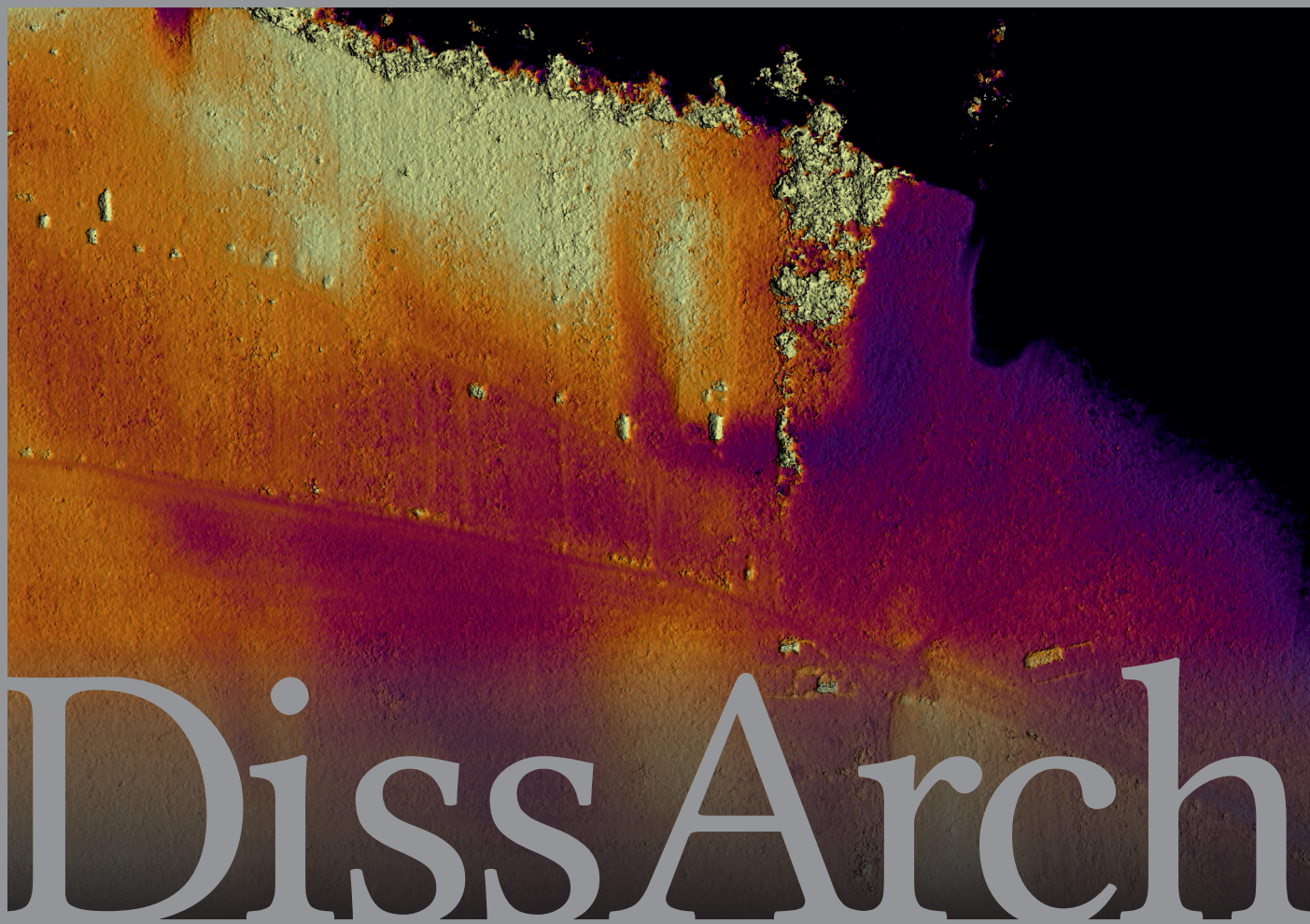
DISSERTATIONES ARCHAEOLOGICAE

ex Instituto Archaeologico
Universitatis de Rolando Eötvös nominatae



DissArch

Ser. 3. No. 11. | 2023

Dissertationes Archaeologicae
ex Instituto Archaeologico
Universitatis de Rolando Eötvös nominatae

Ser. 3. No. 11.

Aviable online at http://ojs.elte.hu/dissarch
Contact: dissarch@btk.elte.hu
Support: vaczi.gabor@btk.elte.hu

ISSN 2064-4574 (online)

Publisher
László Borhy

Budapest 2024

Contents

Articles

Field Reports

Thesis Review Articles

Dissertationes Archaeologicae 3.11 (2023) 77–178 10.17204/dissarch.2023.77

Chronology of the Bronze Age in southeast Transylvania

József Puskás
National Museum of the Eastern Carpathians, Sfântu Gheorghe/Sepsiszentgyörgy, Romania
joska1987@yahoo.com

Sándor-József Sztáncsuj
Székely National Museum, Sfântu Gheorghe/Sepsiszentgyörgy, Romania
sztancsuj@gmail.com

Lóránt Darvas
Szekler Museum of Ciuc, Miercurea Ciuc/Csíkszereda, Romania
ldarvas@gmail.com

Dan Buzea
National Museum of the Eastern Carpathians, Sfântu Gheorghe/Sepsiszentgyörgy, Romania
buzealuci@yahoo.com

Judith Kosza-Bereczki
Szekler Museum of Ciuc, Miercurea Ciuc/Csíkszereda, Romania
bekapofi@yahoo.com

Received 7 February 2024 | Accepted 18 February 2024 | Published 26 March 2024

Abstract: The southeastern part of Transylvania has a specific location in the Carpathian Basin. Being situated on the western fringe of the Eastern Carpathians, influences from west (inner Transylvania and the Great Hungarian Plain) and east (Moldavia and the northern Pontic area) can be traced through human history. The mountains were never an impenetrable border, and their porosity has made it possible for external cultural influences to expand. As a result southeastern Transylvania can be seen as a "contact zone" between East and West, where the above-mentioned influences have sometimes been weaker, but have never ceased: the continuous contacts and links were always present between the two sides of the Carpathians, something that has been confirmed by the numerous archaeological discoveries. While in recent years more and more ^{14}C data have been reported from central and western Transylvania, this number has been negligible from the study area. In the last three years we have managed to measure 33 samples from 23 key-sites belonging to the Bronze Age, covering the whole period. The results have brought us closer to answering the questions that have preoccupied specialists dealing with the Bronze Age for decades. Many of the dates are the first ones for some of the cultures present in the study area (for example, for the Jigodin and Gáva Cultures), offering new, independent dating. The new results confirm many of the earlier suppositions regarding the Bronze Age chronology of the area, but have also raised some problems, which will need to be clarified in the future.

Keywords: Bronze Age chronology, radiocarbon dating, contact area, Eastern Carpathian Basin

Introduction

Research on the Bronze Age chronology of southeast Transylvania is closely linked to the rest of the province and the neighbouring areas. While in recent years more and more ^{14}C data have been reported from central and western Transylvania, this number can be considered negligible from the southeastern part of the province.[1] So far, we have such data for Rotbav,[2] Păuleni,[3] Albiş,[4] Ţufalău[5] and Turia.[6] The aim of this study is to fill this gap by presenting 33 unpublished (or partially published) radiocarbon dates,[7] covering the entire period of the Bronze Age. Many of the dates are the first that have so far been obtained for some of the cultures present in the study area. The results make it possible to draw an independent local chronological picture. Since the area totally lacks this type of research, the chronology of different cultures was determined based on contact-chronology.

For a better understanding of Bronze Age material culture (mostly the pottery), the presentation of artefacts from radiocarbon-dated features is essential. At the end of each period we have made a short summary with the archaeological material found in well-documented contexts (i.e. pits, graves or houses), making supra-regional comparisons possible. Since in cultural layers pottery fragments could belong to different stages of evolution, assigning the whole quantity of ceramic to the same radiocarbon data can be misleading. For this reason the data from Zăbala-Tatárhalom, Turia-Rétiláb II. and the older data from Cernat-Hegyes were not correlated with the pottery discovered in the mentioned sites. Sometimes, even though the ceramic material seems to match the period under discussion, the interpretation need to be made with caution. This is the case with pottery found in the 'ash mounds' of the Noua Culture. Since these features could be used for a long period of time, the pottery collected after ploughing could belong to different phases of evolution. For this reason some of the pottery illustrated in the figures together with the radiocarbon diagram may not all belong to the timespan covered by the respective data.

Geographical frame

The area of southeast Transylvania covers mostly the inner mountain basins of the Eastern Carpathians (Fig. 1). The study area in the present paper encompasses the eastern components of the Braşov Basin (the Sfântu Gheorghe and the Târgu Secuiesc Basins), the Ciuc Basin and the eastern fringe of the Transylvanian Plateau, being interconnected with many, easily accessible passes (Fig. 2). The depressions have well delimited borders, with a dense water network. The main river of the area is the Olt River, connecting the Braşov and Ciuc Basins. Its main tributary is the Feketeügy River (in Romanian, the *Râul Negru,* or the *Black River*), running across the Târgu Secuiesc Basin. Due to favourable climate and natural resources the area was continuously inhabited from the Neolithic.[8]

1 More recently, several measurements have been made from excavations at the Păuleni-Dâmbul Cetății and Arcuş-Hosszú, but these remain unpublished or partially published (see Kavruk et al. 2022, 103, Fig. 1). In the text we are using the following abbreviations: Early Bronze Age – EBA; Middle Bronze Age – MBA; Late Bronze Age – LBA. For the sake of simplicity, the concept of 'culture' is used as synonim for ceramic styles.

2 Dietrich 2014b.

3 Kavruk et al. 2022.

4 Puskás 2020a, 111–150.

5 Puskás 2020b, 51–66.

6 Puskás – Darvas 2021a, 149.

7 One data from Turia-Vármegye (Puskás – Darvas 2021a, 149), and another from Peteni-Alsóhatár (Puskás – Botha 2022, 196) were mentioned earlier, but presented without related archaeological material.

8 Cavruc 1998; Sztáncsuj – Puskás 2022, 217–236.

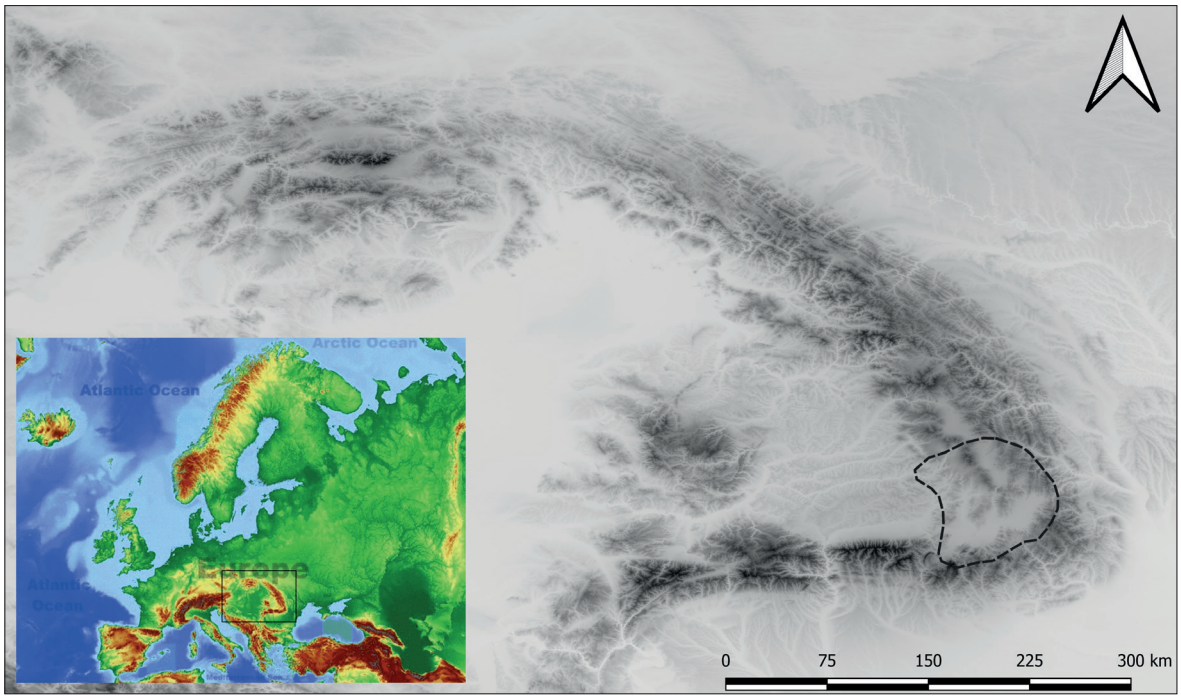


Fig. 1. Location of the study area (dotted line) in Europe (coloured image) and the Carpathian Basin

Southeast Transylvania serves as a unique region in the Carpathian Basin, influenced by both the west (inner Transylvania and the Great Hungarian Plain) and the east (Moldavia and the North-Pontic area). The mountains have never been an unpenetrable border between the two areas. This contact zone between East and West has witnessed continuous cultural interactions throughout pre-history and historical time, that are evident in numerous archaeological discoveries.[9] Of eastern origin, present in southeast Transylvania, are some finds belonging to the Neolithic (Boian Culture), Eneolithic (Ariuşd-Cucuteni-Tripolye Culture), Early Bronze Age (Globular Amphorae Culture) and Late Bronze Age (Noua Culture) cultures. From the west came the influences mostly during the Late Copper Age (Coțofeni Culture), the Middle Bronze Age (Wietenberg Culture) and the second part of the Late Bronze Age (Gáva Culture).[10]

Short overview of the Bronze Age periodization in southeast Transylvania – state of research

The Bronze Age in Romania can be devided into three stages, Early, Middle and Late Bronze Age, all having three or four phases, with respective subphases.[11] The relative chronology of the EBA for southeast Transylvania was established by Petre Roman,[12] whose "opinions [have been] intensely debated and criticized."[13] In the present state of research the EBA in southeast Transylvania (EBA I) is considered to begin with the appearance of the Zăbala-type discoveries, as yet known only from

9 Munteanu 2010b; Puskás 2015a, 97–129.

10 Ursulescu et al. 2010, 103–205; Vulpe et al. 2010, 207–395.

11 Vulpe et al. 2010, 217. For the beginning of the Bronze Age in Romania there are two mainstreams. The first consider the Coțofeni Culture as the earliest Bronze Age manifestation (Băjenaru 2014, 25–28, with further literature), while the second considers the beginning of the Bronze Age as a post-Coțofeni phenomenon (Ciugudean et al. 2022, 23; Ciugudean et al. 2023, 207). For the authors of this paper the arguments for a post-Coțofeni beginning of the Bronze Age seem more convincing.

12 Roman 1986, 29–55.

13 Băjenaru 2014, 28; Gogâltan 2015, 68.

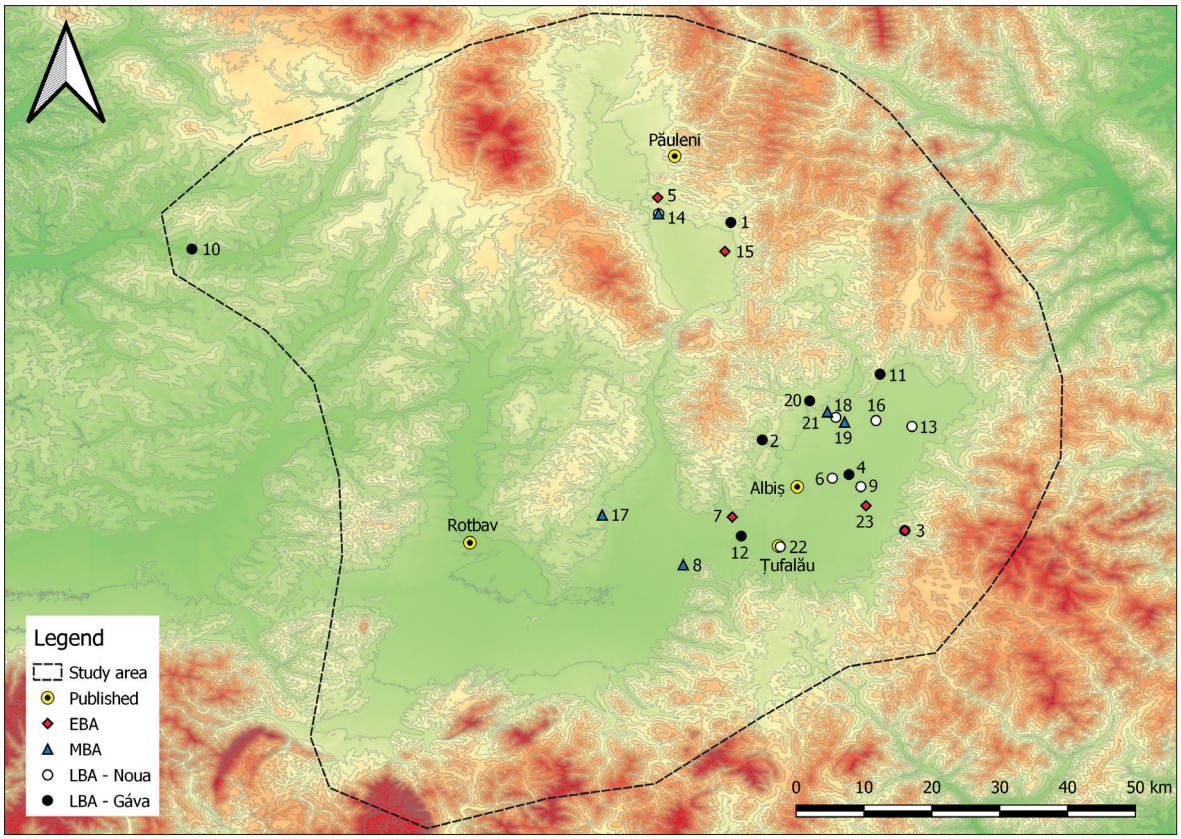


Fig. 2. Spatial and chronological distribution of the new ^{14}C dates discussed in the text

a single site (Zăbala, Covasna County). Also with the EBA I period are associated the Zimnicea-type stone cist graves at Sânzieni and Turia, sometimes refered to as "Zimnicea–Mlăjet–Sânzieni–Turia-type discoveries," and the first phase of the Schneckenberg Culture. The emergence of these cultural manifestations have been placed around the beginning of the 3rd millennium BC.[14] The relationship between the above-mentioned discoveries and the Schneckenberg A type pottery is as yet hard to elucidate, but researchers have accepted that these are successive phenomena.[15] In the same time period in the south-western part of Transylvania the Livezile group has been documented, while in western Transylvania and the Romanian Banat, Yamnaya graves are known.[16] The local communities of southeastern Transylvania seem to have had strong connections with the area east and south of the Carpathians and the Lower Danube region.[17] The chronology of the period in discussion was fixed according to its contacts with neighbouring areas, being placed in the first half of the 3rd millennium BC.[18]

The beginning of EBA II is marked by the presence of the pottery decorated with corded impressions, represented by the Jigodin Culture and the emergence of the Schneckenberg B phase.[19]

14 Székely 1997a, 69–70; Daróczi – Ursuţiu 2015, Pl. 1; Gogâltan 2015, 68; Ciugudean 2021, 57, 60.

15 Székely 1971, 391; Székely 1997a, 33–34; Daróczi – Ursuţiu 2015, Pl. 1; Gogâltan 2015, 68–69, 74, Fig. 23; Ciugudean 2021, 60.

16 Băjenaru 2014, 234; Diaconescu 2020, 44; Ciugudean 2021, 58; Ciugudean et al. 2023, 222–223.

17 Székely 1997a, 69–71; Băjenaru 2014, 255–261; Roman 1986, 29–52; Ciugudean 2021, 60.

18 Băjenaru 2014, 257; Ciugudean 2021, 60.

19 Ciugudean 2021, 60. F. Gogâltan placed the Jigodin ceramic style in the EBA I–II (Gogâltan 2015, 69, 74, Fig. 23). C. I. Popa and R. Totoianu considered the Jigodin group as more likely not belonging to the EBA IIb (Popa 2010, 118). On a different page they also not exclude the evolution of the Jigodin group on the whole period of the EBA II (Popa 2010, 81).

The distribution area of the Jigodin-type pottery is well documented in the inner mountain basins of the Eastern Carpathians,[20] in the Vârghiş Gorge and in the Oneşti Depression on the eastern side of the Eastern Carpathians.[21] The appearance and spread of burial mounds (at Ocland, Brăduţ, Moacşa) considered to belong to the Jigodin–Schneckenberg B Culture, has also been linked to this EBA II period.[22] Based on contact chronology R. Băjenaru has considered that the evolution of the Jigodin Culture, together with the Glina type discoveries, can be dated to between 2700–2400 BC.[23] The beginning of the Ciomortan group has been attributed by some scholars to a later phase of the EBA II (EBA IIb).[24]

The final phase of the Early Bronze Age (EBA III) is marked by the appearance of pottery decorated with textile impressions and brush-strokes (*Besenstrich- und Textlimuster*). In southeast Transylvania such discoveries have been defined as belonging to the Zoltan Group, attested as yet on a single site,[25] and having yet been identified in the Ciuc or the Târgu Secuiesc Basins. In the central part of Transylvania discoveries with *Besenstrich- und Textlimuster* are considered to belong to the Iernut group.[26] As yet there are no radiocarbon datings for this ceramic style, but based on stratigraphic observations similar discoveries can be included between the Jigodin and Wietenberg Cultures, somewhere between 2300/2200 BC and 2000/1900 BC.[27] New data suggest that at the eastern fringe of the Curvature of the Carpathians the Năeni-Schneckenberg communities persisted into the 22nd–21st centuries BC.[28]

The beginning of the Middle Bronze Age in Transylvania is marked by the emergence of the Wietenberg Culture around 2000/1900 BC.[29] In our opinion the tripartite periodization of the MBA proposed for the lower Mureş area can also be used for our study area.[30] The MBA I period in southeastern Transylvania is considered to begin with the evolution of the Ciomortan group,[31] covering the end of the EBA III and the first half of the MBA I (MBA Ia for some authors[32]). In terms of relative chronology this period covers the end of the Reinecke Br A1 period and the beginning of the Reinecke Br A2,[33] in absolute dates c. 2100–2000/1900 BC.[34] In the second part of the MBA I (MBA Ib)

20 Székely 1973, 129–134; Puskás 2015b, 261.

21 Roman et al. 1992, 173–177; Băjenaru 2014, 206.

22 Székely 1980a, 41–45; Székely 1997a, 70; Székely 1997b, 43; Ciugudean 2011a, 22. The grave at Moacşa was dated by P. Roman to a post-Jigodin period (Roman et al. 1992, 78).

23 Băjenaru 2014, 258.

24 Popa 2010, 118.

25 Cavruc 1997, 100–101; Székely 1997a, 70; Daróczi – Ursuţiu 2015, 4; Gogâltan 2015, 69; Ciugudean 2021, 60–61. For a different opinion see Popa 2010, 48.

26 Ciugudean 1996, 110–112.

27 Popa 2010, 106.

28 Constantinescu 2020, 162.

29 Gogâltan 2015, 70; Bălan et al. 2016, 80; Ciugudean 2021, 62.

30 Gogâltan 1999, 206–209; Gogâltan 2015, 54. Earlier studies on the Wietenberg Culture in southeast Transylvania, mostly written by Z. Székely and Zs. Székely, rarely take into consideration the periodization proposed for the rest of the province. When presenting the archaeological material, they mostly refer to either early or late Wietenberg material.

31 Gogâltan 2015, 76.

32 Daróczi – Ursuţiu 2015, 4–5. Daróczi and Ursuţiu proposed a tripartite periodization for the MBA, all having two subphases marked with letters (Daróczi – Ursuţiu 2015, Pl. 1). Since this division doesn't find yet any support in the archaeological material in the studied area (except maybe the MBA I), we opted for the use of the simple numbering without subphases.

33 Gogâltan 2015, 54–55; Ciugudean 2021, 76, Fig. 8.

34 Gogâltan 2015, 54–55.

Wietenberg-type pottery is already present in southeastern Transylvania, its evolution being documented in the following period as well, being represented by the Wietenberg II/A2–B type pottery (MBA II). Also to this period can be related the famous Ţufalău treasure.[35] In terms of absolute chronology the MBA II developed between 2000/1900–1700 BC, and covered the Reinecke Br A2 period.[36] The MBA III period is marked by the appearance of meandric ornamentation motifs on the ceramic vessels and the so-called *Zahnstempelung* technique for filling the incised elements. A high number of settlements have been associated with this period, covering the timespan between the 18th and 16th centuries BC (end of Reinecke A2 and Reinecke B period).[37] Many of the MBA fortifications (Turia, Racoş, Păuleni) were built (or continued in use) in this chronological sequence, but they were abandoned at the end of this period.[38]

The Late Bronze Age[39] in Transylvania is marked by the appearance of a population with eastern origins (from the northern Black Sea area), refered as the Noua Culture (LBA I).[40] The spread of the new ceramic style of this population can be first documented in the eastern part of the province, while in the western part still MBA traditions persisted (Wietenberg III–IV).[41] In this period the pottery of the Noua Culture (Noua I) is marked by a strong, late-Monteoru influence.[42] In parts of western Transylvania the possible synthesis between the late Wietenberg and Noua-type pottery resulted the emergence of the Gligoreşti group.[43] All this cultural manifestations can be dated to the 16th and 15th centuries BC.[44] A somewhat later appereance of the Noua communities has been suggested by H. Ciugudean, putting the beginning of the Noua Culture at around 1500 BC.[45] An even later emergence of the culture, in the second half of the 15th century BC, has been proposed by L. Dietrich.[46] During the LBA II (Reinecke's Br D period) we can see an expansion of the Noua

35 Gogâltan 1999, 207; Puskás 2018b, 4.

36 Gogâltan 2015, 55, 76–77; Kavruk et al. 2022, 119. In the chronological scheme proposed by Bălan et al. 2016, the early Wietenberg phase covers the MBA I–II periods, being dated in absolute terms of chronology to between the "20th century BC and an ending in the first half of the 18th century BC" (Bălan et al. 2016, 80).

37 Gogâltan 2015, 73; Bălan et al. 2016, 82.

38 Kavruk et al. 2022, 119. The existence of a much-debated A3 phase, or the so-called Koszider horizon in Hungary (Kiss et al. 2019, 187) can't be documented in Transylvania. It seems that in southeast Transylvania the Wietenberg III/C phase is evolving until to the appereance of the Noua communities.

39 In the present study we do not cover detailed terminological analyses. Nevertheless, a short description might still be useful to clarify and avoid eventual misunderstandings. Today, some researchers in Romania use the chronological framework which was accepted in the middle of the last century (László 2018, 279). Based on this, the beginning of the Iron Age can be attributed to the 12th century BC, when the first iron objects appeared and the large-scale fortified settlements as well as the Gáva type pottery spread (Vulpe et al. 2010, 289–293). In the last two decades, however, more and more researchers use the Central and Western European chronological framework, adapted to the local context, which is supported by well-founded arguments (Kacsó 1990a, 41–50; Ciugudean 2010; Ciugudean 2011b, 80–81; Gogâltan 2019a). According to this, the end of the LBA can be dated largely to the 9th century BC and the Gáva Culture can be classified here, except its last evolutionary period. The present study uses the latter chronological framework and the 'Hallstatt' appellation has been consciously left out, which is outdated and can be misleading (László 1994, 43; Gogâltan 2019a, 47). Nevertheless, we have used the well-established and currently-used Reinecke chronological division, which includes the term 'Hallstatt' (Ha), but in our study area does not cover the concept of a Western European Hallstatt period.

40 Gogâltan 2015, 78; Gogâltan 2019a, 51.

41 Ciugudean 2010, 172.

42 Popa – Boroffka 1996, 55.

43 Gogâltan et al. 2004, 73–74; Gogâltan 2009, 119; Gogâltan – Popa 2016, 50–60.

44 Motzoi-Chicideanu – Şandor-Chicideanu 2015, 30; Gogâltan 2019a, 51.

45 Ciugudean – Quinn 2015, 155; Ciugudean 2021, 65.

46 Dietrich 2014a, 192; Dietrich 2014b, 63.

communities to western Transylvania.[47] In southeastern Transylvania probably most of the Noua settlements belong to this period (Noua II phase), many of them having so-called 'ash mounds', yet these are mostly known from the Târgu Secuiesc and the Bârsei Basins.[48] The 3rd period of the LBA (LBA III) can be divided into two subphases, labelled LBA IIIa and LBA IIIb,[49] covering the Reinecke's Ha A phase, namely the 12th to the first half of the 11th centuries BC.[50] During the LBA IIIa in Central Transylvania the Band-Cugir group developed, while in the southeastern part of the province the final stage of the Noua Culture (Noua III phase) has been documented, suggesting a partial contemporaneity of the two ceramic styles.[51] In the second phase of the LBA III early Gáva pottery style spread throughout Transylvania.[52] In the light of the excavations at Reci-Telek, Z. Székely has suggested that the Ha A period was the beginning of the Gáva manifestations (refering to Reci I type discoveries) in southeast Transylvania.[53] Later, mostly based on analogies from the Teleac site, the settlements at Reci and Cernat have been considered to belong to the Ha B1–B2 periods.[54]

A fourth stage of the LBA (LBA IV) was outlined by C. Kacsó,[55] getting wider acceptance in the last 10–15 years.[56] This time period corresponds with the Ha B1 stage, dated between c. 1050/1000 and 950/920 BC.[57] From a cultural point of view this timespan is covered by the the classical phase of the Gáva Culture.[58] The most representative southeast Transylvanian sites of the period are considered those at Reci, Cernat and Porumbenii Mari.

The context of the radiocarbon dated samples

Many of the radiocarbon dated samples have resulted from excavations undertaken in the second half of the 20th century. Also some recent material has been included, discovered during field surveys and archaeological excavations. We have tried to cover the whole period and area with radiocarbon datings (Fig. 2). This has been partially accomplished, although no samples were included from the Bârsei Basin, while only MBA material was sent from the Sfântu Gheorghe Basin. From the Ciuc and Târgu Secuiesc Basins the samples were collected from key sites, covering the long period of the Bronze Age. In most cases we were able to send one or two samples for dating, and thus we cannot date the whole duration of each respective site, but the results do offer an idea of the period of occupation. The situation is better with the Leliceni site, from where five samples were sent, from three different layers (Tab. 1).[59]

47 Ciugudean 2010, 172.

48 Dietrich 2014a; Puskás 2020a, 132. Another possible site with an 'ash mound' was investigated at Sântimbru, in the Ciuc Basin (Puskás – Buzea 2021, 23–42).

49 Ciugudean 2010, 172.

50 Ciugudean 2021, 68; Gogâltan 2019a, 54.

51 Ciugudean et al. 2019, 105.

52 Ciugudean 2010, 172.

53 Székely 1966a, 13–15.

54 Vasiliev 1983, 43; Vasiliev 1989, 65, 69–70; Vasiliev et al. 1991, 114; Vasiliev 1992, 25; Vasiliev 2007, 12–13; Ciugudean 2010, 168; Ciugudean 2011b, 75, 81, Fig. 3; Ciugudean 2012, 236.

55 Kacsó 1990a, 48–49.

56 Ciugudean 2010, 172–173; Gogâltan 2019a.

57 Przybyła 2009, 63.

58 Ciugudean 2010, 172; Gogâltan 2019a, 57.

59 The calibration of the radiocarbon data was made with the online version of OxCal v.4.4.4. Reimer et al. 2020, 725–757.

From the total of nine EBA samples two belong to cist-graves of two different cultures. The first sample was collected from the burial mound at Moacşa-Zádogos-tető, the second from the grave discovered at Sânmartin. Another sample was sent from the Zăbala-Tatárhalom site. A set of five samples were obtained from the three layers of the Leliceni-Kőhegy settlement, considered to belong to the Jigodin Culture. The latest data was obtained from a bone sample discovered in the ditch at Covasna-Hankó stream valley.

Of the six MBA samples, two come from a pit excavated near Sfântu Gheorghe at the Avasalja site, and two were sent from the cremation cemeteries at Ozun-Kupántag, and from Turia-Vármegye. The fifth sample was a bone fragment discovered during a field walk near Turia, and the sixth came from a pit near Sâncrăieni, probably belonging to the late Monteoru Culture.

From the period of the Noua Culture, covering the first half of the LBA, eight samples were sent from seven sites. Two of them were discovered during the excavations at Peteni-Alsóhatár in the 1960–70's, one at Sânzieni-Táncospad in 1913 and another in 2021 at Sâncrăieni-Karimósarka, likely belonging to the late Monteoru Culture. The other four samples were discoverd during field surveys. These samples were collected from the surfaces of the so-called 'ash mounds'. For radiocarbon dating, the samples were sent from specific objects of the period, fragments from notched scapulae, and also from common bone fragments. The latter were chosen from sites where only Noua pottery is known, in order to avoid any possible intrusion from other periods.

For the second part of the LBA, represented by the Gáva Culture, a total of ten samples from eight locations were sent to the laboratory at Debrecen. Nine of them came from excavations, and one from field walking. Two samples were sent from a horse skull discovered in a pit at the Porumbenii Mari-Várfele fortified settlement, and one from a pit excavated at Turia-Telek. Another sample was sent from a grave at Poian-Kőhát, which earlier had been considered to belong to the MBA. Two other bone fragments came from the excavations at Cernat-Hegyes. Unfortunately, the material from this latter site was not selected by features, so the measurments only provide information about the timespan in which the settlement was used. The two samples came from the area of a hearth and were associated with Gáva-type pottery. A charcoal sample was sent from the site at Reci-Dobolyka mezeje, from a pit belonging to the Late Iron Age. The sample turned out to be an intrusion from the earlier Gáva period. From the pit discovered at Covasna-Hankó stream valley ^{14}C analysis was made on a tooth of a large mammal. The last sample, which gave the latest result, was sent from the site at Hătuica-Nagyútmente from a feature identified during field surveys.

The contextualization of the data presented in this paper has necessitated the study of the published ^{14}C data on a wider geographical area. For the period of the EBA, aside from Transylvania we also compared data with those published for the western distribution area of the Yamnaya Culture (i. e. from the Lower Danube Region and the Prut River to the east, and the Tisza River to the west). For the Globular Amphorae Culture data was cited from Podolia, Volhynia, Lesser Poland and the Baltic Coast. The MBA data was compared to those in the distribution area of the Wietenberg Culture (Transylvania), respectively with eastern and southern neighbouring areas, in particular the Costişa, Monteoru and Tei Cultures. The set of data obtained for the Noua Culture has good references with other dates obtained from the distribution area of the culture, covering most of Transylvania, Moldavia, Republic of Moldova and parts of Wallachia. Analogies of radiocarbon data for the Gáva Culture were included from the distribution area of the culture, namely Transylvania, northeastern Moldavia and the eastern part of the Great Hungarian Plain, as well as from the neighbouring Babadag Culture.

1. Bancu/Csíkbánkfalva-Potovszky-kert

The site is located both on the territory of Bancu and Ciucsângeorgiu villages, on a high terrace between the confluence of the Fiság and Szentegyháza streams. A few small-scale excavations were carried out in 1962. In 2022 rescue excavations were undertaken by L. Darvas, resulting a rich collection of archaeological material. Beside the consistent eneolithic Ariuşd pottery, artifacts belonging to the LBK, Late Copper Age Coţofeni and Late Bronze Age Gáva Cultures were found. The assemblage includes two pottery sherds belonging to the Babadag or Cozia–Saharna Cultures, which reflect on the contacts between the communities in the Ciuc Basin and those in the Lower Danube area. Unfortunately, the sherds were found in an old excavation trench in a disturbed, secondary position, and not in the area of the radiocarbon dated feature. The quantity of the archaeological material and the stratigraphic observations suggest that the Gáva occupation was not very intense, and was likely to have been a single-layer settlement. This has led us to conclude that the Babadag–Cozia–Saharna sherds belong to the same chronological horizon as the radiocarbon data (Fig. 3).

In the northern half of the opened section, at a depth of -67 cm, a hearth was discovered. No traces of dwelling or post-holes were identified around the feature. The more or less circular hearth had a diameter of 110 cm and luting 3–4 cm thick. On and around the feature several Gáva type pottery fragments and animal bones were found. One sample from the osseous material was sent for radiocarbon dating (DeA-38091), giving a result of 2874±20 BP data, calibrated to the span of 1108–1009 cal BC of 1-σ, or 1123–939 cal BC of 2-σ accuracy (Fig. 3).

2. Cernat/Csernáton-Hegyes

Probably the best known Late Bronze Age – Early Iron Age fortified settlement in southeast Transylvania is the one situated near Cernat, at the top of the Hegyes mountain. The northern part of the site was fortified with a ditch and a rampart, enclosing a surface of approximately seven hectares. During the excavations archaeological material belonging to various periods was discovered (Ariuşd, Wietenberg and La Tène Cultures), but the most consistent occupation belonged to the LBA Gáva Culture. This settlement was dated to the Ha B period.[60] The site became famous because of an iron tool deposit, which was considered to be one of the earliest discoveries of this type in Romania.[61] In 2009 new research was conducted, resulting in the discovery of two bronze hoards and several stray find metal objects.[62]

Based on the documentation, during the research several pits and ditches were identified, but unfortunately the material was not separated by features. Even so two animal bone samples were sent from the cultural layer to have a clearer view of the occupation period of the site. The exact location of the first sample is unknown (DeA-23372), but it was discovered in Trench 22. The ^{14}C measurement resulted the 3046±36 BP year. The calibration of this data has provided 1387–1260 cal BC of 1-σ, or 1414–1212 cal BC of 2-σ accuracy. The second sample (DeA-26327) was found in Trench 23, Cassette 1, probably near a hearth. The ^{14}C-AMS measurement provided the date 2903±34 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1155 and 1016 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1216 and 997 cal BC (Figs 4–5).

