

# KAKUCS–BALLA-DOMB A CASE STUDY IN THE ABSOLUTE AND RELATIVE CHRONOLOGY OF THE VATYA CULTURE

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**Abstract:** The present study hopes to contribute to Middle Bronze Age studies in two specific areas: first, by publishing a new series of radiocarbon dates for a period from which there are few absolute dates, and second, by describing a less known area in the Vatia culture distribution based on the investigations at Kakucs.

The Kakucs area was increasingly intensively settled during the course of the Bronze Age. In this context, the area along the left Danube bank down to the Kakucs area, lying in close proximity to the eponymous site at Újhartyán–Vatia, is very instructive. Following a scanty occupation marked by a few smaller sites at the onset of the Early Bronze Age, the number of sites and associated cemeteries grew dynamically from the late Nagyrév/early Vatia period onward. Despite the uncertainties in the relative chronology of the known Middle Bronze Age sites, the increase in the number of sites is in itself a reflection of a population growth and an increasing landscape exploitation. The left bank of the Danube became one of the period's most intensively settled regions during the Middle Bronze Age 1–3.

**Keywords:** Middle Bronze Age, tell settlements, Vatia ceramic style, Kakucs–Balla-domb, <sup>14</sup>C chronology, absolute dating

## INTRODUCTION

The settlements and the cemeteries in the central region of Hungary lying along the north to south Danube section are characterised by pottery made in the Vatia style during the Middle Bronze Age. This period corresponds to the RB A1/A2–RB B in the chronological scheme introduced by Paul Reinecke. In terms of absolute chronology, the Vatia sequence spans some 400 to 500 years between 2000/1900 and 1500/1450 BC.<sup>1</sup> Regarding ceramic styles and typology, this period starts with the Nagyrév/Vatia transition, continues with Vatia I–III and ends with the Koszider period according to the conventional scheme used in Hungarian Bronze Age studies.<sup>2</sup> Many settlements and cemeteries of the Vatia culture dating from these roughly five hundred years are known from the fundamentally differing environments characterising Northeastern and Eastern Transdanubia, the Danube region and the Danube–Tisza interfluvium. Several studies have been devoted to the culture's cemeteries,<sup>3</sup> as well as to the multi-tiered Vatia

<sup>1</sup> RACZKY–HERTELENDI–HORVÁTH 1992; for a recent overview see: P. FISCHL *et al.* in press.

<sup>2</sup> E. g. BÓNA 1975, 31–78; KOVÁCS 1984; BÓNA 1992a, 24–26; BÓNA 1992b; REMÉNYI 2005; VICZE 2011.

<sup>3</sup> E. g. BÁNDI 1966; BÓNA 1975, 31–78; VICZE 1985; VICZE 1986; VICZE 1992a; KALICZ–SCHREIBER 1995a; SZATHMÁRI 1996; for a good summary, see VICZE 2011.

settlement network made up of fortified hillforts, stratified tell settlements (*Fig. 1*) and open settlements.<sup>4</sup> The period's perhaps best-investigated region is the Százhalombatta area<sup>5</sup> and the Benta Valley<sup>6</sup> west of the Danube. The number of known sites has increased manifold as result of continuous field surveys and excavations. The publication of the already investigated sites will no doubt contribute to drawing together the evidence on Vátya settlements and to adding finer details to the broad picture of how Vátya settlements evolved, as well as to the dynamics of their growth and the diachronic changes in settlement patterns.

The present study hopes to contribute to Middle Bronze Age studies in two specific areas: first, by publishing a new series of radiocarbon dates for a period from which there are few absolute dates, and second, by describing a less known area in the Vátya distribution based on the investigations at Kakucs. The environment of the region south of Budapest and east of the Danube was largely determined by the channels of the palaeo-Danube during the successive archaeological and historical periods.<sup>7</sup> The bluffs overlooking the rivers and the larger islets were dotted with Middle Bronze Age settlements and cemeteries, among them the stratified tell settlements of Balla-domb and Szélmalom-domb on the outskirts of Kakucs, which were probably one of the centres in the settlement network of this region during the earlier 2<sup>nd</sup> millennium BC.

#### THE BRONZE AGE LANDSCAPE IN THE KAKUCS AREA

The study area extends to Dömsöd along the Danube section south of Budapest and is bounded by the Soroksár–Gyál–Kakucs line in the east (*Fig. 2*). Administratively, the area is part of the southern district of County Pest and it incorporates sections of various micro-regions, among them the southerly alluvial fan of the Pest Plain, the eastern half of the Csepel Plain and, moving further to the east, the Pilis–Alpár sand dunes and the Kiskunság sand dunes of the Danube–Tisza interfluvium.<sup>8</sup> Towards the east, the Csepel Plain gradually rises from the floodplain of the Danube Valley towards the higher-lying terraces (95–168 m a.s.l.), whose eastern margins are covered with alkaline grassland (Apaj) and wind-blown sand (Sári [Dabas], Kunpeszér). Lying farther to the east is the Pest alluvial fan on the northern fringes of the Danube–Tisza interfluvium. The area is wedged in-between the Gödöllő Hills and the Csepel Plain (98–251 m a.s.l.). The mosaic of the terraces rising toward the east is criss-crossed by the Danube's left bank tributaries. The areas lying to the south and south-west are characterised by lower-lying terraces covered with wind-blown sand (Kiskunság and Pilis–Alpár sand dunes). The area lies at the interface of the continental, the sub-Mediterranean and the Atlantic climate zones. In terms of vegetation, it can be assigned to the Pannonic forested steppe region.<sup>9</sup>

Dissected by the Danube, the palaeohydrography of the alluvial fan of the Pest Plain differed substantially from the modern one. The river's alluvial fan in the Pest area suggests that the Danube's course gradually changed during the Pleistocene and the Early Holocene, and that it attained its current channel with a 90° westward rotation. Concurrently with the gradual shift in the river's course and the accumulation of the river terraces, the area was criss-crossed by countless spill streams and side-branches. Dividing into several branches, the river moulded the environment unhindered until the large-scale regulations. The river frequently shifted its course before the 19<sup>th</sup>–20<sup>th</sup> century regulation: meander loops appeared and disappeared, bars were formed and eroded, and the side-branches too changed their course, with new ones evolving and earlier ones partially infilling. Palaeoenvironmental and ecological studies on the Bronze Age landscape are only partially available.<sup>10</sup>

<sup>4</sup>E.g. NOVÁKI 1952; BÁNDI 1960; KOVÁCS 1963; F. PETRES–BÁNDI 1969; BÓNA 1975; ENDRÓDI–FELD 1980; MIKLÓS 1982; KOVÁCS 1982; BÓNA–NOVÁKI 1982; POROSZLAI 1988; G. SZÉNÁSZKY 1977; POROSZLAI 1991a; POROSZLAI 1992a; POROSZLAI 1992b; POROSZLAI 1992c; VICZE 1992; ENDRÓDI–GYULAI 1999; POROSZLAI 1999–2000; POROSZLAI 2000; MIKLÓS 2007a; VÁCZI–STIBRÁNYI 2008; P. FISCHL–GUBA 2010. For comprehensive summaries, see VICZE 2000; POROSZLAI 2003a; HORVÁTH 2004a; HORVÁTH 2004b; EARLE–KRISTIANSEN 2010; REMÉNYI in press; SZEVEŘÉNYI–KULCSÁR 2012 with further literature.

<sup>5</sup>POROSZLAI–VICZE 2000; POROSZLAI–VICZE 2005; EARLE–KRISTIANSEN 2010.

<sup>6</sup>VICZE–EARLE–ARTURSSON 2005; VICZE–CZAJLIK–TÍMÁR 2005; SÜMEGI–BODOR 2005; EARLE–KOLB 2010; EARLE–KRISTIANSEN 2010; EARLE *et al.* 2011.

<sup>7</sup>PÉCSI 1959, 135–142; CZAGÁNYI 1995, 16–34; CZAGÁNYI 2000, 21–26; KULCSÁR 2011; SZEVEŘÉNYI–KULCSÁR 2012, 316–330.

<sup>8</sup>PÉCSI 1959; SOMOGYI 2007, 32–33, Table 1.

<sup>9</sup>SÜMEGI–BODOR 2000, Figs 3–4.

<sup>10</sup>Cp. KULCSÁR 2011, 179–184, with further references.

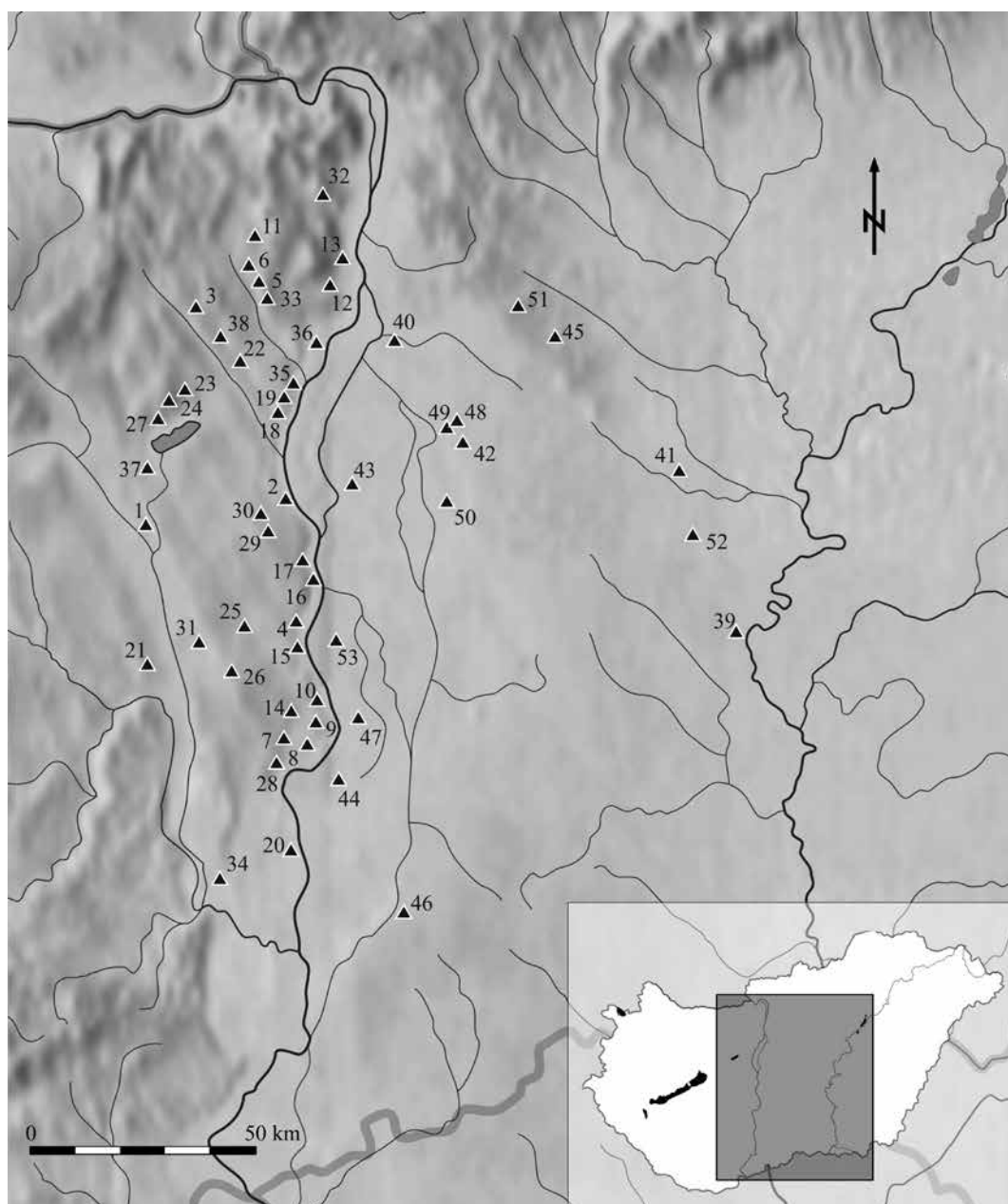


Fig. 1. Middle Bronze Age tells and fortified settlements in Central Hungary (after SZEVEÉNYI-KULCSÁR 2012, Fig. 1)

1: Aba-Belsőbáránd, Bolondvár; 2: Adony-Szentmihály-puszta, Bolondvár; 3: Alcsútdoboz-Göböljárás-Pogányvár; 4: Baracs-Bottyánsánc (today: Dunaföldvár-Macskalyuk); 5: Bátorbágy-Öreg-hegy; 6: Bátorbágy-Pap-réti-dűlő; 7: Bölske-Bolondvár; 8: Bölske-Hadai-hegy 1; 9: Bölske-Hadai-hegy 2; 10: Bölske-Vörösgyőr/Vörösgyűrű; 11: Budajenő-Hegyi szántók; 12: Budaörs-Kamaraerdő; 13: Budapest-Vár-hegy; 14: Dunaföldvár-Gyűrűstábla; 15: Dunaföldvár-Kálvária (or Öreghegy); 16: Dunaújváros-Kozider-padlás and Kozider-asztal; 17: Dunaújváros-Rácdomb; 18: Ercsi-Bolondvár (today: Beloianisz-Bolondvár); 19: Ercsi-Holdhegy; 20: Gerjen-Váradpuszta; 21: Igar-Vámpuszta-Galástya, Bolondvár; 22: Kajászó-Várdomb; 23: Lovasberény-Mihályvár; 24: Lovasberény-Szűzvár Szőszvár; 25: Mezőfalva-Bolondvár; 26: Nagykarcsony-Diófás-dűlő; 27: Pákozd-Pákozdvár; 28: Paks/Dunakömlőd-Bottyánsánc (*Lussonium*); 29: Perkáta-Faluhelyi-dűlő 2; 30: Perkáta-Forrás-dűlő; 31: Sárbogárd-Cifrabolondvár; 32: Solymár-Várhegy (Mátyás-domb); 33: Sós-kút-Kálvária-hegy/Barátház; 34: Szedres-Horgász Tanya; 35: Százhalombatta-Dunafüred; 36: Százhalombatta-Földvár (Téglagyár); 37: Székesfehérvár-Börgöndpuszta-Lászlóhegy; 38: Vál-Pogányvár; 39: (Tisza)Alpár-Várdomb; 40: Budapest, Soroksár-Várhegy; 41: Cegléd-Öregszőlők/Öreghegy; 42: Dabas-Dabasi szőlők; 43: Dömsöd-Leányvár/Tekerős-patak; 44: Dunapataj-Alsószentkirály-Várhegy; 45: Gomba-Várhegy; 46: Hajós-Hildpuszta; 47: Harta-Bojár; 48: Kakucs-Balla-domb and Szélmalom-domb; 49: Kakucs-Turján mögötti dűlő/Dunavölgyi főcsatorna dél; 50: Kunpeszér-Birkajárás 2; 51: Mende-Leányvár; 52: Nagykörös-Földvár (Várhegy); 53: Solt-Tételhegy

The remnants of an ancestral Danube channel between Ócsa and Inárcs to the south of Budapest appears as *Sárvíz* [Sár/Mud waters] or *nagy Sár folyó* [Great Sár/Mud River] in 13<sup>th</sup> century charters.<sup>11</sup> Antal Balla's hydrological map from 1793 shows the river with a wide floodplain coursing through a waterlogged area between Budapest–Soroksár and Kalocsa.<sup>12</sup> The branches of the extensive marshland preserved their freshwater nature for a long time. Fishing and milling places can be identified from the medieval and post-medieval records, and water mills were still active in the region a few generations before the river regulations in the 1920s.<sup>13</sup> The 18<sup>th</sup> century maps depicted a world of lakes and marshes on the western outskirts of Ócsa, Inárcs, Kakucs and Dabas, between Bugyi, Sári, Gyón, Kunszentmiklós and Dömsöd. Various islets rose above the river at Bugyi–Ürbő for example,<sup>14</sup> and one could still travel from Ürbő to Kalocsa by boat in the late 19<sup>th</sup> century.<sup>15</sup> No more than a handful of sand islands were suitable for settlement in a region which could only be approached by boat for the greater part of the year. Medieval documents recount the continuous efforts to create protection against floods and backwater. The problem of drainage was eventually resolved by a network of artificial channels from the 1910s–1920s. The 150 km long Danube Valley Main Channel was also created at this time.

