DISSERTATIONES ARCHAEOLOGICAE

ex Instituto Archaeologico
Universitatis de Rolando Eötvös nominatae

DissArch

Ser. 3. No. 10. | 2022

Dissertationes Archaeologicae
ex Instituto Archaeologico
Universitatis de Rolando Eötvös nominatae

Ser. 3. No. 10.

Aviable online at http://ojs.elte.hu/dissarch
Contact: dissarch@btk.elte.hu
ISSN 2064-4574 (online)

Publisher
László Borhy

Budapest 2023

Contents

Articles

Field Reports

Thesis Review Articles

Dissertationes Archaeologicae 3.10 (2022) 47–61 10.17204/dissarch.2022.47

Cereals from the Late Bronze Age Fortified Settlement of Tállya-Óvár

Máté Mervel
Institute of Archaeological Sciences, Eötvös Loránd University, Hungary
mervelmate@gmail.com

Received 18 January 2023 | Accepted 25 January 2022 | Published 31 March 2023

Abstract: This paper aims to present new archaeobotanical data from the Late Bronze Age settlement of Tállya-Óvár in the North Hungarian Mountains. Upon investigating the area around a bronze hoard found earlier, the floor of a building was unearthed, and 16 archaeobotanical samples were taken. The interpretation of the botanical finds was difficult due to a low to medium density of remains and the judgement sampling method. This paper focuses mainly on cereal remains, attempting to interpret them by comparing them with the record of contemporary sites in Hungary and placing them in a broader European context. The samples from Tállya-Óvár were dominated by spelt, barley, and millet. In general, the archaeobotanical assemblage fits the hypotheses concerning Late Bronze Age agriculture. These results are important because no archaeobotanical data have yet been published from high-altitude fortified settlements in the North Hungarian Mountains.

Keywords: archaeobotany, hillforts, Bronze Age, crops

Introduction

During the Late Bronze Age (ca. 1300–900 BC), the occupation of previously unpopulated areas with unfavourable conditions for habitation was a typical phenomenon throughout the Carpathian Basin. In the North Hungarian Mountains, human communities also ventured to higher and higher altitudes, establishing settlements up to 900 metres above sea level. Thus overcoming the obstacles of the new environment, expansion was limited primarily by access to water.[1]

A complex network of settlements emerged, consisting of high-altitude fortified settlements and smaller, unfortified satellite settlements. The unfortified settlements are less well researched, but more than 30 fortified ones are known from Northeastern Hungary.[2] Their general characteristic is that they are well-adapted to the topography of the surroundings and generally occupy the highest points of the area.[3] Occasionally, they deviate from this pattern, sometimes justifiably (e.g., because of a water source) and sometimes seemingly unjustifiably, opting for less effective solutions.[4] The high-altitude fortified settlements were enclosed by a rampart consisting of a

1 V. Szabó 2003, 164–165.
2 V. Szabó 2003, 165.
3 D. Matuz – Nováki 2002, 24–25.
4 D. Matuz 1994, 27–30.

timber-framed structure filled with compacted earth and stones, sometimes accompanied by a ditch outside.[5]

With only a few excavated remains, even less is known about the houses built inside these fortified settlements. The houses at Felsőtárkány-Várhegy could be reconstructed as 3-metres wide and 6-metres long clay-floored buildings with plastered walls and gable roof, and the remains of a house with plank floor and walls were found at Mátraszentimre-Ágasvár.[6] Plastered floor fragments have also been unearthed at Tállya-Óvár and Bükkszentlászló-Nagysánc.[7]

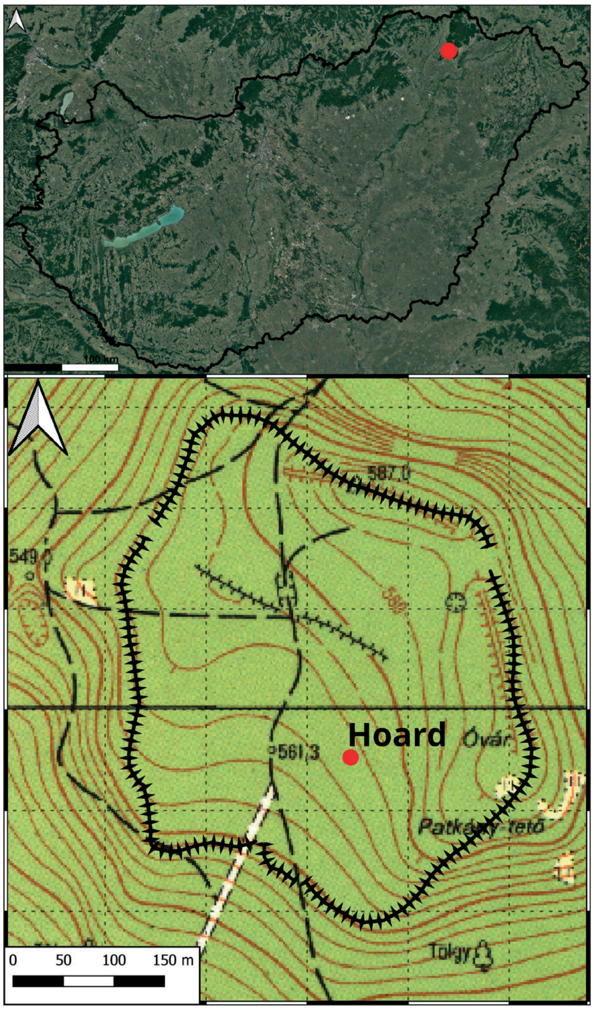

Fig. 1. Location and plan of Tállya-Óvár (after V. Szabó 2019, Fig. 107)

The role of high-altitude fortified settlements has been interpreted in various ways: shelter, economic and power centre,[8] metallurgical centre,[9] or tribal centre.[10] Several external and internal factors, such as climate change, control over trade routes, increasing inner social tension, and the gradually increasing stratification of society, have been identified as the driving force behind the spread of fortified settlements.[11]

The character of warfare changed throughout Europe from the Br D–Ha A period. New territorial-political units emerged, able to demonstrate great military power and launch raids on neighbouring or other groups.[12] The spread of fortified settlements may have also been a response to this threat; such refuges may have been created to protect livestock, crop reserves, and people.[13]

However, it is important to add that there may have been significant differences in the size, habitation pattern, and use of high-altitude fortified settlements, which may reflect the economic and organisational capabilities of the communities that established them, as well as the size of the resources available for them. Some settlements (e.g., Parád-Várhegy) seem to have been inhabited only temporarily and used for ritual purposes; thus, their ramparts had a purely symbolic meaning.[14]

