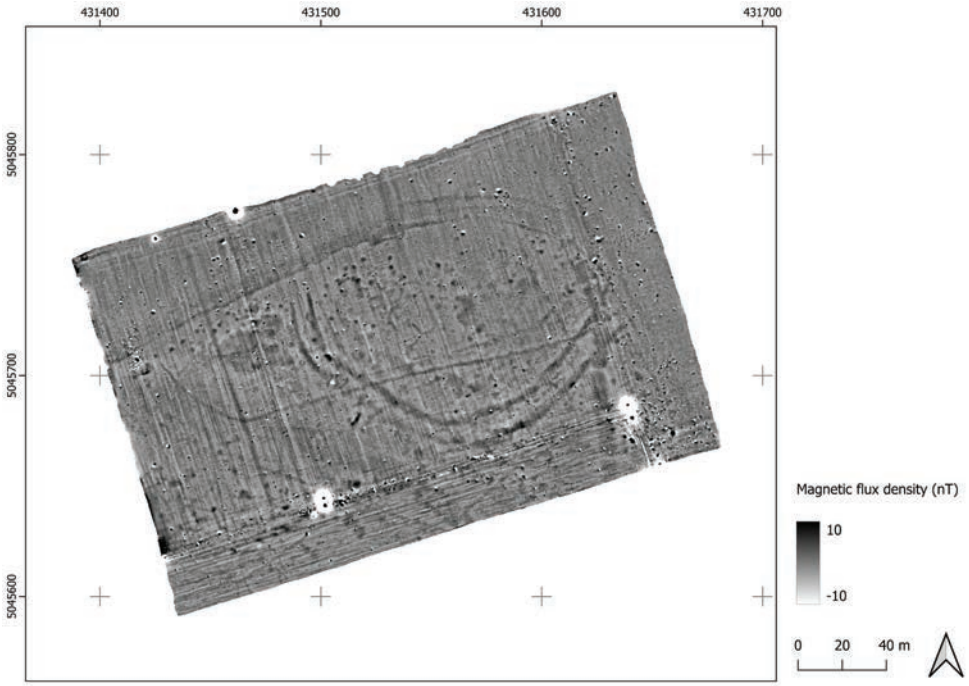

Fig. 3: Geomagnetic image of the site Bereg. Three linear structures are visible, which most likely resemble ditches. The magnetic survey was conducted by R. Hofmann.

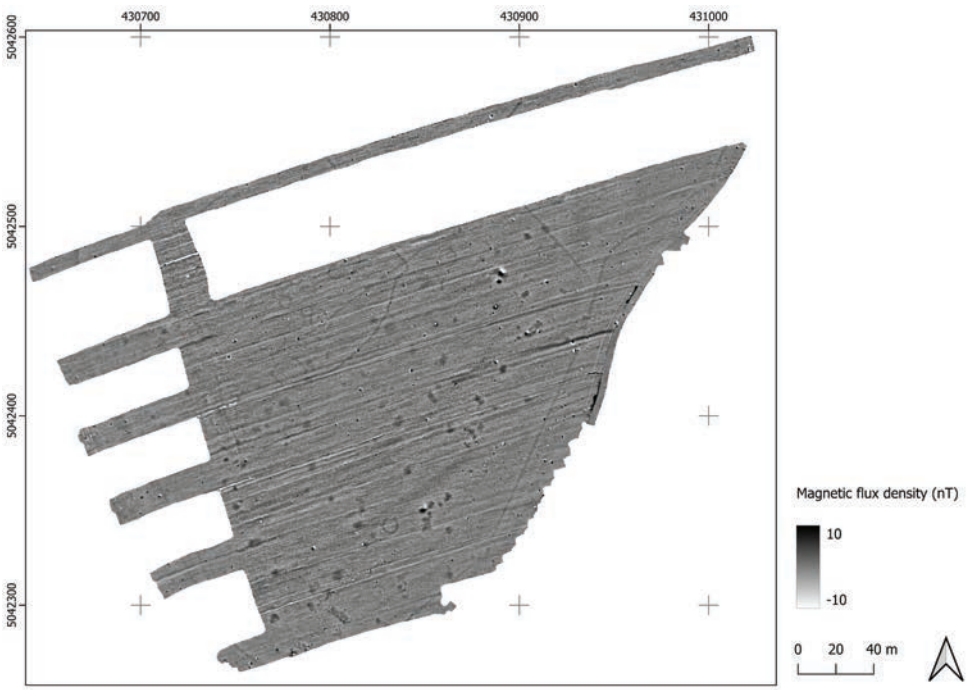

Fig. 4: Geomagnetic image of the site Mala Bara. Linear structures to the north might indicate fence structures, while darker spots can be interpreted as pits. One circular structure in the lower half of the area may indicate the remains of a tumulus. The magnetic survey was conducted by R. Hofmann.

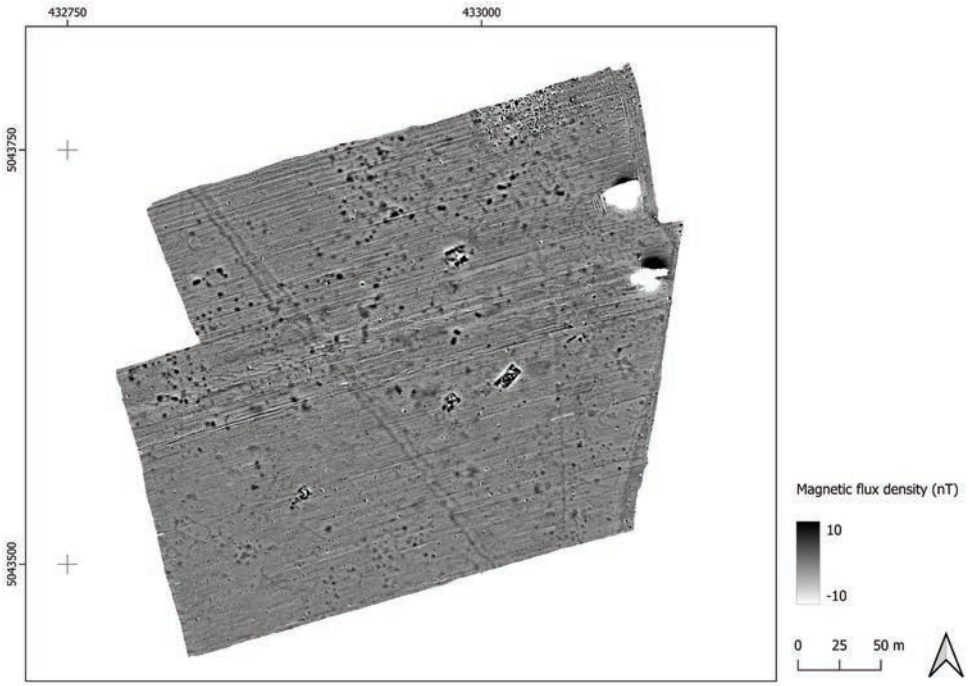

Fig. 5: Geomagnetic image of the site Makaranda. The linear structure crossing through the survey area from northwest to southeast might be a former pathway. The four to five rectangular structures in the center of the area are burnt houses. The magnetic survey was conducted by R. Hofmann.

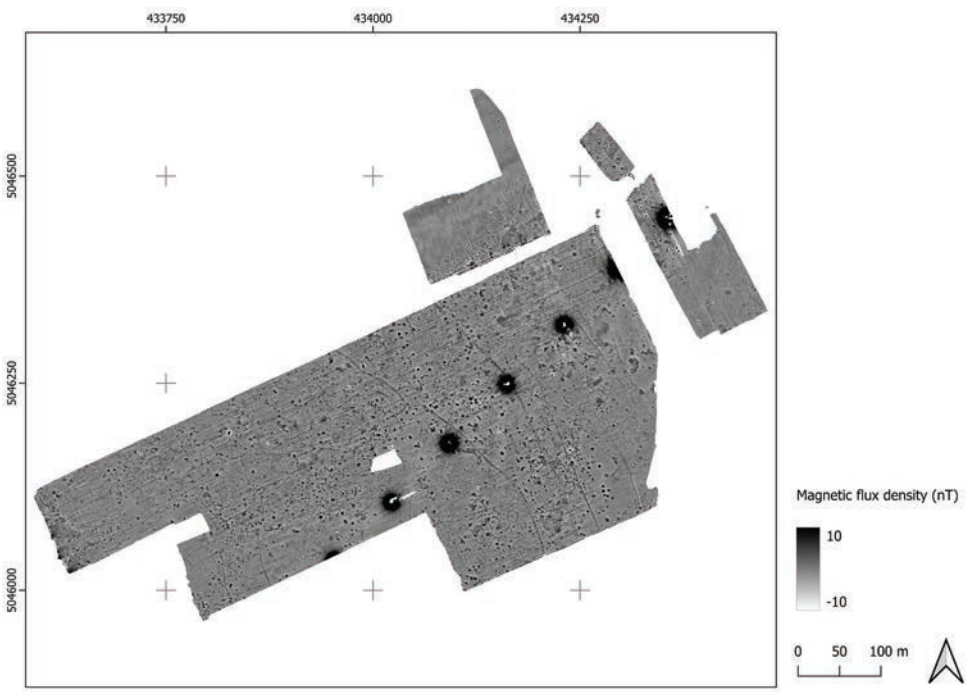

Fig. 6: Geomagnetic image of the site Prečka. The linear structures in the center of the area might resemble fence structures. The many dark “spots,” predominantly in the western half of the surveyed area, are most likely pits. The magnetic survey was conducted by R. Hofmann.

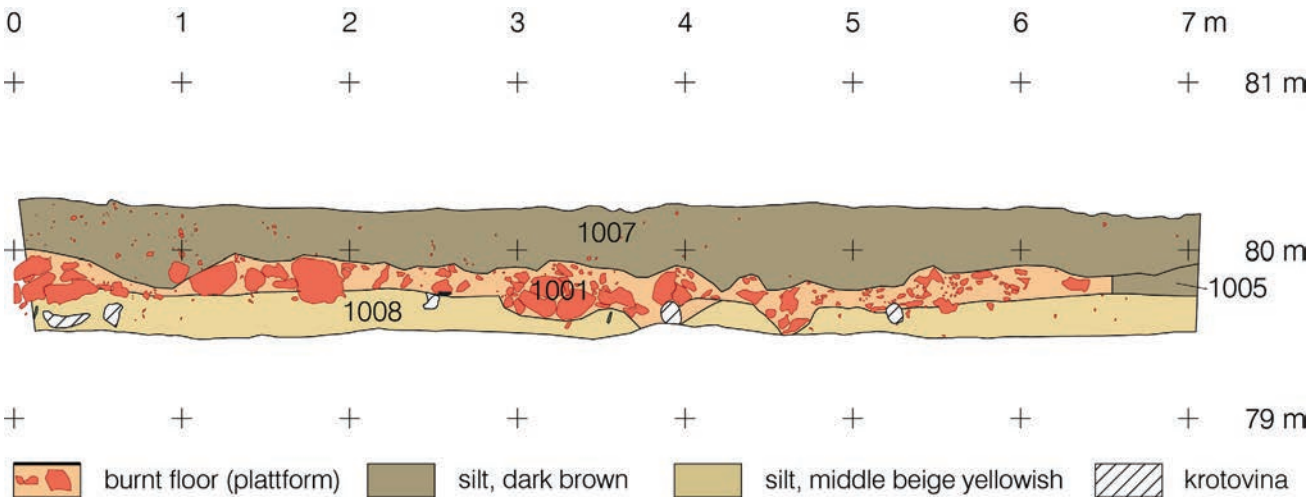

Fig. 7: West profile of the 2018 excavation trench at Makaranda. Graphic by: Robert Hofmann

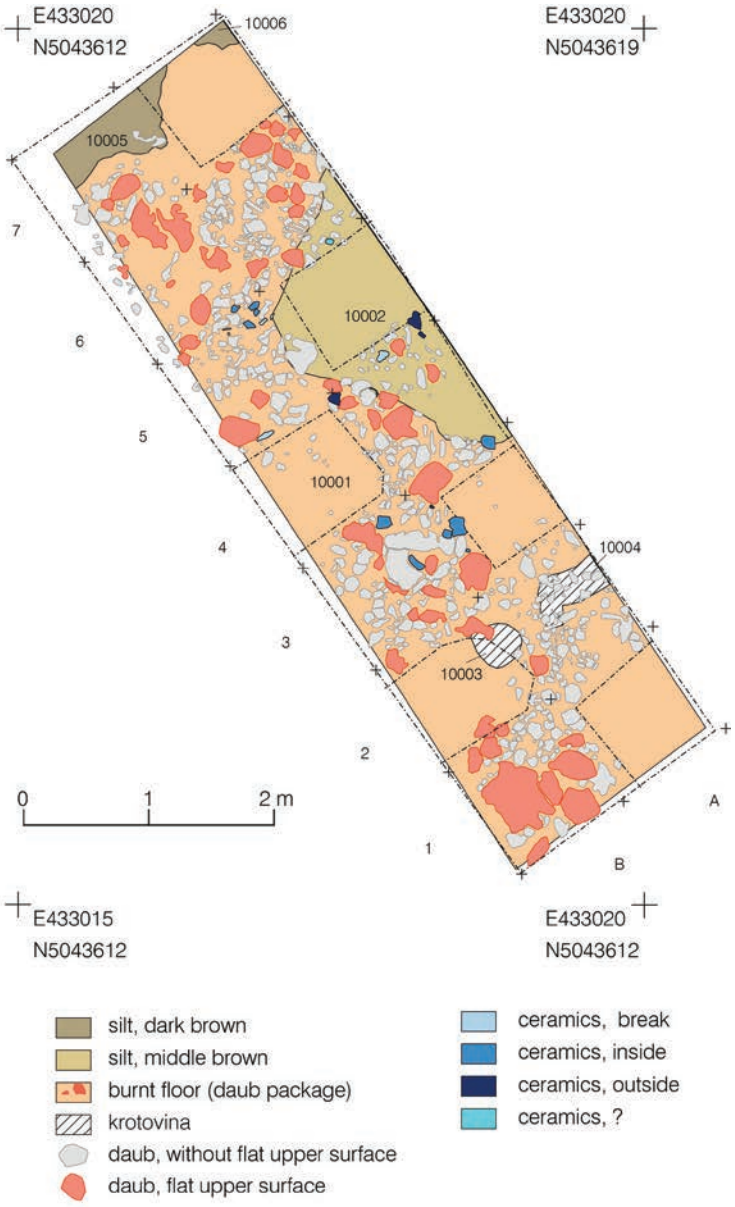

Fig. 8: Planum of the 2018 excavation trench at Makaranda. Graphic by: Robert Hofmann

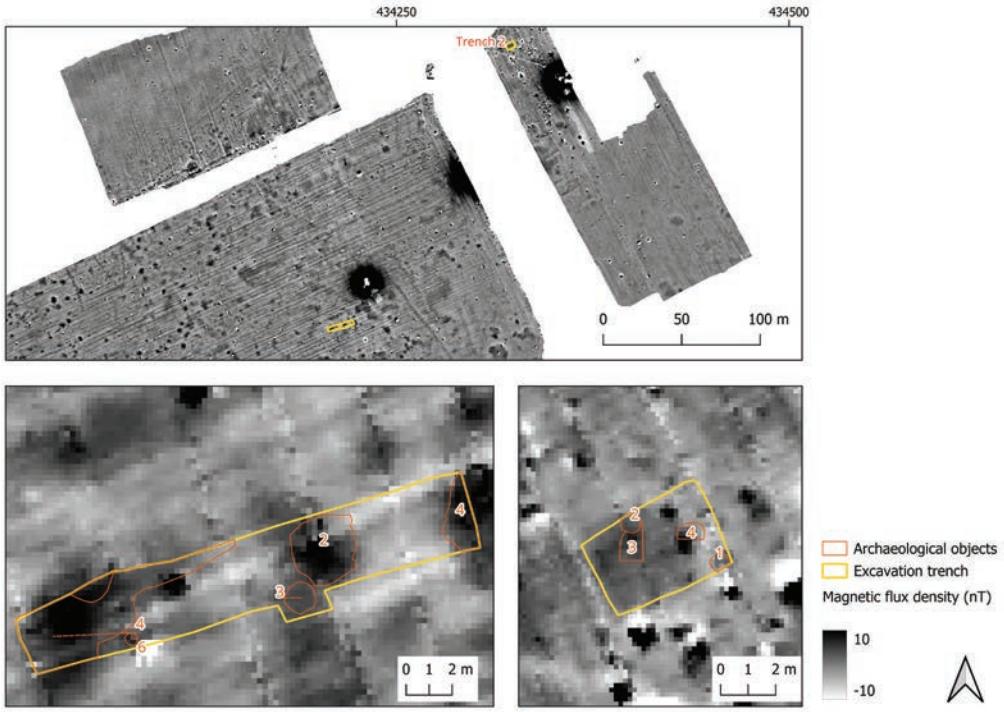

Fig. 9: Top: Position of the two excavation trenches from the 2015 excavation at Prečka. Bottom: Excavation trenches and the main archaeological objects

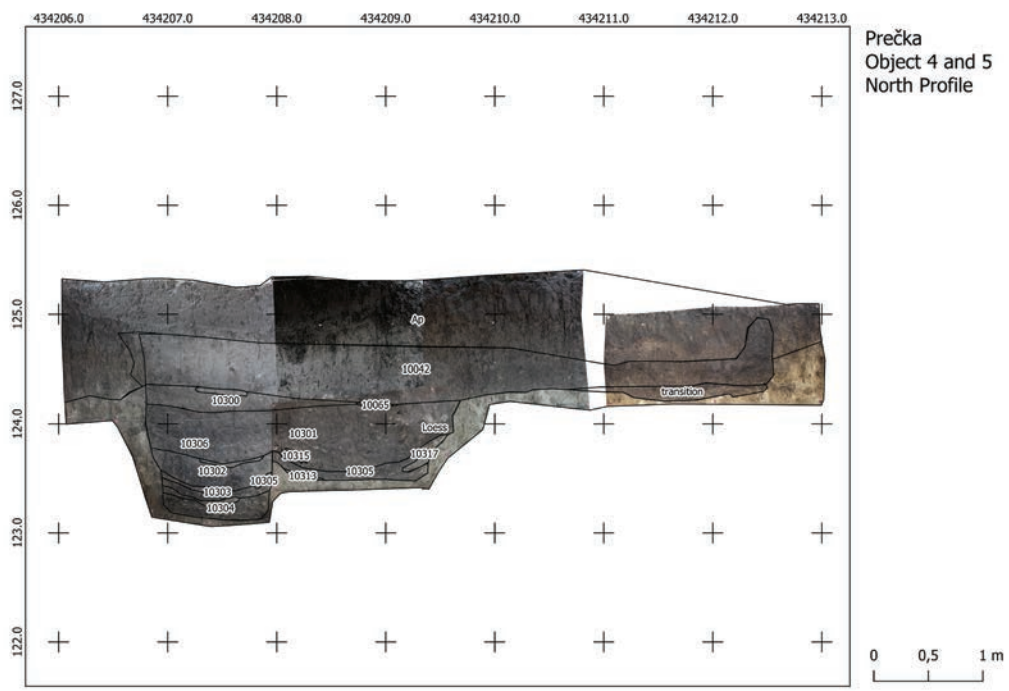

Fig. 10: North profile of the trench 1 objects 4 and 5 at Prečka

Fig. 11: Neolithic oven with a cattle skull from trench 2 at Prečka

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Pottery in situ: Excavation of the site of Borđoš, 2014

Goblet from House 1

Pottery fragment

Pottery in situ

CERAMIC ARTEFACTS

Ildiko Medović

Introduction

Based on a thorough collection of surface artefacts from the entire Borđoš settlement, along with the excavations on both the tell and the horizontal site components, a cataloguing of pottery and non-pottery clay objects has been completed. Surface finds reveal evidence of habitation stretching back to the Early-Middle Neolithic, through the Late Neolithic, the Bronze Age, Iron Age, and into the Middle Ages and modern times. Notably, the largest part of the archaeological material shows characteristics of two widespread Late Neolithic ceramic style groups: Tisza and Vinča. Both style groups emerged around the same time, went through several phases of development, but have different focal points of distribution in the middle Tisza region (Tisza) and in the area south of the Danube (Vinča).

Some of the artefacts from these so-called archaeological cultures are distinct and easily identifiable. Tisza style ceramics are typically a striking red and feature intricate incised geometric meander designs. On the contrary, Vinča ceramics are distinguished for their superior quality, often appearing as polished grey vessels adorned with inlaid smoothed and 'fluted'decorations. Alongside these two stylistically very specific vessel categories, there are numerous often undecorated pottery that cannot be assigned to any of the mentioned styles.

Our intention in this chapter is (In addition to the chapter on figurines) to provide the first overview of the Late Neolithic ceramic artefacts from Borđoš and to present the most important objects.

Pottery Categories

1. Pithoi

The primary purpose of the Pithoi was for food storage. These containers were less fired than other vessels, featuring a rough texture that often showed signs of tempering by crushed ceramics (grog). Their thick walls were frequently coated with a chaff-like engobe. In some cases, they were fixed to the floor. Pithoi had wide openings, and their interiors were subtly profiled. Outside, they had solid handles in shape of a tongue or knob, and some featured both vertical and horizontal handles with perforations for ropes or sticks. Decoration was minimal; typically, ornament was a simple, kneaded strip (Table 8). Fragments of Pithoi have been revealed in various contexts, consistently found within residential units, specifically in houses 1, 5, and 7 (see code P10, P12, P20, Table 15, Classification of vessel shapes).

2. Pots

Vessels characterized by conical and flat shapes, featuring handles positioned in the centre, are known as rough vessels. These medium-sized containers usually have two to four cork-like handles, arranged symmetrically (Table 9). Some handles may be pierced either vertically or horizontally. The design of these pots was intended for tying, which often resulted in two small notches on the rim of the vessel, used to secure the ties. Although less common, vessels with vertical banded stems also exist. This type of vessel has been revealed throughout the settlement area. One was found in its original context within House 5, while another served as a grave accessory in grave number 1 (P01-P05, P13, Table 15).

3. Amphorae

Vessels characterized by a narrow neck and a wide, biconical or rounded body, sometimes with handles, are not common. They varied in size and served for multiple purposes. The larger amphorae, crafted from coarse ceramics, are primarily used for food storage. On the contrary, the smaller varieties have a finer texture, which makes them suitable as containers for holding liquid food. Amphorae can be either decorated or plain. Undecorated versions often feature a simple side handle that can be tongue-shaped, nipple-shaped, or even resemble an animal's paw. Some amphorae have circular perforations near the top, designed for threading a string or attaching a lid (Table 8). On the other hand, the decorated amphorae feature intricate designs, with their surfaces adorned by incised linear patterns and angular meanders formed in metopes. Occasionally, these vessels are highlighted with red paint (A01-A04, A10-A12, A20-A23, Table 15).

4. Pans

The survey and excavation revealed that shallow pans with conical walls and two tongue-shaped handles were one of the most prevalent vessels discovered (Table 8). Even after the excavation, these findings remained mostly unchanged. These pans, characterized by their rough textures, are abundant both inside and around homes. Made primarily of clay, they often include additives that enhance their durability. The interior of the pans shows traces of usage. The flat bottoms frequently display marks from

the vegetable wattle used as a mat for drying before firing. These pans lack any decorative features. Predominantly oval, with circular shapes appearing less often, the upper rims are typically soothed, resulting in a distinctive black colour. Their height ranges from 4 to 5 cm, showing remarkable standardization of size. These pans are widely distributed throughout the settlement, found not only scattered among house foundations but also in outdoor areas surrounding the homes. It's a category which cannot join styles such as Tisza or Vinča (PA, Table 15).

5. Bowls

On the site of Borđoš, the greatest quantity of identified pottery sherds belongs to bowls. These sherds vary significantly in size, shape, and intended use. The diverse types and subtypes of rim modelling reveal much about their evolution. Bowls are undergoing remarkable changes in both their form and decorative styles. A wide range of decorative techniques can be seen, often combined in creative ways, although there are a few instances where bowls remain undecorated. From our current research, we can outline some typological features, though it's challenging to pinpoint cultural influences at this time. The characteristics of the Tisza and Vinča style are well defined. In-depth studies are essential for a thorough analysis of the ceramic vessels. Among the numerous artefacts found in the horizontal settlement, conical bowls stand out. These bowls are typically adorned using a carving technique and feature two perforations on the sides (Table 8). This style is emblematic for Tisza style and is predominantly found in the horizontal settlement (B1-B3, B5, B10-B20, REC, Table 15).

6. Cups – Goblets

A unique collection features goblets adorned with opulent design. Each piece boasts a delicate texture and is lavishly decorated through a blend of engraving and painting techniques. Similarities to Borđoš goblets can be observed in Hungary, particularly at the Szegvár Tűzköves site, where a goblet with a cylindrical leg was unearthed (Meier-Arendt, 1990: 59, cat. no. 33). Additionally, the literature references a funnel-shaped goblet known as a Tricherrand, along with a conical variant, both of which were found at the Late Neolithic site of Hódmezővásárhely–Gorzsa in Hungary (Meier-Arendt, 1990). Notably, the complete goblet with a cylindrical leg was located in House 1, while only one fragment was discovered in House 5 (Table 8; 9) (G01, G02, Table 15).

7. Aryballoi

The aryballoi are uniquely shaped vessels, known for their compact size and exquisite craftsmanship. These small containers feature a flared rim, often resembling a bird's head or beak, complemented by a long cylindrical neck that leads to a biconical body. Tiny circular vertical holes are present along the rim and biconical edges. Their capacity is quite limited. Notably, one aryballos shaped like a bird's beak was uncovered in house 5 (Table 9). Interestingly, they are evenly distributed across both sections of the settlement. Evidence of beeswax and lead compounds indicates that these vessels were probably used for cosmetic or medicinal purposes (ARY, Table 15) (Kramberger et al., 2021; Hansen et al., 2019).

8. Anthropomorphic Vessels

A notable artefact from the Late Neolithic period in Vojvodina, Serbia, is the renowned anthropomorphic vessel from Borđoš (see Fig. 7/5 in the chapter *A New Anthropomorphic Clay Figure from the Site of Borđoš* by Kata and Martin Furholt in this volume). This unique work, exhibited in the National Museum of Serbia in Belgrade, shows a figure holding a vessel in its lap. Another vessel, also from Borđoš, depicts a seated man with a bowl in his lap with his arms embracing the bowl (see Fig. 7/5 in the chapter *A New Anthropomorphic Clay Figure from the Site of Borđoš* by Kata and Martin Furholt in this volume); this one can be seen within the permanent exhibition of the Museum of Vojvodina (Balj, 2022).

Recent researches have revealed a fragment of an anthropomorphic representation, showcasing the lower part with human-like legs arranged in columnar form. The feet extend slightly forward. Attached to these legs is an expanding part that functions as an internal receiver. The exterior is adorned with intricate linear carvings, although the upper half of the piece is unfortunately missing (Table 6).

On the site of Borđoš, fragments of simply shaped legs and feet are commonly unearthed, and the recent finds provide clearer insights into their original context (Table 6).

9. Prosopomorphic Lid

Unique clay artefacts, known as prosopomorphic lids, have fascinating features. One particularly well-preserved copy, smaller in size and showing the characteristics of the Tisza style, was discovered during surface collections in Borđoš (Fig. 1). This lid features tiny, protruding ears, a sculpted nose, and expressive almond-shaped eyes. Unfortunately, the details surrounding its discovery remain unclear. Interestingly, these lids bear a closer resemblance to the deep lids found in the Late Neolithic settlement of Iđoš, showing fewer similarities with the prosopomorphic lids of the Vinča culture (Balj, 2022).

Fig. 1: Prosopomorphic lid, surface find (1985)

10. Sieve

Sieves or colanders belong to a special group of objects (Fig. 2). These are objects that have a conical wall with circular perforations on it and at the bottom or top, there is a circular opening. The perforations are 5 mm in diameter. The outer surface is finely polished, while the inner surface has a rough texture (SI, Table 15).

Fig. 2: Sieve fragment, flat settlement, Find No. 17033/17005

Other Ceramic Objects

Anthropomorphic Figurines

On the site of Borđoš, a range of figurines resembling human forms were unearthed. Some are intact, while others are only partial; primarily showing the upper parts (see Figures in Furholt-Furholt in this volume). These figures depict human traits in a very abstract manner. The eyes are skilfully carved, and the nose has a three-dimensional quality. Most of the figurines have a plate-like shape, featuring arms that resemble stumps extending outward. Their surfaces are adorned with intricate carvings.

A recurring motif is evident on several pieces, always prominently positioned below the head on the front. This design takes the form of a rhombus, containing two symmetrical triangles. Similar carvings found at the Gomolava site, dating back to the 5th millennium BC, appear on the neck and chest areas of the figurines. The discovered figurines come from the Gomolava I a-b phase (Vinča culture). Depending on the interpretation, these designs are thought to represent either necklaces or garments (Jovanović, 2011).

Additionally, this collection includes a conical weight or idol with anthropomorphic features. Its upper section shows carved eyes and a pronounced nose (see Fig. 4 in the chapter *A New Anthropomorphic Clay Figure from the Site of Borđoš* by Kata and Martin Furholt in this volume). Stumpy arms extend from the sides, while beneath the face lies a distinctive parallelogram notch, characterized by dual terminations at both the top and sides (Lazarovici et al., 2001).

Zoomorphic figurines, as well as the miniature figurines are presented in the chapter by Lidija Balj in this volume.

Cult Objects

This collection includes smaller items with shallow triangular or quadrangular shapes, elevated on a high pedestal (Fig. 3, 4). The use of these objects has been the subject in many researches over the time. They can be interpreted as the altars, which appear in the settlements of the Vinča Tordoš II and I culture, although their existence has also been confirmed in the Early Neolithic period – the Starčevo culture (Chapman 1981). Traditionally, it is believed that these objects have been used in rituals. Commonly referred to as tables, altars, or cult tables, they often feature legs and column-like side elements, as seen in the findings at Borđoš (Fig. 5). These pieces are notable for their elaborate decorations, featuring en-

Fig. 3: Cult object or house model (?), surface find, Find No. 2386, (1946), Zrenjanin National Museum

Fig. 3: Cult object or house model (?), surface find, Find No. 2386, (1946), Zrenjanin National Museum

Fig. 4: Cult object or house model (?), surface find (1985)

gravings, vibrant colours, and decorative applications known as protoma (Meier-Arendt, 1990).

Some believe that they have been everyday objects - as lamps (Gimbutas, 2007:224; Tringham-Stevanović, 1990: 323-396) or vessels for lighting fire (Elster 1986: 312). New chemical analyses conducted on the archaeological material in Eastern Macedonia and Greece show that the content of these objects was oil or grease, cedar as a fossil fuel and bee wax - substances with lightning, flammable, aromatic, waterproof and medicinal characteristics. This fact confirms their function as a lamp, fire-starters, and incense burner for home fumigation or temporary vessel for aromatic or healing substances (Marangou, Stern 2009).

Fig. 5: Cult object (leg), surface find (1985)

House Model

Among the surface discoveries, a smaller piece of an angular object was found. This fragment might be a part of a house model, according to comparisons from similar findings (site of Střelice-Sklep, the Czech Republic) (Kovárnik 2017: 85). Previous studies suggest that these models might have been linked to ritual activities, perhaps serving as representations of a domestic shrine. However, it's also important to consider their practical use as simplified architectural interpretations of real houses (Trenner, 2010; Kovárnik 2017).

Fig. 6: House model, surface find (1985)

Open house models were common across all Early-Middle Neolithic cultures, typically measuring up to 20 cm in size. If these models lack roofs, they reveal the internal structures of the houses they represent. Rather than being exact replicas, they are more abstract representations of the essential elements of each Neolithic community.

Mask

We recognize a section of the object featuring two circular openings, resembling the mask, shaped from the material similar to the wattle and daub (Table 9). The object has a gentle arch, suggesting it once belonged to an oval form crafted from a plate. Its front is polished, while above the circular openings, there are raised plastic decorations that resemble eyes. However, the area between the eyes, around the nose, is noticeably damaged. The reverse side is rough and flat, marked by small, uneven holes that may have served to attach the mask to another piece. Masks are often seen as funerary artefacts, fostering a connection between the community and their ancestors, or serving a role in the cult of the deceased. Such masks are exceedingly rare in Europe. The nearest counterpart to the Borđoš mask is found in Uivar, Romania, dating back to between 6200 and 5500 BC (Schier, 2005).

Spoons

Archaeologists unearthed three ceramic spoons in the dwelling objects located in the horizontal settlement. Among them, the most preserved spoon is deep and stands out for its exceptional craftsmanship (Table 8). It has a capacity of 15 ml. Ceramic spoons are unusual finds, leading to the belief that this type of tableware is usually made of softer materials such as bone or wood and only in some cases ceramic. The appearance of spoons could serve as a significant marker of dietary changes within the Neolithic communities (Horvat, 2015).

Clay Balls

Clay balls with roughly smoothed surfaces are commonly found during surface surveys. Notably, a greater concentration of these artefacts appeared in the inner areas of the tell settlement. During the excavation of House 5, a remarkable find was made: a well-preserved group of clay balls, discovered in the original context. Six well-preserved ceramic spheres were discovered lying side by side next to a flat stone panel (Table 9). The other balls were fragmented and were located between the house daub (object 16012). Ten balls were unearthed, each measuring between 6 and 8 centimetres in diameter. Their purpose has caused different interpretations among archaeologists. An increasing number incline towards the idea that these balls served as projectiles for slingshots used in hunting, while a smaller fraction believes they were intended as weapons for defending settlements (Stojić & Cerović, 2011). Given the absence of other projectile types on the site of Borđoš, we suggest that their primary use was indeed for hunting. Remarkably, two similar deposits have been identified in the Neolithic settlement of Uivar in Romania, supporting this interpretation (Schier, 2005).

Weights

Clay weights could serve various purposes based on their design. Traditionally, they were used for fishing nets and in the weaving of textiles. Typically, these weights feature a smooth, polished exterior, often lacking elaborate decorations. They come with perforations that can be either horizontal or vertical. On the site of Borđoš, one can find them in several shapes, including oval, spherical, cylindrical, and conical (Table 9). Among these, a unique variant is the cylindrical weight with two perforations, specifically designed for winding ropes. The weights can be found throughout the entire settlement.

Spindle Whorls

In the Late Neolithic period, South-eastern Europe saw a remarkable presence of small clay discs with a central hole, a common type of ceramic found in settlements. Excavations in Borđoš revealed three of these discs, crafted from fine ceramics similar to those discovered in other regions, though they were shaped with less precision.

Alongside the flat spindle whorls, several oval and cylindrical were unearthed (Table 8, 10). However, their scarcity stands out in the findings.

Jewellery

Ceramic jewellery, along with items crafted from various materials, is quite rare. In the House 5, we found a single circular bead, 2 cm in diameter. It is made of clay mixed with sand, which we believe was likely a component of some kind of accessory (Table 9).

Pottery Technology (Table 16)

The Late Neolithic Pottery from Borđoš was handmade without a potter's wheel. The clay was prepared using different recipes. Around a third of the pottery had an excellent clay matrix, with fine quartz sand sometimes visible to the naked eye. This sand may have been a natural component of the clay. Crushed pottery (grog) was added to 46% of the pottery. Sand temper was added to 10-14% of the pottery, organic components to 6-10%, crushed limestone to 0.3-1.3%, and shells or snails to 0.5%.

The pottery was classified into 13 different fabrics based on texture (break), colour, temper, and surface treatment. Coarse fabrics were mainly used for making backing pans, sieves, pots, and pithoi, while fine fabrics were used for producing amphorae,

bowls, footed bowls, aryballoi, and goblets. Medium fine fabrics were used for making various transport vessels like amphorae, as well as some bowls, goblets, and other rare vessel categories.

The visual appearance of the ceramics is characterized by a wide range of colours. These colours are a result of: 1) the types of clay used, 2) intentional oxidizing or reducing firing, and 3) the different ways the ceramics were used in firing processes, such as food preparation. As a result, the surface colours and the various oxidizing and reducing phases in the fired clay reflect the unique histories of the vessels. Changes in the pottery's appearance also occurred during its burial due to exposure to house fires. The differences observed in the frequency (percentage) of colours and firing atmospheres in different feature categories indicate that the majority of pottery, both the Vinča and Tisza styles, was produced as dark-fired pottery. Subsequently, this pottery often acquired a reddish colour through a secondary oxidizing firing process.

Pottery Decoration (Tables 1-7)

Many of the ceramic artefacts unearthed at the site of Borđoš feature intricate decorations. Based on their decorative styles, we categorize them into several types, each with its own subcategories.

Type 1 – Carving in Metopes

The most common form of decoration features engravings of linear, angular, and flowing designs that weave together, creating intricate patterns reminiscent of dense textile weaves. Just below the rim, a scratched line marks the start of the decoration, segmenting it into vertical sections. Typically, these sections are divided into four panels – two wide and two narrow – especially if they have pierced features.

1 Small motifs (G01, Table 1)
2 Linear incisions (single and multiple lines) (B3, B5, Table 1)
3 Symmetrical motifs (REC, A20, Table 1)
4 Zigzag cuts (B3, B5, Table 1)
5 Chain motif (G01, Table 2)
6 Cross hatch (B5, Table 2)
7 Rhomboids (G01, B5, Table 2)
8 Alternative motifs (A20, Table 2)
9 Hatched triangles (B3, B5, Table 2)

Type 2 – Carving and Painting the Metope

Painting on ceramic isn't a common method of decoration at the Neolithic site of Borđoš. Typically, these pieces are considered luxury items or serve specific purposes. (Horváth-Draşovean, 2013; Miloglav, 2014). They often feature distinctive angular designs and flowing, meandering carvings that add a unique touch.

1 Red and black colour (B5, Table 3)
2 Red colour (B3, B5, Table 3)
3 Red colour and white incrustation (G01, Table 3)

Type 3 – Engraving and Stabbing

The early Vinča culture is known for its distinctive decorative style, which features a blend of incising and stabbing techniques. On the site of Borđoš, various stabbing methods were identified on ceramic artefacts. These decorations include small dots, circles, and notches, often intermingled with one another.

1 Linear cuts and circular notches (B3, B5, G02, Table 3)
2 Linear incisions and small punctures (G02, B13, B14, Table 3)
3 Curved line cuts and stabs (B3, B5, Table 4)

Type 4 – Stabbing

Embellishment exclusively by stabbing is not widespread. It usually occurs together with a polished motif. The piercing is arranged in a horizontal sequence, on the widest part of the vessel. Circular depressions are also found at the widest part of the vessel.