A waterlogged area dotted with bogs extends along the boundary of the Danubian plainland and the sand dunes of the Danube–Tisza interfluvium. The Ócsa peat-bog is the northernmost bog in this bog sequence. The bogs changed dynamically through the ages: at times, they were deep lakes with crystal clear waters, at times they became infilled and their surface was covered with aquatic plants. The palaeoenvironmental investigation of the Ócsa peat bog at *Selyemrét* indicated a gradual decrease in the surrounding woodland between the Late Neolithic and the Early Bronze Age accompanied by soil erosion, as a result of which the inflow of humus into the Ócsa sediment catchment intensified and eventually led to its infilling.<sup>16</sup>

#### THE MIDDLE BRONZE AGE SETTLEMENT NETWORK ON THE LEFT DANUBE BANK: THE KAKUCS AREA

It is clear from the above broad geographic description that there was another channel that gradually succumbed to eutrophication some 50–60 km from the Csepel Island–Ráckeve/Soroksár Danube main channel which undoubtedly determined the area's environmental potentials. Although the area has not been systematically surveyed, the currently available information seems sufficient for a broad reconstruction of the one-time landscape exploitation.

The area was increasingly intensively settled during the course of the Bronze Age.<sup>17</sup> In this context, the area along the left Danube bank down to the Kakucs area, lying in close proximity to the eponymous site at Újhartyán–Vatya, is very instructive. Following a scanty occupation marked by a few smaller sites at the onset of the Early Bronze Age, the number of sites and associated cemeteries grew dynamically from the late Nagyrév/early Vatya period onward.<sup>18</sup> Despite the uncertainties in the relative chronology of the known Middle Bronze Age sites (mostly due to the lack of excavation on these sites), the increase in the number of sites is in itself a reflection of a population growth and increasing landscape exploitation. The left bank of the Danube became one of the period's most intensively settled regions during the Middle Bronze Age 1–3.

For a very long time, mostly cemeteries were known from the geographic centre of the Vatya heartland, i.e. the region extending south of Budapest along the Danube. The culture's eponymous site at Újhartyán–Vatya-puszta<sup>19</sup> lies in this area. There has been a welcome increase in the number of Middle Bronze Age sites because several new settlements and burial grounds were discovered during the past decades.<sup>20</sup> The central hillforts fortified by enclosures, such as the ones at Soroksár–Várhegy<sup>21</sup> and Dömsöd–Leányvár,<sup>22</sup> and the associated open settlements formed the backbone of the Vatya settlement network which, on the testimony of the field survey data, also com-

<sup>11</sup> CZAGÁNYI 1995, 19; CZAGÁNYI 2000.

<sup>12</sup> KELETI–LAKATOS–MAKKAI 1965.

<sup>13</sup> CZAGÁNYI 1995, 16–34; CZAGÁNYI 2000, 21–26.

<sup>14</sup> BÓNA 1957, 155–157.

<sup>15</sup> CZAGÁNYI 2000, 21.

<sup>16</sup> VERES 2007; VERES–SÜMEGI–TÖRŐCSIK 2011.

<sup>17</sup> A similar demographic growth has been posited for the regions west of the Danube, KALICZ–SCHREIBER 1995b.

<sup>18</sup> KULCSÁR 1995b; KULCSÁR 1997; KULCSÁR 2011, 197–202; SZEVEÉNYI–KULCSÁR 2012, 316–330.

<sup>19</sup> KADA 1909; BÓNA 1975, 28, 30, 32.

<sup>20</sup> For a more detailed overview, see KULCSÁR 1995a; KULCSÁR 1995b; KULCSÁR 1997; SZEVEÉNYI–KULCSÁR 2012, 316–330.

<sup>21</sup> ENDRÓDI–GYULAI 1999.

<sup>22</sup> MIKLÓS 2007b, 138, Fig. 4.

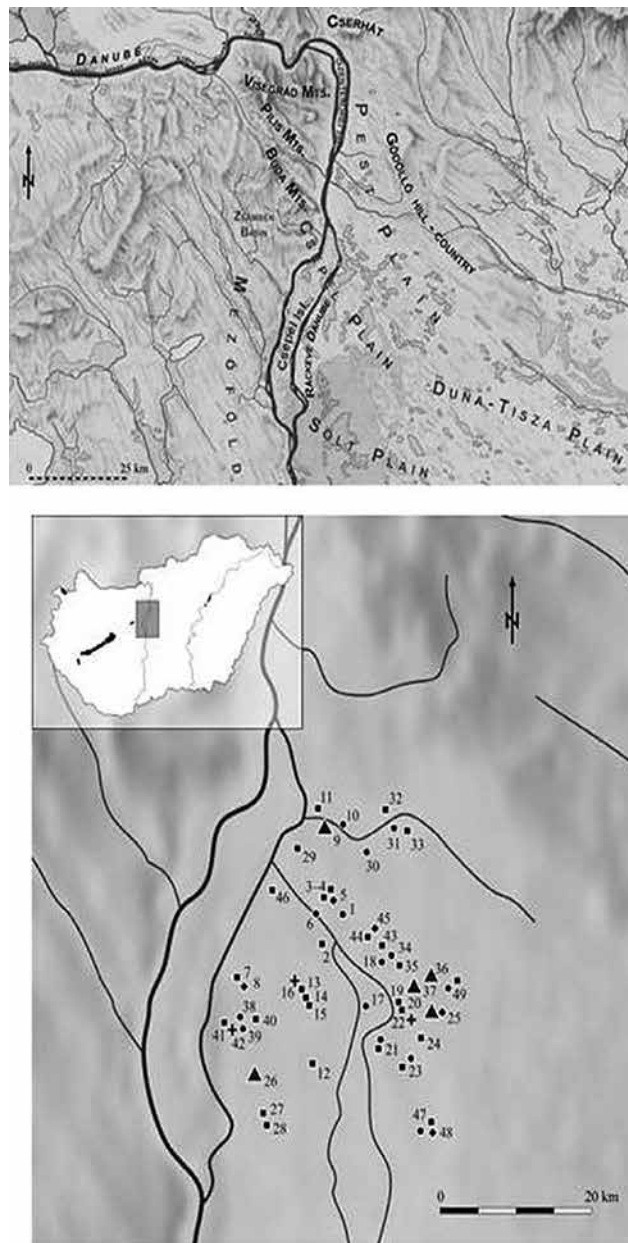


Fig. 2. Geographical map of the Budapest area and the Middle Bronze Age sites in the Kakucs microregion. Triangles: tells and fortified settlements; circles: open settlements; squares: graves and cemeteries; crosses: stray finds of uncertain character; rhombi: bronze hoards (after SZEVEŘENYI–KULCSÁR 2012, Fig. 27)

- 1: Alsónémedi–Kóhalom-Templomhegy; 2: Alsónémedi/Bugyi–Pusztatemplom-dűlő; 3: Alsónémedi, “500–700 m from the new village”; 4: Alsónémedi; 5: Alsónémedi; 6: Alsónémedi–Duna–Tisza Canal, 12360–80 m; 7: Áporka; 8: Áporka–Pusztaszentkirály; 9: Budapest, Soroksár–Várhegy; 10: Budapest, Soroksár–Nagy-rét, Site 1; 11: Budapest–Soroksári út; 12: Bugyi–Ürbőpuszta; 13: Bugyi–Malomkert; 14: Bugyi, formerly Vargha Emil’s estate; 15: Bugyi, east of the village; 16: Bugyi; 17: Dabas–Sári–Fehérhádi földek; 18: Dabas–Sári/Ócsa–Nádi-dűlő, Földvár-sziget; 19: Dabas–Sári; 20: between Dabas–Sári and Bugyi; 21: Dabas, Site 83, Belsőmánteleg (Kis-földek); 22: Dabas (former Alsóda-bas); 23: Dabas–Gyón–Nagypaphegy; 24: Dabas–Gyón; 25: Dabas–Dabasi szőlők; 26: Dömsöd–Leányvár/Tekerős patak; 27: Dömsöd, east of the village; 28: Dömsöd–Fazekas I.’s estate; 29: Dunaharaszti–Bajcsy–Zsilinszky u. 104./Mező Imre utca/Deák F. u.; 30: Gyál, Site 5; 31: Gyál, Site 7; 32: Gyál–Majakovszkij (Puskás) utca 37, Bitó-hegy; 33: Gyál–Löbpuszta; 34: Inárcs–Cibak–Kaszás-tanya; 35: Inárcs–Csetemetekert; 36: Kakucs–Balla-domb and Szélmalom-domb; 37: Kakucs–Turján mögötti dűlő/Dunavölgyi főcsatorna dél; 38: Kiskunlacháza–Kavicsbánya; 39: Kiskunlacháza; 40: Kiskunlacháza–Bankházapuszta, between Pereg and Bugyi; 41: Kiskunlacháza–Pereg–Virágos; 42: Kiskunlacháza; 43: Ócsa–Öregszőlők/Öreghegyi-dűlő (former Üveghegyi-dűlő); 44: Ócsa–Bajcsy–Zsilinszky u. 49; 45: Ócsa–Klapka u. 6; 46: Taksony–Dunakisvarsány; 47: Tatárszentgyörgy–Sarlósárpuszta; 48: Tatárszentgyörgy; 49: Újhartyán (today Újlengyel)–Vatya-puszta

prised smaller villages and farmsteads such as the one recorded at Gyál<sup>23</sup> (*Fig. 2*). In addition to the settlements, a series of larger and smaller cemeteries are also known.<sup>24</sup>

The Kakucs area is one of the more intensely investigated micro-regions. Although the area has not been systematically surveyed, Bronze Age finds have been continuously found and reported from this area since the 1900s. The currently known two largest, most extensive sites in the area are Kakucs–Balla domb and Kakucs–Szélmalom domb. Several smaller settlements, such as the one at Újhartyán–Földek, have been identified along the one-time river channel within a 0.1–1 km radius of the central settlement extending over two (or perhaps even three) elevations. Larger settlements, similarly protected by enclosures, are known within a 10 km radius of the Kakucs–Balla domb site: the settlement at Kakucs–Turján mögötti-dűlő/Dunavölgyi főcsatorna dél lies some 3 km to the west,<sup>25</sup> Dabas–Dabasi Szőlők 6 km to the south,<sup>26</sup> and the cemetery and settlement of the eponymous site at Újhartyán–Vatya-puszta can be found to the east.<sup>27</sup> A chain of settlements and burial grounds can be found towards the north-east, marked by the sites at Inárcs, Ócsa, Dabas–Belső Mántelek, Dabas–Sári, Bugyi and Alsónémedi (*Fig. 2*).<sup>28</sup>

#### KAKUCS–BALLA-DOMB: THE BRONZE AGE SETTLEMENT

The remains of an extensive settlement extend across two large hills rising above the former Tó-környék marshland on the south-western outskirts of Kakucs. The two hills are located on the left side of the Danube Valley Main Channel draining the area. The smaller hill is known as Balla-domb, the larger one to its south-west is called Szélmalom-domb (*Fig. 3*). The Szélmalom-domb is marked on the maps of the First and the Second Ordnance Survey conducted in 1780–1784 and 1829–1867, respectively (*Fig. 3.1*).

We collected various finds indicating occupation during the Bronze Age on the Szélmalom-domb, currently under cultivation, during the field survey conducted in 1991. The same year, we were informed by L. Czágányi that various prehistoric artefacts had regularly come to light during construction and gardening work on the steep hillside between Fő út and Malomkert út.<sup>29</sup> In 1992–93, we therefore conducted a rescue excavation in an area known as the Balla plot that would soon be built up, but was still undisturbed at the time. The site was named Balla-domb after Ferenc Balla (†), the former director of the elementary school, who owned the plot on the hilltop. Rising some 5–6 m above the surrounding area, the built-in, roughly oval hill has a diameter of *ca.* 125 m. Adjoining it from the south-west is the Szélmalom-domb, a larger hill measuring 250 m by 250 m that gradually spreads out towards the south-west and grades into the lower-lying plain once covered with water. The two hills were probably once part of the same settlement. Judging from the surface finds, a third hill, the so-called Liebner-domb on the other side of Fő út, was probably also part of the same settlement centre. Traces of other settlements were identified on the opposite side of the Danube Valley Main Channel, on the outskirts of Újhartyán in an area known as Külső földek during the field survey conducted in 2010.<sup>30</sup>

All traces of an earthen rampart and ditch around and between the Szélmalom-domb and the Balla-domb have disappeared. However, it must be noted that two modern streets (Fő út and Malomkert út) run in a depression between and around the two hills. These may have been natural depressions, but they may equally indicate the location of the one-time enclosures protecting the settlement.

#### *The settlement features and their chronology*

In 1992–93, we opened two trenches in the relatively undisturbed and unbuilt areas: one in the hill's central, highest area (Trench A, 10 m by 10 m) and another one on the north-eastern slope (Trench B, 4 m by 5 m) (*Fig.*

<sup>23</sup> SZEVEŘÉNYI in press.

<sup>24</sup> E. g. BÓNA 1975, 31–78; SZATHMÁRI 1996.

<sup>25</sup> CZAJLIK *et al.* 2008, 121, *Fig. 1*; MIKLÓS 2008, 147, *Fig. 3*.

<sup>26</sup> CZAJLIK–BÖDŐCS–RUPNIK 2010, 86, *Fig. 4. 2*; MIKLÓS 2010, 115, *Fig. 6*.

<sup>27</sup> KADA 1909.

<sup>28</sup> With further references see SZEVEŘÉNYI–KULCSÁR 2012,

Tab. 3.

<sup>29</sup> For a summary of previous research at the site see KULCSÁR 1995a; KULCSÁR 1995b; KULCSÁR 1997; KULCSÁR 2008.

<sup>30</sup> Field survey conducted with Vajk Szeveřényi in 2010.

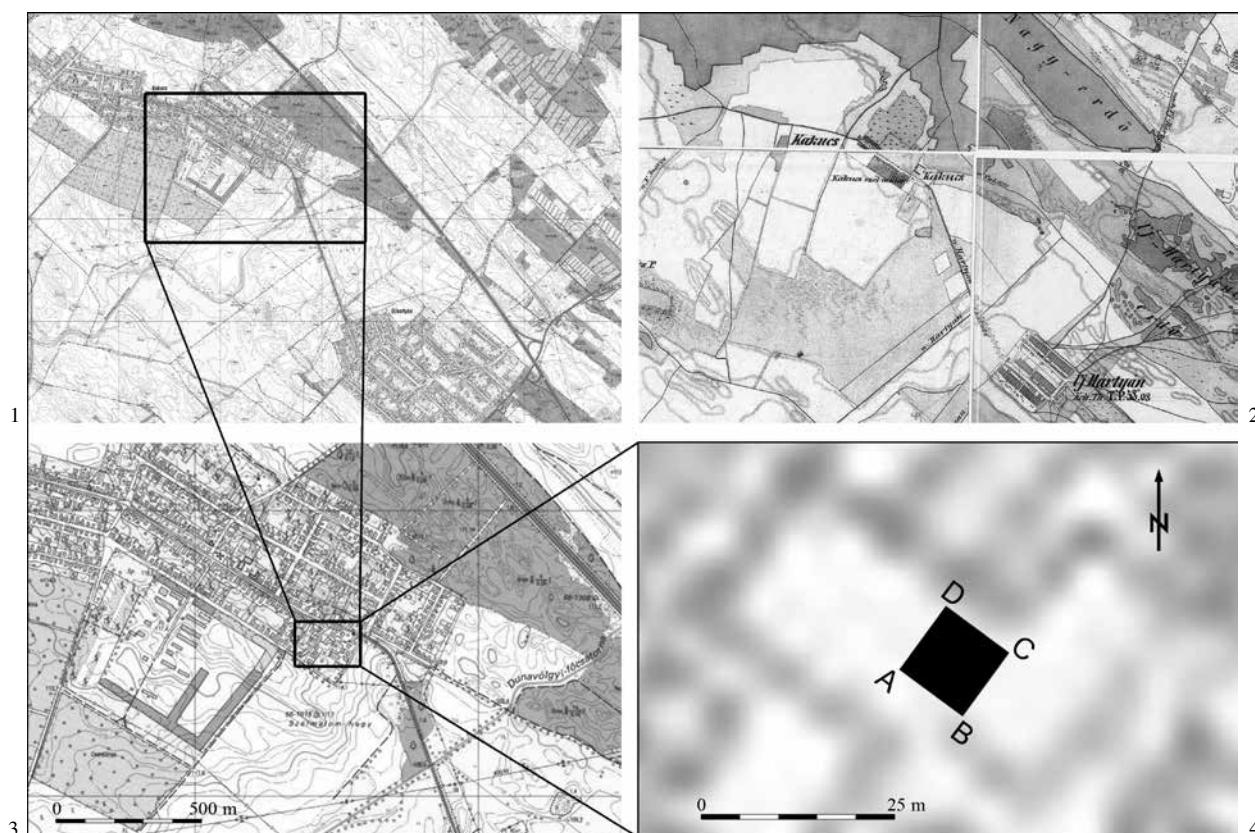


Fig. 3. 1: Kakucs on the maps of the First and the Second Ordnance Survey conducted in 1780–1784 and 1829–1867; 2: location of the sites at Kakucs–Balla-domb and Szélmalom-domb; 3: Kakucs–Balla-domb; 4: Kakucs–Balla-domb, Trench A

3.3–4).<sup>31</sup> In 2010, we had the opportunity to submit ten samples for radiocarbon measurements (*Table 1*).<sup>32</sup> We selected animal and human bone samples recovered from Trench A and thus the dates obtained from the measurements will be included in the description of the excavated settlement section. We strove to select samples from well-definable features, such as burials, animal bones embedded in wall remains and securely identifiable pits. Even so, knowing the nature of stratified tell settlements, there was a fair risk of mixing between the finds, as will be shown below.