60 Székely 1966a, 27.

61 Székely 1966b, 209–219; Boroffka 1987, 55–77; Hansen 2019, 214–217.

62 V. Szabó 2011, 339; V. Szabó 2017b, 122.

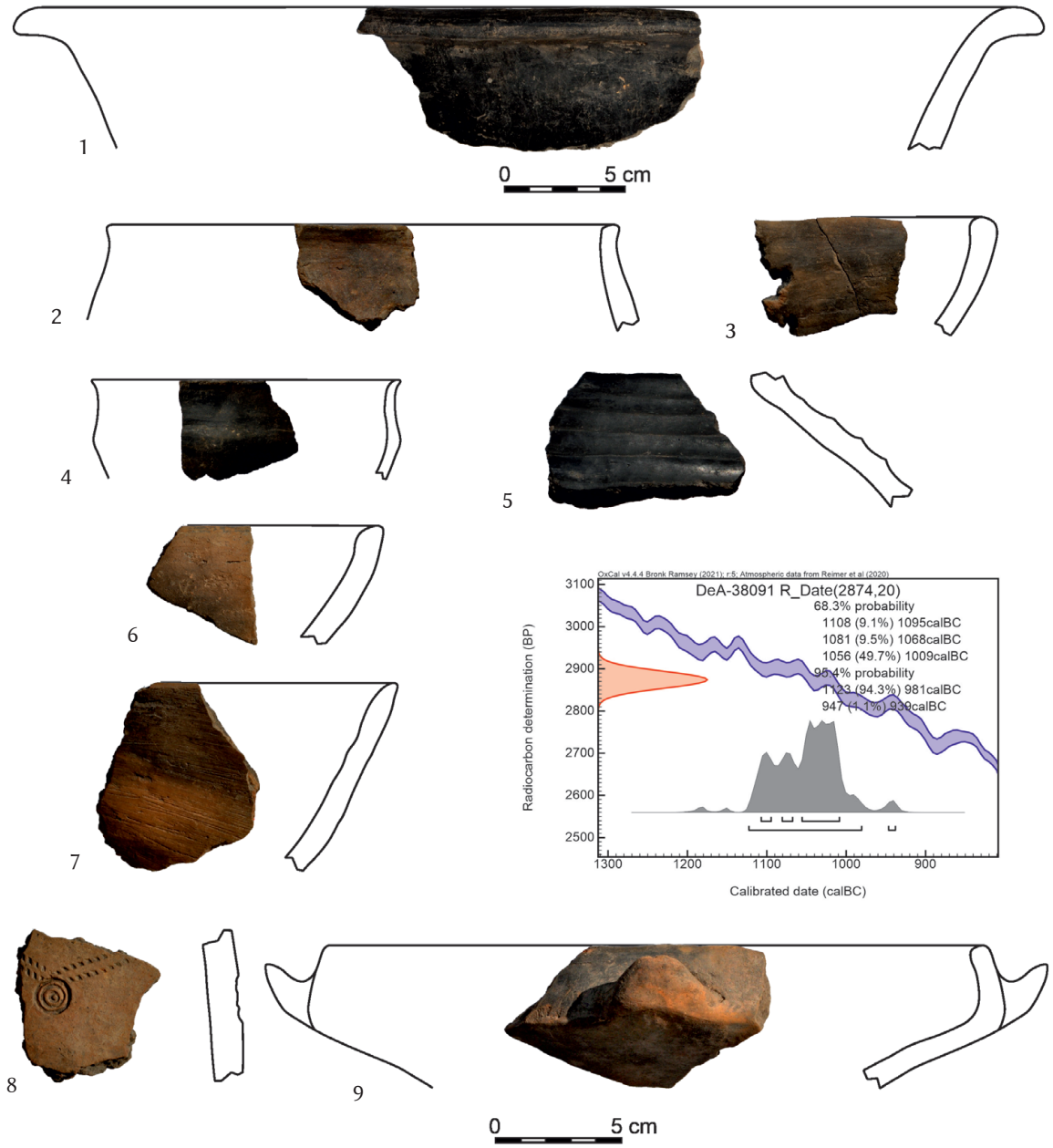


Fig. 3. Pottery finds from the Bancu-Potovszky-kert site and the calibrated ^{14}C diagram

3. Covasna/Kovászna-Hankó stream valley

In 2022, during a rescue excavation on the left terrace of the Hankó stream at Covasna several features were identified, belonging to different periods. The site is located at the foot of a mountain, on which a possible EBA and MBA fortification was identified. At the mentioned terrace the magnetometric survey revealed a semi-circular anomaly, which was interpreted as a ditch. In the filling of this feature ceramic vessel fragments, animal bone and small charcoal pieces belonging to the Jigodin Culture were found. Also during the research an LBA pit was excavated, with several pottery fragments and animal bones belonging to the Gáva Culture.[63]

Three samples were sent from the site for radiocarbon dating, two from the EBA ditch and one from the LBA pit. One of the samples from the ditch contained less than 1% of collagen, making the

63 Buzea – Puskás in press.

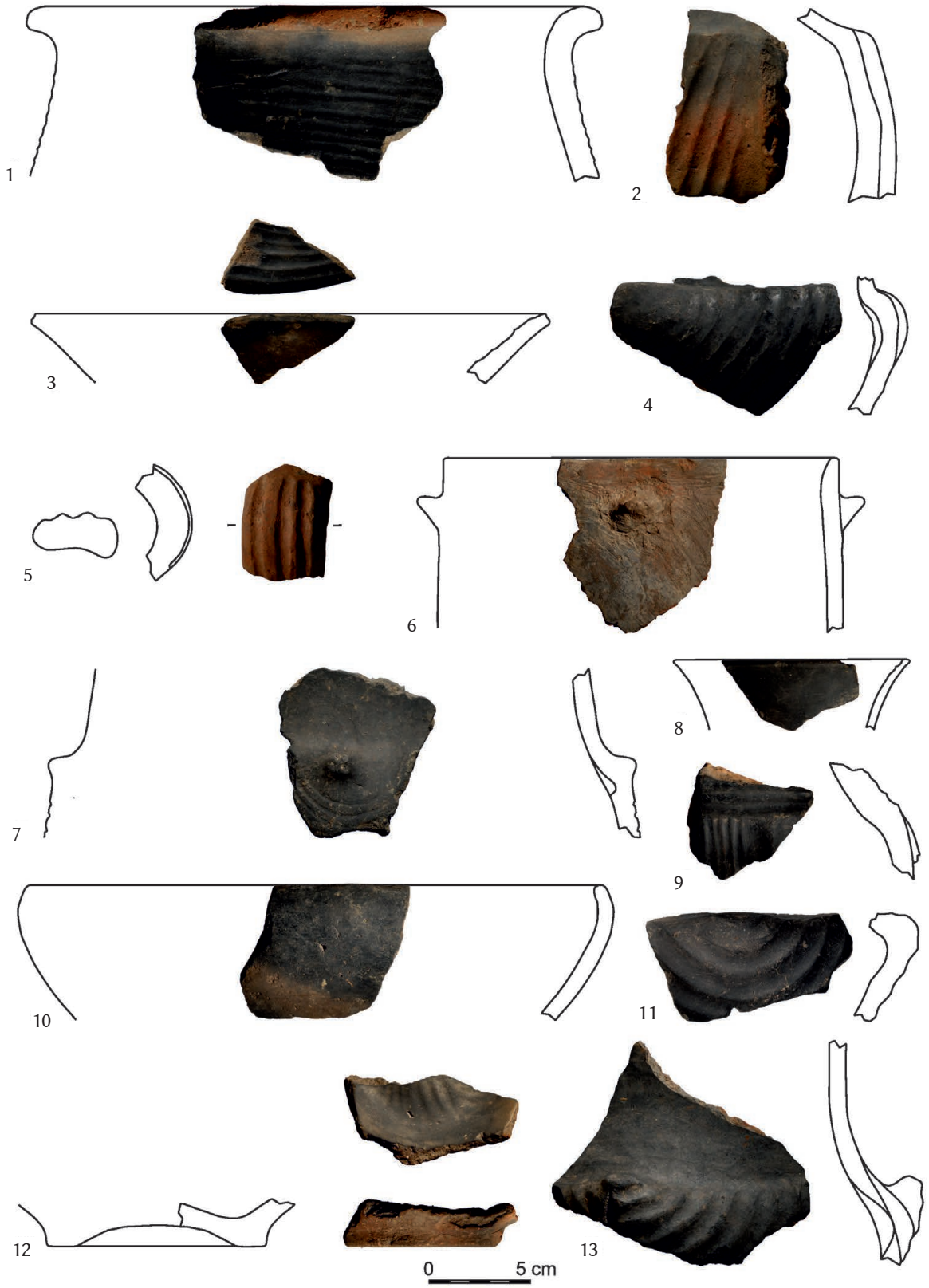


Fig. 4. Characteristic Gáva pottery recovered from the Cernat-Hegyes site

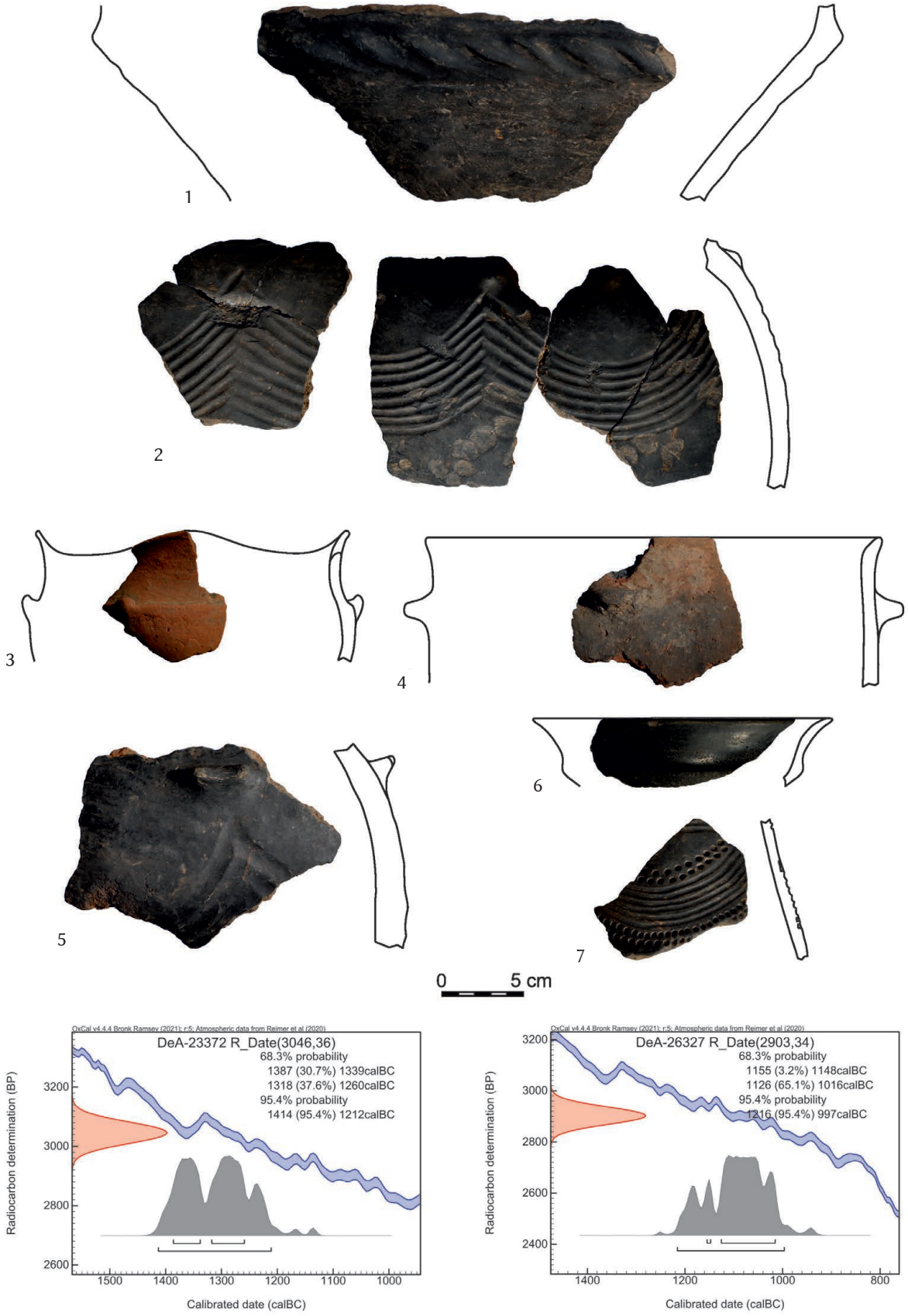


Fig. 5. Characteristic Gáva pottery and the calibrated ^{14}C diagrams from the Cernat-Hegyes site

radiocarbon measurements impossible. The other sample (DeA-42060) resulted 3711±29 BP year.[64] The calibration of this data has provided 2191–2038 cal BC of 1-σ, or 2200–1985 cal BC of 2-σ accuracy (2200–2026 cal BC at 94.6% accuracy). The ^{14}C-AMS measurement for the sample sent from the LBA pit provided the 2829±25 BP data. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1012 and 931 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1053 and 907 cal BC (Figs 6–7).

4. Hătuica/Hatolyka-Alsó nagyútmente/Közösláb

During field walking in 2019 between Hătuica and Mărtineni/Kézdimartonfalva villages, on the right bank of the Feketeügy River, traces of a Gáva settlement were identified. The settlement covers approximately 32 ha. In this area five circular features were observed, having lighter colour compared to the surrounding soil. They resemble the so-called 'ash mounds' identified in the Noua settlements. In the same way they contain a higher quantity of archaeological material (pottery and bone fragments), all belonging to the Gáva Culture.

For radiocarbon dating (to be sure they belong to the mentioned culture) one bone sample was sent from the feature 5. The ^{14}C-AMS measurement provided the date 2795±29 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 989 and 907 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1015 and 838 cal BC (Fig. 8).

5. Leliceni/Csíkszentlélek-Kőhegy

The first excavations at the site called Kőhegy were conducted by Z. Székely in 1956,[65] which were continued in 1969, 1971, 1973–1977 by P. Roman.[66] The research resulted a significant amount of archaeological material, composed of pottery fragments, stone tools, animal bones and fragments of casting moulds made of clay. Since the site was fortified in Late Iron Age the upper layers of the Early Bronze Age cultural layers were significantly disturbed, and most of the ceramic fragments were discovered in the rampart. Even so in some areas undisturbed EBA depositions were found, sometimes measuring half a meter in thickness, making possible the observation of three different cultural layers.[67] In these layers five or six house remains were identified.[68] The ceramic material belongs to the Jigodin Culture, characterized mostly by geometric decorations executed with 'impressed cord' technique.

For radiocarbon dating we tried to select bones from all the three layers, from the filling of the respective houses. This concept could be implemented only partially, since not all the features contained bone material (that could be identified).[69] Five samples were sent to the lab at Debrecen, Hungary, taken from the area of the second and third dwellings.[70]

The second dwelling was discovered during the 1976 campaign, in the western sections of the excavations, in trenches S IVc, f and h.[71] The house was partially preserved, sunken in the local stone. On the floor a hearth had been constructed. The filling of the pithouse was made of grey colour soil,

64 The collagen content of the sample barely exceed 1%.

65 Székely 1959a, 238.

66 Roman et al. 1992, 144–145.

67 Roman et al. 1973, 561–562.

68 Roman et al. 1992, 152.

69 Most of the material discovered at the site is under registration, kept in large boxes, and thus difficult to study.

70 For detailed stratigraphic description see Roman et al. 1992, 146–148.

71 Roman et al. 1992, 137, Abb. 13.1, 140, Abb. 16.

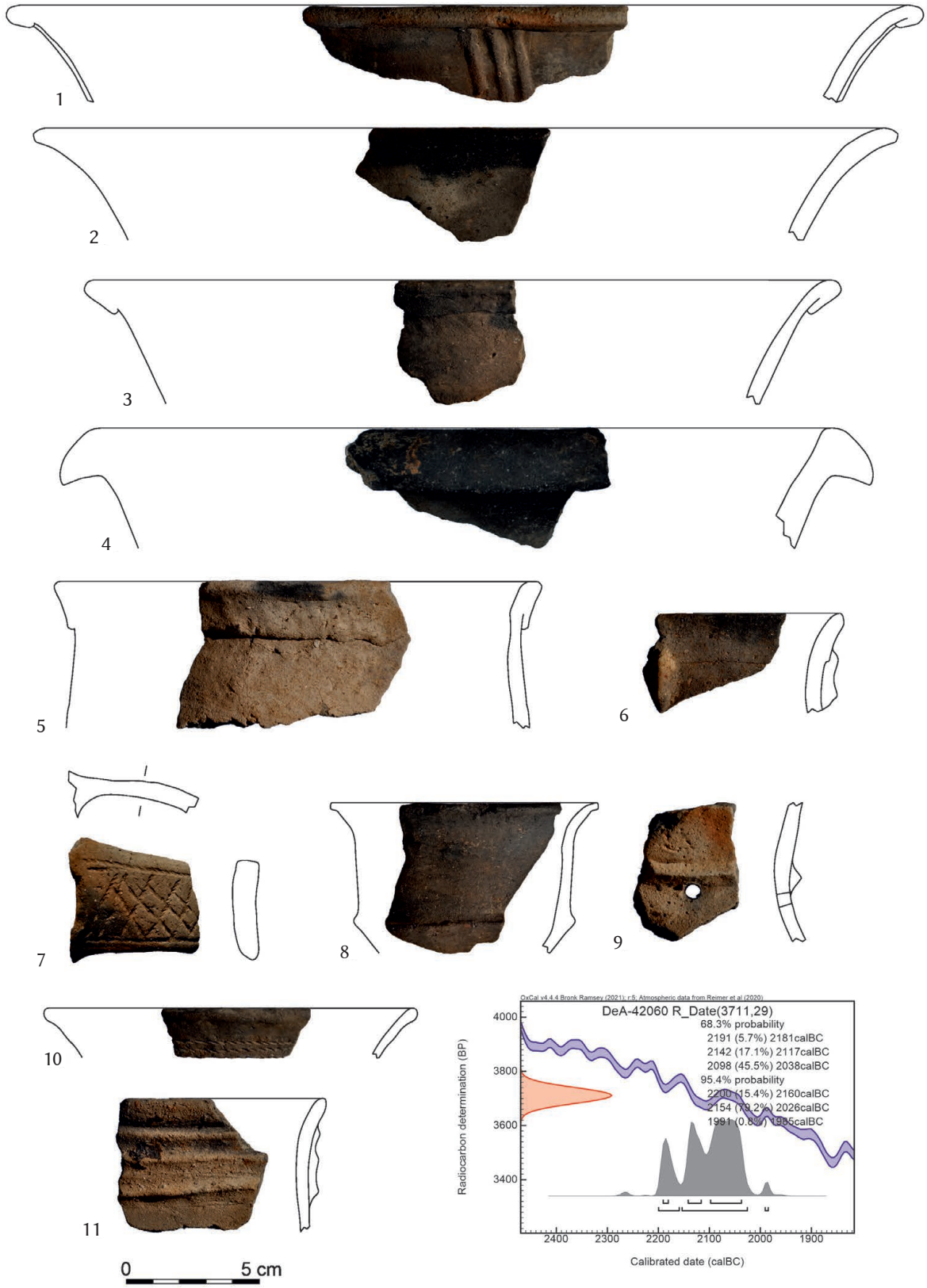


Fig. 6. Pottery fragments and the calibrated ^{14}C diagram from the EBA ditch at Covasna-Hankó stream valley site

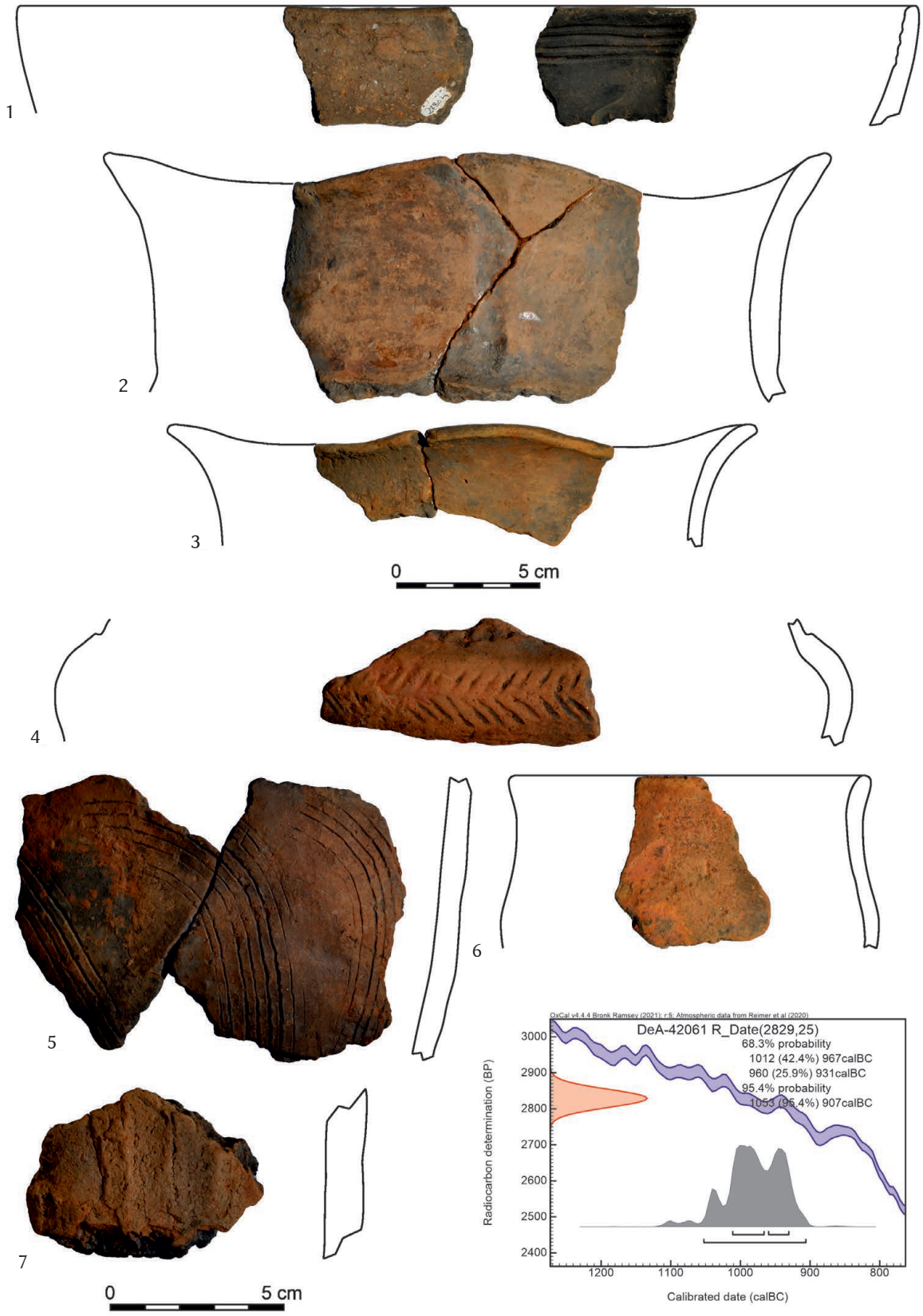


Fig. 7. Calibrated ^{14}C diagram and pottery fragments recovered from the LBA pit at Covasna-Hankó stream valley site

without any traces of wooden structures. The house is considered to have belonged to the uppermost, final settlement level.[72] From the fill of the dwelling a fragmentary animal bone was sent for radiocarbon dating (DeA-37595). The measurement gave the 4133±23 BP result, while the calibrated data has given a 68.2% probability (1-σ) for a dating between 2857 and 2631 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 2871 and 2584 cal BC.

The third house discovered in the eastern sector, in trenches S IIb-c, S VIII a'-b and S IX, was probably also a pit-house. On the floor possible clay plaster and battered floor remains were identified, but the exact contour and dimensions of the dwelling could not be determined. In the house an oval hearth was found, surrounded by three post holes. Above the hearth and in the filling of the dwelling several pottery fragments and bone objects were found. The feature belongs to the second, middle layer of the EBA. From the area of the third house three samples were sent for measurements. The first one was from S VIIIb and it was an animal bone fragment from the layer above the house (DeA-37593), which gave the radiocarbon measurement of 3951±22 BP, calibrated to the span of 2561 and 2360 cal BC for 1-σ, or 2567 and 2347 cal BC for 2-σ (Fig. 9). The second sample was also an animal bone fragment discovered on the floor of the dwelling at the depth of 112 cm. The analysis provided the 3913±21 BP data (DeA-37594). The calibration gave the 2464–2349 cal BC 1-σ result and 2469–2305 cal BC for the 2-σ interval (Fig. 10). The third sample (DeA-37596) was found -15 cm deep below the floor of the house, in the middle of the bluish soil mixed with humus and burnt clay fragments.[73] The ^{14}C-AMS measurement provided the date 3922±22 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 2468 and 2350 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 2471 and 2305 cal BC.

The last sample (DeA-37755), discovered at a depth of -160 cm of S IIc was collected from the bottom of the layer situated below the House 3 (from the layer where the DeA-37596 sample was collected). The measurement gave the 3879±23 BP result, while the calibrated data has given a 68.2% probability (1-σ) for a dating between 2453 and 2299 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 2463 and 2287 cal BC.

6. Mărtineni/Kézdimartonfalva-Völgyoldal

The LBA settlement at Mărtineni-Völgyoldal was discovered during a field survey in 2016. On the surface at least two 'ash mounds' were identified, where several pottery and bone fragments were collected.

For the dating of the site a fragment from a crenated scapulae was sent to radiocarbon dating (DeA-26329), which was discovered in the first 'ash mound'. The ^{14}C-AMS measurement provided the date 3161±31 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1495 and 1411 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1503 and 1322 cal BC (Fig. 11).

7. Moacşa/Maksa-Zádogos-tető[74]

At the platou called Zádogos-tető three burial mounds were visible at the beginning of the 20th century.[75] In a short report it is mentioned that all the three tumuli were investigated, but only one provided archaeological material, namely a stone cist grave with a few charcoal and ceramic fragments.

72 For more details see Roman et al. 1992, 153.

73 Roman et al. 1992, 141, Abb. 17.a.6.

74 In the older literature the name of the village where the discovery was made is mentioned as Eresteghin or Eresztevény in hungarian. Today this is part of the Moacşa village.

75 JSzNM 1910, 47–48.

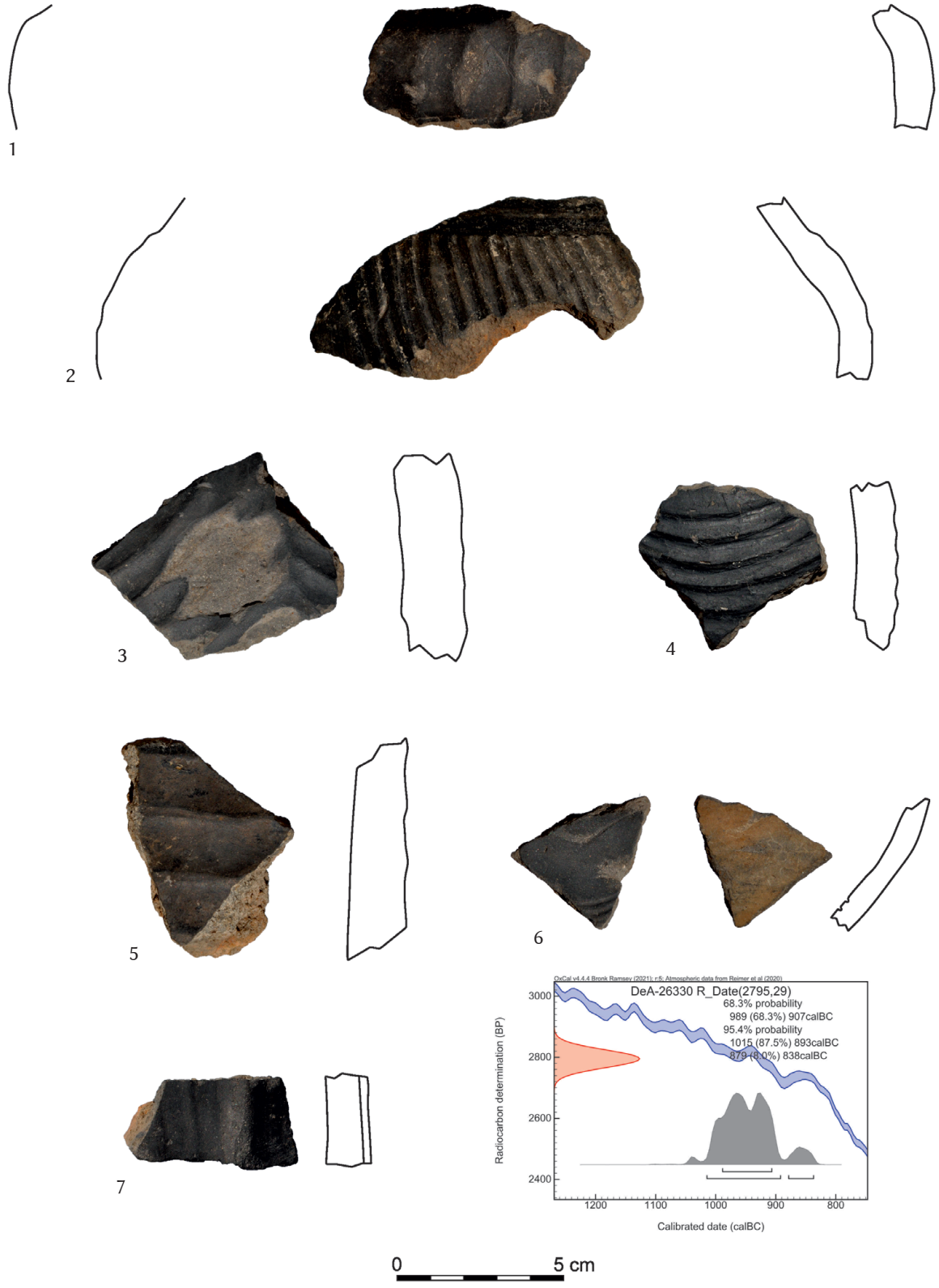


Fig. 8. Pottery finds from the feature 5 at the Hătuica-Közösláb site and the calibrated ^{14}C diagram

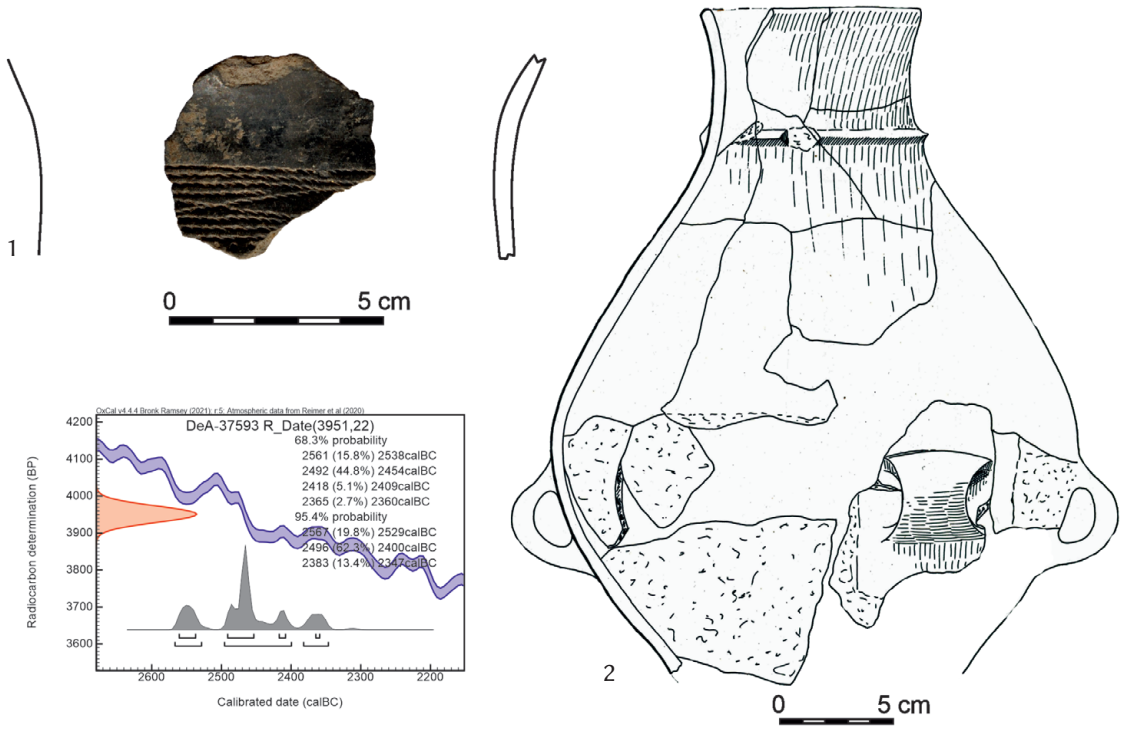


Fig. 9. Pottery finds and the calibrated ^{14}C diagram from the layer above the dwelling 3 from the Leliceni-Kőhegy site (2 – after Roman et al. 1992, Taf. 142.2)

The inner dimensions of the cist were 120 × 70 cm. In 1979 a second tumulus was destroyed by a bulldozer, revealing another stone cist, with a human skeleton and a vessel with impressed cord decoration.[76] The tumulus was c. 12 m in diameter and 2 m high. The deceased was probably a young man, less than 20 years old. He had been placed in the cist with his head to east, facing north and with his legs to the west. The cist was 202 cm long and 72 cm wide, while the inner dimensions were 152 cm by 72 cm.[77]

For radiocarbon measurement the middle part from the humerus was collected. The analysis provided the 4186±22 BP data (DeA-37591). The calibration gave the 2879–2703 cal BC 1-σ result and 2886–2673 cal BC for the 2-σ interval (Fig. 12).

8. Ozun/Uzon-Kupántag

In 1988, during field works a cemetery with inhumation and incineration burials, and traces of a settlement were discovered. In the following years (1989–90), archaeological excavations were made in the area. The information about the number of discovered graves are unclear. The author of the excavations dated the settlement, as well the cemetery, to the LBA Noua Culture, considering it to have been a bi-ritual cemetery.[78] Later this was questioned by many researchers and the cremation burials were attributed to the Wietenberg Culture, while the inhumation burials to the Noua Culture.[79]

76 Székely 1980a, 41–44.

77 The outer and the inner width probably were not measured at the same place. The photos suggest that the cist was somewhat asymmetrical. This could explain the differing inner and outer width.

78 Székely 1997c, 101–106.

79 Motzoi-Chicideanu 2011, 540; Bălan 2017, 163–164; Popa 2019, 65.

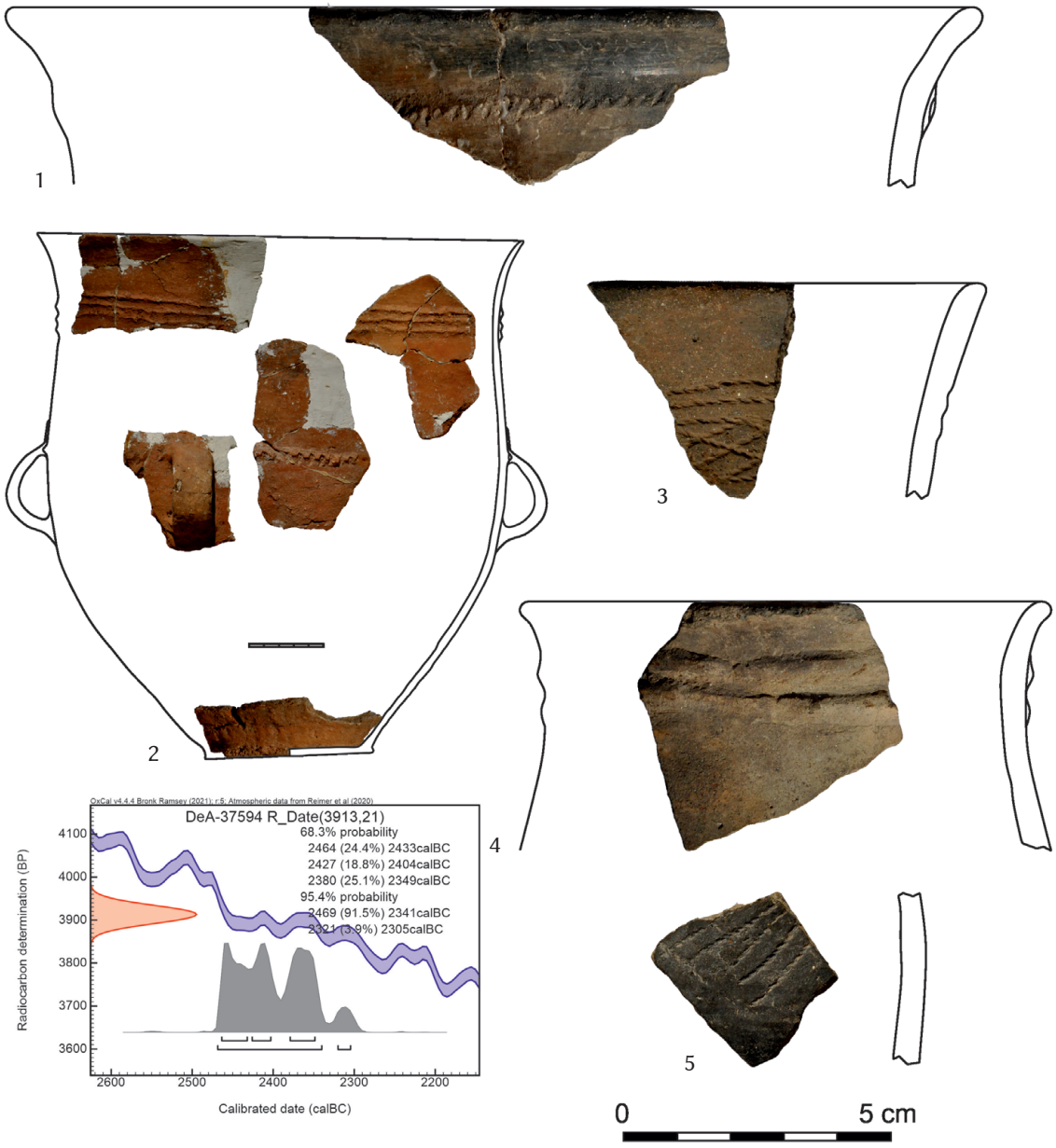


Fig. 10. Pottery finds and the calibrated ^{14}C diagram of the dwelling 3 from the Leliceni-Kőhegy site

For radiocarbon measurements a sample was taken from the cremated bone remains discovered in 1988.[80] These had been placed in urn covered with a lid and placed in a small pit. From the cremated bones one sample was sent for radiocarbon dating (DeA-23492). It has given the 3377±28 BP result. The 1-σ calibration value has given result between 1732 and 1622 cal BC, while the 2-σ the 1745–1545 cal BC date (Fig. 13).