1 Tiny stitches in a row (G02, B15, Table 4)
2 Circular notches in a row (G02, B13, Table 4)
3 Circular depressions (B14, B15, B16, B17, Table 4)

Type 5 – Polishing

The decoration of ceramics using the technique of rubbing, i.e. polishing, is best preserved on vessels from graves. Horizontal, vertical, arched or circular rubbing leaves characteristic marks on the ceramic (Polished - B2, B14, B15, B16, B17, B20, G02, A03, Table 4).

Type 6 – Application

Relief changes on the ceramic surface can be very different. They have no functional role other than decoration. Profiled and perforated nipples have the only functional role and were used to hang vessels on a string.

1 Nipples (B10, B12, B15, B16, B19, Table 5)
2 Profiled perforated nipples (B3, B5 , Table 5)
3 Protoma (B1, B11, Table 5)
4 Flat applications (A03, A04, A23, Table 5)
4a Symmetric application (B20, Table 5)
5 Anthropomorphic applications (A01, Table 5)
6 Plastic rib (P05, P10, P12, Table 5)

Type 7 – Anthropomorphic Separate Parts (Table 6)

A special group includes objects that have physically separated anthropomorphic parts as decoration. On the site of Borđoš, recent research has revealed a part of a vessel standing on human feet. The surface is decorated with engraving. We have known about these types of vessels from Borđoš since before. Their interpretation is still unknown; the only thing certain is that they were not used for cooking and serving.

This type of decoration was widespread in South-eastern Europe during the Late Neolithic in various cultures. The details which resemble the human anatomy, mostly contours of the human face, hands, breasts, genitalia and hips, are represented by decorative techniques (incision, application and painting). Most of the discovered anthropomorphic vessels have features typical of the female body. Anthropomorphic vessels can be divided into two zones: the upper zone where elements of the identity (the face) are visible, and the lower zone where extremities and other details are represented. Anthropomorphic vessels with formed lower parts of the body have been discovered in Macedonia, Serbia, Hungary, Bulgaria, the Czech Republic and Germany. Previous research has shown that anthropomorphic vessels are equated with women. Several authors conclude that the anthropomorphic vessels were used as urns for infants (Naumov, 2008).

Type 8 – Handles

Handles on vessels serve both decorative and practical purposes. Their design influences their function significantly. We can categorize them into several types and subtypes. The most frequently encountered are knob and tongue-like handles, typically found symmetrically positioned on the widest part of the bowl, with four handles per vessel. Band handles can be oriented in various ways – either horizontally or vertically – and may appear in pairs, one being placed above the other. Handles are generally affixed to the rims or the broadest sections of the container, often arranged symmetrically in sets of two or four. Combined and angular handles, on the other hand, are much less common.

1 Button-shaped (B1, B3, P05, Table 6)
2 Double-button shaped (Table 6)
3 Tab form (P02, P04, P05, P13, Table 6)
4 Tab form with modification (PA, P02, P03, Table 6)
5 Band handles (P04, A02, A10, A11, A12, Table 7)
6 Combined handles (P02, Table 7)
7 Angular handles (A01, Table 7)

Type 9 – Rims

On the ceramic vessels discovered on the site of Borđoš, the rim is not decorated. In exceptional cases, the rim was modified and then the rim was cut or pierced (Ribbed rim - B2, B10, B19, B20, P12, Table 7)

Type 10 – Engraved Symbols

Not a single sherd with engraved symbols was discovered on the ceramic material that comes from modern research. Two potential fragments come from older survey. On the bottom of the vessels there are engraved signs “X”. In one case the motif is surrounded by a concentric deep polished motif. In both cases, the ceramic has a texture of the Vinča ceramics. An example of marking the bottom of a biconical bowl can be seen at the site of Vinča-Belo Brdo (House 01/06). Here, an “X” sign was incised after the bowl had been fired, on the outer surface of the base (Engraved symbols (B14, B19, Table 7) (Borojević et al., 2020: 162).

Type 11 – Perforated

The small circular perforations on the vessels were not decorative motifs. The conservators assume it is about the “repair” of the vessel (Circular perforations - B18, A01, Table 7).

Analysis of Household Units

On the site of Borđoš, researchers examined 15 housing complexes from the Late Neolithic period, with two being fully excavated. In addition, electrical resistivity measurements were applied to one house. Dimensions of the houses can be found in Appendix 3 (see Hofmann et al. in this volume).

House 1 (Table 8)

House 1 was tragically destroyed in a fire. Archaeological remains are scattered over the surface of the house, which indicates secondary burning. The ruins of the house suffered damage in a medieval pit and two Bronze Age graves, where they were buried in urns. One urn (Find No. 8032/8002), was found intact, accompanied by grave goods (Table 12).

Ceramic artefacts included remnants of both coarse and fine vessels. Notable discoveries comprised a fragment of an aryballos, ceramic spoons, and several ceramic toys intended for children (see the article by Lidija Balj in this volume). The ceramics mainly exhibited features characteristic of the Tisza style.

The graves date back to the Late Bronze Age and belong to the Gava-Belegiš culture, which was situated south of the flat settlement, bordered by a ditch. A prosperous settlement and necropolis associated with this culture have already been documented at Borđoš (Bukvić, 2000). Evidence such as urn fragments, ploughshares (Medović, 1993), and parts of measuring scales further support this finding (Medović, 1995).

Houses 2, 3 and 4

Houses 2, 3, and 4, positioned in a flat area of the settlement, remain only partially excavated in test trenches. These structures also experienced burning. The ceramic findings from these houses are attributed to the Tisza style. Among the remnants of House 2, researchers revealed fragments of an internal architectural plastics. The preserved flat sections were crafted from a type of soft clay, with some portions adorned with plastic kneaded band.

House 5 (Table 9)

House 5 at the tell settlement was completely excavated, yet the cultural layer extends further below. This structure was destroyed by fire, subsequently affected by two waste pits from the Middle Ages. Ceramic artefacts were found in a disturbed context. In the upper layers and in the spaces between and below the house, fragments of large, coarse vessels and shallow pans are predominantly found. Among the more refined ceramic pieces are fragments of beautifully crafted cups adorned with intricate carvings in metopes, alongside bowls embellished with polished designs. Notably, a fragment of an aryballos was unearthed, and a collection of ceramic balls was also found within the house. Several grid-pattern pieces enhance the architectural significance of the structure, along with small, plate-like amorphous plugs. The archaeological material in this layer is diverse and shows ceramics of both the Tisza and Vinča styles.

House 6

A section of an unburned house was revealed on a slightly elevated area in the centre of the settlement. The structure remains vaguely outlined, lacking clear distinctions between the interior and exterior. Notable ceramic artefacts were adorned with banded metopes, marked by small punctures, alongside polished decorations. These designs and distinctive forms align with the early phase of the Vinča culture, a feature that has not previously been identified in houses examined to date. Additionally, some vessels show engravings within metopes, including the lower portion of an anthropomorphic vessel exhibiting traits characteristic of the Tisza culture. The archaeological assemblage reflects finds from both the Tisza and Vinča cultures, with a predominant representation from the early Vinča phase.

In the flatter section of the settlement, Houses 7-16 have been documented (Table 10, House 14). All these buildings were damaged by fire. House 7 underwent partial excavation, while the others were merely noted after the digging of the irrigation system in 2021. The ceramic artefacts from this area primarily have the characteristic of the Tisza style, with sporadic pieces from the early Vinča style.

House 15

This house underwent geoelectric prospection on the tell (the upper part of the settlement), confirming its existence. However, further excavation was not conducted. Based on vertical electric sounding and geoelectrical mapping, the cultural layer was determined to be approximately 2.6 meters deep, situated between 2.1 and 1.9 meters below the surface (Pešterac Stanković et al., 2014).

Burials

Burials from two periods - the Neolithic and the Bronze Age - were discovered at the site of Borđoš. There are written records of medieval skeletal burials, as well as surface traces around the church located in the Bronze Age part of the settlement. On the site, burials in vessels and one collective grave with skeletal remains were registered. A Neolithic skull was discovered during the construction of the irrigation system, in the zone of the flat settlement (the lower part of the settlement) between the houses. The exact location and context are unknown, therefore, skeletal burials in the Neolithic will not be discussed here.

Six burial units were discovered on horizontal settlement, where the burial was carried out by burning and placing the remains in ceramic vessels. Beside them, there were grave goods – ceramic vessels and one bead. Four graves are dated to the Neolithic, and two belong to the Bronze Age, which will be discussed in the Bronze Age section.

Late Neolithic Burials (Table 11)

Four burial units were discovered in situ at the foot of the entrance gate of the ramparts of the horizontal settlement, although the proof of human bones has not been obtained. The pots were located next to each other at the same depth, which indicates that they may have been buried at the same time. The answer to whether it is a necropolis or just a group of graves remains an open question. The vessels were filled with earth, without ashes. The remains of the burned skeleton were discovered only in traces dimensions. The lack of ashes was also observed in Bronze age urns. According to the experience of anthropologists in certain cases, the composition of the soil can impact the composition of cremated remains. Apart from the ceramic vessels, there were no other accessories, except for one cylindrical marble bead in grave 3. In the zones between the burial vessels, animal horns were registered, which could be part of the burial ritual (Find No. 14145/14004). The vessels did not have a good clay quality, from this, it can be concluded that they may have been made only for this occasion. The forms, as well as the method of decoration by polishing, are typical of Vinča style – Vinča-Pločnik phase.

We have scarce data on burials in the Late Neolithic of the region. Most of the data on the territory of Vojvodina comes from the two necropolises of Botoš (Banat) and Gomolava (Srem), and in both places burials were carried out as inhumations with grave goods. A pattern of mortuary practices in the area consists of particular examples of burials inside settlements of the first Neolithic communities and of the single Late Neolithic/Eneolithic necropolis of the Vinča culture at the site of Gomolava (Borić, 1996). Necropolises were created as specific areas, which were formed at the very beginning of the Late Neolithic on temporary uninhabited parts of the settlement,

which has just been confirmed at this settlement too. The graves were discovered outside the settlement. The assumption that not all members of the community could be buried in a special place tells us about the existence of social strata. (Borić, 1996).

In the territory where Vinča pottery style is distributed, all discovered graves are skeletal (Balj, 2022).

The inhabitants of the Tisza culture settlement also buried their dead in abandoned parts of the settlement and in the settlements among the houses. They practiced skeletal burials with offerings. In the Lengyel culture, skeletal burials were carried out in groups in separate areas. Both cultures had the same burial method – skeletal, which is not the case here. We have further to expand research.

The practice of burial in vessels is present in many Neolithic cultures of Southeast Europe, but it is not numerous. On the other hand, about 80 vessels were discovered in which burials were carried out by cremation, from the entire Neolithic period, with the fact that it was much more widespread in the Early Neolithic. Most of them, the pots have anthropomorphic features of a female person and are believed to have been used for the burial of infants. Bulgarian archaeologists have identified a few burial methods in clay vessels dating back to the Neolithic. The first two refer to skeletal burials, while the third is cremation. The earliest case of a cremated burial in a vessel comes from the early Neolithic of Tel Azmak (Bulgaria) where the grave of a child was discovered, who was buried in the zone of houses (Bacvarov, 2007).

The burial of the cremated remains of the deceased in ceramic vessels were found in the Late Starčevo layer at Vinča-Belo Brdo (Васић, 1936) as well as at the Körös site of Gorzsa in the Tisza Valley (Gazdapusztai, 1963).

An isolated case was registered at the site of Vršac-Potporanj (Banat region). One urn was discovered with cremation remains from the Late Neolithic. The urn was very badly baked and without decoration (Milleker, 1938).

The burials from Vinča, Gorzsa and Vršac formally correspond to the Azmak complex (Early Neolithic in Bulgaria); the calcinated bones were buried in clay pots (Bacvarov, 2007).

Numerous examples of cremation burials in pots come from Soufli Magoula and Plateia Magoula Zarkou and Dimini in eastern Thessaly (Gallis, 1979) as well as in Suplacu de Barcău and Tăşad in Transylvania (Ignat, 1985).

Analysing the data, we conclude that the tradition of burials in clay vessels began with the Early Neolithic cultures and survived in the same areas until the Late Neolithic and even the Bronze Age.

Bronze Age Burials (Table 12)

At the edge of a flat settlement lies a Bronze Age site, tracing the eastern and southern periphery of the plateau. A part of this settlement has been eroded by the Tisza River on its eastern side. The settlement was encircled by several massive ditches, and observations were primarily made in its north-western section. Although this entire site was not subjected to geomagnetic prospecting, research was focused on the area next to the Late Neolithic settlement, where overlaps were identified. Nearby, a necropolis can be found, situated within the bounds of the Late Neolithic horizontal settlement (excavation area 3). During the survey of the House 1, two urns were revealed in their original context. However, archaeological researches of settlements from the Bronze Age itself were scarce; surface finds and artefacts revealed by erosion from the Tisza have been the main sources of information. Notable archaeological items include surface finds, such as a prehistoric Mycenaean scale, a bronze ploughshare, and three hoards dating from the Late Bronze Age. Additionally, sporadic surface finds suggest evidence of the Middle Bronze Age activity (see the chapter *History of Research of the Archaeological Site of Borđoš* by Ildiko Medović in this volume).

Most of the ceramic artefacts and burial sites belong to the Late Bronze Age, specifically associated with the Gava-Belegis culture. Among the intriguing discoveries is a foundry spoon, which points to advanced bronze processing techniques in Borđoš (Table 12).

In 2022, an intriguing find was made: a grave containing one adult and four infants, all buried in an irregular arrangement, and was located near the Tisza River in a high-profile area. Accompanying this burial were fragments of a broken vessel and the femur of an animal, serving as grave goods (Table 17).

Early Iron Age (Table 13)

The Early Iron Age settlement is believed to have expanded upon the earlier Bronze Age site. However, archaeological studies have not confirmed its presence. The only evidence we have is found on the surface and within the collapsed profile of the Tisza River, which is why these remnants are so well preserved. You can find these artefacts displayed at The Cultural Centre of Novi Bečej Municipality.

Middle Ages (Table 14)

Remnants from the Middle Ages have been revealed through both surface discoveries and the collapsed profiles of the Tisza River. The earliest record of a medieval settlement in Borđoš dates back to the 13th century. However, evidence suggests that there may have been earlier settlements as well. It's challenging to determine whether these were permanent or temporary based solely on sporadic finds. Some metal artefacts hint at the Migration period, while a numerous numismatic discoveries range from Antiquity to the Late Middle Ages. Excavations of the House 1 and the House 5 revealed medieval pits, and outside the tell settlement, a spur from the late 17th century was also found. Surface findings strongly indicate the presence of a church and its adjacent necropolis.

Conclusion

The ceramic collection unearthed at the prehistoric settlement of Borđoš shows a remarkable range of historical periods. It encompasses remnants from the earliest cultures of the Early Neolithic Starčevo-Körös culture, through the Late Neolithic Vinča and the Tisza cultures, all the way to the Bronze Age, Iron Age, Ancient Period, and into the Middle Ages. These artefacts, gathered from both survey research and archaeological excavations, vary in representation, with the Neolithic materials being the most prevalent.

The earliest signs of life can be traced back to the Early-Middle Neolithic, found within the fill of the entrance trench of a small round structure. Starčevo-Körös cultural remnants were recorded on the surface north of a small settlement known as Mala Bara, currently separated from the main site by a narrow, water-filled channel. Most of the artefacts originate from the largest horizontal settlement associated with pottery of the classical Tisza style, which also contains a few items from the early Vinča style (Vinča-Tordoš).

The last Neolithic settlement occupies a raised area where a smaller site with a rampart emerged, characterized by Late Vinča culture pottery (Vinča-Pločnik). While the influence of the Tisza culture is present, it appears minimally, represented by only a few ornate fragments. The ceramic artefacts typical of this Late Neolithic phase reflect styles from both the Vinča and Tisza cultures, with no signs of foreign influence.

Notably, four burial units dating to the Late Neolithic have been identified, featuring cremation practices that are relatively rare for this period within the research region. One notable grave urn was found in the last century at the Vršac-Potporanj site, linked to the Vinča culture (Vinča-Tordoš), but available data remain scarce. Future researches may clarify whether this scarcity indicates limited use or if it represents a unique occurrence.

Analogies for certain beads found in Borđoš can be drawn from the Tiszavasvári-Deákhalmi dűlő site, where a smaller Neolithic cemetery with skeletal remains was discovered. In grave No. 11, a woman was buried with stone bead (Kurucz, 1994), dating to the second third of the Early-Middle Neolithic (Tasić, 2009).

Carving in metopes

1. Small motifs



2. Linear incisions (single and multiple lines)






3. Symmetrical motifs


4. Zigzag cuts


Table 1: Pottery decoration

5. Chain motif

6. Criss-cross hatch

7. Rhomboids

8. Alternating motifs

9. Hatched triangles

Table 2: Pottery decoration

Carving and painting in metopes

1. Red and black colour

2. Red colour

3. Red colour and white incrustation

Endgraving and stabbing

1. Linear cuts and circular notches

2. Linear incisions and small punctures

Table 3: Pottery decoration

3. Curved cut lines and stabs


Stabbing

1. Tiny stitches in a row


2. Circular notches in a row

3. Circular depressions


Polished

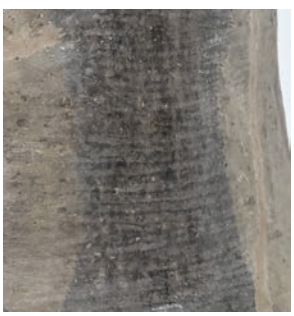





Table 4: Pottery decoration

Applications

1. Nipples


2. Profiled perforated nipples


3. Protoma




4. Flat application


5. Symmetric application

6. Anthropomorphic application

7. Plastic rib

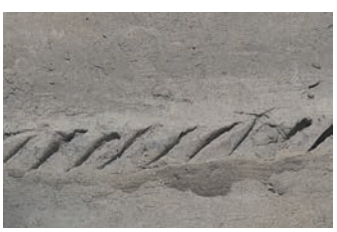


Table 5: Pottery decoration

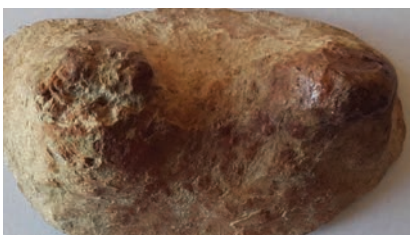
Anthropomorphic separate parts




Handles

1. Button-shaped


2. Double button-shaped



3. Tab form



4. Tab form with modification



Table 6: Pottery decoration

5. Band handles

a. Horizontal

b. Vertical

6. Combined handle

7. Angular handles

Rims

Engraved symbols

Perforated

Table 7: Pottery decoration

Find No. 4081/4003 - goblet, h: 13 cm

Find No. 4083/4003 - amphora, h: 25 cm

Find No. 4115/4003 - pot, h: 15,5 cm

Find No. 4121/4003 - bowl, h: 10 cm

Find No. 4130/4003 - pan, h: 5 cm

Find No. 4144/4014 - Spindle whorl, h: 3 cm

Find No. 9100/9007 – pithoi, h: 20 cm

Find No. 9025/9002 - spoon, h: 3 cm

Table 8: House 1 – Ceramic artefacts

Find No. 7252/7010 - bead,
w: 2.3 cm

Find No. 7294/7010 - aryballoi,
w: 4.5 cm

Find No. 16117/16006 - weight,
h: 3 cm

Find No. 7259/7010 - pot,
h: 11 cm

Find No. 15370/15003 - bow fragment,
with in relief applied hand, h: 7.2 cm

Find No. 15434/15016 - goblet
fragment, h: 5.6 cm

Find No. 7201/7010 - mask, h: 11 cm

Find No. 15193/15003 - architectural
element, l: 16 cm

Find. No. 16294/16003 - architectural
element, h: 18 cm

Find No. 16092/16002, 16093/16002, 16093a/16002, 16331/16012, 16347/16012,16353/16012 - clay balls, h: 5-6 cm

Table 9: House 5 – Ceramic artefacts

Find No. 22000/1
Spindle whorls, north profile, l: 5.3 cm

Find No. 22000/2
Goblet, north profile, h: 12 cm

Find No. 22000/3
Red-black painted vessel, north profile, h:13 cm

Find No. 22000/4
Funnel-shaped vessel, north profile, h: 9.5 cm

Find No. 22000/5
Bowl, south profile, h: 8 cm

Find No. 22000/6
Amphora, south profile, h: 50 cm

Table 10: House 14 – Ceramic artefacts

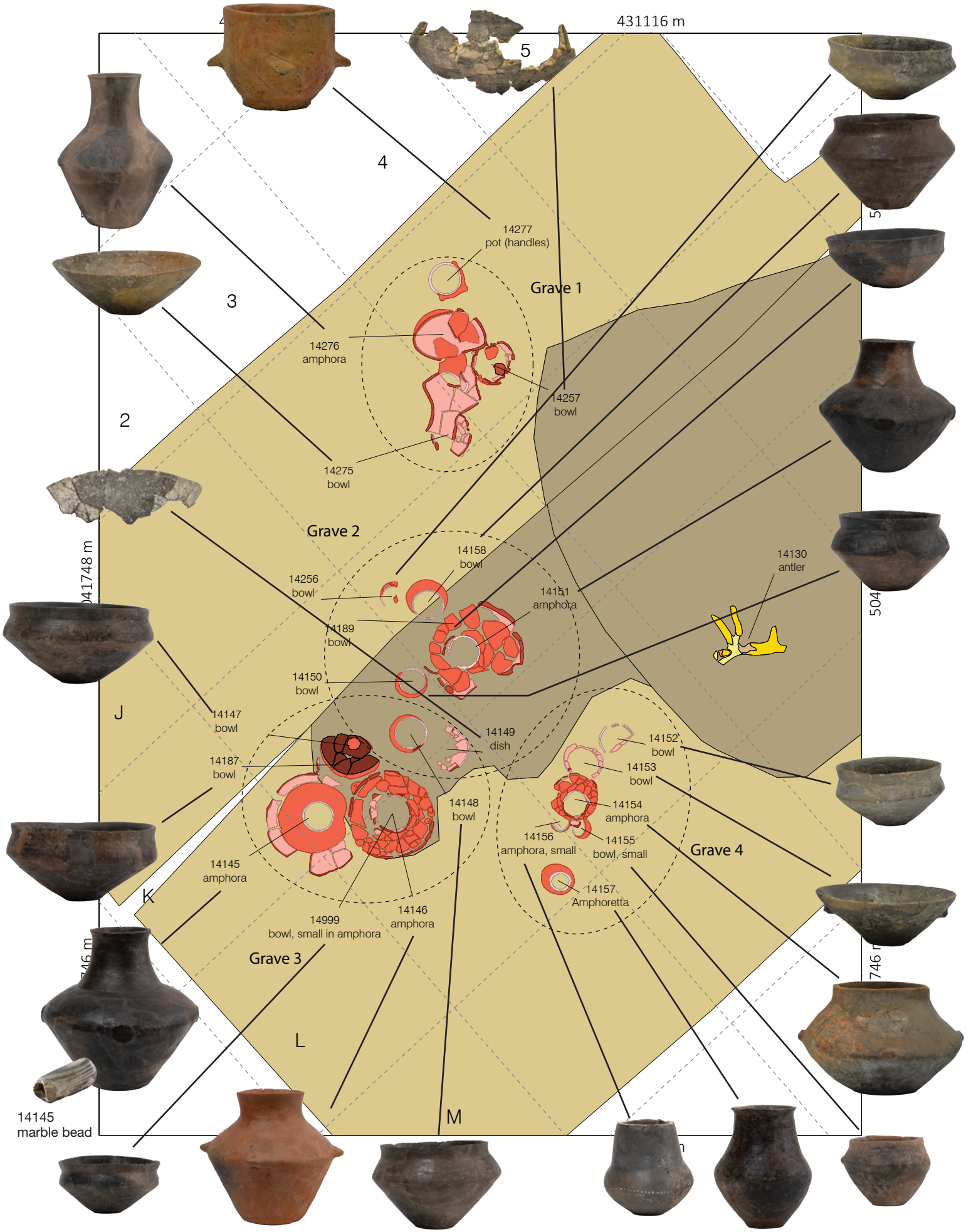


Table 11: Plan of graves with specific pottery finds

Bronze Age

Foundry spoon for metal casting, surface find (2015)

Goblet, surface find (1985)

Cup, surface find (1985)

Urn with vessel offerings, Find No. 8032/8002 (2015)

Bronze objects, surface finds (1985)

Mold for casting metal, surface find (2022) (front and back)

Table 12: Bronze Age finds

Early Iron Age

Pot, surface find, Bosut culture (1985)

Bowl, surface find, Bosut culture (1985)

Cylindrical spools, surface finds (1985)

Table 13: Iron Age finds

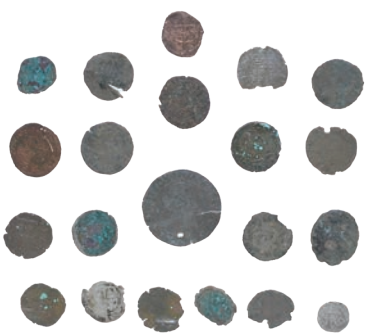
Belt buckle, 12-14th centuries, surface find

Bronze heart-shaped pendants, 12-14th century, surface finds

Bronze applications, 14-16th centuries, surface finds

Silver coin of the Serbian kings Dragutin and Milutin, the end of the 13th century, surface find

Medal of St. Benedict, 17th century, surface find (1985)



Bronze and silver coins from the 15-16th centuries, surface finds

Bronze ring with initials, 14th century, surface find

Bronze ring with initials, 14-15th centuries, surface find

Table 14: Middle Ages

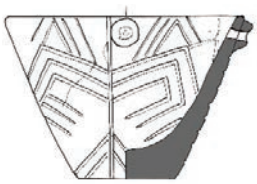
vessel class	type group	Code	Context (feature-id)	Example:
dishes/bowls	single-sectional dish/bowl with flat conical-slightly spherical profile	B1	4003, 6010, 7010, 14002, 14008 17022, 17028	
	single-sectional dish/bowl with flat conical-slightly spherical profile and inside thickened lip	B2	6004, 6010, 6016, 7010, 17005	
	single-sectional bowl with steep conical-slightly spherical profile	B3	3009, 3010, 4001, 4003, 4013, 14002, 14999	
	single-sectional spherical bowl	B5	4013, 4029, 4089, 6003, 6004, 6010, 7005, 7008, 8002, 8011, 9020, 14002, 14007, 17005, 17028	
	multi-sectional dish/bowl with flat slightly concave rim-zone	B10	4002, 4013, 6016, 14008, 14999	
	multi-sectional bowl with straight vertical upper part and rounded breaking point	B11	6016, 8002, 17022	
	multi-sectional rounded bowl	B12	4003, 8011, 9008, 14007	
	multi-sectional carinated bowl with short separated rim	B13	4003, 4029, 7003, 7007, 7008, 7010, 14004, 14008	
	multi-sectional bi-conical bowl with long steep rim	B14	6010, 7010, 14008, 17005, 17022	

Table 15: Classification of vessel shapes. Graphic by: Ildiko Medović and Robert Hofmann

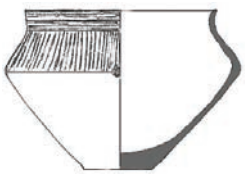
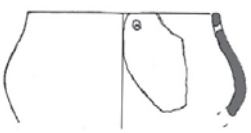
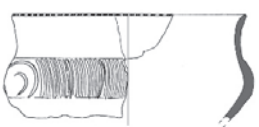
	multi-sectional bi-conical bowl with long steep rim	B14	6010, 7010, 14008, 17005, 17022	
	multi-sectional bi-conical bowl with concave upper part	B15	14008	
	multi-sectional carinated bowl with longer separated rim	B16	7007, 7011, 14008	
	multi-sectional rounded bowl with funnel-shaped rim	B17	6010	
	multi-sectional rounded bowl with s-shaped profile	B18	7003, 7008, 9010, 17005	
	multi-sectional carinated bowl with concave vertical upper part	B19	4003, 6016, 7010, 14008	
	weakly restricted vessel with low conical neck	B20	7010	
'goblets'	footed 'goblet' with low-lying, tendentially bi-conical breaking point and middle-high foot	G01	4003, 4015, 7003	

Table 15: Continued

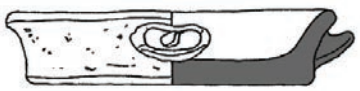
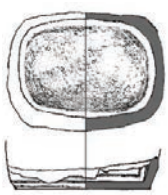
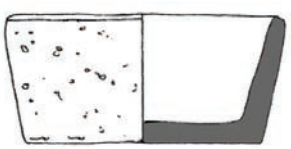
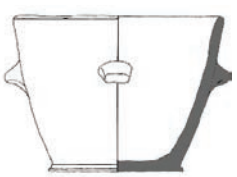
	funnel necked cup („Amphoretta“)	G02	14018	
pans		PA	4003, 4013, 4015, 4016, 4033, 4803, 6003, 6004, 6010, 6016, 7002, 7003, 7005, 7007, 8006, 8009, 8011, 8012, 9004, 9008, 9014, 14002, 14004, 14005, 14007, 14999, 17023, 17025, 17028	
rectangular vessels		REC.	14007	
pots	single-sectional cylindrical pot	P01	7010	
	conical pot	P02	4003, 5008, 6011, 6016, 7007	
	spherical pot	P03	4003, 4031	

Table 15: Continued

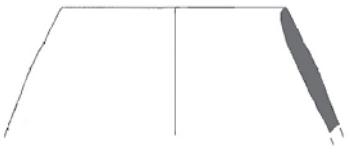
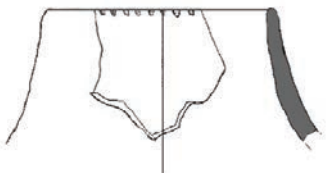
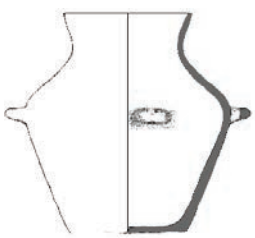
neckless vessels wide-necked vessels	neckless 'pot' with a straight to convex upper part, rim not separated, body unclear	P10	3001, 4029, 6010, 8011, 8012	
	neckless vessel with slightly concave upper part, body unclear	P12	4031, 6004, 6011, 7007, 7010, 8005, 8011, 9010, 14004, 17022	
	neckless vessel with slightly concave upper part and rounded body	P13	4003, 9009, 14008	
	neckless vessel with concave upper part and vertical rim zone, unclear body shape	P14	4003, 4803, 6003, 6004, 6010, 6016, 7005, 7010, 9009, 9019, 9020	
	weakly restricted 'pot' with short funnel-shaped rim	P20	4003, 4803, 6003, 6004, 6010, 6010, 6016, 7005, 7010, 9009, 9010, 9019, 9020	
Amphorae: narrow-necked vessels	short narrow vertical neck, steep elongated shoulder, tendentially bi-conical body with a rounded break	A01	4003, 6004, 7001, 9009	
	medium-high, concave expanding neck, steep shoulder, tendentially bi-conical body with medium-high breaking point	A02	7010, 14008	

Table 15: Continued

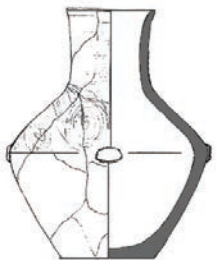
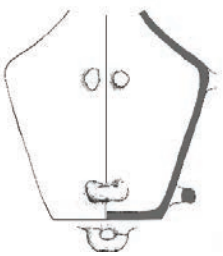
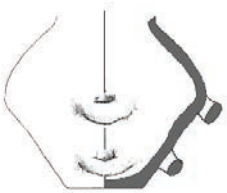
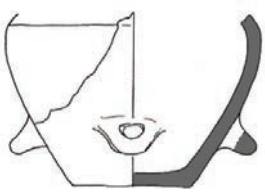
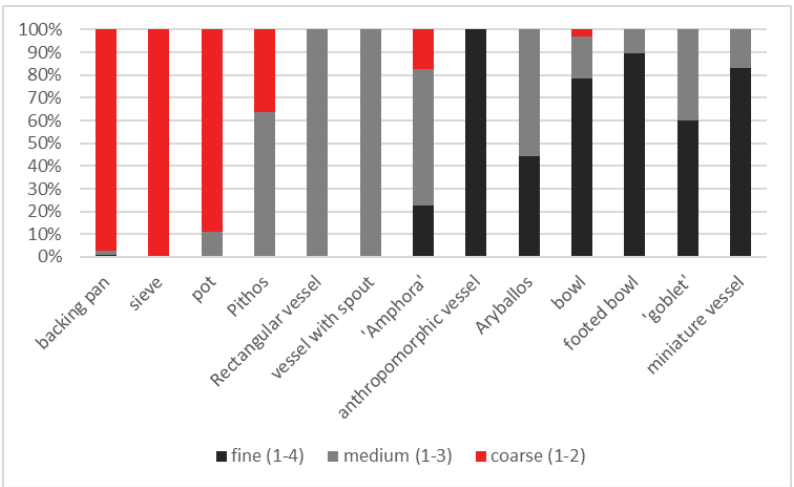
high conical neck, slightly extended rim, flat, slightly convex shoulder, pressed rounded body	A03	14008	
high cylindrical neck, slightly extended rim, steep straight shoulder, tendentially bi-conical body	A04	14008	
body shape: bi-conical, high breaking point	A10	4003, 9009, 9019	
body shape: bi-conical, medium high breaking point	A11	6003, 14008	
body shape: rounded, high breaking point	A12	6003	
neck shape: cylindrical, rim not separated	A20	4013, 4033, 8006	
neck shape: cylindrical, rim bend out	A21	6003, 6004, 14008	

Table 15: Continued

	neck shape: concavely bending out, rim not separated	A22	7010, 14002, 14008	
	neck shape:conical, rim bent out	A23	7010, 14008	
Aryballoi		ARY	4803, 7010, 14002, 14004, 15005, 16003	
Sieves		Si	17005	

Legend to the Codes
A = Amphorae
ARY = Aryballoi
B = Bowls
G = Goblets
P = Pot
PA = Pans
REC = Rectangular vessel
Si = Sieve

Table 15: Continued



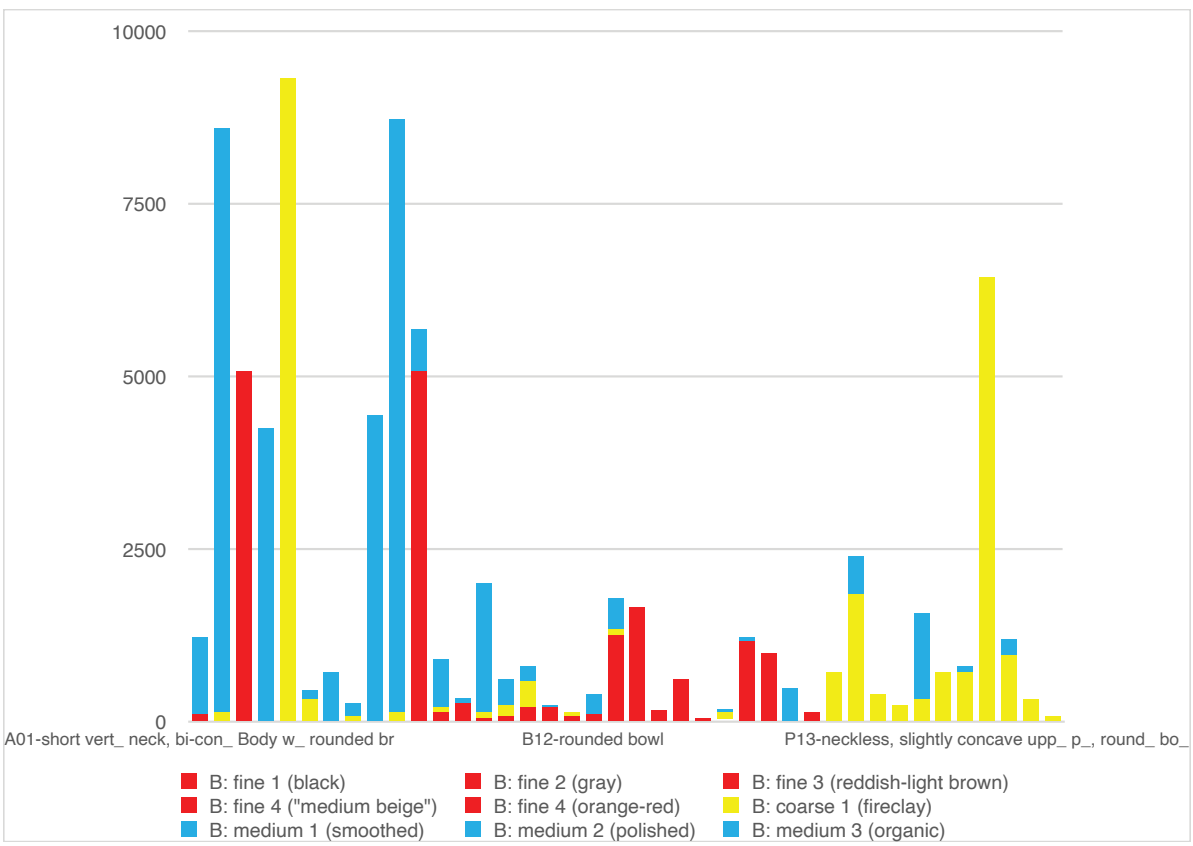


Table 16: Pottery technology, statistics. Graphic by: Robert Hofmann

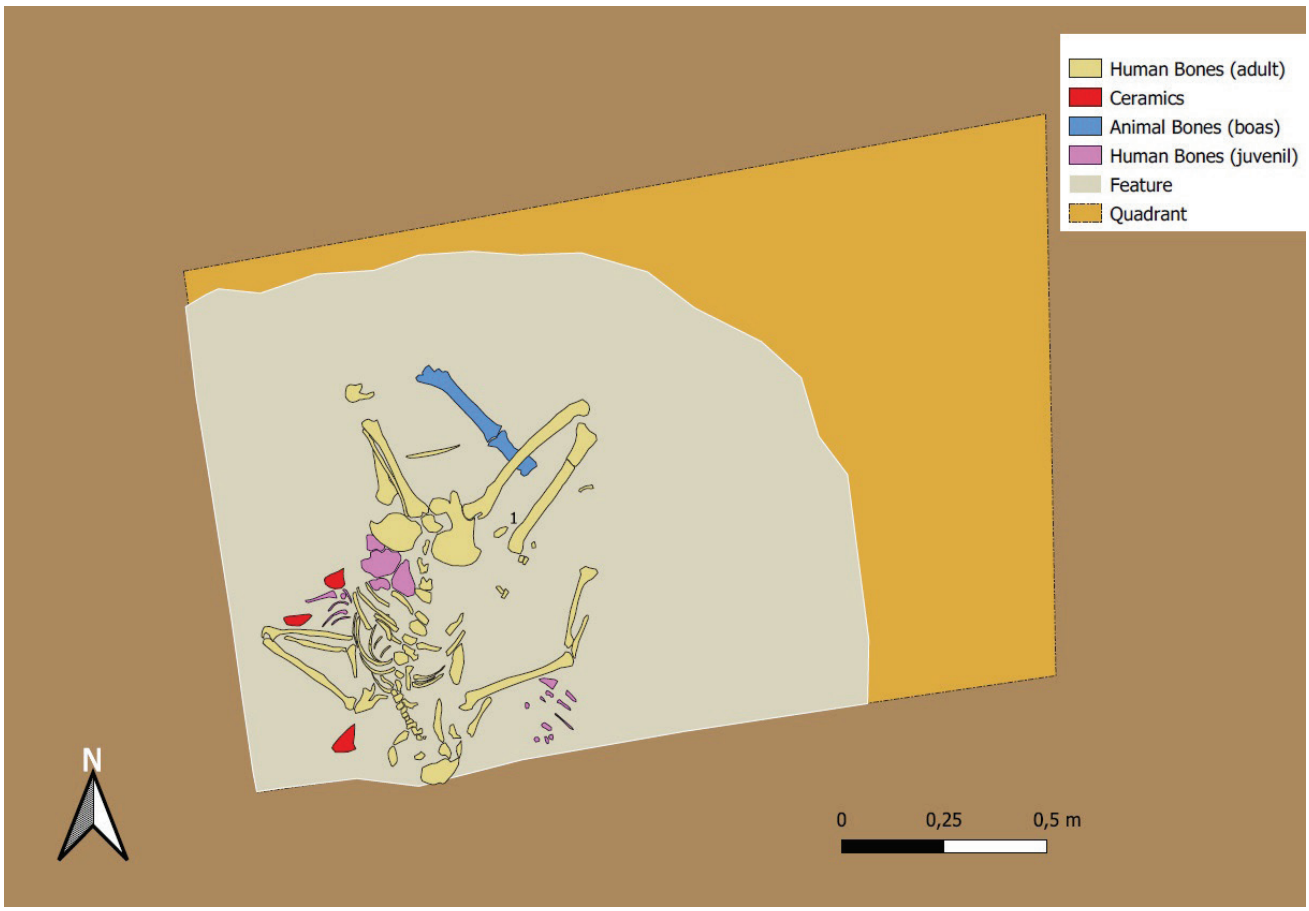


Table 17: Skeletal remains of one adult and four infants

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Profile of the settlement, Trenches 23 and 24, shot from a drone

Aerial view of the terrain

SOME OBSERVATIONS ABOUT A STRATIFIED ARCHAEOLOGICAL FEATURE IN THE LOESS WALL CLOSE TO THE TISZA RIVER AT BORĐOŠ

Kata Furholt, Martin Furholt, Till Kühl, Fynn Wilkes, Darko Radmanović

Circumstances of the Discovery

In 2021, to improve the irrigation system in the field where the Borđoš site is located, a cut through the loess plateau was made towards the Tisza water level, intersecting several features from the Neolithic and Bronze Ages. Two large profiles were created, in which archaeological features with the dark fill were clearly visible. This situation made it necessary to document as much as possible of the entire south and north profiles of the loess walls of the trench in October 2021 and March 2022. In the course of this work, it became clear that these features had a much more complex structure than initially expected (Fig. 1). After removing the wild plants from the tops of the loess walls and cleaning the surface, we documented several archaeological features, two of which were found in superposition. The lower of the two, Feature 002, displayed several layers containing various Neolithic finds. In this chapter, we present this feature along with its layers, which consist of different materials (pottery, stone tools, daub, animal bones, etc.).

