

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

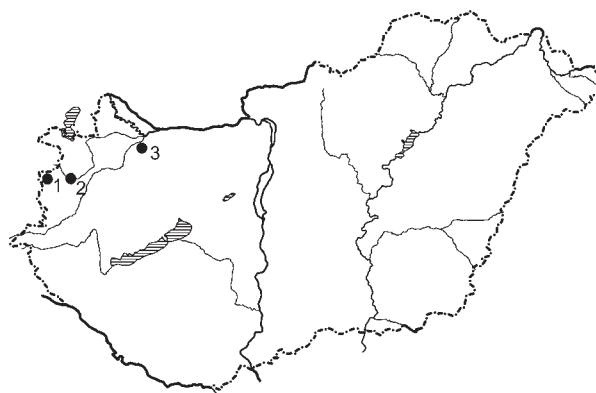


Fig. 1. Western Transdanubia. The most important sites mentioned in the text. 1 – Kőszeg; 2 – Gőr; 3 – Győr-Ménfőcsanak. Map Gy. Isztin.

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.

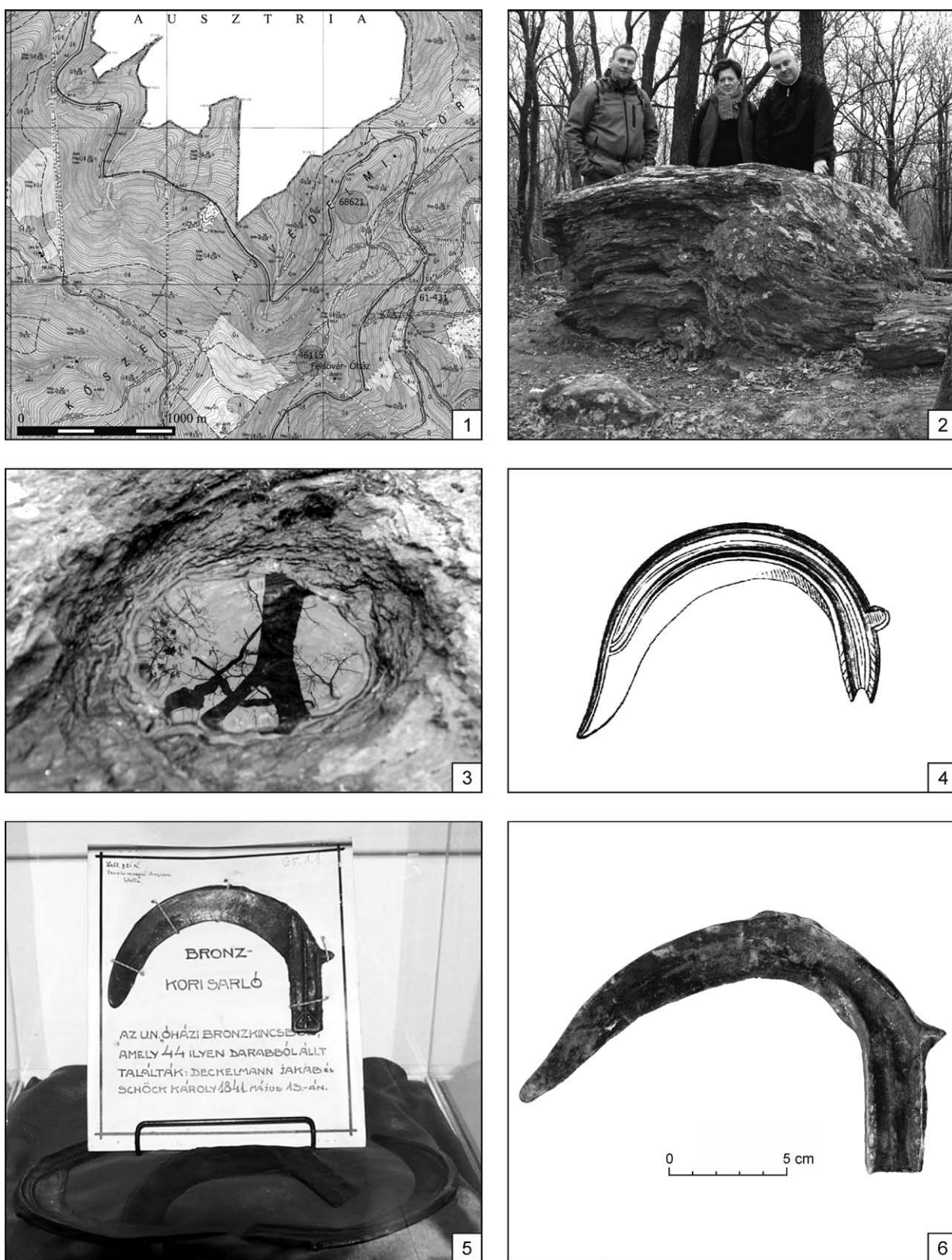


Fig. 2. 1 – topographic position of Kőszeg-Asztalkő (site ID 68621); 2, 3 – the Asztalkő and a depression at its top; 4 – a sickle from the collection of the National Museum (after Rómer 1866, fig. 