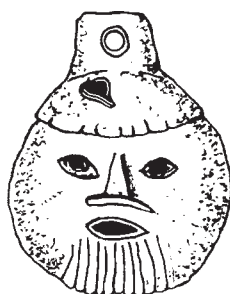


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THREE SEASONS OF RESEARCH IN THE HUČIVÁ DIERA CAVE IN THE SLOVAK TATRA MOUNTAINS¹

MARIÁN SOJÁK – PAWEŁ VALDE-NOWAK

This paper presents the results of a research project addressing the hitherto mysterious absence of Palaeolithic traces within the Tatra Mountains. Preliminary investigations conducted in 2019 at Hučivá diera Cave, located in the Slovak portion of the Tatras (the Belianske Tatras), successfully identified distinct evidence of occupation by the Magdalenian culture. In 2022 and 2024, interdisciplinary research at the site continued. The findings have significantly expanded the archaeological dataset and facilitated a more precise definition of paleoenvironmental aspects, such as the Late Pleistocene fauna and flora within this high-altitude environment. Discoveries from Hučivá diera Cave suggest that during the Bölling warming period at the end of the Pleistocene, the cave was utilised by hunters who primarily targeted the Alpine ibex, processing the carcasses and hides *in situ*.

Keywords: High Tatras, Hučivá diera Cave, Magdalenian, Bölling, hide processing.

INTRODUCTION

The abundance of caves in various physical and geographical units in Slovakia encourages their exploration in the speleological, palaeozoological, and archaeological sense (Bella/Hlaváčová/Holúbek 2007; Soják 2024). Although this research has a long tradition and has often resulted in important discoveries, it has only to a small extent covered the cave objects of the Tatra region. In this context, it is worth mentioning the work undertaken a decade ago by paleozoologists in two caves of the Belianske Tatras: Muránska Cave (1559 m a.s.l.) and Nový 3 Cave (1791 m a.s.l.; Horáček *et al.* 2015). The results of these studies suggest that in the High Tatras, the surfaces of the Vistulian glacier were colonized by a diverse community of small vertebrates, including highly demanding, endemic, and even forest elements. The authors believe that such relatively optimal conditions occurred there not only in the mild part of the Vistula glaciation (MIS 3), but also during the LGM (MIS 2). These hidden refugia for many Central European taxa could, as the authors suggested, also have attracted human interest (Horáček *et al.* 2015, 375, 376). However, the studies in question did not provide any evidence information about larger animals.

From a purely archaeological perspective, it is difficult to say today about the role of the Tatra massif in ancient human penetration. In the Slovak Tatras, we know one cave archaeological site, but without traces dating back to the Stone Age. In the Dúpnica

Cave, located in the Western Tatras, in the Sielnicka Valley, pottery, bronze, and iron items were found. They date back to the younger Bronze Age, Hallstatt period and the Early Iron Age (Šimková 2006; 2014). A Celtic silver coin was also found (Soják/Struhár 2014). The cave was also inhabited in the Middle Ages and was used by the population as a shelter during World War II (Bella/Hlaváčová/Holúbek 2007; 2018).

For the Polish Tatras, the situation is different. The main 19th-c. cave researcher, G. Ossowski, tried to include also the Tatra caves in the then research. Both for him and his archaeological successors in the 1930s, these attempts ended with negative results (Jura 1955; Zwoliński 1955). For almost a hundred years, from the mid-19th c., the object with which great hopes were placed to discover traces of human presence was the Magura Cave in Polish Tatra (Jura 1955; Zwoliński 1955). Despite referring to the scientific authorities of the time, the alleged bone and stone artefacts from the excavations undertaken over time in the Magura Cave were ultimately not confirmed. Thus, the topic of prehistoric settlement in the Polish Tatras has been practically closed to this day. The first steps in the recent attempt to undertake archaeological research in both the Polish and Slovak Tatras were discussed in an article from 2024, in which the results of the first discoveries in Hučivá diera Cave were also briefly summarised (Valde-Nowak *et al.* 2024). This article is an update and enrichment of the results of the previous research in Hučivá diera Cave.

¹ This work was supported by the Slovak research and Development agency under the contract no. APVV-23-0282 and by the grant project VEGA 2/0033/23.

The work was created as a result of the research project no. 2021/41/B/HS3/03217: The Stone Age Man in the Caves of the Tatra Mountains financed by the National Science Centre.

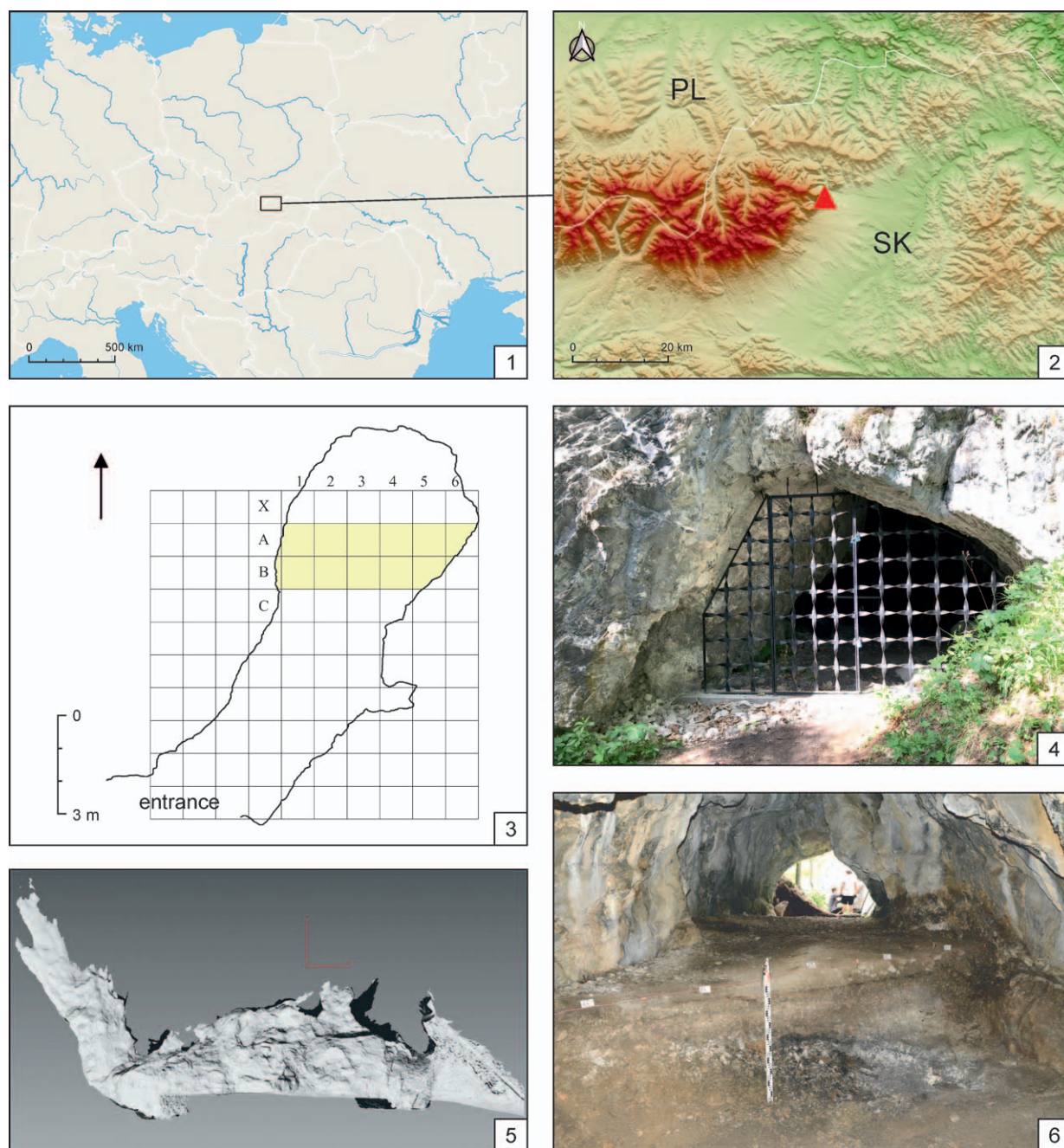


Fig. 1. Hučivá diera cave. 1 – the general location; 2 – location on the map of Slovakia; 3 – plan of the cave chamber with the excavation marked in yellow against the background of a meter grid; 4 – entrance to the cave; 5 – general view of the excavations trench in 2022 season; 6 – longitudinal cross-section of the cave as an effect of 3D scan. Drawing J. Skluckyi, scan M. Cheben.

THE HUČIVÁ DIERA CAVE AS AN ARCHAEOLOGICAL SITE

As we know, cave structures constitute a natural monument and are usually under the protection of scientific and speleological communities. If traces of former settlements are discovered in a cave, the significance of such an object increases further, becoming an archaeological site. It is precisely the

probability of preserving archaeologically significant traces in the cave that means that archaeologists are authorized to conduct an exploration of cave sediments in the first place. The optimal situation is when speleologists remain in contact with archaeologists when exploring caves. To some extent, such a situation took place at the end of 2018 in the Belianske Tatras, in the Hučivá diera Cave in Slovakia, when an important episode occurred,

which today allows us to look differently at the possibility of using Tatra caves in the Stone Age, and specifically in the Palaeolithic period.

During a visit, M. Soják to the Hučivá diera Cave for photo documentation at the end of 2018, in its back premises found significant damage to the cave sediments. This amateur pit was probably made by the speleologists. Through a detailed study of the superimposed heaps of cave sediments, it was possible to discover at the time the first stone artefacts (Soják/Valde-Nowak 2019; 2021). After completing their amateur excavation of its rear spaces, the length of the cave was increased from 13 to 16 m (Bella/Hlaváčová/Holúbek 2018, 270). Several stone artefacts collected from the heap by speleologists were provisionally classified as Magdalenian technocomplex (Valde-Nowak/Soják 2018, 45). At that point, Hučivá diera Cave became an archaeological site.

The Hučivá diera Cave in the Belianske Tatras in Slovakia lies in the cadastre of the High Tatras-Tatranská Lomnica (Poprad district) in the Prešov region in Slovakia (Fig. 1: 1, 2).²

The cave with a total length of 16 m is located at an altitude of 936 m in a rock cliff on the Southern slope of Kobyly vrch (1109 m) in the Belianske Tatry Mountains near the 'Sparkling Spring' (*Rausch Quelle*; Fig. 2: 1). It developed in the Ramsau dolomites (Triassic, Patricum) on a fault discontinuity, which predisposes the formation of the horizontal cave passage with a high ceiling. A portal entrance of a triangular shape with a base of approximately 4 m and more than 2 m in height is a relic of a horizontal (phreatic) cave passage with a length of 10 m (Fig. 1: 3–5). At the cave passage end, where the site of the excavated archaeological profile is located, the cave ceiling sharply rises becoming a vertical chimney (Fig. 1: 6). The narrow chimney is blocked by rocks and soil in its upper parts, which prevents it from opening to the surface. The signs of frost weathering are documented by rock debris and gravitational breakdown, accumulated at and near the archaeological site. The detachment surfaces of the rock breakdown are currently obliterated by weathering, and dissolution by seepage water. If it was open at the time of human use of the cave, it could have ventilated the smoke of the fireplace.

The Institute of Archaeology of the Slovak Academy of Sciences in Nitra and the Institute of Archaeology of the Jagiellonian University in Krakow undertook the first rescue works in 2019, which were continued as systematic works in 2022 (Soják *et al.* 2019; Soják/Valde-Nowak 2019; 2021; Valde-Nowak *et al.* 2022) and in July 2024. Stone and other artefacts,

bones, and plant microfossils are collected during the research after they have been precisely tracked. The sediment was exposed in arbitrary layers (0.05 m), maintaining a grid of quarters of meters (0.25 m²), which forms the basic excavation unit. The whole sediment is wet-screened on sieves with less than 1 mm mesh size (Fig. 2: 2). Sediments were examined in two excavations. One of them was located in the entrance opening – where the entrance grate was planned to be installed, which took place in 2020. So far, sediments have been examined on an area of approximately 20 m² to a depth of 250 cm. The rock floor was not reached in any part of the excavation.

MAIN RESULTS OF EXCAVATIONS

The work to date has allowed us to recognize the stratigraphy. The profile has nine main clay-rubble layers, with layer 6 having variants. The top layers 1–4 were formed in the Holocene. Layer 1 is a modern tramp and the remains of a speleologists' heap. Two Slovak State coins and a cartridge from World War II were found there. Layers 2–3 contain sparse modern ceramic material, which can be related to the 16th c. Layer 4 is transitional. Palaeolithic artefacts were extracted from layers 5–8, but their main deposit is layer 6a, constituting traces of a large hearth. Layer 9, silty-clayey of dark yellow colour, sterile both archaeologically and paleontologically, most probably formed in the Last Glacial Maximum (LGM; Fig. 3).³

Two AMS dates were obtained from charcoal from the fireplace: 12190 ± 60 BP (Poz-114742: 12316–11896 cal BC, at 95.4% confidence) and 12160 ± 60 BP (Poz-114743: 12260–11868 cal BC, at 95.4% confidence). An ibex mandible was also found in this fireplace, resulting in 12160 ± 60 BP (Poz-126122: 12270–11860 cal BC). From pit 6b adjacent to the fire, two further dates were obtained from charcoal: 12280 ± 60 BP (Poz-162378: 12542–12108 cal BC, at 95.4% confidence) and 12200 ± 50 BP (Poz-162379: 12367–12065 cal BC, at 95.4% confidence), indicating synchronicity with the fire, which is additionally confirmed stratigraphically. A slightly earlier date was obtained from a horse's jaw, found outside the excavation in the deeper part of the cave, protruding from unexamined sediment: 12400 ± 50 BP (Poz-154006: 12920–12258 cal BC, at 95.4% confidence). All these data (calibrated with OxCal Program v3.10; Bronk Ramsey 2001) points for Bölling interstadial (GI 1e).

² GPS coordinates N 49°13'14.8", E 20°18'37.2", C-KN 14 705/14, LV 402.

³ Results of the sedimentological analysis carried out by L. Lisá.



Fig. 2. 1 – general view of the Belianske Tatras from the side of the village of Lendak with the approximate location of the Hučivá diera Cave (arrow) in the Kobylí vrch massif (1109 m), in the background, Lomnický Peak (2634 m; photo P. Valde-Nowak); 2 – wet screening of sediments from the Hučivá diera Cave in Biela Potok (photo M. Soják).

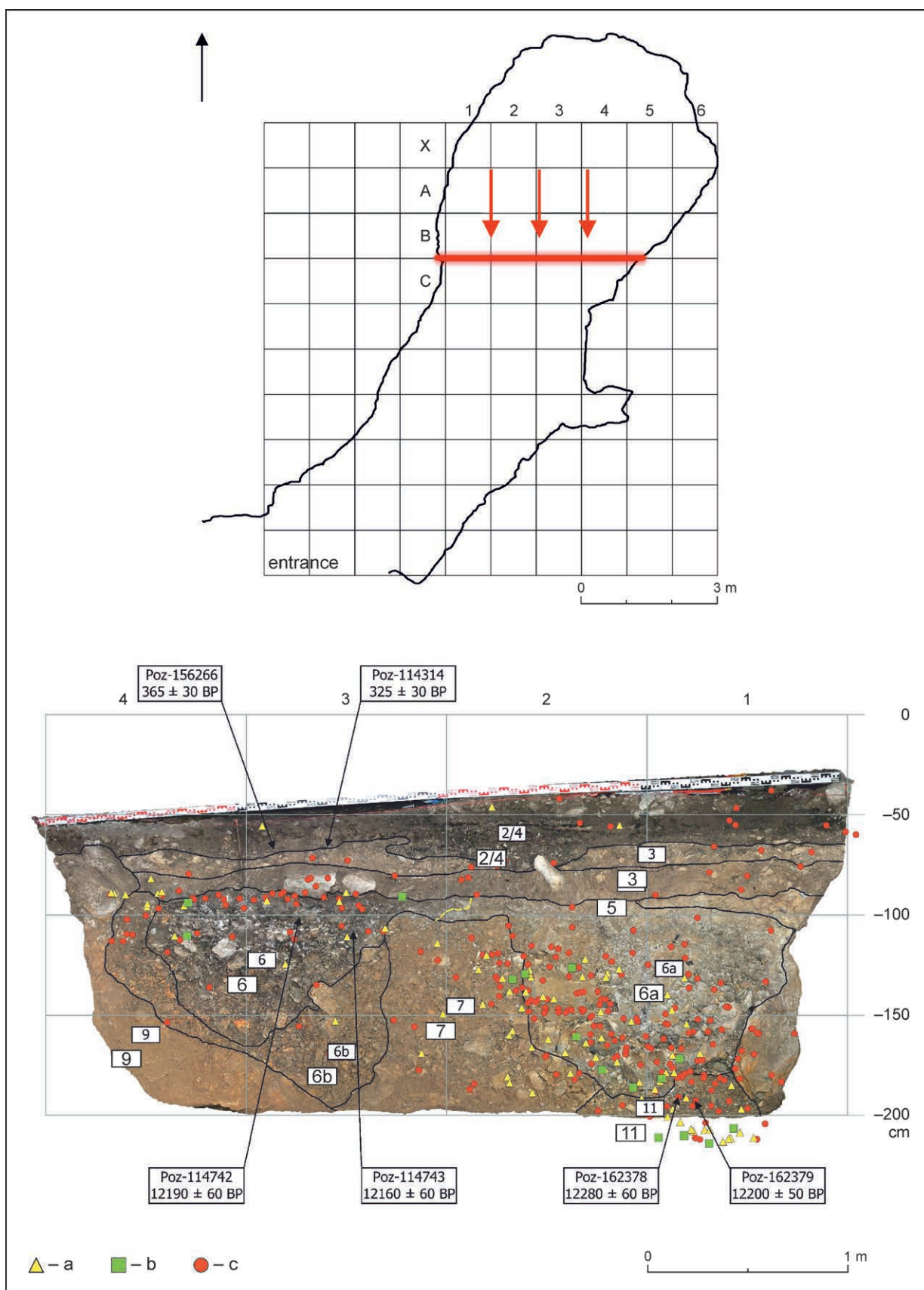


Fig. 3. Hučivá diera Cave. Cross-section of cave sediments (stand 2022) with numbered layers and the position of samples for AMS dating. Legend: a – scatter of stone artefacts; b – burnt stone artefacts; c – animal bones. Layout J. Skłucki.



Fig. 4. Hučivá diera Cave. Cross-section of cave sediments (stand 2024). Photo P. Valde-Nowak.

A sample of charcoal comes from the high cultural layer 2, which gave the early modern time, consistent with the characteristics of the fragments of pottery found there: 365 ± 30 (Poz-156266: 1453–1635 cal AD, at 95.4% confidence).

The southern profile (on the border of meters A and B) was chosen as the most demonstrative for stratigraphy and environmental research purposes (Fig. 3). Its addition of floor parts was made in the 2024 season (Fig. 4).

As a result of work, 812 stone artefacts have been discovered. In terms of raw materials, the inventory is in some cases difficult to determine due to patina. Some of the artefacts were made of radiolarite (77.83%), but there are artefacts from raw materials such as various flints from Polish territory and Volhynia (19.95%), limnosilicite from Middle Slovakia or the borderland between Northern Hungary and Slovakia (*Kaminská zost. 2014*) as well as the hornstone of the Stránská skála (at least one piece) type from the Moravia area (*Bartík et al. 2019*).

The share of different varieties of flints are as follows: 41 Cracow-Jurassic, 26 chocolate, 11 Bircza flint, 4 cretaceous from Volhynia, 80 undetermined pieces. Flint from Bircza must be present, which we can now treat as a good indicator of Magdalenian in its eastern province. The conditions in the cave significantly impacted the state of preserving the siliceous rock surface. Most isolated flints are patinaed with a deep, white patina. Their texture

can also be substantially transformed. To a small extent, this also applies to some specimens made of steel-grey or green radiolarite. Additionally, the proximity of fire influenced the change in the original characteristics of flint products. Many specimens show traces of ‘welding’ and burning, which results in a change in the gloss, texture, and damage to the rock structure.

Among this remarkable blade industry, 3 cores, 108 flakes (without chips and non-diagnostic pieces), 162 blades and 105 tools occurred. The cores are in an extremely exploited form. Despite this, it still represents blade technology. All cores represent single platform cores or cores with changed orientation. One of the cores is shaped like a tablet, made most probably on the big flake. It is preserved in an extremely exploited form (Fig. 5: 1). Another one can be considered a micro-form with signs of a conical shape and is in a very advanced stage of use (Fig. 5: 2). The third can document traces of repeated unsuccessful separation of chips in the form of the so-called hinge (Fig. 5: 3). When assessing the technology used by core users, its high technical level must be emphasized. The core angle has been successively improved as evidenced by the negatives on the striking platform. A soft hammer was commonly used. Blades often confirm the formation of *en éperon* butts (*Inizian et al. 1999, 136*). Splintered bulbs on blades and bladelets are also confirmed. The maximum use of these specimens is impressive.

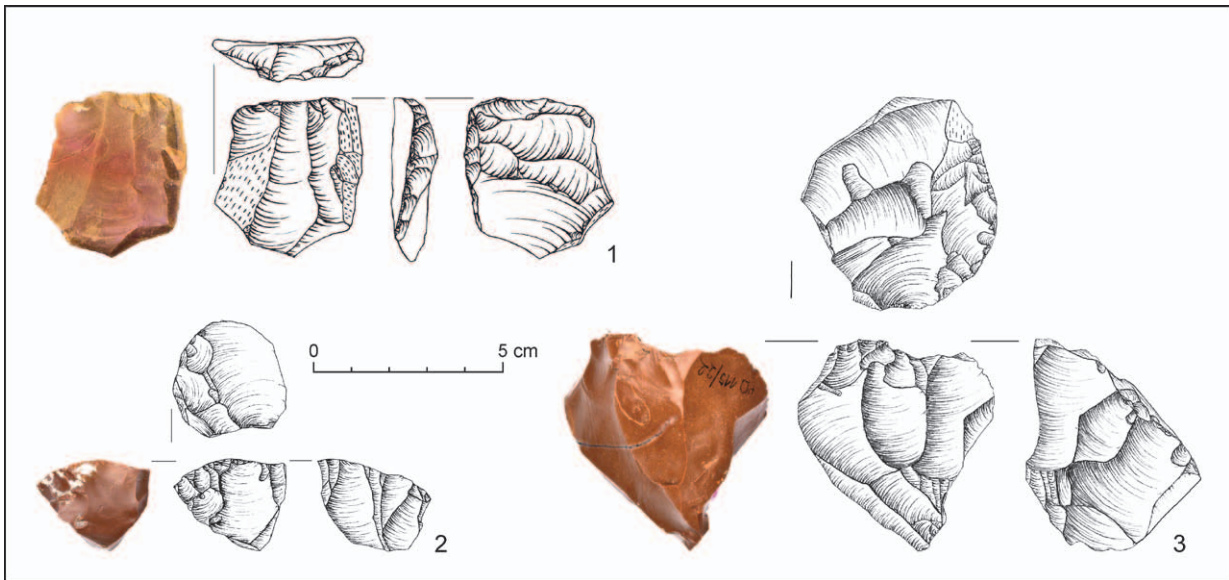


Fig. 5. Hučivá diera Cave. Cores made of radiolarite. Drawing J. Chowaniak, photo J. Skłucki.

The most characteristic tools are points (Fig. 6). Some of them resemble shouldered points (Bohmers 1956; Maier 2015), as well as specimens similar to the massive Creswell triangles (Stapert 1985). One item can be considered as double truncation called Cheddar point (Barton et al. 2003). There are also perforators, including a badly worn specimen with a twisted Zinken sting.⁴ Oblique truncations are also present. It is also essential that the backed bladelets are visible.

The number of tools in the inventory can be presented as follows: 31 projectile points, 6 burins, 17 truncated pieces, 2 combined (end scraper + fine perforator), 20 perforators and borers, 18 retouched blades, 9 backed bladelets, 1 end scraper, 1 notched tool.

One shell has been discovered at the Hučivá diera Cave in 2019 season (Fig. 7: 4). It is a fossil Miocene shell of *Tiaracerrithium pictum* (de Basterot 1825), a highly variable and widely abundant gastropod species in the Paratethys Sea, known from numerous localities in Poland, Slovakia, and Moravia (Harzhauser/Guzhov/Landau 2023, 144–153). The specimen is perforated with two holes made similarly.⁵

The inventory includes an awl (Fig. 7: 1) and two bone needles (Fig. 7: 2, 3), one preserved in two fragments.⁶ There was also a tool made of lynx bone, which was worked intensively so that the tip was blunt, indicating tissue removal due to intense

activity. Also noteworthy is a series of parallel cuts that give the impression of notation (Fig. 7: 5). Bone needles are a relatively common find in the inventories of the Magdalenian culture (d'Errico et al. 2018; Stordeur-Yedid 1979).

Two refitting fragments of sandstone found in the Hučivá diera Cave focal layer require separate attention. They can be interpreted as a lamp (Fig. 7: 6). Such a rock does not occur in the vicinity of the cave, and its reddish colour may be the result of thermal transformation. Minor traces of an unspecified organic substance with lipid characteristics were found on its walls.⁷ Stone objects found in the Magdalenian context, known as candle lamps, are an integral element of this culture also on Polish territory, e.g., Ćmielów (Paczkowski 2020; Paczkowski/Przeździecki 2021, 173) and Wilczyce (Kowalski 2014).

During the 2019 excavation season, five pieces were collected and ascertained initially as ocher lumps. They derived from the three archaeological layers: 5, 6, and 6a, with depths between 125 cm and 135 cm below the current ground level. The chosen samples were subject to 56 singular SEM-EDS analyses. The main colouring agent, thanks to which all the specimens presented a red hue, appeared to be iron compounds. That would imply that all of the samples could be considered as ocher (see Velliky et al. 2019, 2).

⁴ In the 2024 season, one more example of a Cheddar point was found.

⁵ An almost identical specimen, also perforated with two holes, was found in the 2024 season. Results of the analysis carried out by A. Kurzawska.

⁶ One more fragment of a needle was found in 2024 season.

⁷ Results of the analysis carried out by E. Miśta-Jakubowska and R. Siuda.

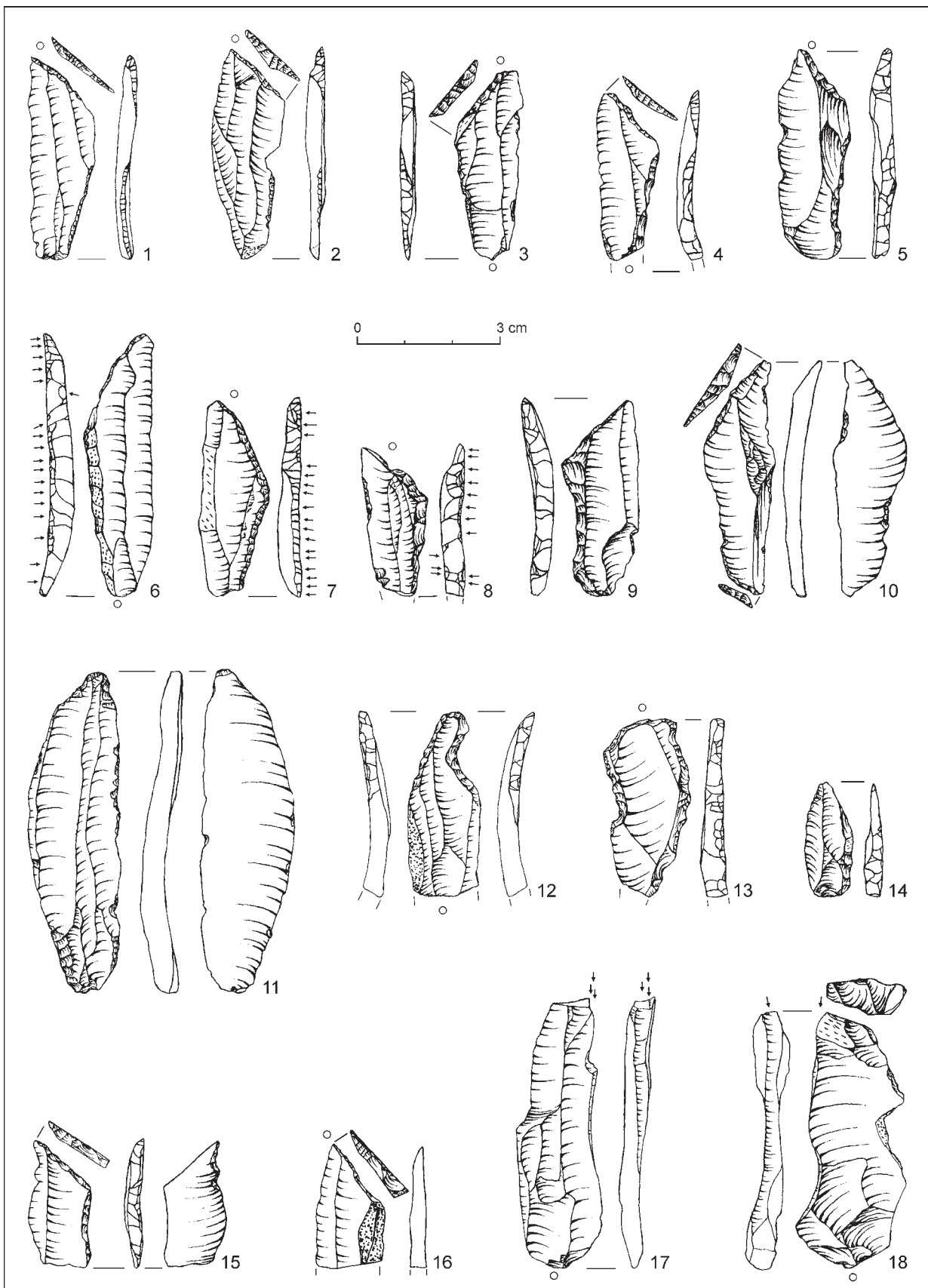


Fig. 6. Hučivá diera Cave. Selected stone artefacts. 1–3, 6–9 – creswell points; 4, 5 – shouldered points; 10 – cheddar point; 11, 13, 14 – perforators; 12 – Zinken; 15 – borer; 16 – truncation; 17, 18 – burins. Drawing J. Chowaniak.

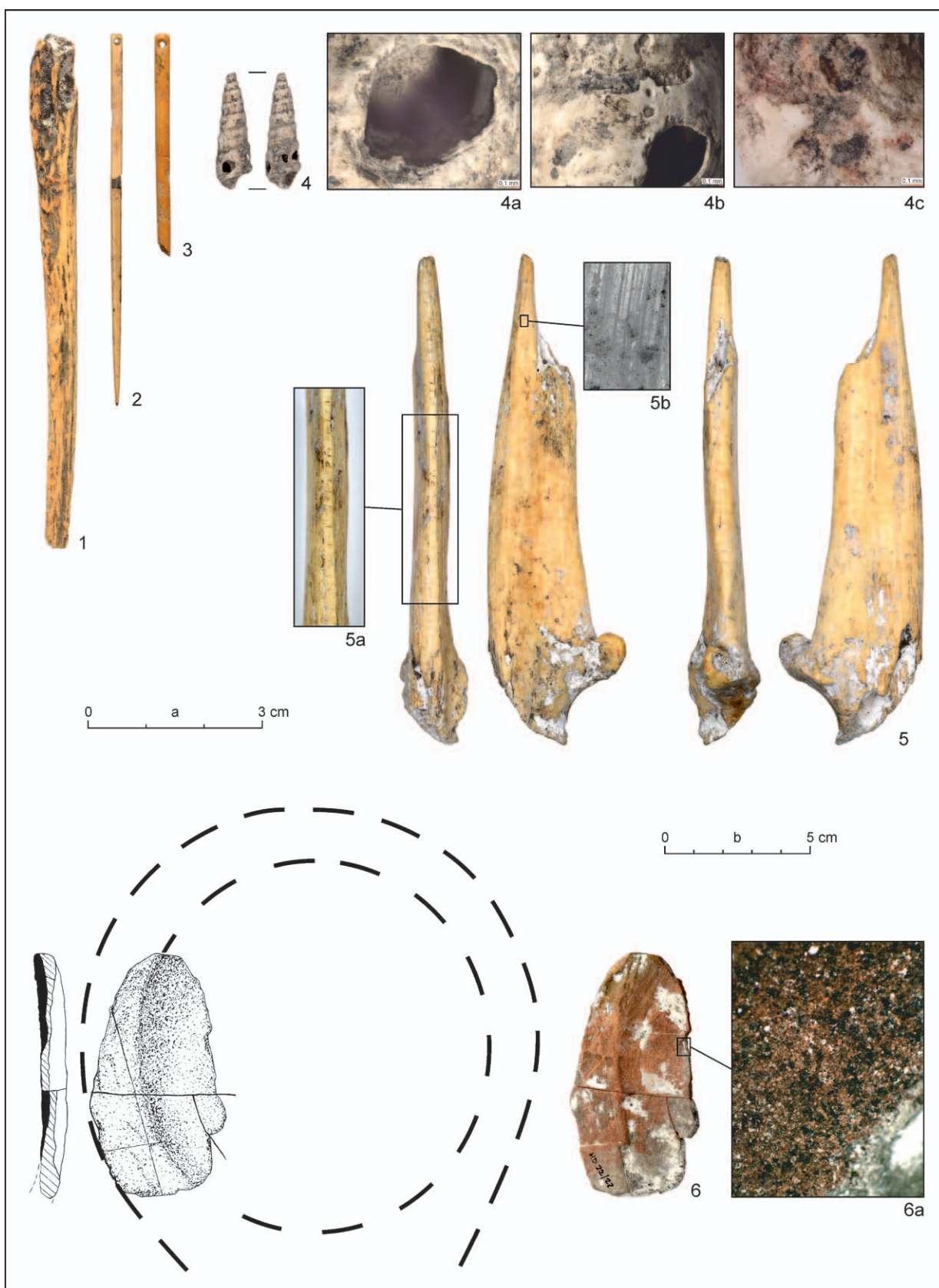


Fig. 7. Hučivá diera Cave. 1 – bone awl; 2, 3 – bone needles; 4 – shells of personal ornament; 5 – strongly polished bone tool (piercer or awl) with a visible series of parallel diagonal cuts; 6 – refitted fragments of sandstone lamp. Drawing J. Chowaniak, U. Bąk, photo A. Kurzawska, J. Skłucki. Scale: a – 1–5; b – 6.

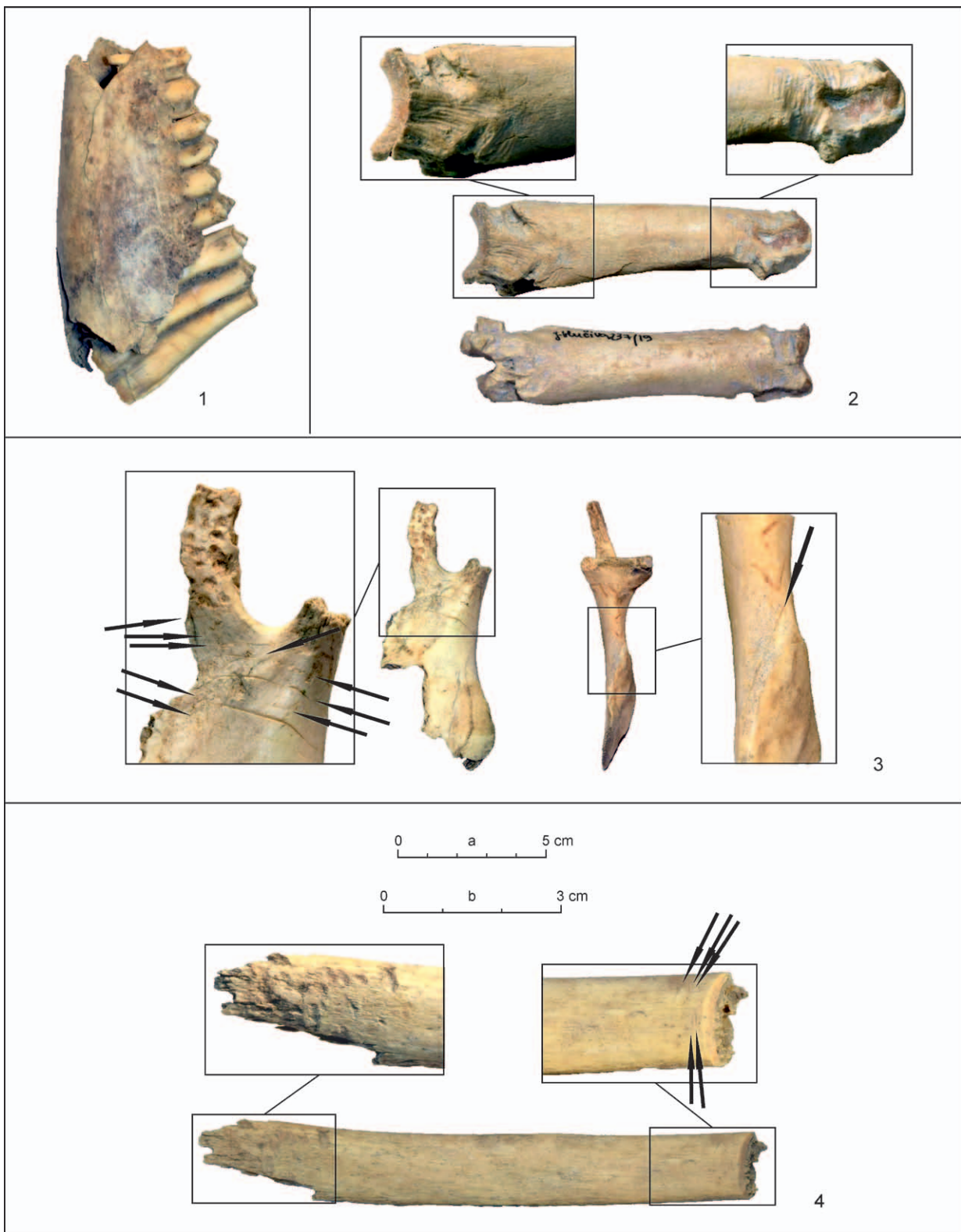


Fig. 8. Hučivá diera Cave. 1 – left mandible of an Alpine ibex (*Capra ibex*) with teeth from the third premolar to the third molar, view from the buccal side; 2 – a proximal phalanx of chamois (*Rupicapra rupicapra*), close-ups show damage caused by rodents gnawing (parallel grooves); 3 – fragment of the left mandibular branch of an Alpine ibex (*Capra ibex*) with numerous cut marks on the buccal and backside and gnawing marks by predators (punctures on the coronoid process); 4 – rib fragment of a medium-sized mammal with cutting marks at one end (multiple scratches at the right end and a smooth cut surface) and traces of gnawing by predators at the other end (punctures and crenulated edge at the left end). Photo and layout K. Wertz. Scale: a – 1, 3; b – 2, 4.

All layers yielded animal bones and teeth, but most of them were found in cultural layers 6 and 6a as well as layer 5. Remains belong to mammals (over 25 taxa have been determined) and birds (more than 15 species), supplemented by less numerous amphibians and very scarce snails. In total, almost 500 remains of small and large mammals and almost 370 bird bones were identified at the species or genus level.⁸

Among larger mammals, that could be hunted by the Magdalenian people, bone fragments and teeth of the Alpine ibex (*Capra ibex*) predominate in the fossil assemblages of cultural layers 6, 6a, 6b, and layer 5, and numerous cut marks are present on some of the bones (Fig. 8: 1, 3). The remains of wild horses (*Equus ferus*) were less numerous, and traces of exploitation were also less frequent. Chamois (*Rupicapra rupicapra*; Fig. 8: 2) and red deer (*Cervus elaphus*) were also identified, while fallow deer (*Dama dama*) and aurochs (*Bos primigenius*) were represented by single specimens only. Remains of carnivores are represented by the brown bear (*Ursus arctos*), red fox (*Vulpes vulpes*), lynx (*Lynx lynx*), and at least four species of mustelids (*Mustelidae*). The most abundant remains belong to brown bears.

In Hučivá diera Cave small mammals are represented by 12 rodent taxa and insectivorous mammals (bats, moles, and shrews), but their remains were few (NISP ca. 150). The rodent community from layer 6a, represented by 10 species, was characterized by the highest quantitative and qualitative diversity.

The studied sediment from the Hučivá diera Cave was characterized by very low pollen frequency (50–280 including terrestrial AP and NAP pollen on the surface of 10 microscopic slides) and, at the same time, a low taxonomic diversity of sporomorphs, among which only 36 taxa (including 9 cryptogams taxa) were determined.⁹ Based on the taxonomic composition and frequency of the main pollen morphological types, two pollen sections were distinguished in the diagram.

The older pollen, representing the Late Glacial, was characterized by a predominance of Scots pine (*Pinus sylvestris*) type pollen (possibly including also dwarf mountain pine [*Pinus mugo*] pollen; up to 64%) and Norway spruce (*Picea abies*; up to 14%) as well as a very high frequency of herbaceous plant pollen. Among arboreal taxa sparse (*Pinus haploxylon*) type pollen (most likely representing stone pine [*Pinus cembra*] up to 2%), birch (*Betula*; 1.1%) as well as juniper (*Juniperus*; 0.7%) were found. The proportion of non-arboreal pollen (22–72%; average 46%) was

very high and consisted mainly of representatives of subfamily *Cichorioideae* (up to 67% in sample 9), grasses (*Poaceae*; up to 6%), sedges (*Cyperaceae*; up to 6% and *Epilobium*; up to 4%).

The younger pollen zone represents the Holocene revealing a completely different picture of vegetation. The frequency of tree pollen was much higher. The spectra were co-dominated by Norway spruce (up to 48%) and Scots pine-type pollen (average 40%; up to 57%). Fir (*Abies alba*; up to 9%) was also determined. The pollen representation of deciduous trees, including mesophilous oak, birch (*Betula*), hazel (*Corylus avellana*), linden (*Tilia cordata*), and alder (*Alnus*) was low and only in sample 5 reached a total of 7%.

The density of finds (charcoal, wood, and seeds) per litre of original cave deposit calculated for all flotation samples shows a higher concentration of plant remains in the upper Holocene (layers 2, 2/5, 5) than in the late Pleistocene (layers 6, 6b and 8). The only exception is layer 6a associated with the hearth.

The charcoal and wood were strongly degraded, vitrified, often penetrated by calcareous plastic sinter and rarely exceeded 2 mm in size. This hindered the taxonomic determination, resulting in intermediate (e.g., *Salix/Populus*) and probability determination (cf. *Juniperus*) or wider taxon category (e.g., deciduous, coniferous). In evaluation, the taxa determined with probability were combined with the determined taxon (e.g., *Salix* and cf. *Salix*).

Taxonomically determined 500 fragments of charcoal and mineralised wood represent one-third of the assemblage of which one-third were assigned to genera or species.¹⁰

DISCUSSION

The problem of the penetration of Palaeolithic hunters into the areas of alpine relief in the Carpathians is closely related to the difficult access to these areas in the coldest phases of the Pleistocene (Kłapyta et al. 2016; Makos 2015) and has affected the availability of game animals (Horáček et al. 2015, 372–376).

The discoveries made so far in the Hučivá diera Cave are comprehensive and bring new content to several disciplines. Let's start with the problems caused by the marked presence of Palaeolithic man. The significance of the results obtained lies primarily in, that it can be assumed, one phase of the occupation of this place by people of the Magdalenian culture. We do not know whether

⁸ Results of the analysis carried out by A. Nadachowski and his team.

⁹ Results of the analysis carried out by A. Wacnik.

¹⁰ Results of the analysis carried out by M. Hajnalová.

it was one continuous stay of a group of hunters or several stays in one or several seasons.

One of the signs of repeated visitation of the cave is probably the presence of limestone clast accumulation within layer 6. This accumulation reflects something like a sedimentation hiatus, which divided layer 6 into three sedimentary stages. The lower and upper parts reflect the presence of the man due to the charcoal accumulations, while the accumulation itself is the result of the natural roof falling. This type of sedimentation is typical for the end of the coldest periods in a cave environment (Nejman *et al.* 2018). The only layer showing the conditions of LGM reflected in the lenticular microstructure is layer 9. Such microstructure is very typical for freezing/thawing processes (Vliet-Lanoë 2010) and for example, a similar one was observed in the LGM strata of Kůlna Cave in Moravian Karst (Lisá *et al.* 2013) or Pod hradem Cave (Nejman *et al.* 2018). Despite that, in terms of archaeological periodization and taking into account the extremely strict AMS dating results, we have grounds to treat the obtained artefacts as a homogeneous group. We do not forget about the late medieval and early medieval traces from World War II at the top of the sequences.

Looking at the inventory of stone artefacts, it is worth emphasizing the extremely reduced workshop section. Only three cores found in a very used form are a document of significant limitations in the possibility of restoring the inventory by its users. The spectrum of raw materials is also clearly shown by a distinct group of flint tools, i.e. from raw materials brought from far away. Since all three found cores are made of local radiolarite and not flint, it can be concluded that the flint blades are the remains of the original hunters' equipment with which they came to the Tatra region, which was then renewed using local raw materials, especially radiolarites.

The features of the series of stone points are extremely peculiar. It is not easy to find references to them in the inventories from the general eastern Magdalenian province (Bobak/Półtowicz-Bobak 2018). We do not know them from the Moravia (e.g., Kapustka *et al.* 2023; Kostrhun 2005) except for single finds, such as from the Ochozská Cave dated similarly to Hučivá diera (Valoch 2002; Valoch/Neruda 2005) and a few Slovak sites that are considered Magdalenian (Kaminská *zost.* 2014, 288–296; Valde-Nowak/Soják/Wąs 2007).

Due to differences in concepts in terms of terminology and typology of these types of blades, the following clarifications are necessary. We can refer to J. B. Campbell's (1977) proposal to pay attention to specimens that are close to shouldered points but are different from them. These are Creswellian points (Campbell's AC I type).

Organizing the current terminology leads to the conclusion that the inventories related to the Creswellian tradition are dominated by specimens generally similar to shouldered points, but without a separate notch, creating a concave outline in this part of the entire shape, as we can see in Hamburgian shouldered points (Burdukiewicz 1987; Kabaciński/Sobkowiak-Tabaka 2012; Weber 2009; 2012) and also, although occurring rarely, shouldered points of Magdalenian, e.g., in Etdorf (Pasda 2018) and Petersfels (Albrecht 1979; Maier/Liebermann/Pfeifer 2020) and some Swiss sites, like Schweizersbild (Höneisen/Peyer 1994).

More or less typical shouldered points of the A2 type by J. M. Burdukiewicz (1987) have also been distinguished in the Hučivá diera Cave inventory, although less numerous than typical Creswell blades.

We are faced here with the classic problem of understanding the Magdalenian-Hamburgian relationship, in which the participation of shouldered points is a primary element. Without entering into this discussion, it should be recalled that the key element for distinguishing Hamburgian Magdalenians is the lack of retouched bladelets in the Hamburgian complexes (Weber 2012, 28). The presence of truncated bladelets in the Hučivá diera Cave inventory is one of the strong indicators of the Magdalenian affinities of the findings. Apart from the incidental appearance of a single mite in the inventory from Krucza Skała a specimen similar to the Creswell blade type, although it was not named as such (Cyrek/Sudoł-Procyk/Czyżewski *eds.* 2020) and a slightly larger series of shouldered points in Magdalenian context from Wrocław-Żerniki (Burdukiewicz *et al.* 2013, 150, fig. 11), we have practically no other references from the East Magdalenian province, e.g., Moravia and Poland. We can also recall two findings from the 19th-c. excavations mentioned several times in the literature but never associated with the typology of finds with Creswell features: a Creswell blade from Na Łopiankach Cave and a Cheddar point from Na Gaiku Cave (Collections of the Archaeological Museum in Kraków).

It is also worth mentioning the site of Rydno II/59, where an oblique and straight double half-back was discovered (Schild *et al.* 2011, 124, 125, fig. 103). Many years ago, this type of point was recorded in the inventory from the foothills of the Tatra Mountains, namely from the site Podczerwone in Podhale, included in the Magdalenian culture. Years later, it turned out that there were more traces at the foot of the Tatra Mountains that did not fit the Polish image of the Magdalenians. First, the site of Sromowce-Wyżne 'Kąty' should be mentioned (Valde-Nowak 1991), with a large inventory and at least one Creswell point made of chocolate flint.

Ongoing excavations in Obłazowa Cave (western entrance) also yielded a small inventory of double half-backed forms similar to Cheddar points (Valde-Nowak *et al.* 2018). Blades of this last-mentioned type are not known from Magdalenian settlements in Moravia and eastern Germany. They are concentrated in the southeastern part of the British Isles and the Netherlands (Barton *et al.* 2003). A single case is known from southern Germany from the Hohle Fels Cave (Taller/Bolus/Conard 2012).

The archaeological material from Hučivá diera Cave, in addition to typological references to the Creswell sites, contains elements known from the Magdalenians in Switzerland (Sedlmeier 2015). It is about techno-assemblage E (Leesch *et al.* 2012; Nielsen 2016) which slightly precedes the settlement in Hučivá diera Cave.

The Alpine ibex is a mountain species that in the late Pleistocene occurred first of all around the Alps and on the rocky coasts of the Mediterranean Sea. Alpine ibexes were victims of specialized hunting by people of the Magdalenian (Gauvrit Roux 2022) and Epigravettian people (Fiore/Tagliacozzo/Cassoli 1998). Currently, *Capra ibex* does not occur in the Tatra Mountains.

The overall assessment of the obtained inventory leads to quite obvious conclusions that we have traces of the operation of a specialized group of hunters in this cave, focused especially on hunting and butchering the hunted ibex on site. The mentioned chimney at the end of the chamber, just above the hearth, points to conscious planning of the camp space. This provided effective ventilation when using fire. Without this, the large fireplace at the back of the cave could not be used (Y. Kedar/B. Kedar/Barkai 2019).

The analysis of lime packages leads to the conclusion that the obtained slaked lime with chemically active properties could be used in the tanning process of leather. The presence of horse remains, as well as species that are alien to the high-mountain environment, e.g., swans, gives food for thought.

Some observations suggest that the late Pleistocene landscape exploited by humans occupying the Hučivá diera Cave was open with (possibly short, shrub-like) trees clustering in sheltered locations and along the watercourses. This picture can be compared to the situation of sites on the border between Switzerland and Germany (Leesch/Bullinger/Müller 2019).

Assuming that the obtained palynological image of vegetation is not the result of an accidental pollen import associated exclusively with the activity of Palaeolithic hunters using the cave, it may indicate an important role of open steppe-like grassland vegetation.

CONCLUSION

The discovery and comprehensive examination of the remains of late Paleolithic human activity in the Tatra cave have several paleogeographic consequences and point to the dynamics of the recolonization process after the LGM climate crisis.

The sedimentary profile excavated in Hučivá diera Cave offered an interesting insight into the formation of sediments at the transition of the glacial/interglacial period and the Holocene. The glacial period is recorded in silty loams, macroscopically and geochemically corresponding to loess. Its primary formation is probably a result of geliculation or some other kind of coluviation occurring during climatically sufficient periods. The micromorphology revealed the signs of freezing/thawing processes so typical for pleniglacial, but this is a post-sedimentary process that influenced already deposited material.

The formation of the cave record continued at the very end of the glacial period when a mass of limestone blocks frost eroded from the roof of the cave and its walls started to fall to the cave bottom. More or less at the same time, the Magdalenian occupation of the cave is present. The human presence is typical by the appearance of fireplaces full of charcoal, burned bones, and ash. All these features are well preserved there. The dilution of burned and unburned bones and probably also of guano is the provenance for the phosphatic nodules and impregnations, which are present as post-sedimentary features. Another post-sedimentary feature is carbonate neoformation, especially aragonite coating and its recrystallization into calcite. The upper part of the study section is probably the result of coluviation, in some cases combined with human action or post-sedimentary digging.

The cave is located in a high mountain zone, which in Böling's warming suddenly became accessible to humans and fauna after the decline of the oldest Dryas.

Looking at things from the extent of the then-Magdalenian colonization (Połtowicz-Bobak 2013), we must note that somewhere in this zone, there is the southern frontier of the colonization of this unit. To the south, one can also point out an open site on the Poprad River in Stará Lubovňa (Valde-Nowak/Soják/Wąs 2007). Materials from old discoveries in the Gudenus Cave in Lower Austria (Obermaier/Breuil 1908) are probably related to Magdalenien, however from the older time as Hučivá diera Cave assemblage. A separate problem is the relationship between the Epigravettians and the Magdalenians in the watershed of the middle

Danube and the upper Vistula is becoming more and more relevant (Lengyel *et al.* 2021; Wiśniewski *et al.* 2017)

Among the distinguished groups of the Magdalenian culture, faunal references to the Hučivá diera Cave can be seen in the Danube group, stretching from the Swiss-German border to Franconia (McCartin/Starkovich/Conard 2023). In the sites of this group, apart from reindeer and horses, hunting of *Capra ibex* is confirmed, although these are not the main species. The distinct distinctiveness of the discovered blade forms, which only seem to represent shouldered points, but are illustrations of Creswell forms, is an important finding that sheds light both on the intergroup differentiation of the Magdalenians, as well as on the dynamics of contacts and even long-distance movements.

The simplest explanation for the originality of the Hučivá diera Cave inventory may be the distinctiveness of the environment around the cave,

which we can define as a high-mountain periglacial area on a micro-scale. A clear focus on alpine ibexes also proves originality. It is also possible that Hučivá diera Cave was a point of animal dressing, in the sense of tanning skins on site. Many cut marks on the bones confirm the cutting of animal carcasses, and numerous lime packets lead to the conclusion that the skins were processed here with slaked lime. This aspect should be analysed in the future.

The repeatedly examined dating results of sites from various phases of Magdalenian development, along with more or less detailed conclusions regarding settlement dynamics, show the GRIP GI-1e phase as a time of widespread Magdalenian (Miller 2012) and the simultaneous emergence of units such as Creswellian and Hamburgian. The Hučivá diera Cave is part of this increase in Magdalenian activity in the younger part of this Bölling climatic phase.

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Tri sezóny výskumu v jaskyni Hučivá diera v slovenských Tatrách

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SÚHRN

Z pohľadu archeológie dnes možno sotva uvažovať o úlohe tatranského masívu pri prenikaní človeka v období praveku. Na slovenskej strane Tatier je známa jediná jaskynná archeologická lokalita, avšak bez stôp osídlenia z doby kamennej. V jaskyni Dúpnica (k. ú. Liptovské Matiašovce) v Západných Tatrách sa našli pamiatky (keramika, kovové artefakty, paleozoologický a antropologický materiál), datované do mladšej doby bronzovej, staršej i mladšej doby železnej a z mladších období.

V prípade poľských Tatier je situácia odlišná. Hlavný jaskyniar 19. stor. G. Ossowski sa snažil do vtedajšieho výskumu zahrnúť tiež tatranské jaskyne. Tak pre neho, ako aj pre jeho archeologických nasledovníkov v 30. rokoch 20. stor. sa tieto pokusy skončili s negatívnym výsledkom. Objektom záujmu archeológov bola od polovice 19. stor. jaskyňa Magura v poľských Tatrách, v ktorej sa neúspešne hľadali stopy prítomnosti pravekého človeka. Napriek odvolávaniu sa na vtedajšie vedecké authority, údajne kostené a kamenné artefakty z tejto jaskyne sa nakoniec

nepotvrdili. Téma pravekého osídlenia v poľských Tatrách je tak dodnes prakticky uzavretá.

Pri speleologických prácach sa neraz, hoci náhodne a s iným zámerom (prednostne objav nových priestorov), objavujú pozoruhodné archeologické nálezy. Preto sa ako ideálna ukazuje spolupráca jaskyniarov s archeológmi. Na sklonku r. 2018 sa podarilo M. Sojákovi v jaskyni Hučivá diera v Belianskych Tatrách (k. ú. Tatranská Lomnica) objaviť v profile jaskyniarskeho výkopu prvé praveké artefakty (Soják/Valde-Nowak 2019; 2021). Autori predloženého príspevku ich predbežne zaradili do magdalénienského technokomplexu (Valde-Nowak/Soják 2018).

Jaskyňa s celkovou dĺžkou 16 m sa nachádza v nadmorskej výške 936 m, v skalnom brale na južnom svahu Kobylieho vrchu (1109 m n. m.) v Belianskych Tatrách, v blízkosti „Šumivého prameňa“ (Rausch Quelle; obr. 2: 1). Vyvinula sa v ramsauských dolomitoch (trias, fatrikum) na zlomovej diskontinuite, ktorá predurčuje vznik horizontálnej jaskynnej chodby s vysokým stropom. Portálový

vchod trojuholníkového tvaru so základňou približne 4 m a výškou viac ako 2 m je reliktom horizontálnej (freatickej) jaskynnej chodby s dĺžkou 10 m (obr. 1: 3–5). Na konci jaskynnej chodby, kde sa nachádza miesto výkopu archeologického profilu, sa strop jaskyne prudko dvíha a pokračuje až k vrcholovej plošine vertikálnym komínom (obr. 1: 6). Úzky komín je vo vrchnej časti dnes už zatarasovaný skalami a zeminou, čo bráni jeho otvoreniu na povrch. Známkys mrazového zvetrávania dokumentujú úlomky hornín a gravitačný rozpad, nahromadené v jaskyni a v jej blízkosti. Odtrhové plochy skalného rozpadu sú v súčasnosti zahladené zvetrávaním a rozpúšťaním presakujúcou vodou. Možno predpokladať, že v čase využívania jaskyne človekom bol uvedený komín otvorený a mohol tak odvádzať z jej interiéru dym z ohniska.

Archeologický ústav SAV, v. v. i. a Archeologický ústav Jagelovskej univerzity v Krakove podnikli v r. 2019 prvé záchranné práce, ktoré pokračovali ako systematický archeologický výskum v r. 2022 (Soják et al. 2019; Soják/Valde-Nowak 2019; 2021; Valde-Nowak et al. 2022) a 2024. Počas výskumu sa detailne dokumentovali kamenné a iné artefakty, kosti a rastlinné mikrofosílie. Jaskynné sedimenty sa odkrývali v tenkých vrstvách (5 cm), pričom sa skúmala sieť o veľkosti 0,25 m², tvoriaca základnú výkopovú jednotku. Celý sediment sa preosieval za mokra na sitách s veľkosťou ôk menšou ako 1 mm (obr. 2: 2). Sedimenty sa skúmali v dvoch výkopoch. Jeden z nich sa nachádzal vo vstupnom otvore – v mieste, kde sa naplánovala a nakoniec aj realizovala (r. 2020) inštalácia vstupnej uzamykateľnej kovovej mreže. Doteraz boli sedimenty preskúmané na ploche približne 20 m², do hĺbky 250 cm. Skalné dno nebolo dosiahnuté v žiadnej časti výkopu.

Výkopové práce umožnili rozpoznať stratigafiu s deviatimi hlavnými hlinito-kamenitými vrstvami, pričom vrstva 6 má niekoľko variantov. Vrchné vrstvy 1–4 vznikli v holocéne. Vrstva 1 je novoveká udupaná vrstva a pozostatky speleologickej haldy. Našli sa v nej dve mince Slovenského štátu a nábojnica z 2. svetovej vojny. Vrstvy 2 a 3 obsahujú nepočítaný včasnónovoveký keramický materiál, ktorý súvisí s horizontom 16. stor. Vrstva 4 je prechodná. Paleolitické artefakty spočívali vo vrstvách 5–8, ale ich hlavný výskyt sa viaže s vrstvou 6a, ktorá reprezentuje stopy po väčšom ohnisku. Vrstva 9 – ílovito-hlinitá, tmavozltej farby – je archeologicky i paleontologicky sterilná a vznikla pravdepodobne v LGM (obr. 3).

Z uhlíkov pochádzajúcich z ohniska sa získali dve AMS dáta: 12190 ± 60 BP (Poz-114742: 12316–11896 cal BC) a 12160 ± 60 BP (Poz-114743: 12260–11868 cal BC). V uvedenom ohnisku sa našla aj čeľuť kozorožca, ktorej absolútny vek je 12160 ± 60 BP (Poz-126122: 12270–11860 cal BC). Z jamy 6b susediacej s ohniskom boli získané ďalšie dve dáta z uhlíkov 12280 ± 60 BP (Poz-162378: 12542–12108 cal BC) a 12200 ± 50 BP (Poz-162379: 12367–12065 cal BC), čo poukazuje na súvekosť s ohniskom, ktorá je dodatočne potvrdená stratigraficky. O niečo skorší dátum bol získaný z konskej čeľuste, nájdenej mimo výkopu v hlbšej časti západnej jaskynnej chodby, ktorá sčasti zasintrovaná vyčnievala z nepreskúmaného sedimentu; jej absolútny vek je 12400 ± 50 BP (Poz-154006: 12920–12258 cal BC). Všetky tieto údaje poukazujú na interštadiál bölling (GI 1e).

Vzorka uhlíkov z vrchnej kultúrnej vrstvy č. 2 poskytla včasnónovoveké datovanie, ktoré zodpovedá získanej

tenkostennej keramike z tejto vrstvy 365 ± 30 (Poz-156266: 1453–1635 cal AD).

Južný profil (na hranici metrov A a B) bol vybraný ako najrelevantnejší pre účely stratigrafie a environmentálneho výskumu (obr. 3). Jeho doplnenie o podlahové časti sa uskutočnilo v sezóne 2024 (obr. 4).

Výsledkom dvoch výskumných sezón je 812 ks získaných kamenných artefaktov. Ich surovinové určenie je v niektorých prípadoch ťažko určiteľné kvôli patine. Časť bola vyrobená z rádiolaritu (77,83 %), ale vyskytujú sa tiež artefakty zo surovín, ako sú rôzne pazúriky z územia Poľska a Volýne (19,95 %), limnosilicít zo stredného Slovenska alebo z pohraničia medzi severným Maďarskom a Slovenskom (*Kaminská zost. 2014*), ako aj rohovec typu Stránska skála (minimálne jeden kus) z oblasti Moravy (*Bartík et al. 2019*). Podiel jednotlivých pazúrikových odrôd je nasledovný: jurský podkrakovský – 41, čokoládový – 26, typ Bircza – 11, volýnsky – 4, neurčený – 80 kusov. Pazúrik typu Bircza je pokladaný za dobrý indikátor magdalénieniu v jeho východnej provincii. Na zmenu pôvodných vlastností silicítových výrobkov mala okrem úložných pomerov vo vlhkých jaskynných sedimentoch vplyv aj blízkosť ohňa. Mnohé vzorky vykazujú stopy menšieho či väčšieho prepálenia, čo má za následok zmenu lesku, textúry a poškodenie štruktúry horniny.

Medzi touto pozoruhodnou čepeľovou industriou sa vyskytli 3 jadrá, 108 úštepov (bez mikrouštepov), 162 čepeľí a 103 nástrojov. Jadrá sú mimoriadne vyťažnené. Napriek tomu vždy reprezentujú čepeľovú technológiu. Všetky jadrá sú jednopodstavové a so zmenenou orientáciou. Jedno z jadier má tvar plochej formy vyrobenej pravdepodobne na masívnom ústepe. Zachovalo sa v extrémne exploatovanej podobe (obr. 5: 1). Ďalšie možno považovať za mikroformu so znakmi kónického tvaru a je vo veľmi pokročilom štádiu používania (obr. 5: 2). Na treťom možno sledovať stopy po opakovanom neúspešnom oddeľovaní úštepov v podobe tzv. závesu (obr. 5: 3). Pri hodnotení použitej technológie možno zdôrazniť vysokú technickú úroveň. Uhol jadra sa postupne zdokonaľoval, o čom svedčia negatívy na úderovej ploche. Bežne sa používalo mäkké kladivo. Čepele často reprezentujú bodovú pätku s rímsou – *en éperon*. Objavujú sa aj odštiepované/redukovvané pätky na čepeľiach a čepeľkách. Maximálne využitie týchto exemplárov je pôsobivé.

Najcharakteristicjšími nástrojmi sú hroty (obr. 6). Niektoré z nich pripomínajú hroty s vrubom (*Bohmers 1956; Maier 2015*), ako aj exempláre podobné masívnym trojuholníkom typu Creswell (*Stapert 1985*). Jeden exemplár možno pokladať za hrot typu Cheddar (*Barton et al. 2003*). Nachádzajú sa tu aj priebojníky, vrátane silne opotrebovaného exemplára s nachýleným trňom typu Zinken. Pritomné sú aj čepele so šikmo retušovaným koncom. Dôležitá je skutočnosť, že sú prítomné i čepeľky s otupeným bokom.

Štatistiku v skupine nástrojov možno prezentovať nasledovne: hroty – 31, rydlá – 6, čepele s otupeným bokom – 17, kombinované (koncové škrabadlo + jemný priebojník) – 2, priebojníky a vrtáky – 20, retušované čepele – 18, mikročepele s otupeným bokom – 9, koncové škrabadlo – 1, nástroj s vrubom – 1 kus.

V sezóne 2019 bola v jaskyni Hučivá diera objavená jedna ulita (obr. 7: 4). Ide o fosílnu miocénnu ulitu druhu *Tiaracerrithium pictum* (*de Basterot 1825*), veľmi variabilného a v Paratethyskom mori hojne rozšíreného druhu ulitní-

ka, známeho z mnohých lokalít v Poľsku, na Slovensku a Morave (Harzhauser/Guzhov/Landau 2023, 144–153). Exemplár je perforovaný dvoma podobne vyhotovenými otvormi. Takmer identický exemplár, rovnako perforovaný dvoma otvormi, bol v skúmanej jaskyni nájdený v sezóne 2024.

Z ohniska pochádza jedna celá (zachovaná v dvoch fragmentoch) a dva ďalšie zlomky kostenej ihly (obr. 7: 2, 3). Pozornosť si zasluhuje fragment mierne prepáleného pieskovcového artefaktu, ktorý s najväčšou pravdepodobnosťou predstavuje lampu na svietenie. Na jej vnútornej ploche sa zistili nepatrné stopy neznámej organickej substancie (obr. 7: 6). Takéto či blízke lampy sú neoddeliteľnou súčasťou magdalénienskej kultúry aj na území Poľska, napr. v Čmielowe (Paczkowski 2020; Paczkowski/Przeździecki 2021) a Wilczycach (Kowalski 2014). Súčasťou inventára je kostené šidlo (obr. 7: 1) a nástroj z kosti rysa, ktorý je výrazne opracovaný; jeho hrot je zatupený, čo svedčí o intenzívnom používaní (obr. 7: 5). Zo sezóny 2019 nechýbajú viaceré hrudky analyzovaného okrového farbiva.

Vo všetkých vrstvách sa našli zvieracie kosti a zuby. Najviac sa ich vyskytlo v kultúrnych vrstvách 6 a 6a, ako aj vo vrstve 5. Pozostatky patria cicavcom (bolo určených viac ako 25 taxónov) a vtákom (viac ako 15 druhov), ktoré dopĺňajú menej početné obojživelníky a vzácné slimáky. Celkovo bolo na úrovni druhov alebo rodov identifikovaných takmer 500 pozostatkov malých a veľkých cicavcov a bezmála 370 kostí vtákov. Spomedzi väčších cicavcov, ktoré boli lovené magdalénienskými lovcami, prevládajú vo fosílnych súboroch kultúrnych vrstiev 6, 6a, 6b a vrstvy 5 fragmenty kostí a zuby kozorozca alpského (*Capra ibex*), pričom na niektorých kostiach sú prítomné početné stopy po rezoch (obr. 8: 1, 3). Pozostatky divých koní (*Equus ferus*) boli menej početné, ako aj stopy po intencionálnych zásahoch. Identifikované zostali tiež kamzíky (*Rupicapra rupicapra*; obr. 8: 2) a jelene (*Cervus elaphus*), kým daniela (*Dama dama*) a zubry (*Bos primigenius*) boli zastúpené len ojedinelými exemplármi. Pozostatky mäsožravcov sú doložené medveďom hnedým (*Ursus arctos*), líškou obyčajnou (*Vulpes vulpes*), rysom ostrovidom (*Lynx lynx*) a najmenej štyrmi druhmi z čeľade lasicovitých (*Mustelidae*). Najpočetnejšie pozostatky patria medveďovi hnedému. V jaskyni Hučivá diera sú drobné cicavce zastúpené 12 taxónmi hlodavcov a hmyzožravými cicavcami (krtkovi, netopiere a vretenica), ale ich pozostatkov sa našlo málo.

Skúmaný sediment z jaskyne sa vyznačoval nízkou frekvenciou peľu a zároveň nízkou taxonomickou diverzitou sporomorfov, medzi ktorými bolo determinovaných len 36 taxónov (vrátane 9 taxónov kryptogamov). Na základe taxonomického zloženia a frekvencie hlavných morfológických typov peľu boli v schéme vyčlenené dve peľové sekcie. Starší peľ reprezentujúci neskorý glaciál sa vyznačoval prevahou peľu borovice lesnej typu *Pinus sylvestris* (prípadne zahrňal aj peľ kosodreviny *Pinus mugo*; až 64 %) a smreka obyčajného (*Picea abies*; až 14 %), ako aj veľmi vysokou frekvenciou peľu bylín. Spomedzi stromových taxónov sa zistil riedky peľ typu *Pinus haploxydon* (pravdepodobne reprezentujúci borovicu limbovú; *Pinus cembra*; do 2 %), brezy (*Betula*; 1,1 %), ako aj borievky (*Juniperus*; 0,7 %). Podiel nelesného peľu (22–72 %; v priemere 46 %) bol vysoký a pozostával najmä zo zástupcov podčeľade *Cichorioideae* (až 67 % vo vzorke 9), tráv (*Poaceae*;

do 6 %), ostrice (*Cyperaceae*; do 6 % a *Epilobium*; do 4 %). Mladšia peľová zóna predstavuje holocén, ktorý odhaľuje úplne iný obraz vegetácie. Frekvencia peľu stromov bola oveľa vyššia. V spektrách spoluvládol peľ smreka obyčajného (až 48 %) a borovice lesnej (v priemere 40–57 %). Stanovený bol aj peľ jedle (*Abies alba* do 9 %). Zastúpenie peľu listnatých drevín vrátane mezofilného duba, brezy (*Betula*), liesky (*Corylus avellana*), lipy (*Tilia cordata*) a jelše (*Alnus*) bolo nízke a len vo vzorke 5 dosiahlo celkovo 7 %.

Uhlíky a zvyšky drevín boli silne degradované, sklovité, často penetrované vápenatým plastickým sintrom a zriedkavo presahovali veľkosť 2 mm. To sťažovalo taxonomické určenie, čo viedlo k medzidruhovému (napr. *Salix/Populus*) a pravdepodobnému určeniu (por. *Juniperus*) alebo širšej kategórii taxónov (napr. listnaté, ihličnaté). Pri hodnotení sa taxóny určené s pravdepodobnosťou kombinovali s určeným taxónom (napr. *Salix* a cf. *Salix*). Taxonomicky určených 500 fragmentov uhlíkov a mineralizovaného dreva predstavuje jednu tretinu súboru, z ktorých jedna tretina bola priradená k rodom alebo druhom.

Doterajšie nálezy v jaskyni Hučivá diera sú komplexné a prinášajú nový pohľad do viacerých vedných disciplín.

Význam získaných výsledkov spočíva predovšetkým v tom, že ide s najväčšou pravdepodobnosťou o jednu fázu osídlenia tohto miesta ľuďom magdalénienskej kultúry. Nevedno posúdiť či išlo o jeden súvislý pobyt skupiny lovcov, alebo o niekoľko pobytov v jednom alebo viacerých obdobiach. Jedným zo znakov opakovaného navštevovania jaskyne je pravdepodobne prítomnosť klastickej akumulácie vápenca v rámci vrstvy 6. Táto akumulácia odráža sedimentačný hiát, ktorý rozdelil vrstvu 6 na tri sedimentačné stupne. Spodná a vrchná časť odráža prítomnosť človeka v dôsledku akumulácie drevených uhlíkov, zatiaľ čo samotná akumulácia je výsledkom prirodzeného prepadu stropu. Tento typ sedimentácie je typický pre koniec najchladnejších období v jaskynnom prostredí (Nejman et al. 2018). Jedinou vrstvou vykazujúcou podmienky LGM, ktorá sa odráža v šošovkovitej mikroštruktúre, je vrstva 9. Takáto mikroštruktúra je typická pre procesy zmrazovania/rozmravovania (Vliet-Lanö 2010) a podobná bola pozorovaná napríklad v LGM vrstvách jaskyne Kúlňa v Moravskom kráse (Lisá et al. 2013) alebo jaskyne Pod hradom (Nejman et al. 2018). Napriek tomu máme z hľadiska archeologickej periodizácie a s prihliadnutím na mimoriadne prísne výsledky AMS datovania dôvod považovať získané artefakty za homogénnu skupinu. Na vrchole sekvencií nezabúdame ani na včasnónovoveké a neskononovoveké stopy osídlenia z obdobia 2. svetovej vojny.

Pri pohľade na inventár kamenných artefaktov je potrebné zdôrazniť extrémne redukovanú dielenskú časť. Iba tri nájdené jadrá vo veľmi používanej podobe sú dokladom výrazného obmedzenia možnosti obnovy inventára jeho užívateľmi. Na spektrum surovín zreteľne poukazuje aj výrazná skupina pazúrikových nástrojov, teda zo surovín dovezených zďaleka. Keďže všetky tri nájdené jadrá sú vyrobené z miestneho rádiolaritu a nie z pazúrika, možno konštatovať, že pazúrikové čepele sú pozostatkom pôvodnej výbavy lovcov, s ktorou prišli do tatranskej oblasti, a ktorá bola následne obnovená s použitím miestnych surovín, najmä rádiolaritu.

Vlastnosti série kamenných hrotov sú mimoriadne osobité. Nie je ľahké nájsť o nich zmienky v inventároch

východnej magdalénienskej provincie (Bobak/Połtowicz-Bobak 2018). Nepoznáme ich ani z Moravy (napr. Kapustka et al. 2023) a tiež z niekoľkých slovenských lokalít, ktoré sú považované za magdalénienske (Kaminská zost. 2014, 288–296; Valde-Nowak/Soják/Wąs 2007). Pri hrotoch z Hučivej diery sa možno odvolať na J. B. Campbellov (1977) návrh označovania nástrojov, ktoré sú blízke hrotom s vrubmi, ale sú od nich odlišné. Ide o hroty Creswellienu (Campbellov typ AC I). V inventároch súvisiacich s creswellskou tradíciou prevládajú z našej jaskyne exempláre vo všeobecnosti podobné hrotom s vrubom, ale bez zvýrazneného vrubu, ako to možno vidieť na hamburských hrotoch (Burdukiewicz 1987; Kabaciński/Sobkowiak-Tabaka 2012; Weber 2009; 2012) a tiež, hoci sa vyskytujú zriedkavo, hroty magdalénienske, známe napr. z lokalít Etdorf (Pasda 2018) a Petersfels (Albrecht 1979; Maier/Liebermann/Pfeifer 2020) a na niektorých švajčiarskych náleziskách, ako je Schweizerbild (Höneisen/Peyer 1994). Viac-menej typické hroty s vrubom typu A2 podľa J. M. Burdukiewicza (1987) boli rozlíšené aj v inventári z Hučivej diery, aj keď v menšom počte ako typické creswellské artefakty.

Stojíme tu pred klasickým problémom chápania magdaléniensko-hamburských vzťahov, v ktorom je účasť hrotov s vrubom primárnym prvkom. Možno pripomenúť, že kľúčovým prvkom pre rozlíšenie hamburských magdaléniencov je absencia retušovaných čepeľových hrotov v hamburských komplexoch (Weber 2012, 28). Prítomnosť čepeľok s otupeným bokom v inventári z Hučivej diery je jedným zo silných indikátorov magdalénienskej príbuznosti nálezov. Okrem náhodného výskytu jedného exemplára blízkeho typu Creswell z Kruczej Skaly, hoci ten bol takto pomenovaný (Cyrek/Sudoł-Procyk/Czyżewski eds. 2020), a o niečo väčšej série hrotov s vrubom v magdalénienskom kontexte z lokality Wrocław Żerniki (Burdukiewicz et al. 2013), nemáme z východomagdalénienskej provincie prakticky žiadne iné analogické nálezy.

Za zmienku stojí aj nálezisko Rydno II/59, kde bol objavený jeden podobný artefakt (Schild et al. 2011, 124, 125, obr. 103). Pred mnohými rokmi bol tento typ hrotu zaznamenaný v inventári z podhoria Tatier, konkrétne z lokality Podczerwone v Podhali, a zaradený do magdalénienskej kultúry. Po rokoch sa ukázalo, že na úpätí Tatier sa nachádza viac stôp, ktoré nezapadajú do poľského obrazu magdalénienskej kultúry. Na prvom mieste možno spomenúť lokalitu Sromowce-Wyżne „Kąty“ (Valde-Nowak 1991) s početnými nálezmi štiepanej kamennej industrie a s minimálne jedným creswellským hrotom z čokoládového pazúrka. Prebiehajúce vykopávky v jaskyni Obłazowa (západný vchod) priniesli aj skromný kamenný inventár foriem podobných čedarským hrotom (Valde-Nowak et al. 2018). Hroty typu Cheddar nie sú známe z magdalénienskych sídlisk na Morave a vo východnom Nemecku. Sú sústredené v juhovýchodnej časti Britských ostrovov a v Holandsku (Barton et al. 2003). Z južného Nemecka je známy jediný prípad z jaskyne Hohle Fels (Taller/Bolus/Conard 2012).

Celkové vyhodnotenie získaného inventára vedie k celkom zjavným záverom, že v prezentovanej jaskyni máme stopy pôsobenia špecializovanej skupiny lovcov, zamieranej najmä na lov a spracovávanie ulovených kozorožcov priamo na mieste. Spomínaný komín na konci komory, tesne nad ohniskom, poukazuje na vedomé plánovanie priestoru táboriska. Ten zabezpečil účinné vetranie pri

použití ohňa. Bez neho by veľké ohnisko v zadnej časti jaskyne nebolo možné používať (Kedar/Kedar/Barkai 2019).

Analýza sintrových povlakov vedie k záveru, že získané hasené vápno s chemicky aktívnymi vlastnosťami by sa dalo použiť pri činení kože. Prítomnosť pozostatkov koní, ale aj druhov, ktoré sú pre vysokohorské prostredie cudzie, napr. labute, dáva podnet na zamyslenie.

Niektoré pozorovania naznačujú, že krajina neskorého pleistocénu využívaná ľuďmi obývajúcimi jaskyňu Hučivá diera bola otvorená so stromami (možno drobnými, kríkovými), zoskupenými v chránených polohách a pozdĺž vodných tokov. Tento obraz možno porovnať so situáciou lokalít na hranici Švajčiarska s Nemeckom (Leesch/Bullinger/Müller 2019).

Za predpokladu, že získaný palynologický obraz vegetácie nie je výsledkom náhodného importu peľu spojeného výlučne s aktivitou paleolitických lovcov využívajúcich jaskyňu, ten môže naznačovať významnú úlohu voľnej stepnej vegetácie.

Nález a komplexné analyzovanie pozostatkov ľudskej činnosti v tatranskej jaskyni na konci mladého paleolitu má viacero paleogeografických poznatkov a poukazuje na dynamiku procesu rekolonizácie po klimatickej kríze LGM.

Sedimentárny profil vyhlbený v jaskyni Hučivá diera ponúkol zaujímavý pohľad na vznik sedimentov na prechode glaciálu/interglaciálu a holocénu. Obdobie ľadovej doby je zaznamenané na sprašových hlinách, ktoré makroskopicky a geochemicky zodpovedajú spraši. Mikromorfológia odhalila znaky procesov zmrazovania/rozmravovania, ktoré sú typické pre pleniglaciál, ide však o postsedimentárny proces, ktorý ovplyvnil už uložený materiál.

Tvorba jaskynnej výplne pokračovala aj na samom konci doby ľadovej, keď zo stropu jaskyne vymrzala masa vápencových blokov a jej steny začali padať na jaskynné dno. Viac-menej súčasné je prítomné magdaléniensko osídlenie jaskyne. Ľudskú prítomnosť zvyrazňuje preskúmané ohnisko plné uhlíkov, spálených kostí a popola.

Jaskyňa sa nachádza vo vysokohorskom pásme, ktoré sa v bölingskom oteplení po úpadku najstaršieho dryasu náhle sprístupnilo lovcovi i faune.

Pri pohľade na magdaléniensku kolonizáciu (Połtowicz-Bobak 2013) možno poznamenať, že niekde v tejto zóne sa nachádza južná hranica kolonizácie tejto jednotky. Na juhu leží tiež otvorená lokalita na pravom brehu rieky Poprad v Starej Lubovni (Valde-Nowak/Soják/Wąs 2007). Materiály zo starších nálezov v jaskyni Gudenus v Dolnom Rakúsku (Obermaier/Breuil 1908) pravdepodobne súvisia s kultúrou magdalénien, sú však zo staršieho obdobia ako súvrstvie z Hučivej diery. Samostatným problémom je vzťah medzi kultúrami epigravettien a magdalénien v puvodí stredného Dunaja a hornej Visly (Lengyel et al. 2021; Wiśniewski et al. 2017).

Zastúpenie fauny v Hučivej diere indikuje skupinu lovcov z dunajskej skupiny, ktorá sa tiahne od švajčiarsko-nemeckých hraníc až po Francúzsko (McCartin/Starkovich/Conard 2023). V lokalitách tejto skupiny je okrem sobov a koní potvrdený lov kozorožca (Capra), ktorý však nie je hlavným druhom lovej zveri. Výrazná osobitosť objavených foriem hrotov, ktoré len zdanlivo predstavujú hroty s vrubom, sú výraznými typmi creswellských foriem, dokladajúcich medziskupinovú diferenciáciu magdalé-

nienských skupín, ako aj dynamiku kontaktov a dokonca pohyby na veľké vzdialenosti.

Najjednoduchším vysvetlením originality inventára z jaskyne Hučivá diera môže byť rázovitost' prostredia v okolí jaskyne, ktorú možno na mikroúrovni definovať ako vysokohorskú periglaciálnu oblasť. Originalitu dokazuje aj jednoznačné zameranie lovcov na alpské kozorožce. Nemožno celkom vylúčiť, že jaskyňa bola miestom garbiarskeho spracovania kožušín ulovených zvierat. Mnohé rezné stopy na kostiach potvrdzujú porciovanie tiel zvierat a početné hrudy vápna vedú k záveru, že kože

sa tu spracovávali haseným vápnom. Tento aspekt by sa mal v budúcnosti analyzovať.

Opakovane skúmané výsledky datovania lokalít z rôznych fáz vývoja magdalénieniu a viac či menej podrobné závery týkajúce sa dynamiky osídlenia sú v podstate konzistentné a poukazujú na fázu GRIP GI-1e ako na dobu rozširujúceho sa magdalénieniu (Miller 2012) a súčasného vzniku kultúrnych jednotiek Creswellien a Hamburgien. Jaskyňa Hučivá diera je súčasťou tohto nárastu aktivity magdalénieniu v mladšej časti tejto böllingskej klimatickej fázy.

Obr. 1. Jaskyňa Hučivá diera. 1 – celková poloha; 2 – poloha na mape Slovenska; 3 – plán jaskynnej komory s vyznačeným výkopom žltou farbou na pozadí metrovej siete; 4 – vchod do jaskyne; 5 – celkový pohľad na preskúmanú sondu (profil) v sezóne 2022; 6 – pozdĺžny rez jaskyňou ako výsledok 3D skenovania. Kresba J. Sklucky, sken M. Cheben.

Obr. 2. 1 – celkový pohľad na Belianske Tatry z obce Lendak s približnou polohou jaskyne Hučivá diera (šípka) v masíve Kobyliho vrchu (1109 m), v pozadí Lomnický štít (2634 m; foto P. Valde-Nowak); 2 – preplavovanie sedimentov z jaskyne Hučivá diera v potoku Biela (foto M. Soják).

Obr. 3. Jaskyňa Hučivá diera. Priečny rez jaskynnými sedimentmi (stav 2022) s očíslovanými vrstvami a polohou vzoriek pre AMS datovanie. Legenda: a – kamenné artefakty; b – prepálené kamenné artefakty; c – zvieracie kosti. Grafická úprava J. Sklucky.

Obr. 4. Jaskyňa Hučivá diera. Priečny rez jaskynnými sedimentmi (stav 2024). Foto P. Valde-Nowak.

Obr. 5. Jaskyňa Hučivá diera. Jadrá z rádiolaritu. Kresba J. Chowaniak, foto J. Sklucky.

Obr. 6. Jaskyňa Hučivá diera. Výber kamenných artefaktov. 1–3, 6–9 – creswellské hroty; 4, 5 – hroty s nevýraznými vrubmi; 10 – čedarský hrot; 11, 13, 14 – priebojníky;

12 – priebojník typu Zinken; 15 – vrták; 16 – čepeľ so šikmo retušovaným koncom; 17, 18 – rydlá. Kresba J. Chowaniak.

Obr. 7. Jaskyňa Hučivá diera. 1 – kostené šidlo; 2, 3 – kostené ihlice; 4 – prevrtaná mušľa ako ozdoba; 5 – silne vyleštený kostený nástroj (priebojník alebo šidlo) s viditeľnou sériou paralelných diagonálnych rezov; 6 – opracované fragmenty pieskovcovej lampy. Kresba J. Chowaniak, U. Bąk, foto J. Kurzawska, J. Sklucky. Mierka: a – 1–5; b – 6.

Obr. 8. Jaskyňa Hučivá diera. 1 – ľavá dolná čeľusť kozorožca alpského (*Capra ibex*) so zubami od tretieho premoláru po tretiu stoličku, pohľad z líčnej strany; 2 – proximálny falang kamzíka (*Rupicapra rupicapra*), pri detailnom pohľade je vidieť poškodenie spôsobené hľodaním hľodavcami (paralelné ryhy); 3 – fragment ľavej čeľustnej vetvy kozorožca alpského (*Capra ibex*) s početnými reznými stopami na líčnej a zadnej strane a so stopami po ohľodaní predátormi (vpichy na korunkovom výbežku); 4 – fragment rebra stredne veľkého cicavca so stopami po rezaní na jednom konci (početné škrabance na pravom konci a hladký rezný povrch) a stopami po ohľodaní predátormi na druhom konci (vpichy a vrúbkovaný okraj na ľavom konci). Foto a grafická úprava K. Wertz. Mierka: a – 1, 3; b – 2, 4.

PREFORMED AND PERFORMED

On the Pedestalled Bowls with Perforated Bottoms in the Lengyel Culture

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JOVAN KOLEDIN – ADELA KOVACS – DRAGAN MILANOVIĆ

*'The sons pass by this writing,
but you, my distant grandchild, will read it...'* (C. K. Norwid)
to Mr. Maciej Rajewski

This short essay concerns a very curious type of artefact of the Lengyel culture which is a pedestalled bowl with a perforation drilled centrally in the bottom of the vessel. Such a ceramic form occurs in a quite narrow chronological horizon at the very beginning of the Eneolithic in the western Pannonian region and neighbouring regions, hence appearing as a phenomenon limited both in time and space. We made an effort to set this intriguing ceramic utensil in a broader prehistoric socio-economic context. In our pursuit to an answer to the question on the genesis of these phenomena, we came to a bold hypothesis that connects the presence of such vessels in the early Eneolithic of Transdanubia and culturally related areas with a stimulus diffusion of a ritualistic idea of 'bottomless' pedestalled bowls from the western Black Sea coastal area. It is argued that the expedient form of the ritual bowl is an expression of thrifty pottery production *habitus* of women encultured within the *milieu* of the late Lengyel culture.

Keywords: Central Europe, Eneolithic, Lengyel culture, pedestalled bowls with perforated bottoms, thrifty production practices.

INTRODUCTION

While the interest in prehistory arose from contemplation of poorly organised relics of bygone times collected in cabinets of curiosities, morphological and functional classifications of prehistoric movable artefacts became one of hallmarks of the professionalisation of archaeology as an academic discipline in the 19th and the first half of 20th c. Nevertheless, even when studying archaeological collections nowadays, it happens to reach some corner of the primary unclassified *Wunderkammer* and find items that do not easily fit into the already established conceptual schemes. This short essay addresses one of such increasingly rare curious types of artefacts.

In the course of the assessment of prehistoric materials discovered in 2016–2022 at the Kraków-Nowa Huta-Zesławice 88 site (Chmielewski 2023), several similar fragments of rather unique vessels were found in a large collection of Lengyel culture potteries. These were hollow pedestals of bowls with single holes drilled in the bottoms of the already broken-off containers (Fig. 1). Although the author of the cited report knew of some analogous

finds, he was also aware that these had never been described and studied comprehensively before. Since the general prehistoric knowledge and intuition made him suppose that the prehistoric phenomenon related to these finds was of an inter-regional scale, covering not only western Lesser Poland and a large part of the Carpathian Basin but possibly also eastern and central parts of the Balkan Peninsula, he decided to discuss the question with other archaeologists. These consultations have led to cooperation with two colleagues – one (Judit P. Barna) specialised in research on the Lengyel culture in the Pannonian Basin, and another (Adela Kovacs) involved into studies on Neolithic and Eneolithic of the area to the east and south-east of the Carpathian arch. Later on, the little intellectual venture was joined by two scholars specialised in the prehistory of the central and northern part of the Balkan Peninsula (Jovan Koledin and Dragan Milanović). The team effort allowed us to define the phenomenon in terms of typo-, choro- and chronology. As a result, we can present a bold hypothesis on the genesis and social context of the phenomenon that is to trigger a wide discussion on the issue.

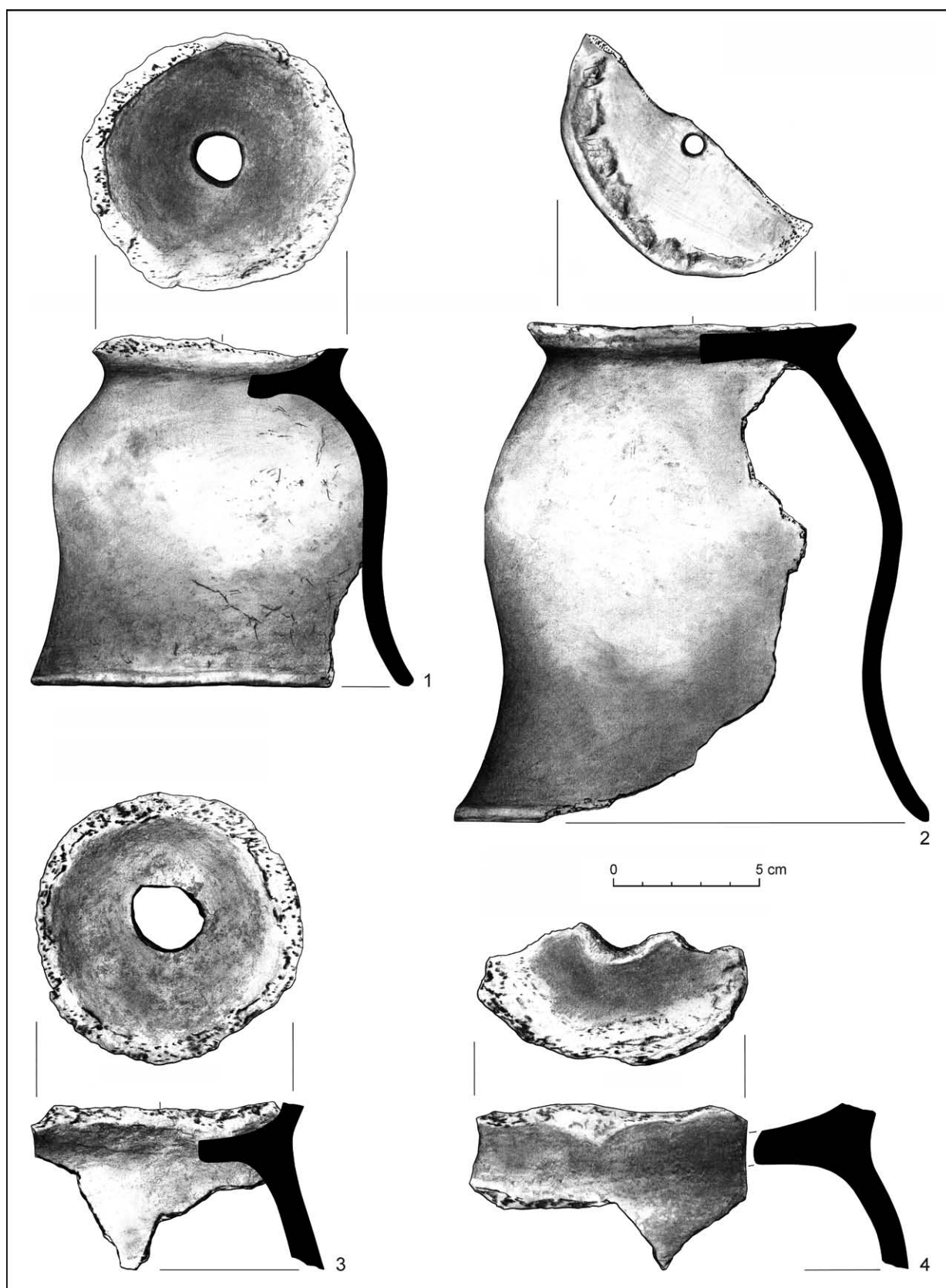


Fig. 1. Kraków-Nowa Huta-Zesławice 88. Lengyel culture pedestals of bowls with perforated bottoms. Drawing N. Lenkow.

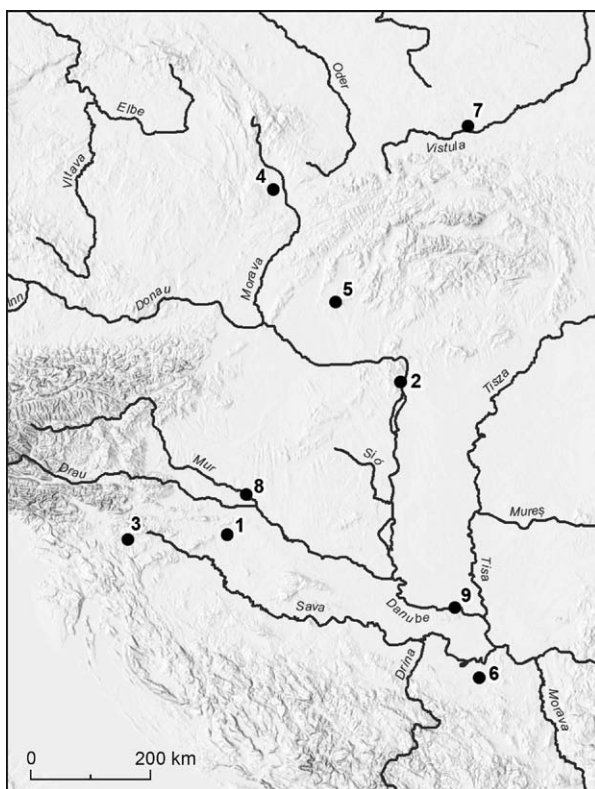


Fig. 2. Lengyel culture sites that yielded finds of pedestalled vessels with perforated bottoms. The sites are numbered and ordered alphabetically. For details see Tab. 1. Graphics M. Zawadzki.

CHRONO- AND CHOROLOGICAL DEFINITION

The contexts in which the pedestaled vessels with perforated bottoms occur in the Lengyel culture clearly indicate the existence of a spatially and temporally limited phenomenon.

Referring to the phasing of the Lengyel culture developed by J. Pavúk (cf., e.g., Čížmář *et al.* 2004; Pavúk 2000), all these finds – except for the slightly older pedestal of a bowl found in Čatež-Sredno polje – can be firmly dated to its IV phase, viz to the first stage of the Eneolithic in the Western Pannonian region and related areas.

All the Lengyel culture finds we have gathered (Fig. 2) concentrate in the Middle Danube catchment area and neighbouring basins of Upper Morava and Upper Vistula. At least at the moment, similar finds are not known from the western peripheries of the Lengyel complex, i.e., from the Austria, Bavaria,

Bohemia or Silesia. Thus, their occurrence clearly corresponds with the spread area of the Balaton-Lasinja and the Ludanice group, as well as regions under their strong influence, such as the Modlnica group in the south-western part of Lesser Poland (Tab. 1).