Description of Feature 002 in Trench 23

Feature 002 is an archaeological feature documented in the southern profile near the Tisza River. It is clearly visible in the surrounding loess and was later cut by the superimposed Feature 001. Since it was partly destroyed during the construction of the slope leading down to the river, it could only be documented as an incomplete feature. The remains of this feature were 250 cm wide and exhibited a rounded, slightly pointed base. The original depth of the feature was difficult to determine, as it was cut at a 45-degree angle by the excavator during the construction of the slope and was also cut by Feature 001, which originated from a later period. The vertical profile created in 2022, however, indicated that Feature 002 was probably about 80 cm deep (Fig. 2). Six layers were identified, each exhibiting different consistencies and colour of fill, as well as various characteristics and dimensions of archaeological and faunal remains (Fig. 2 and 3). Some of the layers were separated by white ash deposits, which, at the time of this writing, have not yet been analysed. All the layers were sampled for further archaeobotanical analysis (see the chapter *What's "Salt" Got to Do With It? – Recreating the Economic and Natural Vegetation of the Late Neolithic Borđoš* by Aleksandar Medović in this volume). The layers were described as follows:

Layer 1: dark brown soil with occasional finds of pottery, daub, and bone fragments. Layer 2: reddish-brown soil, containing a large amount of pottery, daub, and bone remains, including a dog skull found in the middle of the layer. A substantial concentration of larger pottery fragments was found in the western part of Layer 2. The dimensions of daub pieces are also much larger in comparison with those from the other layers. This layer also contained the most diverse archaeological and zoological materials. Layer 3: light brown soil with a higher concentration of white shell. A dog mandible was discovered beside two elongated clay installation elements, more than 10 cm long (Fig. 4.6). At the bottom of this layer was a concentration of white porous ash and beneath a distinct but thin black charcoal concentration, which marks the interface layer between Layers 3 and 4. In addition, several finds from Layer 3 showed signs of burning. Layer 4: subdivided into 4a and 4b; the former consists of black soil, while the latter consists of lighter grey soil of the same consistencies and inclusions, with a lot of charcoal and pottery. Layer 5: yellow soil with brownish spots, no finds. Layer 6: a thin darkish-brown layer that forms the bottom of the pit; it is slightly deeper in the middle, which indicates the pointed shape of the bottom. This layer also contained no finds.

Fig. 1: Feature 001 (above) and Feature 002 (below) in the southern slope of the Loess wall in October 2021

Fig. 2: Stratigraphic position of Feature 001 and 002 in the west profile (Trench 23 in 2022)

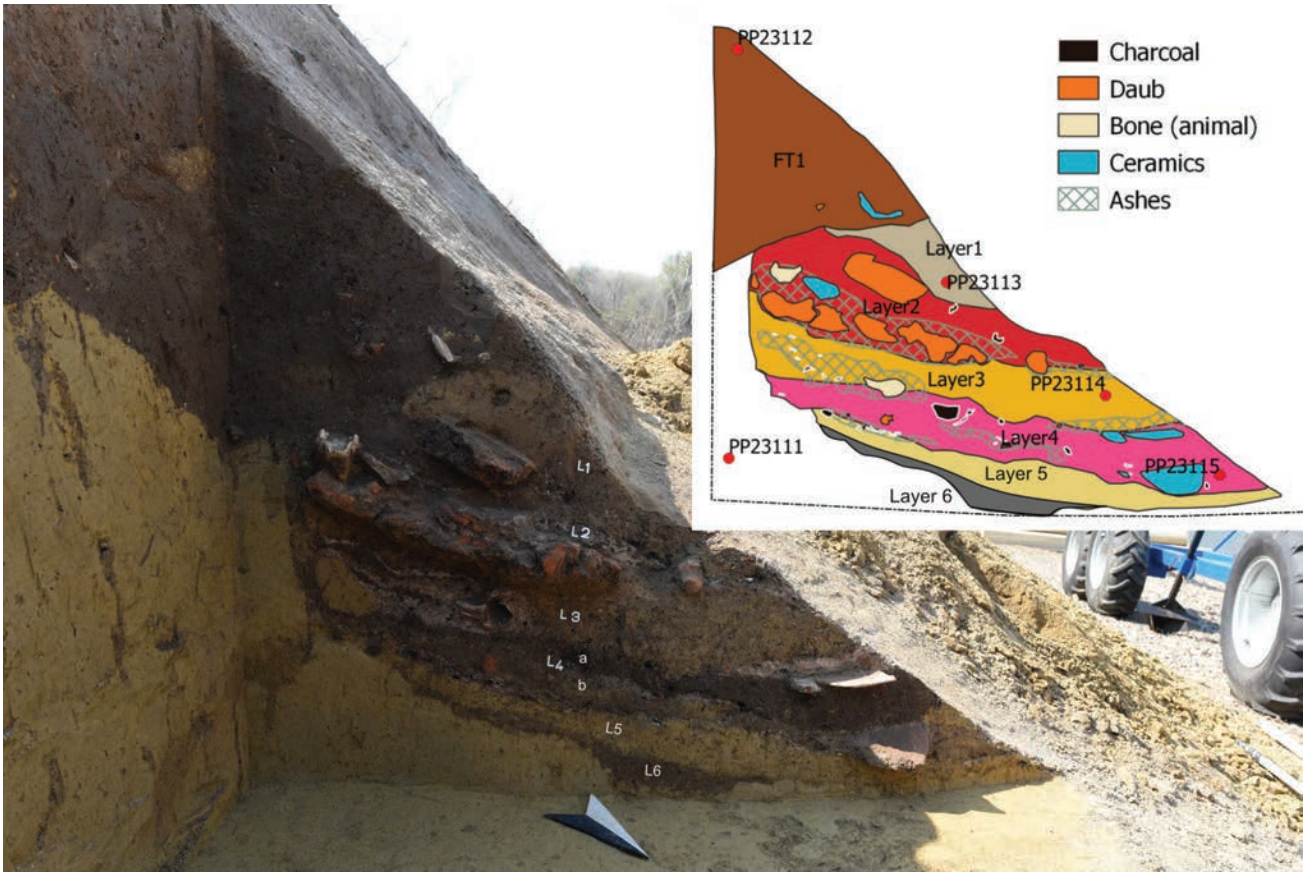

Fig. 3: Documented six layers of Feature 002 in 2022

Archaeological Material

In the upper four layers of features, pottery, daub, animal bones, and chipped stone tools were discovered. The first observation regarding the dimensions of the archaeological material during the excavation was that the smaller fragments of pottery and animal bones (fish and possibly bird bones) appeared in the upper layers, while the dimensions of the items became larger in Layers 3 and 4. For this reason, we present the details of the archaeological materials following their stratigraphic position, layer by layer.

Layer 1: all sherds are fragments of rims or upper parts of vessels, representing light-dark and red-dark everyday pottery, which indicates an open-firing pottery-making process. The pottery fragments are mostly smaller than 8 cm.

Layer 2: pottery fragments still present the same light brown colour shades, but all are more than 10 cm in size. Based on their shape, these fragments are related to larger types of vessels, e.g., bowls and plates with flat bottoms, as well as jars and mugs of medium and larger sizes (Fig. 4/1).

Layer 3: Pottery fragments are again over 10 cm in size but show a more elaborate pottery style compared to the previous two layers. The treatment of the surfaces is more refined and smoother; thus, not all the vessels discovered here are associated with cooking but rather can instead be interpreted as serving pots. The walls of the sherds are thinner, which is probably related to the finer characteristics of the ware. In this layer, more decorated sherds in the typical Tisza culture pottery style are represented, featuring deeply incised lines in triangle and rectangular forms (Fig. 4/3), as well as zig-zag motifs. Dark pottery fragments first appeared in this layer, indicating a reductive pottery-making firing technique or, at very least, a carefully controlled firing environment. Besides a dog mandible (Fig. 4/6), a cattle horn (Table 1, Fig. 4/5) was placed close to one of the clay installation elements discovered (Fig. 4/4). From the Neolithic to the Bronze Age in Southeast Europe, finds of clay figures and clay installation elements, such as bucrania and altars, usually in the contexts of houses, are often interpreted as belonging to ritual functions or practices (Bánffy, 2019: 59-86; Kalicz and Raczky, 1981; Lazarovici and Lazarovici, 2013; Milićević Bradač, 2005; Tasić, 1995). Our construction elements could have been remnants of such a ritual installation within the settlement.

Evidence of fire in the archaeological objects of Layer 3 is represented by secondary fired pottery, heavily burnt large daub fragments, and one unretouched flint blade that shows signs of thermal shock, likely resulting from more or less direct fire

(see 074/002 drawing on Fig. 5). Additionally, the concentration of thin black charcoal between Layers 3 and 4 correlates with a strong connection to fire or a firing process.

Three chipped stone artefacts were discovered in this layer (Fig. 5). F056 is a retouched blade made from unsourced, non-transparent grey flint, which has a plain butt. The left side is retouched from the lower side (direct position). The blade is broken in the medial part, with dimensions: length 19 mm, width 10 mm, thickness 0.3 mm, weight 1.4 g (Inizan et al., 1999, p. 87). F068 is a retouched blade of Bakony radiolarite (Úrkút-Eplény type), which is retouched (inverse position) on the medial and distal part of the left side. The distal end is truncated from both directions, and the right edge is heavily worn. The proximal end on the right side of the blade is partly broken, with dimensions: length 28 mm, width 10 mm, thickness 0.2 mm, weight 1.4 g. F074 is an unretouched blade made from unsourced, non-transparent grey flint, which is probably partly burnt or has undergone heat treatment based on signs of thermal shock visible on the distal part of the dorsal side and the proximal part of the ventral side. The proximal and medial parts of the right side of the blade are worn, with dimensions: length 61 mm, width 14 mm, thickness 0.2 mm, weight 3.47 g.

Layer 4 contained the largest pottery fragments (pans and bowls), which represented domestic and fine-ware vessels. Some of these fragments showed signs of wear from firing and had a robust wall thickness. Additionally, some base fragments of these baking plates were found at the bottom of the pit, close to the black charcoal layer. In addition, an elaborately decorated cup fragment of the Tisza pottery style was discovered, along with one rim and belly fragment of a biconical bowl that is associated with the Vinča pottery style (Fig. 4/7).

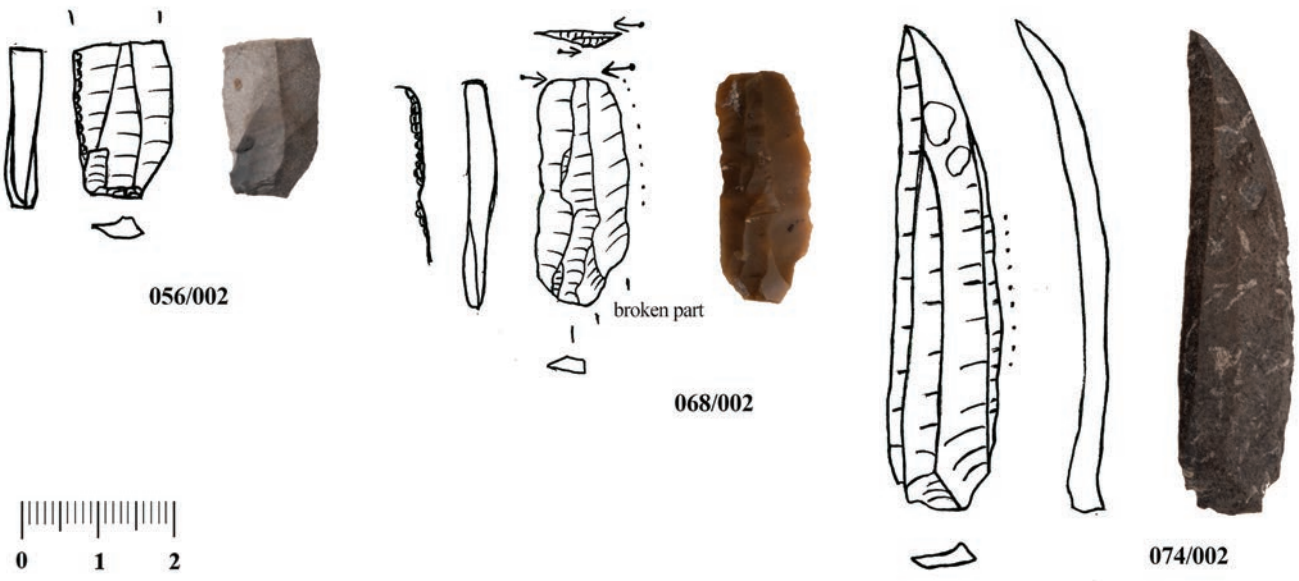

Fig. 5: Chipped stone artefacts (the first number indicates the Find ID and the second is the Feature ID)

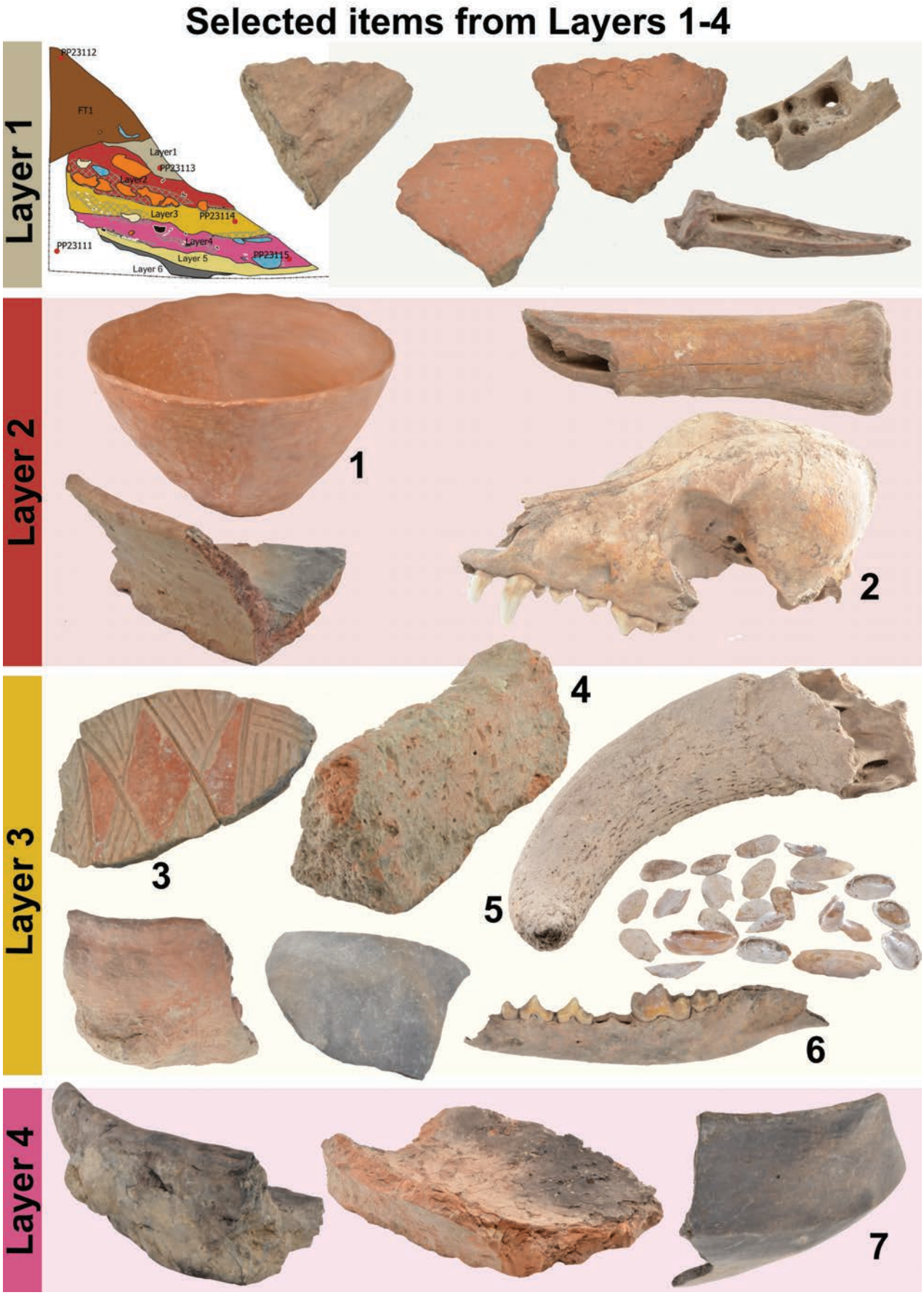

Fig. 4:. 1: A small clay bowl of Tisza pottery style (Find id: F018, layer 2, 2022); 2: A skull of a dog (Canis familiaris) (Find id: F020, layer 2, 2022); 3: An incised triangle with parallel lines found on a pottery bowl fragment typical of the Tisza decoration style (Find id: F057, layer 3, 2021); 4: A fragment of a clay house decoration or some kind of installation element (Find id: F057, layer 3, 2021); 5: A horn of (*Bos primigenius/taurus*) (Find id: F063, layer 3, 2021); 6: A fox mandible (Find id: F065, layer 3, 2022); 7: A rim and wall fragment of a Vinča style biconical bowl (Find id: F027, layer 4, 2022). The items are not scaled to each other; this figure aims to give an overview of the main characteristics of Layers 1-4.

Archaeozoological Remains

Feature 002 includes about 200 fragments of extremely small and fragmented archaeozoological material, which were difficult to determine at the species level. In contrast to the material from the site of Borđoš in 2016, fish remains (mostly the remains of ribs and hard spokes of fins) dominate in the animal bone assemblage. The material is very fragmented, and for this reason, it is difficult to draw conclusions about the number of individuals or, in general, the representation of the species, or even to run a statistical analysis (Table 1, Fig. 4). However, we can make some conclusions: 1) the fish remains represent the *Cyprinidae* and *Percidae* families, i.e., carp and perch; 2) the pig remains are the most dominant domestic species, with cattle and dogs appearing in low numbers, but no other domestic species were discovered; 3) a few bones of deer and, most likely, fox represented the wild animal spectrum; 4) a fragment of turtle shell (most likely *Emys orbicularis*, the pond turtle) was also recovered; 5) Molluscs are represented mainly by river shells of the genus Unio and one snail shell of genus *Viviparus*. The largest part of the material from Feature 002 consists of fragments of ribs, vertebrae, and long bones of animals of different sizes that do not have clear determining characteristics, except for assessing whether they belong to large or medium-sized animals.

Radiocarbon Dates

We dated one C14 sample from this feature, which came from Layer 2. The sample was a rib bone of sheep/goat/dog?/deer (Find id.: KN23061), which was dated to 5910 ± 40 BP, corresponding to 4800-4720 cal BC (Table 2, Fig. 6).

Find ID	Layer	Excavation year	Animal species	Bone type
034	1	2021	Fish remains	no data
021	1	2022	*Sus domesticus*	no data
021	1	2022	Fish remains	no data
020	2	2022	*Viviparus* sp.	no data
020	2	2022	*Bos taurus*	metacarpus
020	2	2022	*Canis familiaris*	skull
020	2	2022	*Cervus elaphus*	no data
065	3	2021	*Vulpes vulpes*	mandible
065	3	2022	*Sus domesticus*	scapula
065	3	2022	*Bos primigenius/ taurus*	horn
028	4	2022	*Unio* sp.	no data
023	no data	2022	Fish remains	no data

Table 1: Table of the identifiable animal species

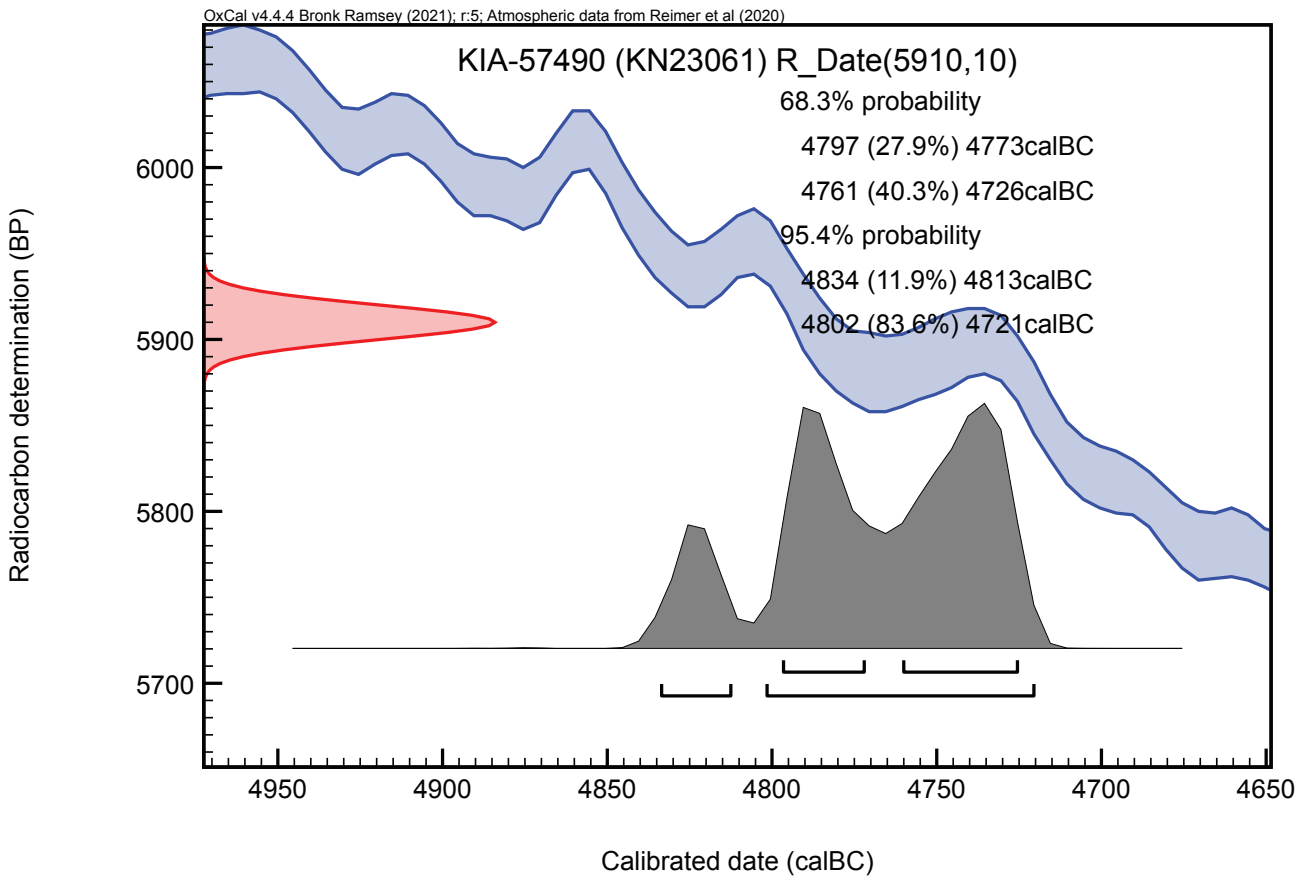

Fig. 6: Calibration of radiocarbon date of sample KIA-57490 from Feature 002, calibrated using OxCal v4.4 (Bronk Ramsey 2021) (Ramsey, 2017) and IntCal20: Northern Hemisphere (Reimer et al., 2020). d13C/ ‰: -19,66

Concluding Thoughts

According to archaeological nomenclature, Feature 002 would be interpreted as a settlement pit. However, its internal structure and content seem more complex than this term would suggest. A striking characteristic of this pit is the six clearly differentiated layers, of which the lowest two appear to be the result of a natural taphonomic process, likely involving continuous filling (see Stäuble, 1997), while the four upper ones are the results of anthropogenic filling events. In other words, the feature was intentionally filled four times with material, most likely from the relative vicinity of the pit, as can be deduced from the large dimensions of the sherds and clay objects found (again following Stäuble, 1997). Indeed, there is an increasing dimension of pottery and animal bone fragments from Layer 1 toward Layer 4. The more elaborate pottery styles of serving vessel types in Layers 2 and 3, as well as the more domestic cooking vessels in Layers 1 and 4, all point toward the existence of a kind of "depositional logic". In our view, this kind of deposition is not well described using the concept of ritual practice. The items are mostly mundane objects of everyday use, which do not, by themselves, obviously have any specific significance in terms of cosmological meaning (Raczky and Anders, 2010; Raczky et al., 2018, 2022). Instead, they are deliberately arranged items of material culture (Hamon, 2008; Hofmann, 2020b). The nature of the intention behind these human acts is difficult to determine. Classifying them as refuse would impose a modern concept, which does not accurately represent the composition of the finds in the layers. Alternatively, it could be seen as an incidence of a structured deposition (Garrow, 2012; Hofmann, 2020b). The way Daniela Hofmann uses this term refers to meaningful intentional practices that, however, significantly differ from those practices referred to by the much overused term *ritual*. While ritual practices, by most definitions, suggest a series of repeated actions and produce a certain regularity - often in connection to public display - many of our findings from the European Neolithic are instead quite varied and highly irregular, without appearing random (Hofmann, 2020a).

In our European archaeological research tradition, we often face methodological problems when it comes to considering such "irregular" phenomena, which are the results of single events, and thus often resort to the concept of ritual. Yet, many of these "irregular" structured depositions do not fit the criteria of rituals at all (Hofmann, 2020a) and could be better understood as material remains of practices connected to acts of magic - meaningful, instrumental performances often carried out in secrecy by a single person (Hofmann, 2020a)[1]. This is a framework that enriches our possibilities to discuss intentional depositions in the archaeological record beyond the ritual-mundane dichotomy, which is, in our view, also useful for the study of Southeast European settlements of the Neolithic to Bronze Age periods. Many features of tell settlements, for example, have been discussed in terms of ritual, especially pointing out the concentration of such finds in the tell area of composite sites, suggesting more profane uses of the flat settlement areas (e.g. Raczky and Anders 2010). Finds like the above-discussed Feature 002 at the site of Borđoš are thus relevant as this feature presents a pit on the flat settlement part of this site, displaying, as we argue, an intentionally created sequence of structured depositions, which could very well indicate intentional acts connected to magical practice in the flat settlement of the Late Neolithic community of Borđoš.

[1] Hofmann's work focuses on the depositional practices of the Linear Pottery period, which have been discussed from multiple aspects, particularly in relation to how the three repetitive contexts - burials, hoards, and settlements - are interconnected.

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A NEW ANTHROPOMORPHIC CLAY FIGURE FROM THE SITE OF BORĐOŠ

Kata Furholt, Martin Furholt

Introduction

With the first settled farming communities appeared not only a new way of life, domesticated animal and plant species, and technological innovations but also a material world sculpted in clay in a way never seen before (Bánffy, 2019; Stevanović, 1997). Human-made objects, tools, and artistic items made from stone, bone, and antler were preserved from the Palaeolithic and Mesolithic periods as well; for example, the unique stone sculptures from Lepenski Vir are especially well-known (Borić, 2021; Srejović, 1972). However, all of them are made of solid, rigid, and only to a certain extent malleable raw materials. This kind of material constraint also limits human imagination and expression, since abstract ideas can only partially be expressed through materials that are difficult to shape. Clay offered a whole new dimension to Neolithic people, as its ease of moulding gave creators almost infinite freedom to express their ideas (Bailey, 2005). Clay figurines appeared with the Starčevo-Körös-Çris population in the Carpathian Basin, particularly the steatopyg (with big-sized lower body parts) female figures (Hansen, 2007; Raczky, 2009; Trogmayer et al., 2005). The Red-Hair or Red-Head Goddess of Donja Branjevina (Deronje) is the most renowned archaeological item from the Early Neolithic Vojvodina (Balj, Starović, 2022: 36; Karmanski, 2005). Communities associated with the Late Neolithic Tisza and Vinča complexes created different clay figurines; some display a more realistic style with more or less naturalistic body proportions (e.g., the "Mother with a baby" from Drenovac or the pregnant female figurine from Medvednjak) compared to the Early Neolithic steatopyg idols (Balj, Starović, 2022: 30-33). A significant number of figurines show a more artistic style, indicating a shift towards a more abstract representation than before. Examples include the double-headed figures from Gomolava-Hrtkovci, the seated woman with a bowl clay figurine from Borđoš, and the classic Vinča dark/black burnished figures from the eponymous Belo Brdo tell site, as well as those from Gomolava, Drenovac, Medvednjak, and Selevac (Brukner, 1974; Milojković, 1990; Petrović, 2002). The sitting position became a frequent presentation mode for Late Neolithic figurines along the Tisza River and across the entire Balkan region. Other particularly typical Late Neolithic anthropomorphic, as well as abstract, clay decorations include lids and face-like lids, the so-called "prosopomorphic lids" (see more details about the lid from Borđoš in the chapter *Ceramic Artefacts* by Ildiko Medović in this volume), which are mostly related to the Vinča pottery style (Tasić et al., 2016; Whittle et al., 2016). The lid-like form is also known in the Tisza pottery style, represented either in lid-form or as a loom weight version very similar to those lids. The latter is associated with the Szakálhát phase (the early or formative phase of the Tisza complex) as noted by Bogdan Brukner (Brukner, 1974: 84-89). In this chapter, we present a new anthropomorphic loom weight clay figure from Borđoš, which was discovered in 2022.

Discovery Circumstances

A new irrigation system was created at the Borđoš site, which cut through the site with a water pipe in 2021 (see details in the chapter *Some Observations about a Stratified Archaeological Feature in the Loess Wall Close to the Tisza River at Borđoš* in this volume). This damage caused the profiles of several burnt Late Neolithic houses and two large parallel profiles in the loess wall running towards the Tisza River (Fig. 1). The disturbed and partly destroyed archaeological remains were visited in 2021, and further documentation of the features in the north and south profiles of the Tisza loess wall was carried out in the spring of 2022. In one of the profiles, a continuous layer of pottery and daub was visible, which indicated the floor and wall remains of a potentially burnt house (Fig. 2).

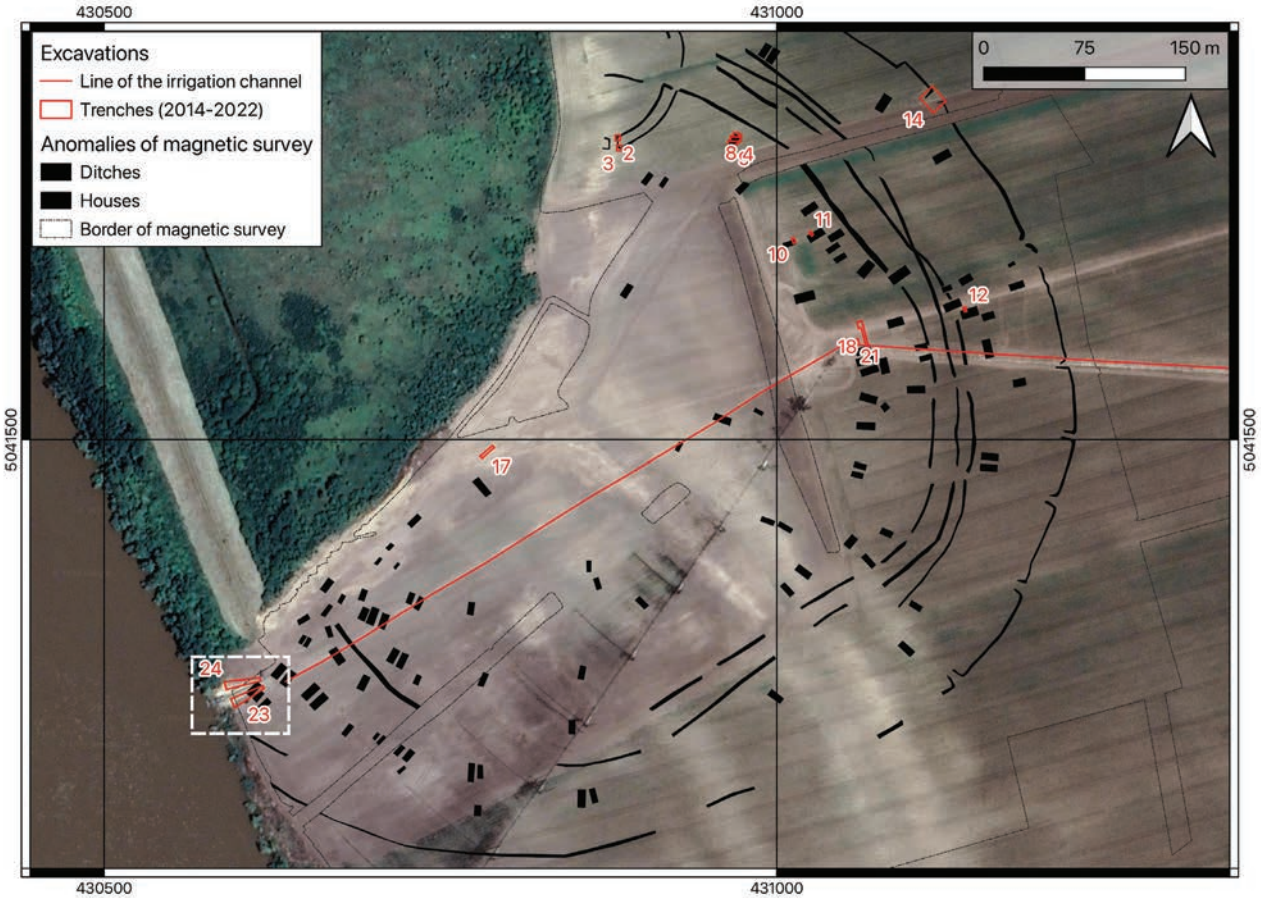

Fig. 1: Position of the laid water pipe (red line) and the north and south profiles along the Tisza River (white dashed line square) are shown on an overview map of the Borđoš site

Fig. 2: North profile and the partially visible pottery and daub layer

After documenting the damage caused by modern activity, we cleaned and documented the profiles to identify the type of archaeological feature present, ensuring that all finds were kept *in situ*. As a result, we were able to identify the majority of pottery types and daub fragments after completing the entire documentation when we collected them (Fig. 3). In addition to the loom weight figurine, several decorated pottery sherds with rich zig-zag Tisza motives were discovered. Some of the decorated sherds belong to typical rectangular pots (called "flower pots") with Tisza pottery style, but one of them could be an altarpiece. Unfortunately, additional fragments from this potential altarpiece were not found, leaving this an open question.