We distinguished four occupation levels characterised by house plans with a plastered floor in the 1.5 m thick layer sequence between the earliest pits dug into the prehistoric humus level and the sub-humus/uppermost mixed deposit overlying the settlement (*Fig. 4*). The settlement was occupied from the late Nagyrév/early Vatyá to the Vatyá III/Vatyá–Koszider period. Most Vatyá settlements are characterised by an abundance of pits, perhaps indicating the shift of various activity areas within the settlement.<sup>33</sup> The presence of so many pits usually makes the exact separation of occupation levels somewhat difficult, and the Kakucs site was no exception. We divided Trench A into 2 m by 2 m squares and then proceeded to excavate and record the various features according to the one-time occupation levels.

The 40–50 cm thick strongly disturbed topsoil mixed with modern debris was removed mechanically. The loose earth of the underlying 30–35 cm thick sub-humus layer was mixed with the debris of the uppermost deposit of the Bronze Age settlement, and contained a rich assortment of Bronze Age, medieval and modern artefacts. This was

<sup>31</sup> The preliminary assessment of the finds was part of an MA thesis, KULCSÁR 1995b.

<sup>32</sup> Samples for radiocarbon measurements were collected as part of M. Jaeger's PhD thesis. The samples were submitted to the Radiocarbon Laboratory in Poznań, through a grant from Poland.

<sup>33</sup> Cp. Százhalombatta–Földvár: POROSZLAI 2000; POROSZLAI 2003a; VICZE 2004; VICZE 2013.

Table 1. Radiocarbon dates from Kakucs–Balla-domb. The dates were calibrated using the OxCal v4.1.7 programme and the IntCal09 calibration curve (<https://c14.arch.ox.ac.uk/oxcal/OxCal.html>)

Lab. No.	Date BP	Cal BC		Sample material	Level	Provenance	Relative chronology
Poz-36175	3230±35	1526–1449 (68.2%) 1608–1430 (95.4%)	4.1‰N 7.9‰C	Human bone	Top	A/Feature 3 (Grave)	Vatya–Koszider or Tumulus Grave
Poz-36177	3315±30	1627–1532 (68.2%) 1681–1521 (95.4%)	3.8‰N 9.7‰C	Animal bone	1	A/3/2	Vatya III– Vatya-Koszider
Poz-36176	3510±35	1889–1772 (68.2%) 1928–1744 (95.4%)	3.2‰N 8.4‰C	Animal bone	1	A/Wall 1, Wall 2	Vatya III– Vatya-Koszider
Poz-36178	3550±35	1947–1782 (68.2%) 2012–1771 (95.4%)	1.5‰N 4.2‰C	Animal bone	2	A/5/3–4	Vatya II–III
Poz-36202	3590±35	2010–1896 (68.2%) 2036–1783 (95.4%)	3.2‰N 7.7‰C	Animal bone	2	A/3–5/1–3	Vatya II–III
Poz-36203	3605±35	2022–1919 (68.2%) 2120–1882 (95.4%)	3.1‰N 7.6‰C	Animal bone	3	A/3–5/1–3	Vatya II–III
Poz-36207	3530±30	1918–1777 (68.2%) 1943–1757 (95.4%)	4.2‰N 9.2‰C	Animal bone	2	A/Feature 4–5	Vatya II–III
Poz-36204	3605±35	2022–1919 (68.2%) 2120–1882 (95.4%)	3.0‰N 7.6‰C	Animal bone	3	A/Pit 9	Vatya I–II
Poz-36206	3470±30	1877–1744 (68.2%) 1884–1694 (95.4%)	4.4‰N 10.5‰C	Animal bone	4/3	A/Pit 15	Vatya I–II
Poz-36205	3565±30	1956–1881 (68.2%) 2021–1777 (95.4%)	4.1‰N 10.2‰C	Animal bone	Prehistoric humus	A/Pit 14	Vatya I

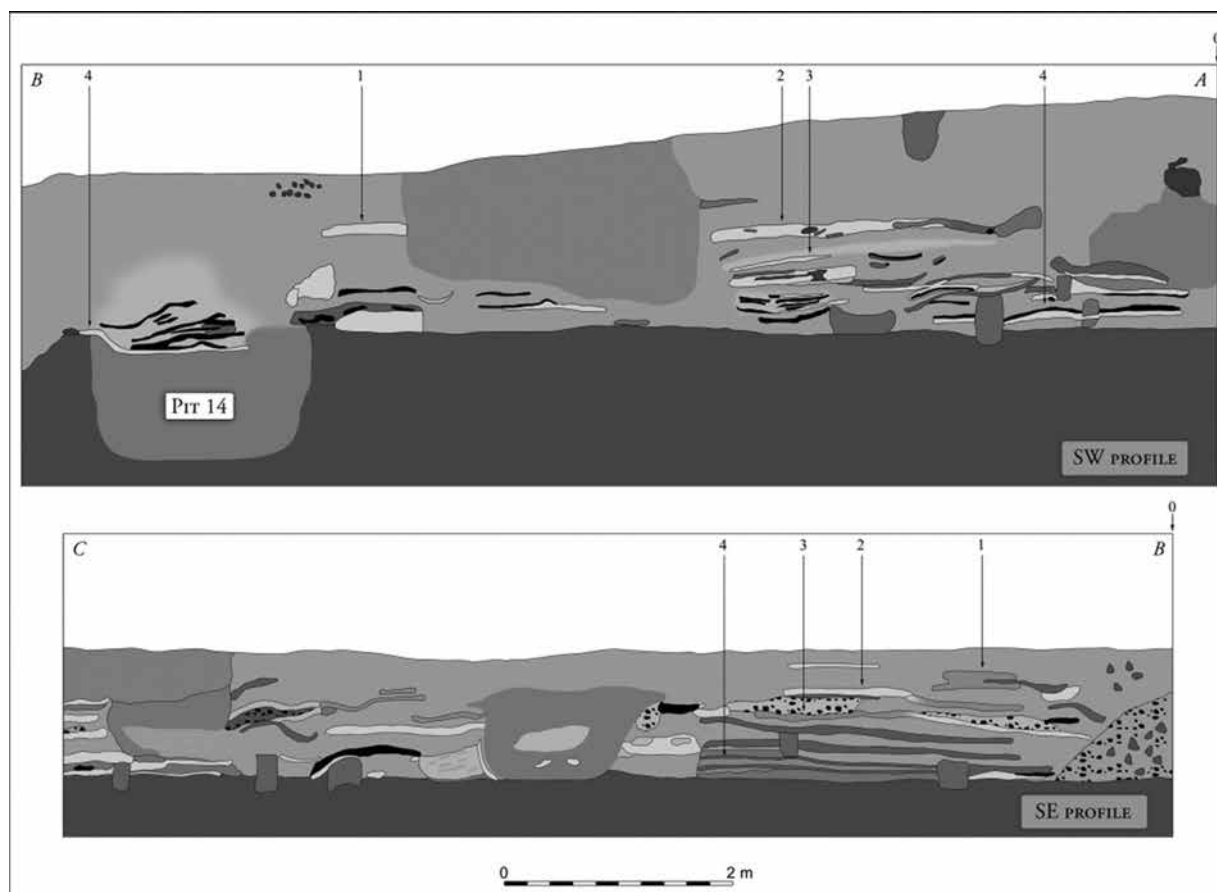


Fig. 4. Kakucs–Balla-domb. The SW and SE profiles of Trench A with four levels



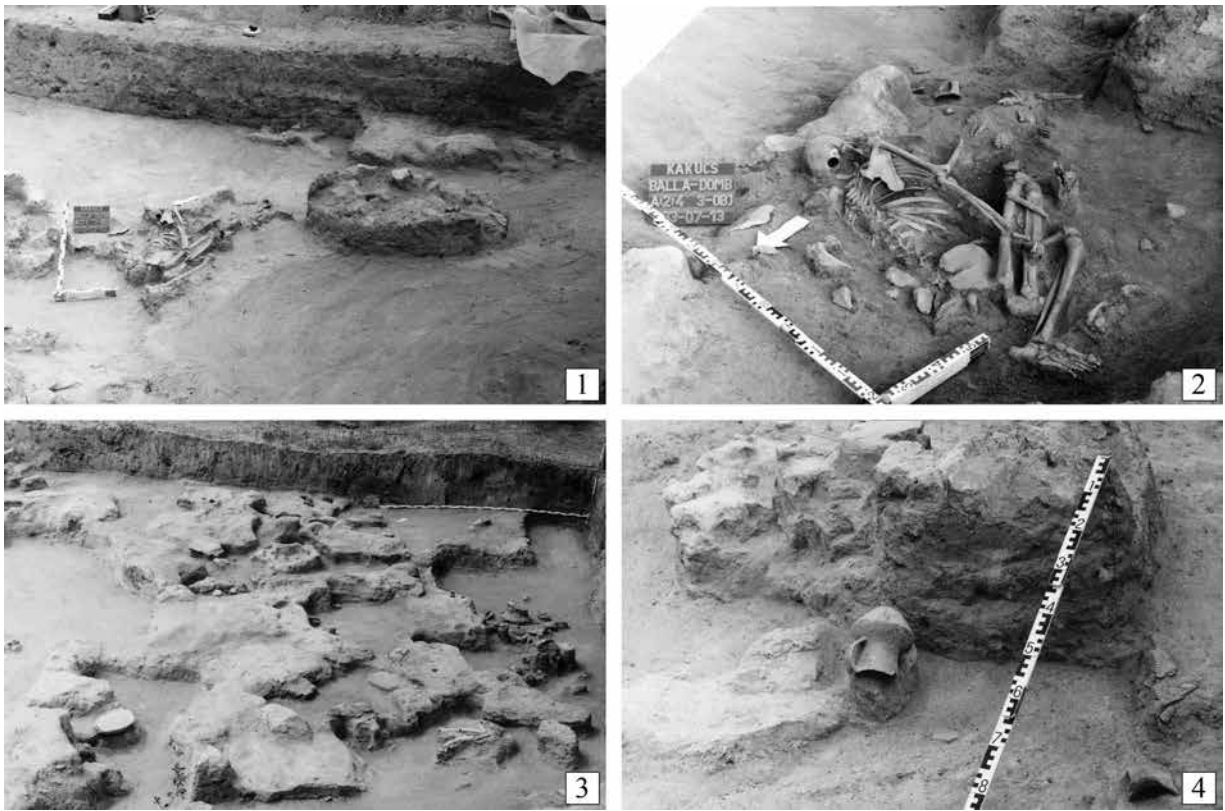


Fig. 5. Kakucs-Balla-domb. 1–2: Feature A/3, Grave; 3–4: Level 1

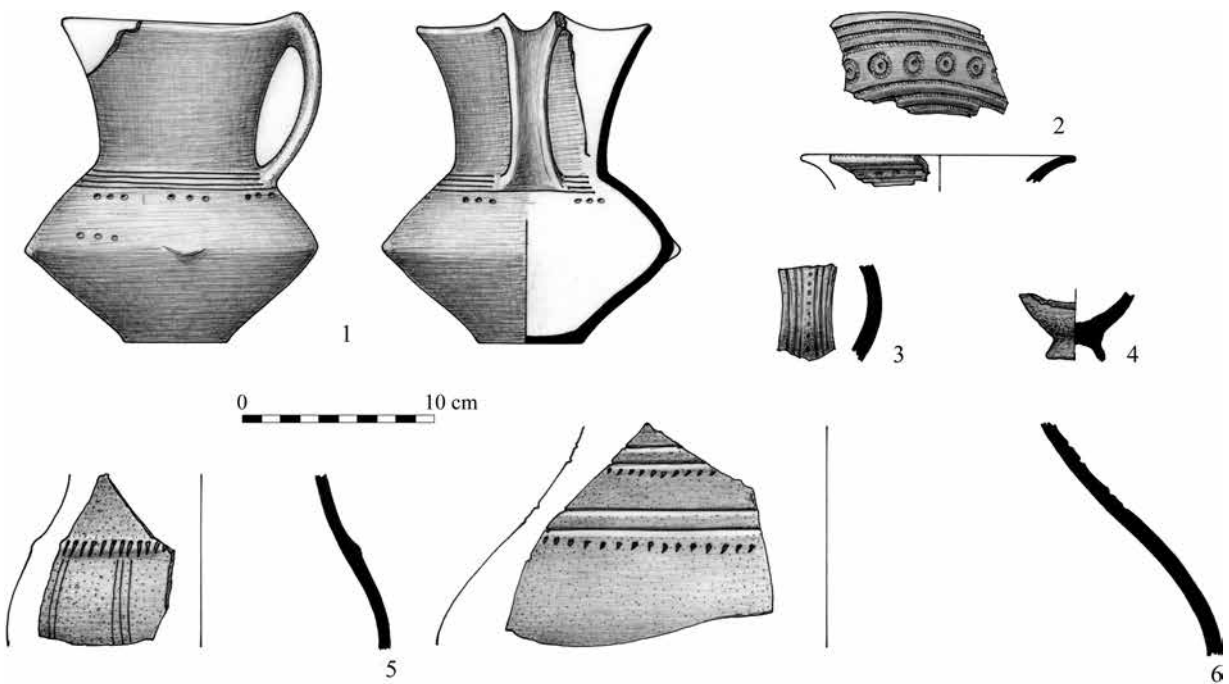


Fig. 6. Kakucs-Balla-domb. 1–6: Selection of finds from the area of Feature A/3

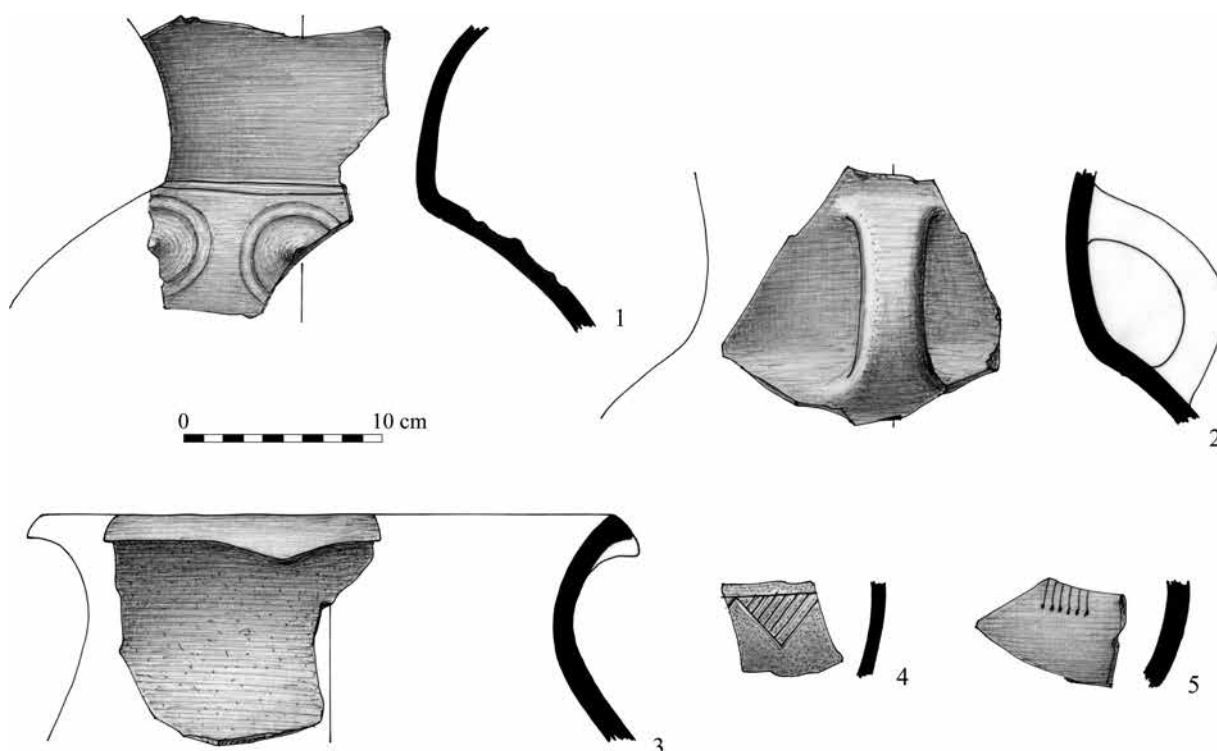


Fig. 7. Kakucs-Balla-domb. 1–5: Selection of finds from Unit A/3/2 of Level 1

followed by the settlement's uppermost deposit, which covered Level 1 of the settlement. The soil marks of several pits indicating the end of the Bronze Age occupation could be noted in this deposit. It was often difficult to precisely observe the outlines of these pits in the greyish, mixed surface of the uppermost deposit. We attempted to distinguish individual pits by carefully proceeding downward. The exact outline of the pits could be recorded in Level 1, where the pits intruded into the plastered floor of the one-time buildings. However, owing to the pits, we were unable to distinguish individual house plans and could only document the fragments of the plastered floors and a few surviving *terre pisé* walls (Fig. 5). On the testimony of the finds, the uppermost deposit and Level 1 could be assigned to the Vátya III and the Vátya III–Koszider period (Figs 6–8). Samples for radiocarbon dating were submitted from a crouched inhumation burial found in Pit “a”, one of the largest pits uncovered in the trench (Feature A/3; Poz-36175; Fig. 5.1–2; Fig. 6, Table 1).<sup>34</sup> The left-side crouched burial of an 18–20 years old juvenile male was SE–NW oriented and lacked grave goods.<sup>35</sup> The grave pit was clearly dug into the occupation level and was backfilled with earth mixed with settlement debris. The sample gave a date of 1526–1449 (68.2%) cal BC (Table 1). Level 1 can be dated to 1627–1532 (68.2%) cal BC on the testimony of a sample taken from one of the floors (Level 1, Section A/3/2; Poz-36177; Table 1, Fig. 7). Another sample from the same level gave a much earlier date: the sample from the 1–1.5 m long surviving section of a red burnt wall remain yielded a date of 1889–1772 (68.2%) cal BC (Level 1, Section A/Wall 1–2; Poz-36176; Table 1, Fig. 8).