5 D. Matuz – Nováki 2002, 25.

6 V. Szabó 2003, 165.

7 V. Szabó 2017, 118–119.

8 Kemenczei 1970, 29.

9 Furmánek 1987, 320.

10 Kovács 1977, 22.

11 D. Matuz – Nováki 2002, 60.

12 Harding 2007, 107.

13 V. Szabó 2019, 15.

14 V. Szabó 2017, 130–132.

Hoards were almost exclusively deposited in and around high-altitude fortified settlements in Northeastern Hungary during the Ha A1–B3 period. Several find assemblages were recovered in some settlements, suggesting repeated depositions throughout a period. Hoards are usually found close to each other in a prominent area of the sites, for example, near a gate or a spring. The area around them is often full of scattered bronze items, suggesting that the area was associated with elite households or metallurgical activity.[15] These hoards can be interpreted primarily as sacrifices or votive offerings and were closely linked with the social structure.[16]

In summary, during the Late Bronze Age, communities in Northeastern Hungary occupied new, previously uninhabited areas and established high-altitude fortified settlements. These settlements are best understood as ritual, political, and economic centres or meeting places for supralocal communities organised on a territorial basis and as residences of the elite. The construction of fortifications can be traced back to the changing character of warfare, but the ramparts also gave the area they surrounded an important symbolic meaning.

However, despite the renewed interest in high-altitude fortified settlements, no archaeobotanical results have been published from them yet. It is unknown how the communities inhabiting these settlements adapted to the mountain environment, how their agricultural practice related to other Late Bronze Age sites, and what the general picture of farming was. The archaeobotanical results from Tállya-Óvár may answer these questions.

The topographical setting of Tállya-Óvár

Tállya-Óvár (formerly known as Párkány-tető) lies 5.5 km northeast of the village of Tállya in the Zemplén Mountains and rises to 583 metres above sea level (Fig. 1). The neighbouring 607-metre-high Szokolya is connected to the Óvár from the east by a deep ridge. The top of the Óvár is almost completely surrounded by ramparts made of stone and earth. The ramparts reach the highest point of the hill at the northeastern edge of the fortified settlement, from which the ramparts descend steadily to the lowest point of the settlement in the southwest. Thus, the fortified area of the southwestern plateau is about 27 hectares. The rampart reaches its greatest height on the eastern side, where it is 3–4 metres high at points, while its western section is the lowest (0.5–1 metres). No ditch accompanies the rampart at any point. The rampart was designed to take advantage of the natural features of the hilltop to the greatest possible extent, including building in natural, standing rocks. The rampart has four—presumably prehistoric—entrances; the "main entrance" seems to have been the northeastern one near the highest point.[17]

The settlement on Tállya-Óvár was inhabited during the Ha B1–3 periods.[18] It was densely populated, with houses almost all over its territory.[19] Five smaller, unfortified Late Bronze Age sites are known within a 5-km area in its vicinity.[20]

Tállya-Óvár is located in the southern part of the Central Zemplén microregion. This mountain range is of volcanic origin; it features horizontally dissected ridges. The southern part consists mainly of andesite and andesite tuff. The most common soil type is the slightly or strongly acidic clay loam brown earth (90%). The pH level can fall below 4 in tertiary sands where acid-tolerant

15 V. Szabó 2017, 131–132.

16 V. Szabó 2019, 22.

17 D. Matuz – Nováki 2002, 8; Nováki et al. 2007, 123.

18 V. Szabó 2017, 108.

19 V. Szabó 2019, 133.

20 V. Szabó 2017, 127–128.

plants can grow. The climate is moderately dry in the south, moderately cool and wet further north, and cool and moderately wet above 500 metres above sea level. The yearly number of sunshine hours can reach up to 1800. The average annual temperature is 9–9.5 °C, with a maximum of 16 °C in the growing season. The annual precipitation is 600 millimetres, of which 400–450 millimetres fall in the summer. The conditions are favourable for forestry, arable farming in the valleys, and viticulture in the southern parts. The southern areas are covered by mixed turkey oak and oak forests which are also rich in forest-steppe elements. In areas above 600 metres, beech forests also appear.[21]

These observations suggest that Tállya-Óvár was not an ideal location for growing cereals. Likely, agriculture was mainly practiced around small satellite settlements with easier access to arable land.

Previous research at Tállya-Óvár

The name of Óvár was first mentioned in written sources in 1682. Géza Gyárfás Dongó published his description of the site in 1898 and Egyed Berzeviczy in 1903; both dated the fortification to the Medieval or Early Modern Period. The county's monograph[22] mistakes Tállya-Óvár for Tállya-Vár-hegy. In 1931, János Barna and Gusztáv Vongery published descriptions of the shape and dimensions of the ramparts, which they dated to the Avar Period or the time of the Hungarian Conquest. The site first appeared on a map marked as a ruin on the county's civil map published in 1986. Gyula Nováki and György Sándorfi surveyed the site in 1990. Magdolna Hellebrandt published their results in her summary in 1994; she dated the site to "prehistoric times." Later, Edit D. Matuz and Gyula Nováki specified the dating, refining it to the Late Bronze Age based on the morphological characteristics of the ramparts.[23]

Traces of illegal metal detector activity have been observed at several points in Tállya-Óvár.[24] In 2006, the Institute of Archaeological Sciences of the Eötvös Loránd University started a programme, led by Gábor V. Szabó to carry out a systematic metal detector survey of the site. The distribution of the relatively few recovered stray metal finds—altogether, 37 Late Bronze Age bronze fragments—and the larger quantity of pottery fragments suggest that the entire inner area was densely populated.[25] The single depot find, with 33 bronze objects, was discovered in 2009 in the central, flat area of the settlement. The 22 socketed axes, four sickles, four bracelets, a winged axe, a round horse harness mount, and a sword hilt with a cup-shaped pommel were probably buried in a bag made from organic material. Most objects can be dated to the Ha B1 period, while some to the Ha B2.[26]

During the following excavations, carried out between 2011 and 2013, a total of 72 m^2 was unearthed in the area of the hoard. Fieldwork has revealed that the depot may have been placed on a burnt clay surface, probably an outdoor hearth. A floor of a building was also found only 1.5 metres from the depot. The area around the depot was undoubtedly one of the most densely populated parts of the fortified settlement. The fine, decorative pottery fragments recovered from the debris of the house and the anthropomorphic and animal figures discovered between the house and the depot suggest that the excavated area may have been a place of complex ritual activities.[27] It was also associated with elite households.[28]