Fig. 3: Trench 24, Feature 2, north profile with the daub and pottery layer with the loom weight figurine in the southwest corner

The loom weight clay figurine

The object in question is a burnt clay loom weight to which anthropomorphic features and an incised abstract symbol were added. It has a conical shape that was used to pull down the thread attached to the weaving frames. A small part is missing from the lower left corner of the object, which could certainly be prehistoric damage, as the calcareous layer covering the entire figure completely covered it as well. In the upper part of the object, a prominent plastic feature protrudes from the surface, indicating the nose, on both sides of which incised lines form the eyes. Two perforated ears can be seen, reminiscent of the hook-like handle characteristic of vessels of the period. The incised pattern on the chest of the anthropomorphic object became visible only after the restoration. The incised pattern on the chest represents a zig-zag line decoration typical of the Tisza pottery style, in this case forming a rhombus shape. A double V-shaped pattern connects to the middle corners of the rhombus, and two additional pieces extend to the top corner (Fig. 4 and Fig. 6/1). The object's dimensions are as follows: length 9.3 cm, upper diameter 6 cm, bottom diameter 6.3 cm and 8 cm, weight 521 g.

Fig. 4: Clay idol after restoration features a human face depicted with a sculpted nose and scratched eyes

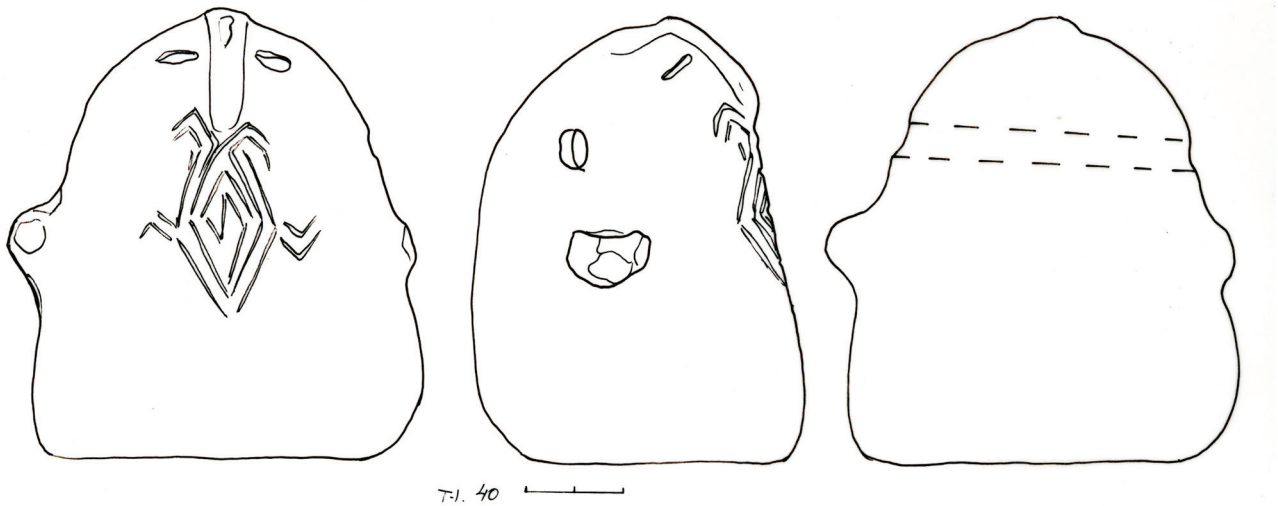

Fig. 5: Drawing of the loom weight figure features a clear chest motif, a detailed face depiction, and the positioning of the perforation

Context: Figurines with Distinct Symbols on the Chest

The loom weight idol is the ninth figurine found at the Borđoš site. Two of these figurines represent a human figure holding a bowl (Fig. 7/1 and 7/5), and four figurines are fragments, three have heads with neck fragments (Fig. 6/3, 6/4 and 6/7), and one has a head with an upper body (Fig. 6/6). Two of them are almost complete or fully reconstructable, these figurines have arms: one is in a straight outstretched position (Fig. 6/5) and the other is in an upward bent position (orans) (Fig. 6/2). Figure 6 shows all figurines from the Borđoš site that have a rhombic incised motive on the chest area. All these figures were discovered on the surface; thus, we do not have information about their original archaeological contexts, except two of them: one is the described loom weight (Trench 24, Feature 2), and one from the south-eastern part of the ditch at the flat settlement (Trench 14, Feature id: 14004, Find id: 14033) (Fig. 6/3). Similar loom weight-like or quite schematic clay figurines are known from Iđoš-Gradište, Novo Miloševo-Akača, Žabalj-Nove Zemlje and Gomolava-Hrtkovci (Jovanović, 2011: 62, 65, 67). It is important to emphasize that all of them have an incised rhomboid symbol under the nose in the chest area (Brukner et al., 1974: 495) (Fig. 6). All nine figures from Borđoš have heads; the common characteristic element is the plastically formed nose, and five figures depict mask-like triangle faces (Fig. 7/2-3, 7/5, and 7/7-8).

We do not know the purpose or meaning of the abstract motif incised on the faces or chests of the figurines. However, it can be established that it was created in the central, clearly visible part of the body, indicating a deliberate spatial organizing principle, thus emphasising the importance of the motif. This may be related to a person, but at the same time, it is a decorative motif characteristic of the Tisza complex, and it could therefore be interpreted as a sign of belonging to a specific social group. This assumption of common group identity is strengthened by the fact that another idol with a specific but different motif was also found in Borđoš. The small clay idol, with a flat body, arms and head, is also highly stylized and simplified.

Presumably, the incised motifs on the chests of the two figurines from Borđoš had the same function but different meanings; it is likely that they could represent a sign of belonging to a particular group. These may refer to clans that were represented by different symbols, yet still lived together in the settlement of Borđoš. A clan is an anthropological term that refers to a larger subgroup of society based on kin lineages. In the Late Neolithic period, the burnt remains of houses and the objects accumulated within them indicate that for the communities living at that time, large feasts were an important means of establishing and maintaining community cohesion (Crnobrnja et al., 2009; Crnobrnja, 2011, 2012; Tasić, 2016). The richly decorated dish sets were probably part of the serving dishes used at joint events, which also strengthened group identities. We do not find many examples from the era that emphasise the importance of the individual; on the other hand, we have a lot of evidence of communal expression and traces of larger events and feasts all along the Tisza River (Dietler, Hayden, 1995; Raczky et al., 2022).

Fig. 6: Seven human figurines from the Borđoš site emphasise chest symbols. The presented items are not scaled relative to each other, as visibility is the priority. The numbers indicate which symbol relates to each figurine.

Context: Anthropomorphic Figures with Everyday Tools

The loom weight figurine from Borđoš is worth to be seen in the context of the other human representations from Borđoš site. These reflect different trends in the representation of anthropomorphic features on pottery or figurines, which can be found in the Tisza region during the Late Neolithic period.

There is the seated woman with a bowl (Fig. 7/1), displaying a motive well known in the context of the Tisza complex, exemplified by the idols from Szegvár-Tűzköves (Fig. 7/10 and 7/11) (Raczky, 2015: 64-67). Except for the famous "Sickle God" idol (Fig. 7/10), none of the figures from Szegvár have a head preserved. By contrast, the head of the Borđoš seated woman was shaped naturally with a nose, ears, and eyes, the size of the head and the body in proportion. She is holding a huge bowl, sitting on a decorated chair.

A similar kind of bowl is depicted with another anthropomorphic figurine from Borđoš (Fig. 7/5). However, in this case, the anthropomorphic features are reduced to a mask-like triangular face and two arms with oversized fingers clutching the bowl, which, however, merge into the human body.

The mask resembles similar examples in the context of the Alföld Linear Pottery complex (Kalicz, Makkay, 1977: 59-61, 294-296, 313, 382; Raczky, 2015: 34-40). The hybridisation of human features with everyday objects is common in this region and period. It can take different forms, or at times being much reduced, for example, only depicting selected facial elements, such as eyes and nose. In the Carpathian Basin, this motif is frequently encountered since the Alföld Linear Pottery period (5500/5400-5000 cal BC), and human face-like features on pottery is mostly linked to the Szakálhát complex within this period.

A Crossover Figurine

The loom weight figurine from Borđoš is a special variant of this hybridization of everyday tools and anthropomorphic elements, possibly an expression of the humanization of the personification of those objects. This connection between human beings and everyday objects seems to be transmitted and embedded in the Tisza pottery style along the Tisza River.

What our loom weight idol does is display both the tradition of combining everyday tools with human facial features, mainly found along the Tisza, and the tradition of marking human figurines with a distinct symbol on the chest or below the face, primarily found in Vojvodina.

Fig. 7: An overview plate of the Borđoš figurines with other comparable objects from along the Tisza, as mentioned in the text. The presented items are not proportionally aligned with each other; visibility takes priority. 1: Seated woman with a bowl, Borđoš (Medović, 2006; Medović at al., 2014); 2-3: Mask-like triangular face figurine fragments, Borđoš; 4: Loom weight figure, Borđoš; 5: Anthropomorphic figurine with a bowl, Borđoš (Balj, Starović, 2022); 6, 8: Upper body fragments of figurines, Borđoš; 7-9: Almost complete figurines, Borđoš (Medović et al., 2014); 10: "Sickle God", Szegvár-Tűzköves; 11: "Axe God", Szegvár-Tűzköves; 12: Clay figurine, Iđoš-Gradište (Brukner et al., 1974: 497, 64); 13: Clay figurine, Novo Miloševo-Akača (Brukner et al., 1974: 497, 65); 14: Conical lids with face decoration, Iđoš-Gradište (Balj, Starović, 2022: 102); 15: Zsáka-Várdomb (Raczky, 2015: 55, II.106); 16: Clay figure with a symbol, Žabalj-Nove Zemlje (Vilotijević, 1965); 17: Clay figure with a symbol, Žabalj-Nove Zemlje (Vilotijević, 1965)

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Miniature ceramic figurine: Borđoš, 2014; single find no. 1082; date: April 2, 2014; found by Sabrina Autenrieth

MINIATURE CERAMIC ARTEFACTS FROM THE BORĐOŠ SITE

Lidija Balj

Introduction

Miniature ceramic artefacts are a unique category of finds that can be found on numerous prehistoric sites in Southeast Europe. The largest number of these artefacts are small pots which are differently shaped and resemble kitchen utensils. Most of these vessels represent precise copies of the kitchen pottery that were used at the time, just in miniature size. Apart from the vessels, these finds also include miniature figurines of animals and people, ritual objects, rattles and small ceramic balls.

In the attempts at interpreting these objects, there are several different points of view. Some scholars see them as ritual objects - mostly offerings; others see them as special purpose objects; and some interpret them as children's toys (Bagwel, 2002; Balen-Letunić, 1982; Balj, 2009; Grober, 1928; Letica, 1967; Nikolić and Vuković, 2008; Tomaž, 2005; Živković, 2001 etc.). Some of the recent studies have revealed that most of these objects can be associated with children, meaning they can be perceived as toys for children's education and entertainment (Balen-Letunić, 1982, 2012; Balj, 2009, 2010, 2015, 2021; Baxter, 2000, 2005; Kamp, 2001; Lillehammer, 2000; Park, 1988 etc.).

Methodology

The methodology applied for this study is primarily based on the characteristics of the material used for the manufacture of these miniature artefacts and its unusual dimensions. Clay is a very suitable material for the production of different objects; by adding water, its plasticity increases and facilitates forming, and after drying and firing, it hardens and keeps its form permanently. Freely formed objects, i.e., those that were made without a potter's wheel, preserve many features on the basis of which it is possible to reconstruct the procedure that was used for their manufacture. Finger impressions created during the modelling phase may be preserved on ceramics in cases where the surface was not subsequently treated. Sometimes we find preserved traces of dactyloscopic lines, and their analysis can result in the most precise data regarding the person who manufactured the object in question (for more information see Balj, 2010, 2017 and references therein).

In the attempt to find the way to recognize children's toys among archaeological finds, I have created a scientific approach based on an all-encompassing analysis of the miniature objects (Balj, 2009). Although these artefacts could have been used for different purposes, with careful observation of their shape and manufacturing marks and use and wear traces, which can be seen on their surface, as well as by analysis of their archaeological context and with key evidence provided by fingerprints that are found on some of them, most of them could be interpreted as children's toys (Balj, 2010, 2017; Kamp et al., 1999; Králík and Novotný, 2003).

Analysis

In this paper, a total of 11 miniature objects originating from the site of Borđoš will be discussed. Three of them come from previous archaeological research, and due to the lack of reliable archaeological context they will be used to demonstrate various types and variations of miniature objects. The rest are findings from archaeological research that was carried out at the Borđoš site in the period from 2014 until 2022. This includes one find that comes from a field survey conducted in 2014 (Medović et al., 2014) and seven objects that come from archaeological excavations at a Late Neolithic settlement.

Miniature Anthropomorphic Figurines

In this group, there is only one figurine that was found during the field survey (Fig. 1/1) and it was previously published (Medović et al., 2014; Balj, 2012). The figurine is only 3.8 cm tall and is simply modelled in the Vinča culture style. It was made of clay using a simple process: a small amount of clay was moulded into a flat rectangular shape, and then the head, neck, arms, and body were modelled by pressing with the fingers on the sides. It is decorated with a geometric ornament made with a sharp tool in the form of a rhombus. It represents a miniature version of a figurine with incised motifs on the clothes. The same motif has been found on several anthropomorphic figurines and vessels on this site, so it seems to have had some symbolic significance for the people who lived there. The figurine was found in the southern part of the trench that surrounded the tell settlement (see the chapter *A New Anthropomorphic Clay Figure from the Site of Borđoš* by Kata Furholt and Martin Furholt).

Miniature Zoomorphic Figurines

There are five miniature zoomorphic figurines that originated from this site. Two of them came from excavations that were previously conducted without any supporting field documentation. The first one has the characteristics of a bovid—precisely of a cow with an accentuated belly as if pregnant (Fig. 1/6). The legs and the tail are partially damaged, and the horns are missing. It is interesting that on this figurine there is an open muzzle as well as an udder on the stomach. The anatomical characteristics are very well represented. This figurine is 5.8 cm long with a height of 3.5 cm. On the surface, there are visible finger imprints from the modeling process.

The second figure is a headless four-legged animal. It is not clear if the head is damaged or if there should be an oval recipient instead of the head. (Fig. 1/5). There are zoomorphic vessels in the Vinča culture that have a recipient modelled in place of the head (e.g., Nikolić and Radoman, 2008, 257, cat. 161), but it's unclear in this instance if it's a rhyton or just a broken figurine. Based on the existing characteristics—a powerful body and a short tail—it is impossible to identify which animal is represented, except for the assumption that it could be a bear. This well-modelled figurine retains some fingerprints from the manufacturing process. Its length is 8.3 cm, and its height is 5.3 cm.

The following zoomorphic figurines come from newly conducted and well documented excavations. The first is a coarsely made figurine with features of both zoomorphic and anthropomorphic attributes (Fig. 1/2). It is 4.7 cm high and is made in the form of a thicker roller, on which eyes are formed in the form of two shallow depressions by pressing with the fingers. In the area of the chest, there are two protrusions that represent the breasts, and on the very bottom part, there are two small, horn-shaped protrusions that represent the legs. Anatomically, it most resembles the figure of an owl. On the surface, there are visible marks, which are possible dactyloscopic lines. If that is the case, we have the opportunity to determine whether this figure was made by a child or an adult. It was found on the surface of the flat settlement.

The last two zoomorphic figurines are particularly important and interesting because they were found in House 1, which was located on a horizontal settlement and dates back to the period between 4900 and 4700 BC. The first is a four-legged animal with a well-modelled body and all the anatomical characteristics emphasized, based on which it is clear that it is cattle (Fig. 1/3). The legs are partially damaged, and the head has a well-modelled muzzle and horns (one horn is missing). The ridge on the back is emphasized by pinching with the fingers. This figurine is 5.2 cm long with a height of 3.3 cm.

The second figurine from this house is completely opposite; it is very poorly shaped (Fig. 1/4). It was made from a clay roller on which four legs were roughly made; the tail is missing due to damage, and there is a line emphasized in relief on the back. Considering the shape, it could be assumed that it is a badger. The length of the figurine is 6 cm.

Miniature Vessels

There are two miniature vessels that are presented in this paper. The first one came from earlier research, and we have no information about the context of the findings (Fig. 2/8). It is a deep cylindrical vessel with small damage on the upper part. The vessel is asymmetrical, with cracked walls that probably occurred during the drying phase. The bottom of the bowl is flat, but it has a slope so that the bowl stands at an angle. It is 5.4 cm high with a rim diameter of 3 cm. The thickness of the vessel wall is 0.8 cm.

The second one was damaged; only one half of the miniature vessel has been preserved, so it has been restored (Fig. 2/7). There are noticeable finger marks that were created when the vessel walls were thinned. It was made with the simplest pinch-pot technique. It is asymmetrical with an uneven bottom. This vessel was found in House 5, which was located on the tell settlement, which is chronologically placed in the period from 4700 to 4600 BC. It is 3 cm high, and the diameter of the rim is about 2.7 cm. The quality of the workmanship presented and choice of pottery making, such as pinch-pot technique, indicates that both vessels were made by beginners and that they are probably the work of children.

Small Ceramic Balls

Two small ceramic balls are included in the group of toys. Both have an irregular spherical shape and they were both found in houses. The first one was discovered in House 1 and had a diameter of 2.1 cm and a weight of 7 gr (Fig. 2/9), and the second one was found in House 5 and has a diameter of 1.7 cm and a weight of 4 gr (Fig. 2/10). They were found among other clay balls that are larger and heavier, and judging by their light weight, they were probably used for playing.

Rattle

One rattle was found in House 7, which was located in the flat settlement and dated to the period 4900–4700 BC (Fig. 2/11). About half of the rattle was found with the whole profile preserved so that it could be restored precisely. It consists of two conical halves, each with two small holes at one end, through which a rope can be threaded for hanging. It is roughly modelled, and finger marks created during modelling are visible on the surface. It is 5.9 cm high, and the circumference of the widest part is 5.7 cm. Based on the traces on the widest part of the rattle, it can be concluded how it was made. First, both halves would have been modelled as small conical bowls, then small ceramic balls (or seeds, small rocks, etc.) would have been placed inside, and then they would have been carefully joined in the middle and fired afterwards. Based on the results of ethnological studies, it may be inferred that rattles were used to protect children from evil spirits through the power of their sound (Bošković-Matić, 1963, 426-433).

Discussion

The results of the analysis of the miniature ceramic artefacts from Borđoš show the same characteristics as in other localities from the same period. Although a small number of objects were found, their representation and forms vary, and they are all based on imitation, which formed the basis for a miniature world in which children mimicked the activities of adults. In this case, it is especially valuable to have precise data about the context of the finds because it is of a great importance for the interpretation of the miniature objects. For the three objects, this information is missing, but the majority of the artefacts presented in this paper have been found in the context of the houses.

The situation in House 1 is particularly interesting because two animal figures and one small ceramic ball were found there. This house was destroyed in a fire and its remains were subsequently damaged by two Bronze Age graves and the medieval pit. Ceramic material mainly shows the characteristics of the Tisza style (see the article by I. Medović in this volume). The most significant ceramic finds include richly decorated goblet, ceramic spoons and toys.

In House 5, two children's toys have been found: a miniature vessel and a small ceramic bowl. This house was also destroyed in the fire, and the remains were subsequently damaged by the waste pits from the Middle Ages. It is very significant that in this house were found a great amount of archaeological material - pottery, flint artefacts, ground stone tools, bone tools, and other ceramic material. At the same time, the ceramic material from this house shows the mixed characteristics of the Vinča and Tisza cultures. The finding of a large group of ceramic balls stands out (see the article by I. Medović in this volume). The balls measure between 6 and 8 centimeters in diameter, and they are interpreted as hunting projectiles.

These objects from both House 1 and House 5 were not very skilfully made, so we could say that they were made by children. Based on all the characteristics and the context of the findings, they belong to the group of children's toys. After completing all the data regarding the distribution of the finds in this houses, it will be possible to gain a better insight into the daily lives of the people who lived there.

In House 7, one half of the rattle has been found. Rattles are among the favourite toys for small children, and they have been used from prehistory until today. In addition to their basic, practical purpose, they are also attributed with the power to drive away evil spirits with their noise. In this case, these toys acquire apotropaic significance because they have a protective character.

Conclusion

Children's toys from Borđoš site are very interesting in terms of variety of shapes. There are anthropomorphic and zoomorphic figurines as well as miniature vessels, a rattle and two small clay balls. Judging by the unskilful way in which they were made, it can be concluded that they are children's works. Most of them were found in houses among other objects that were used in everyday life. Of particular note is the find of a miniature figurine (Fig. 1/1), which, with its characteristics and especially the carved rhombus symbol, points to the possible religious aspects of children's toys. Two small clay balls could be used for games as well as for hunting practice.

All of this is in accordance with the results from other Vinča culture settlements (e.g., Gomolava, Obrež-Beletinci, Divostin, Vinča - Belo Brdo, Pavlovac, Drenovac) where children's toys show some of the basic features of its material culture, such as the rich ceramic production and a large representation of various vessels as well as anthropomorphic and zoomorphic figurines. These observations are in accordance with the generally accepted view that the content of children's play is completely connected with the life, work, and activities of adult members of a society. Because of this reason, the choice of toys is continuously changing depending on the culture and existing social circumstances. With the discovery of ceramics, their range became significantly larger because clay was a safe and easily available raw material.

Through analyses of children's toys and by taking into account the fact that they mostly represent replications of objects from the world of adults, it is possible to obtain a whole range of data that indicates the education process and various aspects it includes. In addition to being used for play, toys were also used to introduce children to local customs and social norms. They are often associated with religious, social, and economic characteristics of life in the community.

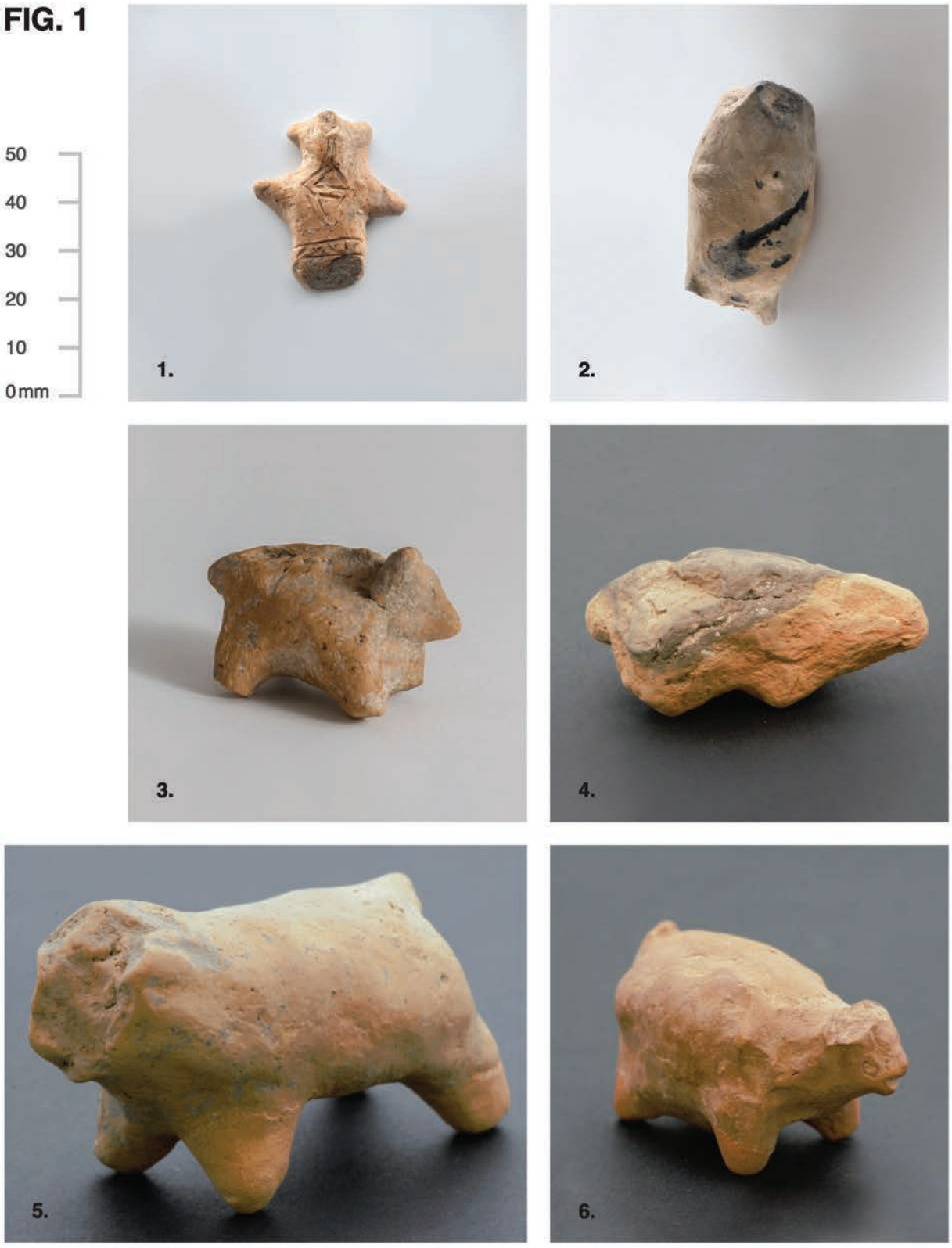

Fig. 1: Miniature ceramic artefacts from the Late Neolithic settlement at Borđos site: 1 Zone 1082; 2 Surface find (2014); 3 Find no. 8150/8009; 4 Find no. 8109/8008; 5 Surface find (1985); 6 Surface find (1985)

FIG. 2

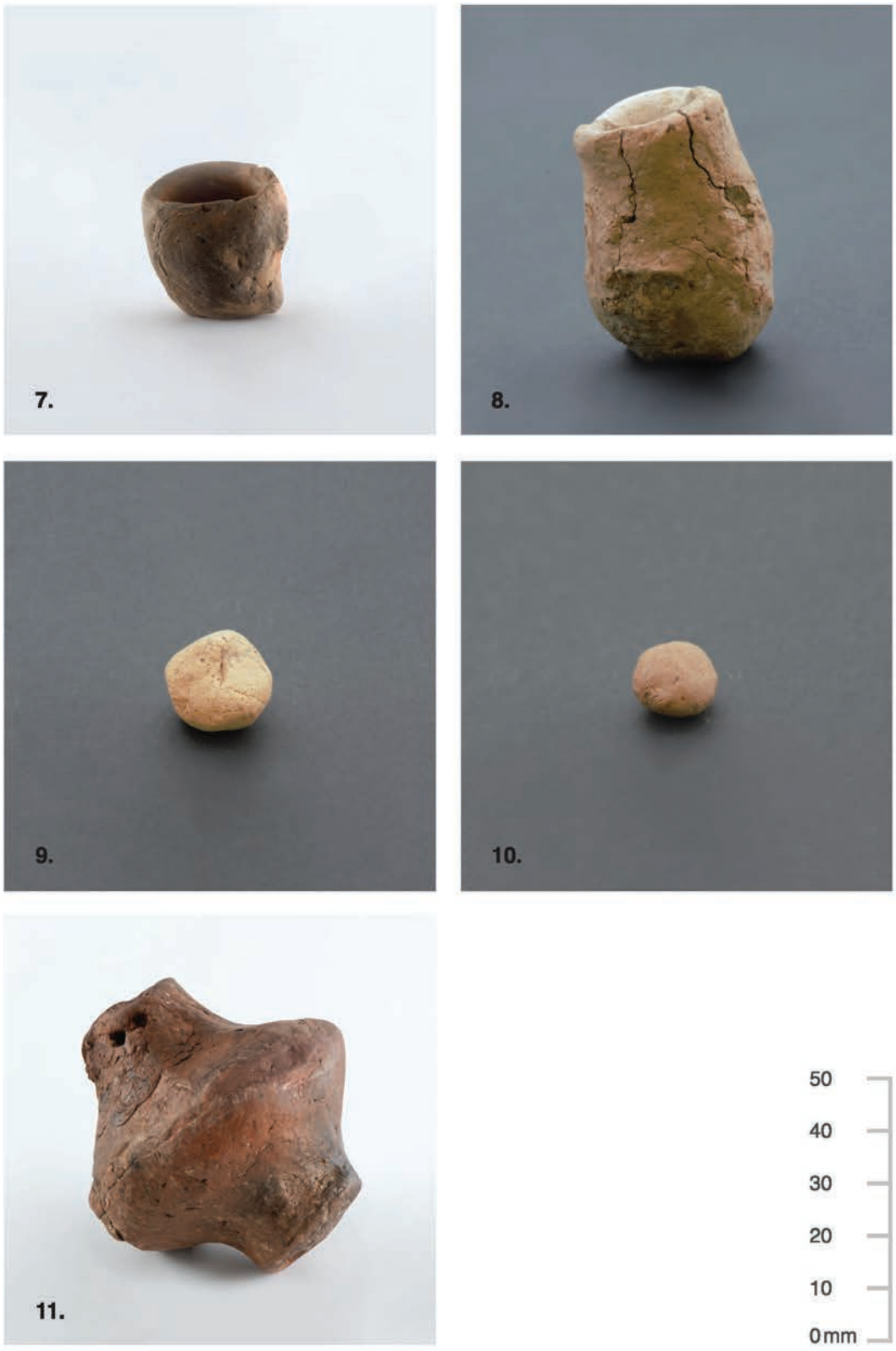

Fig. 2: Miniature ceramic artefacts from the Late Neolithic settlement at Borđos site: 7 Find no. 16399/16003; 8 Surface find (1985); 9 Find no. 9192/9010; 10 Find no. 16042/16002; 11 Find no. 18340/18011

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Miniature ceramic figurine

CHIPPED STONE ASSEMBLAGE OF THE LATE NEOLITHIC BORĐOŠ SITE

Kata Furholt, Ildiko Medović

Introduction

This chapter focuses on the chipped stone material, discovered in the Late Neolithic part of the Borđoš site between 2014 and 2022. It aims to provide a brief overview of the raw material and typo-technological categories of chipped stone assemblage. The comparative units are organized by the archaeological context in tell and flat settlements, with a particular focus on the house level to examine any potential tool-making and differences in use between the two divergent spatial areas or households. Altogether, 1,193 pieces of chipped stone tools were discovered at the site of Borđoš, making it one of the largest published stone assemblages from Neolithic sites in Vojvodina, alongside Čoka-Kremenjak, Donja Branjevina (Deronje), Opovo-Ugar Bajbuk, Gomolava, and Potporanj-Kremenjak (Banner, 1960; Jovanović, 1982; Kaczanowska, Kozłowski, 1986; Marić, 2015; Priskin, 2012; Šarić, 2014; Tringham et al., 1992). It is also one of the most numerous assemblages compared to other Neolithic materials, e.g., Vinča-Belo Brdo, Popovića Brdo, and Blagotin in North-Central Serbia (Šarić, 2014: 80-98, 117-128; Srejović, 1984). Short information about the raw materials and the importance of obsidian from Borđoš has been published in part (Hofmann et al., 2019: 10-11). This lithic assemblage opens up the possibility of analysing the potential proxy function of the Late Neolithic community at Borđoš for transporting raw materials and stone artefacts, in addition to the transmitted lithic technological information along the Tisza river. In this chapter, we provide a cross-section of the raw materials and typo-technology of the chipped stones, which offers a rich basis for studying the economic and social connections of the local and wider environment of the Late Neolithic Borđoš community based on the chipped stones.

Field Research Method & Archaeological Context

In 2014 and 2015, systematic surface find collecting was carried out along with the geomagnetic and geoelectrical prospection. A 20 x 20 m square grid system was applied to collect information (10 minutes per person in each grid) about the spatial and temporal distribution of the finds (see more details in the chapter *Results of the Excavations, Geophysical Prospection, and Surface Find Collection on and around the Borđoš Loess Plateau* by F. Wilkes in this volume). Our further goal with this grid system was to identify specific activities and houses based on detailed macroscopic material analysis. According to the principle of surface find collection, a total of 131 squares were researched, resulting in 291 pieces of chipped stone, which constitutes 25% of the entire chipped material (Table 1-2). All surface finds were analysed at the tell settlement by Sabrina Autenrieth in her master's thesis (Autenrieth, 2015: 46-48), one of the main results of which was that all the raw material and typological variations appeared on the tell without any clear spatial pattern. However, based on the density of cores and debitage waste production, she suggested three activity zones in the south and middle parts of the tell site (Autenrieth, 2015: 96, Abb. 45). The vast majority of the chipped stones came from a defined archaeological context[1] (896 pieces, 75.11%). Slightly more than 66% of the lithic finds were deposited on the tell, while 8% were found on the flat settlement (Table 2, Fig. 1). This significant quantitative difference limits statistical comparability; however, it is worth examining the larger trends in terms of reconstructing lithic production. Figure 1 illustrates the quantification of different survey methods; thus, the number of chipped stones is the highest, with a relatively low proportion of total weight, while lithics without archaeological context display the opposite trend. The reason for this is the applied sieving method (sieve with a mesh size of 0.5 x 0.5 cm), which enabled us to identify smaller dimensional debitage production pieces from the excavated units, while on the surface, mostly the cores, raw material fragments and debris were visible, demonstrating a larger dimension. For this methodological reason, we analyse the surface collection separately from the lithics of the archaeological context, although the excavation trenches were placed according to the applied grid system.

[1] Ildiko Medović did the data recordings of the chipped stones.

Trench ID	Area ID	Part of the site	Year	Number (n)	Weight (g)
1	0	surface collection	2014, 2015	291	3054.00
2	2	circular earth work	2014	4	26.50
3	2	circular earth work	2014	0	0.00
4	3	flat site	2014, 2015	5	3.80
5	3	flat site	2014	1	0.50
6	4	flat site	2014	42	171.60
7	4	flat site	2014	65	351.65
8	3	flat site	2015	2	9.60
9	3	flat site	2015	4	122.70
10	5	flat site	2015	2	2.10
11	6	flat site	2015	0	0.00
12	7	flat site	2015	0	0.00
13	8	Tisza profile	2014	6	30.20
14	9	flat site	2016	5	30.70
15	4	tell site	2016	385	485.48
16	4	tell site	2016	298	518.46
17	10	flat site	2017	27	73.30
18	11	flat site	2019	37	115.10
19	12	northeast of the tell	2019	0	0.00
20	13	northeast of the tell	2019	1	1.40
21	11	flat site	2019	12	34.70
22	14	flat site (water pipe)	2020	3	11.30
23	15	flat site	2021, 2022	3	6.50
24	15	flat site	2021, 2022	0	0.00
SUM	-	-	-	1193	5049.59

Table 1: Number and the total weight of chipped stones by trenches

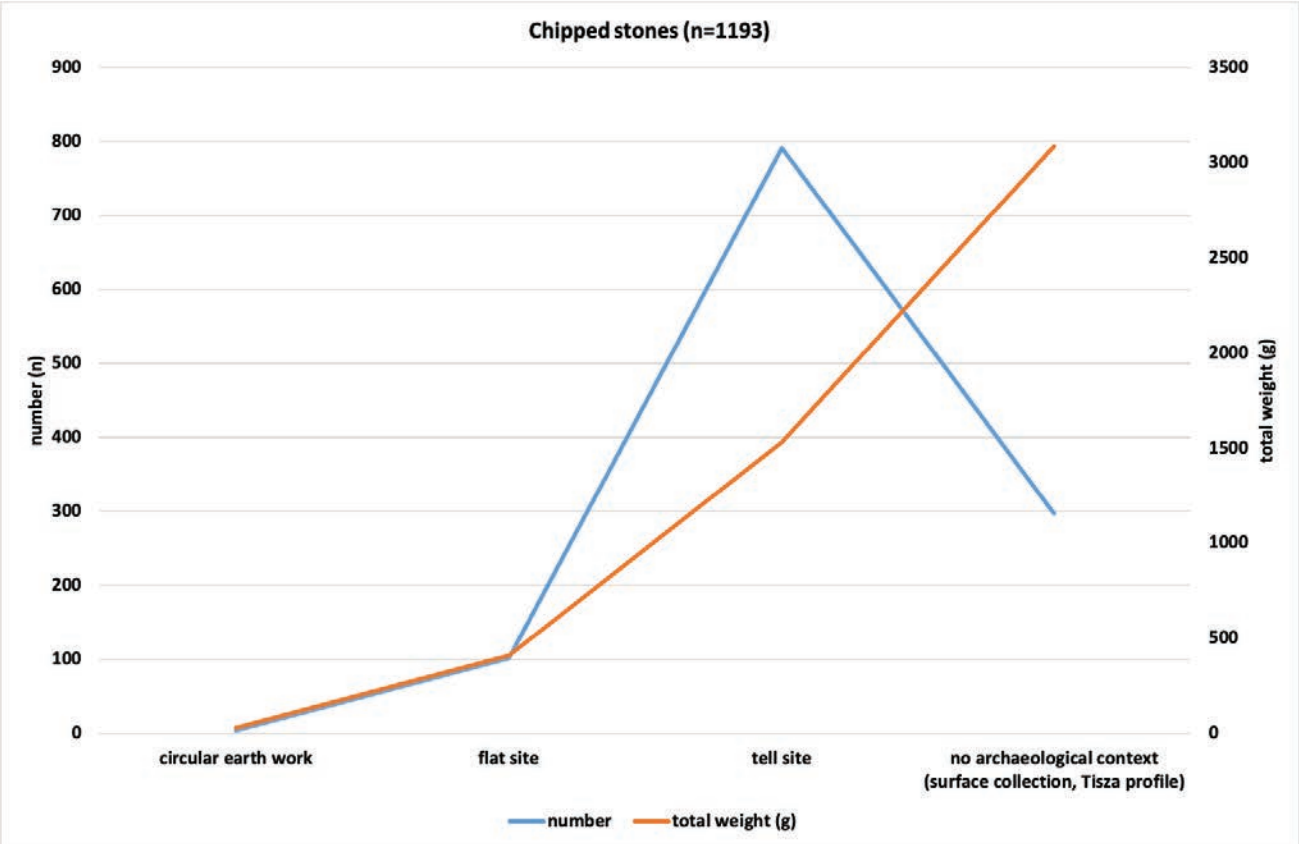

Fig. 1: Number and the total weight of chipped stones by archaeological contexts

Part of the site	Number (n)	Number (%)	Weight (g)	Weight (g)
Circular earth work	4	0.34	26.50	0.52
Flat site	101	8.47	410.30	8.13
Tell site	791	66.30	1528.59	30.27
No archaeological context (surface collection, Tisza profile)	297	24.90	3084.20	61.08
SUM	1193	100.00	5049.59	100.00

Table 2: Quantitative distributions of chipped stone by archaeological contexts

The interpretation of the features designated the main units of the analysis. Thus, area 4 (Trenches 6, 7, 15 and 16; layer formation: Bord 4/1 and Bord 4/2) indicates a burnt house on the tell. Area 3 (Trenches 4, 5, 8 and 9; layer formation: Bord 3/1 and Bord 3/2) was a burnt house on the flat settlement, and area 10 (Trench 17; layer formation: Bord 10/1 and Bord 10/2) was also an unburnt house on the flat settlement too (see the description of layer formations in the paper *Strategy and Results of 10 Years Interdisciplinary Fieldworks at the Late Neolithic Multi-Component and Multi-Period Settlement Borđoš* in this volume). These three areas are prioritized in the comparative analysis of raw material and technological information.