9. Peteni/Székelypetőfalva-Alsóhatár

The first excavations at Peteni-Alsóhatár were carried out in 1960, and were continued in 1978–1980.[81] The area was used as cemetery during the 12th–13th centuries AD, overlapping a LBA settlement

80 Until now other skeletal remains aside from the one presented above could not be identified in the collection of the Székely National Museum.

81 Székely 1965, 21–32; Székely – Székely 1979, 71–72; Székely 1980b, 129–133.

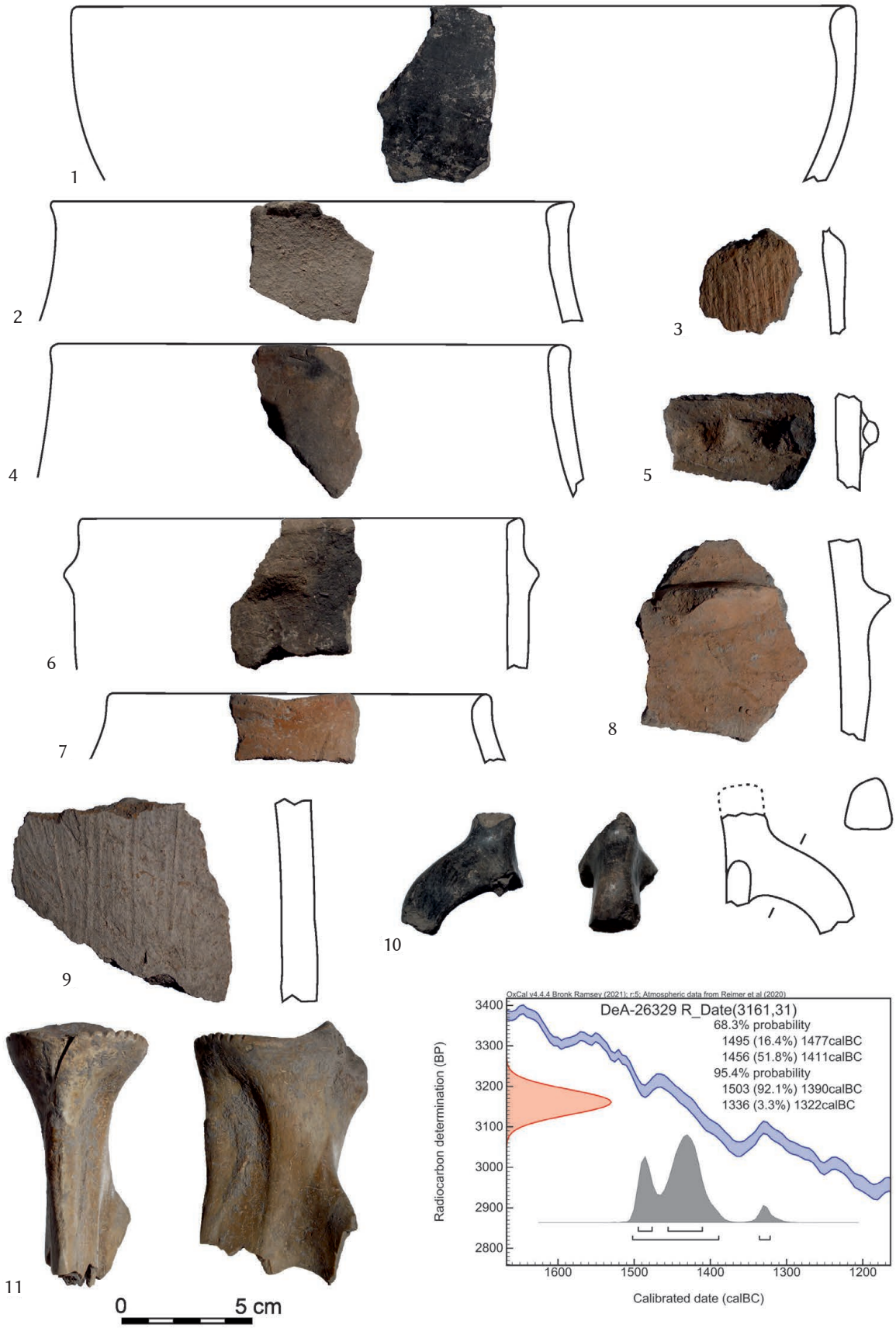


Fig. 11. Characteristic Noua-type finds and calibrated ^{14}C diagram from the 'ash mound' 1 at the Mărtineni-Völgyoldal site

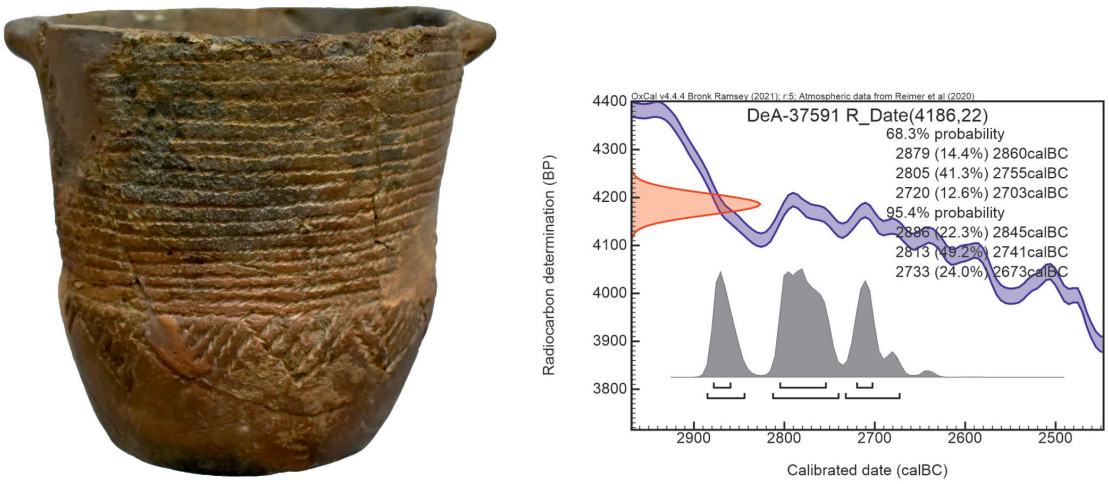


Fig. 12. The vessel and calibrated ^{14}C diagram from the cist grave at Moacşa-Óriáspince-tető burial mound

with an 'ash mound'. During the excavations part of the 'ash mound' was investigated, resulting a large quantity of pottery fragments, clay objects, bone and stone tools, etc. In the archaeological documentation there is also a reference to a few pits and houses, but the archaeological material was not selected by features. This makes it hard to correlate the radiocarbon dating with the pottery, but gives us some clues as to the beginning and duration of the settlement.

Two bone samples were sent to the laboratory at Debrecen, where ^{14}C analyses were made. The first sample was taken from a bovine crenated scapula (DeA-24130), giving the 3294±24 BP years result. The 1-σ calibration value has given the result between 1609 and 1518 cal BC, while the 2-σ the 1616–1508 cal BC date. The second sample was the teeth of herbivore (bovine or horse). The ^{14}C-AMS measurement provided the date 3241±24 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1531 and 1457 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1598 and 1438 cal BC. For this sample the probability of a date between 1541 and 1438 cal BC is high (94.8%) (Figs 14–15).

10. Porumbenii Mari/Nagygalambfalva-Várfele

The Porumbenii Mari-Várfele site has been known in the archaeological literature since the end of the 19th century.[82] In 2007 a rescue excavation was made in an area of 3.5 m by 3.5 m, because in a disturbance made by wild boars several pottery fragments were discovered. The excavation brought to light a pit with broken storage vessels belonging to the Gáva Culture. In the pit bone fragments were found belonging to at least three cattle, one pig and a horse.[83]

In 2020 two samples were sent to ^{14}C analysis from the horse skeleton. The first sample (DeA-31006) was a molar, while the second (DeA-31007) a bone fragment from the skull. The first sample has given a result of 2922±27 BP, while the second 2892±30 BP. The DeA-31006 sample has a 1-σ calibration between 1194 and 1054 cal BC and 2-σ calibration between 1215 and 1016 cal BC. The other sample has a similar calibration value. At 1-σ has given a result between 1117 and 1016 cal BC, while at 2-σ 1203–941 cal BC (1203–983 – 95.1%) (Figs 16–17).

82 Nagy – Körösfői 2010, 133–134.

83 Kelemen 2010, 153–154. We also would like to thank to Zsolt Körösfői for giving access to the material in the mentioned site.

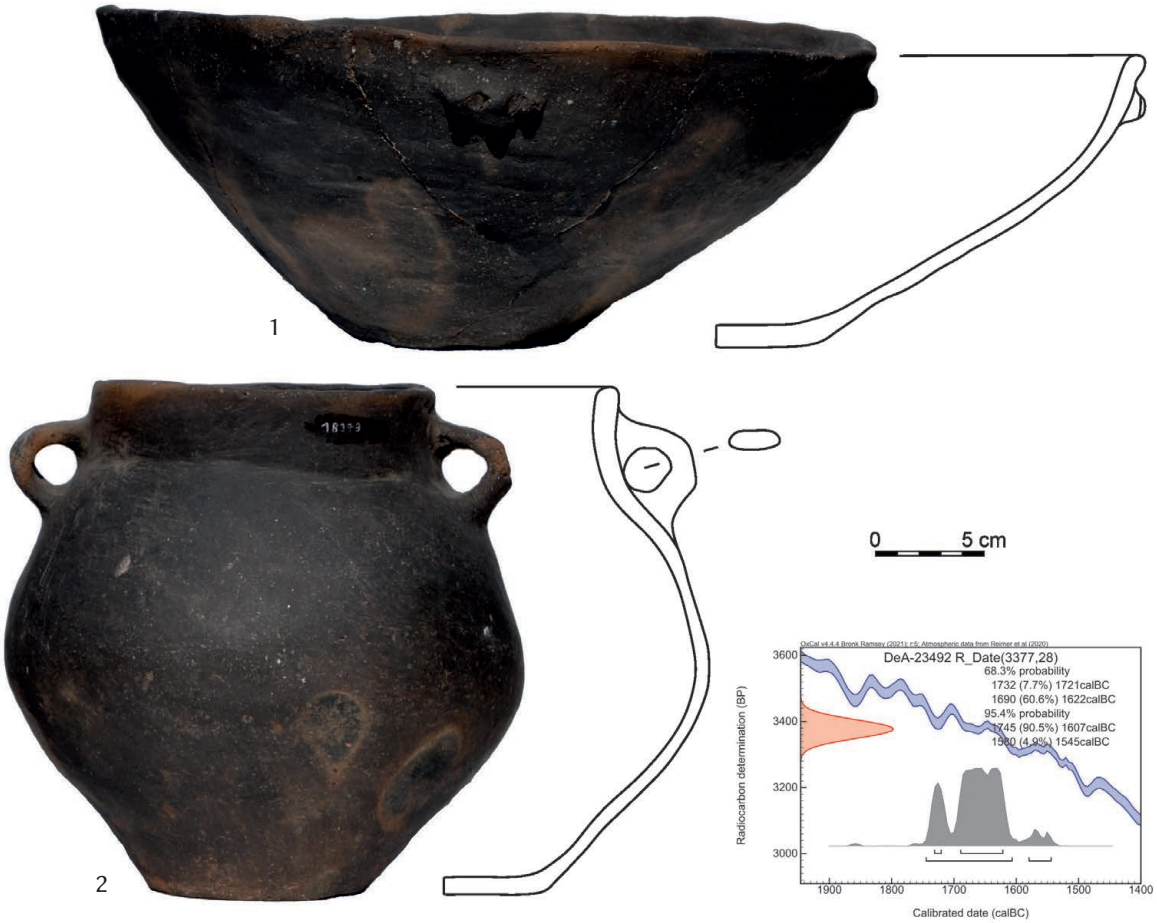


Fig. 13. The pottery assemblage and calibrated ^{14}C diagram from the cremation grave at Ozun-Kupántag cemetery

11. Poian/Kézdipolyán, Kézdiszentkereszt-Kőhát

In the early 1960's on a shallow slope of the Telek/Veres árok stream, between Poian and Belani, archaeological material was found during field-work. Between 1963 and 1967 Z. Székely investigated the area in five campaigns. Through the excavations several MBA and LBA (Noua and Gáva Cultures), Late Iron Age and Late Migration period features were discovered. In the MBA findings the Wietenberg material was dominant, with a few sherds belonging to other cultures—Costişa/Ciomortan and Monteoru.

In 1967 at the western end of Trench 16 a child's grave was discovered at a depth of 0.35 m. The body was lying in a north-south direction, on its back, in contracted position. The head was placed into south direction, facing east. The publication of the grave also mentioned a small bowl as grave-good, placed near the head.[84] This information is differently mentioned in the excavation journal: a twisted bronze wire is mentioned, which is probably a fragment of a bracelet, and a small bowl with *Furchenstich*, both found in the discarded soil where the grave was discovered. These could belong to the grave, but without conclusive evidence it remains only a supposition.

Based on the small bowl, the grave was considered by Z. Székely to belong to the Ciomortan Culture.[85] Later R. Munteanu convincingly argued that this was a Monteoru-type vessel and a Monteoru

84 Székely 1968, 426.

85 Székely 1968, 427.

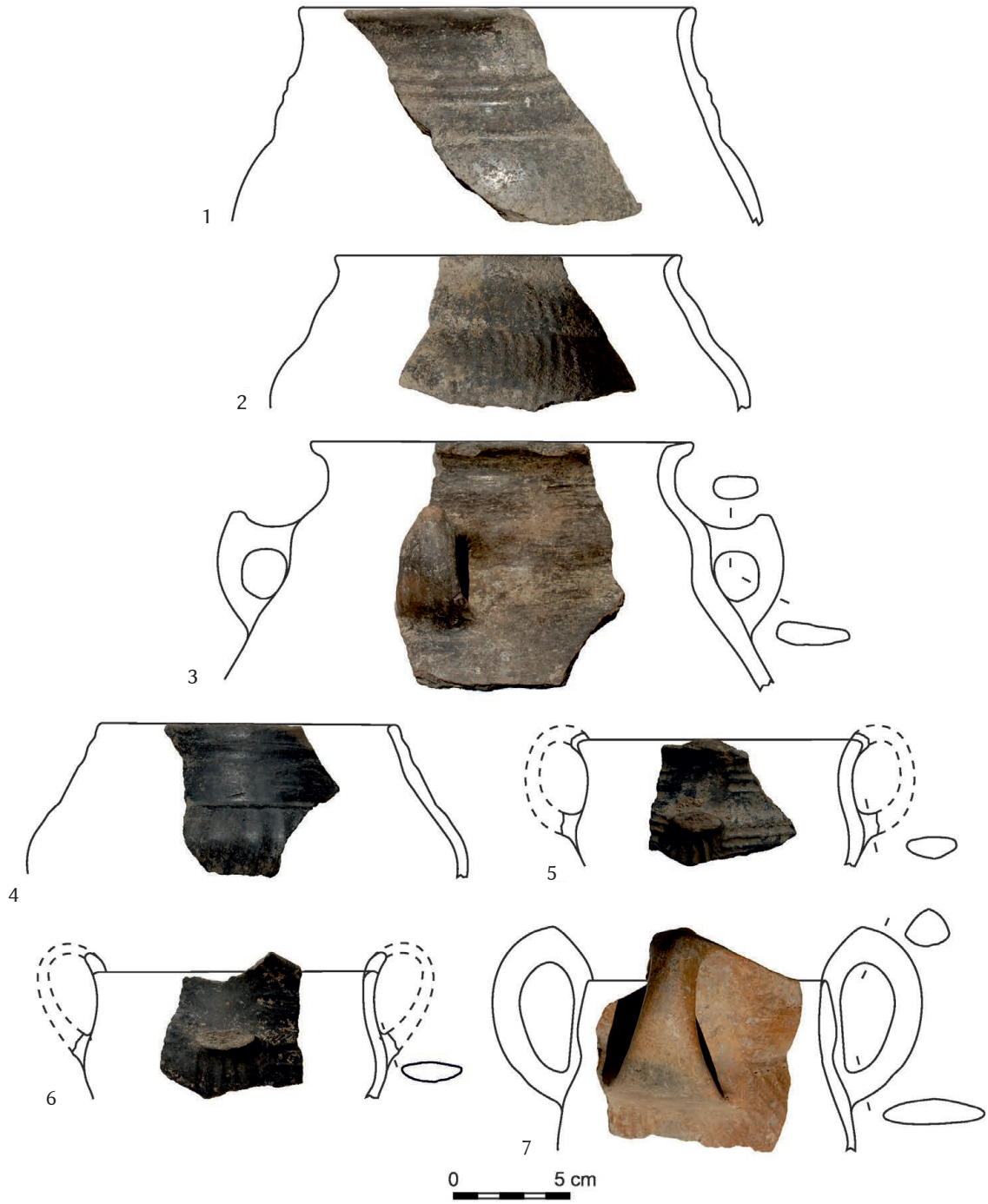


Fig. 14. Late Monteoru or early Noua-type pottery discovered at the Peteni-Alsóhatár site

grave, belonging to the early, Ic3 phase.[86] For radiocarbon dating a fragment of a humerus was chosen. The measurements totally contradicted the previous chronological suppositions, dating the grave to the LBA. The ^{14}C-AMS measurement provided the date 2956±34 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1254 and 1116 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1272 and 1048 cal BC (Fig. 18).[87]

86 Munteanu 2010a, 271–276. This information has been adopted by other authors, as well. See e.g., Puskás 2015a, 100; Puskás 2018a, 227–228.

87 Very likely the small vessel belongs to the early MBA, and got into the grave accidentally, or was mistakenly considered to have belonged to the grave.

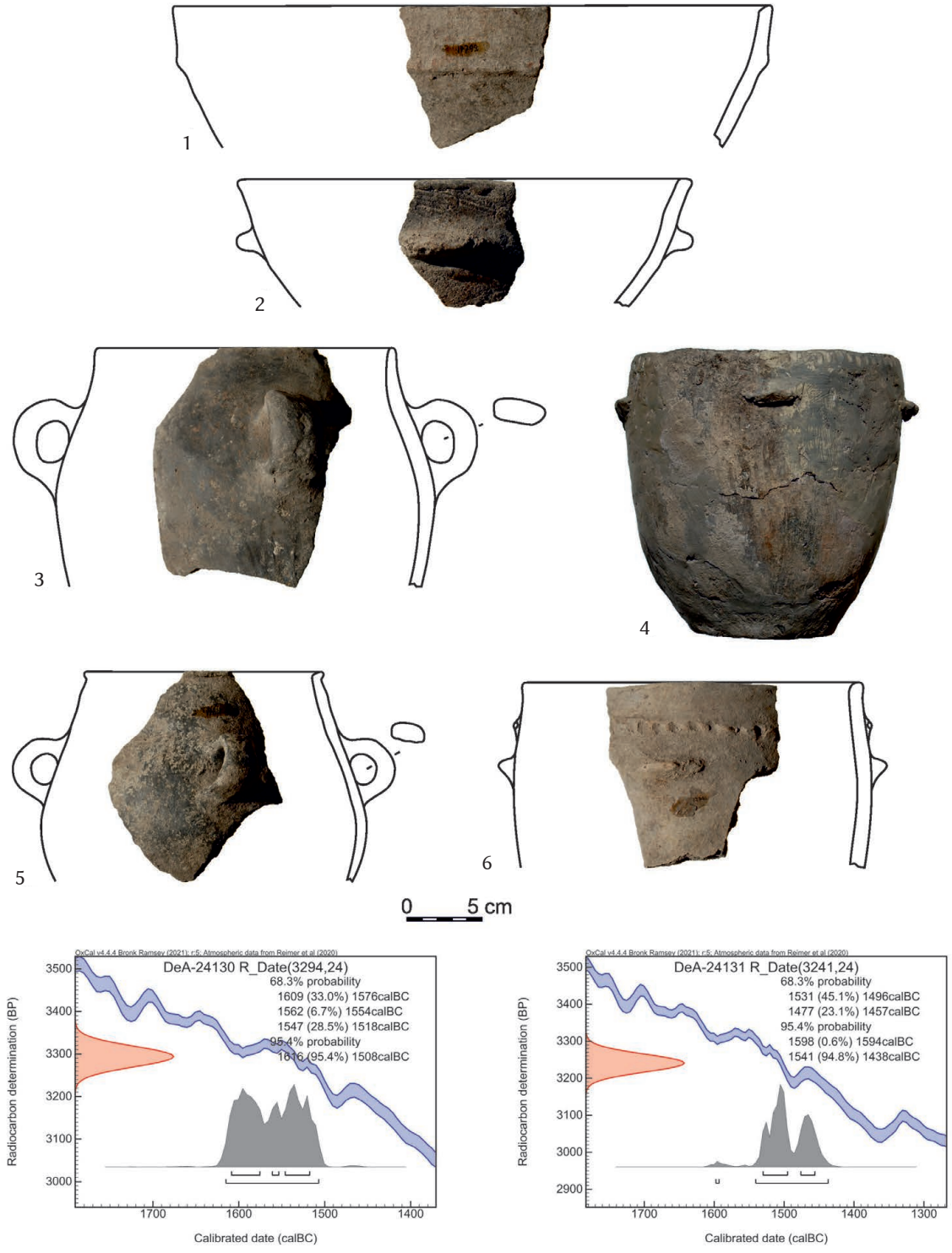


Fig. 15. Noua-type pottery and calibrated ^{14}C diagram discovered at the Peteni-Alsóhatár site

12. Reci/Réty-Dobolyka

The Reci-Dobolyka site is located on a terrace of the Besenyő stream, in the vicinity of the Telek site, that was investigated by Z. Székely between 1957–59. The proximity of the two investigated areas raises the possibility that they belong to the same site.[88] In 2015, during a rescue excavation

88 Ştefan et al. 2018, 150.

near the village of Reci, some 110 features, mostly pits, were investigated. Most of them belong to the Late Iron Age, but some could be dated to the Gáva Culture. Only three of the pits can certainly be attributed to the LBA, while 20 other features did not contain any archaeological material.[89]

From Cx 30 a charcoal fragment was sent for radiocarbon dating. The ^{14}C measurements (RoAMS 1454.114) resulted 2927±30 BP year. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1119 and 1055 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1219 and 1016 cal BC. Since the pit contained mostly Late Iron Age material, the sample probably was an intrusion from the earlier period.

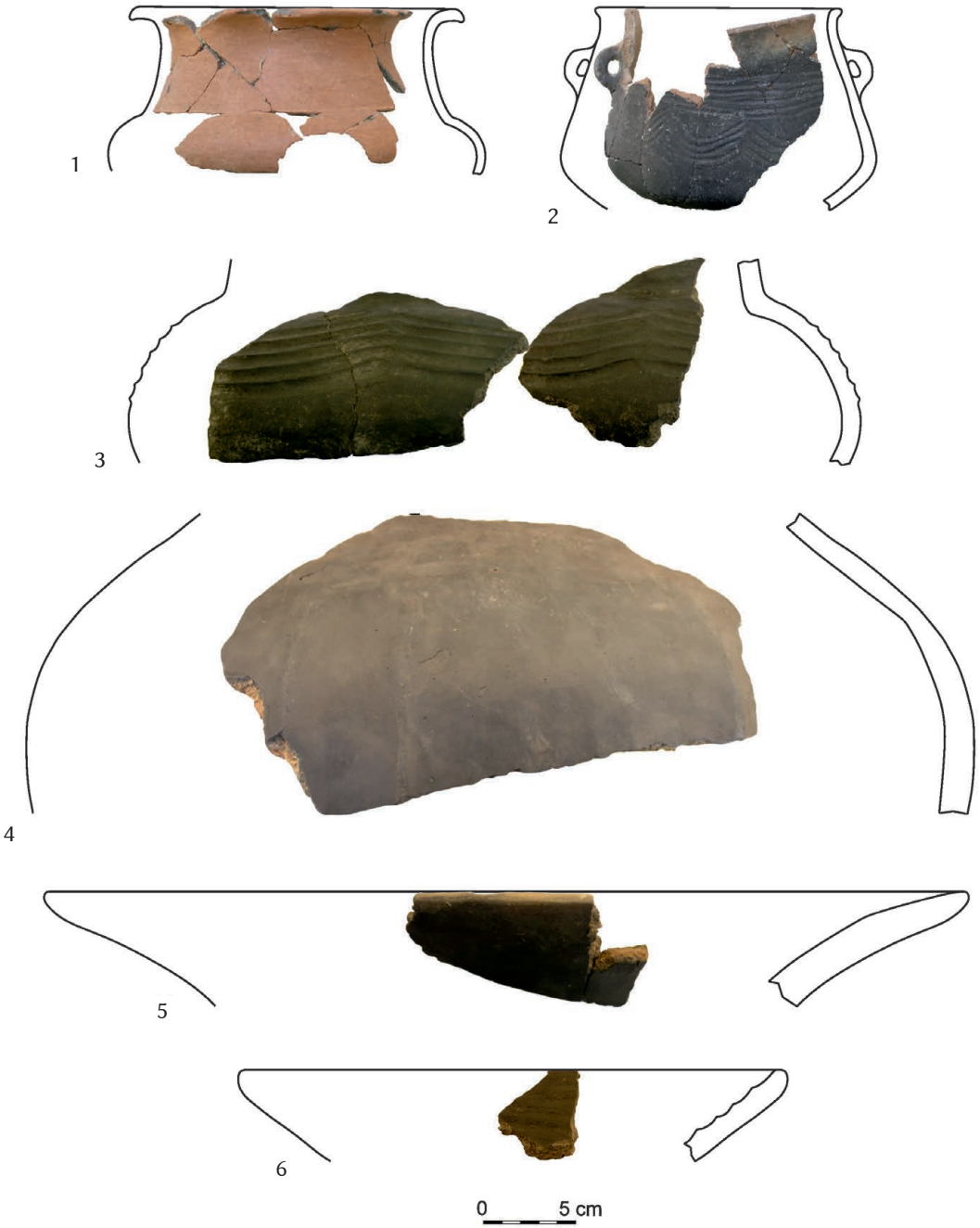


Fig. 16. Characteristic Gáva pottery recovered from the Porumbenii Mari-Várfele site (after Nagy – Körösfői 2010, Figs 4–5, Fig. 7)

89 Ştefan et al. 2018, 140–141. The monographical study of the excavations is in course of publication by Maria-Magdalena Ştefan et al.

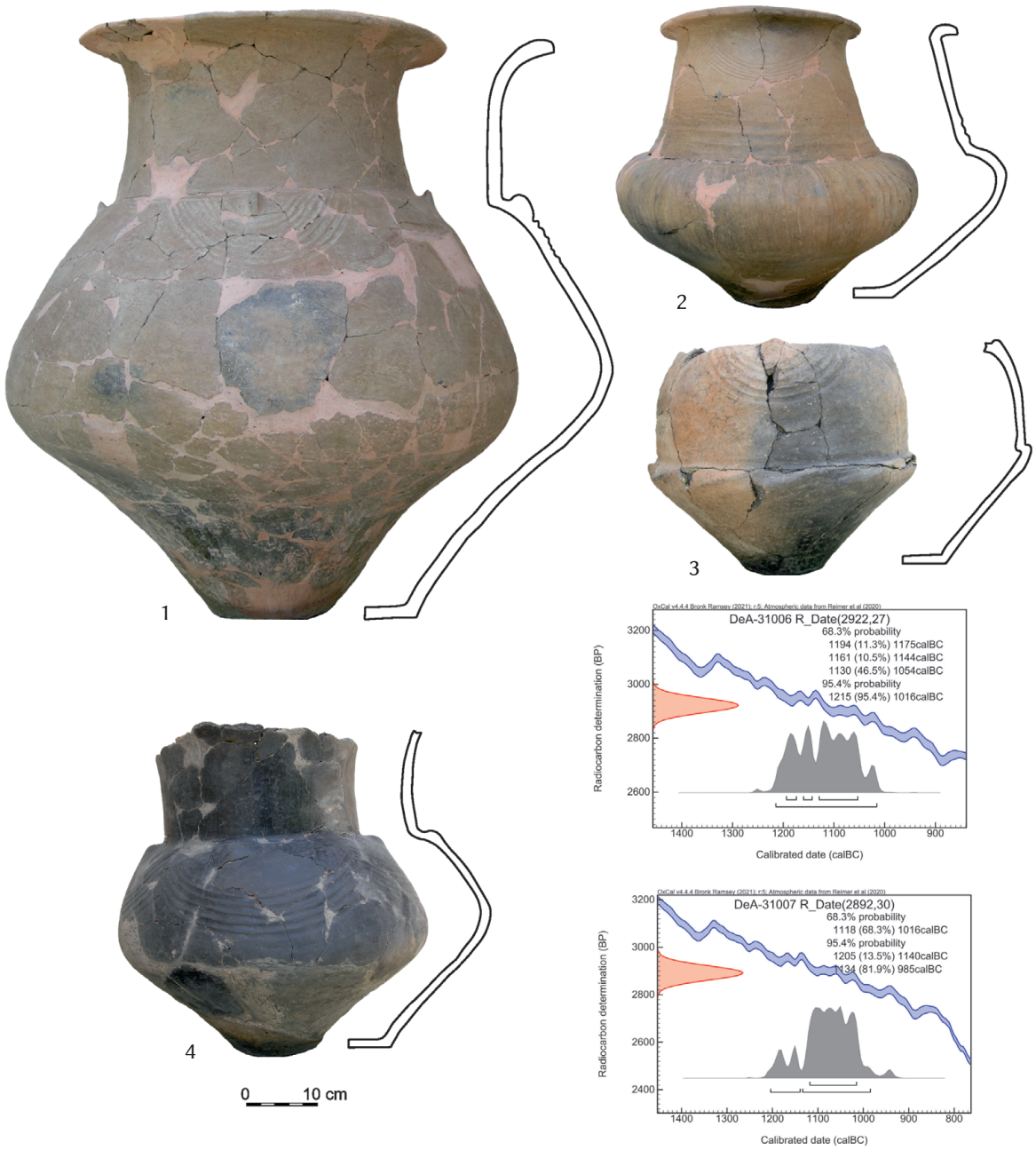


Fig. 17. Characteristic Gáva pottery and the calibrated ^{14}C diagrams from the Porumbenii Mari-Várfele site (after Nagy – Köröspői 2010, Figs 3–4)

13. Săsăuși/Kézdiszászfalu-Középső határ

The site is located on the left bank of the Feketeügy River, on a slightly prominent terrace. The area was inhabited during the MBA (Monteoru and Wietenberg Cultures) and the LBA (Noua Culture).[90] At the southeastern edge of the site three 'ash mounds' are located, clearly visible on the surface.

One sample, which was a teeth of a large size mammal, was sent from 'ash mound' 3 for radiocarbon measurement. The ^{14}C analysis (DeA-31010) provided the 3185±39 BP result. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1498 and 1428 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1530 and 1325 cal BC (1530–1393 cal BC – 94.3%) (Fig. 19).

90 Puskás 2012, 119–122.

14. Sâncrăieni/Csíkszentkirály-Karimósarka

This site is located on a high terrace of the left bank of the Olt river. In the last few years several houses have been built in the area, making rescue excavations necessary. This was the case in 2022, when the area was investigated by L. Darvas in advance of the construction of a garage. During his work 20 features were identified, most of them belonging to the MBA and LBA. Three samples were sent for radiocarbon dating from G9A, G9B and G19. The sample from the G9A pit could not be measured due to poor preservation of collagen (Fig. 20). Since the G9B pit was in superposition compared to G9A (it was later), the data obtained for the sample at the G9B can be interpreted as a *terminus ante quem* for dating the G9A feature. Superposition was documented also in the case of the G19 and G18 features: the latter one being the more recent. So the radiocarbon data of the G19 implies it is a *terminus post quem* for feature G18.

Feature G9B was an oval-shaped pit filled with black soil. The archaeological material consisted of pottery fragments, animal bones and small pieces of charcoal. A bone fragment was sent for radiocarbon dating. The sample (DeA-38093) resulted 3342±23 BP year. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1666 and 1543 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1728 and 1536 cal BC (Fig. 21).

The feature G19 had a circular shape, with widening bottom. The filling was made of black soil, with archaeological material consisting of pottery and luting fragments, animal bones, as well as small pieces of charcoal. For radiocarbon dating a bone sample was sent from the filling of the pit. The ^{14}C analysis (DeA-38094) provided the 3275±19 BP result. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1599 and 1505 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1612 and 1501 cal BC (Fig. 22).

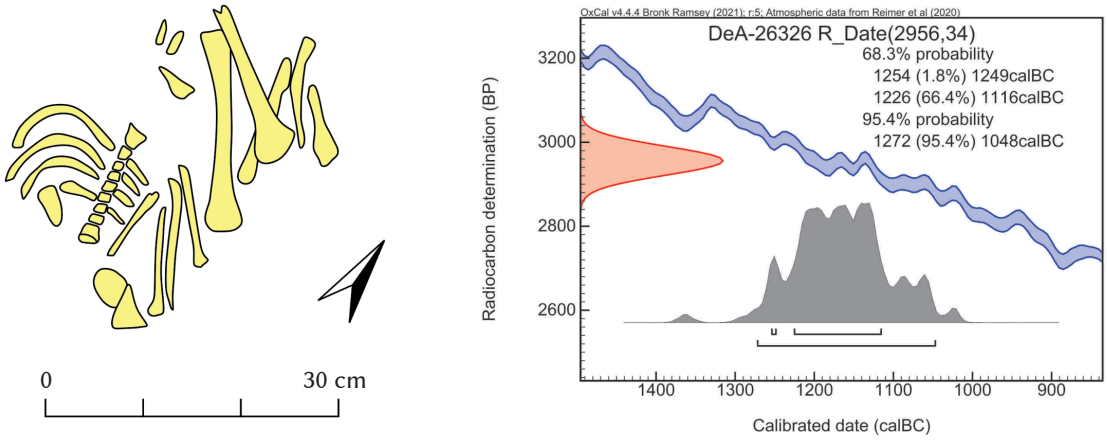


Fig. 18. The skeleton and calibrated ^{14}C diagram from the feature discovered at the Poian-Kőhát site

15. Sânmartin/Csíkszentmárton-Tankó-kert, Harghita County

In 1998, while digging a pit in the courtyard of the Tankó family at Sânmartin, a cist grave made of stone slabs was found. The grave (and the skeleton) had an orientation of ESE–WNW. The stone construction was 137 cm long and 126 cm wide, being made from local stone. The inner dimension was 93 × 50.3 cm. Inside the cist a human skeleton of a young man or woman was discovered, buried in crouched position. Around the hip two bone appliques (probably belt buckles) were found.[91]

91 Szabó 1999, 129–132; Székely 2002, 40–42. There is no anthropological study for the skeleton. The fact that the molar had not yet erupted at the time of death, suggests that the buried person was less than 20 years old.

The first upper premolar of the right side was sent for radiocarbon dating. The ^{14}C-AMS measurement (DeA-38089) provided the date 4098±22 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 2838 and 2580 BC, which corresponds to a 95.4% probability (2-σ) for a dating between 2855 and 2505 cal BC (with high probability between 2855 and 2572 cal BC – 94.8%) (Fig. 23).