Moving downward the traces of pits intruding from the overlying level could still be observed in Level 2. Level 2 was closely associated with Level 3 (Fig. 4; Fig. 9). The two buildings with a plastered clay floor uncovered in the two levels were erected in the same spot in both levels, the floor of the buildings was renewed in the same area and the refuse pits too lay in roughly the same area. The ceramic wares from Levels 2–3 can be predominantly assigned to the Vátya II (–III) period (Figs 11–12). The close association of the two levels is confirmed by the samples from the area of the successively rebuilt houses, which gave dates of 2010–1896 (68.2%) cal BC (Level 2,

<sup>34</sup> Pit “a” extended down to the lowermost level and cut into the prehistoric humus. We are able to distinguish different phases in its fill.

<sup>35</sup> We wish to thank Éva Susa for the anthropological evaluation.

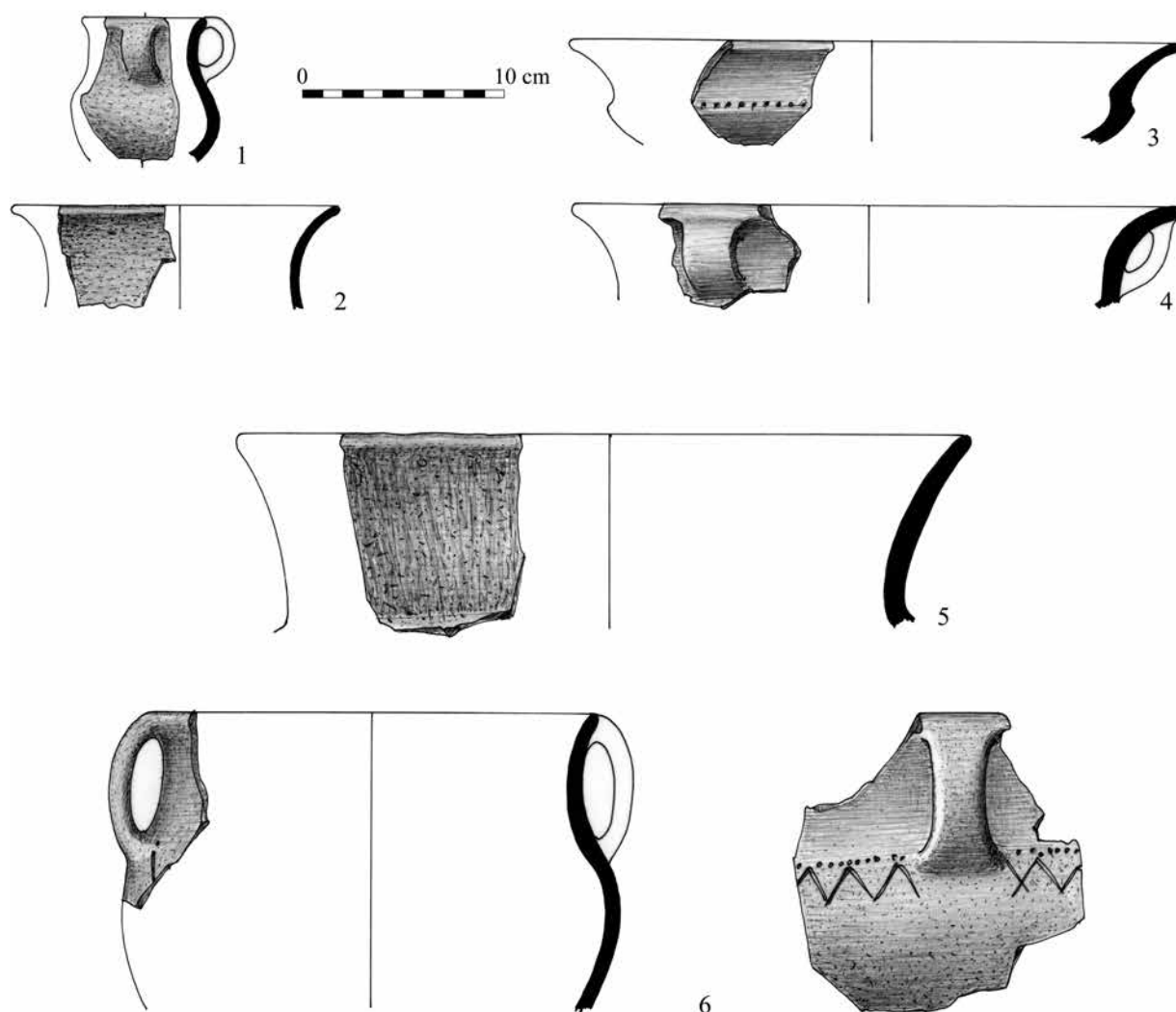


Fig. 8. Kakucs-Balla-domb. 1–6: Selection of finds from Unit A/3–5/1 of Level 1

Section A/3–5/1–3; Poz-36202; *Fig. 10*) and 2022–1919 (68.2%) cal BC (Level 3, Section A/3–5/1–3; Poz-36203; *Fig. 11*) (*Table 1*). The date of 1947–1782 (68.2%) cal BC (Level 2, Section A/5/3–4; Poz-36178; *Fig. 12*) for another contemporaneous house area in Level 2 fits into this sequence (*Table 1*). Feature 4–5, a pit, could be associated with this level (*Fig. 9.3–4*). The pit contained a halved, headless cattle body with the limbs placed on top of each other, as well as typical Vatyá cups and other pottery sherds (*Fig. 13*). Samples from the cattle bones yielded a date of 1918–1777 (68.2%) cal BC (Feature A/4–5; Poz-36207) (*Table 1*). Pit 9, a beehive shaped pit which reached to the prehistoric humus level (*Fig. 16.1*), can be linked to the early phase of Level 3, as shown by the presence of both early Vatyá and Vatyá II/III pottery among its finds (*Figs 14–15*). The date for this pit, 2022–1919 (68.2%) cal BC (Pit A/9; Poz-36204), represents an earlier occupation phase (*Table 1*).

Level 4 was characterised by houses with a plastered clay floor erected directly on the prehistoric humus level (*Fig. 4*; *Fig. 16.2*). We found the remnants of clay floors separated by gaps which, however, were not pits, but a “street” littered with debris and refuse. The floors were renewed once or twice with fresh plastering. It is difficult to reconstruct the rhythm of the rebuilding activity after the occupation phase represented by Level 4 because in some areas, the surface was levelled and covered with a 25–30 or even 40 cm thick mixed, brownish-grey layer, while in others, the use of earlier buildings continued. The dynamic shift in activity areas could be noted in all phases of the settlement’s occupation. Pit 15 can be associated with the late phase of Level 4. The rather late date

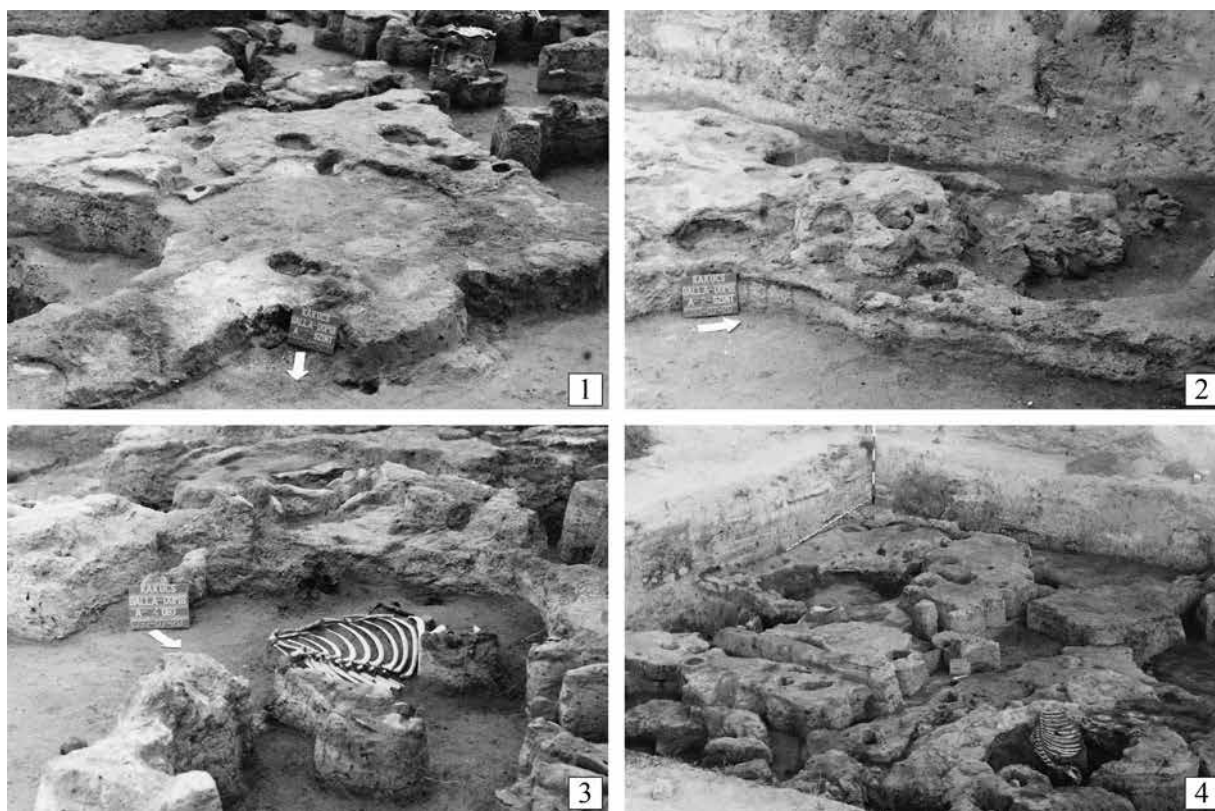


Fig. 9. Kakucs–Balla-domb. 1–2: Level 2; 3: Feature A/4–5; 4: Level 3 with Features A/4–5

obtained for this feature, 1877–1744 (68.2%) cal BC (Pit A/15; Poz-36206; *Table 1*, *Fig. 17*) perhaps indicates that finds from a later period had intruded into Pit 15 from later pits (see Feature A/4–5) either during the excavation or during the settlement's occupation.

The earliest phase of the Kakucs–Balla-domb settlement is indicated by the pits dug into the dark brown prehistoric humus level, which was reached at a depth of 230–240 cm from the 0 point (*Fig. 4*; *Fig. 16.3*). This 70–100 cm thick prehistoric humus level overlies the hill's geological bedrock. Seventeen pits and several post-holes could be identified in the prehistoric humus level. Seven pits represented the settlement's earliest occupation, while the other pits were dug into the humus from a later, higher-lying level. The finds indicate that the artefactual material from the earliest pits and from Level 4 cannot be sharply distinguished because both contain late Nagyrév/early Vatya and Vatya I ceramics. We decided to date a sample from Pit 14 because it contained very typical early Vatya material (*Fig. 4*; *Fig. 18*). Surprisingly enough, the date of 1956–1881 (68.2%) cal BC (Pit A/14; Poz-36205) was closer to the dates from Levels 2–3 (*Table 1*).

In sum, the typochronological and stratigraphic evidence shows that the settlement was occupied continuously from the late Nagyrév/early Vatya transition to the Vatya III and Vatya–Koszider period, spanning the period between the turn of the Hungarian Early Bronze Age 3/Middle Bronze Age 1 and the close of the Middle Bronze Age 3 in the relative chronological framework. This corresponds to the RB A1/A2–RB B period. The currently available absolute dates for the Kakucs settlement indicate that the site was occupied between 2022–1919 and 1627–1532 (68.2%) cal BC, although the date of the burial, 1526–1449 (68.2%) cal BC, must also be considered (*Table 1*, *Fig. 19*). The detailed assessment of the finds and of the settlement layout will no doubt contribute to a finer periodization of the Vatya ceramic style. One point that emerges clearly is that problems caused by the mixing of the finds on a tell settlement can only be prevented by very precise sampling. An explicit correlation between ceramic styles and absolute chronological dates is not possible, in part owing to the continuous changes in the settlement's layout and the lack of burnt destruction levels, and in part to the margin of error of the radiocarbon dates.

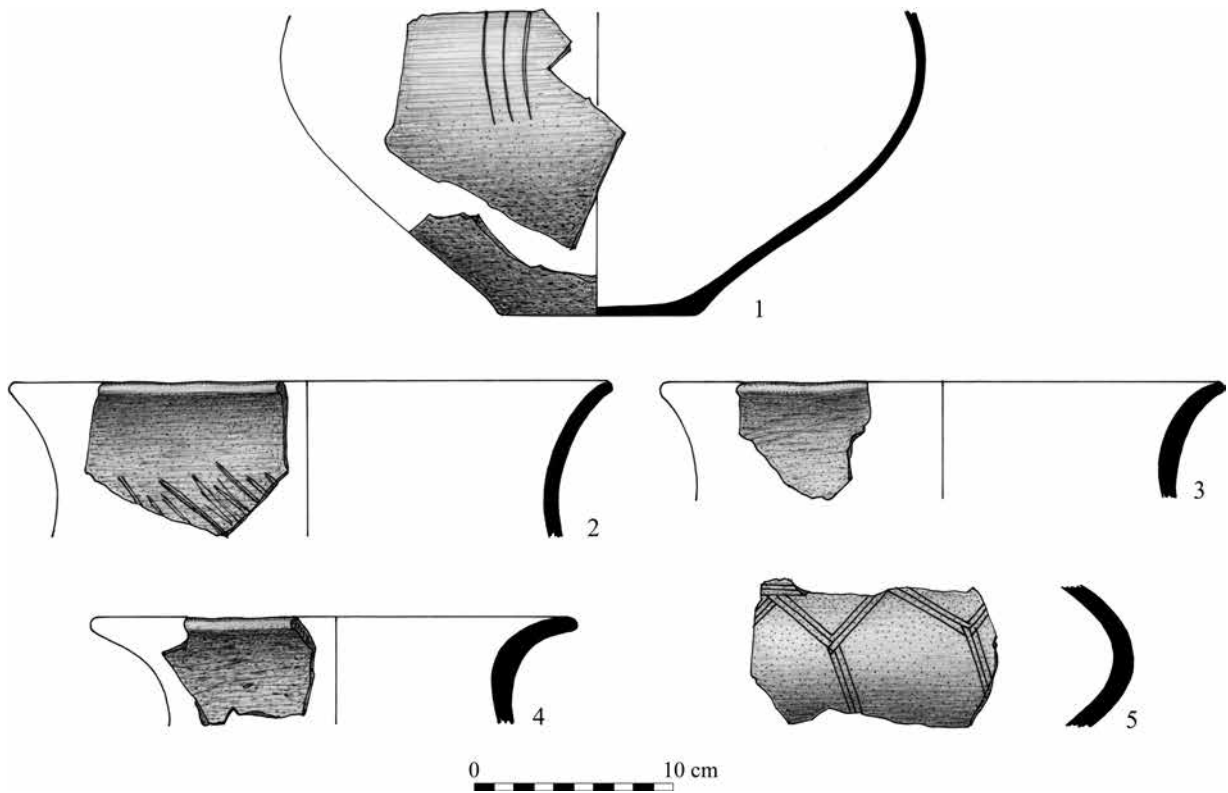


Fig. 10. Kakucs-Balla-domb. 1: Selection of finds from Unit A/3-5/2-3 of Level 2; 2-5: selection of finds from Unit A/3-5/1-3 of Level 2