50); 5 – a sickle from the depot with a handwritten inscription by K. Miske; 6 – a sickle from the depot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

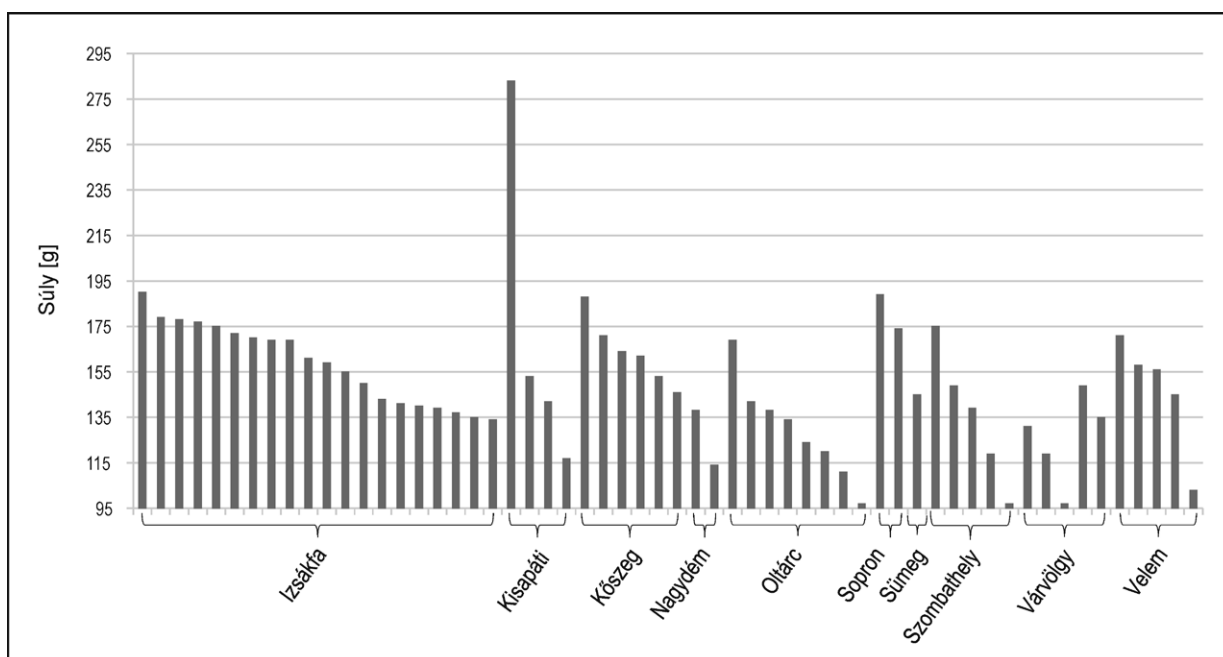


Diagram 1. The weight of intact sickles from the region (after Ilon 2024, tab. 8.E1.2).

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 Várvolgy-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 Várvolgy-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 Griebel/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.