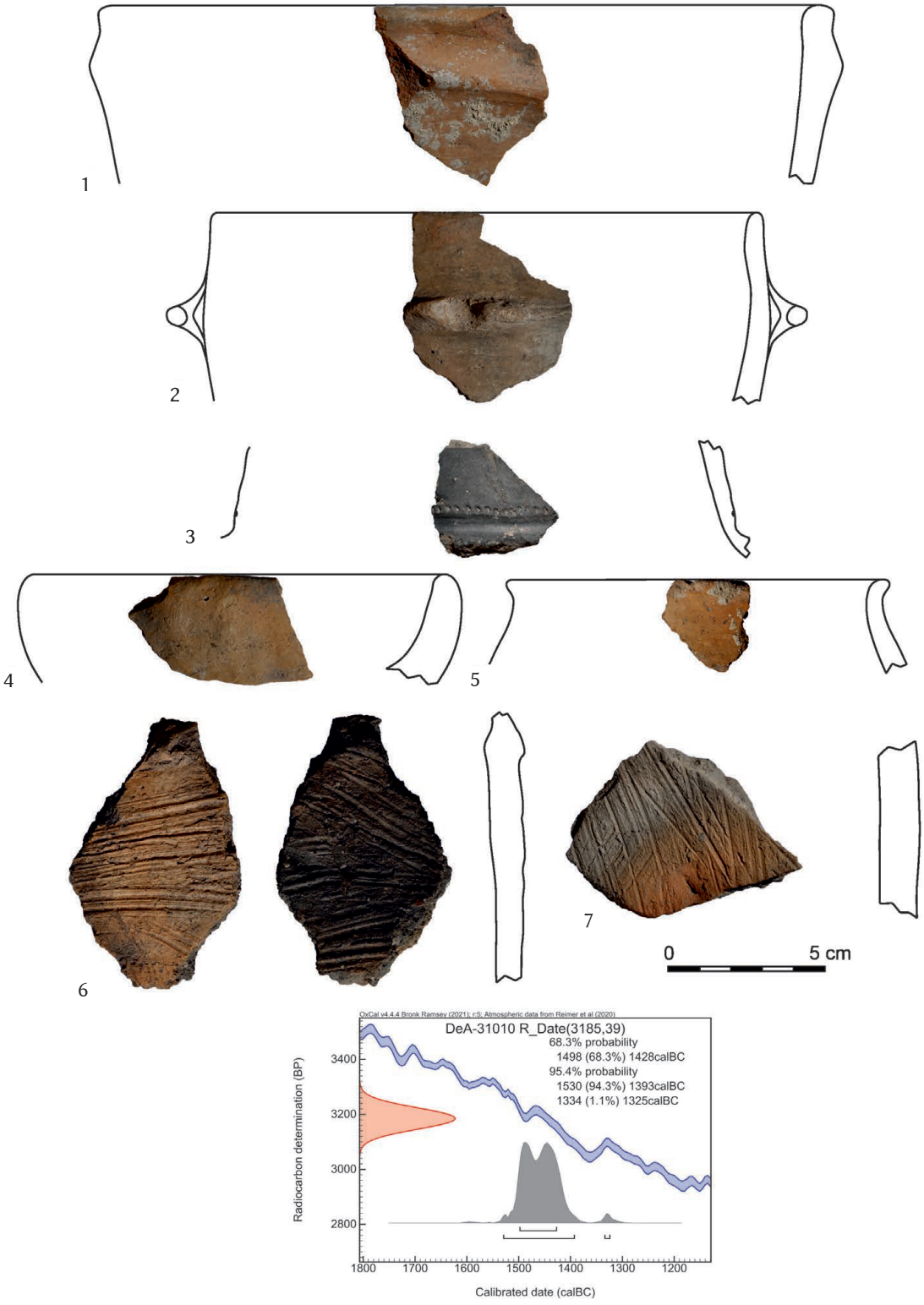


Fig. 19. Characteristic Noua-type pottery and calibrated ^{14}C diagram from the 'ash mound' 3 at the Săsăuși-Középső határ site

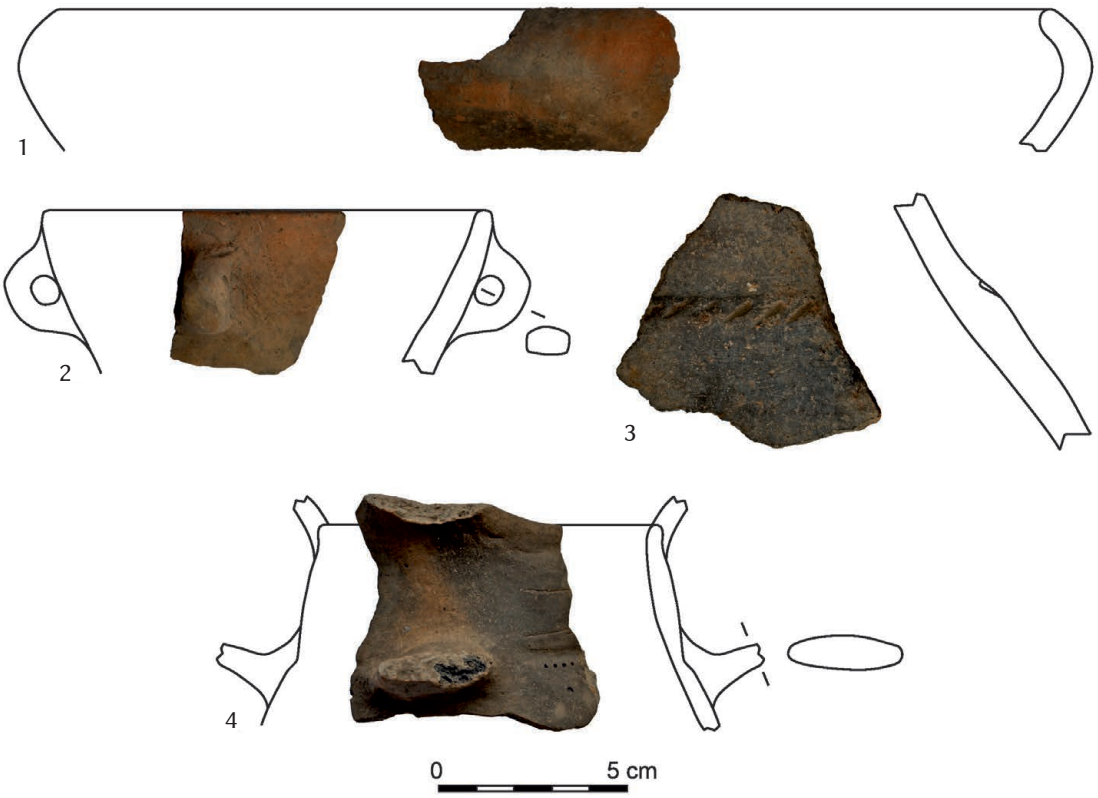


Fig. 20. Late Monteoru pottery from feature 9A at the Sâncrăieni-Karimósarka site

16. Sânzieni/Kézdiszentlélek-Táncospad

The site is located 4 km southeast from the Roman-Catholic church in Sânzieni, on a high, flood-free terrace of the Kászon stream. The area was populated in the MBA and LBA (Wietenberg and Noua Cultures) and later in Roman Period. In 1913 archaeological excavations were conducted by V. Csutak. The results were published in two (very) short reports.[92] The research was made in three sections. In the third section a hearth was unearthed, with carbonized millet seeds underneath.[93] Around the hearth several pottery fragments were discovered, belonging to the Noua Culture, probably in its last phase of evolution.

A small amount of carbonized millet seeds were sent for radiocarbon measurement. The DeA-24242 sample has given a 3005±24 BP result. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1365 and 1208 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1380 and 1128 cal BC (Fig. 24).

17. Sfântu Gheorghe/Sepsiszentgyörgy-Avasalja

The Bronze Age settlement at Sfântu Gheorghe-Avasalja is located on the right bank of the Debren stream, on a gentle slope. At the beginning of the 20th century field surveys were undertaken in the area. Small scale excavations were carried out in 1950 by Z. Székely.[94] In 2009–2010 rescue excavations were made because of the construction of a motocross track. In the 2009 campaign two pits were discovered (G1 and G2). From the filling of feature G1 a large quantity of ceramic material was recovered, with many joinable vessels.

92 JSzNM 1914, 14; JSzNM 1915, 14.

93 Cârciumaru 1996, 114.

94 Székely 1959b, 709–722.

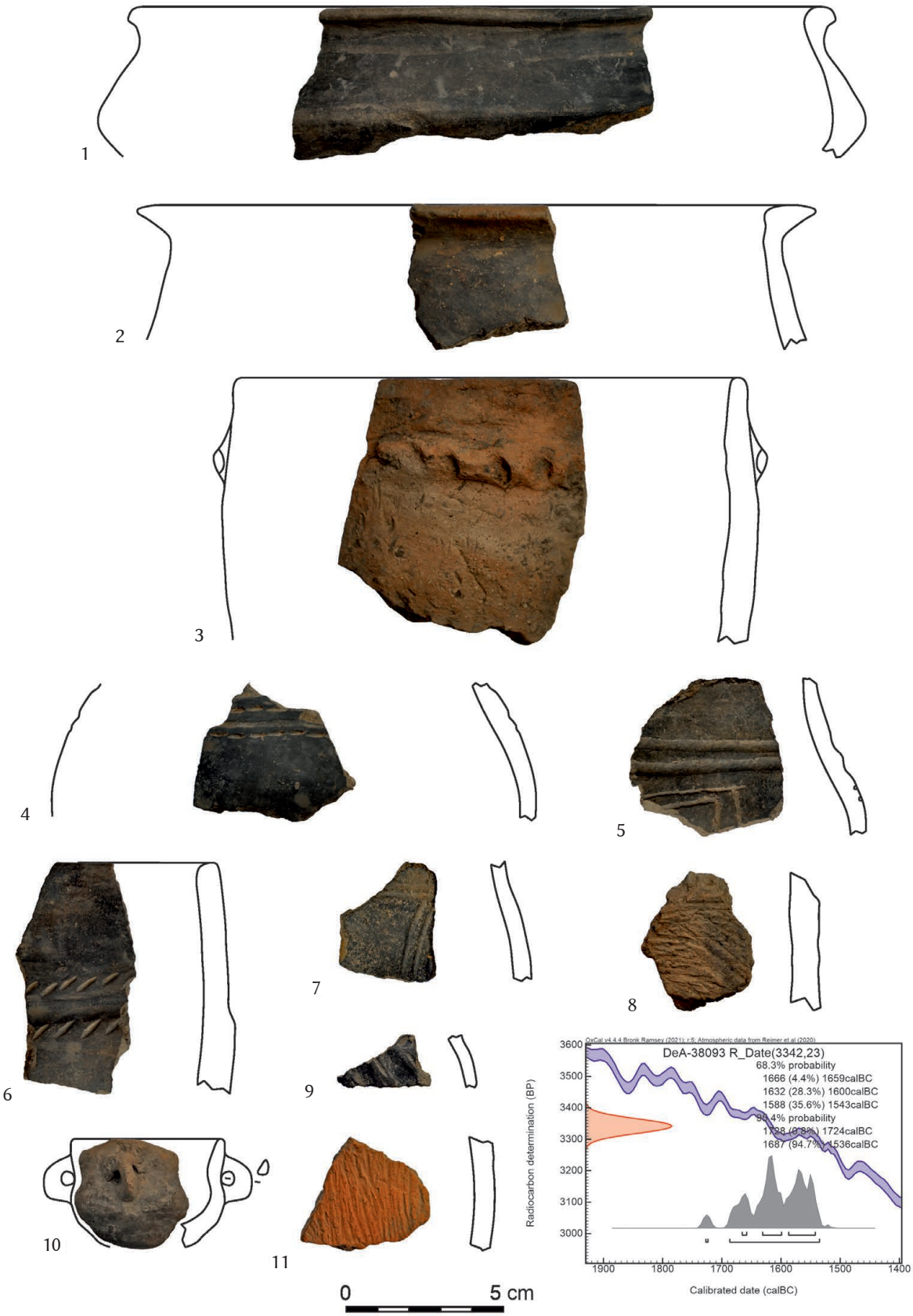


Fig. 21. Late Monteoru pottery and calibrated ^{14}C diagram from feature 9B at the Sâncrăieni-Karimó-sarka site

From the osseous material two radiocarbon samples from G1 were sent to the laboratory at Debrecen. The first sample (DeA-23370) was an animal bone fragment, while the second (DeA-23371) an animal tooth. The first sample has given a result of 3412±35 BP, while the second 3373±32 BP. The DeA-23370 sample has a 1-σ calibration between 1745 and 1632 cal BC and 2-σ calibration between 1874 and 1616 cal BC. The other sample has a somewhat later calibration value: at 1-σ has given a result between 1734 and 1618 cal BC, while at 2-σ 1744–1543 cal BC (Figs 25–26).

18. Turia/Torja-Belső-rétiláb

Traces of a LBA Noua settlement were discovered on the right bank of the Torja stream, on a low prominency, slightly outstanding from the flood-plain of the stream. In the area of the settlement four 'ash mounds' were identified. The site is situated c. 2.5 km east of the Turia Roman-Catholic church. On the surface of the 'ash mounds' several pottery and bone fragments, including bone tools, were collected.

From 'ash mound' 1 a bone fragment belonging to a large-sized mammal was sent for radiocarbon dating. The sample (DeA-26328) has given the 3220±29 BP result. The 1-σ calibration data is between 1507 and 1449 cal BC, while the 2-σ calibration between 1533 and 1428 cal BC (Fig. 27).

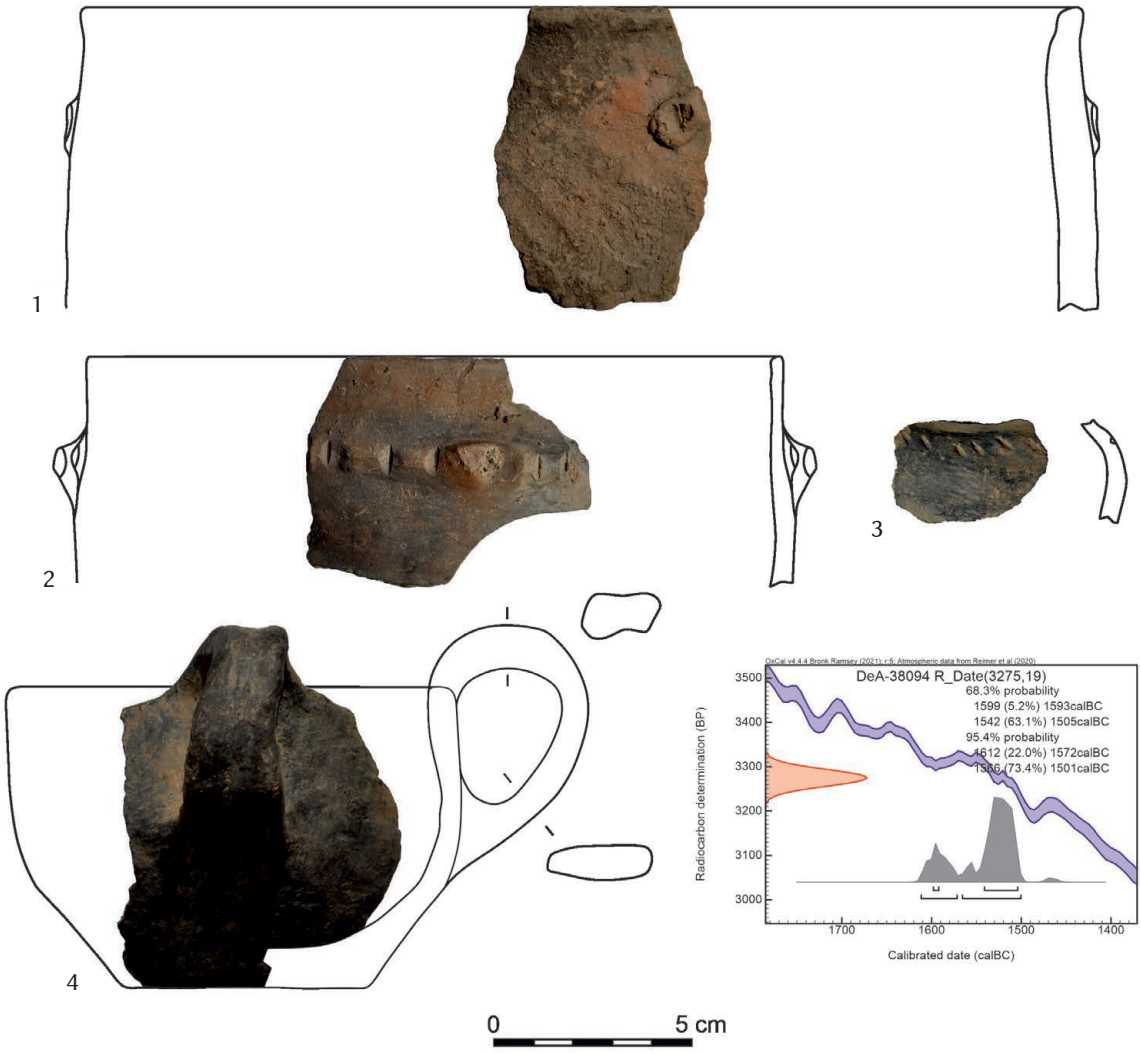


Fig. 22. Late Monteoru or early Noua pottery and calibrated ^{14}C diagram from feature 19 at the Sâncrăieni-Karimósarka site

19. Turia/Torja-Rétiláb II[95]

This site was discovered in 2018, during a field survey. It is located on both sides of the DJ 113 road, between Târgu Secuiesc and Turia, some 2.2 km northwest from the Reformed Church in the center of the city of Târgu Secuiesc and 3.6 km southeast of the Roman-Catholic church in the village of Turia. The site is located on the first terrace of the right bank of the Torja stream. During a second field survey of the northwestern edge of the site, in a well-delimited area of approximately 0.35 ha, an accumulation of archaeological material made of ceramics and bone fragments was discovered, belonging to the Wietenberg Culture. Very likely a rich cultural layer or a feature had been disturbed by ploughing. Several vessel types were identified, but the decoration of the pottery is scarce, with only a few characteristic decorative motifs.

For the dating of the site an animal bone fragment was sent for radiocarbon dating. The sample (DeA-31009) has given the 3478±23 BP result. The 1-σ calibration data is between 1876 and 1748 cal BC, while the 2-σ calibration between 1883 and 1701 cal BC.

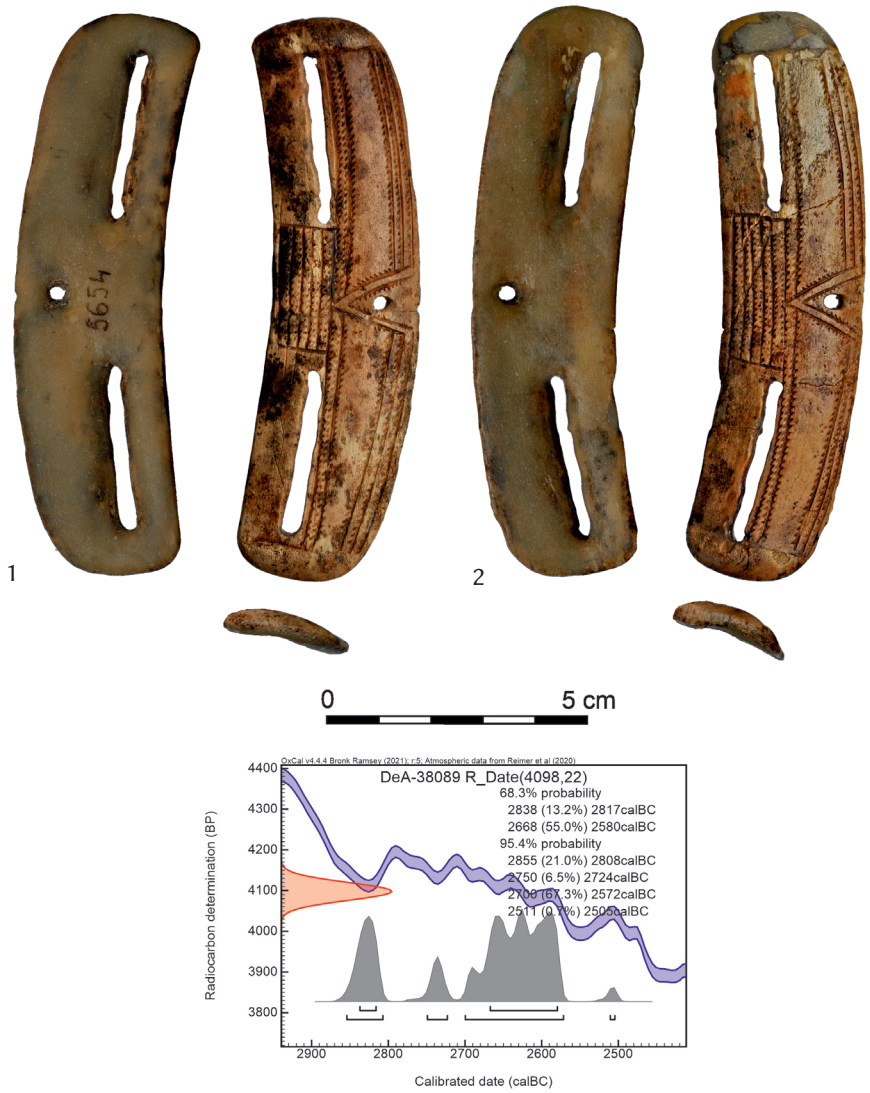


Fig. 23. The bone appliques and calibrated ^{14}C diagram from the cist grave at Sânmartin-Tankó-kert

95 The site lies partially on the territory of the city of Târgu Secuiesc. Since in the archaeological literature there is another Rétiláb site (Cavruc 1998, 146, nr. 592), different from the one presented here, we choose to mark this new site as the second in the same parcel.

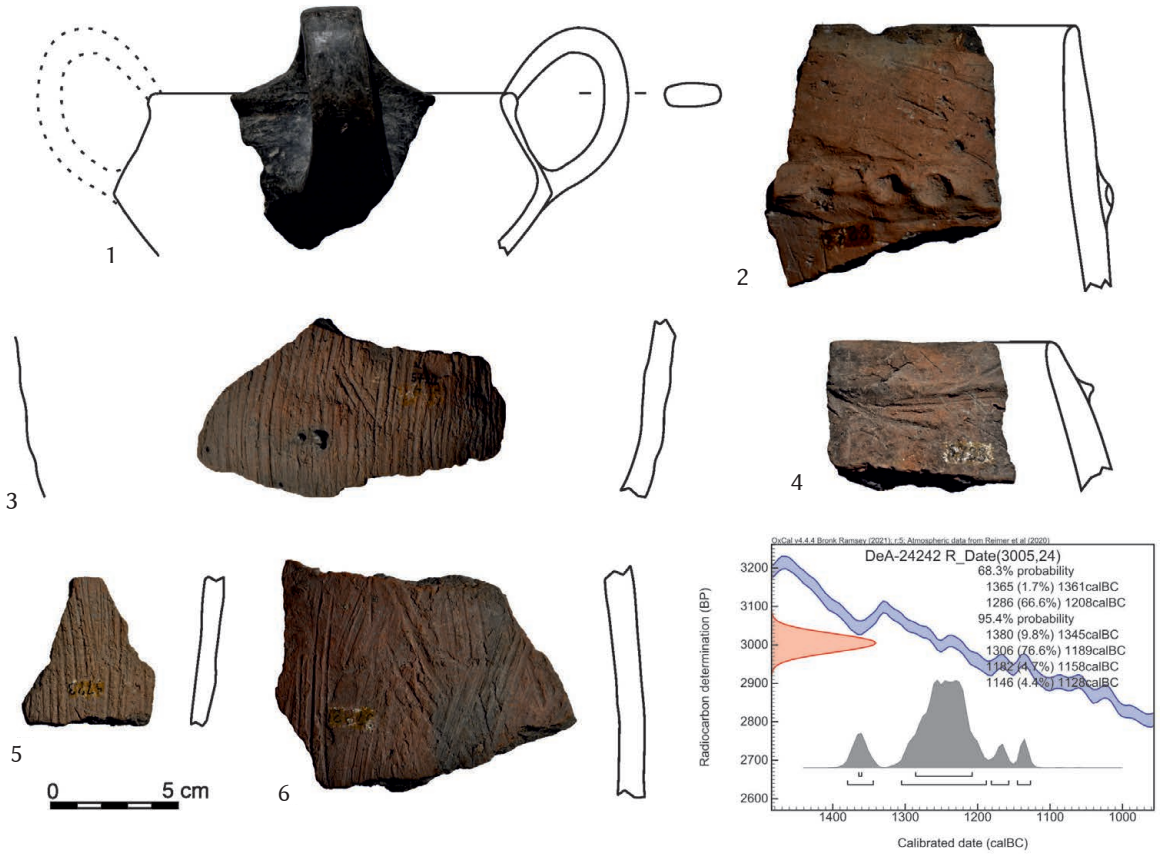


Fig. 24. Calibrated ^{14}C diagram obtained from the millet seeds and pottery fragments recovered around the hearth at the Sânzieni-Táncospad site

20. Turia/Torja-Telek

The site is located at the northeastern part of the modern-day settlement of Turia, on a high, flood-free terrace on the left bank of the Torja stream. At the end of the 1980's, excavations were carried out at the place called Telek. Settlement traces were discovered belonging to the LBA Gáva Culture, to the Migration Period Sântana de Mureș–Černjachov Culture and to the Medieval Period. A single pit was discovered, dated to the Gáva Culture period. The upper part of the feature was disturbed by another, a medieval pit.[96]

The archaeological material consisted of pottery fragments, and a few wattle-and-daub and bone fragments. One sample from an animal bone was sent for radiocarbon analysis (DeA-23373). The measurment provided the 2888±39 BP result. The 1-σ calibration falls between 1155 and 1006 cal BC, while the 2-σ calibration between 1210 and 934 cal BC (Fig. 28).

21. Turia/Torja-Vármegye[97]

In 1988 a cemetery consisting of 25 burials was discovered on the left bank of the Torja stream, on a flood-free terrace. All were cremation graves with funerary urns, except M 7, where only the ashes/burnt bones were placed in a pit.[98] The cemetery was dated to the LBA according to the author of

96 Székely 1993, 299.

97 The result of the radiocarbon measurement was published in a different article (Puskás – Darvas 2021a, 141–164), but without the proper description of the grave. Here we would like to fill this gap.

98 Székely 1995, 127–130; Motzoi-Chicideanu 2011, 539–540.

Fig. 25. Wietenberg-type pottery recovered from G1 at the Sfântu Gheorghe-Avasalja site

the excavations, but this has been challenged by later studies that have dated it to the 1st or 2nd phase of the Wietenberg Culture.[99]

In the collection of the Székely National Museum cremated remains were found only from grave M 19. The grave was made of the urn and a lid covering it. Samples for radiocarbon measurement were selected from the calcinated bones (DeA-23493). The ^{14}C dating provided 3556±30 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1948 and 1826 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 2016 and 1773 cal BC (highest probability between 1978 and 1773 cal BC – 92.1%) (Fig. 29).

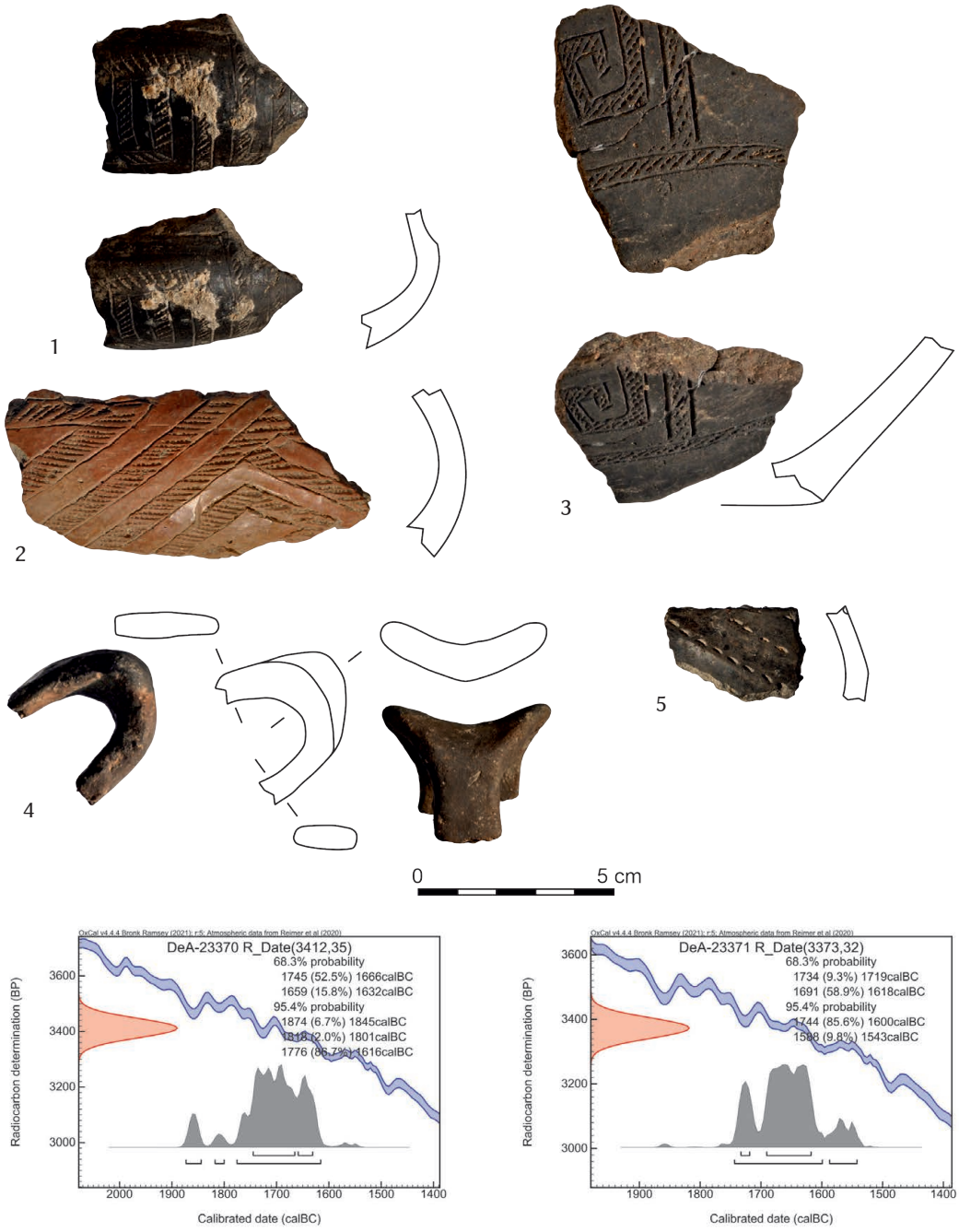


Fig. 26. Wietenberg-type pottery and the calibrated ^{14}C diagrams from G1 at the Sfântu Gheorghe-Avasalja site

99 Cavruc 1998, 144–145, nr. 583; Cavruc – Rotea 2000, 158; Popa 2005, 143; Popa 2010, 131–132.

22. Țufalău/Cófalva-Alámenő II

This site is located some 750 m southwest from the Reformed Church at Țufalău, at the place called 'Alámenő'. Approximately 200 m to the west there is a Wietenberg cemetery.[100] The two sites are separated by a shallow valley, probably a former river bed. The area was used during the Late Copper Age, MBA (Wietenberg Culture), LBA (Noua Culture) and Dacian communities. On the eastern edge of the former Noua settlement one 'ash mound' was delimited.

For the dating of the Noua settlement a fragment from a cremated scapulae was sent to radiocarbon dating (DeA-23375), which was discovered in the 'ash mound'. The ^{14}C-AMS measurement provided the date 3148±32 BP. The calibrated data has given a 68.2% probability (1-σ) for a dating between 1493 and 1398 cal BC, which corresponds to a 95.4% probability (2-σ) for a dating between 1500 and 1310 cal BC (Fig. 30).

23. Zăbala/Zabola-Tatárhalom

The former EBA site is situated 3,3 km from the Reformed Church in Zăbala, on a hill (*butte*) standing upon the relatively flat plain. The first excavations were made in 1969–70, resulting in the discovery of a EBA settlement with a ditch and a medieval cemetery.[101] It seems the Bronze Age layers were washed away, and most of the archeological material was found in the 3 m wide and 1 m deep ditch.[102] Except for one grave no other features belonging to the EBA could be identified.[103]

For radiocarbon dating a large size mammal tooth was sent, very likely to have been discovered in the filling of the ditch (DeA-37590).[104] The sample has given the 4154±24 BP result. The 1-σ calibration data is between 2869 and 2673 cal BC, while the 2-σ calibration between 2876 and 2631 cal BC.

Discussion

The EBA Chronology in southeast Transylvania and chronological contacts with neighbouring areas[105]

During our research nine radiocarbon measurements were made on EBA material (Fig. 31). The data clearly indicate three main clusters, corresponding to the periodization of the EBA. The earliest group, marked by four dates, covers the interval between the beginning of the 29th century and the end of the 26th centuries BC (i. e. 2886–2505 cal BC); a second group, represented by the dates at Leliceni, covers the timespan between the second half of the 26th century and the second half of the 21st century BC (i. e. 2567–2287 cal BC); and a third cluster is dated after the beginning of the 22nd century cal BC (i. e. 2200–2026 cal BC) (Fig. 32).

The four earliest EBA samples are known from the sites at Sânmartin (DeA-38089), Leliceni (DeA-37595), Moacșa (DeA-37591) and Zăbala (DeA-37590). This is a surprising result since in the traditional chronological concept the three 'cultures' (Sânmartin–Globular Amphorae Culture (GAC),

100 Puskás 2020b, 51–66. Since the cemetery is located on the parcel with the same name, we separateed them with numbers: the cemetery is referred as Alámenő I, while the settlement as Alámenő II.

101 Székely 1994, 277.

102 Székely 1997a, 26–27.

103 Székely 1997a, 32.

104 For a more conclusive data we tried to identify the EBA skeleton and send bone sample from it, but until now our attempt was without success.

105 All the calibrated data mentioned in the text are in 2-σ interval. If not the difference is indicated in brackets. For the transparency of the text analogies for the datings are listed in footnotes, all with BP and 2-σ intervals, followed by bibliography.