21 Dövényi 2010, 778–781.

22 Vende 1905, 116.

23 Nováki et al. 2007, 123.

24 V. Szabó 2010, 26.

25 V. Szabó 2017, 118–119.

26 V. Szabó 2010, 27; V. Szabó 2018, 182.

27 V. Szabó 2017, 119; V. Szabó 2018, 182.

28 V. Szabó 2019, 129.

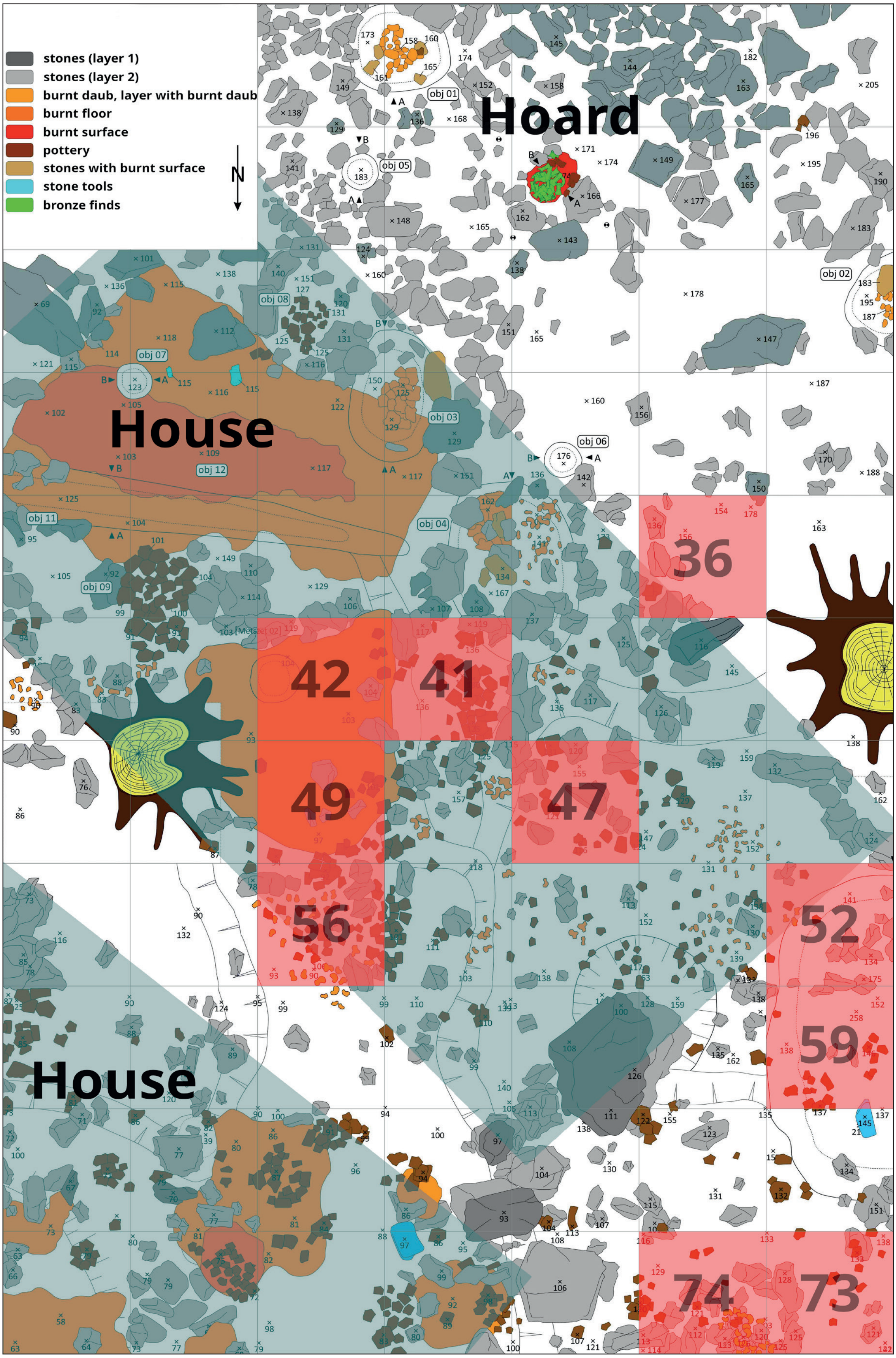

Fig. 2. Survey map of the excavation with sampling points (after V. Szabó 2019, Fig. 108)

The samples presented in this paper were recovered during this excavation (Fig. 2). Most of them (14 samples) were collected from discoloured spots rich in charcoal in the infill layers of the house using the so-called judgement sampling strategy and documented in a grid projected over the excavation area. Seven more samples were taken from a pit and a posthole (Tab. 1). The total weight of the soil samples collected during excavation was 92 kg.

Tab. 1. List of archaeobotanical samples from Tállya-Óvár

Sample Number	Square	Level	Feature	Notes	Analitycal Unit	Sample Volume (l)
1	36	3	House		1	3
2	41	2	House	From underneath a pot	2	4
3	41	2	House	From underneath a pot	2	3.5
4	42	2	House	Layer of daub	3	4
5	42	2	House	Layer of daub	3	3.2
6	47	3	House		4	4
7	49	2	House	Layer of daub	5	3.5
8	49	2	House	From underneath a pot	6	2.1
9	52	4	Pit		7	3.3
10	52	4	Pit		7	3
11	52	4	Pit		7	4
12	56	2	House		8	3
13	59	na	Pit	-46 cm	9	12
14	59	na	Pit	-49 cm	9	15
15	59	na	Pit	-47 cm	9	17.5
16	73–74	na	Posthole	-132 cm	10	8

Methods

The extraction of botanical finds from the soil samples was done using a machine-assisted flotation technique the principle of which is that the inflowing water releases organic matter from the soil particles, which, due to their specific weight, float to the surface and fall with the overflow water onto a sieve that collects them. A 400 µm-mesh sieve was used to catch both the coarse and fine flot fractions. The heavy residue was withheld by a 2 mm-mesh net. Prior to flotation, the weight and volume of the soil samples were measured. The duration and conditions of the flotation process and other observations were also recorded.