MORPHO-STYLISTIC AND FUNCTIONAL DEFINITION

Almost all the discussed ceramic finds of the late Lengyel culture were discovered as intact or distinctive fragments of vessels on bell-shaped pedestals, which belong to *fossiles directeurs* of the above mentioned Eneolithic groups of the late Lengyel culture in the Pannonian and peri-Pannonian area (cf., e.g., Dimitrijević 1979, 154, pl. XX: 3; XXI: 1; Horváth/Simon 2003, 111, 112, fig. 22: 16; Kalicz 1991, fig. 8; 17; 18; 1995a, fig. 3: 12; Pavúk 2000, 10, fig. 4: 19; 2023, 122, fig. 63: 8, 14; 65: 1b, 2) as well as the south-western part of Lesser Poland (cf., e.g., Kamińska/Kozłowski 1990, 53, pl. 25: 1, 3, 7). The only exception is the slightly older low conical pedestal from Čatež.¹

Regrettably, only two of the discussed vessels have their containers preserved. One comes from remains of the Ludanice group settlement discovered at the Dobogókő street in Budapest (Fig. 3).² Leaving aside the perforation, certain metrical and morphological attributes make this pot uncommon. Firstly, if compared with other pedestalled bowls from the time, the discussed vessel turns out to be very small. Secondly, the container has been shaped into ‘a crown’ with four symmetrically placed projections rising above the rim. Although similar bowls infrequently occur on contemporaneous sites of the Ludanice group and have even been found at other sites in Budapest (cf. Horváth 2003, fig. 2: 1), they do not match the pottery canon of the Ludanice culture. The other completely preserved vessel of the kind was found at the site Kalenić-Livade in Serbia (Fig. 4) together with pottery typical for the Krivodol-Sălcuța-Bubanj and Balaton-Lasinja cultures. Also in this case, the pot is rather small, and its container was shaped in a peculiar way. Very shallow and wide-opened subconical bowls as such occur rather rarely in the Balaton-Lasinja group (e.g., Horváth/Simon 2004, fig. 15; 17). On the contrary, *differentia specifica* of bowls of the mentioned cultural formation – represented also in the

¹ We excluded from our comparative analyses pedestalled vessels, bottoms of which had numerous smaller perforations, as these are closer to strainers (cf., e.g., Barna 2001, pl. III: 1; Regénye 2011, 9, pl. 7).

² The fact that the bottom of container is perforated was noted by the first author during his study trip to BTM Aquincumi Múzeum in the springtime 2010. The unique vessel was displayed on the exhibition entitled ‘Van új a föld alatt...’ and presented in the accompanying catalogue.

Tab. 1. Intact and fragmented pedestalled bowls with perforated bottoms found within the spread area of the Lengyel culture (see Fig. 2).

No.	Archaeological site	Administrative location	Feature	Context	Chronology	Description	Bibliography
1.	Beketinec-Imbralovec/Topolje	Koprivnica-Križevci County, HR	not specified	not specified	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Čataj 2020, slika 86, 113
2.	Budapest-Dobogókő street 5	Municipality of Budapest, HU	SE 23	settlement pit	Lengyel IV	pedestalled bowl with a single perforation	Tóth et al. 2023, 124, fig. 4: 3
3.	Čatež-Sredno polje	Municipality of Brežice, SL	PO 96	settlement pit	Lengyel III	pedestal of a vessel with a single perforation in the bottom	Tomaž 2022, 48, 49, 434, fig. 25
4.	Držovice	Olomouc Region, CZ	not specified	not specified	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Čížmář 2008, 271, photographs on the bottom of the page
5.	Jelšovce	Nitra Region, SK	316/84	settlement pit	Lengyel IV	single perforation	Pavúk/Bátora 1995, 43, 53, fig. 35: 1
6.	Kalenić-Livade	Kolubara District, RS	house (not specified)	remains of a house	Lengyel IV Sălcuța III	pedestalled bowl with a single perforation	Blagojević 2005, 60, fig. 22
7.1.	Kraków-Nowa Huta-Zesławice 88	Municipality of Kraków, PL	B227	settlement pit	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Chmielewski 2023, fig. 74: 1
7.2.	Kraków-Nowa Huta-Zesławice 88	Municipality of Kraków, PL	C139	settlement pit	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Chmielewski 2023, fig. 77: 1
7.3.	Kraków-Nowa Huta-Zesławice 88	Municipality of Kraków, PL	X654	settlement pit	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Chmielewski 2023, fig. 81: 1
7.4.	Kraków-Nowa Huta-Zesławice 88	Municipality of Kraków, PL	A317	redeposited into a younger settlement pit	Lengyel IV(?)	fragment of a bottom of a pedestalled vessel, single perforation	Chmielewski 2023, fig. 90: 6
8.	Letenye-Szentkeresztődomb	Zala County, HU	14	settlement pit	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	Kalicz 1995b, 72, fig. 23: 3
9.	Novi Sad-Sajjlovo	South Bačka District, RS	38	settlement pit(?) within the Bodrogkeresztúr culture cemetery	Lengyel IV	pedestal of a vessel with a single perforation in the bottom	unpublished; finds presently assessed by J. Koledin

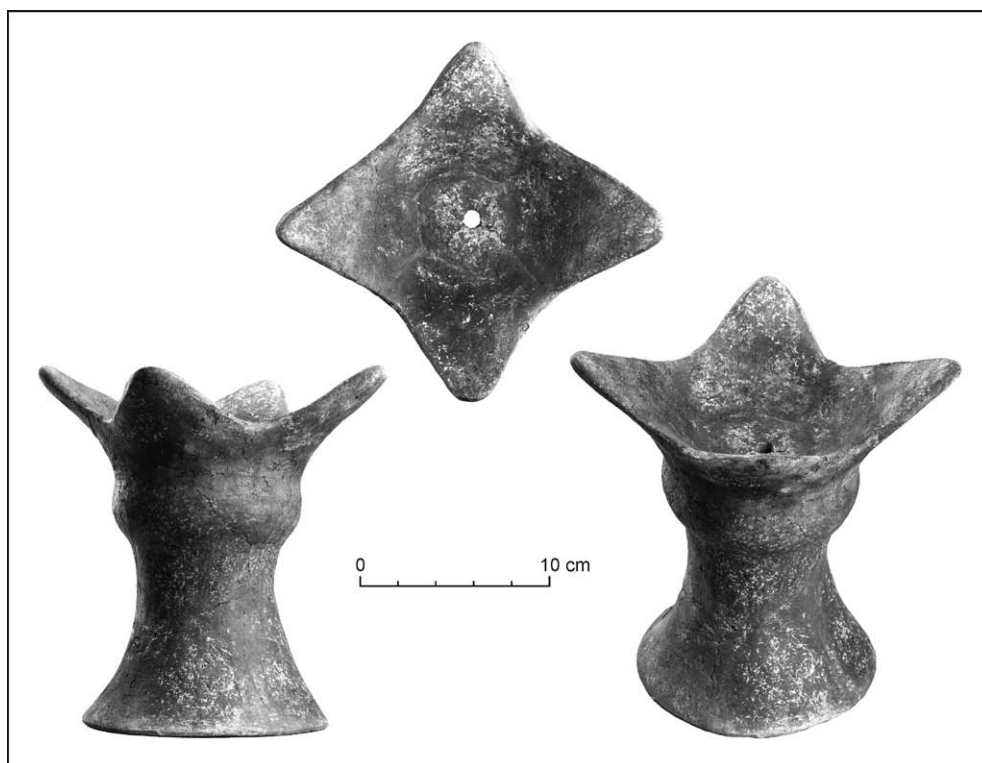


Fig. 3. Budapest, Dobogókő street. Lengyel culture pedestalled bowl with perforated bottom (Budapest History Museum, Inv. n. GY/2849/23/1). Photo N. Szilágyi.

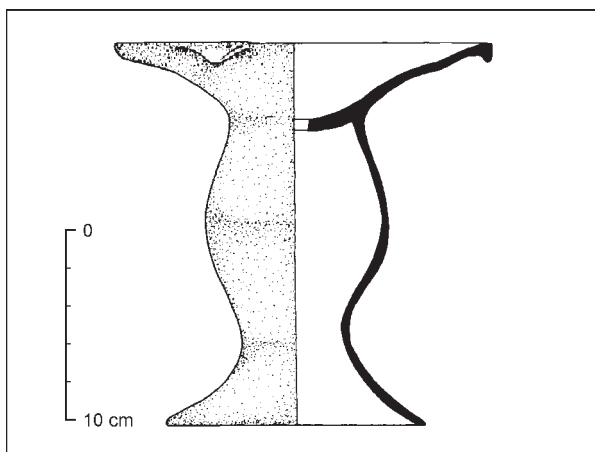


Fig. 4. Kalenić-Livade. Lengyel culture pedestalled bowl with perforated bottom (after *Blagojević 2005*).

rich Lengyel-style ceramic assemblage discovered at the same site – is that they are deeper and have inverted rims (*Blagojević 2005*, fig. 23; cf. *Horváth/Simon 2003*, 111, 112, fig. 22: 9, 10; 23: 1; 24: 1, 2, 4, 7; 25: 2, 3; *Kalicz 1991*, fig. 6; 7).

When assessed from the technological point of view, all vessels in question appear rather as a common everyday use ware of the Lengyel culture at the late stages of its development. These are typical shards of medium thickness made of grog (cham-

otte) tempered clay and fired in rather low fireplace temperature. The surfaces of the pedestalled vessels are rather smooth. Their colours are not homogeneous and range from dark greyish brown to reddish/orange brown or buff, sometimes with firing clouds. Excluding the pedestal found in Novi Sad, which bears very delicate traits of white painted lines, they were unornamented.

Whatever they were originally intended to contain, the primary function of the vessels has been negated by acts of perforating their bottoms clearly performed to make them leak. What is worth noting, is the presence of a specific white crust on inner surfaces of the pedestals found in Kraków-Nowa Huta-Zesławice 88. No such coating has been observed on the outer walls or on the upper surfaces of the original bottoms of other vessels of the kind. Also, it must be stressed that such residues are not observed on any other bowls' pedestals frequently occurring in the large Lengyel culture ceramic assemblage from the site. The presence of such coating indicates that some liquid rich in calcium carbonate has flowed down the inner walls of the pedestals. Unfortunately, analyses of residual lipids from the walls of these vessels, except for one case, gave negative results.³ Right now then, we can only speculate on the character of liquids leaking down the pedestals of the vessels under discussion.

Although very little can be inferred about function(s) of the discussed ceramic forms from their archaeological contexts, two finds appear very meaningful. The first of them is the above-mentioned vessel from Novi Sad. The broken-off pedestal comes from a feature (although not a grave pit!) located within the area of a burial ground of the Bodrogkeresztúr culture (with some pottery grave goods indicating apparent Lengyel influences). The other context that has been described as a possible ritual pit was the one found on the outskirts of Budapest. As described by F. M. Tóth and co-authors ‘... on the southeastern side of Péter-Hill, on a higher, steeply sloping terrain, features different from those usually occurring in settlements were unearthed; stratified, repeatedly renewed firing and burning surfaces, as well as pits containing intact vessels [...] that were also different from the usual ones.’⁴ It seems quite likely then, that pedestalled bowls under discussion were used as ritual paraphernalia.

GENETICAL ANALYSIS

Since the occurrence of pedestalled vessels with secondarily perforated bottoms seems to be unprecedented in the western Carpathian Basin and circum-Pannonian *milieu* of the Lengyel culture and correlates with the beginning of the Eneolithic, the phenomenon seems to be associated with epochal socio-technological changes taking place in early agrarian communities inhabiting this part of Central Europe. It is therefore worthwhile to look for analogous finds in neighbouring areas where the development of the Danubian complex was stimulated by similar socio-technological factors.

In our view, special attention must be drawn to a very peculiar group of finds coming from the very cradle of the European Chalcolithic, i.e., in the lower Danube area. No later than at the stage of the Late Neolithic, in the Vădastra culture, in the region there appeared ‘baroque’-ornamented hollow pedestalled bowls with holes purposefully formed in their bottoms before firing. A strong evidence connects them with a cult of ancestors (Fig. 5). Shortly later, similar ceramic forms – hollow-pedestalled table-like stands with holes preformed

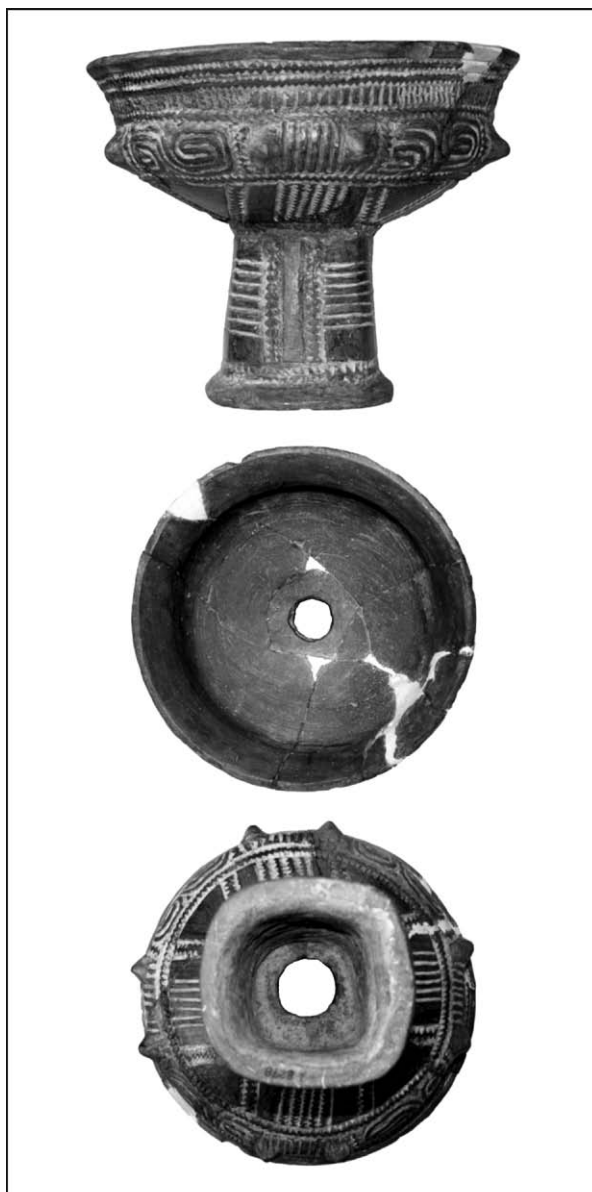


Fig. 5. Hotărani-Fărcașele. Vădastra culture hollow-pedestalled bowl (after Dragoman 2019). A human skull deposited within the vessel is a clear evidence of its connection with the cult of dead or ancestors (cf. Dragoman 2009, 101, fig. 4; Nica 1971, 18, 20, fig. 6: 6; 7: 1). Without scale.

in their tops – became commonly used as grave goods (buried exclusively with men of high status) in the coastal area of nowadays Romania and Bulgaria. Their common occurrence in funeral contexts

³ All fragments of pedestalled bowls with perforated bottoms from Nowa Huta-Zesławice 88 were sampled for lipid residue analyses. The sampling was performed personally by I. Wiltshire and the analyses by M. Roffet-Salque from the Organic Geochemistry Unit of the University of Bristol. Only in one case the result was positive (animal fats). However, as commented by Mrs. Wiltshire, who communicated us the output of analyses, detected remains could be connected with the primary function of the investigated vessel.

⁴ “A Péter-hegy délkeleti oldalában, magasabban fekvő, erőteljesen lejtő térszínen megtalált lelőhelyen, a településeken megszokottaktól eltérő jelenségek; egymásra rétegződő, többször megújított tüzelő- és sütőfelületek, valamint a szokványostól szintén különböző, ép edényeket tartalmazó (rituális rendeltetésű?) gödrök kerültek felszínre [...]” (Tóth et al. 2023, 124).

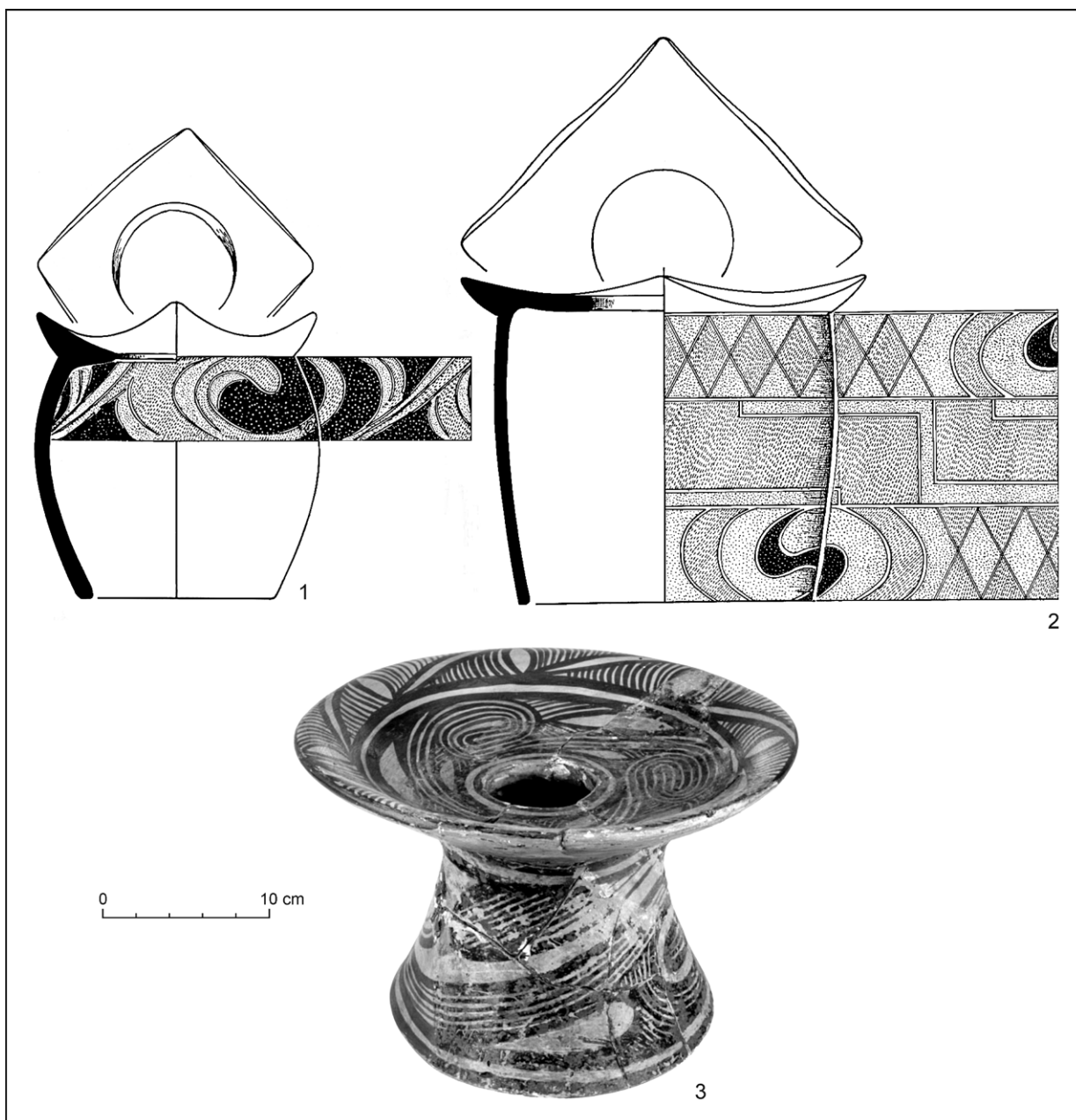


Fig. 6. Kodžadermen-Gumelnița-Karanovo VI (1, 2) and Cucuteni culture (3) 'stands' with holes preformed in their tops. 1, 2 – Durankulak-Golemija ostrov (after *Todorova et al. 2002*); 3 – Traian-Dealul Fântânilor (after *Preoteasa 2023*).

began at the end of phase III and reached its peak in phase IV of the Hamangia culture and phase I of the Varna culture (Fig. 6: 1, 2). At the same time, these were very seldom deposited in settlement contexts (*Todorova 2002*, 86, 87, fig. 113; *Voinea 2005*, 41). Most probably under the influence of the Kodžadermen-Gumelnița-Karanovo VI complex, such pottery forms appear in hybrid complexes of the Bolgrad-Aldeni type (*Dragomir 1983*, 66, fig. 28: 9), which constitute the *Kulturbrücke* between the mentioned West Pontic cultural area and the Cucuteni-Trypillia circle to the north. Although less frequently, vessels

of the kind occur also in contexts associated with the latter cultural complex (Fig. 6: 3).

Despite the temporal and historical concurrence, the perforated pedestals of the Lengyel culture and the Eneolithic stands from the Black Sea coastal area are connected only by a distant similarity of forms. Therefore, some may simply conclude that these phenomena were convergent. Considering the opposite hypothesis, we should rather wonder what imponderables could have caused the phenomenon to manifest itself so differently in both areas under discussion – as ritual paraphernalia carefully made

to be used in lavish funerary ceremonies of the Varna culture communities, on the one hand, and expediently reused (perforated) shallow pedestalled bowls of the Lengyel culture, on the other.

SOCIO-HISTORIC ANALYSIS

When looking for factors that could have caused the (assumingly) same phenomenon to take such contrasting forms in the Pontic area and in the Western part of the Carpathian basin, one should delve deep into Eneolithic technical practices located between binary production strategies, which will be referred to as 'lavish' and 'thrifty' ones. As observed in the course of numerous studies conducted among living cultures, the perception of certain economic practices through the prism of these categories reveals the contradictory nature of human behaviour. Thriftiness in social life is always defined concerning the binary relationship between wastefulness and lavishness. The relationship depends on available economic resources, technological means (including time, skills and knowledge) and socially defined end-goals (cf., e.g., *Alexander/Sosna* 2022). It is in these categories that we will attempt to explain the differences between Eneolithic 'ceramic economies' in Central and South-Eastern Europe in general, and the occurrence of different forms of 'made-to-leak' pedestalled vessels in particular.

The scale of the use of 'lavish strategies' observed in the already mentioned Kodžadermen-Gumelnița-Karanovo VI cultural complex, and especially on the Dobrogea coast of the Black Sea, in the Varna culture, is unprecedented in the whole prehistoric Europe. Making use of their rapid technological development and focal position in the network of interregional connections, the communities inhabiting the West Pontic zone not only became producers of a wide range of prestigious items but also gained access to various luxurious goods from the entire eastern part of the Balkan Peninsula and beyond. The ability of the Eneolithic communities living at the time in the Black Sea coastal area to stimulate the primary demand for symbols of prestige and use it to build their social position by applying lavish strategies is perfectly mirrored in funeral rituals. In burials discovered at large cemeteries such as those in Varna (*Ivanov/Avramova* 2000) or Durankulak (*Todorova Hrsg.* 2002), there were numerous grave goods made of gold and copper, unique stone and flint tools, ornaments made from *Spondylus* shells, and finally – richly decorated (sometimes even gold-plated!) ceramic vessels. The luxurious items, or at least raw materials necessary to make them, often came from several hundred kilometres away. Their

acquisition and production required a lot of effort, knowledge and skills. Therefore, the readiness to sacrifice them as a 'due share' given posthumously to individual members of the community must be considered a costly manifestation of the socio-economic position of families and relatives of the deceased.

Relatedly and soon afterwards, similar social transformations took place in the eastern part of the Carpathian Basin in the so-called Polgár cultural circle. Also there, in the 45th c. BC, large cemeteries, such as Tiszapolgár-Basatanya (*Bognár-Kutzián* 1963) or Veľké Raškovce (*Vizdal* 1977), started to play the role of crucial places of analogical social performance. Consequently, many burials were furnished with numerous and diverse prestigious gifts, sometimes of very distant provenance (cf., e.g., *Kadrow* 2008; *Lichter* 2001, 269–293, 311–359; *Nevizánsky* 1984).

Contrary to the course of the development of the Eneolithic in the eastern part of the Balkan Peninsula and in the Tisza Basin, among Lengyel communities in the western part of the Carpathian Basin and neighbouring culturally related regions, social interactions became much more atomized and concentrated in separate households. At this stage, the occurrence of large cemeteries wherein some individuals were buried with numerous and varied prestigious grave goods that appeared at the end of the Late Neolithic (cf. *Lichter* 2001, 233–257; *Regenye et al.* 2016; *Zalai-Gaál* 2012; *Zalai-Gaál et al.* 2012) is no longer observed (cf. *Lichter* 2001, 360–372; *Nevizánsky* 1985; *Pažinová/Bistáková* 2013; *Virág* 2023, 144–149). Bigger community burial grounds or smaller family cemeteries with richly equipped graves are recorded only on the distant north-western peripheries of the Lengyel community – in the area of the Polish Lowland (see, e.g., *Grygiel* 2008; *Mozgala-Swacha/Murzyński* 2017).

In the case of the Chalcolithic communities of the Lengyel culture, the choice of socio-economic strategies aimed at achieving social fitness resulted from their restricted productivity, which was largely determined by the insular occurrence of raw materials that were of strategic importance for the early Eneolithic economy. The deficient supply of copper or the lack of high-quality knappable siliceous rocks significantly hampered the transfer of prestigious technologies, *ipso facto* limiting the access of many Lengyel communities to the luxury goods' market.

However, the fact that most village groups of the Lengyel culture could not participate very intensively in 'lavish strategies' at the level of production does not mean that social interactions in these Eneolithic communities were in no way based on the use of prestigious items. Although somewhat later, in the spread area of the Lengyel culture

there appeared similar luxury goods of local manufacture, what is best manifested in the regional metallurgical production (see, e.g., *Matuschik* 1996, 2–11, fig. 10; 1998, 215–219, 230–232, fig. 230; *Peška/Ondrkál* 2023, 203–228; *Siklósi et al.* 2022, 25–34; *Virág* 2010; 2019; *Virág et al.* 2025). Significantly though, at the earliest stage of the Eneolithic in the western part of the Carpathian Basin and in neighbouring areas of Lower Austria and Moravia lavish socio-economic manifestations of metal items' consumption took the form of hoarding rather than the 'funeral potlatch' typical of the early Eneolithic communities of the West Pontic zone or the Great Hungarian Plain (e.g., Csáford-Zalaszengrót: *Korek* 1960; Kotouč-Štramberk: *Jisl* 1967; Šikulová/Zápotocký 2010; Magyaregres: *Hornok/Kiss* 2017; Stollhof-Lange Wand: *von Angeli* 1967). Of course, the hoarding of precious golden, silver and copper goods must have belonged to the lavish strategies of the leaders of the Lengyel culture communities and as such they could have constituted, for example, votive deposits (cf. *Kovárník* 2020; *Lichardus-Itten* 1991), yet at least with some prospect of recovering them without disturbing the peace of their dead relatives.

The outlined differences were generated by bottom-up geo-economical and socio-ideological mechanisms that also determined emic concepts of rational thriftiness and lavishness/wastefulness. To understand this better, one must first realise that thrift practices in traditional societies do not belong permanently to the sphere of a community; it is only in modern times that thriftiness has become a public issue. Regarding some Chalcolithic agrarian communities one can even think that community-level wastefulness (unprecedented consumption of prestigious goods) completely displaced thriftiness from the public discourse. In our view, however, in the Pannonian and Circum-Pannonian area of the Lengyel culture the entanglement of thrifty and lavish economic behaviours evolved differently, allowing these societies to achieve individual and group social fitness in quite another way than in the Varna or Polgár cultures. The ceramic production of the Lengyel culture in the eastern part of the Carpathian Basin and related neighbouring areas seem to reflect this unique relationship between public wastefulness and household-level thriftiness very well. We believe that vessels under discussion took their peculiar expedient form as a material expression of this regionally and temporally specific understanding of thriftiness.

Starting from the phase Lengyel III, the traditional high quality richly ornamented thin-walled ultra-fine ware of the Lengyel culture was gradually going out of circulation. The pottery dated to the Lengyel IV phase is characterized by a noticeable

stylistic and technological minimalism, particularly visible among the communities of the Balaton (sub-) group and the Ludanice group. Even though they started to use a wider range of vessel forms than in previous periods, the clear division into fine and coarse earthenware disappears altogether, and the pottery undergoes a technological and aesthetic simplification (cf. *Horváth/Simon* 2003, 111–115, fig. 21–27; *Pavúk* 2023, 122, 123, fig. 63–65). The latter manifests itself, among others, in the poverty of ornamentation, which persists mainly in some western peripheral areas of the Lengyel circle, such as the southeastern sub-Alpine region (Lasinja sub-/group; cf. *Kramberger* 2020, 66–76, fig. 5; 7; 8; ftn. 2), the northern sub-Alpine area (Münschofen group; cf. *Süß* 1976, 6–39; see also *Meixner* 2017), or the Circum-Sudeten region (Jordanów Śląski group; cf. *Kamieńska/Kozłowski* 1990, 76, 77, pl. 44; 45; *Košťuřík* 1997, 90–92, fig. 1–9; *Zápotocký* 2016, 19, fig. 3–9).

It has long been noticed that the changes in the Early and Middle Eneolithic ceramic production of the western part of the Carpathian Basin and related areas resulted from the contact of the Lengyel culture communities with pottery-making patterns originating from the central Balkans (cf., e.g., *Bánffy* 1995; 2002; *Kalicz* 1982, 6, 7; 1991, 355; 1995a, 38–40; *Kramberger* 2014, 247–257; 2020, 76). Although in this context more attention has been paid to stylistic and formal similarities of vessels, one cannot forget about the adaptation of a number of technological solutions, which include a common use of thrifty ceramic production practices (re-use of pottery) deeply rooted in the tradition of the Vinča culture (see, e.g., *Vuković* 2015; 2017, 63–67). These were, among others, common adding crushed ceramics (grog) as a temper in pottery matrix (cf., e.g., *Kreiter et al.* 2017; *Spataro* 2017, 64–69; see also the current overview in *Opriş* 2025), making spindle whorls from shards (cf. *Chmielewski* 2009, 82–86), or using massive handles of storage vessels as ceramic fishing net weights/pottery smoothing tools (cf. *Janák* 1997). We are inclined to add to the list also the discussed adaptation of the pedestalled bowls for some ritual purposes by drilling holes in their bottoms.

The very items of our interest, expediently obtained from rather coarse everyday use vessels of no particular aesthetic, symbolic or technological value, certainly allowed to save some resources and time (for the production of ceramic utilities) as well as energy (including energy carriers in the form of firewood) in the future. Still, the economic gain cannot be considered substantial. As *A. Podkalicka* and *J. Potts* (2014, 235) aptly put it, "... [t]hrift is an utterly normal behaviour of material and skilful rationality when observed under conditions of resource scarcity or competition. That is exactly where thrift resides for most

of human history, making its way into ethical templates. Thrift behaviour has thus traditionally been identical to necessary behaviour in the face of poverty and as a morally rightful – ‘waste not/want not’ – type of behaviour through the escape from such poverty. The puzzle, then, is why thrift behaviour persists, both maintained and even sometimes re-expressed when wealth [...] rises, and furthermore why it takes the particular forms it does.” So, why it occurred when it did and in the way it did?

It must be noticed that despite significant differences in the pace and direction of Eneolithic socio-economic changes, the basic polarisation of male and female social roles and its symbolic expressions among communities of the Lengyel culture and those remaining under its dominant influence, closely reminds early Chalcolithic phenomena observed in the West Pontic or East Carpathian areas (cf., e.g., Kadrow 2008; 2011). However, the new social model must have been adopted to quite a different economic reality of the western Pannonian and peri-Pannonian area. This must have had a natural effect on the differences in the ways the two sexes built their social capital and engendered their roles.

As already stressed, the Lengyel culture community quickly adopted Eneolithic lavish behaviours based on the production and consumption of various prestige goods to their spectrum of social strategies. However, in the western part of the Carpathian Basin the transfer of Eneolithic prestigious technologies into such male-dominated spheres of production as metallurgy or chipped stone industry was limited by difficulties of obtaining raw materials. Therefore, in this cultural area, ‘luxury’ products of the woman-dominated sphere of production, that was not seriously affected by resource shortages (cf. Chmielewski 2014, 53, fn. 4), might have been valued higher than in neighbouring regions. At the beginning of the Eneolithic, such goods probably included linen woven textiles (cf., e.g., Chmielewski 2009, 244–246). Of course, in light of the previous arguments, the production of ceramic utensils – undoubtedly also belonging to the feminine domain (cf., e.g., Vuković 2013) – was no longer as prized symbolically and economically as it used to have been in earlier times. Still, women, who not only could produce prestige goods, but also were able or at least skilfully manifested ability to economize on what at the time was less exposed in socio-economic interactions, must have been valued exceptionally. In this context, creative reuse of pottery can be seen as a performative (ritual?) manifestation of the ethos of a thrifty woman, who by her skilful household husbandry could contribute to a community-oriented (and more wasteful) social activity of man.

The rising desire for artisans bearing the knowledge and skills necessary to produce certain innova-

tive prestigious goods, as well as the growing ethos of a thrifty guardian of hearth and home, who could save resources allowing for acquiring prestigious goods that could not be made locally, must have increased matrimonial mobility of women. In the archaeological record it is reflected by the maximum expansion of Lengyel culture ceramic patterns (cf. Pavúk 2007, 19, 20, fig. 6; 2023, 104, 105), including the wide spread of different pottery recycling and reuse techniques. The idea of expediently made ritual pots (hollow pedestalled bowls with perforated bottoms) quickly diffused over and beyond the Carpathian Basin as a part of this Eneolithic package of thrifty pottery practices.

Interestingly, this wide distribution of the early Chalcolithic Lengyel-style ceramics in Central Europe contrasts sharply with the much more limited reception of early Copper Age pottery-making patterns developed earlier in the Tisza basin (the Tiszapolgár culture and the early phase of Bodrogkeresztúr culture). It cannot be a coincidence that the Chalcolithic ‘Polgár model’ reached its greatest impact on neighbouring regions only when these communities abandoned excessively luxurious production and consumption practices at the stage of the late Bodrogkeresztúr culture and the Lažňany-Hunyadihalom-Vajska complex. Apparently, the development of male-dominated ‘lavish strategies’ based on the use of prestige technologies and raw materials of limited accessibility were in and on themselves exclusivist and led to technological and social isolationism, while ‘thrifty strategies’ and related practices were inherently egalitarian and therefore more diffusible. These opposing patterns of cultural patterns’ mobility correspond with matrimonial mobility as reflected by different ranges and directions of genetic flows within and between the early Eneolithic populations of the Lengyel and the Polgár culture (see Szécsényi-Nagy et al. 2025, 10–13, fig. 4).

Seen from such a diffusionist-processual perspective (see Rajewski 2017 for an exhaustive discussion on the question), the transmission of the idea of ‘stands’ with a preformed holes from the West Pontic area into the milieu of the Lengyel culture would represent a cultural process which A. Kroeber named ‘stimulus diffusion’ and defined as follows: ‘... [d]iffused culture material often contains concrete or specific elements by which the fact of diffusion can be subsequently recognized even in the absence of a record of the event. In some cases [...] the diffusion is definitely piecemeal [...]. In this event, the fragments or isolated items may be put into an entirely new context in the culture which they enter. Such partial bits may diffuse more widely than patterns or systems or complexes of which they form a part [...]. [This] type of diffusion [i.e., stimulus diffusion – T. J. Ch.]

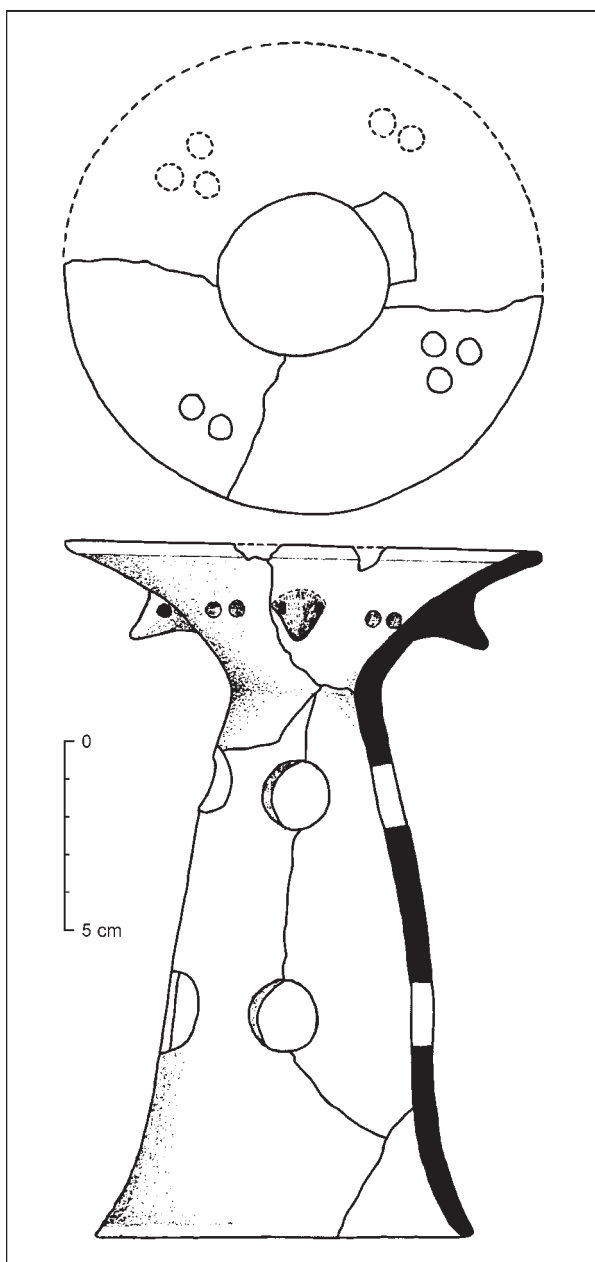


Fig. 7. Şumal-Dealul lui Kun. Tiszapolgár culture hollow-pedestalled bowl without bottom (after Iercoşan 2002). Similar bottomless pedestalled bowls were found in the grave 68 of the Tiszapolgár-Basatanya cemetery (Bognár-Kutzián 1963, pl. LXXVIII: 5; CXXVII: 3a) and at the site Tiszavalk-Kenderföld (Patay 1978, 51, pl. VIII: 1).

is in some ways of an opposite kind. It occurs in situations where a system or pattern as such encounters no resistance to its spread, but there are difficulties in regard to the transmission of the concrete content of the system. In this case it is the idea of the complex or system which is accepted, but it remains for the receiving culture to develop a new content...' (Kroeber 1940, 1).

Approaching the problem of borrowings in such a way we can nuance the hypothesised furtherance

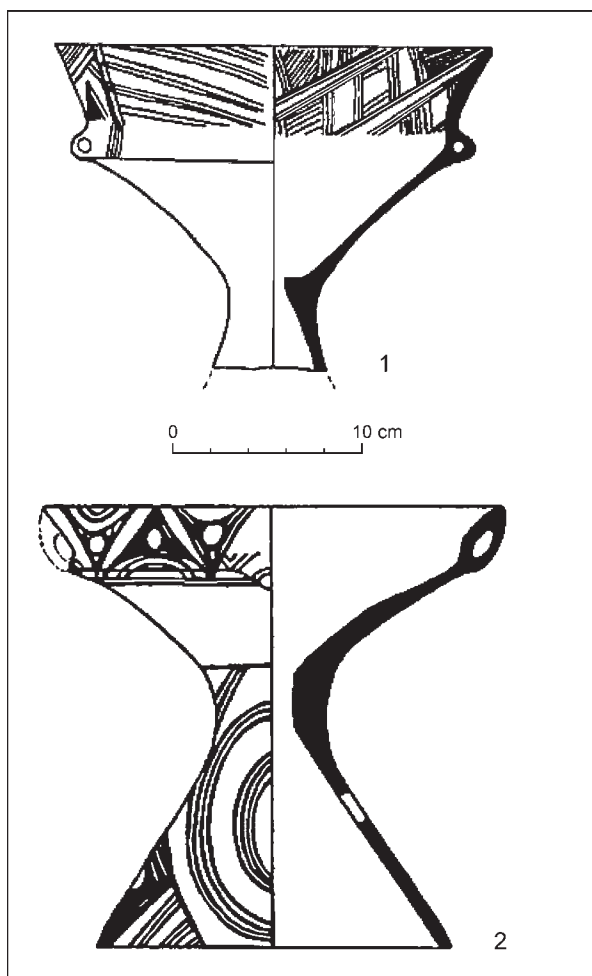


Fig. 8. Slatino 5-6. Sălcuţa-Krivodol-Bubanj culture hollow-pedestalled bowl with a hole preformed in its bottom (1) and without bottom (2; after Georgieva 2012). As noticed by P. Georgieva (2012, 124), the 'stands' belong to ceramic forms that represent the highest quality craftsmanship of the Sălcuţa-Krivodol-Bubanj culture's potters.

of the discussed idea of ritual pot from the Black Sea coast to the western part of the Pannonian Basin and beyond. Otherwise, the expediently performed pedestals with perforated bottoms found in the Lengyel culture could be at best considered to represent strongly degraded forms of stylistically refined ritual vessels of the Varna culture (the Kodžadermen-Gumelniţa-Karanovo VI complex). Also, when accepting the explanation in terms of stimulus diffusion, we allow for yet other possible regional manifestations of the supposedly same wide Eneolithic phenomenon, i.e., hollow-pedestalled bowls without bottoms (Fig. 7). What bridges the idea of an Eneolithic preformed (holed/bottomless) and performed (secondarily perforated) 'made-to-leak' pedestalled bowls in space and time, is their co-occurrence in the transitory *milieu* of the Sălcuţa-Krivodol-Bubanj culture in Central Balkans (Fig. 8)

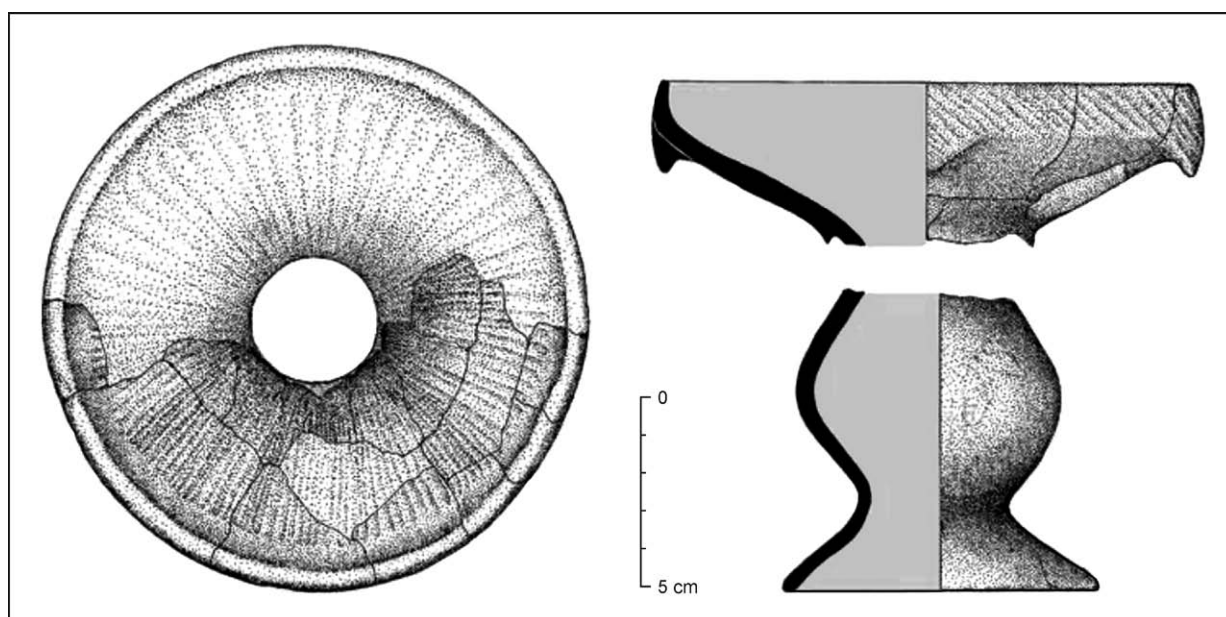


Fig. 9. Sormás-Mántai-dűlő. Lengyel culture hollow-pedestalled bowl without bottom (after Straub 2006).

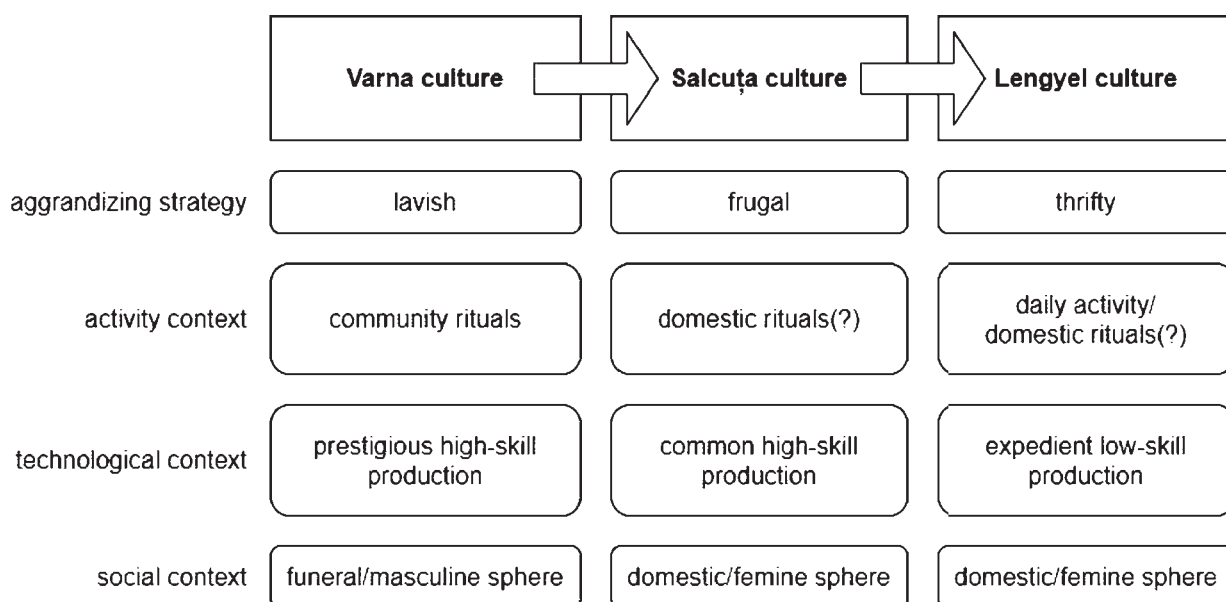


Fig. 10. Diagram illustrating transformations occurring in the course of the hypothesised stimulus diffusion of Eneolithic ‘made-to-leak’ pedestalled vessels from the western Pontic coast (Varna culture), via central Balkan area (Salcuța-Krivodol-Bubanj culture), into the Carpathian region (Lengyel culture). Conception and graphics T. J. Chmielewski.

and – as attested by an unique vessel from Sormás (Fig. 9) – also in Transdanubia.

CONCLUSIONS

Pedestalled bowls with perforated bottoms that have been presented and discussed in this study represent a very peculiar ceramic form occurring

exclusively in contexts of the late Lengyel culture in the western part of the Carpathian Basin and culturally related neighbouring regions. Their range – as we know it today – corresponds to the spread area of different cultural patterns from Transdanubia to the north (southern part of the Lesser Poland Upland), as well as to the south and south-east (north-western Serbia). So far, their presence has not been documented in the north-western peripheral spread area

of the Lengyel culture (Bohemia, Lower Silesia). For these reasons they should be seen as spatially and temporally limited phenomenon correlated with the beginning of the Eneolithic in this area.

Based on numerous analogies, we formulated quite a bold diffusionist-processual hypothesis explaining their Western Pontic origins. We suppose that pedestalled bowls with perforations performed in their bottoms occurring in the Lengyel culture can be genetically connected with hollow pedestalled stands with holes preformed in bottoms of shallow containers commonly occurring in man's graves of late phases of the Hamangia and Varna culture. It is apparent that the indicated prototypes were of great ceremonial and prestigious significance in funeral rituals and it is very likely that the vessels of the Lengyel culture were also used for

ritual purposes. In our view, the idea of carefully preformed ritual made-to-leak pedestalled vessels could have found its way to the western part of the Carpathian Basin through the area of Central Balkans (the Sălcuța-Krivodol-Bubanj complex). We suppose that when it reached the Pannonian and Circum-Pannonian *milieu* of the Lengyel culture, local communities adapted the concept into a specific woman-dominated household 'economy of pots' as expediently made bowls with perforated bottoms. Taking into account the contextually inferred ritual function of the vessels under discussion, one could venture an opinion that within the Lengyel community the expedient way of turning everyday ceramic objects into cultic paraphernalia could be perceived as a form of ritualized (though rather not ceremonial) thrift (Fig. 10).

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Authors' contributions

Tomasz J. Chmielewski – conceptualization (lead), data curation (lead), analysis (equal), funding acquisition (lead), investigation (equal), methodology (lead), supervision (lead), writing of original draft (lead), review and editing (supporting), visualisation and graphics (lead); Judit P. Barna – data curation (supporting), analysis (equal), investigation (equal), writing of original draft (supporting), review and editing (lead), visualisation and graphics (supporting); Jovan Koledin – data curation (supporting), investigation (equal); Adela Kovacs – data curation (supporting), analysis (equal), investigation (equal), writing of original draft (supporting), review and editing (supporting), visualisation and graphics (supporting); Dragan Milanović – data curation (supporting), analysis (equal), investigation (equal), review and editing (supporting).

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Vyformované a perforované

O misách na nôžke s otvorom v dne v lengyelskej kultúre

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SÚHRN

Počas spracovania nálezov z archeologických výskumov v rokoch 2016–2022 na lokalite Krakov-Nowa Huta-Zesławice, poloha 88 (Chmielewski 2023), bolo v keramickom súbore lengyelskej kultúry objavených viacero fragmentov špecifických typov nádob. Ide o duté nôžky mís (pohárov) so sekundárne prevrtanými dnami (obr. 1; 3; 4). Analogické keramické tvary sú v okruhu lengyelskej kultúry J. Pavúkom datované do jej III. a IV. fázy (pozri Čížmář *et al.* 2004; Pavúk 2000). Koncentrujú sa v povodí stredného Dunaja, na priľahlých územiach Moravy a v západnej časti Malopoľska (obr. 2).

Keďže sa tento fenomén objavuje až na začiatku eneolitu, domnievame sa, že výskyt prevrtaných dien na misách s dutou nôžkou môže mať súvis s prebiehajúcimi spoločenskými zmenami. V tomto kontexte sú zaujímavé nálezy priamo z „kolísky“ stredoeurópskeho eneolitu, teda z oblasti Pričiernomoria (západopontské pobrežie), kde sa objavujú plytké misy na dutých nôžkach najmä v III. fáze kultúry Hamangia (najčastejšie v hrobách) a počas fázy Varna I (obr. 6: 1, 2). Tieto typy nádob sa vyskytujú v hrobách mužov, ktorým sa pripisuje vysoký spoločenský status. Nateraz ich neeviduujeme na sídliskách (Todorova 2002, 86, 87, obr. 113; Voinea 2005, 41).

Okrem chronologických súvislostí sa diskutované formy nádob v okruhu lengyelskej kultúry v mnohom líšia od hrovej keramiky z pričiernomorskej oblasti – plytkých mís („tácok“) na nôžkach. Na základe uvedeného by teda mohlo ísť o konvergentný charakter tohto javu. Ak však vezmeme do úvahy opačnú hypotézu, teda pričiernomorskú genézu myšlienky objavujúcej sa vo včasnoeneolitickej lengyelskej kultúre, je potrebné zvážiť aké okolnosti spôsobili, že sa tá istá myšlienka prejavila v rovnakom čase úplne odlišným spôsobom v predmetných oblastiach. Na jednej strane išlo o kvalitne a špeciálne vyhotovené príslušenstvo pre potreby luxusných pohrebných obradov, na strane druhej o keramické formy pravdepodobne vyrobené a opakovane používané na každodenné aktivity v podobe mís na dutých nôžkach. Usudzujeme, že tieto rozdiely môžu poukazovať na polarizované sociálne praktiky, ktoré možno spájať s odlišnými hospodárskymi stratégiami: okázalé (založené na bohatstve) a úsporné.

V kontexte európskeho praveku je dobre rozoznateľná stratégia založená na okázalosti a bohatstve (luxuse) v kultúrnom komplexe Kodžadermen-Gumelnița-Karanovo VI, ale obzvlášť v kultúre Varna. Schopnosť vytvárať dopyt po prestížnom tovare a zároveň ho využiť na budovanie a upevňovanie si spoločenského postavenia, ktoré

sa dobre odzrkadľuje v pohrebnom ríte, je charakteristickou črtou eneolitickej spoločnosti v oblasti Dobružde. V hrobách z rozsiahlych pohrebísk vo Varne (Ivanov/Avramova 2000) alebo v Durankulaku (Todorova *et al.* 2002) sa nachádzajú početné hrobové prídavky vyrobené zo zlata a medi, unikátne nástroje vyhotovené z kamenných surovín, šperky z mušlí *Spondylus*, ako aj bohato zdobené keramické nádoby, v niektorých prípadoch aj zlatom. Výroba a zadováženie si týchto luxusných predmetov nepochybne vyžadovalo veľa úsilia, vedomostí a zručností. Zámer použiť tieto predmety ako hrobové prídavky pre zosnulých členov komunity treba interpretovať ako prejav vysokého postavenia pozostalých.

Zrejme v súvislosti s týmito udalosťami došlo onedlho na to k analogickým transformáciám spoločnosti aj v potiskej oblasti, v tzv. polgárskom kultúrnom okruhu. V tom čase (cca 45. stor. pred Kr.) sa v danej oblasti objavujú rozsiahle pohrebiská, napríklad Tiszapolgár-Basatanya (Bognár-Kutzián 1963) alebo Veľké Raškovce (Vizdal 1977), ktoré reflektujú spoločenské interakcie – vyskytujú sa tu hroby s bohatou a rôznorodou hrobovou výbavou, vrátane predmetov cudzej proveniencie (napríklad Kadrow 2008; Lichter 2001, 269–293, 311–359; Nevizánsky 1984).

V kontraste k rozvoju eneolitu vo východnej časti Balkánskeho polostrova a Potisi sa v kultúrnom okruhu lengyelskej kultúry a kultúrne priľahlých územiach prejavuje určitá atomizácia sociálnych interakcií do menších domácností. V tejto fáze absentujú prestížne predmety v mužských hrobách situovaných na rozsiahlych pohrebiskách (porovnaj Lichter 2001, 233–257, 360–372; Nevizánsky 1985; Pažinová/Bistáková 2013; Virág 2023, 144–149; Zalai-Gaál 2012; Zalai-Gaál *et al.* 2012).

Predpokladáme, že v prípade eneolitických spoločností lengyelskej kultúry výber socio-ekonomických stratégií zameraných na zvýšenie sociálnej zdatnosti vyplýval z produkčných obmedzení, ktoré boli do značnej miery determinované ostrovným výskytom surovín strategických pre „eneolitickú ekonomiku“. Nedostatočný prísun medi a kvalitných kamenných surovín potrebných pre výrobu štiepanej industrie výrazne obmedzili možnosť transferu prestížnych technológií, čím sa *ipso facto* mnohé komunity lengyelskej kultúry vylúčili z trhu s luxusným tovarom. Predpokladáme, že vzhľadom na priestorovú odľahlosť väčšiny sídlisk od zdrojov kamenných surovín, medi a ďalších kovov, ktoré karpatská oblasť poskytuje (zlato, striebro), neparticipovala väčšina vidieckej spoločnosti na tzv. okázalých hospodárskych stratégiách. Využívanie miestnych zdrojov a lokálna metalurgia je

pri súčasnom stave poznatkov nespochybniteľná najmä v období starého eneolitu (porovnaj napríklad *Matuschik* 1996, 2–11, obr. 10; 1998, 215–219, 230–232, obr. 230; *Peška/Ondrkál* 2023, 203–228; *Siklósi et al.* 2022, 25–34; *Virág* 2010; 2019; *Virág et al.* 2025). Je pravdepodobné, že v najstaršom úseku doby medenej v západnej časti Karpatskej kotliny malo socio-ekonomické správanie, manifestované pomocou prestížnych predmetov, podobu ukladania depotov, resp. votívnych darov (pozri *Kovárník* 2020; *Lichardus-Ippen* 1991), čo je zásadne odlišné oproti pohrebom v oblasti Pričernomorja a Veľkej dunajskej nížine.

Načrtnuté kultúrne rozdiely boli výsledkom rovnakých sociálnych a ekonomických mechanizmov, ktoré determinovali aj samotnú diferenciáciu konceptov racionálneho šetrenia a okázalosti. Pre lepšie porozumenie je potrebné pripomenúť, že šetrné hospodárne postupy nepatria v tradičných spoločenstvách do verejnej oblasti. Až v modernej dobe sa stalo šetrenie prostriedkov verejnou záležitosťou. Domnievame sa, že existoval zjavný vzťah medzi okázalými/luxusnými a šetrnými ekonomickými stratégiami, pretože verejný luxus/prestíž a súbežne šetrenie na úrovni domácností umožnili týmto komunitám dosiahnuť vyššiu sociálnu zdatnosť na individuálnej, ako aj skupinovej úrovni.

Od fázy Lengyel III dochádza k postupnému ústupu v používaní tradičnej vysokokvalitnej, bohato zdobenej a veľmi jemnej tenkostennej keramiky. Nádoby datované do fázy Lengyel IV sú charakteristické výrazným štýlovým a technologickým minimalizmom, obzvlášť zreteľným v spoločenstvách (sub-) skupiny Balaton a Ludanickej skupiny. Hoci sa začala používať širšia škála tvarov nádob než v predchádzajúcich obdobiach, jasné rozdelenie na jemnú a hrubú keramiku úplne zaniká a keramika prechádza technologickým a estetickým zjednodušením (pozri *Horváth/Simon* 2003, 111–115, obr. 21–27; *Pavúk* 2023, 122, 123, obr. 63–65). To sa prejavuje okrem iného úbytkom výzdobných motívov, ktoré pretrvávajú najmä v západných periférnych oblastiach sféry lengyelskej kultúry (pozri *Kamieńska/Kozłowski* 1990, 76, 77, tab. 44; 45; *Košťurík* 1997, 90–92, obr. 1–9; *Kramberger* 2020, 66–76, obr. 5; 7; 8; príloha 2; *Sűjő* 1976, 6–39; *Zápotocký* 2016, 19, obr. 3–9).

Je známe, že zmeny v keramickej produkcii počas starého a stredného eneolitu v západnej časti Karpatskej kotliny a priľahlých oblastiach boli výsledkom kontaktu komunit nositeľov lengyelskej kultúry s výzdobnými prvkami pochádzajúcimi z centrálneho Balkánu (pozri napr. *Bánffy* 1995; 2002; *Kalicz* 1982, 6, 7; 1991, 355; 1995a, 38–40; *Kramberger* 2014, 247–257; 2020, 76). Hoci sa v tomto kontexte venovala väčšia pozornosť bádateľov štýlovým a formálnym podobnostiam nádob, nemôžeme opomenúť adaptáciu mnohých technologických riešení, medzi ktoré patria bežne používané šetrné postupy pri výrobe keramiky (opakované použitie keramiky), ktoré sú hlboko zakorenené v tradícii kultúry Vinča (pozri napríklad *Vuković* 2015; 2017, 63–67). Príkladom je okrem iného pridávanie rozdrvenej keramiky (grog) do keramickej hmoty (pozri napríklad *Kreiter et al.* 2017; *Spataro* 2017, 64–69; pozri tiež aktuálny prehľad *Oprš* 2025), výroba tkáčskych závaží z úlomkov (pozri *Chmielewski* 2009, 82–86), alebo použitie masívnych rukovätí zásobných nádob v podobe keramických závaží na rybárske siete, či ich používanie na vyhladenie povrchu keramiky pri

jej výrobe (pozri *Janák* 1997). Do pomyselného zoznamu je potrebné pridať aj diskutovanú adaptáciu mís na dutej nôžke a ich využitie na rituálne účely, spočívajúce v sekundárnom prevrácaní ich dien.

Skúmané nálezy, ktoré sú účelne vybrané z pomerne hrubých nádob pre každodenné použitie, bez osobitnej estetickej, symbolickej alebo technologickkej hodnoty, nepochybne umožnili šetriť určité zdroje a čas (potrebný na výrobu keramiky), vrátane energetických zdrojov (drevo potrebné na kúrenie). Napriek tomu hospodársky prínos nemožno považovať za významný. Ako výstižne poznamenali *A. Podkalicka* a *J. Potts* (2014, 235): „... šetrnosť je úplne bežným prejavom materiálnej a remeselnej racionality, keď ju sledujeme v podmienkach nedostatku zdrojov alebo konkurencie [...] otázkou však ostáva, prečo správanie založené na úspornosti pretrváva, je udržiavané a niekedy dokonca znovu prejavované aj v čase keď' bohatstvo [...] rastie a navyše, má také podoby aké má.“ A teda, prečo sa to dialo práve v tom čase a takým spôsobom?

Je potrebné vziať v úvahu, že napriek socio-ekonomickým rozdielom medzi západopontskou a východokarpatskou oblasťou, sledujeme na oboch územiach výraznú polarizáciu v rodovom rozdelení spoločnosti – v mužských a ženských aktivitách (pozri *Kadow* 2008; 2011). Prirodzene to vyplývalo z rozdielnych spôsobov, akými pohlavia budovali spoločný kapitál. V prostredí nositeľov lengyelskej kultúry bola „stratégia okázalosti“ zrejme záležitosťou mužov a ich verejných aktivít, pričom aktivity žien súviseli skôr s chodom domácností. V tejto súvislosti mohla byť úspornosť pri výrobe keramiky fyzickým vyjadrením étosu hospodárnej strážkyne domáceho ohniska, ktorá mohla vďaka svojim šetrným postupom podporovať spoločensky orientované (a viac „plytvajúce“) sociálne aktivity muža.

Z tohto pohľadu by transmisia myšlienky v podobe tákoc/mís na dutých nôžkach zo západopontskej oblasti do priestoru rozšírenia lengyelskej kultúry odpovedala v terminológii *A. Kroebera* „stimulujúcej difúzii“, ktorá „... sa vyskytuje v situáciách, kedy systém alebo vzor ako taký nenarádza na odpor voči svojmu šíreniu, avšak objavujú sa ťažkosti pri prenose jeho konkrétneho obsahu. V takomto prípade je prijatá samotná myšlienka komplexu alebo systému, no prijímajúcej kultúre prislúcha rozvinúť nový obsah...“ (*Kroeber* 1940, 1). Tento prístup k problematike „výpožičiek“ nám umožňuje bližšie pochopiť proces kultúrnej transmisie diskutovanej keramickej formy v lengyelskom kultúrnom okruhu. V opačnom prípade by sme mohli tieto nádoby v porovnaní s prostredím varnskej kultúry (komplex Kodžadermen-Gumelnița-Karanovo VI) považovať prinajlepšom za značne degradované formy, ktoré boli súčasťou technologicky veľmi vyspelej keramickej produkcie. Ak však prijmem interpretáciu v zmysle stimulačnej difúzie (obr. 10), môžeme počítať s ďalšími regionálnymi prejavmi tohto eneolitického fenoménu, napríklad v podobe mís s dutými nôžkami bez dien (obr. 7). To, čo spája myšlienku eneolitických vopred vyrobených (s otvorom/bez dna) a dodatočne perforovaných (s dierou v dne) mís na dutej nôžke v čase a priestore, je ich spoločný výskyt v prechodnom období kultúry Sálcuța-Krivodol-Bubanj na území stredného Balkánu (obr. 8) a – dôkazom čoho je aj jedinečná nádoba z lokality Sormás (obr. 9) – rovnako aj v Zadunajsku.

- Obr. 1. Kraków-Nowa Huta-Zesławice 88. Lengyelská kultúra. Misy na nôžke s perforovanými dnami. Kresba N. Lenkow.
- Obr. 2. Lokality lengyelskej kultúry s nálezmi nádob na nôžke s perforovanými dnami. Lokality sú očíslované a zoradené abecedne. Podrobnosti pozri v tabele 1. Grafika M. Zawadzki.
- Obr. 3. Budapešť, ulica Dobogókő. Lengyelská kultúra. Misa na nôžke s perforovaným dnom (Historické múzeum Budapešť, inv. č. GY/2849/23/1). Foto N. Szilágyi.
- Obr. 4. Kalenić-Livade. Lengyelská kultúra. Misa na nôžke s perforovaným dnom (podľa *Blagojević* 2005).
- Obr. 5. Hotărani-Fărcașele. Kultúra Vădastra. Misa na dutej nôžke (podľa *Dragoman* 2019). Ľudská lebka uložená vo vnútri nádoby je jasným dôkazom jej spojenia s kultom mŕtvych (porovnaj *Dragoman* 2009, 101, obr. 4; *Nica* 1971, 18, 20, obr. 6; 7: 1). Bez mierky.
- Obr. 6. „Stojany“ kultúr Kodžadermen-Gumelnița-Karanovo VI (1, 2) a Cucuteni (3) s vyformovanými otvormi v ich horných častiach. 1, 2 – Durankulak-Golemija ostrov (podľa *Todorova et al.* 2002); 3 – Traian-Dealul Fântânilor (podľa *Preoteasa* 2023).
- Obr. 7. Șumal-Dealul lui Kun. Kultúra Tiszapolgár. Misa na dutej nôžke bez dna (podľa *Iercoșan* 2002). Podobné misy na nôžke bez dna boli nájdené v hrobe 68 na pohrebisku Tiszapolgár-Basatanya (*Bognár-Kutzián* 1963, tab. LXXVIII: 5; CXXVII: 3a) a na lokalite Tiszavalk-Kenderföld (*Patay* 1978, 51, tab. VIII: 1).
- Obr. 8. Slatino 5-6. Kultúra Sălcuța-Krivodol-Bubanj. Misa na dutej nôžke s vyformovaným otvorom v jej dne (1) a bez dna (2; podľa *Georgieva* 2012). Ako uviedla *P. Georgieva* (2012, 124), „stojany“ patria ku keramickým formám, ktoré predstavujú najvyššiu kvalitu remeselnej práce hrnčiarov kultúry Sălcuța-Krivodol-Bubanj.
- Obr. 9. Sormás-Mántai-dűlő. Lengyelská kultúra. Dutá misa na nôžke bez dna (podľa *Straub* 2006).
- Obr. 10. Diagram ilustrujúci transformácie prebiehajúce v priebehu hypotetickej difúzie stimulov v podobe eneolitických nádob na nôžke s otvorom v dne zo západného pobrežia Pontu (kultúra Varna), cez stredobalkánsku oblasť (kultúra Sălcuța-Krivodol-Bubanj), do karpatského regiónu (kultúra Lengyel). Koncepcia a grafika T. J. Chmielewski.
- Tabela 1. Celé a fragmentárne zachované misy na nôžke s perforovanými dnami nájdené v oblasti rozšírenia lengyelskej kultúry (pozri obr. 2).

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THE BRONZE AGE SETTLEMENT HISTORY OF THE SÜTTŐ PLATEAU (NORTHWESTERN HUNGARY)

ESZTER FEJÉR

The loess plateau overlooking the Danube west of the present-day settlement of Süttő (North Transdanubia, Hungary) was used and inhabited in various ways throughout prehistory. Recent research has focused mainly on the Early Iron Age remains of the area, but over the past century numerous traces of earlier occupations have also been discovered. A vast amount of Middle Bronze Age artefacts have come to the light, but the territory was settled in the Middle Neolithic, Early Bronze Age and Late Bronze Age periods as well. Most of these finds were unearthed in the second half of the 20th c., but our knowledge of them remained limited due to the lack of detailed publications. Several naturally protected or artificially reinforced sites and open settlements were established on the plateau, inhabited for longer or shorter periods and interrupted by centuries of abandonment. The main occupied area was the hilltop of Nagysánc-tető, which was part of a relative dense settlement network in several periods involving both the hinterland of the plateau, the Danube bank, as well as the land along its nearby tributaries. The present paper aims to reconstruct the course of prehistoric inhabitation on the Süttő plateau during the Bronze Age by presenting unpublished material and summarizing the results of old and new investigations.

Keywords: Transdanubia, Süttő, Makó-Kosihy-Čaka culture, Hatvan culture, Transdanubian Encrusted Pottery, Maďarovce culture, Urnfield culture.

INTRODUCTION

The multi-period prehistoric site complex at Süttő (North Transdanubia, Hungary) is located on the right bank of the Danube, on top of the loess plateau between the today settlements of Neszmély and Süttő. This plateau is bordered by the foothills of the Gerecse Mountain Range on the south, the Bikol stream on the east and the hilly landscape around Neszmély on the west, while it has a steep, approximately 40 m deep edge overlooking the Danube and its alluvial plain in Slovakia on the north side. The investigated upland area is divided by several gullies creating naturally protected areas.

The site complex consists of several open and fortified hilltop settlements which were once established on the northern edge and the inner areas of the plateau. In the northern area, prehistoric sites are known at Kissánc, Nagysánc-tető and Nagysánc (formerly cited as ‘Feketehídi árok mellett’). The central territory south of these hilltop sites is generally called Sáncföldek (formerly often cited as ‘Sánci dűlő II’), and it was used in different prehistoric periods for various purposes. Prehistoric occupation has been also recorded in the areas east of Sáncföldek at Sánci dűlő I and Papi földék and to the south, at the bank of the stream Bikol, at Tatai úti dűlő I and II. The gully dividing the plateau between Kissánc and Nagysánc-tető, named Hosszúvölgy, yields evidence of prehistoric inhabitation too (Fig. 1).

The prehistoric landscape has undergone several natural and anthropogenic changes over the past millennia. The agricultural exploitation of the area, which can be evidenced for the late modern period, was one of the main human impacts on the natural environment. Today, the hilltop areas of Nagysánc and Nagysánc-tető are used as meadows, Kissánc is covered by bushy forest, while the inner parts of the plateau are under cultivation (crop, corn, viticulture). The second major human factor that affected the landscape is sand mining, which, according to some archaeological reports, destroyed several archaeological features in the gully Hosszúvölgy (now covered by bushy forest) in the mid-20th c. (*Patek/Mozsolics 1959*). Further significant change has been caused by railway construction on the Danube shore between 1888 and 1891 (*Bárdos szerk. 2000, 66–73; Horváth Cs. S. 2021, 207, 208*) which probably demolished some parts of the plateau’s northern edge (*V. Vadász 2003, 110, fn. 35; Vékony 1986b, 260; 2000, 178*).

The site complex is known in academia and among the public mainly for the Early Iron Age monuments, which have been investigated since the late 1920’s. Although archaeological fieldworks have revealed several remains of other prehistoric and historical (Roman Age) periods as well during the last hundred years, these findings have been barely published. The present paper focuses on the Bronze Age inhabitation of the area by publishing

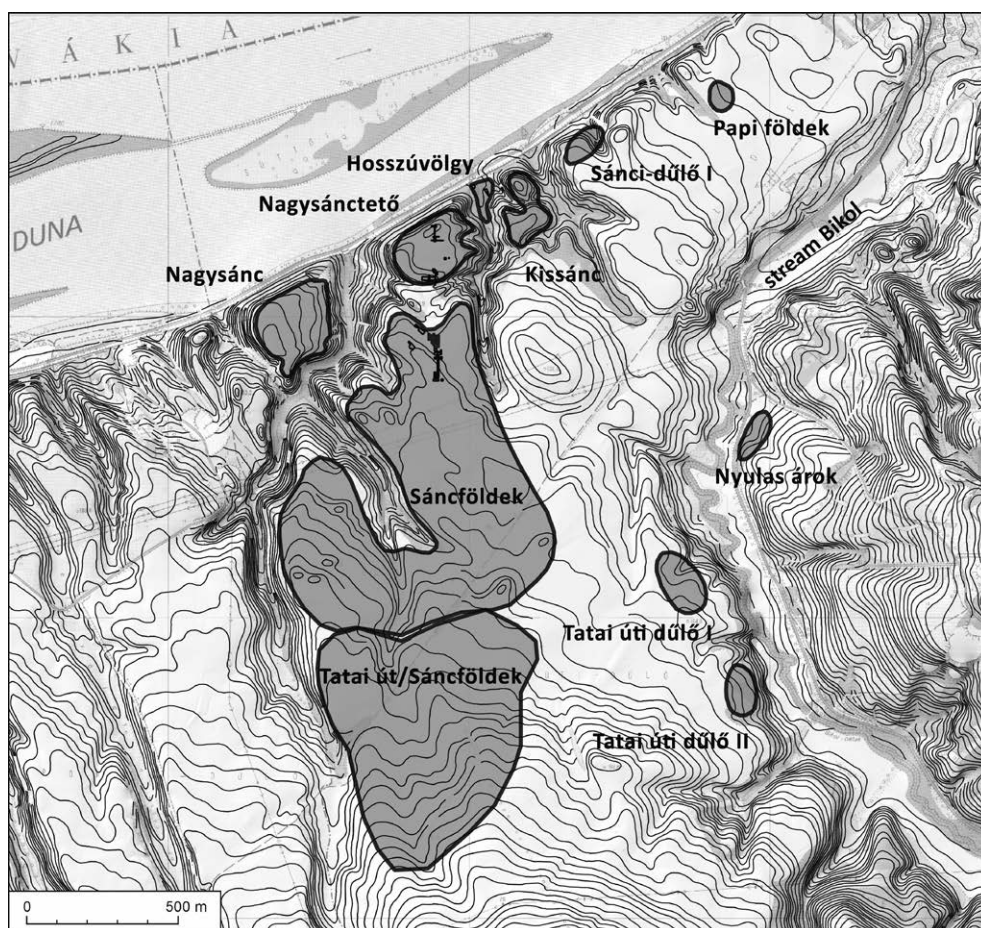


Fig. 1. The known prehistoric sites at and around the Süttö plateau. Trenches of previous excavations are marked in the background. Map E. Fejér, source of background Unified National Cartography System of Hungary, Scale = 1 : 10,000.

old and new discoveries from the Early, Middle and Late Bronze Age.¹

HISTORY OF RESEARCH

The first excavations at the site complex near Süttö took place at the end of the 1920's. These investigations aimed the Early Iron Age burial mounds, although little is known about their discoveries (Czajlik/Novinszki-Groma/Horváth A. 2015, 59, 60; Horváth/H. Kelemen/Torma szerk. 1979, 317, 318; Mérey Kádár 1958; Vékony/Vadász 1982).

At the end of the 1950's, the Archaeological Institute of the Hungarian Academy of Sciences started preliminary rescue excavations along the Danube in the areas which were threatened by the constructions of the Danube Waterworks

Project's (Castiglione 1967, 98, 99). As part of this rescue mission, E. Patek started to investigate two valleys in the area in 1959 by opening trial trenches. While in Süttö-*'Szépvölgy'* (whose location cannot be identified) no archaeological material was detected, in Süttö-Hosszúvölgy, in the valley (gully) between the hilltop areas of Nagysánc-tető and Kissánc, remains of Bronze Age activities were discovered. After E. Patek's two-month-long fieldwork, A. Mozsolics continued the investigation for additional three months. For a long time, only some short scientific reports (Mozsolics 1967, 118; Mozsolics/Patek 1960a; 1960b) and communications in popular newspapers were published about their results, which claimed that part of a Middle Bronze Age settlement including houses, and many ovens had been unearthed.² The archaeological material would have been

¹ The chronological terms are used according to the Hungarian terminology throughout the paper. Summarizing about the differences between the chronological systems *Furmánek/Veliačik/Vladár* 1999, 12–18; *Kiss et al.* 2019; *Kulcsár/Szeverényi* 2013; *Lichardus/Vladár* 1997; *Novotná* 2019.

² 4000 éves kenyérsütő kemencét tártak fel. *Petőfi Népe*, 23. 5. 1959, 2; Négyezer éves pékműhely. *Pest Megyei Hírlap*, 24. 7. 1959, 4.

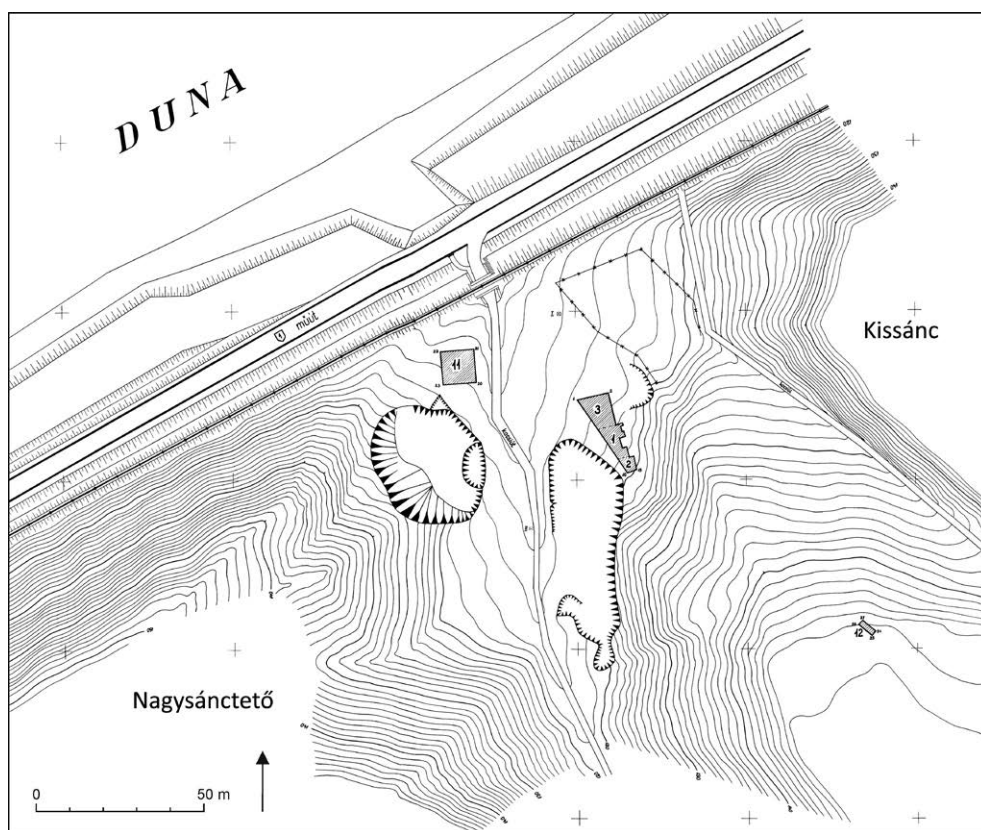


Fig. 2. Süttő-Hosszúvölgy. The trenches opened by E. Patek and A. Mozsolics in 1959 (Patek/Mozsolics 1959).

processed by G. Bándi (Bándi 1965, 68; 1972, 57, fn. 276; 1974, 239), but it did not happen and only T. Kovács released a summary paper in 1988 about the excavations. By publishing some part of the Bronze Age material, he noticed the problems related to the stratigraphic position of the finds and to the supposed connections between the hilltop areas' and the valley's material (T. Kovács 1988). The location of the trenches was not published, which hindered the study of the relations among the various sites in the area.

Based on the available documentation³, the following plan can be reconstructed for the 1959 excavation (Fig. 2): the first trenches (trenches 1–3, directly next to each other, altogether approximately 120 m²) were opened by E. Patek and A. Mozsolics on the eastern side of the valley, below the hilltop of Kissánc. At the same time, a small, 5 × 2 m trial trench (trench 12) was excavated on the top of Kissánc, and another, 9 × 9 m trench (trench 11) at the foot of Nagysánc tető on the western side of the valley. Most of the trenches yielded Middle Bronze Age finds, but the ce-

ramic material from trench 12 was interpreted by G. Bándi as finds from the younger period of the Early Bronze Age (Bándi 1965, 68). In trench 11, Roman Period features were also unearthed. Additionally, E. Patek observed archaeological features in the wall of the sand mine south-southwest of trench 2, which she tried to document, however, they had been heavily destroyed. A. Mozsolics mentioned that she had collected Palaeolithic finds in some of the sand mining pits, which she gave to M. Gábori.⁴

Between 1968 and 1972 in the framework of the Hungarian Archaeological Topographic Research Project, largescale topographic investigations were carried out in the entire district of Esztergom, involving the area of the site complex west of Süttő (Horváth/H. Kelemen/Torma szerk. 1979, 311–320). The surveys made clear that the area of Nagysánc (formerly 'Feketehídi árok mellett'; Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/6) was inhabited during the Late Bronze Age, Early Iron Age and Late Iron Age, Nagysánc tető (Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/5) was settled during the Middle

³ The documentation is kept in the Archives of the Institute of Archaeology at the HUN-REN Research Centre for the Humanities. The finds are stored in the Hungarian National Museum (Inv. no. 62.59.1–415; 62.75.1–18; 68.16.1).

⁴ Today no record is available about Palaeolithic finds originating from Süttő-Hosszúvölgy.

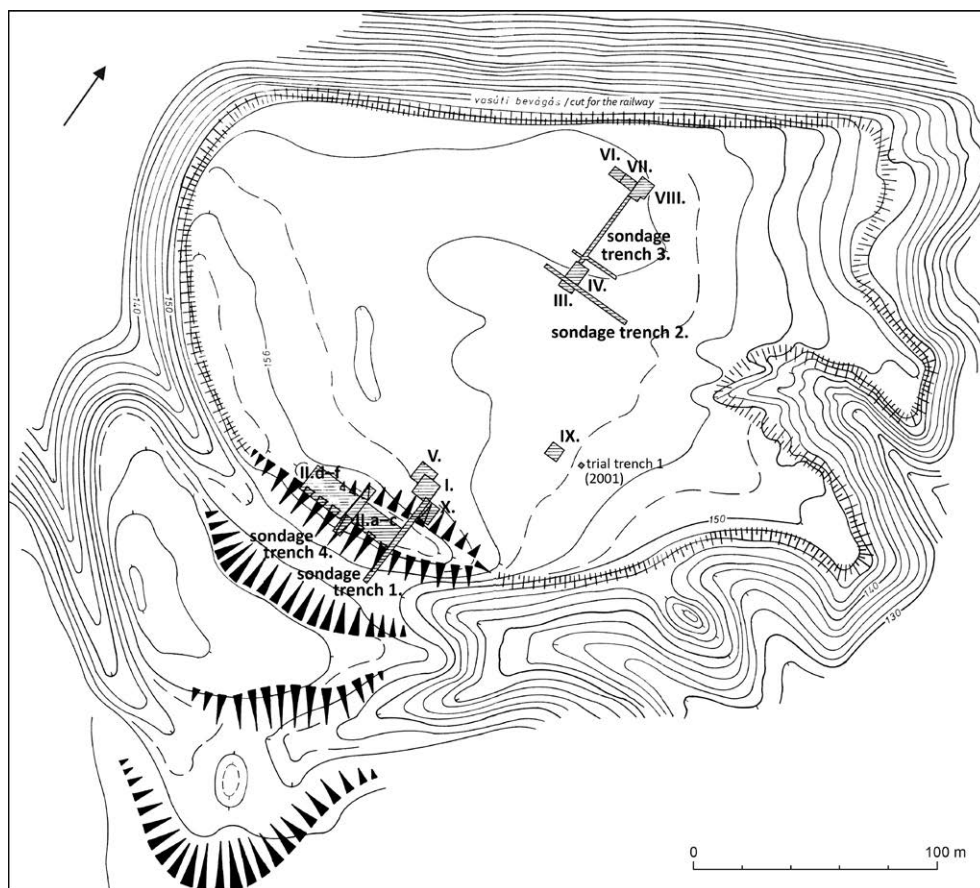


Fig. 3. Süttő-Nagysánc. The trenches opened by G. Vékony until 1984, supplemented with the reconstructed position of the environmental trial trench 1 opened in 2001. Source by courtesy of K. Novinszki-Groma, from the legacy of G. Vékony, geodesy possibly by G. Rózsa, editing E. Fejér.

Bronze Age, Late Bronze Age and Early Iron Age, while Kissánc (Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/4) was occupied during the later period of the Early Bronze Age. In the inner areas of Sáncföldek (formerly 'Sánci-dűlő II'; Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/7 and 'Sáncföldek' as site no. 20/19) the survey identified an Early Iron Age tumulus cemetery. East of Kissánc, a Middle Bronze Age settlement was recorded at Sánci dűlő I (Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/3) and further Middle and Late Bronze Age remains were collected at Papi földek (Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/25). In the southern part of the area, a Middle Neolithic and possibly Copper Age site (Tatai úti dűlő I; Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/12), and an Early Bronze Age settlement (Tatai úti dűlő II; Horváth/H. Kelemen/Torma szerk. 1979, site no. 20/13) were identified. West of Nagysánc no further topographic research has been conducted, since the project was limited only to the Esztergom district, whose western administrative border lies between Süttő and Neszmély (Fig. 1).

In 1978, É. Vadász and G. Vékony started to excavate at the site. Their research focused on an Early Iron Age tumulus grave and the contemporary flat grave cemetery at Sáncföldek, as well as the multiperiod hilltop settlement of Nagysánc. Their fieldwork continued until 1990 and they reported about the results in a series of short communications; however, the majority of the unearthed material has remained unpublished (V. Vadász 1979; 1983; 1986b; Vadász/Vékony 1980; 1981; Vékony 1982a; 1983a; 1984a; 1986a; 1986c; 1988b; Vékony/Vadász 1982; summarizing Czajlik/Novinszki-Groma/Horváth A. 2015; Novinszki-Groma 2017).

The finds have been only partially processed and inventoried. A large amount of the material cannot be identified and connected to archaeological features anymore, some finds are missing, furthermore significant part of the excavation records cannot be found in the archives, which all hamper the evaluation of the material.

Based on the available part of the documentation and the identifiable material, we can recon-

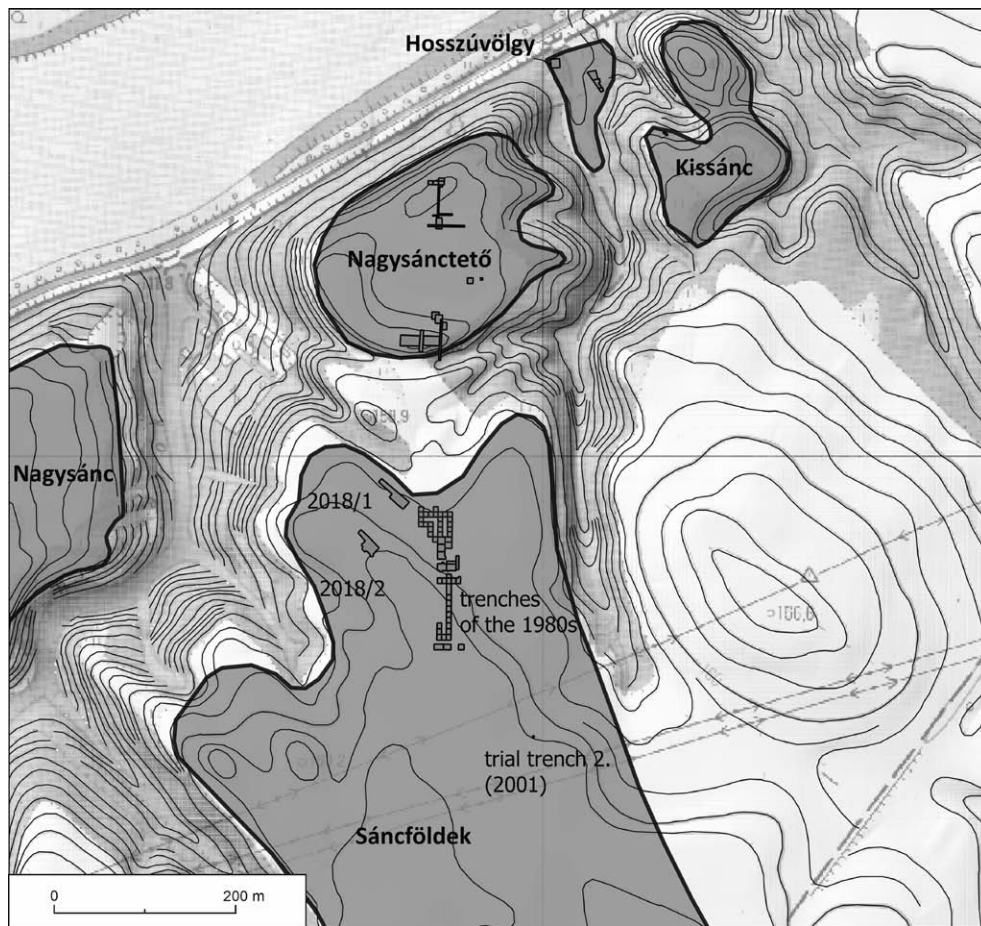


Fig. 4. Süttő-Sáncföldek. The opened trenches (the reconstruction of the trenches from the 1980s is based on some drawings from the archives after *Novinszki-Groma 2017* and *L. Rupnik in Czajlik et al. 2019*). Source of background Unified National Cartography System of Hungary, Scale = 1 : 10,000, Digital Elevation Model by L. Rupnik, editing E. Fejér.

struct the course of the excavation campaigns as follows:⁵

In 1978, 1981 and 1982, excavations were conducted on an Early Iron Age burial mound.

In 1979, G. Vékony started digging at Nagysáncstető both in the inner areas (1979–1981 trenches III, IV, VI, VII, VIII, sondage trenches 2, 3; 1983–1984 trench IX) and on the rampart, but the latter became the main focus of research (1979–1986 trenches I, II, V, X, sondage trenches 1, 4; Fig. 3).⁶ There is no evidence that fieldwork was carried out in the territory of Nagysáncstető after 1986. The publications mention Middle Neo-

lithic, Early Bronze Age, Middle Bronze Age, Late Bronze Age and Early Iron Age archaeological remains in this area.

In 1984, excavation was started in the territory of Sáncföldek, where mostly Early Iron Age graves were unearthed; however, short communications and the material itself testify to Early Bronze Age, Late Bronze Age, Late Iron Age and Roman Age features too (Fig. 4).

Reports on the results after the season of 1986 have not been published, but the later communications and the handwritten notes kept in the archives refer to continuous fieldwork till 1990.

⁵ Part of the documentation is available in the Archives of the Hungarian National Museum: field diaries of some seasons (*Vékony 1980; 1981; 1982b; 1983b*), selected photos and drawings. Supplementary documents have been recently revealed in the Archives of the Kuny Domokos Museum, Tata: fragmented field diaries of multiple seasons (*Vékony 1980; 1984b; 1985; 1986c; 1987*) with selected photos, drawings and notes. The archaeological material can be found in the Balassa Bálint Museum, Esztergom (BBM) under the following inventory units: 85.1.1–1632; 86.2.1–66; 87.47.1–58; 88.3.1–313; 89.1.1–463; 90.1.1–90.26.11; 98.56.1–98.67.1; 2000.2.1–2000.50.6; as well as unprocessed finds (77 boxes).

⁶ É. Vadász and G. Vékony used Roman numerals to identify their trenches at Nagysáncstető (except for the sondage trenches), while during the previous excavations E. Patek and A. Mozsolics used Arabic numerals for their excavation units. In the text, as well as on the maps, the Arabic and Roman numerals are used accordingly for disambiguation.

In 2001, A. Horváth dedicated her thesis to the environmental reconstruction of the Early Iron Age period at Süttő-Nagysánc. In order to gain new environmental data, G. Vékony opened two trial trenches (2 × 2 m), one at Nagysánc and another in the area of Sáncföldek (Fig. 3; 4; Horváth A. 2001, 75).

In the 2010's, the Eötvös Loránd University initiated field research in the area of the site complex. Mainly fieldwalking, geophysical surveys and aerial research were carried out, but in the framework of the Interreg DTP Iron Age Danube Project, excavations were also conducted at Süttő-Sáncföldek in 2018 and 2019 in collaboration with the Archaeological Heritage Protection Directorate of the Hungarian National Museum, and under the direction of Z. Czajlik (Czajlik et al. 2018; 2019).

These investigations focused primarily on the areas of Nagysánc, Nagysánc and Sáncföldek, and they targeted questions related to the Early Iron Age inhabitation of the area. Besides, the extensive and intensive fieldwalking and the excavated trenches (Fig. 4) yielded material from other periods as well: both from the Early Bronze Age, Middle Bronze Age, Late Bronze, Late Iron Age and Roman Period.

Beside professional archaeological research, a local private collector, L. Riegler has to be also mentioned. He was a doctor in Süttő, lived in the second half of the 20th c., who was strongly committed to the history of the region and collaborated with the archaeologists investigating the area. He collected antiquities from various locations in the surrounding area, including both prehistoric and ethnographic materials, and donated several finds of his private collection to the Balassa Bálint Museum, Esztergom (Bondár 2017, 115; Horváth/H. Kelemen/Torma szerk. 1979, 310–320).⁷

PREHISTORIC INHABITATION AT THE SÜTTŐ SITE COMPLEX

Before the Bronze Age

The earliest evidence of settlement on the Süttő plateau is from the Middle Neolithic period. During the fieldwalkings of the Hungarian Archaeological Topographic Research Project some Neolithic material was collected on the hilltop of Nagysánc (Horváth/H. Kelemen/Torma szerk. 1979, 311, site no. 20/5) and later field campaigns of G. Vékony and É. Vadász clarified that a Middle Neolithic settlement with Želiezovce type material of the Linear Pottery Culture once existed on the hill (Vadász/Vékony 1980; 1981, 20; Vékony 1980; 1981; 1982a; 1982b; 1983b; 1984a;

1984b). To the south, on the west bank of the Bikol stream at Tatai úti dűlő I (Horváth/H. Kelemen/Torma szerk. 1979, 315, site no. 20/12) and on the opposite side of the creek, at Nyulas árok (Horváth/H. Kelemen/Torma szerk. 1979, 319, site no. 20/24) the fieldwalkings revealed further remains of Middle Neolithic occupation with Želiezovce type material. The discovered finds and features are unpublished.

The central area of the plateau shows no traces of habitation between the Neolithic and Bronze Age, but on the bank of the Bikol stream at Tatai úti dűlő I, Late Copper Age stray finds associated with the Boleráz culture have been collected (Horváth/H. Kelemen/Torma szerk. 1979, 315).

Early Bronze Age

Remains of Early Bronze Age (EBA) inhabitation have been discovered in various parts of the investigated site complex. A. Mozsolics has recorded EBA finds on the top of the Kissánc area, while É. Vadász and G. Vékony have unearthed at least one EBA pit in Sáncföldek and possibly several features at Nagysánc. During recent fieldworks in Sáncföldek, another pit from the same period was discovered in 2018. Despite intensive fieldwalkings, no indication of EBA occupation was detected in other areas of the plateau. The finds represent both the older and younger phases of the period, the Makó-Kosihy-Čaka (MKČ) and the Hatvan-Tokod type material culture.

Early Bronze Age 1–2

Nagysánc

From the hilltop area of Süttő-Nagysánc É. Vadász and G. Vékony reported remains of Early Bronze Age inhabitation. They claimed in various publications that several features (buildings?) of the MKČ culture were unearthed on the site and the settlement had been already fortified probably during this period, since possible remains of an inner ditch were detected in trench II-IIb (Vékony 1982b; 1986b, 260; 1988a, 71; 2000, 178; Vékony/Vadász 1982). However, no EBA material can be identified today among the finds of the site stored in the BBM (for more details see Fejér 2022, 39, 40).

Sáncföldek

More evidence is available of EBA settlement on the plateau of Sáncföldek. É. Vadász and G. Vékony

⁷ D. M., A lópatkoló gyógykovács diplomája. *Magyar Hírlap* 1/124, 16. 9. 1968, 5.

uneearthed at least one feature (pit) of the MKČ culture in the area in 1990, while another feature (a shallow pit) with contemporary material was excavated in 2018 within a distance of approximately 100 m.

The material from 1990 and 2018 has been recently published (Fejér 2022, 33–39). Several fragments of interior decorated bowls, conical mugs, pots with brushed surface characteristic for the EBA material culture were documented in the unearthed features. The archaeozoological material available from the pit discovered in 2018 is dominated by caprines, but cattle and pig are also present in a significant proportion among the remains, which is similar to what was observed in other, contemporary settlements (Csippán 2007, 84, 86; Gál/Kulcsár 2012; Kulcsár 2009, 67–69). There was no clear evidence of built structures and it is assumed that the EBA settlement at Süttő-Sáncföldék had a dispersed layout, which is comparable to other published sites with MKČ material (Kulcsár 2009, 66, 67; Tóth K. 2004).

The pit excavated in 2018 provided a radiocarbon date -4014 ± 33 BP, 2585–2466 cal BC (90.8%) – that is in line with dates from other sites of the MKČ culture (see Fejér 2022, 48).

Further sites of the MKČ culture in the area

The nearest contemporary site was discovered at Süttő-Tatai úti dűlő II, situated ca. 1.5 km south-east from the area being examined, where stray finds testify to an EBA settlement (Fejér 2022, 40, 41; Horváth/H. Kelemen/Torma szerk. 1979, 315, site no. 20/13; Kulcsár 2009, 202, site no. 230).

Although there is no data on their fine chronological position, internal structure, size or their role in the settlement hierarchy, the close proximity of the sites at Nagysáncföldék, Sáncföldék and Tatai úti dűlő II let us to presume a dense network of EBA sites on the plateau.