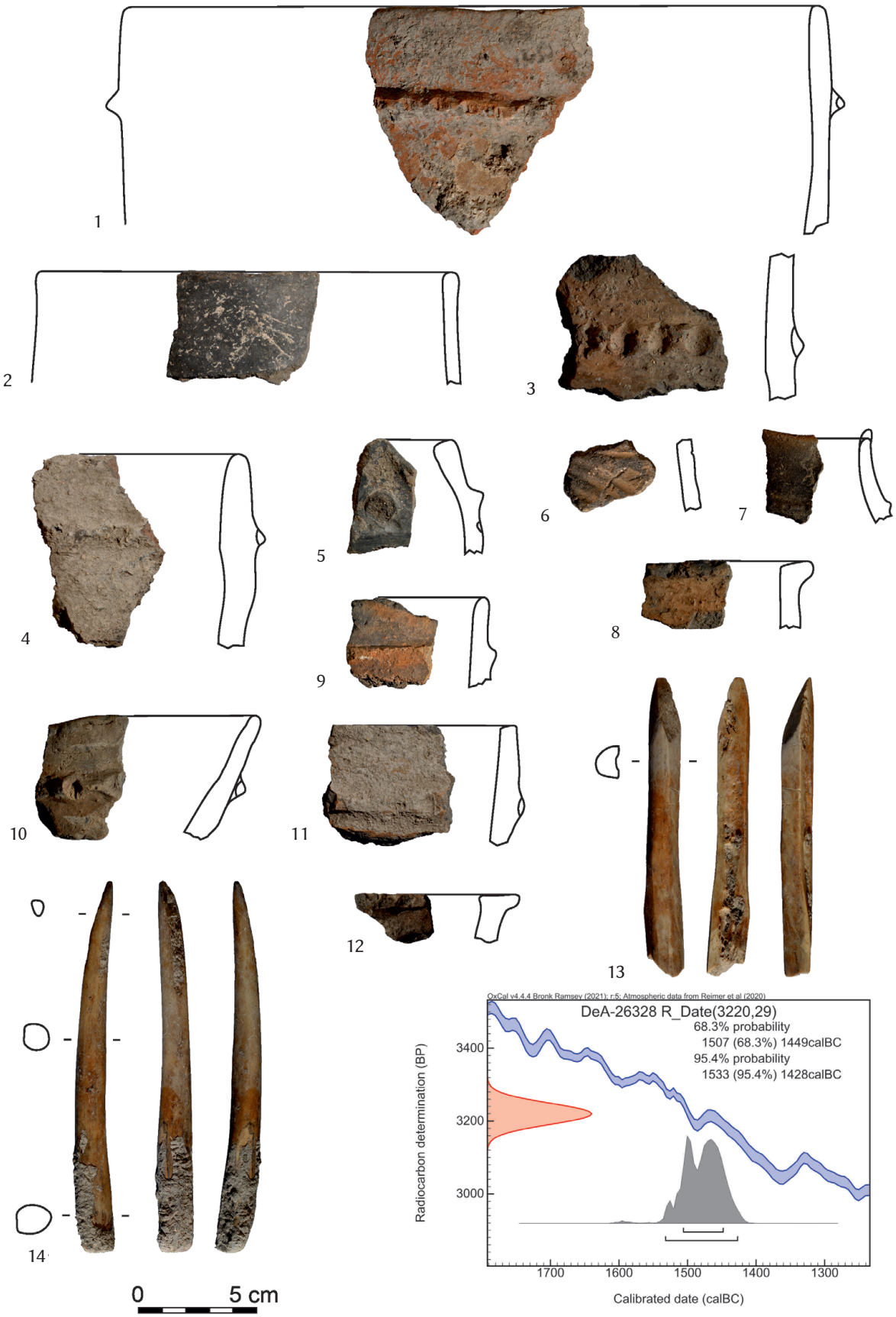


Fig. 27. Characteristic Noua-type finds and calibrated ^{14}C diagram from the 'ash mound' 1 at the Turia-Belső rétiláb site

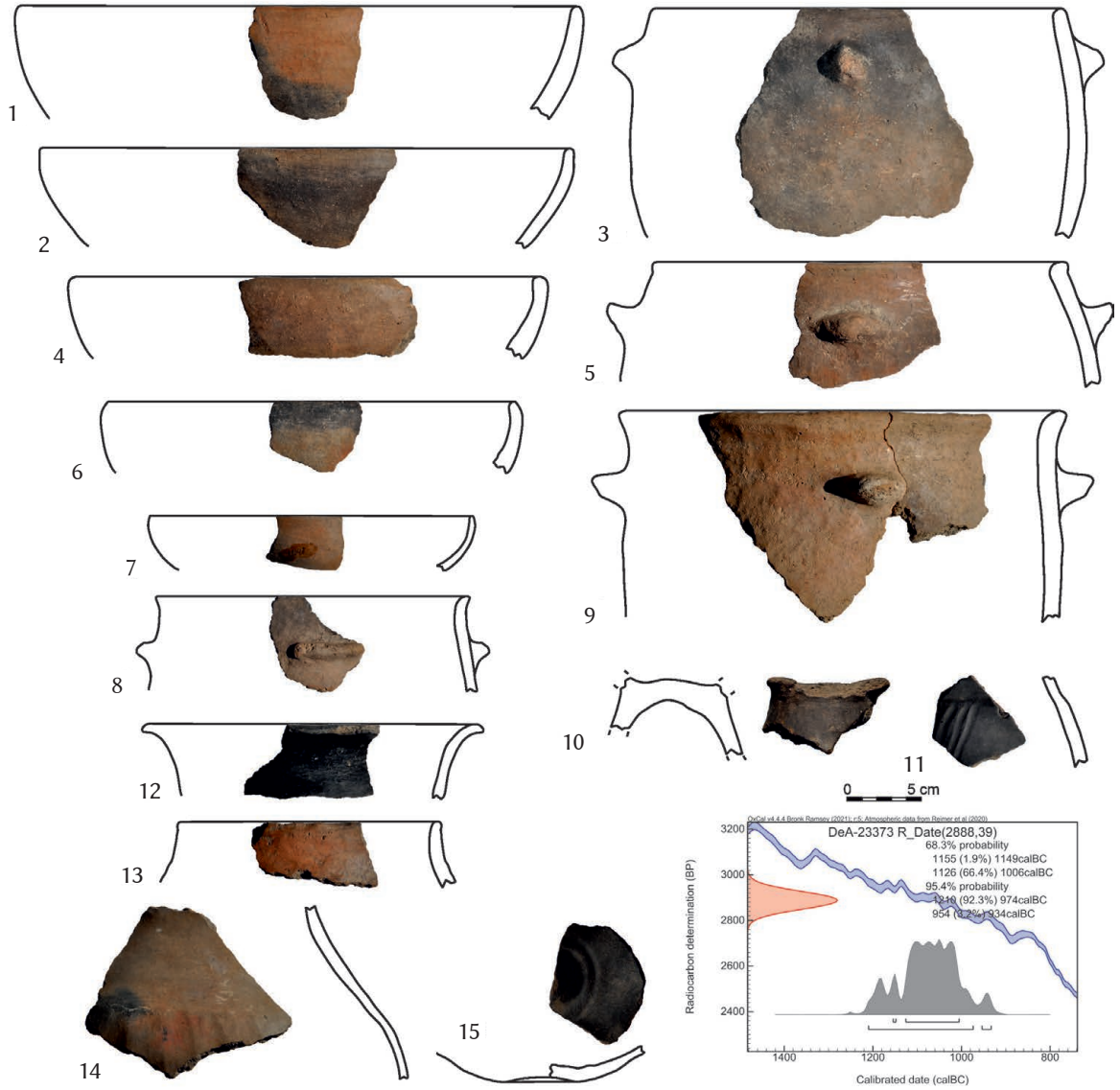


Fig. 28. Calibrated ^{14}C diagram and pottery fragments recovered from the Gáva pit at Turia-Telek site

Zăbala – Zăbala Culture, and Leliceni and Moacşa – Jigodinulture) should follow each other, but the results show more likely a (partial) contemporaneity between them. Of course, we cannot exclude the possibility that the respective ceramic styles followed each other in a short timespan, since calibration data cover wide, overlapping intervals. In the present state of research, due to the small number of data, the Bayesian analysis does not really help, and thus we could not reduce the long-time intervals to shorter ones.

The earliest EBA data was provided by the skeleton of the cist grave from the burial mound at Moacşa. The calibration suggested the interval between 2886 and 2673 cal BC, marking probably the earliest manifestation of the cord-decorated pottery in southeastern Transylvania. Also similar data was obtained for a bone fragment from the filling of one of the houses at Leliceni, with the calibration ranging between 2871 and 2621 cal BC (92.9 %), also accompanied by cord-decorated pottery. The third set of data from the settlement at Zăbala-Tatárhalom gave a calibrated timespan of between 2876 and 2631 cal BC, while the cist grave at Sânmartin, resulted in 2855–2572 cal BC (94.7%).

For the mentioned timespan (i.e. the 29th–26th centuries BC) in Transylvania we have only a few radiocarbon datings. Five measurements were made for the Coţofeni settlement at Poiana Ampoiu-

lui, two falling in the relevant centuries.[106] Another data set was considered by H. Ciugudean to be too late for the Coţofeni settlement.[107] Other authors have opted for an intrusive character for the two other dates (UZ-2869 and UZ-2870),[108] likely belonging to the EBA Livezile group, also present at the site in question. Until now we dispose of only one confirmed data set published for the Livezile group settlement, which was recovered from the site at Livezile-Baia.[109] The situation is somehow better for the cemeteries of this group: a set of three data sets recovered from the Tumulus 1 at Meteş-La Meteşel covers the 29th-26th centuries cal BC,[110] being the first burial horizon of the mound. In the same period Yamnaya-type burials too are also documented in western Transylvania. A set of nine dates were obtained for the mounds at Silvaşu de Jos. The younger Yamnaya phase matches the time-period discussed above.[111] Recently eight radiocarbon dates have been published from the Hăpria burial mound, some of the data being associated also with burial customs of the Yamnaya tradition.[112]

From a total of 14 radiocarbon dates three cover the 28th–26th centuries from the late Baden/Kostolac horizon at Foeni-Gaz from the Banat region.[113] From Bačka six radiocarbon datas cover the relevant timespan, all attributed to the Yamnaya phenomenon.[114]

There are currently seven radiocarbon dates from four sites in the Great Hungarian Plain, calibrated between the 29th–26th centuries. This period corresponds to the beginning of the EBA in the area, from the "Period III – Early Pit Grave 3300/3100–2900/2600 cal BC", proposed by Horváth et al.[115] Radiocarbon measurements were obtained from three graves of the Sárrétudvari-Őrhalom mound,[116]

106 UZ-2869: 4085±70 BP/2874–2473 cal BC; UZ-2870: 4030±75 BP/2871–2345 cal BC (Ciugudean 2000, 58). Two other dates (Bln-4620: 4239±40 BP/2919–2674 cal BC; Bln-4621: 4260±41 BP/2936–2695 cal BC [92.3%]) are close to the timespan in discussion, probably a little earlier than the mentioned centuries. See also Ciugudean et al. 2022, 28.

107 UZ-2868: 3755±70 BP/2452–1961 cal BC (Ciugudean 2000, 58).

108 Băjenaru 1998, 6–10; Diaconescu – Tincu 2016, 114; Diaconescu 2020, 28, 30.

109 Bln-4624: 4109±44 BP/2873–2499 cal BC (Ciugudean 1997, 22; Gerling – Ciugudean 2013, 184). Similar data is mentioned for the Alba Iulia-Pârâul Iovului Livezile-type settlement (Ciugudean et al. 2023, 225, Fig. 16).

110 UGAMS-44058: 4170±25 BP/2882–2636 cal BC (Ciugudean et al. 2023, 220–223, Fig. 12). See also UGAMS-44057 and UGAMS-44059 at the same figure.

111 Poz-56765: 4135±30 BP/2873–2583 cal BC; Poz-53778: 4115±30 BP/2867–2567 cal BC; Poz-78170: 4130±35 BP/2872–2580 cal BC; RoAMS 5C: 4104±25 BP/2861–2573 cal BC; RoAMS 5E: 4147±31 BP/2877–2623 cal BC (Diaconescu – Tincu 2016, 107–141; Diaconescu 2020, 17–47).

112 MAMS-35016: 4169±20 BP/2880–2640 cal BC; MAMS-35014: 4155±20 BP/2876–2632 cal BC; MAMS-35020: 4126±20 BP/2866–2582 cal BC; MAMS-35015: 4115±22 BP/2863–2577 cal BC (Ciugudean et al. 2023, 214, Fig. 6).

113 MAMS-11203: 4214±27 BP/2901–2695 cal BC; MAMS-10893a: 4133±25 BP/2871–2583 cal BC and MAMS-10893b: 4126±26 BP/2868–2581 cal BC (Krauss – Ciobotaru 2013, 61–62; Gogâltan 2015, 60–61; Diaconescu 2020, 32–33, 41). A fourth date (Hd-29516: 4017±48 BP) at 2-σ probability resulted the interval between 2847–2353 cal BC, but most likely it's younger than the other dates (2677–2353 cal BC – 91.5%).

114 Jabuka: Poz-93213: 4100±40 BP/2870–2498 cal BC; Šajkaš: Poz-88657: 4170±40 BP/2886–2627 cal BC; Poz-88664: 4195±35 BP/2895–2636 cal BC; Žabalj: Poz-100501: 4125±35 BP/2871–2578 cal BC; Poz-100500: 4130±30 BP/2871–2581 cal BC (Koledin et al. 2020, 369–371). Here we didn't include the data obtained from the Pančevo site (Poz-81208: 4050±40 BP) because it has a particularly small probability (8.6%) for a time interval between 2847–2686 cal BC.

115 Horváth et al. 2013, 170. Tab. 6, 171.

116 Grave 4: deb-7182: 4135±60 BP/2885–2501 cal BC; Grave 9: deb-6871: 4060±50 BP/2861–2468 cal BC and Grave 7: DeA-16572: 4148±32 BP/2878–2623 cal BC (Dani – Nepper 2006, 44, 48–49; Dani – Kulcsár 2021, 336, Fig. 6).

from two graves at the Kunhegyes-Nagyálláshalom site,[117] from one grave at Püspökladány-Kincsesdomb,[118] from one at Bojt-Tökös Varga-tag 2,[119] from the grave at Hajdúnánás-Tedej-lyukas-halom[120] and from three graves at Kétegyháza-Török-halom.[121] All of them have been characterized as Yamnaya burials. The grave discovered at Bucova Pusta IV, in this geographical area (but in the territory of modern-day Romania), also belongs to this timespan.[122]

In recent years for the area south of the Carpathians, namely from Wallachia and Dobrudja several radiocarbon datings have been published spanning the 29th–26th centuries cal BC. Most of the samples were obtained from tumulus burials in the territory of modern-day Prahova and Buzău Counties, at Ariceştii Rahtivani,[123] Blejoi,[124] Strejnicu,[125] Smeeni,[126] Lipia[127] and Târgşoru Vechi.[128] Aside from burial mounds three data sets are known from the Moara Vlăsiei[129] and the Şoimeşti[130] settlements. The archaeological material discovered during the excavations was attributed (with reservations) to the Cernavodă II Culture.[131] Here we should mention the data belonging to a Coţofeni occupation at the Cuina Turcului site. The ^{14}C data has given a result of 2875–2623 cal BC.[132] Recently five data sets from two sites of the Glina Culture have been published. Two dates at the Vităneşti and Mavrodin settlements belong to the first half of the 3rd millennium BC.[133] Comparable data were obtained from two burials at Rahman,[134] both from Aliman[135] in Dobrudja.

117 Grave 14: Poz-39454: 4075±35 BP/2857–2476 cal BC; Grave 18: Poz-39456: 4195±35 BP/2895–2636 cal BC (Horváth et al. 2013, 165, Tab. 3).

118 Grave 1: Poz-42724: 4215±35 BP/2905–2672 cal BC (Horváth et al. 2013, 165, Tab. 3).

119 DeA-8908: 4193±25 BP/2890–2674 cal BC (Dani – Kulcsár 2021, 345, Fig. 11, 348).

120 Poz-31405: 4210±35 BP/2902–2671 cal BC (Horváth 2011, 93, Tab. 2).

121 Poz-39103: 4090±35 BP/2865–2494 cal BC; Poz-39105: 4130±40 BP/2874–2578 cal BC; Poz-39106: 4180±40 BP/2889–2631 cal BC (Frînculeasa et al. 2017, 124, Tab. 5, nr. 11–13).

122 Poz-66988: 4190±35 BP/2893–2635 cal BC (Krauss et al. 2016, 298, Tab. 7, 302).

123 DeA-2880: 4167±50 BP/2889–2584 cal BC; DeA-4300: 4165±23 BP/2880–2634 cal BC; Hd-30147: 4146±25 BP/2875–2626 cal BC (Frînculeasa et al. 2017, 129–130, Tab. 7, nrs 7,13,15). See also: Frînculeasa et al. 2021, 81, Fig. 6.

124 DeA-16952: 4212±29 BP/2901–2676 cal BC; DeA-8813: 4174±33 BP/2886–2631 cal BC (Frînculeasa et al. 2019, 46, Tab. 3).

125 DeA-30662: 4203±48 BP/2904–2631 cal BC; DeA-32810: 4130±27 BP/2870–2582 cal BC; DeA-26793: 4121±30 BP/2868–2578 cal BC; Hd-30719: 4106±38 BP/2869–2501 cal BC (Frînculeasa et al. 2021, 79, Tab. 2; Frînculeasa et al. 2017, 129, Tab. 7, nr. 8).

126 DeA-7735: 4126±31 BP/2869–2580 cal BC; DeA-7737: 4142±30 BP/2875–2585 cal BC (Frînculeasa et al. 2017, 130, Tab. 7, nrs 22–23).

127 Without lab nr.: 4083±30 BP/2857–2494 cal BC (Frînculeasa et al. 2022, 145).

128 DeA-10666: 4176±32 BP/2886–2632 cal BC; DeA-10667: 4123±33 BP/2870–2578 cal BC; DeA-10668: 4140±33 BP/2875–2584 cal BC (Frînculeasa 2019, 134, Tab. 1).

129 DeA-3859: 4157±28 BP/2877–2631 cal BC; DeA-3860: 4215±31 BP/2903–2675 cal BC; DeA-3861: 4120±29 BP/2868–2578 cal BC (Frînculeasa 2021, 58, Tab. 1).

130 DeA-5395: 4170±43 BP/2888–2624 cal BC; DeA-7734: 4093±32 BP/2864–2497 cal BC; DeA-5396: 4063±43 BP/2856–2471 cal BC (Frînculeasa et al. 2020, 2–4, Tab. 1).

131 Frînculeasa 2021, 65–68.

132 OxA-30442: 4143±28 BP (Boroneanţ 2020, 39, Tab. 10).

133 RoAMS 208.53: 4101±35/2867–2500 cal BC; RoAMS 337.53: 4094±33/2865–2497 cal BC (Mirea – Frînculeasa 2021, 27, Tab. 1).

134 Poz-46583: 4220±35 BP/2907–2674 cal BC; RoAMS 1370.46: 4196±32 BP/2895–2668 cal BC (Ailincăi et al. 2014, 83, Fig. 7; Ailincăi et al. 2021, 217–218).

135 BRAMS-3571: 4157±29 BP/2878–2631 cal BC; BRAMS-3575: 4096±28 BP/2859–2500 cal BC (Ştefan et al. 2023, 106, Tab. 2). See also: Frînculeasa et al. 2022, 141.

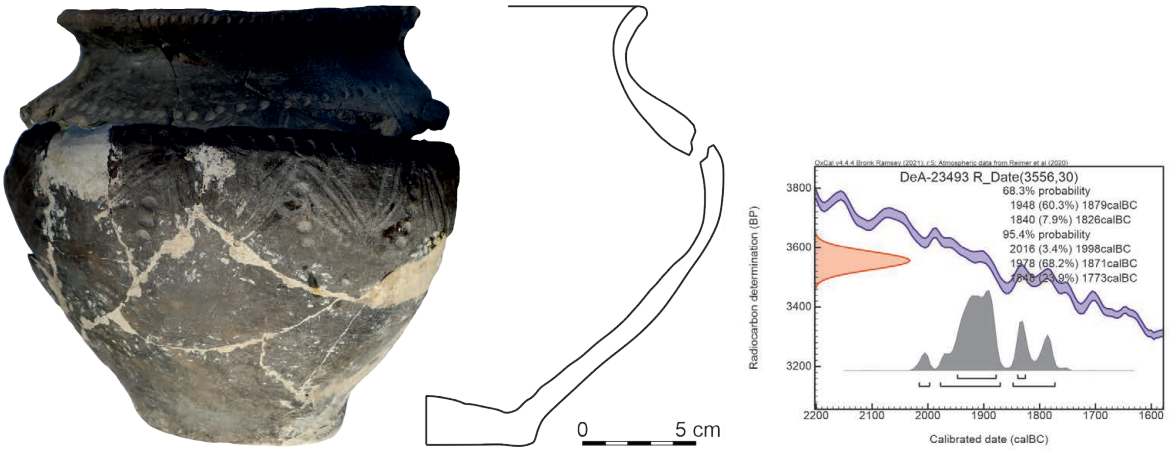


Fig. 29. The funerary urn and calibrated ^{14}C diagram from the cremation grave at Turia-Vármegye cemetery

East and northeast of Transylvania radiocarbon datings for the first half of the 3rd millennium are known from GAC burials discovered in Moldova.[136] A similar date-range to that from Sânmartin was obtained for a grave at Piatra Neamţ,[137] dating the skeleton to between 2887 and 2572 cal BC (94.3%). Further east, on the territory of the Eastern group of the GAC, similar intervals were obtained for the graves at Sandomierz Upland,[138] Volhynia,[139] Podolia,[140] the interior of the forest zone[141] and the Baltic Coast regions,[142] respectively, for the settlements of the culture.[143] Based on the radiocarbon measurements the GAC Culture in Eastern Europe was dated between c. 3100–2500 BC.[144] The grave at Sânmartin fits well into this time-span.

For the EBA II period a set of five dates from the Leliceni-Kőhegy site gives us an insight for the chronology of the settlement. The earliest dating has been mentioned above (DeA-37595). The other four samples (DeA-37593, DeA-37596, DeA-37594, DeA-37755) at 2-σ level fall between 2567 and 2287 cal BC. The DeA-37593 sample has a relatively small probability (19.8%) of dating before 2500 cal BC. Otherwise all of the calibrated dates are later than this year.

Radiocarbon data for the time-span between the second half of the 26th century and the first half of the 23rd century BC are also known from Transylvania, both east and south of the Eastern Carpathians. Recently one radiocarbon data was obtained for mound T. 26 at Ocland-Kövesbérc located on the eastern fringe of Central Transylvania (DeA-43519, see Fig. 32). The calibrated data has given a 95.4% probability (2-σ) for a dating between 2621–2601 cal BC (4.9%), with a higher probability

136 Mihăilescu-Bîrliba – Szmyt 2003, 82–112.

137 Ki-10653: 4140±60 (Mihăilescu-Bîrliba – Szmyt 2003, 105, Tab. 1.6).

138 Witkowska et al. 2021, 68, Tab. 2; Witkowska – Włodarczak 2021, 145, Tab. 1.

139 Ozdiv: Ki-5919: 4150±50/2882–2581 cal BC; Ivanye: Le-5021: 4090±70/2874–2475 cal BC (Szmyt 2010, 64, 70, Fig. 19). Since the measurements were made before the AMS technology the standard deviations are wider, therefore the calibrations are covering much larger time periods.

140 Loshniv: Ki-5006: 4150±55/2884–2579 cal BC; Khartonivtsy II: Ki-5586: 4130±70/2888–2495 cal BC and Ki-5587: 4060±60/2868–2467 cal BC (Szmyt 2010, 65, 70, Fig. 19).

141 Prorva: Le-5020: 4150±80/2903–2493 cal BC and Ki-5140: 4060±45/2857–2469 cal BC; Krasnaselski 1: Gd 9249: 4080±140/2935–2203 (94.7%) (Szmyt 2010, 66–67, 70, Fig. 19).

142 Šventoji 4: Vs-967: 4120±110/2924–2348; Šventoji 6: Vs-500: 4070±110/2897–2306 (Szmyt 2010, 67, 70, Fig. 19).

143 Florek – Witkowska 2021, 182, Tab. 1.

144 Mihăilescu-Bîrliba – Szmyt 2003, 111; Szmyt 2010, 81; Szmyt 2014, 113.

between 2584–2472 cal BC (90.6 %).[145] From western Transylvania we can mention the dates from Poiana Ampoiului,[146] Livezile,[147] and Hăpria,[148] belonging to the Livezile group, overlapping partially with the Leliceni data. A (secondary?) grave at Cluj-Napoca-Polus has also been to the EBA II period.[149] Similar data was obtained from a mallet at the salt extraction site near Băile Figa.[150] The recently published two graves from Păuleni-Ciuc-Dâmbul Cetății site were considered to have been Jigodin burials.[151] In the case of the earlier feature (Cx 14), dated to between the second half of the 27th and the first half of the 25th centuries cal BC,[152] this attribution can be questioned if we compare the data to one of the burials at the Costişa-Cetăţuie site, where a strikingly similar vessel was found.[153] The radiocarbon data for the two skeletons discovered in the M2/2004 cover the time-span between 2635 and 2471 cal BC (91.4%).[154] They seem to be earlier than most of the dates obtained for the Jigodin Culture, but this fits very well the time-period of the earlier grave at Păuleni-Ciuc. For these graves parallels with Yamnaya burial custom have been suggested,[155] as well as analogies with the western Transylvanian Livezile group.[156] The second grave at Păuleni-Ciuc (Cx 14A) is probably later. This is suggested by the ^{14}C data,[157] as well as by the adjacent vessel with a thickened, recurved rim, being a common element along the pottery sherds at the Leliceni site.[158] A similar vessel was discovered in mound nr. 13 at Brăduţ.[159]

From the Great Hungarian Plain radiocarbon measurements are fewer compared to the previous time-span. Most of the dates belonging to the 26th–23rd centuries BC can be attributed to the Makó Culture,[160] but one date has been documented from the Baden milieu as well.[161] South and southeast of our study region, from the Lower Danube area, we can mention two dates, obtained from a grave excavated at Târgşoru Vechi[162] and another at Rahman,[163] both attributed to the Yamnaya communities.

145 We would like to thank to V. Kavruk for the kindly information about the data. The publication of the results obtained at Ocland is forthcoming

146 UZ-2868: 3755±70 BP/2452–1961 cal BC (Ciugudean 2000, 58).

147 Poz-42712: 4015±35 BP/2624–2465 cal BC (Gerling – Ciugudean 2013, 184).

148 MAMS-35017: 3996±21 BP/2572–2467 cal BC; MAMS-35018: 3992±20 BP/2571–2467 cal BC (Ciugudean et al. 2023, 214, Fig. 6). Also to this period may be added one of the dates at Meteş (UGAMS-42280) (Ciugudean et al. 2023, 225, Fig. 16).

149 Hervella et al. 2015, S8; Gogâltan 2015, 66; Frînculeasa et al. 2015, 75, Note 260. The radiocarbon data was not yet published. We have only a diagram which approximately place the burial between 2450 and 2200 BC (R_Date P11) http://www.plosone.org/article/fetchSingleRepresentation.action?uri=info:-doi/10.1371/journal.pone.0128810.s008 (last access: 10.12.2022).

150 OxA-19273: 3837±35 BP/2456–2152 cal BC (Harding – Kavruk 2013, 116, Tab. 4.2).

151 Kavruk et al. 2022, 105.

152 Kavruk et al. 2022, 103, Fig. 1 (DeA-28198). A similar dating is known from the first mound at Ariceşti (DeA-7738: 4018±32/2623–2467 cal BC), with typical characteristics of Yamnaya burials (Frînculeasa et al. 2019, 46, Tab. 3, 47).

153 Popescu – Băjenaru 2008, 67–68, 77, Fig. 8.2.

154 Popescu – Băjenaru 2008, 68.

155 Popescu – Băjenaru 2008, 64, 68; Frînculeasa et al. 2022, 142.

156 Popescu – Băjenaru 2008, 68.

157 Kavruk et al. 2022, 103, Fig. 1 (DeA-28200).

158 Roman et al. 1992, Taf. 116.1–13, Taf. 117.1–7.

159 Székely 1997b, 42, 50, Fig. 5.1.

160 Poz-31798: 3990±30/2577–2460 cal BC; Poz-31800: 3955±35/2573–2310 cal BC; Poz-31801: 3955±35/2573–2310 cal BC; Poz-31803: 3970±40/2579–2342 cal BC; Poz-31804: 3940±35/2569–2299 cal BC (Horváth et al. 2013, 165, Tab. 3).

161 Poz-39467: 3860±50/2467–2153 cal BC (Horváth et al. 2013, 165, Tab. 3).

162 PSUAMS-3996: 3980±25 BP/2574–2459 cal BC (Frînculeasa 2021, 60).

163 Poz-65968: 3950±35/2571–2305 cal BC (Ailincăi et al. 2016, 45, Tab. 4).

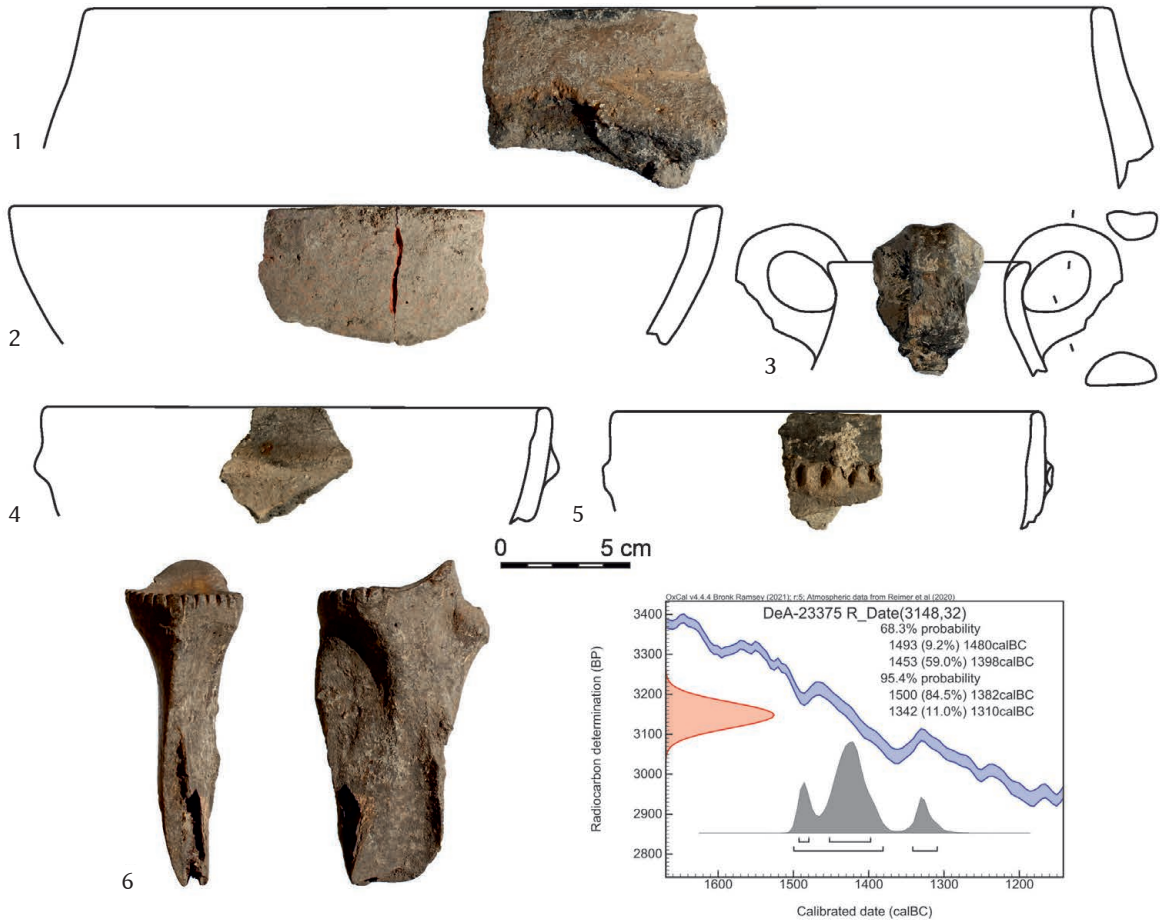


Fig. 30. Characteristic Noua-type finds and calibrated ^{14}C diagram from the 'ash mound' 1 at the Țufalău-Alámenő II site

The circulation of the cord-decorated pottery in southeast Transylvania is linked to the Jigodin Culture.[164] However its appearance in the area is as yet unclear. Some scholars define it as a post-Schneckenberg A manifestation, having evolved at the same time as the Schneckenberg B period (EBA II),[165] while others have proposed an earlier beginning, at the EBA I level.[166]

For our discussion of cord-decorated pottery in the study area it is important to mention that its appearance in the first half of the 3rd millennium BC (and even earlier) is widely documented in the northern Pontic and the Lower Danube area,[167] but it also occurs in Transylvania and the rest of the Carpathian Basin.[168] Its eastern origin has already been documented.[169] Even though the grave at Moacşa was dated to a post-Schneckenberg B period by P. Roman,[170] many of new studies discuss the grave and its cord-decorated vessel among discoveries belonging to the first half of the 3rd millennium BC,[171] correctly but based only on analogies, which, compared to the new radiocarbon

164 Roman et al. 1973, 559–574; Gogâltan 2021, 255.

165 Roman 1986, 42, 51, Fig. 7; Ciugudean 2021, 60.

166 Gogâltan 2015, 69.

167 Frînculeasa 2019, 143–144; Frînculeasa et al. 2019, 43–44; Frînculeasa 2021, 60–61.

168 Ciugudean 1996, 99; Székely 1997a, 29; Dani 2011, 33–35.

169 Bertemes 1998, 206; Dani 2011, 35; Frînculeasa et al. 2017, 119; Ivanova 2022, 108.

170 Roman et al. 1992, 77–78.

171 See for example: Frînculeasa et al. 2015, 70, Fig. 13.9; Frînculeasa 2019, 143; Preda-Bălănică et al. 2020, 90, Fig. 3.9, 96; Gogâltan 2021, 255–256.

dating, now turn out to have been a correct interpretation. More or less close analogies for the vessel in the Moacşa grave are from burials considered as Yamnaya, with local pottery,[172] as well as from Corded Ware burials from Central and Northern Europe.[173] The few cord-decorated sherds and objects discovered at Zăbala[174] can be linked probably to the distribution area of the Yamnaya, GAC or Corded Ware Cultures.

Three of the newly-presented radiocarbon datings between the 29th and 27th centuries BC are from discoveries where cord-decorated pottery is documented.[175] All are contemporary with those published from Yamnaya burials south of the Carpathians and the data from the settlement at Moara Vlăsiei. These and the analogies listed above cause us to reconsider the possibility that all the cord-decorated pottery in Transylvania belongs to the Jigodin Culture. Very likely these early discoveries are part of the steppic influence linked to the Yamnaya or the GAC horizon. This element is often documented in these cultures. For us it is difficult to accept that the Jigodin Culture was widespread from the Tisza River to the Northern Pontic area. We think that the grave at Moacşa could be related to the wide phenomenon of placing the dead beneath burial mounds, widely documented around the 29th century BC on a large area.[176] Also we have to accept that these mounds, even though they are contemporary with the Yamnaya ones, differ significantly in their structure and in the custom of placing the dead. Some of these southeastern Transylvanian mounds contain stone cists, with or without human osseous remains,[177] and are considered to be the characteristic EBA burial phenomenon for southeastern Transylvania.[178] The earliest grave of this type has been considered to be the one at Sânmartin, followed by those belonging to the Schneckenberg Culture.[179] The building of stone cist graves had been attributed to an earlier southern influence (Zimnicea-type discoveries),[180] but lately more scholars consider these to have originated from the GAC milieu.[181] The dates from the two different stone cists at Moacşa and Sânmartin seem to be more or less contemporary, even though they have been attributed to different, successive cultures. On the other hand the widely calibrated dates could suggest a possible succession, but for a more detailed chronology of the period we need more data. In the present state of research, it seems more plausible that the cist graves originated from the GAC area. This custom spread in southeastern Transylvania, probably during the 29th–28th centuries BC, and was still being used in the 24th–22nd centuries BC, as is documented in the vicinity of the study area, in the Năeni–Schneckenberg milieu.[182]

One of the most controversial cultural manifestations of the EBA in Transylvania is the so-called Zăbala Culture. This 'culture' is currently known from a single site, making hard to link with other

172 Frînculeasa et al. 2015, 67, 70, Fig. 13; Ivanova – Toschev 2015, 357, 359, Fig. 12.2.

173 Frînculeasa et al. 2015, 67; Heyd 2021, 389, Fig. 5.

174 Székely 1997a, 29.

175 The earliest data from Leliceni is hard to link to archaeological material since it was found in a secondary position.

176 Daróczi et al. 2022, 49. In western Transylvania the existence of burial mounds in the Late Copper Age Coţofeni Culture (pre-Yamnaya) has been documented (Diaconescu 2020, 43–44). In the southeastern part of Transylvania even though many tumuli are known, only a few have been excavated. All of them belong to a post-Coţofeni horizon, being attributed to the Schneckenberg and Jigodin Cultures (Székely 1997b, 43).