After gentle drying, the volume of the flot fraction and the proportion of recent plant parts (e.g., roots) were measured. Next, the flot fractions were separated into two sections according to size, using a 1mm mesh sieve to facilitate manual sorting. The samples were sorted under a binocular stereomicroscope[29] using Petri dishes, soft and hard tweezers, and brushes. During coarse sorting,

29 ZEISS STEREO Discovery.V8: zoom (zoom range 6,3×-80×) stereomicroscope; Imaging system: Camera: ZEISS AxioCam MRc5 (5MP); Software: ZEISS AxioVision version 4.9.1; extended focus system: Helicon Focus version 6.0; KMOP-4.2.1/B-10-2011-0002: Interdisciplinary and innovative research directions and development of background for industrial co-operation and introduction of teaching new educational technologies at Eötvös Loránd University (ELTE).

recent plant parts, snails, insects, bugs, bone fragments, and small inorganic fragments of finds, etc., were collected and packed separately. In the case of charcoals, pieces larger than 2 mm were packed separately for possible identification in the future.

Cereal grain and chaff types were identified based primarily on the criteria determined by Stefanie Jacomet,[30] while other seeds and fruits were classified using various seed atlases and handbooks;[31] all results were cross-checked with the recent seed and fruit collection of the University of Tübingen and the private collection of Maria Hajnalova.

The Minimum Number of Individuals (MNI) was calculated from the number of identified fragments to be used in further statistical analyses. Some individual botanical finds were also documented in photos (Fig. 3).

Results

A total of 677 charred seeds or fruits were identified in the analysed samples, which can be considered a moderate quantity (Tab. 2). Most archaeobotanical finds, 525 in total, were cereal remains, but almost a third could not be more precisely identified than wheat or barley. Based on the absolute quantity of grains, the most important cereal species was probably spelt *(Triticum aestivum L. subsp. spelta [L.] Thell.)*. The large proportion of spelt is particularly interesting, as spelt was never a leading cereal on any Late Bronze Age site in Hungary. Three spikelet forks were found at the site, which also belonged to spelt. The second most common cereal was barley *(Hordeum vulgare L.)*, not falling far behind spelt. Surprisingly, millet came in third, well behind the other two. Emmer *(Triticum turgidum L. subsp. dicoccum [Schrank] Thell.)*, einkorn *(Triticum monococcum L. subsp. Monococcum)* and naked wheat *(Triticum aestivum/durum)* were also found in small quantities. It is also worth mentioning that a single grain of rye *(Secale sp.)*, probably not yet cultivated, was also recovered from the archaeobotanical samples (Fig. 4).

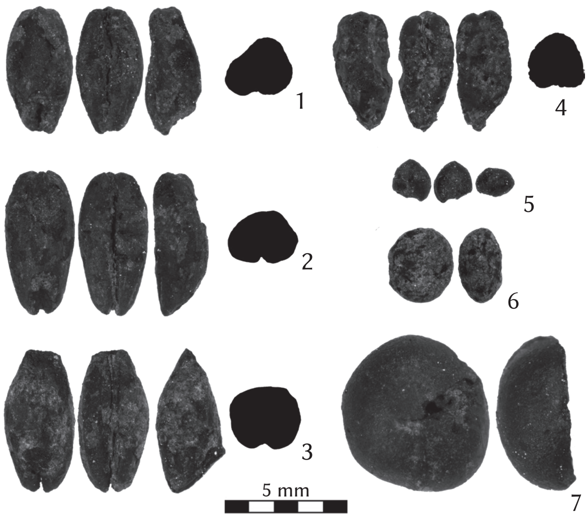

Fig. 3. Images of selected seeds from Tállya-Óvár. 1 – emmer, 2 – spelt, 3 – barley, 4 – rye, 5 – millet, 6 – lentil, 7 – pea

Besides cereals, only a small number of pulses were found. Among these, lentils (*Lens culinaris Medic.*) were the most common, although peas *(Pisum sativum L.)* were also present in smaller quantities. Besides farming, the diet possibly also relied on occasional gathering, as indicated by a fragment of a seed, probably elderberry (*Sambucus sp.*) and a single seed of midland hawthorn *(Crataegus laevigata [Poir.] DC.)*. Typical weeds of autumn cereals like black-bindweed *(Fallopia convolvulus [L.] A. Löve)*, field or rye brome *(Bromus arvensis L./secalinus L.)* and false cleavers *(Galium spurium L.)*, together with weeds of typical spring cereals, including white goosefoot (*Chenopodium album agg.*), maple-leaved goosefoot *(Chenopodium hybridum L.)*, and black nightshade *(Solanum nigrum L.)* were also identified among the remains.

30 Jacomet 2006.

31 Beijerinck 1947; Brecher 1960; Barkley – Martin 1961; Schermann 1967; Berggren 1981; Anderberg 1994; Bojnanský – Fargašová 2007; Nesbitt 2008; Cappers et al. 2012.

Tab. 2. Results of archaeobotanical identification of the samples from Tállya-Óvár

Name/Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Triticum monococcum L.										1	1		1		1	
Triticum turgidum L. subsp. dicoccum (Schrank) Thell.											2		1		2	4
Triticum aestivum L. subsp. spelta (L.) Thell.		1			2		1		6	13	8		9	6	9	41
Triticum turgidum L. subsp. dicoccum (Schrank) Thell./Triticum aestivum L. subsp. spelta (L.) Thell.									3	5	8			5	6	11
Triticum aestivum L. subsp vulgare (Vill.) Mackey/ T. turgidum cv. durum (Desf.) Mackey								1	1	2	2		4	1	1	
Triticum spec.															2	6
Hordeum vulgare L.	1			1		1		3	4	6	3		7	3	8	43
Triticum/Hordeum spec.	1	2	1	1	2	4	1	1	20	27	14		29	22	16	100
Panicum miliaceum L.			2	2	3	3	2	1	2			1	11	7	3	
Lens culinaris Medic.					1		1	1				1		1	2	
Pisum sativum L.										1						2
Lathyrus tuberosus L.																1
Coronilla spec.													1			
Melilotus spec.				1												
Fabaceae					4											
Chenopodium album agg.	1		1	2		1	1	1	6	3	4	1	10	1	9	
Chenopodium hybridum L.						1							1		1	
Chenopodium polyspermum L.													2		2	
Chenopodium album agg./Atriplex spec.													5			
Setaria viridis (L.) PB./ verticillata (L.) R. et Sch.										1				1	1	
Echinochloa crus-galli (L.) P. B.														1		
Setaria viridis (L.) PB./ verticillata (L.) R. et Sch./Echinochloa crus-galli (L.) P. B.								1								
Digitaria sanguinalis (L.) Scop.															1	