Early Bronze Age 3

Kissánc

On the hilltop area of Kissánc, a settlement of the later EBA was documented. In 1959, A. Mozsolics opened a 5×2 m trench on the top of the hill (Fig. 2, trench 12; Fig. 5) and although no archaeological feature was described, the documented stratigraphy testifies to at least a 50 cm thick cultural deposition. The uppermost 50–60 cm layer was heavily disturbed according to the field diary, but it already contained significant amount of ceramic finds, while the lower part between –60 and –100–110 cm –

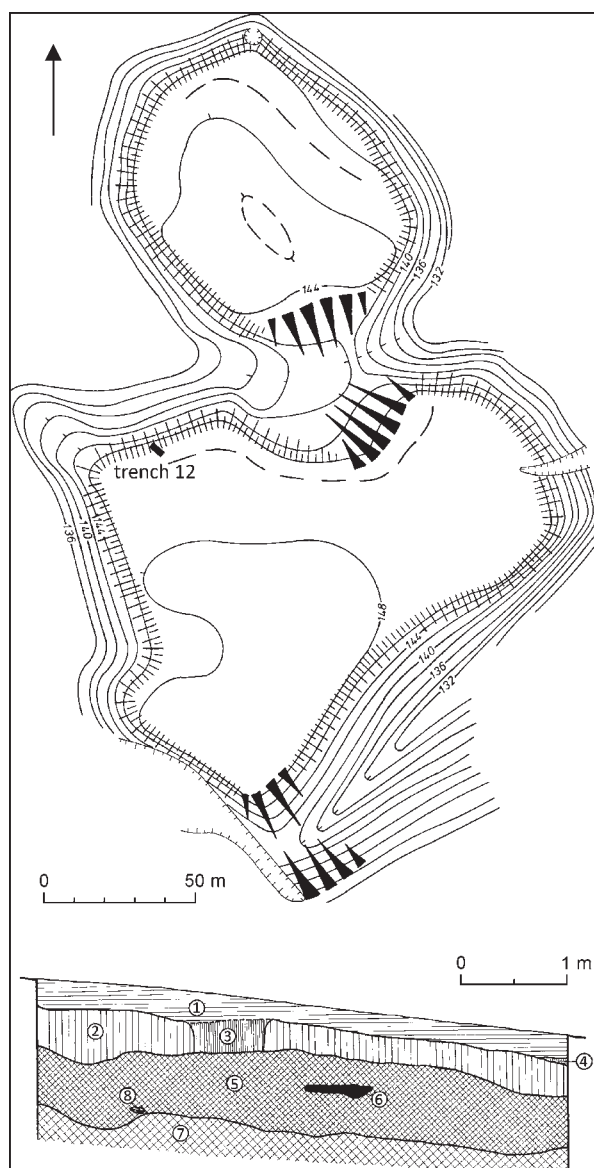


Fig. 5. Süttő-Kissánc and the west profile of trench 12 opened by A. Mozsolics in 1959. Map of the hilltop area by courtesy of K. Novinszki-Groma, from the legacy of G. Vékony, geodesy possibly by G. Rózsa, profile of trench 12 after Patek/Mozsolics 1959. Legend: 1 – topsoil; 2 – grey, mixed soil; 3 – dark grey, mixed soil; 4 – black layer with charcoal; 5 – dark brown soil; 6 – red (burnt) layer; 7 – light brown soil; 8 – stone.

a dark brown layer with various finds (mostly ceramic and bone) – indicated a more intact layer of the prehistoric inhabitation (Fig. 5; Patek/Mozsolics 1959). In 1968, when the Topographical Research Project's survey was conducted on the site, the area was partially covered by vineyard, but sherds and shells could be seen and collected on the surface (Horváth/H. Kelemen/Torma szerk. 1979, 310).

The topography of the site suggests that the settlement on the hilltop was naturally protected on three

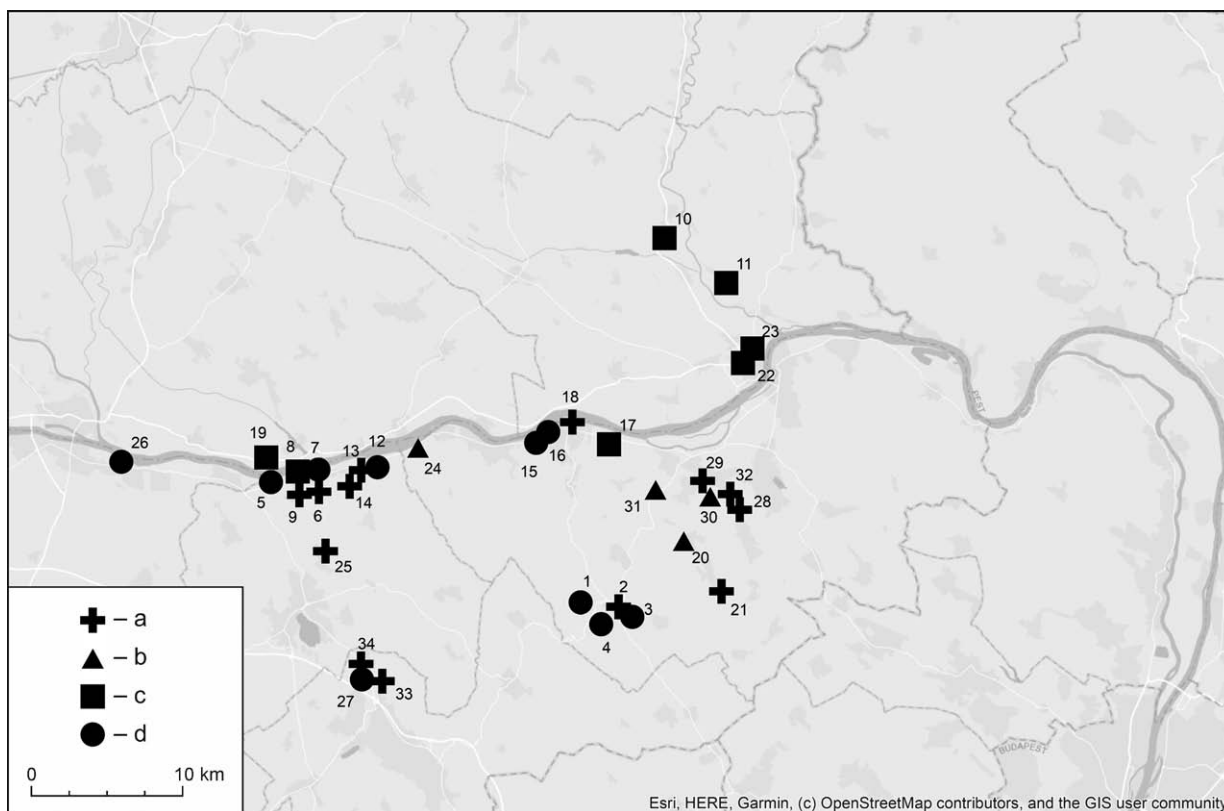


Fig. 6. Early Bronze Age sites with Hatvan type of material culture in the vicinity (ca. 20 km radius) of Süttő. 1 – Bajna-Halászfői dűlő; 2 – Bajna-Hősök tere; 3 – Bajna-Őrhegy alja; 4 – Bajna-Vízállás alatti dűlő; 5 – Dunaalmás-Foktorok; 6 – Dunaalmás-Hegysor utca; 7 – Dunaalmás-Lenhardt-öregszőlő; 8 – Dunaalmás-Parókia; 9 – Dunaalmás-Uradalmi szőlő; 10 – Kamenin-Várhegy; 11 – Malá nad Hronom-Rövid föld; 12 – Neszmély-Kalinvár; 13 – Neszmély-Téglagyár; 14 – Neszmély-Várhegy; 15 – Nyergesújfalu-Sáncdűlő; 16 – Nyergesújfalu-Sánc-hegy; 17 – Nyergesújfalu-Szélesföldek; 18 – Nyergesújfalu-Viscosa gyár; 19 – Patince; 20 – Sárísáp-Quadriburg; 21 – Sárísáp-Újtelep; 22 – Štúrovo-Istenhegy; 23 – Štúrovo-JCP; 24 – Süttő-Kissánc; 25 – Szomód-Gyulahegy; 26 – Szőny-Sörház; 27 – Tatabánya-Felső-rét-föld; 28 – Tokod-Árpádakna; 29 – Tokod-Csomorja (Hegyeskő); 30 – Tokod-Leshegy; 31 – Tokod-Sáncok; 32 – Tokod-XV. akna; 33 – Vértesszőlős-Likótelek; 34 – Vértesszőlős-Vasútállomás (after Bándi 1965; Batora 2018; Horváth/H. Kelemen/Torma szerk. 1979; Kisné Cseh 1999; L. Kis Szabó 2017; Marková 2010; Nešporová 1969; Torma 1972). Map E. Fejér. Legend: a – burial; b – hilltop settlement; c – settlement (excavated); d – stray find.

sides by the steep slopes of the plateau, and it was probably artificially fortified on its southern side by a 2–3 m deep, 10–20 m wide ditch. Archaeological material was found both in the inner territories and on the outside, south of the fortification, but still within a naturally separated area (Horváth/H. Kelemen/Torma szerk. 1979, 310; Torma 1972, 76; Vékony 1986b, 260; 1988a, 72).

The finds originating from Kissánc were identified by G. Bándi and I. Torma as typical to the Tokod type of the Hatvan culture. Fragments with brushed or textile-impressed surfaces and finger-impressed cordons were recorded among them (Bándi 1965, 68, pl. XIX; Horváth/H. Kelemen/Torma szerk. 1979, 310).

Material associated with the Hatvan culture has been known in the northern part of Central Hungary and the adjacent regions of Southwest Slovakia (Batora 2018, 91–98; Furmánek/Veliačik/Vladár 1999, 41–43; Kalicz 1968; 1984; Marková 2010; Nešporová

1969). In Northeast Transdanubia the Hatvan culture material had been often found together with finds typical to the Kisapostag culture and it has been called the Tokod type of the Hatvan material culture. Soon, in general, this term got used to describe the finds in the western distribution area of the culture (Bándi 1965; 1984, 260, 261; Kalicz 1968, 189; 1984, 192; Torma 1972; 1996; see also Kiss 2002, 478–484; 2010; 2012, 29–31; Melis 2011). Unfortunately, the lack of publication of larger assemblages hinders the exact understanding of the relative chronology and the processes responsible for the entanglements observable in the material culture of the region. The Tokod type material in Northeast Transdanubia is dated to the end of the EBA and beginning of Middle Bronze Age (R BA1/A2; David 1998, fig. 3; Furmánek/Veliačik/Vladár 1999, 41, 42; Kiss 2012, 32, 33, 101; Melis 2011; Torma 1996; V. Vadász 1986a, fn. 72). Among the finds from Süttő-Kissánc,

there are not any Kisapostag-type encrusted vessels (e.g., decorated jugs), only a stray vessel can be associated with the Kisapostag culture, which was allegedly found in the area (Horváth/H. Kelemen/Torma szerk. 1979, 310, pl. 10: 1). The very low number of finds does not allow us to draw more detailed conclusion regarding the chronological position and cultural connections of the site.

The settlement on top of Kissánc was a most likely fortified, single-layer hilltop site, which has several parallels discovered in Northeast Transdanubia (e.g., Sárísáp-Quadriburg, Tokod-Leshegy, Tokod-Sáncok; Kisné Cseh 1999; L. Kis Szabó 2017; Torma 1972). These hilltop settlements were parts of a dense network of sites involving open settlements and burial grounds too. The nearest contemporary sites to Süttő-Kissánc are reported from Neszmély-Kalinvár, Neszmély-Téglagyár, Neszmély-Várhegy, Nyergesújfalu-Sánc-dűlő, Nyergesújfalu-Sánchegy, Nyergesújfalu-Széles-földek and Nyergesújfalu-Viscosa-gyár in Hungary, Patince, Štúrovo-Istenhegy and Štúrovo-JCP in Slovakia (see Fig. 6; Bándi 1965; Batora 2018, 92, 93; Horváth/H. Kelemen/Torma szerk. 1979; Kisné Cseh 1999; Marková 2010; Nešporová 1969; for the settlement structure on the left bank of the Danube, see Batora/Tóth 2014).

Finds were discovered on Kissánc both inside and outside of the fortified area of the settlement, which resembles other fortified sites in the Hatvan culture's central distribution area, where often only a part of the inhabited area was enclosed (P. Fischl/Kienlin 2013; Kalicz 1968, 133; Kienlin 2018). This observation at Kissánc contradicts to I. Torma's study, who suggested that in Transdanubia the entire area of the settlements had been surrounded by fortifications (Torma 1972, 76).

Middle Bronze Age

Inhabitation during the Middle Bronze Age (MBA) was suspected in the area on the basis of some stray finds collected by L. Riegler (Horváth/H. Kelemen/Torma szerk. 1979, 315–317), but it was the 1959 excavation at Hosszúvölgy that first confirmed the presence of an MBA settlement in the investigated Süttő site complex (T. Kovács 1988; Mozsolics/Patek 1960a; 1960b). Not long after, the Hungarian Topographic Research Project yielded contemporary material from Nagysáncetető, where the subsequent investigations of G. Vékony and É. Vadász were able to distinguish different phases of MBA occupation and fortification. G. Vékony suggested, that the site complex at Süttő was inhabited in course of the entire MBA. While from the area of Kissánc only Hatvan-Tokod type material is known, what G. Vékony

interpreted as the earliest finds of the MBA from the site complex, at Nagysáncetető he could identify three consecutive phases of inhabitation of the Transdanubian Encrusted Pottery Culture (Vékony 2000, 178, 179). The finds of Hosszúvölgy are contemporary with the late MBA occupational period of Nagysáncetető (T. Kovács 1988; Vékony 2000, 179). The survived material and the available documentation do not allow us at the moment to reconstruct and re-evaluate the settlement history in detail.

Nagysáncetető

The first excavations of the settlement at Nagysáncetető were carried out by G. Vékony and É. Vadász between 1979 and 1986 (see above). They reported about part of their observations in several communications; however, no archaeological finds were published. The accessible field diaries as well as the inventoried and unprocessed find material in the Balassa Bálint Museum testify that MBA material culture was unearthed in a large amount and in almost every trench. Abundant MBA finds were collected during the excavation of the rampart's area (trench II; Fig. 3). Furthermore, at the northeast foothills of the settlement, already in Hosszúvölgy (trench XI; Fig. 2), A. Mozsolics discovered some scattered MBA finds and some others originating from pits (e.g., pit 104; see T. Kovács 1988, fig. 4: 1–8). It is plausible to assume that some part of the upper settlement had fallen down during prehistory; however, it cannot be ruled out either, that this material belonged to the contemporary settlement located at the entrance of the Hosszúvölgy (Patek/Mozsolics 1959; see below in detail).

According to G. Vékony's observations, three phases of MBA occupation, all attributed to the Transdanubian Encrusted Pottery Culture (TEP), can be distinguished in the area of Nagysáncetető. He could parallelize them with the three main phases of the culture: early TEP (R BA1); classical TEP (Esztergom subgroup; R BA2); and late TEP, mixed with material attributed to the Maďarovce culture and Litzen ceramic (R BB; Vékony 2000, 179, 180). G. Vékony and É. Vadász claimed that the settlement had been fortified by a 2 m high rampart and a ditch at the entrance during the first phase. They thought that this early settlement had been destroyed by fire, and in the next phase the newly established settlement had been reinforced by a higher (2–3.5 m) rampart. After another destruction event, the fortification was not renewed in the third phase, and the new houses were built on top of the demolished rampart. The final abandonment of the settlement correlates with the end of the MBA (V. Vadász 2001, 48, 49; Vékony 1988a, 73, 74; 2000; Vékony/Vadász 1982).

The MBA fortified hilltop settlement at Nagysáncstető is of great significance for several reasons. On the one hand, there is evidence of erecting and maintaining a fortification system, which is a rarely documented phenomenon on TEP sites. On the other hand, the settlement was inhabited during the late phase of the MBA (Koszider period) too, which is characterized on the site by closed archaeological assemblages that contained both TEP, early Tumulus Culture and Litzen ceramic finds (Kiss 2012, 65–67, 189–192; Vékony 2000, 179–181). The present paper cannot aim to process and evaluate the abundant MBA material unearthed and stored from Süttö-Nagysáncstető, it can only offer a modest selection of the finds. Research would definitely benefit from the detailed investigation of the material; however, the lack of stratigraphic information would restrict the success of such a project. New fieldworks on the site would be necessary.

Descriptions of some selected finds

1. Fragment of a conical bowl with slightly indrawn, flattened rim. Two horn-shaped, standing vertical knobs (directly next to each other) are elevated from the rim. At the outer side of the vessel, below the neck, incised lines with encrustation are visible: pairs of parallel vertical lines are connected by sets of roof-shaped double lines. Tempered with fine-grained material. The outer surface of the bowl above this decoration is polished, around the decoration no surface treatment is visible. The inner surface of the vessel is polished. Dark grey colour, polished to black. Size 10 × 8 cm, th. 0.6 cm (BBM, box 49, trench II/D; Pl. I: 1).
2. Two fragments of a conical bowl with slightly indrawn and flattened rim. There is a horizontally extruded knob at the rim. The lower part of the vessel is decorated with incised lines, which are arranged as vertical lines running down from a zigzag line. Tempered with fine-grained material, sand and grog. The surface of the vessel is heavily worn, traces of burnishing, possible polishing are identifiable. Inside dark grey, outside grey-brown patchy colour. Size 10 × 8 cm, th. 0.7–0.8 cm (BBM, box 49, trench II/D; Pl. I: 2).
3. Fragment of a conical bowl with indrawn and slightly flattened, oblique rim. The outer surface of the vessel is decorated by incised lines: ca. 2 cm below the rim a horizontal line of V motifs is set on top of several less finely elaborated crossing lines. Tempered with fine-grained material, crushed pebble and sand. The upper part of the outer surface is polished, around the decoration no treatment is visible. Yellowish brown colour with black patches. Size 12 × 10 cm, th. 0.7–0.9 cm, h. 8.5 cm (BBM, box 49, trench II/D; Pl. I: 3).
4. Fragment of a bowl with everted, flattened rim. A small, wide handle is attached to the rim connecting it to the neck. Incised decoration is visible on the vessel: close to the handle the outer side of the rim is decorated with small vertical incised lines around the handle. Two horizontal lines are running parallel to the rim, around the neck, the lower one starts with a dot at the handle. There is a vertical incised line running down from the top of the handle, below the neck two oblique branches join to this line, both ending in a dot. On the top of the rim the vertical line of the handle starts with two dots and a horizontal line, also starting with a dot, runs around the vessel on the rim. Tempered with fine grained material. Inside and outside polished. Dark grey, black colour, the white encrustation is still visible in the incised lines. Size 4 × 3.5 cm, th. 0.5–0.6 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 4).
5. Fragment of a conical bowl with slightly indrawn neck and inwards facing flattened rim. A wide handle is attached to the rim connecting it to the neck. Below the neck the outer surface is decorated with incised crossing lines (net-like pattern). Tempered with fine-grained material. The upper part of the outer surface is polished, below the handle, around the decoration, no treatment is visible. Inner surface is polished. Brown, grey patchy colour. In some of the incisions traces of greyish white encrustation can be observed. Size 11 × 6 cm, d. rim 15–16 cm, th. 0.7 cm (BBM, box 49, trench II/D; Pl. I: 5).
6. Fragment of a strongly outdrawn neck with an everted, flattened rim of an undeterminable type of vessel. The top of the outer surface of the fragment is cut out, was possible filled with encrustation. This area is bordered from below with a zigzag line. Underneath two parallel horizontal incised lines are visible. Tempered with fine-grained material, crushed pebble and grog. Inner and outer surface are polished. Dark brown, dark grey patchy colour. White encrustation is visible in the thin incised lines. Size 7 × 9 cm, th. 0.8–1 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 6).
7. Fragment with funnel-shaped necked and everted rim of an undeterminable type of vessel. The top of the rim is decorated with a double incised zigzag line. Tempered with fine-grained material and crushed pebble. Surface is polished. Greyish-brown patchy colour. In the deeper incision white encrustation is still visible. Size 4.5 × 4.5 cm, th. 0.6 cm, d. > 32 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 7).
8. Fragment of a strongly outdrawn neck with straight rim of an undeterminable type of vessel. The outer edge of the rim is decorated with a series of short vertical incised lines, below that two horizontal lines are visible, the upper one is interrupted by a motif arranged by three dots under each other and two short oblique lines, forming a triangle. The inner part of the rim is decorated with a horizontal zigzag line. Tempered with fine-grained material. Surface is polished. Dark grey, black colour. Remains of white encrustation is visible in the incised lines. Size 5.5 × 4.5 cm, th. 0.8 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 8).
9. Fragment of a round, conical lid. The rim is decorated with short vertical lines, at the upper surface of the lid radially arranged dots and a perforation (d. 0.4 cm) close to the rim are visible. Tempered with fine-grained material. The outer surface is polished, inside smoothed. Dark grey, black colour. Encrustation is poorly preserved in the incised decoration. Size 2.5 × 3.5 cm, d. 8–9 cm, th. 0.5 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 9).
10. Fragment of a slightly outdrawn neck with straight rim. The rim is decorated with a series of short incised vertical lines, below that on the outer surface three hori-

- zontal lines are visible. Under the lowest line vertically arranged dots form lines. Tempered with fine-grained material. Surface is polished. Dark grey, black colour. White encrustation is still visible in the incisions. Size 2.5×2.5 cm, th. 0.4–0.5 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 10).
11. Slightly curved body fragment of an undeterminable type of vessel. Decorated on its upper part with an incised horizontal line, below that a set of short lines forming zigzag motif. Underneath two grooved around knobs are elaborated. Tempered with fine-grained material. Surface outside is burnished, inside worn, but traces of polishing are recognisable. Outside yellowish brown, inside dark grey colour. In the upper incised lines remains of white encrustation are visible, the lower circular motifs do not imply encrustation, they have a smooth surface. Size 3×4.5 cm, th. 0.5–0.6 cm (BBM, box 49, trench II/D; Pl. I: 11).
 12. Slightly curved body fragment of an undeterminable type of vessel. A horizontally set rib separates the fragment visually, on the upper part two horizontal incised lines and above them unidentifiable motif is visible. Part of the rib is decorated with incised short vertical lines. Below the rib, part of an oblique motif is identifiable: a zigzag line starting with a dot and from the zigzags short branches are heading downwards (making them Y-shaped), ending in dots. Tempered with crushed pebble and grog. Outer surface is polished, inside no treatment. Dark grey, black colour. Remains of white encrustation are visible in the incisions. Size 5×5.5 cm, th. 0.7–0.8 cm (BBM, box 54, trench II/D, –80 cm; Pl. I: 12).
 13. Almost straight body fragment of an undeterminable type of vessel. A horizontally set rib, decorated with a series of short, oblique incisions runs through the fragment. Below the rib a row of incised V motifs is visible, which are connected to vertical lines. Tempered with fine- and medium-grained material (crushed pebbles). Over the rib and between the V incisions and the rib the surface is polished, below the V motifs and inside no treatment. Dark grey, black colour. Remains of white incrustation can be observed in some incisions. Size 6×5 cm, th. 0.7 cm (BBM, box 49, trench II/D; Pl. I: 13).
 14. Fragment of a large undeterminable type of vessel. A wide strap handle is attached on the top to a horizontal rib, which is decorated with short incised vertical lines. Below the rib two oblique, parallel incised lines are visible, running downwards. Tempered with finely crushed pebbles. The handle is polished, the outside of the vessel is worn, inside smoothed. Brown, dark grey patchy colour. Size 9×10 cm, th. 0.6–0.7 cm (BBM, box 49, trench II/D; Pl. II: 1).
 15. Curved body fragment of a large vessel with a broken off wide strap handle. Below the handle a horizontal line is incised, from there two-two parallel vertical lines are running downwards. Tempered with medium- and large-grained material, crushed pebble. The upper part is polished, below the horizontal line and inside no treatment. Outside and inside brown, dark brown patchy colour, in the middle dark grey. Remains of white encrustation can be observed in the incisions. Size 8×12 cm, th. 0.7–0.9 cm (BBM, box 53, trench II/D; Pl. II: 2).
 16. Two body fragments of an undeterminable type of vessel. In the middle a vertical incised line is visible, bordered by three horizontal, parallel lines, from top to bottom starting further and further from the centre. The uppermost line starts with dots, the lower ones with a horizontal V shaped motif. Tempered with crushed pebble and grog. The surface outside is polished, inside burnished. Dark grey, black colour. White encrustation is visible in the incised lines. Size 12×7 cm, th. 0.7–0.8 cm (BBM, box 54, trench II/D, –80 cm; Pl. II: 3).
 17. Curved body fragments of a large vessel with slightly indrawn, grooved neck and a wide strap handle on its belly. The handle has been elaborated with three vertical ribs. The outer surface of the vessel is separated by a large zigzag incision, which goes down at the handle. Tempered with small and medium size material, with grog. Below the zigzag line the surface is brushed, above it burnished, inside smoothed. Light brown colour with a black patch. Size 28×20 cm, th. 0.7–0.8 cm (BBM 86.2.7, sondage trench 3, 0–30 cm; Pl. II: 4).
 18. Spherical lower part of a closed vessel, standing on an articulated base. Four flattened lugs are facing down on the lower part of it and two further lugs, and two horizontally perforated lugs are placed on its shoulder. Neck is missing. Tempered with finely crushed pebble. Surface outside is burnished, no treatment inside. Grey colour with reddish-grey patches. D. base 5.8 cm, h. > 6.5 cm, th. 0.5–0.6 cm (BBM, box 74, sondage trench 4; Pl. III: 1).
 19. Fragment of a closed vessel with spherical body and lightly curved neck, standing on four lugs. Tempered with finely crushed pebble and sand. Surface outside is polished, no treatment inside. Dark grey colour. D. base 6.8 cm, th. 0.4–0.6 cm (BBM, box 74, sondage trench 4, upper layer; Pl. III: 2).
 20. Fragment of a mug with flattened spherical body and straight, slightly outdrawn neck. Wide strap handle starts from the shoulder. Tempered with finely crushed pebble and sand. Surface outside and the inner part of the neck is polished. Dark grey colour with brownish, worn patches. D. base 3.7 cm, d. neck 5 cm, th. 0.4 cm, h. > 6 cm (BBM, box 74, sondage trench 4, upper layer; Pl. III: 3).
 21. Shoulder and neck with a strap handle of an undeterminable type of vessel (mug?). Tempered with finely crushed pebble and sand. Surface outside polished, no treatment inside. Dark grey, dark brown colour. Size 6×3 cm, th. 0.4 cm (BBM, box 74, sondage trench 4, upper layer; Pl. III: 4).
 22. Fragment of a cup with slightly curved neck, flattened spherical body and two handles connecting the shoulder and the rim (partly reconstructed). There are two knobs on the opposite sides of the shoulder. Tempered with fine-grained material. Surface outside and inside at the upper part of the neck is polished. Brown, dark grey patchy colour. D. base 3.5 cm, h. 6–7 cm, d. rim 6.8–7 cm, th. 0.4–0.5 cm (BBM, box 74, sondage trench 4, ashy layer; Pl. III: 5).
 23. Cup with slightly curved neck, flattened spherical body and two handles connecting the shoulder and the rim (partly reconstructed). There are two knobs on the opposite sides of the shoulder. Tempered with fine-grained material. The upper part of the neck outside and inside is polished. Dark grey, brown patchy colour. D. base 4 cm, h. 5.5 cm, d. rim 6.4 cm, th. 0.4 cm (BBM, box 74, sondage trench 4, ashy layer; Pl. III: 6).

24. Fragment of a large vessel with slightly curved neck and possibly four knobs placed on its shoulder. Tempered with crushed pebble. Outer surface is lightly burnished, inner surface is smoothed. Yellowish colour with greyish patches. Size 25 × 15 cm, d. neck 13 cm, th. 0.8–0.9 cm (BBM, box 64, trench II/c, north, feature 'a', vessel nr. 3; Pl. III: 7).
25. Fragment of a jug with funnel-shaped neck and biconical body (partly reconstructed). The top of the shoulder is grooved. Strap handle connects the shoulder and the neck. Three knobs are on the shoulder. Tempered with fine-grained material. Surface is polished. Dark brown colour. H. 11.2 cm, d. base 3.5–3.7 cm, d. rim 9.5 cm, th. 0.4 cm (BBM, box 72, trench IX, feature IX/3; Pl. IV: 1).
26. Fragment of a jug with funnel-shaped neck and biconical body (partly reconstructed). The top of the shoulder is grooved. Strap handle connects the shoulder and the neck. Three knobs are on the shoulder. Tempered with fine-grained material (sand). Surface outside and the upper areas of the neck in the inner side are polished. Dark grey, blackish colour. H. 10.6 cm, d. base 3.5 cm, d. rim 8.2 cm, th. 0.4 cm (BBM, box 39, sondage trench 4, depth –180 cm; Pl. IV: 2).
27. Fragment of a jug with slightly curved neck and biconical body (partly reconstructed). A strap handle connects the rim and the shoulder. There is a small knob directly below the lower end of the handle. The upper edge of the shoulder is grooved. Tempered with fine-grained material. Surface outside and the upper part of the neck's inner surface is polished. Dark grey, black colour. H. 8.2–9 cm, d. base 3.4 cm, d. rim 7–7.5 cm (BBM, 86.2.3., feature 1/d; Pl. IV: 3).
28. Fragment of a jug with possible funnel-shaped neck and biconical body (partly reconstructed). Originally could have had an *ansa lunata* handle, but the reconstruction does not allow the examination of the broken surfaces, reconstructed as the top of the handle would be depressed. Tempered with fine-grained material. Surface outside is polished, inside no treatment. Dark grey, black colour. H. 12.4 cm, d. base 3.8–4 cm (BBM, 86.2.11., feature VIII/7; Pl. IV: 4).
29. Fragment of an elongated vessel possibly standing on a four-footed pedestal (partly reconstructed). At the end of the pointed oval-shaped vessel the rim is thickened and elevated, at the widest point a strap handle slightly elevated over the rim is connected to the neck. Only one quarter of the vessel is preserved, and the reconstruction hinders the examination of the broken surfaces. It is supposed that it was symmetrical and standing on four stands. Tempered with fine-grained material. Outer surface is burnished and has reddish-brown, greyish patches, inner surface is smoothed and has brown colour with dark patches around the centre. H. 6–8 cm (without legs), estimated length 19.5 cm, estimated width 15.5 cm, th. 0.6–1 cm (BBM, 86.2.13., trench I, 120–140 cm; Pl. IV: 5).
30. Almost intact jar with funnel-shaped neck and spherical body (partly reconstructed). On the neck five rows of Litzen decoration are visible (each row contains of five or six lines of string imprints). Four elongated horizontal perforated handle straps are attached to the belly of the jar, which are connected to the neck by three-three vertical ribs. Tempered with fine-grained material. Surface outside and the inner surface of the neck is polished.

Reddish-brown, grey patchy colour. H. 18.5 cm, d. base 7 cm, d. rim 14 cm, th. 0.5 cm (?) (BBM, box 76, trench II/D; Pl. V: 1).

Many of the presented finds have characteristical encrusted decoration and despite their fragmented condition in several cases the type of the original vessels can be also reconstructed, and their parallels can be identified among the TEP material culture.

Large vessels with funnel-shaped neck (with or without encrustation, e.g., Pl. I: 6, 7) have analogies among the TEP finds (Bóna 1975, 205–211; types Ub1–4 after Kiss 2012, 65–69; T. Kovács 1988, 122, 123; Torma 1976, 29). Larger vessels with a wide handle (Pl. II: 1, 2, 4) attached mostly to the belly and with simple decoration below it or with a horizontal, notched rib connected to the handle (Pl. II: 1) are also common among the TEP material, the latter one especially in the northern TEP group (Bóna 1975, 210; types Ub1–2 after Kiss 2012, 65–69; Reich 2006, 33–43, fig. 109; 110; map 1; Torma 1976, 29, 30; e.g., Dunaalmás-Regálási temető: V. Vadász 1986a, pl. I; Esztergom-Szentgyörgymező: Bóna 1975, pl. 204: 8; Esztergom-Várhegy: Torma 1976, pl. 9: 1–3; Lábatlan: Bóna 1975, pl. 204: 4; Malé Kosihy-Papföld: Točík 1981a, fig. 12: 7; Tatabánya-Bánhida-Dinnyeföldek: Kisné Cseh 1999, pl. 2: 1–3). Conical or spherical bowls (Pl. I: 1–5) are also well-known in the TEP distribution area and the indrawn flattened rim of the presented examples is also typical (Bóna 1975, 211; types B5 and B7 after Kiss 2012, 69, 70; Reich 2006, 81–93; e.g., Dunaalmás-Foktorok: V. Vadász 2001, pl. 14: 4–9; Süttő-Hosszúvölgy: T. Kovács 1988, fig. 1b: 9; Tatabánya-Bánhida-Dinnyeföldek: Kisné Cseh 1999, pl. 4: 1–4). The surface of these bowls below their shoulder or their handle is often decorated with crossing lines, whereas the upper area is polished. The rim of the bowls is often supplemented with horizontally extruding knobs (Pl. I: 2; types S-A1a and S-A1c after Reich 2006, 92; e.g., Dunaalmás-Foktorok: V. Vadász 2001, pl. 14: 5, 9; Dunaalmás-Regálási temető: V. Vadász 1986a, pl. IV: 3, 4; Iža: Dušek 1969, pl. 26: 12; Kecskéd: Dušek 1960a, pl. XVIII: 1; Malé Kosihy-Papföld: Točík 1981a, fig. 12: 2; Szőny-Koponyás: Bóna 1975, pl. 205: 4). The bowl with standing vertical double knobs on the rim (Pl. I: 1) has also parallels among the areas finds (e.g., Tatabánya-Bánhida-Dinnyeföldek: Kisné Cseh 1999, pl. 4: 4), but in further territories too (among the material of the Koszider period; e.g., type 5 bowls after Vicze 2011, 128, 135). There is one conical, flat lid among the presented material (Pl. I: 9) which seems to be a characteristic find of the northern groups of the TEP (types D-Dc and D-De after Reich 2006, 94, 95).

As regards the decorative motifs of the described finds, one motif can be considered a regional characteristic: the pattern consisted of single or double vertical lines connected on their top by incised V-shaped (or rooftop) lines (Pl. I: 1, 2, 13) was typical of the northern distribution area of the TEP (type UI4i after Reich 2006, 119, 120; e.g., Esztergom-Várhegy: Torma 1976, pl. 9: 2, 3; 10: 1, 3; Malé Kosihy-Papföld: Točík 1981a, fig. 29: 2; Malé Kosihy-Törökdomb: Točík 1981a, pl. XXXIII: 6; Süttő-Hosszúvölgy: T. Kovács 1988, fig. 2: 8). On the contrary, vertical lines connected to a horizontal incision above them (Pl. II: 2) are common in the entire distribution area of the TEP (type UI4a after Reich 2006, 119, 120). The funnel-shaped neck with wide encrusted panel bordered on its lower edge by a zigzag motif (Pl. I: 6) has parallels in whole Transdanubia, including the discussed region as well (type FIII5g after Reich 2006, 137, 138; e.g., Dunaalmás-Foktorok: V. Vadász 2001, pl. 13: 2; Malé Kosihy-Papföld: Točík 1981a, fig. 29: 14; Malé Kosihy-Törökdomb: Točík 1981a, pl. XXXVI: 7, 23). Encrusted zigzag lines placed on the rims of funnel-shaped vessels (Pl. I: 7, 8), are known in both northern and eastern Transdanubia (type AII5a after Reich 2006, 109; e.g., Süttő-Hosszúvölgy: T. Kovács 1988, fig. 3: 5, 6). The fragment with incised lines and two grooved knobs (Pl. I: 11) is unusual among the classical TEP finds, but similar decorations are known from the youngest phase of the MBA in various cultural contexts (cf. T. Kovács 1988, 126; e.g., Dolný Peter: Dušek 1969, fig. 5: 1, 2; 14: 1; Nitriansky Hrádok: Ilon 1998–1999, 250; Točík 1978, pl. LXXVII: 13; Süttő-Hosszúvölgy: T. Kovács 1988, fig. 1b: 16; 4: 1). Other motifs observed on the presented finds, such as combination of dots and lines, or notches on the rim, are also common elements of TEP decoration system, but, due to the fragmentation of the material, the complex decorative patterns in which they were involved are hardly reconstructable.

There is a large amount of ceramic material known from Nagysáncetű which lacks any encrusted decoration. Many of these finds have not been processed and therefore have not been selected for presentation. There are several vessels in the material which have been preserved in good condition and can be dated to the late phase of the MBA. According to G. Vékony, the uppermost layer of the MBA settlement testifies to a fire and abandonment, which could explain the more intact state and the younger character of these finds (Vékony 2000, 180).

The mug with spherical body standing on four knobs ('Zapfenfussgefäß'; Pl. III: 2) is an emblematic find. Similar vessels were found also in the Hosszúvölgy, both on the eastern slope of the valley (T. Kovács 1988, fig. 4: 10) and on the western side of the site (trench 11; T. Kovács 1988, fig. 4: 2). Many anal-

ogies were discovered in Dolný Peter (Dušek 1969, fig. 7: 4, 5, 8; 15: 8, 9; 16: 5), but also in Esztergom-Várhegy (Torma 1976, pl. 11: 5) and in Nitriansky Hrádok (Točík 1978, pl. LXXXII: 4, 10). This vessel type is known from Austria, Moravia, North Transdanubia and Slovakia, with variants having or lacking additional knobs on the belly or on the shoulder and represents the period of Maďarovce and the earliest Tumulus culture (summarizing Ilon 2017).

The two small two-handled jugs (sometimes described as amphorae) with two knobs on their shoulders (Pl. III: 5, 6) have parallels in Majcichov (Benkovský-Pivovarová/Chropovský 2015, pl. 52: B7.1; 56: 29.4; 63: 18.3), Nitriansky Hrádok (e.g., Točík 1978, pl. LXXV: 13; XCI: 16, 17) and in Veselé (Točík 1964b, pl. LXIII: 4), all from the context of the Maďarovce culture (type A-4 after Benkovský-Pivovarová/Chropovský 2015, 17; type C2e after Točík 1978, 94).

The jugs having funnel-shaped neck and biconical body connected by a strap handle (Pl. IV: 1, 2) belong to a well-known vessel types, whose variants appear both in the context of the northern TEP and in the Maďarovce cultures (type Ju5 after Kiss 2012, 72, 170, 171, fig. 46; type K-Ve after Reich 2006, 62, 63; type A7 after Točík 1981b). Those specimens that have three knobs on their shoulder represent a less frequent variant (e.g., Iža: Dušek 1969, pl. XXVI: 17; Kecskéd: Dušek 1960a, pl. 10: 3; Malé Kosihy-Törökdomb: Točík 1981a, pl. XXVI: 22; XXVIII: 21; Patince: Dušek 1960b, pl. XXVI: 1; Süttő-Hosszúvölgy: T. Kovács 1988, fig. 3: 10). One-handled jugs with biconical or spherical body (Pl. III: 3, 4; IV: 3) are also often found in the same cultural context, but the one with knob below the handle (Pl. IV: 3) is a less common type (types K-L and K-Ma1 after Reich 2006, 54, 55; types A4 and A7 after Točík 1981b, 92). A handle fragment with an *ansa lunata* (Pl. IV: 4) has analogies in the regions material (e.g., Iža: Dušek 1969, pl. XXII: 4; XXIV: 4, 7), while parallels to the large vessel with lightly curved cylindrical neck and four knobs on its shoulder (Pl. III: 7) can be observed on some Southwest Slovakian sites representing early Tumulus culture material (Furmánek/Veliačik/Vladár 1999, fig. 22: 8; type C5 after Točík 1964a, 44, 45; 1981b, 94; e.g., Nitriansky Hrádok: Točík 1978, pl. CI: 15; CVI: 19; Salka: Točík 1964a, 44, 45, pl. XI: 6; XXI: 11; XXX: 12). The vessel having spherical body and four knobs on both its lower part and its shoulder – two of them are horizontally perforated – (Pl. III: 1) recalls the pottery traditions of the early Tumulus culture, where amphoras or jugs were often made with two rows of knobs and eventually two handles on the shoulder (Točík 1964a, 48; see further Nagy 2005, 11; e.g., Salka: Točík 1964a, pl. XIII: 1; XXI: 15; Szentes-Nagyhegy: Nagy 2005, fig. 1: 1; Tápe: Trogmayer 1975, pl. 19: 206.2; 27: 301, 302.11).

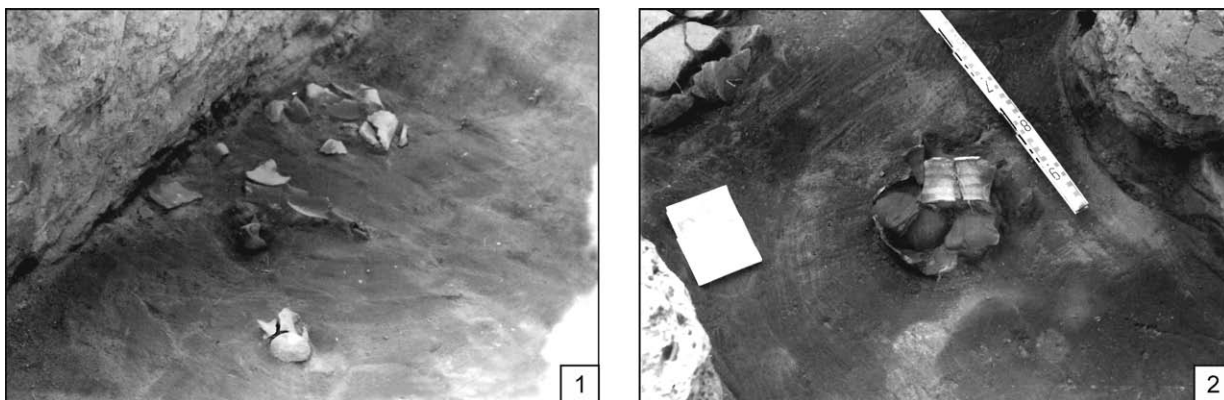


Fig. 7. The 'ashy layer' with several intact vessels (among them the Litzen-decorated jar) of sondage trench 4 at Süttö-Nagysáncstető in 1984. Photos G. Vékony, by courtesy of K. Novinszki-Groma, from the legacy of G. Vékony.

The elongated bowl with two possible handles and two vertically raised knobs (Pl. IV: 5) may have once stood on four legs, however, its reconstructed state does not allow us to examine the original broken off surfaces. Elongated, asymmetric vessels with horizontally or vertically standing knobs are common in the late MBA material of the region (type B8 after Kiss 2012, 70; type S-AHa–S-Ala after Reich 2006, 90–93; type D1a–b after Točík 1981b, 95), and there are also known vessels or clay objects standing on four legs (Kiss 2012, 83–85; types Vo–E and Ti after Reich 2006, 96–99; type D14 after Točík 1964b, 31–34, fig. 15; 1981b, 97).

The jar with Litzen decoration (Pl. V: 1) is an important find of the Nagysáncstető settlement, which had been already described by G. Vékony although without publishing a picture of it (Vékony 2000, 179, 180). According to the note stored with the jar it was found in trench II/d, however the field diary describes as it was found in sondage trench 4, during excavation of an ashy layer. The two trenches were opened directly next to each other and the layer with thick ash and rich material was identified in both of them. The jar was accompanied by several other intact and fragmented vessels, further with remains of floor and an oven (Vékony 1984b; for identifiable vessels from this context see Fig. 7; Pl. IV: 5, 6). G. Vékony has pointed out its significance by stating that it was found in a mixed assemblage containing the material of both the TEP and Maďarovce cultures. Furthermore, he also cited analogies to the vessel: one from Mattersdorf (Benkovský-Pivovarová 1986; Benkovský-Pivovarová/Gömöri/Kaus 1988, 13, fig. 6) and other vessels from Mužla (cf. Kuzma 2011b, 82–84, fig. 8; 9). In terms of the arrangement of the decoration and the handles, the jar from Mattersdorf is close to the Nagysáncstető find, however, there are obvious differences too.

The non-representative selection of the material and the incomplete data available on their context makes it difficult to evaluate the presented ceramic material, although a few remarks can be made.

G. Vékony dated the three MBA inhabitation layers at Nagysáncstető to the periods R BA1, BA2 and BB (Vékony 2000, 179). V. Kiss redefined this periodization suggesting that these three phases coincide with the periods R BA2a, BA2b–c, BA2c–BB (Kiss 2012, 201, fn. 936).

In northern Transdanubia and Southwest Slovakia strong connections can be observed in the archaeological material between the TEP and the Maďarovce cultures (Bátora 2018, 101–109; Dušek 1960b; Furmánek/Veljačik/Vladár 1999, 43–49; Ilon 1998–1999, 255–259; Kiss 2002, 484–486; 2012, 65–67, 170, 171; Novotná/Novotný 1984; Torma 1996, 46; V. Vadász 1986a, 26–29), and these entanglements are visible also among the selected Nagysáncstető finds. For a more precise inner periodisation of the encrusted material, more qualitative and quantitative data on the vessel types would be necessary, but parallels to the pottery forms that can be reconstructed in the assemblage, especially shapes known from datable mortuary context in Southwest Slovakia (e.g., Dolný Peter: Dušek 1969, 8; Iža: Dušek 1969, 8; Majcichov: Benkovský-Pivovarová/Chropovský 2015, 7–9; Patince: Dušek 1969, 211; Salka: Točík 1964a, 54; in general Kiss 2012; Lichardus/Vladár 1997), testify that the site was inhabited during the R BA2/BB1 periods. The unearthed material which is characteristic for the late phase of the Maďarovce culture, the early Tumulus grave culture (e.g., jugs standing on lugs, small amphorae with two knobs on their shoulder, various jug and jar types with knobs on their shoulder, *ansa lunata* handle), as well as the Litzen pottery tradition (Benkovský-Pivovarová 2018; Ilon 2019, 264–266, 270–274; Kiss 2012, 65–78, 177, 178, 191, 192; 2015, 32, 33; Kovács T. 1997; Vékony

2000) indicates a period of material entanglements and changes, known as the Koszider period.

A stray find, discovered on Nagysántető in the 1980s, represents the same inhabitation period:

1. Clay loaf-of-bread idol (*Brotlaibidol*). It has an elongated cuboid shape, with flat back side, slightly curved front side, and curved short edges. On the front face of the object, near its short edges, two circle-shaped (d. 1 cm, depth 0.2 cm) imprints are visible. Both consist of two concentric circles, a deeper central (d. 0.3–0.4 cm, depth 0.7–0.8 cm) and a shallower outer one with short radial lines. From the centre of these two imprints shallow incised lines are directed to the back of the artefact. Tempered with sand and crushed pebble, yellowish-reddish brown colour, smoothed surface. H. 8 cm, w. 2.3 cm, th. 1.9 cm, weight 44.7 g (BBM, box 43, 'Nagysántető', no further information; Pl. V: 2).

Previously, in Süttő-Hosszúvölgy, on the eastern part of the valley, A. Mozsolics has unearthed another, similar artefact, which has been published later by G. Bándi. This idol is 6.8 cm long, 2.4 cm wide and has a rather ovoid shape. Its front side is decorated with three circle-shaped imprints (d. 0.8 cm), all of which have a deeper central and a shallower outer ring with short radial lines. Each circle-shaped imprint is connected to a horizontal incised line. The artefacts have dark brownish colour, possible smoothed surface (Pl. V: 3; Bándi 1974, 239, fig. 3: 1; T. Kovács 1988, 129, 130, fig. 2: 10).

Loaf-of-bread idols are known from several regions of Europe, but they are concentrated in North Italy, in the Lower Danube region, and in the territory of South Bohemia, Southwest Slovakia and North Transdanubia. They were produced in various forms and sizes and are mostly known from settlement contexts or as stray finds, but very rarely also as funerary objects (Carafa 2011–2012; David 2016; Trnka 1992). It is common that several specimens come to light on the same settlement (e.g., Nitriansky Hrádok – 43 idols: Bartík/Gregor/Marková 2011; Točík 1978; Veselý – 7 idols: Bartík/Bača 1999). In the investigated area a regional group of loaf-of-bread idols was identified by G. Bándi (Bándi 1974; but see also David 2016; Trnka 1982; 1992) which can be associated with the material cultures of Maďarovce-Věteřov-Böheimkirchen groups and represents the R BA2–BB1 periods.

The imprints visible on the objects from Süttő are common on idols both in the region of North Transdanubia – Southwest Slovakia and in the Lower Danube Region, but they can appear also in North Italy (Bartík/Bača 1999, 24, 25; Trnka 1992, 618, 619, fig. 3: 1; e.g., Čata: Trnka 1982, fig. 9; Kenyeri: Károlyi 1996–1997, fig. 3: 1; Ménfőcsanak: Ilon 2012, fig. 3; Vép: Ilon/Nagy 2013, fig. 2; Vráble: Kujovský 1978, fig. 82: 6; further Nagyrozvágy: Koós 2008,

fig. 1; summarizing Carafa 2011–2012, 63–95; Meller 2024, fig. 4; Mihovilić 2020, 122–128, fig. 9). The motif is codified in A. Piccoli's and A. Zanini's system as C5c and its arrangement as SQ3, while the shape of the artefact connects it to the class 1c (Piccoli/Zanini n. d.). According to S. Carafa's typology the newly described specimen belongs to group 1 of the loaf-of-bread idols (Carafa 2011–2012, 63–95). No exact analogy of the Süttő-Hosszúvölgy artefact is known in the published material; however, similar objects can be found, for instance, among the finds allegedly originating from Lepenski Vir (Trnka 1992, fig. 1: 2) or among those coming from Nitriansky Hrádok (Točík 1978, pl. 111: 7). The best parallel of the Süttő-Nagysántető specimen is a stray find from Kisterenye-Hárshegy (Bándi 1974, 237, fig. 3: 4; Kubinyi 1861, 99, pl. XXI: 142), which is approximately one centimetre shorter but has a similar, elongated cuboid shape and two imprints arranged according to the same principles as for the Nagysántető find. The objects used to make the impressions visible on the region's idols are not known; however, it is plausible that the described motifs are imprints from a plant of the *malvaceae* family (possibly of *lavatera thuringiaca*; Hajnalová 1999).

Besides the clay idol, an additional artefact may be linked to the MBA horizon at Nagysántető. G. Vékony mentioned in a brief report about the excavation in 1985 and more detailed in the field diary that a mould of a bronze dagger was unearthed in the MBA layers, in the northern part of trench II/c. According to G. Vékony's opinion the dagger type is characteristic for the Koszider period (Vékony 1985; 1986a). Currently, no mould can be identified in the storage rooms of the BBM and no other document refers to this discovery.

Scarce data is available on the subsistence strategies of the MBA communities at Nagysántető. Although no detailed archaeozoological analyses have been published, A. Horváth cited some results of I. Vörös in her thesis, concerning the archaeozoological material excavated at Süttő-Nagysántető in 1979–1981. According to these charts, during the latest phase of the MBA occupation the archaeozoological material (n = 638, possibly from pits 1a, 1b, 1d and VIII/7) was dominated by domesticated animals (over 95%), among which cattles (43%) and pigs (39%) were the most numerous, but caprines (15%) were also present in a significant amount. Furthermore, horse and dog bones were also described (1–2%). Among the wild animals, brown hare, red deer, wild cat, wild boar and aurochs were listed. From the earlier MBA inhabitation layer, A. Horváth's thesis mentions only domesticated animals (n = 51, possibly from pits VI/1, VI/2 and VII/1), dominated by cattles (59%) but included a large number of caprines

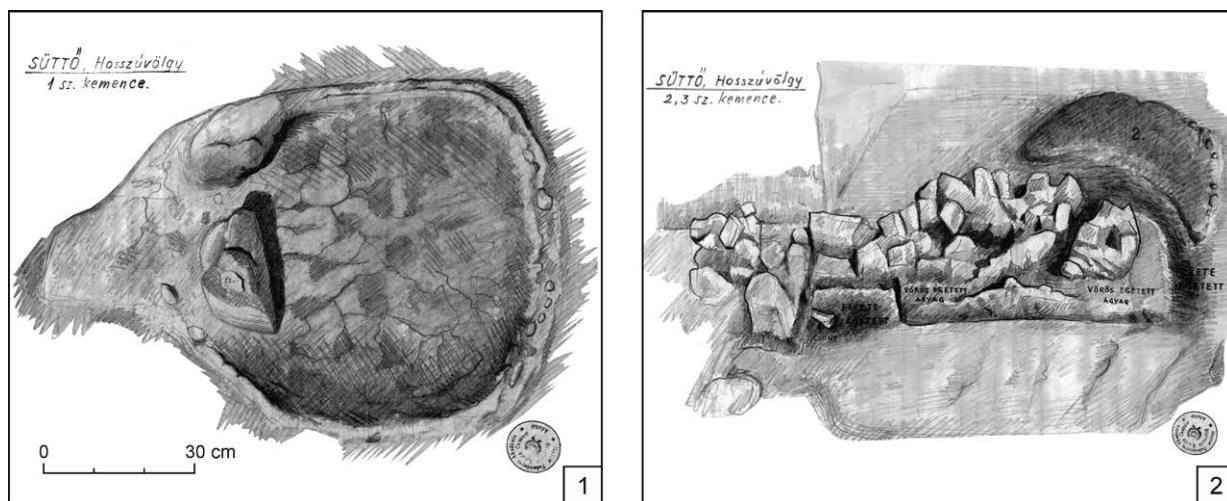


Fig. 8. Süttö-Hosszúvölgy. Ovens 1–3. The original drawings of E. Patek in 1959 (after Patek/Mozsolics 1959). 2 – without scale.

(19%) and pig bones (18%), and also some dog bones. Unionids were found in both periods (Horváth A. 2001, 49–53, 74–84). These results can hardly be evaluated without knowing the context and without processing the later seasons' material, but in general they are comparable with data published from other contemporary MBA settlements (see below).

Hosszúvölgy

In 1959, E. Patek and A. Mozsolics unearthed a part of a settlement in the gully Hosszúvölgy, partially contemporaneous with the one later discovered at Nagysáncetető. Due to the incomplete publication of their results, the site was later misinterpreted in some places as if it consisted of layers that had slid down from Nagysáncetető (e.g., Horváth A. 2001, 48; Kisé Cseh 1999, 67; Vékony 2000, 179). In fact, most of the trenches were opened on the eastern slope of the valley, therefore the excavated settlement could not have fallen down from Nagysáncetető, which is located to the west of it. On top of the Kissánc, no site of the same age has been detected. The recorded features in Hosszúvölgy (houses and several ovens) were described as intact, which confirms the existence of an MBA settlement below the steep hillside at the entrance of the valley to the Danube. The material found in the Hosszúvölgy is coeval with the youngest MBA inhabitation layers on Nagysáncetető and represents the late TEP mixed with elements of the Madarovec culture.

The information provided about the great thickness of the excavated cultural layers (4 m) in the first reports was also misleading (e.g., Horváth/H. Kelemen/Torma szerk. 1979, 315), since, as it was clarified by T. Kovács, the discovered thick stratigraphy in fact comprised a series of cultural and geological

depositions over the virgin soil (T. Kovács 1988, 119). A. Mozsolics mentioned in the field diary that she had consulted on site several times during the excavations with the geologist F. Neppel in order to understand the depositional process that resulted in thick strata of gravel over and under the Bronze Age cultural layers. They concluded that these gravel layers are alluvial sediments deposited by the periodic floodings of the Danube (Patek/Mozsolics 1959, 13, 14, 16, 22, 29).

The question arises why and how the valley below the existing settlement of Nagysáncetető began to be used for domestic activities at the end of the MBA. The Danube played an essential role in the life of communities inhabiting the hilltop at all times, as it was the main source of fresh water, additionally yielded food, furthermore, provided access to remote areas as a waterborne communication route. Nevertheless, there is no evidence of temporary or permanent settlements in the lower elevations around the hilltops in earlier prehistoric periods. There may be two plausible explanations for why this was the case: firstly, the low territories close to the river could have been often flooded, and secondly, such open settlements at the riverside could have been more exposed to external attacks. The appearance of a settlement in Hosszúvölgy in the MBA may therefore testify to a stable period, both in social and climatic terms, when, on the one hand, foreign insults were not to be expected and, on the other hand, the Danube had a low, predictable water level.

In the eastern slope of Hosszúvölgy several features were documented: the excavation reports mention over a dozen of ovens (Fig. 8) and at least three houses (no. 26, 28, 41). For the latter, the reports claim that below a thick layer of daub (some of them

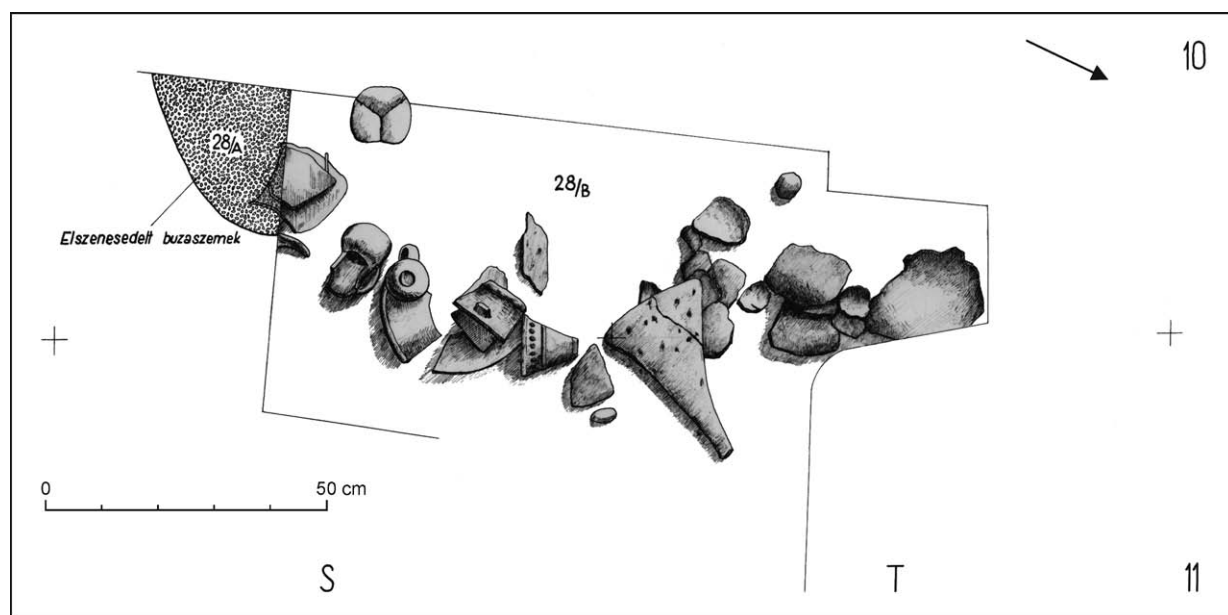


Fig. 9. Süttő-Hosszúvölgy. Detail of trench 1 and 3. Accumulation of burnt cereals (28/A) and ceramic material (28/B). Drawing from the excavation's documentation, possibly prepared by E. Egyed (after Patek/Mozsolics 1959).

with imprints of branches) plastered floors were detected, which in the case of house 26 had been even renewed. Due to the sloping, eroded surface, it was difficult to identify and follow archaeological layers, and it is not possible to reconstruct them anymore. T. Kovács assumed that two settlement layers had been unearthed during the excavation, but their material cannot be divided. It is worth mentioning that A. Mozsolics did not rule out the possibility that terraces were established in the area during the MBA (Patek/Mozsolics 1959, 14).

Some selected finds were published from the excavation by T. Kovács, who, based on the ceramic material, was able to ascertain the age and cultural attribution of the site. He highlighted the mixed nature of the archaeological material of the settlement, characterized by the co-occurrence of late TEP ware and elements of the Maďarovce culture. These observations show that the Hosszúvölgy settlement was in use simultaneously with the latest MBA inhabitation phase of the Nagysáncető site (T. Kovács 1988; cf. Kiss 2012, 170, 171, 189–192; Vékony 2000, 179).

In addition to the evaluation of the ceramic finds, some botanical and zoological remains have also been processed. House 28 was identified as a large, burnt, reddish discoloration on the surface with large quantities of burnt cereals discovered in the northern corner of the building in the company of several vessels (Fig. 9). Z. Tempír possibly referred to these findings in his work, mentioning that mostly einkorn wheat (*Triticum monococcum* 141 grains), smaller amounts of common wheat (*Triticum aeis-*

tivum L. *rsp. aestivocompactum* Schieman 15 grains) and barley (*hordeum* sp. 1 grain) were unearthed (Tempír 1964, 76, 77), which were all commonly cultivated species at the end of the MBA (Gyulai 2010, 100–126; Hajnalová 2012, 51–53). Regarding the archaeozoological material, there is only a general evaluation available. According to the data published by S. Bökönyi, mostly bones of domesticated animals (85%) were found on the settlement, but wild animals were also present (15%) in the analysed material. The most important hunted animals were probably red deer (53%) and wild boar (27%), but aurochs and roe deer, as well as fish, wild cat, brown hare and fox bones were recorded too. Among the domestic animals, the dominant species were cattles (50%), caprines (23%), and pigs (18%), but horse and dog bones were also revealed in larger amounts in the investigated material (Bökönyi 1974, 399).

Although the subsistence economies of the late MBA sites of Nagysáncető and Hosszúvölgy show many similarities, it has to be emphasized that the relevant data is quite limited in both cases. It can be seen that beside domestic animals, hunting and fishing played a significant role in the subsistence of the settlements, which can probably be explained by the proximity of the mountainous region of the Gerecse, as well as of the river Danube. On both sites the domesticated animals were dominated by cattles and were followed by caprines and pigs. Similar data have been published from another settlement of the TEP culture, Ménfőcsanak-Szeles-dűlő, where beside cattles, caprines and pigs, wild animals were also documented (Bartosiewicz 1996, tab. 1; Ilon/

Bartosiewicz/Galik 2016; Tugya/Đurković/Ilon 2022). In general, similar combinations of animal species have been described in the material of several MBA sites from the territory of the Maďarovce culture and also from other parts of the Carpathian basin (Choyke/Bartosiewicz 1999; Gál 2017, 141–155; Hajnalová 2012, 51–53; Kiss 2012, 216, 217).

Contemporary finds in the vicinity

Despite intensive field surveys carried out by the Eötvös Loránd University, no archaeological material associated with the TEP culture has been found on the plateau outside of the fortified area of Nagysáncetető. However, remains of MBA inhabitation were identified at the southwestern edge of the territory of Sáncföldék (Fig. 1; Tatai út/Sáncföldék). Among a concentration of mostly unidentifiable Bronze and Early Iron Age ceramics found on the surface, two fragments with Litzen decoration and a body fragment with incised decoration were documented:

1. Lightly curved neck (?) fragment of an undeterminable type of vessel, decorated on the outer side with two bands of Litzen decoration, both consisting of four rows of string imprints. Tempered with sand. Smoothed surface. Yellowish grey colour. Size 2 × 2.5 cm, th. 0.6 cm (BBM, not inventoried; Pl. V: 4).
2. Fragment of an everted rim with a complete and a partially preserved band of Litzen decoration on its outer side. The complete band consists of four rows of string imprints. Tempered with sand and finely crushed pebble. Surface is worn but burnished, possibly polished. Dark grey with lighter patches. Size 4.5 × 2.5 cm, th. 0.6–0.8 cm (BBM, not inventoried; Pl. V: 5).
3. Lightly curved body fragment of an undeterminable type of vessel. On the outside incised decoration is visible: a horizontal line at top, bounded by three elongated dots below; from the horizontal line bundles of three parallel lines run obliquely downwards to the left and right, at the edge of the fragment part of another similar bundle. Tempered with small and medium size material, with crushed pebbles. Outer surface is heavily worn, inner surface is smoothed. Brownish, dark grey colour. Size 6 × 4.5 cm, th. 0.5–0.6 cm (BBM, not inventoried; Pl. V: 6).

The Litzen decoration is a characteristic feature of the end phase of the MBA in the northwestern Carpathian Basin (Benkovsky-Pivovarová 2018; Ilon 2017, 405; 2019, 270–274; Kiss 2013; 2015, 32, 33). The incised pattern observed on a ceramic fragment is less common in this region, but similar designs occur both in the Maďarovce and early Tumulus culture material in this period (Ilon 2019, 284–292; Mali 2020, 234, 235; e.g., Nyergesújfalu: Horváth/H. Kelemen/Torma szerk. 1979, pl. 16: 17; Salka: Točík 1964a, pl. XVIII: 6; XXVI: 2; XXXVI: 1; further from Kozármisleny: Mali 2020, pl. 19; Tápé:

Trogmayer 1975, pl. 59: 2; in contemporary materials e.g., Dunaújváros-Kosziderpadlás: Mozsolics 1957, fig. 4: 5–7).

During field survey, a large amount of body sherds was discovered on this part of Sáncföldék and Tatai úti dűlő, which indicate the presence of an open settlement in this area, but we have no information on the exact occupational period and function of the site. Beside the above described two fragments with Litzen decoration, no other finds were recorded in the material, which would clearly indicate MBA inhabitation. Most of the collected sherds are non-diagnostic prehistoric fragments, while a decent amount has younger character representing the Late Bronze Age or Early Iron Age.

East of Nagysáncetető and Hosszúvölgy, in the territory called Sánci dűlő I (Fig. 1), field surveys of the Hungarian Topographic Research Project reported numerous sherds belonging to the TEP and Maďarovce cultures (Horváth/H. Kelemen/Torma szerk. 1979, 311, pl. 15: 3; site no. 20/3). The published data is very scarce; however, it is possible that another contemporary MBA site existed in this area.

According to the local collector, L. Riegler, en-crusted pottery was also found in the area Papi-földék; however, during field surveys no evidence of inhabitation from that period was documented (Horváth/H. Kelemen/Torma szerk. 1979, 319).

Regarding the broader vicinity of the Süttő plateau, TEP material was found in many places on the right side of the Danube (Fig. 10). These are usually stray finds with the exceptions of Lábatlan (Tanács-ház/Piszeke-Rákóczi utca) where possibly a cemetery of the TEP culture was identified (Horváth/H. Kelemen/Torma szerk. 1979, 244, 246; Kisné Cseh 1999, 61), and Nyergesújfalu where two cemeteries were discovered (Eternittelep, elementary school and Viscosa gyár; Horváth/H. Kelemen/Torma szerk. 1979, 274, 275; Kisné Cseh 1999, 62–64; Torma 1996). From the area of Nyergesújfalu further stray finds are known which represent a mixed material of the TEP and Maďarovce cultures (Papírgyár and Téglagyár; see Horváth/H. Kelemen/Torma szerk. 1979, 264, 270; Kisné Cseh 1999, 63, 64). To the west of Süttő, at Neszmély-Sertésvölgy, a settlement of the TEP might have been recorded (Kisné Cseh 1999, 47), as at Dunaalmás-Foktorok where both TEP and Maďarovce type of material were identified (Kisné Cseh 1999, 40, 41; V. Vadász 1986a; 2001). At Dunaalmás-Uradalmi regálási temető (Kisné Cseh 1999, 42; V. Vadász 1986a) burials of the TEP were recorded. In Slovakia, on the left side of the Danube, late MBA cemeteries with TEP material are known nearby from Iža-Ŕrék, Iža-Velký Harčáš, Marcelová, and Patince, but stray finds also suggest burials at Radvaň nad Dunajom-Žitavská Tňň. Settlement features are suspected at Iža (Velký

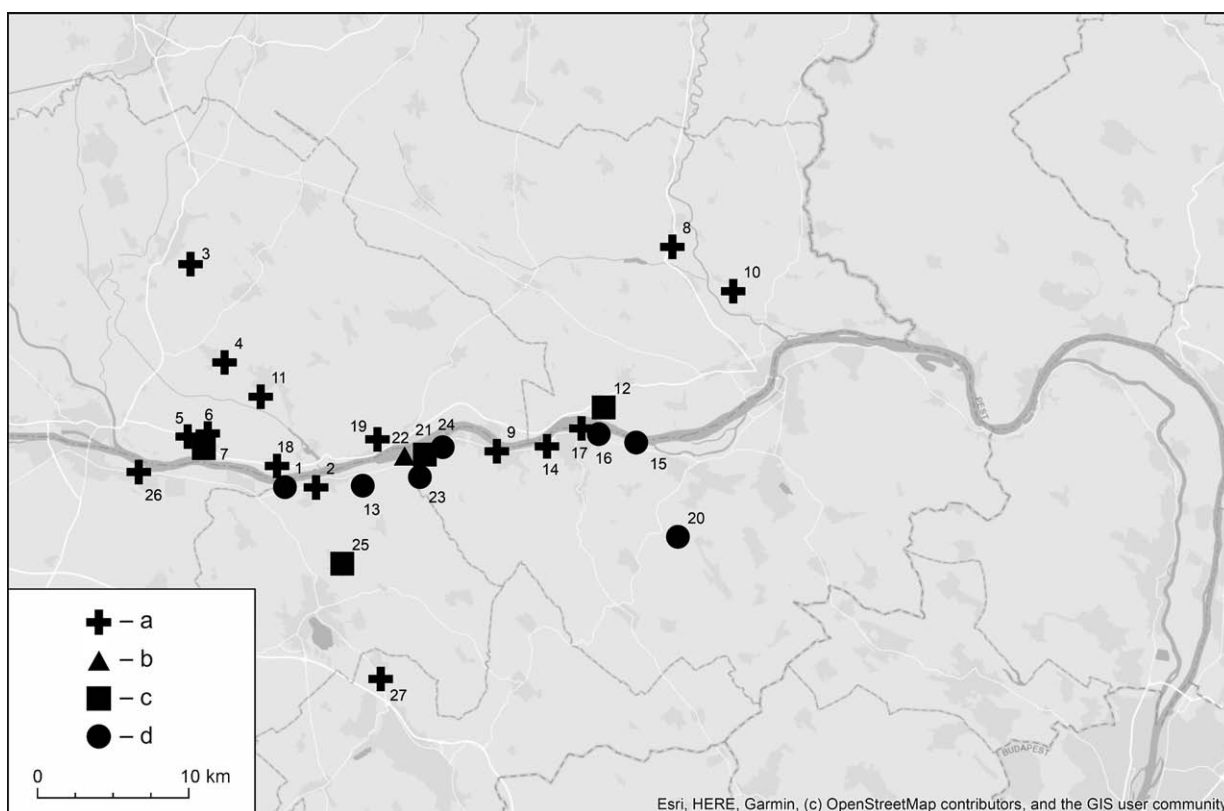


Fig. 10. Middle Bronze Age sites with material of the young or late Encrusted Pottery Culture in the vicinity (ca. 20 km radius) of Süttő. 1 – Dunaalmás-Foktorok; 2 – Dunaalmás-Uradalmi regálási temető; 3 – Hurbanovo; 4 – Chotín; 5 – Iža-Órék; 6 – Iža-Vel'ký Harčáš; 7 – Iža-Vel'ký Harčáš; 8 – Kamenín; 9 – Lábatlan-Piszke (Rákóczi utca); 10 – Malá nad Hronom; 11 – Marcelová; 12 – Mužla-Čenkov; 13 – Neszmély-Sertésvölgy; 14 – Nyergesújfalu-Eternittlepi Általános Iskola; 15 – Nyergesújfalu-Papírgyár; 16 – Nyergesújfalu-Téglagyár; 17 – Nyergesújfalu-Viscosa gyár; 18 – Patince-Marcelová; 19 – Radvaň nad Dunajom-Žitavská Tõň; 20 – Sárísáp-XII. tábla; 21 – Süttő-Hosszúvölgy; 22 – Süttő-Nagysáncstető; 23 – Süttő-Sáncföldek/Tatai út; 24 – Süttő-Sánci dűlő I; 25 – Szomód-Hosszú-dűlő; 26 – Szőny (unknown); 27 – Vértesszőlős-Likótelek (after Bátor 2018; Dušek 1960b; 1969; Horváth/H. Kelemen/Torma szerk. 1979; Kissné Cseh 1999; Kiss 2012; Kuzma 2011a; 2011b). Map E. Fejér. Legend: a – burial; b – hilltop settlement; c – settlement (excavated); d – stray find.

Harčáš), two features with Maďarovce material and four features with Litzen ceramic were excavated at Mužla-Čenkov, and similar material was unearthed at Štúrovo-Obidská pusta too (Fig. 10). Other settlements with similar material culture can be identified also further from the Danube, e.g., in Malé Kosihy, Rybník or Santovka (Bátor 2018, 101–110; Bátor/Tóth 2014; Dušek 1960b; 1969; Kiss 2012, fig. 13; with catalogue; Kuzma 2011a; 2011b, 82–84; Oždáni 1985).

Hilltop settlements are known from several regions of the TEP culture: mostly from South Transdanubia, but a few have been registered in the northern territories, e.g., in Veszprém-Várhegy, too. They belong to various periods of the culture, but little is known about their possible fortifications (Kiss 2012, 205–215). Until now, beside Süttő-Nagysáncstető, the only hilltop settlement where the fortifications have been investigated in detail is Bakonyszentlászló-Kesellőhegy (Nováki 1979). In northern Transdanubia, the settlements discovered with TEP material are

usually unfortified, having only a single habitation layer and located on flatland areas (Kiss 2012, 205–215, 267). By contrast, north from the Danube in the territory of Slovakia, many sites with TEP or mixed Maďarovce-TEP material culture have fortifications (Bátor 2018, 105, fig. 84; 86; Bátor/Tóth 2014).

Late Bronze Age

Late Bronze Age (LBA) archaeological remains has been reported in many areas of the site complex, but these are often heavily fragmented stray finds, which cannot be dated precisely within the LBA, and, in some cases, it is not even possible to distinguish them from the subsequent Early Iron Age settlement material. The excavated material indicates inhabitation on the plateau only in that phase of the LBA, which is characterized by Late Tumulus–Early Urnfield material.

Nagysánc

The first evidence of LBA inhabitation at Nagysánc was brought to light during the field walkings of the Hungarian Topographical Research Project at the end of the 1960's. Their results suggested Urnfield period occupation at the site (Horváth/H. Kelemen/Torma szerk. 1979, 311, site no. 20/5). Later, the excavations of G. Vékony confirmed this by identifying Late Tumulus–Early Urnfield culture material (period R BD–HA1) on the field. The short reports of the fieldwork stated that no fortification can be dated to this inhabitation period and that most of the LBA finds and features had been destroyed during the Early Iron Age (EIA). According to the field diaries, LBA material was identified solely among the EIA material of feature 'a' in trench IV (Vékony 1980), but trench VIII and the trenches opened on the rampart might have also provided some sherds from this period. The material identified as LBA was discovered only in mixed contexts in the fillings of younger (EIA) pits (Vékony 1986b, 260; Vékony/Vadász 1982), therefore, for a better understanding of the LBA material and inhabitation phase in Nagysánc, the processing of the EIA material would be essential.

Establishing settlements on naturally protected hilltops is a known phenomenon during the Urnfield period, in both its older and younger phases and some of these settlements were continuously used also in the Iron Age. During their inhabitation several sites became artificially fortified. Due to lack of precise observations, dating the establishment of these settlements and their fortifications is problematic in many cases, since it is often only possible to infer the period of inhabitation from surface finds (Bándi 1982; Furmánek/Veliačik/Romsauer 1982; Jockenhövel 1990, 219–226; Kőszegi 1988, 28, 33, 61; Patek 1968, 17–24; Primas 2002, 50–52). Based on surface material studies, contemporary fortified hilltop settlements are supposed to have existed at Süttő-Gerecse (Horváth/H. Kelemen/Torma szerk. 1979, 317, 318, site no. 20/18) a little further at Mogyorósbánya-Óhegy (Horváth/H. Kelemen/Torma szerk. 1979, 258, site no. 13/9) and possibly at Süttő-Nagysánc (see below).

Nagysánc

In the framework of the Hungarian Topographic Research Project, the hilltop area west of Nagysánc, the so called Nagysánc area, was also surveyed, during which large amounts of pottery were collected: beside Early Iron Age and Late Iron

Age finds, ceramic fragments of the LBA were also registered (Horváth/H. Kelemen/Torma szerk. 1979, 311, site no. 20/6). The field survey conducted by the Eötvös Loránd University in 2017 yielded similar results: several body fragments of LBA or EIA vessels, as well as Late Iron Age sherds were discovered. Nevertheless, the exact date of the supposed LBA inhabitation cannot be determined merely on the basis of the survey material.

Sáncföldek

It was reported that during the excavation of the Early Iron Age flat grave cemetery at the end of the 1980's features of the Urnfield culture were also unearthed, but no data was provided about their exact chronological position (Vékony 1986a; 1988b).⁸ More information is available for only one LBA feature: on the basis of the field diaries, in pit 1 of trench TI (approximately 2 × 3 m wide, 1.2 m deep), excavated in 1985, a *Peschiera* dagger and an *Achterschleifenfibel* were found together with horizontally channelled pottery and a graphite coated cup, the latter ones described provisory as EIA types (Vékony 1985). In the museum collection, the material connected to this feature could not be traced; however, there was an uninventoried bronze dagger in the collection labelled as found in 'Nagysánc, 1985', which could be identical to the one mentioned briefly in the diary. Furthermore, from the legacy of G. Vékony and É. Vadász a fragmented bronze fibula labelled as found in 'Süttő, urnfield settlement' has been preserved, and it is reasonable to assume that it is the one discovered in the mentioned pit.

1. Bronze tanged dagger with elongated triangle shaped blade. The artefact is 22.2 cm long, it is almost complete, one spur at the top of the tang is broken off. The blade has an articulated midrib, which is worn, rounded in the middle section of the blade. The cross section of the blade has a rhomboid shape (slightly curved in the middle, worn section) and it is 2.7 cm wide. The edge of the blade is heavily damaged. The tang is bordered by a flange which tapers off towards the blade and the top of the tang; the tang is 1.4 cm wide and 0.1 cm thick, the flange is 0.7 cm thick. Three holes are visible below each other in the tang, which all occurred during the casting process: the upper one has a large, irregular, elongated shape (2 cm long), the middle one is smaller and circular in shape (dm. 0.5 cm), while the lower one, directly above the midrib of the blade, is also rounded (dm. 0.6–0.8 cm). The blade is approximately 63% (14.3 cm) of the total length of the dagger, while the tang is 36% (8.4 cm). The artefact is restored and has brown-bronze colour; its surface is worn and damaged, destroyed by many cavities. Weight 59.6 g (BBM, not inventoried, box 71; Pl. VI: 1).

⁸ The EIA material of the excavation carried out in the Sáncföldek in the 1980's is currently being processed by K. Novinszki-Groma in the framework of her dissertation (Eötvös Loránd University).

2. Bronze fibula. The artefact is 16.8 cm long, mostly complete, but the end of the bow including the catchplate is missing. The pin has a round cross section (dm. 0.5 cm), the spring consists of three coils and has also a round cross section (dm. 0.2 cm). The bow is rhomboid in cross section (0.7 × 0.9 cm), which is slightly thicker in the middle part than at the ends. On the side of the spring, the bow has been transformed to an 8-shaped loop with round cross section, set crosswise to the bow. On the other side a similar loop is assumed but broken off halfway. The artefact is restored and has brown-bronze colour; its surface is very smooth. Weight 48 g (BBM, not processed yet; Pl. VI: 2).

Tanged daggers are characteristic finds of the LBA in Central Europe (Bianco Peroni 1994, 146–168; Hansen 1994, 215–229; Mozsolics 1971, 64–66; 1985, 17, 18; Novák 2011, 103–111; Peroni 1956). According to the typology introduced by T. Kemenczei this specimen belongs to type A, variant 3 of the *Griffzungenlangdolche*; however, its length slightly exceeds the length of the daggers classified into this group. The variant 3 has been interpreted as closely related to variants 1 and 2 and dated to the Early Urnfield Period (Kemenczei 1988, 25, 26). Close analogies to the presented find are known, e.g., from Dolný Peter (Vladár 1974, 51, pl. 7: 147), Mikušovce (Vladár 1974, 50, pl. 7: 145), Nezamyslice (Novák 2011, 104, pl. 37: 509; see also the dagger from unknown provenience listed by Novák 2011 as pl. 36: 507), which are all dated to the Early Urnfield Period, but several scatter finds can also be mentioned (e.g., Kemenczei 1988, 25, pl. 8: 98; Tahitótfalu: Tarbay 2019, 6). The heavily destroyed surface of the object does not allow to analyse the use-wear traces on the blade, but in the middle section it seems to be quite worn (below and above the central area a midrib and thus a rhomboid section can be observed, but in this area the section is rounded, the midrib is not detectable, indicating the usage of the blade). Similar conclusion can be drawn upon the fact that the edges of the blade are destroyed, since a thin, sharpened blade can more easily be damaged by the taphonomic processes than a thicker, unused blade. The holes in the tang were not related to the use of the artefact, but they most probably occurred during preparing pegholes.

Similar tanged bronze daggers are usually known beyond single finds from the contexts of hoards (although often in fragmented condition, e.g., Bakonyszűcs-Százhalom: Jankovits 1992, fig. 3: 4; Ducové: Vladár 1974, 51, pl. 7: 150A; Hostice: Vladár 1974, 50, pl. 7: 142, 143; Nagyvejke: Mészáros Gy. 1972, 27, fig. 5: 5), graves (e.g., Dolný Peter: Vladár 1974, 51, pl. 7: 147; Mikušovce: Vladár 1974, 51, pl. 7: 145, 146) but also from settlements of this period (e.g., Lovčíčky: Novák 2011, 104, pl. 37: 511; Süttő-Sáncföldek: Fejér 2021 and see also below).

The bronze fibula belongs to a one-piece wire bow fibula type (*einteilige Drahtbügelfibel*), which appeared in Central Europe during the R BD–HA1 period. Although the artefact is not completely preserved, it is assumed that both ends of the bow were formed to 8-shaped loops and the catch was followed by a spiral at the foot. Most probably it can be assigned to the type Vösendorf (Betzler 1974, 21, 22; Pabst 2018, 158, 159; Říhovský 1993, 20, 21; Vasić 1999, 17, 18), its best-preserved analogies are known from Petrovice (Říhovský 1993, 20, pl. 1: 5) and Vösendorf (Betzler 1974, 22, pl. 2: 31). Similar pieces have been also published from some sites in the western and southern Carpathian Basin, which all represent the same R BD–HA1 chronological horizon (e.g., Borjaš: Vasić 1999, 17, pl. 2: 25; Poljanci: Vinski-Gasparini 1973, 183, pl. 48: 21; summarized by Pabst 2008, 627, fig. 14; list 13; 2018, 158, fig. 14). They were found mostly in graves or hoards, and only one piece has been reported from settlement context (Borjaš: Vasić 1999, 17). The specimen found in Süttő differs from the other fibulae of this type in size, which, even if they are complete, do not exceed the length of 13 cm. The fibula from Süttő is almost 17 cm long, and since its foot is missing, it may originally have been twice as long as an average fibula of type Vösendorf. In contemporary material culture fibulae of this size were unusual. Among fibulae belonging to other coeval and strongly related types (type Unter-Radl and type Čaka; Bader 1983, 15–25; Betzler 1974, 17–26; Novotná 2001, 12–18; Pabst 2011, 199–202, 218, 219; 2018, 158, 159; Říhovský 1993, 17–24), only a few pieces reach similar extents (Bučovice and Bítov; Říhovský 1993, 22, pl. 2: 6, 8).

The fact that the chronological position of the two presented artefacts is similar – both are dated to the Late Tumulus–Early Urnfield period – supports the hypothesis that they shared a common context. The preliminary assumptions of G. Vékony that the ceramic material of the pit in which these artefacts were probably found together dates to the Early Iron Age, should be revisited by re-evaluating the unearthed sherds and the stratigraphy of the feature.

In the course of the fieldworks conducted within the framework of the Interreg Iron-Age-Danube project in 2018 traces of LBA inhabitation were detected in the Sáncföldek area. On the one hand, the intensive field and metal detector surveys yielded ceramic fragments of LBA or EIA origin and some stray metal finds dated roughly to the LBA (e.g., fragments of tanged sickles; Czajlik et al. 2019, 197–199). On the other hand, two features were excavated which represent the same LBA occupation period as reported from the Nagysáncetető site. In trench 2 features 16 and 18 (Fig. 4) yielded large amounts of archaeological material of the Late

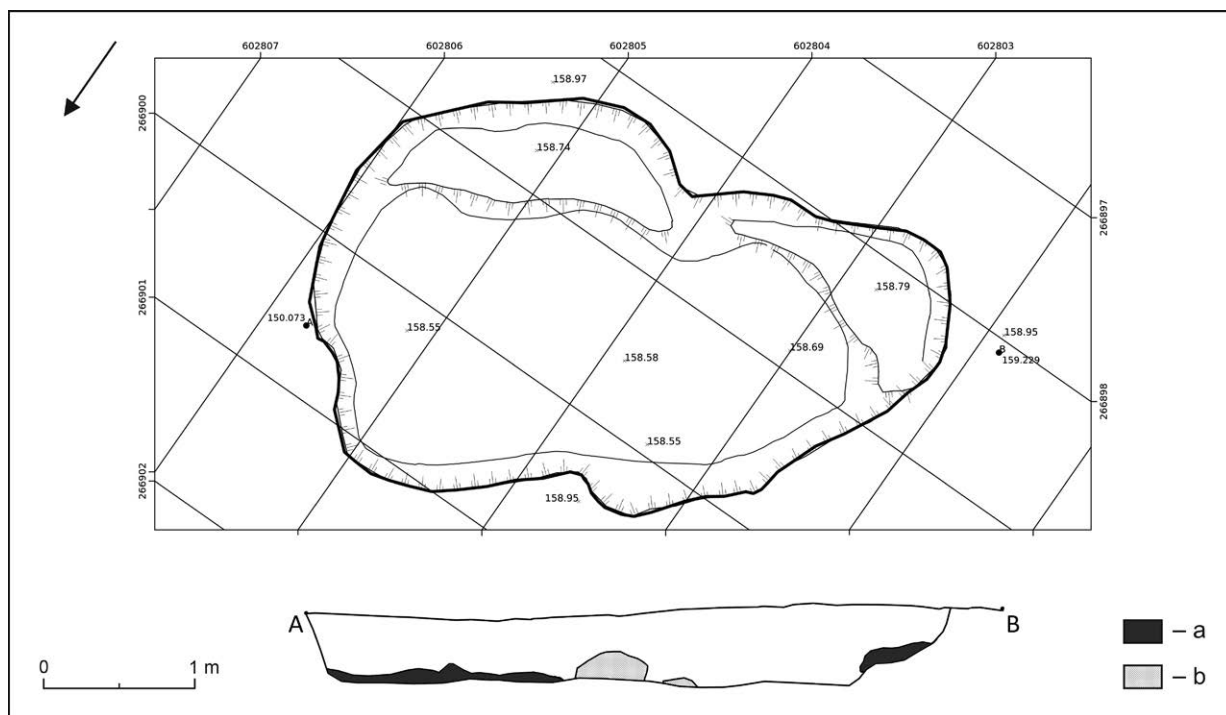


Fig. 11. Süttő-Sáncföldek. Feature 16 (2018). Drawing E. Fejér, A. Bődócs. Legend: a – intact soil; b – rubble.

Tumulus–Early Urnfield culture. They were located approximately 100 m to the northwest of trench TI of É. Vadász, from where the above described two bronze objects were reported.

Feature 16 had an irregular, oval shape; its horizontal dimensions were $4.2 \times 2.5\text{--}2.6$ m, and its depth was 40 cm (measured from the surface of the trench). It had a homogeneous dark filling. In the middle of the feature, a small patch of rubble (burnt daub with ceramic fragments) was observed directly on the bottom (Fig. 11).

The archaeological material of the feature consists mostly of ceramic finds (253 fragments), a bronze item, animal bones and stones. Furthermore, ca. 1 kg of daub fragments were also collected, of which only a few smaller pieces show imprints of branches or elaborated surfaces. The stone material (4 kg in total) includes one limestone and some smaller sandstone fragments, but traces of possible manufacturing or use wear are suspected only in the case of four small fragments (4×6 cm) which have one plain surface.⁹

The diagnostic ceramic material of the pit

1. Fragment of a conical bowl with indrawn rim. Tempered with fine-grained material. Its surface is burnished both inside and outside; traces of graphite coating are

visible but very worn. Yellow-grey patchy colour. Size 10×9 cm, d. rim 36 cm, th. 0.5 cm (BBM, 2019.140.237; Pl. VI: 3).

2. Two fragments of an undeterminable type of vessel with lightly curved, everted rim. Tempered with fine-grained material. Traces of graphite coating are visible both inside and outside. Outside yellow, inside grey colour. Size 4.5×3 cm, th. 0.4–0.5 cm (BBM, 2019.140.236; Pl. VI: 4).
3. Two fragments of a bowl with funnel shaped straight neck and spherical, obliquely channelled body. Tempered with fine-grained material. Inside and outside polished. Yellow colour. Size 6×7 cm, th. 0.4 cm (BBM, 2019.140.209; Pl. VI: 5).
4. Two fragments of an undeterminable type of vessel with curved, funnel shaped neck. Tempered with fine- and medium-grained material. Traces of graphite coating are visible both inside and outside. Brownish, dark grey colour. Size 6×4 cm, d. rim 14 cm, th. 0.4–0.6 cm (BBM, 2019.140.216; Pl. VI: 6).
5. Body fragment of an undeterminable type of vessel with a broken off handle and horizontally channelled body. Tempered with fine- and medium-grained material (crushed pebble). Outside worn, inside polished. Dark grey colour. Size 4×4 cm, th. 0.5 cm (BBM, 2019.140.53; Pl. VI: 7).
6. Slightly outturned, straight rim fragment of an undeterminable type of vessel. Tempered with medium-grained material. Outside yellowish brown, inside dark grey colour. Size 6×5.5 cm, th. 0.8 cm (BBM, 2019.140.115; Pl. VI: 8).

⁹ The stone material of the excavation was examined by D. Kürthy (Eötvös Loránd University, Budapest; Kuny Domokos Museum, Tata).

7. Fragment of a bowl with curved neck, everted rim, distinct shoulder and conical body. Tempered with fine- and medium-grained material. Burnished surface. Yellow-yellowish grey patchy colour. Size 4 × 7 cm, d. rim 20 cm, th. 0.5 cm (BBM, 2019.140.207; Pl. VI: 9).
8. Curved body fragment of an undeterminable type of vessel with an elongated knob protruding downwards and visually dividing the body. Tempered with fine-grained material. Burnished surface. Yellow-grey patchy colour. Size 6 × 5 cm, th. 0.6 cm (BBM, 2019.140.146; Pl. VI: 10).
9. Strongly curved body fragment of an undeterminable type of vessel with an elongated knob attached to the curved wall. Tempered with fine-grained material. On the outer side, traces of graphite coating are visible. Yellow colour. Size 4 × 5 cm, th. 0.6 cm (BBM, 2019.140.48; Pl. VI: 11).
10. Slightly curved body fragment of an undeterminable type of vessel with a horizontally attached finger-impressed cordon. The cordon starts in the centre of the fragment. Tempered with fine- and medium-grained material including grog. The surface is smoothed on the outside. Brownish grey colour. Size 7 × 9 cm, th. 0.8–1 cm (BBM, 2019.140.219; Pl. VI: 12).
11. Slightly curved body fragment of an undeterminable type of vessel. Tempered with fine-grained material. On the outside traces of fine brushing are visible. Yellow colour. Size 2.5 × 3 cm, th. 0.7 cm (BBM, 2019.140.203; Pl. VI: 13).
12. Curved body fragment of an undeterminable but possibly biconical type of vessel. On the upper part of the fragment a small (dm. 0.1 cm) hole has been pierced through the vessel's wall. Tempered with small and medium size material (crushed pebble). The surface is heavily eroded. Inside yellow, outside yellowish grey colour. Size 4 × 3.5 cm, th. 0.8 cm (BBM, 2019.140.170; Pl. VI: 14).
13. Straight base of a small, undeterminable type of vessel. Tempered with fine-grained material. Inside and outside homogenous dark grey colour. D. base 3.8 cm, th. 0.5 cm (BBM, 2019.140.211; Pl. VI: 15).
14. Large fragment of a vessel with slightly indrawn neck and horizontally outturned rim. Tempered with fine- and medium-grained material. The surface is smoothed on the inside and covered with a calcareous deposit on the outside. Yellow colour. Size 9 × 9 cm, d. rim 18 cm, th. 1 cm (BBM, 2019.140.235; Pl. VII: 1).
15. Fragment of a vessel with indrawn neck and slightly everted, straight rim. Tempered with medium- and large-grained material. Outside yellowish brown, inside dark grey colour. Size 5 × 6 cm, th. 0.9 cm (BBM, 2019.140.116; Pl. VII: 2).
16. Two base and body fragments of an undeterminable type of vessel. Tempered with medium- and large-grained material (crushed pebble and grog). Outside brown-grey patchy, inside yellowish grey-black patchy colour. Size 13 × 12 cm, th. 0.7–0.9 cm (BBM, 2019.140.220; Pl. VII: 3).

The bronze item

1. Bronze wire rolled in a spiral at one end and broken at the other end. It has a homogenous dark green patina. L. 3 cm, w. 1.7 cm, dm. 0.2 cm, weight 2.8 g (BBM, 2019.140.241; Pl. VII: 4).

Feature 18 was located directly next to feature 16, to north-northeast of it. It had an irregular, round-oval shape measuring 3.6–3.8 × 3 × 3.5 m. The bottom of the feature was found 100–110 cm below the surface of the trench. The pit had a homogenous greyish filling containing a lot of animal bones and ceramic fragments. During the excavation stratigraphic units were determined in order to separate spatially the high amount of material, but no archaeological layers were observed, with the exception of the northeast and southwest edge of the feature where small patches of yellowish-brownish mixed soil were found, although without any finds (Fig. 12).

The pit contained large amount of heavily fragmented ceramic material (701 pieces), three bronze objects, a few bone implements, stones and animal bones. Furthermore, ca. 1 kg of daub was collected, of which some have imprints of branches and elaborated surfaces. The stone material unearthed (7 kg in total) comprises mostly sandstone fragments, but a few limestone fragments were also identified. Presumably worked surface is suspected only in the case of a 7 × 4 cm specimen.

The diagnostic ceramic material of the pit

1. Rim and body fragments (two pieces) of a large vessel with indrawn neck, straight rim and a horizontally attached finger-impressed cordon at the shoulder. Tempered with fine- and medium-grained material. Smoothed surface. Outside grey, brown, reddish, orange patchy colour; inside yellowish brown; the core is dark grey. Size 14 × 10 cm, d. rim 18 cm, th. 0.8 cm (BBM, 2019.137.249; Pl. VII: 5).
2. Three body fragments of a large vessel with spherical body and outdrawn neck. The upper part of the vessel is smoothed, the lower part of the outer surface is roughened, consisting of vertical roughened stripes of 1 cm width and smoothed stripes of similar width between them. Tempered with small and medium grained material. Outside yellow, brown, grey patchy, inside dark grey colour. Size 8 × 11 cm, th. 0.8 cm (BBM, 2019.136.243; Pl. VIII: 1).
3. Two fragments of a conical bowl with indrawn rim. Tempered with fine-grained material. Smoothed, but worn surface. Homogenous dark grey colour. Size 6 × 8 cm, th. 0.4–0.5 cm (BBM, 2019.139.112; Pl. VIII: 2).
4. Fragment of a conical bowl with indrawn rim. Tempered with fine-grained material. Inside and outside traces of graphite coating are visible. Brownish grey colour. Size 2.5 × 4 cm, th. 0.5 cm (BBM, 2019.139.113; Pl. VIII: 3).
5. Fragment of a conical bowl with slightly indrawn rim. Tempered with small and medium-grained material. Inside and outside polished. Dark grey, brown patchy colour. Size 9 × 9 cm, th. 0.6 cm (BBM, 2019.139.119; Pl. VIII: 4).
6. Fragment of a vessel with slightly outdrawn neck, everted rim and a distinct, rounded shoulder. The fragment indicates part of a handle raised above the rim.