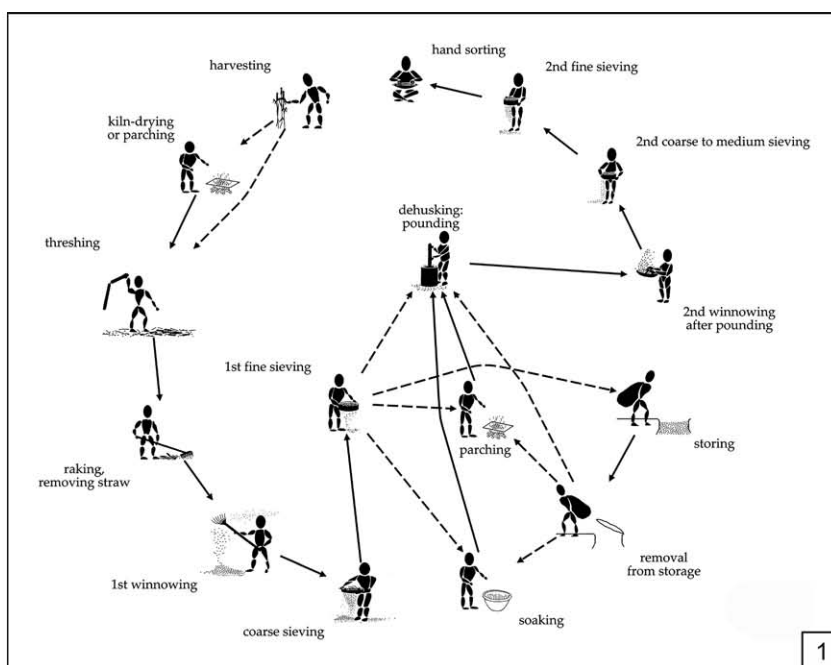


Fig. 3. 1 – processing of crops from harvesting to stacking (after Heiss *et al.* 2021, fig. 5); 2 – harvest in Százhalombatta with a replica bronze sickle (1998); 3–5 – Gór, excavation of storage pits for crop. 2–5 – photo the author.

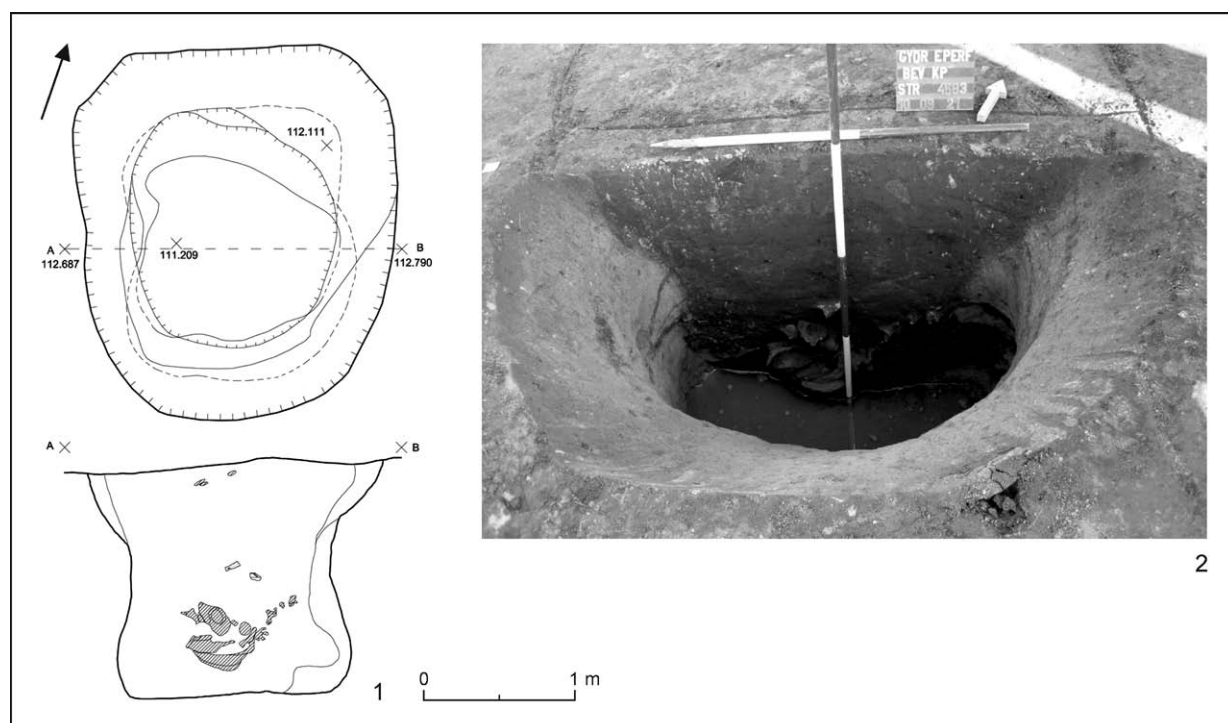


Fig. 4. Ménfőcsanak, feature SNR 4583. A storage pit in excavation. Drawing M. Pápai, photo F. Halász.