Name/Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Koeleria pyramidata (Lam.) P.Beauv.										1						
Poacae spec.								1	1		2		1	1	1	
Poa spec.	1									2						
Poa palustris L.													1			
Poa pratensis agg.			1											1		
Bromus spec.						1							1			
Bromus secalinus L.							1								1	
Bromus arvensis L./ secalinus L.									1		4			1		1
Bromus sterilis L./ tectorum L.											1					1
Secale cereale L.																1
Saponaria officinalis L.				1												
Moehringia trinervia (L.) Clairv.													1			
Gypsophila paniculata L.								2								
Lychnis flos-cuculi L.													1			
Teucrium type									1							
Stachys recta L.														1		
Polygonaceae	1															1
Polygonum lapathifolium L.				1												
Fallopia convolvulus (L.) A. Löve		1				1	1	1	3	3	1	1		1		
Galium spurium L.										1						
Galium spec.						3		1		1	1		1	1		
Crataegus laevigata (Poir.) DC.													1			
Potentilla arenaria Borkh.									1							
Malva spec.						1									1	
Malva silvestris L. / neglecta															1	
Solanum nigrum L.	1								1							
Sambucus spec.														1		
Mercurialis spec.														1		
Indet seed	1					1	1	2						2		
Triticum aestivum L. subsp. spelta (L.) Thell. [furca bicornis]											1			2		
Charcoal >2mm (fragments count)	181	83	252	13	112	28	8	8	123	684	81	38	335	363	233	199
Charcoal >2mm (ml)	5	1.8	4	0.3	6.5	0.4	0.1	0.2	1.4	4	2.8	0.9	4.4	3.2	3.2	2.2

Discussion

Although absolute counts (raw number per taxon) are a simple tool to characterise archaeobotanical samples, they are highly influenced by other factors such as sampling method and preservation.[32] This also holds true for the samples of Tállya-Óvár, as a single archaeobotanical sample (No. 16) contained 39% of all cereal grains. Since nine samples contained less than ten cereal grains and six samples 30–70 pieces, a single, rich sample may result in certain cereal species being overrepresented. It is also worth mentioning that the samples with fewer cereal grains were taken from the layers of the excavated house, while the grain-rich samples from the infill of negative features (pit, posthole), thus, one must take into account different degrees of preservation. Also, the judgement sampling method and the varying sample volumes make it difficult to compare the samples.

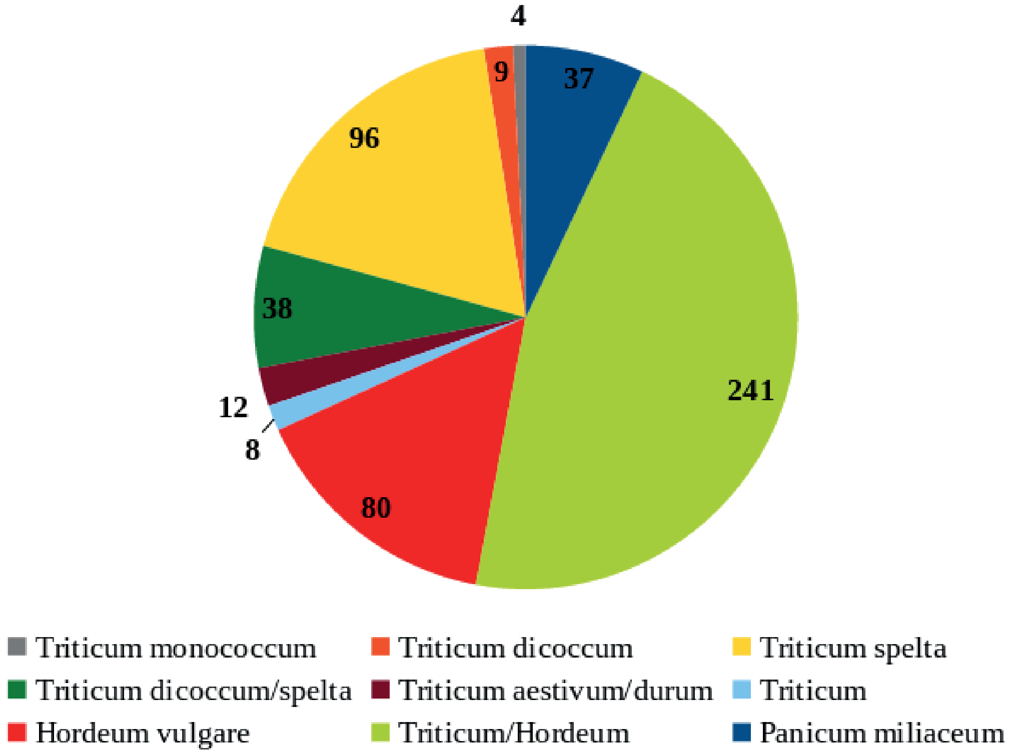

Fig. 4. Proportions of cereal grains from Tállya-Óvár (n=525)

As absolute counts might be influenced by other factors too, other statistical methods should also be considered in estimating the significance of different cereal species in the life of Late Bronze Age people. One possible way to go around these distorting factors when assessing non-ideal samples is the ubiquity or presence analysis, only counting the number of samples in which a taxon is present. It gives the same weight to a taxon regardless of the actual number of remains per sample; the score only depends upon the presence or absence of the taxon in the archaeobotanical sample. The number of samples in which a taxon is present can then be compared to the scores of other taxa, which may reflect their relative importance. Ubiquity analysis assumes that all samples taken into examination are independent. However, if all samples were considered independently, two rich samples from the same archaeological context (e.g., a homogeneous fill of a pit) could overrepresent certain taxa and seriously distort the results of presence analysis.[33]

32 Popper 1988, 60.

33 Popper 1988, 60–61.

Most samples were combined into analytical units to mitigate the distorting effect of individual samples in the case of Tállya-Óvár. Combining the samples was not evident because, in many cases, the documentation did not provide precise enough information on the context of samples and their relationship, especially in the area of the house. The most important guidelines regarding the archaeological context were the ID numbers of the squares in the documentation grid from which the samples were taken. Therefore, those were chosen to be the basis of sample combination. In the case of the samples taken from the pit, it was supposed that the pit, as an archaeological feature, corresponded better to the archaeological context than the two related squares separately, and it was chosen as a unit of combination.

However, after testing the homogeneity of the samples to be combined, some changes must have been made. The ratios of seed counts/sample volume and seed counts/counts of charcoal bigger than 2 mm were used to reflect the deposition and preservation of individual archaeobotanical samples. These results provided another factor to be considered when combining samples, as only samples with somewhat uniform deposition and preservation characteristics should be combined (Fig. 5).