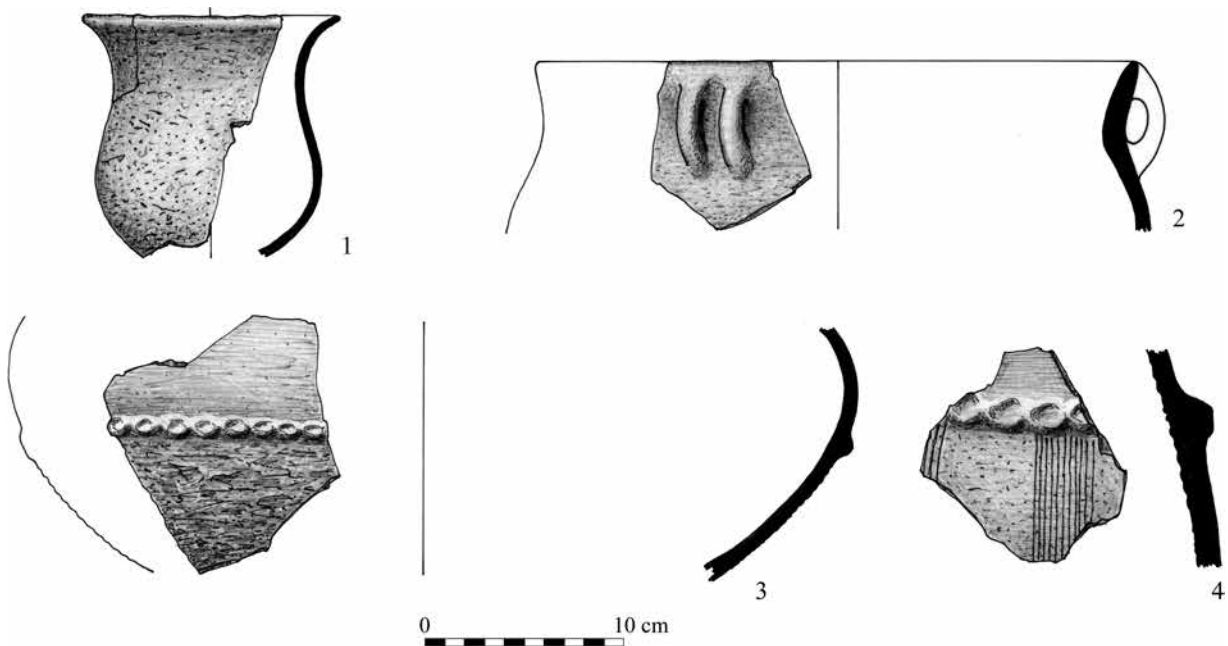


Fig. 11. Kakucs-Balla-domb. 1-4: Selection of finds from Unit A/3-5/1-3 of Level 3

## NOTES ON THE ABSOLUTE CHRONOLOGY OF THE FORTIFIED SETTLEMENTS OF THE VATYA CULTURE

The wide-ranging issue of the Bronze Age chronology of the Carpathian Basin is a problem that would deserve a separate study. The most important studies seeking to reconcile the chronological schemes constructed before World War 2 and during the later 20<sup>th</sup> century have been described in detail by W. David.<sup>36</sup> These schemes were based solely on stratigraphic observations made on settlement and cemetery sites, and on the typology of pottery and metal artefacts, the latter including hoards.<sup>37</sup> The main reason for this situation is the low number of radio-carbon dates.<sup>38</sup>

Our main concern here is the chronology of the fortified settlements of the Vanya culture and of the Koszider horizon, traditionally regarded as marking the end of the so-called tell cultures (amongst them, the Vanya culture). In the conventional Hungarian chronological framework, the so-called Koszider period (RB B, *ca.* 1600–1500/1450 BC) corresponds to the last phase of the Middle Bronze Age and, at the same time, it also represents the transition to the Late Bronze Age. The interpretation of this period is hotly debated among archaeologists working in Hungary and in the westerly regions of Central Europe. The deposition of the so-called Koszider hoards was traditionally linked to the attacks of the mobile pastoralist warriors of the “Tumulus culture” arriving from Southern Germany, whose arrival brought an end to the flourishing “tell cultures” along the Danube and the Tisza.<sup>39</sup> In this interpretation, the Koszider period was regarded as brief interlude of turbulence and war, which was followed by the classical Tumulus period (RB C, *ca.* 1500/1450–1300 BC). More recently, however, the period is not seen as a

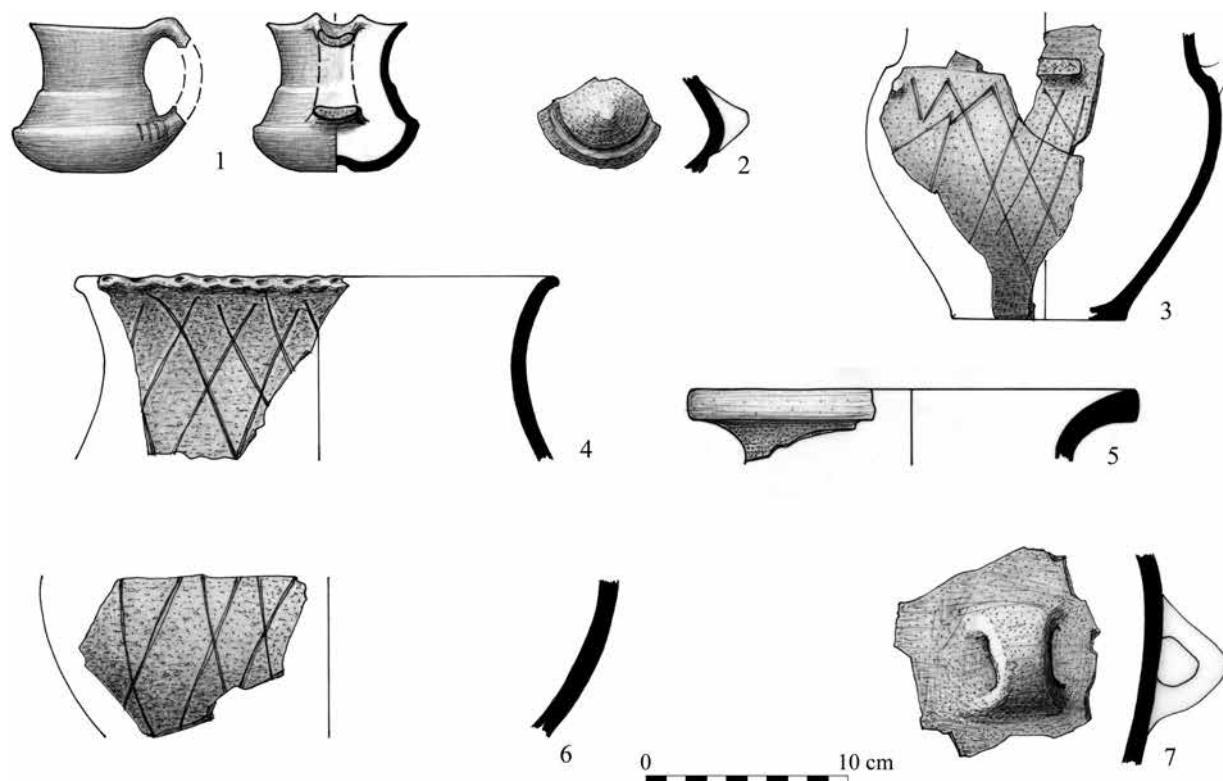


Fig. 12. Kakucs–Balla-domb. 1–7: Selection of finds from Unit A/5/5 while clearing Level 2

<sup>36</sup> DAVID 2002, 3–46. It is symptomatic that the author did not use any of the chronological systems he referred to, and instead employed the classical terminology of the scheme proposed by P. Reinecke.

<sup>37</sup> GOGÁLTAN 1998, 191; GOGÁLTAN 1999; DAVID 2002, 3.

<sup>38</sup> GÖRSDORF 2002; RACZKY–HERTELENDI–HORVÁTH 1992; ROEDER 1992; FORENBAHER 1993; ILON 1999; KOÓS 2002; GÖRSDORF–MARKOVÁ–FURMÁNEK 2004, 79–80, Fig. 1; ILON 2007; KOÓS 2009; KOÓS 2010; UHNÉR 2010.

<sup>39</sup> MOZSOLICS 1957; BÓNA 1958; MOZSOLICS 1967.

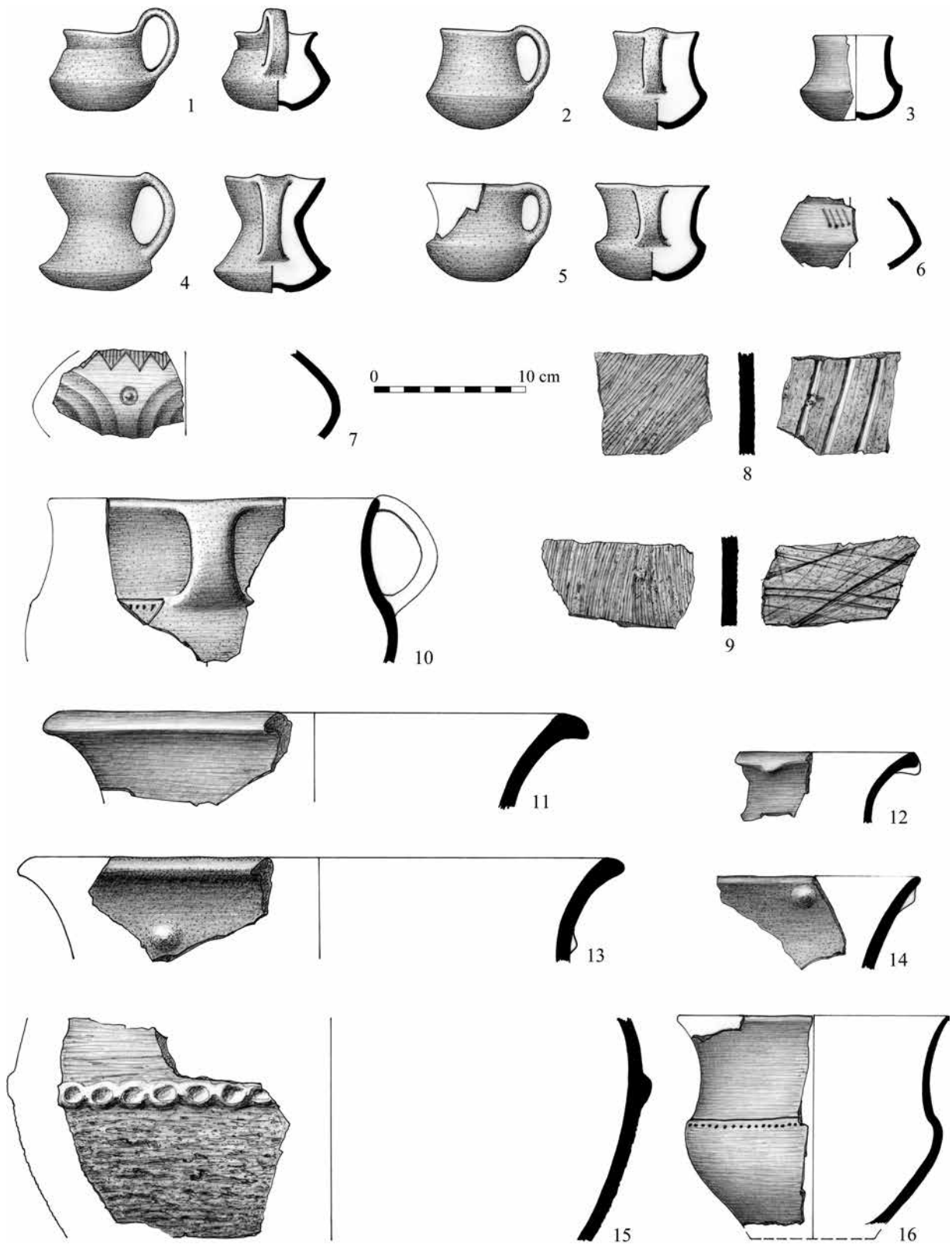


Fig. 13. Kakucs-Balla-domb. 1-16: Selection of finds from Features A/4-5

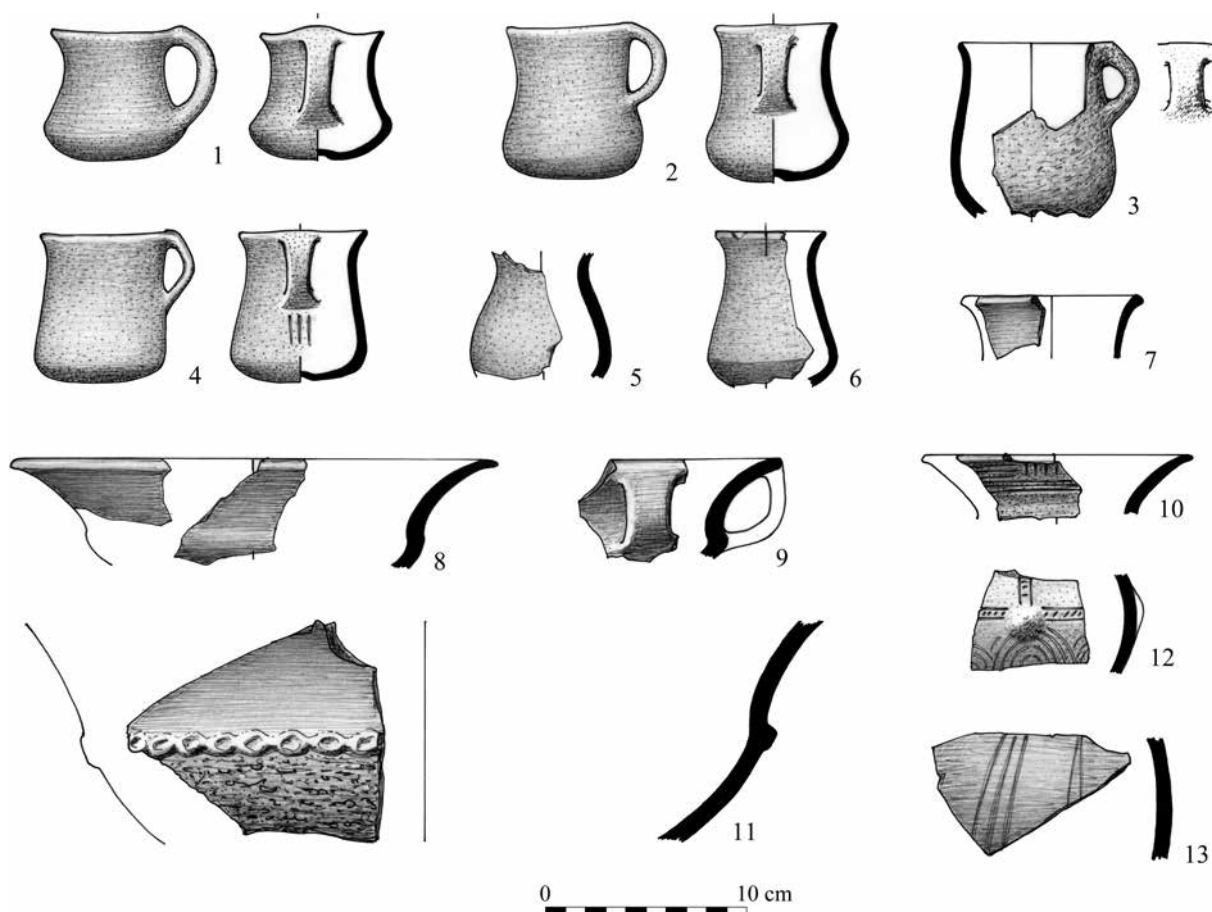


Fig. 14. Kakucs–Balla-domb. 1–13: Selection of finds from Pit A/9

“horizon” linked to a specific set of events, but rather as a longer period representing a cultural peak in the Bronze Age of the Carpathian Basin, whose end was marked by profound transformations.<sup>40</sup>

The classical periodization of the Vátya culture into three phases, Vátya I (sub-phases a and b), Vátya II and Vátya III, was proposed by I. Bóna.<sup>41</sup> He correlated the three sub-periods with the main divisions of the Middle Bronze Age he had distinguished.<sup>42</sup> The Vátya sequence ends with the Koszider period.<sup>43</sup> Although I. Bóna had originally assigned this period to the Late Bronze Age, it is now generally associated with the Middle Bronze Age.<sup>44</sup>

According to the generally accepted Hungarian chronological framework, as elaborated by T. Kemenczei, T. Kovács and N. Kalicz, the emergence of the Vátya culture (Vátya I) is linked to the onset of the MBA 1, Vátya II roughly corresponds to the MBA 2, while MBA 3 can be equated with the culture’s late variants (Vátya–Koszider, Alpár, Rákospalota).<sup>45</sup>

<sup>40</sup> POROSZLAI 2003b; REMÉNYI 2005; P. FISCHL *et al.* in press.