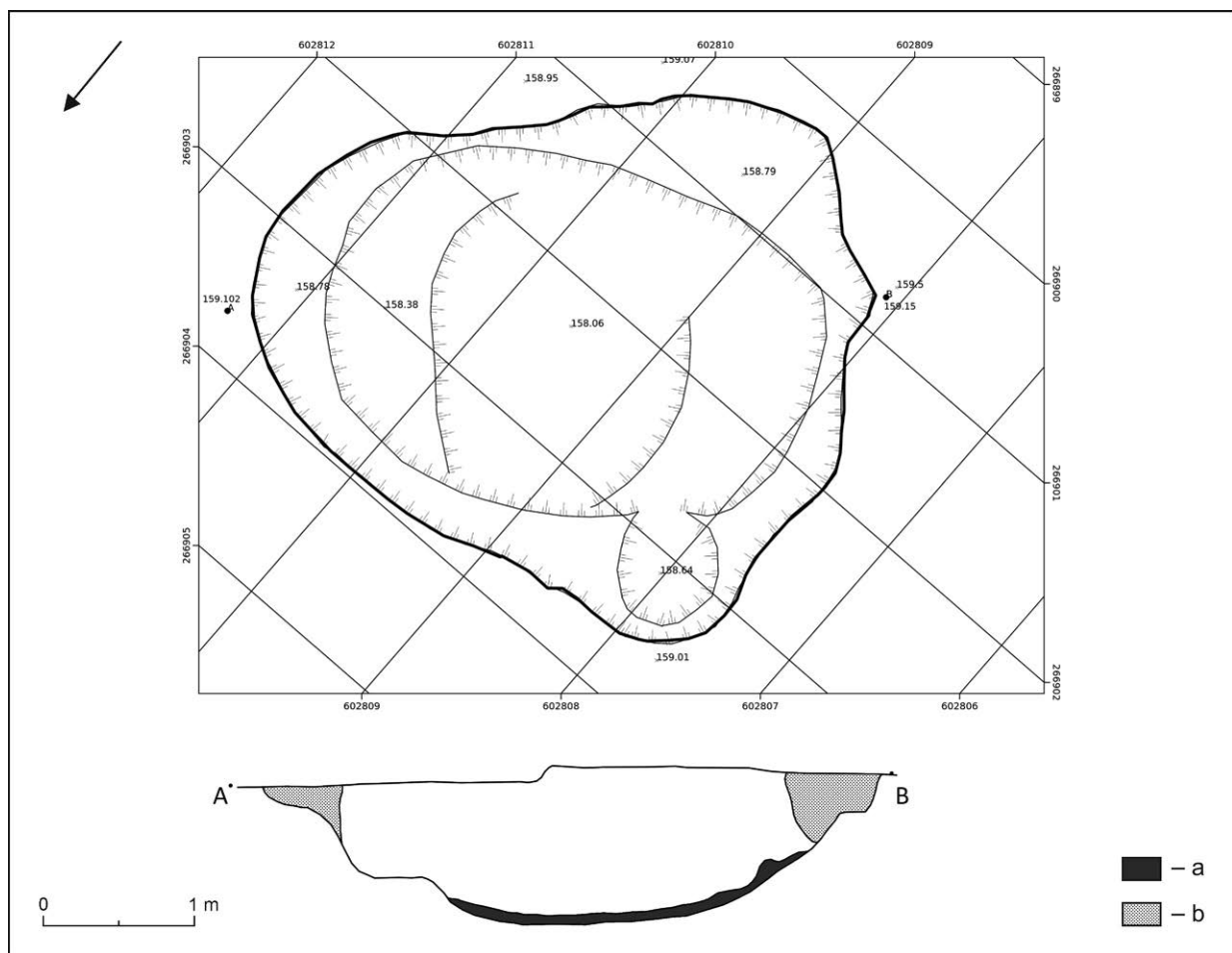


Fig. 12. Süttö-Sáncföldék. Feature 18 (2018). Drawing E. Fejér, A. Bődöcs. Legend: a – intact soil; b – yellowish-brownish mixed soil.

Tempered with fine-grained material. Outside polished, inside smoothed. Inside and outside greyish brown colour, the core is dark grey. Size 5 × 4 cm, d. rim 12 cm, th. 0.5–0.6 cm (BBM, 2019.137.247; Pl. VIII: 5).

7. Fragment of a conical bowl with a strap handle attached to the centre of the body in an almost vertical, slightly oblique position. Tempered with fine-grained material. Inside and outside polished surface and black colour. Size 6 × 7.5 cm, d. rim 22 cm, th. 0.5 cm (BBM, 2019.137.245; Pl. VIII: 6).
8. Fragment of a conical bowl with pointed rim. Tempered with small and medium-grained material. Outside grey and brown patchy, inside dark grey colour. Size 11 × 14 cm, th. 0.8–1 cm (BBM, 2019.136.242, similar 2019.136.26; Pl. VIII: 7).
9. Straight base of a conical bowl. Tempered with small and medium size material. Outside polished, inside no treatment. Dark grey colour. Size 5 × 7 cm, d. base 7 cm, th. 0.5 cm (BBM, 2019.137.241; Pl. VIII: 8).
10. Base fragment of a vessel with omphalos on its bottom. Tempered with small and medium size material. Greyish brown colour. Size 4 × 7 cm, d. base 6 cm, th. 0.5–0.6 cm (BBM, 2019.139.102; Pl. VIII: 9).
11. Fragment of a conical bowl with slightly curved neck and everted rim. Tempered with fine-grained material.

Inside and outside polished. Dark grey colour. H. 7.3 cm, d. rim 17 cm, th. 0.4 cm (BBM, 2019.137.246; Pl. IX: 1).

12. Fragment of a conical bowl with slightly curved neck, everted rim and omphalos at the bottom; as a broken off surface indicates, a handle was attached to the shoulder. Tempered with small-grained material. Traces of graphite coating are visible on the outside. Dark grey colour. H. 4.8 cm, d. rim 11 cm, d. base 2 cm, th. 0.3–0.6 cm (BBM, 2019.137.242; Pl. IX: 2).
13. Three fragments of a vessel with possibly everted rim and a body made up of three distinctly separated parts, a conical lower, an almost vertical central and a conical upper body part. At the border of the upper and central parts, the start of a wide handle with pointed triangular cross section is visible. Tempered with fine-grained material (sand). Inside and outside polished but heavily worn surface. Dark grey colour. D. neck 14–15 cm, th. 0.4 cm (BBM, 2019.136.241; Pl. IX: 3).
14. Fragment of a conical bowl with straight rim. Tempered with small and medium grained material. Inside dark grey, outside brownish grey colour. Size 4 × 8 cm, th. 0.5 cm (BBM, 2019.139.79; Pl. IX: 4).
15. Fragment of an undeterminable type of vessel with strongly outturned neck and rim. Tempered with small and medium-grained material (crushed pebble and

- sand). Yellow colour. Size 5.5 × 6 cm, th. 0.7–0.9 cm (BBM, 2019.136.184; Pl. IX: 5).
16. Fragment of a conical bowl with outturned neck and rim. Tempered with small and medium size material. Inside brownish grey, outside grey colour. Size 5 × 5.5 cm, th. 0.4 cm (BBM, 2019.139.96; Pl. IX: 6).
 17. Fragment of a conical bowl with slightly indrawn neck and everted rim. The shoulder is connected to the rim with a strap handle raised over the rim. Tempered with fine-grained material. The surface is polished, and traces of graphite coating are visible both inside and outside. Dark grey colour. Size 6 × 6 cm, th. 0.4 cm (BBM, 2019.137.243; Pl. IX: 7).
 18. Fragment of an undeterminable type of vessel with strongly outturned neck and rim. Tempered with small and medium sized material. Inside polished, outside worn surface. Grey colour. Size 2.5 × 5.5 cm, th. 0.5 cm (BBM, 2019.139.33; Pl. IX: 8).
 19. Fragment of an undeterminable type of vessel with slightly everted straight rim, which has a flattened (faceted) inner side. Tempered with small and medium size material. Inside and outside polished. Greyish yellow colour. Size 2 × 7 cm, d. rim > 22 cm, th. 0.8 cm (BBM, 2019.139.98; Pl. IX: 9).
 20. Fragment of a conical bowl with slightly indrawn rim and a strap handle raised over the rim. Directly below the handle, a horizontally pierced (d. 0.4 cm) knob is attached to the vessel's neck. Tempered with small grained material. Outside burnished, inside traces of graphite coating are visible. Inside and outside greyish brown colour, the core is dark grey. Size 5 × 4 cm, th. 0.5 cm (BBM, 2019.137.244; Pl. IX: 10).
 21. Fragment of a strap handle with vertically faceted surface. Tempered with small and medium size material. Outside polished and traces of graphite coating are visible. Light grey colour. Size 4 × 2.3 cm, th. 1 cm (BBM, 2019.139.69; Pl. IX: 11).
 22. Curved body fragment of an undeterminable type of vessel with a horizontally elongated knob on it. Tempered with fine-grained material. Inside traces of polishing, outside traces of graphite coating are visible. Grey colour. Size 4 × 4 cm, th. 0.5 cm (BBM, 2019.137.240; Pl. IX: 12).
 23. Curved body fragment of an undeterminable type of vessel with vertically channeled outer surface. Tempered with fine-grained material. On the outside traces of graphite coating, on the inside calcareous deposition are visible. Light grey on the outer surface. Size 4 × 4 cm, th. 0.5 cm (BBM, 2019.137.137; Pl. IX: 13).
 24. Almost straight body fragment of an undeterminable type of vessel with a small hole pierced through its wall (d. 0.4 cm). Tempered with small and medium sized material (crushed pebble). Heavily worn surface. Grey colour. Size 3.5 × 3.5 cm, th. 0.6–0.8 cm (BBM, 2019.137.236; Pl. IX: 14).
 25. Almost straight body fragment of an undeterminable type of vessel with brushed outer surface. Tempered with small and medium size material. Outside yellowish brown, inside grey colour. Size 4 × 2.5 cm, th. 1 cm (BBM, 2019.137.74; Pl. IX: 15).
 26. Body fragment of an undeterminable type of vessel with a horizontally pierced (d. 0.4 cm), elongated knob

(2.5 × 3.5 cm). Tempered with small and medium size material (crushed pebble). The surface is covered with calcareous deposition. Orange, dark brown patchy colour. Size 4 × 3.5 cm, th. 0.9 cm (BBM, 2019.137.238; Pl. IX: 16).

The metal finds from the pit's filling

1. Bronze tanged dagger with ring-shaped handle tip and triangle-shaped blade. The artefact is 20.9 cm long. The blade has a rhomboid cross section, an articulated midrib is visible only on its uppermost part. The widest part of the blade measures 2.5 cm. The tang is 1.3 cm wide and 0.2 cm thick and bordered by a flange which is 0.5 cm thick in the middle and tapers towards the blade. The tang is separated from the ring by a plastic midpart which consists of three horizontal ribs. The ring has a diameter of 2.8 cm and a rectangular cross section. There are two pegs preserved in the tang, each of them is 1.2 cm long and have a diameter of 0.5 cm. The length of the blade is approximately 52% (11 cm), while the length of the tang (without the ring) is 30% (6.4 cm) of the dagger's total length. The surface of the whole artefact is patinated and has a dark green colour, but the patina on the inner part of the tang differs in texture from the patina observed on the blade. Weight 58.3 g (BBM, 2019.137.257; Pl. X: 1).
2. Bronze needle with conical head (*Keulenkopfnadel*). The head is decorated with three horizontal incised lines and underneath three rows of fir branch motif. The object is slightly bend in the middle, its surface is patinated and has a dark green colour. L. 11.8 cm, dm. head 0.5 cm, dm. middle 0.3 cm, weight 5.4 g (BBM, 2019.139.126; Pl. X: 2).
3. Bronze wire with round cross section. The ends of the object are rounded and seem intact, but the body is bent at two points. The surface is patinated and has dark green colour. L. 11.8 cm, dm. 0.2 cm, weight 2.5 g (BBM, 2019.139.127; Pl. X: 3).

The worked osseous material¹⁰

1. Small ruminant sheep/goat thighbone diaphysis (*Ovis/Capra femur diaphysis*) point without epiphysis (Schibler type 1/7; Schibler 1981, 29). Complete tool, but poorly preserved, the surface of the artefact is eroded, covered with traces of root etching, the original surface can be seen only on small spots. The bone was bipartited very likely by splitting, the final shaping (or renewing) was made by abrasion, visible at a small spot above the tip. The tool is certainly used, traces of use polish and rounding is moderate. L. 9.66 cm, w. 1.57 cm, depth 0.35 cm, weight 3.85 g (BBM, 2019.137.255).
2. Large ungulate (*Bos/Equus* size group) bipartited rib burnisher. Three fragments of the same tool, not fitting together. Surface preservation is poor, eroded, covered thickly with root etching. At some places thin layer of crust is visible as well. Very likely it is the inactive end of the tool. Both lateral edges were used, medium use polish and rounding could be observed. A large flake broke out of the inactive end as use damage. Exact

¹⁰ The worked osseous material was described and analysed (see below) by Zs. Tóth (Hungarian National Museum).

technique of the bipartition of the rib raw material is undeterminable. L. of fragment 5.64 cm, w. 1.9 cm, depth 0.34 cm, weight 6.23 g (BBM, 2019.137.256).

3. Fragment of a large ungulate (*Bos/Equus* size group) rib burnisher. Surface preservation is medium, with medium amount of root etching covering it. The tool fragments are burnt brown, but this is visible only as a narrow band on the surface. More than middle use polish and rounding can be observed at both sides. Stigma of manufacturing already disappeared; they are covered with use traces. The fragment is most likely situated towards the upper part of the active end. Both lateral edges are worn wavy, towards active end the spongy tissue is worn more heavily as well. L. of fragment 9.2 cm, w. 2.25 cm, depth 0.3 cm, weight 6.6 g (BBM, 2019.139.122).
4. Fragment of a red deer (*Cervus elaphus* L. 1758) antler tine, a manufacturing waste. Preservation is good, with moderate amount of taphonomy, root etching. At both ends of the tine stigmas of abrupt chopping left by metal tools can be seen. At least part of the surface is decorticated, pearling is removed to create an even surface. Assumedly it is not part of a finished and used tool, but rather a fragment of a half-finished tool, which suffered failure possibly during the manufacturing process and thus gone to waste. The raw material could be damaged due to original poor quality, inappropriate storage or handling during the manufacturing process, leading to discarding the piece unfinished. L. 3.45 cm, w. 1.22 cm, depth 6.1 cm, weight 2.05 g (BBM, 2019.139.121).
5. A small point with epiphyseal end (Schibler type 1/4; Schibler 1981, 25) made of roe deer (*Capreolus capreolus* L. 1758) radii (radius). The surface is medium well preserved, moderate amount of taphonomy, root etching is visible. Primary phase of the manufacturing process is not identifiable, most probably the primary cutting was done by splitting or a natural break was used. Final shaping was done by scraping to form. A large impact flake removed from the tip due to use damage. Degree of use polish and rounding is moderate. L. 9.3 cm, w. 8.9 cm, depth 1.23 cm, weight 6.05 g (BBM, 2019.139.123).
6. Narrow spatulate tool made from roe deer (*Capreolus capreolus* L. 1758) tibia diaphysis part. Taphonomy is visible as moderate erosion at the surface, the preservation is good. Most probably it was an *ad hoc* spatulate tool made on a fortunately broken flake. No modification can be detected at all, one of the ends was used in its natural form. Medium polish, rounding and hand polish refers to use. There is minimal use polish and rounding at the inactive end as well. L. 7.44 cm, w. 1.2 cm, depth 0.55 cm, weight 4.09 g (BBM, 2019.139.124).
7. Tiny wedge made of sheep/goat (*Ovis/Capra*) radii (radius). Surface preservation is middle, erosion is visible. Thong-shaped flake bears the tool which was made by fracturing. A tiny wedge is the active end, which is rather spatulate in shape. There is a large impact break at the medullary side caused by use. Use polish and rounding is moderate, like the handling polish at the mesial part of the tool. L. 6.5 cm, w. 1.64 cm, depth 1.25 cm, weight 9.9 g (BBM, 2019.139.125).

The two features have yielded large quantities of ceramic material, but they are in heavily fragmented state, no complete vessels could be reconstructed and only a small percentage of the finds is suitable for typological analyses. Feature 16 contained 253 sherds, the average size of which is 3×3 cm. Beside 23 different rim and 12 base fragments over 80% of the finds are body sherds. In only nine cases was it observed that multiple fragments of the same vessel were deposited in the pit, but many of these sherds have traces of fresh breakage. Approximately 80% of the fragments were tempered with fine- or medium-grained material. The proportion of the dark and light-coloured ware is around 50 : 50%. The material of feature 18 has similar characteristics. The average size of the 701 fragments is around 4×3 cm. 104 various rim and 47 base fragments were identified, but 78% of the finds are body sherds. Very few matching fragments were identified – they belonged to eleven different vessels. Most of the fragments (over 70%) were tempered with fine or medium-grained material; the coarse ware is rare. The proportion of dark and light-coloured ware is 50 : 50%. The amount of polished fragments is under 10% in both pits; traces of graphite coating were observed on 42 sherds in total.

Various types of bowls, pots and cups have been identified which have parallels in the ceramic material of the Late Tumulus–Early Urnfield culture. Most of the vessels represent common LBA types, such as conical or slightly curved bowls with straight rim and with or without a strap handle below the rim (e.g., Pl. VIII: 6; IX: 4; Kalicz-Schreiber 2010, 252–254; Kőszegi 1988, 21, 29, 39; Patek 1968, 101–105, pl. VI: 24, 26; VII: 4, 31, 35), conical bowls with indrawn rim (e.g., Pl. VI: 3; VIII: 2–4; Kőszegi 1988, 21–24, 29, 49; Patek 1968, 102, pl. VI: 28), or various large vessels with finger-impressed cordon (Pl. VI: 12; VII: 5; Kőszegi 1988, 21–25, 29–33, 37, 48; Patek 1968, 110–112).

There are several vessels in the material with conical lower part, slightly curved neck and outturned rim (Pl. VI: 9; IX: 1, 2, 6), which have numerous parallels from the early phase of the Urnfield culture (Kőszegi 1988, 21; Patek 1968, 105, 106, pl. VII: 6, 8; e.g., Bajč: Paulík 1963, fig. 11: 1; Csabrendek: Kőszegi 1988, pl. 1: A11–12; Cserszegtomaj: Kőszegi 1988, pl. 2: B19; Némethánya: Ilon 2014, 115, 116, pl. 3: 2, 9). Smaller vessels of similar shape with a strap handle raised over the rim (Pl. IX: 7) were also present in the Early Urnfield assemblages (Patek 1968, 106; e.g., Marcellová: Paulík 1963, fig. 25: 2; 40.B; Szigetszentmiklós: Vadász 1992, fig. 7: 6). Conical or hemispherical bowls with pointed rim (Zipfelschüssel; Pl. VIII: 7) are usually considered as inherited shapes from the

period of the Tumulus culture, but they were also used in the Urnfield period (Patek 1968, 102; Paulík 1963, fig. 40.E; Vadász 1992, 219). The open vessel with short rim, strap handle raised over the rim and a horizontally pierced knob directly below the handle (Pl. IX: 10) has parallels only among the finds dated to the Late Tumulus and Early Urnfield period (e.g., Balatonfűzfő: Ilon 2014, pl. 16: 4; Farkasgyepű: Jankovits 1992, fig. 12: 3; Némethánya: Ilon 2014, pl. 3: 5; Perbál: Mali 2015, pl. 10: 1).

In the material of the two pits, only a very small percentage of the vessels have channelled wall, a decoration type usually considered as a general phenomenon of the Urnfield material. There is one body fragment with vertical channelling (Pl. IX: 13) and one fragment with oblique facets on the body (Pl. VI: 5); the latter has numerous parallels in the Early Urnfield material (e.g., Bakonyjákó: Ilon 2014, pl. 11: 6; Balatonfűzfő: Ilon 2014, pl. 16: 3; Marcelová: Paulík 1963, fig. 25: 13; Szigetszentmiklós: Vadász 1992, 217, fig. 7: 1). One fragment of uncertain vessel type has horizontal channels or facets on the body (Pl. VI: 7), which has several parallels in the Late Tumulus and Early Urnfield assemblages (Patek 1968, 102, pl. VI: 12; e.g., Bajč: Paulík 1963, fig. 11: 6; Čaka: Paulík 1963, fig. 6: 6; 8: 1; Némethánya: Ilon 2014, pl. 2: 1; 5: 7). Furthermore, there is also one faceted/trapezoid shaped handle in the material (Pl. IX: 11; see a similar fragment in Szigetszentmiklós: Vadász 1992, fig. 2: 4). Among the many vessels with out-turned rim (Pl. VI: 4, 6, 8; VII: 1; IX: 5, 8, 9), faceted rim can be identified only in one case (Pl. IX: 9). Although conical bowls with channels or facets are characteristic for the Urnfield material culture (Kőszegi 1988, 33; Patek 1968, 89–115), they are missing among the finds of the Sáncföldek.

In general, most of the vessels of the two assemblages are finely tempered and have carefully elaborated, often polished surface. Graphite coating is visible only on a small percent of the fragments. Although only a few comparable assemblages are known from its vicinity (e.g., Perbál: Mali 2015; Tatabánya-Dózsakert: Mészáros K. V. 2012; for a general overview see Furmánek/Veliačik/Vladár 1999, 80; Kőszegi 1988; Patek 1968, 71–77; Paulík 1963), the material from Süttő is essentially in line with the observations made on those sites. Our knowledge about this period in the region is based mostly on burial assemblages and stray finds; however, data from some partially published settlement contexts show that finely prepared pottery prevails in the material and coarse ware is represented only by some larger vessels (Kőszegi 1988, 25, 33, 34; Vadász 1992, 238).

The bronze dagger and the needle are characteristic finds of the period R BD–HA1. The needle

(Pl. X: 2) is a *Keulenkopfnadel* with simple head, which is a widespread type in Central Europe during the Early Urnfield period, but rarely found in younger contexts (Novotná 1980, 141, 142; Říhovský 1979, 151–153; 1983, 33–36). Although a number of similarly decorated pieces can be mentioned (e.g., Čachtice: Novotná 1980, 140, pl. 41: 928; Gemer: Novotná 1980, 141, pl. 42: 938; Radzovce: Novotná 1980, 140, pl. 41: 916; Velem-Szentvid: Říhovský 1983, 33, 35, pl. 13: 294; 14: 336), needles with a completely identical decoration are not known from elsewhere.

The dagger (Pl. X: 1) is a special variant of the more common tanged daggers (cf. above the dagger from the previous excavations; Pl. VI: 1). Tanged daggers with ring-shaped handle tip have a sporadic distribution and from a typological point of view they form a very diverse group. The detailed analysis of the find places the production of the object in the R BD–HA1 period and connects it with the territories of the Eastern Alp, Moravia or West Slovakia (detailed in Fejér 2021).

The bronze wire fragment with spiral ending (Pl. VII: 4) can be part of a jewellery item, but its exact type is hard to define. The diameter of the wire suggests that it belonged to a small needle or fibula. There are some LBA needle types which have spiral ending, e.g., the *Wellennadeln* (e.g., Bakonybél: Jankovits 1992, fig. 2: 8; Farkasgyepű: Jankovits 1992, fig. 28: 10; in general see Jankovits 1992, 63, 64; Říhovský 1983, 15), or the *Spiralkopfnadeln* (Novotná 1980, 93–95; Říhovský 1979, 215, 216) but several fibula types which have spiral-shaped wire elements can also be taken into consideration as analogies (e.g., Ilon 2014, pl. 7: 7; Jankovits 1992, fig. 5: 3; 6: 9; 33: 12; Novotná 2001; Patek 1968, pl. X: 3–5).

The worked osseous assemblage is minimal, altogether six tools and a manufacturing waste could be identified, all of them belonged to the filling of feature 18. The material includes two pointed tools, two *spatulae*, two rib-based tools and an antler fragment (waste). The artefacts are preserved in poor condition. The typological composition of the tools corresponds in general to other Bronze Age sites (Sofaer/Jørgensen/Choyke 2013, 482–487), however, it should be noted that there is a lack on comparable LBA analyses, since only few contemporary settlement materials have been published and worked osseous materials are significantly less studied from this period than from the previous phases of the Bronze Age (for LBA results see e.g., Furmánek/Veliačik/Vladár 1999, 145, 146; Ilon 2014, 131; Kustár/Tugya 2010; Vörös 1996).

The archaeozoological material of these two LBA features was preserved in poor and fragmented condition (404 pieces in total) which does not allow

representative statistical analyses to be carried out.¹¹ The main domestic mammals (in order of abundance) are cattle, caprine, pig and horse, which reflects a pattern typical for the investigated period in the Carpathian basin (e.g., Börcs-Paphomok dűlő and Mosonmagyaróvár-Német dűlő: *Choyke/Bartosiewicz* 1999; Dunakeszi-Székesdűlő: *Csippán* 2013, 331; Németbánya: *Vörös* 1996; Rákosszabamajor-hegy Dél: *Csippán* 2019, 225–227). Wild mammals were found only in a very low amount ($n = 12$), which makes it not possible to assess their quantitative proportions: roe deer, red deer, boar and brown hare have been identified.

Two bones per feature were chosen for radiocarbon dating. The analyses of the samples from feature 16 yielded the results 3094 ± 29 BP (1428–1277 cal BC, 95.4%) and 3028 ± 24 BP (1391–1208 cal BC, 95.4%), while from feature 18 the absolute dates are 3043 ± 27 BP (1937–1220 cal BC, 95.4%) and 3055 ± 28 BP (1408–1226 cal BC, 95.4%; *Fejér* 2021, fig. 5; *Czajlik et al.* 2019, fig. 19). These data place the features into the 14–13 c. BC, which is in accordance with their relative chronological position suggested by the finds (see below).

Contemporary sites in the vicinity

The field surveys on the Süttő plateau provided evidence on LBA inhabitation at two further areas. East of the Sánccöldek, at Papi földek, it was reported that during the surveys of the Hungarian Topographic Research Project in the 1970's one faceted rim was discovered beside a few non-diagnostic sherds, which could possibly originate from the LBA (*Horváth/H. Kelemen/Torma szerk.* 1979, 319, site no. 20/25). The western edge of this territory was partly covered by our field surveys too in 2018 and some non-diagnostic LBA–EIA sherds were collected.

At the southwestern edge of the Sánccöldek area recent field surveys of the Eötvös Loránd University have testified to an intensively inhabited zone. As it was described above, barely any diagnostic finds were collected here, however, the tempering, firing conditions and surface treatment of the sherds indicate LBA or EIA origin in most cases. Based on the Litzen-decorated sherds (see above), multi-period occupation is suggested in this territory. North of the present dirt road, at the eastern edge of the intensively occupied zone, a concentration of some large and freshly broken ceramic fragments and larger stones were observed in a 50×50 cm area (*Czajlik et al.* 2018, 534, 535, fig. 8; note, that some of the fragments were not correctly published). The accumulation of these finds indicated the discovery

of the remains of a destroyed grave, although no bones or cremated remains were noticed. The material of the area was collected separately, but they do not represent a closed context. The most diagnostic sherds are the following:

Finds

1. Three rim and body fragments of a vessel with out-turned rim, lightly indrawn neck and curved body. The shoulder of the vessel is vertically channeled, the top of the shoulder and the middle of the neck are connected by a small, knee-shaped handle. Two other matching fragments of a channeled shoulder presumably also belonged to this vessel. Tempered with fine-grained material (sand). The surface of the vessel seems to have been burnished, but it is heavily worn; inside some traces of graphite coating are visible. Inside and outside homogenous dark grey colour. Size 10×7 cm, th. 0.4–0.5 cm (BBM, not inventoried yet; Pl. X: 4).
2. Two body fragments of a large, possibly biconical vessel type with vertically channeled body. Tempered with small and medium-sized material (crushed pebble). The surface is heavily worn, inside no traces of treatment, outside remains of graphite coating. Homogenous dark grey colour. Size 13×5 cm, th. 0.8–1 cm (BBM, not inventoried yet; Pl. X: 5).
3. Fragment of an undeterminable type of vessel with conical lower part, short, vertically channeled shoulder and straight, slightly indrawn neck. A small thick handle with a very narrow horizontal hole is situated at the shoulder. Tempered with fine-grained material (sand). The surface is heavily worn, but traces of graphite coating are visible both inside and outside. Homogenous dark grey colour. Size 5×3 cm, th. 0.5–0.8 cm (BBM, not inventoried yet; Pl. X: 6).
4. Almost straight body fragment of an undeterminable type of vessel. Tempered with fine-grained material (sand). The outer surface is heavily worn, the inside is burnished and shows traces of graphite painting (or coating). Homogenous dark grey colour. Size 3×3 cm, th. 0.6 cm (BBM, not inventoried yet; Pl. X: 7).
5. Fragment of a large vessel with straight neck and possibly outturned rim. Tempered with fine and medium size material (crushed pebble). Smoothed on the outside, no treatment inside. Outside dark grey, inside brown colour. Size 12×12 cm, th. 0.6–0.8 cm (BBM, not inventoried yet).
6. Fragment of an undeterminable type of vessel with conical lower part, short, vertically channeled shoulder and possibly straight, slightly indrawn neck. Tempered with fine-grained material (sand). The surface is heavily worn; traces of graphite coating are visible both inside and outside. Homogenous dark grey colour. Size 3×2.5 cm, th. 0.6–0.8 cm (BBM, not inventoried yet; Pl. X: 8). Although found a little further apart and on a different occasion, it presumably belongs to vessel no. 3. In addition, ten other smaller or larger non-diagnostic body fragments were also collected in the area, which are similar in tempering, colour and surface treatment (often graphite coating) to the above described specimens.

¹¹ The analysis of the archaeozoological material was carried out by P. Csippán (Eötvös Loránd University, Budapest).

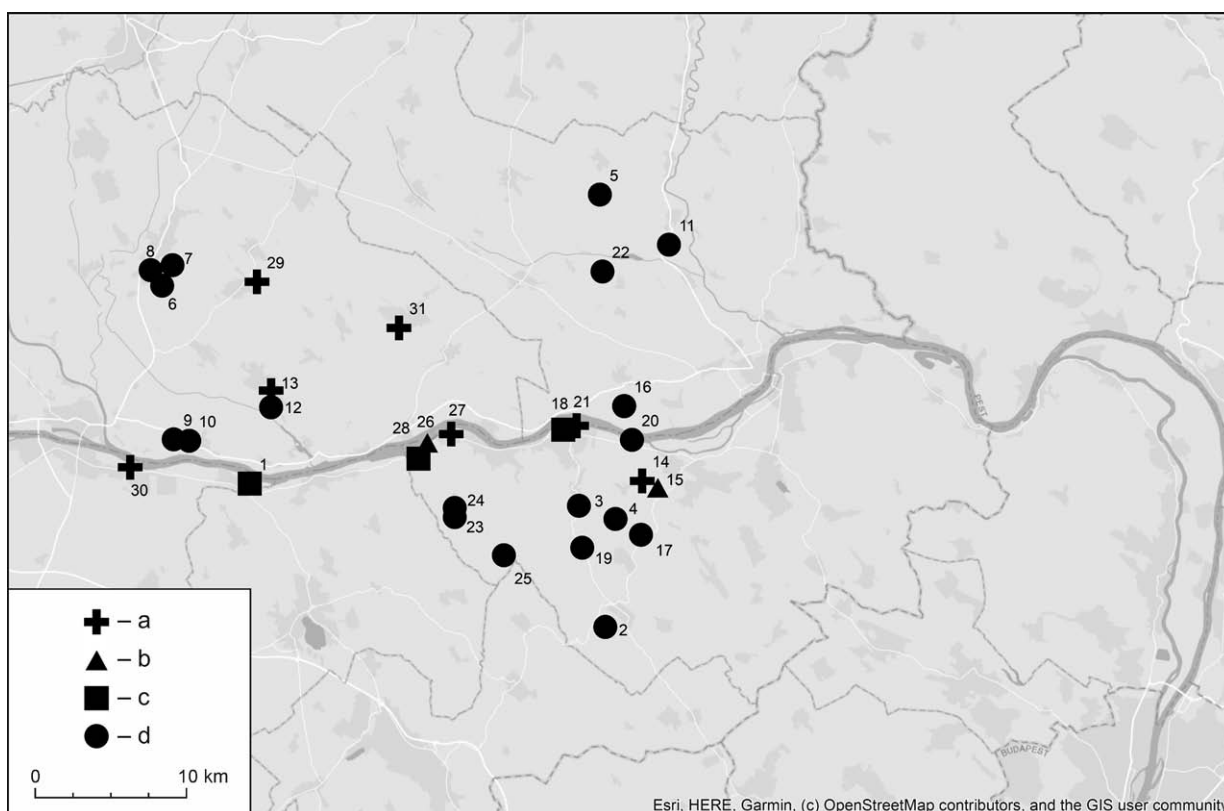


Fig. 13. Late Bronze Age sites with material of the older phase of the Urnfield Period in the vicinity (ca. 20 km radius) of Süttő. 1 – Almásfüzitő-Foktorok; 2 – Bajna-Vízállás alatti dűlő; 3 – Bajót-Hagymásrét; 4 – Bajót-Pélimődszentkereszt; 5 – Bruty; 6 – Hurbanovo-Bacherov major; 7 – Hurbanovo-Dolný Bacher; 8 – Hurbanovo-Nagy nyilas; 9 – Iža-Danube bank; 10 – Iža-Öregállás; 11 – Kamenín-Várhegy; 12 – Marcelová; 13 – Marcelová; 14 – Mogyorósbánya-Fehérkereszt; 15 – Mogyorósbánya-Óhegy; 16 – Mužla-Svätějurský vnútorný hon; 17 – Nagysáp-Úrisáp; 18 – Nyergesújfalu-Dunapart; 19 – Nyergesújfalu-Gunyhóalji dűlő; 20 – Nyergesújfalu-Papírgyári földek; 21 – Nyergesújfalu-Viscosa gyár; 22 – Šarkan-Pod jazerom; 23 – Süttő-Bikolpuszta II; 24 – Süttő-Bikolpuszta III; 25 – Süttő-Gerecse; 26 – Süttő-Nagysáncstető; 27 – Süttő-Rákóczi utca 36; 28 – Süttő-Sáncföldek; 29 – Svätý Peter (Dolný Peter); 30 – Szöny-Őszöny; 31 – Vojnice (after Horváth/H. Kelemen/Torma szerk. 1979; Kőszegi 1988; Kuzma 2011c; Patek 1968; Paulik 1963; Veliačik/Romsauer 1994). Map E. Fejér. Legend: a – burial; b – hilltop settlement; c – settlement (excavated); d – stray find.

Although in a previous publication this material from the Sáncföldek was preliminarily identified as a LBA grave (Czajlik *et al.* 2018, 534, 535), the detailed analysis of the ceramic finds rather suggests a destroyed EIA feature. The vessel with S profile body, vertically channeled shoulder and a small handle (Pl. X: 4) has some parallels in the Urnfield material culture (Csöngye: Patek 1968, pl. XLI: 5; Neszmély: Patek 1961, pl. I: 8; Sághegy: Kőszegi 1988, pl. 9: 20; 46: 2; Tököl: Kőszegi 1988, pl. 11: 4) – albeit usually with larger handles and additional horizontal channels above the shoulder – but its best analogies are known from EIA contexts (e.g., Balatonboglár-Berekre dűlő: Jáky 2016, fig. 5: 17, 18; Győr-Ménfőcsanak: Ďurkovič 2016, pl. 106: 3). Similarly, the decoration and texture of the vessel with short, channeled neck and small, thick handle on it (Pl. X: 6) is not foreign to the Urnfield pottery repertoire, its distinct shoulder, however, has no analogies

from this period; in contrary to the numerous EIA finds (e.g., Győr-Ménfőcsanak: Ďurkovič 2016, pl. 16: 4; Regöly: Patek 1968, pl. LXXXV: 1; Tokod-Altár: Patek 1982–1983, pl. 19: 5, 7–10), where this type of shoulder is a common feature (Ďurkovič 2016, 71, 72). Graphite coating, which can be observed on several fragments, was a known surface treatment method in the territory throughout the LBA and EIA; however, painted graphite motifs – as assumed on one of the fragments (Pl. X: 7) – were characteristics only for the EIA period (Kreiter *et al.* 2014, 129, 130; Patek 1982–1983, 66–68).

In the broader vicinity of the Süttő plateau several stray finds have been reported which may indicate LBA inhabitation, but their finer chronological position cannot be established (Fig. 13).

The Hungarian Topographic Research Project revealed possible LBA finds from the area of present-day Bikolpuszta (Bikolpuszta II and III; see

Horváth/H. Kelemen/Torma szerk. 1979, 314, sites no. 20/10; 20/11), approximately 4 km to the south of the plateau, west of the stream Bikol. From the inner territory of today's Süttő village, a prehistoric cemetery is known in the Rákóczi street, where various graves were discovered in the 1930's, 1950's and 1960's, some of them dated to the LBA, while others to the EIA. There are many contradictions in the literature about the interpretation of the finds (Horváth/H. Kelemen/Torma szerk. 1979, 319, site no. 20/21; cf. Patek 1968, 38, 39, 149, pl. CVIII: 3–5). Further to the south, remains of a fortification were documented on the hillside below the summit of the Gerecse at an altitude of 460–510 m, and although the collected material was very scarce and uncharacteristic, they suggested that the site was probably established during the LBA (Horváth/H. Kelemen/Torma szerk. 1979, 317, site no. 20/18). Another, presumably fortified hilltop settlement has been reported from Mogyorósbánya-Óhegy, but from here too only stray finds are known, therefore little certain can be said about its inhabitation period and fortification (Horváth/H. Kelemen/Torma szerk. 1979, 258, site no. 13/9; Kőszegi 1988, 161). There are some settlement remains reported from Almásfüzitő-Foktorok, which may originate from the older phase of the Urnfield period (Kőszegi 1988, 116; V. Vadász 1972). Remains of an Urnfield settlement were unearthed in Nyergesújfalu-Dunapart (Kőszegi 1988, 167; Patek 1968, 35), and stray finds indicate the existence of contemporary sites at Nyergesújfalu-Papírgyári földek and Nyergesújfalu-Gunyhóalji dűlő (Kőszegi 1988, 167). Scattered finds collected in the vicinity of Bajót-Hagymásrét, Bajót-Péliföldszentkereszt and Nagysáp-Úrisáp might also represent contemporary settlements (Kőszegi 1988, 118, 164). Several LBA stray finds were collected also around Bajna, including from the site Bajna-Vízallás alatti dűlő, the material of which might be contemporary with that of the described sites at Süttő (Kőszegi 1988, 118).

There are also some data about LBA burials in the region from Mogyorósbánya-Fehérkereszt, Nyergesújfalu-Viscosa gyár, and from a little further away at Szöny-Ószöny (Kőszegi 1988, 161, 167, 187), but their material have not been published. A number of LBA sites are clustered in the vicinity of Esztergom, and among them some burial assemblages (Esztergom-Cserepesvölgy, Esztergom-MIM szerelőcsarnok, Esztergom-Sintértelep: Kőszegi 1988, 137–139) can be dated to the earlier phase of the Urnfield culture.

On the left bank of the Danube, similarly, several stray finds indicate contemporary LBA

inhabitation characterized by the Čaka material culture; however, excavation data are scarce and the fine chronological position of the finds cannot be always determined (Benkovský-Pivovarová 2019; Furmánek/Veliačik/Vladár 1999, 70–81; Paulík 1963; Veliačik/Romsauer 1994). The nearest reported LBA site is located at Mužla-Svätøjurský vnútorný hon (Kuzma 2011c, 62, no. 11), while stray finds probably indicate other contemporary sites at Bajč-Ragoňa II, Bajč-Tehelňa, Bruty, Hurbanovo-Bacherov majer, Hurbanovo-Dolný Bacher, Hurbanovo-Nagy nyilas, Iža-Danube bank, Iža-Öregállás, Kamenín-Várhegy, Marcelová, Šarkan-Pod jazerom (Paulík 1963, no. 2; 6; 9; 44; 60; Veliačik/Romsauer 1994, no. 16; 18; 90; 198; 199; 203; 206; 227; 228; 246; 352; 353). At Marcelová, Svätý Peter (Dolný Peter), and Vojnice graves were discovered (Paulík 1963, no. 42; 57; 74; Veliačik/Romsauer 1994, no. 143; 144; 351; 620).

THE ABSOLUTE CHRONOLOGICAL FRAMEWORKS OF THE PREHISTORIC INHABITATION AT THE PLATEAU

Regarding the absolute chronology of the described archaeological material, six recently obtained ¹⁴C dates are available, although they do not cover the entire span of prehistoric occupation at the plateau (Fig. 14).

There is little known about the Neolithic inhabitation on the plateau. It is characterized by Želiezovce type material of the Linear Pottery Culture,¹² which is roughly dated in Transdanubia to the end of the 6th millennium BC (5300/5250–5000/4900 cal BC; Oröss/Bánffy 2009, 177). In order to date the oldest inhabitation period of the site complex, a sample was chosen for radiocarbon dating from the material of the excavations in the 1980's. According to the available documentation, pit 1 of trench VI, unearthed in the Nagysáncetű area (1981), provided solely Neolithic finds, therefore its material was suitable for further investigation. Beside a small fragment of a human humerus which did not contain sufficient amount of collagen, a dozen of freshwater shells was the only osseous material stored among the pit's finds. One of those shells was selected for radiocarbon dating and it yielded the result 5280 ± 27 BP (4234–3993 cal BC, 95.4 %; Fig. 14). These absolute dates are within the chronological frame of the Copper Age in the Carpathian Basin, but as the sample originates from a river, it may appear older than the reality due to the freshwater reservoir effect (FRE). The FRE is responsible for anomalously old dates of riverine or lacustrine samples, and it is

¹² The Neolithic material from the site is currently being processed by Zs. Tóth (Hungarian National Museum).

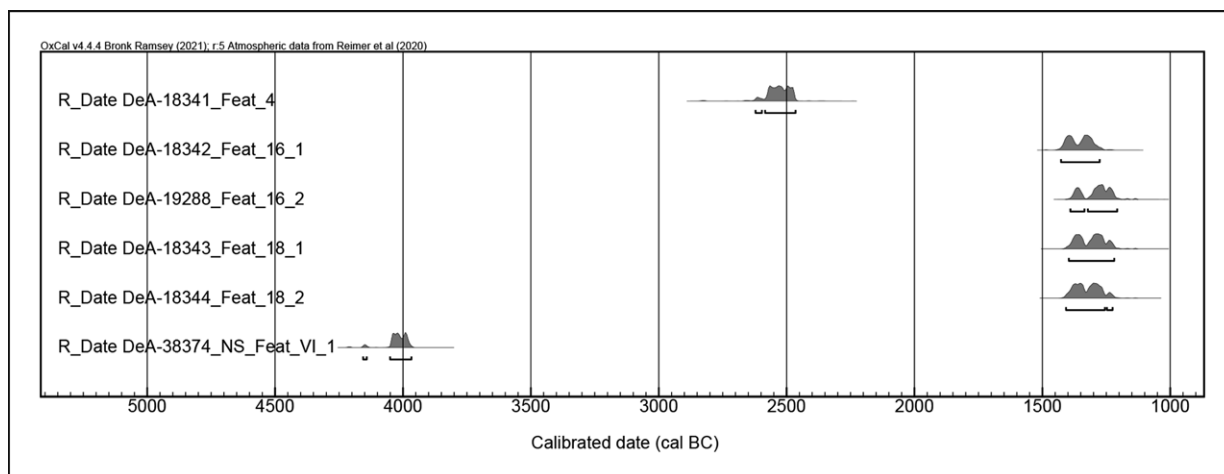


Fig. 14. Radiocarbon dates from Süttő. Süttő-Sáncföldék – feature 4 (2018), feature 16 (2018), feature 18 (2018); Süttő-Nagysáncstető – trench VI feature 1 (1981).

highly variable both in global measures and even within the same body of water. The possible offset caused can range between 0 and 6000 years and requires series of local control samples to calibrate (Ervynck/Boudin/Van Neer 2018, 395, 396; Lanting/van der Plicht 1998, 153, 154; Philippsen 2013; Philippsen/Heinemeier 2013). Thus, it can be securely stated that the investigated shell from Nagysáncstető does not originate from the Neolithic. It was either kept in a mislabelled bag or the original context was not closed, and the feature had a mixed archaeological material.

Our recent knowledge suggests that there was a gap between the Middle Neolithic and Early Bronze Age inhabitation at the plateau. From this roughly three thousand years long period, no evidence of permanent or temporary use was detected on the plateau overlooking the Danube. Some Late Copper Age ceramic fragments (Boleráz culture) were documented during field surveys solely at the bank of the stream Bikol, at Tatai úti dűlő I (Horváth/H. Kelemen/Torma szerk. 1979, 315). As outlined above, archaeological record testifies to the intensive inhabitation of the plateau in several phases of the later prehistoric period during the 2nd and 1st millennia BC. For now, the investigated shell cannot be securely anchored to any prehistoric inhabitation period, but future studies regarding FER in the river Danube could refine its dating.

Regarding the Early Bronze Age, two phases of inhabitation have been recorded on the plateau. The older period is represented by the Makó-Kosihy-Čaka material and, on the basis of ¹⁴C data from Süttő-Sáncföldék, testifies to an inhabitation around the mid-3rd millennium BC (2585–2466 cal BC, 90.8%, see detailed above; Fig. 14). The pe-

riod of inhabitation at Süttő-Kissánc can only be roughly estimated, since the available material is not sufficient for fine chronological observations and absolute dates are missing for this Hatvan-Tokod type of material in Transdanubia. This type of material culture has been usually placed to the R BA1–BA2 periods and dated to the end of the 3rd millennium BC, although the chronology of these periods has been often debated (P. Fischl et al. 2015; Kiss et al. 2015; 2019; Stockhammer et al. 2015; Szabó 2017; for absolute chronological data related to the Hatvan culture see Marková 2010, 71; Schlütz/Bittmann 2016 and cf. some old results from the territory of central Hungary in Raczky/Hertelendi/Horváth F. 1992, 42–45).

Currently, no ¹⁴C dates are available for the MBA material at Süttő. The archaeological finds indicate a long-time inhabitation at Nagysáncstető, but it has not been confirmed yet by absolute chronological dates. In relative chronological terms, the TEP corresponds to the phases R BA2–BB1, which, based on radiocarbon dates from other sites, covered the period between the early 2nd millennium BC and the 17–15. c. BC (Dani et al. 2019a, 33, tab. 1; Ilon 2019, fig. 3; Kiss 2012, 201–203; Kiss et al. 2015, 28, 29; 2019, 178, 179; Szabó 2017, 112, 113).

From a relative chronological point of view, the LBA inhabitation at Süttő-Sáncföldék can be dated to the periods R BD–HA1, which correspond with the 14–13. c. BC at the site according to some ¹⁴C dates (1428–1277 cal BC, 95.4%; 1391–1208 cal BC, 95.4%; 1397–1220 cal BC, 95.4%; 1408–1226 cal BC, 95.4%; Fig. 14; see detailed in Fejér 2021, 51; for summarized comparative results in the region see Ilon 2019, fig. 3).

The currently available data shows that the territory of the plateau remained unsettled after the

13th c. BC until the EIA. A significant part of the material excavated on the Süttő plateau represents the HC period and can be dated to the 8–6th c. BC (Czajlik *et al.* 2019, fig. 19; Novinszki-Groma 2017; V. Vadász 1986b).

CONCLUDING REMARKS

The loess plateau above the Danube between the present-day settlements of Süttő and Neszmély testifies to dynamic changes in settlement strategies throughout the various prehistoric periods. These shifts might have been driven by various factors, such as population growth, transforming economic and social structures and interactions, shifts in subsistence strategies, or the environmental and climatic changes.

Despite the low altitude of the plateau (approximately 150 m above sea level), its relative height over the Danube (ca. 50 m) makes it a prominent location, offering both control over a long-distance communication route and natural protection. Although environmental data on the Neolithic and Bronze Age inhabitation periods of the site are very limited, it has been suggested that the territory was covered by forest steppe vegetation that time (Horváth A. 2001), which could have provided favourable conditions for prehistoric population. The large open inner area of the plateau (today's Sáncföldek and further Tatai úti dűlő) were suitable for cultivation and animal husbandry, while the nearby hilly and more forested areas to the south and west could have been used for hunting. Water source, a crucial necessity for settlement, was available in the area: beside the river Danube, the stream Bikol was also within reach, and periodic streams and springs in the valleys may have been exploited too. The Danube was not only an essential resource, but it also served as an important means of communication, enabling those people living close to its banks to maintain long-distance exchange networks. The recovered archaeological material of the plateau confirms this assumption, since it testifies to mixing cultural traditions and strong connections with distant territories in several periods (see, e.g., the distribution of the loaf-of-bread idols; the mixed MBA material with elements of the Maďarovce and TEP culture; the tanged dagger with ring-shaped handle attachment).

The research carried out so far shows that prehistoric communities preferred to establish settlements on the hilltops at the edge of the plateau divided by gullies (Nagysánc, Nagysántető, Kissánc). There is evidence of inhabitation on these hilltops throughout all prehistoric periods

with the exception of the Copper Age, which is only represented by remains discovered at the bank of the stream Bikol, at Tatai úti dűlő I site. Although the current gully-system does not necessarily reflect the prehistoric conditions, the topographic situation of the hilltops suggests that the most suitable area for permanent settlement was the Nagysántető, because unlike Nagysánc and Kissánc it has been directly connected to the hinterland. The archaeological discoveries of the Nagysántető indicate that this area was indeed used as primary settlement zone. The hill was naturally protected on several sides, but there is evidence that its southern edge, where it was easily accessible, was artificially fortified in several periods. Ramparts and ditches are generally interpreted as defence structures, but other interpretation possibilities should be also considered regarding enclosed spaces (Harding 2006; Parkinson/Duffy 2007; Szeverényi/Kulcsár 2012, 291, 292). The plateau covers an area of approximately 3.2 ha today, but taking into account that part of it was demolished during the 19th c., its prehistoric extent is estimated at about 3.5–4 ha.

The first settlement at the plateau is dated to the end of the Middle Neolithic period, after that a three-thousand-year long gap is suspected in the plateau's inhabitation. A new settlement was established at Nagysántető in the first phase of the EBA, and finds indicate possible contemporary settlements at Sáncföldek and Tatai úti dűlő II as well; however, their precise chronological relationships cannot be determined with certainty. The scarce evidence available in general on the settlement structure of the Makó-Kosihy-Čaka culture suggests that the communities characterized by this material lived on small settlements with dispersed layout mainly established along rivers; hilltop and fortified hilltop settlements are barely known, unfortunately the available data about the Nagysántető settlement is also very scarce (Fejér 2022; Kulcsár 2009, 69). According to our recent knowledge, during excavation very low amount of material attested to the Makó-Kosihy-Čaka culture was found, which implies, the over 3 ha area was not densely inhabited.

In the younger phase of the EBA, a settlement was founded at the hilltop Kissánc, in an area having about 1.5 ha of habitable land. The facts that occupation can be detected in the area only in this period, and that Hatvan-Tokod type material culture that characterizes this settlement has not been found at any other parts of the plateau yet, suggest that the population occupied this hill was driven by completely different economic and social factors. Instead of living on a more spacious, eas-

ily defensible area above the Danube with direct contact to the plain hinterland (Nagysáncstető), they preferred to choose a small, prominent location that was easy to protect but difficult to access from the nearby lands. The defensive structure (ditch) assumed to cut in the middle of the Kissánc has not been investigated, but it is important that archaeological material was found both inside and outside of this division and that the outer part of this system was located still within the naturally enclosed hilltop.

During the MBA the area of the Nagysáncstető was intensively settled and repeatedly reinforced on its southern side. Both the first and second settlements were fortified and the dimensions of the later rampart and outer ditch exceeded those of the earlier ones. There was no other site on the plateau contemporary with these fortified hilltop settlements. The third settlement, established at the end of the MBA and abandoned after a while, was built over the same area as the previous ones, but it was not fortified by any rampart as the houses erected over the previous fortifications suggest. During this last phase of MBA inhabitation at Nagysáncstető two or three other coeval sites appeared in its close vicinity: a settlement in the valley Hosszúvölgy, and occupied areas are suspected upon surface collections in the south-western area of Sáncföldek and to the east of it, at Sánci-dűlő I. The settlement in the valley is of great significance, since, according to our current knowledge this is the only prehistoric period, when the Danube bank below the plateau was also inhabited. This location had several disadvantages for human settlement in prehistoric times, including its vulnerability to hostile attacks or its exposure to the elements of nature. Field research has proven that the area was often affected by flooding. Previously, before the location of the MBA settlement in Hosszúvölgy became published, it had been often misinterpreted as part of the Nagysáncstető settlement that had fallen down into the valley. Although this theory does not stand up in the light of the exact position of the site, it draws attention to another possible threat, landslides, which could have affected both the upper and lower settlements. The loess plateau along the Danube poses a high risk of landslides (Gerzsényi/Albert 2021, 731; Józsa *et al.* 2019), although no research has targeted this question so far and no evidence of prehistoric land instability has been documented during previous fieldworks at Süttő.

The trenches opened on Nagysáncstető yielded enormous quantities of MBA (TEP) material, indicating intensive inhabitation, but the available data are insufficient to reconstruct the internal

structure and density of the settlement in any of its phases. The publications of G. Vékony do not describe in detail what type of MBA features were excavated in the inner areas, but the available field diaries and the first reports mention several pits containing TEP material, as well as daub fragments with imprints of branches which may indicate the presence of houses with walls constructed using the wattle-and-daub technique (Vékony 1980; 1981; 1982b; 1983b; Vékony/Vadász 1982). Misinterpreting G. Vékony's references to finding houses with plastered floor at Süttő-Hosszúvölgy, it has been recently claimed that similar structures were also unearthed inside the fortified hilltop settlement of Nagysáncstető (Dani *et al.* 2019b, 863). However, according to the reported data, 'floors' (Vékony 2000, 179) and 'fragmented floor surfaces' (V. Vadász 2001, 48) were discovered at Nagysáncstető only from the latest MBA inhabitation phase, when no fortification surrounded the settlement. Architectural structures dug into the ground (e.g., postholes) were not recorded.

In the distribution area of the TEP, several hilltop settlements and hillforts are reported, dated to various periods of the culture, but only a few of them have been investigated so far. Most of these sites are located in the central territories of South Transdanubia and usually cover an area of 4–5 ha (Dani *et al.* 2019b, 862–864, fig. 14; Kiss 2012, 211–215, 277). Among them, the settlement at Dunaszekcső-Várhegy resembles most closely in topographic location to the Nagysáncstető site – it is situated on top of the loess plateau overlooking the Danube – however, its area was intensively used in the Roman Period and Middle Ages and therefore the MBA inhabitation is only known upon collected stray finds (Ecsedy 1984, 89, 96; Kiss 2012, 211–215, 277). For better understanding the hilltop settlements at Süttő-Nagysáncstető, the phenomenon should be investigated beyond its cultural (TEP) context. The MBA in the central Carpathian Basin is characterized by fortified, often multi-layered sites, which is comparable also to Central European tendencies (Jockenhövel 1990, 211–218; Primas 2002; Shennan 1986, 119–123; Szeverényi/Kulcsár 2012). Many of these hilltop and possibly fortified hilltop settlements are located on the loess plateau along the Danube in central Hungary, just as the Süttő settlement (Kovács T. 1984; Reményi 2012; Szeverényi/Kulcsár 2012). The observations made at Süttő-Nagysáncstető regarding the final phase of the MBA are in line with those noticed at several similar enclosed sites in central Hungary, namely that during the Koszider period the ditches surrounding the previous settlements were filled in and built over, testifying to social and/or ideological changes (e.g., Százhalombatta-

Földvár, Lovasberény-Mihályvár; *P. Fischl et al. 2013*, 358–362; *Szeverényi/Kulcsár 2012*, 292).

The study of MBA hilltop settlements in central Hungary have revealed that they rarely stood alone but were linked to large networks of contemporary sites (e.g., around Százhalombatta-Földvár in the Benta valley; *Earle/Kolb 2010*, 71–78; *Uhnér 2019*; *Vicze 2000*; *Vicze/Earle/Arthursson 2005*; in general, see *Dani et al. 2019b*; *Szeverényi/Kulcsár 2012*). These results are hard to be compared to the settlement structure around Süttő-Nagysántető, as large-scale intensive research is still missing here. However, the study of the Süttő plateau has already brought to light sufficient evidence to safely assume that the Nagysántető settlements were also embedded in a dense network of sites. These include the remains of a late MBA settlement at the Süttő-Hosszúvölgy in the valley below the hilltop, a contemporaneous site at Süttő-Sánci dűlő I, furthermore, a site of late MBA inhabitation southwest of Nagysántető indicated by Litzen-decorated fragments collected from the surface. Further MBA sites are known from the broader vicinity of the plateau (e.g., at Dunaalmás, Lábatlan, Neszmély, Nyergesújfalu), but more archaeological research is needed, including clarification of their chronological relationships, to determine the positions and roles of these sites in the regional settlement network. Despite the intensive and long-lasting MBA inhabitation, no contemporary cemetery has been discovered so far on the Süttő plateau. Little is known about the spatial relation between settlements and burials of the TEP, but it is supposed that they are located close to each other (*Kiss 2012*, 216). According to our recent knowledge, the nearest cemetery was discovered at a distance of 4–5 km, in Lábatlan (Fig. 10; *Horváth/H. Kelemen/Torma szerk. 1979*, 244, 246; *Kisné Cseh 1999*, 61).

After a period of abandonment, the area of Nagysántető was resettled during the LBA, although without fortifications. Features of this

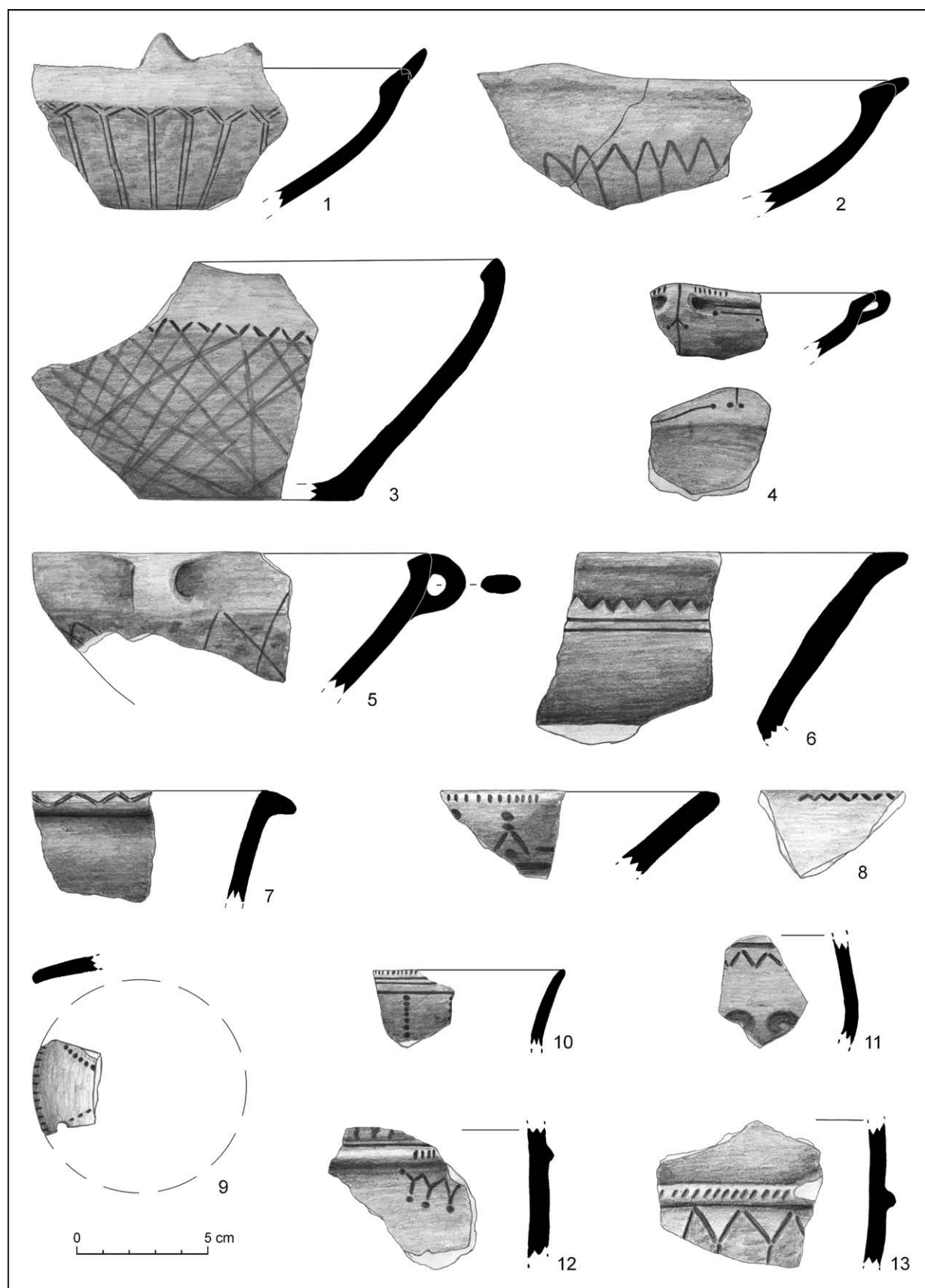
period were also discovered in Sáncföldek and there are some unsecure data about a contemporary settlement at the hilltop Nagysánc and in the southwest edge of Sáncföldek; a dense network of LBA sites can be supposed in the neighbouring region, but the sites can rarely be dated precisely. In general, settlements of the period are frequently found on river banks or terraces. Hilltop settlements are a common type of settlement in the Urnfield period, including only naturally and both naturally and artificially protected sites. Many of these settlements testify to permanent occupation and are commonly interpreted as centres of metallurgy or long-distance trade (*Bánda 1982*; *Jockenhövel 1990*, 219–226; *Kőszegi 1988*, 28, 30, 33, 36, 47; *Primas 2002*). The Süttő-Nagysántető settlement was inhabited only for a shorter period of time and there is no evidence of specialized metallurgical activities on the site. Casting moulds or other tools of metalworking have not been reported and metal finds have also been rarely found in the close vicinity. There are no contemporary hoards known from the neighbouring land, but LBA swords were discovered in the Danube a few kilometres away (Lábatlan-Piszke: *Kemenczei 1988*, 44, pl. 17: 186; *Mozsolics 1972*, 190, fig. 1: 4; Nyergesújfalu: *Kemenczei 1988*, 62, pl. 37: 335; 1991, 194–196, pl. 20: 92; 43: 194; 44: 195, 196; *Mozsolics 1975*, 14–16, fig. 5: 2, 3; 6; 7). To evaluate the phases of LBA inhabitation on and around the Süttő plateau further research would be needed.

While there are no signs of occupation on the plateau during the younger phase of the Urnfield period, the intensive use of the area is documented in the EIA. The Nagysántető was resettled and reinforced and possibly the territory of the Nagysánc became also inhabited that time, but what is of particular concern is the different perception of the surrounding plateau area, as suggested by the funerary monuments erected on the Sáncföldek, on a land previously connected to mundane (such as residential and agricultural) activities.

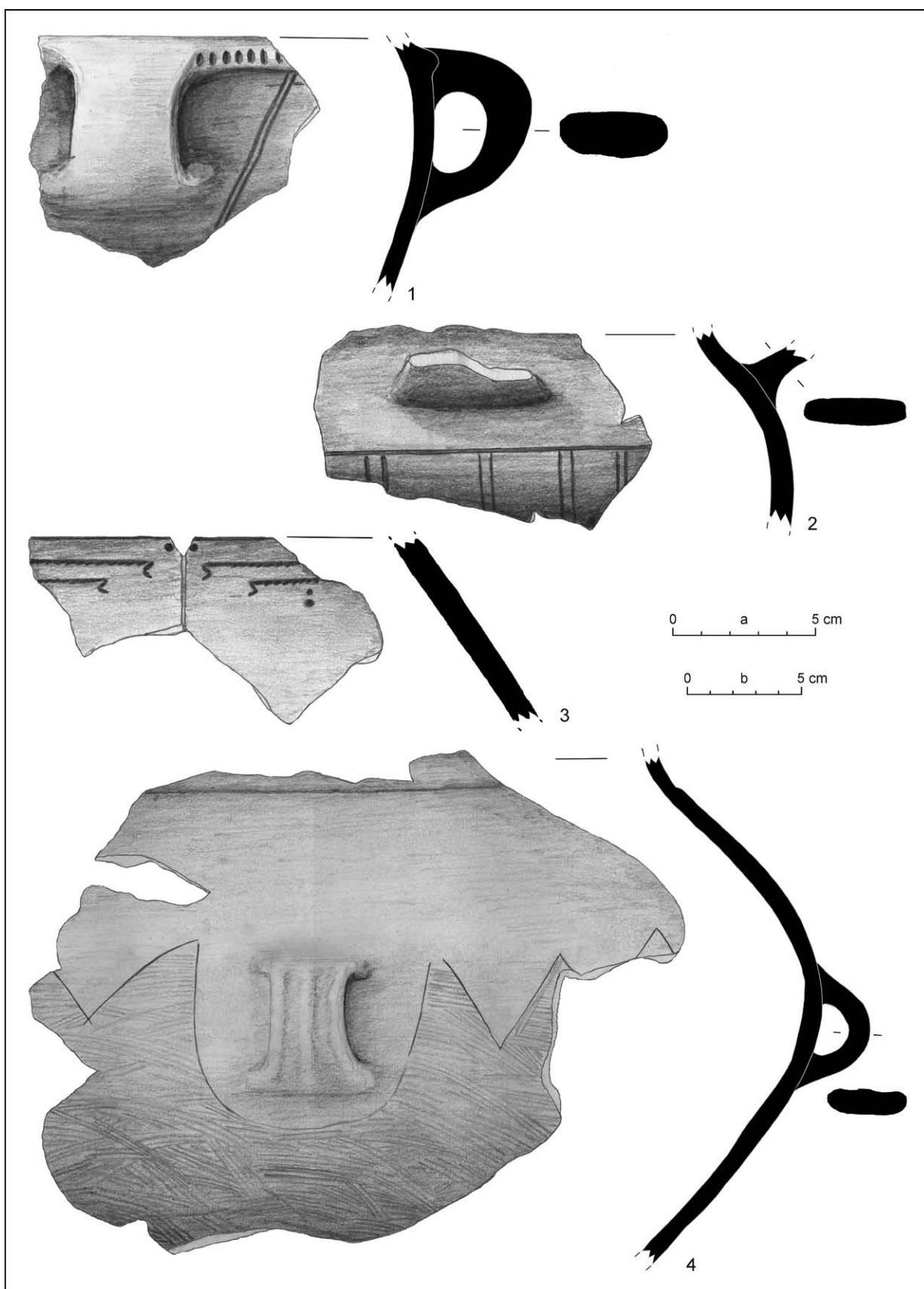
Acknowledgements

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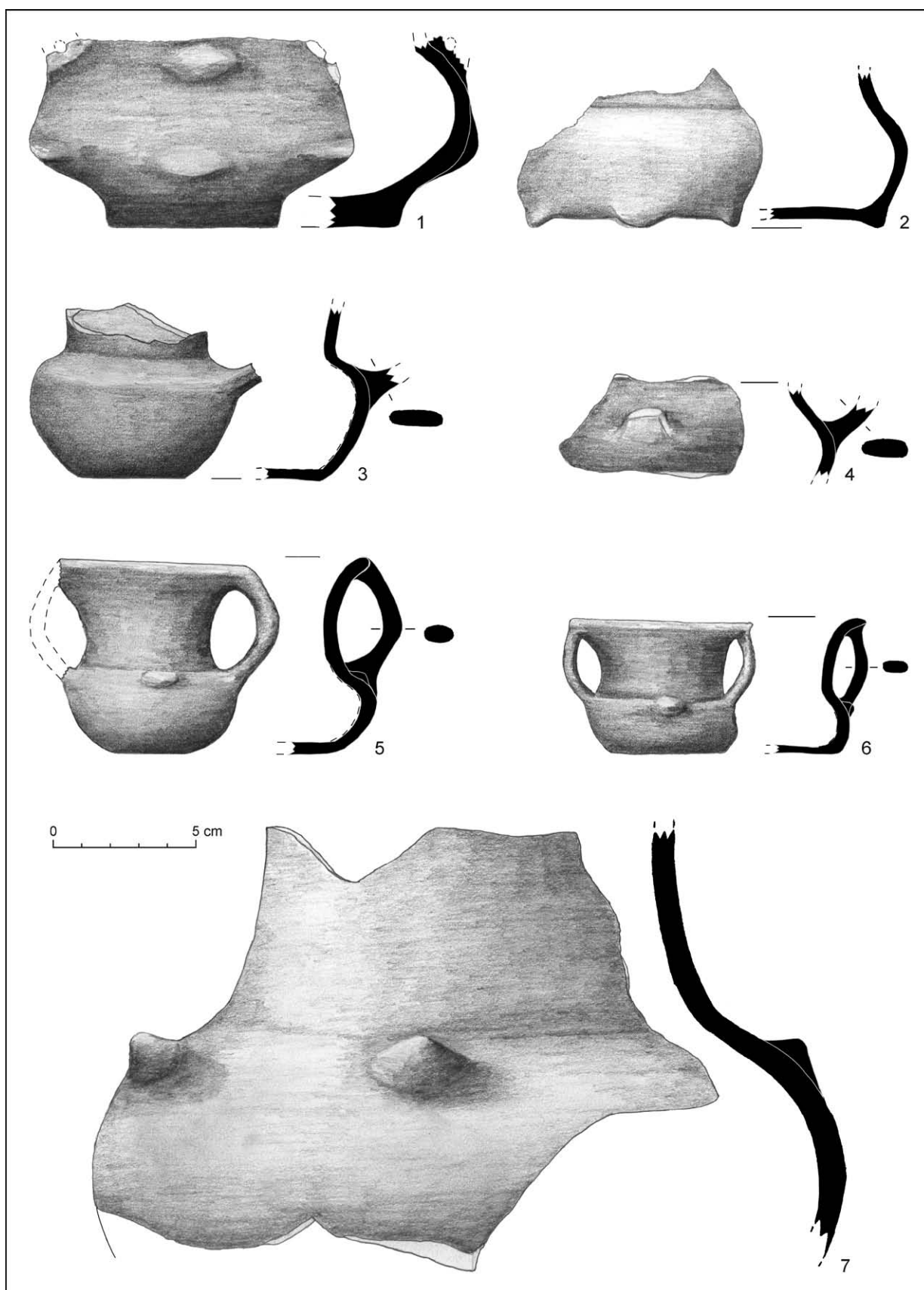
The archaeozoological analysis of the new excavation material was carried out by Péter Csippán (ELTE), the stone material was processed by Dóra Kürthy (ELTE, Kuny Domokos Museum). Mónika Merczi (BBM) assisted the research in Esztergom. In the Archive of the Hungarian National Museum I was helped by Szilvia Komiszár, in the Archives of the Institute of Archaeology at the HUN-REN Research Centre for the Humanities by Friderika Horváth, Magdolna Füredi and Vilmos Sternád, and in the Archive of the Kuny Domokos Museum by Anna Győri-Pórszász. András Markó (Hungarian National Museum) lent a hand in the Hungarian National Museum during the search for the Palaeolithic finds. Zsuzsanna Tóth (Hungarian National Museum) analysed the worked osseous material and assisted the research in the archives. Katalin Novinszki-Groma (ELTE) shared useful data and documentation material related to the excavations of the 1980s at Süttő. Csaba Bodnár (Museum of Fine Arts) gave advice during data processing and on the first version of the draft. I am deeply indebted to them for all of their assistance.



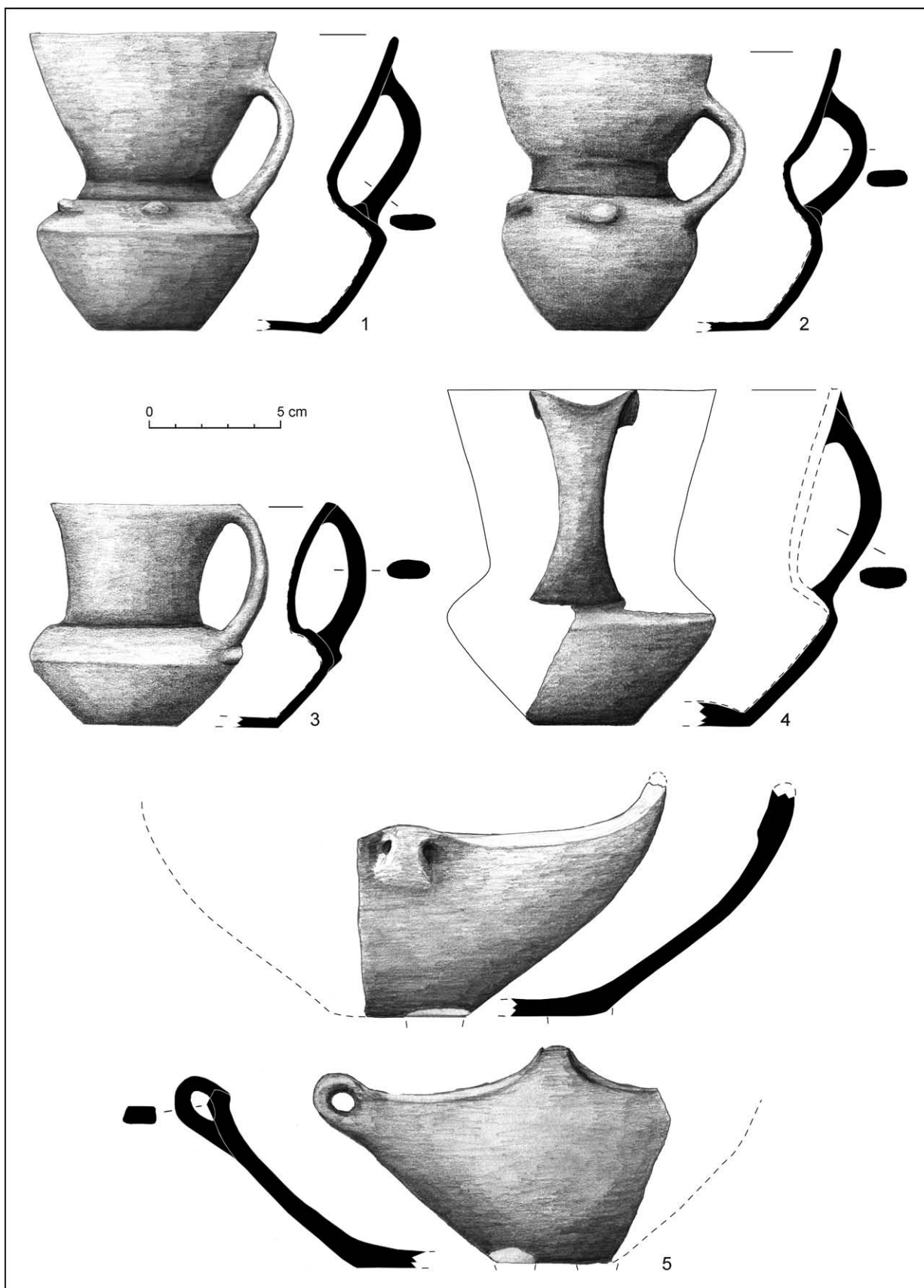
Pl. I. Middle Bronze Age material from Süttő. Selected ceramic finds from Süttő-Nagysáncstető. Drawing E. Fejér.



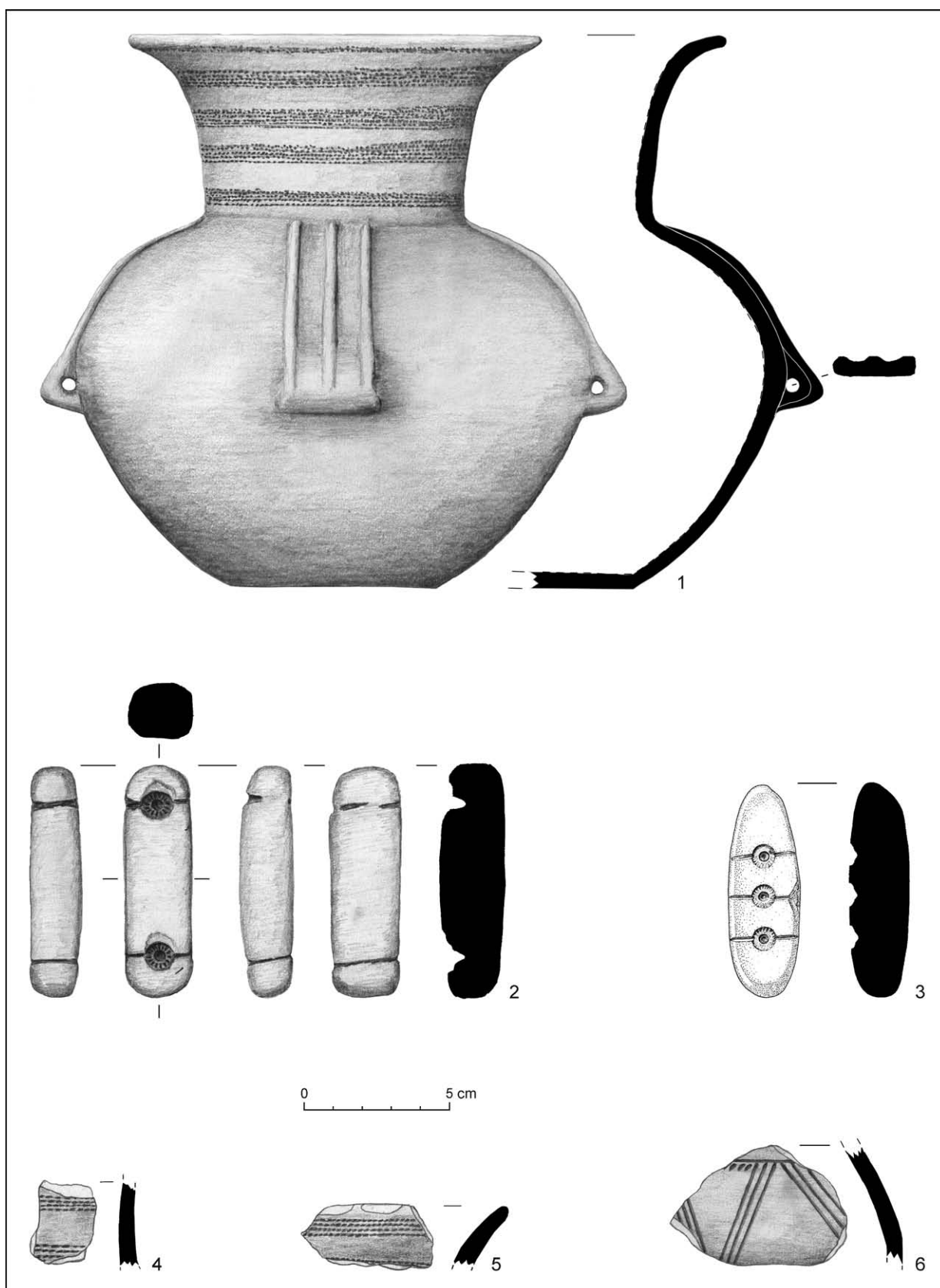
Pl. II. Middle Bronze Age material from Süttö. Selected ceramic finds from Süttö-Nagysáncstető. Drawing E. Fejér. Scale: a – 1–3; b – 4.



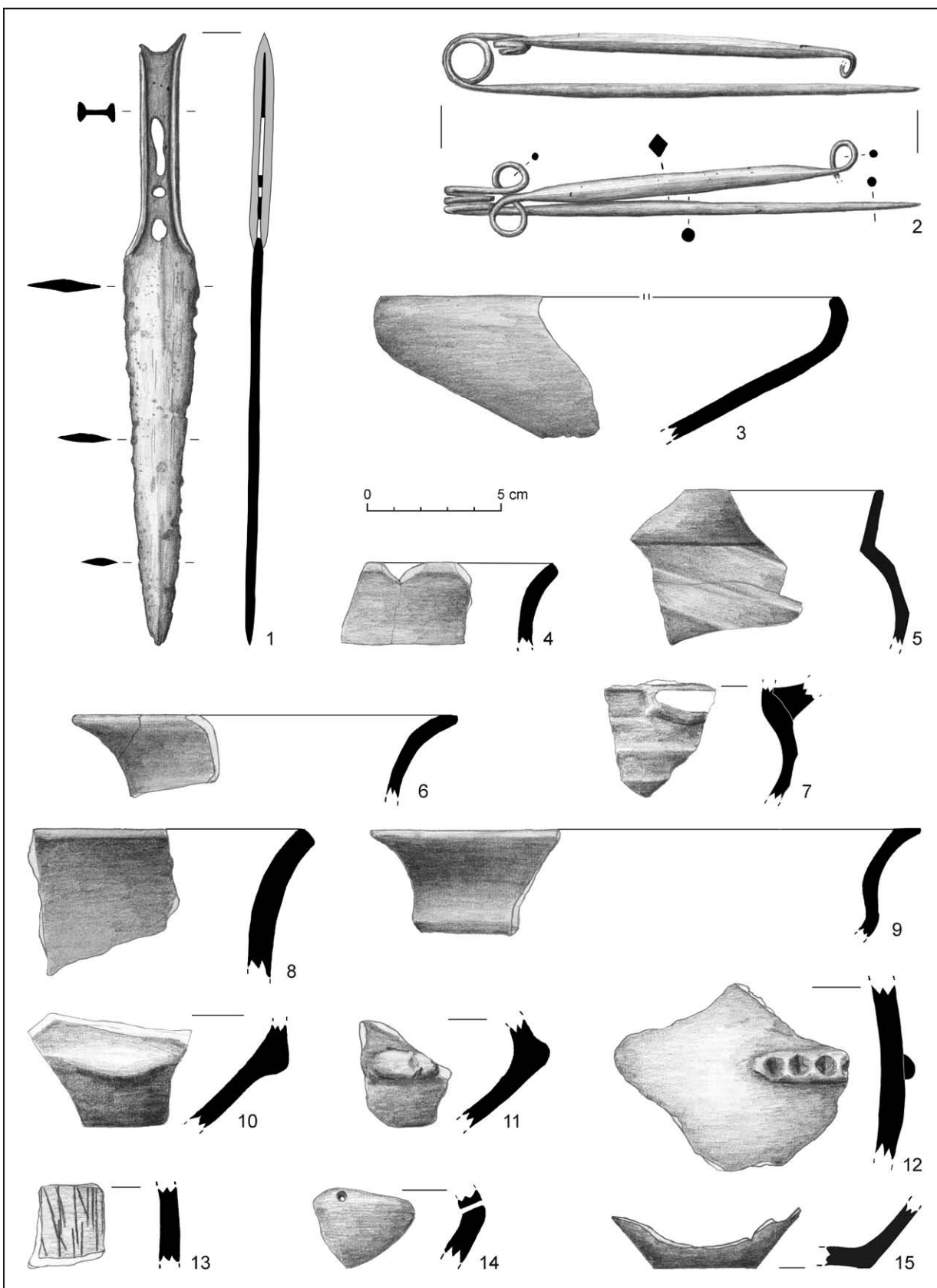
Pl. III. Middle Bronze Age material from Süttő. Selected ceramic finds from Süttő-Nagysáncstető. Drawing E. Fejér.



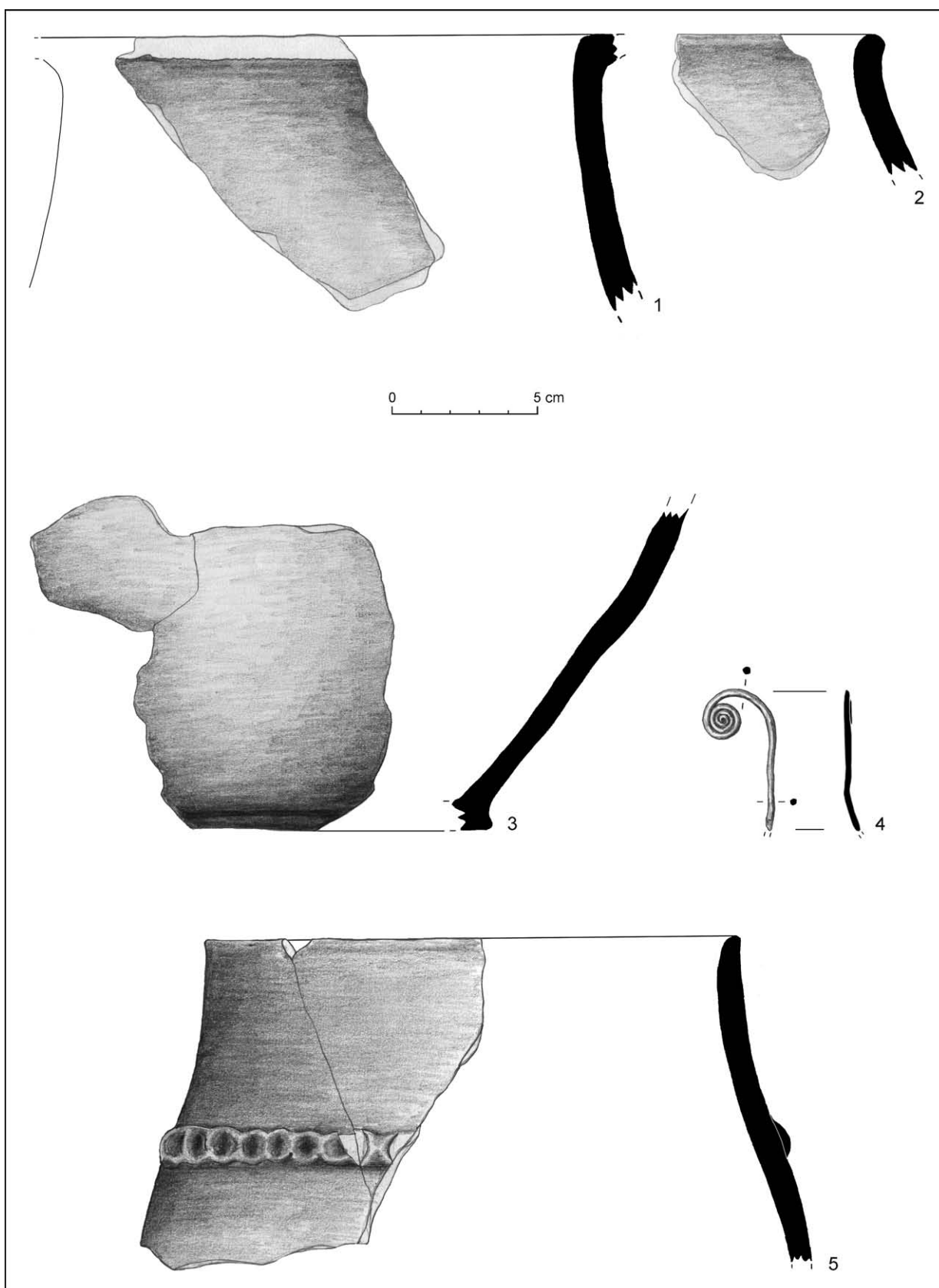
Pl. IV. Middle Bronze Age material from Süttő. Selected ceramic finds from Süttő-Nagysáncstető. Drawing E. Fejér.



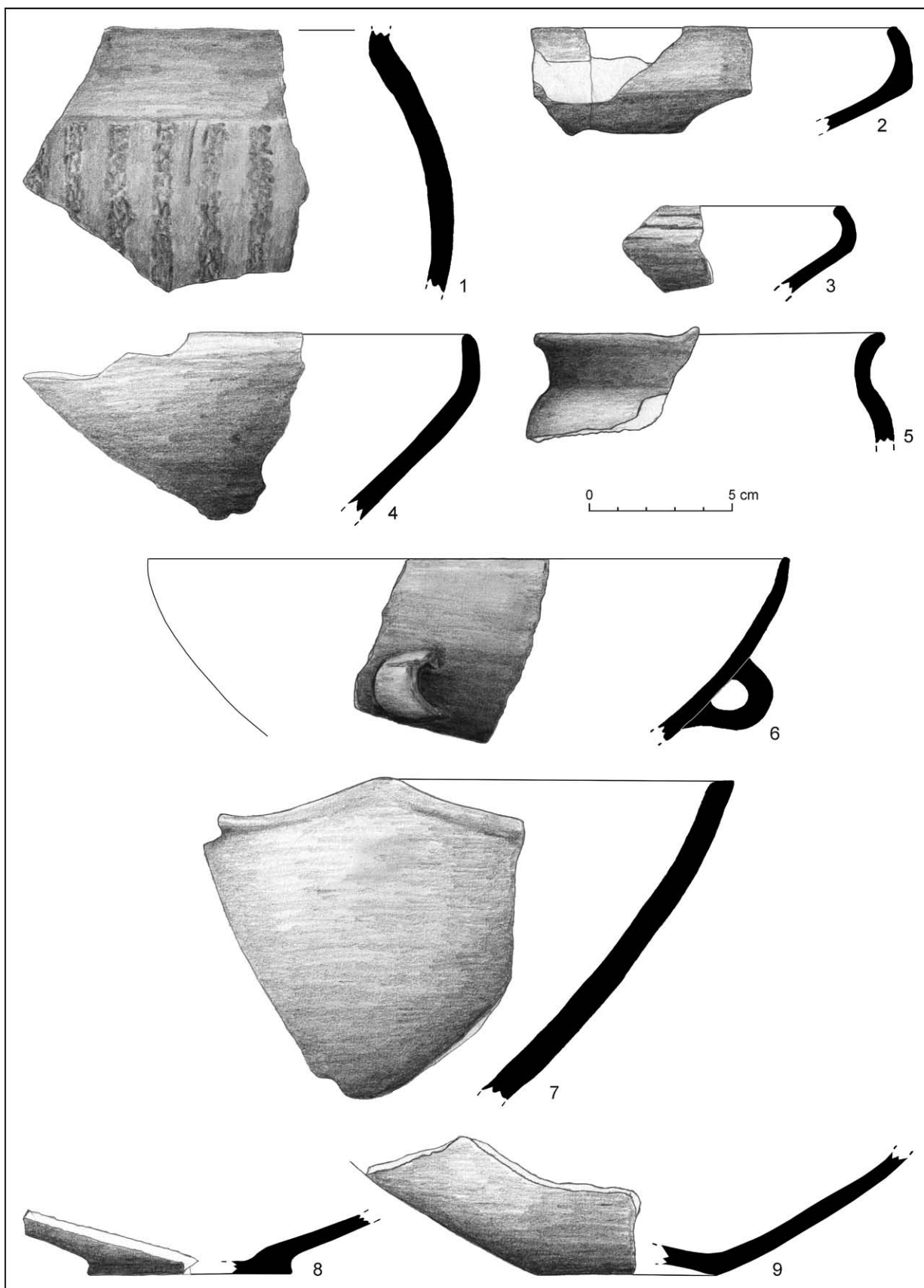
Pl. V. Middle Bronze Age material from Süttő. 1 – ceramic vessel from Süttő-Nagysáncstető; 2 – *Brotlaibidol* allegedly from Süttő-Nagysáncstető; 3 – *Brotlaibidol* from Süttő-Hosszúvölgy; 4–6 – selected stray finds from Süttő-Tatai úti dűlő/Sáncföldek. Drawing 1–2, 4–6 – E. Fejér; 3 – after Kovács 1988, fig. 2: 10.



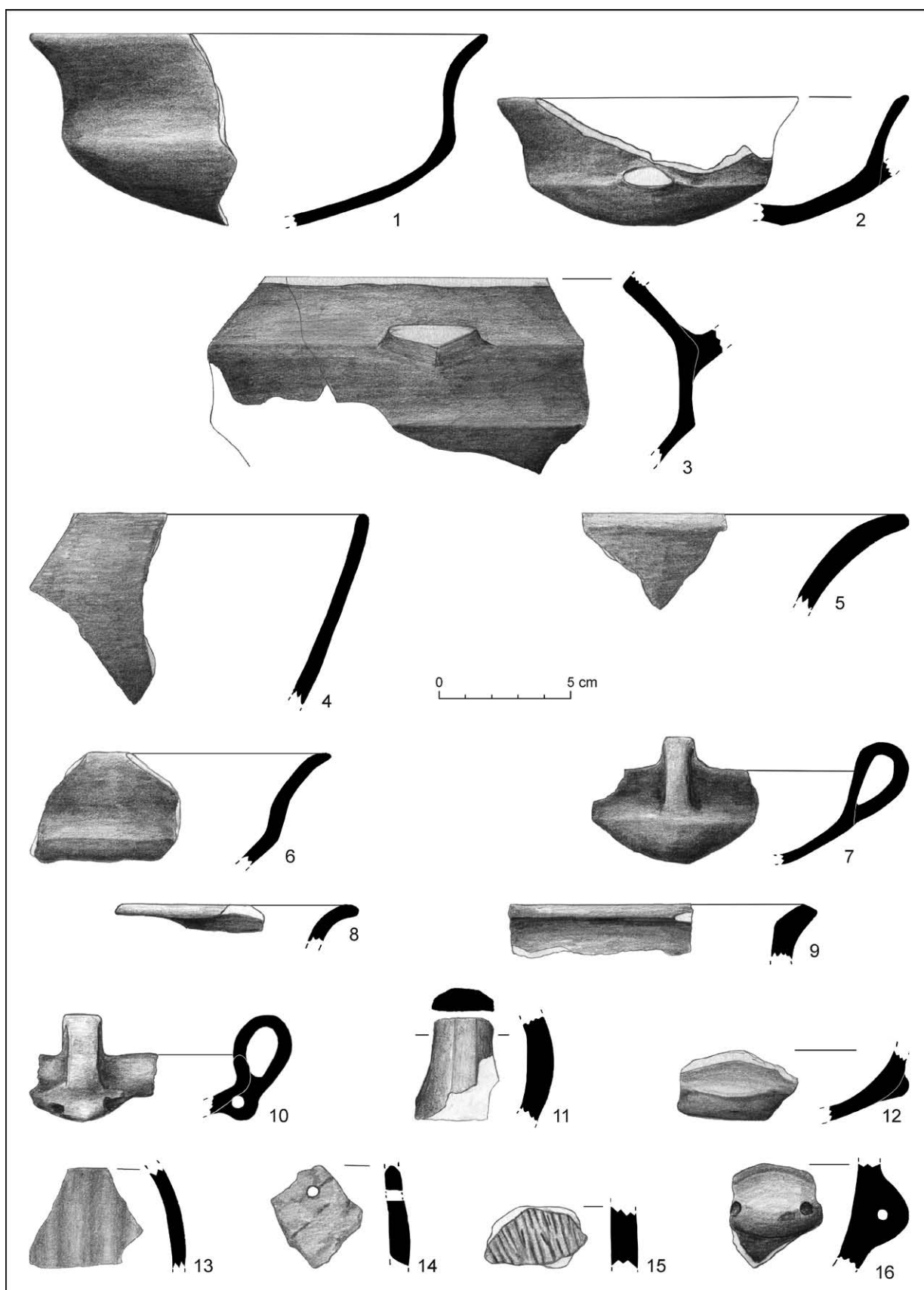
Pl. VI. Late Bronze Age material from Süttö. 1 – bronze dagger possibly originating from Süttö-Sáncföldek; 2 – bronze fibula possibly originating from Süttö-Sáncföldek; 3–15 – selected ceramic finds from Süttö-Sáncföldek, feature 16. Drawing E. Fejér.



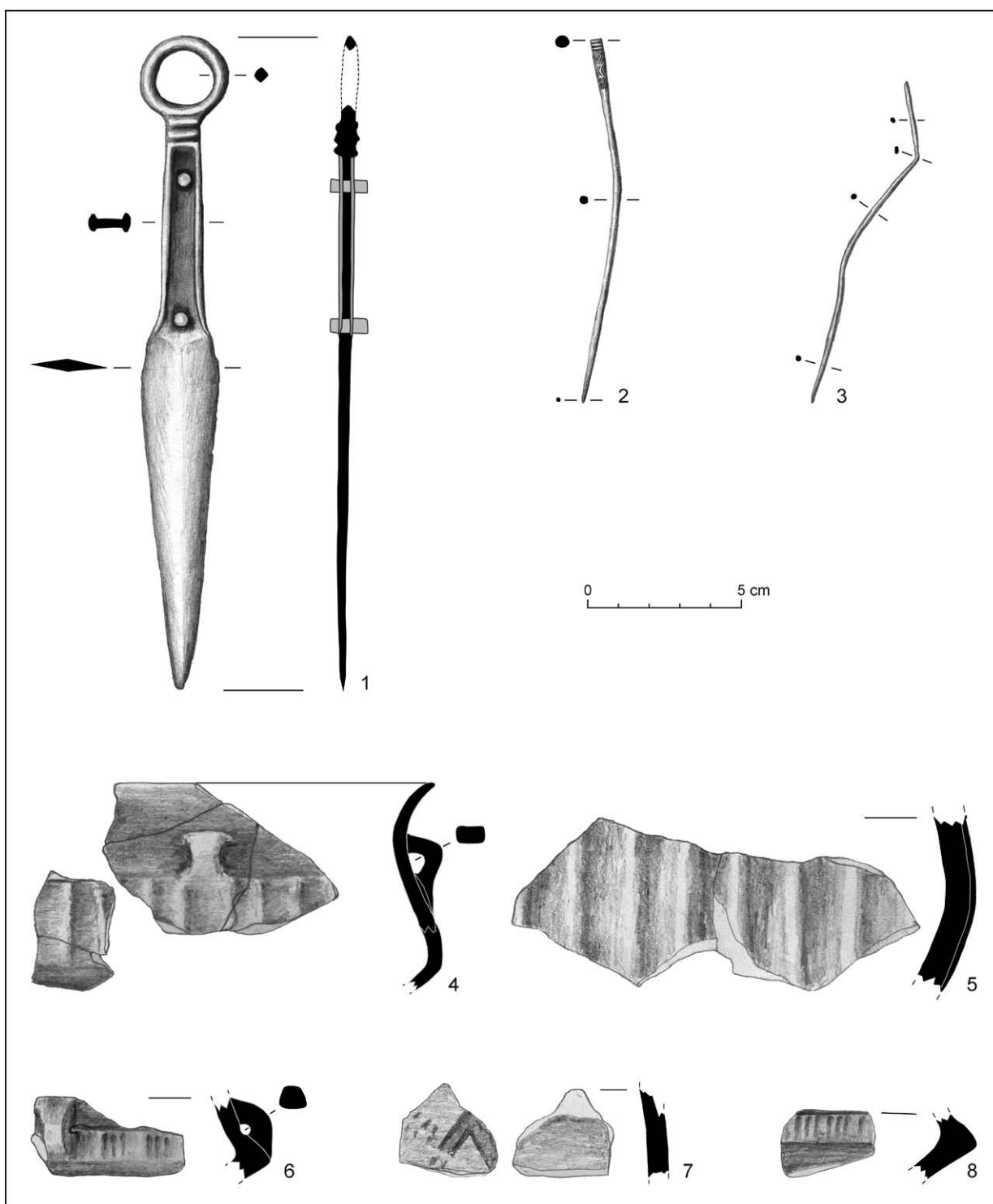
Pl. VII. Late Bronze Age material from Süttő-Sáncföldek. 1–3 – selected ceramic finds, feature 16; 4 – bronze wire, feature 16; 5 – ceramic find, feature 18. Drawing E. Fejér.