Lithic raw materials

Originally, 30 raw material categories were created based on general characteristics (fabric and colours); this categorisation was applied in the database and the master's thesis of Ms. Autenrieth (2015). The majority of these lithic categories did not reflect the Europe-wide standard flint terminology, which might refer to the original geological source, but they effectively described and grouped lithic variations. In the recent years, several geoarchaeological field surveys have demonstrated that colour variations and characteristic patterns are not suitable for identifying the original raw material sources (Fernandes et al., 2007; Szilágyi, 2018; Szilasi, 2017). More specifically, one geological formation can have several colour varieties with diverse patterns (e.g. Mecsek radiolarite) (Furholt, in press; Szilágyi, 2018), but one type of flint can appear in several different parts of a mountain (e.g., Jurassic radiolarites and silicites of the Pieniny Klippen Belt in present-day Austria, Poland, Slovakia, the Czech Republic) (Bąk, 1995; Bąk et al., 2018; Mateiciucová, 2008: 49; Přichystal, 2013: 111-112, 120-123). To consider this new methodological development, we merged these 30 previously used lithic categories into 16 larger lithic groups. The identified larger raw material categories are the following: 1) obsidian, 2) Balkan flint, 3) Central Banat flint, 4) Chocolate flint, 5) unsourced radiolarite, 6) Bakony radiolarite, 7) Mecsek radiolarite, 8) limnic silicite, 9) unidentifiable burnt material, and the most dominant grey flint variation, which we divided into three sub-categories referring to the main colour and pattern: 10) flint 1a (grey), 11) flint 1b (grey-brown), 12) flint 1c (grey-spotted), 13) flint 2 (white), 14 flint 3 (brown), 15) limnic silicite and 16) unidentifiable burnt material.

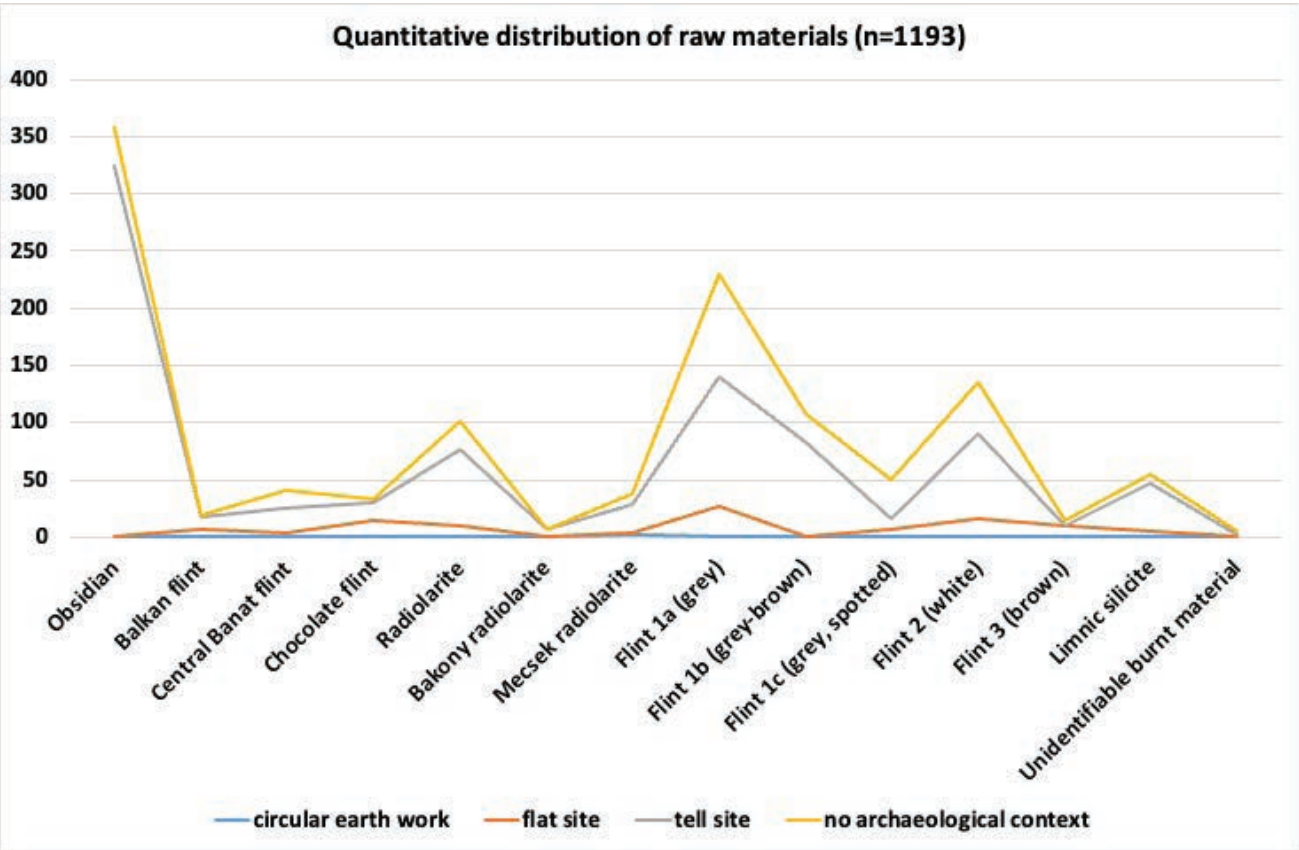

Fig. 2: Quantitative distributions of raw materials by main archaeological contexts

[2] Flint 1a (grey) contains the following raw material types: black-grey flint, greenish-grey flint, grey radiolarite, grey-brown flint, grey-honey yellow flint, light-dark-grey flint with silicic inclusions, light-grey flint, lusterless light-grey-brown flint, medium to dark-grey flint, shiny light-grey-brown flint, bone-flint, ivory-flint, latte macchiato-flint and tiramisu-flint. The Flint 1b (grey-brown) includes: grey-brown flint, grey-honey yellow flint, grey-spotted flint, light-dark-grey flint with silicic inclusions, light-grey flint, lusterless light-grey-brown flint, medium to dark-grey flint, and shiny light-grey-brown flint. The Flint 1c (grey, spotted) is equivalent to grey-spotted flint. Flint 2 (white) merged the following previous types: milk flint, milkwhite flint, milky-light grey with ruby-coloured inclusions, white-flint, bone-flint, ivory-flint, latte macchiato-flint, tiramisu-flint, and quartz-flint. The limnic silicites refer to the macroscopic observation of many previously named flint, which is semi-transparent and has some plant remains in the matrix: amber-flint, honey flint, grey radiolarite, grey-brown flint, grey-honey yellow flint, light-dark-grey flint with silicic inclusions, lusterless light-grey-brown flint, medium to dark-grey flint, shiny light-grey-brown flint, and latte macchiato-flint. Mecsek radiolarite has been identified as the earlier greenish-grey flint, along with some pieces from the types of: radiolarite, grey radiolarite, and light-dark-grey flint with silicic inclusions.

Raw materials	Trenches 2, 3		Trenches 4, 5, 8, 9, 10, 11, 12, 14, 17, 18, 21, 22, 23, 24		Trenches 6, 7, 15, 16, 19, 20		Trenches 1, 13		SUM	
	Circular Earth work		Flat site		Tell site		No archaeological context (surface collection, Tisza profile)			
Unit	n	g	n	g	n	g	n	g	SUM (n)	SUM (g)
Obsidian	0	0.00	0	0.00	324	109.68	35	130.45	359	240.13
Balkan flint	0	0.00	7	12.48	10	15.40	2	7.00	19	34.88
Central Banat flint	0	0.00	4	42.00	22	92.30	15	241.00	41	375.30
Chocolate flint	0	0.00	15	57.20	15	108.06	3	7.20	33	172.46
Radiolarite	1	16.30	9	39.10	66	227.51	25	208.00	101	490.91
Bakony radiolarite	0	0.00	0	0.00	6	12.10	0	0.00	6	12.10
Mecsek radiolarite	2	3.20	2	2.40	25	115.20	8	224.80	37	345.60
Flint 1a (grey)	1	7.00	26	179.52	113	444.93	89	1146.24	229	1777.69
Flint 1b (grey-brown)	0	0.00	0	0.00	83	162.97	24	401.25	107	564.22
Flint 1c (grey, spotted)	0	0.00	7	27.00	9	18.75	34	269.30	50	315.05
Flint 2 (white)	0	0.00	16	22.90	74	182.80	46	404.20	136	609.90
Flint 3 (brown)	0	0.00	10	22.50	0	0.00	5	30.36	15	52.86
Limnic silicite	0	0.00	5	5.20	42	27.79	8	9.40	55	42.39
Unidentifiable burnt material	0	0.00	0	0.00	2	11.10	3	5.00	5	16.10
SUM	4	26.50	101	410.30	791	1528.59	297	3084.20	1193	5049.59

Table 3: Number and weight of raw materials and their distribution by main archaeological contexts

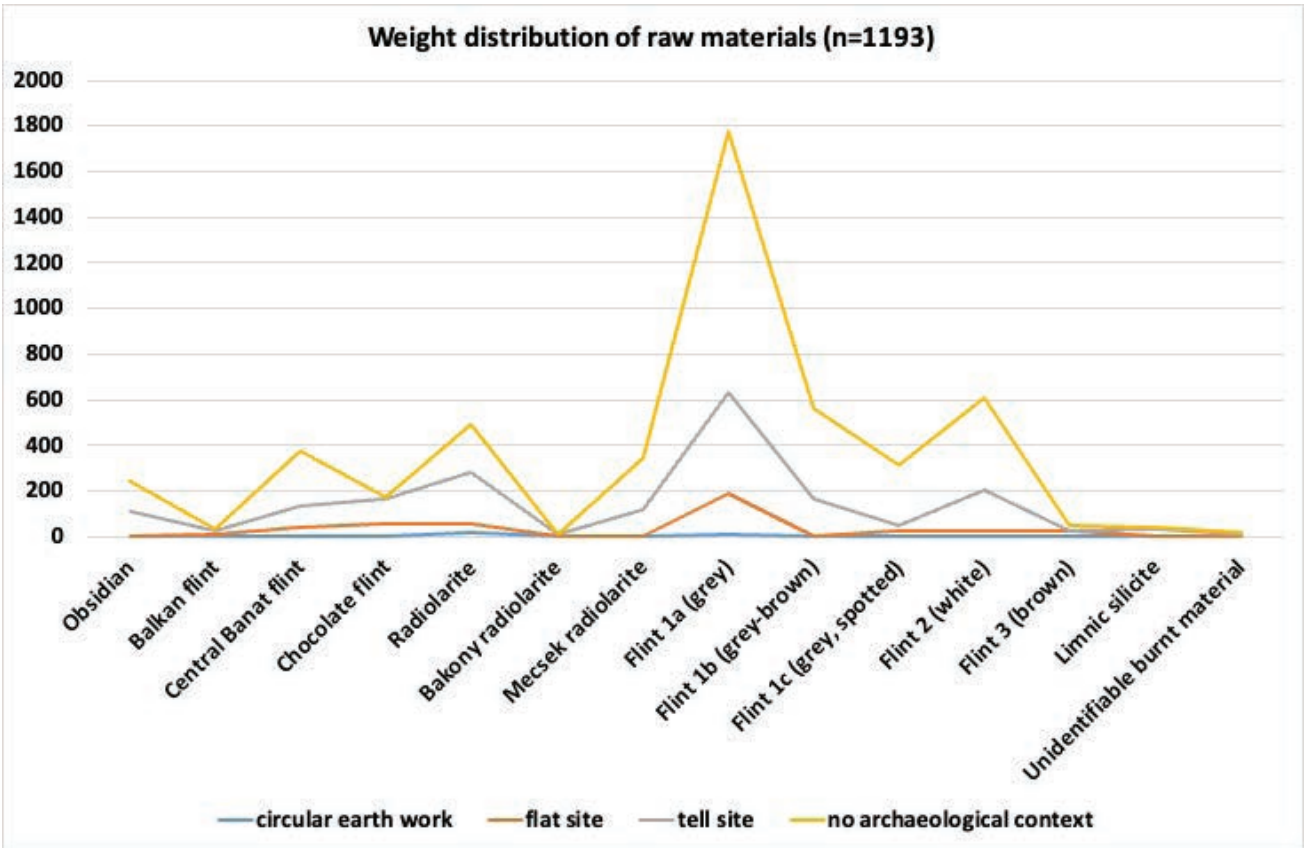

Fig. 3: Weight distributions of raw materials by main archaeological contexts

The most frequently used raw materials for chipped stones are obsidian, flint (grey and white types), and radiolarite. All of these display very high quality, well-knappable lithic types; particularly, the obsidian (volcanic glass) artefacts have extraordinary sharp edges without any further retouching (Table 3; Fig. 2). The obsidian comes from the Carpathian region, specifically the Tokaj-Eperjes Mountains (Zemplén/Zemplín Mountains in the North-Carpathian Mountains, Northeast Hungary and Southwest Slovakia) (Biró T., 2014, 2018; Furholt, 2024). The vast majority of the obsidian is the transparent C1 (Slovakian) version. The flint and radiolarite variations also have a very homogenous fabric, featuring varied colours; the grey flint predominates alongside the white version (Fig. 4). At the time of writing this paper, we have not yet concluded any geochemical and detailed petrological analyses to further understand the exact geological formations and identify the original source. The grey, white and brown flint variations also appeared and predominated in the chipped stone material in Gomolava. Małgorzata Kaczanowska and Janusz Krzysztof Kozłowski attributed these flint varieties from the mountain region of Western Serbia, as well as some Lower Cretaceous formations in the region of modern Belgrade, and potentially in the region of Šumadija (Kaczanowska, Kozłowski, 1986: 14-16). In recent years, more Prehistoric sites have been discovered in the Romanian Banat, where very similar grey flint chipped stone artefacts have appeared, originating from northeast Romania along the Prut river valley (Mitoc, Rădăuţi-Prut) (Văleanu, 2015) (Fig. 7). This flint version is also related to Cretaceous formations and is distributed across Transylvania. The white flint variation, which is labelled as the “milk flint” during the initial data recording, is very similar macroscopically to white opal. Dragana Antonović emphasized that the white colour could have played an important role in the Starčevo and Vinča communities, particularly influencing the lithic raw material selection strategy (Antonović et al., 2017). The majority of the radiolarite samples are unsourced; however, the shiny, waxy surface and the vivid reddish-brown radiolarite version is associated with the Bakony Mountains (Balaton Highland). The lustreless, greyish-green, and reddish-brown colour variants are thought to have originated from the East-Mecsek Mountains (Southeast Transdanubia).

The number of obsidian tools is predominant in the material of the tell settlement (324 pieces, 40.96%), but there is not a single one in the flat settlement. In comparison with the weight distribution, the grey flint shows the highest amount, alongside the unsourced radiolarite and white flint on the tell settlement. The grey and white flint varieties and Chocolate flint dominate in the flat settlement (Fig. 2-3).

Fig. 4: The most frequently used raw material groups are: 1: Carpathian obsidian (left: transparent C1-type/Slovakian/, right: non-transparent, C2-type/Hungarian/); 2: Central Banat flint, 3: Flint 1a, 1b, 1c (grey variations); 4: Flint 2 (white); 5: Mecsek radiolarite; 6: Bakony radiolarite (Figure made by Kata Furholt).

Technological-Typological Assessment

Each lithic assemblage requires a different classification based on its nature; therefore, the conceptual framework must be appropriately clarified prior to assessment. We applied a basic lithic analytical system to reconstruct the tool production process, with particular attention to which lithic variations were processed from the original raw material forms and which ones can be seen as imported lithic artefacts. Five main techno-typological categories are used in the lithic analysis: 1) raw material fragment, 2) cores, 3) flake and waste/debris, 4) blade, and 5) tool. The smaller subtypes, e.g., retouched, truncated, denticulated, and composite tools, are recorded in the database[3]. The analytical units (types and subtypes) of the applied techno-typological take into account the working method of Małgorzata Kaczanowska and Josip Šarić, who published several chipped stone assemblages in Serbia (Kaczanowska, Kozłowski, 1986; Šarić, 2014).

Technological categories	Trenches 2, 3		Trenches 4, 5, 8, 9, 10, 11, 12, 14, 17, 18, 21, 22, 23, 24		Trenches 6, 7, 15, 16, 19, 20		Trenches 1, 13		SUM	
	Circular Earth work		Flat site		Tell site		No archaeological context (surface collection, Tisza profile)			
Unit	n	g	n	g	n	g	n	g	SUM (n)	SUM (g)
Core	0	0.00	4	131.7	9	196.9	29	1089.24	42	1417.84
Raw material fragment	0	0.00	1	1.2	2	104.6	1	177	4	282.8
Flake	2	22	44	128.38	424	534.13	137	1249.96	607	1934.47
Blade	2	4.5	31	39.4	268	284.64	52	202.6	353	531.14
Tool	0	0.00	21	109.62	88	408.32	78	365.4	187	883.34
SUM	4	26.5	101	410.3	791	1528.59	297	3084.2	1193	5049.59

Table 4: Technological categories of the entire chipped stone assemblage and their distribution by main archaeological context

[3] The evaluation of the detailed technological analysis will be published in another paper due to the limits of this book chapter.

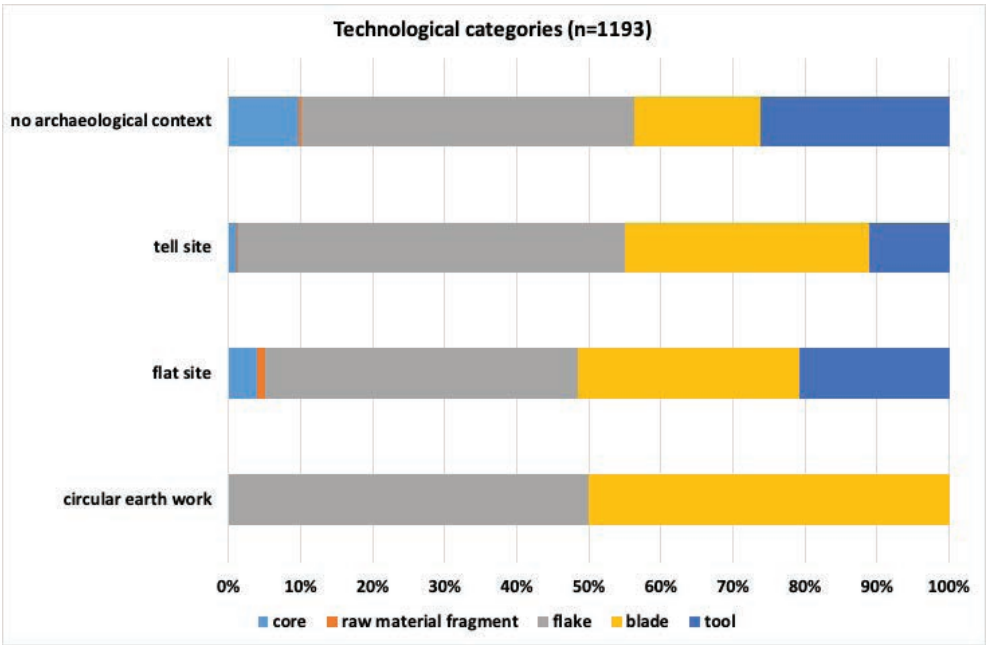

Fig. 5: Quantitative distribution of technological categories by the main archaeological contexts

The number of cores and raw material fragments is very low on the tell and flat settlements, indicating the beginning phase of the entire chaîne opératoire (Table 4, Fig. 5). Most unretouched flakes dominate every part of the settlement, but they are present in a higher proportion in the tell part (53.60%). Blades represent around 30%, while tools account for 20.79% in the flat settlement and 11.13% on the tell. The differences in the proportion of the technological categories illustrate the general trend regarding what is represented by the tool production process, while the quantity of the material from the tell is eight times more than that from the flat settlement. The tools category includes end-scrapers on flakes, end-scrapers on blades, borers, and trapezes (Plates 1-4). Except for 7 borers (5 from the flat settlement and 2 from the tell) and 2 trapezes (from the tell), all the tools are end-scrapers. The common characteristic of the end-scrapers is that many of them are broken, and only the active working scraper parts are presented as fragments[4]. The original support form of the end-scrapers is not possible to identify based on the fragmented condition, but it seems that the knappers used a shorter, thicker blade fragments with wider distal ends for making end-scrapers.

Importance of Borđoš in the Obsidian Circulation Network

The Tokaj-Eperjes Mountains, the geological source of obsidian, are about 350 km away on foot along the Tisza, making it unlikely for the community of Borđoš to have directly collected obsidian nodules. This obsidian acquisition scenario is implausible because there are two obsidian cores and no raw nodule forms or fragments of raw material at the tell settlement. Half of the obsidian is displayed in flake form, while the other half is in blade forms. The Tisza river was the primary natural distribution route in the obsidian circulation network. The Hódmezővásárhely-Gorzsa Late Neolithic tell settlement exhibits a very similar lithic assemblage (1900 pieces), where obsidian, Central Banat flint and Mecsek radiolarite are the prominent types of raw material (Starnini et al., 2007: 273). More than three-quarters of the lithics are radiolarite versions, while the number of obsidian pieces is very low in the chipped stone material of Čoka (Priskin, 2012). The composition of raw materials shows significant variations in the Late Neolithic assemblages along the Tisza, suggesting that different communities had varying access to the raw material circulation network. Some communities played a greater role in the distribution of obsidian and other lithics. We can consider these obsidian-dominant materials as proxy sites that facilitated the distribution of lithics further away from the Tisza along its tributaries, such as Hódmezővásárhely-Gorzsa, Borđoš, Opovo, Vršac and Potporanj (Marić, 2015) (Fig. 6). The Tisza is a navigable river, being the second largest river in the Carpathian Basin and the most important in the hydrological system of the Great Pannonian Plain. Based on the scheme of obsidian circulation, it can be inferred that obsidian was traded in both water and land routes (Marić, 2015; Trampota and Přichystal, 2024).

Until the detailed petroarchaeological analysis, we can only assume the original sources of grey, white and brown flint varieties (see areas labelled with "D" in Fig. 6. However, based on the Chocolate, Central Banat and Balkan flint varieties, the raw material circulation network of the Borđoš communities show beyond the Carpathian Basin.

[4] A future research question is what kind of activity caused the breakage and end of these tools. Use-wear analysis is necessary to study this question.

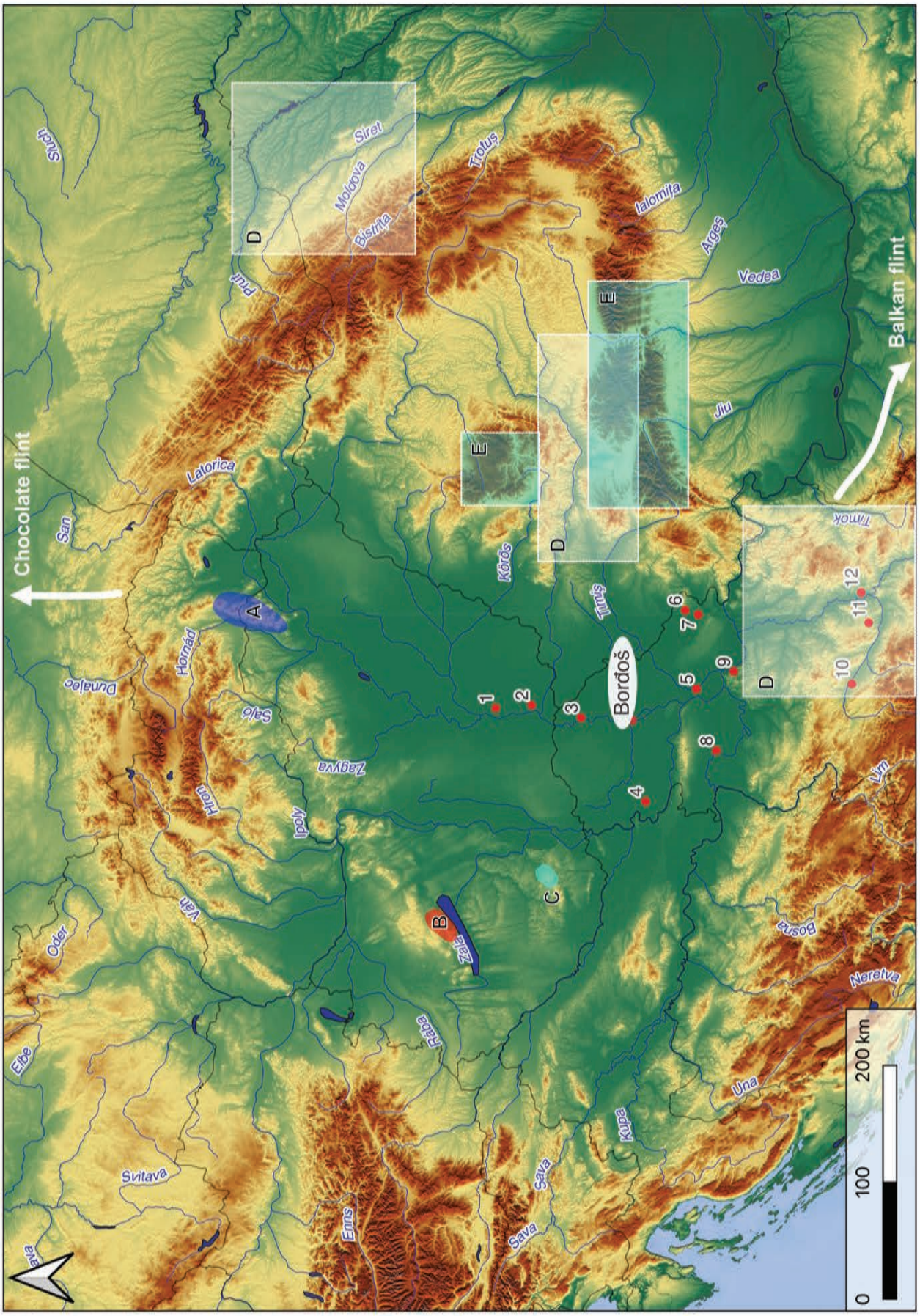

Fig. 6: Geological sources of lithic raw materials which are represented in the Borđoš material. Legend for the geological sources A: obsidian; B: Bakony radiolarite; C: Mecsek radiolarite; D: grey flint; E: Central Banat flint. The numbers refer to the mentioned sites in the text: 1: Szegvár; 2: Hódmezővásárhely-Gorzsa; 3: Čoka/Csóka; 4: Donja Branjevina (Deronje); 5: Opovo; 6: Vršac; 7: Potporanj; 8: Gomolava; 9: Vinča-Belo Brdo; 10: Popovića Brdo; 11: Blagotin; 12: Drenovac. Graphic by: Kata Furholt

Plates

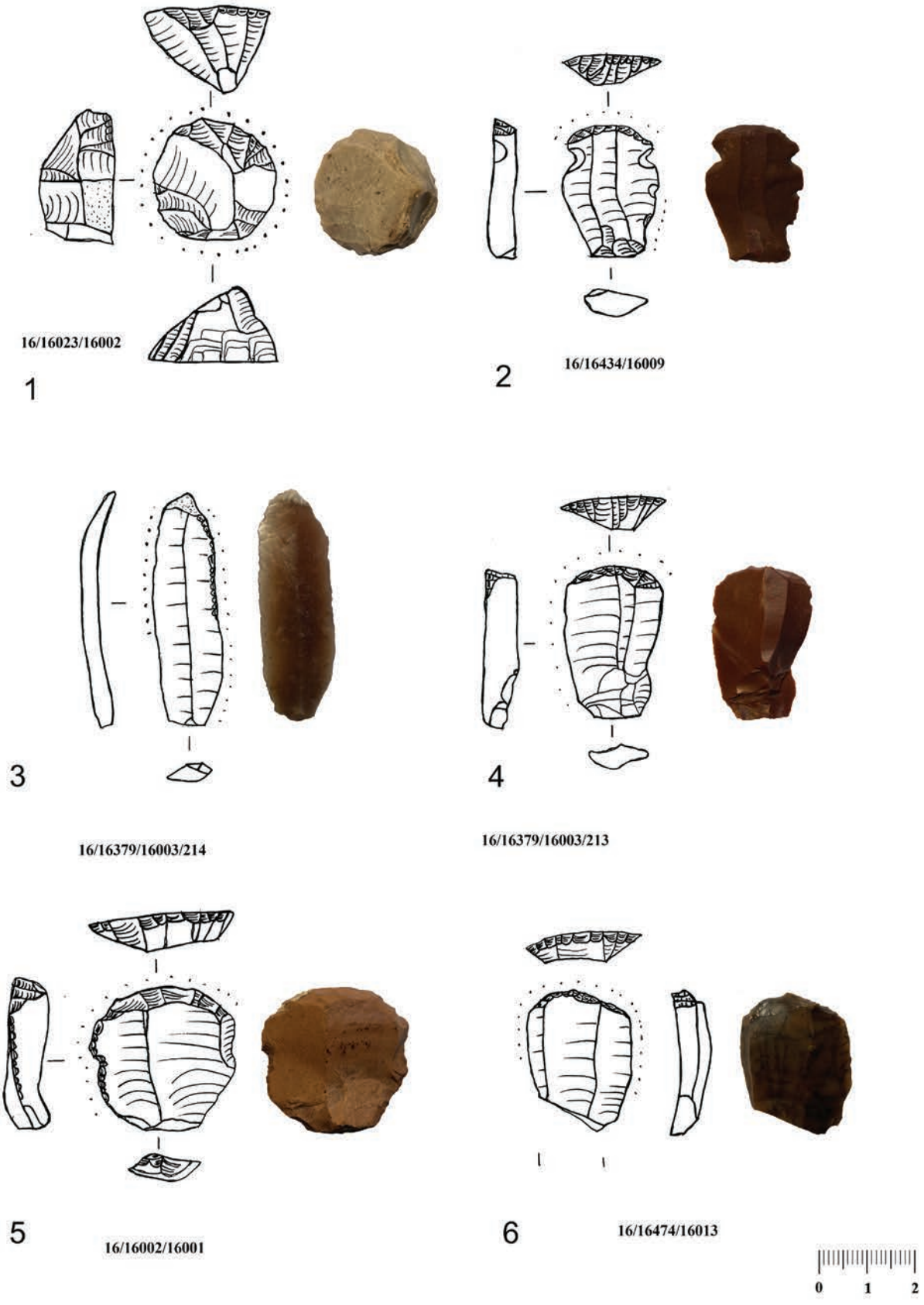

Plate 1: Tools from the tell settlement of Borđoš (Trench 16). 2, 4, 6: end-scrapers on blade; 5: end-scraper on flake; 1: double end-scraper (on flake/a distal part of a core); 3: retouched blade. Graphic by: Kata Furholt

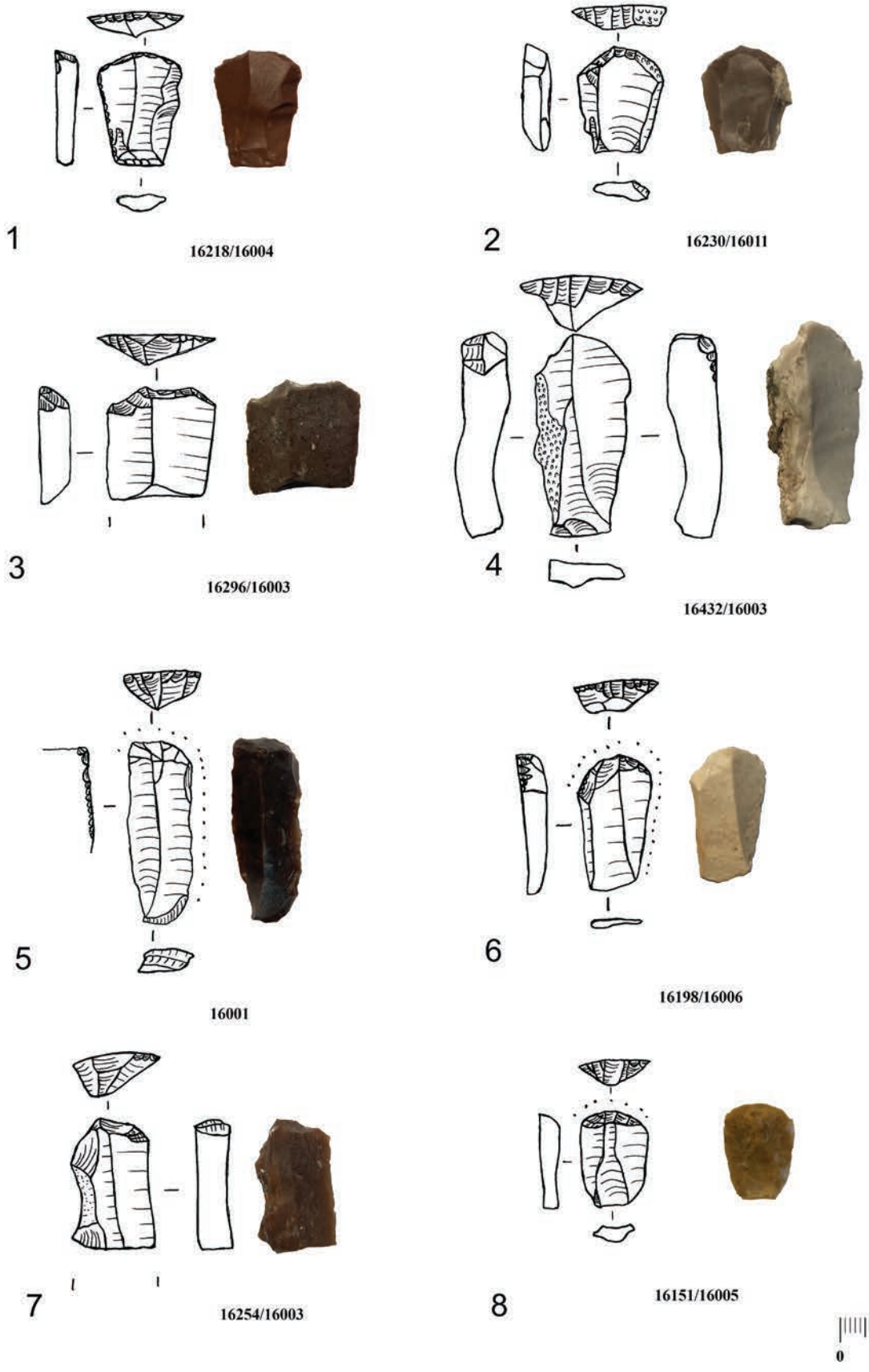

Plate 2: End-scarpers on blades from the tell settlement of Borđoš (Trench 16). Graphic by: Kata Furholt

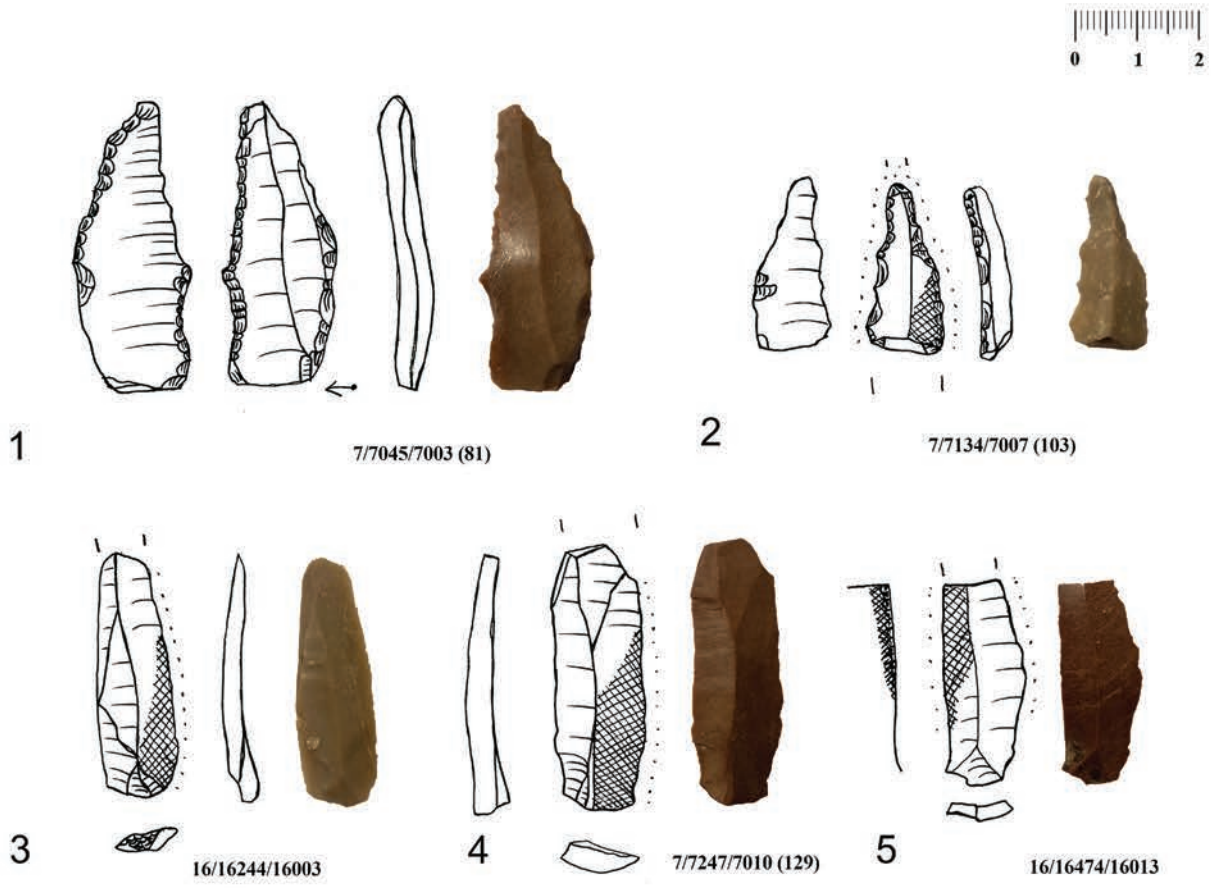

Plate 3: Retouched tools from the tell settlement of Borđoš (Trench 7 and Trench 16). 1-2: borer; 3-5: heavily worn blades with triangle-shape gloss. Graphic by: Kata Furholt