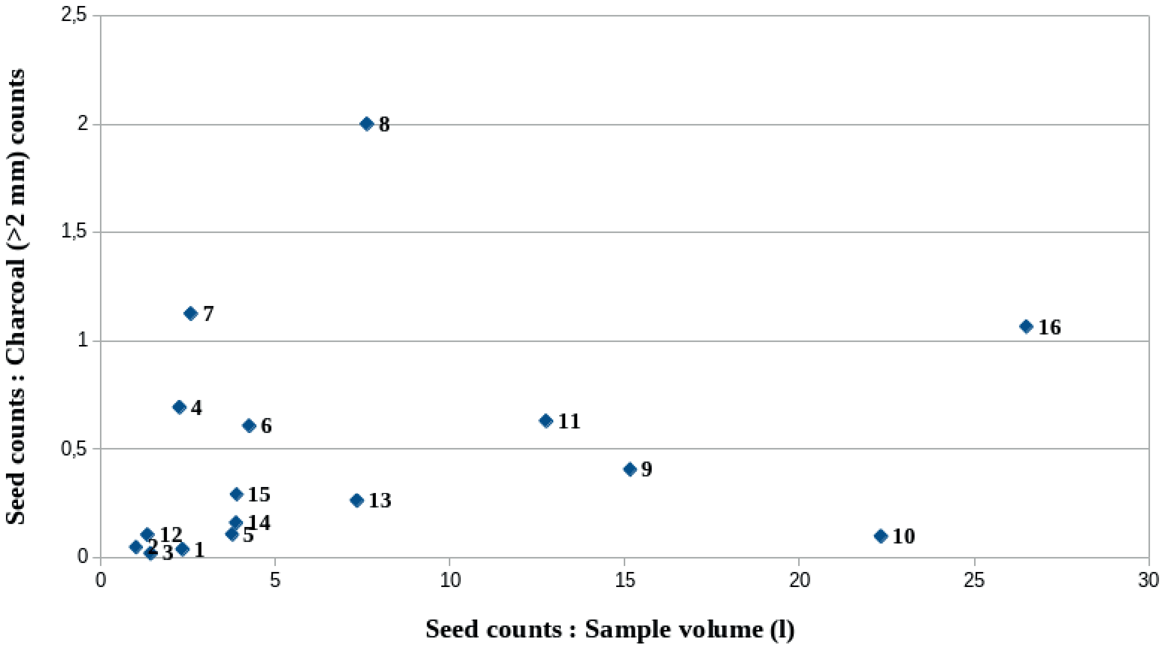

Fig. 5. Composition of samples by seed count: sample volume and seed counts: charcoal counts ratios

The two samples from Square 49 (samples No. 7 and 8) were not combined because of the differences in their ratios. The documentation also supports this separation since one of the samples (No. 8) was taken from underneath a pot, and the other was not. The samples from the pit were combined by their square numbers instead of the whole feature because the respective parts of the pit showed significant differences in their ratios. The ratios of Square 59 (samples No. 13, 14, and 15) fell closer to those of samples taken from the house. The ratios of Square 52 (samples No. 9, 10, and 11) are clearly distinct from the ones in Square 59. They are also more scattered but still could be combined because they represent a distinct group among the other samples. In the end, the 16 samples were grouped into ten analytical units.

The results of the presence analysis showed a more even distribution of the three cereal species that were the most prevalent based on absolute counts (Fig. 6). The samples contained altogether 37 millet grains in 8 analytical units, which is the highest ubiquity score among the three most dominant cereal species. Besides, 80 barley grains were found in 7 analytical units. While by absolute counts, spelt was the most frequent cereal on the site (96 grains), it was only present in 6 analytical units. This distribution of taxa also confirms that the high absolute counts of barley and emmer were mainly the result of a few grain-rich samples. For example, the richest sample (No. 16) contained almost half of all spelt and barley grains found at Tállya-Óvár but not a single millet grain. It might be worth mentioning pulses here. Altogether seven lentils and three pea seeds were found in the samples, which is not a significant amount compared to the cereal grains. However, lentil is present in five analytical units, and pea appears in two, that is, in a range comparable to the scores of cereals. Their presence becomes even more significant when looking at the ubiquity of all pulses combined, as they are present in seven analytical units. Although presence analysis is a useful tool for assessing archaeobotanical samples, it does not make absolute counts redundant, and the two methods should be used side by side to characterise an assemblage.

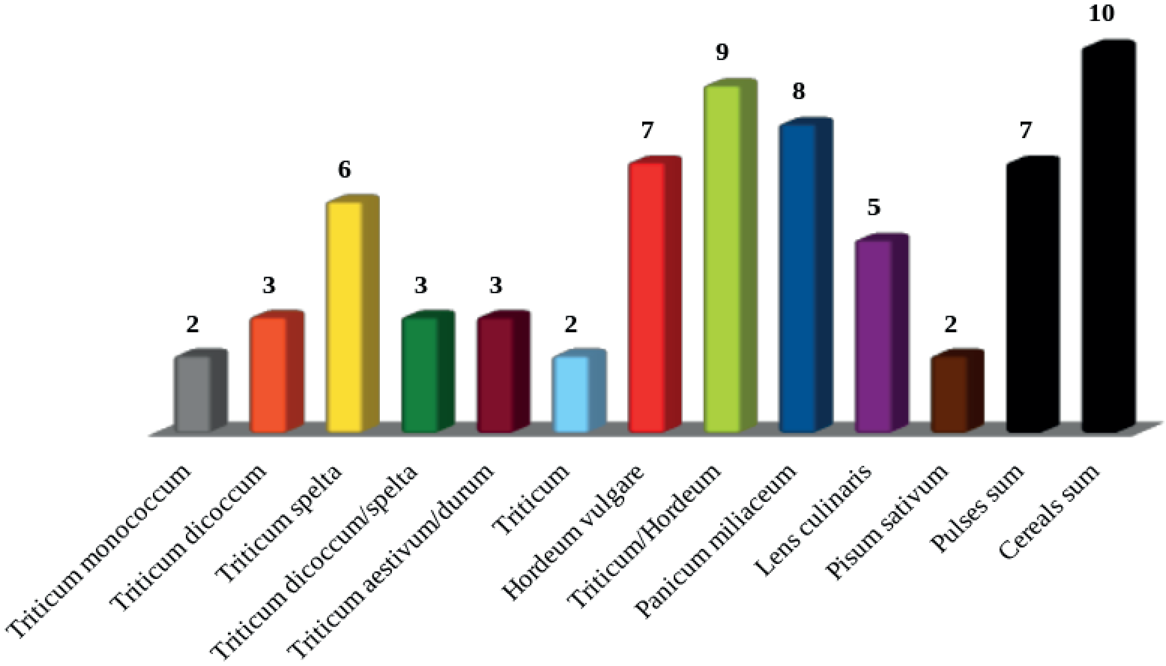

Fig. 6. Number of analytical units containing different taxa

Einkorn and emmer should be considered insignificant according to both their absolute counts and presence in analytical units. Both wheat types are part of the founder crops and played a major role in agriculture during the earlier phases of prehistory. By the Late Bronze Age, their significance decreased drastically, although there are some examples of their cultivation from the Late Bronze Age of Hungary. Emmer was the most common cereal, followed by einkorn in Gór-Kápolnadomb.[34] Emmer was also the dominant cereal in Sopron-Krautacker.[35]