177 Solymossy 1895, 418; Székely 1997b, 41.

178 Ciugudean 2011a, 21; Gogâltan 2021, 254.

179 Ciugudean 2011a, 21–22.

180 Roman 1986, 30, 35; Schuster 1997, 156; Székely 1997b, 43.

181 Motzoi-Chicideanu – Olteanu 2000, 32; Burtănescu 2002, 384; Motzoi-Chicideanu 2011, 299; Ciugudean 2011a, 21–22.

182 Constantinescu 2020, 155, Fig. 35.1–3.

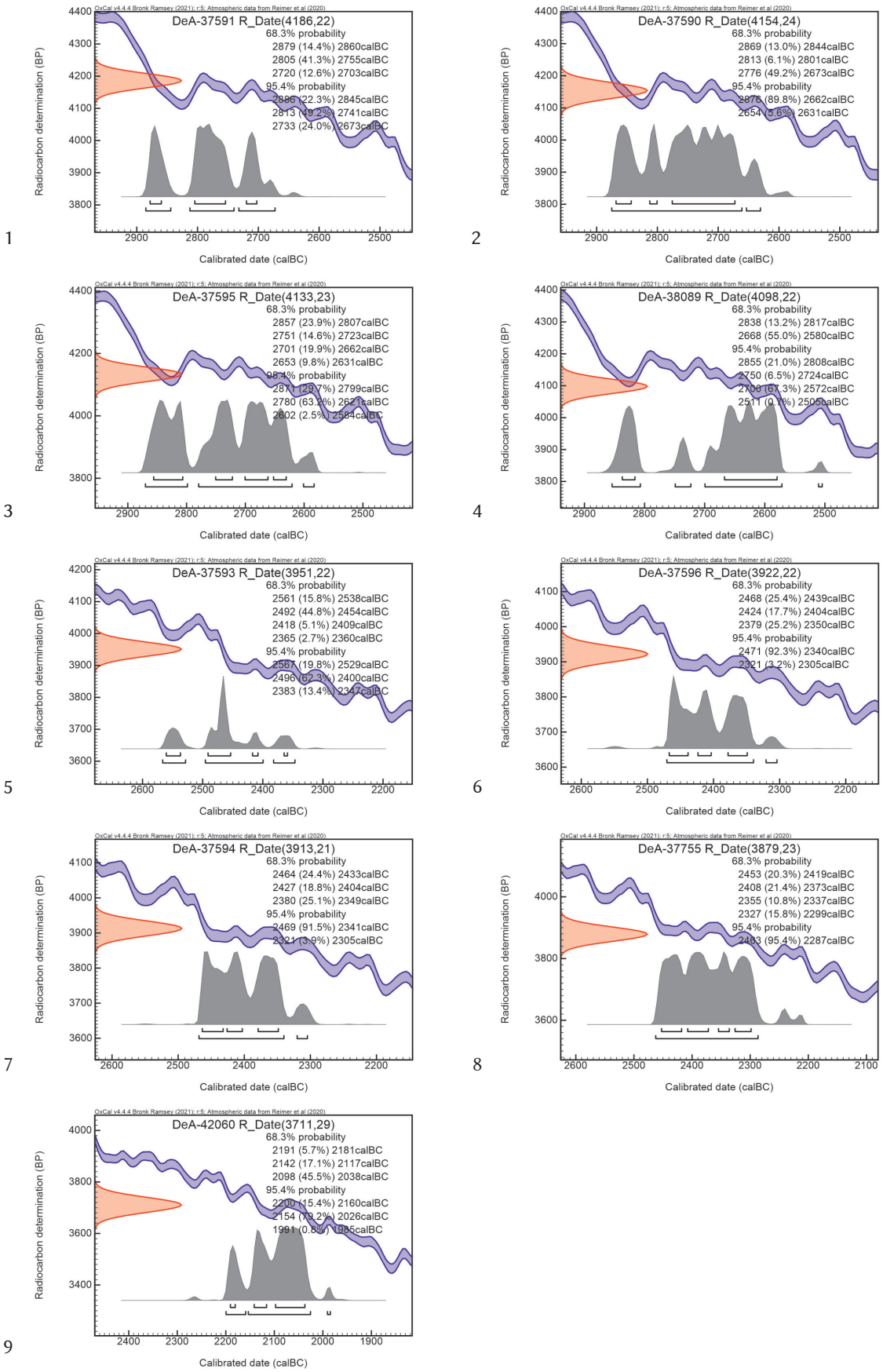


Fig. 31. EBA calibrated ^{14}C dates discussed in the text. 1 – Moacşa-Óriáspince-tető, 2 – Zăbala-Tatár-halom, 3, 5–8 – Leliceni-Kőhegy, 4 – Sânmartin-Tankó-kert, 9 – Covasna-Hankó valley

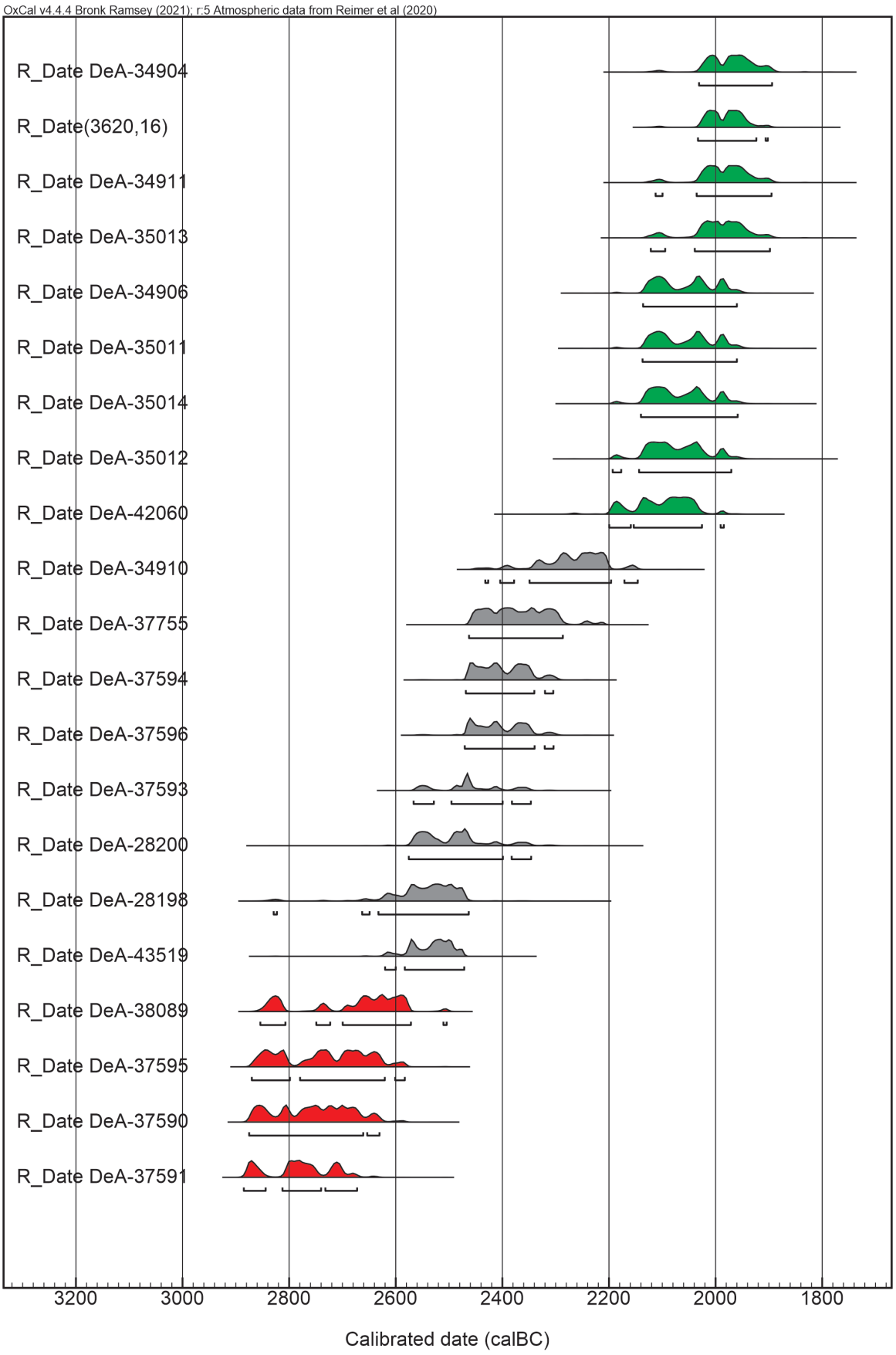


Fig. 32. Calibrated ^{14}C dates obtained for the different phases of the EBA from the study area. Red – EBA I, grey – EBA II, green – EBA III/MBA I

contemporary cultures. A single grave was discovered at the site in question, containing a vessel and probably a copper object. Near the skull some kind of red material was documented, without any further detail.[183] If that material was indeed ochre, then contacts with Yamnaya communities must be considered, since ochre was a characteristic element of the 'Yamnaya-package'. Also we have to specify that we do not consider it to have been a Yamnaya grave, since most other key Yamnaya elements were missing from the burial.[184] The appearance of the 'Zăbala Culture' was linked to population movements from the Lower Danube area into Transylvania.[185] Together with the Turia–Mlăjet–Sânzieni–Zimnicea type discoveries it has been considered to be a pre-Schneckenberg phenomenon.[186] The contemporaneity of the Zăbala and Turia–Sânzieni discoveries seems very probable. This is supported by a flat grave discovered at Şoimeşti, Prahova County. Near the skeleton of a woman, aside from several bone and copper ornaments, one askos-type vessel was found, similar to those known from the graves at Turia and Sânzieni.[187] The ^{14}C calibrated data from the human bone place the death of the individual between 2892 and 2674 cal BC,[188] which is very similar to the one at Zăbala. Even though the earlier research considered the presence of askos-type vessels to constitute an argument for the penetration of Zimnicea communities from the Lower Danube area, recently these objects are considered to be imported objects in the Schneckenberg milieu.[189]

Another unclarified question is the beginning and the evolution of the Schneckenberg Culture, especially its early (A) phase. Just as in the case of the Turia and the Sânzieni graves we could not send any samples for radiocarbon dating from contexts attributed to this culture. We have to rely on the earlier observations which place the Schneckenberg Culture in the first half or the second third of the 3rd millenium BC.[190] If we accept the assumption that this culture is later than the Zăbala-type discoveries, such as the graves from Turia and Sânzieni, then this date seems very likely. The relationship between the Glina and Schneckenberg Cultures has been pointed out earlier.[191] The recent radiocarbon dates from Mavrodin and Vităneşti obtained from two Glina settlements suggest their beginning could have been somewhere between 2850 and 2500 cal BC.[192] Even though these dates have been considered early for the beginning of the Glina Culture, they fit well into the estabilished EBA chronology (2750–2300 cal BC).[193]

Questions are raised by the earliest data at Leliceni, where we have the ^{14}C data, but not the proper context. Since it came from the filling of what is considered to have been the latest house,

183 Székely 1997a, 209, Pl. 88. R. Băjenaru considered that the red material was red ochre (Băjenaru 2014, 122, nr. 775), but none of the earlier publications mention this information. See for example: Székely 1971, 389; Székely 1997a, 32–33, 83.

184 Harrison – Heyd 2007, 196–197; Frînculeasa et al. 2020, 14.

185 Székely 1997a, 34; Székely 1998, 147.

186 Székely 1971, 391; Roman et al. 1992, 76. In some earlier papers (Székely 1980a, 45; Székely 1983, 62) Zs. Székely attributed the finds from Turia and Sânzieni to the Schneckenberg A Culture. Later he returned to the hypothesis which stated that "These communities [GAC – the authors], as well as the Zimnicea–Mlăjet–Sanzieni–Turia type ones, with origins at south, integrated in the Transition Period and contributed to the birth of the Schneckenberg Culture in Barsa County and in Trei Scaune Depression, as well as the Schneckenberg B–Jigodin Culture from the Ciuc Depression." (Székely 2009, 42). Unfortunately, from the graves at Turia and Sânzieni we couldn't send samples, because the bones were not collected during the excavations, so we can't compare with the Zăbala data.

187 Frînculeasa et al. 2020, 2, 12.

188 DeA-10070: 4197±26 BP (Frînculeasa et al. 2020, 4, Tab. 1).

189 Goglâltan 2013, 44, with further literature.

190 Ciugudean 2011a, 30; Frînculeasa et al. 2020, 2.

191 Băjenaru 2021, 559, with literature.

192 Mirea – Frînculeasa 2021, 27.

193 Băjenaru 2014, 257–258; Băjenaru 2021, 559.

it cannot date the feature itself, because all the other samples, from a stratigraphic point of view, should be earlier. But this is not the case. All the other samples are later. Even though the data can not provide a reliable dating for the respective feature, it proves the existence of human activity on the site as early as the second quarter of the 3rd millenium. In the monograph by Roman et al., there are some pottery analogies which could suggest a period of occupation in the 29th–27th centuries. These are the askos-type vessels,[194] similar to those discovered at Turia, Sânzieni and Şoimeşti. Probably these pottery types can be linked to an early Schneckenberg level, prior to the Jigodin occupation.[195]

The appearance of a GAC grave in Transylvania is a hitherto unique phenomenon, but it seems very likely that in this case we are dealing with an infiltration from the Moldavian Uplands.[196] Other scarce GAC discoveries from the neighbouring Târgu Secuiesc and Sfântu Gheorghe Basins suggest that there were contacts between the local communities and the area located east of the Carpathians.[197] We must also mention some GAC discoveries at Albiş in a layer attributed to the Coţofeni I period.[198] The new studies highlight later contacts between the GAC at the end of Coţofeni II, more probably during the Coţofeni III horizon.[199] The new radiocarbon dating for the Coţofeni III site at Poiana Ampoiului suggest a contemporaneity between this phase and the GAC communities.[200] New research suggests that the 3rd phase of the Coţofeni Culture can be dated to between 3250 and 2800 cal BC.[201] This timespan is earlier than the one obtained for the grave at Sânmartin. Another issue is the lack of Coţofeni III pottery found in southeast Transylvania. For now the latest occupation level of the culture in the study area can be attributed to its second phase of evolution.[202] From this perspective the Coţofeni II period should be dated *ante* 3250 cal BC.[203] For the influence of the GAC in the Coţofeni III milieu some specific decorative motifs have also been mentioned, in particular the concentric garland decorations, made with *Furchenstich* technique.[204] In southeastern Transylvania this influence cannot be traced because of the lack of Coţofeni III pottery. Although vessels with a similar, concentric garland decoration are present, these were not as made with small impressions, but with incisions. A vessel decorated in a similar manner has been discovered at Sfântu Gheorghe-Őrkő in a Schneckenberg settlement.[205] The lack of radiocarbon dating for the Schneckenberg discoveries in southeast Transylvania is not conducive to finding parallels with the GAC, but as we have seen above this contemporaneity seems very likely.[206]

All of this information suggests that contacts between the GAC and the early Coţofeni communities were probably made in the second half of the 4th millennium BC (the earliest in the study area

194 Roman et al. 1992, Taf. 124.1–2.

195 It needs to be mentioned here that most of the ceramic material was discovered in secondary positions, making any proper stratigraphic observations impossible.

196 Ciugudean 2021, 60.

197 Szmyt 2013, 97; Ciugudean 2015, 164.

198 Székely 2007, 88, 90; Székely 2009, 41.

199 Popa 2012, 148; Ciugudean 2015, 167.

200 Ciugudean 2015, 168–169.

201 Diaconescu 2020, 32; Ciugudean et al. 2022, 31.

202 Lazarovici et al. 2000, 108–109 (the existence of Coţofeni III type pottery at Păuleni is questioned by the authors of the study); Sztáncsuj – Körösfői 2009, 23; Ciugudean 2015, 167.

203 Unfortunately there are no radiocarbon measurements for this period from the study area.

204 Popa 2012, 147–148; Ciugudean 2015, 165. For the garland ('festoons') decorative elements of the GAC see: Szmyt 2010, 44, 58, 121, 122, Fig. 33.3.

205 Roman 1986, 37, Fig. 2.3a–c.

206 The Schneckenberg A period was considered by P. Roman to have evolved in parallel with the end of the Coţofeni II phase (Roman 1986, 51, Fig. 7).

being the discoveries at Albiş). At the present state of research we cannot say if these early contacts were the result of population movements, but it is certain that later on, at the beginning of the 3rd millennium, small communities from Moldavia infiltrated into the Carpathian Basin (as indicated by the grave at Sânmartin).[207]

For the EBA I stage radiocarbon-dated features with characteristic archaeological material are scarce (Fig. 33). Here we can discuss the two graves at Sânmartin and Moacşa. The grave at Sânmartin contained two bone appliques, for which good analogies are known from the 2nd grave at Dolheştii Mari, all dated before 3000 BC.[208] Another similar object is known from Kanev, Ukraine, without proper dating.[209] Our data shows that similar objects were in use even in later periods. The grave at Moacşa contained a single vessel, with long, slightly out-curved neck, decorated with several parallel lines made with cord-impressions. The body of the vessel was decorated with hanging triangles, also made with cord-impression technique. More or less close analogies for the vessel appear sporadically in burials considered to belong to the Yamnaya Culture,[210] as well as from Corded Ware burials found in Central and Northern Europe.[211]

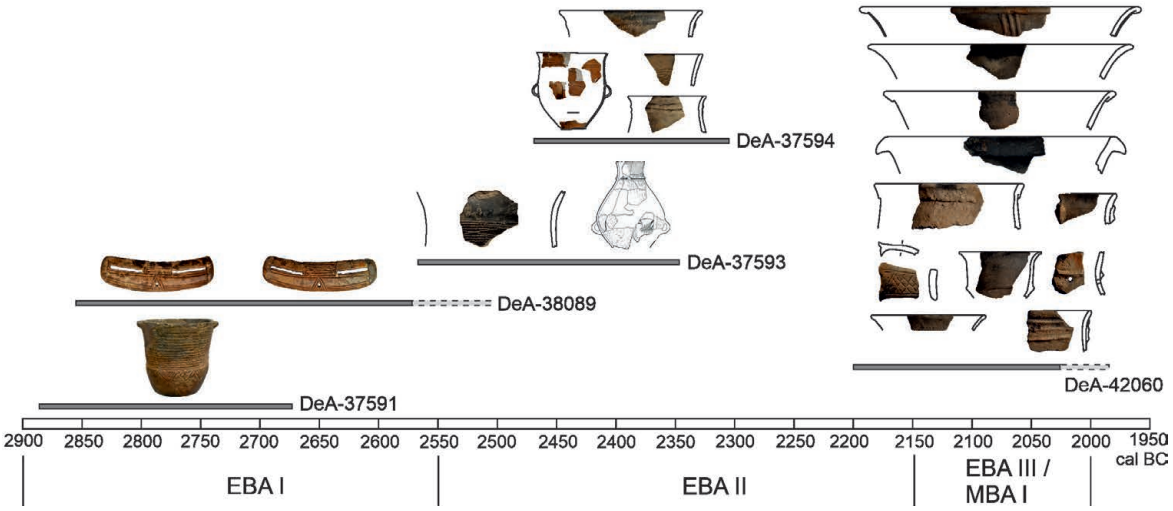


Fig. 33. EBA finds from radiocarbon-dated features from reliable contexts. The light-grey segment represents less than 1% probability of dating

Around the middle of the 3rd millennium BC (EBA II) most of the earlier-mentioned manifestations ceased to exist and new one appeared. The most characteristic phenomenon of the area is the spread of the cord-decorated pottery, refered to as the Jigodin Culture. This pottery style was common in the Ciuc[212] and the Târgu Secuiesc Basins[213] and parts of southern Subcarpathian Moldova.[214] In the Eastern Carpathian area its evolution can be traced from the beginning of the 26th century BC, or perhaps a bit earlier, as is suggested by most of the data from Leliceni. When collecting the samples for ^{14}C dating we have taken into consideration the stratigraphic situation. Even so we cannot distinguish fine chronological borders between the layers. It seems that all the three

207 Ciugudean 2011a, 22.

208 Mihăilescu-Bîrliba – Szmyt 2003, 96, Fig. 8.5–6, 105, Tab. 1.3–4.

209 Szmyt 2010, 211, Catalogue 1A, nr. 22, 261, Pl. 17.1.

210 Frînculeasa et al. 2015, 67, 70, Fig. 13; Ivanova – Toschev 2015, 357, 359, Fig. 12.2.

211 Frînculeasa et al. 2015, 67; Heyd 2021, 389, Fig. 5.

212 Roman et al. 1992, 173–175.

213 Puskás 2015b, 261; Buzea – Puskás in press.

214 Roman et al. 1992, 78–83, 176.

preserved layers belong to a horizon between c. 2500–2300 cal BC. Many discoveries suggest the contemporaneity between the second phase (B) of the Schneckenberg Culture,[215] meaning that the Schneckenberg A can be dated before the 26th century BC. The origin of the Jigodin type pottery in Transylvania is as yet unclear. Its appearance was first understood by Z. Székely to be the result of the movement of the Gorodsk–Usatovo population into Transylvania.[216] Later, in the light of the excavations at Jigodin and Sfântu Gheorghe, he reconsidered his opinion and now saw the Jigodin pottery as a variant of the Schneckenberg Culture.[217] On the other hand F. Bertemes considered it to be related to the Makó Culture,[218] while others raised the possibility of a Central European origin (Corded Ware Culture ?).[219]

The large quantity of pottery sherds found at Leliceni came from secondary position, so only a few fragments can be associated with ^{14}C data. From the filling of the 3rd house a few vessel fragments with everted rim were identified, decorated with one or two horizontal ribs, and sometimes with incisions. Cord impressions were used to make some simple motifs like multiple horizontal or cross-hatched lines or hanging triangles. From the layer above the dwelling in question came a sherd with horizontal and rhomboidal corded decoration, with circular impressions beneath it. The Jigodin pottery discovered at the Covasna site does not show differences from the pottery of the EBA II culture at Leliceni. Similar vessel forms and decorative motifs continued to be used after the 22nd century BC, at least in the Târgu Secuiesc Basin. Probably around the end of the century the Jigodin type pottery began to dissappear, as suggested by some discoveries of Năeni–Schneckenberg-type,[220] marking the beginning of the MBA.

This new set of EBA radiocarbon dates has led us to make some observations on the metallurgy of the Bronze Age in southeastern Transylvania, even though there are no metal discoveries from ^{14}C-dated contexts. The metallurgy of the 3rd millenium BC is characterized by the spread of shaft-hole axes.[221] The earliest shaft-hole axes found in the study area belong to the Dumbrăvioara-type,[222] being a product of the Schneckenberg B and Jigodin communities.[223] The local production of the weapons is attested by the casting moulds discovered at Leliceni. Their attribution to a narrower time period is reinforced by the context in which they were found: the fragments of the casting moulds were discovered in a secondary position, in the composition of the Iron Age rampart.[224] We consider that the moulds belong to the later period of the settlement, namely to the Jigodin Culture. Recently V. Klochko has referred to the discoveries at Leliceni, considering them to be moulds for a "Lelişeni–Szczytna" variant of the "classic" Kozarac–Stublo-type axes.[225] He dated such discoveries to the first half/middle of the 3rd millenium BC, seeing them as products of the Corded Ware Culture.[226] The radiocarbon dates obtained for the Jigodin Culture suggest that all the casting moulds discovered at Leliceni can be dated after the 26th century cal BC, but no later than the 22nd century cal BC.

215 Roman et al. 1973, 571.
216 Székely 1959a, 238.
217 Székely 1973, 128–129, 133.
218 Bertemes 1998, 199, 206.
219 Roman et al. 1973, 572; Dani 2013, 209.
220 Constantinescu 2020, 162.
221 Szeverényi 2013, 662.
222 Vulpe 1970, Taf. 44.B; Dénes – V. Szabó 1998, 89–110; V. Szabó – Dénes 1999, 123–138.
223 Vulpe 1970, 32; Roman et al. 1992, 187–188; V. Szabó – Dénes 1999, 126; Dani 2013, 208.
224 Roman et al. 1992, 157–159.
225 Klochko 2020, 321; Klochko et al. 2020, 51.
226 Klochko 2020, 323–325; Klochko et al. 2020, 51, 82, 145.

Transition period: the EBA III and MBA I horizons

The EBA III period in southeastern Transylvania is characterized by pottery decorated with textile impressions and broom-strokes (*Besenstrich- und Textilmuster*). From a chronological point of view this pottery style is situated "soon after the end of the Jigodin and Schneckenberg Cultures",[227] between 2300/2200 BC and 2000/1900 BC.[228] The small number of sites suggests a short period of existence, probably much less than the 200–400 years suggested by the above dating. The appearance of this pottery style has been interpreted as a southern infiltration from the Gornea-Orleşti milieu,[229] while other scholars prefer a Transylvanian origin, from the Iernut group.[230] At the present state of research this group can be localized in southeastern Transylvania only in the Sfântu Gheorghe Basin, represented by the site at Zoltan-Nisipărie.

The beginning of the MBA in Transylvania is linked to the appearance of Wietenberg-type pottery. Yet we cannot draw a direct and satisfactory scheme of the evolution of this pottery style from the local pottery styles of the late EBA.[231] All the published radiocarbon dates on the distribution area of the Wietenberg Culture point to around 2000/1900 cal BC for its beginning.[232] Also, in the vicinity of the study area, on the eastern side of the Subcarpathian Curvature, the beginning of the MBA is situated one or two centuries earlier. Here the beginning of the MBA is marked by the spread of the Monteoru Ic4,3–Ic3 ceramic style around 2200 cal BC.[233] Taking into consideration these differences in the periodization systems elaborated for the beginning of the MBA in the region of the Carpathian Curvature (inner and outer regions), seems more appropriate to discuss the period between 2200–2000/1900 cal BC, of the late EBA and the early MBA together (Fig. 34).

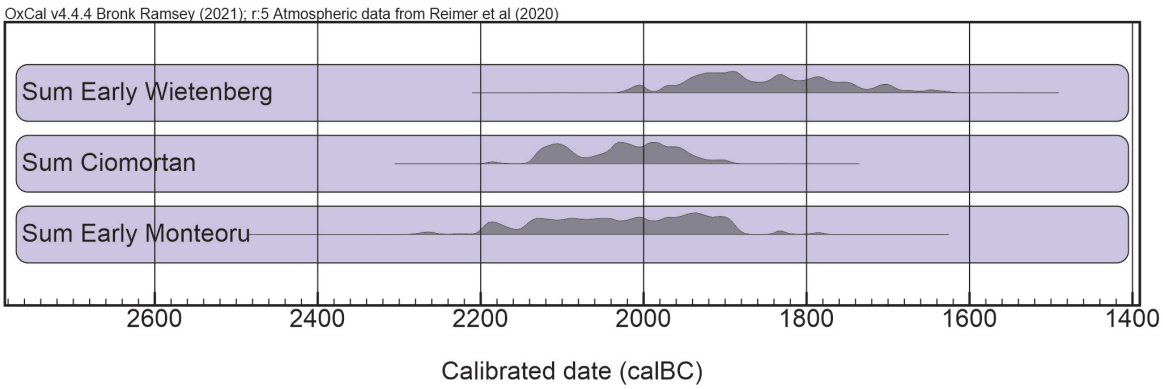


Fig. 34. Sum of radiocarbon dates of the EBA III/MBA I cultures in the Curvature Carpathian area

During our project only one sample belonging to the aforementioned period was radiocarbon dated, namely the 2nd feature at Covasna-Hankó stream valley, placing the occupation of the settlement (at least partially) between 2200 and 2000 BC. The high quantity of Jigodin type pottery recovered from the feature suggests that this culture evolved until the end of the 3rd millennium BC.

227 Cavruc 1997, 101.

228 Popa 2010, 106.

229 Cavruc 2005, 92.

230 Székely 1997a, 51–52. For a detailed terminological analysis see Popa 2010, 45–48.

231 Popa 2010, 129–138.

232 Gogâltan 2015, 75; Bălan et al. 2016, 80; Kavruk et al. 2022, 110.

233 Băjenaru 2002, 118; Munteanu 2010b, 178–180 (with further literature); Vulpe et al. 2010, 244–245; Băjenaru 2014, 218; Constantinescu 2020, 138. For a different opinion see Motzoi-Chicideanu 2011, 55–56.

Aside from these pottery fragments some sherds belonging likely to the Monteoru Ic3 period were also found, making possible the parallelization between the two pottery styles.[234]

Radiocarbon dates for the relevant timespan are scarce. From western Transylvania more or less similar data has been obtained from the sites at Meteş and Alba Iulia.[235] From the region of the Subcarpathian Curvature identical data is known from the Monteoru Ic3–Ic2 milieu.[236]

Recently in the Târgu Secuiesc Basin more and more sites with Monteoru Ic3 type pottery have been discovered, always occurring together with Wietenberg ceramics. These sites have so far been investigated only by field surveys, so we do not have conclusive data for the existence of distinctive settlement horizons for each period. Earlier studies have treated Monteoru Ic3-type pottery as imported, the result of 'inter-tribal connections.'[237] The quantity of the material, the Wietenberg imports in the Monteoru milieu and the recent radiocarbon datings have caused us to reconsider the presence of Monteoru communities in southeast Transylvania.

Particularly significant quantities of Monteoru Ic3 and Wietenberg pottery fragments have been collected in the area of the Săsăuşi and Ghelinţa villages. The numbers of decorated, identifiable sherds belonging to the two cultures are close, being about 50% for each. Such a high percentage of Monteoru-type fragments suggests that they were not likely to have been imported, as might reasonably be supposed had there been just a small number. Furthermore we should mention the site at Turia, where a larger quantity of Monteoru Ic3 pottery was discovered.[238] Another argument for the presence of Monteoru Ic3 communities in Transylvania is the lack of Wietenberg ceramic imports at sites of the same period in Moldavia. In the present state of research the first Wietenberg pottery found to the east of the Carpathians appears together with Monteoru Ic2 type pottery.[239] Probably this is the period when the Wietenberg ceramic style spread in eastern Transylvania and the contacts became more intensive with communities east of the Carpathians. This hypothesis is supported by the discoveries at the Păuleni-Ciuc site, where Monteoru Ic2 type pottery was discovered in the Wietenberg II layer,[240] and the Ciomortan habitation was sychronized with the Monteoru Ic3 period.[241] The third argument that supports the Monteoru presence is based on the radiocarbon data (Fig. 31). Using the 16 ^{14}C measurements from Moldavia the early period of the Monteoru

234 Here we have to mention three similar sherds from the Leliceni site (Roman et al. 1992, Taf. 84.6,9–10). All were considered as belonging to the Jigodin Culture, but their small number suggest that they could be interpreted more likely as import wares. Their shapes are very similar to those found at Covasna, being more frequent east of the Carpathians, characteristic for the Monteoru Ic3 period (Munteanu 2010b, 300, Fig. 40.1–13; Zaharia 1987, 37, Fig. 12.3, 38, Fig. 13.1). Also at the Sfântu Gheorghe-Őrkő site a few Monteoru Ic4–Ic3 sherds were discovered, probably from the Jigodin layer (Székely 1973, 133; Zaharia 1990a, 34–35).

235 Hd-29056 and Poz-42714 (Ciugudean et al. 2023, 223–225, Fig. 16).

236 Hd-28577: 3696±16 BP/2191–2027 cal BC; Hd-28524: 3692±17 BP/2141–1985 cal BC; Poz-50602: 3710±35 BP/2204-1979 cal BC; Poz-50603: 3685±35 BP/2196–1957 cal BC; Poz-72847: 3660±40 BP/2194–1926 cal BC; Poz-72603: 3710±40 BP/2275–1973 cal BC; Poz-72604: 3735±35 BP/2282–2028 cal BC; Poz-72605: 3735±35 BP/2282–2028 cal BC; Poz-72612: 3750±30 BP/2284–2037 cal BC; Hd-28110: 3738±21 BP/2268–2038 cal BC (Constantinescu 2020, 155–157, Fig. 35).

237 Zaharia 1990a, 33–37; Popa 2010, 64. In 1960 I. Nestor has suggested that the Târgu Secuiesc Basin was part of the early Monteoru distribution area (Nestor 1960, 103, 112). Some recent studies also mark the area in discussion as belonging to the Monteoru Culture, not giving any explanation for their affirmation (Frînculeasa 2020, 127, 128, Fig. 1).

238 Puskás 2015a, 101, 103–104.

239 Florescu 1971, 43–44, 66–67; Popescu 2008, 196.

240 Cavruc – Buzea 2002, 47, 50.

241 Florescu 1971, 45; Cavruc – Dumitroaia 2000, 133; Cavruc 2005, 93; Popa 2010, 108.

Culture (i. e. Ic4,3–Ic3 phases) has been situated between 2200 and 1900 cal BC.[242] The end of this timespan is covered by the two earliest Wietenberg data from southeastern Transylvania (Rotbav and Turia), suggesting possible contacts between the two communities. This is also suggested by the decorations of three urns uncovered in the Turia cemetery, which resemble Monteoru Ic3 motifs. The urns of graves 5, 10 and 19 have hanging triangles decoration with a few vertically placed circular impressions.[243] The shape of the urns clearly belongs to the Wietenberg style, but this combination of decorative motifs is not representative of the culture.[244] From the lowest layer at Rotbav a ceramic fragment has been published,[245] with the best parallels in the Monteoru Ic3 milieu.[246] All these data suggest that before the appearance of the Wietenberg communities in the Târgu Secuiesc Basin for an unknown period of time Monteoru type pottery was present. Meanwhile in the neighbouring depressions other cultural manifestations could evolve, like the Ciomortan group in the Ciuc Depression and the Zoltan group in the Sfântu Gheorghe Basin. The (partial) contemporaneity between the Ciomortan and the Zoltan groups has also been highlighted.[247]

All things considered, if we accept the *de facto* presence of the Monteoru Ic3 phase in southeastern Transylvania at the end of the 3rd millennium BC, then the beginning of the MBA should be placed one or two centuries earlier in the area, just as in the area of the Subcarpathian Curvature, where the MBA begins with the spread of the Monteoru Ic4,3–Ic3 ceramic style around 2200 cal BC.[248] This means that the Ciomortan-type pottery (and perhaps the Zoltan-type as well) would belong to this transition period.

A possible scenario for the pre-Wietenberg (EBA III/MBA I) period in the Târgu Secuiesc Basin has been outlined above, but the cultural situations in the neighbouring Ciuc, Sfântu Gheorghe and Bârsei Basins are less clear. In the Ciuc Basin we have to rely on the results of a single, well-excavated site, the fortified settlement at Păuleni-Ciuc. Until now in Transylvania the Ciomortan Culture has been documented only on the relevant site,[249] while other, scarce finds are mentioned together with Wietenberg pottery.[250] The problem of contacts between the Ciomortan and Wietenberg communities has long been under debate, yet not satisfactorily explained. New data suggest that the Dâmbul Cetății site was used in two different ways in the two periods: "during the Ciomortan occupation the site appears to have housed a fortified sanctuary, while during the Wietenberg occupation it was a fortified settlement."[251] Based on new ^{14}C data the Ciomortan occupation can be

242 Motzoi-Chicideanu – Şandor-Chicideanu 2015, 10–11, 25; Constantinescu 2020, 149–150, 154. See also: Popescu 2001, 30; Munteanu 2010b, 180.

243 Székely 1995, 142, Pl. 5.5, 146, Pl. 10, 147, Pl. 11.2. Analogies for the decoration: Zaharia 1990b, 37, Fig. 22.8.

244 Non of Boroffka's (Boroffka 1994) or Dietrich's (Dietrich 2014a) monographies present similar ornaments.

245 Dietrich 2014a, Taf. 86.1.

246 Florescu 1966, 89, Fig. 33.2; Zaharia 1990b, 35, Fig. 17.4, 37, Fig. 22.3.

247 Cavruc 2002, 91.

248 Băjenaru 2002, 118; Munteanu 2010b, 178–180 (with further literature); Vulpe et al. 2010, 244–245; Băjenaru 2014, 218; Constantinescu 2020, 138. For a different opinion see Motzoi-Chicideanu 2011, 55–56.

249 Kavruk et al. 2022, 118.

250 The only exception is the Peteni-Alsóhatár site, where aside from a single amphora considered to belong to the Ciomortan Culture (Székely 1997a, 80), no MBA material was identified. More likely we are dealing with a Costişa-type vessel. This pottery style was in use until the 16th century cal BC (Popescu 2013, 198, Fig. 4: Hd-27933), corresponding to one of the ^{14}C measurements obtained from Peteni.

251 Kavruk et al. 2022, 119.

dated between 2194 and 1899 cal BC,[252] while the Wietenberg level(s) probably not before 1950 cal BC.[253] If the lowest layer at Rotbav (Rt 1) is truly older than the second one (Rt 2), there is chance that it could be dated before 1950 BC, making probable a partial contemporaneity between the Wietenberg communities in the Braşov Basin and the Ciomortan Culture in the Ciuc Basin. Even so, in our opinion the beginning of the Wietenberg Culture in the study area did not last beyond the beginning of the 20th century BC.

The chronology of the MBA II and III in southeast Transylvania and chronological contacts with neighbouring areas

MBA II period

For the inner evolution of the Wietenberg Culture four phases have been proposed, the most widely used arrangement being the one proposed by N. Chidioşan and N. Boroffka.[254] Recently the quadripartite periodization of the Wietenberg Culture has been reduced to three: Early, Classical and Late phases,[255] including the I/A and II/B horizons (Chidioşan/Boroffka system) within the Early stage.[256] Some southeastern Transylvanian sites have been linked to this early horizon, such as the cemetery at Turia, the two lower layers at Rotbav, and the fortified site at Păuleni-Ciuc.[257] All the mentioned sites and discoveries represent the earliest manifestation of the culture in the study area.

The new radiocarbon datings presented in this paper (Figs 35–36), as well as those published earlier, make possible some new observations on the beginning of the MBA II, and the evolution of the Wietenberg Culture in southeastern Transylvania. As we have seen, the earliest ^{14}C data was obtained from the grave 19 of the Turia cemetery (DeA-23493), whose calibrated result gave the highest probability (92.1%) of between 1978 and 1773 cal BC.[258] These data match those obtained from several graves at the Sebeş-Între răstoace cemetry,[259] at the settlements at Geoagiu de Sus,[260] Peţelca,[261] and Stremţ,[262] and at the ritual place at Oarţa de Sus,[263] located in western Transylvania, along with the earliest data from Rotbav[264] and Păuleni-Ciuc,[265] sites located in southeastern Transylvania. All these dates are cover the periods between the first quarter of the 20th century BC and the beginning of the 17th century BC.

252 Gogâltan 2015, 77; Kavruk et al. 2022, 110.

253 Kavruk et al. 2022, 113, 119.

254 See Chidioşan 1980, 68–84; Boroffka 1994, 244–257.

255 Bălan et al. 2016.

256 Bălan et al. 2016, 70. A critical approach to the existing periodizations has been published by Quinn et al. 2020.

257 Bălan et al. 2016, 70–71.

258 Chances for an earlier dating into the first quarter of the 21st century BC are very small (3.4%).

259 M.17: AA-103613: 3517±41 BP/1952–1699 cal BC, M.25: AA-103614: 3533±41 BP/1973–1745 cal BC (94.4%), M.32: AA-103615: 3555±41 BP/2025–1766 cal BC (94.9%), M.34: AA-103616: 3562±42 BP/2028–1769 cal BC M.43: AA-103618: 3520±41 BP/1956–1740 cal BC (94.2%), M.44: AA-103619: 3495±40 BP/1931–1693 cal BC, M.45: AA-103620: 3501±40 BP/1935–1696 cal BC (Bălan et al. 2017, 187, Fig. 283).

260 OS-100530: 3610±25 BP/2033–1892 cal BC (Quinn et al. 2020, 52, Fig. 5; Supplementary material).

261 OS-113605: 3530±20 BP/1936–1770 cal BC, UGAMS-18994: 3570±25 BP/2020–1780 cal BC (Quinn et al. 2020, 52, Fig. 5; Supplementary material).

262 OS-107622: 3560±30 BP/2020–1774 cal BC (Quinn et al. 2020, 52, Fig. 5; Supplementary material).

263 Bln-5626: 3507±37 BP/1935–1700 cal BC (Kacsó 2011, 412). From the same amount of charred seeds another sample was sent to the laboratory at Lyon (Ly-9190: 3265±30BP/1615–1452 cal BC). The obtained results were totally different from the one obtained at Berlin. Very likely the results of the Berlin laboratory are the right ones; see also (Palincaş et al. 2019, 48).