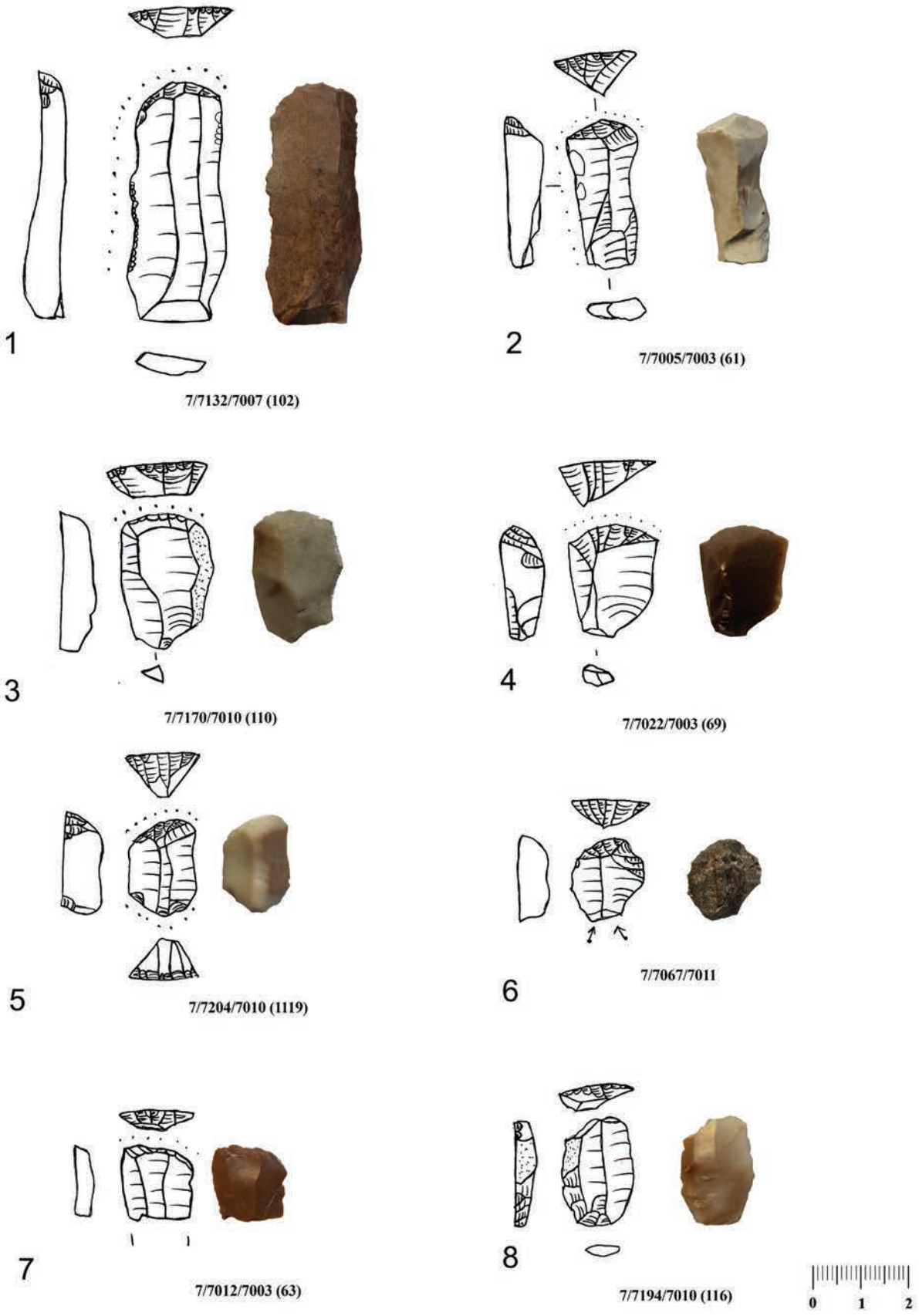

Plate 4: Tools from the tell settlement of Borđoš (Trench 7). 1-3, 7: end-scrapers on blade; 4, 6, 8: end-scraper on flake; 5: double end-scraper on blade. Graphic by: Kata Furholt

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Five most freqvent row materials in chipped stone material

Chipped stone tools from Borđoš

Chipped stone tools from Borđoš

GROUND AND ABRASIVE STONE TOOLS FROM THE SITE OF BORĐOŠ

Dragana Antonović, Vidan Dimić

Introduction

The study of the ground and abrasive stone industry at any site in the southern Pannonian plain always represents a challenge. Stone was a rarity in this region and every occurrence of it in an archaeological layer, even when there are no traces of processing and use on it, represents a certain sign that it ended up there intentionally, having been brought from afar, perhaps even as a finished product. For the time being, no workshops or places where the production of stone tools could have taken place have been discovered on the researched sites in Vojvodina (Antonović, 2003, 103; Karmanski, 2005: 49-57). The situation is similar in eastern Slavonia; however, places where some sort of stone processing was conducted have been discovered there. It is assumed that the making, or at least repairing of ground stone tools took place at the site of Stari Petkovci – Debela Šuma, while a considerable amount of grindstones with clear traces of finishing process on the stone was discovered at the sites of Čepin-Ovčara and Kaznica-Rutak, which is connected with a stone tools workshop (Rajković, 2018: 12, 21). This is why the study of stone items from Borđoš represents a considerable contribution to the forming of an overview of the ground and abrasive stone industry in Vojvodina.

Methodology

Stone tools are divided into two groups: ground stone tools and abrasive stone tools. The group of ground stone tools encompasses all the stone tools that obtained their final form by means of grinding as the final technique used for reducing the raw material and forming the functional shape of the tool (axe, adze, chisel, etc.). The group of abrasive stone tools includes all stone tools whose main property is abrasiveness, and which obtained their ground, and often also concave working surface, by being used in the making of other items from hard materials. Representatives of this category of more massive tools are grindstones, whetstones, querns and pounders.

The tools were subjected to a technological-typological analysis (Antonović, 2014), which comprehended the determination of the production manner on the basis of processing traces, shapes of the artefacts according to a previously established typology (Antonović, 2003), use of the tools, but also an analysis of mechanisms for their reuse (maintenance, recycling, secondary use; Antonović, Dimić, 2024; Jacquier, Naudinot, 2015; Schiffer, 2010).

Analysis

A total of 247 finds collected at Borđoš were defined as ground and abrasive stone artefacts. This group encompasses finds from field surveys of several sites (Table 1), as well as the excavations of the site of Borđoš itself, from which the majority of finds originated.

	Number of artefacts	Completely preserved	Class of findings
Field survey	**110**	44 (17.81%)	
Site 18 „Kod starog hrasta“	6	3 (1.21%)	Ground and abrasive stone tools
Site 19, Taraš Selište	1	0	Abrasive stone tools
Borđoš – Site 23	5	2 (0.81%)	Ground and abrasive stone tools
Site Borđoš	74	27 (10.93%)	Ground and abrasive stone tools
Site Borđoš tell	3	2 (0.81%)	Ground stone tools
Site Borđoš Makaranda	6	3 (1.21%)	Ground and abrasive stone tools
Site Borđoš Ajlaš	2	0	Abrasive stone tools
Site Borđoš, Mala Barica	13	7 (2.83%)	Ground and abrasive stone tools
Archaeological excavation	**137**	25 (10.12%)	Ground and abrasive stone tools
Site Borđoš	130	25 (10.12%)	Ground and abrasive stone tools
Site Borđoš, Prečka	7	0	Abrasive stone tools
Total	**247**	**138 (55.87%)**	

Table 1: Stone artefacts collected during field survey and archaeological excavation from 2014 to 2022

During the field survey of the site of Borđoš itself, a considerable number (77) of artefacts made of ground and abrasive stone was collected. Among these findings are those that undoubtedly indicated that Borđoš was inhabited during the Late Eneolithic and Bronze Age as well. (Fig.1a-b). These are fragmented perforated axes and hammers, and the raw material used to make them, as well as the manner in which their butt and cutting edge were shaped, indicate that those were probably weapons from the 4th and the 3rd millennium BC (Antonović, Đorđević, 2011). All the perforated tools are broken precisely at the thinnest section, i.e., perforation. Some of them were discarded after being damaged, and a larger number of them were used secondarily or after being recycled. After being used in their primary function, these objects were used secondarily in the form of hammers or pounders. On one example, we can notice that the life cycle of the object was extended, after it was damaged, by creating a new perforation, and it was most likely still used in its primary function after that (Fig. 1a). Unlike them, tools with a cutting edge (axes, adzes and chisels; Fig. 1c-g) completely correspond to the Neolithic ground stone industry encountered at numerous Vinča culture sites to the south of the Sava and the Danube (Antonović, 2003). Among them, adzes are the most dominant, and three chisels were also found. A certain number of them did not have enough elements which would enable us to determine the type, while other examples showed a prominent typological variability, with almost all the types present (III/1-III/8; Antonović, 2003). Types III/1 and III/3 (adzes with a wider distal end, as well as those with a narrow, oblong form) stand out with a few more examples than others, which is also a common case in Vinča culture settlements, in terms of typology. This type of tools yielded a large number of examples

with traces or secondary use and recycling (Fig. 1e-g), which was noticed later as well, during the archaeological excavations. In most cases, damaged adzes were used secondarily, or after recycling, as hammers, and one of the three discovered chisels was created by recycling an adze that was damaged lengthwise. Even though the mechanisms of reuse of objects are characteristic for the entire area of the Vinča culture (Antonović, Dimić, 2024), this practice represents a specificity of the sites in Vojvodina.

During the excavations at the site of Borđoš, ground and abrasive stone tools were discovered only within the Late Neolithic layers, while in the oldest layers no stone tools have been discovered. In the archaeological sense, the most interesting findings are those related to residential buildings. This is a group of artefacts found in layers related to Houses 1, 2, 5 and 6. Houses 1, 2 and 6 were discovered in the flat area of the settlement and they all belong to the Late Neolithic Tisza culture. House 5 was located in the elevated part of the settlement, designated as a *tell*, and it belonged to the Late Neolithic Vinča culture. Regardless of the fact that they belonged to different cultures, all the houses show uniformity in terms of the typology and raw material choice, indicating the same technological development within the Late Neolithic communities in southern Pannonia (Fig. 2-3). The only difference is reflected in the number of finds from those buildings and layers associated with them, such as, first and foremost, the rubble layer above the houses. House 5, which was inhabited by the members of Vinča population, has a significantly larger number of ground and abrasive stone finds, which is one of the basic features of the Vinča culture south of the Sava and the Danube (Antonović, 2003: 131).

Seventy tools were found in layers associated with the houses (Fig. 2-3): in House 1 – four examples (two static grindstones and two fragments of tools with a cutting edge); in House 2 – nine examples of ground and abrasive stone tools (an adze, grindstones, a whetstone, pounders, querns); in House 5 – as many as 55 pieces (the largest number discovered in one place); and in House 6 – two examples of stone tools (an adze and a fragment of a perforated axe.

Kind of tool	**Type***	**Number of artefacts**	**Completely preserved**	**Recycled**
Adzes	III/1/d, III/3/a, b	5 (9.09 %)	1	1
Chisels	V/2/b, V/3/a	2 (3.64 %)	1	1
Hammers	VI/2/b	1 (1.82 %)	1	1
Perforated adzes		3 (5.46 %)	0	1
Flakes from ground stone tools		9 (16.36 %)	0	0
Grindstones	XI/3/b, XI/6/a, c, d	26 (47.27 %)	3	4
Whetstones	XII/4	1 (1.82 %)	0	0
Pounders	XIII/3	1 (1.82 %)	0	0
Querns	XIV/1, XIV/2	5 (9.09 %)	1	0
Pieces of raw material		2 (3.64 %)	1	0
Total		**55**	**8 (14.55)**	**8 (14.55)**

* Typology after Antonović 2003.

Table 2: House 5: ground and abrazive stone tools

Ground and abrasive stone tools from House 5 also came from the rubble layer, while no objects of this type have been found within it. Stone tools from this house have all the features in terms of the typology, raw material and traceology that are characteristic of the Vinča ground and abrasive stone tools industry (Table 2; Fig. 3).

Adzes dominate among ground stone items, as a universal tool for woodworking. Axes, primarily used for cutting down trees (Dimić, 2020: 364-394; Semenov, 1976: 125-129), have not been discovered in the settlement at Borđoš. Adzes, but also chisels, which were also found, only in smaller numbers, show use-wear traces characteristic of woodcarving; hence, it can be assumed that the production of wooden items was carried out within the settlement itself, in the immediate vicinity of houses.

Abrasive tools are considerably more numerous. All kinds of tools are present – grindstones, whetstones, pounders and querns (Table 2). Numerous grindstones and very few pounders have use-wear traces that unequivocally show their use in processing hard materials such as stone, horn, bone or ceramics. Large, mostly fragmented, static grindstones prevail (type XI/6 according to the typology by D. Antonović, 2003). Pounders and querns were abrasive tools used in food preparation. Finely finished on the upper side, used as a working surface, and roughly shaped on the lower and lateral sides, these massive tools show clear traces of grain grinding use. There are rare cases when large static grindstones and querns were simultaneously used both for processing objects made of solid materials and for food preparation, and this occurrence was also recorded at Borđoš. Judging by the intensity of the use-wear traces on the working surfaces, such alternating use did not last long. Occasionally, in layers associated with houses, flakes with parts of a polished surface were found, unequivocally showing that they came from ground stone tools. These flakes may indicate that the repairing of blunt tools with a cutting edge was carried out in the immediate vicinity of houses; however, it is also quite possible that the flakes were created when tools were damaged during work activities.

The recycling of damaged tools was observed only on ten finds – an adze, a chisel, a hammer, four grindstones, a fragment of a perforated tool and two flakes created during the repairing of a ground stone tool. The number of non-recycled tools is significantly higher, with as many as 20 of them, but even those tools show that they had been in use for a long time. They are mostly fragmented and there are only three examples among them that have been preserved whole or with little damage. All three were in use for a short time, judging by the barely noticeable and poorly defined use-wear traces. In contrast to them, fragmented tools show clear traces of longer use, which, actually, probably led to the fragmentation of those objects (Fig. 3c–d). All this speaks in favour of the notion that stone raw material was not easily available for the Late Neolithic inhabitants of Borđoš and that each piece of stone was used to the fullest. This attitude is clearly reflected in the fact that there is a minimal number of whole tools: in House 5, they make up 14.5%, while that number is slightly higher among the finds from all layers of the site, namely, out of all the samples, only 19% have been fully preserved. A total of eight fully preserved tools were found inside the house, including some that were created by recycling (Table 2).

The analysis of raw materials was performed only macroscopically, hence, it is not possible to discuss their origin, which would provide answers about contacts between the inhabitants of the settlements at Borđoš with Late Neolithic communities in the surrounding region. For the time being, it is known that compact, fine-grained sandstones were used the most, because they were the most suitable raw material for the production of abrasive tools for processing objects made of solid materials, as well as for grinding from large static grinding wheels. Querns and pounders, which, judging by the intensive use-wear traces on them, were used over longer periods of time, were produced from andesite and conglomeratic sandstone. Tools with a cutting edge were made from fine-grained compact and hard rocks, such as crystalline schists, metamorphic sandstones, metaalevrolite, limestone, and quite exceptionally also from the so-called light white rocks, which could not be defined more precisely.

Conclusion

Ground and abrasive stone tools from Borđoš, both those found in the researched archaeological layers and those collected during field surveys, show a general picture of stone products similar to the one from other prehistoric sites as well. Items collected as surface finds during field surveys, which can be dated into the Eneolithic and the Bronze Age, and perhaps even the Iron Age, do not differ in terms of the choice of raw materials, method of processing and use, from finds discovered at other sites from that period (Antonović, Đorđević, 2013; Petrović, Jovanović, 2003; Medović, 1988; Medović, Medović, 2011).[1] Likewise, the items originating from the late Neolithic layers at Borđoš follow all the technological, raw material, and usage patterns that, after several years of research on the Neolithic ground and the abrasive stone industry, have been determined to be characteristic of the Vinča culture. (Antonović, 2003; Dimić, 2020; Antonović, Dimić, 2022).

Stone tools discovered at Borđoš were made from high-quality stone, solid and hard, hence, tools made from it could have been used for long periods of time. Stone axes, adzes and chisels were used in woodworking, as indicated by use-wear traces regis-

[1] The authors had the opportunity to analyse the material from the site of Gradina, on Bosut, thanks to the courtesy of the staff members of the Public Library "Simeon Piščević" from Šid, and Jovan D. Mitrović, from the National Museum of Serbia.

tered on them as well. On the other hand, tools made from rocks with abrasive properties, namely, grindstones and whetstones, were used in the production of ground stone tools with a cutting edge. Querns and pounders were an obligatory part of the household inventory at Borđoš, since they were used for food preparation. On the basis of the quality of the raw material, the careful processing and long-term usage, it can be seen that the craftsmen from the Neolithic site of Borđoš invested a lot of effort and skills in the making these objects, as can be seen on almost every stone item.

Stone tools and household inventory, without which life in prehistoric times could not be imagined, show how precious stone was as a raw material throughout prehistoric times. All stone items gathered during field surveys and excavations at Borđoš show that they were carefully kept and used to the fullest by the inhabitants of prehistoric settlements at Borđoš, and traces of long use and attrition can be noted on almost all of the tools discovered so far. They were not discarded even after being damaged. A broken adze for woodworking would become the raw material for making one, or even two new, smaller tools. Grindstones and whetstones always had several working surfaces. A part of a broken big quern would become the upper part of a grinding implement (pounder), held in hand and used to crush grains. Once a tool couldn't serve its primary purpose anymore because it was too damaged, it would be used as a hammer, which was often the final stadium in the life cycle of a tool. Such an attitude towards stone tools confirms that stone as a raw material had a special value for the inhabitants of the Late Neolithic site at Borđoš. We do not know where the raw materials came from, since it is not possible to determine their origin without more precise geological analyses. It is assumed that they were brought from afar, perhaps from the mounts of Vršačke Planine, Fruška Gora or even from regions to the south of the Sava and the Danube, but certainly from a distance of more than 70 km. Thus, we can say that this was precisely the reason why stone was a highly valued raw material and why it was used to the fullest though constant maintenance, secondary use and recycling of stone tools.

Fig. 1: Ground stone tools found during the field survey. Fragments of perforated hammer-axes: a. Find no.1103, b. Find no. 1104). Adzes: c. Find no. 1100, d. Find no. 1094. Reused adzes: e. Find no. 1154, f. Find no. 1001, g. Find no. 1001

Fig. 2: Ground and abrasive stone tools found in houses. House 1: a. ground stone adze (Find no. 8011); b. grindstone (Find no. 8006). House 2: c. wheatstone (Find no. 10004); d. quern (Find no. 10004). House 6: e. perofrated hammer-axe (Find no. 17022); f. adze (Find no. 17022)

Fig. 3: Ground and abrasive stone tools found in House 5. Reused adzes: a–b. Find no. 15013. Fragmented tools made of „light white stone“: c. Find no. 15005; d. Find no. 16003. Static grindstone: e. Find no. 16003

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NEOLITHIC BONE ARTEFACTS FROM THE SITE OF BORĐOŠ

Selena Vitezović

Introduction

Osseous raw materials (bone, antler, teeth and mollusc shells) were widely used throughout the prehistoric times for a variety of everyday objects, ornamental and non-utilitarian items. The communities that occupied the site of Borđoš in the Neolithic period used them as well, along with lithic and clay, for production of everyday tools, hunting and fishing weapons, and for personal ornaments.

Materials and methods

The assemblage of bone artefacts from Borđoš is rather small, and comprises 44 items (Table 1). Artefacts were singled out during excavations, or afterwards, during the examination of faunal remains. Their preservation is not particularly good; their surfaces are damaged to a different degree predominantly by carbonate crusts, along with some other taphonomic agents. Therefore, traces of manufacture and use-wear are not well visible at some of them. Artefacts were analysed from the technological viewpoint, more specifically – raw material selection, manufacturing procedures, morphological traits and use-wear traces were analysed (see Vitezović 2016 and references therein). Traces of manufacture and wear were interpreted according to criteria established by different authors (Christidou, 2005; Christidou, Legrand, 2005; Maigrot, 2003, Mărgărit et al., 2014, Ramseyer, 2004; Peltier, 1986; Semenov, 1976).

Techno-typological analysis

Raw materials that were used include bones, antlers, teeth and mollusc shells. Bones were mainly long bones from small ruminants and ribs from large mammals, mainly from animals killed for food. The antlers were predominantly those of red deer (Cervus elaphus). Teeth and mollusc shells were used for ornaments only.

Artefacts were classified into eight groups, based on their morphology and the function of the working end: I. pointed artefacts, II. cutting tools, III. burnishing tools, IV. percussion tools, V. objects of special use, VI. ornaments, VII. non-utilitarian items, and VIII. incomplete items. Each group is further divided into types and, when applicable, subtypes (Vitezović, 2016: 79-98).

Pointed artefacts (I). This group includes several awls, heavy points, and three fragmented barbed points.

Awls (medium-sized points) were produced from segments of longitudinally split long bones and from split ribs (fig. 1a, 1b/2, 3). Segments of long bones (mainly metapodial bones of small ruminants) were divided by longitudinal grooving with a chipped stone tool, then the bone was either completely sawn, or split by indirect percussion, and the final shape was obtained by burnishing and polishing with some abrasive stone tool (cf. Christidou, 2005; Vitezović, 2023). Awls – find numbers 15174, 7172, 15317 and 16363 – were produced by this technique; awls 15174, 15317 and 16363 have segments of the proximal epiphysis preserved at the basal part, while the base of awl 7172 is fragmented. Their tips are sharp, worn out from use (except awl 16363, with a broken distal portion). Awl find number 17128 is only partially preserved, and it was not possible to determine whether it was also produced by this technique, or it was simply made from some irregularly broken long bone splinter. It has a fine, pointed tip, worn out from use.

Awls produced from split long bones, especially metapodials, were widespread in the Neolithic period across Europe, including the sites in the southern Carpathian Basin and adjacent areas, such as the sites of Rast in Romania (Mărgărit et al., 2023: 92-93, fig. 3, 4), Aszód-Papi in Hungary (Tóth, 2013: 329, T. 1/1, 2, 3, 4, 6), or Vinča – Belo Brdo in Serbia (Srejović and Jovanović, 1959: 182, fig. 1; Vitezović, 2023).

Sometimes, the bone was split in half and then split again by grooving and indirect percussion into one quarter of the bone's original circumference (cf. Vornicu, 2014; Vitezović, 2023). Artefact, find number 16284, was obtained by this quartering or *débitage by successive partition* method: a longitudinal segment was extracted from a metapodial bone by grooving and finalised by burnishing. The final product has a segment of the proximal epiphysis at the basal part, straight edges, slightly concave cross-section, and fine point, damaged by use, at the distal end. Traces of use were not well preserved due to taphonomic damages; only polish and worn surfaces may be noted.

Ribs were first divided into segments by direct or indirect percussion, then their edges were removed by some chipped stone tool, and split into two bone plates by indirect percussion. The final shape of the tool was obtained by scraping and burnishing. Among pointed items made from ribs, one completely preserved double point, find number 15412, may be singled out. It was produced from one bone plate of a rib segment, it is more or less lozenge-shaped and both ends are pointed, with traces of use, although one is somewhat sharper. Traces of use are not well

preserved; only polish and worn surfaces at both ends may be noted. Spongy tissue on the lower surface is worn only at ends. This tool may have been used for production of diverse items from organic materials (textiles, leather), but also in fishing. Similar double points, interpreted as fishing equipment (labelled as transverse fish hooks), used for hook-and-line fishing, were noted, among others, at the site of Pietrele in Romania (Benecke et al., 2013: 187, fig. 14).

Beside this possible fishing tool, additional items used for hunting and fishing were found – three fragmented barbed points (often labelled as harpoons; find numbers 16291, 21074, 15084) (fig 1a, 1b/4). The barbed points were produced from red deer antlers. Blanks for their production were extracted from antler beams, probably by longitudinal grooving, by so-called *débitage by extraction technique* (Averbouh, Pétillon, 2011: 1; Vitezović, 2017). They were further modified by cutting and scraping with a chipped stone tool. One barbed point (find number 16291) was uniserial, i.e., it had unilateral barbs. Its mesial part is preserved, with two relatively short barbs. The second barbed point was biserial (find number 21074), i.e., it had barbs on both sides; four barbs in total are partially or completely preserved (two at each side), more or less symmetrically placed. Only the proximal part of the third barbed point (find number 15084) is preserved, rectangular, with two widenings that were used to secure the hafting, and therefore it is not possible to determine whether it was uniserial as well, or it was barbed bilaterally.

Barbed points of this type were widespread in the Late Neolithic and Eneolithic in the southern Carpathian Basin and adjacent areas, including the sites of the Sopot culture, such as Hermanov Vinograd in Croatia (Hršak, Los, 2014: 42, kat. 112), Vinča culture sites of Gomolava and Vinča – Belo Brdo in Serbia (Vitezović, 2017; Vitezović et al., 2024), as well as sites of Pietrele (Benecke et al., 2013: 186, fig. 11) and Căscioarele-Ostrovel (Mărgărit, 2024) in Romania. Whether the barbed points from Borđoš were used as harpoons *sensu stricto*, i.e., as retractable weapons, or were simply hafted into spears, it is not possible to determine due to their fragmented state (for full discussion on typology and function of barbed points, and definition of harpoons, see Pétillon, 2009, and references therein).

One heavy point was found (find number 16361) (fig 1a, 1b/1), also produced from a long bone, but irregularly split, and with a damaged distal portion. Also, two fragmented tools made from red deer antler tines were most likely used as heavy points.

Cutting tools (II). One smaller, partially fragmented cutting tool (find number 1174) was found, most likely used as a chisel, made from red deer antler segment.

Burnishing tools (III) were also uncommon, just one small burnishing tool – spatula (find number 21053), made from a rib, was discovered; it has a small, rounded working edge, and the entire distal portion is heavily worn from use (fig 1a, 1b/5).

Percussion tools (IV). Two damaged red deer antler tines were used as smaller percussion tools – punches for different materials, and perhaps even as retouching tools. They are not well preserved, but intensive use-wear traces may be observed on their surfaces. Antler tines were commonly used as percussion tools in the Neolithic in the area – they were found at Vinča culture sites, such as Drenovac and Belovode (Vitezović, 2017: 219, fig. 10).

Objects of special use (V). One fragmented *Bos* astragal with use-wear traces belongs to this group. Used astragals were widespread in the Neolithic and Eneolithic in the area, including Vinča culture sites such as Pločnik (Vitezović, 2021), Drenovac and Slatina near Paraćin (Vitezović, 2007), as well as numerous Neolithic and Eneolithic sites in Romania (e.g., Poduri–Dealul Ghinadru: Bejenaru et al., 2010) and in Bulgaria (e.g., Voden: Bǎčvarov, Vitezović, 2014). Their exact function hasn't been determined with certainty, however, they were most likely used in the processing of some organic materials (see discussion in Vitezović, 2021).

Ornaments (VI). Within the Borđoš osseous artefact assemblage, nine ornamental items were discovered. The first one is a pendant, find number 16168, a perforated tooth of *Canidae* (Fig. 2a, 2b/1). It is completely preserved, and it has a perforation in the upper part, R = 3 mm, made by drilling from both sides, worn from use. It was worn suspended, most likely as a jewellery piece (single or combined with some other ornaments). The remaining ornaments were produced from marine mollusc shells (Fig. 1a, 1b/6). Two of them most likely recycled from other ornaments. They are elongated, somewhat irregular in form, and have a perforation at one end, carefully made by drilling and worn from use. Traces of burnishing may be noted on one of them. They may have served as some sort of a pendant, or were sewn onto clothes. Two items were fragmented bracelets, made from the outer rim of a shell valve (cf. Tsuneki, 1989 for the reconstruction of the bracelet manufacturing process), one from *Spondylus* and one from *Glycymeris* (Fig. 2a, 2b/2, 3). Also, two beads produced from shells were recovered, most likely from *Spondylus* – cylindrical bead (find number 14145) and discoid bead (find number 15453), Fig. 2a, 2b/3, as well as one small circular ornament with transversal perforation, used most likely as some sort of application or button on clothes.

Artefacts produced from marine shells were very frequent and widespread in the Neolithic in Europe (e.g., Ifantidis, 2019); in fact, it is widely assumed that the Neolithic communities in Europe were engaged in long-distance trade and exchange, and that some of the items that were transported were shell ornaments (Ifantidis, 2019; Séfériadès, 2010). Finds from Borđoš show that these prehistoric communities also participated in this large contact and exchange network.

Unfinished items (VIII). Beside these tools, it is interesting to note the presence of a red deer antler

segment with traces of manufacture - a raw material piece from which blanks for products were taken (find number 15402). The antler in question is the basal part of an antler obtained from prey - it has a pedicle segment, pearly part, segment of the beam and small segment of bow tine. Traces of hacking and adzing from extracting blanks are visible on the edge of the beam. Also, one fragmented artefact made from red deer antler beam was found (find number 16472), probably some kind of heavy cutting or combination tool.

Discussion

Neolithic communities from Borđoš used osseous raw materials for a variety of purposes, for both everyday items and ornaments. Some of these raw materials were obtained locally (bones from domestic animals), in the vicinity (red deer antlers gathered or obtained by hunting, as demonstrated by the presence of the raw material piece from a killed stag), and from large distances (marine molluscs). Manufacturing debris is scarce, but it is reasonable to assume that bone and antler objects were produced locally, while shell ornaments were most likely imported as finished items. Typological repertoire demonstrates certain analogies with the bone tool assemblages from other Neolithic communities in the region.

Use-wear traces are not well preserved; however, we still may derive some conclusions regarding the activities they were used for – hunting, fishing, processing organic materials such as plant fibres and hide, possible food preparation, and possible retouching chipped stone tools.

Concluding remarks

The assemblage of osseous artefacts from Borđoš is rather small, but very interesting in terms of the raw materials, techniques and techno-types used. In particular, the presence of hunting and fishing weapons should be singled out, as it demonstrates that this was an activity of certain significance for the Borđoš prehistoric communities. Furthermore, relatively large amounts of red deer antlers reveal how members of this community explored the surrounding areas, and finally, the presence of imported ornaments shows that the prehistoric inhabitants of Borđoš had vivid interactions with neighbouring and distant communities.

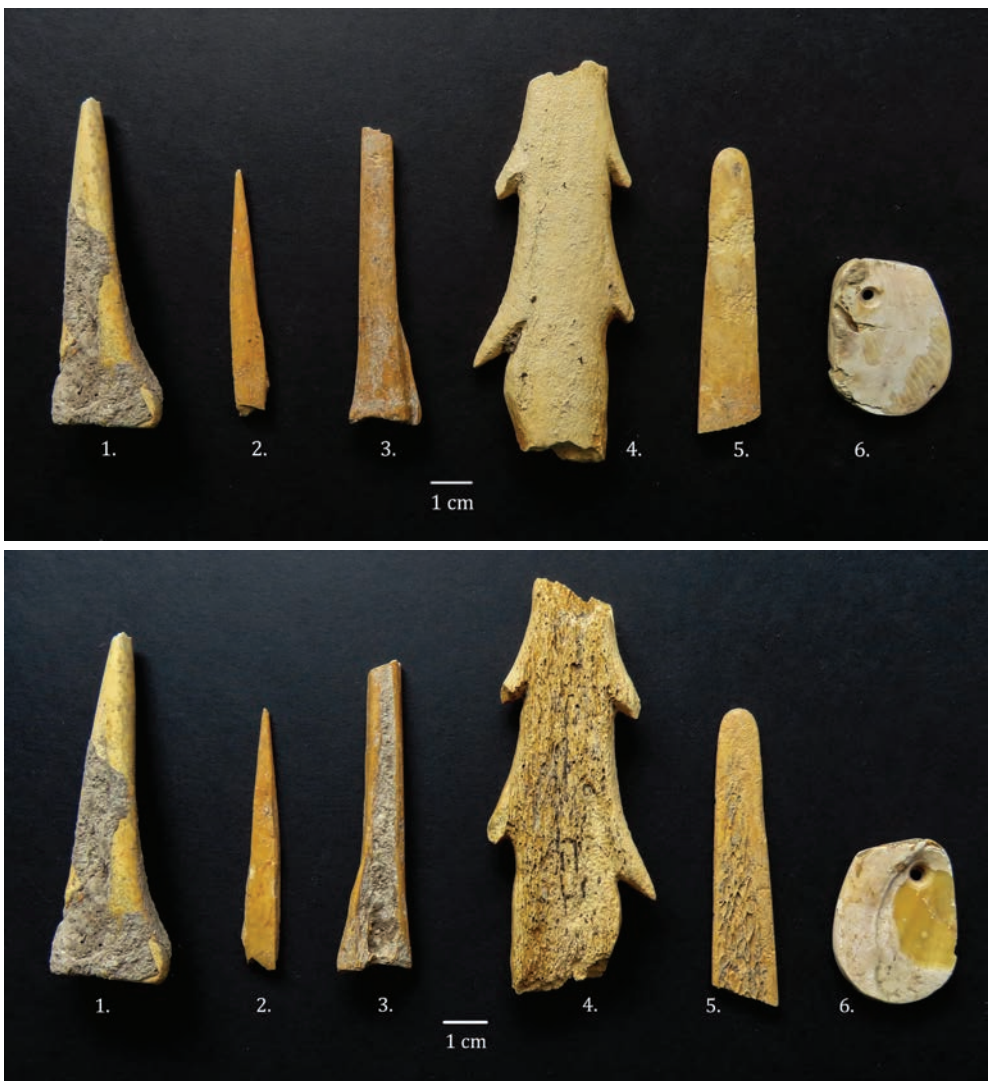

Fig. 1a, 1b: 1) Heavy Point (Find no. 16361); 2) Awl from Long Bone Splinter (Find no. 17128); 3) Fragmented Awl from Long Bone Segment (Find no. 16363); 4) Fragmented Barbed Point with Bilateral Barbs (Find no. 21074); 5) Burnishing Tool - Spatula Made from Rib Segment (Find no. 21053); 6) Ornament (pendant) from *Spondylus* Shell (JIS 492)

Artefact class		Total no.
Pointed artefacts		13
	Awls	*8*
	Heavy point	*1*
	Fishing and hunting gear	*4*
Cutting tools		1
Burnishing tools		1
Percussion tools		2
Objects of special use		1
Ornaments		9
Unifinished items		2
Total		**44**

Table 1: Artefacts from osseous raw materials

Fig. 2a, 2b: 1) Pendant from perforated tooth (Find no. 16168); 2) Fragmented shell bracelet (JIS 54/4001/4001); and 3) Shell discoid bead (Find no. 15453)

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Fig. 3: Bracelet made from *Spondylus* shell

INSIGHTS INTO ANIMAL MANAGEMENT AND WILD FAUNAL RESOURCE EXPLOITATION AT BORĐOŠ DURING THE LATE NEOLITHIC

Sarah Pleuger-Dreibrodt, Darko Radmanović

Introduction

The transition from the Late Neolithic to Copper Age across the Pannonian Basin (ca. 5000 to 3000 BC) is marked by socioeconomic and sociocultural changes. An important indicator for this transition, documented in the archaeological record of the Tisza and Danube regions, is a shift in patterns of human-animal relationships. In particular, differences in subsistence modes based on animal husbandry and the exploitation of wild faunal resources have been in the focus of zooarchaeological research (e.g. Bartosiewicz, 2005, see Orton, 2012 for review). The shift in social organisation and population increase most likely went hand in hand with a widespread intensification of livestock husbandry management both for primary (e.g. meat, fat, raw materials) and possibly secondary (e.g. dairy) products (Hoekman-Sites, Giblin, 2012).

With faunal remains from multiple settlement components, Borđoš provides a promising foundation for comparative analyses between different time periods marked by differential usage of two co-existing settlement layouts (Hofmann et al., 2019). Main subject of this chapter are the zooarchaeological remnants recovered from two houses; *House 5* located in the northern part of the tell settlement and *House 1* in the inner zone of the flat settlement at the southern foot of the tell. House 1 predates House 5 on the tell by ca. 100 to 150 years. Both were constructed and used during a period of significant change in settlement patterns at ca. 4740/4700 BC with the pre-existing tell-settlement being complemented or potentially temporarily replaced by the flat settlement (see Hofmann et al. in this volume). While the faunal assemblages from these two contexts are limited in extent, they did show some significant differences potentially indicative of shifts in subsistence modes. The results presented in this chapter can be considered a starting point for future comparative analyses on-site and should be considered in the wider context of faunal assemblages from contemporary sites in the Pannonian basin.

Materials and Methods

Faunal remains incorporated into this study were analysed in the archives at the Museum of Vojvodina in Novi Sad. A full analysis of the remains (including demographic, taphonomic and metrical) was conducted on finds from trenches 4, 5, 8 and 9 (area 3, House 1), as well as trenches 6 and 7 (area 4, House 5). Trenches 15 and 16 (area 4, House 5) and 14 (area 9) were analysed for complementary basic taxonomic identifications. Where possible, the taxonomic determination was made to the level of species. For the sake of scientific accuracy, all domestic taxa with possible wild counterparts in the area were reported at the genus level (e.g. *Bos* sp.). Quantities were reported in Number of Identified Specimen (NISP). The taxonomic nomenclature follows the International Commission on Zoological Nomenclature. Not further determinable mammal bone fragments were, where possible, assigned to the groups large (corresponding to cattle/horse), medium (corresponding to sheep/goat/pig/dog), and small (corresponding to rabbit/hedgehog). Anatomical terms were used according to Latin nomenclature following the guidelines of the Nomina Anatomica Veterinaria were used (Gasse et al., 2017). An estimate of the minimum number of individuals (MNI) was included as a reference point based on the minimum number of (skeletal) elements (MNE). For the age determination based on mandibular tooth wear of cattle, the recording schemes according to Grant (1982) were used. A conversion of the age groups for cattle was based on Legge (1992). The age of postcranial bones was determined based on epiphyseal fusion stages. The classification into age groups is based on Silver (1969) as well as König and Liebich (2018) for pig and cattle. For sheep, the classification according to Zeder (2006) was used. Metrical data of the mammal bones were collected according to the standard measurement distances of von den Driesch (1976). An evaluation of the breadth measurements was conducted for cattle using the Logarithmic Size Index (LSI) according to Meadow (1999) and based

on the standard from a Hinterwald cow (Inv. no. 2431, IPNA University of Basel).