In addition to the cereals typical before the Late Bronze Age, some have become more important in the following periods. The few free-threshing wheat grains found at Tállya-Óvár were not suitable for closer identification, although it is highly likely that they belonged to common wheat and not durum wheat. Such wheat is present only in small numbers at Tállya-Óvár and many other Late Bronze Age sites in Hungary, but it was the most common cereal in Csanádpalota-Földvár.[36]

34 Gyulai – Torma 1999, 360.

35 Jerem – Facsar 1984, 150.

36 Szeverényi et al. 2015, 48–52.

The most typical cereals of Tállya-Óvár were spelt, barley, and millet. While spelt leads the absolute counts, it is only third in the presence analysis. Spelt was not a dominant cereal in any Late Bronze Age site in Hungary, but it was a significant crop in Poroszló-Aponhát[37] and Gór-Kápolnadomb.[38] Barley was the second most important cereal according to both absolute counts and the presence analysis. Barley was the most common cereal in a few Late Bronze Age settlements in Hungary (Győr-Szabadrétdomb and Polgár, site no. 31)[39] and the second most common in many sites. In Tállya-Óvár, millet took third place among cereals by absolute counts, but it was present in more analytical units than spelt and barley. It was the dominant cereal in many Late Bronze Age sites in Hungary (usually followed by barley), including Börcs-Paphomlok, Budapest-Albertfalva-Kitérő utca, Lébény-Billedomb, Dunakeszi-Székesdűlő, Mosonmagyaróvár-Németdűlő,[40] and Balatonmagyaród-Hídvégpuszta.[41]

It can be clearly determined that spelt, barley, and millet played an important role in agriculture not just in Tállya-Óvár but in many other contemporary sites in the territory of Hungary; its role is better understood in a broader European context. In Late Bronze Age Europe, farming and subsistence underwent fundamental changes, reflected mainly by an increase in the number of cultivated and gathered plant species. The spread of cultivated plant species enabled the emergence of more complex and diverse farming systems well-adapted to social characteristics and ecological conditions. Among the cereals that newly gained importance, millet was among the most widespread in Late Bronze Age Europe. Millet has several properties that can give it an advantage over other cereals: it germinates late, grows quickly, and is easy to store for long periods without quality loss. Its short vegetation period (three months) was probably a most appreciated feature by Late Bronze Age farmers for two reasons. First, it allowed them to increase the size of arable land. Harvesting and sowing are the main periods limiting the extension of arable fields that can be cultivated, requiring the biggest labour investment from farmers. Millet can be sown and harvested more flexibly, avoiding labour-intensive periods coinciding with other cereals. Second, the flexibility of millet also allows it to be used to mitigate the effect of harvest failures caused by late frosts. Besides millet, barley and spelt should also have had a distinguished place in subsistence. Another characteristic of Late Bronze Age agriculture is the increased cultivation of legumes, which may be linked to the emergence of crop rotation or mixed sowing but also the increased need for soil improvement. Pulses could play an important role in the diet, as they can supplement the necessary protein a cereal-based diet lacks. The third characteristic of Late Bronze Age agriculture is a greater emphasis on gathering compared to earlier periods.[42]

The cereal spectrum of Tállya-Óvár corresponds well to this European context. It should also be noted that millet, considered a popular crop of herders, may be linked to the increasing prestige of cattle and its role in the life of the elite. The archaeobotanical record of Tállya-Óvár seems to reflect the growing importance of legumes, as only a few seeds were found, but they were present in seven analytical units. Only the two elderberry and midland hawthorn seeds bear evidence of foraging, which seems to have been marginal in the life of the related community.

37 P. Hartyányi – Nováki 1975, 28.

38 Gyulai – Torma 1999, 360.

39 Gyulai 2010, Archaeobotanical Database, CD appendix, Tab. 03–02.

40 Gyulai 2010, Archaeobotanical Database, CD appendix, Tab. 03–02.

41 Gyulai 1996, 173.

42 Kneisel et al. 2015, 275–277.

Conclusions

Despite the fact that the samples collected at Tállya-Óvár did not prove to be rich and there were difficulties in contextualising them, they provided important data for understanding what life must have been like at high-altitude fortified settlements in the North Hungarian Mountains in the Late Bronze Age. By absolute counts, the main cereal was spelt, followed by barley and millet. Due to the uneven distribution of plant remains, the statistical method used for evaluation was one that could compensate for overrepresentation, a bias caused by rich samples. The presence analysis reversed the ranking of cereal species provided by absolute counts. Based on the combined results, the only thing that can be said with certainty about cereals in Tállya-Óvár is that spelt, barley, and millet were the dominant ones among them. This cereal spectrum fits well with both other Hungarian Late Bronze Age sites processed so far and the broader European context. While the presence analysis seems to underpin the importance of pulses, the role of gathered plants was negligible. Generally, Tállya-Óvár seems to be a typical Late Bronze Age site in terms of cultivation.

The results currently show no indication that communities had to change their farming practices in a mountain environment. The archaeobotanical remains do not seem different from ones from other coeval sites, even though they were collected in a prominent location of a central settlement that was associated with elite households and may serve as a setting for complex ritual activities.

References

Anderberg, A.-L. 1994: *Atlas of seeds and small fruits of Northwest-European plant species (Sweden, Norway, Denmark, East Fennoscandia, and Iceland) with morphological descriptions. Part 4. Resedaceae – Umbelliferae.* Stockholm.

Barkley, W. D. – Martin, A. C. 1961: *Seed Identification Manual.* Berkeley.

Beijerinck, W. 1947: *Zadenatlas der Nederlandsche Flora.* Wageningen.

Berggren, G. 1981: *Atlas of seeds and small fruits of Northwest-European plant species (Sweden, Norway, Denmark, East Fennoscandia, and Iceland) with morphological descriptions. Part 3. Salicaceae – Cruciferae.* Stockholm.

Bojnanský, V. – Fargašová, F. 2007: *Atlas of Seed and Fruits of Central and East-European flora. The Carpathian Mountains Region.* Dodrecht.

Brecher, Gy. 1960: *A magismeret atlasza.* Budapest.