Pl. VIII. Late Bronze Age material from Süttő. Selected ceramic finds from Süttő-Sáncföldek, feature 18. Drawing E. Fejér.



Pl. IX. Late Bronze Age material from Süttő. Selected ceramic finds from Süttő-Sáncföldek, feature 18. Drawing E. Fejér.



Pl. X. Late Bronze Age and Early Iron Age material from Süttő. 1–3 – bronze finds (dagger, needle, wire) from Süttő-Sáncföldek, feature 18; 4–8 – Early Iron Age ceramic assemblage from Süttő-Tatai úti dűlő/Sáncföldek. Drawing E. Fejér.

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Vývoj osídlenia na plošine Süttő v dobe bronzovej (severozápadné Maďarsko)

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SÚHRN

Štúdia prezentuje staršie a novšie nálezy z pravekého sídliskového komplexu v Süttő (severné Zadunajsko), osídleného počas viacerých dejinných období a súčasne si dáva za cieľ rekonštruovať vývoj osídlenia počas doby bronzovej. Sídliskový komplex sa nachádza na pravom brehu rieky Dunaj, na vrchole sprašovej plošiny medzi dnešnými obcami Neszmély a Süttő. Plošina je z južnej strany vymedzená úpäťm pohoria Gerece, na východe potokom Bikol a na západe hornatým terénom v okolí Neszmély; na severe má plošina strmý, približne 40 m hlboký zráz s výhľadom na Dunaj a jeho aluviálnu nížinu na slovenskej strane. Skúmané vyvýšené územie je rozčlenené viacerými roklinami, tvoriacimi prirodzene chránené územie, na ktorom boli zakladané rôzne otvorené i opevnené výšinné sídliska. V severnej časti plošiny sú známe praveké lokality – Kissánc, Nagysánc a Nagysáncetető. Centrálna časť plošiny, nachádzajúca sa južne od spomenutých lokalít, je známa pod názvom Sáncföldek a jej využitie sa počas jednotlivých období praveku menilo. Stopy pravekého osídlenia boli identifikované rovnako aj na východ od Sáncföldeku – lokality Papi földek a Sánci dűlő I – ako aj južne, pri potoku Bikol – lokality Tatai úti dűlő I a II. Stopy pravekého osídlenia boli zistené aj v rokline Hosszúvölgy, rozdeľujúcej plošinu medzi Kissánc a Nagysáncetető (obr. 1).

Archeologický výskum v tejto oblasti sa začal už pred storočím. Prvé vykopávky, realizované koncom 20. rokov 20. stor., boli zamerané na pohrebiská zo staršej doby bronzovej, avšak o ich výsledkoch je známe len málo. V roku 1959 zrealizovali E. Pateková a A. Mozsolicsová záchranný výskum na lokalite Süttő-Hosszúvölgy, v doline (rokline) medzi výšinnými územiaми Kissánc a Nagysáncetető. Výskum bol primárne zameraný na východnú stranu doliny, kde bol objavený rozsiahly súbor materiálu zo strednej doby bronzovej, avšak skúšobné sondy boli vyhlbené aj na vrchole Kissánc a na úpäťí Nagysáncetető (obr. 2). Medzi rokmi 1968–1972 sa v rámci Maďarského archeologického topografického výskumného projektu uskutočnila rozsiahla topografická prospekcia v oblasti sídliskového komplexu západne od dnešnej obce Süttő. V roku 1978 É. Vadászová spoločne s G. Vékonom začali archeologický výskum. Ich pozornosť bola zameraná na mohylové hroby zo staršej doby železnej a súčasné pohrebisko s plochými hrobmi na lokalite Sáncföldek, ako aj na výšinné sídlisko Nagysáncetető, osídlené počas viacerých dejinných období. Terénne práce pokračovali do roku 1990, avšak dokumentácia z viac než 10-ročného výskumu nie je úplne zachovaná a niektoré nálezy dnes už nemôžu byť identifikované. Okrem náleзов zo staršej doby železnej bolo získané aj značné množstvo materiálu zo strednej doby bronzovej, nálezy zo staršej a mladšej doby bronzovej, ako aj z mladšej doby železnej.¹³ V roku 2001 vyhlbil G. Vékony dve skúšobné sondy na odber paleoenvi-

ronmentálnych vzoriek (obr. 3; 4). Od roku 2010 iniciovala terénny výskum v tejto oblasti Univerzita Loránda Eötvösa, zahŕňajúci primárne povrchový zber, geofyzikálne a letecké prieskumy. V rokoch 2018 a 2019 bol pod vedením Z. Czajlika realizovaný aj terénny výskum na lokalite Süttő-Sáncföldek.

Najstaršie doklady osídlenia plošiny pochádzajú zo stredného neolitu. Pozostatky osídlenia s nálezmi patriacimi k lineárnej keramike železovského typu boli zistené na výšine Nagysáncetető, avšak doteraz neboli publikované.

Po dlhšom období bez osídlenia, bola oblasť znovu obývaná v staršej dobe bronzovej. Na výšinnom území Nagysáncetető zaznamenali É. Vadászová a G. Vékony niekoľko objektov (stavieb?) kultúry Makó-Kosihy-Čaka, pričom autori uvádzajú, že sídlisko bolo v tomto období čiastočne opevnené. Na lokalite Sáncföldek odkryli výskumy z rokov 1990 a 2018 súdobé objekty (dve jamy), ktoré boli v nedávnom období publikované. Ďalší analogický materiál je známy z lokality Tatai úti dűlő II, čo dovoľuje predpokladať husté osídlenie plošiny počas staršej doby bronzovej.

Vo výšinnej časti lokality Kissánc bolo počas terénneho výskumu v roku 1959 a následných povrchových prieskumov identifikované opevnené sídlisko, datované do neskoršej fázy staršej doby bronzovej (obr. 5). Nálezy boli určené G. Bándim a I. Tormom ako typické pre tokodský typ hatvanskej kultúry. Osada bola prirodzene chránená z troch strán strmými svahmi plošiny, južná strana bola pravdepodobne chránená umelo vytvorenou priekopou s hĺbkou 2–3 m a šírkou 10–20 m. Zo širšieho okolia Süttő bolo publikovaných niekoľko ďalších súčasných lokalít (obr. 6).

Zo sídliskového komplexu pochádza rozsiahly súbor materiálu zo strednej doby bronzovej (severopanónska kultúra). Medzi najlepšie preskúmané lokality patria Hosszúvölgy a Nagysáncetető, avšak sporadické nálezy pochádzajú aj z iných lokalít. Výšinné sídlisko Nagysáncetető malo veľký význam počas strednej doby bronzovej – boli na ňom doložené tri po sebe nasledujúce fázy osídlenia, pričom v dvoch z nich sú doklady o existencii fortifikačného systému. Osídlenie pretrvávalo počas celého obdobia strednej doby bronzovej vrátane jej neskoršej fázy – Kosziderského horizontu, ktorý je na lokalite zastúpený uzavretými nálezovými celkami obsahujúcimi keramický materiál severopanónskej kultúry, maďarovskej kultúry,časnej mohylovej kultúry a keramiky typu Litzen. Predkladaná štúdia prezentuje len skromný výber z týchto nálezov patriacich do strednej doby bronzovej (tab. I–V: 1). Väčšina keramických nálezov je zachovaná vo fragmentárnom stave, ale niektoré nádoby z mladšej fázy osídlenia sa zachovali takmer neporušené (obr. 7). Typy nádob a výzdobné prvky majú viacero analógií so súčasnými nálezmi zo severného Zadunajska a juhozápadného Slovenska; materiál reflektuje prepojenie medzi

¹³ Termíny včasná, stredná a neskorá doba bronzová sú v celom článku používané na základe maďarskej terminológie.

severopanónskou a maďarovskou kultúrou. Na základe typologickej analýzy možno predpokladať, že lokalita bola osídlená v období BA2–BB1. Bochníkový idol, pravdepodobne pochádzajúci z lokality, rovnako spadá do materiálnej kultúry strednej doby bronzovej daného regiónu (tab. V: 2).

Na východnej strane rokliny Hosszúvölgy bolo identifikované sídlisko, súdobé s najmladšími vrstvami osídlenia lokality Nagysáncetető počas strednej doby bronzovej. Nájdený tu bol materiál s prvkami neskorej severopanónskej kultúry spoločne s maďarovskou kultúrou. Na lokalite Hosszúvölgy bolo zdokumentovaných niekoľko objektov. Nálezové správy uvádzajú viac ako tucet pecí (obr. 8) a najmenej tri domy s podlahami a hrubou vrstvou mazanice (detail na obr. 9). Len málo informácií je známych o spôsobe obživy vtedajšieho spoločenstva. Popri chove hospodárskych zvierat (s prevahou hovädzieho dobytku) zohrával dôležitú úlohu lov a rybolov.

Počas terénneho prieskumu boli na juhozápadnom okraji lokality Sáncföldek nájdené dva črepy s výzdobou typu „Litzén“ a črep z tela nádoby s rytou výzdobou. Nálezy môžu indikovať prítomnosť tretej súčasnej lokality z neskorej strednej doby bronzovej na plošine (tab. V: 4–6). Predchádzajúce výskumy predpokladali dve ďalšie lokality zo strednej doby bronzovej východne od Sáncföldeku. V širšom okolí sú známe viaceré sídliská a pohrebiská zo strednej doby bronzovej, s nálezmi patriacimi severopanónskej kultúre (obr. 10).

Na základe starších nálezových správ bol na lokalite Nagysáncetető odkrytý materiál patriaci do neskorej mohylovej kultúry až včasnej fázy kultúr popolnicových polí, avšak objekty z mladšej doby bronzovej boli poškodené počas staršej doby železnej. Materiál z mladšej doby bronzovej bol s najväčšou pravdepodobnosťou nájdený aj na Sáncföldeku počas predchádzajúcich výskumov, avšak dnes môžeme do tohto obdobia spoľahlivo zaradiť iba dva bronzové predmety (tab. VI: 1, 2). Nedávne výskumy na spomenutej lokalite odkryli dva objekty z mladšej doby bronzovej (obr. 11; 12), ktoré obsahovali veľké množstvo keramiky vo fragmentárnom stave, niekoľko bronzových predmetov, zlomky mazanice, kamene, zvieracie kosti a fragmenty opracovaných kostí. Nádobu a bronzové predmety patria k bežným typom mladšej doby bronzovej (tab. VI: 3–X: 3). Nájdený archeozoologický materiál nie je štatisticky reprezentatívny, zaznamenané boli kosti hovädzieho dobytku, ovce/kozy, prasťa a koňa.

Povrchový prieskum plošiny Süttő priniesol ďalšie dôkazy o osídlení v mladšej dobe bronzovej. Východne od Sáncföldeku, na lokalite Papi földek, rovnako ako aj na západnom okraji územia, kde boli nájdené prevažne atypické črepy z mladšej doby bronzovej alebo staršej doby železnej. Spomenutá koncentrácia nálezov keramických fragmentov a kameňov bola v minulosti interpretovaná ako hrob z mladšej doby bronzovej, avšak po detailnejšej analýze sa zdá, že ide o nálezy pochádzajúce zo zničeného objektu zo staršej doby železnej (tab. X: 4–8).

V širšom okolí plošiny bolo zaznamenaných viacero nálezov, ktoré môžu indikovať osídlenie z mladšej doby bronzovej, avšak ich presnejšie chronologické zaradenie nie je možné stanoviť (obr. 13).

Z hľadiska absolútnej chronológie analyzovaného archeologického materiálu je k dispozícii šesť nedávno získaných ¹⁴C dát, ktoré však nepokrývajú celé časové rozmedzie pravekého osídlenia plošiny (obr. 14). Interpretácia absolútneho datovania sladkovodnej mušle z predpokladaného neolitického objektu je predmetom diskusie, avšak všetky ostatné dáta korešpondujú s relatívnym chronologickým zaradením jednotlivých objektov, ktoré vyplýva z dostupného archeologického materiálu.

Aj napriek nízkej nadmorskej výške náhornej plošiny z nej relatívne prevýšenie nad Dunajom robí významnú lokalitu poskytujúcu kontrolu nad diaľkovou komunikačnou trasou a poskytuje prirodzenú ochranu. Sprašovaná plošina nad Dunajom, medzi dnešnými obcami Neszmély a Süttő, je dokladom dynamických zmien v sídelných stratégiách počas viacerých období praveku, ktoré mohli byť zapríčinené rôznymi faktormi – nárast populácie, zmena ekonomických a sociálnych štruktúr a interakcií v spoločnosti, zmena v spôsobe obživy alebo environmentálne a klimatické zmeny.

Napriek obmedzeným poznatkom o sídliskovej štruktúre nositeľov kultúry Makó-Kosihy-Čaka sú náznaky, že obývali malé osady s rozptýlenou zástavbou v blízkosti riek. Výšinné opevnené a neopevnené sídliská sú takmer neznáme, a žiaľ, dostupné dáta zo sídliska Nagysáncetető sú rovnako veľmi obmedzené.

Sídlisková stratégia počas mladšej fázy staršej doby bronzovej (hatvanská kultúra) sa v porovnaní s predchádzajúcim obdobím zmenila. To naznačuje, že komunitu ktorá sídlila na vrchu Kissánc ovplyvňovali úplne iné ekonomické a sociálne faktory.

Počas strednej doby bronzovej bolo územie Nagysáncetető intenzívne osídlené a opevnené z juhu. V ďalšej fáze už nebolo sídlisko opevnené, čo naznačujú stavby zachytené na predošlých opevneniach. Počas tejto poslednej fázy osídlenia v strednej dobe bronzovej sa na náhornej plošine, v blízkosti opevnenej osady Nagysáncetető, objavili ďalšie dve alebo tri súčasné sídliská. Rozsiahle siete súdobých lokalít predpokladané v okolí Süttő majú blízke analógie v opevnených sídliskách zo strednej doby bronzovej v centrálnej časti Karpatskej kotliny, ktoré sa taktiež mohli nachádzať na podobne výrazných miestach pozdĺž brehov Dunaja.

Po hľade v osídlení bolo územie Nagysáncetető a Sáncföldek znovu obývané počas mladšej doby bronzovej, avšak bez fortifikácie. Z okolia pochádzajú nejednoznačné informácie o súdobých sídliskách. Hoci na plošine chýbajú doklady osídlenia z mladšej fázy mladšej doby bronzovej, intenzívne využívanie tohto územia je opäť doložené v staršej dobe železnej.

Obr. 1. Plošina Süttő. Známe praveké lokality v oblasti plošiny. V pozadí sú zvýraznené sondy z predchádzajúcich výskumov. Mapa E. Fejér, zdroj mapového podkladu Jednotný štátny kartografický systém Maďarska, M = 1 : 10 000.

Obr. 2. Süttő-Hosszúvölgy. Sondy E. Patekovej a A. Mozsolicsovej z roku 1959 (podľa Patek/Mozsolics 1959).

Obr. 3. Süttő-Nagysáncetető. Sondy z výskumov G. Vékonyho do roku 1984, doplnené o rekonštruovanú polohu environmentálnej sondy 1, vyhlbenej v roku 2001. Zdroj pozostalosti G. Vékonyho, so súhlasom K. Novinszki-Gromovej, geodetické zameranie pravdepodobne G. Rózsa, úprava E. Fejér.

Obr. 4. Süttő-Sáncföldek. Preskúmané časti lokality. Rekonštrukcia sond z 80-tych rokov je založená na kresbách z archívov (podľa Novinszki-Groma 2017 a L. Rupnika v Czajlik et al. 2019). Zdroj mapového podkladu Jednotný štátny kartografický systém Maďarska, M = 1 : 10 000, digitálny model reliéfu L. Rupnik, úprava E. Fejér.

Obr. 5. Süttő-Kissánc. Západný profil sondy 12 skúmanej A. Mozsolicsovou v roku 1959. Mapa vrcholovej časti pahorku z pozostalosti G. Vékonyho, so súhlasom K. Novinszki-Gromovej, geodetické zameranie pravdepodobne G. Rózsa, profil sondy 12 podľa Patek/Mozsolics 1959. Legenda: 1 – ornica; 2 – sivá, zmiešaná hlina;

3 – tmavosivá, zmiešaná hlina; 4 – čierna vrstva s uhlíkmi; 5 – tmavohnedá hlina; 6 – červená (prepálená) vrstva; 7 – svetlohnedá hlina; 8 – kamene.

Obr. 6. Lokalita staršej doby bronzovej s nálezmi hatvanskej kultúry v okolí Süttő (približne v okruhu 20 km). 1 – Bajna-Halászi dűlő; 2 – Bajna-Hősök tere; 3 – Bajna-Őrhegy alja; 4 – Bajna-Vízállás alatti dűlő; 5 – Dunaalmás-Foktorok; 6 – Dunaalmás-Hegysor utca 4; 7 – Dunaalmás-Lenhardt-öregszőlő; 8 – Dunaalmás-Parókia; 9 – Dunaalmás-Uradalmi szőlő; 10 – Kamenín-Várhegy; 11 – Malá nad Hronom-Rövid föld; 12 – Neszmély-Kalinvár; 13 – Neszmély-Téglagyár; 14 – Neszmély-Várhegy; 15 – Nyergesújfalu-Sáncdűlő; 16 – Nyergesújfalu-Sánchehy; 17 – Nyergesújfalu-Szélesföldek; 18 – Nyergesújfalu-Viscosa gyár; 19 – Patince; 20 – Sárísáp-Quadriburg; 21 – Sárísáp-Újtelep; 22 – Štúrovo-Istenhegy; 23 – Štúrovo-JCP; 24 – Süttő-Kissánc; 25 – Szomód-Gyulahegy; 26 – Szőny-Sörház; 27 – Tatabánya-Felső-rét-föld; 28 – Tokod-Árpádakna; 29 – Tokod-Csomorja (Hegyeskő); 30 – Tokod-Leshegy; 31 – Tokod-Sáncok; 32 – Tokod-XV. akna; 33 – Vértesszőlős-Likótelek; 34 – Vértesszőlős-Vasútállomás (podľa Bándi 1965; Batora 2018; Horváth/H. Kelemen/Torma szerk. 1979; Kisné Cseh 1999; L. Kis Szabó 2017; Marková 2010; Nešporová 1969; Torma 1972). Mapa E. Fejér. Legenda: a – pohrebisko; b – výšinné sídlisko; c – sídlisko (skúmané); d – ojedinelý nález.

Obr. 7. Süttő-Nagysáncetető. Sonda 4 z roku 1984. "Popolová vrstva" s viacerými neporušenými nádobami (vrátane nádoby zdobenej odtlačkami šnúry). Foto z pozostalosti G. Vékonihó, so súhlasom K. Novinszki-Gromovej.

Obr. 8. Süttő-Hosszúvölgy. Pece 1–3. Pôvodné kresby E. Patekovej z roku 1959 (podľa Patek/Mozsolics 1959). 2 – bez mierky.

Obr. 9. Süttő-Hosszúvölgy. Detail sond 1 a 3. Zhluk spáleného obilia (28/A) a keramického materiálu (28/B). Kresba z výskumnej dokumentácie, pravdepodobne zhotovená E. Egyedom (podľa Patek/Mozsolics 1959).

Obr. 10. Lokalita strednej doby bronzovej s nálezmi mladšej alebo neskorej fázy severopanónskej kultúry v okolí Süttő (približne v okruhu 20 km). 1 – Dunaalmás-Foktorok; 2 – Dunaalmás-Uradalmi regálási temető; 3 – Hurbanovo; 4 – Chotín; 5 – Iža-Órék; 6 – Iža-Vel'ky Harčas; 7 – Iža-Vel'ky Harčas; 8 – Kamenín; 9 – Lábatlan-Piszke (Rákóczi utca);

10 – Malá nad Hronom; 11 – Marcelová; 12 – Mužla-Čenkov; 13 – Neszmély-Sertésvölgy; 14 – Nyergesújfalu-Eternittepi Általános Iskola; 15 – Nyergesújfalu-Papírgyár; 16 – Nyergesújfalu-Téglagyár; 17 – Nyergesújfalu-Viscosa gyár; 18 – Patince-Marcelová; 19 – Radvaň nad Dunajom-Žitavská Tõr; 20 – Sárísáp-XII. tábla; 21 – Süttő-Hosszúvölgy; 22 – Süttő-Nagysáncetető; 23 – Süttő-Sáncföldek/Tatai út; 24 – Süttő-Sánci dűlő I; 25 – Szomód-Hosszú-dűlő; 26 – Szőny (neznáme); 27 – Vértesszőlős-Likótelek (podľa Batora 2018; Dušek 1960b; Dušek 1969; Horváth/H. Kelemen/Torma szerk. 1979; Kisné Cseh 1999; Kiss 2012; Kuzma 2011a; 2011b). Mapa E. Fejér. Legenda: a – pohrebisko; b – výšinné sídlisko; c – sídlisko (skúmané); d – ojedinelý nález.

Obr. 11. Süttő-Sáncföldek. Objekt 16 (2018). Kresba E. Fejér, A. Bödöcs. Legenda: a – intaktná pôda; b – suť.

Obr. 12. Süttő-Sáncföldek. Objekt 18 (2018). Kresba E. Fejér, A. Bödöcs. Legenda: a – intaktná pôda; b – žltohnedá zmiešaná hlina.

Obr. 13. Lokalita z mladšej doby bronzovej s nálezmi staršej fázy kultúry popolnicových polí v okolí Süttő (približne v okruhu 20 km). 1 – Almásfüzitő-Foktorok; 2 – Bajna-Vízállás alatti dűlő; 3 – Bajót-Hagymásrét; 4 – Bajót-Péliföldszentkereszt; 5 – Bruty; 6 – Hurbanovo-Bacherov majer; 7 – Hurbanovo-Dolný Bacher; 8 – Hurbanovo-Nagy nyilas; 9 – Iža-Danube bank; 10 – Iža-Öregállás; 11 – Kamenín-Várhegy; 12 – Marcelová; 13 – Marcelová; 14 – Mogyorósbánya-Fehérkereszt; 15 – Mogyorósbánya-Óhegy; 16 – Mužla-Svätajurský vnútorný hon; 17 – Nagysáp-Úrisáp; 18 – Nyergesújfalu-Dunapart; 19 – Nyergesújfalu-Gunyhóalji dűlő; 20 – Nyergesújfalu-Papírgyári földek; 21 – Nyergesújfalu-Viscosa gyár; 22 – Šarkan-Pod jazerom; 23 – Süttő-Bikolpuszta II; 24 – Süttő-Bikolpuszta III; 25 – Süttő-Gerecse; 26 – Süttő-Nagysáncetető; 27 – Süttő-Rákóczi utca 36; 28 – Süttő-Sáncföldek; 29 – Svätý Peter (Dolný Peter); 30 – Szőny-Őszőny; 31 – Vojnice (podľa Horváth/H. Kelemen/Torma szerk. 1979; Kőszegi 1988; Kuzma 2011c; Patek 1968; Paulík 1963; Veliačik/Romsauer 1994). Mapa E. Fejér. Legenda: a – pohrebisko; b – výšinné sídlisko; c – sídlisko (preskúmané); d – ojedinelý nález.

Obr. 14. Süttő. Výsledky rádiouhlíkoveho datovania. Süttő-Sáncföldek – objekt 4 (2018), objekt 16 (2018), objekt 18 (2018); Süttő-Nagysáncetető – sonda VI, objekt 1 (1981).

Tab. I. Nálezy zo strednej doby bronzovej zo Süttő. Výber keramického materiálu zo Süttő-Nagysáncetető. Kresba E. Fejér.

Tab. II. Nálezy zo strednej doby bronzovej zo Süttő. Výber keramického materiálu zo Süttő-Nagysáncetető. Kresba E. Fejér. Mierka: a – 1–3; b – 4.

Tab. III. Nálezy zo strednej doby bronzovej zo Süttő. Výber keramického materiálu zo Süttő-Nagysáncetető. Kresba E. Fejér.

Tab. IV. Nálezy zo strednej doby bronzovej zo Süttő. Výber keramického materiálu zo Süttő-Nagysáncetető. Kresba E. Fejér.

Tab. V. Nálezy zo strednej doby bronzovej zo Süttő. 1 – keramická nádoba zo Süttő-Nagysáncetető; 2 – bochníkový idol údajne zo Süttő-Nagysáncetető; 3 – bochníkový idol zo Süttő-Hosszúvölgy; 4–6 – vybrané náhodné nálezy z lokalít Süttő-Tatai úti dűlő/Sáncföldek. Kresby 1–2, 4–6 – E. Fejér; 3 – podľa Kovács 1988, obr. 2: 10.

Tab. VI. Nálezy z mladšej doby bronzovej zo Süttő. 1 – bronzová dýka pravdepodobne zo Süttő-Sáncföldek;

2 – bronzová spona pravdepodobne zo Süttő-Sáncföldek; 3–15 – vybrané keramické nádoby zo Süttő-Sáncföldek, objekt 16. Kresba E. Fejér.

Tab. VII. Nálezy z mladšej doby bronzovej zo Süttő-Sáncföldek. 1–3 – vybrané keramické nálezy, objekt 16; 4 – bronzový drôt, objekt 16; 5 – keramika, objekt 18. Kresba E. Fejér.

Tab. VIII. Nálezy z mladšej doby bronzovej zo Süttő. Vybrané keramické nálezy zo Süttő-Sáncföldek, objekt 18. Kresba E. Fejér.

Tab. IX. Nálezy z mladšej doby bronzovej zo Süttő. Vybrané keramické nálezy zo Süttő-Sáncföldek, objekt 18. Kresba E. Fejér.

Tab. X. Nálezy z mladšej doby bronzovej a zo staršej doby železnej zo Süttő. 1–3 – bronzové nálezy (dýka, ihla, drôt) zo Süttő-Sáncföldek, objekt 18; 4–8 – nálezy keramiky zo staršej doby železnej z lokalít Süttő-Tatai úti dűlő/Sáncföldek. Kresba E. Fejér.

DATA ON THE RESEARCH HISTORY OF THE DEPOSIT FOUND AT KŐSZEG AND PLANT CULTIVATION IN WESTERN TRANSDANUBIA (HUNGARY) IN THE URNFIELD PERIOD

G Á B O R I L O N

In memoriam Margarita Primas (1935–2025)

The first part of the study presents the history of a hoard discovered in Kőszeg in 1841. Originally, the assemblage was comprised of 42 or 44 sickles, making it the second biggest pure sickle depot from an Urnfield context in Central Europe. Of these, only six pieces are available in public collections today, based on which the find could be dated to the HA1–A2 period. The second part of the paper provides a summary of the macro-archaeobotanical results of the two most important sites in the region in focus, the ritual-metallurgical settlement at Gőr and a cemetery at Győr-Ménfőcsanak, completed by a presentation of the respective record of lesser sites, a survey of our knowledge of the agriculture of the period (palynological data excluded), the findings of archaeological experiments on storage and cultivation, the current state of research, and future tasks.

Keywords: Western Hungary, Transdanubia, Urnfield Period, hoard, sickles, cultivation, macro-archaeobotany.

INTRODUCTION

The town of Kőszeg lies in the eastern foreground of the Alps, on a terrace of the Gyöngyös Stream, a watercourse springing in Austria. West of the town, in the oak forest of the Felső-erdő (Upper Forest) formerly Esterházy- or Hercegi-erdő (Princely Forest) on a ridge of the Kőszeg Mountains at 605.8 m a.B.s.l. is a large rock called Ördögasztala (Taufelstisch/Devil's Table), Ördögtányér (Taufelsüssel/Devil's Plate), or Asztalkő (Table Rock; Fig. 1: 1; 2: 1). Its upper side features a plate-like depression (Fig. 2: 2, 3).

On the 13th of May 1841, two-day labourers found 42 tanged bronze sickles (*Sicheln mit Griffzunge*) 'next to each other in a hole in a rock' during stone quarrying. The time and place ('Felső-erdő') of discovery were recorded the next day in the minutes of the meeting of the town council (Fig. 2: 1). The quoted text was published in a book on the history of the town by K. Chernel in 1877 (Chernel 1877, 11), where he mentions 44 sickles.¹ The findspot is registered in the National Register of Archaeological Sites in Hungary as Site no. 68621 (Fig. 2: 1). An old stone quarry lies only 1.5 km away on the recent asphalt road from Asztalkő. If it was in use back in the 19th c., could it be the actual place where the sickles have been found? Were they in a one-time crack (*Sporn*

2015, 343) or a hole? Is it possible that the finders only mentioned the Asztalkő, a town property at the time, because it was the nearest landmark?² These questions cannot be answered anymore.

Did they decide to keep two sickles, hence the difference in numbers? One of the sickles was given to the secret archive of the town, and another, out of patriotic enthusiasm, was offered to the Hungarian National Museum. The latter cannot be identified anymore, but earlier, F. Rómer published a drawing

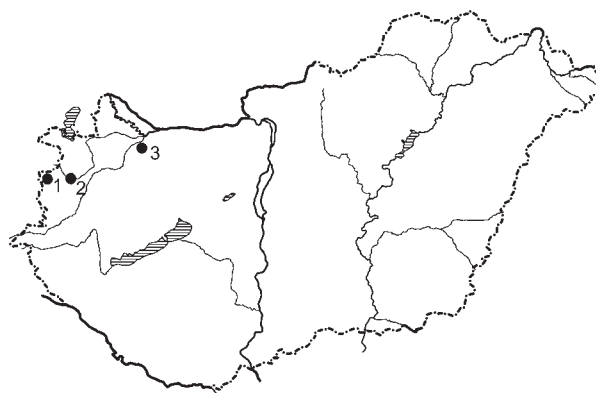


Fig. 1. Western Transdanubia. The most important sites mentioned in the text. 1 – Kőszeg; 2 – Gőr; 3 – Győr-Ménfőcsanak. Map Gy. Isztin.

¹ Research did not reach a consensus on the original number of sickles in the deposit even a couple of years ago; see Fejér 2020, 124, 212. The minutes of the meeting of the town council were published almost a decade ago (Ilon 2018a, fig. 2: 2).

² At my request, G. V. Szabó and his team carried out a metal detector survey in the area but did not discover more items from the era in question.

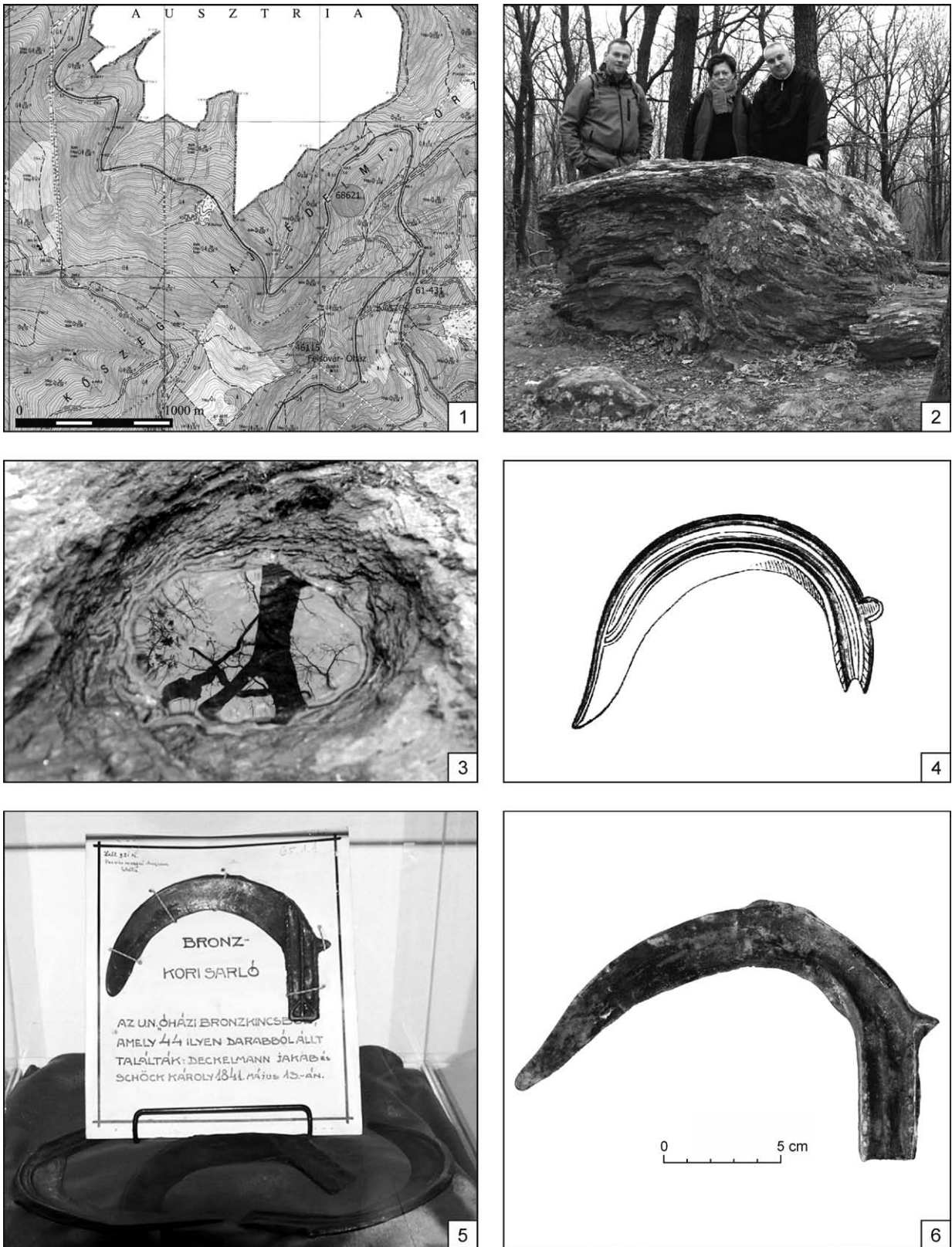


Fig. 2. 1 – topographic position of Kőszeg-Asztalkő (site ID 68621); 2, 3 – the Asztalkő and a depression at its top; 4 – a sickle from the collection of the National Museum (after Rómer 1866, fig. 50); 5 – a sickle from the depot with a handwritten inscription by K. Miske; 6 – a sickle from the depot in the collection of the Pannonhalma Abbey Museum. 2, 3 – photo Gy. Isztin, 5 – photo the author.

Tab. 1. Kőszeg. The weight of the remaining sickles from the deposit (after Ilon 2024, 484).

Place of deposition	Inventory no.	Weight [g]	References	
Town Museum in Kőszeg	65.1.1.	188.5	<i>Nováki 1966</i> , 69, fig. 1	Fig. 2: 5
	64.8.1.	164.5	<i>Nováki 1966</i> , 69, fig. 2	–
	64.7.1.	171	<i>Nováki 1966</i> , 69, fig. 3	–
	64.6.1.	162	<i>Nováki 1966</i> , 69, fig. 4	–
Savaria Museum, Szombathely	54.532.1.	153	<i>Nováki 1966</i> , 69, fig. 5	–
Pannonhalma Abbey Museum	PFM.R.BZK.0002	146	–	Fig. 2: 6

of it (Fig. 2: 4). The sickle from the secret archive (Fig. 2: 5) got later into the collection of the Town Museum in Kőszeg (*Ilon 2018a*, 150–152; *Mozsolics 1985*, 139; *Rómer 1866*, 35, 122, 131, fig. 50). Several pieces were given to the members of the town council and other officials, and Reverend A. Wirth donated one to the collection of the Benedictine Abbey of Pannonhalma (Fig. 2: 6).³ The pieces in the collection of the Savaria Museum in Szombathely and the private collection of K. Darnay in Sümeg could get there only later, after the foundation of these; the sickle in the Darnay collection has perished since. The two specimens from the private collection of I. Paur later became part of a public collection, the Liszt Ferenc Museum. The wife of J. Artner donated another sickle to the Sopron Museum in 1934; the museum passed it on to the Town Museum in Kőszeg in 1964 (*Nováki 1965–1966*, 67). Thus, today the whereabouts of six sickles are known: four are held in Kőszeg, one in the collection of the Savaria Museum in Szombathely (*Károlyi 2004*, fig. 4), and one in the Benedictine Abbey in Pannonhalma (Tab. 1). Each feature three parallel ribs along the tang, completed on three with oblique ribs at the end of the tang (Fig. 2: 4–6; *Nováki 1965–1966*, fig. 1: 1–5; *Pavlin 2023*, fig. 6). Only a drawing has remained of a seventh sickle in the handbook by F. Rómer (mentioned above), while the eighth, the fate of which could be followed to some point, perished in the Second World War together with the private collection of K. Darnay in Sümeg (*Nováki 1965–1966*, 67).

Summarising the above, the findspot could be localised within a circle of 1.2 km in diameter, and the original number of the sickles in the deposit remains uncertain. The minutes of the town council meeting mention 42, while the book of K. Chernel and the inventory sheet written by archaeologist and museum director Baron K. Miske lists 44. K. Miske referred to the assemblage on a tableau exhibited in the museum as a ‘hoard from Óház (Old House)’. Did he do so because he believed that

Óvár (Old Castle), the medieval castle in the vicinity, was easier to find than the Asztalkő, Ördögasztala, or Ördögtányér?

SICKLE AS A NON-EVERYDAY OBJECT

Regardless of the uncertainty around the exact number of items, the deposit is the second biggest pure sickle deposit (*Primas 1986*, 12) in continental Europe (*Fejér 2020*, tab. 4: 1). The biggest hoard, Děčín II in the Czech Republic, contains 44 sickles, followed by Dersca (Romania, 12 pcs), Dornburg (Germany, 18 pcs), Gemer (Slovakia, 33 pcs), Grgar (Slovenia, 11 pcs), Spiš (Slovakia, 26 pcs), Szedres (Hungary, 12 pcs), and Tidorești (Romania, 12 pcs; *Fejér 2020*, tab. 4: 1; *Pavlin 2023*, 653, 654, map 315). Due to the lack of most sickles, the dating of the deposit cannot be specified within the HA1–HB3 period. The shape of the blade, the spurs, and the design of the ribs on the surviving pieces suggest a HA1–HA2 dating, of which the former seems more probable based on the three ribs on the tang (*Pavlin 2023*, 451, 452, graph 5; 12). Only one another pure sickle hoard is known for sure from western Transdanubia: the forgotten hoard from Csabrendek in Veszprém County. As K. Darnay wrote: ‘Recently I received three sickles from Csabrendek only; all three are identical, one has been sharpened, but the other two have not. They were found in a pile of stones during ploughing. They are similar to the deposit found at Sümeg-Papföle, which contained identical bronze sickles and...’ (Darnay 1890, 168).

With the hoard from Csabrendek, four pure sickle deposits have been discovered in the territory of today’s Hungary. Besides, five such assemblages from Romania, four from Germany, four from the Czech Republic, and one from Switzerland contained three sickles each of the 61 pure sickle hoards known from Europe today (*Fejér 2020*, 125, fig. 4: 24; tab. 4: 1; *Pavlin 2023*, 653, 654, map 315).⁴ A deposit found in

³ Catalogus et Repertorium Artefactorum Musei Archicoenobii Condavi IV. depositorum by M. Czinar in 1857. The press mark of the source, i.e., the first inventory book of the museum in the Bencés Könyvtár (Benedictine Library), is BK.65.11. Pannonhalma, page 11, entry K11.

⁴ Four deposits have been discovered in Slovenia since the publication of her collection by E. Fejér.

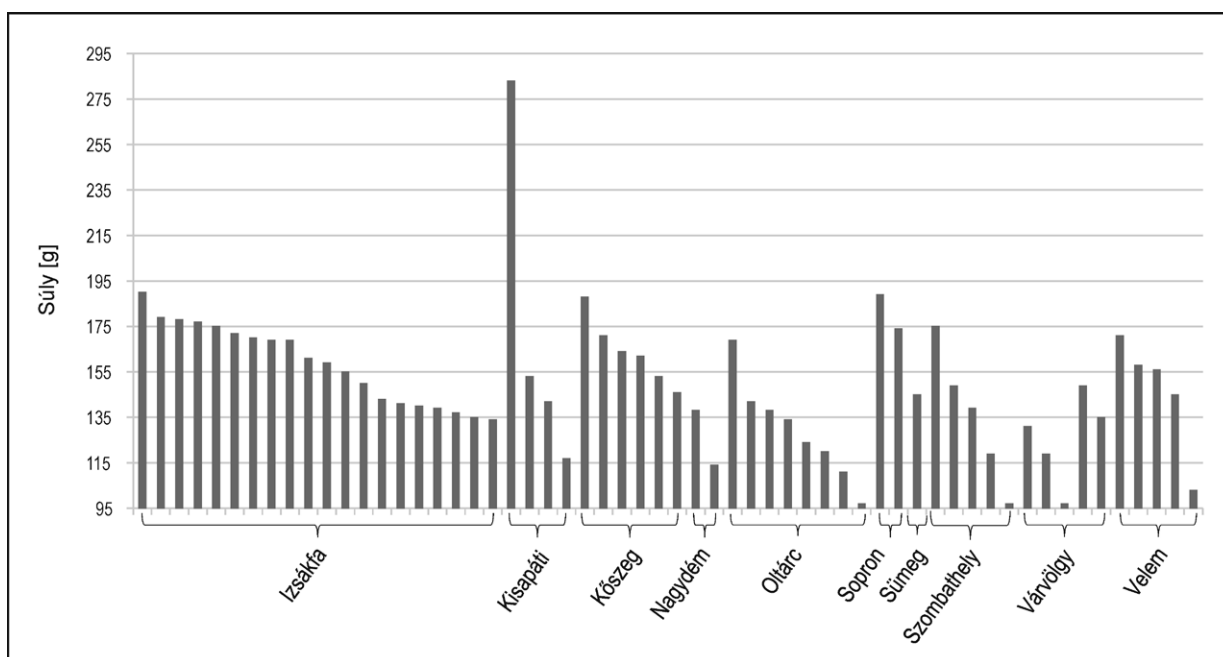


Diagram 1. The weight of intact sickles from the region (after Ilon 2024, tab. 8.E1.2).

Styria (Lower Austria) contained two sickles, while another also two sickles and an ingot (Cat. no. 19 [HB1] and no. 28 [HB2–HB3] in *Windholz-Konrad* 2018, 166, 170, 200, fig. 88–90; 114; tab. 5; 36; pl. 44: C).

In addition to the two pure sickle deposits from western Transdanubia (Csabrendek and Kőszeg), such find assemblages are known from the neighbouring regions. P. Turk and P. Pavlin collected six in Slovenia, dating them in a rather broad period from the Kurd to the Románd horizon by A. Mozsolits, i.e., the HA1–HB2 period (Pavlin 2023, 654, map 315: 38; Turk 1996, 106–119). V. Furmánek and M. Novotná published three pure sickle depots from Slovakia, assigning them to the Early and Middle Urnfield Period.⁵

Conspicuous rock formations like the Asztalkő are not only landmarks but could be ‘special places’ in the landscape. Were these easy-to-remember points ceremonial venues or altars (Bartík/Farkaš/Jelínek 2019, fig. 32c; Falkenstein 2012, 2; Hansen 2013, 381; Keil/Nicolussi Castellan/Wallner 2019, 244, 245, fig. 4; Sporn 2015, 343)? The respect of such places seems to have been common in the Urnfield world; examples include Albrechtice v Jizerských horách (Jizera Mountains; Smrž/Blažek 2002, 798, fig. 5), Kletečná Mountain in the northwestern part of the Czech Republic (Smrž/Blažek 2002, 809, fig. 1) and Maximiliansfels in Bayern (Mühldorfer 2015, 245, 252, fig. 3; 5; 6; 8–12).

J. E. Levy (1982, 25, 80, 81) connected sickles with food, more broadly with success in agriculture, certain agricultural rites, wealth, and economic hierarchy. When a deposit is interpreted as an ‘offering to the gods’, sickles appear in it not as tools but rather as items of value, pieces of raw material given some shape, where their real value lies in their material in the first place (Jahn 2012, 195). One must remember that the sickle is one of the three ‘flagship’ types appearing in depositions in the territory of the Czech Republic (Vachta 2016, 54, 57–59, 71, fig. 24), and these are the most frequent types appearing in depositions found in the territory of Hungary, too. Based on parallels from Denmark – depressions suitable for holding vessels in monolithic rocks, bread offerings in context with such rocks, and beliefs related to fertility (see Kaul 2020, 48–51, fig. 9; 11; 12) – it was perhaps not by accident that the sickles were hidden near the Asztalkő. This practice must have been quite widespread, as evidenced by a large rock in Fondo Squaratti in Valcamonica, the D sector of which features anthropomorphic and other representations and 140 depressions suitable for holding vessels. Pottery and quernstone fragments dated to the 12th c. BC (*Bronzo Finale*) were collected from the surface nearby (Rondini/Marretta/Brocca 2021, 32–34, 36, 37, fig. 2; 4; 6; 8). In light of the above, could the plate-sized regular depression at the top of the Asztalkő (Fig. 2: 2, 3), which nowadays only

⁵ ChJaba, Gemer, Spiš, Veľký Blh (Furmánek/Novotná 2006, 22, 25, 34, 95, 105, pl. 2: 31; 4: 68–72; 8: 133–137; 25: 420, 421; 26: 422; 30: 468, 469); the latter might be the remaining part of a bigger hoard, but there is no information on the missing pieces (see also Furmánek/Novotná 2006, pl. 55).

collects rainwater from time to time, be a venue for ceremonies related to agricultural and fertility rites, like bread offerings, or a place where vessels were placed on such occasions?

The current academic consensus accepts the view that the torques with rolled ends, the hoops, the copper rib ingots (*Spangenbarren*), and the intact and fragmented sickles had a role in rituals and the ceremonies performed in shrines (*Baitinger 2018; Brandherm 2018; Fejér 2017; Kőszegi 1988; Kuijpers/Popa 2021; Pare 2013, fig. 29: 3; Rezi 2017; Sommerfeld 1994, 265, 267, 268, 271; Szabó 2019, 50–59, 129–138, fig. 35; 45; 105; 110*). At the same time, they were raw material units, too, used in acts of value measurement and exchange. Standardised sickles spread to distances of thousand kilometres; the theory that they could serve as an international ‘currency’⁶ (*Gerätegeld Sichel*) is becoming more and more accepted and is considered unmissable in archaeology today (*Athanassov et al. 2020, 269–271*). The regional acceptance of particular variants is also conspicuous: for example, analogues of the piece in the Szombathely hoard are only known from the depositions from Sümeg and Velem-Szent Vid (type T1.2.A.0.1.2d and T.1.2.D.0.m.2a after *Pavlin 2023, 190, 208, pl. 25: 2; 27: 21*). At the end of the 19th c., K. Darnay published the weights of the four sickles in the Kisapáti hoard (*Darnay 1897, 120; 1899, 11, pl. IV*) – obviously, with no intent to study standardisation but probably as first in the region and setting an example. His data were completed with available data on the weight of the sickles from the region (Diagram 1). More and more professionals believe today that these metal objects have been designed and crafted in a way that their weight matched a standard unit of measurement in a certain area, and were broken or cut and measured during use (*Ialongo/Lago 2021, 4, fig. 11; Lago et al. 2023, 11, 12, fig. 7; 9; tab. 2; Vargyas 2010, 269, 270*).

SICKLE AS AN EVERYDAY OBJECT

Sickles were crafted using the same methods throughout a vast area: by pouring molten metal into a negative created in a sand bed in a wooden frame or a casting mould carved from sandstone, starting the process usually (but not exclusively) at the centre of the object on the back of the blade (*Koblevo, Ukraine – HA1; Heilbronn-Neckargartach, Baden-Württemberg, Germany – HB3; Gimbutas*

1965, 134, fig. 98: 6; Overbeck 2018, 104, pl. 37–40; Primas 1986, 7, 8), and covering the top with a flat clay or stone slab to shape the flat backside of the sickle (*Appleby/Sørensen 2018, 104; Lago et al. 2023, 3, fig. 2; Molloy/Mödlinger 2020, 194; Nessel 2019, 161–163; Sommerfeld 1994, 164, 165; Tompa 1927, 44–46; Trampuž et al. 1996*). Moulds for casting sickles are known in the study region from Ság Hill (*Lázár 1943, 282, pl. IV: 27, 28*) and the metallurgical centre at Velem-Szent Vid (*Ilon 2018b, 120, 125, fig. 4: 1; Miske 1908, pl. XXVI: 3; XXVII: 5*). Almost all known specimens bear a carelessly corrected trace of pouring at the centre on the back of the blade, where the molten metal overpoured; this point was the best for securing an even distribution of metal towards the ends of the object (*Primas 1986, 7*). Among the pieces from western Transdanubia, the sickles from Kőszeg (*Fig. 2: 4; Nováki 1965–1966, fig. 1: 1, 3–5*), Izsákfa,⁷ Hoard II of Ság Hill (*Mozsolics 2000, pl. 10: 5–8*), and some stray finds from Velem-Szent Vid (*Miske 1908, pl. XVII: 1, 3; XIX: 16*) feature such traces. The pouring cup was on the back of the blade on seven sickles, at the meeting of the back of the blade and the tang of one, and on the tang on two tanged sickles in the deposit from Szombathely-Jáky Road (*Ilon 2002, fig. 7: 3; Tarbay 2018, tab. 41*). The researcher publishing the deposit found at Várvölgy-Szebiketető supposed that one of the sickles had two pouring cups (*Müller 2019, fig. 7: 9*). Four sickles from the Kőszeg hoard fit existing categories in the new typological framework of sickles in Europe, developed by P. Pavlin, while one represents a new subtype (*Nováki 1966–1967, fig. 1: 5; type 3.Ee.1.Lf1.1a after Pavlin 2023, 57, 108, 158, 166, 330, 359, 385, 389, pl. 7: 5; 15: 13; 22: 20; 23: 13; map 18; 60; 139; 149*). Of the 115 objects subjected to elemental composition analysis, the tin content of three sickles proved to be surprisingly low (4.65, 3.41 and 2.57%, respectively; *Müller 2018, 87*). Arsenic (As) was the second major alloying element in the material of the analysed HA1 tin bronze sickles from Slovenia, followed by antimony (Sb) and nickel (Ni). After removing the surplus material, the edge part of the raw casting was enhanced by cold hammering to reach the desired hardness (*Trampuž et al. 1996, 181, 182, fig. 7*). R. Müller published the only available data on similar analyses in Hungary, carried out on three sickles from the deposits of Várvölgy-Nagyláz Hill: the edges of these are 35–65 HV (Vickers Hardness) harder, ranging from 172–212 HV (*Müller 2011, 215, 216, fig. 6: 29; 7: 30, 31*).⁸

⁶ K. M. Petruso (2019, 6) warns to be pessimistic about hypotheses envisaging large-scale ‘exchange systems’ and ‘worldwide systems’ and advocates for a more cautious phrasing.

⁷ The deposit is unpublished.

⁸ Vickers Pyramid Number, a system developed by two engineers at Vickers Ltd. in 1924, is determined by the load over the surface area of indentation.

Probably completed with handles of various lengths, the main purpose of the sickles could be reaping crops, i.e., cutting the stems of the nearly ripened plants (Fig. 3: 2), while their role in collecting forage (grass and reed cutting) could be marginal (Müller 1982, 343; Primas 1986, 1). Save for a piece from Izsákfa, all sickles known from the region (e.g., Szombathely and the surviving specimen from the Kőszeg hoard) are right-handed, matching the general trend (Pavlin 2023, 19, 314). While there is no place in this study to expound on the size of cultivated plots,⁹ it is worth considering the weight of the sickles known from western Transdanubia (Diagram 1) – this time in the context of use instead of exchange. Data could be obtained on the weight of 58 sickles in the studied region from four counties (Győr-Moson-Sopron, Vas, Veszprém and Zala). Only a piece from Kisapáti is heavier than 195 g, weighing 283 g. Six more are heavier than 176 g (four from Izsákfa and one from Kőszeg and Sopron). The three sickles weighing less than 100 g represent the other extreme (Oltárc, Szombathely, and Várvolgy). The weight of most (42 pcs) ranges from 131–175 g, matching the average weight range of sickles in Central Europe (Primas 1986, 31, 32, fig. 3). Based on the above and my experience, it is unlikely that the weight differences are gender- or age-related, i.e., that the different ‘weight classes’ can be linked with men, women, and children. Instead, could the heavier ones (176 g or more) have been used in forage collecting, for example, to cut leaves (Primas 1986, 1)? Use-related wearing alone cannot result in such big weight differences either (Pavlin 2023, 455). Landscape did not influence the distribution of diverse sickles: although the weight classes determined for the analysis are arbitrary, they all equally appear in the Little Hungarian Plain and on sites in hilly or mountainous terrain. In conclusion, the weight of the sickles probably reflects pre-determined units (Lago *et al.* 2023, 11, 12, fig. 7; 9; tab. 2; Sommerfeld 1994, 38).

Last but not least, attention must be paid to composite sickles with mosaic inlaid stone blade edges, which were still in use in the Bronze Age, as evidenced by a rare find, some silex sickle blades found in a vessel in the Middle Bronze Age tell settlement of Nagykároly-Babold (Carei, Romania; Molnár/Gyurka 2018, 27, note 64). Another important example is an intact sickle with a birch handle and a 116 mm flint blade, a peat bog find from Stenild

next to Hobro in Jutland, Denmark, from the late 19th c. Experimental archaeological investigations have revealed that it could be used to reap produce and weed but not to cut leafy branches (Masojć 2016, 73). However, the closest specimen in time (Late Bronze Age) and space is a retouched blade inlay with sickle gloss made of Bakony radiolarite, recovered from a Classic Tumulus Culture pit at Reyersdorf in Lower Austria (Brandl 2019). Of the coeval sites in the Bakony Region, the lithic record of the Late Tumulus–Early Urnfield Period (BC2/D1–HA1) tell settlement at Némethánya has been processed and evaluated, revealing no sickle parts among the 555 pieces (Biró 1996). The lithic material of the Later Urnfield Period settlement of Górkápolnadomb was studied decades ago but still awaits publication – a timely task for younger lithic specialists, together with the research of the knapped stone record of the period.

PRODUCE AND SOME EXAMPLES OF FOOD STORAGE

Pit storage has been the most natural, cheap, efficient (fireproof and hidden) way of storing plants and other produce and products, practised throughout Europe since the Neolithic (Bönisch 2006; Miret-Mestre 2008; 2011). With some luck (if they remained relatively intact, especially their steeply narrowing mouth), these storage pits are easy to distinguish from, for example, the clay extraction pits of potters. The shape of storage pits varied depending on soil conditions: bottle-shaped storage pits could be dug into loose soil, and pear-shaped ones when the soil was heavy. The size of its mouth was determined by practical reasons (e.g., ‘the full width of the body with one hand on the hip’; Fig. 3: 4; 4), while its bottom could be flat (Fig. 3: 3–5; 4) or slightly concave. After digging, the new storage pit was smoked or fired for days to make its walls dry and free of germs, practically firing them into ceramic. This was followed by thorough ventilation, and the pit was filled with the stored goods only after that (Ikvai 1966, 349, 351, 352, 358, 360, 362, 364, 365, tab. I).¹⁰ The simplest way to seal it has probably been used since prehistory (Bönisch 2006, 315); according to the 19th-c. descriptions, the procedure involved filling the rest of the space with some water-absorbent material (chaff or straw),

⁹ For a recent overview of the topic and the discussion about the estimated ca. 20 × 40 m average plot size in northern, western, and central Europe, see Molnár/Gyurka 2018, 11, 12, note 15; with further literature; for our hypothesis on the position of the cultivated plots at Szombathely-Zanat, see Ilon/Sümegei/Törőcsik 2011, 283, 373. The results obtained from Farád-Dámföld (a report by Fácies Ltd) are unpublished.

¹⁰ Grieb/Biederer 2022, fig. 34–39; 42; 63 published a new and excellent typological framework for storage pits, almost identical to the one developed by N. Ikvai.

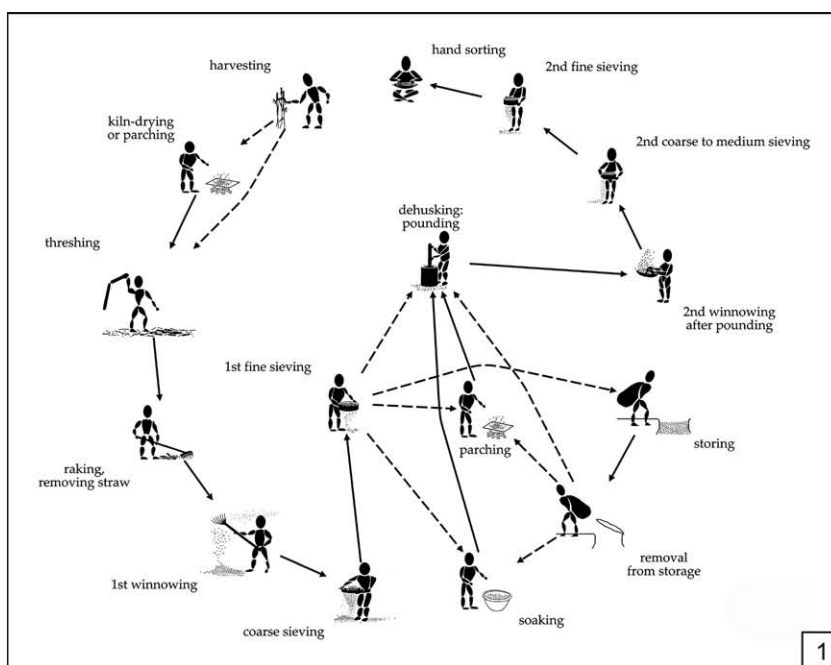


Fig. 3. 1 – processing of crops from harvesting to stacking (after Heiss *et al.* 2021, fig. 5); 2 – harvest in Százhalombatta with a replica bronze sickle (1998); 3–5 – Gór, excavation of storage pits for crop. 2–5 – photo the author.

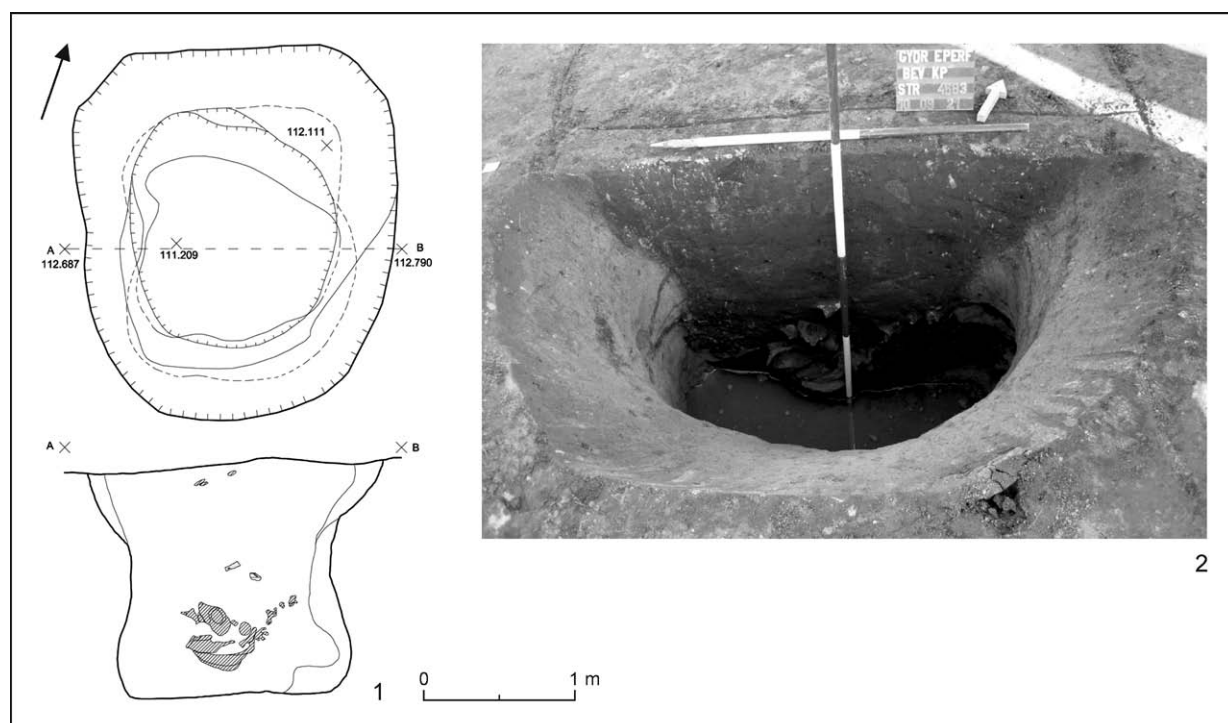


Fig. 4. Ménfőcsanak, feature SNR 4583. A storage pit in excavation. Drawing M. Pápai, photo F. Halász.

followed by an airtight layer of soil or, better, clay; finally, the convex top was shaped and its surface smoothed and coated with another slip layer or turf to repel rainwater; sometimes even a small roof was constructed above it. Based on ethnographic analogies, the goods were stored this way from harvest until next spring but could be kept even for two or three years if it was not necessary to use them (Ikvai 1966, 367, 368, tab. II). Evidence of this practice (daub finds with wattle imprints) have been reported from Late Bronze Age sites in the Czech Republic and Germany (Bönisch 2006, 313). After the stored produce had been removed, the empty pit could be reused to store ready-to-eat food (dairy and meat products) until the next harvest (Fig. 3: 3; Ikvai 1966, 369). The extremely important observation made by N. Ikvai in the 1960s concerning the round storage pits that have been still used occasionally as cellars in the countryside is still valid today and must be considered in the interpretation of the Late Bronze Age of the study area. ‘... vegetables, fruits, wine, milk, eggs, and everything else that must be protected from heat and frost is stored there [...] due to that it is difficult to access and reach whatever is stored there...’ (Ikvai 1966, 371). In cases when the remains of more than one good are discovered in a storage pit, each was probably placed there separately, in a basket or a textile or leather bag (Kern 2017, 65); besides, obviously, pottery vessels must have also been used in such a context (Fig. 3: 3). The prehistoric storage

facilities could be bigger than the ones mentioned by N. Ikvai and likely had a step- or ramp-like entrance or could be reached via a ladder. The reconstructions of several such features can be discovered in literature: of an Early Bronze Age storage pit from Grossmugl in Austria (Neugebauer 1994, fig. 57: 1), several Late Bronze and Early Iron Age ones from Germany (Bönisch 2006, 315, fig. 3; 5), and Early Iron Age ones from Mošorin-Feudvar in Serbia (Hänsel 1991, pl. 47: 2).

Soil conditions and the depth of the storage pit were crucial for the success of storing. Slightly alkaline soils (with a pH somewhat over 7) prevent the growth of fungi. The average temperature of the soil at a depth of 1 m is between 4.3 °C (February) and 17.9 °C (August), while at a depth of 3 m it ranges between 6.7 °C (March) and 15.6 °C (September). Low temperature and minor temperature fluctuation are the key to long-term preservation (Ikvai 1966, 359, 360). Such facilities were built ‘in a safe place out of way’, around the house, in clusters in a dedicated part of the settlement or the lands around it where the soil was suitable (Ikvai 1966, 353, 354). The storage facilities observed in Mesopotamia in the Early Dynastic, Akkadian, and Ur III periods – bottle- and pear-shaped subterranean and surface structures lined with large bricks – are similar to the ones observed, even if in a smaller size range, in excavations (for example, the surface structure supported by eight posts

discovered at Nemesbőd in Vas County; *Ilon 2024*, 127, fig. 5.2.1.2.1–3) and others (*Dular/Tomanič Jevremov 2010*, 191–193, 198–201, fig. 93; *Paulette 2016*, especially fig. 4: 3; *Schauer 1995*, 124, fig. 3; 4).¹¹ The results of the experimental archaeological studies carried out on various continents during the last fifty years correspond with the ethnographic data collected by N. Ikvai in Hungary. Having been stored in a cylindrical or pear-shaped pit for 112 days, the moisture content of crops only increased by 1–2%, of millet from 13.3% to only 15.1%; loss due to insects and fungi was no more than 3% and 2%, respectively, if the facility was only opened once when all its content was removed (*Miret-Mestre 2008*, 222, fig. 2: Palestine; 226: Kansas, USA; 228: Ethiopia).

In the following, a brief and sketchy survey is presented on the storage characteristics in some microregions in western Transdanubia and the storage facilities of certain settlements within them. From the onset of the Late Bronze Age around 1650 BC (corresponding with the Lössen Advance Period), yearly precipitation increased, resulting in higher groundwater levels than before. The amount of precipitation started to decrease again from the middle of the Urnfield Period, reaching its minimum around 1000–800 BC, after which it started to increase again. This fluctuation affected the climate of the Carpathian Basin only in certain areas (*Horváth 2000*, fig. 1; *Sümegi 2004*, 330–340; *Sümegi/Kertész/Rudner 2003*; *Törőcsik/Torma/Sümegi 2018*, 243, 244), but must have influenced the location, shape, depth, and way of sealing of the pits. For example, the pits found at Gó, located on higher terrain and used in a relatively dry climate, were deeper, while the ones in Boba and Ménfőcsanak, settlements at a lower altitude, were shallower. Extensive areas in the Transdanubian Mountains (including Veszprém County, the study area) have silty loam and loam soils, and the Transdanubian Hills (most of Vas and Zala counties) also consist predominantly of silty loam, sandy loam, and loam soil formations. The surface in the area of watercourses (Szigetköz and Hanság, the area of Lake Fertő, and the valley of the Marcal River) is covered by marshland soil and alluvial meadow roll over, for example, quicksand or sand sheet layers in the Little Hungarian Plain, where

the 0.5–1.5 m thick sandy silt layer covers a sandy gravel layer. The latter would be suitable for storage pits, but the groundwater level is generally high in the area, often reaching the root zone, which is suboptimal for digging deep pits but allows for constructing natural ‘fridges’.

Covered alluvial meadow roll layers were observed in the profiles in the excavations preceding the building of brick factories at Beleg and Csorna in the Rábaköz (*Góczán 1975*; *Pécsi 1975*). Therefore, it is not surprising that on the site of Ménfőcsanak-Széles-földek at the confluence of the Danube, Rába, and prehistoric Marcal rivers, only a few (e.g., SNR 133, 1767, 2327, and 4583; Fig. 4) of the about two hundred features dated with certainty to the Tumulus Period (BB–BC; *Ilon 2019*, fig. 2), the transition between the Tumulus and Urnfield periods, and the early Urnfield Period (BD–HA2; *Ilon 2015*, pl. 2b) could be interpreted as a storage or cooling pit. These were likely established next to post-framed buildings which remained undetected.¹² The soil of the site is proluvial-deluvial silt, also known as loess.¹³

According to a suitably detailed pedological map, the soil of Boba-Metszés-dűlő, a Late Tumulus Culture (BD2) settlement by the Marcal River, is a fluviatile sand deposit of Middle Pleistocene origin.¹⁴ Not a single ‘classical’ storage pit was excavated there (*Ilon 2024*, 399–409), suggesting that the goods were stored on raised platforms standing on posts or a plinth beam structure, a solution known and applied since the Neolithic from Europe to the Far East, or in surface storage buildings with wattled or beam walls, standing on a plinth beam frame, as supposed in the case of several sites from the onset to the end of the Urnfield Period, including, e.g., Börcs, Várvolgy, and Velem-Szent Vid (*Ilon 2024*, 231–234, 367, 368).

The ferrous loam layer in the foregrounds of the Bakony Mountains in the southern part of the Little Hungarian Plain covers loess and marl deposits. The soil there is neutral or slightly acidulous. The bedrock of the mountains is limestone and dolomite, covered by chalky sand with gravel, which are also neutral or slightly acidulous. Based on a detailed pedological map, the Late Tumulus and Early Urnfield Period (BC2/D1–HA1) settlement and cemetery at Némethánya-Felsőerdei-dűlő were

¹¹ The latter are even smaller structures supported by four posts.

¹² The thousands of postholes identified on the site formed a chaotic ‘order’ and contained no finds. I suppose an arrangement similar to the hypothesis on the situation in Březno (Czech Republic) as reconstructed in *Biederer 2023*, 354, fig. 1 on the left and fig. 3.

¹³ The excavation documentation has not been completed due to the cease of the Cultural Heritage Protection Service (2007–2010) and its successors in title (2017), accompanied by a constant bleeding out in staff and funds. See *Marsi et al. 2005a*, section L-33-24 (Győr).

¹⁴ See *Marsi et al. 2005b*, section L-33-35 (Pápa).

established on a loess deposit covered by brown forest soil.¹⁵ However, no soil samples were taken from the few excavated pits.

The subsoil under the pale grey loam covering almost the entire Zala Hills and the area of the Rába River section near Szentgotthárd is grey clay with some occasional marl accumulations. Based on the detailed pedological map, the Urnfield Period (HA1) settlement of Nagyrécse-Baráka-dűlő was established on Upper Palaeolithic loess deposits; the excavated part of the single unearthened pit does not hint at a storage function.¹⁶ When a storage pit was dug into loess or sand, its walls had to be reinforced to prevent collapse with a wattle brace and daub plastering and/or firing (Bönisch 2006, 314).

The topsoil on the terraces of the Rába River up to ca. Sárvár and the pale grey gravel sand in the valley of the Gyöngyös Stream cover ferrous gravel and sand layers. These soils are slightly acidic or acidic. The bedrock under the neutral or slightly acidic gravelly clay of the Kőszeg Mountains is gneiss and mica slate.¹⁷ The setting is different in the case of settlements established on higher ground, like Górkápolnadomb in the Répce Valley. The hill of Kápolnadomb is a solid, hard, 1–10 m thick loess deposit of Ice Age origin, with a gravel layer at a depth of 1–3.5/5 m and greenschist underneath.¹⁸ Several storage pits were observed in the excavation of the ‘sacred’ settlement on the plateau,¹⁹ most of which were reused as cooling and/or waste disposal pits (Bönisch 2006, 316).²⁰ The bottom of some was plastered and fired multiple times, which implies repeated use in the primary function (crop storage). The assemblages containing pottery vessels and grindstones (Fig. 3: 3) may refer to the process of processing and storage and perhaps the rites connected with that; these ritual ‘waste deposits’ or ‘irregular burials’ may have also included human remains, even if only some bones (Ilon 2001, fig. 2; 3; 5; 2014a). Similar phenomena could be observed in Várköly-Nagyláz-hegy, a site with a similarly eroded surface. For example, based on the several intact vessels in its fill, feature 343 of Várköly could have been a ‘fridge’ for storing food (Müller 2017, fig. 3).

Parallels to the presented storage pit types from the study area have been uncovered in coeval settlements at Stillfried in Austria and Lower Lusatia in Germany. While these are available in excellent publications, currently, there is no (available) information either on the spatial relation of the residential buildings and storage facilities on any Late Bronze Age settlement in the study area or on distinct settlement parts dedicated to diverse functions like mentioned in several cases by B. Biederer and E. Bönisch (Biederer 2023, 351, 353, fig. 1; Bönisch 2006, 307, 311, 316, 320, fig. 1; 2; 7; 8; Griebel/Biederer 2022, fig. 34).²¹

Large pottery vessels, plastered clay containers, and clay bins with a capacity of sometimes over 100 l and other organic containers were used for organising the stored goods in cellar pits, storage buildings (e.g., Assiros; Wardle/Wardle 2007, 459–463, fig. 1; tab. 1; pl. 4–6), palaces (e.g., Pylos), and residential buildings. Several finds imply the use of wooden chests: plastered bins like the one discovered at the Neolithic settlement of Hódmezővásárhely-Kökénydomb and the urns adorned with sun symbols, resembling a wooden chest suitable for storing, from the Late Bronze Age Assiros and Crete (Banner 1931; Déchelette 1909, 97, fig. 33; Wardle/Wardle 2007, 461). As evidenced by the wattled (Bezi, Rábapátóna) wells and ones with box lining in the study area (e.g., Farád, Lébény, Mosonmagyaróvár, Rábapátóna; Egry 2010; Grynaeus 1998–1999; Ilon 2024, 238, 590, fig. 3.1.7; 7.1.7; Németh/Takács 2003; Polgár 2020, 390; Törőcsik/Torma/Sümegei 2018, fig. 2), the know-how necessary to make such bins and chests was present. Finds of leather, gourd, and bark vessels and wattled reed and twig baskets are exceptionally rare; the remains of two of the latter have been discovered amongst the burnt ruins of Fidvár near Verebély (Vráble, Slovakia). One of the baskets even contained charred grain (Skornal/Kalmbach/Bátora 2018, 106, 107). The wooden tanks published from Noceto in the Po Valley in Italy are parallels closer in time but more distant in space (Castiglioni et al. 2009, fig. 16: 5–7; Cremaschi et al. 2021).

¹⁵ See Marsi et al. 2005c, section L-33-36 (Veszprém).

¹⁶ See Fullár 2008b, table IV–VII.; Marsi et al. 2005d, trench L-33-59 (Marcali).

¹⁷ See Treitz/Timkó 1911–1918. The same results appear in the most recent pedological overview of the country (see Pásztor et al. 2018).

¹⁸ Field diary of the 1990 excavation by the author and report on the soil coring of the Kápolnadomb by L. Fűköh. The grey schist bedrock was exposed when water management experts quarried away the hill.

¹⁹ An excavation led by archaeologist J. Dénes and the author.

²⁰ The usual fate of these features.

²¹ The lack of such publications in the study area results mainly from many settlements being unpublished (e.g., Börös and Várköly), and their find material, including the archaeobotanical record, still awaits processing. In many cases, the small area of the excavated surface (e.g., Némethbánya), the special function of the settlement (e.g., Górk), or the accumulation of features of multiple historical periods (e.g., Ménfőcsanak) hinders dating and interpretation.

Regrettably, no lucky find is available from the western Transdanubia like House 1, a Late Urnfield Period house detail unearthed at Thunau am Kamp 01, where not only the kitchen stove and the majority of the cooking vessel set were found but also a 120 l container, used for short-term storage of crops, in a storage pit. An even bigger, 202 l container is mentioned from Stillfried an der March (Kern/Lochner 2021, 81–83; Popovtschak/Heiss/Stika 2021, 131).

STORED AND USED GOODS²²

While the role of crop cultivation gradually increased throughout the Bronze Age, the pollen composition of certain sites in the study area (e.g., Farád, Nemesbőd, and Zanat) indicates that the cultivated plots were still enclosed by forests (Fácies 2016; Ilon/Sümegi/Törőcsik 2011, 283, 284, fig. 133; 134; 139; 150–154; 162; Náfrádi/Sümegi/Törőcsik 2011, 267). Spelt (*Triticum spelta* L.) remains have been identified in the fill of the bottom of a churning vessel from a Late Tumulus–Early Urnfield Period settlement at Szigliget (Horváth 1974, 60). F. Gyulai processed 500 g of the 1500 g sample taken from a pit of the Urnfield Period settlement at Balatonmagyaród-Hídvépuszta, distinguishing 45 g of similarly charred seeds including pea (*Pisum sativum* L.), bitter vetch (*Vicia ervilia* [L.] Willd.), grass pea (*Lathyrus sativus* L.), diverse Papilionaceae species, lentil (*Lens culinaris* Medik.), millet (*Palicoum miliaceum* L.), common wild oat (*Avena fatua* L.), barley, common vetch (*Vicia angustifolia* Grufbg.), and hairy vetch (*Vicia hirsute* [L.] Gray). Based on this composition, he interpreted the find as waste that also contained the remains of the oldest wood strawberry cake known from the Carpathian Basin (Gyulai 1991; 2010, 129, fig. 195–203; Ilon 2024, 166, 167). The data on the unspecified drupe tree from the HA1 settlement at Nagyréde-Baráka-dúló has no parallels in the region (Fullár 2008a, 84).

Altogether 41 soil samples were taken from the Urnfield Period (BD2–HB2–HB3) graves unearthed at Ménfőcsanak (Fig. 1; 5) to identify the food remains rather than the wood species used for the pyre.²³ The relatively many samples yielded a poor but highly significant set of data. Á. Kenéz discovered 239 plant remains (Ilon 2014b, 32, 33,

fig. 20; 23; Kenéz 2012), most of which (86.6%) were cereals. He found cereal remains in every sampled grave, sometimes in both the grave pit and the urn (Pető/Kenéz szerk. 2018, fig. 21), regardless of the sex and age at death of the deceased. This undoubtedly reflects the key role of cereals in the local mortuary practice. Moreover, the pollens found in the samples indicate the time of internment in the period from the end of April to early June.²⁴ The proportion of weed pollens in the samples was marginal.

- The sample taken from the pit of Grave 1 (SNR 4879, an urn burial) contained 14 cereal fragments, a single round wheat (*Triticum aestivum* ssp. *vulgare*) grain, and a single brome grass (*Bromus* sp.) grain fragment, while six cereal fragments and a single einkorn grain (*Triticum monococcum* ssp. *monococcum*) have been found in the urn.
- The pit of Grave 2 (SNR 4894, urn burial) held 13 unspecified cereal grain fragments, while its urn yielded 26 unspecified cereal fragments, a multi-row barley grain, a millet seed, a wheat grain, and a goosefoot (*Chenopodium album*) seed.
- The urn of Grave 3 (SNR 4904) contained 17 unspecified cereal grain fragments and a wheat grain (DeA-1745: 2877 ± 31, 1131 [2σ] 971 cal BC).
- The pit of Grave 4 (SNR 4907) held only eight, and the urn two more tiny fragments of some unspecified cereal.
- The pit of Grave 5 (SNR 4909) only yielded 13 unspecified cereal grain fragments and an undetermined seed.
- The 13 charred fragments separated from the sample taken from the pit of Grave 6 (SNR 4910) were likely the remains of some cereal porridge; the urn did not contain any grain or seed.
- The soil of Grave 7 (SNR 4911; Fig. 6) contained eight, while the urn yielded 11 more unspecified cereal grains.
- The sample taken from the pit of Grave 8 (SNR 4912; Fig. 6) included eight unspecified cereal fragments, one of which was likely some kind of wheat grain (*Triticum* sp.); six more have been recovered from the urn.
- The soil of Grave 9 (SNR 4921) contained two, the urn one more unspecified cereal grain fragment.

²² This chapter discusses only macrobotanical evidence and does not take into account the palynological data available from the region.

²³ Based on a reconstruction from more than 250 graves unearthed in Dortmund-Oespeler Bach (Meurers-Balke/Schamuhn 2008, 65).

²⁴ The unpublished results of the processing of the samples taken from the graves of the cemetery Farád-Dámföld indicate a period almost identical to the one emerging from the analysis of the graves of Szombathely-Zanat (Ilon 2024, fig. 7.2.22; Ilon/Sümegi/Törőcsik 2011).

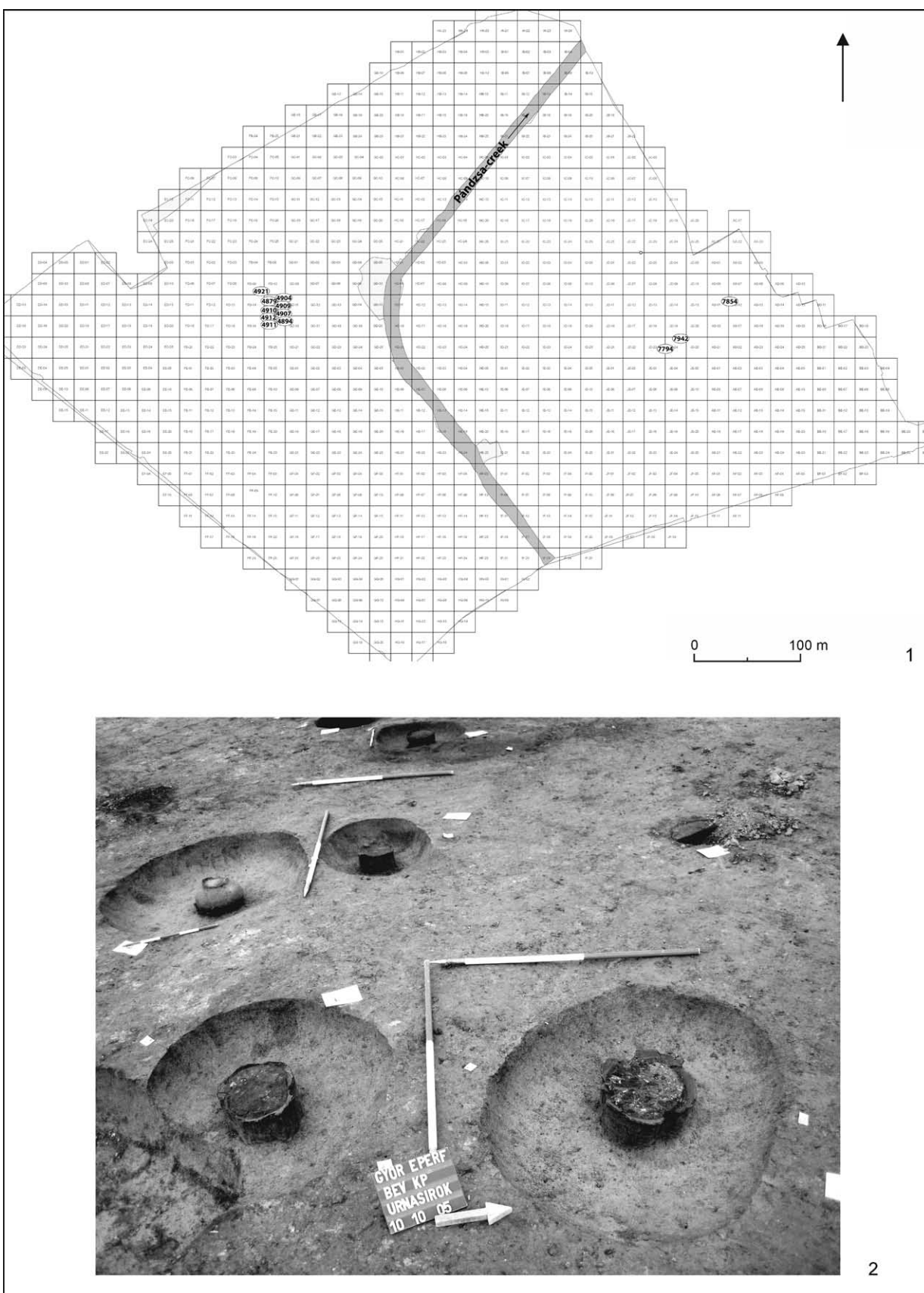


Fig. 5. Ménfőcsanak. 1 – map of the Urnfield Period cemetery; 2 – detail. 1 – survey and drawing by I. Eke, 2 – photo J. Hatos.

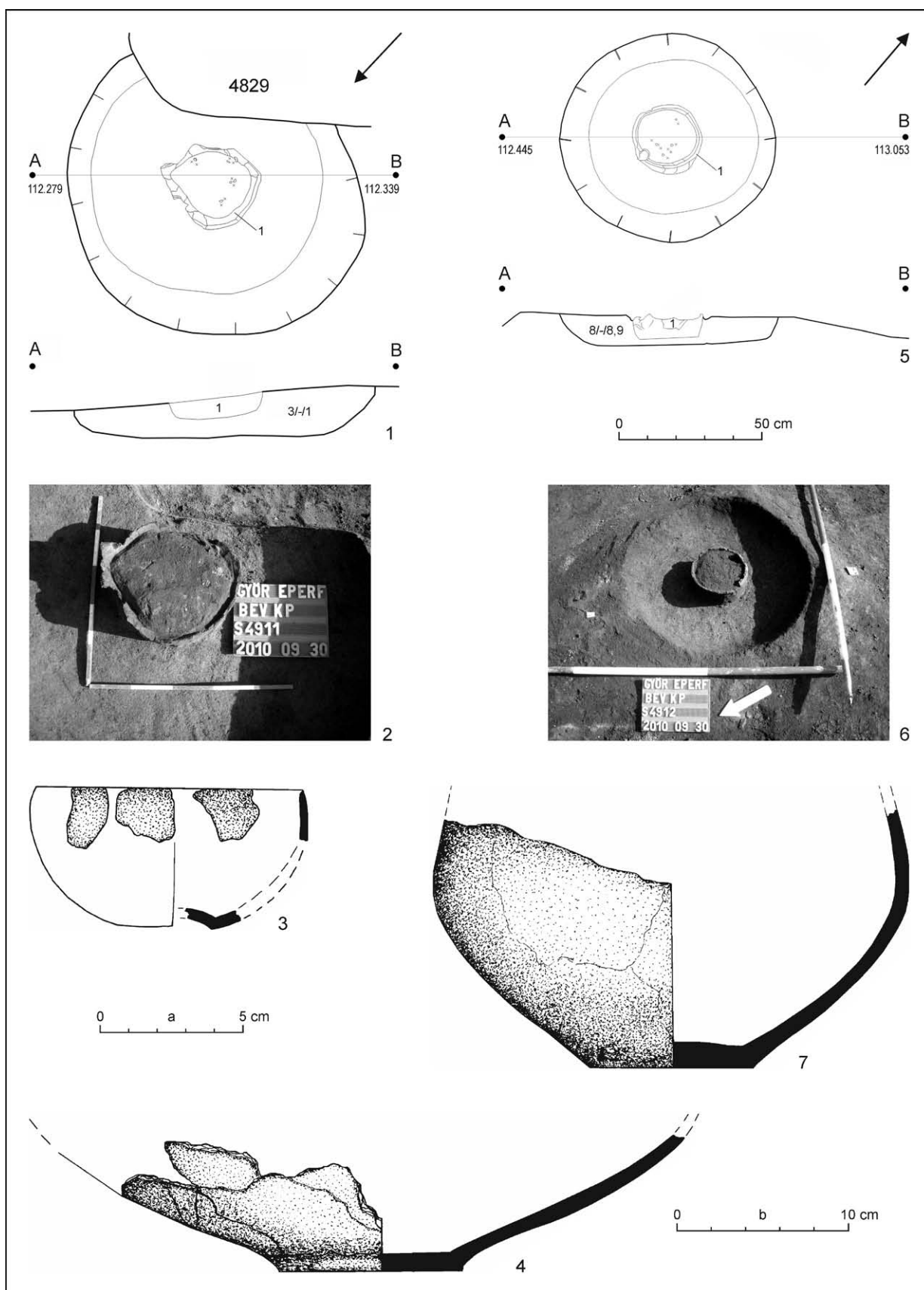


Fig. 6. Ménfőcsanak. 1–4 – grave 7 (SNR 4911); 5–7 – grave 8 (SNR 4912; after Ilon 2014b, fig. 11).



Fig. 7. 1 – Ménfőcsanak, soil sampling of a La Tène feature; 2, 3 – Gó, the soil sample and its flotation (1990); 4 – Gó, spelt remains. 1 – photo T. Csuti, 2, 3 – photo the author, 4 – photo A. Torma.

- The most abundant sample was taken from the pit of Grave 10 (SNR 5000). It included 169 unspecified cereal grain fragments, six multi-row barley grains, six highly fragmented brush remains of hulled wheat, four double-row barley grains, three millet seeds, and two common wheat grains. Weeds are represented by a goosefoot and a many seed goosefoot (*Chenopodium polyspermum*) seed, and a highly fragmented seed of probably a rye brome (*Bromus secalinus*) plant.
- The soil in the urn of Grave 11 (SNR 7794) contained 38 small unspecified cereal grain fragments, a *Chenopodiaceae* seed fragment, and an unidentifiable one (DeA-1747: 2880 ± 32, 1132 [2σ] 972 BC).
- The content of the cup in Grave 12 (SNR 7854) also held a cereal grain fragment.

The millet and cereal data of the site are a new point on the archaeobotanical map of the Bronze Age in the area of Hungary (Filatova 2022, 63, fig. 3; Gyulai 2010, fig. 35; 2014, fig. 1). Based on the grave finds, the major plants cultivated in the area

included millet, common wheat, einkorn, double-row barley, and six-row barley. These could be the main ingredients of cereal porridge (millet and barley), unleavened and leavened bread, and barley and wheat beer. Particularly important is the porridge remains from Grave 6, the SEM analysis of which is timely, just like the NIR analysis to detect fat and protein remains and reveal its chemical composition. It would be a waste not to utilise the information hidden in this 'culinary artefact'. However, it is known that the more processed the dish, the more difficult it is to identify the original ingredients. Barley and millet porridge remains have been identified in the record of the metallurgical settlement of Prigglitz-Gasteil in Lower Austria, and the findings of another such complex analysis carried out on samples from Stillfried have also been published recently (Heiss *et al.* 2021, 10, 11, 17, fig. 14; Stika/Heiss 2013, 194). Plant remains have also been found in the settlement at Ménfőcsanak: four unspecified cereal grains have been obtained from the lowermost 10 cm of the fill of SNR 4583, a storage pit reused later as a waste disposal pit (Fig. 4).

The biggest macrobotanical find assemblage from the Urnfield Period in Transdanubia is part of the archaeological record of G6r-K6polnadomb, a site interpreted lately by the author of this paper as a ritual memorial place (Fig. 1; 3: 3–5; 7; Ilon 2024, 117).²⁵ The samples taken from six pits yielded 20353 remains of 34 species altogether (Gyulai/Torma 1996; 1998–1999; Ilon 1992, 258). The latest radiocarbon data from the site – PSUAMS-10139: 2845 ± 20, 1107 (2σ) 924 BC, corresponding to HB1 – was made from the skeletal remains of a 23–39-year-old man (Ilon 2023, 218, 219, fig. 5: 1; Zoffmann 2006, 152, 154, tab. 1) found in Pit D2 in Trench H-I-6 on top of an 8 cm thick burnt clay layer rich in charcoal and plant remains.²⁶ While weeds dominate the type spectrum with fourteen species (41%), followed by elements of the natural vegetation (nine species, 26%), cereals (eight species, 24%), legumes (two species, 6%), and, finally, oil crops (one species, 3%), in absolute numbers cereals are heavily predominant with 18195 pieces (91%). The 1108 seeds and other plant parts representing the background flora comprise only 6% of all pieces, while the proportion of weeds, legumes, and oil crops together is less than 3%.²⁷ The species composition of cereals reflects a preference for hulled wheat; most identified remains (45%) were emmer (*Triticum dicoccum*), followed by the most ancient variant, einkorn (26%), which was particularly popular in the Bronze Age due to its high resistance to frost, drought, and weeds, as well as its optimal nutrient composition. However, its yield is considerably smaller than that of common wheat and other variants (Gyulai 2019, 313, 315, 316). The third highest amount of grains in the sample belonged to spelt (*Triticum aestivum* ssp. *spelta*) with 10% (Fig. 7: 4; Torma/Sümegei 2015, fig. 4: 2). Barley (4%)²⁸ and millet (1%) were marginal. Millet in roughly coeval sites was found in both small and surprisingly large quantities in Austria in Heimschuh, Koppentretalm, and Stillfried (Mele et al. 2019, 66, fig. 8; 9; Modl/Heiss/Wiesinger 2019, 60; Popovtschak 2022, 155, fig. 143) and in Slovenia in Dragomelj, Grosuplje, and Orehova vas (Tolar/Pavlin 2022, 116, tab. 3). Emmer, barley, and millet dominated the type spectrum of the sample taken from a house at T6llya-6v6r, too (Mervel 2023, 57, 58, fig. 3; 6). However, one must be cautious when interpreting the role of millet in the one-time diet,

as the amounts identified depend highly on the scale of the excavation and the samples (Fig. 7: 1, 3).²⁹ According to the latest radiocarbon data, millet cultivation in the Carpathian Basin started around 1500 BC (Filipović et al. 2020, 10, 11, fig. 4; 5). Carbon and nitrogen stable isotope analyses and elemental composition analyses could greatly contribute to the reconstruction of the diet, like in the case of several coeval sites in the Crimea (Kulkova et al. 2024, 106, 107, tab. 2). Free-threshing wheat (*Triticum aestivum* ssp. *vulgare*) and its subspecies, compact wheat (*Triticum aestivum* ssp. *compactum*) were found in insignificant quantities in G6r; besides, Pit d2 in Trench H-I-6 yielded two rye (*Secale*) grains (Gyulai/Torma 1998–1999, fig. 4), which are exceptionally important because they represent the oldest occurrence of rye in the territory of today's Hungary and one of the few from the era in whole Europe (Hajnalová 2012, 80; Jockenhövel 1997, 160, 161; Stika/Heiss 2013, 206, tab. 6–8).³⁰ Besides weed, einkorn, emmer, and spelt spike fragments indicate that the cereals were cleaned, likely wind threshed (Fig. 3: 1) as part of a chain of activities (Heiss et al. 2021, fig. 5; Popovtschak/Heiss/Stika 2021, fig. 5: 3). A representation of wind threshing is known from Grave 52, the tomb of Nakht, in Thebe (Müller-Karpe 1980, pl. 21.A).

Weed remains help specify the time of sowing of some winter crops (spelt, einkorn, and winter barley), root crops, and summer crops (Gyulai 2010, 129, 130, 133; Gyulai/Torma 1996, 277–279, fig. 1–4). The advantage of winter crops, sowed in the autumn, is the absence of harmful fungi and insects, higher average yield, and the fact that they become available earlier during the year, thus contributing to a steady food supply.

As for the cultivated plants in the study area, the results of experimental archaeology in Hungary represent a reliable starting point for reconstruction, while the findings of such endeavours elsewhere in Europe can be only regarded as informative. Accordingly, only the less widely known results of the experiments led by A. Torma and A. F. Bálint in the Százhalombatta Archaeological Park in 1997–2003 are mentioned here (Bálint 2008; Torma 1999). They cultivated emmer and spelt, and from 1999, einkorn; they have only published the results of the experiment with the first two species. Both emmer and

²⁵ Similar sites include Blučina-Cezavy (Salaš 2015) and Ivanovice na Hané 3/2 (Parma et al. 2018, 328–331, fig. 4; 5).

²⁶ A similar thick, heavily burnt layer was observed in storage pits in several settlements at Lower Lusatia (Bönisch 2006, 314).

²⁷ The proportions are similar in the archaeobotanical record of 7022 items of the coeval Late Urnfield Period (1050–800 BC) metallurgical settlement of Priggwitz-Gasteil (Heiss et al. 2021, 13, 16–22, fig. 10; 11).

²⁸ The only coeval pit to contain almost exclusively barley is known from Sopron-Krautacker (Gyulai 2010, 130).

²⁹ I believe the opinion in Molloy 2022 shall be reconsidered.

³⁰ Rye is also rare on coeval sites in Germany, the Alps and its foregrounds, and Central Europe.

spelt were sowed in mid-October into 3–5 cm deep grooves made with a hoe at 30 cm intervals and reaped in the second half of July by hand, using a composite sickle with a knapped stone blade, a bronze specimen (Fig. 3: 2), or an iron scythe. The stems were cut right under the ears in the first four years and close to the surface later, which made the harvest much more effective, and the crop could be bound into sheaves, but it involved harvesting weed, too.³¹ The yield ranged from 1 : 17–1 : 27, which means 2008 kg/ha for spelt and 2154 kg/ha for emmer on average (the average yield of common wheat is 4000–5000 kg/ha). According to estimations, an average prehistoric man consumed 200 kg of crops a year (Molnár/Gyurka 2018, footnote 25).

Of emmer and spelt, only the latter is suitable for making soft leavened bread (Fig. 7: 4).³² Grinding the crops was no small task: based on experimental results (likely affected by the lack of expertise of the grinding person), 0.3–1 kg of flour could be made in 1.5–3 hours (see the quern on the right side of Fig. 3: 3; Lauermaun 2013, 73; Marcigny/Chesquière *dir.* 2003, 170; Mecke 2008, 67).³³ Cultivation and processing experiments must be continued, and the available food remains must be subjected to scientific analyses because they are an undeniable part of the culture (Heiss *et al.* 2021, 9, 10, 44) and characteristic of a specific group of people.

Finally, it must be stressed that the archaeobotanical results of the Urnfield Period record of Ménfőcsanak and Górá stand alone in the region and cannot be extrapolated to characterise western Transdanubia,³⁴ as it has been known for decades that the climate of the Carpathian Basin is a patchwork where the distribution of precipitation is highly uneven (Sümegei/Kertész/Rudner 2003, 55, 56, fig. 15), which raises caution and restrains one from drawing large-scale general conclusions.³⁵ The volume of this study is nowhere near the reconstructions of Bronze Age agriculture like the one published by A. Jockenhövel in Germany (1997). It must be admitted that we have almost no information on the selective use (for humans and animals) of crops in an everyday or ceremonial context or knowledge of any gender-related pattern (Halstead 2012, 36–38).

Available macrobotanical information can be completed with the pollen sequences obtained from archaeological features in excavations on at least 27 sites and continuous soil cores made for environmental-historical studies on fourteen more in western Transdanubia (Ilon 2024, 74–79, fig. 3.2.1; Ilon *et al.* 2011; Törőcsik/Sümegei 2019). The reconstruction of Bronze Age cultivation, outlined based on these data, will be the subject of an individual study. However, it must be kept in mind that the number and distribution of sickles reflects the unequal intensity of research rather than the agricultural relations of the time of their making (Fejér 2020; Primas 1986, 43).³⁶

CONCLUSIONS

Only six of the 44 or 42 sickles from the ‘pure’ deposit found at the special rock called Asztalkő near Kőszeg in 1841 are available in public collections today. The surviving pieces could be dated to the HA1–HA2 phases; it is highly unlikely that more sickles from the deposit resurface in the future.