<sup>41</sup> BÓNA 1975, 25, 73; cp. KREITER 2007, 33.

<sup>42</sup> Cp. KOVÁCS 1984, 223.

<sup>43</sup> The controversies concerning the Koszider horizon are reflected in the labels attached to this period. It is variously referred to as Vátya–Koszider horizon, period, phase or even culture (MOZSOLICS 1988, 42; BÓNA 1992b, 58–64, with additional literature) and the label is then used to describe discrete phenomena such as the deposition of hoards and settlement development. This picture is fur-

ther complicated by the ever-growing number of cultural groups, which are then used as synonyms for the Koszider horizon: e.g., Streda nad Bodrogom/Bodrogszerdahely phase (Otomani–Füzesabony culture), Alpár phase, Rákospalota phase (Vátya culture) (cp. BÓNA 1992a, 17).

<sup>44</sup> BÓNA 1992a; BÓNA 1992b; DAVID 2002, 21, note 131; POROSZLAI 2003b, 161.

<sup>45</sup> DAVID 1998, 232–233; DAVID 2002, 32, Abb. 2. 7; 34, Abb. 2. 8.



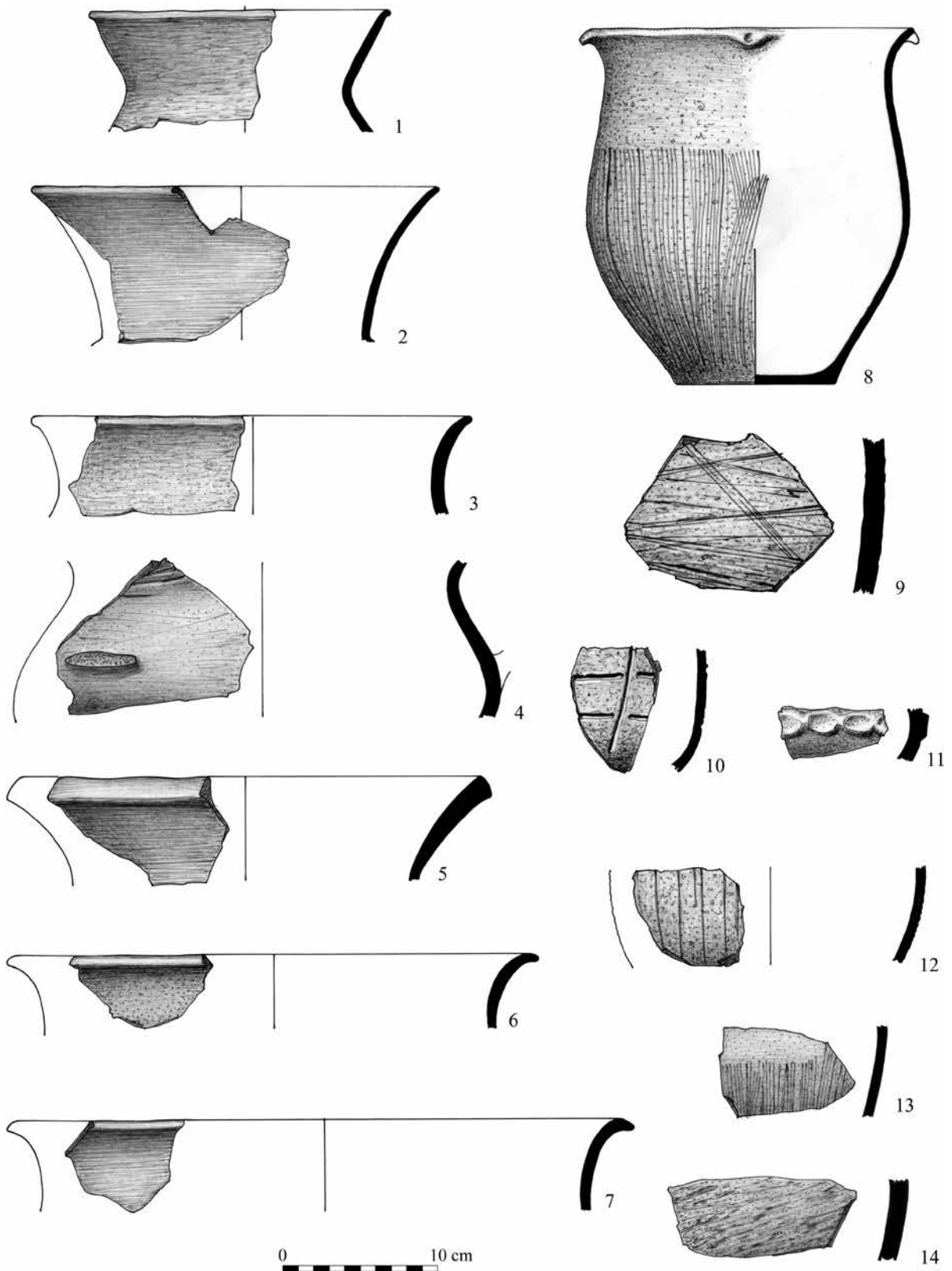


Fig. 15. Kakucs-Balla-domb. 1–14: Selection of finds from Pit A/9



Fig. 16. Kakucs–Balla-domb. 1: Pit A/9; 2: Level 4; 3: prehistoric humus level with pits and post-holes

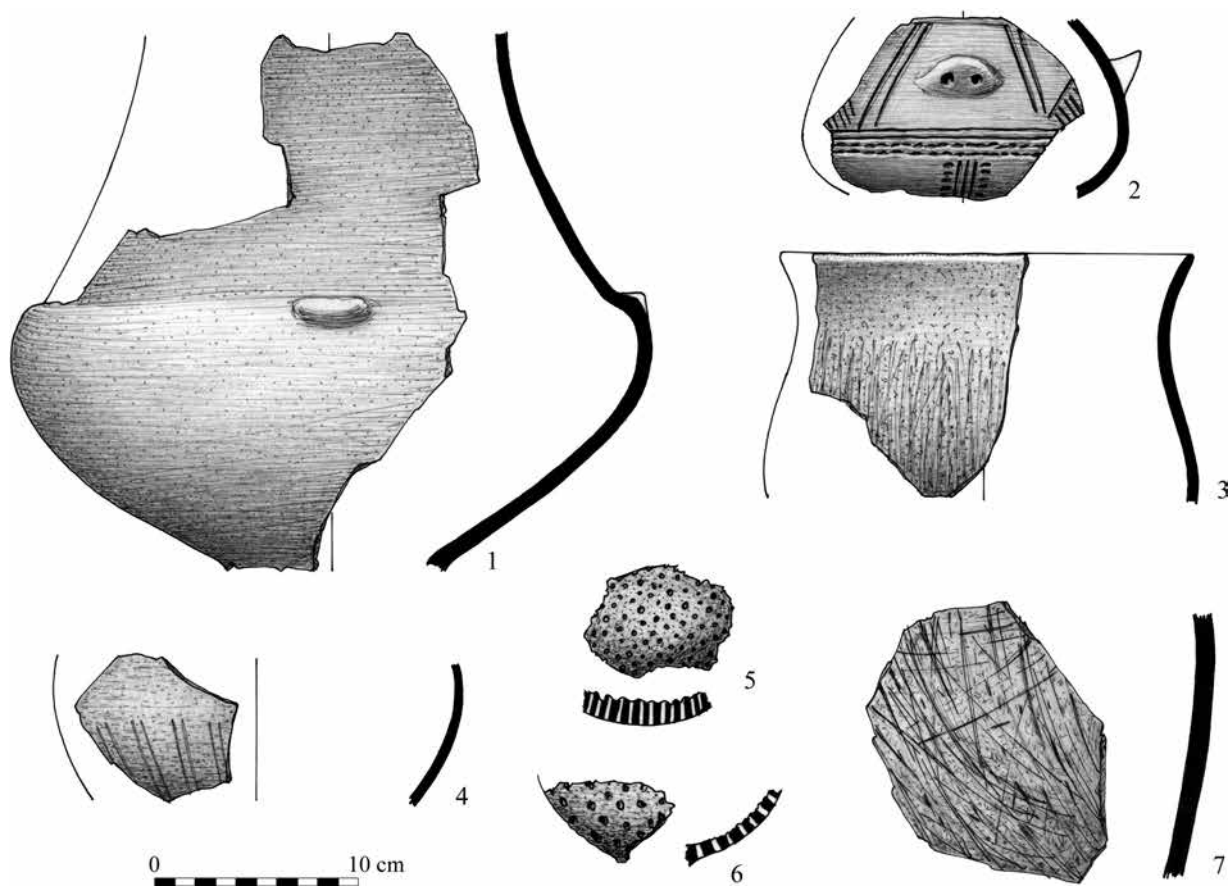


Fig. 17. Kakucs–Balla-domb. 1–7: Selection of finds from Pit A/15

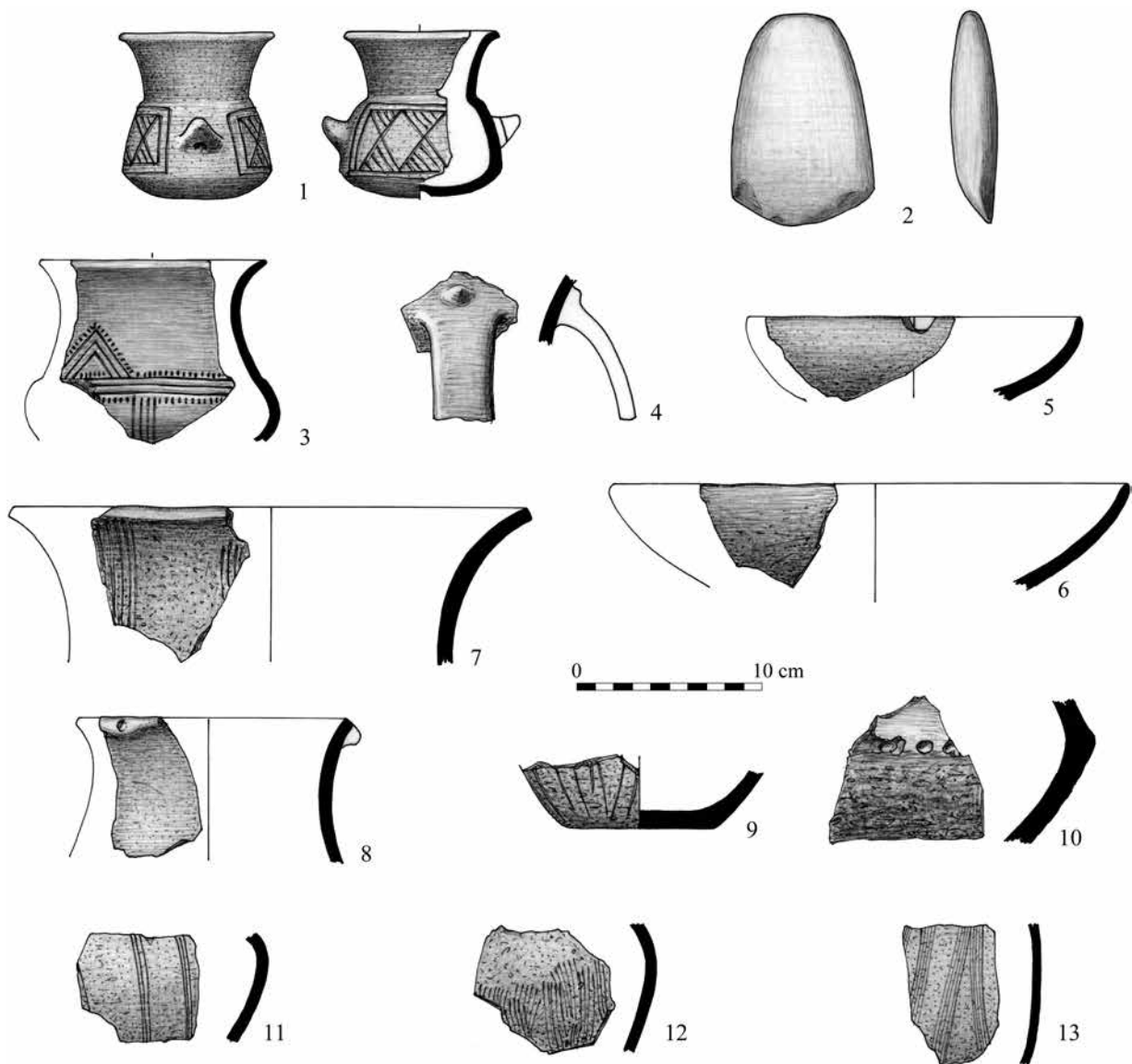


Fig. 18. Kakucs–Balla-domb. 1–13: Selection of finds from Pit A/14

In F. Gogáltan's view, Vатья I is co-eval with his Horizon 3 of the tell culture development (the turn of the EBA 3 and the MBA 1; *ca.* 2300–1950 BC), Vатья II with Horizon 4 (MBA 2; *ca.* 1900–1700 BC) and Vатья III with Horizon 5 (MBA 3; *ca.* 1650–1500 BC).<sup>46</sup>

I. Bóna outlined a different chronological scheme in the catalogue accompanying the exhibition *Bronzezeit in Ungarn*.<sup>47</sup> Drawing on an outdated Bronze Age chronology, he proposed a general chronology for the Vатья culture, which in his view spanned the period between *ca.* 1650 and 1350 BC.<sup>48</sup> In this chronology, Vатья I and Vатья

<sup>46</sup> GOGÁLTAN 2005; GOGÁLTAN 2008, 40–41, Fig. 2.

<sup>47</sup> MEIER-ARENDR 1992. A French version of the catalogue *Le bel Âge du Bronze en Hongrie* (sous la dir de J. L. Coudrot, J. P.

Thévenot, Budapest 1994) without any substantial changes was also published.

<sup>48</sup> MEIER-ARENDR 1992, 40.