264 Hd-28203: 3547±24 BP/1957–1772 cal BC (Dietrich 2014b, 65, Fig. 3).

265 Kavruk et al. 2022, 103, Fig. 1.113.

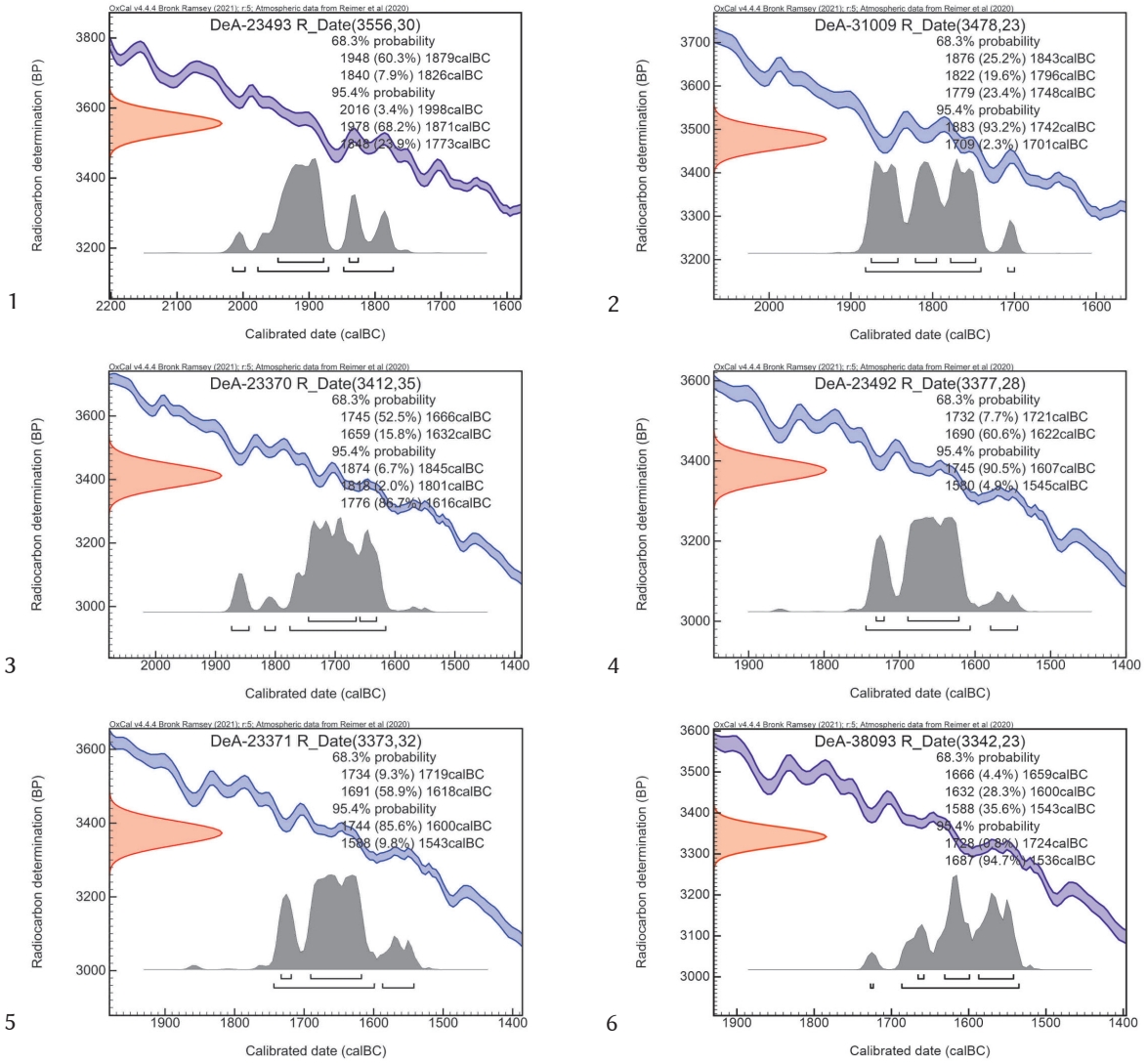


Fig. 35. MBA calibrated ^{14}C dates discussed in the text. 1 – Turia-Vármegye, 2 – Torja-Rétiláb II, 3 – Sfântu Gheorghe-Avasalja, 4 – Ozun-Kupántag, 5 – Sfântu Gheorghe-Avasalja, 6 – Sâncrăieni-Karimósarka

Another dataset, recovered not far from the above-mentioned cemetery, from the Turia-Rétiláb II site (DeA-31009), is later by 79 BP years. The calibration value with high probability falls between the 19th–17th centuries BC. The material collected from the site seems likely to belong to further phases of the Wietenberg Culture, although characteristic sherds of the classical period have not yet been found.[266] Some black, shiny fragments with impressed triangles suggest an occupation level in the classical phase as well. The ^{14}C data most probably belongs to the early phase of the Wietenberg Culture. This is suggested by a newly obtained data set from a recently-discovered cemetery near Țufalău, which was considered to belong to the Wietenberg A2–B phases.[267] The calibration of the sample falls between 1885 and 1688 cal BC,[268] close to Turia-Rétiláb II and to some of the Păuleni-Ciuc sites.[269] Also, some graves at the earlier-mentioned Sebeş-Între răstoace[270] and the Limba-Oarda

266 Pottery fragments decorated with meandric motifs, the lack of *Zahnstempelung* technique.

267 Puskás 2020b, 55.

268 DeA-23494 (Puskás 2020b, 55).

269 UGAMS-12286: 3440±25 BP/1878–1637 cal BC (Whitlow et al. 2013, 77).

270 M.2: AA-103611: 3445±41 BP/1881–1630 cal BC and M.36: AA-103617: 3425±41 BP/1879–1618 cal BC (Bălan et al. 2017, 187, Fig. 283).

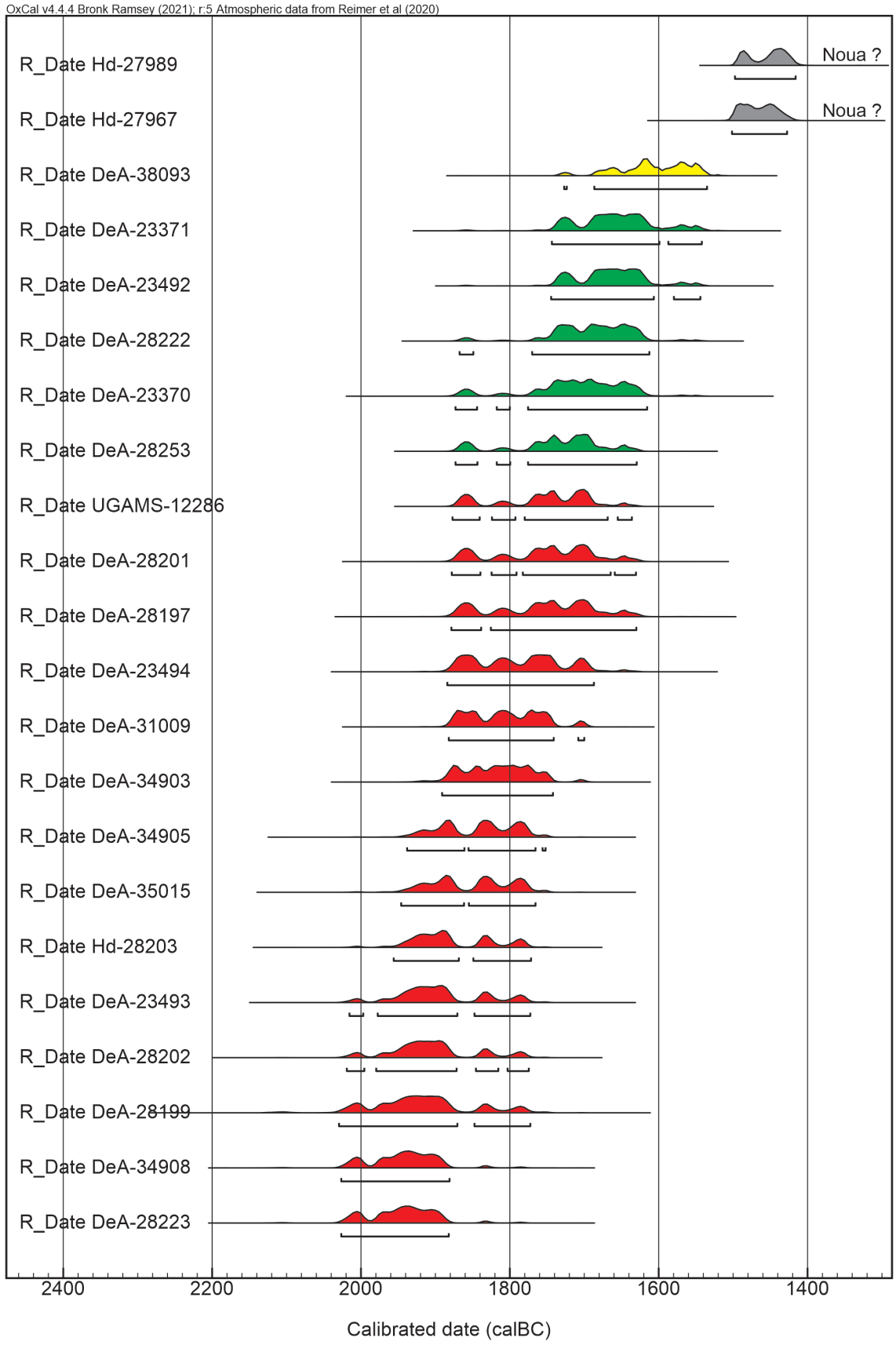


Fig. 36. Calibrated 14C dates obtained for the MBA II-III periods from the study area. Red – MBA II (Wietenberg II phase), green – MBA III (Wietenberg III phase), yellow – MBA III (late Monteoru phase), grey – Wietenberg III radiocarbon dates from Rotbav)

de Jos cemetries[271] belong to the period between the 19th and 17th centuries BC as well as the settlement at Alba Iulia-Recea/Monolit,[272] all these sites being situated in western Transylvania.

Contacts between the study area and the communities of the Costişa Culture situated to the northeast, on the eastern slopes of the Carpathians, are less documented. Lately more and more radiocarbon dates from the area has been published, making possible the chronological synchronization of the cultures between the sides of the Eastern Carpathians. In 2013 a number of 13 radiocarbon dates was published by Anca-Diana Popescu from the Costişa-Cetăţuie fortified settlement. Three of the earliest dates fall between 2016 and 1770 cal BC. These samples were taken from charred oak beams, making possible that there was an old wood effect.[273] A (partial?) contemporaneity at the level of the 21st/20th–18th centuries BC is suggested by a dating from the Siliştea site, calibrated between 1961 and 1771 cal BC (95.1%).[274] More or less contemporaneous with the Turia cemetery are six graves at the Cârlomăneşti site in northern Wallachia, attributed to the Monteoru Ic3 phase, dated between 2025 and 1781 cal BC,[275] belonging to the Ic1 phase, dated between 1953 and 1746 cal BC.[276] From Bârseşti a similar dating was obtained from cremated human bone, found together with Monteoru Ic2 pottery.[277]

Two data sets from Moldavia belong to the period between the 19th and 17th centuries BC: one at the above-mentioned Siliştea site, obtained from the Costişa/Monteoru level,[278] and a further data set from a Komarow site at Lunca.[279] To the same period belong two other graves from Wallachia. The one at Pietrosu is a flat grave, dated between 1885 and 1691 cal BC,[280] while the other is a secondary burial in a mound excavated near Smeeni, and dated between 1898 and 1739 (93.1%).[281] Its cultural affiliation is hard to determine, since the vessel in question resembles Tei pottery, but the grave is outside the distribution area of that culture.[282]

The earliest evidence for the presence of Wietenberg Culture in southeastern Transylvania can be placed in the first century of the 2nd millenium BC. The number of settlements suggests a higher population density compared to the earlier period. New research in the Târgu Secuiesc Basin suggests a clustering in the distribution of the find spots. This might be linked to possible centres of the area.[283]

Regarding the material culture of the MBA II period we dispose of scarce radiocarbon dates. For the early period of the Wietenberg Culture there is only one dated sample with a precise context,

271 UGAMS-44053: 3440±25 BP/1878–1637 cal BC (Ciută et al. 2021, 81).

272 Hd-29143: 3492±23 BP/1886–1745 cal BC (Quinn et al. 2020, 52, Fig. 5; Supplementary material).

273 Hd-27904: 3569±21 BP/2016–1784 cal BC; Hd-26471: 3547±21 BP/1952–1774 cal BC, Hd-26472: 3530±20 BP/1936–1770 cal BC (Popescu 2013, 185).

274 Hd-29247: 3546±26 BP (Bolohan 2010, 238, Tab. 1).

275 M27b: Hd-28065: 3588±21 BP/2022–1886 cal BC; M25a: Hd-28597: 3583±19 BP/2020–1884 cal BC; M25b: Hd-28808: 3570±23 BP/2018–1782 cal BC; M24: Hd-26957: 3576±28 BP/2025–1781 cal BC (Motzoi-Chicideanu – Şandor-Chicideanu 2015, 15–16; Constantinescu 2020, 155–156, Fig. 35.10–13; M58: Poz-72601: 3580±40 BP/2036–1774 cal BC (Constantinescu 2020, 156, Fig. 35.16).

276 Poz-61285: 3530±35 BP (Constantinescu 2020, 155, Fig. 35.8).

277 ETH-57398: 3563±51 BP/2035–1746 cal BC (Constantinescu 2020, 155, Fig. 35.5).

278 Hd-29027: 3455±30 BP/1882–1687 cal BC (Bolohan 2010, 238, Tab. 1).

279 Poz-8152: 3450±35 BP/1882–1640 cal BC (Bolohan et al. 2015, 146, Tab. 3.22).

280 DeA-8818: 3466±30 BP/1885–1691 cal BC (Frînculeasa 2020, 135, Tab. 2).

281 DeA-10671: 3494±31 BP/1898–1698 cal BC (Frînculeasa et al. 2017, 113–114).

282 Frînculeasa 2020, 131.

283 Puskás 2023, 285–296.

the grave nr. 19 from the Turia cemetery (Fig. 37).[284] That grave can be dated with high confidence between 1978 and 1773 cal BC (92.1%). All the urns at Turia lack any spiral or S-hook decorations. This may be attributed to regional differences of pottery craft, but also may be some kind of burial custom, which allowed as funerary urns only certain vessel types with defined decorations. Probably the S-hooked ornaments were not part of the funerary iconography,[285] but are documented among the ceramic sherds discovered on settlements.[286]

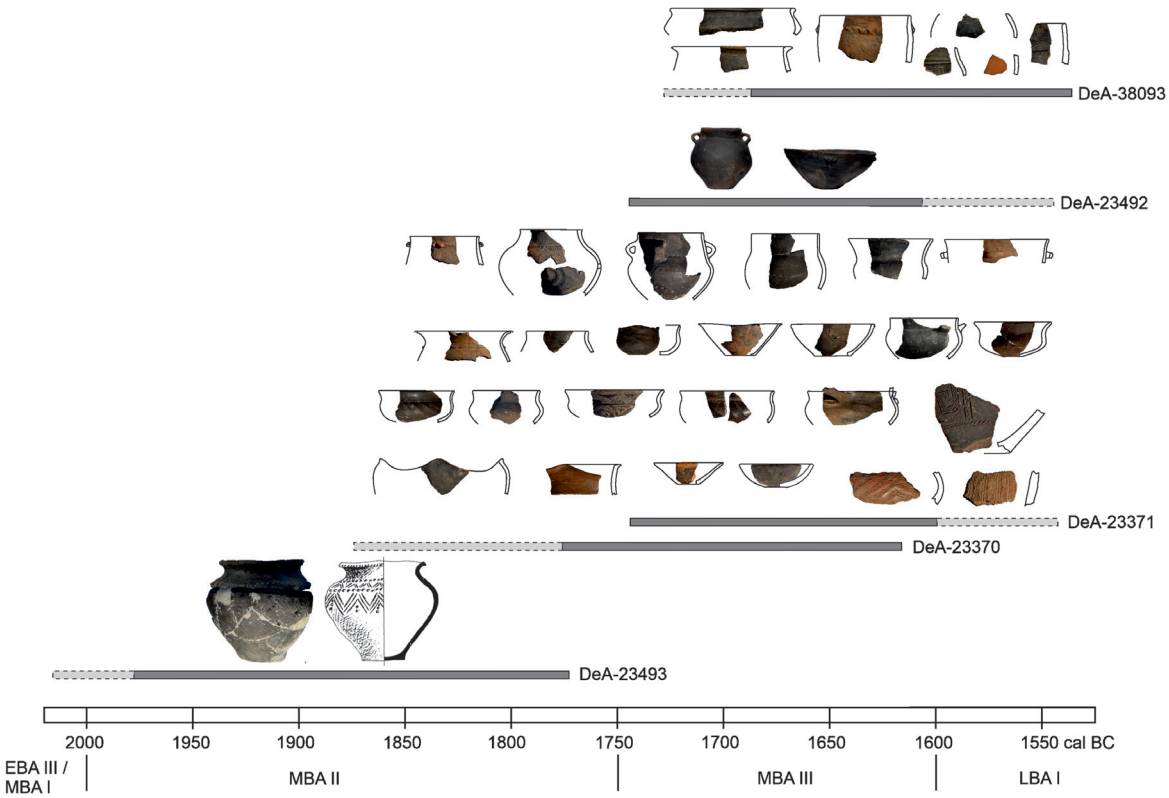


Fig. 37. MBA pottery from radiocarbon-dated features from reliable contexts. The light-grey segment represents less than 10% probability of dating

The metallurgy of the MBA is particularly well documented. Around the first quarter of the 2nd millenium BC in southeast Transylvania the Pădureni-type axes made of tin bronze became widespread.[287] Circulation of this weapon-type has been linked to the Wietenberg communities, with a higher concentration documented in southeastern Transylvania.[288] A. Vulpe has distinguished two variants of the axe type, to which possibly a third variant may be added, which is widespread in the Lower Danube area.[289] The later, second variant of the Pădureni axes was linked by Vulpe to the Wietenberg II phase,[290] even though until today we do not have any direct ^{14}C data from

284 For the vessel forms and decorative motifs of the Wietenberg Culture we used the typology brought together by Nikolaus Boroffka (Boroffka 1994, 119–194, Typentaf. 1–29). The urn was a TA4c type pot, decorated with small alveoli (VA9) and narrow, zigzag channels (similar to VA14).

285 None of the funerary urns from southeast Transylvania have similar decoration. See: Székely 1995; Puskás 2016, 89–103; Puskás 2020b, 51–66.

286 Dietrich 2014b, 61; Puskás 2018a, 276, Pl. 9.6,8.

287 Vulpe 1970, 13, 48; Székely 1997a, 85, 35–36; Puskás 2019, 102–103.

288 Vulpe 1970, 48; Puskás 2019, 103, Fig. 4.

289 Băjenaru 2017, 118; Puskás 2019, 101.

290 Vulpe 1970, 48; Soroceanu 2012, 68.

features containing this type of object. The most outstanding feature belonging to the Wietenberg Culture was excavated at Oarţa de Sus.[291] Some spectacular gold objects were recovered from one of the pits, which was probably a votive assemblage. The gold hoard at Ţufalău had a very similar composition,[292] and contained Pădureni type axes too. Both sets of finds have been dated to the Br A2 period,[293] the feature from Oarţa de Sus being dated by radiocarbon method. This information strenghtens the previous statements concerning the contemporaneity between the Hajdúsámson–Apa horizon with the Pădureni-type discoveries,[294] dated to the MBA II phase.

MBA III period

During the MBA III period the Wietenberg pottery underwent significant transformations. More complexe motifs were used, as well as new decorative techniques. The differences between the early and the classical phases of the Wietenberg Culture are evidenced not just by the new decorative elements, but by radiocarbon dates as well. The pottery from the pit excavated at Sfântu Gheorghe-Avasalja belongs to this classical period. The two radiocarbon dates sets obtained from this feature suggest that the pottery decorated with meandric motifs, sometimes filled with *Zahnstempelung* technique and characteristic for the period, could be present in the area from the second half of the 18th century BC. This is confirmed by other data from central Transylvania. The mass-grave discovered at Voivodeni had a few specific pottery sherds, decorated with meandric motifs, filled with *Zahnstempelung* technique. The ^{14}C measurements placed the feature between the 19th and 16th centuries BC, the highest probablity being the 18th–17th centuries BC.[295] A few data published from western Transylvania by H. Ciugudean and C. Quinn situate the wide-spread distribution of Wietenberg III/C type pottery in the second half of the 18th century BC.[296] Another data set was obtained from a pit at Sighişoara,[297] calibrated to between 1743 and 1501 cal BC.[298] A similar data set was obtained from a pit (Cx 22) at Luduş, with the highest probability of dating in the 18th–17th century BC.[299] The recently published five ^{14}C data from the Dumbrăviţa-Stricata cemetery confirm the relevant timespan for the Wietenberg III/C type pottery.[300]

291 Kacsó 2011, 409–412.

292 Compare Kacsó 2011, 226, Fig. 209 and Metzner-Nebelsick 2013, 331, Abb. 3.

293 Kacsó 2004, 60; Gogâltan 1999, 208.

294 Vulpe 1970, 13, 50; Kacsó 2004, 60. In Central- and Northern-Europe the Hajdúsámson–Apa-type swords were dated later compared to those discovered in the Carpathian Basin. When discussing the Nordic Bronze Age H. Vandkilde dated the Hajdúsámson–Apa-type hoards after 1600 BC (Vandkilde 2014, 606). H. Meller suggested an earlier dating for the Hajdúsámson hoards, between 1775–1625 BC, and 1625–1550 BC for the Apa-type discoveries (Meller 2013, 513). The recently published set of radiocarbon dates obtained for the Túrkeve-Terehalom multi-stratified site place the Hajdúsámson horizon before 1700 cal BC (Daróczi et al. 2023, 184).

295 VOI 1: 3337±38 BP/1736–1516 cal BC, VOI 2: 3412±42 BP/1878–1611 cal BC (94.5%) and VOI 3: 3407±38 BP/1875–1611 cal BC (94.5%) (Németh 2015, 186–187, Figs 4–6).

296 Ciugudean – Quinn 2015, 149, 157, Fig. 9. A few other data suggest that in western Transylvania the specific motifs and decorative techniques could appear even earlier, in the 19th century BC. See: Ciugudean – Quinn 2015, 150, Tab. 1; Quinn et al. 2020, Supplementary material.

297 Popa – Boroffka 1996, 56; Ciugudean – Quinn 2015, 148–149; Boroffka – Boroffka 2020, 56.

298 Bln-4622: 3330±51 BP/1743–1501 cal BC (Boroffka – Boroffka 2020, 56, Note 33). There is some contradictory information regarding the standard deviation. Quinn et al. 2020 (Supplimentary material) mentions the data as 3330±30 BP.

299 LUD-5/RoAMS 16.07: 3422±36 BP/1782–1629 cal BC (82.4%) (Berecki 2016, 137). The remaining data has a wide standard deviation value, not being proper for short period datings (Bălan et al. 2016, 82).

300 AAR-31613: 3352±26 BP/1736–1535 cal BC; AAR-31614: 3380±31 BP/1747–1544 cal BC; AAR-31615: 3348±28 BP/1735–1535 cal BC; AAR-31616: 3321±27 BP/1674–1511 cal BC; AAR-31617: 3434±28 BP/1875–1630 cal BC (Daróczi et al. 2022, 53–57, Pls 2–6).

The third data set presented in this paper is from a cremation grave at Ozun. The urns lack any decoration, except the knobs of the bowl used as a lid. The ^{14}C measurements resulted a very close match to those at Sfântu Gheorghe, which is why we consider it to belong to the classical phase of the Wietenberg Culture.

The fourth data set from this timespan was obtained from pit 9B at the Sâncrăieni-Karimósarka site. Even though the data suggest traces of a classical Wietenberg settlement, the pottery is not so conclusive. A few fragments (such as lobed vessels) found in various contexts can be attributed to the Wietenberg Culture, but most of the material, mainly based on the decoration, has good parallels in the Monteoru area, from its later, IIb phase. Similar data is known from Năeni village in the area of the Subcarpathian Curvature, obtained from a skeleton attributed to the Monteoru IIb horizon.[301]

Six of the dates from the Costişa-Cetăţuie site are contemporary with Wietenberg period III/C, which caused the author to place the occupation of the site most probably between "1780 and 1630 BC."[302] From the Monteoru Ic2–Ic1 layer, which covers the earlier Costişa level, another data set was obtained, suggesting the close relationship between the two cultures.[303] Into this time period falls the latest data set from Siliştea,[304] as well as the second data set from Lunca.[305]

Tei III type pottery is also considered to be contemporary with Wietenberg period III/C.[306] The Monteoru IIa pottery found in a Tei III milieu suggests that there was a parallel evolution of these three horizons.[307] For the absolute dating of the Tei III type pottery until now we have a single ^{14}C data from a pit at Bălăceanca. The Poz-132918 sample has the calibration value at 1873–1622 cal BC, the earliest probable date being between 1775 and 1622 cal BC (86%).[308] This date is synchronous with most of the Wietenberg III/C data from Transylvania.

The Transylvanian ^{14}C results confirm the assumption according to which in the central and southeastern parts of the region the Wietenberg III/C-type pottery became widespread during the 18th century BC. The diffusion probably came from western Transylvania, where the characteristic ornamentation and decorative technique appeared earlier, as suggested by many radiocarbon dates. From the relevant area there are now at least six data sets which correspond to the early phase of the Wietenberg Culture (i.e. 20th–17th century BC) of southeastern Transylvania. They are from the Stremţ-Fabrica de alcool,[309] Geoagiu de Sus-Viile satului,[310] Alba-Iulia-Recea/Monolit[311]

301 Poz-52926: 3365±35 BP/1743–1537 cal BC (Motzoi-Chicideanu – Şandor-Chicideanu 2015, 16, 27, Tab. 3).

302 Hd-26587: 3433±17 BP/1873–1642 cal BC; Hd-28033: 3429±15 BP/1871–1642 cal BC; Hd-28034: 3453±18 BP/1878–1691 cal BC; Hd-27991: 3419±25 BP/1869–1626 cal BC; Hd-27903: 3417±21 BP/1865–1628 cal BC; Hd-26473: 3375±22 BP/1742–1566 cal BC; Hd-27977: 3405±16 BP/1745–1629 cal BC; Hd-28358: 3407±26 BP/1768–1622 cal BC (93.8%) (Popescu 2013, 184–187, 198, Fig. 4).

303 Hd-28949: 3381±21 BP/1741–1616 cal BC (Popescu 2013, 185).

304 Hd-29337: 3371±22 BP/1741–1547 cal BC (Bolohan 2010, 238, Tab. 1).

305 Poz-8153: 3350±35 BP/1740–1532 cal BC (Bolohan et al. 2015, 146, Tab. 3, nr. 23).

306 Ştefan 2021, 123.

307 Oancea 1981, 183; Ştefan 2021, 123. Until now a single radiocarbon date has been published for the Monteoru Ia-IIa pottery style from Năeni (Hd-28858: 3439±23 BP/1876–1641 cal BC [Vasilescu 2013, 174; Motzoi-Chicideanu – Şandor-Chicideanu 2015, 16, nr. 9, 26–27; Constantinescu 2020, 157, nr. 26]). Taking into consideration all the Monteoru data, Motzoi-Chicideanu and Şandor-Chicideanu situated the Monteoru Ia–IIa phase between 1800and 1700 BC (Motzoi-Chicideanu – Şandor-Chicideanu 2015, 32, Tab. 6).

308 Ştefan 2021, 123–124.

309 OS-107553: 3560±25 BP/2015–1777 cal BC; OS-107621: 3520±30 BP/1931–1749 cal BC; OS-107620: 3480±30 BP/1888–1696 cal BC (Quinn et al. 2020, 52, Fig. 5, Supplementary material).

310 OS-107554: 3470±25 BP/1881–1696 cal BC (Ciugudean – Quinn 2015, 149, 150, Tab. 1).

311 Hd-29515: 3448±21 BP/1878–1634 cal BC (Ciugudean – Quinn 2015, 149, 150, Tab. 1).

Sibişeni-Deasupra satului[312] sites. Some of these were wood charcoal samples, so we have to take the possibility of an 'old wood' effect into account. For the last phase of the Wietenberg Culture (IV/D) there are two samples from the Miceşti-Cigaş site.[313] The radiocarbon dates obtained from human bones caused the authors to consider that the specific decorative motifs of this period must have appeared as early as the beginning of the 17th century BC.[314] All these data suggest that very likely the specific Wietenberg III/C-IV/D decorative motifs and techniques were in use in the 18th–17th centuries BC in western Transylvania.

We want also to reflect on some post-Monteoru Ic3 discoveries from the Ciuc and Târgu Secuiesc Basins. After the spread of the Wietenberg type pottery in southeastern Transylvania, contacts with the Monteoru communities persist. At Păuleni-Ciuc in the early Wietenberg layer Monteoru Ic2-type pottery was found,[315] while at Albiş a pottery sherd of Ib1 was documented.[316] Some small cups, with one or two handles, without decoration or with short and wavy incisions were discovered at Cernat, Catalina and Târgu Secuiesc, without certain contexts. The fact that they were discovered unbroken suggests that they are from closed contexts, probably graves.[317] Similar objects are known from cemeteries belonging to the Monteoru IIa period east of the Carpathians.[318] If they truly belong to Monteoru graves, then probably at the level of Wietenberg phase III/C we are dealing with the penetration of small, mobile groups. Probably their presence may be the result of short term, personal manifestations (like exogamy or transhumant pastoralism), since until now we lack any traces of settlements similar to those belonging to Monteoru Ic3 phase.[319]

Based on radiocarbon dates, the end of the Wietenberg Culture in southeastern Transylvania most probably can be placed in the first half of the 16th century BC, which is suggested by the discoveries at Sfântu Gheorghe and Ozun. The latest possible data for the Wietenberg manifestation are from the middle of the 16th century BC. On both sites the presence of the Noua Culture is documented. At Sfântu Gheorghe, aside from the Wietenberg discoveries traces of a Noua settlement were also identified, while at Ozun characteristic Noua burials, inhumation graves, have been found. Yet we lack any Noua ^{14}C measurements for the relevant sites. As we will see below the first Noua elements already appear in the 16th century BC, so the interactions between these two communities seems likely, but we lack any conclusive data. The overlapping, parallel use of the two pottery styles cannot be excluded on the level of micro-regions, but this phenomenon is not yet documented in the study area. The parallel evolution is more visible over larger areas. Several sites with Wietenberg III/C type pottery resulted in particularly late, post-15th century radiocarbon datings, mostly from central and western Transylvania.[320] All these data are contemporary with most of the Noua II dates

312 AA-103610: 3454±46 BP/1886–1630 cal BC (Ciugudean – Quinn 2015, 150, Tab. 1).

313 OS-108311: 3460±25 BP/1881–1691 cal BC, OS-108811: 3390±25 BP/1746–1616 cal BC (Bălan – Quinn 2014, 119–126). For details see: Bălan 2014, 27, 29.

314 Bălan – Quinn 2014, 122, 126.

315 Cavruc – Buzea 2002, 47, 50.

316 Puskás 2015a, 104, 115, Pl. 2.1.

317 Zaharia 1990a, 37.

318 Bârzu 1989, Tab. 3.1, Tab. 6.1, Tab. 35.2,4, Tab. 45.1, Tab.78.1, Tab. 88.2, etc.

319 An exception may be the site at Sâncrăieni.

320 AAR-31627: 3211±29 BP/1518–1423 cal BC (Daróczi 2021, 19); OS-113647: 3170±20 BP/1498–1413 cal BC (Quinn et al. 2020, 52, Fig. 5; Supplementary material). Two other dates were published from Rotbav as belonging to the third Wietenberg layer (i. e. layer contemporaneous with the Wietenberg III/C period). In the light of new Noua data from southeastern Transylvania (see below) it is hard to accept that they truly belong to the culture in question. Concerns have also been expressed by some scholars (Gogâltan 2015, 78; Németh 2015, 186–187; Bălan et al. 2016, 82), while these arguments are accepted by others (Ciugudean – Quinn 2015, 152; Quinn et al. 2020, 56). If the samples truly belong to the Wietenberg

from the study area, supporting the possibility, that certain ceramic styles were used for non-synchronous periods of time in various regions. This will make necessary the revision of pottery-based relative chronologies.[321]

The classical Wietenberg phase is represented by a great variety of vessel forms and decorative motifs. Most of them have been identified in the feature at the Sfântu Gheorghe-Avasalja site and can be dated between 1874 and 1543 cal BC, but more probably between 1776 and 1600 cal BC. The main vessel types are pots with narrowing neck (TA2a-b) and S-profiled vessels (TA4a-c). A few examples with cylindrical neck and globular body also occur (TA3b-c). Most of the pots have simple decorations, consisting of simple, finger-impressed or incised ribs (VE1-3). In one case the body of the vessel with spiral channeling (similar to VA18), while another was decorated with zigzag incisions (similar to VD14). The bowls are represented by simple forms, such as conical vessels (TD1a), decorated with impressed triangles on the rim (VD47). The most common forms have a curved body (TD1b), sometimes decorated with simple or impressed ribs (VE1-2), knobs (VE10), or, rarely, with impressions (VD5). One bowl with cylindrical neck (TD2b) was decorated with oblique channelling on the body (VA11). Two fragments of mugs belong to the TC3a and TC3d types, both without decoration. The S-profiled bowls (TD3c-e, TD3g)[322] are without decoration or with simple motifs like imprerssed triangles on the rim (VD47) or oblique channelling on the body (VA12). Four different types of cups,[323] often with over-riding handle (TD3c-e, TD3g-j), were identified. The most common decorations are the oblique channeling on the body (VA12), but rarely vertical channellings (VA6), shallow alveoli (VA9) and impressed triangles (VD6) also occur. In one case a more complex spiral motif was identified, filled with *Zahnstempelung* technique (VC1, VC45, VD14, and similar to VC15). In the filling of the pit characteristic lobed bowls of TE1c and TE2a were also found, all without decoration. Three small undecorated plates belong to the TF1a and TG1c types (Fig. 37).

Also to the classical period of the Wietenberg Culture belong the TA3c type urn and the TD1b-type lid from the Ozun-Kupántag site. The lid was decorated with four, symmetrically-placed finger-impressed knobs (VE10). The grave can be dated to between 1745 and 1545 cal BC, but more likely falls between 1745 and 1607 cal BC (Fig. 37).

The pottery recovered from the features at Sâncrăieni-Karimósarka is not so abundant, and there are few vessels with a specific form or decoration. The pottery fragments recovered from pit 9A and 9B do not belong to the Wietenberg III/C style, as we would expect based on the radiocarbon dating and the cultural context of the area. The pit 9A contained a small quantity of pottery, one cup having a Monteoru decoration, with parallels in the IIb phase.[324] The ceramic fragments recovered from the later (9B) pit were mostly decorated with narrow channels, bordered by sharp impressions and *Besenstrich* decoration. The bag-shaped vessel had a finger-impressed rib, while the S-profiled bowl and the vessel with thickened rim had no decoration. Even though well-matching parallels are scarce, the narrow channels with sharp impressions occur on vessels

phase, than in the Bârsei Basin (at least in the Rotbav settlement) we are dealing with different cultural manifestations at the level of the 15th century BC. Here the Wietenberg III/C ceramic style could be used for a longer period of time after the spreading of the Noua type pottery in Transylvania (i.e. 16th century BC). Another possibility is that the samples are from a disturbed context and they belong to the Noua Culture.

321 Quinn et al. 2020, 55.

322 The rim diameter is over 20 cm.

323 The rim diameter not exceeding 20 cm.

324 Zaharia 1963, 153, Abb. 7.11.

recovered from the Pietroasa Mică[325] and Balinteşti[326] cemeteries, as well as from early Noua settlements.[327] The ^{14}C data of the younger pit is too early for the Noua Culture, so both features very likely belong to the Monteoru IIb horizon (Fig. 37).

The metallurgy of the MBA III cannot be easily separated from the MBA II. The number of bronze artefacts recovered from features of this period is small. One fragment of a Pădureni-type axe was discovered at Albeşti, in a pit containing Wietenberg III pottery, proving that the type continued longer in use.[328] A lunular pendant, mainly characteristic of the upper Tisza region, was recovered from grave 1.[329]

The LBA chronology in southeastern Transylvania and chronological contacts with the neighbouring areas

The Noua Culture

The LBA of Transylvania can be divided into two major periods, corresponding to the Noua and the Gáva Cultures. These two cultural manifestations spread into southeastern Transylvania from two different areas: the Noua Culture from the northern Pontic area and the Gáva Culture from the northeastern part of the Great Hungarian Plain, and from northwestern Romania.

The beginning of the LBA in Transylvania is linked to the appearance of the Noua Culture, roughly dated to the 15th century cal BC.[330] The new set of ^{14}C data from south eastern Transylvania give a new perspective to this question (Figs 38–39). The two earliest dates for the LBA were obtained from the sites at Peteni-Alsóhatár and Sâncrăieni-Karimósarka. The excavations at Peteni were carried out in a so-called 'ash mound', that contained a rich collection of archaeological material belonging to the Noua Culture.[331] The material also contained a few specific late Monteoru (IIb) pottery fragments. The ceramics recovered from the pit 19 at Sâncrăieni were decorated with narrow channels, bordered by sharp impressions. Similar vessel forms and decorative motifs are common for the latest stage of the Monteoru Culture[332] and the earliest stage of the Noua Culture. The specific bone tools and pottery collected from Peteni cause us to attribute the settlement to the Noua I phase, with a strong late Monteoru IIb influence. On the other hand, even though it seems to be contemporary, the settlement at Sâncrăieni may be assigned to the Monteoru IIb period. Probably contemporary settlements are those at Țichindeal,[333] Gârbovăț,[334] Lăteşti,[335] Lichitişeni[336] and Cavadineşti.[337] Some of the published sherds from these sites have late Monteoru decorative elements. Except the settlement at Gârbovăț, we do not yet have radiocarbon dates for the other sites.