Only one more pure sickle deposit is known from the region, found near Lake Balaton: the Csabrendek hoard, a find assemblage that has fallen out of the focus of research since long. Pure sickle deposits are rare in the neighbouring regions, too, and several of them have been discovered in special places.

No significant conclusions could be distilled from the available information regarding the weight and function (reaping) of the sickles or the identification of the one-time users; however, the interpretation covered the symbolic and economic aspects of their use, as well as the agricultural consequences of sickle use.

The graves of the BD2–HB2–HB3 cemetery at Ménfőcsanak and the storage and waste disposal pits of the ritual ironworking zone at Górá, dated to the HB1–HB3 period, are an unparalleled source of archaeobotanical finds from the period. However, even completed with data from considerably smaller sources, the results do not allow drawing general conclusions on the focus area. Due to the abrupt end and small scale of the project, the crop

³¹ Based on weed seeds, the application of this harvesting technique was hypothesised on other sites, too (Popovtschak/Heiss/Stika 2021, 131, fig. 5: 25).

³² For an overview of the Middle and Bronze Age bread remains from the Carpathian Basin and the related publications, see Molnár/Gyurka 2018, note 44.

³³ Répcelak – Tumulus Culture; Ság Hill – prehistory, perhaps Urnfield Culture (Ilon 2024, fig. 5.2.3.1: 1, 3).

³⁴ E.g., Popovtschak/Heiss/Stika 2021, fig. 5: 9 blurs microregional differences.

³⁵ See Molloy 2022. A statement that holds for a part of the Southern Hungarian Plain may be not valid for the eastern Carpathian Basin (Transylvania) and certainly cannot be regarded as such for the eastern foregrounds of the Alps, the valley of the Zala River, and the Bakony Mountains.

³⁶ For the latest collection, see Fejér 2020.

production experiment in the Archaeological Park in Százhalombatta in 1997–2003 can only be regarded as an interesting addition, a warning to not to neglect the important tasks that archaeobotanical research poses in the future. Another just as important task is the instrumental analysis of the food remains recovered from the

cemetery of Ménfőcsanak – especially as, in lack of a researcher interested in working on them, the non-processed soil samples taken from the pits and other settlement features of the ironworking district of the Ménfőcsanak settlement were removed from the collection of the Hungarian National Museum.

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História výskumu depotu z Kőszegu v kontexte poznatkov o pestovaní plodín v západnom Zadunajsku (Maďarsko) v období popolnicových polí

Gábor Ilon

SÚHRN

V úvodnej časti štúdia sumarizuje dostupné informácie o depote nájdenom v blízkosti špecifického skalného útvaru, nazývaného Asztalkő („Stolová skala“) s plochou priehľbinou na jeho vrchole, ktorý sa nachádza na okraji mesta Kőszeg (Maďarsko, Vašská župa) v roku 1841. Na základe zozbieraných dostupných dát, nie je presná lokalizácia nálezu možná. Je veľmi pravdepodobné, že pracovníci, ktorí depot našli, uviedli ako miesto nálezu Asztalkő (ako sa uvádza v zápisnici zo zasadnutia mestského zastupiteľstva) len preto, že to bol najbližší orientačný bod ku skutočnému miestu nálezu. Dokonca, archeológ a riaditeľ múzea barón K. Miske vlastnoručne zaevidoval depot do inventárnej knihy múzea ako „depot z Óház“, teda stotožňuje miesto nálezu s neďalekou stredovekou vežou (obr. 2: 5). V konečnom dôsledku teda nie je možné miesto nálezu určiť presnejšie než v rámci približne 1,2 km širokého okruhu.

Pôvodne depot pozostával zo 42 alebo 44 kosákov, presný počet nie je možné stanoviť, keďže údaje zo zápisnice zo zasadania mestského zastupiteľstva a údaje z knihy histórie mesta si navzájom protirečia (Chernel 1877). Aj napriek týmto nejednotným informáciám môžeme v súčasnosti tento súbor pokladať za druhý najväčší hromadný nález zložený výlučne z kosákov z obdobia popolnicových polí v strednej Európe (Pavlin 2023, 653, 654, mapa 315). Ďalší takýto depot, ktorý obsahoval len kosáky, bol nájdený pod kopou kameňov v Csabrendeku (Maďarsko, Vespřemská župa; Darnay 1890), skladal sa z troch kosákov a v odbornej literatúre upadol do zabudnutia. Čo sa týka hromadného nález z Kőszegu, v múzejných zbierkach sa dnes nachádza len šesť kusov z celkového počtu (tabela 1) a na základe typológie sa datujú do obdobia HA1–HA2 (Pavlin 2023, 451, 452).

Samostatnú časť textu predstavuje symbolický aspekt kosákov a s ním spojený stručný prehľad súvisiacich hypotéz a interpretácií. J. E. Levy spája tento druh artefaktu s jedlom, v širších súvislostiach s úspešným poľnohospodárstvom a s niektorými výnimočnými rituálmi, bohatstvom a ekonomickou závislosťou (Levy 1982, 25, 80, 81). Iní bádatelia interpretujú podobné nálezy ako „dary bohom“, pričom primárna hodnota kosákov spočívala v surovine, z ktorých boli vyrobené, t.j., predstavovali akýsi druh „peňazi“ alebo ingotového platidla (Jahn 2012, 195; Sommerfeld 1994, 265, 267, 268, 271). Otázka znie, či môžeme považovať depresiú v skale na vrchole Asztalkő, ktorá dnes zhromažďuje dažďovú vodu, za miesto určené na rituálne obrady za účelom zabezpečenia bohatej úrody a úspešného poľnohospodárstva, za miesto obetovania chleba, alebo za miesto uloženia nádob používaných pri obradoch. Na základe analógií z Dánska a severného

Talianska sa to javí ako pravdepodobné (Kaul 2020, 48–51, obr. 9; 11; 12; Rondini/Marretta/Brocca 2021, 32–34, 36, 37, obr. 2; 4; 6; 8). Skaly, podobné tej v Asztalkő, predstavujú dominantné body v krajine. Ak sa pýtame, či je možné, že slúžili ako orientačné body, ako miesta určené na vykonávanie rôznych rituálov, poprípade ako oltáre, niektoré analógie z územia dnešnej Českej republiky a Bavorska takéto interpretácie naznačujú (Mühldorfer 2015, 245, 252; Smrž/Blažek 2002, 798, 809).

Predmetom diskusie je rovnako aj praktické využitie kosákov, exkurz do technológie ich výroby a údaje o hmotnosti 58 súčasných exemplárov z daného regiónu (diagram 1). Je známe, že rozšírenie rôznych typov kosákov neovplyvnil krajinný reliéf. Hoci nie sú pri ich analýze presne definované hmotnostné kategórie, všetky sa v rovnakej miere vyskytujú aj na území Malej dunajskej kotliny, rovnako aj na lokalitách v kopcovitom alebo horskom teréne. Záverom možno konštatovať, že hmotnosť kosákov pravdepodobne odráža vopred určené jednotky (Lago et al. 2023, 11, 12, obr. 7; 9; tabela 2; Sommerfeld 1994, 38). Ak sa ku kosáku pripevnila rúčka rôznej dĺžky, ich hlavnou funkciou bolo pravdepodobne žatie obilnín, teda rezanie stebiel takmer dozretých rastlín (obr. 3: 2; Müller 1982, 343; Primas 1986, 1). S výnimkou jedného exemplára z Izsákfa sú všetky kosáky z regiónu zahnuté doprava – napr. nálezy z Izsákfa, Szombathely a zachovaný kus z depotu z Kőszeg.

Na vyššie zmienené nadväzuje téma skladovania plodín. Vo vymedzenej sledovanej oblasti prevládalo skladovanie v zásobných jamách. Porovnávané boli vlastnosti týchto jam z hľadiska pôdných a vodných pomerov (obr. 3: 3–5). Práca sa vo veľkej miere opiera o etnografické závery štúdie N. Ikvaia (1966), ktorá je dodnes považovaná za zásadnú v skúmaní tejto problematiky. Uvádzajú sa aj vybrané analógie z lokalít ako napr. Gór-Kápolnadomb (spráš, HB–HB2), Ménfőcsanak-Széles-földek (spráš; Ilon 2015), Nagyrécsce-Baráka-dűlő (spráš, HA1; Fullár 2008a), Stillfried (Griebl/Biederer 2022) a Várvolgy-Nagyláz-hegy (erodovaná pôda na bazalte, HA2–HB1; Müller 2017, obr. 3). Iný spôsob skladovania zásob ako v obilných jamách bol identifikovaný na sídlisku Boba-Metszés-dűlő, ktoré je datované do stupňa BD2 a bolo založené na fluviatilnom pieskovom sedimente stredopleistocénneho pôvodu. Aj v súčasnosti je na tejto lokalite vysoká hladina podzemnej vody (Ilon 2024, 399–409). To mohlo zapríčiniť, že počas výskumu sídliska nebola identifikovaná ani jedna zásobná jama. Je možné, že plodiny sa uchovávali na vyvýšených plošinách postavených na koloch, podobných tým, ktoré sa využívali už od neolitu a boli rozšírené od Európy až po ďaleký východ. Takáto konštrukcia, podopretá

ôsmimi kolmi, bola doložená na lokalite Nemesbőd (Maďarsko, Vašská župa; *Ilon 2024*, 127, obr. 5.2.1.2.1–3). Podobné, avšak menšie nadzemné objekty na skladovanie zásob boli už skôr zistené aj na iných lokalitách (*Dular/Tomanič Jevremov 2010*, 191–193, 198–201, obr. 93; *Paulette 2016*, najmä obr. 4: 3; *Schauer 1995*, 124, obr. 3; 4). Rovnako je nutné brať do úvahy možnosť existencie prútených alebo drevených nadzemných konštrukcií, ktoré boli podpierané len základovými trámami a sú veľmi ťažko identifikovateľné, keďže po ich existencii na lokalite zostane len minimum stôp. Takýto spôsob skladovania sa predpokladá na viacerých lokalitách regiónu, v časovom rozpätí od začiatku obdobia popolnicových polí až po koniec jej klasickej fázy (pozri napr. Börcs, Várvölgy, Velem-Szt. Vid; *Ilon 2024*, 231–234, 367–368).

Záver štúdie je venovaný makro botanickým zvyškom z dvoch najvýznamnejších lokalít obdobia v skúmanom území: pohrebisko Ménfőcsanak-Széles-földek z konca stupňa BD–HB2/HB3 a sídlisko Górkápolnadomb datované do stupňa HB1–HB2, ktoré sa spája s metalurgickou produkciou spoločne s rituálnym využitím sídliska. Štúdia ako vôbec prvá prezentuje výsledky získané z analýzy makro zvyškov z pohrebiska Ménfőcsanak-Széles-földek, rovnako však sumarizuje už publikované závery zo sídliska Górkápolnadomb. Vzorky odobraté na vyššie zmienenom sídlisku obsahovali aj zvyšky rastlín. Napríklad, objekt SNR 4583 bol pôvodne používaný ako zásobná jama, neskôr znovu využitý ako jama na odpad. Vzorka odobratá z 10 cm hrubej najspodnejšej vrstvy zasypu obsahovala štyri obilné zrná (obr. 4). Zo 41 vzoriek pôdy odobratých z 12 hrobov na pohrebisku Ménfőcsanak-Széles-földek, bolo získaných celkovo 239 kusov rastlinných zvyškov, prevažne obilnín (207 ks, 86,6 %, proso, pšenica obyčajná, jednozrnný jačmeň, dvoj a šesťradový jačmeň; *Kenéz 2012*). To naznačuje konzumáciu prosa a jačmenných kaší, nekysnutého a kysnutého chleba, ako aj pšeničného a jačmenného piva. Každý hrob, z ktorého bola odobratá vzorka, obsahoval obilné zrná. Niekedy sa zvyšky rastlín nachádzali aj v hrobovej jame aj v urne, nezávisle od pohlavia a veku

pochovaných. To nepochybne odzrkadľuje kľúčovú rolu obilnín pri vtedajšom pohrebnom rite.

Doteraz najväčší súbor spracovaných makrobotanických zvyškov z územia Zadunajska pochádza z lokality Górkápolnadomb (obr. 1; 3: 3–5; 7). Vzorky pôdy, odobrané zo šiestich jám, obsahovali dokopy 20 353 rastlinných pozostatkov, patriacich 34 rôznym druhom (*Gyulai/Torma 1996; 1988–1999; Ilon 1992*, 258). V súbore dominovala pšenica jednozrnná (45 %), nasledoval najstarší druh pšenice, pšenica jednozrnná (26 %) a špalda (10 %; *Triticum aestivum* ssp. *Spelta*; obr. 7: 4; *Torma/Sümegei 2015*, obr. 4: 2). Jačmeň (4 %) a proso (1 %) boli zastúpené minimálne. V jame d2 v sonde H-1-6 sa našli dve zrná raže (*Secale*; *Gyulai/Torma 1998–1999*, obr. 4). Nález sa považuje za jej najstarší výskyt v oblasti dnešného Maďarska a jeden z mála doložených prípadov v Európe spadajúci do sledovaného obdobia (*Hajnalová 2012*, 80; *Jockenhövel 1997*, 160, 161; *Stika/Heiss 2013*, 206, tabela 6–8). Ide o významnú skutočnosť, keďže raž bola v tomto období považovaná za burinu. Nálezy zvyškov buriny a fragmenty klasov pšenice jednozrnné, dvojzrnné a špaldy indikujú previevanie (obr. 3: 1).

Tento rozsiahly súbor bol doplnený dátami z menších sídlisk. Napríklad na lokalite Szigliget sa našiel odtlačok špaldy na nádobe na výrobu masla (*Horváth 1974*, 60); na lokalite Balatonmagyaród-Hídvégpuszta bolo evidované značné množstvo archeobotanických vzoriek, medzi nimi aj zvyšky koláča z lesných jahôd (*Gyulai 1991; 2010*, 129, obr. 195–203; *Ilon 2024*, 166, 167). Neurčené zvyšky kôstkovín nájdených na sídlisku Nagyréce-Baráka-dűlő, datovaného do stupňa HA1, nemajú v regióne paralelu (*Fullár 2008a*, 84).

Bližšia charakteristika poľnohospodárstva v dobe bronzovej na základe týchto údajov je však úlohou budúcej samostatnej štúdie. Dostupné dáta, získané z analýzy makro zvyškov, možno doplniť o peľové sekvencie z objektov z archeologických výskumov minimálne 27 sídlisk, rovnako ako aj o vzorky súvislých pôdnych jadier odobratých pre účely environmentálno-historických štúdií na ďalších 14 sídliskách v západnom Zadunajsku (*Ilon 2024*, 74–79, obr. 3.2.1; *Ilon et al. 2011; Törőcsik/Sümegei 2019*).

Obr. 1. Západné Zadunajsko. Najvýznamnejšie lokality uvedené v texte. 1 – Kőszeg; 2 – Górk; 3 – Győr-Ménfőcsanak. Mapa Gy. Isztin.

Obr. 2. 1 – poloha Kőszeg-Asztalkő (ID 68621); 2, 3 – Asztalkő a depresia v skale na jeho vrchole; 4 – kosák zo zbierky Národného múzea (podľa *Rómer 1866*, obr. 50); 5 – kosák z depotu s ručne písaným opisom od K. Miskeho; 6 – kosák z depotu zo zbierky Múzea opátstva v Pannonhalme. 2, 3 – foto Gy. Isztin, 5 – foto autor.

Obr. 3. 1 – proces spracovania plodín od žatvy po uskladnenie (podľa *Heiss et al. 2021*, obr. 5); 2 – žatva v Százhalombatte s replikou bronzového kosáka (1995); 3–5 – Górk, výskum zásobných jám. 2–5 – foto autor.

Obr. 4. Ménfőcsanak. Objekt SNR 4583. Výskum zásobnej jamy. Kresba M. Pápai, foto F. Halász.

Obr. 5. Ménfőcsanak. 1 – plán pohrebiska z obdobia popolnicových polí; 2 – detail. 1 – zameranie a kresba I. Eke, 2 – foto J. Hatos.

Obr. 6. Ménfőcsanak. 1–4 – hrob 7 (SNR 4911); 5–7 – hrob 8 (SNR 4912; podľa *Ilon 2014b*, obr. 11).

Obr. 7. 1 – Ménfőcsanak. Odber vzoriek pôdy z objektu z doby laténskej; 2, 3 – Górk, odber vzoriek pôdy a ich preplavovanie (1990); 4 – Górk, zvyšky špaldy. 1 – foto T. Csuti, 2, 3 – foto autor, 4 – foto A. Torma.

Diagram 1. Hmotnosť zachovaných kosákov z regiónu (podľa *Ilon 2024*, tabela 8.E1.2).

Tabela 1. Kőszeg. Hmotnosť dostupných kosákov z depotu (podľa *Ilon 2024*, 484).

A GAMEBOARD FROM GERULATA (BRATISLAVA-RUSOVCE) IN THE CONTEXT OF ROMAN-PERIOD GAMING FINDS IN THE NORTH OF THE CARPATHIAN BASIN¹

TIM PENN – BRANISLAV KOVÁR – BOHUSLAV ŠEBESTA

This article examines a Roman period gameboard (Gameboard 1) from Gerulata (modern Bratislava-Rusovce, Slovakia), a military settlement on the Danube frontier in Pannonia. The board was carved into a tile and features a 7 × 8 grid layout. A much smaller fragment of another possible gameboard or fragment of wall tile (Possible gameboard/tile 2) was also recovered from the site, though this identification is less secure. This study explores the archaeological context, typology, and potential identification of the board(s). Gameboard 1 was probably used for playing the game known as *ludus latrunculorum*, even if other possibilities should not be entirely discarded. Analysis of published and unpublished finds from the Northern Carpathian basin and neighbouring regions – which we present together for the first time – indicates that this gameboard belongs to a wider ludic culture, which was particularly visible among Roman soldiers and military communities. Portable elements of Roman-style material culture (dice, counters) but not bulky gameboards have been recovered in parts of Slovakia that were in the *Barbaricum*, and this suggests some cultural diffusion across borders in the Roman period. These objects appear to be prestige finds, since they are commonly associated with elite sites, but we cannot be sure that they were used to play ‘Roman’ games. The article argues that such objects offer a valuable lens into the social and cultural life of Roman soldiers and civilians on the frontier. It also highlights the methodological challenges of identifying and interpreting gameboards in provincial contexts.

Keywords: West Slovakia, Bratislava-Rusovce, Gerulata, Roman period, board games, *tegulae*.

INTRODUCTION

Board games have not received much attention in Slovak archaeology. Moreover, there has been limited study of game-boards in the archaeology of Central Europe more broadly, and relatively few gameboards of Roman date have been published from the region. However, the discovery of a wooden gameboard in a rich grave at Poprad (Lau/Pieta 2014, 360, 361; Lau/Pieta/Štolcová 2022; Schädler/Hall 2024, 162), outside Roman territory, shows that the interaction between the Roman Empire and *Barbaricum* was not necessarily limited to warfare or trade: cross border cultural interactions may also have included games.

Recent scholarship in other parts of the Roman world has emphasised the importance of publishing gaming-related finds in their archaeological and social contexts. Moreover, gaming kit found in the *Barbaricum*, outside of Roman territory, has long been recognised as a valuable source for understanding social life across borders in antiquity (e.g., Krüger 1982; Schädler/Hall 2024 and further bibliography cited below). However, we still understand very little of the gaming culture of the Romans and their neighbours in the territory today occupied by Slovakia

as few gaming-related objects from the region have been published or analysed in detail, and indeed few other gameboards have been published from the rest of the Roman province of Pannonia to which Southwest Slovakia partly belonged in antiquity.

This contribution seeks to meet this gap through an exploration of a gameboard from Roman-held territory in Slovakia. This gameboard scratched onto a tile, which was found during a rescue excavation at the Roman military camp at Gerulata (modern Rusovce; Fig. 1) – a second tile found during the same excavation also bears an incised grid,

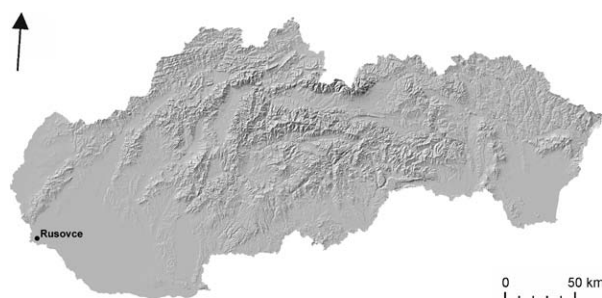


Fig. 1. Bratislava-Rusovce (Gerulata), Maďarská street, the territory of Slovakia. Location of the find of the gameboard.

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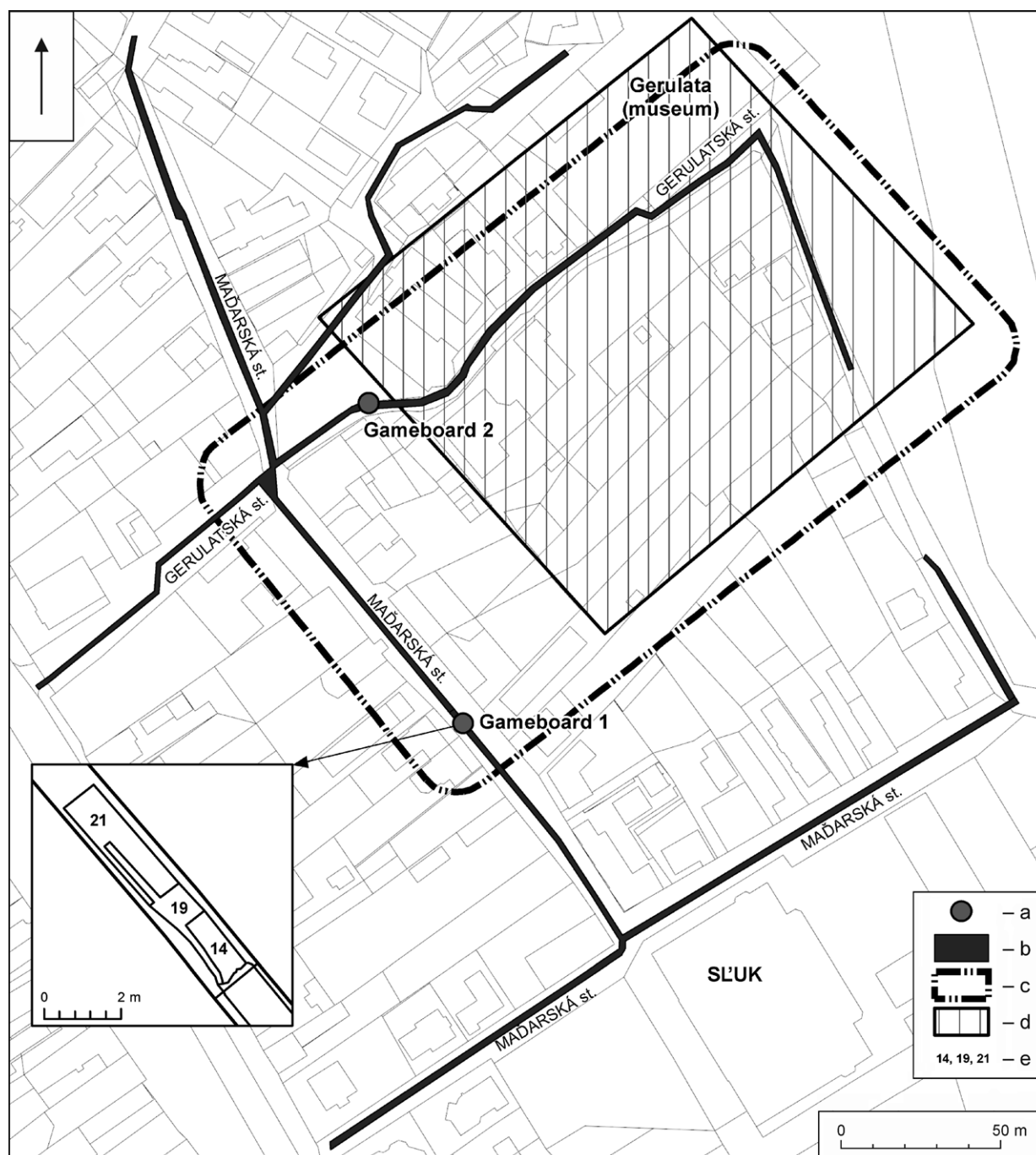


Fig. 2. Plan of the construction/excavation and location of gameboards finds. Legend: a – gameboard; b – trench; c – first construction stage of the castellum (1st–2nd c. AD); d – third construction stage of the castellum (end of the 3rd–4th c. AD); e – feature number. Graphics B. Šebesta.

though it is likely that in this instance, the deeper incisions, which bear traces of mortar, relate to the tile's use in building. We begin by introducing the site and summarising the broader setting in which the gameboard(s) were recovered. We then present the gameboard(s) and their specific find contexts in

detail, situate these objects in the wider context of published gaming-related finds in Slovakia and in neighbouring countries, much of which we draw together for the first time, and discuss the game which may have been played on them. This is likely to have been *ludus latrunculorum*,² although other

² Basic information about this game can be found in Schädler 1994; 2001 or online in W. Crist's useful summary available at <https://ludii.games/details.php?keyword=Ludus%20Latrunculorum> [28. 9. 2025]

possibilities also need to be considered. We then close by examining the role of games in military communities and in the wider context of the archaeology of Roman Pannonia. Throughout, we hope to demonstrate the value of studying game-related finds in the wider context of contemporary research on games studies and encourage colleagues in Slovakia and neighbouring countries to invest time in studying and publishing these materials.

THE DISCOVERY AND FIND CONTEXT

Archaeological investigations were carried out between 2014 and 2016 during sewer system construction and water pipeline reconstruction in the Bratislava district of Rusovce (Gerulatská, Irkutská, and Maďarská streets; Šebesta *et al.* 2017; Žák Matyasowszky *et al.* 2015). In 2014, two potential finds associated with board games were uncovered (Fig. 2). During these excavations, a large number of archaeological features were identified, although not all could be fully investigated due to the scale of the works and the constraints of ongoing construction. Among the features uncovered were ditches, masonry structures, floor surfaces, and various settlement-related remains, as well as graves dating to the Roman later periods. Almost all of the excavated features are associated with the well-known Roman site of Gerulata, a small Roman fort or *castellum* (Šebesta *et al.* 2017; Žák Matyasowszky *et al.* 2015). The fort was in use from the late 1st c. to the 4th c. AD, though most of the finds uncovered during the 2014–2016 rescue excavations belong to the 2nd and 3rd c. AD. Gerulata's immediate surroundings included a civilian settlement and numerous Roman-period cemeteries (Schmidtová 2012; Varsik 2012a). A cavalry unit, *ala I Cannanefatium*, was stationed at the site for most of its operational period. There is also evidence to suggest the short-term presence of other military units, including *cohors V Callaeorum Lucensium* and *equites sagittarii* (Varsik 2012b).

Find no. 1/Gameboard 1 (inventory number 92/2014)

Gameboard 1 (Fig. 3: 2) comes from Feature 21, located on Maďarská Street within the Roman-period *castellum*. Feature 21 can be interpreted as either a plaster (mortar) layer or part of a collapsed wall from a building, preserved as a thin stratum. The fill consisted of white or light pink mortar mixed with small, fine stones. A floor surface was identified nearby, although the context was disturbed by a later trough. Both the floor and the trough date to

the Roman period. Unfortunately, as the excavation was confined to a 1-m-wide service trench and conducted under rescue conditions, it was not possible to undertake broader or more detailed investigation of the context.

Gameboard 1 was previously published in the catalogue of the exhibition *Romans and Slovakia* (Kucharík *ed.* 2021, 181), but it has not been subject to detailed analysis and was presented without accompanying contextual information. The fragment is roughly trapezoidal in shape, measuring 13 × 12 × 16 × 7 cm, with a thickness ranging from 2.2 to 2.7 cm. It has been fired to an orange colour. The fabric is free of small stones or other visible inclusions. One surface was smoothed, while the opposite side bears visible plant impressions. Based on its form and composition, the object appears to be a fragment of a Roman brick or *tegula*, of the type likely produced by soldiers stationed in the region. A gameboard was shallowly incised into the smoothed surface after firing. The gameboard comprises a grid of at least 7 by 8 squares – 44 squares are partially preserved in total. A thicker incised line shown on the right-hand edge in the drawing (Fig. 3: 2) may indicate one edge of the gameboard. The irregular breaks on the other sides indicate that the gameboard would originally have been larger but it is unclear how much larger. The squares are irregular in size, with the best-preserved examples measuring between 1.5 and 2.7 cm. This is broadly consistent with the cells of a sample of grid-type gameboards which have been measured in Britain, where the individual squares ranged between ca. 2–4 cm on a side (Courts/Penn 2021, 2, 3, fig. 4). While it is important to be careful when using evidence from elsewhere in the Roman Empire as diagnostic tools to identify gameboards, this comparative data suggests that the design is fitting with that of a gameboard. Gameboard 1 appears to have been engraved after firing. A misdrawn line is visible approximately at the centre of the board. The shallowness of the incisions suggests that the lines were intended to be visible but did not serve a structural function, such as securing mortar. Combined with the likelihood that the lines were added after firing, this indicates that the object was originally intended as a building tile but was subsequently (re)used as the surface for a gameboard. Specially made ceramic boards with grids are known across the Roman Empire, for example at the town of Calleva Atrebatum (Silchester; e.g., Fox/Hope/Reid 1901, 231–233, fig. 1; pl. XXVII) and along Hadrian's Wall (England; e.g., Gerrard/Mills 2003, 64, fig. 2) in Britain. Further examples of gameboards from Pannonia and its neighbours are discussed further below.

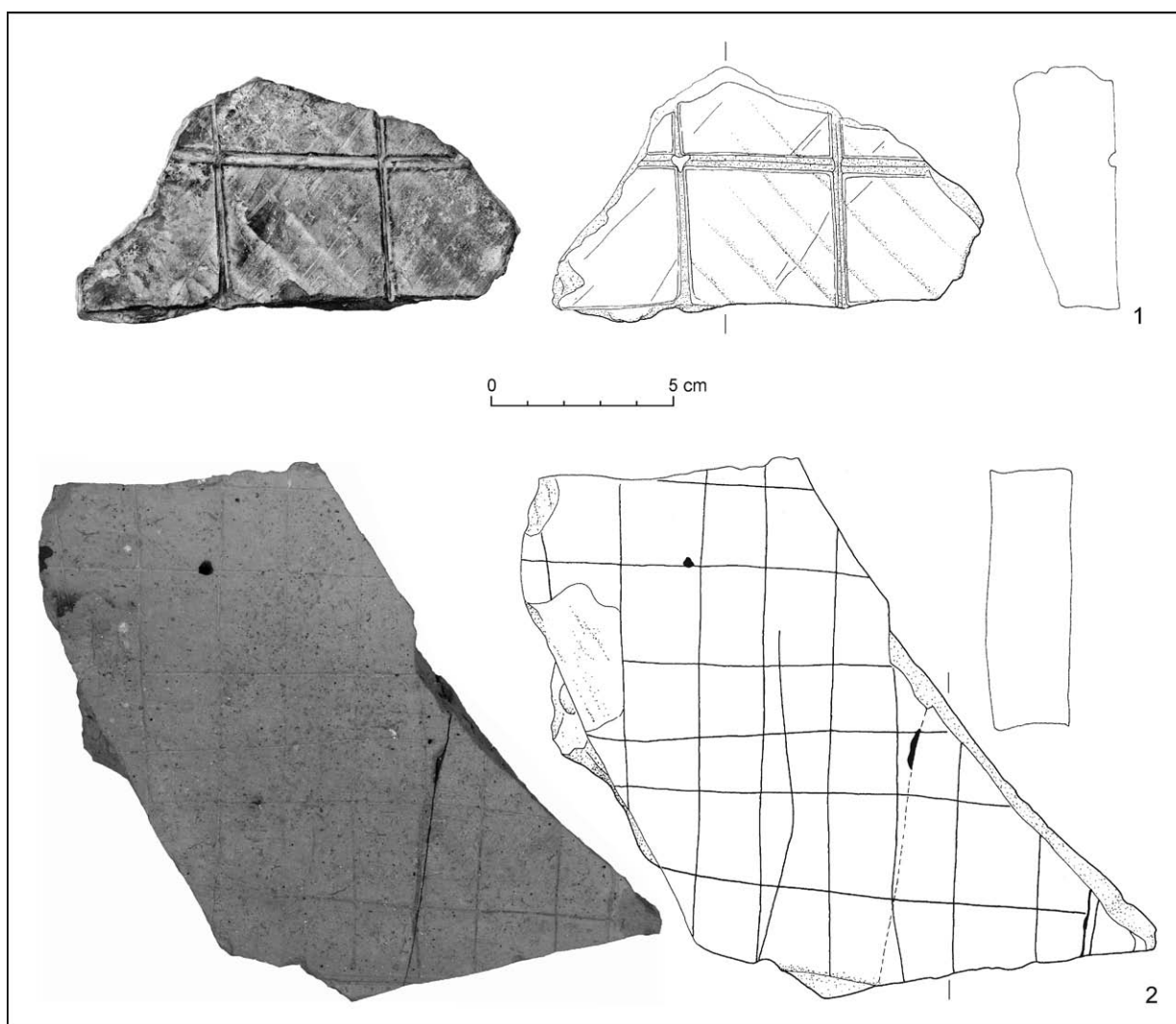


Fig. 3. Bratislava-Rusovce. Gameboards. 1 – find no. 2/possible gameboard; 2 – find no. 1/Gameboard 1. Drawing A. Balogová, photo Š. Hritz.

Find no. 2/Possible gameboard or tile 2 (inventory number 531/2016)

Possible gameboard 2 (Fig. 3: 1) was recovered within the area of the Roman *castellum* (Gerulatská Street, near the Church of Saint Mary Magdalene). However, the context of this find is unclear and lacks stratigraphic integrity, making interpretation difficult. Later disturbance cannot be ruled out.

This object is worth including in this publication because it underlines the difficulty of securely distinguishing between gameboards and tiles which were incised for other reasons. It is an elongated and irregular fragment of tile, measuring approximately 11.4 × 5.8 cm, with a thickness ranging from 2.3 to 3.2 cm. It has been fired to an orange colour. The fabric contains no small stones or visible inclusions. One surface bears a very thin (1–2 mm) grey-white

layer, probably plaster, into which regular square shapes have been incised. Six squares are partially preserved, with only one complete side surviving, measuring 4.4 cm. The engravings appear to have been made prior to firing and are visibly deeper and broader than those on Gameboard 1. While a few grid-type gameboards from Britain have cells of this size, most are smaller (Courts/Penn 2021, 2, 3, fig. 4).

Four criteria therefore suggest that this object was more likely produced as a building tile than as a gaming board: (1) the incisions were made before firing; (2) the incisions are much deeper than on Gameboard 1; (3) they appear to be partially filled with plaster; and (4) the squares are bigger than is typical for similar gameboards from elsewhere, as discussed above. While these observations do not rule out the possibility that it was later repurposed as a gameboard, such an interpretation remains

largely hypothetical. Although we remain sceptical about the use of this piece as a gameboard, it is worth presenting here, as similar tiles have been interpreted as gameboards in other parts of the empire (see *Courts/Penn* 2019, 5, 6). Future studies of grid-type gameboards in Slovakia and beyond should therefore place special emphasis on clear identification criteria to prevent confusion between gameboards and other incised tiles.

Other finds from Gerulata

Gameboard 1 is not the only gaming-related find from Gerulata, and before we continue, we will summarise the other published finds. In burials from Gerulata's Roman Cemetery II, cubic bone dice were found in graves LXXVI (two dice) and 97 (one die).³ The dice from grave LXXVI were placed in the hands of the buried child (*Pichlerová* 1981, 19, 76, 148, tab. XXXV: 1, 2; CXXI: 11). Roman Cemetery II is dated to the second half of the 1st c. AD through to the end of the 2nd c. AD. A bone die was also found inside the *castellum* on Kováčsova Street, in a context dated to the 2nd–3rd c. AD (*Schmidtová* 2012, 262, fig. 432). In addition to dice, round bone, mica, and bronze counters have also been recorded but are without context (*Schmidtová* 2012, 262, fig. 430). These finds underline that a range of gaming kit was available to the occupants of Gerulata, and the presence of dice in particular indicates that games of chance were played here. However, as we will see, the most likely game played on Gameboard 1 was a game of skill, rather than of chance.

DISCUSSION: THE GAME(S) PLAYED ON GRID-TYPE BOARDS

Grid-type gameboards (type SG after *Bell/Roueché* 2007; type 29 after *Pace/Penn/Courts* 2024, 363) are a well-known component of the ludic culture of the Roman Empire. A recent synthesis has shown that they are attested from Britain in the West to Egypt in the East (*Crist et al.* 2024, 67, fig. 4). In some areas, grid-type gameboards are particularly popular: they make up the vast majority of such items identified in Britain (*Courts/Penn* 2019), but they are apparently less common in Eastern Mediterranean sites like Aphrodisias (*Russell/Chaniotis/Wilson* 2024), Ephesus (*Schädler* 2024), and in Lycia and Phrygia (*Talloon* 2024), where they are either not attested or

only make up a small proportion of the gameboards identified. At present, the small number of published gameboards across the whole of the Roman world means that we are not able to say whether this reflects a real pattern in the popularity of the game(s) played on grids (discussed further below) through time and/or space, or simply a publication bias, since the gameboards at many sites remain to be documented.

Previous scholarship has previously associated grid-type gameboards of various sizes with the game described in Latin literature at *ludus latruncularum* or *ludus latrunculi* ('Game of the little soldiers' or 'of the bandits', see e.g., *Austin* 1934, 26; *Bell* 1979, 84–87; *Courts/Penn* 2019, 5–7; 2021, 1–3; *Murray* 1952, 33, 34; *Parlett* 1999, 234–238; *Purcell* 1995, 5; *Richmond* 1994; *Schädler* 1994; 2001). *Ludus latruncularum* is discussed explicitly or implicitly by many textual sources, particularly in Latin. It is first mentioned by name by the 1st c. BC author M. T. Varro, *Ling.* 10.22 and continues to be discussed by learned sources as late as the 7th c. AD (*Isidore*; *Origins* 18.67). It may be a descendent of an earlier Greek game known as *Polis* (for a critical review with earlier bibliography see *Nelson* 2020, 24–26). The game has been studied in detail by *U. Schädler* (1994; 2001), and key features have more recently been summarised by *W. Crist et al.* 2024. Our characterisation of the game in the following paragraphs is heavily reliant on these earlier syntheses. Four key aspects of the game can be inferred from surviving texts:

A rectilinear board. Varro, in his discussion of Latin grammar in the 1st c. BC, compares a declension table composed of horizontal and vertical lines to the board used for *ludus latruncularum* (*Varro, Ling.* 10.22). This implies that the game was played on a square or rectangular grid, though the precise dimensions remain unspecified. *U. Schädler* (2007, 361) has suggested that a declension table would typically consist of six rows – corresponding to the Latin cases – and six columns for the singular and plural forms across the masculine, feminine, and neuter genders.

Placement phase. Two sources indicate that the board was empty at the start of play. In the *Laus Pisonis* (190–208), an anonymous poem praising a man who belonged to the *gens* Piso, the game is invoked with martial symbolism (*Richmond* 1994), explicitly noting that the pieces are 'more cunningly placed'⁴ on an open board. *Isidore of Seville* (*Isidore. Etym.* 18.67) writing in the early 7th c. AD, refers to

³ At the site, the inhumation graves were numbered with Roman numerals, and the cremation graves were numbered with Arabic numerals.

⁴ 'callidiore modo'; *Laus Pis.* 192; translated by authors.

three types of pieces – or perhaps, three modes of movement: *ordine* (moving in regular fashion), *vagi* (moving freely), and *inciti* (immobile).

Orthogonal movement. Ovid (*Ov. Tr.* 2.477), states that the pieces move in straight lines.

Custodial capture. Ovid's *Tristia* (*Ov. Tr.* 2.477) also implies that a piece trapped between two enemies is captured, an unusual mechanism known in modern literature as 'custodial capture'. The same concept appears in the *Ars Amatoria* (*Ov. Ars am.* 3.358), where Ovid writes that 'when one-piece falls before a double'⁵ and in Martial's *Epigrams* (*Mart. Epig.* 14.17), we read that 'On this side of me the die scores with double sixes. On this other a piece of different colour is killed by two foemen.'⁶

Given the breadth and longevity of references to *ludus latruncularum* in Latin literature, it is very likely that many of the grid-type boards identified in the archaeological record were used for this game. However, it remains possible that some of these boards were employed for other, currently unidentified games. The limited and fragmentary nature of the textual evidence means that we cannot determine with certainty what these alternative games were, nor reconstruct how they may have been played. Published grid boards across the Roman world vary considerably in size: W. Crist *et al.*'s (2024, 65–67) synthesis of well-preserved boards showed that they ranged from six-by-six squares to eleven by sixteen squares, and some fragmentary boards also had at least seventeen cells on a side. This variety in board size has led to questions about whether all such boards were suitable for playing *ludus latruncularum*. U. Schädler's (2007) analysis of pieces laid out for a game on a lost wooden board from the mid-1st c. AD Doctor's Grave at Stanway, Colchester, England, suggests that pieces were arranged on a grid-like board, which was not used for *ludus latruncularum* and may have instead been used for an otherwise unknown Celtic game. Moreover, recent artificial intelligence simulations by W. Crist *et al.* (2024) have suggested that grid-based boards with a larger number of squares would be unsuitable for *ludus latruncularum*, as they tend to result in extremely long or even unfinishable games; U. Schädler and M. A. Hall (2024, 168, 169) have also made similar observations based on more traditional archaeological-typological methods of analysis. This could indicate that other games were

played on larger grid-type boards in some regions of the Roman world. Given that the total number of squares on either Gameboard 1 or Possible game-board/tile 2 remains unknown, it cannot be ruled out that these boards were used for games other than *ludus latruncularum*, although this remains the most likely interpretation.

It has also been suggested that grid-like boards could have been used as *abaci* (Eckardt 2017, 201, with further references). This interpretation may draw support from a passage of Pliny the Younger, who writes: 'I was often obliged to introduce calculations into the midst of my impassioned and lofty arguments and practically demand counters and a board for reckoning...'⁷ (*Plin. Ep.* 6.33.9). However, recent research into *abaci* in the ancient world has suggested that these took a very different form (Dasen/Gavin 2021). It is therefore likely that grid-layout boards were made and primarily used for the gaming, though secondary, improvised use as *abaci* cannot be excluded.

The identification of Gameboard 1 with *ludus latruncularum* is particularly appropriate given the strong connection between this game and military communities. As we have already mentioned, the very name *ludus latruncularum* itself refers to either 'little soldiers' or 'bandits'. Moreover, the *Historia Augusta* relates an incident in which the pretender Proculus (d. AD 281) was declared 'imperator' after winning ten games in a row, perhaps reflecting a connection between this game and military skill (*Hist. Aug.* 12.1–3). The popularity of this game appears to be borne out by the large number of grid-type boards which have been found in Roman military settings, particularly in Britain, Spain, and Egypt (e.g., Courts/Penn 2019; Mulvin/Sidebotham 2004, 611–603; Pace 2022b; Requena/Sala 2021). It is worth noting at this point that *ludus latruncularum* is a game of pure skill, i.e., one distinct from chance-based games played with dice (whether that involves games using dice alone, or boardgames which used dice, such as *ludus duodecim scriptorum*, a game with analogies to modern backgammon, on which see Schädler 1995). Given that dice have been recovered from Gerulata, as we saw above, it is clear that members of this community played both games of skill and of chance. Roman military life was characterised by discipline but also by long periods of waiting around for things to happen – whether on duty or otherwise – and it should therefore be seen as little surprise that soldiers, or other members of military

⁵ 'Unus cum gemino calculus hoste perit', translated by J. H. Mozley.

⁶ 'Hac mihi bis seno numeratur tessera puncto; calculus hac gemino discolor hoste perit', translated by D. R. Shackleton Bailey.

⁷ 'Intervenit [...] acribus illis et erectis frequens necessitas computandi ac paene calculos tabulamque poscendi [...]'. Translated by B. Radice.

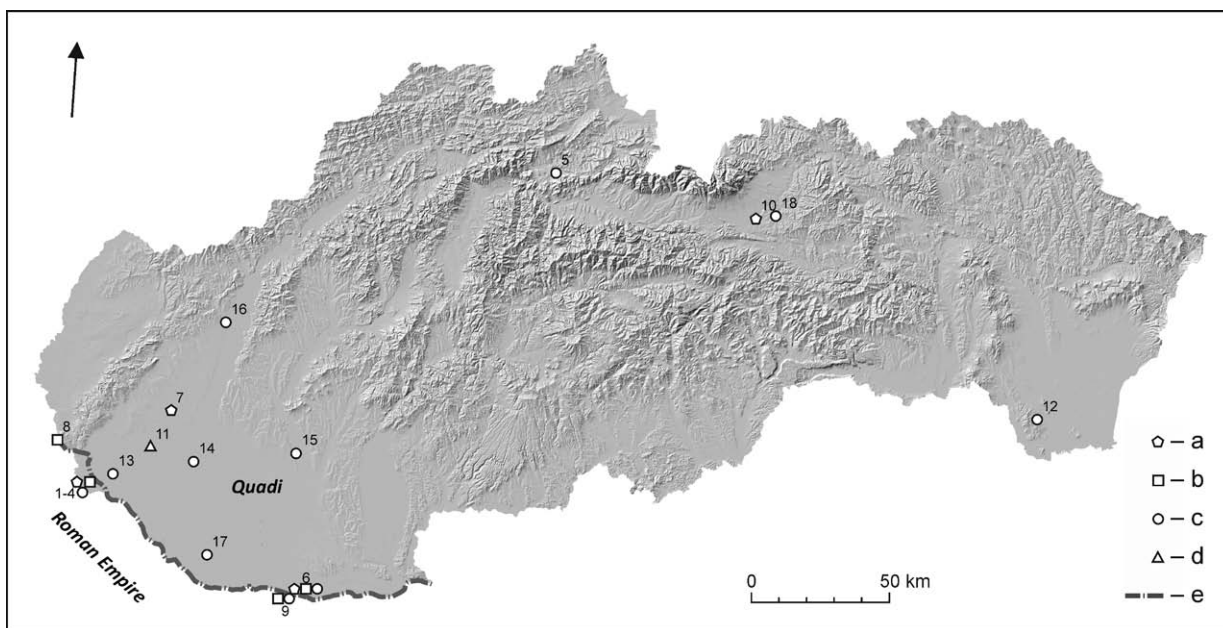


Fig. 4. Distribution of the gaming finds in Slovakia. 1 – Bratislava-Rusovce, Maďarská street; 2 – Bratislava-Rusovce, Cemetery II; 3 – Bratislava-Rusovce, Kováčova street; 4 – Bratislava-Rusovce, without context; 5 – Vyšný Kubín; 6 – Iža-Leányvár; 7 – Cífer-Pác; 8 – Bratislava-Devín; 9 – Komárom-Brigetio; 10 – Poprad-Matejovce; 11 – Kostolná pri Dunaji; 12 – Cejkov; 13 – Dunajská Lužná; 14 – Čierny Brod; 15 – Branč; 16 – Krakovany-Stráže; 17 – Veľký Meder; 18 – Kežmarok-Vrbov. Legend: a – gameboards; b – dice; c – tokens/counters; d – others; e – frontier of the Roman Empire.

communities with whom they were associated, were keen gamers: gaming activities must have played an important role in structuring free time among Roman military communities.

THE LOCAL CONTEXT: ROMAN-PERIOD GAMING FINDS IN SLOVAKIA

Few gaming-related finds from the Roman period have been published from Slovakia, and in this section, we will provide a first survey of published material in order to meet this gap. Finds have been recovered from both Roman sites and sites inhabited by Germanic populations (Fig. 4). It is likely that Roman-period gaming material began to arrive in Slovakia before or very shortly after the Roman annexation: The earliest glass playing piece in the region was found at the Vyšný Kubín settlement, dating to the end of the La Tène period and the beginning of the Roman period (Hrnčiarik 2013, 165, tab. LXXXVIII: 2274). We have already seen that some gaming-related finds have been published from Gerulata. Further evidence for finds from sites within Roman territory includes:

1. Finds of one die (now lost) as well as round, conical and flat bone counters have been reported at

Iža (the ancient Roman camp/fort of Kelemantia). In total, seven counters have been found in various parts of the fort and are dated roughly from the late 2nd to the 4th c. AD (Hrnčiarik 2015, 66, 67; 2017, 72, 73, 130, pl. XIV: 195–201). An as-yet-unpublished gameboard, scratched on a *tegula*, also comes from the same site (Kolón 2024).

2. A gameboard of similar design to our Gameboard 1 was engraved on a brick or tile from the sunken-featured building 58 at the Roman-period site at Cífer-Pác – probably an productive installation (weaving weights were also found there), dating to the 4th c. AD (as Roman coins from that century were found at the site), along with fragments of Roman brick (Varsik/Kolník 2021, 114–119, 220, fig. 169: 4; tab. 6).
3. Three bone cubic dice and 17 round bone counters are housed in the museum in Komárno. Their precise origin is uncertain, but they most likely come from the Roman camps at Brigetio (Komárom) and/or Kelemantia (Iža-Leányvár; Hrnčiarik 2012, 36–38, 76–78, 92, tab. XVII).⁸
4. A die of unspecified material recovered from a Roman-period site of poorly understood function at Bratislava-Devín (Hrnčiarik 2002, 139).

This small collection of material – to which we hope to add in future – indicates that there

⁸ The documentation for these finds is lost.

is a correlation between military communities and gaming in Roman Slovakia, with finds from a range of military bases or their surrounding settlements – Kelemantia and possibly Brigetio (nos. 1, 3). This pattern of findspots is similar to the general pattern of finding gaming material on military sites in other parts of the Roman Empire (Courts/Penn 2019; Mulvin/Sidebotham 2004; Pace 2015; 2020; 2024; 2025, and further reference above). However, non-military settlements also feature gaming finds, as at Cífer-Pác (no. 2) and possibly Bratislava-Devín (no. 4), which reminds us that gaming was not only practised by soldiers, even if soldiers may have been particularly avid gamers. It is also worth noting that few glass counters (discussed further below) have so far been published from Roman-held territory in Slovakia, though it is likely that this is a publication bias, as no doubt much Roman material remains to be studied.

The most famous example of a gameboard from Slovakia in this era is from a princely grave at Poprad (mentioned above), located outside the Roman Empire, which can be dated to AD 375 or later based on the inclusion of a coin of Valens (Lau/Pieta 2014, 360, 361; Lau/Pieta/Štolcová 2022; Schädler/Hall 2024, 162). Unusually, this board was made of wood and featured a grid of approximately 15 by 17 squares. As noted above, the work of W. Crist *et al.* (2024) suggests that boards of this size may have been unsuitable for playing *ludus latrunculorum*, raising doubts as to whether the Poprad board reflects the same type of game being played both within and beyond the boundaries of the Roman world. The gameboard was found with six plano-convex counters, made of dark green and opaque white glass (Pieta/Štolcová 2021, 59). Other finds from non-Roman (barbaric) contexts include:⁹

5. A possible bone stick die from a Germanic urn grave at Kostolná pri Dunaji, dated to the 1st c. AD (Kolník 1959, 150).¹⁰
6. Eighteen (or possibly 19) probably planoconvex glass counters of various colours were also found in a rich grave at the Cejkov site, dated to the end of the 3rd and beginning of the 4th c. AD (Beninger 1931, 192, 193; Hrnčiarik 2013, 165; Krekovič 1987, 267).
7. A flat circular bone counter was recovered from a Roman-period hoard at Dunajská Lužná, which also included bone, stone, clay, and iron objects, as well as a bronze vessel. The hoard is

dated by the vessel to phases B2/C1 and C1a (i.e., second half of the 2nd c. AD; Bazovský 2010, 23, fig. 7: 12, 15–27; Miklíková 2010, fig. 9).

8. A bone counter was also found in a Germanic urn grave at Čierny Brod (phases C2–D1; Kolník 1975, 347, fig. 7: 14), while one (or possibly two) clay counters were discovered at the settlement in Branč (Kolník/Varsík/Vladár 2007, 94, tab. XXXIX: 7, 8).
9. Gaming counters were also found in the elite grave II at Krakovany-Stráže. Twenty-four milk-white and 11 plano-convex black counters made of glass paste were discovered. The burial is tentatively dated to the 3rd c. AD (Hrnčiarik 2013, 165, tab. LXXXVIII: 1074; Krupa/Klčo 2015, 75, 114, fig. A-281).
10. A small stone counter was found in a Roman-period context at Veľký Meder (Mitáš/Bobek 2021), and a bone counter was also recovered from an urn grave (Kolník 1975).
11. A glass counter was found at the 4th c. settlement site of Kežmarok-Vrbov (Giertlová/Soják 2005, 114; Hrnčiarik 2013, 165, tab. LXXXVIII: 2374).

Most of these finds might be linked with play, though some caveats are necessary. Stick dice (found at Kostolná, no. 5) are common finds on pre-Roman Iron Age sites (Kerschner 2025), but remained in use in the early imperial period, including within the territory of Roman and some have been found inside the empire too (e.g., Lamburgo/Bianchi 2016, 71, fig. 2; Mikler 1997, 32). While interpretation of this find remains tentative, it is possible that it reflects indigenous gaming habits. Bone counters (found at Dunajská Lužná, no. 7 and Čierny Brod, no. 8) are generally assumed to be used for play but could have functioned as inlays or been used in accounting. They are often also published as spindle whorls if they have perforations. Stones (as at Veľký Meder, no. 10) are often interpreted as gaming counters though the grounds for this are often unclear (see this article, note 5). Similarly, there has been considerable debate about the use of glass counters (Cejkov, no. 6; Kežmarok-Vrbov, no. 11; Krakovany-Stráže, no. 9) for play in Roman-controlled territory, especially in the centre of the empire: a variety of methodologies for identifying the ones which would have been used for play have been put forward, including by drawing comparisons between colour and di-

⁹ In our analysis, we do not include finds of river stones (pebbles) in Germanic graves because we cannot be sure they were used for games, despite the fact that they are sometimes considered to be playing stones.

¹⁰ The original publication suggests this object – a parallelepiped, slightly bent bone shank with dot-in-circle motifs on at least two sides, both with five dots, though the object appears to be partially broken – was an awl, though similar objects elsewhere, typically with different numbers of dots on each side, are interpreted as flat dice (Kerschner 2025). It was not possible for the authors to inspect this item in person.

ameter of examples from securely identified sets (Cool 2016), and through association with dice (Pace 2022a). U. Schädler and M. A. Hall's survey of finds from the *Barbaricum*, which made no claim to being exhaustive and does not include the material from Slovakia, has noted that glass counters are commonly found outside the Roman Empire (Schädler/Hall 2024), and it is possible that some of these finds – like the ones from the Slovakian *Barbaricum* – were made in Roman territory before being exported, though this remains to be confirmed (e.g., by chemical analysis).

It is important to underline that we do not know which games these elements of the gaming kit were used for. J. Werner (1973) suggested that graves in the *Barbaricum* containing Roman-style gaming kit belonged to people who had spent part of their lives within the Empire. This may be true in some cases but not in all of them. Other possible modes of transmission include as booty taken during cross-border raiding (Schädler/Hall 2024, 167–169) and trade, as counters are small, cheap and easy to produce and transport, but can be visually appealing and can be used for several purposes, gaming-related and otherwise. Some of these modes of transmission – particularly violent plunder, but possibly also down-the-line exchange – would not necessarily have been compatible with playing the same games, such as *ludus duodecim scriptorum* and *ludus lantruculorum*, attested in our Roman textual sources. Therefore, the presence of Roman-style gaming kit such as boards, counters, and dice, in non-Roman contexts reflects the adoption of a shared material culture across borders, but this does not need to imply the adoption of Roman games and it is entirely possible that Germanic people used similar material culture in order to play very different games (Schädler/Hall 2024, 165–167).

This review of finds from non-Roman contexts in Slovakia suggests that many (but not all) gaming items were found at relatively elite sites, which underlines the prestige associated with access to Roman-style gaming materials. This is in line with broader patterns of gaming material recovered from elsewhere in the *Barbaricum* (Schädler/Hall 2024), though A. Widura (2015) observes that not all gaming kit from sites outside Roman territory belongs to elite contexts. It may well be then that part of the pattern we are seeing is one of visibility, i.e., that higher-status sites, and higher-status graves, are more visible to us in the archaeological record.

Taken together, the evidence presented in this section suggests that gaming items widely circu-

lated in Roman-period Slovakia; further research aimed at identifying and analysing the social distribution of such material from Roman sites in Slovakia would be highly valuable, as it would have further potential to cast light on the social role of games in Roman Slovakia and neighbouring regions of the *Barbaricum*.

THE BROADER CONTEXT: ROMAN-PERIOD GAMING FINDS IN PANNONIA AND ITS NEIGHBOURS

Southwestern Slovakia, where Gerulata is located, should be understood within the broader context of the Roman province of Pannonia, to which it belonged in antiquity. It is therefore necessary to briefly consider the wider pattern of gameboard finds from elsewhere in Pannonia and the Danubian region more generally. As in Slovakia, few gameboards from this area have been published, though important and recent work by L. Dobosi (2025) in Hungary has identified grid-type boards like our Gameboard 1 at:¹¹

- A site near Arrabona (Győr),
- Aquincum (a Roman military base and later city),
- Brigetio (a military base and urban centre),
- Intercisa (another military campus and associated town, now modern Dunaújváros),
- Sárvár (a road station),
- Szabadbattyán (in the baths of a 4th c. villa).

Moreover, from the 4th c. AD Roman port of Dunakeszi (again in Hungary), comes another *tegula* bearing a post-firing engraved grid, just like our Gameboard 1 (Mráv 2011, 47, fig. 52: 5).

Three fragmentary grid gameboards scratched onto tiles and one on stone were probably recovered in the territory of Carnuntum in Austria. These comprise:

- Tile bearing grid-type gameboard, Lower Austria State Collections Online inventory number CAR-K-3550 (which is currently on display in the exhibition in the visitor centre at Petronell-Carnuntum; Hummer Hrsg. 2009, 158, fig. 591);
- Tile bearing grid-type gameboard, CAR-K-3551 (Hummer Hrsg. 2009, 158, fig. 592),
- Tile bearing grid-type gameboard, CAR-K-1676 (Beutler et al. Hrsg. 2017, 354, 355, fig. 716),
- Stone slab bearing grid-type gameboard, CAR-S-1916 (currently on display in the exhibition in Museum Carnuntinum in Bad Deutsch-Altenburg).

¹¹ We thank Linda Dobosi for sharing information about these finds in advance of publication.

The precise findspots of these objects have not yet been identified. Moreover, as many as five further unpublished grid-type gameboards have been recovered at *Carnuntum*.¹² These latter gameboards underline the strong connection between military communities and boardgames.

Beyond Pannonia, tile boards featuring grid patterns, as well as designs for other games (such as nine men's morris), have been recorded at sites in Dacia (*Mihăilescu-Bîrliba* 2016; *Paki/Cociş* 1993), Moesia Inferior (*Nutu/Botan* 2009), and Moesia Superior (*Janković* 2008–2009). However, as *U. Schädler* and *M. A. Hall* (2024, 162) have noted, such gameboards do not appear to be attested beyond the boundaries of the Empire. The fuller implications of these observations will need to be unpacked in subsequent contributions, but for now it suffices to note tile boards are, as we have outlined in this article, specifically associated with military (and sometimes urban) contexts, which are more likely to have had dedicated tile-making facilities nearby. These boards were manufactured for use by people who have access to tile manufacturing technology (i.e., the tilery workers themselves) or their wider customer base. It is important to emphasise here that most tiles were made for use in building, but making a few tile gameboards might have been an attractive sideline or simply a way to pass the time. The end products would have been relatively heavy and do not appear to have travelled outside of Roman territory. Since tile manufacturing was not common outside the Roman Empire, it is unlikely that tiles on gameboards would be made locally in the *Barbaricum*, and the absence of bulky ceramic boards outside of the Empire is probably in part because such boards were heavy and impractical to transport over long distances from their point of manufacture. Tile boards may also have been unattractive exports given that grid designs were so simple to produce that they could easily be manufactured in the *Barbaricum* on other materials, possibly perishable ones like wood. Smaller, more portable elements of gaming-related material culture, such as dice and counters, could be either manufactured in Roman lands and exchanged out of the Empire or manufactured in the *Barbaricum* itself.

CONCLUSIONS

The gameboard(s) from Gerulata offer(s) a rare glimpse into the material culture of play along the Slovakian sector of the northern frontier of the Roman Empire. The layout and archaeological context of Gameboard 1 in particular support a tentative identification as a *ludus latrunculorum* board – a strategic game whose associations with martial thinking and discipline – resonate strongly in a military setting, though the identification of Possible gameboard/tile 2 must be handled with greater care as there is much potential for building tiles to be mis-identified as gameboards due to their morphological similarities. The presence of at least one gameboard at Gerulata, as well as other gaming materials such as dice and counters, underlines that gaming was part of the social fabric of this military community at the end of the Empire. This observation adds nuance to our understanding of life in a frontier fort, where leisure, training, and socialisation were often closely intertwined.

The evidence from Gerulata – and from the wider region – also highlights the potential for further work on ancient gaming in Roman Slovakia and its neighbours. While scattered parallels exist across the region, they remain underexplored in the scholarly literature. The Gerulata board encourages us to bring these materials into sharper focus – not only through typological analysis, but by considering their broader implications for the study of frontier society and regional identities. The data which we have gathered in this contribution suggest that games were widely played in Pannonia – particularly in military contexts, and this correlates well with what we know about gaming in military contexts in other parts of the Roman Empire. Moreover, the presence of portable material in elite sites outside Roman territory strongly suggests that possession and use of elements of Roman-style gaming culture held value among Rome's Germanic neighbours, though this does not mean that the games being played with this material culture were necessarily Roman-style in and of themselves. In sum, future research on the material culture of gaming of the Northern Carpathian basin area promises to enrich our understanding of both Roman games and the cultural landscape of the region.

¹² Many thanks go to Katarína Tökölyová (Römerstadt Carnuntum) for sharing information about these finds.

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Herná doska z Gerulaty (Bratislava-Rusovce) v kontexte nálezov hier z rímskeho obdobia na severe Karpatskej kotliny

Tim Penn – Branislav Kovár – Bohuslav Šebesta

SÚHRN

Výskumu doskových hier, až na niekoľko výnimiek, sa v slovenskej archeológii nevenovala veľká pozornosť, hoci hranie hier bolo (a stále je) dôležitou ľudskou činnosťou. Nález drevenej hracej dosky v bohatom hrobe v Poprade, mimo územia Rímskej ríše, však ukazuje, že interakcia medzi Rímskou ríšou a barbarikom sa nemusela nevyhnutne obmedzovať na vojnu a obchod – cez hraničné kultúrne interakcie mohli zahŕňať aj hry.

Nedávny výskum v iných častiach rímskeho sveta zdôraznil význam publikovania nálezov súvisiacich s hrami v ich archeologickom a sociálnom kontexte. Príspevok sa snaží vyplniť medzeru v bádaní analýzou nálezov hracej a novej hracej dosky z lokality Bratislava-Rusovce (antická Gerulata), ktoré sa našli počas záchranného archeologického výskumu, realizovaného v rokoch 2014–2016 v súvislosti s výstavbou kanalizácie a rekonštrukcie vodovodu v bratislavskej mestskej časti Rusovce (Gerulatská, Irkutská a Maďarská ulica; Šebesta et al. 2017; Žák Matyasowszky et al. 2015).

Počas výskumu sa podarilo identifikovať veľké množstvo archeologických objektov, ktoré, žiaľ, vzhľadom na rozsah prác a obmedzenia vyplývajúce z prebiehajúcej výstavby, nebolo možné v úplnosti preskúmať. Medzi odkrytými objektami boli priekopy, murované štruktúry, podlahové plochy a podobne, ako aj hroby z doby rímskej a z neskorších období. Takmer všetky vykopané objekty súvisia s rímskym *castellum* Gerulatou (Šebesta et al. 2017; Žák Matyasowszky et al. 2015). *Castell* bol osídlený od konca 1. stor. do 4. stor. n. l., avšak väčšina nálezov odkrytých počas záchranných výkopov v rokoch 2014–2016 patrí do 2. a 3. stor. n. l. V bezprostrednom okolí Gerulaty sa nachádzala civilná osada a početné pohrebiská z rímskeho obdobia (Schmidtová 2012; Varsik 2012a).

Prvá hracia doska (1) bola vyrytá na *tegulu* (obr. 3: 2), na druhej dlaždici (2) sa rovnako nachádza vyrytá mriežka, hoci je pravdepodobné, že v tomto prípade skôr súvisí s použitím dlaždice pri stavbe (obr. 3: 1). Hracia doska 1 bola v minulosti publikovaná v katalógu výstavy *Rimania a Slovensko* (Kucharík ed. 2021, 181), nebola však podrobená detailnej analýze. Predmet má približne lichobežníkový tvar, rozmery 13 × 12 × 16 × 7 cm, hrúbka sa pohybuje od 2,2 do 2,7 cm. Bol vypálený do oranžovej farby. Jedna strana bola vyhladená, zatiaľ čo na opačnej strane sú viditeľné odtlaky rastlín. Na základe tvaru a zloženia sa predmet javí ako fragment rímskej tehly alebo *teguly*. Do vyhladeného povrchu bola po vypálení plytko vrezaná hracia plocha. Hracia doska pozostáva z mriežky s rozmermi najmenej 7 × 8 štvorcov – čiastočne sa zachovalo 44 štvorcov. Zdá sa, že hracia doska 1 bola vyrytá až po vypálení. Približne v jej strede je viditeľná chybné nakreslená čiara. Plytkosť

zárezov naznačuje, že čiary mali byť viditeľné, ale neplnili konštrukčnú funkciu.

Možná hracia doska 2 je podlhovastá a nepravidelná, s rozmermi približne 11,4 × 5,8 cm a hrúbkou od 2,3 do 3,2 cm. Bola vypálená do oranžovej farby. Na jednej jej strane je veľmi tenká (1–2 mm) sivobiela vrstva, pravdepodobne omietka, do ktorej boli vrezané pravidelné štvorcové tvary. Zdá sa, že ryhy vznikli pred vypálením a sú viditeľne hlbšie a širšie ako na hracej doske 1. Zatiaľ čo niekoľko hracích dosiek mriežkového typu z Británie má políčka tejto veľkosti, väčšina z nich je menšia (Courts/Penn 2021, 2, 3, obr. 4). Skutočnosť, že zárezy boli urobené pred vypálením, spolu s ich hĺbkou a veľkosťou políčok naznačuje, že tento predmet bol pravdepodobne vyrobený ako stavebná dlaždica. To síce nevylučuje možnosť, že bol neskôr opätovne použitý ako hracia doska, ale takáto interpretácia zostáva do značnej miery hypotetická.

Z Rusoviec poznáme ďalšie nálezy, ktoré súvisia s hrami. Z pohrebiska II z doby rímskej pochádzajú kostené hracie kocky (druhá polovica 1. stor. až koniec 2. stor. n. l.; Pichlerová 1981, 19, 76, 148, tab. XXXV: 1, 2; CXXI: 11). Kostená kocka sa našla aj na Kováčovej ulici, v kontexte datovanom do 2.–3. stor. n. l. (Schmidtová 2012, 262, obr. 432). Okrem kociek boli zaznamenané aj kostené, sľudové a bronzové žetóny, ktoré sú však bez kontextu (Schmidtová 2012, 262, obr. 430).

Hracie dosky mriežkového typu (typ SG podľa Bell/Rouche 2007, 108; typ 29 podľa Pace/Penn/Courts 2024, 363) sú známou súčasťou ludickej kultúry Rímskej ríše. Nedávna syntéza ukázala, že sú doložené od Británie na západe až po Egypt na východe (Crist et al. 2024, 67, obr. 4). V niektorých oblastiach sú hracie dosky mriežkového typu obzvlášť obľúbené: tvoria prevažnú väčšinu takýchto predmetov identifikovaných v Británii (Courts/Penn 2019), ale zrejme sú menej časté v lokalitách východného Stredomoria.

Predchádzajúce vedecké práce už skôr spájali hracie dosky mriežkového typu rôznych veľkostí s hrou opísanou v latinskej literatúre v *ludus latrunculorum* alebo *ludus latrunculi* („hra malých vojakov“ alebo „hra banditov“; pozri napr. Austine 1934, 26; Bell 1979, 84–87; Courts/Penn 2019, 5–7; 2021, 1–3; Murray 1952, 33, 34; Parlett 1999, 234–238; Purcell 1995, 5; Richmond 1994; Schädler 1994; 2001). Hru môžeme pravdepodobne, vzhľadom na nálezy a zmienky v písomných prameňoch, spojiť s vojenskými spoločenstvami. Je však možné, že niektoré z nálezov hracích dosiek sa používali aj na iné, v súčasnosti neidentifikované hry. Tiež sa predpokladá, že niektoré mriežkovité dosky mohli byť použité aj ako *abakus* (Eckardt 2017, 201, s ďalšími odkazmi).

Z územia Slovenska poznáme viacero lokalít z doby rímskej, kde sa podarilo nájsť kocky, hracie kamene/toke-

ny alebo hracie dosky (obr. 4). Najznámejšia hracia doska z dreva sa našla v hrobe príslušníka germánskej elity z konca 4. stor. v Poprade (*Lau/Pieta* 2014, 360, 361; *Lau/Pieta/Štolcová* 2022; *Schädler/Hall* 2024, 162).

Hracie dosky vyryté na rímskej *tegule* poznáme z územia Slovenska z dvoch lokalít – z Iže (*Kolón* 2024) a z lokality Cífer-Pác (*Varsik/Kolník* 2021, 114–119, 220, obr. 169: 4; tabe-la 6). V oblasti Carnunta poznáme ďalšie tri nálezy hracích dosiek vyrytých na tehľách/*tegulách* alebo na kameni (*Beutler et al. Hrsg.* 2017, 354, 355, obr. 716; *Hummer Hrsg.* 2009, 158, obr. 591; 592). Okrem toho sa v Carnuntume našlo ešte päť ďalších nepublikovaných hracích dosiek mriežkového typu (pozri vyššie).

Obr. 1. Bratislava-Rusovce (Gerulata), Maďarská ulica, územie Slovenska. Lokalizácia nálezu hracej dosky.

Obr. 2. Plán stavby/výskumu a miesta vyzdvihnutia nálezov herných dosiek. Legenda: a – hracia doska; b – ryha; c – prvá stavebná etapa kastela (1.–2. stor.); d – tretia stavebná etapa kastela (koniec 3.–4. stor.); e – číslo objektu.

Obr. 3. Bratislava-Rusovce. Doskové hry. 1 – nález č. 2/otázna dosková hra; 2 – nález č. 1/dosková hra. Kresba A. Balogová, foto Š. Hritz.

Na území Panónie bolo publikovaných len málo hracích dosiek, hoci dôležitá nedávna práca *L. Dobosi* (2025) identifikovala hracie dosky mriežkového typu podobných hracej doske 1 z Rusoviec na týchto lokalitách (alebo v ich blízkosti) z doby rímskej: Arrabona (Győr), Aquincum, Brigetio, Intercisa (dnešný Dunaújváros), Sárvár, a Szabadbattyán. Z lokality na Dunaji v Dunakeszi (Maďarsko) pochádza ďalšia *tegula* s mriežkou (*Mráv* 2011, 47, obr. 52: 5).

Nález hracej dosky z lokality Rusovce nám pomôže pochopiť život na hraniciach Rímskeho impéria. Zároveň veríme, že naša analýza upriami pozornosť výskumu na ďalšie podobné nálezy z územia severu Karpatskej kotliny, ktorých identifikáciu v budúcnosti predpokladáme.

Obr. 4. Nálezy súčastí hier/herných súčastí na území Slovenska. 1 – Bratislava-Rusovce, Maďarská ulica; 2 – Bratislava-Rusovce, Pohrebisko II; 3 – Bratislava-Rusovce, Kováčova ulica; 4 – Bratislava-Rusovce, bez kontextu; 5 – Vyšný Kubín; 6 – Iža-Leányvár; 7 – Cífer-Pác; 8 – Bratislava-Devín; 9 – Komárom-Brigetio; 10 – Poprad-Matejovce; 11 – Kostolná pri Dunaji; 12 – Cejkov; 13 – Dunajská Lužná; 14 – Čierny Brod; 15 – Branč; 16 – Krakovany-Stráže; 17 – Veľký Meder; 18 – Kežmarok-Vrbov. Legenda: a – hracia doska; b – kocky; c – tokeny/žetóny; d – ostatné; e – hranica Rímskej ríše.

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RÍMSKA PRILBA Z GERULATY (BRATISLAVA-RUSOVCE)

Výsledky chemického a mineralogického výskumu korózných produktov

IGOR PETRÍK – † LUBOMÍR SMRČOK –
LADISLAV SNOPKO – JAROSLAVA SCHMIDTOVÁ

Roman Helmet from Gerulata (Bratislava-Rusovce). Results of the Chemical and Mineralogical Investigation of Corrosion Products. The paper presents results of the mineralogical and chemical research of parts of the Roman helmet found in the Roman military camp Gerulata (present day Bratislava-Rusovce, Slovakia). The parade cavalry helmet is richly decorated and represents a highly valuable piece of metalwork. The chemical and mineralogical research of the detached part of neck guard, fragments of the left cheek and the helmet body have shown its composite character: the helmet is made of brass, the cheek is made of bronze. The fragment of neck guard (collar) shows a technique of its welding to the main helmet body. Patina of the brass collar has already been mineralogically characterised – the minerals identified in are brochantite, atacamite, malachite, simonkolleite (?) and nantokite. Our research of patina minerals and minerals of secondary coatings from five small helmet fragments revealed that the fragments of the left cheek are decomposed to layers of cuprite and secondary Sn-oxide and covered by secondary patina coating. Chemical compositions of the analysed small fragment domains indicate the similar mineralogy as in the collar (cuprite, atacamite, brochantite, malachite). The composite character of the helmet points both to common use of the brass in Roman metalwork workshops and to probable recycling of the valuable metal materials by craftsmen.

Keywords: Slovakia, Gerulata, Roman period, brass, bronze, patina, Cu, Zn secondary minerals, archeometry.

ÚVOD

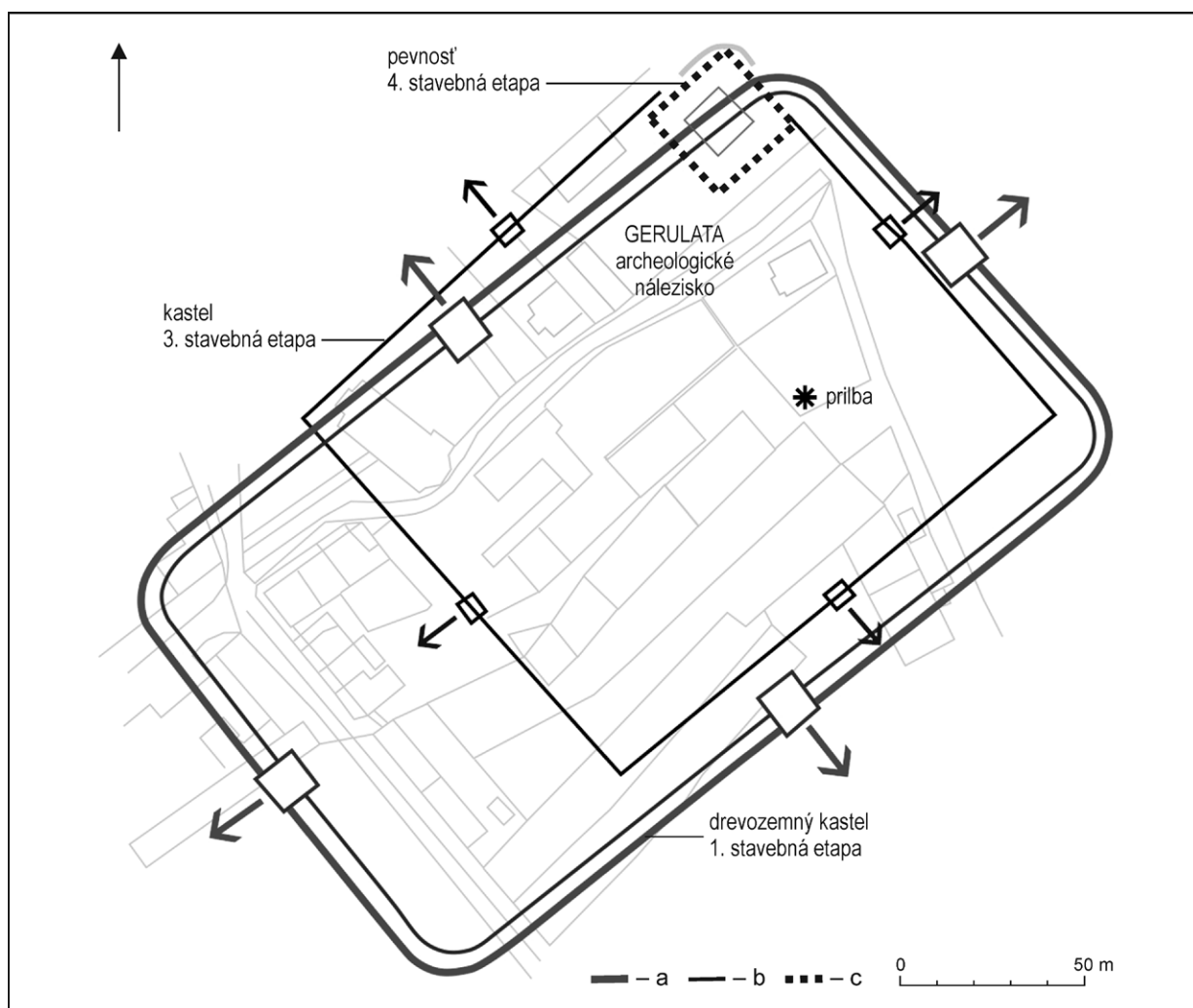
V r. 1978 sa v Rusovciach v záhrade rodinného domu oproti múzeu (parcela 112) našla rímska prilba (obr. 1). Nález sa nachádzal 136 cm pod úrovňou terénu (Krekovič/Snopko 1998), v deštrukčnej vrstve so zlomkami rímskych tehál, vykurovacieho zariadenia, neopracovaných lomových kameňov, fragmentov prepálenej keramiky a hliny zmiešanej s popolom. Prilba je deformovaná. Je možné, že úderom, ale pravdepodobnejšie aj tlak deštrukčných vrstiev. Zachovala sa takmer celá. Skladá sa z troch častí – z vlastného tela prilby a dvoch prinitovaných lícníc, z ktorých ľavá lícnica je neúplná. Výšku odhadujeme na 28–29 cm (obr. 2).

Stav, v ktorom sa našla, umožnil odobratie niekoľkých vzoriek bez ďalšieho poškodenia. Odber sa uskutočnil v máji 1979. Predbežný výskum ukázal rôzne produkty korózie na fragmentoch, ktoré indikovali rozdielne zloženie použitých kovov. Vzhľadom na nedostupnosť vhodných metód sa však prvý detailný výskum uskutočnil až v r. 2009 (Smrčok a i. 2010). Čisto analyticko-mineralogický charakter tejto práce podnietil autorov k predloženiu širšej interpretácie, zaujímavejšej z archeologického hľadiska. V práci dokumentujeme mineralogické zloženie dvoch typov patiny a tiež kompozitný charakter prilby z mosadze i bronzu.

PRILBA Z GERULATY V KONTEXTE INÝCH ZNÁMYCH NÁLEZOV RÍMSKÝCH PRILIEB

Prilba spolu s pancierom a štítom tvorili obrannú výzbroj rímskych vojakov. Názvy prilieb sú v Británii typologicky rozdelené podľa H. R. Robinsona (1975), na kontinente sú odvodené od miesta ich nálezu (Goldsworthy 2010, 121). Ich prioritnou funkciou bola ochrana hlavy a temena. Pre rímske prilby bolo typické, že nezakrývali tvár a uši, pretože vojaci potrebovali nielen vidieť, ale aj počuť rozkazy. V období pred zlomom letopočtu sa objavujú v rímskej armáde dva základné typy, galský a italicý typ, ktoré nosili prevažne legionári. Prilby pomocných zborov sa od legionárskych výrazne nelíšili, častejšie však boli z bronzu ako zo železa. Prilby jazdy sa od pechoty líšili tvarom, mali viac kónický alebo hruškovitý tvar, tylová ochrana bola skrátená tak, aby sa jazdec pri páde neporanil (Fischer 2012, 333; Goldsworthy 2010, 137).

Nález z Gerulaty patrí medzi ceremoniálne (honosné) prilby auxiliárnych jazdeckých jednotiek pseudoatického typu Guisborough. J. Garbsch ich rozdelil do dvoch skupín, a to s pohyblivými lícnicami a s pevným rámom tvárovej časti (Garbsch 1978, 7). Avšak, autor upozorňuje na nebezpečenstvo predčasných typológií, keďže je známych len sedem



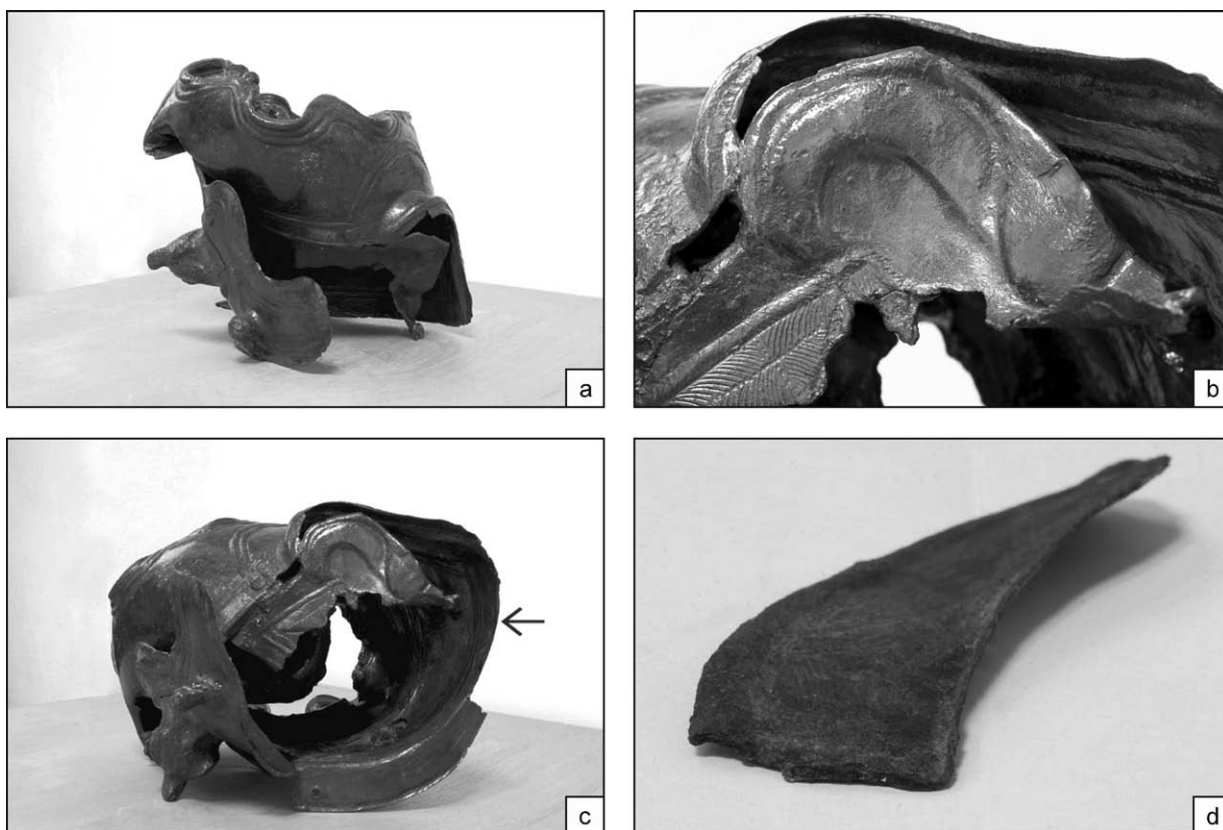
Obr. 1. Bratislava-Rusovce. Rímsky tábor Gerulata s vyznačením miesta nálezu prilby. Legenda: a – drevozemný kastel 1. stavebnej etapy. Rozmery 240×145 m. Šípky naznačujú brány. Doba trvania: Domitianus (81–96) až koniec vlády Antoninovcov (170–192); b – kastel 2. stavebnej etapy má čiastočne spoločné fortifikácie s 3. stavebnou etapou. Rozmery tábora 2. stavebnej etapy nie sú známe. Šípky označujú brány kastela 3. stavebnej etapy. Doba trvania: Commodus (176–192) až Aurelianus (270–275). Tretia stavebná etapa má rozmery 150×150 m; c – neskorantická pevnosť 4. stavebnej etapy. Rozmery približne 30×30 m. Doba trvania: Povalentiniánovská éra po r. 380 (podľa Baxal/Ferušová 2002, upravil I. Petřík).

exemplárov takmer úplne zachovaných prilieb typu Guisborough. Ide o lokality Bratislava-Rusovce, Cetate-Războieni, Chalon-sur-Saône, Guisborough, Theilenhofen, Vetren a Worthing.

Charakteristickou črtou prilby z Bratislavy-Rusoviec je plastická výzdoba zvieracími motívmi ako orly, hady, morská príšera a hlavy neznámych zvierat, možno korytnačiek. Orol dominuje v každej časti, najväčší je usadený na vrchole a je v obkľúčení morskej príšery s hadím telom. Motív hada je na ohraničení hornej časti prilby, kde budí dojem koruny. Hady ovíňajú aj hlavy korytnačiek (?) v jej zadnej časti. Orol s hadom okolo nôh sa nachádza aj na lícniciach a jemne ryhované hadie telá vyplňajú všetky plošné rozhrania. Spomedzi zachovaných kusov má prilba z Bratislavy-Ru-

soviec na sebe najviac rytých motívov. Na čelnej strane stojí nahý Mars s kopijou a štítom. Po jeho stranách sú dve Viktórie s vavrínovými vencami, ktoré stoja na polmesiaci. Spodok čelnej časti zdobí pás tvorený rastlinnou výzdobou. Na boku prilby sú dve ďalšie ryté Viktórie, resp. okrídlené bytosti. Na zadnej časti sa tesne pod vlnovkami hadích tiel nachádza lovecký výjav, na ktorom je bežiacia Diana v krátkom loveckom plášti s oštepom na ľavom pleci. Tri psy prenasledujú tri zajace. Diana je venovaná aj obetný oltár s horiacim ohňom v pozadí.

Po vydaní katalógu k výstave o prilbách, autorom ktorého je J. Garbsch (1978), sa pridalo ďalších šesť nálezov pseudoatických prilieb: Carnuntum v Rakúsku (Stiglitz 1987, 130–133), Doboj v Bosne



Obr. 2. Bratislava-Rusovce (Gerulata). Rímska prilba. a – celkový pohľad; b – detail ľavej lícnice; c – pohľad zospodu, šípka ukazuje miesto odpadnutého fragmentu goliera; d – oddelený fragment goliera. Foto F. Šimko.

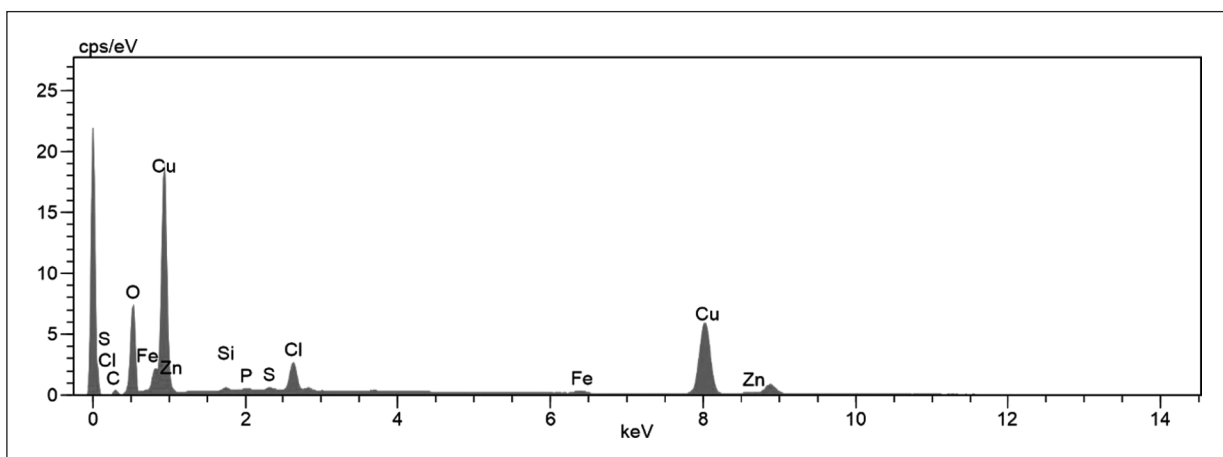
a Hercegovine (časť lícnice; Čremošník 1980), Gerulata na Slovensku (Krekovič 1994, 211–225; Snopko 1980, 249, 250), Künzing v Nemecku (Fischer 1991, 130–133), Sarmizegetusa v Rumunsku (Petculescu 1990, 843, obr. 1) a Vetren v Bulharsku (celá prilba; Georgiev/Bačvarov 1987). Celkovo je známych 39 kompletných a fragmentárne zachovaných prilieb z 25 lokalít (Krekovič 1994, 288). Hoci v mnohých prípadoch nie je isté, či príslušné fragmenty patria k uvedenému typu (to platí najmä pre lícnice), s istotou môžeme uviesť 22 exemplárov z 12 nálezísk. Pohľad na mapu (Krekovič 1994, 294, obr. 16) ukazuje široký rozptyl od Británie po Moesiú (centrálna časť Balkánskeho poloostrova) a isté sústredenie vidíme v oblasti horného Dunaja, v provincii Raetia.

Rozšírenie tohto typu nemožno posudzovať oddelene od iných typov prilieb a ceremoniálneho výstroja, pričom J. Garbsch (1978, 92, 93) upozorňuje, že rímske provincie Raetia a Germania Inferior zohrali vo výskyte tohto typu výzbroje vedúcu úlohu.

Pri hľadaní miesta výroby honosnej výzbroje existuje niekoľko názorov. Predpokladá sa jedno výrobné centrum v Thrákii či Podunajsku (Drexel 1924, 69; Radnóti 1946, 137). Iní bádatelia predpo-

kladajú orientálny pôvod honosnej výzbroje, a to buď na jednom mieste alebo s putujúcimi sýrskymi remeselníkmi, či výrobu priamo v tábore (Barkóczi 1954, 47; Garbsch 1978, 17, 18; Klumbach 1977, 204; Thomas 1971, 13).

Z jestvujúcich ikonografických analógií sa pri datovaní prilieb nedá vychádzať, keďže nezodpovedajú realite. Mytologické scény v duchu gréckych tradícií sú spodobované bez ohľadu na nositeľov. Prilby pseudoatického typu datujeme do druhej polovice 2. stor. až prvej polovice 3. stor. Podporuje to aj domnienka J. M. C. Toynbeeovej, že prilby typu Guisborough prišli do užívania až po pôsobnosti Ariana, ktorého známy spis hovorí len o prilbách s maskami (Toynbee 1964, 245). Prilba z Gerulaty zapadá svojim tvarom a výzdobnými motívmi do načrtnutého chronologického rámca. Našla sa vo vrstve bez datovateľného materiálu. Prepálené deštrukčné vrstvy sa na lokalite objavujú v súvislosti s dvomi katastrofickými udalosťami. V 2. stor. to boli markomanské vojny a v rokoch 259–260 barbarské kmene spustošili takmer celú provinciu Panóniu. Doba uloženia do zeme sa pravdepodobne spája s touto udalosťou. V chronológii tábora to predstavuje koniec 2. stavebnej etapy.



Obr. 3. Energo-disperzné spektrum. Úlomok 3a, miesto 3/1 (tabela 2) tvorené hlavne kupritom (Cu), atacamitom (Cl) a malým množstvom brochantitu (S) s prímiesou Zn, Fe, Si. Autor E. Smrčok.

ODBER A CHARAKTERISTIKA VZORIEK

Celkove sme odobrali päť úlomkov s rozmermi 3–6 mm, z nich jeden zo zvyšku ľavej lícnice, ostatné z vnútornej preliačenej časti prilby. Všetky boli silne korodované a v čase odberu takmer uvoľnené z telesa prilby. Okrem malých úlomkov sme dostali k dispozícii väčší kus goliera, ktorý sa našiel už oddelený. Detailne sme študovali: 1. mineralogicky zaujímavý fragment 2a z ľavej lícnice (obr. 2b) a 2. podstatne menej korodovaný fragment goliera (obr. 2c, 2d; 4). Ostatné úlomky (3a, 3b, 4) sú charakterizované niekoľkými bodovými analýzami (EDX). Fragment goliera má dĺžku cca 10 cm, úlomok 2a je dlhý 1,3 cm, ostatné majú menej ako 1 cm.

ANALYTICKÉ METÓDY

Pri identifikácii korózných produktov (sekundárnej mineralizácie) sme použili metódy schopné analýzy bez deštrukcie analyzovaného materiálu (práškovania, brúsenia, leštenia; *Uda/Demortier/Nakai eds. 2005*). Vzorky prilby (úlomky) sme analyzovali v Ústave anorganickej chémie SAV, v. v. i. energo-disperznou Rtg analýzou (EDX) na prístroji Brucker AXS s použitím mikroskopu Jeol 5700, urýchľovacie napätie 20 kV, merací čas 1 minúta, so skenovacím elektrónovým mikroskopom, detektor typu XFlash 4010.¹ Výsledky nie sú normalizované na 100 %. Fragment goliera sme analyzovali vo Výskumnom ústave zväračskom na prístroji SEMQuant metódou EDX s využitím ske-

novacieho elektrónového mikroskopu SEM JEOL 5800 vybaveným vákuovou komorou dostatočne veľkou na 10 cm dlhú vzorku.² Primárne údaje boli získané pri urýchľovacom napätí 15 kV a korigované štandardnou ZAF metódou so štandardami: Si – kremeň, S – FeS₂, kovové Cu, Zn a Sn. Výsledky sú normalizované na 100 %.

Pri metóde EDX sa celé spektrum prvkov snímá naraz, kvantita sa počíta z výšky pík v spektre, ktorá zodpovedá počtu impulzov (cps, eV; obr. 3).

VÝSLEDKY MINERALOGICKÉHO A CHEMICKÉHO VÝSKUMU

Fragment goliera, zliatina, patina

Poznatky o zložení telesa prilby máme zo štúdia oddelenej časti goliera. Teleso prilby poznáme len z oddelených úlomkov 3a, 3b a 4. Fragment goliera bol už podrobne mineralogicky študovaný hlavne so zameraním na tenkú povrchovú patinu (*Smrčok a i. 2010*). Identifikované boli sekundárne minerály Cu a Zn, atacamit, brochantit, malachit, nantokit, hydrozinkit a simonkolleit (vzorce a zloženie minerálov sú uvedené v tabele 1 a 2). Chemické zloženie zliatiny po zoškrabaní patiny bolo, vzhľadom na rozmery fragmentu goliera, možné analyzovať len metódou EDX (SEMQuant), ktorá udáva analýzu normalizovanú na 100 %. Obsah Cu je 78–82, Zn 16–21 hm. %, obsah Sn nepresahuje 1 %.

Fragment sa na jednom konci javí ako opravovaný, „priletovaný“ odlišným pórovitým typom zliatiny. EDX analýza niekoľkých bodov priletovanej

¹ Analytička A. Jurová.

² Analytik Zifčák.

Tabela 1. Vzorce sekundárnych minerálov Cu a Zn diskutovaných v texte. Zostavil I. Petřík.