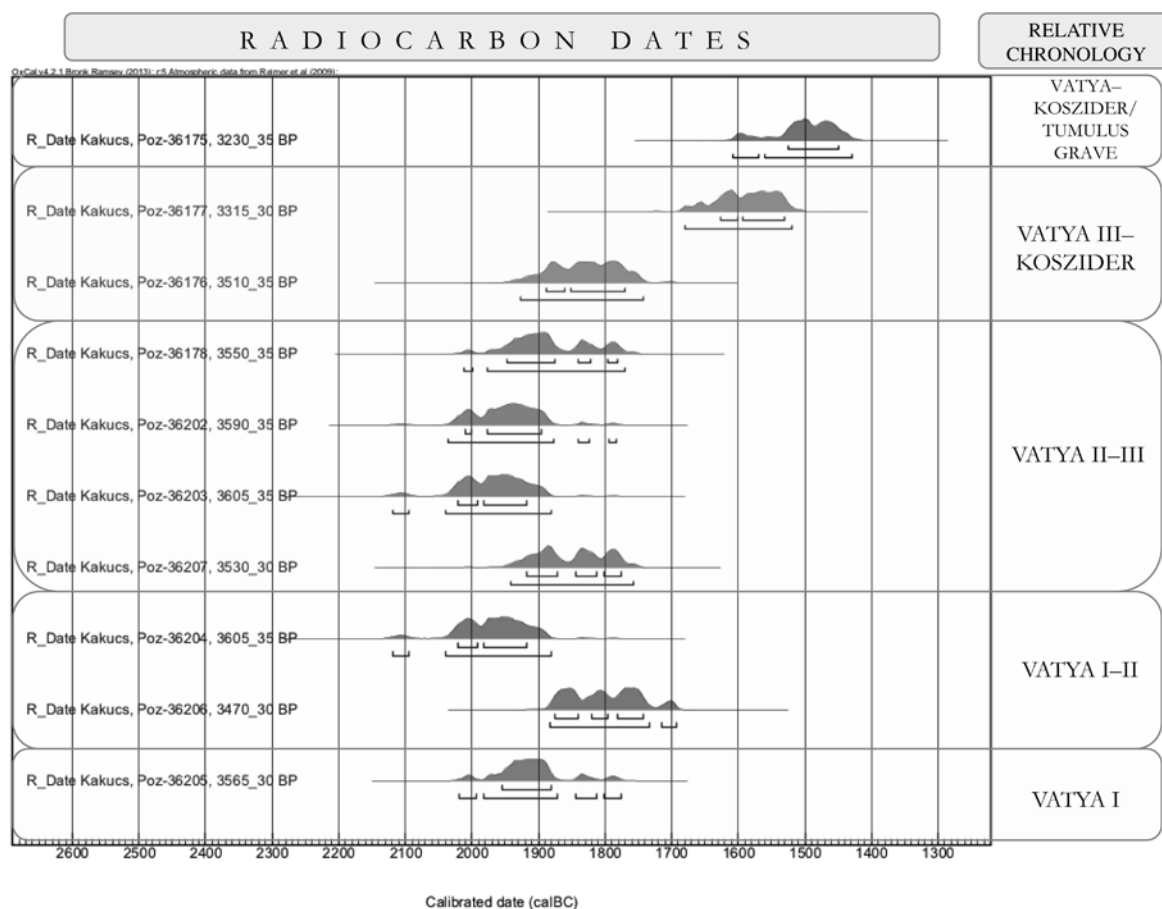


Fig. 19. Kakucs–Balla-domb. The sum of the probability distribution of the radiocarbon dates for Phases I–II–III and the Koszider period of the Vátya culture (JAEGER 2011)

II were linked to the MBA 1, Vátya III to the MBA 2, and the late variants (Vátya–Koszider, Alpár, Rákospalota and late Vátya–Koszider) to the MBA 3.<sup>49</sup>

In her assessment of the Dunaújváros–Duna-dűlő cemetery, M. Vicze outlined the following sequence and relative chronology for the burial ground (although without assigning absolute dates to individual periods): formative Vátya–Kisapostag 2 (EBA 3; RB A1), Vátya I–Kisapostag 3 (MBA 1; RB A1), Vátya II, Vátya II–III (MBA 2; RB A2), early and late Koszider phase (MBA 3; RB B1), Rákóczifalva group–Tumulus culture (LBA 1; RB B2).<sup>50</sup>

Some of the Vátya sites were occupied continuously from the Early Bronze Age onward (the Nagyrev culture).<sup>51</sup> The available stratigraphic data indicate that during the initial and the early Vátya occupation, these sites were open settlements and that fortifications were mainly constructed during the late Vátya period.<sup>52</sup> Other settlements, however, were demonstrably established during the late Vátya period.<sup>53</sup>

As mentioned above, the decline of fortified settlements and, more broadly, the collapse of the tell cultures of the Carpathian Basin are generally linked to the Koszider period. Traditionally, the abandonment of the tell sett-

<sup>49</sup> BÓNA 1992a, 17; DAVID 2002, 30, Abb. 2. 6.

<sup>50</sup> VICZE 2011, 156, Fig. 31. Currently, there are no absolute dates for the culture's cemeteries, and the Dunaújváros–Duna-dűlő burial ground is no exception. The typo-chronological analyses were based on the grave assemblages from these cemeteries. The lack

of radiocarbon dates can in part be attributed to the custom of cremating the dead.

<sup>51</sup> MEIER-ARENDE 1992, 40; DAVID 1998, 231.

<sup>52</sup> DAVID 1998, 234.

<sup>53</sup> BÓNA–NOVÁKI 1982, 112, 115; KOVÁCS 1982, 289; POROSZLAI 1991b, 59.

OxCal v4.1.4 Bronk Ramsey (2010); r:5 Atmospheric data from Reimer et al (2009):

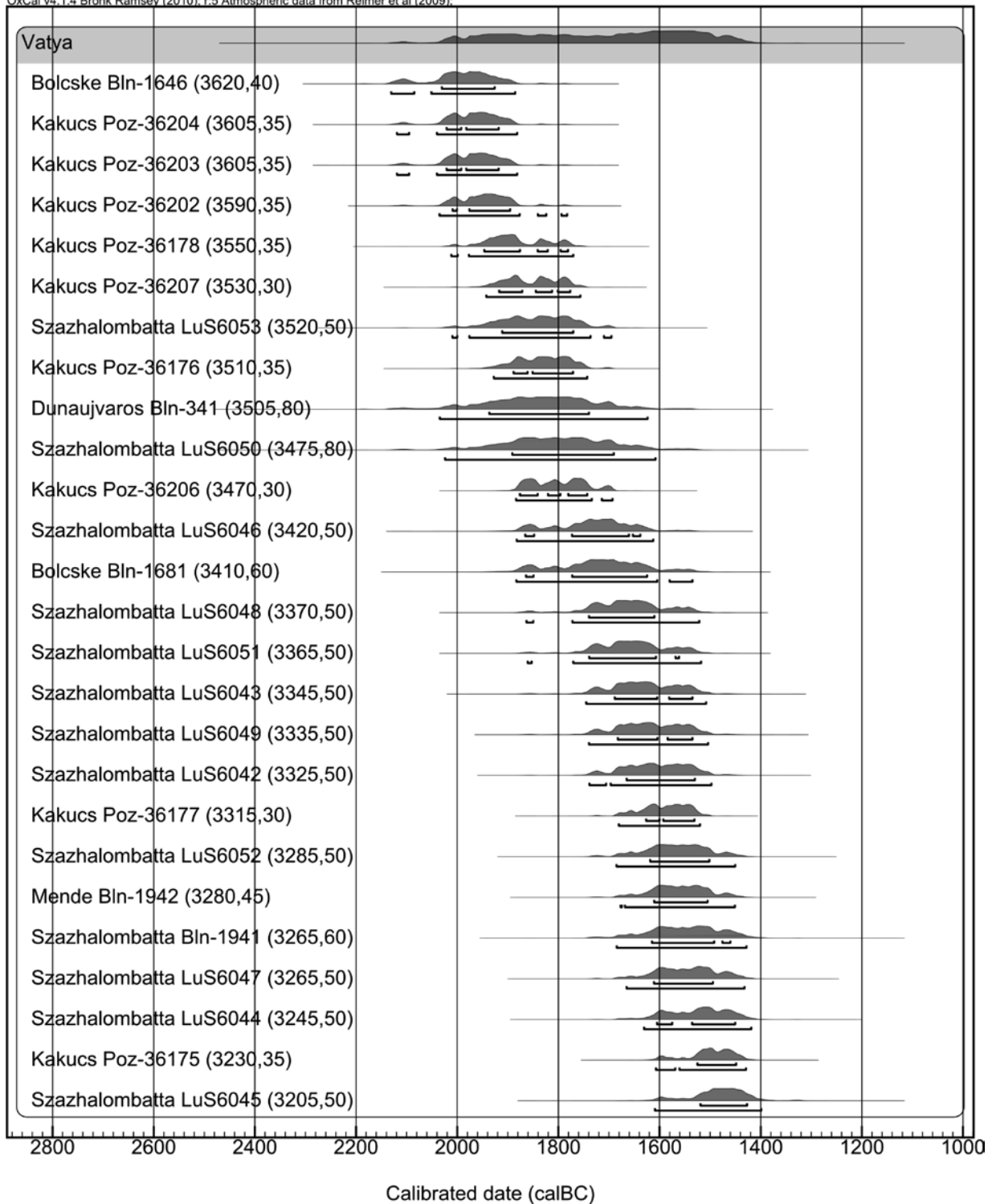


Fig. 20. The sum of the probability distribution of radiocarbon dates from the defensive settlements of the Vatyá culture (after RACZY–HERTELENDI–HORVÁTH 1992; FORENBAHER 1993; UHNER 2010; JAEGER 2011)

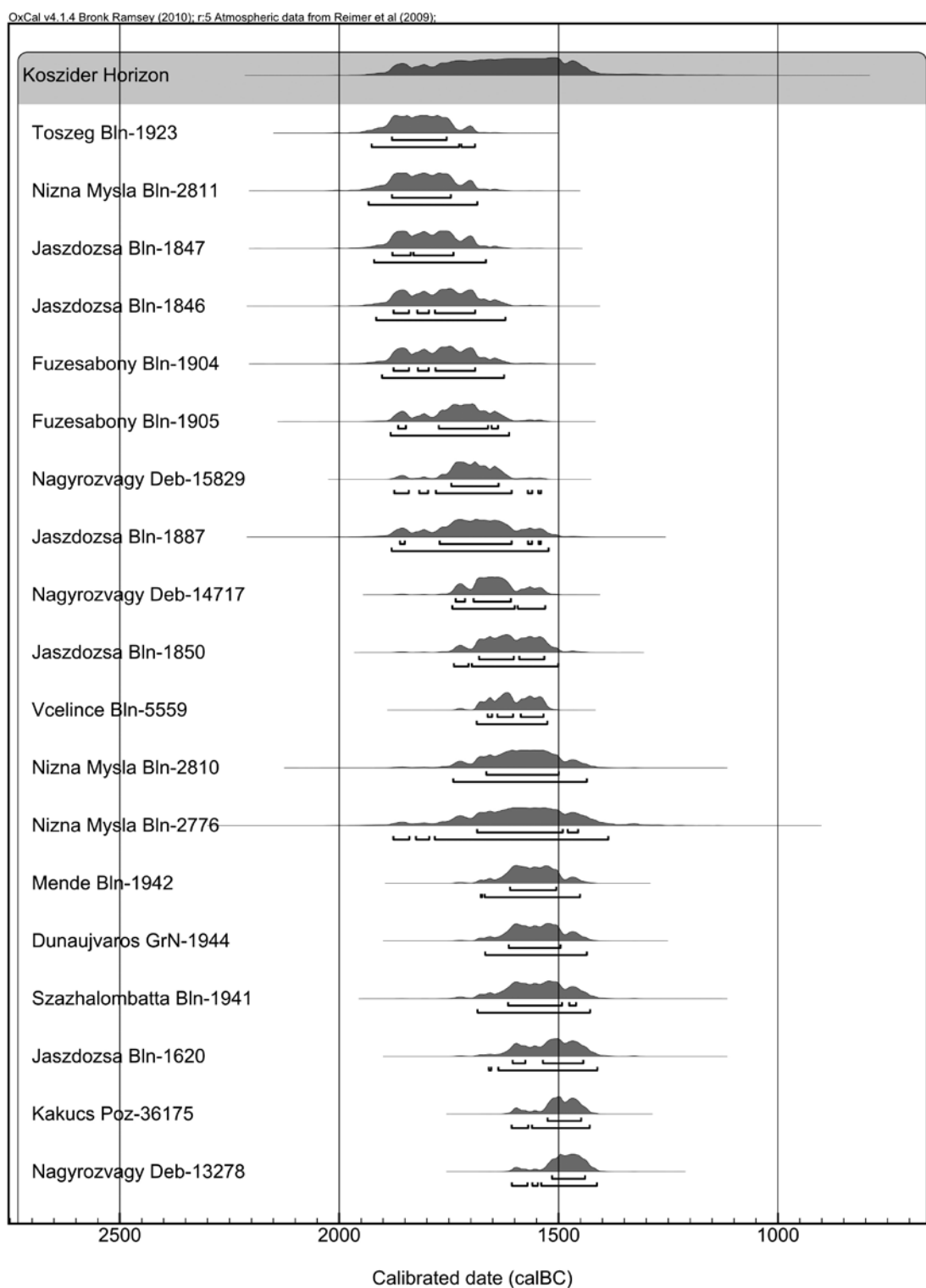


Fig. 21. The sum of the probability distribution of radiocarbon dates connected with the Koszider period (after RACZKY–HERTELENDI–HORVÁTH 1992; FORENBAHER 1993; GÖRSDORF–MARKOVÁ–FURMÁNEK 2004; KOÓS 2009; JAEGER 2010; KOÓS 2010; JAEGER 2011)

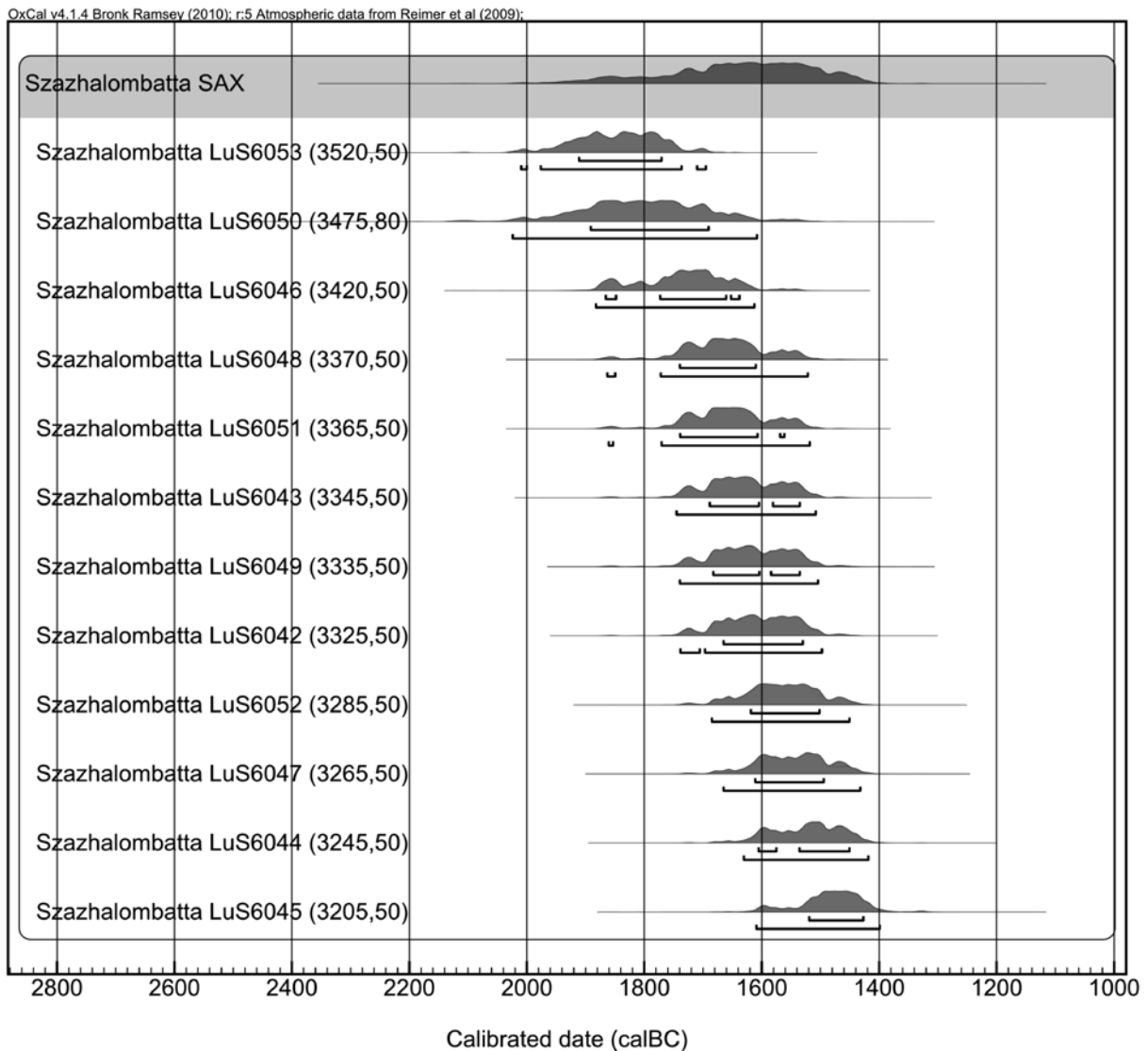


Fig. 22. The sum of the probability distribution of radiocarbon dates from the Szazhalombatta–Földvár (after UHNÉR 2010; JAEGER 2011)

lements is dated to the turn of the 15<sup>th</sup> and 14<sup>th</sup> centuries BC,<sup>54</sup> with the line most often drawn at *ca.* 1350 BC as marking the end of the occupation on fortified settlements.<sup>55</sup>

Until recently, there were only a handful of radiocarbon dates, which did not enable an absolute dating of the Vatia sequence (see in Appendix).<sup>56</sup> The most complete list of radiocarbon dates appeared in the *Bronzezeit in Ungarn* catalogue mentioned above.<sup>57</sup> However, the information accompanying the dates lacks basic data such as the provenance of the samples within a particular site and the material on which the dating was performed. This is the main reason that they cannot be regarded as a sound basis for drawing conclusions. The likelihood of an erroneous interpretation based on these dates is amply illustrated by dates from Sample Bln-341 for Dunaújváros–Koszi-

<sup>54</sup> POROSZLAI 1991b, 66; MEIER-ARENDE 1992, 40.

<sup>55</sup> KOVÁCS 1982, 289; POROSZLAI–VICZE 2004, 231.