Taphonomic analyses included the recording of size classes (size 1 = 1-2 cm; 2 = 3-5 cm; 3 = 6-10 cm; 4 = 11-15 cm; 5 = 16-20 cm) and the calculation of a fracture freshness index (FFI) based on features of fracture surfaces indicative of breakage occurring in relation to the freshness of certain parameters (angle, outline and edge) or closeness to the point of death (based on Outram, 2001). Fresh breakage on bones has an overall helical appearance while dry breakage results in perpendicular irregular breakage patterns (Outram, 2002). Furthermore, traces of human modifications (cut- and chop marks, other processing marks, burning (stage 1-5 based on colour) were recorded. Together with occurrences of paleopathologies these could provide indications for intensity levels of husbandry strategies of domestic livestock.

Results

Taxa and Skeletal Elements

A total of 351 zooarchaeological specimens (Table 1) were recorded from House 1 (area 3; trenches 4, 5, 8 and 9 in a tell house). Of these, 46 % (n = 162) were from identified/grouped mammals, 38 % (n= 146) specimens were mollusc shells, a number of three specimens were identified as birds. A fraction of 14 % (n = 50) of the total assemblage were indeterminate fragments. Of all recorded mammal bones (Fig. 1), 25 % (n = 52) were only grouped as large mammals and 14 % (n = 29) as medium sized, respectively. The most dominant taxon within the identified mammals were *Bos* sp. with 62 % (n = 48), followed by *Ovis/Capra* with 17 % (n=13). Of these, two specimens were identified as *Ovis aries*. With nine and seven specimens, respectively, *Sus* sp. and *Cervus elaphus* were only represented in minor quantities. *Capreolus capreolus* was represented with a single specimen. Three specimens were identified as Rodentia (two comparable in size to nutria, one likely *Rattus rattus*) and are interpreted as likely modern. The majority of molluscs were Gastropoda (n = 124) here represented by the genus *Helix* sp., Bivalvia (n = 12) were represented by shell of *Unio* sp.

Compared to House 1, faunal remains were found in larger quantities in House 5 (area 4, trenches 6, 7, 15 and 16). A total of 3029 specimens were recorded from this house feature located in the flat settlement. Of these, 43 % (n = 1304) were from identified/grouped mammals, with here only 6 % (n = 181) from mollusc shells, and a single bird bone. The assemblage from area 4 was additionally complemented with finds of Testudinae (n = 7), most likely *Emys orbicularis* (European pond turtle), as well as not further identified pisces (fish, 1 %; n =34). The fraction of indeterminate fragments here was much higher with 49 % (n = 1502) indicating an overall higher rate of fragmentation. Similar to area 3, of the identified mammals (Fig. 2), *Bos* sp. made up the largest fraction with 58 % (n = 627). In area 4 the second most dominant taxon was *Cervus elaphus* with 21 % (n = 232). *Sus* sp. was represented with a similar fraction of 10 % (n = 110) while compared with area 3, *Ovis/Capra* were less represented at 6 % (n = 65) with four specimens further identified as *Capra hircus* and three as *Ovis aries*. *Capreolus capreolus* was represented with 1% as well but here with a higher number of specimens (n = 13). It should be emphasised though, that the overall size of the two assemblages differs by an order of magnitude, and hence distributional differences should be taken with caution. Next to the larger

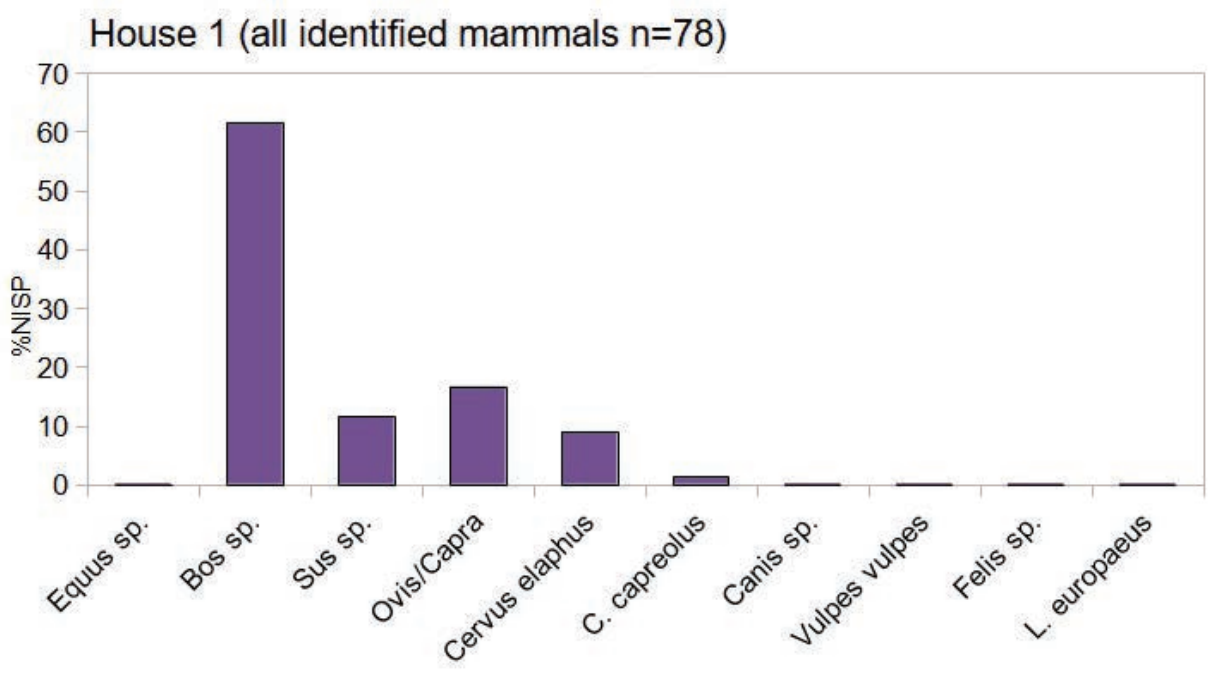

Fig 1: Distribution of identified mammals from house 1 (Trenches 4, 5, 8, 9; Area 3)

	House 1		**House 5**	
	NISP	%NISP	NISP	%NISP
Equus sp.	0	0.2	6	0.2
Bos sp.	48	22.9	627	22.4
Sus sp.	9	4.3	110	3.9
Ovis/Capra	11	6.2	61	2.3
Ovis aries	2	1.0	3	8.3
Capra hircus	0		1	0.5
Cervus elaphus	7	3.4	232	0.8
Capreolus capreolus	1	0.5	13	0.5
Canis sp.	0		22	0.8
Vulpes vulpes	0		1	0.04
Felis sp.	0		2	0.1
Lepus europaeus	0		2	0.1
Large mammal	52	24.9	157	5.6
Medium mammal	29	13.9	62	2.2
Small mammal	0		2	0.1
indeterminata	50	23.9	1502	53.6
Total mammals	**209**	100	**2803**	100
Testudinidae	0		7	
Mollusca indet.	0		148	
Unio sp.	12		28	
Helix sp.	124		5	
Pisces	0		34	
Aves	3		1	
Rodentia (likely modern)	3		3	
Total	**351**		**3029**	

Table 1: Distribution of Taxa in House 1 and House 5

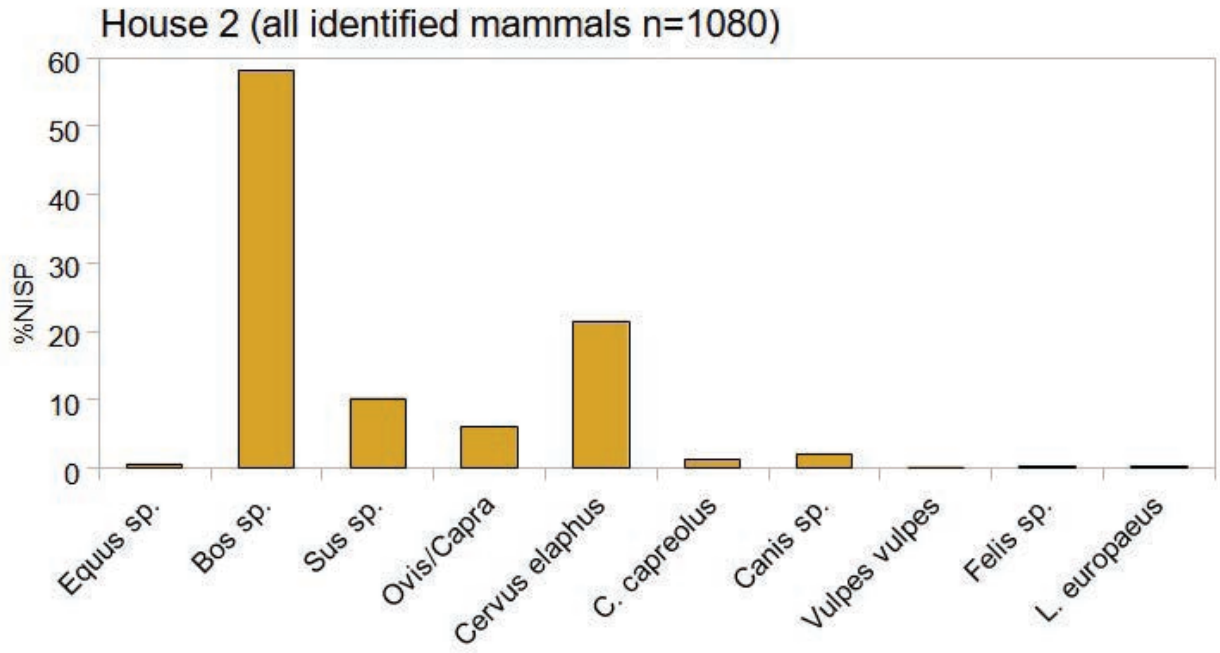

Fig. 2: Distribution of identified mammals from house 5 (Trenches 6, 7, 15, 16; Area 4)

fraction of wild game (mostly *C. elaphus*), there is a noticeable presence of singular findings from a larger variety of taxa compared to area 3. While completely absent from House 1, at House 5 a fraction of 2 % (n = 22) were identified as *Canis* sp. (with no further determination of *lupus/familiaris*). Furthermore, six specimens (1 %) were identified as *Equus* sp., two specimens each were identified as *Lepus europaeus* and *Felis* sp., with the latter not conclusively identified as wild (*silvestris*) or domestic (*catus*), however, domestic cats are not documented during the Neolithic of the region. A single specimen was identified as *Vulpes vulpes*. Molluscs were present at Area 4 as well (n = 181) with *Unio* sp. (n = 25) and *Helix* sp. (n = 5) making up the only identified taxa. Additionally, a number of seven specimens were identified as Testudinae (likely *Emys orbicularis*).

In regard to a complete skeletal element pattern analysis, numbers were too small for a standardized approach (e.g. %MAU for a representation of body parts in reference to their standardised occurrence in a reference animal), and for a meaningful comparative analysis of most taxa. However, the %NISP-based skeletal element patterns of *Bos* sp. (at both House 1 and 5) and *Cervus elaphus* (House 5) showed striking similarities (Fig 3). The distribution of skeletal elements from different skeletal areas (skull, axial skeleton, forelimb, hindlimb and extremities) between cattle finds from the tell house and the flat settlement house (Trench 6 and 7 only) show a high representation of skull fragments and extremities compared to the other groups. While this might either be culturally driven or biased by a higher representation of high-density extremities and teeth representative for the skull area, the distribution pattern at least provides an argument of sufficiency for on-site processing of remains at both House 1 and House 5 based on meat rich portions appearing underrepresented. The same is the case for *Cervus elaphus* at House 5. The skeletal element distribution and MNI of identified specimen at both sites can be obtained from Appendix 1.

Demography and Metrics

Age distribution based on mandibular tooth wear estimations was possible for one cattle individual from House 1, only broadly estimated to an age at death of 2 to 8 years, and two individuals from House 5 with ages at death of 15 to 36 months and 6 to 8 years, indicating possibly different modes of subsistence (meat/dairy and work, after Payne, 1973).

Epiphyseal fusion data for all available taxa per area can be obtained from Table 2. Fused elements can only indicate an age estimation “older than” which particularly for the younger ages-at-fusion provides only low-resolution timespans for an age-at-death. Epiphyseal fusion data from cattle, recovered from House 5, for example, showed different age-at-death groups (with 6 specimens indicating age-at-death older than 3-3.5 years and several unfused / fusing specimens indicating ages younger than 3.5-4, 2.5-3; 2-2.5 and around 12-18 years. While the data base is small, the presence of different age groups might indicate a mixed utilisation of this taxon.

Only a single specimen, namely a first upper molar from *Bos* sp., exhibited palaeopathological tissue changes in the form of extremely irregular abrasion.

The comparative metrical LSI-based analysis (Fig. 4) of *Bos* sp. breadth measurements showed a notable difference in LSI values of specimens from House 1 being significantly smaller

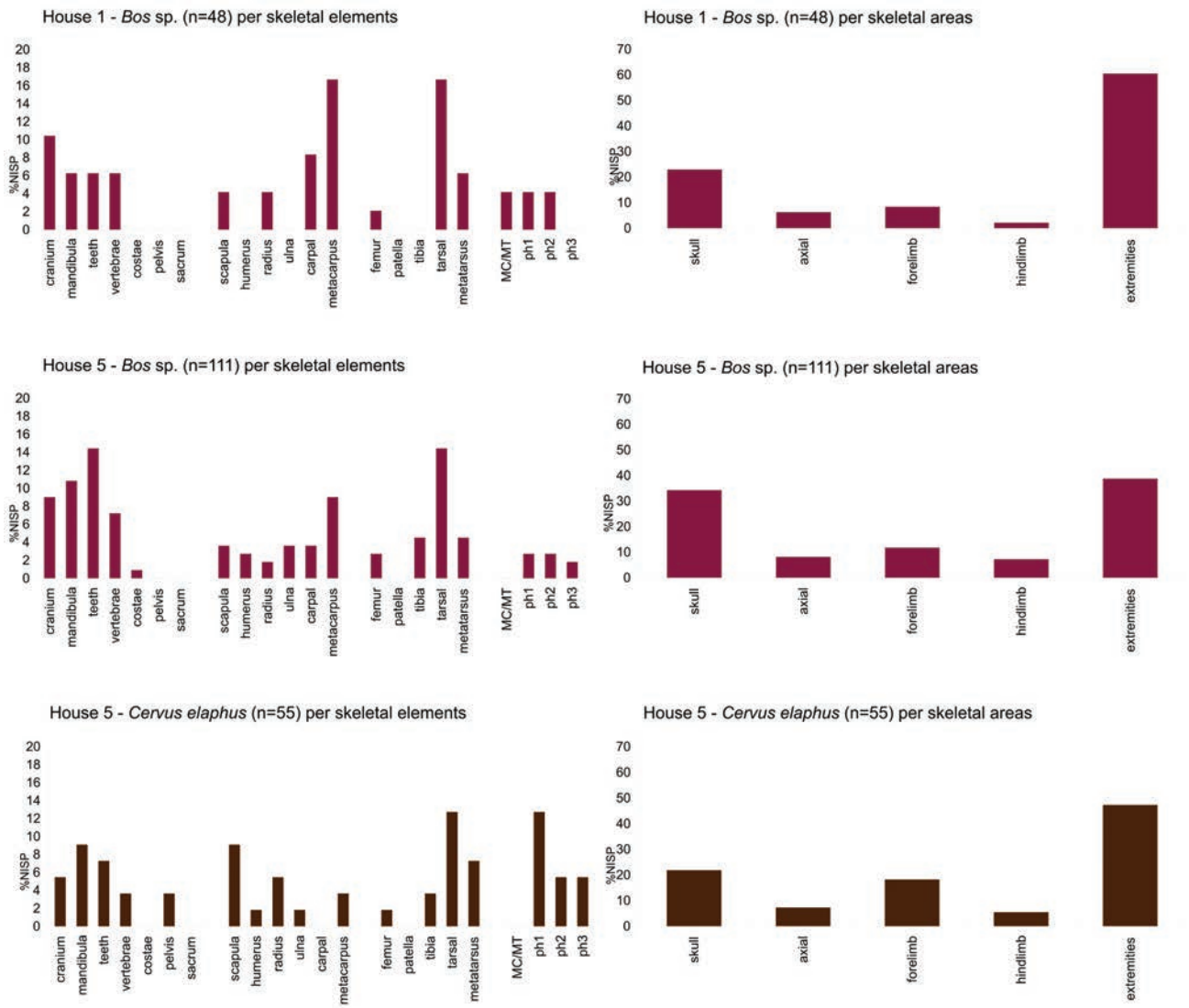

Fig. 3: Distribution of skeletal elements / grouped elements for *Bos* sp. (House 1 & 5) and *Cervus elaphus* (House 5)

Site	Taxon	Element	Fusion px	Fusion ds	Fusion other	Younger than (m.)	Older than (m.)	Estimated range (m.)	Count
Area 3	*Ovis* sp.	metatarsus		fused			18-30		1
Area 3	*Ovis/Capra*	metacarpus		fused			18-30		1
Area 3	*Ovis/Capra*	ulna	unfused			30-48			1
Area 3	*Bos* sp.	scapula		fused			7-10		2
Area 3	*Bos* sp.	radius	fused				12-18		1
Area 3	*Bos* sp.	ph1	fused				18		1
Area 3	*Bos* sp.	ph2	fused				18		2
Area 3	*Bos* sp.	metacarpus		fused			24-30		1
Area 3	*Bos* sp.	metatarsus		fused			30-36		1
Area 3	*Bos* sp.	humerus	fused				12		1
Area 4	*Bos* sp.	scapula					7-10		2
Area 4	*Bos* sp.	humerus		fused				12-18	1
Area 4	*Bos* sp.	humerus		fused			12-18		1
Area 4	*Bos* sp.	ph1	fused				18		1
Area 4	*Bos* sp.	ph2	fused				18		3
Area 4	*Bos* sp.	tibia		unfused		24-30			1
Area 4	*Bos* sp.	tibia		fused			24-30		2
Area 4	*Bos* sp.	metacarpus		fused			24-30		3
Area 4	*Bos* sp.	metatarsus		unfused		30-36			1
Area 4	*Bos* sp.	calcaneus	fused				36-42		1
Area 4	*Bos* sp.	femur	fused				42		2
Area 4	*Bos* sp.	femur		unfused		42-48			1
Area 4	*Bos* sp.	ulna	unfused			42-48			1
Area 4	*Bos* sp.	ulna	fused				42-48		1
Area 4	*Bos* sp.	tibia	fused				42-48		2
Area 4	*Equus* sp.	ph1	unfused			13-15			1
Area 4	*Equus* sp.	metapodium	fused				15-20		1
Area 4	*Equus* sp.	pelvis			fused		54-60		1
Area 4	*Sus* sp.	ph2	fused				12		1
Area 4	*Sus* sp.	ph1	unfused			24			1
Area 4	*Sus* sp.	ph1	fused				24		2
Area 4	*Sus* sp.	tibia		fused			24		1
Area 4	*Sus* sp.	calcaneus					24-30		1
Total									**44**

Table 2: Epiphyseal fusion data from all available specimens at House 1 and 5 (after Silver, 1969; Zeder, 2006)

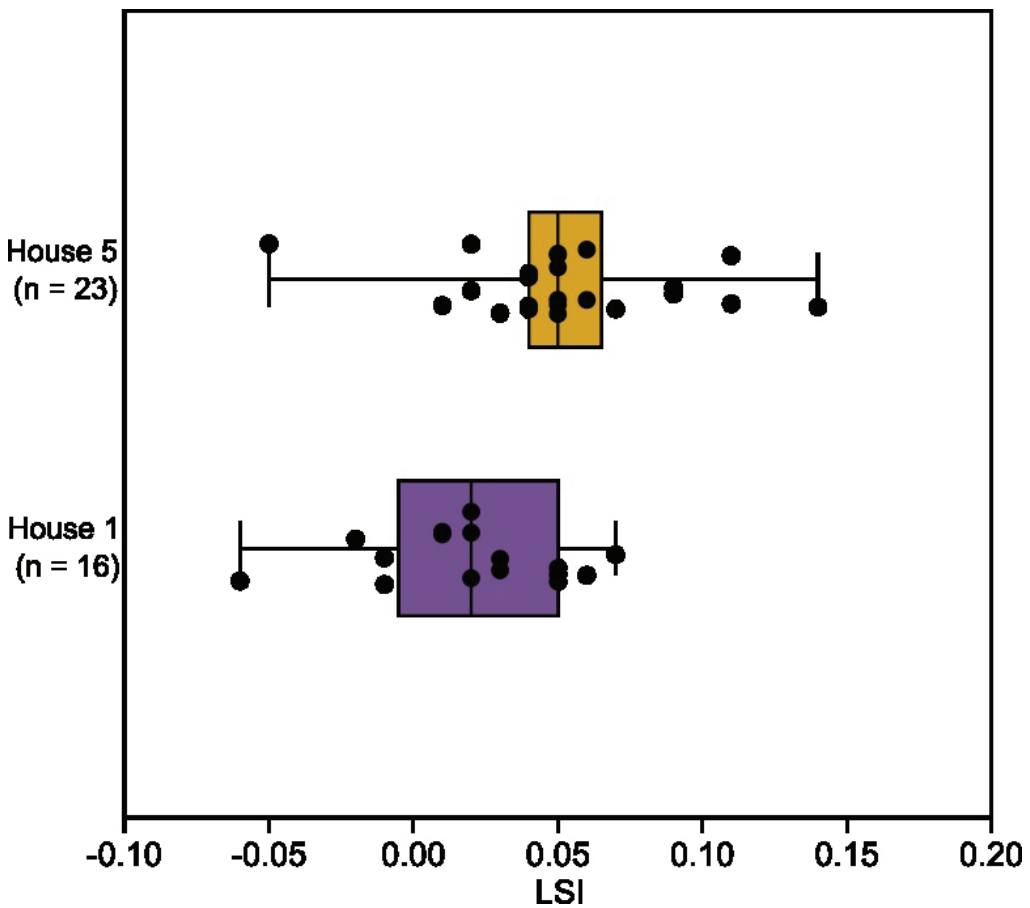

Fig. 4: LSI values of breadth measurements from *Bos* sp. (Standard: Hinterwald cattle, (Inv. nr. 2431, IPNA University of Basel)

(mean 0.02±0.03SD) than those from House 5 (mean 0.06±0.04SD). Both data sets were normally distributed (House 5; shapiro-wilk, p =0.1537; House 1; shapiro-wilk, p=0.5187). In cattle there is a strong sexual dimorphism (which with both female and male individuals present would result in a bimodal distribution, see Schmölcke and Groß, 2020), which for the two data sets in comparison can either mean, that a) at the two different sites each only/mostly females (House 1) or males (House 5) were present indicating different modes of subsistence (e.g. dairy versus meat/work) or b) groups of the same sex but with different body types were present at the two sites which in turn could either reflect wild versus domestic or selection processes of different body types (Albarella, 1997; Helmer et al., 2005; Schmölcke, Groß, 2021).

Taphonomy

A small fraction of the faunal specimens at both sites exhibited traces of human impact (Table 3). A fraction of 4 % (n = 8) of the material from House 1 and 1 % (n = 7) of the material from Trenches 6 and 7 of House 5 exhibited traces of processing or use. Most of these were cut and chop marks in accordance with marks from food processing (Pickering et al., 2013; Soulier, Costamagno, 2017). In Trench 4 of House 1 two specimens showed traces of modification, which could be related to manufacturing or use wear. One specimen in particular (a large mammal shaft fragment) exhibited irregular scratches all across the surface, filled with perlmut dust. Similar findings were made on four specimens from Trenches 6 and 7 in House 5 (retouching, carving). A detailed use/manufacture wear analysis was not part of the study.

Of all specimens, 11 % (n = 27) at House 1 and 4 % (n = 22) at Trenches 6 and 7 of House 5 were burned at different stages. While stages 1 to 3 might be related with heat / fire exposure from cooking, stage 4 and 5 (full calcination) indicate higher temperatures of at least 600 °C (see Ellingham et al., 2015) likely due to the house contexts being burned down after (Hofmann, personal communication, 2024).

Chewing marks were present on 2 % (n = 4) of bone specimens from House 1 and 5 % (n = 32) in Trenches 6 and 7 of House 5 with one exception all attributed to carnivore chewing. In House 5 this might be connected with the presence of *Canis* sp. bones.

The assemblages from House 1 and House 5 were analysed for fracture patterns and fragmentation intensity (Fig. 5). Size classes were recorded for an estimation of fragmentation intensity potentially indicative of taphonomic processes. Combined with fracture patterns, which can provide an indication for different ways of processing (e.g. marrow extraction, size reduction for deposition shortly after slaughtering) or post-depositional processes (e.g. trampling, densification, relocation) this can be suggestive of the intensity of aforementioned processes (Outram 2001). Overall, fracture patterns and intensity of fragmentation were relatively similar between the spot check samples of House 1 and 5. In both assemblages the mid-range FFI (Fracture Freshness Index) suggests an overlay of processes impacting the assemblage both in a relatively fresh (close to slaughtering as well as dried out (long after slaughtering) condition. The first possible process captured in the recorded fracture patterns would be the intentional shattering of bones, for example for the purpose of marrow extraction or size reduction for waste disposal or further usage resulting in helical fracture patterns (Kooyman, 2004; Outram, 2002). This is followed by a second process involving fracturing through intensive relocation of the material or trampling by animals (Nicholson, 1992). Which of these processes were involved, cannot be determined securely with the methods used. However, two statements can be made: a) The higher ratio of highly fresh fracturing (score 0) on material from House 5 indicates either a higher need for reducing remains in size or an intensive utilisation of bone, either for the acquisition of food (marrow) or raw materials; b) both assemblages experienced multiple processes, leading to the observed fracture patterns. In combination with the presence of several specimens in both houses, which indicates varied usage and manufacturing of bones as raw materials, it seems likely that the intensive exploitation of bones as raw materials at least contributed.

Context	Taxon	Element	Modification	Additional information	
Area 3	*Bos* sp.	astragalus	burned	stage 3	1
Area 3	*Bos* sp.	calcaneus	cut		1
Area 3	*Bos* sp.	cranium	burned	stage 5	3
Area 3	*Bos* sp.	mandibula	chopped		1
Area 3	*Bos* sp.	metacarpus	burned	stage 1	1
Area 3	*Bos* sp.	metacarpus	chopped		1
Area 3	*Bos* sp.	metapodium	burned	stage 2	1
Area 3	*Bos* sp.	metacarpus	burned	stage 2	1
Area 3	*Bos* sp.	os carpale	burned	stage 1	2
Area 3	*Bos* sp.	os carpale	cut		1
Area 3	*Bos* sp.	radius	burned	stage 1	1
Area 3	*Bos* sp.	scapula	burned	stage 5	1
Area 3	*Ovis* sp.	cranium	cut, chopped		1
Area 3	*Sus* sp.	humerus	burned	stage 4	1
Area 3	*Sus* sp.	humerus	burned	stage 3	1
Area 3	*Sus* sp.	os tarsale	burned	stage 1	1
Area 3	Large mammal	costa	burned	stage 5	2
Area 3	Large mammal	cranium	burned	stage 5	2
Area 3	Large mammal	diaphysis	manufacture/use	polished	1
Area 3	Large mammal	diaphysis	manufacture/use	probable use-wear, irregular scratches, chipped edges, perlmut residues	1
Area 3	Large mammal	indet.	burned	stage 5	1
Area 3	Medium mammal	cranium	burned	stage 5	1
Area 3	Medium mammal	diaphysis	burned	stage 4	1
Area 3	Medium mammal	diaphysis	burned	stage 1	3
Area 3	Medium mammal	indet.	burned	stage 1	1
Area 3	indet.	indet.	burned	stage 1	1
Area 3	indet.	indet.	burned	stage 4	1
Area 4	*Bos* sp.	astragalus	burned	stage 2	2
Area 4	*Bos* sp.	astragalus	burned	stage 3	3
Area 4	*Bos* sp.	astragalus	burned	stage 4	4
Area 4	*Bos* sp.	scapula	manufacture/use	partially carved out	1
Area 4	*Sus* sp.	cranium	burned	stage 5	1
Area 4	*Cervus elaphus*	astragalus	burned	stage 3	1
Area 4	*Cervus elaphus*	astragalus	chopped		1
Area 4	*Cervus elaphus*	astragalus	cut		1
Area 4	Pisces	vertebra	chopped		1
Area 4	Large mammal	costa	chopped		2
Area 4	Large mammal	diaphysis	manufacture/use	chipped, retouched	1
Area 4	Large mammal	epiphysis	burned	stage 2	1
Area 4	Large mammal	mandibula	manufacture/use	chipped, retouched	1
Area 4	Large mammal	ulna	burned	stage 2	1
Area 4	Large mammal	vertebra	chopped		1
Area 4	Medium mammal	diaphysis	manufacture/use	retouched	1
Area 4	indet.	indet.	burned	stage 5	4
Total					**61**

Table 3: Modifications (burning, cut/chop marks, manufacture/use wear) on all available specimens from House 1 and 5

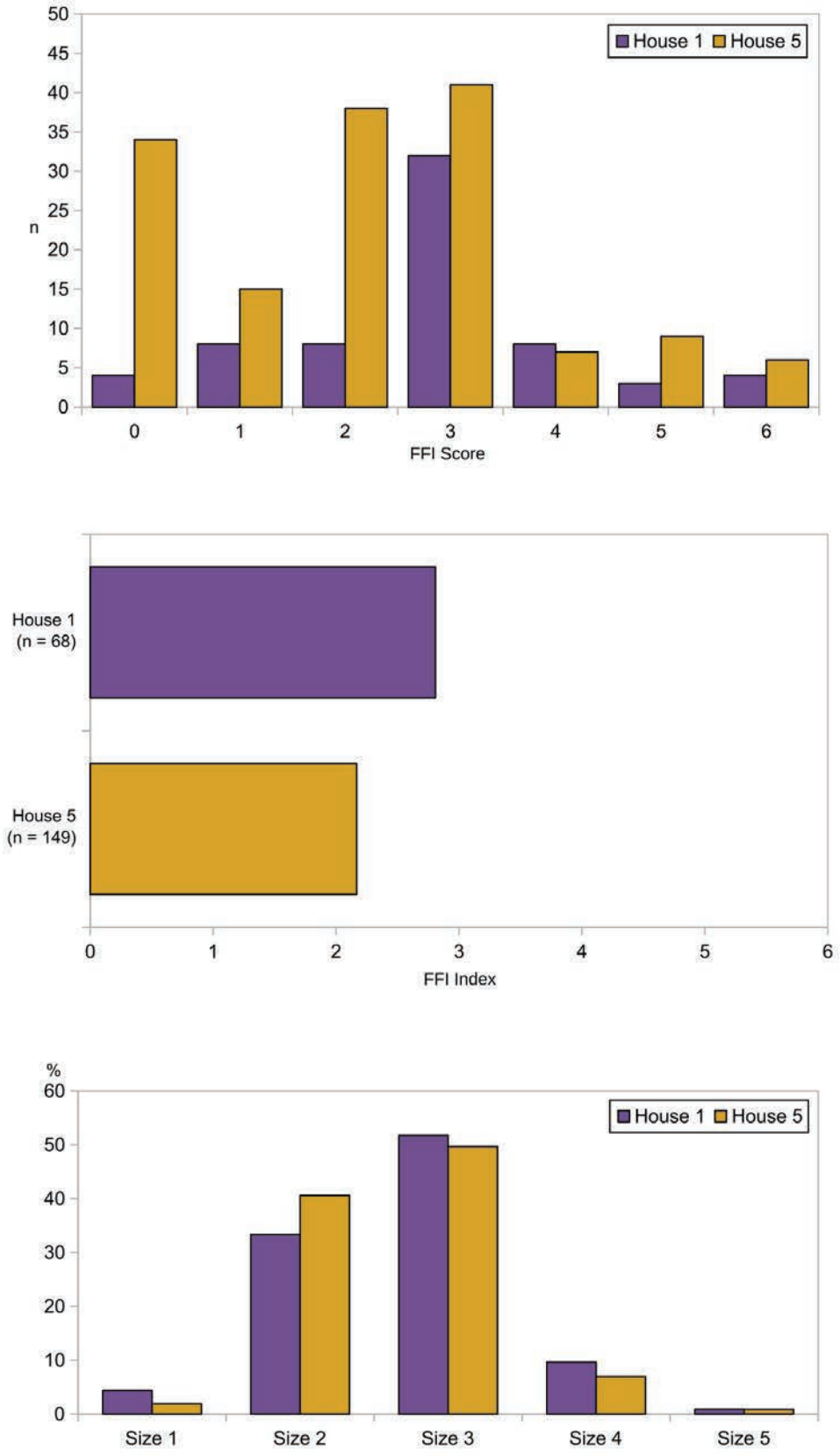

Fig. 5: Fracture patterns and size class distribution for bone fragments (House 1 and Trench 6, 7 of House 5)

Area 9

The faunal assemblage of area 9 was recovered as part of a ditch-filling largely contemporary with the finding from House 1 in the flat settlement. In contrast to the taxonomic spectrum from the latter the distribution of taxa here was mainly focused on wild game, even though this statement has to be taken with caution as the overall extent of the assemblage is limited with 37 specimens. The total %NISP and NISP can be obtained from Table 4. The recovery of further material and a comparative analysis of assemblages from the settlement site and the ditch system would help shed light on possibly differential depositional practices and work areas of subsistence-related faunal remnants.

Discussion

The faunal assemblages presented in this chapter are of limited extent but still provide valuable insights into various subsistence modes and taphonomic processes. Both house assemblages contained a high fraction of *Bos* sp. specimens, indicating the significant role of livestock management in day-to-day food provisioning (Bartosiewicz, 2005). In the Late Neolithic period, cattle became the primary domesticated animal in the Pannonian basin and the central Balkans, although there were considerable differences between sites and regions (Orton, 2012). It is uncertain whether the preference for cattle over other domestic livestock at the settlements of Borđoš was based on environmental or social factors. However, the combined zooarchaeological findings indicate that cattle were intensively managed for various uses in sustaining the community (also see Hoekman-Sites, Giblin, 2012). The varying body size distributions in cattle from Houses 1 and 5, as indicated by LSI values from breadth measurements, could be due to differences in the predominant sexes kept for different subsistence purposes. It is also possible (albeit less likely based on the LSI range) that the differences stem from a presence of both wild and domestic cattle or from a large overall size variability in domestic cattle, as reported for south-eastern Europe (Bartosiewicz, 2005). The importance of caprines decreased when comparing Houses 1 and 5, reflecting a trend commonly observed during the Late Neolithic in the Pannonian basin (Bartosiewicz, 2005). The populated regions within the Tisza and Danube floodplains provide suitable pasture grounds for cattle in particular, opposed to caprines (Orton, 2012). Riparian forest areas persisting in the Late Neolithic provide a rich base for wild game and other resources (Guliás, Sümegi, 2011). The demographic data obtained from livestock recovered from the two house contexts were too limited to provide conclusive information on differential subsistence strategies for primary or secondary products as hypothesized by (e.g.) Bökönyi (1988). A high intensity of bone processing, either for marrow extraction or preparation for raw material processing, particularly at the tell House 5, suggests that animal-based products were used at high efficiency.

The high variety of taxa, particularly from the spectrum of large and small wild game, as well as carnivores suggests a broadening and diversification of animal-exploitation and management techniques. During the Neolithic period in Europe, wild resources such as hunting, foraging, and fishing were essential for supplementing the mainly livestock and cultivated plant-based subsistence. The role of wild resource exploitation varied across different regions. The increased exploitation of wild resources, especially at House 5, may be attributed to changes in settlement patterns and a growing population (Hofmann et al., this volume). The pattern would fit the larger context of an increase in wild faunal resource exploitation across the Pannonian basin and adjacent areas. *Cervus elaphus*, for example, increased to similar ratios (c. 16 % on average) in the Late Neolithic of Hungary (Bartosiewicz, 2005). It should be emphasized at this point, that zooarchaeological results from Borđoš, so far, are limited and can only be seen as supporting evidence. The presence of dog remains has been observed in combination with an increased ratio of wild game bones in the Hungarian plains suggesting a utilization of dogs as hunting aids (e.g. Bartosiewicz, 2005; Bökönyi, 1974). Intensive livestock herding at this point was established as well for the entire inhabited area of the Pannonian basin, which makes a use as herding dogs equally possible (also see Bartosiewicz, 2005). Moreover, if the remains found in the ditch (area 9) were linked to the occupation of the flat settlement (e.g. House 1), it is also plausible that wild game may have been processed outside of the settled area, or that their remains were disposed of separately, perhaps as part of the ditch filling.

Fishing and the consumption of fresh-water resources were common all across the Tisza regions and adjacent regions of the Central Balkan during the entire Neolithic (Greenfield, 1986; Bartosiewicz, 2013). *Unio* sp. are a bivalve freshwater genus abundant in the tributary river system of the Danube. They have been a regularly exploited seasonal resource during the entire Neolithic (Clason, 1979; Greenfield, 1986). In case of *Helix* sp. there is no direct evidence of consumption of these even though their shells are found in archaeological features of the area (Clason, 1979; Greenfield, 1986). It is possible these snails merely colonized places where subsistence remains were deposited. European pond turtles (i.e. *Emys orbicularis*) are usually found in wetlands surrounded by wooden landscapes but also in open steppe and are semi-aquatic, which means they can move away hundreds of meters away from water bodies (Ficetola/DeBernardi, 2006; Marić, 2013). Their presence in the assemblage of House 5 cannot be securely interpreted as a sign of their consumption, as remains might have been deposited incidentally.