Minerál	Vzorec	Minerál	Vzorec	Minerál	Vzorec
Oxidy		Chloridy		Karbonáty	
kuprit	Cu ₂ O	nantokit	CuCl	malachit	Cu ₂ (CO ₃)(OH) ₂
zinkit	ZnO	atacamit	Cu ₂ Cl(OH) ₃	azurit	Cu ₃ (CO ₃) ₂ (OH) ₂
–	–	simonkolleit	Zn ₅ (OH) ₈ Cl ₂ ·H ₂ O	hydrozinkit	Zn ₅ (CO ₃) ₂ (OH) ₆
–	–	Silikáty		smithsonit	ZnCO ₃
–	–	hemimorfit	Zn ₄ (OH) ₂ Si ₂ O ₇ ·H ₂ O	–	–
–	–	chrysokol	Cu ₂₋₃ AlxH ₂₋₃ Si ₂ O ₅ (OH) ₄ ·nH ₂ O	–	–
Sirany		Fosfáty		–	–
brochantit	Cu ₄ (SO ₄)(OH) ₆	libethenit	Cu ₂ (PO ₄)(OH)	–	–
–	–	pseudomalachit	Cu ₅ (PO ₄) ₂ (OH) ₄	–	–
–	–	arthurit	Cu ²⁺ Fe ³⁺ ₂ (AsO ₄ , SO ₄ , PO ₄) ₂ (O,OH) ₂ ·4H ₂ O	–	–

Tabela 2. Teoretické zloženie sekundárnych minerálov Cu a Zn. Vľavo – oxidy; vpravo – prvkové množstvá v hm. %. Zostavil I. Petřík.

Oxidy	kuprit	brochantit	malachit	azurit	hydrozinkit	hemimorfit	pseudomalachit	libethenit	arthurit	Prvky	atacamit	nantokit	simonkolleit
Cu ₂ O	100	70,35	–	–	–	–	–	–	–	Cu1+	–	64,19	–
CuO	–	–	71,95	69,24	–	–	69,09	66,55	16,12	Cu2+	59,51	–	–
ZnO	–	–	–	–	74,12	67,58	–	–	–	Zn	–	–	61,23
SiO ₂	–	–	–	–	–	24,95	–	–	–	Cl	16,6	35,81	13,28
Fe ₂ O ₃	–	–	–	–	–	–	–	–	32,37	OH	23,9	–	25,48
As ₂ O ₅	–	–	–	–	–	–	–	–	11,65	–	100	100	99,99
P ₂ O ₅	–	–	–	–	–	–	24,66	29,69	7,19	–	–	–	–
CO ₂	–	–	19,9	25,54	16,03	–	–	–	–	–	–	–	–
SO ₃	–	17,7	–	–	–	–	–	–	16,23	–	–	–	–
H ₂ O	–	11,95	8,15	5,23	9,85	7,48	6,26	3,77	16,43	–	–	–	–
Spolu	100	100	100	100	100	100	100	100	100	–	–	–	–

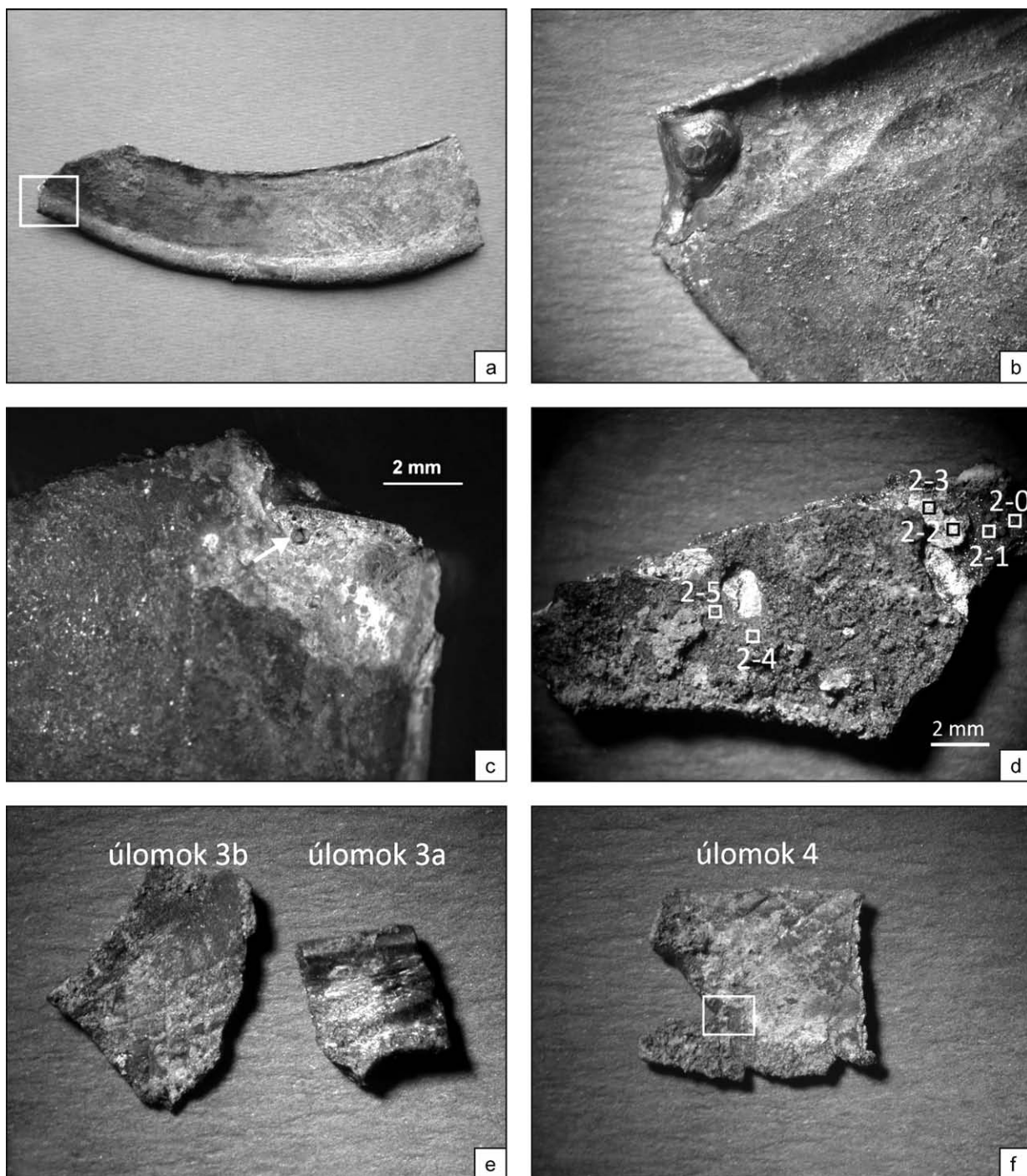
kvapky (obr. 4b, 4c) ukazuje variabilné zloženie od takmer čistej medi, po zliatinu Cu–Zn–Sn. Detailné štúdium v BSE ukázalo zonálnosť kvapky na povrchu, kde vrchná vrstva (cca 0,2 mm hrubá) je významne obohatená o Cu (cca 73 hm. % Cu alebo 82 % Cu₂O) oproti vnútornej vrstve bohatej na Zn (53 hm. % Zn alebo 66 % ZnO), zinkový kuprit a atacamit (?).

Ľavá lícnica

Dva úlomky (2a, 2b) odobraté z deštruovanej ľavej lícnice poskytli najzaujímavejšie informácie o kom-

pozitnom charaktere prilby. Analyzovaný bol väčší kus (2a; obr. 4d).

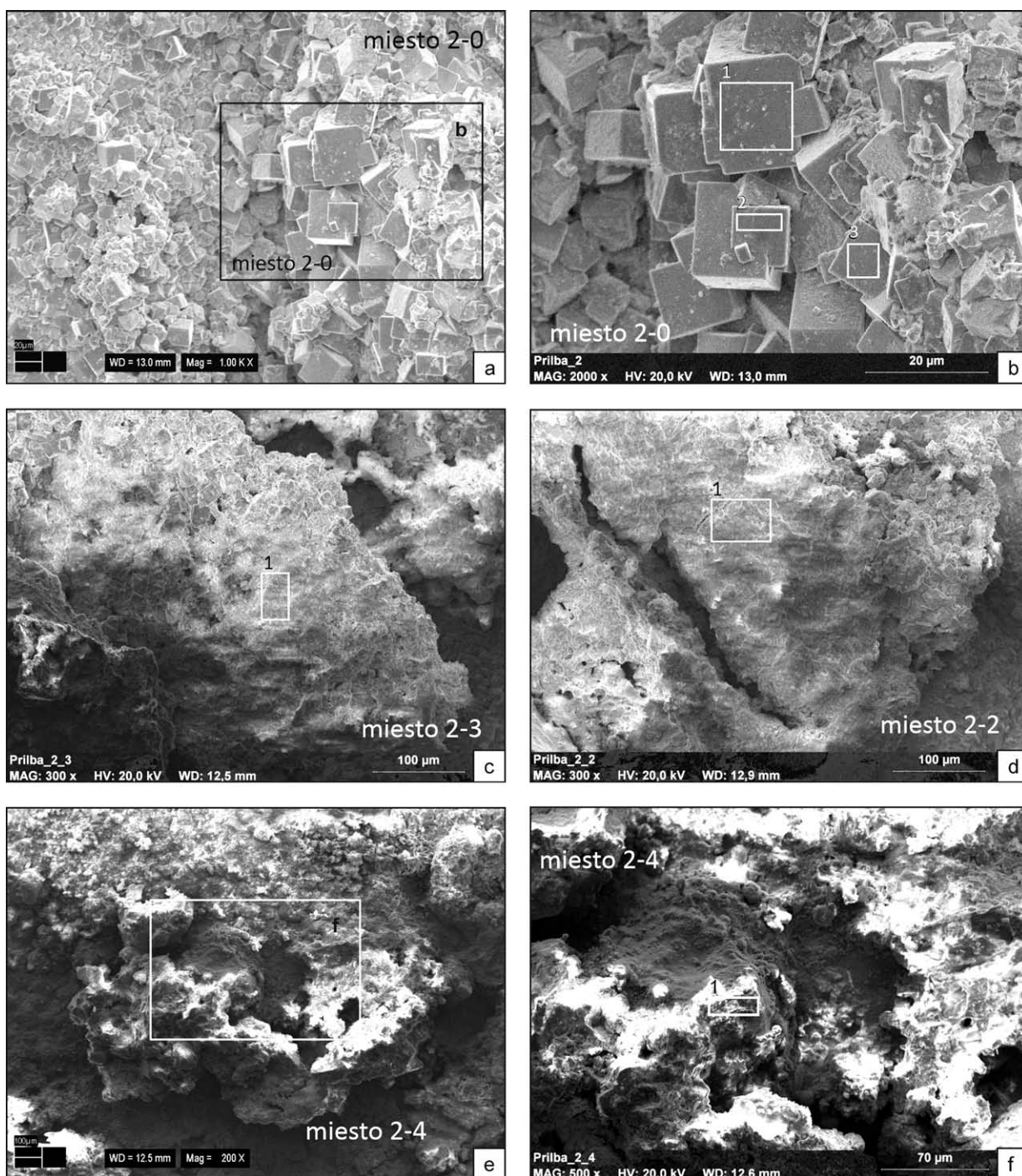
Úlomok 2a má v súčasnom stave nasledovnú stratifikovanú štruktúru: tri vrstvy sú oddelené dutinou s vykryštalizovaným červeným kupritom a bielym povlakom Sn oxidu. Na povrchu prevažuje tyrkysový povlak sekundárnych minerálov Cu. Obrázok 4d ilustruje presnú pozíciu analyzovaných oblastí. Vrstvička kupritu (cca 1 mm hrubá) je tvorená drobnými idiomorfnými kockami (kuprit kryštalizuje v kubickej sústave) s rozmermi 10–20 μm (obr. 5a, 5b), ktorá je prekrytá vrstvou amorfného SnO₂ hrubou cca 0,5 mm identifikovaného práškovou difrakciou. Nad bielou vrstvou je ešte spomenutý



Obr. 4. Fotodokumentácia študovaných častí prilby. a – fragment goliera; b – detail konca s priletovanou mosadznou „kvapkou“, pôvodný stav; c – detail fragmentu po odpadnutí časti letovania, biela šípka; d – najväčší zo študovaných úlomkov (2a) odobratý z ľavej lícnice, ukazuje rozpad na vrstvy kupritu (červený, kryštalický povrch), oxidu Sn (SnO_2 , biely amorfny), sekundárnych karbonátov a chloridov Cu (malachit, brochantit, nantokit). Miesta analýz (2-0 až 2-5) sú vyznačené bielymi štvorcami; e, f – menšie úlomky pochádzajúce z preliačenej časti prilby, úlomky 3b a 4 nesú stopy po ryhovaní. Vzdialenosti medzi ryhami, cca 1 mm. Foto I. Petřík.

nepravidelný povlak tyrkysovej farby (tvorený sekundárnymi minerálmi medi) s hnedými škvrnami pravdepodobne silikátov. Je zrejme, že sekundárne produkty vznikli rozpadom pôvodnej bronzovej zliatiny.

Rozbory rôznych fáz získané analýzou EDX sú uvedené v tabele 3, všetky prvky (okrem Cl) boli prepočítané na oxidy. Analyzované množstvá kyslíka (porovnaj pík „O“; obr. 3) kolíšu vo veľkom rozmedzí medzi 5–50 hm. % a použili sme ich len



Obr. 5. Zobrazenie študovaných plôšok na úlomku 2 v rastrovacom mikroskope (miesta 2-0, 2-2, 2-3, 2-4; obr. 4d). Obdĺžniky vyznačujú analyzované plochy. Foto L. Smrčok.

na porovnanie s vypočítaným stechiometrickým kyslíkom (v tabele 3 len ako súčasť oxidov). Kolísavá kvalita analýz je spôsobená nerovným, nelesťným povrchom, ako to vidno hlavne na bielom povlaku sekundárneho SnO_2 (obr. 5c, 5d). V analýzach so zvýšeným obsahom Cl (por. č. 4, 6) je odpočítaná meď ako stechiometrická súčasť atacamitu (t. j. $1\text{Cl} = 0,5\text{Cu}$; Cu^{2+} v tabele 3) a odpočítaná z celkovej meďi

(zvyšok je prepočítaný ako Cu_2O), pripočítané je tiež stechiometrické množstvo H_2O . Viazanú vodu (OH skupiny) treba predpokladať aj v ostatných analýzach s celkovými sumami oxidov 85–95 % (tabele 1; 2).

Zloženie kupritu dokladajú analýzy miesta 2-0, kocky 1, 2 (tabele 3), zloženie bielej vrstvy sekundárneho SnO_2 udávajú analýzy miesta 2-5.

Tabela 3. Vybraté EDX analýzy študovaných úlomkov a fragmentu goliera (hm. %). Zostavil I. Petrík.*

Poradové číslo	1	2	3	4	5	6	7	8	9	10	11	12	13
Úlomok	2	2	2	2	2	3a	3b	3b	4	4	–		
	lícnica	lícnica	lícnica	lícnica	lícnica	príoba	príoba	príoba	príoba	príoba	golier		
Miesto	2-0/1	2-0/2	2.2	2.5.2002	2.5.2003	3.1	3.1	3.3	1	2	povrch	let. kus	let. kus
Poznámka	kuprit	kuprit	Sn oxid	kuprit atacamit brochantit	povlak zmes	kuprit atacamit	kuprit zmes	kuprit zmes	zmes	zmes	očistený kov	lem 1 kuprit, zinkit	vnútro 2 kuprit, zinkit
Obrázok	4d	4d	4d	4d	4d	3, 4e	4e	4e	4f	4f	4a	6a, 6b	6a, 6b
Cu kovová	–	–	–	–	–	–	–	–	–	–	81,73	–	–
Zn kovový	–	–	–	–	–	–	–	–	–	–	16,57	–	–
Sn kovový	–	–	–	–	–	–	–	–	–	–	0,89	–	–
S atom.	–	–	–	–	–	–	–	–	–	–	0,24	–	–
Cu ²⁺	–	–	–	4,28	–	4,09	–	–	–	–	–	–	3,13
Cu ₂ O	90,87	93,67	10,93	48,14	32,95	74,3	75,59	11,42	28,06	57,27	–	81,81	18,34
SnO ₂	2,42	2,68	68,22	–	–	–	11,13	–	–	–	–	–	–
ZnO	–	–	–	4,41	25,03	2,5	11,5	60,19	–	10,03	–	14,69	66,77
Fe ₂ O ₃	–	–	6,28	1,23	1	1,32	–	–	3,65	–	–	1,23	1,36
As ₂ O ₃	–	–	1,85	–	–	–	–	–	–	–	–	–	–
SiO ₂	–	–	1,54	2,08	6,74	0,9	1,5	2,2	24,94	8,88	–	1,97	–
Al ₂ O ₃	–	–	–	0,62	1,78	–	–	–	6,03	7,09	–	0,17	–
CaO	0,08	–	0,25	0,49	1,94	–	1,13	3,51	4,49	0,53	–	–	–
MgO	–	–	–	–	0,98	–	–	–	6,2	0,55	–	–	–
K ₂ O	–	–	–	–	–	–	–	–	2,04	–	–	–	–
Cl	0,84	0,97	0,38	4,78	1,26	4,57	0,39	0,85	0,58	0,03	–	0,13	3,49
CO ₂	–	1,8	–	–	–	2,6	–	–	–	–	–	–	–
SO ₃	0,8	–	6,94	3,72	3,52	1,3	1	–	3,67	0,8	–	0,45	1,07
P ₂ O ₅	–	–	0,85	2,2	2,36	0,53	3,69	3,8	4,17	1,7	–	0,23	2,66
H ₂ O _{calc}	–	–	–	3,64	–	3,48	–	–	–	–	–	–	–
Spolu	95,02	99,12	97,23	75,59	77,57	95,59	105,94	81,98	83,83	86,87	100	100,67	96,82

* V analýzach por. č. 4, 6, 13 so zvýšeným množstvom Cl je odpočítané množstvo Cu ekvivalentné Cl v atacamite (0,5 Cu = Cl) a uvedené ako Cu₂, a pripočítané stochiometrické množstvo vody (H₂O_{calc}). Zvyšok Cu je prepočítaný ako Cu₂O (kuprit). Nízke sumy indikujú prítomnosť viazanej (OH) aj voľnej vody (H₂O). Ako Zmes sú označené body so zvýšenými SiO₂, Al₂O₃, CaO, MgO, K₂O (detritické silikáty). Let. kus – guľovitý kus mosadze použitý na prileptovanie goliera (obr. 4b; 6a).

Okrem kupritu a atacamitu potvrdili analýzy prítomnosť malachitu (prítomnosť CO_2) a brochantitu (prítomnosť SO_3). Analýzy z tyrkysovej vrstvičky sekundárnych minerálov medi a zinku sú pestré, okrem Cu a Zn obsahujú aj prvky Fe, Si, Al, Ca, Mg a P, ktoré indikujú prítomnosť silikátov a fosfátov z okolia prilby.

Ostatné úlomky

Okrem ľavej lícnice sme získali aj tri malé úlomky z temena prilby (3a, 3b, 4). Sú pomerne tenké, (cca 1 mm), všetky pokryté patinou (obr. 4). Zložením sú blízke mosadzi (tabela 3), ZnO kolíše od 2–11 % (úlomok 3a) a 10–14 % (úlomok 4). Patina na úlomku 3a má zvýšený obsah CO_2 , (tabela 3: por. č. 6) ktorý ako anión CO_3^{2-} indikuje prítomnosť malachitu. Dve analýzy na fragmentu 3b zachytili aj cín (SnO_2 4–10 %), čo znamená, že mosadzná zliatina obsahovala aj určitý podiel bronzu. Na úlomku 4 (podobne ako na úlomku 2a) zachytilo niekoľko analýz zvýšené množstvo Si, Al, Ca, Mg a Fe, čo sú bežné prvky silikátov (ílové minerály, allofán?, kremeň) pravdepodobne zachytených v narastenom povlaku z okolia.

DISKUSIA

Interpretácia EDX analýz

Analýzy z tabele 3 sú z nelešteného prírodného povrchu patiny a hrubých povlakov tvorených sekundárnymi minerálmi Cu, Sn, Zn a neidentifikovaných silikátov. Zo zloženia týchto minerálov (v tabele 1 a 2 je uvedený výber z množstva sekundárnych minerálov) vyplýva, že obsahujú med' v dvoch mocenstvách Cu^{1+} , Cu^{2+} a premenlivé množstvá H_2O . Interpretácia získaných plošných analýz (obdĺžniky; obr. 5) je preto možná len v odhadoch. Zatiaľ čo analýzy kupritu sú pomerne blízke ideálnemu zloženiu, analýzy tyrkysového povlaku predstavujú zmesi viacerých Cu, Zn minerálov (tabela 3: por. č. 4). Prítomnosť As spolu s S, P a Fe^{3+} poukazuje na možnú prítomnosť arthurit. Treba poznamenať, že presná identifikácia zmesi nie je možná bez röntgenovej práškovej difrakcie (porovnaj Smrčok a i. 2010). Zo študovaných úlomkov však bez ich deštrukcie nebolo možné získať práškový preparát. Porovnanie zloženia úlomku z lícnice a z temena prilby potvrdzuje použitie dvoch odliš-

ných zliatin (mosadze a bronzu) na výrobu prilby, teda jej kompozitný charakter.

Mosadz v rímskej dobe

Rimania bežne používali mosadz ako vysoko cenný kov (*aurichalcum*, grécky *oreichalkos*; Hauptmann 2020, 401), najneskôr od 1 stor. pred n. l. vo veľkom meradle (Craddock 1978, 9). Na jej výrobu využívali proces cementácie, pri ktorom sa táto zliatina vyrába z medi a kalamíny (*cadmea*; podľa opisu Plínia st. v Merkel 2021, 250). Kalamína je zmes sekundárnych minerálov Zn (zinkit, hydrozinkit, smithsonit; tabela 1), ktorá vzniká buď prirodzene v gossanoch Zn rúd alebo umelo pražením z primárnej rudy (najčastejšie sfalerit, ZnS ; Schroll 2005, 175, 176). Technológia výroby mosadze spočíva v pražení kovovej medi spolu s kalamínou a dreveným uhlím. Pri teplote 900–1000 °C sa v prostredí CO (z dreveného uhlia) zinok vyredukuje ($\text{Zn}^{2+} \rightarrow \text{Zn}^0$) a v podobe pary je absorbovaný med'ou (Hauptmann 2020, 405; Newbury/Notis/Newbury 2005, 75, 77). V roku 23 pred n. l. zaviedol cisár Augustus mincovú reformu (Grant 2002, 29; Pečírka 1989, 766), ktorá spustila široké využívanie mosadze na výrobu mincí (*asov*, *dupondii*, *sestercii*) a dekoratívnych kovaných výrobkov. Na našom území mosadz používali Kelti v dobe laténskej. Podrobné štúdium mosadzného ingotu nájdeného v keltskom oppide na bratislavskom hrade (1 stor. pred n. l.) ukázalo, že obsahuje 18,6 hm. % Zn, 80,1 % Cu a pod 1 % ostatných kovov (Fe, Sn, Pb, As).³ Autori argumentujú, že bol vyrobený pokročilou technológiou vo viacerých štádiách, s najväčšou pravdepodobnosťou Rimanmi. Nie je preto prekvapivé, že dekoratívna prilba datovaná do druhej polovice 3. stor. n. l. je tiež mosadzná (Krekovič/Snopko 1998). Porovnanie prilby z Gerulaty s ingotom ukazuje podobné zloženie s trochu nižším obsahom Zn (cca 16,5 % Zn, 0,9 % Sn, očistený povrch fragmentu goliera). Všetky ostatné analýzy indikujú podstatné množstvo kyslíka a nedávajú už pôvodné zloženie kovu zliatiny. Pozoruhodná je absencia olova, ktoré nebolo v EDX spektrách zachytené. Hojnosť mosadzných produktov začína klesať v 4. stor. n. l., kedy je mosadz nahrádzaná Pb-bronzom a delovinou (*gunmetal*) a Cu–Pb–Zn zliatinou (Gliozzo a i. 2011, 280). Mosadzné prilby opísali J. Kaminski a D. N. Sim (2019) – dekorovanú prilbu typu Ribchester z 1. stor. n. l. a J. Istenič (2018) – typ Haguenau 1. stor. n. l.

³ Výsledky analýzy boli prezentované na konferencii Archeologie barbarů 2023. XVIII protohistorická konference. Elity a prestižní artefakty ve středoevropském barbariku (sídelně-geografické, nálezné, kulturní, chronologické, technologické, sociální a historické kontexty). Brno, 25.–28. 10. 2023.

Patina fragmentu goliera vs. korózia bronzového úlomku

Korózia medených zliatin a vznik patiny sú podrobne študované z hľadiska prevencie a konzervácie a archeologické materiály sa využívajú na vyhodnotenie dlhodobého pôsobenia korozívnych procesov (Fitzgerald/Nairn/Atrens 1998). Patina dosahuje typicky hrúbku 20–50 µm a pozostáva z dvoch vrstiev: spodná vrstvička kupritu na styku s kovom, vrchná porézna vrstvička brochantitu a atacamitu. Prvý stupeň oxidácie [$\text{Cu}^0 \rightarrow \text{Cu}^+$ Appendix, reakcia (1)] produkuje kuprit, ktorý čiastočne chráni kov pred ďalšou koróziou. V prítomnosti vody (dážď, pôdna vlhkosť) sa kuprit ďalej oxiduje ($\text{Cu}^+ \rightarrow \text{Cu}^{2+}$) a v prítomnosti síranov (SO_4^{2-}) vytvára brochantit [Appendix, reakcia (4)]. Táto reakcia je pomalšia a kontroluje rýchlosť vzniku patiny. Uvedené procesy sú komplexné z hľadiska charakteru artefaktov, uloženia, prostredia, veku atď. Jeden z dôležitých experimentálnych poznatkov je, že rýchlosť ataku roztokov je pre rôzne typy pôdy rôzna – od 0,05 do 4 µm/rok a časom dosahuje stály stav (*steady state*). To znamená, že patina vzniká v pomerne krátkom období niekoľkých rokov, maximálne prvých desiatok rokov a dĺžka následného pochovania už nie je podstatná (Robbiola/Blengino/Fiaud 1998). V experimentoch, pri ktorých sa študovala korózia medi ponorenej v tropickej vode, sa stály stav dosiahol za dva roky (Núñez a i. 2005).

Nami študované úlomky ukazujú pozoruhodné rozdiely v stupni korózie. Fragment goliera a malé mosadzné kusky z preličenej časti majú prevažne len tenkú vrstvu patiny, naproti tomu najväčší kus (2b) z bronzovej lícnice je kompletne skorodovaný a rozpadnutý a dosahuje sekundárnu hrúbku až 2 mm. Artefakty zo zliatin medi často podliehajú tzv. chorobe bronzu (*bronze disease*). Ide o sériu autokatalytických reakcií, ktoré v prítomnosti vhodného agensu postupne premenia zliatinu na chloridy a hydroxychloridy (nantokit a atacamit, pozri reakcie v Appendixe). Pri dostatku chloridových aniónov s postupujúcou oxidáciou dochádza k úplnej korózii zliatin. V patine fragmentu goliera sme skutočne, popri malachite, brochantite a simonkolleite, identifikovali chloridy nantokit, atacamit (Smrčok a i. 2010). Avšak, patina dosiahla len nepatrnú hrúbku. Naproti tomu bronzový fragment úplne podľahol korózii a rozpadu na kuprit a amorfný SnO_2 . Vrchná tyrkysová vrstva (obr. 4d) je však tiež silne patinovaná. L. Robbiola, J.-M. Blengino a C. Fiaud rozlíšili dva typy patiny (I – s tenkou, II – s hrubou koróznou vrstvou), ktoré približne zodpovedajú patine z goliera

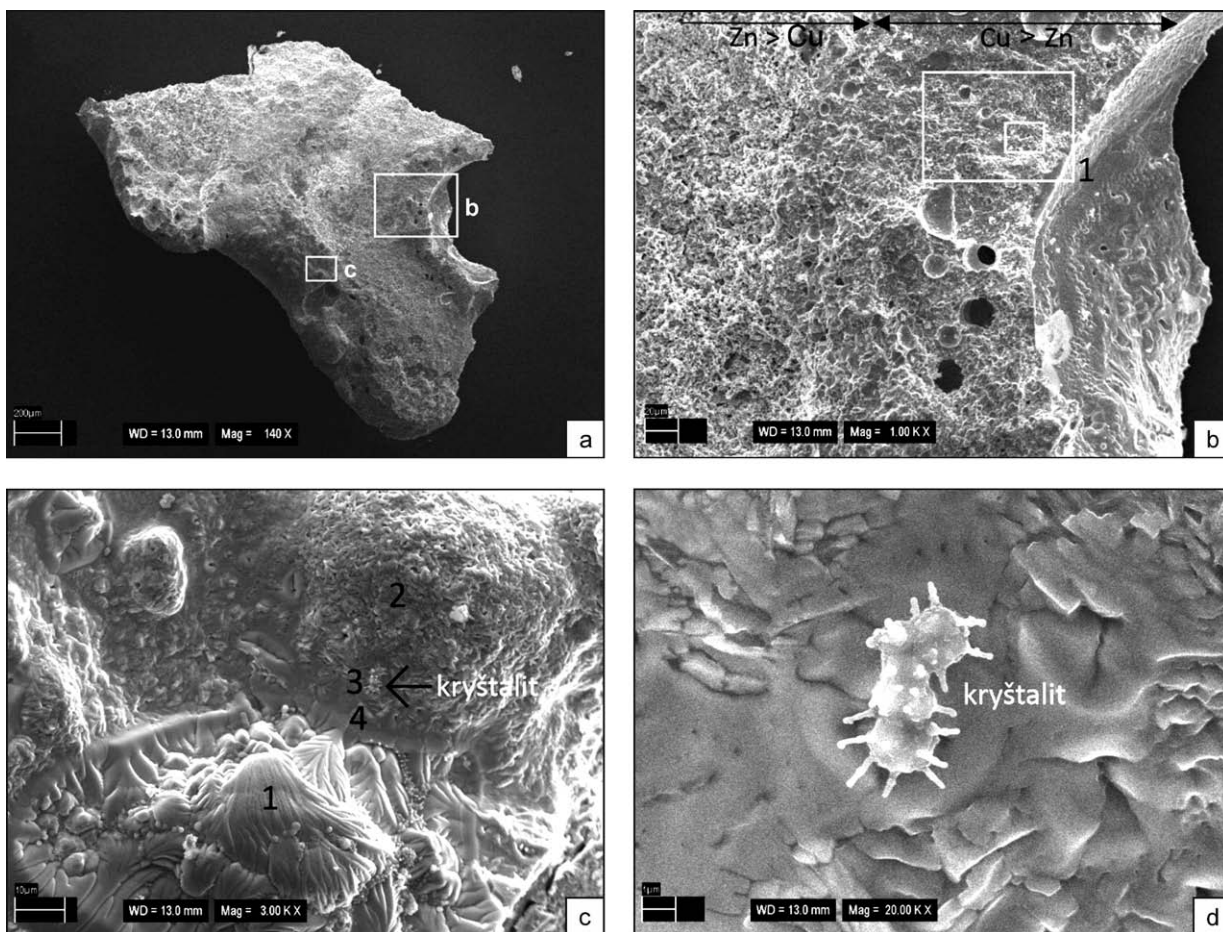
a z úlomku 2b (Robbiola/Blengino/Fiaud 1998). Stupeň korózie závisí od rýchlosti rozpúšťania a od prítomnosti Cl^- iónov (typ II). Progresívna oxidácia Cu–Sn zliatin spôsobila rozštiepenie bronzu na vrstvičku kupritu kryštalizáciou z roztoku (idionormné kubické kryštáliky; obr. 5a, 5b) a amorfný hydratovaný oxid SnO_2 (prekurzor kassiteritu). Na povrchu oboch vrstvičiek potom vykryštalizovala patina, ktorá podľa zvýšeného obsahu Cl a S tak tiež obsahuje nantokit a brochantit. Poznamenávame, že tieto minerály boli rovnako identifikované v keltských téglíkoch z 1. stor. pred n. l. (Ozdín/Gregor 2006). Pretože úlomky oboch rozdielnych zliatin prilby boli v identických podmienkach, príčina rozdielneho stupňa korózie môže spočívať v zložení kovu (bronz vs. mosadz). Podľa pokusov Z. P. Lianga (Liang/Jiang/Zhang 2021) s koróziou bronzov v pôde, sa odolnosť voči korózii zvyšuje s obsahom medi v zliatine. Ďalším faktorom môže byť rozdielna technická úroveň spracovania (vykovanie), čomu nasvedčuje deštrukcia bronzovej ľavej lícnice (obr. 2b).

Poznámky k technológii výroby prilby

Rozdielne zliatinu použité na výrobu prilby (mosadz a bronz) naznačujú, že výrobcovia používali materiál zo starších výrobkov. Stopy po letovaní (obr. 4b) na fragmente goliera, ako aj jeho následné oddelenie po zasypaní, zas poukazujú na viacetapovú techniku výroby prilby, vykovanie telesa a pripevnenie lemu letovaním s tekutým kovom (obr. 6). Na med' bohatý povrch tohto kovu sa dá interpretovať pomocou fázového diagramu Cu–Zn ako vysokoteplotný lem. S poklesom teploty sa zloženie zvyškovej zliatinu po vykryštalizovaní na med' bohatej vrchnej vrstvy posunie po fázovej hranici od Cu k Zn, t. j. obohatí sa o Zn, čo sa prejaví v zložení neskoršej, vnútornej vrstvy (obr. 4c; 6b; tabeľa 3). Priama aplikácia fázového diagramu nie je možná, pretože EDX analýza indikuje vysoký stupeň oxidácie kovu na príslušné oxidy. Zváranie ako súčasť technológie výroby prilieb typu Hagenau a Weisenau dokumentovala J. Istenič (2018).

Prilba s bohatou plastickou i rytou výzdobou mala vysokú hodnotu. D. N. Sim a J. Kaminsky (2017) ukázali na podobnej prilbe typu Guinsborough nájdennej v Yorkshire (UK), že bola veľakrát opravovaná.

Poznamenávame, že menšie úlomky z telesa prilby (obr. 4e, 4f) sú ryhované v dvoch smeroch pod uhlom cca 60° a vzdialenosť rýh je cca 1 mm. Účel ryhovania nie je známy.



Obr. 6. Opadnutý kus goliera zobrazený v rastrovacom mikroskope. a – celkový pohľad; b – detail analyzovanej oblasti zachytáva dve zóny: vonkajšiu obohatenú o meď a vnútornú obohatenú o Zn; c – detail zobrazujúci miesta analýz 1–4 a malý kryštalit; d – kryštalit: rýchlo stuhnutá mikroväpka kovu (dĺžka 5 μm) s mosadzným zložením. Foto L. Smrčok.

ZÁVER

Chemické a mineralogické štúdium rôznorodých úlomkov získaných z rímskej prilby z Rusoviec ukázalo jej kompozitný charakter. Teleso prilby je z mosadze, ale ľavá lícnica je z bronzu. Zloženie pravej lícnice nie je známe. Mosadzný golier prilby bol pravdepodobne k prilbe priletovaný, čo spôsobilo, že sa jeden fragment v priebehu času (cca 1700–1800 rokov) úplne uvoľnil. Zliatina (Cu–Zn–Sn) podľahla nevyhnutnej premene, oxidácii, reakciám za účasti roztokov s aniónmi Cl^- , CO_3^{2-} , SO_4^{2-} v hypergénnych (pripovrchových) podmienkach a vzniku typickej asociácie sekundárnych Cu, Zn, Sn minerálov (nantokit, atakamit, brochantit, malachit, libethenit?, SnO_2).

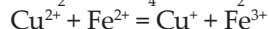
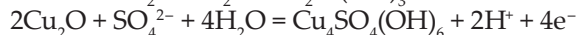
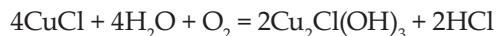
Vysoká úroveň umeleckého spracovania a ceremoniálny charakter prilby svedčia o jej značnej hodnote. Neprekvapuje preto, ako naznačuje

technológia výroby prilby (rozdielne kovy tela a lícnice, privarenie goliera), že ju v priebehu používania opakovane opravovali (Sim/Kaminsky 2017), možno s využitím recyklovaného materiálu. Priamych dôkazov o recyklácii pri výrobe prilieb je málo (vyžadujú podrobné chemické štúdium), avšak recyklácia suroviny (Cu, Ag, Sn rúd) zo starých hald bola bežná, je doložená od doby železnej cez antiku, islamské obdobie, 19. stor. až po súčasnosť. Podobne ako recyklácia medziproduktov, taviacich téglikov a šrotu v metalurgickom procese (Hauptmann 2020, 210, 214, 355, 457, 491).

Poznatky prezentované v tejto práci zatiaľ nie sú úplné kvôli nemožnosti analyzovania hlavného tela prilby a pravej lícnice. V budúcnosti bude možné a potrebné využiť nedeštruktívne metódy (hlavne Rtg fluorescencia, pXRF) na získanie kompletných informácií o zložení prilby.

APPENDIX

Reakcie vyjadrujúce progresívnu koróziu Cu zliatin, produkujúce nantokit, atacamit a brochantit (1–4). V anaerobnom prostredí pôdne mikroorganizmy spôsobujú redukciu železa (z Fe^{3+} na Fe^{2+}), ktoré je rozpustné vo vode. Ak je prítomná meď ako Cu^{2+} , pôsobí ako významný reaktant – oxidant podľa



reakcie (5) redukciiou medi na Cu^+ a vznikom Cu_2O (kupritu). Vysoká stabilita kupritu posúva reakciu (5) doprava (Matocha a i. 2005). V prítomnosti Cl^- zostáva v roztoku ako CuCl^- alebo kryštalizuje ako nantokit (CuCl). Uvedené minerály sú stabilne prítomné v artefaktoch z medených zliatin.

1. oxidácia kovovej medi
2. vznik nantokitu v prítomnosti aniónov Cl^-
3. oxidácia Cu^+ na Cu^{2+} a vznik atacamitu
4. vznik brochantitu vo vodnom prostredí
5. redukcia medi a oxidácia železa

Podakovanie

Práca vznikla s podstatným príspevím L. Smrčka z Ústavu anorganickej chémie SAV, v. v. i. vďaka jeho zariadeniu pre štúdium archeologických artefaktov. Na to využil svoje skúsenosti v uplatňovaní fyzikálnych analytických metód a styky na príslušných analytických pracoviskách, ktoré umožnili spoľahlivé určenie sekundárnych minerálov nedeštruktívnymi metódami. Lubomír Smrček zomrel v r. 2016. Vzorky z prilby sme spolu s nálezcom L. Snopkom odobrali v máji 1979. Autorom fotografií prilby (obr. 2) je F. Šimko. Za konštruktívne pripomienky ďakujeme obidvom recenzentom. Výskum bol financovaný z projektov VEGA 2/0008/19 (I. Petrík) a 2/0002/24 (M. Janák).

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Roman Helmet from Gerulata (Bratislava-Rusovce)

Results of the Chemical and Mineralogical Investigation of Corrosion Products

Igor Petrík – † Ľubomír Smrčok – Ladislav Snopko –
Jaroslava Schmidtová

SUMMARY

A Roman parade helmet was found in the destruction horizon containing Roman debris in the year 1978, in Gerulata military camp (present day Bratislava-Rusovce village; Fig. 1). Our paper presents results of chemical and mineralogical study of the metal alloy and patina minerals. For this goal a detached fragment of collar (guard neck) and five pieces of main body and left cheek were sampled. All pieces come from highly corroded and deformed helmet parts. The helmet was identified as a pseudo-Attic Guisborough type and is richly decorated by plastic mythological motifs (Krekovič/Snopko 1998, fig. 2a–2c).

The guard neck piece covered by thin patina layer has already been studied by physical methods by L. Smrčok (Smrčok *a i.* 2010) who identified several secondary Cu and Zn minerals (atacamite, brochantite, malachite, nantokite, hydrozinkite and simonkolleite; Tab. 1; 2). EDX analysis of the fresh collar surface (Fig. 2d; 4a) yielded composition Cu 78–82, Zn 16–21 wt. %, Sn below 1 wt. %. From the studied pieces (Tab. 3) the most interesting are those sampled from the left cheek. They represent originally bronze alloy decomposed to separate layers of red secondary cuprite (Cu_2O) and of white amorphous tin oxide (SnO_2). Cuprite forms euhedral cubes (Fig. 5a; 5b) of almost pure composition. Thick secondary patina of turquoise colour has variable composition showing the presence of brochantite (the presence of SO_3) also silicates and phosphates. The other fragments (3a, 3b, 4) taken from main helmet body give surface composition high in Zn and low in Sn indicating their origin from the brass. EDX analyses (Tab. 3) confirm the identified cuprite, small amounts of atacamite, based on Cl contents 4–8 wt. %, zincian cuprite or atacamite. A more precise identification would require X-ray powder diffraction, which was not possible without

destroying the fragments. The contrasting compositions of the left cheek and the main helmet body confirms that two alloys have been used, brass and bronze, and thus a composite character of the helmet. Moreover, the fragment of collar seems to have been welded to the main helmet body (Fig. 6). The brass was commonly used by Romans, who since the 1st c. BC introduced cementation process, in which Zn is obtained from calamine (a mixture of Zn secondary minerals; Craddock 1978; Hauptmann 2020). The technology involves copper smelting, followed by roasting with calamine and charcoal. Between 900–1000 °C ZnO is reduced to Zn, which evaporates and permeates the overlying copper transforming it into brass. Since the 1st c. BC after monetary reform of Augustus, the brass was widely used for coinage and metalwork. A brass ingot from 1st c. found in the Celtic oppidum in Bratislava castle, was interpreted as product of advanced technology by Romans (Petrík *a i.* 2023). The use of brass for production of parade helmet for 3rd c. AD in military camp is therefore not surprising.

Mineralogical study also showed two types of patina, a thin primary patina on collar and brass fragments (3, 4) as opposed to thorough corrosion of the bronze fragment (2). The corrosion was shown to proceed fast in the humid soil environment reaching steady state with several years (Robbiola/Blengino/Fiaud 1998), the difference may due to different compositions as suggested by complete destruction of the left cheek.

The decorated helmet must have represented a high value object, worth maintaining and/or repairing. Its composite character results, therefore, from its value for users. D. N. Sim and J. Kaminsky (2017) document that same Guisborough type of helmet was repaired many times.

Fig. 1. Bratislava-Rusovce. Roman military camp with localization of the helmet finding site. Legend: a – timber and earth castellum of the 1st construction phase. Dimensions: 240 × 145 m. Arrows indicate the gates. Period: Domitian (81–96) to end of the reign of the Antonines (170–192); b – the castellum of the 2nd construction phase shares partial fortifications with the 3rd construction phase. The dimensions of the camp during the 2nd phase are unknown. Arrows mark the gates of the castellum from the 3rd construction phase. Period: Commodus (176–192) to Aurelian (270–275). The 3rd construction phase has dimensions of 150 × 150; c – Late Antique fortress of the 4th construction phase. Approximate di-

mensions: 30 × 30 m. Period: Post-Valentinianic era after 380 AD (after Baxa/Ferušová 2002, modified I. Petřík).

Fig. 2. Bratislava-Rusovce (Gerulata). The Roman cavalry helmet. a – overall view; b – detail of the left cheek; c – view from the bottom, the arrow indicates the original position of the collar fragment; d – detached collar fragment. Foto F. Šimko.

Fig. 3. Energy-dispersed spectrum. The fragment 3a, site 3/1 (Tab. 3) consists mostly of cuprite (Cu), atacamite (Cl), a small amount of brochantite (S) with admixture of Zn, Fe, Si. Author L. Smrčok.

Fig. 4. Photo documentation of the studied fragments of the helmet. a – the collar fragment; b – a detail of

ending with a welded brass 'drop', original condition; c – the detail of the fragment after the drop detachment (white arrow); d – the largest of the studied fragments (2a) taken from the left cheek shows the breakdown to layers of cuprite (red euhedral crystals), Sn oxide (amorphous SnO₂), secondary carbonates and chlorides (malachite, brochantite, nantokite). The analyses sites (2-0 to 2-5) are shown by white squares; e, f – smaller fragments from deformed part of helmet. The fragments 3b, 4, are grooved, with ca. 1 mm distances. Foto I. Petřík.

Fig. 5. Scanning microscope images of the studied areas on the fragment 2 (sites 2-0, 2-2, 2-3, 2-4; Fig. 4d). The white quadrangles show the analysed areas. Foto L. Smrčok.

Fig. 6. The detached fragment of the collar in scanning microscope images. a – overall view; b – detail of the analysed area shows two zones: a Cu-enriched outer and a Zn-enriched inner one; c – detail showing analyses sites 1-4 and a small crystallite; d – the crystallite: a rapidly chilled metal micro-drop (5 µm in size) having composition of brass. Foto L. Smrčok.

Tab. 1. Compositions (formulae) of the Cu, Zn secondary minerals. Author I. Petřík.

Tab. 2. Theoretical compositions of the secondary minerals of Cu and Zn. Left – oxides; right – elements, in wt. %. Author I. Petřík.

Tab. 3. Selected EDX analyses of the studied helmet and collar fragments (wt. %). Author I. Petřík.⁴

⁴ In the analyses 4, 6, 13 having increased Cl contents, a Cu amount equivalent to Cl in atacamite ($0.5 \text{ Cu} = \text{Cl}$) is subtracted and shown as $\text{Cu}_{2\text{Cl}}$, also added is stoichiometric (atacamite) water ($\text{H}_2\text{O}_{\text{calc}}$). The remaining Cu is recalculated as Cu_2O (cuprite). The low totals indicate presence of bounded water (OH) and free water (H_2O). Lícnic – cheek; prilba – helmet; golier – collar; povrch – surface; lem 1 – rim 1; vnútro 2 – interior 2; očistený kov – cleansed metal; kovový – metallic; povlak – coating; spolu – total; zmes – (mixture) refers to the points with increased contents of SiO_2 , Al_2O_3 , CaO, MgO, K_2O (from detrital silicates); let. kus – welded piece, a spherical piece of brass probably used for welding of the collar.

INVESTIGATIONS ON SOME PELLET BELLS AND BELLS FROM THE EARLY MIDDLE AGES IN SLOVAKIA

**Nové Zámky I, Radvaň nad Dunajom-Žitavská Tôň (Radvaň I),
Holiare and Skalica**

BEATE MARIA POMBERGER – JÖRG MÜHLHANS –
KAYLEIGH SAUNDERSON

Pellet bells and bells from the Avar period cemeteries Nové Zámky I, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, Holiare and the Slavic cemetery Skalica, housed in the archaeological collections of the Slovak National Museum in Martin and the Archaeological Institute of the Slovak Academy of Sciences were investigated interdisciplinary within the research project ‘Metallic Idiophones between 800 BC and 800 AD in Central Europe’ (funding Austrian Sciences Funds FWF, supporting Natural History Museum Vienna). The aim of the research project was to gain more information about their function, their tonal influence, their material and the textiles corroded on the surface. They sound objects served as sounding-apotropaic amulets for humans and sounding-apotropaic decoration of horse harness. The pellet bells are cast in various copper alloys and forged from metal sheet. Filled with small pebbles or cinder they show oval or ball shaped forms with various decorations on the surfaces. Frequency ranges show partial from 2 kHz up to 20 kHz. The sounds are rather quiet, more noise like, bright, a little bit sharp and very low in roughness. Most of the objects are heavily corroded, which influences the sounds. Apart from decorative and apotropaic uses, a practical test has shown that the horse is much more concentrated and less likely to spook at outside factors when in movement carrying pellet bells.

Keywords: Western Slovakia, Early Middle Ages, music archaeology, acoustics, psychoacoustic, pellet bells, horse bridle.

INTRODUCTION

The project ‘Metallic Idiophones between 800 BC and 800 AD in Central Europe’ (funding Austrian Sciences Funds FWF, supporting Natural History Museum Vienna) investigated metal idiophones, their functional use and their acoustic influence on the daily life of people in Central Europe from 800 BC to 800 CE. An interdisciplinary approach was used for this cross-national project. The investigated metal idiophones were bells, pellet bells and sounding metal jewellery from the Hallstatt period. The aim of the research project was to gain more information about their function, their tonal influence, their material and the textiles corroded on the surface (*Pomberger/Mühlhans/Grömer 2021*).

Therefore, our research questions were: What was the function of the sound objects? Which impact had they on the society? Which frequency ranges and maximum sound pressure level can be produced by the objects? At which distance the sounds can likely been heard and how can the emitted sounds be described with extracted timbral features? Which metals and alloys were used producing the idiophones and what is the composition of the metal alloys in their individual components

like? Which fibers and weaving technics had been used for the textiles?

A few people started to wear pellet bells again in Central Europe in the middle of the 7th c. – probably for apotropaic purposes. Some used them to decorate the bridle of their horses. The archaeological collections of the Slovak National Museum Martin and the Institute of Archaeology of the Slovak Academy of Sciences in Nitra (IA SAS) keep pellet bells and bells from the Avar period cemeteries Holiare, Nové Zámky I, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, and the Slavic cemetery Skalica (Fig. 1). A part of the objects could be investigated within the frame of our project.

SITES, GRAVES AND FIND POSITIONS

Radvaň nad Dunajom-Žitavská Tôň, Radvaň I

Žitava is part of the village Radvaň nad Dunajom in the Nitra Region. 50 graves were excavated during a rescue excavation (*Budinský-Krička 1956*). Another 33 burials came to light during excavations in 1960. A part of the cemetery in the east was destroyed by gravel extraction, so that the total number of original graves is not known

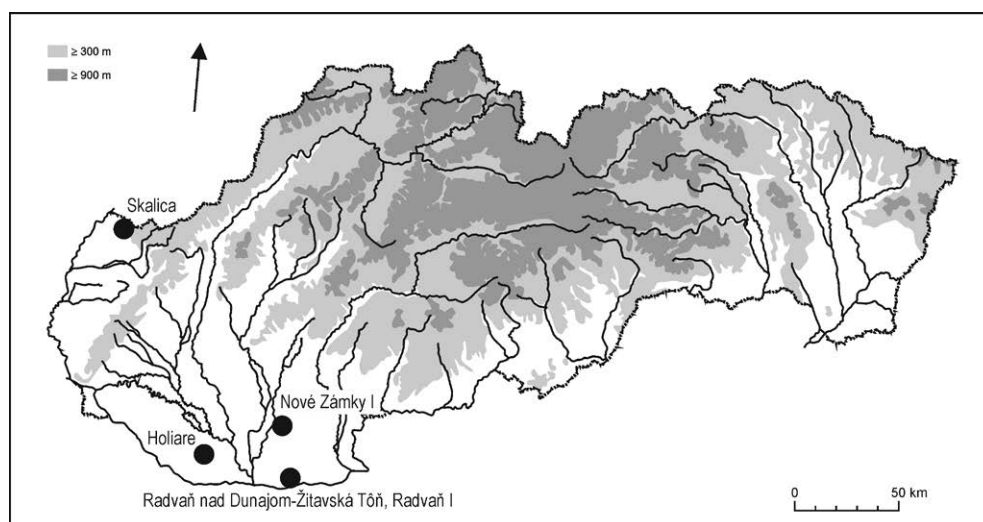


Fig. 1. Map of the sites with pellet bells, discussed in this article. Map background source www.d-maps.com, graphic B. M. Pomberger.

(Čilinská 1963, 87, 107). The cemetery dates to the Late Avar period (Zábojník 1995, 299). Only three graves contained pellet bells. Two graves, 10 and 31, belonged to horsemen/riders and their horses can be dated to SPA III (Csuthy 2020, 161, 162, tab. 4; Zábojník 1995, 315). They are located in the eastern part of the cemetery and are disturbed because of grave robbery. The pellet bells belonged to horses' head bridles. 14 metal sheet pellet bells were found in grave 10 (Cat. nos. 1–14) near the place where usually the horse skull lay. Another four pellet bells made from sheet metal – badly conserved – originate from grave 31 (Cat. nos. 15–18; Budinský-Krička 1956). The pellet bells are composed of the forged vertical halves, filled with a pellet and soldered together. Their surfaces are gilded. One pellet bell, showing a human face, was found in grave 1, excavated in 1960. Three individuals and one horse were buried here. The pellet bell lying near the skull of the animal, probably was part of the horse harness (Cat. no. 19; Fig. 2; Čilinská 1963, 87–89, fig. 2; pl. II: 16).

Holiare

The cemetery in Holiare, Nitra Region, consists of approximately 788 graves.¹ Since the 1930s, a number of graves have been destroyed by exploiting the sand pit. First rescue excavations in 1931 and 1932 were followed by excavations in the years 1952–1955. In only five burials pellet bells were

found (Točík 1968). The graves date to the 2nd half of the 7th to the 8th c. (Točík 1968, 10; Zábojník 2009, 92). Pellet bells were found in the two women's graves 92 (Cat. no. 21) and 146 (Cat. no. 22) and two children's graves, 437 (Cat. no. 23) and 667 (Cat. no. 24). The position of the pellet bells was near the left femur in burial 92, between the skeleton and the left arm in burial 147, between the femurs in grave 437 and near the left hand in grave 667. In grave 782 two pellet bells were found near the left femur of a child's skeleton (Cat. nos. 25; 26; Fig. 3; Točík 1968, 25, 34, 73, 102, 115).

Nové Zámky I

The site is located in the Northwest part of Nové Zámky, Nitra Region. Excavations were carried out in 1958 and from 1961 to 1962, but several graves had been destroyed already before through clay extraction. The cemetery originally consisted of 580 graves approximately² and was occupied from the second half of the 7th c. to the 9th c. (Čilinská 1966, 201–205). Six graves contained pellet bells and one grave a bell. The bell was found in the woman's grave 510 near the femur (Cat. no. 33). In the children's burial 175 (Cat. no. 27) and burial 509 (Cat. no. 32) each one pellet bell was found near the femur respectively in the middle of the grave. In grave 386 three individuals were buried. One was a little child with a pellet bell near the left arm (Cat. no. 30). Grave 438 contained also three

¹ These graves were excavated by the IA SAS and do not represent the whole number of graves from this cemetery. Not all are from the Avar period.

² The disturbed graves are included within this number.

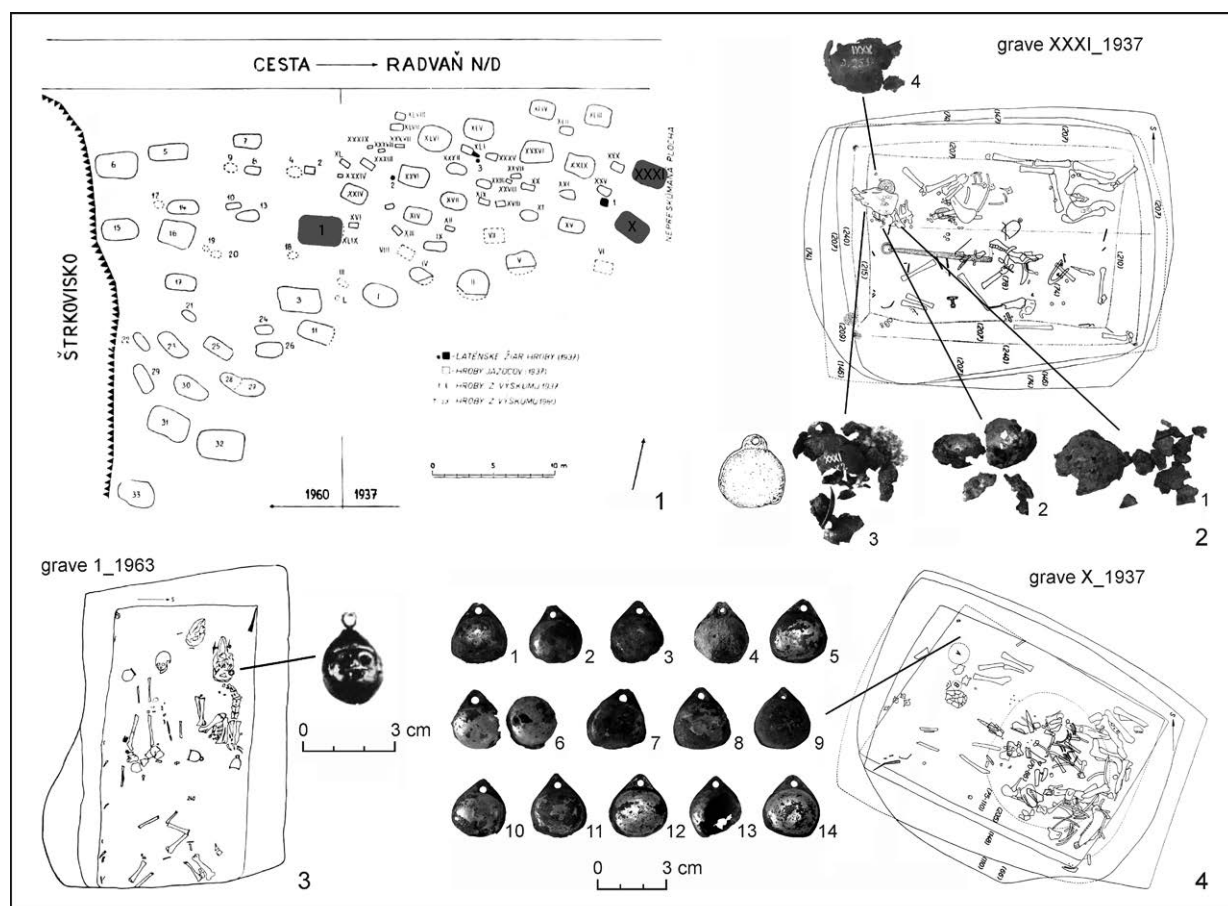


Fig. 2. Cemetery Radvaň nad Dunajom-Žitavská Tôň, Radvaň I. Graves with pellet bells. 1 – position of graves; 2 – grave 31 with four pellet bells; 3 – grave 1_1963; 4 – grave 10 with 14 pellet bells (according Budinský-Krička 1956, 7; Čilinská 1963, 88, fig. 1). Photo, graphic B. M. Pomberger, Slovak National Museum Martin.

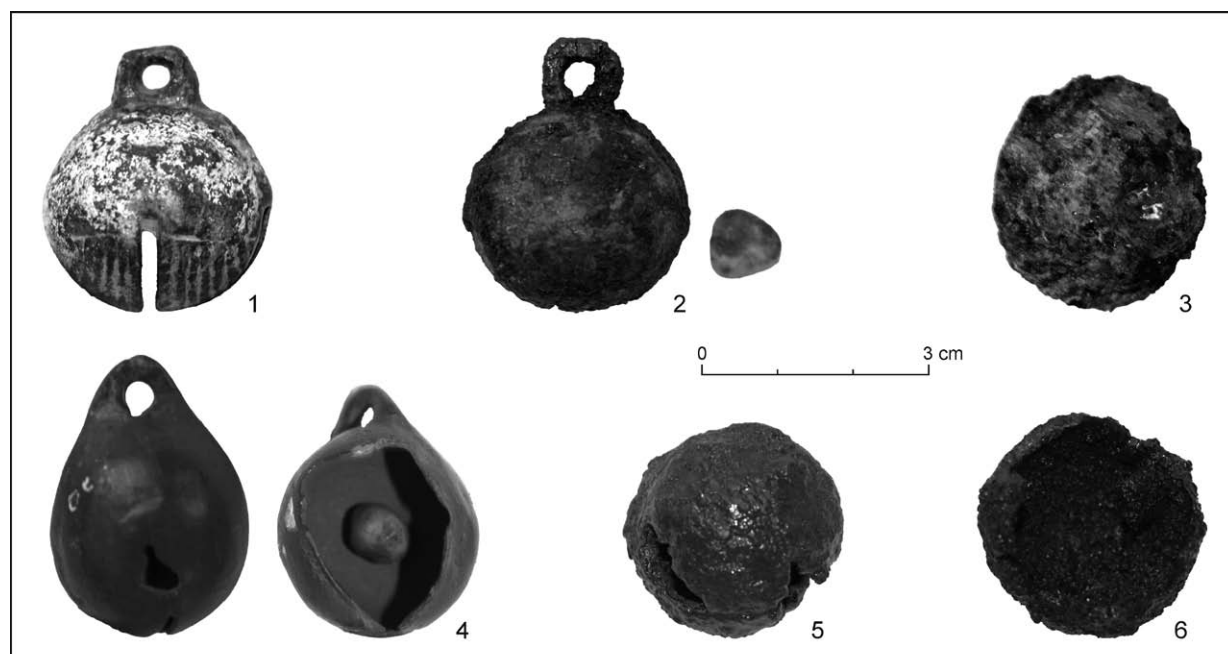


Fig. 3. Cemetery Holiare. Pellet bells. 1 – grave 92; 2 – grave 146; 3 – grave 437; 4 – grave 667; 5, 6 – grave 728. Photo, graphic B. M. Pomberger, IA SAS.

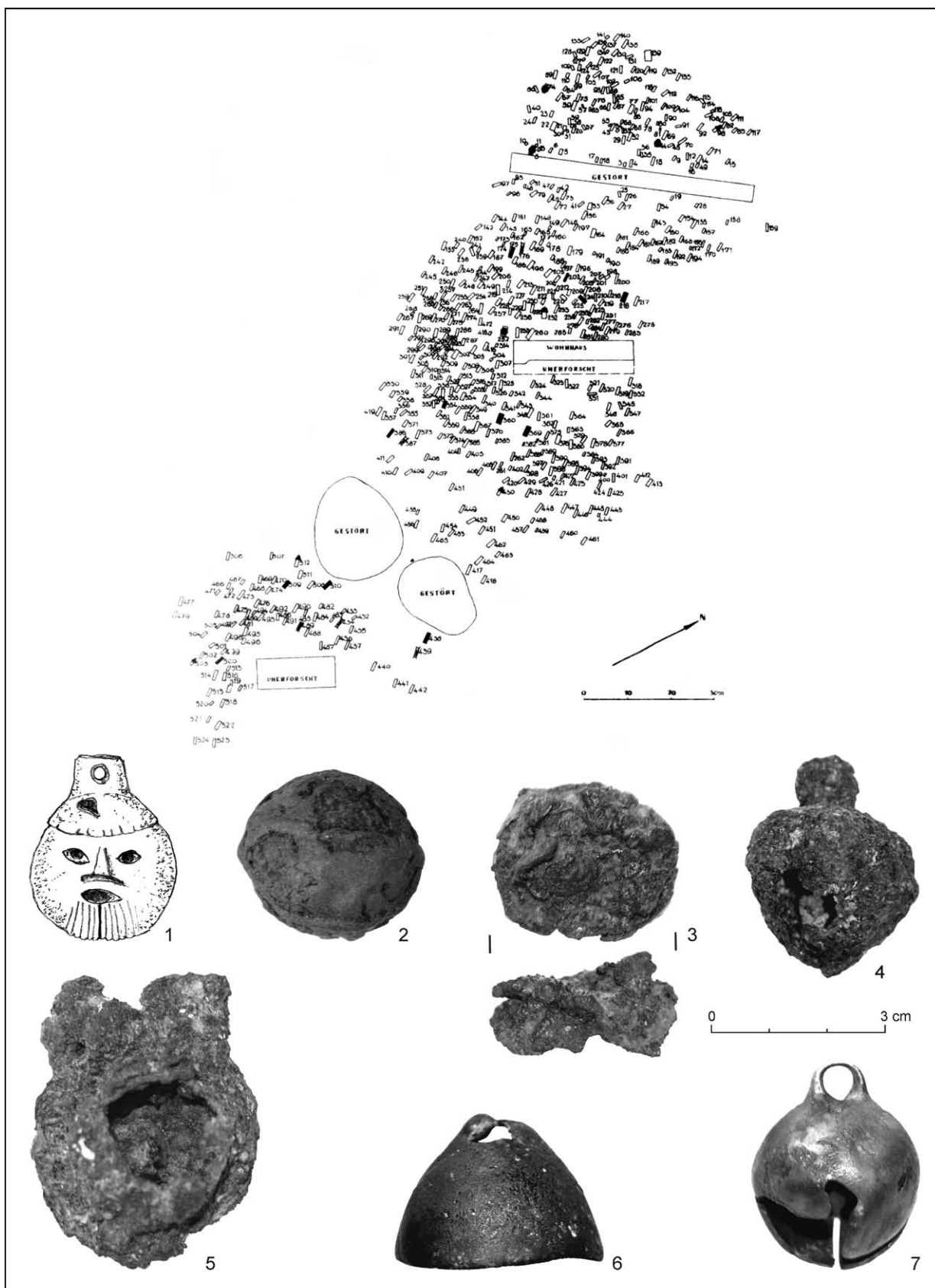


Fig. 4. Cemetery Nové Zámky I. Graves containing pellet bells and the objects. 1 – grave 175; 2 – grave 224; 3 – grave 354; 4 – grave 386; 5 – grave 509; 6 – grave 510; 7 – grave 438 (map according Čilinská 1966, 327). Photo, graphic B. M. Pomberger, IA SAS.

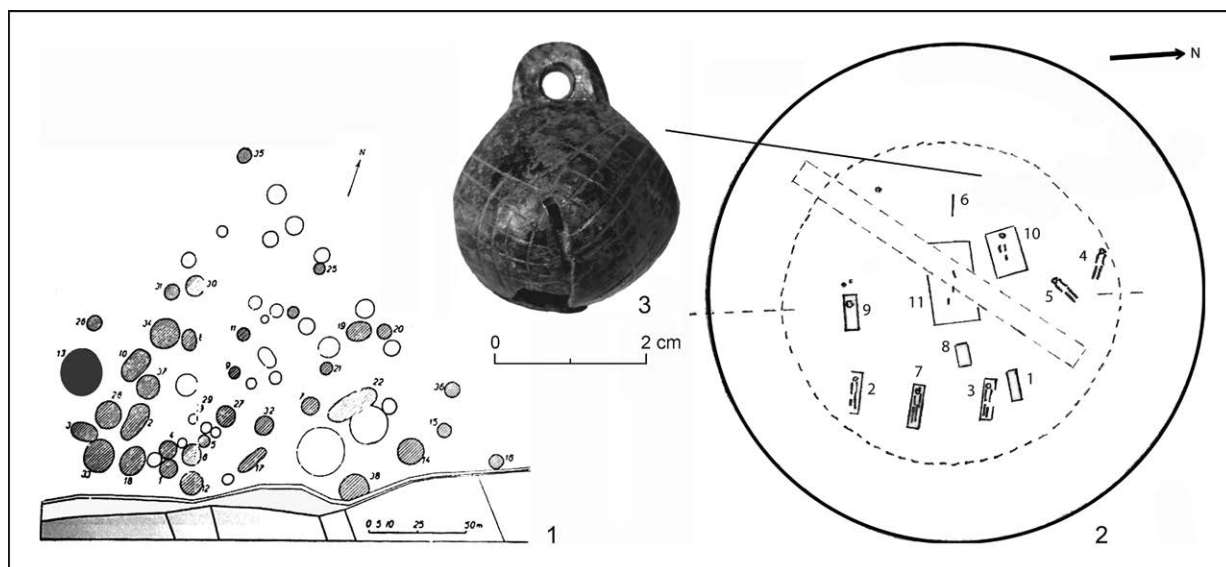


Fig. 5. Cemetery Skalica. Tumulus 13. Pellet bell (according Budinský-Krička 1959, 40, 74, pl. 21: 4). Photo, graphic B. M. Pomberger, Slovak National Museum Martin.

individuals. A pellet bell belonged to a little child, who probably wore it around the neck (Cat. no. 31). The child in grave 354 had two pellet bells near the right femur (Cat. no. 29). The last pellet bell was found in a man's burial 224 near the left foot of the deceased (Cat. no. 28; Fig. 4).

Skalica

The Slavic cemetery in Skalica, Vysoké pole, Trnava Region, contained in total approximately 100 tumuli. First excavations were carried out in 1922 and 1923. During the second world war in 1943–1944 further excavations followed. The cemetery dates to the 9th till 10th c. (Budinský-Krička 1959, 145–149; Kraskovská 1959, 179–182). One complete conserved pellet bell was found in tumulus XIII in a child's grave, burial 6 (Budinský-Krička 1959, 74, pl. 21: 4). It lay near the skull of the skeleton and therefore we can conclude that it was worn around the neck. It is cast in copper alloy, has a size of 3.5 cm and weighs 25.03 g (Cat. no. 20). A small pebble serves as rattle body. The surface is decorated with a network of diagonal lines (Fig. 5).

In all the mentioned cemeteries pellet bells do not play a dominant role. They are rather rare finds and this observation is in accordance with all the observations made in several other contemporary cemeteries, which are for examples the Avar Cemeteries in Slovakia, namely in Bratislava-Devínska Nová Ves, Bratislava-Rusovce (Pri cintoríne), Bratislava-Záhorská Bystrica in Bratislava Region (Pomberger/Mühlhans/Saunderson 2022); as well as

Komárno, Nitra Region (Pomberger et al. 2021a); the Hungarian Avar cemeteries of Szombathely-Kőszegi street and Vasasszonyfa-Gyöp, Vas County (Pomberger et al. 2021b); Cikó and Gerjen Váradmajor, Regöly-Kapuvár-Bozót-dűlő, Váradi, Váradpuszta in Tolna County; Halimba Belátó-domb in Veszprém County; Jánoshida and Jászalsószerbgyörgy in Jász-Nagykun-Szolnok County; Kiskőrös in Bács-Kiskun County; Kölked-Feketekapu A, Szebény Cemetery I in Baranya County; Mosonszentjános-Kavicsbánya in Győr-Moson-Sopron County; Pilismarót-Basaharc and Pilismarót Öreges-dűlő in Komárom-Esztergom County; Solymár, Szob-Homok-dűlő, Újhartyán in Pest County (Pomberger et al. 2022b); Gyenesdiás, Keszthely-Dobogó, Keszthely-Városi temető, Lesencetomaj B-Piroskereszt in Zala County (Pomberger et al. 2023); Kaposmérő-Agyagbánya, Kaposvár-Toponár-Fészerlak-puszta, Kaposvár 61-es út, Kaposvár-Toponár 40-es őrház, Kereki-Homokbánya, Vörs-Battyáni disznólegelő, Vörs-Papkert B, Zamárdi-Rétiföldek Somogy County (Pomberger et al. 2025). And furthermore, the Austrian cemeteries of Csokorgasse-Wien Simmering, Edelstal (Nemesvölgy), district Neusiedl am See, and Carlberggasse-Liesing Vienna (Pomberger/Mühlhans/Mehofer 2022; 369–377, 388–393).

Only three graves of the known 83 graves in the site Radvaň nad Dunajom-Žitavská Tőň, Radvaň I, four graves out of 788 in Holiare, seven graves of 580 graves in Nové Zámky I and only one burial of 100 tumuli in Skalica contained pellet bells. They appeared during the second half of the 7th c. (Pomberger/Stadler 2018a, 139) and spread across Central Europe. Pellet bells excavated in the four

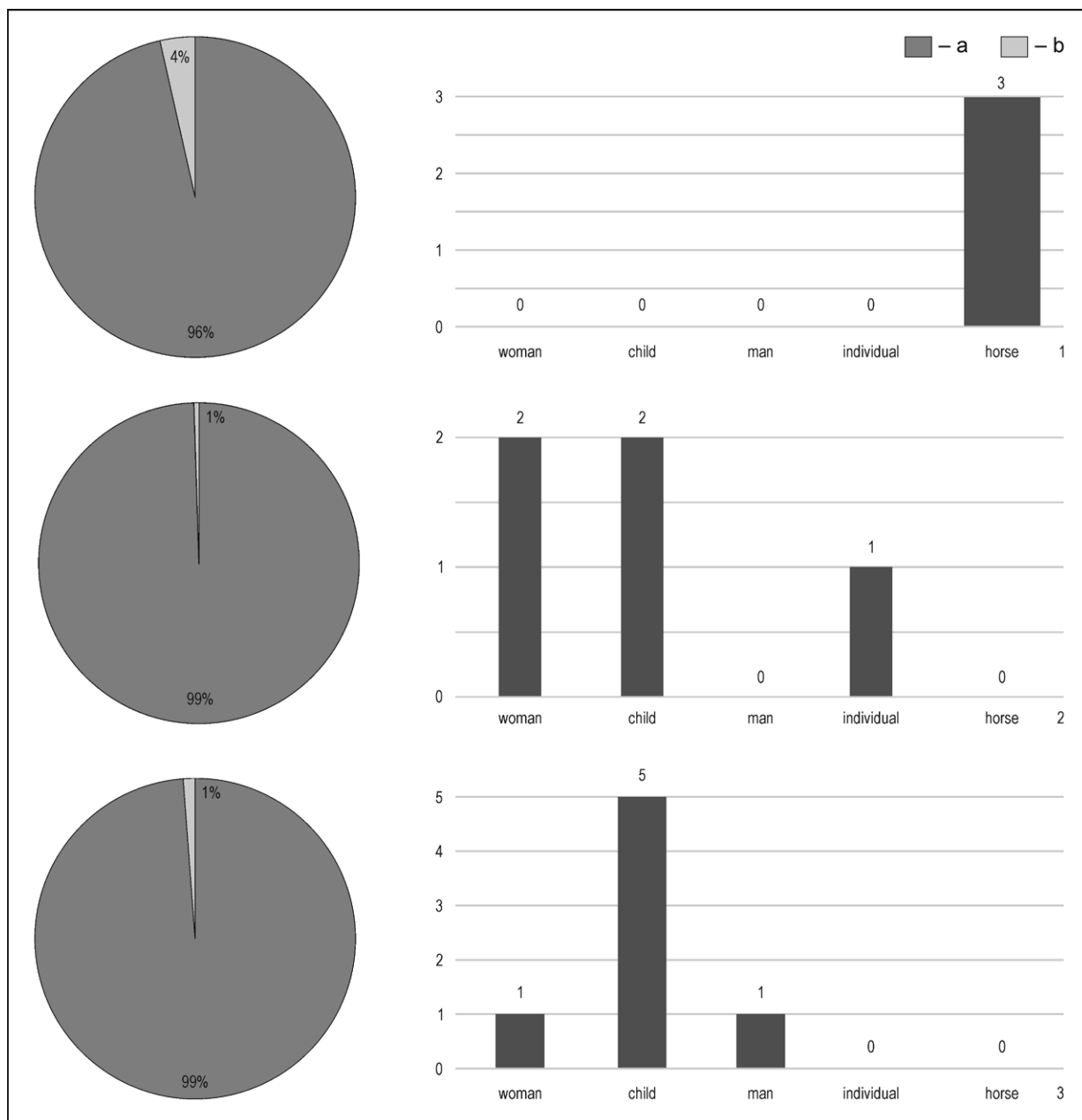


Fig. 6. Statistics on the distribution of pellet bells in the cemeteries and graves. 1 – Radvaň nad Dunajom-Žitavská Tôň, Radvaň I; 2 – Holiare; 3 – Nové Zámky I. Legend: a – graves total; b – graves with pellet bells. Graphic B. M. Pomberger.

cemeteries presented here were mainly worn by children, followed by women (Fig. 6). Horse harness of a few horses, whose owners belonged to the upper social class, was decorated with them (Csuthy 2020).

SHAPES AND TYPES

The pellet bells discussed in this article can be classified into four base shapes (Pomberger 2020). Shape I is probably represented by the pellet bell

from grave 175, Nové Zámky I (Cat. no. 27). Ten pellet bells show shape II. They are the objects from the cemetery in Holiare, grave 92 (Cat. no. 21), grave 437 (Cat. no. 23), grave 667 (Cat. no. 24), grave 782 (Cat. nos. 25; 26), from the cemetery in Nové Zámky II, grave 224 (Cat. no. 28), grave 386 (Cat. no. 30), grave 438 (Cat. no. 31), grave 509 (Cat. no. 32) and from Skalica tumulus 13/grave 6 (Cat. no. 20). All 14 pellet bells from burial 10 (Cat. nos. 1–14) and the four from burial 31 (Cat. nos. 15–18) from the cemetery Radvaň nad Dunajom-Žitavská Tôň, Radvaň I belong to shape VII.

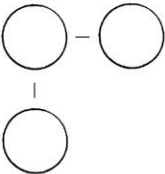
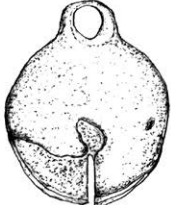
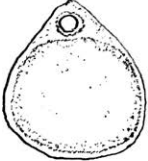
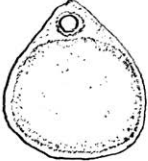
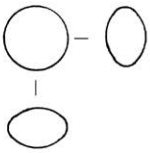
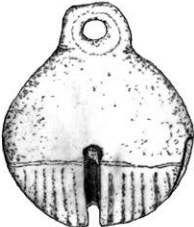
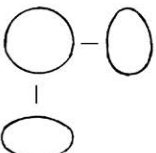
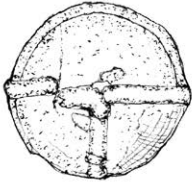
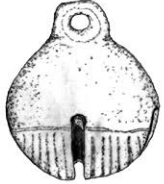
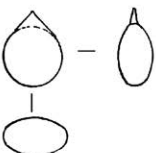
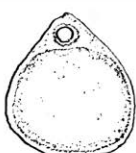
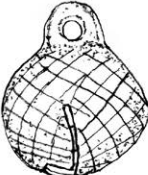
Basic shapes	Production	Sound slot	Decoration
 shape I - circular	 cast	 none	 smooth, gilded
 shape II - oval	 forged	 cruciform	 face
 shape IV	 two horizontal halves		 vertical grooves
 shape VII	 two vertical halves		 network of diagonal grooves

Fig. 7. Shapes of pellet bells. Graphic B. M. Pomberger.

Pellet bells are cast in various copper alloys in the lost wax technique and forged from copper alloy sheets. First, two halves are pressed into moulds, filled with the rattle body and soldered together. Depending on the shape, the halves can be joined vertically and horizontally. Those which are composed of two vertical halves show no sound slot, the others – as far as recognisable – have cruciform sound slots. A great number of the pellet bells have smooth surfaces without any decoration. The ones from grave 10 and 31, cemetery Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, are gilded. The find from grave 92 in Holiare, is decorated with

vertical grooves on its lower body. Masculine faces show the pellet bells from grave 92 in Nové Zámky I and grave 1/1963 in Radvaň nad Dunajom-Žitavská Tôň, Radvaň I. Very rare is the network like ornament on the pellet bell from Skalica (Fig. 7).

The bell from grave 510/Nové Zámky I can be classified to the 'Avar' bell type 1/var. A (Pomberger/Stadler 2018b, fig. 12) which is equivalent to the ancient Roman bell type 5/var. A (Pomberger et al. 2022a).

Pellet bells forged from sheet metal (non-ferrous metal) appear during the last two phases of the Late Avar Period (Csuthy 2020).³

³ This article includes only pellet bells from horse harness.

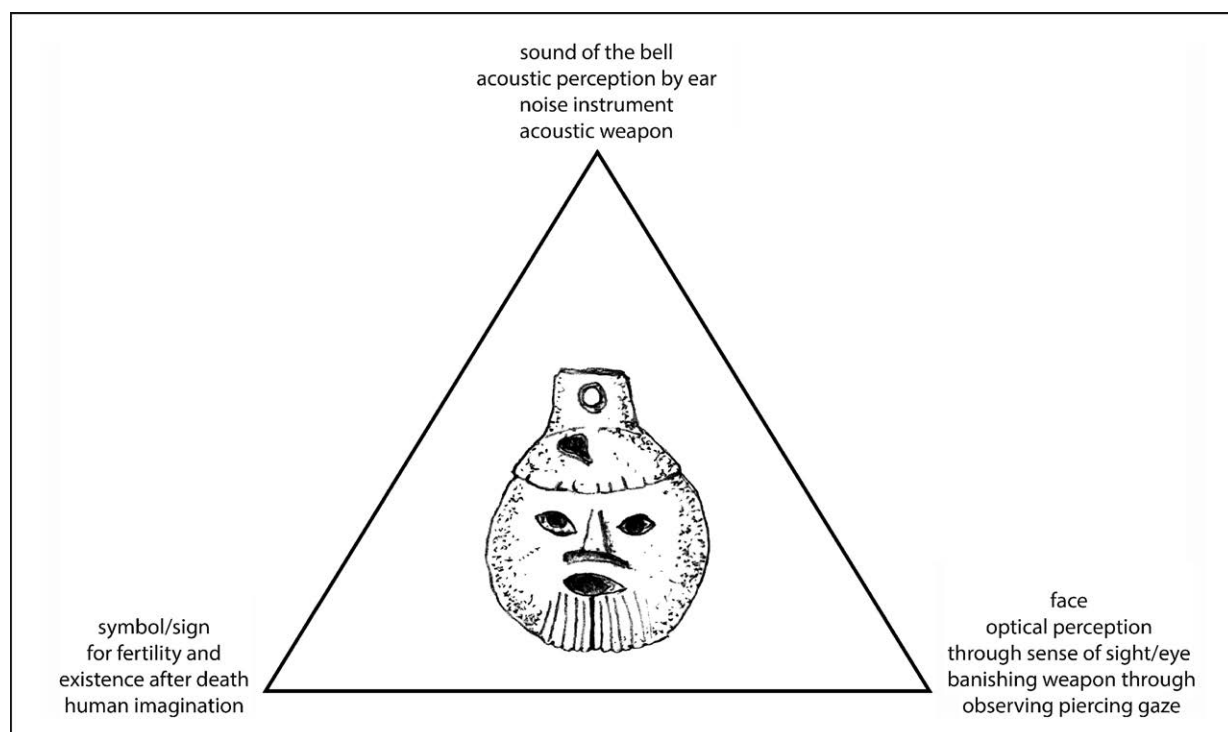


Fig. 8. Interpretation of apotropaic meaning of faced pellet bells. Graphic B. M. Pomberger.

FUNCTION

Pellet bells mainly served for people – especially for children – as apotropaic amulets and were worn on belt straps, bracelets, necklaces, maybe also in belt pouches or small belt bags. In very few cases they were wrapped in textiles (Pomberger et al. 2023, 47–49).

Wearing an amulet requires magic beliefs. Magic thinking is described as an archaic state of mind. Events or objects are attributed a special significance for predicting the future (superstition; *Roubicek-Solms s.d.*). Magic is the attempt to influence fate and the environment in a purely spiritual way. If people believe they perceive animate beings all around them (animism), they also believe they can conjure and influence them and project their spiritual inner world onto the outside world and their environment (Bartheim-Rixen s.d.). An amulet (also fetish, talisman) is defined as a small object often worn around the neck – sometimes in the form of a medallion – which is said to ward off danger and bring luck (Schneider-Ermer s.d.). This object is said to have a kind of ‘magical power’. But this ‘power’ does not come from the ‘magic’ object, but from the feelings and ideas attached to it.

Two of the pellet bells investigated show human faces, namely the ones from grave 175, Nové Zámky I and from grave 1_1963, Radvaň nad Dunajom-

Žitavská Tôň, Radvaň I. The first belonged to a buried child and shows similarities to finds from infants’ burials in Keszthely-Városi temető, grave of a girl (Lipp 1885, 116, 326; Pomberger et al. 2023), a child’s burial in Jánoshida (grave 107; Erdély 1958, pl. 61; Pomberger et al. 2022b, fig 1: 7) and a boy’s grave from Komárno IV, Váradiho street (grave 11; Čilinská 1982, 358, tab. 4: 39; Pomberger et al. 2021a, fig. 3: 1). The second one of the above-mentioned pellet bells – Radvaň nad Dunajom-Žitavská Tôň, Radvaň I – was found near the skeleton of a horse and reminds on the four pellet bells belonging to the bridle of the horse in burial 107 from Komárno IX (Trugly 1993, 197, tab. 12: 15–18). The interpretations of the meaning of faced pellet bells range from apotropaic amulet (Rácz 2012, 429, 435) via decorations on horse harness (Csuthy 2019, 354) till decollated heads of enemies (Csuthy 2022). The author of this article prefers to plead for apotropaic amulets and tries to explain this interpretation.

Pellet bells with smooth surface or other decorations include two ideas: sound and the imitation of a vascular fruit with its symbols. Pellet bells with faces additionally have a third aspects, which are said to give them enhanced ‘apotropaic powers’: protective power intensified by the optical sense.

Imitating vascular fruits with many seeds pellet bells are symbols of fertility, prosperity, long life and life after death (Fig. 8; Grömer/Pomberger 2024,

60). They are also noise instruments that produce sound by being shaken. The rattle bodies inside the rattles hit against the rattle wall and thus create acoustic waves. The wearer of the pellet bell draws attention to himself through the sound, i.e., he is heard, perceived acoustically. Animals as well as humans try to shout over each other, to shout the other down. Noise was and is used as an acoustic weapon to disturb other living beings, to terrorise them psychologically and acoustically and, in some cases, to drive them crazy. People now believe that these methods are also effective against evil, illness and evil spirits. The third aspect is the face of a man (warrior) with closely observing eyes. Here the effect is said to work via the visual sense. A piercing, cold and stern gaze can stop attacking creatures and keep them at a distance. On the other hand, every hunter (animal or human) focusses his prey with an extremely concentrated gaze before attacking. And also, emotions can often be read in the eyes of the other person (Fig. 8).

The three Gorgons, terrifying creatures with snake hair, whose gaze turns anyone who looks at them to stone, are known from Greek mythology (Bremmer/Welwei 2006). This subject, especially which of the decapitated Gorgon Medusa, has been taken up and depicted by numerous artists. The goddess Athena for examples carries a shield with a Gorgoneion (Roscher 1884, 1695–1721). Furthermore, the idea of the evil eye is a widespread phenomenon (Tuczay 2024). Bells with faces are known from the Graeco-Roman period of ancient Egypt. Very often they show the face of God Bes, who was dedicated to women and children (British Museum s.d., Roman Period/Object number EA6374; Metropolitan Museum of Art s.d., Ptolemaic Period/Object number 1985.73; EgyptCentre, Ptolemaic Period/Object WK44). ‘Magic’ bells from Meroë, Sudan, dating to the 1st c. CE, show images of war, capture and torture of the enemies and the fear-inducing depiction of the griffin. These depictions are intended to reinforce the cruel desires of the Meroan rulers and turn the bells into effective weapons of protection (Hermann 1966).

Pellet bells in connection with buried horses appear during the middle Avar period II – around 650 CE (Csuthy 2019, 355; 2020, 170; Pomberger/Stadler 2018a, 139). Mostly they are part of the head horse harness, but also could be fastened on the breast strap, on a back strap and on the saddle (Pomberger et al. 2021a). Pellet bells forged from two sheet metal halves (vertically assembled) became common during the second half of the Late Avar period (Csuthy 2020). Mainly they are

gilded and are fixed on the head harness. Objects are known from Kaposvár-Toponár 40-es őrház, Komárno IV, Komárno IX, Lukáčsháza-Hegyalja dűlő 8, Pitvaros-Víztározó (Csuthy 2020, 170), Wien-Csokorgasse (Pomberger/Mühlhans/Mehofer 2022) and Vösendorf-Laxenburgerstraße (Pomberger/Stadler 2018a). Vertically assembled sheet pellet bells are only found in connection with horse skeletons. Therefore the one find from Dobogó or Keszthely-Városi temető (Lipp 1885, 93, fig. 13; Pomberger et al. 2023, fig 1: 11) has to be mentioned here.⁴ Since the sounds of all these pellet bells are rather weak and high, as the analyses of the pellet bell from grave 650, Wien-Csokorgasse proves (Pomberger/Mühlhans/Mehofer 2022) it could be perceived by the horse but possibly did not disturb the animal.

EXPERIENCES AND USES OF PELLET BELLS ON HORSE TACK

A practical test was conducted by attaching four modern pellet bells – two beneath each ear – to a horse’s bridle. This cannot be seen as an experiment, as it was only tested on one case and there is an abundance of variables and factors that can hardly be measured regarding a horse’s psychology. Rather, it applied in order to gain some insights into using pellet bells on horses and how it might influence the practical test. The tested horse, a 23-year-old Camargue gelding, and rider in this case have been regularly working together for 15 years.

At first, before the bells were attached (Fig. 9), the horse was somewhat wary of the sound of the pellet bells, which is not surprising as a flight animal. As soon as they were attached to the bridle and sounded with every movement of the horse, it no longer paid attention to them. During riding in the countryside with a lot of factors that could spook the horse (agricultural machines, wild animals, wind), the horse seemed much more concentrated than usual and did not spook as easily at sounds, most likely due to the constant sound of the pellet bells driving its hearing towards them instead of the outside. This could have likely also been the reason for using pellet bells on horses during the Avar period. This use can also be observed during the Late Medieval and Early Modern period, from the late 15th to the 16th c., where in most depictions of jousts, the horses wear a strap with many large pellet bells behind their ears. Furthermore, the horses are also (at least partially)

⁴ Magyar Nemzeti Múzeum, Inv. nr. 157.1880.9.



Fig. 9. Pellet bells attached to the horse's harness near the ear. Photo K. Saunderson

blinded by fabric covering their eyes. This most definitely served a practical purpose, since in this martial game, two horses and riders charge at each other with lances, which is highly likely to spook or at least drive away a horse that is aware of this. Thus, when the horse is not able to see (by

the blinding fabric) and hear (by the loud sounds of the pellet bells) this situation, it will concentrate on its rider's aids, charging very closely towards the other combatant. Earlier depictions, such as a late 12th c. fresco from the Church of Lyngby (Denmark) also showing a joust (*Meyer 2017, 54*), suggest a similar use of bells and pellet bells attached to the horses' breast plates. From Sassanid Persia, there is another interesting example from Taq-e Bostan: A heavily armoured warrior, probably Khosrow II (ruling from 591 to 628 CE; *Daim 2021, 302, 303*), and horse are shown in a stone relief with a lance. The chest, neck, and head of the horse are armoured and are covered in many pellet bells. It is quite likely that these served the same purpose as those used in Medieval and Early Modern jousts. The sounding element might have been especially necessary for close combat rather than mounted archery, i.e., with lances, where it is vital that the horse follows the rider's aids and does not shy away. This might indicate the use of pellet bells for in the Avar period.

Frequency ranges of the pellet bells mostly are between 1000 and 10,000 Hz. The horse's hearing threshold shows a clear kink in this range (Fig. 10). This probably means that the horse does not perceive the pellet bells as well as humans or dogs (*Pomberger/Mühlhans/Mehofer 2022, 378, fig. 16: 2–4*). However, as flight animals, horses should hear twice as well as humans, namely up to 32 kHz/40 kHz (*Pollmann s.d.; Schay-Beneke s.d.*).

But there are also more possibilities. They could have served an acoustic decorative purpose, as the sound of the pellet bells in rhythm with the horse's gaits can be considered as appealing. Apart from

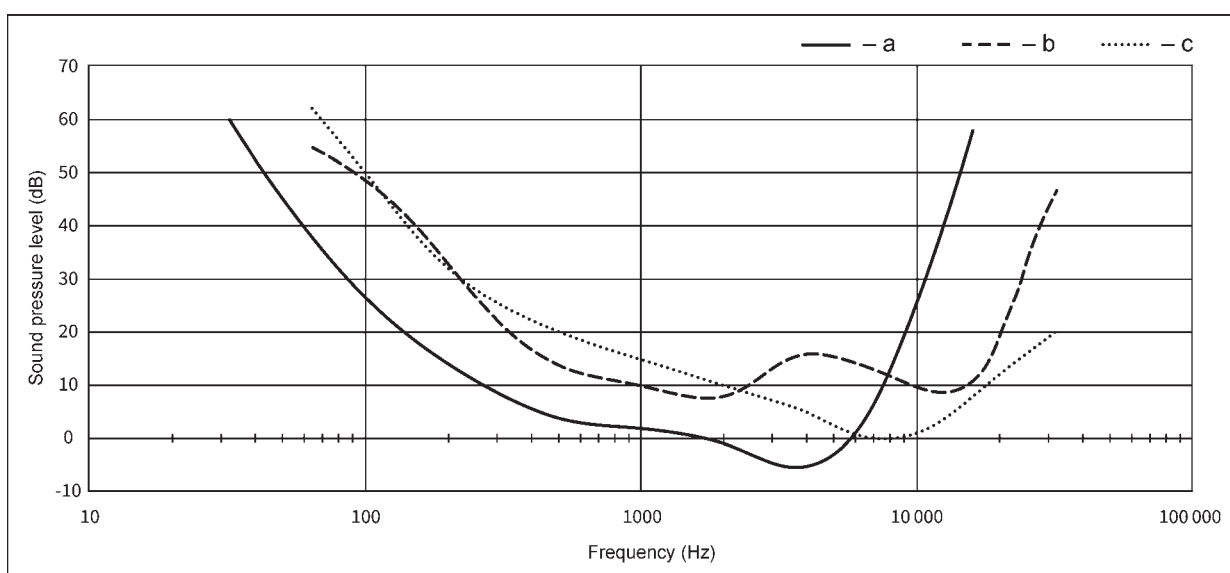


Fig. 10. Threshold of hearing. Legend: a – humans; b – horses; c – dogs. Graphic J. Mühlhans.

also maybe being connected to apotropaic beliefs protecting the horse, the sounds could also have a practical function. The sound created during movement could have warned nearby people of a horse and rider coming closer, alerting them in time to move out of the way. The speed can also be determined by the rhythm of the sounds. Thus, this might have been a safety measure for other people. Two videos were recorded and are available on the repository of the Natural History Museum Vienna (*Saunderson/Saunderson/Dupper 2024*).⁵

THE (PSYCHO-) ACOUSTICS OF IDIOPHONES

The acoustics of idiophones is very complex and influenced by numerous factors, primarily related to the object's physical characteristics such as material/alloy, weight, size, shape, and wall thickness. Additionally, the mode of excitation is crucial. The sound and timbre of pellet bells arise from a series of individual excitations over time, caused by a smaller encapsulated object striking the inner walls, prompting the bell's mantle to oscillate. When continuously excited (e.g., by shaking), these idiophones typically generate up to 25 single impacts per second. Each impact has a short decay time of approximately 20–150 milliseconds, depending on the level of corrosion (*Pomberger et al. 2021a*, 124).

The oscillation duration of an idiophone primarily depends on its physical properties. If an object is solid and minimally dampens oscillation, numerous modes can form. In idiophones (and membranophones), the sound comprises a complex combination of single oscillations (modes) creating various partial frequencies or overtones, unlike aerophones and chordophones, where overtones are integer multiples of a fundamental frequency (f_0 ; *Hall 1980*, 156–168).

Instruments excited impulsively have a very short attack time, just a few milliseconds, within which the maximum amplitude is reached, and the oscillation begins to decay. The moment of impact is rich in spectral energy, and partial frequencies become visible within a few milliseconds. On a spectrogram, the impact appears as a vertical line with dense colouring, and the decay of partials appears as horizontal lines. Decay time varies for all partials, but typically low-frequency oscillations are less dampened (*Hall 1980*, 168), resulting in a longer decay time than higher frequencies. Fig. 11 illustrates the typical pattern of excitation in the

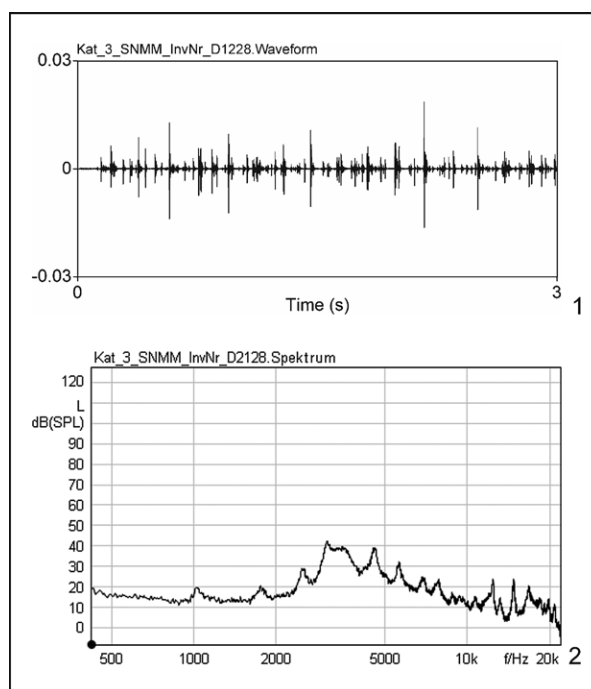


Fig. 11. 1 – waveform of pellet bell Cat. no. 3 (burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I), that shows the single impulses during a 3^s period of constant excitation; 2 – resulting spectrum shows the partial frequencies and the spectral distribution of energy. Graphic J. Mühlhans.

waveform (1) and the resulting spectrum (2) from one of the objects.

The given example in Fig. 11 is quite representative for the examined pellet bells, some are a little bit more tonal, others are slightly noisier. Compared to small bells, that were quite common in later ages, pellet bells sound is generally noisier, which leads to less pitch perception (*Schneider 2000*).