<sup>56</sup> FORENBAHER 1993, 244–245, 251, Fig. 11.

<sup>57</sup> RACZKY–HERTELENDI–HORVÁTH 1992.

derpadlás and the dates for Bölcske–Vörösgyőr/Vörösgyűrű. The former was obtained from charred grain which was reportedly recovered from layers associated with the Nagyrév culture.<sup>58</sup> The results of the measurements however gave a date more in line with the settlement's Vátya occupation (Bln-341; 3505±80 BP, 1937–1740 [68.2%] cal BC, 2035–1624 [95.4%] cal BC).<sup>59</sup> However, this can no longer be clarified owing to the lack of any field documentation regarding the context of the sample. As far as the Bölcske dates are concerned, the technique of excavating a site by spade spits (the *Spatenstichtechnik*)<sup>60</sup> as was customary at the time, means that few, if any, reliable stratigraphic and contextual observations were made. The overall impression of a general chaos in the available information is further enhanced by the different dates specified for one sample in the available publications.<sup>61</sup> This is illustrated by the dates given for the samples from Mende–Leányvár (Bln-1942) and Tószeg (Bln-1923). The discrepancy between the Mende dates is relatively small (20 years) and involves a laboratory error (3280±45 BP<sup>62</sup> vs. 3280±65 BP<sup>63</sup>), while the Tószeg dates are characterised by both a laboratory error (5 years) and a 100 years difference in the specified BP age (3490±45 BP<sup>64</sup> vs. 3590±50 BP<sup>65</sup>).

The only information on the material of the samples comes from Dunaújváros (charred grain).<sup>66</sup> The dates published in the *Bronzezeit in Ungarn* catalogue were broadly associated with the Vátya culture, but without any reference to typochronology or a particular period in the Vátya sequence.<sup>67</sup> In view of the above, they contribute little to the refinement of the internal periodisation of the Vátya culture and the absolute chronology of the fortified settlements in the Vátya distribution.<sup>68</sup>

The five radiocarbon dates for the Vátya culture published in the *Bronzezeit in Ungarn* catalogue obtained from samples collected at Bölcske (2 dates), Dunaújváros, Mende and Százhalombatta gave a date between ca. 2000–1600/1500 BC (Fig. 20).<sup>69</sup>

Although several dates are available for the Koszider period, they come from a fairly extensive and culturally much more diverse area. The known dates are based on samples from sites of the Hatvan, Otomani–Füzesabony and Vátya cultures.<sup>70</sup> They demonstrate a relatively long period between 1950/1900–1500/1450 cal BC, grouped in two time brackets between ca. 1950/1900–1650 (95.4%) cal BC and 1650–1500/1450 (95.4%) cal BC (Fig. 21). Since there is virtually no information about the archaeological context of the samples, it is impossible to make any meaningful comment on the relative lateness of the date from Sample Bln-1217 from the Jászdózsa settlement (3105±100 BP;<sup>71</sup> 1496–1221 [68.2%] BC, 1612–1057 [95.4%] cal BC). What is crucial, however, is that this date, together with the latest one of the Kakucs–Balla-domb series (Poz-36175; 3230±35 BP; 1526–1449 [68.2%] cal BC, 1608–1430 [95.4%] cal BC) falls after 1500 BC, indicating a late date for the decline of fortified settlements in the Carpathian Basin (Table 1).

Even though the dates quoted in the above lack any information on the archaeological context of the samples, they nonetheless suggest that the Koszider period and the cultural transformation associated with this period in the Carpathian Basin was more complex and lasted for fairly long period of time.<sup>72</sup> Traditionally, the Koszider hoards are linked to the late phase of the Otomani–Füzesabony, Mádarovce and Vátya cultures. Hoards of this type were no longer deposited after the decline of these cultures, although some of the artefact types in them continued to be manufactured and used as shown by their typologically later types.<sup>73</sup>

<sup>58</sup> QUITTA–KOHL 1969, 241.

<sup>59</sup> RACZKY–HERTELENDI–HORVÁTH 1992, 45.

<sup>60</sup> POROSZLAI 1999–2000, 113.

<sup>61</sup> The published dates for Sample 1942 from Mende–Leányvár come from two different laboratories: Hannover (FORENBAHER 1993, 245) and Berlin (RACZKY–HERTELENDI–HORVÁTH 1992, 45). In addition, T. Kovács mentions that this date was obtained in the <sup>14</sup>C Laboratory of the Niedersächsisches Landesamt für Bodenforschung (see in Hannover) (KOVÁCS 1973, 12, and note 10). There is no information suggesting that several measurements were made on one sample originating from the Mende–Leányvár site.

<sup>62</sup> RACZKY–HERTELENDI–HORVÁTH 1992, 45.

<sup>63</sup> FORENBAHER 1993, 245.

<sup>64</sup> RACZKY–HERTELENDI–HORVÁTH 1992, 45.

<sup>65</sup> GÖRSDORF–MARKOVÁ–FURMÁNEK 2004, 90.

<sup>66</sup> QUITTA–KOHL 1969, 241.

<sup>67</sup> RACZKY–HERTELENDI–HORVÁTH 1992, 45.

<sup>68</sup> JAEGER 2011, 97–112.

<sup>69</sup> RACZKY–HERTELENDI–HORVÁTH 1992; FORENBAHER 1993, 244–245, 251; UHNER 2010; JAEGER 2011.

<sup>70</sup> RACZKY–HERTELENDI–HORVÁTH 1992; FORENBAHER 1993; KOÓS 2002; GÖRSDORF–MARKOVÁ–FURMÁNEK 2004; KOÓS 2009; JAEGER 2010, 315–317; KOÓS 2010; JAEGER 2011, 111–112.

<sup>71</sup> RACZKY–HERTELENDI–HORVÁTH 1992, 43.

<sup>72</sup> JAEGER 2010.

<sup>73</sup> NOVOTNÁ 1998, 357.



The recently obtained dates for Százhalombatta–Földvár, Érd<sup>74</sup> and Kakucs–Balla-domb<sup>75</sup> contribute to our knowledge of the chronological dimensions of the occupation on various Vatia settlements. A series of twelve dates spanning the period between 1900 and 1400 BC is now available for Százhalombatta (Fig. 22).<sup>76</sup> The samples from open settlement at Érd roughly fall into the same period.

Knowing that the Százhalombatta settlement was occupied throughout the Vatia sequence, the lack of precise information on the relation between the dates and a particular typological phase or stratigraphic level is particularly distressing. In the case of the ten dates for Kakucs–Balla-domb, we know that they can be associated with Vatia I–II, Vatia II–III and Vatia III–Koszider, and that they fall within the period from 2000/2050 to 1450 BC (Fig. 19, Table 1). At present, it is not possible to link the different sub-phases to absolute dates.<sup>77</sup> Aside from possible sampling errors, the separation of the successive typo-chronological phases/sub-phases within the Vatia sequence is also uncertain on the culture's settlements.<sup>78</sup> At present only so much can be said, that the occupation of the Kakucs settlement began around 2000/1900 BC. The dates for the early Vatia period (Vatia I–II) show a scatter between 2000/1900 and 1800/1700 BC. The currently known dates for the classical Vatia II–III period partly overlap with the early period, although most fall between 1900/1800 and 1800/1700 BC. The late Vatia III–Koszider period can be dated to around 1600–1500 BC. The date of final occupation phase, 1526–1449 (68.2%) cal BC, is indicated by the burial dug into the earlier occupation levels.

The reliability and accuracy of the radiocarbon-based chronology outlined above can only be confirmed by additional dates for the Vatia culture and the correlation of the Százhalombatta–Földvár series with specific occupation phases and Vatia sub-periods. The dates from Százhalombatta–Földvár and Kakucs–Balla-domb indicate that the decline of the Vatia culture lasted longer than the dates quoted from the *Bronzezeit in Ungarn* catalogue would suggest. The occupation of the (fortified) settlements can be maximally defined as spanning the period between 2000/1900–1500/1450 BC (Appendix and Fig. 20).

It must also be noted that it is still virtually impossible to determine the chronology of the key periods in settlement development: the Nagyrév/Vatia cultural transformation documented at some sites,<sup>79</sup> the date when the initially open Vatia settlements were fortified (e.g., at Dunaújváros, Százhalombatta–Földvár and Pákozd–Vár)<sup>80</sup> and the period when new fortified settlements appeared following the culture's expansion as postulated in Bronze Age studies (e.g., Alpár–Várdomb, Mende–Leányvár, Nagykőrös–Földvár).<sup>81</sup> Still, the increase in the number of radiocarbon dates available for a particular settlement (Százhalombatta–Földvár, Kakucs–Balla-domb) will no doubt remedy this situation. Building a full series of radiocarbon dates correlated with the complete stratigraphic sequence of individual sites will surely help to overcome the current obstacles in reconstructing the dynamics of fortified Vatia settlements.

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<sup>74</sup> UHNÉR 2010, 347–348.

<sup>75</sup> JAEGER 2011.

<sup>76</sup> Although the list specifies twenty samples, only twelve are associated with the Vatia culture (UHNÉR 2010, 347), and therefore only these samples were considered here.

<sup>77</sup> Cp. GOGÁLTAN 2005; GOGÁLTAN 2008.

<sup>78</sup> Cp. for the cemeteries see VICZE 2011.

<sup>79</sup> E.g. Százhalombatta–Földvár: POROSZLAI 1996, 5; Bölske–Vörösgyőr: POROSZLAI 1999–2000.

<sup>80</sup> DAVID 1998, 234.

<sup>81</sup> BÓNA–NOVÁKI 1982, 115; KOVÁCS 1982, 288.

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## APPENDIX

Radiocarbon dates presented in the study. The dates were calibrated using the OxCal v4.1.7 programme and the IntCal09 calibration curve (<https://c14.arch.ox.ac.uk/oxcal/OxCal.html>) (after RACZKY–HERTELENDI–HORVÁTH 1992; FORENBAHER 1993; GÖRSDORF–MARKOVÁ–FURMÁNEK 2004; KOÓS 2009; KOÓS 2010; JAEGER 2010; JAEGER 2011; UHNÉR 2010)

Site	Lab. No.	Date BP	Cal BC
Bölcske–Vörösgyir	Bln-1646	3620 ± 40	2031–1927 (68.2%) 2131–1886 (95.4%)
Bölcske–Vörösgyir	Bln-1681	3410 ± 60	1865–1625 (68.2%) 1884–1536 (95.4%)
Érd	LuS-6054	3585 ± 50	2022–1885 (68.2%) 2126–1772 (95.4%)
Érd	LuS-6063	3550 ± 50	1956–1776 (68.2%) 2024–1750 (95.4%)
Érd	LuS-6055	3535 ± 50	1939–1775 (68.2%) 2021–1741 (95.4%)
Érd	LuS-6062	3475 ± 50	1880–1743 (68.2%) 1932–1682 (95.4%)
Érd	LuS-6061	3460 ± 50	1878–1695 (68.2%) 1907–1639 (95.4%)
Érd	LuS-6056	3320 ± 45	1662–1529 (68.2%) 1733–1500 (95.4%)
Érd	LuS-6060	3310 ± 45	1635–1523 (68.2%) 1731–1495 (95.4%)
Érd	LuS-6057	3280 ± 50	1616–1501 (68.2%) 1682–1451 (95.41%)
Érd	LuS-6058	3255 ± 45	1608–1460 (68.2%) 1632–1431 (95.4%)
Dunaújváros–Kosziderpadlás	Bln-341	3505 ± 80	1937–1740 (68.2%) 2035–1624 (95.4%)
Dunaújváros–Kosziderpadlás	GrN-1944	3270 ± 50	1614–1496 (68.2%) 1668–1436 (95.4%)
Füzesabony–Öregdomb	Bln-1904	3450 ± 55	1877–1691 (68.2%) 1903–1625 (95.4%)
Füzesabony–Öregdomb	Bln-1905	3420 ± 50	1866–1639 (68.2%) 1883–1613 (95.4%)
Jászdózsa–Kápolnahalom	Bln-1847	3469 ± 50	1879–1740 (68.2%) 1921–1666 (95.4%)

Site	Lab. No.	Date BP	Cal BC
Jászdózsa–Kápolnahalom	Bln-1846	3450 ± 58	1877–1691 (68.2%) 1916–1622 (95.4%)
Jászdózsa–Kápolnahalom	Bln-1887	3390 ± 70	1862–1541 (68.2%) 1881–1523 (95.4%)
Jászdózsa–Kápolnahalom	Bln-1850	3330 ± 50	1682–1533 (68.2%) 1739–1501 (95.4%)
Kakucs–Balla-domb	Poz-36175	3230 ± 35	1526–1449 (68.2%) 1608–1430 (95.4%)
Kakucs–Balla-domb	Poz-36177	3315 ± 30	1627–1532 (68.2%) 1681–1521 (95.4%)
Kakucs–Balla-domb	Poz-36176	3510 ± 35	1889–1772 (68.2%) 1928–1744 (95.4%)
Kakucs–Balla-domb	Poz-36178	3550 ± 35	1947–1782 (68.2%) 2012–1771 (95.4%)
Kakucs–Balla-domb	Poz-36202	3590 ± 35	2010–1896 (68.2%) 2036–1783 (95.4%)
Kakucs–Balla-domb	Poz-36203	3605 ± 35	2022–1919 (68.2%) 2120–1882 (95.4%)
Kakucs–Balla-domb	Poz-36207	3530 ± 30	1918–1777 (68.2%) 1943–1757 (95.4%)
Kakucs–Balla-domb	Poz-36204	3605 ± 35	2022–1919 (68.2%) 2120–1882 (95.4%)
Kakucs–Balla-domb	Poz-36206	3470 ± 30	1877–1744 (68.2%) 1884–1694 (95.4%)
Kakucs–Balla-domb	Poz-36205	3565 ± 30	1956–1881 (68.2%) 2021–1777 (95.4%)
Mende–Leányvár	Bln-1942	3280 ± 45	1611–1506 (68.2%) 1678–1452 (95.4%)
Nagyrozságy–Pap-domb	Deb-15829	3400 ± 40	1745–1637 (68.2%) 1875–1541 (95.4%)
Nagyrozságy–Pap-domb	Deb-14717	3360 ± 40	1735–1609 (68.2%) 1743–1531 (95.4%)
Nagyrozságy–Pap-domb	Deb-13278	3215 ± 40	1516–1440 (68.2%) 1607–1413 (95.4%)
Nižná Myšľa	Bln-2811	3480 ± 50	1880–1746 (68.2%) 1934–1686 (95.4%)
Nižná Myšľa	Bln-2810	3300 ± 70	1665–1500 (68.2%) 1741–1436 (95.4%)
Nižná Myšľa	Bln-2776	3290 ± 100	1686–1456 (68.2%) 1877–1387 (95.4%)
Százhalombatta–Földvár	LuS-6053	3520 ± 50	1912–1771 (68.2%) 2010–1696 (95.4%)
Százhalombatta–Földvár	LuS-6050	3475 ± 80	1892–1691 (68.2%) 2025–1609 (95.4%)
Százhalombatta–Földvár	LuS-6046	3420 ± 50	1866–1639 (68.2%) 1883–1613 (95.4%)
Százhalombatta–Földvár	LuS-6048	3370 ± 50	1740–1611 (68.2%) 1864–1522 (95.4%)
Százhalombatta–Földvár	LuS-6051	3365 ± 50	1740–1562 (68.2%) 1861–1519 (95.4%)
Százhalombatta–Földvár	LuS-6043	3345 ± 50	1689–1536 (68.2%) 1746–1509 (95.4%)
Százhalombatta–Földvár	LuS-6049	3335 ± 50	1683–1536 (68.2%) 1740–1505 (95.4%)

Site	Lab. No.	Date BP	Cal BC
Százhalombatta–Földvár	LuS-6042	3325 ± 50	1666–1531 (68.2%) 1739–1498 (95.4%)
Százhalombatta–Földvár	LuS-6052	3285 ± 50	1619–1502 (68.2%) 1686–1451 (95.4%)
Százhalombatta–Földvár	LuS-6047	3265 ± 50	1612–1495 (68.2%) 1666–1433 (95.4%)
Százhalombatta–Földvár	Bln-1941	3265 ± 60	1616–1461 (68.2%) 1685–1429 (95.4%)
Százhalombatta–Földvár	LuS-6044	3245 ± 50	1606–1451 (68.2%) 1631–1419 (95.4%)
Százhalombatta–Földvár	LuS-6045	3205 ± 50	1520–1428 (68.2%) 1610–1400 (95.4%)
Tószeg–Laposhalom	Bln-1923	3490 ± 45	1880–1756 (68.2%) 1927–1691 (95.4%)
Včelince	Bln-5559	3328 ± 30	1662–1535 (68.2%) 1687–1526 (95.4%)