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 fluvial 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, Rábapatona) wells and ones with box lining in the study area (e.g., Farád, Lébény, Mosonmagyaróvár, Rábapatona; 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-dűlő 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).

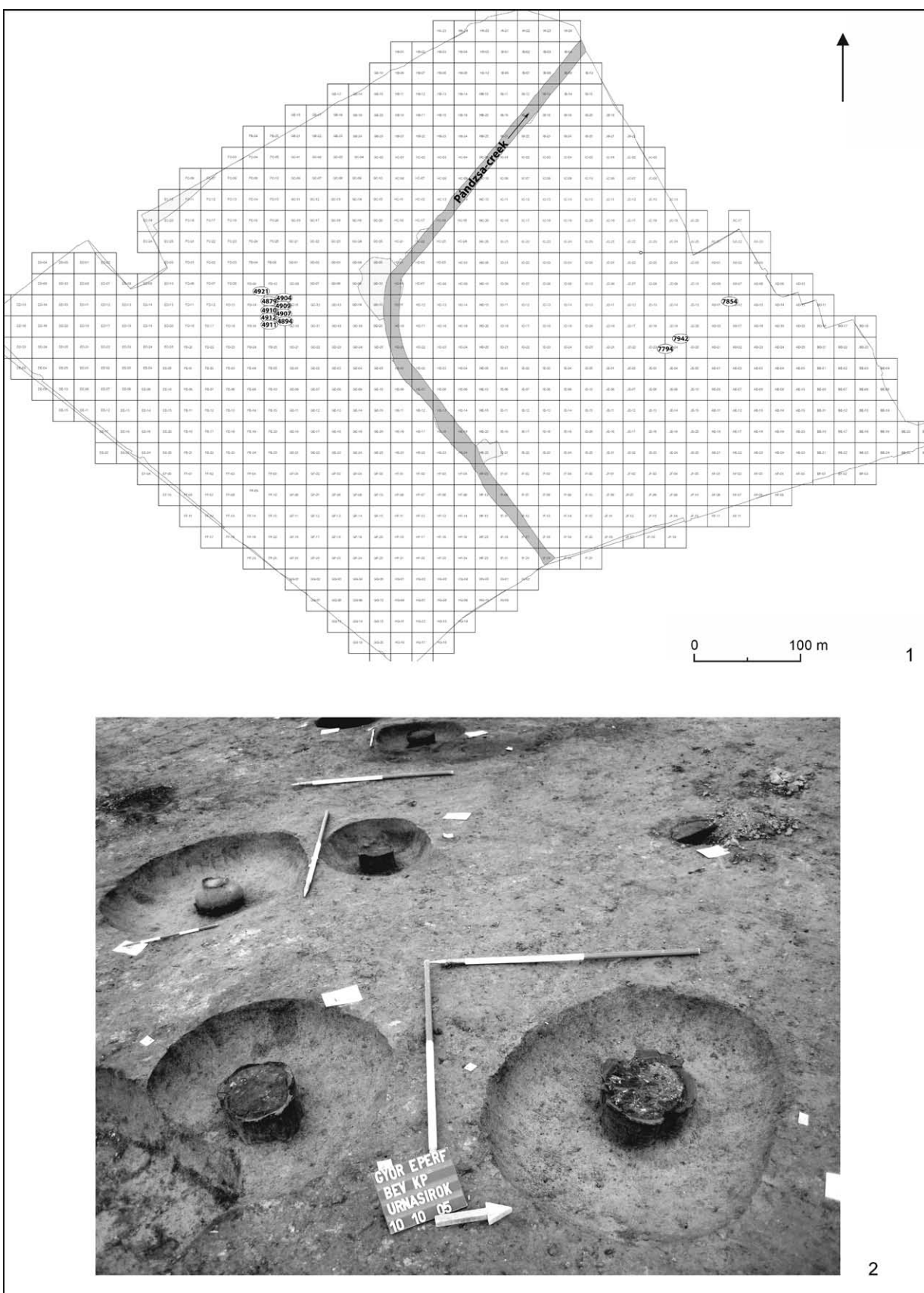


Fig. 5. Ménfőcsanak. 1 – map of the Urnfield Period cemetery; 2 – detail. 1 – survey and drawing by I. Eke, 2 – photo J. Hatos.