A crucial acoustic parameter is the sound pressure level (SPL) of the objects, given in dB re p_0 ($= 0.00002$ Pa), calculated from the root mean square (RMS) value of the calibrated recordings. Since SPL decreases by 6 dB per doubling of the distance from the source (*Attenborough 2014*, 119), the maximum audible distance for a sound object can be determined for a given background noise. Another key parameter is the frequency range, from the lowest ($f_{\min}$) to the highest ($f_{\max}$) partial frequency. Although the overall SPL of small idiophones is not high, their frequency range typically overlaps with the most sensitive area of human hearing, roughly between 1.5–6 kHz (*Moore 2008*, 55–57). Often, one of the partial frequencies has a particularly high amplitude, known as the 'peak frequency', which matches the

⁵ Horse_wearing_eight_pellet_bells_in_canter.mp4; Horse_wearing_eight_pellet_bells_in_trot.mp4

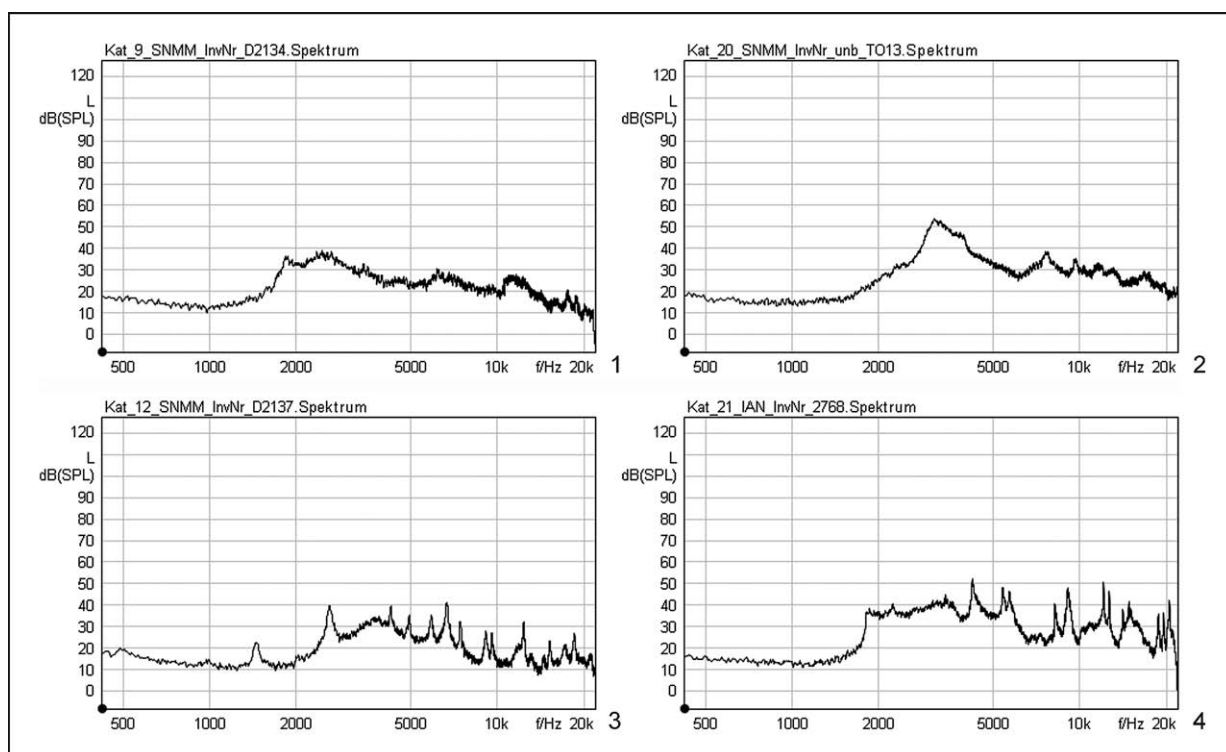


Fig. 12. Spectra of pellet bells, that lack pronounced partials and only have specific frequency ranges with increased spectral energy (rather noisy objects). 1 – Cat. no. 9 (burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 2 – Cat. no. 20 (tumulus 13, burial 6, Skalica). Spectra of pellet bells that have at least more than ten clearly visible partials/peaks. 3 – Cat. no. 12 (burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 4 – Cat. no. 21 (burial 92, Holiare). Graphic J. Mühlhans.

idiophone's 'eigenfrequency' and plays a significant role in pitch perception.

Psychoacoustic parameters provide a different approach to describing sounds, focusing on subjective human perception rather than physical properties. Psychoacoustics, a branch of psychophysics, seeks to correlate the physical qualities of a sound with its perception. In psychoacoustics, loudness measures the intensity sensation and is expressed in 'phon' or 'sone'. A reference sound of 1 kHz at 40 dB SPL equals 40 phon or 1 sone (Fastl/Zwicker 2007, 203, 204). Phon is interval-scaled, while sone is ratio-scaled, meaning 50 phon is twice as loud as 40, and 2 sone is twice as loud as 1. Sharpness, measured in 'acum', describes a sensation resulting from the spectral shape and density, with a critical band wide noise at 60 dB centred at 1 kHz (Fastl/Zwicker 2007, 241). Roughness, caused by amplitude modulation (AM), peaks around a 15 Hz modulation frequency, reaching its maximum at 70 Hz, and decreases above 150 Hz. It is measured in 'asper', ranging from 0 (not rough) to 1 (maximum roughness at 70 Hz AM at 1 kHz; Fastl/Zwicker 2007, 257). Tonality is represented by the tone-noise-ratio (TNR), given in dB, comparing the tonal part of a sound to the noise part based on a human hearing model (Becker/Sottek/Lobato 2019, 5820). These four parameters of-

ten quantify the concept of 'sensory pleasantness' of sound (Fastl/Zwicker 2007, 243).

Common adjectives for describing timbral brightness include high/low or dark/brilliant. This parameter can be estimated using the spectral centre of gravity or 'spectral centroid' (SC) in Hz (Saitis/Siedenburg 2020, 2256). Finally, impulsiveness measures the degree of impulsive content perceived in a sound, often described as 'rattles' or 'clicks' (Willemsen/Rao 2010, 2), in the non-standardized 'impulsiveness unit' (iu).

The aforementioned (psycho-) acoustic parameters have been calculated using Audition CC (Adobe Audio Team), ArtemiS Suite 9.3 (HEAD Acoustics), and Praat (Boersma/Weenink 2022). The number of examined objects in this study is not large enough for additional statistical calculations.

(Psycho-) Acoustic Analyses

Nine objects in total could be recorded and analysed for their (psycho-) acoustical parameters. Recordings were made in the portable sound absorbing chamber built for the project to avoid any external noise (Pomberger/Mühlhans 2022) at the distance of about 10 cm to the measurement

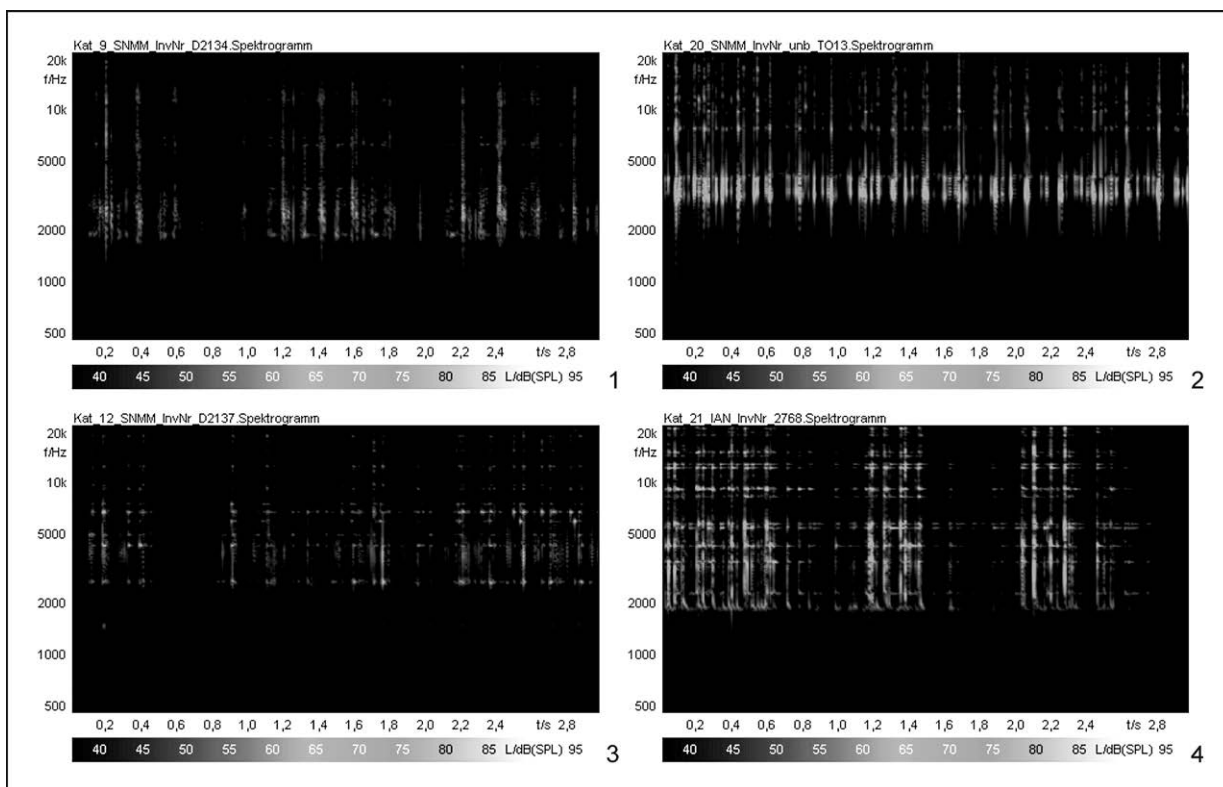


Fig. 13. Spectrograms of pellet bells. 1 – Cat. no. 9 (burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 2 – Cat. no. 20 (tumulus 13, burial 6, Skalica); 3 – Cat. no. 12 (burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 4 – Cat. no. 21 (burial 92, Holiare). Both pellet bells from burial 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I (1, 3), show significantly lower amounts of spectral energy (colouring). Find from tumulus 13, burial 6, Skalica (2) has more energy in a narrow band of roughly 3–4 kHz and the last one from burial 92, Holiare, has its higher energy more evenly distributed between 2–20 kHz. Graphic J. Mühlhans.

microphone (Presonus PRM 1). In SPL, they vary between 56–72 dB with an average of 62 dB. These values have to be reduced by 20 dB to evaluate the SPL at a distance of 1 m. Given those values, we can estimate that the pellet bells on average, with their actual status of corrosion today, are audible at distances of 2–16 m maximum, even in a quiet surrounding. However, practical tests with replicates have shown that corroded original finds made from copper alloys are not necessarily lower in SPL than the replicas (Mühlhans/Pomberger 2023). The loudness ranges from 6.8–18.6 sone, so the loudest object (Cat. no. 21; pellet bell Inv. nr. 2760_Holiare, burial 92) is about 4 times as loud as the least loud one (Cat. no. 25; pellet bell Inv. nr. 2405a_Holiare, burial 782).

In terms of sharpness and roughness, the pellet bells from Nové Zámky I, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, Holiare and Skalica line up quite well with similar objects from other locations that have been studied during the project. With an average sharpness of 3.3 acum and roughness of 0.11 asper, the pellet bells can be described as quite sharp, but not rough overall, which is typical

for pellet bells. The rather high sharpness for the generally low SPLs is a result of the objects having their peak frequencies and overall high spectral energy in the human's sensitive hearing area of roughly 1.5–6 kHz, even for the ones without pronounced partials. In bells, for comparison, the partials' peaks are up to 60 dB higher than the noise floor, in pellet bells this value is rather 30 dB at best. Also, the number of visible partials in the spectrum is quite low in comparison to bells, in some cases only frequencies areas are 10–20 dB above the noise floor without any visible partials (Fig. 12).

Despite the similarities in the spectral range, Cat. no. 9 (pellet bell Inv. nr. D 2134, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) and Cat. no. 20 (pellet bell, Skalica, tumulus 13_tomb 6) do not sound as similar as one might expect, and neither do Cat. no. 12 (pellet bell Inv. nr. D 2137, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) and 21 (pellet bell Inv. nr. 2760_Holiare, AI SAS). If one considers the time range, as shown in Fig. 13, a different picture emerges. There seems to be a greater similarity between Cat. no. 9 (pellet

bell Inv. nr. D 2134, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) and 12 (pellet bell Inv. nr. D 2137, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) and also between Cat. no. 20 (pellet bell, Skalica, tumulus 13_tomb 6) and 21 (pellet bell Inv. nr. 2760_Holiare, AI SAS), but this is not confirmed by the auditory impression either. This should only be mentioned to clarify that auditory impressions cannot be satisfactorily clarified by analytical visualizations, at best individual tonal characteristics that contribute to the overall impression. The differences in the other parameters analysed contribute significantly to this.

The general sound impression of most objects (Cat. no. 2, pellet bell Inv. nr. D 2127; Cat. no. 3, pellet bell Inv. nr. D 2128; Cat. no. 8, pellet bell Inv. nr. D 2133; Cat. no. 9, pellet bell Inv. nr. D 2134; Cat. no. 12, pellet bell Inv. nr. D 2137, all from Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10; Cat. no. 25, pellet bell Inv. nr. 2405a_Holiare, burial 782) is muffled and noisy but quiet. They are in the range of 6.8–11.4 sone loudness. The same sound impression, but with a significantly higher loudness of 16.9 sone, is created by Cat. no. 20 (pellet bell, Skalica, tumulus 13_tomb 6). The remaining two objects differed significantly in timbre. Cat. no. 13 (pellet bell Inv. nr. D 2138, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) is lower than Cat. no. 20 (pellet bell, Skalica, tumulus 13_tomb 6) at 11.7 sone but has the highest value for tonality at 13.8 dB TNR. Cat. no. 21 (pellet bell Inv. nr. 2760_Holiare, burial 92) is comparable in terms of sound, although its tonality is significantly lower at 8.7 dB TNR, but this compensates for the high loudness of 18.6 sone.

Due to the spectral density and envelope curve, all objects have a high sharpness of 2.3–4.2 acum and a very low roughness of 0.006–0.1 asper. There are clearer differences in brightness, which is also reflected in the auditory impression. The objects range in the spectral centre frequency between 2.8–7.8 kHz, whereby again Cat. no. 13 (pellet bell Inv. nr. D 2138, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I, burial 10) and Cat. no. 21 (pellet bell Inv. nr. 2760_Holiare, burial 92) are located at the upper edge.

The recordings of the original pellet bells are available on the repository of the Natural History Museum Vienna.

SUMMARY

Pellet bells appear in the middle of the 7th c. in the Avar domain. They probably were imported from Eastern regions like the Caucasus and Black Sea area. Only 1% of all the burials contained pellet bells. They were worn by a few children and women and decorated the bridle of a few horses. For the former they had the function of apotropaic amulets, for the latter they were probably status objects. In three graves of the cemetery Radvaň nad Dunajom-Žitavská Tôň, Radvaň I pellet bells were found, all decorating the horse harness. Four burials of the Holiare cemetery contained pellet bells, namely two children's graves and two women's graves. The cemetery Nové Zámky I included five children's and one man's grave with pellet bells. A Roman period bell originates from a woman's burial. And from tumulus XIII/grave 6 one pellet bell is known. The pellet bells are cast in various copper alloys or forged from iron or copper alloy sheet metal. Small pebbles or lumps of bronze/cinder serve as pellets. The sizes of the pellet bells vary in height from 2.4 cm to 4.2 cm and weight from 0.67 g to 25 g. Their shapes are spherical or oval. The surfaces either carry no decoration or are adorned by vertical grooves, networks of lines and human faces. The find positions show that pellet bells were worn around the neck and on the wrist, but mostly on the belt or belt straps of the garment. From an acoustic point of view, the objects fit seamlessly into the previous analyses of bells. They are quiet and not very tonal, yet bright and somewhat sharp, but their roughness is very low. These characteristics are generally typical for pellet bells, with the exception that non-corroded objects are significantly higher, especially in loudness and tonality. In summary, one could say that most of the objects are quite typical of heavily corroded jingles in both aural impression and analytical findings. For the use of pellet bells on horses, multiple purposes come into question. Apart from decorative and apotropaic uses, a practical test has shown that the horse is much more concentrated and less likely to spook at outside factors when in movement carrying pellet bells. This was utilised during jousts in the Late Medieval and Early Modern period and likely also earlier.

CATALOGUE⁶

**Archaeological collection
of the Slovak National Museum in Martin**

**Cemetery Radvaň nad Dunajom-Žitavská Tôň,
Radvaň I, Nitra Region**

Excavations: 1937

Graves with pellet bells: 2 (Fig. 2)

Storage: Slovak National Museum Martin

Dating: LAP, last third 7th–9th c.

References: *Budinský-Krička 1956*

Burial 10

Contents and condition: individual, horse, disturbed

Individual: *masculine, maturus*

Animal: horse

Dating: LAP; LPh III

Finds: 14 pellet bells

Inv. nr.: D 2126–D 2139

Position in grave: the north-western part of the grave, where the horse's skull usually is located

References: *Pomberger/Stadler 2018a*, 139, fig. 4; *Zábojník 1995*, 315

- Cat. 1 pellet bell Inv. nr. D 2126 (Fig. 2: 4: 1)
Conservation status: complete, 2 halves
Rattle body: corroded inside
Basis shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 2.44 g
Material: copper-alloy-sheet
Surface/decoration: gilded, no analyses
Frequency range/pitches: no recordings, no frequency analyses
- Cat. 2 pellet bell Inv. nr. D 2127 (Fig. 2: 4: 2)
Conservation status: complete, two halves
Rattle body: 1–2 pebbles
Base shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 2.89 g
Material: copper-alloy-sheet, gilded
Frequency range/pitches: 1 kHz–21 kHz
- Cat. 3 pellet bell Inv. nr. D 2128 (Fig. 2: 4: 3)
Conservation status: complete, two halves
Rattle body: pebble
Base shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.4×1.3 cm; h. 2.8 cm, wth. 0.5 mm; cons. wgt. 2.08 g
Material: copper-alloy-sheet, gilded
Frequency range/pitches: 0.8 kHz–21 kHz

- Cat. 4 pellet bell Inv. nr. D 2129 (Fig. 2: 4: 4)
Conservation status: complete, two halves
Rattle body: pebble
Base shape: oval, shape VII
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 3.27 g
Material: copper-alloy (?), gilded, no analyses
Frequency range/pitches: no recordings, no frequency analyses
- Cat. 5 pellet bell Inv. nr. D 2130 (Fig. 2: 4: 5)
Conservation status: complete, two halves, soldering open
Rattle body: lost (?), corroded (?)
Base shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.8 cm, wth. 0.5 mm; cons. wgt. 3.08 g
Material: copper-alloy-sheet
Frequency range/pitches: no recordings, no frequency analyses
- Cat. 6 pellet bell Inv. nr. D 2131 (Fig. 2: 4: 6)
Conservation status: complete, two halves, two holes in body, fragmented
Rattle body: lost (?), corroded (?)
Base shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 2.29 g
Material: copper-alloy-sheet
Frequency range/pitches: no recordings, no frequency analyses
- Cat. 7 pellet bell Inv. nr. D 2132 (Fig. 2: 4: 7)
Conservation status: complete, two halves, deformed
Rattle body: lost (?), corroded (?)
Base shape: oval, shape VII
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 2.38 g
Material: copper-alloy-sheet
Frequency range/pitches: no recordings, no frequency analyses
- Cat. 8 pellet bell Inv. nr. D 2133 (Fig. 2: 4: 8)
Conservation status: complete, two halves
Rattle body: pebble
Base shape: oval, shape VII
Sound slot/sound holes: none
Decoration: smooth, gilded
Measures: dm. 2.5×1.3 cm; h. 2.7 cm, wth. 0.5 mm; cons. wgt. 2.92 g
Material: copper-alloy-sheet
Frequency range/pitches: 0.8 kHz–21 kHz
- Cat. 9 pellet bell Inv. nr. D 2134 (Fig. 2: 4: 9)
Conservation status: complete, two halves
Rattle body: pebbles

⁶ Legend: dm. – diameter; h. – height; hwh. – height without handle; wth. – wall thickness; cons. wgt. – conserved weight.

Base shape: oval, shape VII

Decoration: smooth, gilde

Measures: dm. 2.5×1.3 cm; h. 2.7 cm, with. 0.5 mm; cons. wgt. 3.62 g

Material: copper-alloy-sheet

Frequency range/pitches: 0.8 kHz–18.5 kHz

- Cat. 10 pellet bell Inv. nr. D 2135 (Fig. 2: 4: 10)

Conservation status: complete, two halves, one hole

Rattle body: lost (?), corroded (?)

Base shape: oval, shape VII

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: dm. 2.4×1.2 cm; h. 2.6 cm, with. 0.5 mm; cons. wgt. 2.22 g

Material: copper-alloy-sheet

Frequency range/pitches: no recordings, no frequency analyses

- Cat. 11 pellet bell Inv. nr. D 2136 (Fig. 2: 4: 11)

Conservation status: complete, two halves

Rattle body: lost (?), corroded

Base shape: oval, shape VII

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: dm. 2.5×1.4 cm; h. 2.9 cm, with. 0.5 mm; cons. wgt. 3.06 g

Material: copper-alloy-sheet

Frequency range/pitches: no recordings, no frequency analyses

- Cat. 12 pellet bell Inv. nr. D 2137 (Fig. 2: 4: 12)

Conservation status: complete, two halves

Rattle body: lost (?), corroded (?)

Base shape: oval, shape VII

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: dm. 2.5×1.3 cm; h. 2.9 cm, with. 0.5 mm; cons. wgt. 1.5 g

Material: copper-alloy-sheet

Frequency range/pitches: 1.5 kHz–20 kHz

- Cat. 13 pellet bell Inv. nr. D 2138 (Fig. 2: 4: 13)

Conservation status: two halves, fragmented

Rattle body: pebble

Base shape: oval, shape VII

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: dm. 2.5×1.3 cm; h. 2.9 cm, with. 0.5 mm; cons. wgt. 1.75 g

Material: copper-alloy-sheet

Frequency range/pitches: 1.5 kHz–21 kHz

- Cat. 14 pellet bell Inv. nr. D 2139 (Fig. 2: 4: 14)

Conservation status: two halves, fragmented

Rattle body: lost

Base shape: oval, shape VII

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: dm. 2.45×1.3 cm; h. 2.9 cm, with. 0.5 mm; cons. wgt. 1.62 g

Material: copper-alloy-sheet

Frequency range/pitches: no recordings, no frequency analyses

Burial 31

Contents and condition: individual, horse, disturbed

Individual: *masculine* (?), adult (*maturus*?)

Animal: horse

Dating: LAP 680–822 CE; LPh III

Finds: four pellet bells (Fig. 2: 2)

Inv. nr.: 2495, 2500, 2507, 2517

Position in grave: pellet bell near horse's skull

References: *Pomberger/Stadler 2018a*, 139, fig. 4; *Zábojník 1995*, 315

- Cat. 15 pellet bell Inv. nr. D 2495 (Fig. 2: 2: 1)

Conservation status: two halves (?), fragmented, many pieces

Rattle body: lost

Base shape: oval/circular (?)

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: h. ca. 3.3 cm; dm. ca. 3 cm; with. 0.5 mm; cons. wgt. 3.66 g

Material: copper-alloy or bronze, gilded

Frequency range/pitches: no recordings, no frequency analyses

- Cat. 16 pellet bell Inv. nr. D 2500 (Fig. 2: 2: 2)

Conservation status: two halves (?), fragmented, many pieces

Rattle body: lost

Base shape: oval/circular (?)

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: h. ca. 3.3 cm; dm. ca. 3.3 cm; with. 0.5 mm; cons. wgt. 1.31 g

Material: copper-alloy or bronze, gilded

Frequency range/pitches: no recordings, no frequency analyses

- Cat. 17 pellet bell Inv. nr. D 2507 (Fig. 2: 2: 3)

Conservation status: two halves (?), fragmented, many pieces

Rattle body: lump of bronze

Base shape: oval/circular (?)

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: h. ca. 3.3 cm; dm. ca. 3.3 cm; with. 0.5 mm; cons. wgt. 4.71 g

Material: copper-alloy or bronze, gilded

Frequency range/pitches: no recordings, no frequency analyses

- Cat. 18 pellet bell Inv. nr. D 2517 (Fig. 2: 2: 4)

Conservation status: two halves (?), fragmented, many pieces

Rattle body: lump of bronze

Base shape: oval/circular (?)

Sound slot/sound holes: none

Decoration: smooth, gilded

Measures: h. ca. 3.3 cm; dm. ca. 3.3 cm; with. 0.5 mm; cons. wgt. 0.67 g

Material: copper-alloy or bronze, gilded

Frequency range/pitches: no recordings, no frequency analyses

Burial 1/1960

Contents and condition: three individuals, one horse

Individual: two adults (?), one child

Dating: LAP; LPh III

Finds: one pellet bell

Inv. nr.: no information

Position in grave: near skull of horse

References: Čilinská 1963, 87, 88, fig. 2: grave 89; pl. II

- Cat. 19 pellet bell Inv. nr. unknown (Fig. 2: 3)
Conservation status: complete (?)
Rattle body: no information
Base shape: shape I
Sound slot: cruciform
Decoration: human face
Measures: h. 3.2 cm
Material: copper-alloy
Frequency range/pitches: no recordings, no frequency analysis

Cemetery Skalica-Vysoké pole, Trnava Region

Excavations: 1922/1923, 1943/1944

Graves with pellet bells: one (Fig. 5)

Dating: 9th–10th c.

References: Budinský-Krička 1959

Burial in tumulus 13/tomb 6

Contents and condition: individual

Individual: child

Dating: Slavic, end of Moravian Empire, at 900 CE

Finds: 1 pellet bell

Inv. nr.: no information

Position in grave: near skull

- Cat. 20. pellet bell Inv. nr. unknown (Fig. 5: 3)
Conservation status: complete, two holes
Rattle body: small pebble
Base shape: shape II
Sound slot/sound holes: cruciform
Decoration: crossing diagonal lines
Measures: h. ca. 3.5 cm; hwh. 2.4 cm; dm. 2.7 × 2.35 cm; wth. 1–2 mm; cons. wgt. 25.03 g
Material: copper-alloy
Frequency range/pitches: 1–22 kHz

Collection of the Institute of Archaeology Slovak Academy of Sciences, Nitra

Cemetery Holiare, Nitra Region

Excavations: 1931/1932; 1952–1955

Graves with pellet bells: four (Fig. 3)

Dating: MAP–LAP, second half of the 7th to the 8th c.

Storage: Collection of the IA SAS, Nitra

References: Točík 1968; Zábajník 2009

Burial 92

Contents and condition: individual, undisturbed

Individual: woman

Dating: second half of 7th c. to 8th c.

Finds: one pellet bell

Inv. nr.: 2760_Holiare

Position in grave: pellet bell near left femur

- Cat. 21 pellet bell Inv. nr. 2760_Holiare (Fig. 3: 1)
Conservation status: complete
Rattle body: conserved, small pebble
Base shape: shape II

Sound slot/sound holes: cruciform

Decoration: vertical grooves on lower part of body

Measures: h. ca. 3.6 cm; hwh. 3 cm; dm. 3.2 × 2.7 cm; wth. 1 mm

Material: copper-alloy

Frequency range/pitches: 1.7 kHz–21.3 kHz

Burial 146

Contents and condition: individual

Individual: woman

Dating: second half of 7th c. to 8th c.

Finds: one pellet bell

Inv. nr.: 505_Holiare

Position in grave: pellet bell between skeleton and left arm

- Cat. 22 pellet bell Inv. nr. 505_Holiare (Fig. 3: 2)
Conservation status: nearly complete, one small piece broken out, corroded
Rattle body: conserved, small pebble
Base shape: shape IV
Sound slot/sound holes: cruciform
Decoration: none
Measures: h. 3.7 cm; hwh. 2.75 cm; dm. 3.1 × 2.8 cm; wth. 2 mm; cons. wgt. 12.6 g
Material: iron sheet
Frequency range/pitches: no recordings, no frequency analyses

Burial 437

Contents and condition: individual

Individual: child

Dating: second half of 7th c. to 8th c.

Finds: one pellet bell

Inv. nr.: 1414_Holiare

Position in grave: pellet bell between femurs

- Cat. 23 pellet bell Inv. nr. 1414_Holiare (Fig. 3: 3)
Conservation status: complete, corroded, textiles corroded on surface
Rattle body: conserved, corroded inside
Base shape: shape II
Sound slot/sound holes: no information because of corrosion
Decoration: none
Measures: hwh. 2.8 cm; dm. 3.1 × 2.9 cm; cons. wgt. 13.68 g
Material: iron sheet
Frequency range/pitches: no recordings, no frequency analyses

Burial 667

Contents and condition: individual

Individual: no information

Dating: second half of 7th c. to 8th c.

Finds: one pellet bell

Inv. nr.: 2034_Holiare

Position in grave: pellet bell near left hand

- Cat. 24 pellet bell Inv. nr. 2034_Holiare (Fig. 3: 4)
Conservation status: one piece broken out
Rattle body: conserved, small pebble
Base shape: shape II
Sound slot/sound holes: cruciform, one hole on vertex
Decoration: none
Measures: h. 3.9 cm; hwh. 3 cm; dm. 2.9 × 2.8 cm; wth. 0.5–1 mm; cons. wgt. 23.91 g
Material: copper-alloy
Frequency range/pitches: no recordings, no frequency analyses

Burial 782

Contents and condition: individual

Individual: child

Dating: second half of 7th c. to 8th c.

Finds: two pellet bells

Inv. nr.: 2405a_Holiare, 2405b_Holiare

Position in grave: pellet bells near left femur

- Cat. 25 pellet bell Inv. nr. 2405a_Holiare (Fig. 3: 5)

Conservation status: two holes in body, handle is lost

Rattle body: conserved, small pebble

Base shape: shape II

Sound slot/sound holes: cruciform

Decoration: none

Measures: hwh. 3 cm; dm. 3 × 3.2 cm; cons. wgt. 14.75 g

Material: iron sheet

Frequency range/pitches: 3.2 kHz–11 kHz

- Cat. 26 pellet bell Inv. nr. 2405b_Holiare (Fig. 3: 6)

Conservation status: fragmented

Rattle body: lost

Base shape: shape II

Sound slot/sound holes: simple sound slot

Decoration: none

Measures: hwh. 3 cm; dm. 2.9 cm; cons. wgt. 7.06 g

Material: iron sheet

Frequency range/pitches: no recordings, no frequency analyses

Cemetery Nové Zámky I, Nitra Region

Excavations: 1958, 1961–1962

Graves with pellet bells: 7 (Fig. 4)

Dating: MAP–LAP, 7th c.–9th c. CE

Storage: Collection of the IA SAS, Nitra

References: *Čilinská 1966*

Burial 175

Contents and condition: individual, undisturbed

Individual: child

Dating: LAP, 8th c. CE

Finds: one pellet bell

Inv. nr.: no information

Position in grave: near right femur

- Cat. 27 pellet bell Inv. nr. unknown (Fig. 4: 1)

Conservation status: complete

Rattle body: no information

Base shape: shape I or II

Sound slot/sound holes: cruciform

Decoration: face

Measures: dm. 2.5 cm

Material: copper-alloy

Frequency range/pitches: no recordings, no frequency analyses

Burial 224

Contents and condition: individual

Individual: man, *adultus/maturus*

Dating: LAP, 8th c.

Finds: one pellet bell

Inv. nr.: 83_Nové Zámky I

Position in grave: near left foot

- Cat. 28 pellet bell Inv. nr. 83_Nové Zámky I (Fig. 4: 2)

Conservation status: complete, inside filled with material (?), textile fragments on surface (?)

Rattle body: no information

Base shape: shape II

Sound slot/sound holes: no information

Decoration: smooth, two circular belts

Measures: hwh. 3.4 cm; dm. 3.25 × 3.05 cm; cons. wgt. 19.71 g

Material: iron sheet (?)

Frequency range/pitches: no recordings, no frequency analyses

Burial 354

Contents and condition: individual

Individual: *infans*

Dating: LAP, 8th c.

Finds: two pellet bells

Inv. nr.: 213_Nové Zámky I

Position in grave: near right femur

- Cat. 29 two pellet bells Inv. nr. 213_Nové Zámky I (Fig. 4: 3)

Conservation status: deformed, flat, corroded together

Rattle body: no information

Base shape: no information

Sound slot/sound holes: no information

Decoration: no information, corroded

Measures: length. 4.2 cm, wth. 3.5 cm; cons. wgt. 22.47 g

Material: iron sheet

Frequency range/pitches: no recordings, no frequency analyses

Burial 386

Contents and condition: three individuals

Individual: one woman/adult and two children, *infans* and *infans I*

Dating: LAP

Finds: one pellet bell

Inv. nr.: 245/62_Nové Zámky I

Position in grave: near left arm of one child

- Cat. 30 pellet bell Inv. nr. 245/62_Nové Zámky I (Fig. 4: 4)

Conservation status: deformed, textiles fragments on surface

Rattle body: pebble

Base shape: shape II (?)

Sound slot/sound holes: no information

Decoration: no information, corroded

Measures: h. 3.8 cm, hwh. 2.56 cm; dm. 3.1 × 2.5 cm; cons. wgt. 12 g

Material: iron sheet

Frequency range/pitches: no recordings, no frequency analyses

Burial 438

Contents and condition: 3 individuals

Individual: one woman and unknown sex; *senilis*, *adultus*, *infans*

Dating: LAP, 8th c.

Finds: one pellet bell

Inv. nr.: 297_Nové Zámky I

Position in grave: near left arm of senile person and teeth of child

- Cat. 31 pellet bell Inv. nr. 297_Nové Zámky I (Fig. 4: 7)
Conservation status: fragmented, 75% conserved
Rattle body: lost
Base shape: shape II
Sound slot/sound holes: cruciform, two sound holes
Decoration: vertical grooves on lower part
Measures: h. 3.5 cm; hwh. 2.8 cm; dm. 2.8 × 2.55 cm; wth. 2 mm, cons. wgt. 13.34 g
Material: copper-alloy
Frequency range/pitches: no recordings, no frequency analyses

Burial 509

Contents and condition: individual, disturbed
Individual: child, *infans*
Dating: LAP, 8th c.
Finds: one pellet bell
Inv. nr.: 509_Nové Zámky I
Position in grave: in the middle of the grave

- Cat. 32 pellet bell Inv. nr. 509_Nové Zámky I (Fig. 4: 5)
Conservation status: deformed, compressed, 60% conserved, broken, corroded on a ring with two further rings, textile fragments
Rattle body: pebble
Base shape: shape II
Sound slot/sound holes: no information

Decoration: corroded
Measures: h. ca. 3 cm; length 5 cm; wth. 4 cm; wth. 0.1 cm, cons. wgt. 23.1 g
Material: iron sheet
Frequency range/pitches: no recordings, no frequency analyses

Burial 510

Contents and condition: individual
Individual: woman, *adultus* (?)
Dating: MAP, 7th c.
Finds: one bell
Inv. nr.: 369_Nové Zámky I
Position in grave: near left femur

- Cat. 33 bell Inv. nr. 369_Nové Zámky I (Fig. 4: 6)
Conservation status: 75% conserved, two holes in body, one hole on vertex
Clapper: lost
Type: type 1/var. A
Sound slot/sound holes: no information
Decoration: smooth
Measures: hwh. 2.7 cm; dm. 3.85 × 3.7 cm; wth. 1 mm, cons. wgt. 15.98 g
Material: copper-alloy
Frequency range/pitches: no recordings, no frequency analyses

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Analýza rolničiek a zvončekov z včasného stredoveku na Slovensku

Nové Zámky I, Radvaň nad Dunajom-Žitavská Tôň (Radvaň I), Holiare a Skalica

Beate Maria Pomberger – Jörg Mühlhans –
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SÚHRN

Nálezy rolničiek sa na území avarského kaganátu objavujú od polovice 7. stor. Pravdepodobne boli importované z východných oblastí Kaukazu a Čiernomoria. Iba 1 % z celkového počtu hrobov na pohrebiskách obsahovalo v rámci hrobového inventáru tento nálež. Nosené tak boli len zopár ženami a deťmi a rovnako slúžili ako ozdoba konského postroja. Ich funkcia bola rôzna – pre niekoho predstavovali apotropaický amulet, neskôr boli pravdepodobne symbolom spoločenského postavenia.

Na pohrebisku Radvaň nad Dunajom-Žitavská Tôň, Radvaň I sa našli rolničky v troch hroboch a všetky boli súčasťou konského postroja. Na pohrebisku Holiare boli objavené štyri hroby s rolničkami, konkrétne dva detské a dva ženské hroby. Podobne aj pohrebisko Nové Zámky I obsahovalo päť detských a jeden mužský hrob s týmto typom artefaktu. Rolnička datovaná do obdobia rímskej ríše pochádza zo ženského hrobu a ďalšia sa našla v mohyle XIII/hrob 6.

Rolničky sa vyrábali odlievaním z rôznych zliatin medi alebo kovaním zo železného plechu, poprípade medenej zliatiny. V ich vnútri bol umiestnený voľne sa pohybujúci drobný kamienok, hrudka bronzu alebo trosky. Veľkosť nálezov sa pohybuje okolo 2,4–4,2 cm a váha 0,67–25 g. Tvar je spravidla oválny alebo guľovitý. Ich povrch je buď

bez výzdoby, alebo nesú stopy po vertikálnych ryhách, zväzky čiar a tiež na nich boli zobrazované ľudské tváre. Na základe umiestnenia nálezov v hrobe sa zdá, že boli nosené na krku alebo na zápästí, avšak najčastejšie boli upevňované na opasku a na bočných remeňoch opasku.

Z hľadiska akustiky zodpovedajú analyzované nálezy podobným nálezom rolničiek. Ich zvuk je málo intenzívny a slabo tonálny, avšak jasný a čiastočne ostrý, spektrálna drsnosť je pritom veľmi nízka. Táto charakteristika je vo všeobecnosti platná, avšak s výnimkou nekorodovaných exemplárov, ktoré vykazujú výrazne vyššie hodnoty, predovšetkým v hlasitosti a tonálnosti. Je možné konštatovať, že väčšina skúmaných exemplárov je z hľadiska zvukového dojmu, rovnako aj výsledkov analýz, pomerne typická pre silne skorodované rolničky.

Čo sa týka upevnenia rolničiek na konský postroj, je možné uvažovať o viacerých funkčných účeloch. Odhliadnuc od ich dekoratívneho a apotropického využitia, praktický test dokázal, že kôň je vďaka ich zvuku viac sústredený a menej náchylný na rušenie vonkajšími vplyvmi. Na túto funkciu sa prihliadalo predovšetkým počas dobových turnajov v období neskorého stredoveku a raného novoveku a pravdepodobne aj v predchádzajúcich dejinných obdobiach.

Obr. 1. Mapa s vyznačenými lokalitami s nálezmi rolničiek. Zdroj mapového podkladu www.d-maps.com, grafika B. M. Pomberger.

Obr. 2. Pohrebisko Radvaň nad Dunajom-Žitavská Tôň, Radvaň I. Hroby s nálezmi rolničiek. 1 – poloha hrobov; 2 – hrob 31 so štyrmi rolničkami; 3 – hrob 1_1963; 4 – hrob 10 so 14 rolničkami (podľa *Budinský-Krička 1956, 7; Čilinská 1963, 88, obr. 1*). Foto, grafika B. M. Pomberger, Slovenské národné múzeum v Martine.

Obr. 3. Pohrebisko Holiare. Nálezy rolničiek. 1 – hrob 92; 2 – hrob 146; 3 – hrob 437; 4a, b – hrob 667; 5, 6 – hrob 728. Foto, grafika B. M. Pomberger, AÚ SAV, v. v. i.

Obr. 4. Pohrebisko Nové Zámky I. Hroby s nálezmi rolničiek a inými predmetmi. 1 – hrob 175; 2 – hrob 224; 3 – hrob 354; 4 – hrob 386; 5 – hrob 509; 6 – hrob 510; 7 – hrob 438 (mapa podľa *Čilinská 1966, 327*). Foto, grafika B. M. Pomberger, AÚ SAV, v. v. i.

Obr. 5. Pohrebisko Skalica. Mohyla 13. Nález rolničky (podľa *Budinský-Krička 1959, 40, 74, tab. 21: 4*). Foto,

grafika B. M. Pomberger, Slovenské národné múzeum v Martine.

Obr. 6. Štatistické znázornenie distribúcie rolničiek na pohrebiskách a v hroboch. 1 – Radvaň nad Dunajom-Žitavská Tôň, Radvaň I; 2 – Holiare; 3 – Nové Zámky I. Legenda: a – hrobov spolu; b – hroby s guľôčkovými zvončekmi. Grafika B. M. Pomberger.

Obr. 7. Tvary rolničiek. Grafika B. M. Pomberger.

Obr. 8. Interpretácia apotropaického významu rolničiek s vyobrazením ľudskej tváre. Grafika B. M. Pomberger.

Obr. 9. Rolničky pripevnené ku konskému postroju v blízkosti ucha zvierťa. Foto K. Sanderson.

Obr. 10. Praha počutia. Legenda: a – ľudia; b – kone; c – psy. Grafika J. Mühlhans.

Obr. 11. 1 – vlnový priebeh zvuku rolničky Cat. 2 (hrob 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I), zobrazujúci jednotlivé impulzy počas 3-sekundovej konštantnej excitácie; 2 – výsledné spektrum zobrazujúce čiastkové

frekvencie a spektrálne rozloženie energie. Grafika J. Mühlhans.

Obr. 12. Spektrá rolničiek, ktorým chýbajú výrazné čiastkové tóny a majú zvýšenú spektrálnu energiu iba v určitých frekvenčných pásmach (skôr hlučné objekty). 1 – kat. č. 9 (hrob 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 2 – kat. č. 20 (mohyla 13, hrob 6, Skalica). Rozsah rolničiek, ktoré majú aspoň desať zreteľne viditeľných čiastkových tónov/pikov. 3 – kat. č. 12 (hrob 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 4 – kat. č. 21 (hrob 92, Holiare). Grafika J. Mühlhans.

Obr. 13. Spektogramy rolničiek. 1 – kat. č. 9 (hrob 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 2 – kat. č. 20 (mohyla 13, hrob 6, Skalica); 3 – kat. č. 12 (hrob 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I); 4 – kat. č. 21 (hrob 92, Holiare). Obe rolničky z hrobu 10, Radvaň nad Dunajom-Žitavská Tôň, Radvaň I (1, 3), ukazujú výrazne nižšie množstvo spektrálnej energie (sfarbenie). Nález z mohyly 13, hrob 6, Skalica (2) má viac energie v úzkom frekvenčnom pásme 3–4 kHz a nález z hrobu 92, Holiare, má vyššiu energiu rovnomernejšie rozloženú v pásme medzi 2–20 kHz. Grafika J. Mühlhans.

RECENZIE

Karina Grömer – Alexandra Krenn-Leeb – Michaela Binder (Hrsg.): Prähistorisches Gold. Mitteilungen der anthropologischen Gesellschaft in Wien 154. Wien 2024. 364 pp. ISSN 0373-5656.

The gold artefacts discovered in Mycenae, Perşinari, Tufalău (Cófalva), Troy, Varna, Velem-Szt. Vid, and Villenna, as well as the world of the pyramids and the royal tombs of Ur, have been raising general and professional interest in the treasures of prehistory since the last decades of the 19th c. (*Catalogue Varna* 1989; *Karo* 1933; *Leusch et al.* 2015; *Mozsolics* 1950; 1965–1966; *Ruiz-Galvez* 1995; *Troja* 1996; *Vulpe* 1995). Other related, important findings include the gold sheet breastplate and other gold accessories retrieved from an undisturbed Etruscan tomb at Cerveteri Regolini-Galassi and the related workshop in 1841 (*von Hase* 1995, fig. 3), as well as the Scythian gold jewellery and fittings found in the princely kurgans of Aržan and Pazyryk (*Menghin et al.* Hrsg. 2007).

The recent decades witnessed the release of numerous books on gold in prehistory, focusing on mining, processing, related trade, social and symbolic meaning, and more. Let me cite a few arbitrary examples from international scholarly literature.

The publication of *Prehistoric Gold in Europe* marked the outset of a new research era (*Morteani/Northover eds.* 1995). The continuation is just as worthy of praise: the two-volume *Metalle der Macht – Frühes Gold und Silber* (*Meller/Risch/Pernicka Hrsg.* 2014) crowned an immense endeavour, the bilingual catalogue of the exhibition *Gold and Bronze. Metals, Technologies and Interregional Contacts in the Eastern Balkans during the Bronze Age* (*Haag et al.* Hrsg. 2017; *Popov/Dimitrova eds.* 2017) is an unforgettable read, while the *Searching for Gold. Resources and Networks in the Bronze Age of the Eastern Balkans* (*Jung/Popov eds.* 2024) is a long-needed and fundamental work. All three books are exquisite demonstrations of the organising power and capacity of scholarly institutions in Vienna (OREA and Kunsthistorisches Museum), also reflecting, in my opinion, the pivotal role the one-time centre of the former Austro-Hungarian Empire still plays in research today.

Another remarkable event represents the next milestone in this new era. On 18th August 2023, the Österreichische Bundesbahnen (ÖBB) officially donated a Late Bronze Age gold treasure discovered during railway construction works on the outskirts of Ebreichsdorf in 2019–2020 to the Kunsthistorisches Museum. The occasion was

marked by the publication of a prestigious volume titled *Gold. Die Geschichte des Goldfundes von Ebreichsdorf* (*Grömer/Binder/Krenn-Leeb Hrsg.* 2023). At about the same time, the same researchers also published a major (22-page) popular scientific study in a double issue of *Archäologie Österreich* (*Grömer/Binder/Krenn-Leeb* 2022; 2023). Additionally, an international symposium on gold artefacts in Europe in the 2nd and 1st millennium BC and the related issues of research, organised in collaboration between several institutions, was held in the Kunsthistorisches Museum on 18–20th August 2023. The presentations were published with exemplary speed by December 2024 in the 154th issue of *Mitteilungen der anthropologischen Gesellschaft in Wien*, the Museum's journal. This publication is the focus of this review.

The editors of the thematic volume (and authors of the introductory chapter) were Karina Grömer, Michaela Binder, and Alexandra Krenn-Leeb. The 33 studies, authored by 65 researchers, cover sites in 12 countries and are supplemented by an independent general technological overview in one of the papers. The distribution of countries is telling and reflects the strong and lasting connection between Bulgarian and Austrian research. 10 studies focus on sites in Austria, surpassing Bulgaria (7), Germany (4), Germany and Poland (1), Bohemia and Moravia (3), as well as France, Hungary, Scotland, Slovakia, Slovenia, Ukraine, and Romania (1 on each).

The first part, with five studies, revolves around the main topic of the conference, the Ebreichsdorf treasure. In the second part, three papers from Bulgaria focus on the provenance of gold and the local mines. The seven contributions in the third part discuss topics related to the processing of gold ore and gold. The fourth part comprises detailed presentations of various Bronze Age gold treasures in five studies. The fifth thematic unit includes nine papers on special gold artefacts. The volume concludes with four studies in the sixth part on gold in the Iron Age.

Thirteen contributions have a single, and twenty more have more than one author – understandably, since the latter usually involve instrumental scientific raw material and technological analyses (albeit some of the former also include such results).

The following review reflects my personal opinion of the volume. Accordingly, it does not follow its original structure (as presented above) and does not include a comprehensive and unified evaluation of every part.

What I miss from this otherwise exquisite volume is a study on the gold mines in the Garam Valley in Slovakia, the Prešov (Eperjes)-Tokaj Mountains, the area of Baia Mare (Nagybánya) and the Apuseni (Bihar) Mountains in Transylvania in western Romania, and Bor and Majdanpek in Serbia. The closest one in focus is a thorough and exceedingly interesting paper by Tomáš Zachar on the spiral natural gold ores known as *aurum vegetabile*, associated with the Piliny culture in Eastern Slovakia, but even that cannot fill the void. The three mentioned natural deposits in the Carpathian Basin are fundamental for research since they include the most prosperous gold resources in medieval Europe before the discovery of America and were certainly exploited already in prehistory (Lehrberger 1995, fig. 1). Moreover, some material analyses in the book identify the provenance of the studied items as one of these deposits.

The material of the Erbreichsdorf treasure could be linked, even if only with some caution, with the secondary alluvial gold deposits on the southern slopes of the Slovakian Ore Mountains (see the study by Ernst Pernicka and Moritz Numrich on pages 41–43). For an excellent new overview of this topic, see the *Prospektionen der Goldlagerstätten Žitava- und Grantal bei Zlaté Moravce* by J. Garner (2021). On the other major mining region in the Carpathian Basin, the ‘Gold Triangle’ consisting of Baia de Arieș (Offenbánya), Orăștie (Szászváros), and Hălmagiu (Nagy-Halmágy) in Transylvania, see H. I. Ciugudean’s (2012) *Ancient gold mining in Transylvania. The Roșia Montană – Bucium area*. Had they been invited to contribute to this volume, the authors of these studies would have certainly provided reliable summaries of their respective study areas; besides, such collaboration could be another excellent opportunity for personal communication between them and other contributors, including colleagues in Bulgaria.

Even if published only in Hungarian, several early studies, now almost completely forgotten, are worth reintroducing into research on gold deposits and mines in Transylvania. These include geological papers (Szabó 1873), a summary of decades of observations by the mine inspector (Weisz 1891), and early elemental composition analyses (Molnár 1873).

Moreover, the entire topic could have been discussed from a broader perspective, akin to the scope of the study on the gold items retrieved from the 14th-c. BC Uluburun ship, published by D. D. Klemm 2005, which surveyed all possible parallels from Nubia through Anatolia to the Carpathians. Albeit our knowledge of the gold sourced from the mines he mentioned has improved considerably in the

decades since this publication, his approach nonetheless remains exemplary.

The volume that is the focus of this review also holds a wealth of new information on ‘old’ discoveries. Carola Metzner-Nebelsick and Ernst Pernicka discuss two 8th-c. BC hoards found in the last decades of the 19th c. in Mikhaľkiv, Ukraine. By applying analyses involving micro-invasive laser ablation and QICP-MS, they identify the elemental composition of the gold artefacts in these treasures and reveal that they were made from the same material. Next, they compare them with two Mikhaľkiv-Dalj-style gold objects obtained from the antiquities market, only to reveal a difference between their materials. The study also discusses the symbolism incorporated in these objects and the social position associated with the attire that included such accessories (pp. 193–206).

Another noteworthy study by Herald Meller and his colleagues (pp. 229–240) sets a bowl found at Germany in 1909 in the limelight. Elemental composition analysis has revealed that the material of the vessel contains a relatively high proportion of silver (15–20%) and an unusually high proportion of copper (4–20%); the latter, along with the visibly heterogeneous structure of the material, are indicators of deliberate alloying. The paper also mentions the gold cup discovered at Bistrița-Dealul Târgului in northern Transylvania; however, the authors did not venture to reassess the 2018 evaluation of this find by Florin Gogâltan, albeit such an addition would have been greatly welcome and could help fill the void left by the lack of topics related to the gold of Transylvania in the volume (Gogâltan/Marinescu 2018, 53–70).

Several case studies present relatively new discoveries in detail. Obviously, the firsts to be mentioned revolve around the Erbreichsdorf treasure. This gold find assemblage, weighing 708 g, consists of the remains of a gold sheet drinking vessel, a two- and an eight-part set of spiral coils, a ball of gold thread, and three long pieces of gold wire (Alexandra Krenn-Leeb, fig. 1; Robert Linke/Birgit Bühler, fig. 1; Ernst Pernicka/Moritz Numrich, fig. 1; Kayleigh Saunderson/Karina Grömer, fig. 1). The images show the artefacts from different angles, providing another evidence of the attention of the editors.

The pieces of the Erbreichsdorf treasure – all finished products – were found in an Urnfield Period settlement and dated to 1200–1000 BC. They had been deposited perhaps as part of a ritual ceremony. The diverse instrumental analyses yielded a wealth of information on the traces related to their making, decoration, and more, including material composition. The material of the drinking vessel

differs from the rest: its alloy contains a relatively high proportion of silver (20%) and copper (almost 6%; see Robert Linke/Birgit Bühler, pp. 27–36). The gold thread may have belonged to two types of textile and a textile band; according to the authors, textiles interwoven or embroidered with gold came in fashion around 1100 BC (Kayleigh Saunderson/Karina Grömer, pp. 49–58).

Gold finds associated with textiles from fourteen sites (including five new ones) from the 14th–9th c. BC, respectively, in the National Archaeological Collection in München (Archäologische Staatssammlung München) could be classified into three categories: threads, sheets, and tubes (Ina Schnee-bauer-Meissner/Heiner Schwarzberg, pp. 289–300). The collection holds 1 to 1000 pieces from each site. Workshop districts could be outlined based on the SEM analysis of the production traces, while the inclusions in the material yielded information on raw material type and the extent of melting (p. 298). The gold threads of the approximately 1000-piece Urnfield Period find assemblage from Hohenaschau could be separated into three distinct clusters associated with three different textiles (p. 291, Tab. 1; pp. 292, 293, Fig. 2; 3; 8).

The impressively thorough and comprehensive collection of 189 gold wire spirals from 54 sites, compiled by Regine Maraszek (pp. 261–270), must be mentioned here, as the Ebreichsdorf treasure also contains some such items. The study provides an overview and reassessment of the distribution, classification, chronology, contexts, functions, and interpretation of this find type, which is primarily associated with the Lausitz culture and the Baltic region but is also found throughout Europe. A comparative analysis of gold and bronze double-wire spirals completes the discussion.

The two studies by Violetta Reiter are also noteworthy. The first, co-authored with Robert Linke, presents in detail an assemblage of seven gold double wire spirals with a total weight of 34.9 g, dated to the Reinecke's BD–HA1 period, discovered during a rescue excavation in Leithaprodersdorf, Burgenland, in 2005 (pp. 283–288). Their material contains, on average, $75.7 \pm 2.1\%$ gold, $13.0 \pm 1.4\%$ silver, and $1.3 \pm 0.9\%$ copper. The site is near Ebreichsdorf, and the artefacts in the two deposits represent identical types. Therefore, as part of the evaluation of the Ebreichsdorf treasure, the spirals of this assemblage were also subjected to SEM analysis, revealing a high degree of similarity between the production technology and material composition of the two. Violetta Reiter supposes that in the Early Urnfield Period, several waterways in the region (Fischa, Leitha, Piesting, Schwarza) were also places of offering.

Another study by her presents Grave 160 of Steyr-Hinterberg, a Reinecke's BD–HA1 burial excavated in 1999 and re-discovered in 2020 (pp. 301–308). The paper includes an anthropological evaluation, radiocarbon dates, and the results of the SEM-EDX elemental composition analysis of the gold wire found in the grave (87.7% gold, 12.3% silver). The radiocarbon date is an important addition to the meagre data pool of the period in Eastern Austria and corroborates the absolute chronology emerging from such data in Western Transdanubia.

The Ebreichsdorf treasure is the second gold deposit from the era in the Vienna Basin in Eastern Austria; the first was found at Rothengrub. Four additional Urnfield Period gold treasures are known from the Salzkammergut region (Arikogel, Buchberg, Halstatt, and Koppental), reflecting the pivotal economic role of the salt mines in Hallstatt. Detailed descriptions of two are included in the volume: the deposit from Buchberg is a relatively new discovery (Martin Gamon et al., pp. 171–180), while Hoard 5 of Bad Aussee has been known since 1994 but has never been published in detail before (Maria Windholz-Konrad, pp. 181–192).

Szilvia Guba and her colleagues present the results of PIXE and XRF analyses of 25 gold artefacts, classified into three categories, discovered at five sites in Northern Hungary over the past fifteen years (pp. 119–128). The objects in Group 3, comprised of finds from the Koszider Period, were made of a material with a relatively low gold content (76%) and barely any copper (0.1%). Readers may find it difficult to interpret the round orange symbol in the Cu : Au G1 group in Fig. 5, as it is not resolved in the legend (p. 125).

The Gessel treasure was unearthed in Northern Germany more than a decade ago, in 2011. It has been the focus of several publications since then, but the most thorough and comprehensive study is the one by Daniel Neuman and his colleagues in this volume (pp. 161–170). The find assemblage, with a total weight of 1.7 kg, consists of 117 gold artefacts and six bronze pins, making it one of the biggest such hoards in Central Europe. It was removed *en bloc*; thus, its original structure could be recorded using 3D CT scanning. The radiocarbon data obtained from the string with which the pins were bundled corresponds to Period III of the Nordic Bronze Age. The results of the technological and material composition analyses are expected to be published in the next stage of research.

A treasure of four gold double-wire bracelets weighing 630.28 g was discovered near two Urnfield Period highland settlements, Domašov and Šternberk, Central Moravia, in 2019. Based on the

provenance analysis carried out by Ernst Pernicka, the material of the jewellery likely originates from the southern slopes of the Slovakian Ore Mountains, an area with gold and tin deposits (Jaroslav Peška, pp. 271–282).

Metal detectorists discovered an Early Urnfield Period hoard on the outskirts of Şişeşti, near the Iron Gate, Romania, in the spring of 2021. The evaluation of the find assemblage has revealed that the connection networks outlined by the bronze weapons and tools, as well as the gold and bronze jewellery, are different (Nikolaus Boroffka/Marian Neagoe/Oana Neagoe, pp. 207–216).

The gold foil sheet covering the Urnfield Period diadem, a marker of exceptional social position, found in Opava at the end of 2022 weighs 56.5 g. Elemental composition analysis has revealed that the material contains a relatively high amount of silver (14%) and a significant amount of copper (1%; Matěj Kmošek/Stanislaw Stuchlík/Nikola Suhejová, pp. 241–249).

Two studies focus primarily on production-related traces and technology, albeit their scopes differ greatly in both time and space. The one written by Barbara Armbruster summarises decades of advancements in the research of Bronze Age bronze, silver, and especially gold vessels in Western, Central, and Northern Europe (pp. 217–228). The other, a work by Marina Kalpachka and Petya Penkova, examines the gilding of 4th–3rd-c. BC silver artefacts – likely the products of local Thracian craftspeople or imported goods – from Bulgaria (pp. 251–260).

No study on gold threads in the volume mentions the 9.1 g clew comprising two different gold yarns, found in Gurnitz in Carinthia, likely in a hoard (Gleirscher 2014, 138, fig. 1).

Although in his thorough study on the diverse ways of storing pre-processed gold, Albrecht Jockenhövel briefly refers to the topics of early currencies, standardised weight systems, and scales (pp. 89–100), these would be worth an independent study by, for example, Nicola Ialongo, Giancarlo Lago, or Lorenz Rahmstorf. Obviously, this field also encompasses the issues of exchange and trade of gold raw materials and products, as well as the related networks. Such studies include material composition analyses using a handheld XRF device by Szathmári *et al.* (2024) of artefacts from Central and Southern Europe and Great Britain, as well as the Early Bronze Age finds from Arildskov in Denmark, by C. Rassmann (2025). Another related

and interesting topic is the royal tombs of Ur, where the osmium isotope patterns of certain materials indicate that the gold was obtained from natural gold deposits in the territories of today's Iran and Afghanistan (Schwall *et al.* 2024). The networks related to the procurement, processing, and trade of metals in the vast area from the Aegean and Egypt to Scandinavia are intertwined with those of amber (Vandkilde *et al.* 2024), glass beads (Bellintani/Angelini 2020), and certain objects (e.g., single-edged razors; Kaul/Frei/Reiter 2024).

Some other finds are also missing from the topics: the Early Urnfield gold foil remains found in Bled in Slovenia (Turk 2012) and especially their symbolism, and the still unpublished find of almost 2000 gold spirals coiled on textile strings, dated to Period V of the Nordic Bronze Age, which was discovered in Boeslunde (Zealand) in Denmark.*

The last part of the volume focuses on the Iron Age. For me, the most exciting paper amongst the ones arranged here is the one by Christiane Eluère, presenting the grave of an adult man buried with several gold items and a metal vessel, which is currently the westernmost known specimen of Hajdúböszörmény-type situlae (pp. 309–317). The gold torque, bracelet, and pin of the man weigh a total of 130.5 g; they were made from different materials. As for the dating of the feature, although I believe the earliest 8th c. BC in Western Transdanubia, my primary research area, corresponds to the final phase of the Urnfield Period, I accept the author's opinion that this time in the West equates the HC period. It must be noted, however, that the parallels cited from the Carpathian Basin represent a rather long interval.

The Early Iron Age gold finds from Southwestern Germany (Birgit Schorer/Gerd Stegmaier, pp. 319–328) and Stična in Slovenia (Anja Hellmuth Kramberger, pp. 341–349), as well as the Celtic ones from the area of Salzburg (Holger Wendling, pp. 329–340) belong to centuries of which my knowledge is unsuitable for a reliable in-depth evaluation; however, all three studies seem to add novel data and findings to the pool of information on their respective periods.

Another point where the volume feels lacking is the discussion of the symbolism of vessels and clothing accessories (except for the one on the Stična find), as well as elaborations on the social role of gold, especially in the context of representation and power – such as the exemplary summary by C. Metzner-Nebelsick 2013.

* I learned about this discovery from a letter by Flemming Kaul in December 2015. I am grateful for the information. For more about this treasure, please visit <https://www.thehistoryblog.com/archives/37420> and <https://www.thisiscolossal.com/2015/07/archaeologists-unearth-trove-of-2000-mysterious-gold-spirals-in-denmark/> [23. 2. 2025].

Finally, a succinct statement by major figures in provenance studies must be cited here: 'There is currently no technique of direct provenancing in metallurgy comparable to geologically distinctive lithics such as obsidian (e.g., Tykot 2002) or jadeite (Pétrequin et al. dir. 2012)...' (Radivojević et al. 2019, 138). No wonder that the provenance of most gold objects presented in the volume could only be determined vaguely, if at all.

I also feel it necessary to highlight the concentration of gold treasures in the period in focus in Transdanubia (Western Hungary), my primary research area. Some deposits have been well-known worldwide for a long time – the ones from Velem (Ilon 2015; Mozsolics 1950), Ság Hill (Ilon 2024; Mozsolics 1950), and Várvolgy-Nagyláz-hegy (Mozsolics 1981; Müller 2013) – while others are new, including one discovered at Somló Hill (Tarbay et al. 2024) and a still unpublished hoard found by Attila Mrenka in Sopron-Burgstall in 2023. Based on reliable information, most of these have been recovered from highland settlements; however, little is known about their material composition and the provenance of their raw materials – leaving us with several gaps in our knowledge to fill.

The volume concludes with permanent columns: two book reviews and a summary of the most important events of the Anthropologisches Gesellschaft in Wien.

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- Vladimír Turčan: Antické okná zo Stupavy. Najstaršie svedectvo zemetrasenia na Slovensku.** Zamerané na predmet 3. Slovenské národné múzeum. Bratislava 2024. 70 strán. ISBN 978-80-8060-566-7.
- Ludské spoločnosti žili vždy v krajine, v ktorej na ich vývoj vplývali rôzne prírodné sily. V archeológii nevieme vždy tieto sily postihnúť, napriek tomu je zrejme, že s nimi musíme počítať. Typickým príkladom sú zemetrasenia, ktoré často predpokladáme, ale málokedy nám archeologické metódy práce umožňujú ich identifikáciu.
- Archeoseizmológia nepatrí medzi mladé archeologické metódy, jej počiatky môžeme hľadať už vo vykopávkach Arthura Evansa (1928) na Kréte alebo pri výskumoch Clauda Schaeffera (1948)

v Ugarite (Jusseret/Sintubin 2013). Mnohé výskumy jednoznačne dokázali, že zemetrasenia vplývali na dejiny ľudských spoločností. Na druhej strane musíme priznať, že mnohí bádatelia ich až príliš často používali ako *deus ex machina* a pomocou nich interpretovali situácie, ktoré mohli mať viacero vysvetlení, ako napríklad náhle opustenie alebo zničenie lokality. Zemetrasenia jednoducho pridávali do archeologického príbehu drámu a „tajomné“ dohady (Sintubin 2011, 5, 6).

Zemetraseniu sa venuje aj recenzovaná publikácia od V. Turčana *Antické okná zo Stupavy. Najstaršie svedectvo zemetrasenia na Slovensku*. Autor v nej predkladá svoju hypotézu o zemetrasení v dobe rímskej, ktoré sa mu podarilo zdokumentovať počas archeologického výskumu v Stupave. Recenzovaná publikácia je určená odborníkom, ale aj širšej verejnosti a vychádza v špeciálnej edícii, ktorú vydáva Slovenské národné múzeum – Edícia Zameraná na predmet. Informácie o náleze už autor publikoval v zborníku, ktorý sa zameriaval na kolapsy historických spoločností (Turčan 2019). Kniha je vhodne doplnená obrazovou prílohou, ktorú tvoria aj populárne rekonštrukcie.

Na Slovensku máme vďaka písomným prameňom zaznamenané najstaršie zemetrasenie v roku 1348. Naše územie zasiahli v minulosti aj veľké zemetrasenia, napríklad v prameňoch sú dobre zdokumentované udalosti z roku 1443 (Tomeček 2019). V okolitých štátoch sú potvrdené ešte staršie zemetrasenia. Podľa geofyzikov a seizmológov, na základe dlhodobého výskumu a meraní, môžeme územie Slovenska charakterizovať ako oblasť so strednou úrovňou seizmickej aktivity (Madarás a i. 2008, 4; 2012), a preto musíme s ich zásahom do dejín Karpatskej kotliny počítať.

Recenzovaná kniha začína krátkym predslovom a pokračuje kapitolou o počiatkoch osídlenia Stupavy (Počiatky osídlenia), ktoré máme zatiaľ doložené zo začiatku 3. tisícročia pred n. l. z obdobia lengyelskej kultúry (poloha Urbárske sedliská), následne osídlenie pokračovalo v dobe bronzovej, v dobe halštatskej (pohrebisko medzi ulicami Športová a Lipová) a v dobe laténskej (pohrebisko pri zaniknutej cementárni; s. 9, 10). V publikácii je stručne opísaný aj príchod Germánov a Rimanov (poloha Kopce) na územie Stupavy (Rimania v Stupave; s. 11–13).

Podrobne je spracovaná nasledujúca väčšia kapitola o histórii výskumu (Odkrývanie antickej minulosti Stupavy; s. 14–24), pričom kapitola sa ešte delí na ďalšie podkapitoly. Začína zmienkami o stupavských „starožitnostiach“ v diele Mateja Bela a pokračuje prvými, zväčša amatérskymi, bádateľmi na lokalite – Václav Honza, Ignác Gond alebo Móríc Spitzer. Následne sa rímskej lokalite v Stupave venovali odborníci – Anton Gnirs, Vojtěch

Ondrouch, Ludmila Kraskovská (na výskumoch sa neskôr ako asistenti alebo ako brigádnicí podieľali viacerí významní slovenskí bádatelia). Vedci na polohu Kopce v Stupave identifikovali rímske stavby, ktoré prisúdili pôsobeniu rímskych légii.

V 80. rokoch 20. stor. boli obnovené výskumy na lokalite a výrazne sa na nich podieľal aj samotný autor recenzovanej knihy – Vladimír Turčan. V ďalšej kapitole sa autor v krátkosti venuje zmene pôvodného datovania lokality z doby rímskej (Výskum v rokoch 1987–2004, predatovanie počiatkov stavebného komplexu; s. 24–30). Vojtěch Ondrouch uvažoval, že rímske stavby sa na lokalite objavili v prvých desaťročiach 2. stor., ale na základe neskorších výskumov sa zistilo, že v tej dobe ešte obývali polohu Kopce Germáni. Rimania vstúpili na vyvýšeninu až po polovici 2. stor. Navyše sa podarilo zistiť, že tu v tretej fáze osídlenie stála *villa rustica* (s. 24).

Ďalšia kapitola sa už venuje samotnému objavu (Objav z roku 1994, odhalenie záhadu sklopenej steny; s. 25–29). V kapitole autor opisuje objav a identifikáciu stôp po zemetrasení. Počas výskumu sa našla sklopená stena múru, pričom ostala pomerne celistvá. Každopádne nešlo o štandardnú deštrukciu muriva, ktorá väčšinou začína v horných častiach a postupne nastáva pád štruktúry. Nález bol na základe analógií v neďalekom Carnunte interpretovaný ako dôkaz zemetrasenia (v Carnunte je zemetrasenie doložené okolo roku 350).

Vladimír Turčan našiel aj ďalšie analógie k nálezu stôp zemetrasenia (Zemetrasenie v strednom Podunajsku v 4. storočí; s. 30–37) či už v Stupave, alebo na ďalších lokalitách v okolí – Bratislavský hrad, Bratislava-Rusovce.

Zaujímavou časťou knihy sú nasledujúce dve kapitoly, v ktorých sa autor venuje transferu, reštaurovaniu a prezentácii nálezu (Transfer a reštaurovanie steny; Okná do antiky; s. 38–45). Počas reštaurátorských prác sa podarilo identifikovať ďalší dôležitý nález – zvyšky antickej grafity (Antické „grafiti“ zo Stupavy; s. 46–49). Podľa autorovej analýzy ide o detské kresby.

Keďže kniha sa zameriava na širšie publikum, nachádzajú sa tu tri populárnejšie kapitoly – Za múrmi antickej dvorca; Štyri stupavské prvenstvá a Lokality dnes. Prvá z nich poskytuje čitateľovi širší kontext doby rímskej v strednom Podunajsku v dobe existencie stavieb v Stupave. Druhá identifikuje prvenstvá lokality Kopce v stredoeurópskych dejinách – Najstarší „stavebný denník“; Prvé známe okná zo slovenského územia; Rytina hlavonožca z parapetu okna a Najstaršie doložené zemetrasenie na Slovensku.

Poslednou kapitolou je krátky zhrňujúci záver. V texte sa vyskytli dve menšie nezrovnalosti. Autor píše, že v 4. stor. sa objavila, podľa kontextu v Rímskej ríši a v jej susedstve, epidémia

moru. Pravdepodobne išlo o inú epidémiu, aj keď možno označovanú ako mor (s. 65). Baktériu moru – *yersiniu pestis* – máme zatiaľ potvrdenú až počas pandémie tzv. Justiniánovho moru v 6. stor., jej archaické formy sú potvrdené ešte v eneolite a v dobe bronzovej, ale nie v tomto období. Aj keď uvidíme, čo nám prinesie ďalší výskum (Harper 2017, 199–245).

Druhou nezrovnalosťou je informácia, že Huni v Pričernomorí rozvrátili kmeňový zväz germánskych Ostrogótov. Podobná nezrovnalosť sa však v literatúre vyskytuje často. Osobne by som navrhol nepoužívať v prípade tejto gótskej ríše v oblasti Čierneho mora konkrétnejšie označenie, pretože písomne pramene tvrdia, že tu až do tretej štvrtiny 4. stor. existovalo minimálne 6 samostatných gótskych kráľovstiev. V prameňoch sa ďalej spomínajú dve skupiny Gótov – Tervingovia a Gretungovia, ale ich vzťah k neskorším pomenovaniu Vizigóti a Ostrogóti ešte nie je ujasnený (Heather 2002, 107). Ide však skôr o recenzentovo odporúčanie (prípadne podnet pre budúcu diskusiu) a nie chybu.

Kniha *Antické okná zo Stupavy* je príjemným publikačným osviežením a nie je určená len laickej verejnosti, ale niektoré myšlienky z nej môžu vhodne poslúžiť aj odborníkom a môžu upriamiť pozornosť na hľadanie dôkazov ďalších zemetrasení v dávnych dejinách Slovenska.

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SPRÁVA

60 rokov archeologického výskumu
v Liptovskej Mare

*Zo vzdušných terás
vidíš svoje stopy v priezračnom
po-časí a svoje (slnkom ožiarené) stély:
keltskú,
kresťanskú...*

Ivan Laučík, Havránok

Pred šesťdesiatimi rokmi, v septembri v roku 1965 bol zahájený archeologický výskum v Liptovskej Mare. V prvej etape, v rokoch 1965–1974, sa tu realizovali záchranné práce vyvolané stavbou rovnomennej priehrady.¹

Sústreďovali sa na sídliská z doby laténskej, rímskej a včasného stredoveku v záplavovej oblasti pod hradiskom Havránok (rovnako nazývaný Vrchhrádok), na ktorom zároveň paralelne prebiehal zisťovací výskum (obr. 1; 2; *Pieta* 1967; 1971; 1972a; 1972b). Organizácia vykopávok, ich rozsah i personálne nasadenie boli poznačené vtedajšími možnosťami, ale aj časovými obmedzeniami, diktovanými stavebnou činnosťou, i skromnými predchádzajúcimi informáciami o rozsahu a charaktere archeologických nálezísk v zátopovej oblasti (*Budinský-Krička* 1965; *Furman* 2016, 124–129). Terénne práce po istú dobu ovplyvnili aj udalosti počas sovietskej okupácie Československa v roku 1968, ktoré dočasne zasiahli aj priestor výskumu.

Na mnohých problémoch sa podpísal aj chaos po dočasnom prerušení výstavby priehrady a následný chvat a zmätok pri jej dokončovaní.

V porovnaní so súčasnosťou sa najmä v prvých rokoch pracovalo v skromných podmienkach. Po prvé tri sezóny slúžila ako základňa malá drevená búda na Havránku, v ktorej boli okrem lôžka a stolíka aj krabice s nálezmi, lopaty a krompáče. V roku 1968 sa naše podmienky zlepšili. Ako dočasné pracovisko i ubytovanie sme získali dve drevenice v opustenej dedine Liptovská Mara, kde sme bývali a pracovali až do roku 1974. V tomto roku Archeologický ústav (AÚ SAV) postavil na svojom pozemku na Rybníkoch výskumnú stanicu, ktorá dodnes slúži výskumníkom pre oblasť Liptova a Oravy (obr. 3).

V šesťdesiatych a sedemdesiatych rokoch minulého storočia boli naše vedomosti o osídlení severného Slovenska značne obmedzené. Spomenuté výskumy v tomto smere znamenali

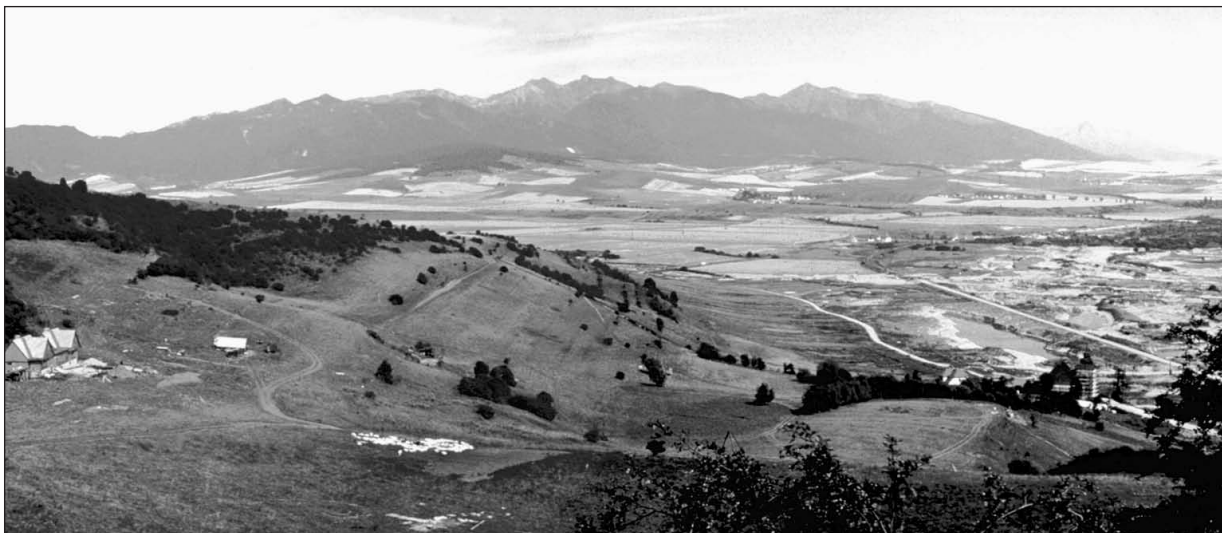


Obr. 1. Havránok. Pohľad od západu. Rok 1965.



Obr. 2. Osada Liptovská Mara III, Za panskými humny s Havránkom v pozadí na začiatku výskumu.

¹ <https://www.youtube.com/watch?v=9grQAJi1bKg> [11. 8. 2025]



Obr. 3. Pohľad z Havránka na plochy osád II (vľavo, s výskumnou stanicou) a III. Rok 1974.

významný prelom. Už prvé sondáže ukázali, že ohrozené sídliská z doby laténskej a zo staršej doby rímskej boli mimoriadne intenzívne osídlené a ich súvrstvia, s množstvom objektov budovaných na úrovni terénu, si vyžadovali špecifický prístup k ich spoznávaní i dokumentácii.

Výskum sídliskovej aglomerácie okolo hradiska Havránok, realizovaný AÚ SAV nebol jedinou aktivitou na rozsiahlom záplavovom území vodnej nádrže. Stavebnými prácami bolo zasiahnuté aj mohylové pohrebisko lužickej kultúry v Liptovskej Ondrašovej (Veliačík 1975) a zachránili sa aj ďalšie cenné pamiatky z tejto oblasti (Furmánek 1970; Pieta 1970). Viaceré kostoly a kaštiele boli skúmané vtedajším Slovenským ústavom pamiatkovej starostlivosti a ochrany prírody. Z nich spomeňme aspoň kostol Panny Márie s cintorínom v Liptovskej Mare (Hoššo 1976; 1987; Puškárová 1987).

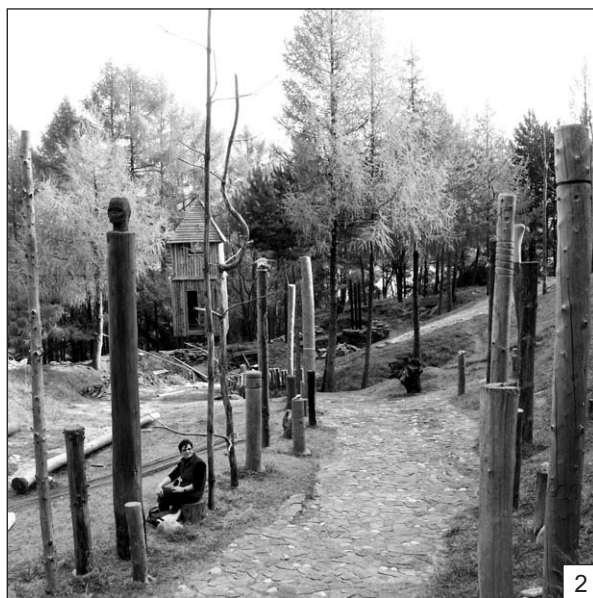
Dokončenie výstavby priehrady v roku 1975 neznamenal ukončenie archeologických výskumov. Naopak, záchranné práce vystriedali systematické vykopávky na hradisku Havránok a na príľahlých osadách na jeho úpätí, ktoré prebiehali v rokoch 1975–1999 a dočasne sa obnovili ešte v roku 2004. Na výskumných prácach sa okrem autora podieľalo viacero archeológov. Prvé štyri sezóny tu pôsobil Václav Furmánek a v druhej polovici osemdesiatych rokov sa na výskume, a to najmä na skúmaní stredovekého hrádka, aktívne podieľal Václav Hanuliak, pracovník Liptovského múzea a neskôr pamiatkového ústavu (SÚPSOP). Výskumný projekt na sídlisku Liptovská Mara II v roku 2004 i revízný výskum opevnenia hradiska v roku 2015 viedla Lucia Benediková, ktorá sa aj



Obr. 4. Pracovníci výskumu z Liptovskej Mary a okolitých obcí s V. Furmánkom (vzadu) a farárom A. Kontríkom (v strede dolu). Rok 1967.

v súčasnosti venuje regiónu Liptova. Ako študenti či čerství absolventi tu svoju terénnu prax začínali viacerí, dnes už renomovaní a skúsení bádatelia.

Významnými postavami v Liptovskej Mare boli vždy terénni technici, ktorých sa tu počas desiatok rokov výskumov vystriedalo niekoľko. S úcty k ich obetavej práci si dovoľím ich menovite pripomenúť. V čase pred prijatím na štúdium archeológie tu ako technik v roku 1968 začínal známy slovenský bádateľ Michal Slivka. V rokoch 1971–1973 tu pôsobili Marián Torda a neskorší pracovník Pohronskeho múzea v Novej Bani Gejza Trgina. Výskum stredovekého hrádka pomáhal skúmať skúsený technik Emil Rejholec, ktorý má tiež zásluhu na vybudovaní novej výskumnej základne, využívanéj od roku 1975. Prácou i priateľskou podporou archeológie boli po viacero rokov s Lip-



Obr. 5. Havránok. Dlažba obetiska s radmi kolových jám pred a po rekonštrukcii.

tovskou Marou spojení aj liptovskí rodáci Rasťo Halička a najmä Zdeno Tomo, ktorého syn Marek je dodnes správcom tamjšej výskumnej stanice. V súčasnosti tu pôsobí Štefan Hritz, služobne najstarší terénny technik, ktorý sa do výskumu Liptova zapojil od roku 1985.

Každoročné rozsiahle vykopávky zamestnávali tiež veľa mladých brigádnikov. Mnohí z nich dodnes spomínajú na týždne či mesiace strávené v sondách archeologických výkopov i na väčšie, či menšie objavy, na ktorých sa podieľali. Základom pracovného kolektívu však boli starší obyvatelia z okolitých dedín (obr. 4). Mnohí z nich každoročne pracovali počas celej sezóny, ktorá sa začínala na jar a končila sa až v neskorú jeseň. Niektorí robotníci pochádzali z opustenej obce Liptovská Mara, ale väčšina dochádzala z okolitých osád Hliník, Liptovské Vlasy, Tvarožná, či Vlašky. Tvorili pracovitý, súdržný a odolný kolektív, v ktorom nechýbal ani humor a dobrá nálada, najmä pri každoročných rozlúčkach so sezónou v novembri, „na Karola“.

VÝSLEDKY VÝSKUMOV

Návršia a svahy okolo vrchu Havránok boli husto obývané počas predpúchovského stupňa a v oboch fázach púchovskej kultúry, teda niekedy od 5. stor. pr. Kr. až po 2. stor. po Kr. Celkovo sa tu v uvedenej dobe nachádzalo šesť osád, a to v bývalom chotári obce Liptovská Mara v polohách Rybníky (Liptovská Mara II), Za panskými humny (Liptovská Mara III, dnes zaplavené),

Kamenica (Liptovská Mara VII, dnes pod hrádzou priehrady) a v katastri obce Vlašky (Špania zem, Liptovská Mara IV). Osady V a VI ležali na severných svahoch v katastri Bobrovníka a prvé informácie o tamjšom osídlení priniesli sondáže pracovníka Liptovského múzea Petra Múdreho. Podrobnejšie sa skúmali najmä výstavbou priamo ohrozené osady III, IV a VII.

Systematické vykopávky sa sústredili na hradisko Havránok a na polohu Rybníky pri jeho východnom úpätí. Najvýznamnejšie boli objavy na hradisku, kde sa na východnej terase kopca postupne odkryli unikátne pozostatky svätyne. Pozostávala z kameňmi dláždených ciest, lemovaných dreveným stĺporadím (obr. 5). V strede obetiska sa v oboch stavebných fázach nachádzala hlboká jama, do ktorej sa počas obetných ceremónií ukladali zvyšky ľudských obetí – hlavy a časti tiel mladých žien (obr. 6; *Pieta/Stloukal 1987*). Mimoriadne dobre sa zachovali pozostatky fortifikácií. Kamenné múry a plenty z pieskovcových i dovážaných travertínových platní dosahovali miestami výšku dvoch metrov (obr. 7). Rozpoznať sa dali aj osadenia a zuhoľnatené časti drevených konštrukcií, najmä v priestore obetiska i oboch preskúmaných brán. Tieto pozostatky umožnili spoznať ich tvar a postaviť ich hypotetické repliky.

Na rozsiahlom sídlisku Liptovská Mara II so súvrstvím miestami presahujúcim hrúbku 300 cm bolo možné sledovať dlhodobé využívanie tohto terénu (obr. 8). V rokoch 1991–1999 a 2004 sa tu skúmali jednotlivé sídliskové horizonty, počínajúc záverom púchovskej kultúry okolo polovice 2. stor.



Obr. 6. Havránok. Výskum obetnej jamy s ľudskými pozostatkami. Rok 1968.



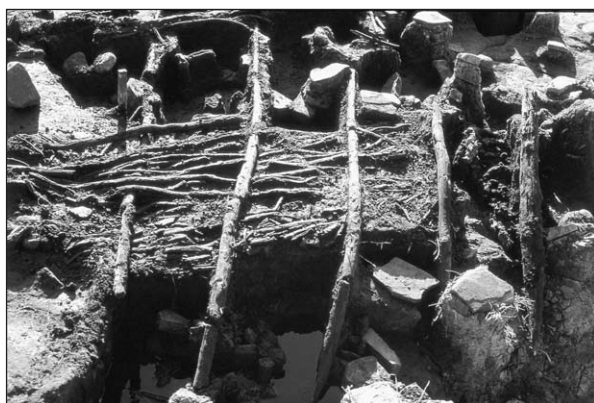
Obr. 7. Havránok. Opevnenie východnej terasy hradiska. V pozadí pri profile kamenná stéla obetného miesta.



Obr. 8. Liptovská Mara II. Práce na sídlisku.

po Kr. V zamokrenej spodnej časti súvrstvia sa výborne zachovali pozostatky drevených konštrukcií domov, hospodárskych stavieb a ohrád (obr. 9). Tieto doteraz podrobne nespracované situácie sú neoceniteľným prameňom pre poznávanie stavitelstva doby železnej i datovania starších horizontov osídlenia (Pieta 2000b; Pieta/Barta/Benedíková 2021). Slatinné vrstvy poskytli mimoriadny súbor rastlinných zvyškov (časti rastlín, drevo, plody, semená), ako aj bohaté kolekcie iných organických pozostatkov (hmyz, malakofauna, parazity, peľ, zvyšky stravy, a pod.).

Niekedy v druhej polovici 2. stor. po Kr. bolo po dobu viac ako piatich storočí trvajúce liptovské centrum pod Havránkom náhle opustené (Švihurová 2015; 2017). Kraj dnešného Liptova zostal po stáročia len málo obývaný, s výnimkou krátkej epizódy začiatkom sťahovania národov (severokarpatská skupina) sa sem život postupne dostával až koncom 9. a v 10. stor. Jedna z najstarších slovenských osád regiónu sa našla v Liptovskej Mare powyše kostola, popri dnešnej ceste na Havránok. Doteraz z nej bola preskúmaná len malá časť.



Obr. 9. Sídlisko II. Prútená ohrada v spodných vrstvách.

Do zátopového územia sa dostal aj cenný objekt kostola Panny Márie z 12.–17. stor. na okraji bývalej obce Liptovská Mara. Po uskutočnení archeologického výskumu, ktorý viedol Jozef Hoščo z Univerzity Komenského v Bratislave, boli interiéry i loď kostola rozobraté a celý objekt bol znovu v pô-



Obr. 10. Kostol Panny Márie. Veža a pôdorys kostola na pôvodnom mieste.



Obr. 11. Náznaková rekonštrukcia hrádka z 15. storočia.

vodnej podobe vybudovaný v Múzeu liptovskej dediny v Pribyline. Na brehu priehrady sa vďaka obetavosti viacerých ľudí napriek pôvodnému zámeru podarilo spevniť terén a zachovať aspoň vežu kostola s vyznačeným pôdorysom stavby (obr. 10). Bolo to kompromisné riešenie tam, kde bola reálna šanca i technické riešenie zachovať ikonický kostol Liptova na pôvodnom mieste. Avšak vtedajší režim nerád videl pozostatky cirkevnej stavby na brehu priehrady – „veľkej stavby socializmu“.

Samostatným, rovnako výnimočným objektom, ktorý súvisel so stredovekou históriou Liptovskej Svätej Mary je hrádok z 13.–15. stor. na vrchole kopca, vymedzený šijovou priekopou. Dobře zachovaná najmladšia fáza hrádka pozostávala z obvodovej drevenej palisády, kamennej dlažby nádvorja, základových brvien zrubovej budovy čeladníka i rozmernej obytnej veže (obr. 11). V skalnom podzemí bola umiestnená hlboká cisterna a 11 m dlhá chodba, ktorá slúžila ako úkryt či zásobáreň.

VÝSKUMY V LIPTOVskej MARE DNES A V BUDÚCNOSTI

Rozsiahle dlhoročné výskumy v Liptovskej MARE zásadne ovplyvnili pohľad na vývoj osídlenia západokarpatskej oblasti vo včasnej dobe dejinnej. Na základe týchto výsledkov vznikla dodnes používaná koncepcia členenia predpúchovského stupňa a púchovskej kultúry. Žiaľ, výskumy v Liptovskej MARE či jej jednotlivých lokalít neboli nikdy podrobne zverejnené. Okrem malej monografie (*Pieta 1996b; 1996c*) sú dosiahnuté výsledky rozptýlené v rade čiastkových štúdií a vo viacerých syntetizujúcich prácach (*Pieta 1982; 2000b; 2008; 2010*). Osady III a IV boli spracované v diplomovej a v dizertačnej práci (*Andrišek/Benediková 2012; Benediková 1999; Švihurová 2017*). Súhrnne boli vyhodnotené aj antropologické a archeobotanické pramene (*Hajnalová 1999; Pieta/Stloukal 1987*), ako aj archeozoologický fond (*Chrószcz/Janeczek/Miklíková 2010*) a numizmatické nálezy (*Kolníková/Tirpák 2021*).

Doba personálne i finančne náročných dlhodobých terénnych výskumov sa, ako sa zdá, skončila a do popredia sa dostávajú racionálnejšie riešenia s širokým zapojením prospekcie, modelovania, podrobných analýz a environmentálnych prístupov. Rozsiahly materiál z Liptovskej Mary bol poznačený viacerými negatívnymi faktormi, predstavuje však významný nálezový fond pre súčasné i budúce bádanie. Je potešiteľné, že dnes už nie je toto nálezisko jedinou podrobnejšie skúmanou lokalitou púchovskej kultúry. Prekvapivé výsledky priniesli a prinášajú práce na významnom nadregionálnom centre v Jánovciach-Machalovciach na Spiši, ale aj v Liptovskom Mikuláši-Ploštine, ktoré umožňujú porovnávanie týchto nálezísk. Aglomerácia v Liptovskej MARE má aj naďalej veľký výskumný potenciál, ktorý nachádza svojich riešiteľov. Kvôli získaniu vzoriek sa uskutočnil revízný výskum valu na Havránku (L. Benediková). Pripravuje sa publikácia osady Liptovská Mara III (M. Kisošová), ale aj spracovanie najvýznamnejšieho sídliska II – Rybníky. Táto lokalita s bohatým nálezovým fondom a pozoruhodnou stratigrafiou (*Pieta 2000b; Pieta/Barta/Benediková 2021*) ponúka veľmi dobré možnosti pre ďalšie úspešné bádanie. Pokračovanie prác, najmä na slatinných vrstvách starších sídliskových horizontov s pozostatkami drevených stavieb, by pri využití najnovších výskumných a analytických metód nepochybne prinieslo množstvo nových informácií a poznatkov. Nedoriešená zostala aj pôvodná funkcia a datovanie do skaly vytesaného veľkého podzemného priestoru poniže stredovekého hrádka, azda cisterny, kde práce neboli ukončené. Prínosom by bol aj výskum alebo aspoň prospekcia včasnostredovekej osady v blízkosti kostola.

LIPTOVSKÁ MARA AKO PAMIATKOVÝ AREÁL

Už počas odkrývania jednotlivých architektúr sa vynoril problém ich zachovania a prezentácie po skončení výskumných prác. Z tohto dôvodu bolo navrhnuté vytvorenie pamiatkového areálu, ktorý bol v roku 1991 vyhlásený za národnú kultúrnu pamiatku. Archeologické múzeum v prírode na Havránku a v jeho okolí už má za sebou viac ako tridsať rokov svojej existencie. Pre jeho zriadenie sa na tejto lokalite vytvorili takmer ideálne podmienky. Je to malebné miesto s výbornými výhľadmi, pozoruhodným prírodným prostredím a pomerne dobrou komunikačnou dostupnosťou, len málo vzdialené od atraktívnych turistických infraštruktúr – akvaparkov pri Liptovskom Mikuláši a v Bešeňovej. Skanzen vznikol ako výsledok dlhoročného výskumu naviazaného na stavbu vodného diela a potrebu zachrany tých archeologických i architektonických pamiatok, ktoré boli priamo ohrozené zaplavením (Pieta 1999). Zo zátopového územia okrem iného pochádza pôdorys dvorca za staršej doby laténskej s dvojpriestorovým domom, sýpkou a chlievom (obr. 12) či keramická dielňa s hrnčiarskou pecou, ktorá bola v roku 1973 z miesta nálezu vyzdvihnutá v bloku. Tento zrekonštruovaný súbor stavieb bol umiestnený pod východnú terasu hradiska v mieste nálezu studne, ktorá bola rovnako upravená a začlenená do dvorca.

Prvá rekonštrukcia bola realizovaná už v roku 1985 pri príležitosti 20. výročia zahájenia výskumu na Havránku. Bola to brána vnútorného opevnenia s časťou hradby, postavená na upravených originálnych základoch (obr. 13). V roku 1991 sa k svetovému archeologickému kongresu vybudovala dnešná prezentácia, ktorej autormi boli Karol Pieta a Václav Hanuliak spolu s architektom Jozefom Sálusom. Vznikla prehliadková trasa prepájajúca objekt pozostatkov kostola, najzaujímavejšie pamiatky na hradisku a zrekonštruovaný dvorec z mladšej doby železnej pri jeho úpätí. Projekt bol financovaný z prostriedkov Ministerstva kultúry SR, ale po prvej etape bol predčasne ukončený. V plánoch zostalo vstupné informačné centrum s expozíciou, prístupová cesta a parkovisko. Tieto objekty, potrebné pre návštevníkov skanzenu, sa žiaľ dodnes nerealizovali. Expozícia a technické objekty pre turistov sa improvizovane inštalovali v budove výskumnej stanice a na pozemku AÚ SAV. Pamiatkový areál v rozsahu archeologických rekonštrukcií bol majetkovo-právne vysporiadaný a odovzdaný Liptovskému múzeu v Ružomberku, ktorý je správcom a prevádzkovateľom archeologického múzea v prírode.



Obr. 12. Rekonštrukcia dvorca z doby laténskej.



Obr. 13. Náznaková rekonštrukcia brány vnútorného (mladšieho) opevnenia.



Obr. 14. Experiment s výrobou laténskej keramiky (H. Friesinger, K. Pieta).

Technické objekty, najmä hrnčiarska dielňa s pecou, postavená podľa dobre zachovanej predlohy nájdennej na sídlisku VII, sa v spolupráci s kolegami z univerzity vo Viedni opakovane využívali na

dokumentované experimenty s výrobou a vypaľovaním keramiky (obr. 14; *Pieta* 1996a).

Za roky terénnych výskumov AÚ SAV a prezentácie národnej kultúrnej pamiatky Hradisko Havránok (Bobrovník) si objekt získal dobré meno v bádateľských kruhoch a v rámci kultúrneho turizmu patrí k obľúbeným lokalitám aj medzi širokou verejnosťou. Okrem odborných publikácií k tomu prispela popularizácia v masmédiách, akcie organizované Liptovským múzeom i vysoká návštevnosť archeologického múzea v prírode. Nechýbal ani záujem umelcov. Režisér Martin Hanzlíček využil tajuplné prostredie Havránka pri natáčaní dvojdielného dokumentárneho filmu o Keltoch. Bola vydaná aj poštová známka s motívom rekonštrukcie brány (Karol Felix). Sochárka Ľudmila Cvengrošová, ktorá sa autorsky podieľala na výtvarnom riešení obetiska na hradisku, vytvorila aj viacero umeleckých diel s tematikou objavov v Liptovskej Mare. Známý slovenský básnik a rodák z Liptovského Mikuláša Ivan Laučík sa inšpiroval podivuhodnou históriou vrchu Havránok a vytvoril básnickú zbierku rovnakého mena, ktorá bola preložená do viacerých jazykov a vydaná v Európe i v Amerike.

Rekonštrukcie a najmä ich súčasti z dreva a iných organických materiálov majú relatívne krátku životnosť, ktorá závisí od prijatého technického riešenia, ale aj od pravidelnej údržby objektov. Aj pri rekonštrukciách v Liptovskej Mare sa s odstupom rokov začala prejavovať prirodzená degradácia materiálov, nedostatočná starostlivosť o prezentácie, ale aj chyby v ich stavebnom riešení či technologických postupoch (*Pieta* 2002). Preto v rokoch 2003–2007 došlo k významným úpravám a prestavbám financovaným z viacerých projektov. Obnovu viedol Oto Makýš a na náročných prácach sa okrem ďalších odborníkov svojimi dobrovoľníkmi podieľala aj organizácia Strom života (*Makýš* 2014, 67–117). Úpravy viacerých stavieb, ako je sýpka či chliev v rekonštruovanom dvorci, realizovali aj pracovníci Liptovského múzea. Ďalšie objekty, ako napríklad zadná brána do hradiska, na prestavbu pôvodnej náznakovej rekonštrukcie ešte len čakajú (*Pieta/Ruttkay* 2020; 2024).

Hojne navštevovaná pamiatka Archeoskanzen Havránok si udržal svoju hodnotu, ktorá prezentuje jednu z významných etáp minulosti Slovenska. Po šesťdesiatich rokoch od začiatku výskumov a štyridsať rokov od prvej rekonštrukcie by si však svojím významom a potenciálom tento objekt zaslúžil vkročiť do novej etapy svojej existencie. So zázemím pre návštevníkov, s parkovaním, prístupovou cestou, moderným infocentrom a výstavným priestorom.

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