	Area 9	
Taxon	NISP	%NISP
Cervus elaphus	12	34
Bos taurus	9	26
Bos primigenius	2	6
Sus scrofa	9	26
Sus domesticus	1	3
Capreolus capreolus	2	6
Total mammals	35	100
Unio sp.	2	
indeterminata	19	
Total	**56**	

Table 4: Distribution of Taxa in Area 9 (Trench 14)

Conclusion

Multipurpose livestock herding with a strong focus on cattle husbandry was practiced at Borđoš evidenced by zooarchaeological findings from both the flat settlement and the slightly later tell site occupation. During this transitional time the complementary husbandry of caprines and pigs decreased while the exploitation of wild resources (*Cervus elaphus* in particular) increased (although the relationship with findings from the ditch in area 9 is yet to be determined, and both assemblages were limited in quantities.). At both sites, faunal (osteological) resources were processed intensively, possibly for food and raw materials alike. With higher variability in the (wild) taxonomic spectrum, remains from the tell house (House 5) likely reflect a more varied engagement with both domestic and wild faunal resources. Zooarchaeological findings from Borđoš fit the general trend in animal-based subsistence strategies observed across the Pannonian basin. For future research, a focus should be placed on the differential spatial distribution of taxa and skeletal elements for a possible determination of work areas across the entire site (e.g. comparing the ditch filling with more house findings).

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WHAT'S "SALT" GOT TO DO WITH IT? – RECREATING THE ECONOMIC AND NATURAL VEGETATION OF THE LATE NEOLITHIC BORĐOŠ

Aleksandar Medović

Macrobotanical samples from the Late Neolithic period on Borđoš are not abundant in terms of the number of isolated subfossil plant units or identified species (Hofmann et al., in press). This wasn't unexpected due to unfavourable conditions for the conservation of plant residues. The Late Neolithic cultural layer at Borđoš spreads directly below the plough layer. It is, partially, damaged by agricultural machinery and inhabitants activities of the Bronze Age and medieval settlements.

In 2021, access to the Tisza River from the Late Pleistocene terrace was breached due to the installation of a large-scale irrigation system. As a result, two profiles of 50 m in length were cut through Borđoš's "flat settlement". This incident brought to light, among other archeological features, a deep-reaching Late Neolithic pit (4702 calBC). Several separated layers of the pit were systematically sampled and macro-botanically analyzed. One sample stands out by the number of detected charred plant items (Tab. 1). It contains charred grains and seeds of cultivated plants, chaff fragments of cereals, seeds of gathered fruits, and generative and vegetative parts of weed and ruderal vegetation. Moreover, its content is informative concerning the reconstruction of the microregional biomes. This allows an update for the already proposed environmental reconstruction based on macrobotanical, palynological, malacological, and palaeoclimatic data of the Borđoš microregion (Medović et al., in press). Wood charcoal residues, fish scales, and mollusks complete the inventory of the macrobotanical sample. Their analysis further contributes valuable insights into the reconstruction of natural habitats.

Crops of Arable Fields

By the number of finds, charred chaff fragments, and grains cereals dominate the sample (Tab. 1). Einkorn (*Triticum monococcum*) is the most prominent wheat. *Triticum timopheevii* (ex "new" glume wheat (Czajkowska et al., 2020)) was a significant crop in the Late Neolithic Borđoš. Chaff fragments of *T. timopheevii* can be found in almost each Late Neolithic sample, not only at Bordjoš but in the whole region. The southeastern part of the Carpathian Basin is considered one of the emerging centers of Zanduri wheat in prehistoric Europe (Fischer and Rösch, 2004; Medović and Horváth, 2012; Kenéz et al., 2014). Emmer's findings complete the list of the three most common cereals in the region during the Late Neolithic (Filipović et al., 2023). There are only a few pulse finds at the Neolithic Borđoš. Among them, lentil is the most prominent.

The lower Tisza region typically experiences two annual floods, one occurring in the spring and the other in the fall (Slavnić, 1952). The intensified flooding increased river activity in southeastern Hungary during the transition from the 6th to the 5th millennium (Gulyás and Sümegi, 2011). Consequently, the fields must have been situated at elevated topographical elevations, such as the Late Pleistocene terrace.

Other Plant Finds

The gathering of wild fruits and nuts significantly impacted the plant economy during the Late Neolithic. The phrase "agro-gathering" sums it up best (Borojević, 2006). The functional group of fruits and nuts is hardly represented in the plant assemblage list from Borđoš. Here, only a piece of distinctive reticulate-foveate, charred seed of the Chinese lantern (*Physalis alkekengi*) could be singled out (Table 1). Another specimen discovered in a different sample from the same pit was a charred water chestnut (*Trapa natans*).

Taxa	n	n%	mg	mg %
Cereals				
Triticum monococcum	4	+	19	5.21
T. monococcum, spikelet forks	158	36.07	88	24.11
Triticum timopheevii, spikelet forks	50	11.42	66	18.08
Triticum timopheevii, terminal spikelet forks	4	+	3	+
Triticum dicoccum	1	r	8	2.19
T. dicoccum, spikelet forks	12	2.74	11	3.01
Triticum, spikelet forks	48	10.96	37	10.14
Cerealia indeterminata	17	3.88	69	18.90
Pulses				
Lens culinaris	2	r	10	2.74
Fruits				
cf. *Physalis alkekengi*	1	r	0	r
Weed and ruderal vegetation				
Alopecurus (cf. *geniculatus*)	91	20.78	6	1.64
Hordeum cf. *hystrix*	21	4.79	10	2.74
Chenopodium album	1	r	0	r
Fallopia convolvulus	1	r	0	r
Setaria viridis	1	r	0	r
Polygonaceae	1	r	0	r
Rubiaceae	1	r	0	r
Vegetative plant items				
Poaceae, cf. culms and culm base nodes	24	5.48	38	10.41
Sum	**438**	**100.00**	**365**	**100.00**
Charred wood				
Quercus	61	81.33	3037	77.95
Cornus	9	12.00	671	17.22
Alnus	1	1.33	60	1.54
Maloidae	1	1.33	50	1.28
(cf. *Euonymus*)	3	4.00	69	1.77
Small wood fragments	-	0	9	r
Sum	**75**	**100.00**	**3896**	**100.00**
Non-vegetable finds				
Mollusks	**80**		**121**	
Fish scales	**68**		**9**	

Table 1: Charred and mineralized plant items (seeds and one seeded fruits, unless otherwise stated) from a macro-botanical sample (6 liters, 44058 mg) from the 2021 archaeological campaign at Bordoš; the Late Neolithic pit: macrobotanical sample 258, trench 23, find id 061, feature 2, layer 3, 20.10.2021. n: quantity; n (%): quantity percentage; mg: mass in milligrams; mg (%): mass percentage; r: < 0.5 %; +: > 0.5 % < 1.0 %.

Generally, weeds and ruderals are rare in the plant assemblage of Borđoš. The sample is characterized by finds of small seeded *Alopecurus* species and by grains of small-sized, weedy barley species (Tab. 1). The latter fits the description of *Hordeum hystrix* (Fig. 1). Recent grains are 3.8-4.2 long and 1-1.2 mm wide (Bojňanský and Fargašová, 2007). On the other hand, it is challenging to find a proper species match among the *Alopecurus* genus (Fig. 2). Although *Alopecurus* species and *H. hystrix* can grow as weeds in grain fields they can be seen as part of the natural pasture. Discovered charred culms and culm base nodes of grasses in the same sample indicate that the latter is more likely (Fig. 3). All this refers to the agro-pastoral activities of the sites' inhabitants.

Mediterranean Barley (*Hordeum hystrix*)

Mediterranean Barley is a small plant, only 5-20 cm tall. Its stems are erect or ascend bent at a sharp angle (Fig. 1). The long awned spikelets resemble a hedgehog.

Fig. 4: Dried dung surrounded by *Hordeum hystrix* at the pasture on chloride Solonetz solonchackic soils (N 45.37965 E 20.11410) near the village of Žabalj and the Late Neolithic site Žabalj – Nove Zemlje (Photo: A. Medović, 16. 5. 2024)

Fig. 1: Charred *Hordeum* cf. *hystrix* grains

Fig. 3: Charred vegetative parts of grasses

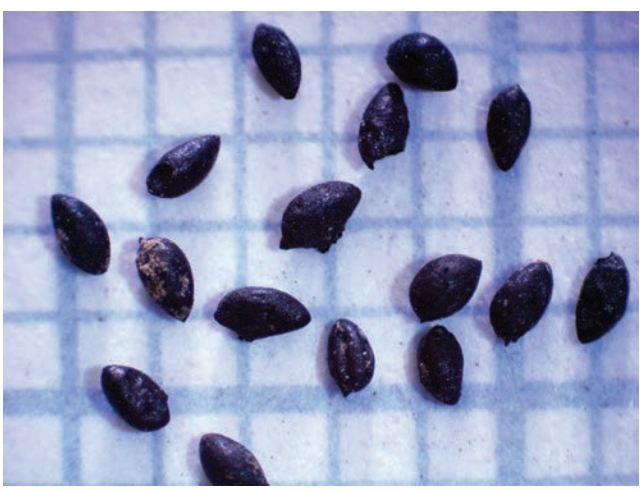

Fig. 2: Charred *Alopecurus* (cf. *geniculatus*) grains

This annual species is an obligate halophyte preferring slightly to moderately saline soils with a high content of nutrients manured by the grazing animals (Daniel et al., 2012; Eliáš et al., 2013; Dítětová et al., 2016; Luković, 2019; Eliáš Jun et al., 2021). This plant is native to Eurasia and prefers soils that are moist in spring and dry in summer (Bojňanský and Fargašová, 2007). Mediterranean barley is related to the steppe climate (Slavnić, 1953).

Unlike most other plants with which it grows together, it is rarely eaten by animals, except in the early stages of development. As a result, *H. hystrix* occupies a vacant ecological niche and can reach high cover values. The main reason animals do not overgraze the species *H. hystrix* is most likely the presence of long prickly awns typical of the genus *Hordeum*. These awns stick in the mouths of the animals and can cause their death in extreme cases. Some shepherds confirmed that the awns of *H. hystrix* can harm the eyes of sheep and livestock.

Grazing affects the change in the floristic composition, leading to the prevalence of *H. hystrix* in the native Pontic-Pannonian steppic saline pastures on Solonetz (alliance *Festucion pseudovinae*) in the Banat area (Luković, 2019). *H. hystrix* vegetation gradually subsided due to the absence of grazing (Dítě et al., 2011).

Halophtytic vegetation, dominated by *H. hystrix*, is classified as a *Hordeetum hystricis* association (Dítě et al., 2011). Within the zonation of saline vegetation, the plant community occupies higher elevated places, but shallow flooding can occur. It is relatively widespread across Hungary, Serbia, and Romania.

Alopecurus Finds

Identifying the specific species of *Alopecurus* solely from the charred seeds represents a challenging task. Two species that grow in the Carpathian Basin can be distinguished based on the grain size – *Alopecurus geniculatus* 1-1.5 x 0.8-0.9 mm and *A. aequalis* 1.2-1.4 x 0.6-0.7 mm (Bojňanský and Fargašová, 2007). Both can be connected with halophytic plant communities (Luković, 2019). Short-awned Foxtail (*A. aequalis*) prefers slightly wetter locations. *A. geniculatus* was discovered in the natural pasture habitats on Solonetz near the Kumane settlement, north and northeastern of Borđoš (Knežević et al., 2009b, a).

Marsh Foxtail (*Alopecurus geniculatus*)

Marsh foxtail is native to boreal Europe (Bojňanský and Fargašová 2007). It tolerates salt and anaerobic conditions but is moderate to highly nutrient-demanding and drought-intolerant. *A. geniculatus* is known to hybridize with other members of the *Alopecurus* genus. Marsh foxtail prefers full sun. It is small (20-60 cm), low grass whose stems start off the ground. Marsh foxtail is a component of the meadow vegetation stands, found in the lower part of the Tisza River, which experiences regular flooding (Parabućski et al., 1989). It can regenerate to recolonize bare mud from seed or shoot fragments. It can also grow in wet arable fields.

Dung

Domestic animals used to eat more environmentally representative group of plants than people (Miller, 1996). Analysis of plant remains in herbivore dung can provide valuable insights into localized habitats (Fuks and Dunseth, 2021). Seeds can be brought to the site embedded in animal dung and charred when that dung is deliberately burned for fuel. The presence and quantity of seeds in the diet of herbivores will vary depending on the seasonality of fruiting of forage, browse plants, and the nature of animal fodder (Miller and Smart, 1984). Charred seed assemblages reflect animal dietary patterns, but may include natural seed rain. Large proportions of seeds of various wild species survive digestion in an identifiable form, probably due to their small size and protective coating (Wallace, Charles, 2013).

It has been suggested that small seeded *Alopecurus* indicate grazing habitats (Wallace et al., 2019). The elevated concentrations of seeds from wild plants found in archaeobotanical collections indicate that dung was utilized as a source of fuel by ancient populations (Miller, 1984). Chaff is less suitable for human consumption and more appropriate for other uses, e.g. fodder (Valamoti, Charles, 2005). Cereal chaff could have become a component of dung by being fed to animals as fodder, alone or tied to the grain that the animals feed on. Experimental and ethnographic studies have shown, that chaff would have survived the digestive system of an animal appearing as a component of dung. The chaff of glume wheat, in the form of glume bases or glume fragments and rachis fragments, survives better than the grain (Valamoti, Charles, 2005).

Plant groups also talk about the issues of seasonality. At certain times of the year, seeds may be present or rare in the diet of animals, and also in the animal's dung. *H. hystrix* ripens from the middle of May (Fig. 4) until June. *A. geniculatus* seeds mature from June to August. Under climatic conditions in Vojvodina, winter-sawn Einkorn and Zanduri are harvested at the beginning of July. Given that all *Hordeum*, *Alopecurus*, and wheat chaff samples originate from a single dung source, the earliest possible date suggested is July. If only *Hordeum* and *Alopecurus* seeds are traced back to a single dung source, the earliest potential date indicated is June.

Many wild, cultivated, and weed seeds become carbonized due to being incorporated in dung cake fuel and are thus preserved in the archaeological record. Hearths are cleaned frequently and the burnt fuel is deposited in pits. Straw is required to produce dung cakes, and some grains that stick to the rachis can be mixed into dung cakes (Miller, 1984). Small pieces of firewood are also burnt together with dung

cakes. The sparse distribution of charred seeds in the sample, with high proportions of wild seeds compared to cultivated fits the expectations for dung fuel.

When the available wood became scarce, people started to retrieve wood from a distance (Dufraisse, 2008). People burned dung even when wood resources were available (Spengler, 2019). Dried-out dung burns longer than wood (Gur-Arieh et al., 2019). The significant presence of oak in the sample implies that there was still enough firewood nearby, or may indicate an enlargement of the wood-gathering area.

Vegetation reconstruction of the Late Neolithic Borđoš Microregion

In the Potential Natural Vegetation of Vojvodina (Parabućski, Janković, 1978) the presence of large areas of saline soil along the lower part of the Tisza River, mainly on its left bank, in the historical Banat, is recognized.

Halomorphic Soils

It has been estimated that halomorphic soils cover approximately 10% of the total territory of the Vojvodina Province: the class of saline soils, Solonchak (15,000-25,000 ha), and the class of alkalized soils - Solonetz (75,000 ha). All Solonetz and most Solonchaks in Serbia have generally been formed on alluvium or loess deposits (Zeremski et al., 2021). In neighbouring countries, Solonetz soil occurs mainly in Hungary, along the Tisza River (Jones et al., 2005).

The Carpathian Basin has been home to alkali habitats since the end of the Ice Age (Molnár, Borhidi, 2003; Sümegi et al., 2013; Szilágyi et al., 2024), with natural alkalinization processes reinforced by the first pastoralist cultures. The landscape character remained relatively unchanged for millennia, with domestic animals gradually taking over habitat management from large ungulates, i.e. aurochs. However, significant changes have occurred in the last two centuries due to the river management and interventions to intensify agriculture, including the drainage of marshes, irrigation of pastures, and creation of fishponds.

To the east of the Late Pleistocene terrace of Borđoš are spacious complexes of Solonetzs which are divided in two by a 100 m wide hydromorphic black limeless soil (Nejgebauer et al. 1971b). Due to low organic productivity, Solonetzs are uncultivated, so a natural plant cover has been formed on them, which locals used for mowing and grazing livestock (Knežević et al., 2009b). The vegetation of a native pasture on the Solonetz soil in the vicinity of the vil-

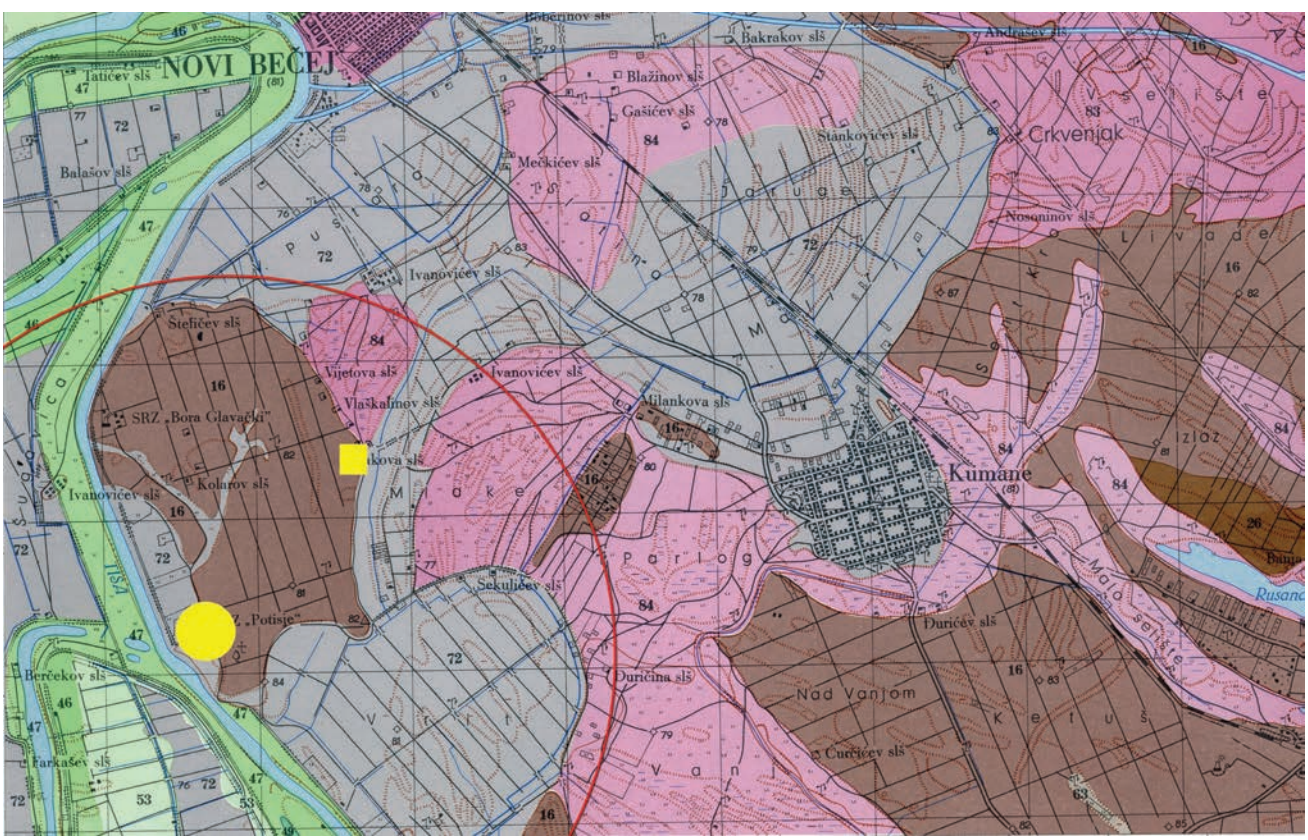

Figure 5: Soil map of the vicinity of the Late Neolithic site Borđoš. Yellow circle: Borđoš; yellow square: Makaranda. Red circle: the catchment area of the Borđoš Neolithic settlement (5 km Radius). Areas highlighted in pink: Solonetz solonchackic soil; in brown: Chernozem calcareous (micellar) on loess; in gray: Hydromorphic Black limeless soil (Nejgebauer et al., 1971b)

lage of Kumane has specific floristic, plant-geographic, and phytocoenological features. Of the 92 taxa, less-than-half (46.74%) can grow in saline soil, and 53.26% of species are tolerant to salinity or can avoid high salinity of the site completing their vegetation in the spring when salt concentration in the substrate is low due to abundant rainfall.

A mosaic of specific halophytic vegetation has developed on the native pasture near Kumane. Nine distinct plant associations were detected (Knežević et al., 2009b, a). They are classified within the meadow-steppe vegetation of continental salinas, specifically under the class *Festuco-Puccinellietea* Soó. From the ecological aspect, the native pasture of the Solonetz soil near Kumane is part of the halobiome of the Pannonian Plain. The variety of halophytic communities found in the Pannonian Basin can be attributed to the characteristics of the habitat, such as its microtopography. The distinct zonation of halophytic vegetation is the result of a mosaic of microhabitats and different levels of soil salinity (Eliáš Jun et al., 2021).

Possible Location of the Late Neolithic Pastures

Traditionally, pastures near villages are grazed first, and grazing intensity has historically been high here (Ronkin, Savchenko, 2016). The recent discoveries at Borđoš change this scenario and suggest that the pastures were located 3 km northeast of the prehistoric settlement.. In this context, the site of Makaranda on the opposite side of the Late Pleistocene terrasse (Medović et al., in press) could be characterized as a small pastoral community, given that Solonetz's pastures extend from it to the north and east.

Sodium in Plants and Sodium Requirements of Animals

Sodium (Na) is an element, essential for animals, but is often toxic in high concentrations to plants (Doughty et al., 2016). Most animals get their sodium intake through eating plants. Sodium is not essential for plant growth but is beneficial. Halophytes are plants that have developed a tolerance to sodium and are well-suited to saline soils. Some plant species, i.e. perennial and annual ryegrass, or white clover, are known to accumulate sodium.

In contrast, animals require sodium as it serves as their primary extracellular cation. Sodium plays a vital role in the metabolic processes of animals (Dougher et al., 1995). Usually only small regular sodium intakes are necessary. But, cattle, similar to humans, possess a specific appetite for salt. They can differentiate between different tastes and consume more salt than required if given the opportunity. Livestock have been observed to selectively graze on plants with higher sodium content, potentially compensating for the intake of herbage that is low in sodium. This behaviour suggests that animals meet their sodium requirements through dietary choices.

The Possible Connection Between the Spatial Distribution of Halomorphic Soils and the Late Neolithic Sites in the Historical Banat Region

During the last decade, several Late Neolithic sites were geomagnetically explored in the Banat and Bačka region in Vojvodina, northern Serbia. It has been noticed that their spatial distribution is in close relation with the distribution of, not only fertile chernozem soils, but of Solonetz and Solonchack soils, or with the alluvial salinized soils, which are sporadically alkalized or have spots of solodi soils (Fig. 6). Lately, there have been attempts to analyze the spatial relationships between settlements and salt resources, in the example of five Late Neolithic settlements, from the territories of the Pannonian Plain and the Central Balkans (Milanović, 2021). But, up to now, there has been no direct botanical evidence of the presence of natural salt pastures in the vicinity of the settlement.

Forest Steppe

One of the finds that regularly occurs in all Late Neolithic samples at Borđoš is that of charred awn fragments of *Stipa* (Medović, 2019; Hofmann et al., in press). However, they are absent in all the layers of the explored pit. The discovery of *Stipa* macro-remains provides evidence of steppe-like vegetation near ancient human settlements (Bieniek, Pokorný, 2005). It has been suggested that the initial Neolithic settlers intentionally brought feather grass to new territories, incorporating *Stipa* into their plant economic activities (Mueller-Bieniek et al., 2016).

The Pannonian Basin is included in the temperate continental steppic bioclimatic region (Rivas-Martínez et al., 2011). The interactions among climate, competition, facilitation, fire, grazing, browsing, and human-induced deforestation outline complex forest-grassland ecosystems (Erdős et al., 2018; Bede-Fazekas et al., 2023). Aridity can constrain tree growth and thus may be the most important factor limiting the extension of forests.

The response of steppe vegetation to grazing or abandonment varies depending on the grazing intensity. Feather grass communities are promoted by lack of grazing and prolonged abandonment, while light to moderate grazing encourages plant species with a low competitive strategy (Ronkin, Savchenko, 2016). The cessation of usage causes the growth of trees and shrubs. Tree invasion dramatically changes grassland ecosystems as shading and competition from woody plants exclude several light-demanding grassland species. Encroachment by trees is a common phenomenon that occurs during the natural succession of different types of grasslands after they have been abandoned.

Feather grass communities are destroyed after the early stage of pasture degradation. The recovery of these communities is contingent upon a prolonged absence of cattle grazing, specifical-

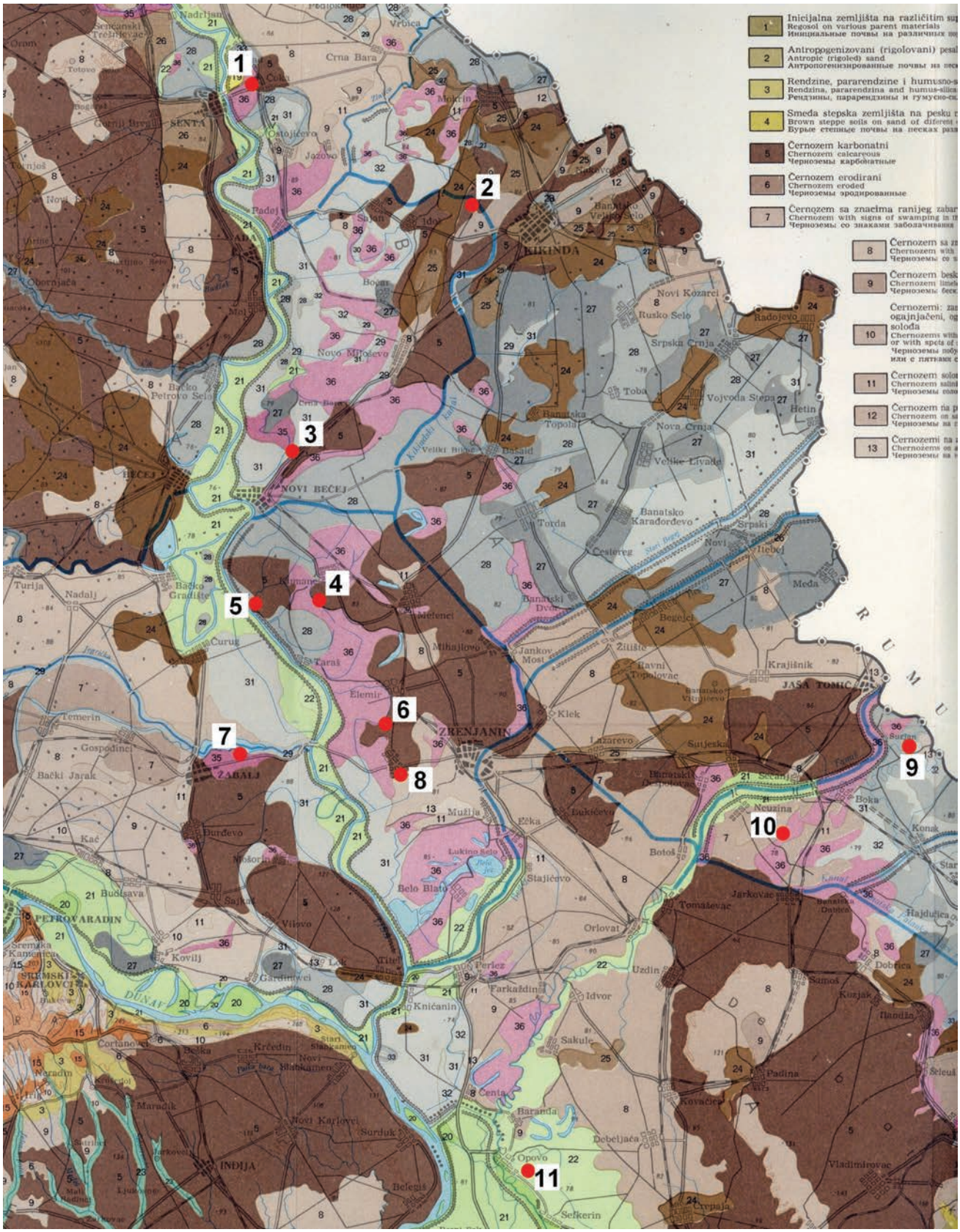

Figure 6: Simplified soil map of Vojvodina (Nejgebauer et al., 1971a) with marked Late Neolithic settlements along the lower Tisza and Tamiš River: 1. Čoka – Kremenjak; 2. Iđoš – Gradište; 3. Matejski Brod; 4. Taraš – Selište; 5. Borđoš, 6. Elemir – Orbara; 7. Žabalj – Nove Zemlje; 8. Aradac – Kameniti Vinogradi; 9. Šurjan – Stara Sarča; 10. Jarkovac; 11. Opovo – Ugar-Bajbuk. Areas highlighted in pink are Solonetz and Solonchack soils; in pale green (near Opovo) are alluvial salinized soils, which are sporadically alkalized

ly requiring a period of 10 to 12 years. During thas time, typical steppe species such as *Stipa lessingiana*, *S. pennata*, *S. pulcherrima*, and *S. tirsa* emerge as isolated individuals. This gradual reestablishment highlights the critical role of grazing management in restoring feather grass ecosystems (Ronkin, Savchenko, 2016).

Charred Wood

The collection of charred wood from the examined Late Neolithic pit is primarily composed of oak (see Tab. 1). It is noteworthy to mention that no charred fragments of *Ulmus* wood were identified, despite their presence in nearly all samples from Borđoš (Hofmann et al., in press; Medović et al., in press). The find differs from other anthracological findings at Borđoš by the four newly identified taxa (Tab. 1). The most significant is the charred wood from the *Cornus* species. Findings of *Alnus*, cf. *Euonymus* and Maloidae wood underscores the presence of oak and elm forests in floodplain environments (Slavnić, 1952). Cornellian cherry (*Cornus mas*) is ecologically highly plastic and can grow in many soils and temperature ranges, though it is salt-sensitive. *Alnus glutinosa* grows in light and semi-light habitats in lowland floodplain forests (Slavnić, 1952; Šilić, 1990). It is a pioneer species. The tree grows fast. Common alder is excellent firewood. In contrast, *Cornus sanguinea* and *Euonymus europaeus* have been recently identified among short trees and bushes in dry oak woodlands at an elevated position above the Tisza River on the Titel loess plateau (Butorac et al., 2008). The classification of the *Quercus* wood finds as either belonging to the oak-dominated woodland steppe on the Late Pleistocene terrace (*Q. pubescens*) or the floodplain forest (*Q. robur*) is a subject that may warrant further debate.

Macrobotanical and anthracological analyses from Makaranda and Borđoš reflect mixed vegetation in the vicinity. A buried, weakly developed cambic B-horizon at Borđoš site indicates the presence of a forest on the Late Pleistocene terrace. Charred *Stipa* awn fragments at the same site (Hofmann et al., in press) and many krotovinas in studied ditches further suggest the presence of the steppe. Generally, the steppe component of forest steppes frequently grows on chernozem soils, and the forest component on grey forest (Erdős et al., 2018). Both will equally thrive in a climate zone where neither dense forests nor open grasslands predominate.

Malacofauna

Milica G. Radaković of the University of Novi Sad's Faculty of Sciences completed the analysis of the malacofauna shells found in the macrobotanical sample (Tab. 2).

Fossilized mollusk shells can be classified down to the species level. The assemblages of mollusks provide insights into the characteristics of the surrounding landscape. The molluscan fauna at Borđš reflects mixed habitat types. Two major habitat types in the vicinity of Borđoš are aquatic and terrestrial. The existence of steppe and alluvial woodland, but also woodland on the Late Pleistocene terrace, is also indicated (Hofmann et al., in press; Medović et al., in press).

Fish Scales

Desanka Kostić of the Faculty of Sciences at the University of Novi Sad analyzed the fish scales. The sample comprised 68 fragments, predominantly consisting of cycloid scales. This particular scale type indicates the Cyprinidae family, which encompasses carp fish and represents the most prevalent family of freshwater fish within the Pannonian Basin. Among the 11 fragments where sclerites are distinctly visible, one scale fragment indicates a minimum age of 4+, suggesting that the fish had reached its fifth year of life. Additionally, four fragments reveal a minimum age of 2+, indicating that those fish were in their third year of life. The morphology of the fragments suggests that the fish were likely older, implying an even greater age. The identification of water chestnut in the pit indicates the existence of sluggish river channels, such as oxbow lakes, in the vicinity of the settlement. The fish population found in the dead backwaters of the Tisza in southern Hungary predominantly belongs to the fish family Ciprinidae (Farkas, 1977).

Conclusion

Cereals are the main crops grown at the Borđoš site during the Late Neolithic. Among them, Einkorn and Zanduri wheat are the most prominent. Numerous charred finds of Zanduri wheat in all phases at Borđoš, both chaff and grain fragments, confirm the southeastern part of the Carpathian Basin as one of the emerging centres of this wheat in prehistoric Europe. Sporadical pulse findings indicate the diverse plant growing strategies. The importance of fruits and nuts gathering in the economy of the Late Neolithic community can be summarized in the term "agro-gathering".

Feather grass awn and grain fragments were scattered throughout the Borđoš settlement in all its phases and the Late Neolithic site of Makarada. It is a typical steppe species. The abundance of *Stipa* finds indicates a lack of grazing near the settlements. A lucky macrobotanical finding of burnt dung indicates that cattle herds were grazing on alkali pastures, so-called Slatina's, north and northeastern of the Late Pleistocene terrasse. This represents the initial physical proof of the presence and utilization of saline soils in present-day Serbia by prehistoric communities in their agricultural practices during the Late Neolithic period. The deliberate collection and using dung as fuel may indicate a firewood deficiency in the later phases of the settlement. The forests must have experienced substantial area reductions following centuries of persistent exploitation. The

Species	**Abundance**	**Percentage (%)**	**Environment**
Anisus spirorbis	15	18.75	marsh and aquatic
Punctum pygmaeum	9	11.25	woodland - open country
Carychium tridentatum	5	6.25	woodland - open country
Pupilla muscorum	5	6.25	open country
Trochulus hispidus	5	6.25	woodland - open country
Succinella oblonga	4	5	woodland - open country
Chondrula tridens	2	2.5	open country
Clausilia sp.	2	2.5	woodland - open country
Galba trucantula	2	2.5	marsh and aquatic
Granaria frumentum	2	2.5	open country
Vallonia costata	2	2.5	open country
Vallonia sp.	2	2.5	open country/marsh & aquatic
Vertigo pusilla	2	2.5	woodland
Bathyomphalus contortus	1	1.25	marsh & aquatic
Cochlicopa lubrica	1	1.25	woodland - open country
Euconulus fulvus	1	1.25	woodland - open country
Valvata crystata	1	1.25	marsh & aquatic
Valvata macrostoma	1	1.25	marsh & aquatic
Vertigo pygmaea	1	1.25	open country
Vitrea crystallina	1	1.25	woodland - open country
Not identified	16	20	
Total	**80**	**100**	

Table 2: Results of the analyzed fossilized mollusk shells within the macrobotanical sample. Classification of organisms into distinct ecological groups follows Juřičková et al. (2014)

charred wood assemblage and mollusk findings indicate a habitat mosaic, that includes open, arid regions, light and closed-canopy woodlands, and damp and aquatic environments. This corresponds with the distinct geomorphological formation in the catchment area of the Neolithic settlement. A thriving forest grassland flourished on the elevated Late Pleistocene terrace (ca. 80 m asl). Alkali pastures were represented in lower areas up to 4 m on Solonetz soil. The hardwood forest flourished at the lowest altitude (ca. 73 m asl) in the floodplain of the Tisza River.

A consistent pattern has been observed in the spatial distribution of the Late Neolithic settlements along the lower Tisza River. The presence of fertile soils significantly influenced the establishment of settlements. Additionally, the proximity to alkali or saline soils was crucial. This combination allowed settlers to adopt a variety of economic strategies. In a radius of 5 km of prominent late Neolithic settlements along the lower Tisza and Tamiš Rivers, alkali or salt-affected soils were detected in all.

Grazing on alkaline or saline grasslands provides domestic animals access to the vital electrolyte, sodium (Na). Most animals get their sodium input through eating plants. On the other hand, the Late Neolithic settlers may get their sodium input through eating animal products.

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Ceramic spoon with barley

FUTURE OF THE PROJECT BORĐOŠ

Tijana Stanković Pešterac, Robert Hofmann, Martin Furholt

Due to the large quantity of results obtained over the ten years of multidisciplinary research within the Borđoš Project, it was not possible to present them fully in this volume (Vol. I). We have provided basic information about the project itself and the Neolithic site of Borđoš, as well as sites in its immediate vicinity—from the loess plateau and nearby areas. The aspects and archaeological sites that have been omitted here due to space limitations will be presented in the next volume.

In order to reveal as many traces of the human life in the Neolithic period as possible, the multidisciplinary research within the Project Borđoš will continue, along with the international cooperation that initiated it. This work has already begun and aims, among other things, to answer the question of how the results from Borđoš should be interpreted in a regional and supra-regional (global) context. Does Borđoš represent an isolated case, or are there similar settlements in the region? Are settlements like Borđoš 'only' the result of short-term extreme population agglomerations or can they be understood as centres with a hinterland of smaller settlements?

Another important complex of questions concerns the social and economic processes that led to the emergence and decline of these settlements. What role did political processes and social inequality play in these dynamics, or could the emergence of the latter have been avoided? On what economic foundations were these processes based? In order to answer these questions, it has proven necessary to go beyond the spatial scale of the Borđoš key site and micro-region of the Borđoš loess plateau, expanding the working area to other parts of the lower reaches of the Tisza River. Preliminary results already show an enormous potential for such research in the region and reveal a rich cultural heritage that remains undiscovered in many aspects.

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If you're looking to enrich your understanding of multidisciplinary archaeological research, *Project Bordoš – 10 Years of Research*, Vol. I, is an essential addition to your library. This volume, edited by T. Stanković Pešterac, offers a deep dive into various aspects of the Late Neolithic Bordoš site, featuring contributions from experts across disciplines. From historical context and excavation strategies to analyses of ceramics, stone tools, and zooarchaeological findings, this book provides a holistic view of the site's significance. Each chapter introduces advanced techniques and insights that illustrate the power of interdisciplinary research in archaeology. This book is a guide for students and scholars alike, showcasing how meticulous research can unlock the secrets of the past. Don't miss the chance to explore this masterwork of collaborative scholarship.

Prof. Nenad Tasić, PhD