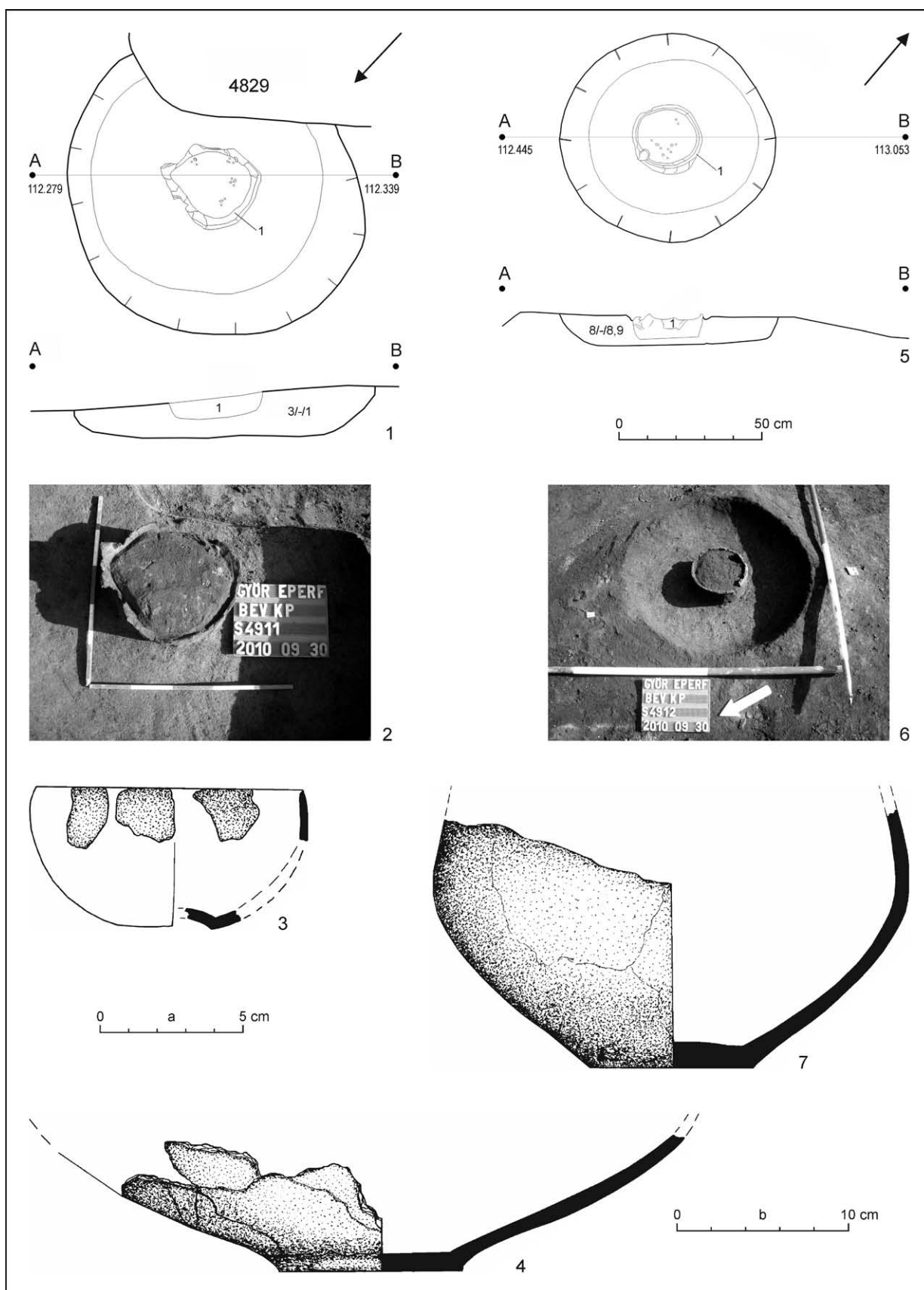


Fig. 6. Ménfőcsanak. 1–4 – grave 7 (SNR 4911); 5–7 – grave 8 (SNR 4912; after Ilon 2014b, fig. 11).



Fig. 7. 1 – Ménfőcsanak, soil sampling of a La Tène feature; 2, 3 – Gőr, the soil sample and its flotation (1990); 4 – Gőr, 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 pôdných 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).