Cappers, R. T. J. – Bekker, R. M. – Jans, J. E. A. 2012: *Digitale Zadenatlas van Nederland. Digital Seed Atlas of the Netherlands.* Groningen Archaeological Studies 4. Groningen.

Dövényi, S. (ed.) 2010: *Magyarország kistájainak katasztere.* (2nd edition). Budapest.

Furmánek, V. 1987: Die Kyjatice-Kultur. In: Plesl, E. – Hrala, J. (eds): *Die Urnenfelderkulturen Mitteleuropas. Symposium Liblice, 21-25. 10. 1985.* Praha, 317–323.

Gyulai, F. – Torma, A. 1999: Die Pflanzenfunde einer Siedlung der Urnenfelderkultur in Gór. S*avaria. A Vas Megyei Múzeumok Értesítője* 24/3, 359 – 368.

Gyulai, F. 1996: Balatonmagyaród-Hídvégpuszta késő bronzkori település növényleletei és élelmiszermaradványai (Plant Findings and Food Remnants of the Late Bronze Age Settlement at Balatonmagyaród-Hídvégpuszta). *Zalai Múzeum* 6, 169–195.

Gyulai, F. 2010: *Archaeobotany in Hungary. Seed, Fruit, Food, and Beverage Remains in the Carpathian Basin from the Neolithic to the Late Middle Ages.* Archaeolingua 21. Budapest.

Harding, A. 2007: *Warriors and Weapons in Bronze Age Europe.* Archaeolingua Series Minor 25. Budapest.

P. Hartyányi, B. – Nováki, Gy. 1975: Növényi mag- és termésleletek Magyarországon az újkőkortól a XVIII. századig. II. *A Magyar Mezőgazdasági Múzeum Közleményei*, 23–71.

Jacomet, S. 2006: *Identification of Cereal Remains from Archaeological Sites*. Basel.

Jerem, E. – Facsar, G. 1984: A Sopron-Krautackeren feltárt vaskori telep régészeti és környezetrekonstrukciós vizsgálata I. *Archaeologiai Értesítő* 111, 141–169.

Kemenczei, T. 1970: A Kyjatice kultúra Észak-Magyarországon. *A Herman Ottó Múzeum Évkönyve* 9, 17–78.

Kneisel, J. – Dal Corso, M. – Kirleis, W. – Taylor, N. – Tiedtke, V. 2015: The Third Food Revolution Common Trends in Economic and Subsistence Strategies in Bronze Age Europe. In: Kneisel, J. – Dal Corso, M. – Kirleis, W. – Scholz, H. – Taylor, N. – Tiedtke, V. (eds): *The Third Food Revolution Setting the Bronze Age Table: Common Trends in Economic and Subsistence Strategies in Bronze Age Europe. Proceedings of the International Workshop "Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes III (15th-18th April 2011) in Kiel.* Universitätsforschungen zur prähistorischen Archäologie 283. Bonn, 275–286.

Kovács, T. 1977: *A bronzkor Magyarországon*. Budapest.

D. Matuz, E. – Nováki, Gy. 2002: *Spätbronzezeitliche, früheisenzeitliche Erdwälle in Nordungarn*. Inventaria Praehistorica Hungariae 10. Budapest.

D. Matuz, E. 1994: A kyjaticei kultúra földvára Bükkszentlászló-Nagysáncon (Erdburg der Kyjatice-Kultur in Bükkszentlászló-Nagysánc). *A Herman Ottó Múzeum Évkönyve* 32, 9–54.

Nesbitt, M. 2008: *Identification Guide for Near Eastern Grass Seeds*. London.

Nováki, Gy. – Sárközy, S. – Feld, I. 2007: *Borsod-Abaúj-Zemplén megye várai az őskortól a kuruc korig*. Magyarország várainak topográfiája. Borsod-Abaúj-Zemplén megye régészeti emlékei 5. Budapest, Miskolc.

Popper, V. S. 1988: Selecting Quantitative Measurements in Paleoethnobotany. In: Hastorf, C. A. – Popper, V. S. (eds.): *Current Paleoethnobotany. Analytical Methods and Cultural Interpretations of Archaeological Plant Remains*. Chicago, 53–71.

Schermann, Sz. 1967: *Magismeret I–II*. Budapest.

V. Szabó, G. 2003: A kitágult világ: a bronz mesterei a Kárpát-medencében. In: Visy, Zs. – Nagy, M. (eds): *Magyar régészet az ezredfordulón*. Budapest, 163–167.

V. Szabó, G. 2010: Fémkereső műszeres kutatások kelet-magyarországi késő bronzkori és kora vaskori lelőhelyeken. Beszámoló az ELTE Régészettudományi Intézete által indított bronzkincskutató program 2009. évi eredményeiről (Metal Detection Investigations at Eastern Hungarian Late Bronze Age and Early lron Age Sites Report on the Results of the Bronze Hoard Exploration Project of the Institute of Archaeology of ELTE in 2009). In: Kisfaludy, J. (ed.): *Régészeti kutatások Magyarországon 2009 - Archeological Investigations in Hungary 2009*, 19–38.

V. Szabó, G. 2017: Hoards and Fortifications: New Observations on the Structure and Function of Eastern Hungarian Late Bronze Age and Early Iron Age High-altitude Fortified Settlements. In: Heeb, B. S. – Szentmiklosi, A. – Krause, R. – Wemhoff, M. (eds): *Fortifications: The Rise and Fall of Defended Sites in Late Bronze and Early Iron Age of South-East Europe*. Berlin. 107–134.

V. Szabó, G. 2018: Tállya határa. In: Kisfaludi, J. – Kvassay, J. – Kreiter, A. (eds): *Régészeti kutatások Magyarországon 2011 - Archeological Investigations in Hungary 2011*, 182.

V. Szabó, G. 2019: *Bronzkori kincsek Magyarországon. Földbe rejtett fegyverek, eszközök, ékszerek nyomában*. Hereditas Archaeologica Hungariae 3. Budapest.

Szeverényi, V. – Priskin, A. – Czukor, P. – Torma, A. – Tóth, A. 2015: Élelmiszertermelés, település és társadalom a késő bronzkorban Délkelet-Magyarországon: Esettanulmány Csanádpalota-Földvár erődített település alapján. *A Móra Ferenc Múzeum Évkönyve – Új Folyam* 2, 41–65.

Vende, A. 1905: Zemplén vármegye községei. In: Borovszky, S. (ed.): *Zemplén vármegye és Sátoraljaújhely város*. Magyarország Vármegyéi és Városai. Budapest, 14–141.