325 Oancea 1981, 166, Fig. 18.20, 167, Fig. 19.3.

326 Zaharia 1963, 147, Abb. 5.2, 149, Abb. 6.1,8.

327 Florescu 1991, 203, Fig. 31.26; Popa – Totoianu 2010, 94, Pl. 6.7,14, Pl. 15.

328 Baltag – Boroffka 1996, 389.

329 Rezi 2016, 127.

330 Gogâltan 2019a, 51; Ciugudean 2021, 65.

331 Székely 1965, 21–32; Székely 1970, 305, nr. 10; Székely – Székely 1979, 71–72; Székely 1980b, 129–133; Székely 1983, 143.

332 Oancea 1976, 203–205. A. Oancea considered the Monteoru IIb (Balinteşti–Gârbovăț type discoveries) phase to be distinct from Monteoru IIa, and proposed the Monteoru III denomination, with little success (Oancea 1976, 224; Oancea – Drâmbocianu 1977, 527).

333 Popa – Boroffka 1996, 51–61.

334 Florescu 1991, 237, Fig. 65.20, 238, Fig. 66.28.

335 Florescu 1991, 221, Fig. 49.3.

336 Florescu 1991, 224, Fig. 52.13, 225, Fig. 53.17.

337 Florescu 1991, 245, Fig. 73.9.

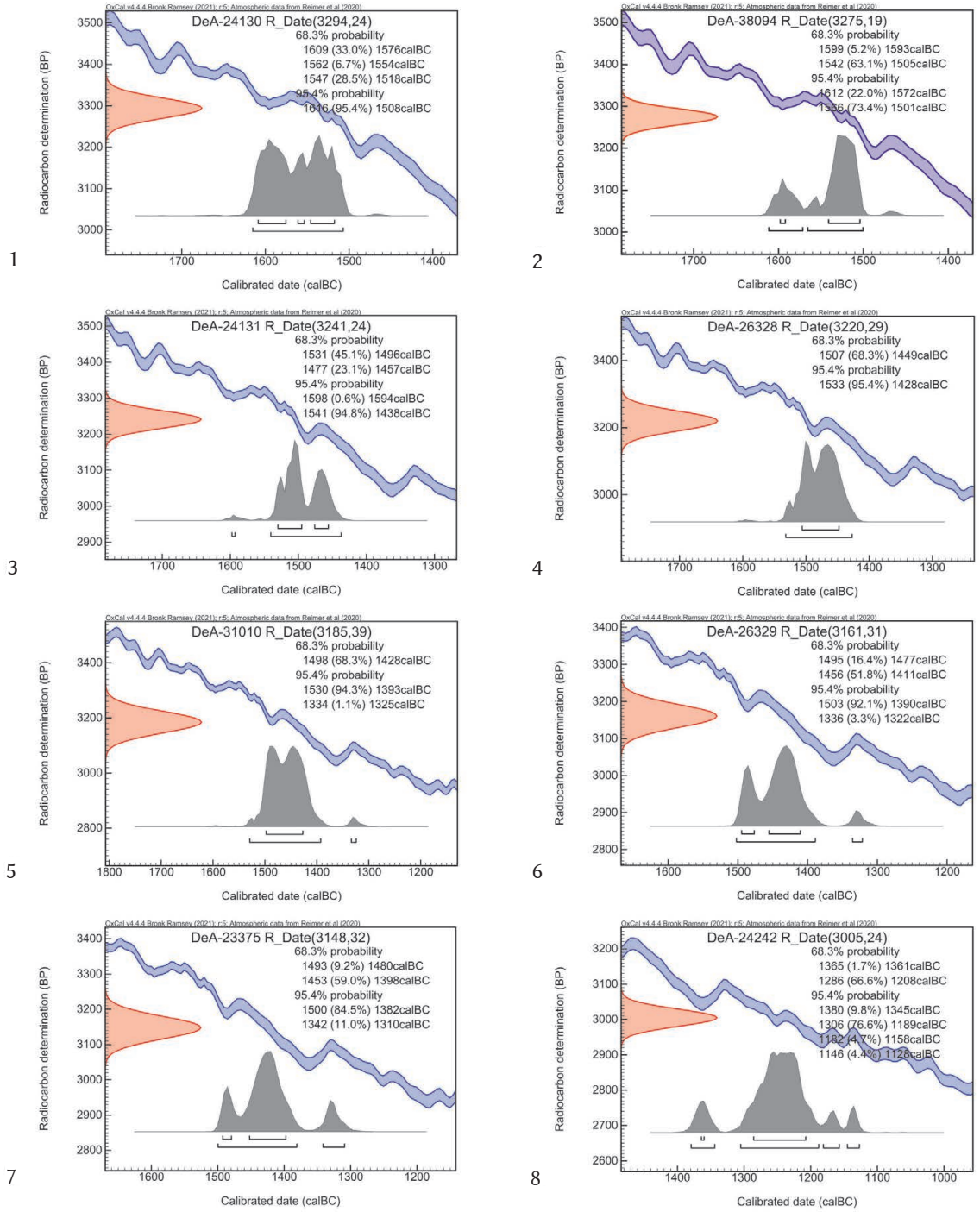


Fig. 38. LBA (Noua Culture) calibrated ^{14}C dates discussed in the text. 1 – Peteni-Alsóhatár, 2 – Sâncrăieni-Karimósarka, 3 – Peteni-Alsóhatár, 4 – Turia-Belső rétiláb, 5 – Săsăuși-Középső határ, 6 – Mărtineni-Völgyoldal, 7 – Țufalău-Alámenő II, 8 – Sânzieni-Táncospad

Compared to other data belonging to the Noua Culture, those mentioned above could seem to be somewhat early. Most of the published ^{14}C data cover the timespan beginning with the end of the 16th century BC. In spite of this there are a few sites where particularly early data are mentioned together with Noua pottery.[338] Two were published from the Noua site at Crasnaleuca and cover the

338 In discussing the Noua phase I we ignored the earliest data (Bln-1086: 3260±100 BP/1870–1290 cal BC [László 2018, 288, Tab. 1, nr. 45]) from the Mahala site, by reason of it having a large standard deviation, any worthwile calibration making impossible.

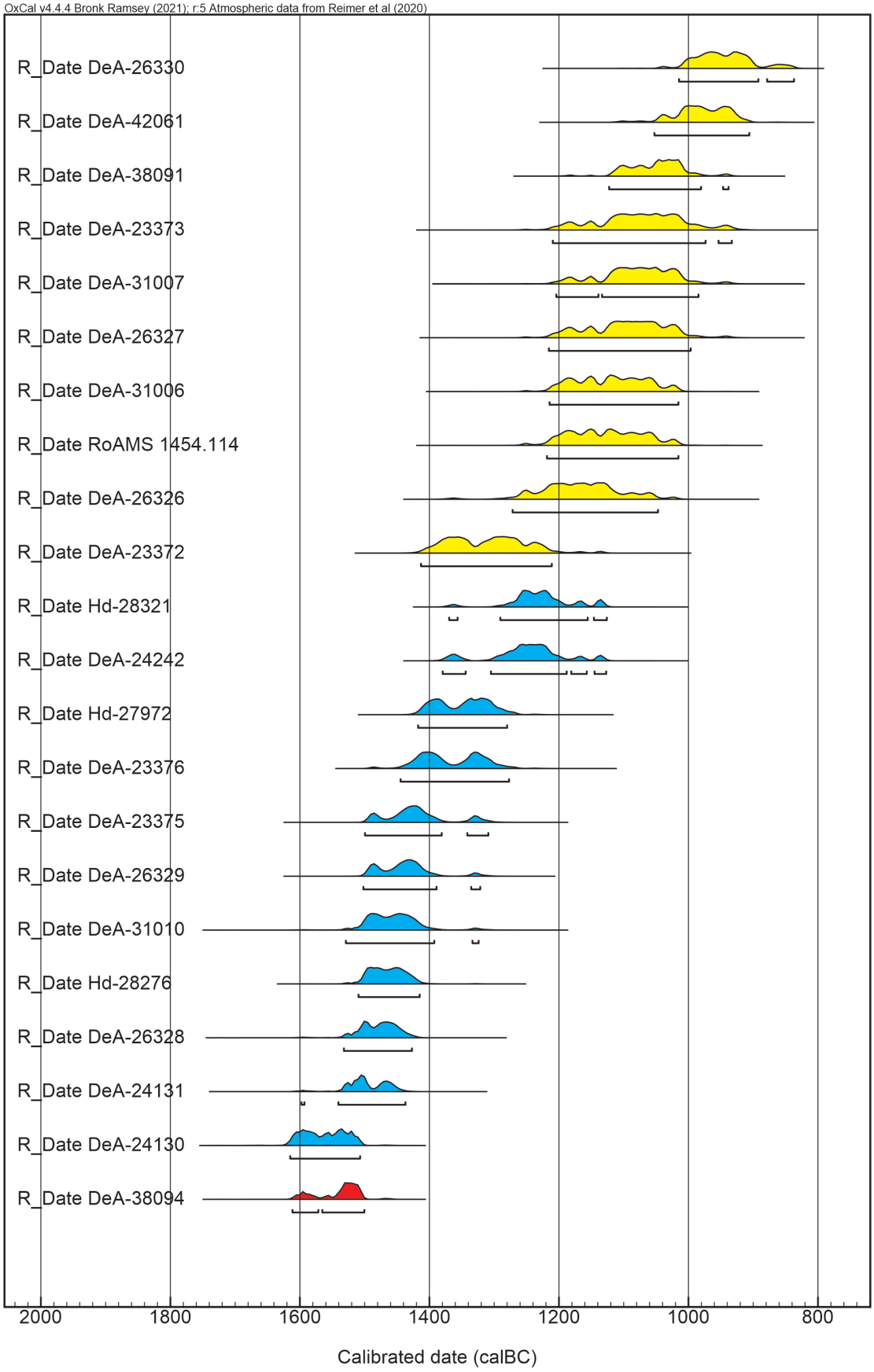


Fig. 39. Calibrated ^{14}C dates obtained for the LBA from the study area. Red – late Monteoru phase, cyan – Noua Culture, yellow – Gáva Culture

16th–15th centuries BC.[339] A third data set has been published from one of the 'ash mounds' at the Gârbovăţ site,[340] while another sample was collected from a crenated scapula from western Transylvania at the Gligoreşti site.[341] The presence of the tool in question clearly shows contact between the late Wietenberg and Noua communities. All the relevant data more or less cover the timespan given by the early data at the Peteni and the latest from the Sâncrăieni sites.

From Wallachia, there is just a single radiocarbon date for the period in discussion. The charcoal sample taken from one of the beams of the Popeşti fortification resulted in a value of 1616–1456 cal BC.[342] The pottery attributed to this level is in the style of Tei IV–V (Govora-Fundeni).[343] From Moldavia the latest date obtained from the Costişa-Cetăţuie fortified site was a value of 1684–1519 cal BC.[344] Recently from Aliman (Dobrudja) a date for a secondary burial in a Yamnaya mound has been published, with a similar result to the one mentioned above from Costişa.[345]

Five dates from the study area obtained for the Noua Culture belong to the LBA II.[346] These dates span the first half of the 16th century and the end of the 14th century cal BC. The pottery presented on the relevant sites shows all the characteristics of the classical phase of the culture (Noua II). Nevertheless in some of the settlements the presence of early Noua elements may still be recognized: one sherd from the 'ash mound' at Săsăuşi has good parallels in the pit 19 at Sâncrăieni, and some MBA Wietenberg pottery fragments were present in the 'ash mound' at Turia. Some of the latest Wietenberg ^{14}C data from southwestern and central Transylvania are contemporary with the Noua dates, so the interaction between these two cultures is beyond doubt.[347]

The period in question (i.e. late 16th–14th centuries cal BC) corresponds to the dates of the settlements at Albiş-Rétremenő[348] and Rotbav-La pârâuţ,[349] both located in southeastern Transylvania. From the western part of the province some data has been published, which can be linked to the Noua II communities, covering the last quarter of the 15th and the first half of the 13th centuries BC.[350] From the site at Pălatca-Togul lui Mândruşcă two samples are published, calibrated between the very end of the 16th, and the first quarter of the 13th centuries BC, respectively.[351] This fits particularly well with the Noua II dataset from the eastern part of the province, but the pottery indi-

339 GrN-21797: 3250±50 BP/1622–1422 cal BC; GrN-21798: 3240±40 BP/1610–1428 cal BC (Motzoi-Chicideanu – Gugiu 2004, List 1, nrs 2–3).

340 Without lab nr.: 3270±20 BP/1612–1465 cal BC (Frînculeasa 2022, 292).

341 DeA-5021: 3298±38 BP/1681–1461 cal BC (Gogâltan 2015, 76, Fig. 29).

342 B-6103: 3270±30 BP (Palincaş 1996, 240–242, 246).

343 Palincaş 1996, 257. For a different opinion see: Leahu 2003.

344 Hd-27933: 3330±24 BP/1684–1519 cal BC (Popescu 2013, 198, Fig 4).

345 BRAMS-3573: 3316±27 BP/1669–1508 cal BC (Ştefan et al. 2023, 110–111).

346 Peteni (DeA-24131: 1541–1438 cal BC [94.8%]), Turia (DeA-26328: 1533–1428 cal BC), Săsăuşi (DeA-31010: 1530–1393 cal BC [94.3%]), Mărtineni (DeA-26329: 1503–1322 cal BC [92.1%]) and Ţufalău (DeA-23375: 1500–1310 cal BC).

347 See for example: Quinn et al. 2020, 57.

348 DeA-23376: 3109±32 BP/1445–1278 cal BC (Puskás 2020a, 133–134).

349 Hd-28276: 3196±30 BP/1510–1416 cal BC; Hd-27972: 3085±23 BP/1418–1281 cal BC (Dietrich 2014b, 62). Probably the two late Wietenberg III/C dates from this site can be also linked to the Noua horizon (Hd-27967: 3195±19 BP/1502–1428 cal BC and Hd-27989: 3174±16 BP/1498–1417 cal BC).

350 Teiuş: OS-113542: 3080±20 BP/1414–1280 cal BC; Alba Iulia-Bazinul olimpic: Hd-29183: 3062±21 BP/1408–1262 cal BC; Valea Viilor: OS-108807: 3060±25 BP/1409–1259 (93.1%) (Ciugudean – Quinn 2015, 152, Tab. 2); Floreşti: Beta-317259: 3050±30 BP/1405–1223 cal BC (Rotea et al. 2014, 59, Pl. 19).

351 RoAMS 145.47: 3181±29 BP/1505–1411 cal BC; RoAMS 147.47: 3086±24 BP/1419–1279 cal BC (Palincaş et al. 2019, 40).

cates some differences.[352] Three other dates come from the Geoagiu de Sus-Fântâna Mare site, where only pottery belonging to the Wietenberg III/C and IV/D was identified.[353] The excavations made at the Băile Figa salt extraction site have provided a considerable number of radiocarbon dates, most of them belonging to the LBA.[354] In contrast to the outstanding number of wooden structures uncovered, the pottery discoveries were scarce, and because of the type of sites involved, proper stratigraphic observations could not be made.[355] As the authors describe the recovered pottery fragments "…some elements have good analogies within the Noua, Wietenberg, Suciu de Sus and Lăpuş Cultures, [but] the whole assemblage can hardly be attributed to one of them."[356] Approximately 30 dates covers the timespan between 1600 and 1200/1100 cal BC. Even though the radiocarbon dates can be sorted into two horizons (i. e. 1630–1400, respectively 1400–1100 cal BC),[357] their proximity suggests a continuous activity on the site.

Into this timespan may be added the three earliest dates from the Câmpina Bronze Age cemetery,[358] located to the south of the study area, in Wallachia. These dates are represent the first horizon of burials at the site. The vessels discovered near the skeletons are known from other late Monteoru graves.[359] In Dobrudja, at Jijila, part of a settlement was excavated, assigned to the Noua Culture. A set of six dates obtained from the LBA features covers the whole period of evolution of the relevant cultural manifestation. The first sequence of occupation indicates a chronological framework between the 16th and 15th centuries cal BC.[360] Some of the material recovered from Cx 131 at Jijila is similar to cups known from the late Monteoru IIb period.[361]

Most of the radiocarbon dates obtained for the Noua Culture east of the Carpathians belong to the classical phase. The two latest dates at Crasnaleuca and Mahala show that the settlements were still inhabited in the 15th–14th,[362] and the 15th–13th centuries BC, respectively.[363] The 13 radiocarbon

352 The archaeological material was considered by M. Rotea to belong to the so-called Deva-Bădeni III horizon, which is considered to be being a synthesis between the late Wietenberg and Otomani pottery styles and has been dated to the beginning of the LBA (Rotea 1994, 45–46). Contrary to Rotea's opinion, F. Gogâltan mentions the Pălatca site as one of the Gligoreşti-group's settlements (Gogâltan 2009, 119; Gogâltan – Popa 2016, 54), where many characteristic Noua elements have been documented, such as a *Warzennadel* type pin, and kantharos-type cups (Rotea 1997, 13–14).

353 OS-100529: 3100±25 BP/1428–1290 cal BC; OS-100528: 3070±25 BP/1413–1264 cal BC; OS-100527: 3130±20 BP/1448–1308 cal BC (94.9%) (Ciugudean – Quinn 2015, 152). Also the authors mention that "the present remarks on the archaeological context are based on a single 1 × 1 m excavation unit (Unit 3/2012). This prevents us from definitively concluding that the Wietenberg C type sherds are in situ and not the result of filling a possible LBA pit with earlier material in three distinct formation events."

354 Harding – Kavruk 2013, 116, Tab. 4.2; Kavruk et al. 2019, 35–36, Tab. 1.

355 Harding – Kavruk 2013, 116.

356 Harding – Kavruk 2013, 127.

357 Kavruk et al. 2019, 23–25.

358 MAMS-25288: 3189±28 BP/1506–1416 cal BC; Poz-52541: 3180±35 BP/1511–1327 cal BC; Hd-29799: 3159±23 BP/1500–1397 cal BC (Frînculeasa 2014, 81, Tab. 9; Frînculeasa 2022, 290–291, Tab. 1).

359 Frînculeasa 2022, 294.

360 RoAMS: 1354.46: 3250±29 BP/1610–1442 cal BC; RoAMS: 1371.46: 3225±27 BP/1533–1433 cal BC; RoAMS: 1353.46: 3191±29 BP/1506–1416 cal BC (Ailincăi et al. 2023, 15, Tab. 3). Even if on 2-σ range the oldest sample overlap partially with those at Peteni and Sâncrăieni, a probability of over 84% may suggest a later date, between the mid-16th and mid-15th centuries cal BC.

361 Ailincăi et al. 2023, 8, Pl. 10.5, 15–16.

362 GrN-21796: 3190±45 BP/1539–1384 cal BC (92.8%) (Motzoi-Chicideanu – Gugiu 2004, 45, List 1 nr. 1).

363 GrN-5135: 3100±55 BP/1497–1221 cal BC (Motzoi-Chicideanu – Gugiu 2004, 45, List 1 nr. 7). One of the dates from the Mahala settlement is not discussed here because of the wide standard deviantion (Bln-1085: 3135±100).

dates from Miciurin-Odaia cover the period between 1400 and 1100 cal BC,[364] suggesting that there were two main horizons of occupation. The first one covers the timespan between c. 1400–1300/1250 cal BC,[365] matching many of the Transylvanian dates. The second horizon will be discussed below. From the Câmpina cemetery six dates are contemporary with the Noua II phase,[366] representing the 2nd and 3rd burial horizons. Most of the pottery types have close analogies in the Noua repertoire, but some Monteoru elements still persist.[367] Another date obtained from a charred beam at the Popeşti site covers roughly the 15th century cal BC.[368]

The last phase of evolution of the Noua Culture (Noua III or Noua-Teiuş) has been outlined by K. Horedt.[369] Even though this period is little known, its existence is accepted by researchers.[370] To this period belong the radiocarbon date obtained from Sânzieni-Táncospad and the data obtained from the layer 5 at Rotbav.[371] Partial overlapping between the ^{14}C dating of the Noua III phase and the Cugir-Band group seems probable, which suggests a parallel evolution of the two ceramic styles.[372] Similar results with the data from Sânzieni gave four samples from Jijila, corresponding to the second chronological sequence of the settlement.[373] Two dates for the Câmpina cemetery also match the time period in discussion, proving the long use of the burial ground.[374] The radiocarbon dates of the second horizon at the Miciurin-Odaia site are roughly contemporary with the 14th–12th centuries. Six dates cover the period between 1390 and 1117 cal BC,[375] while two others have a larger standard deviation.[376] The pottery published in the work of E. Kaiser and E. Sava doesn't have any sign of 'Hallstattization', being more or less homogenous throughout the occupation period.

Even if the 17th–16th century Noua dates are scarce, we can't ignore them. Some of the dates clearly suggest the early evolution of the Noua Culture during the 16th century BC (Fig. 39).[377] In south-eastern Transylvania at this time we have settlements, while in the western part of the province the technological influence can be documented (for example, the occurrence of crenated scapulae).

364 Sava – Kaiser 2011, 393; Sava 2014, 520.

365 KIA-31495: 3077±31 BP/1422–1261 cal BC, KIA-31494: 3077±27 BP/1416–1266 cal BC, KIA-31490: 3077±26 BP/1416–1266 cal BC, KIA-31492: 3106±27 BP/1436–1288 cal BC, without lab nr: 3120±70 BP/1531–1206 cal BC (Sava – Kaiser 2011, 396–397, Tab. 26).

366 MAMS-25289: 3110±28 BP/1441–1290 cal BC; Hd-29820: 3107±18 BP/1430–1301 cal BC; Hd-29813: 3081±18 BP/1413–1285 cal BC; Hd-29866: 3054±18 BP/1399–1235 cal BC; Hd-30157: 3022±33 BP/1396–1129 cal BC; Hd-30094: 3039±20 BP/1390–1221 cal BC (Frînculeasa 2014, 81, Tab. 9; Frînculeasa 2022, 291, Tab. 1).

367 Frînculeasa 2022, 297.

368 B-6105: 3200±30 BP/1513–1417 cal BC (Palincaş 1996, 244).

369 Horedt 1967, 152–153.

370 Petrescu-Dîmboviţa 2010, 280; Ciugudean 2010, 164.

371 Hd-28321: 2994±19 BP/1370–1127 cal BC (Dietrich 2014b, 65, Fig. 3).

372 MAMS-40017: 2943±23 BP/1224–1051 cal BC; UGAMS-42281: 2920±20 BP/1210–1019 cal BC; MAMS-35023: 2907±19 BP/1199–1013 cal BC (Ciugudean et al. 2019, 105, 107, Fig. 12).

373 RoAMS:1355.46: 3061±29 BP/1412–1229 cal BC; RoAMS:1359.46: 3048±26 BP/1400–1224 cal BC; RoAMS:1358.46: 3033±26 BP/1397–1211 cal BC; RoAMS:1352.46: 3004±29 BP/1381–1126 cal BC (Ailincăi et al. 2023, 15, Tab. 3).

374 Hd-29800: 2972±21 BP/1266–1118 cal BC; Hd-30840: 2966±18 BP/1260–1120 cal BC (Frînculeasa 2014, 81, Tab. 9).

375 KIA-31499: 3023±25 BP/1390–1199 cal BC (94.9%), KIA-31491: 3016±28 BP/1388–1129 cal BC; KIA-31496: 2996±32 BP/1381–1121 cal BC; KIA-31493: 2992±22 BP/1292–1125 (93.1%); KIA-31498: 2981±26 BP/1294–1116 (93.9%); KIA-31497: 2979±24 BP/1284–1117 (95.0%) (Sava – Kaiser 2011, 396–397, Tab. 26).

376 Without lab nr: 2990±60 BP/1401–1048 cal BC; Without lab nr: 2950±60 BP/1311–991 cal BC (91.1%) (Sava – Kaiser 2011, 383).

377 László 2019, 55.

This is the case at the Gligoreşti-Holoame site, where a synthesis of the late Wietenberg and Noua pottery has been highlighted. In spite of this, on neighbouring sites, at the same time the exclusive use of local pottery has been recorded.[378] The Noua pottery from the study area does not bear defining marks of mixture with the Wietenberg ceramic style, but a strong late Monteoru influence can be observed. Yet it is not clear if these pottery fragments are the result of a pre-Noua infiltration of late Monteoru communities, or if they can be linked to the earliest populations of the Noua Culture. The discoveries at Sâncrăieni suggest the existence of late Monteoru settlements in the area. All this information suggests to us that the Noua I phase could have evolved between the first half of the 16th and the middle of the 15th centuries BC.[379] The exchange of the two pottery styles (i. e. late Monteoru to Noua type pottery) was a gradual process instead of a clear disruption. Probably at the same time in neighbouring regions both pottery types were in use.

The pottery belonging to the Noua I phase is as yet difficult to separate from that of the late Monteoru style, if it can be separated at all. Many vessel forms and decorative motifs present at the Peteni-Alsóhatár site have good parallels in the material of the Monteoru IIb period, as well as in the Noua I phase.[380] Handles with small knobs placed on the body of the vessels are also characteristic for Noua phase I.[381] The presence of crenated scapulae may be decisive to attribute the settlement to the one or the other culture. What seems very probable is that the early phase of Noua Culture in southeastern Transylvania is marked by a strong late Monteoru influence, which gradually dissappeared by the middle of the 15th century BC (Fig. 40).

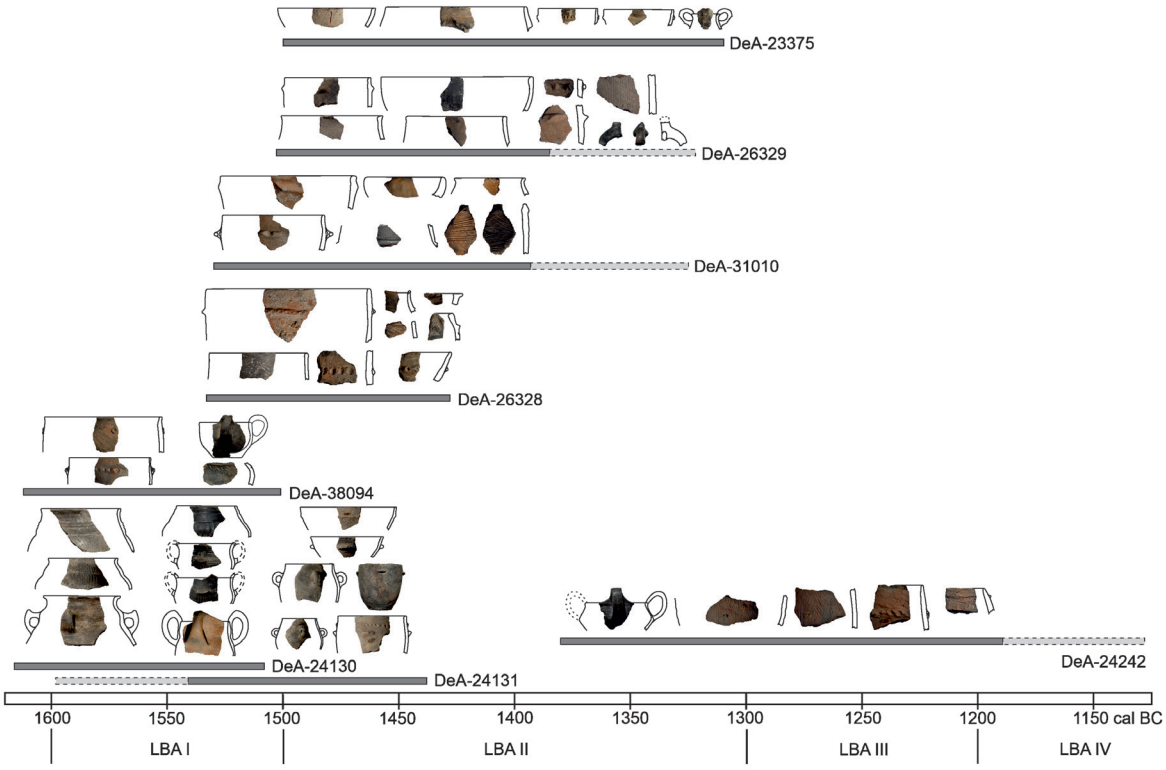


Fig. 40. LBA Noua-type pottery from radiocarbon-dated 'ash mounds' and features from the study area

378 Vlaha-Pad: DeA-5096: 1610–1441 cal BC; DeA-5152: 1611–1424 cal BC (Gogâltan – Popa 2016, 58, 59, Fig. 9); Geoagiu de Sus-Viile satului: OS-107555: 1612–1451 cal BC (Ciugudean – Quinn 2015, 155).

379 László 2018, 281–282.

380 See: Footnotes 318–321.

381 Popa – Totoianu 2010, 94.

The mobility of the Noua communities is demonstrated by the archaeological discoveries. Aside from the east-west direction of contacts, proved by the notched scapulae discovered at Gligoreşti in western Transylvania, reverse connections have also been documented. A pottery fragment discovered at the Peteni-Alsóhatár site has been considered to be an 'imported vessel' from the Upper Tisza Basin, probably from the Suciu de Sus or Cehăluţ milieu.[382]

As suggested by the pottery, probably most of the settlements belong to the classical phase (Noua II) of the culture. They are located near rivers or streams, on flood-free terraces. During field surveys made in the last decade several settlements with so-called 'ash mounds' have been identified in the Târgu Secuiesc Basin.[383] An increase of their number in the classical phase seems likely, although we do not have enough data concerning the spatial and chronological dynamics of each feature. The abundant archaeological material found in the 'ash mounds' suggests an intense place of activity inside the settlements.[384]

The pottery of the Noua II period contains all the elements known from its large distribution area. During this phase a homogenization of the pottery style can be observed.[385] Even though some local characteristics of the pottery has been highlighted earlier,[386] the main pottery types and decorative motifs from Transylvania are very similar to those identified in Moldova. The most characteristic vessel forms are the bag-shaped pots, with different variations. Mostly they were made of coarse fabric, rarely with a smoothed surface, and often they occur with traces of secondary burning.[387] Probably they were in daily use, mostly for preparing food. Most of these vessels are decorated with one or two horizontal ribs, disposed on the neck. The fine pottery is represented by small or middle-sized cups with one or two overriding handles (*kantharos*-type cups). The handles often have a triangular section with or without knobs on the top. The decorative motifs of this vessel-type are made by horizontal or oblique, narrow channels, rarely associated with impressions. In the study area the classical phase of the culture evolved approximately between c. 1500/1450 and 1300 cal BC.

For the final phase of the Noua Culture (III) as yet we dispose of little data. The single ^{14}C dating obtained from a pit at Sânzieni-Táncospad suggests that earlier vessel forms, like the different variants of bag-shape vessels or biconical cups are still present, just like the decorative motifs, such as the finger-impressed ribs or the *Besenstrich* technique. Newly-appearing vessel forms of this phase include the urn-like pot with outcurved rim. Similar vessel fragments were recovered from two sites in the study area, namely from Sânzieni-Urakszerelábja (Fig. 41.1–3) and Sânzieni-Táncospad (Fig. 41.4–7). The fragments from Táncospad site are not from the radiocarbon-dated feature, but the lack of other LBA material suggests that they very likely belong to the same timespan as the millet seeds (i. e. 1380–1128 cal BC). Such pots are also known from the Sebeş-Podul pripocului site, being dated to the Br D–Ha A period.[388] Vessels with outcurved rims occur in the pottery repertoire of the Cugir-Band group,[389] which later became widespread in the Gáva period.[390] All these mark the 'Hallstattization' of the local pottery.[391] Another vessel type considered to be characteristic of

382 Puskás – Botha 2022, 195–196.

383 Puskás 2020a, 131–132.

384 Dietrich et al. 2018.

385 Compare for example: Puskás 2020a with Andriţoiu 1992, 61–69, 220–225, Pl. 52–57; Sava 2014; Sava – Kaiser 2011, 177–308.

386 Sava 2002, 218.

387 Puskás 2020a, 123–127.

388 Popa – Totoianu 2010, 86–87, Pl. 1.8, Pl. 5.2.

389 Ciugudean et al. 2019, 124, Pl. 8.6, 126, Pl. 10.6, 127, Pl. 11.3.

390 Ciugudean 2012, 233, Fig. 4.6.

391 Horedt 1967, 152; Ciugudean 2010, 164.

Fig. 41. Noua III-type pottery from the Sânzieni-Urakszerelábja (1–3) and Táncospad (4–7) sites

the period is the cup with two band-like handles, sometimes with a knob on the upper part.[392] Even though several examples are known from southeastern Transylvania, their contexts remain uncertain, and thus further research is needed to be able to make conclusive remarks.

During the LBA the number of bronze objects grew significantly. The most characteristic objects at the beginning of the period were the socketed axes and sickels.[393] The hoards (Ruginoasa–Cara type) and single finds of these objects have been dated mostly into the Br D period, approximately between 1300 and 1200 BC, and they are considered to be tools of the Noua communities.[394] The new sets of radiocarbon dates suggest an earlier beginning of the Noua Culture, somewhere in the 16th century BC (Br B–C period). All these data raise the question of what was developing from a metallurgical point of view during this two-hundred-year timespan. This is a period when metal discoveries are scarce.[395] We must consider the possibility of an earlier production of those metal objects (for example, 'Transylvanian-type' socketed axes), which have been dated in the Br D.[396] A. László raised the possibility of a longer evolution of the Br D period, approximately between the mid-14th and mid-12th centuries BC.[397] Another type of object which could belong to the Noua period are the so-called 'Mycenaean-type' swords. The examples found in Transylvania all belong to the Karo A type, having a particularly long period of use, between the Br A2 and Br D periods. They have been thought to belong to the Wietenberg Culture, some of them being imported from the Aegean region or local imitations.[398] Recently near Pylos in Greece the so-called Griffin Warrior grave has been discovered, with spectacular grave goods.[399] The grave also contained a Mycenaean sword of Karo A or B type,[400] similar to those found in Transylvania. The grave was dated to the LH IIA period,[401] covering approximately the timespan between 1520/10 and 1450/40 BC,[402] which in our periodization correspond to the classical phase of the Noua Culture. This could be an argument in the favour of linking 'Mycenaean-type' swords to the Noua communities. Further contacts between the Noua Culture and the Aegean have already been documented above.[403]

The Gáva Culture

In the present state of research the emergence of Gáva type pottery from the so-called proto-Gáva style has been widely accepted. This formation took place in the north-eastern section of the Carpathian Basin, from where it spread to south and east.[404] The appearance of Gáva Culture in southeastern Transylvania is still under debate, but new ^{14}C measurements shed light on this process too. As mentioned above the key sites of the area (Reci-Telek and Cernat-Hegyes) have been considered

392 Ciugudean 2010, 164. Similar cups are known from the Olteni (Buzea 2006, 101, Pl. 7) and Feldioara sites (Florescu 1991, 192, Fig. 20.4–5). From the uppermost layer at Rotbav (Rt. 5), dated to the same timespan, similar vessels are missing.

393 Rezi 2011, 309.

394 Petrescu-Dîmboviţa 1977, 31; Kacsó 1990b, 246.

395 László 2006a, 133–134.

396 A similar dating has been proposed by C. Kacsó for the Uriu–Ópályi type hoards, contemporaneous with the Rugionasa–Cara type depositions (Kacsó 2015, 255).

397 László 2006a, 133; László 2006b, 48; Irimia 2008, 91.

398 Bader 1991, 23–30 with further literature; Dietrich 2010, 197.

399 Davis – Stocker 2016, 627–655.

400 Stocker – Davis 2017, 594.

401 Davis – Stocker 2016, 635–636.

402 Wiener 2020, 283, 301.

403 Hochstetter 1981, 252–254; László 2006a, 124–143; Irimia 2008, 79–117; László 2012, 52.

404 V. Szabó 2017a, 239–247.

to have begun in the Ha B1 period, thus at the end of the 11th century BC.[405] Recently some of the pottery at the Porumbenii Mari and Augustin sites have been considered to belong to an earlier, Ha A2 period, dated into the second half of the 11th century BC.[406] Some of the newly-presented radiocarbon dates suggest that an even earlier beginning of the Gáva Culture in southeast Transylvania should be considered (Fig. 39, Fig. 42).

The earliest ^{14}C dates (DeA-23372) come from the Cernat-Hegyes fortified settlement. Despite the fact that the sample is from a layer and not a well-defined feature, we assume that the data can nevertheless be linked to the Gáva occupation level.[407] Such early dates for the Gáva Culture are still scarce. One similar date is known from a well at Polgár, Hungary, which was attributed to the pre-Gáva horizon.[408] Another date is known from feature Cx 144 at the Pecica-Est site. The calibrated date situates the age of the pit in the 14th–13th centuries BC.[409] This dating is very similar to the one at Polgár, and the material discovered in the pit is characteristic for the classical Gáva phase. The two earliest dates from the Siret settlement are also similar to the one at Cernat.[410] The ^{14}C data obtained from the Cernat, Pecica and Siret sites are close to some of the burial mounds at Lăpuş. The three latest cover the period between the end of the 15th, and the end of the 12th century BC,[411] a timeperiod which is refered to as the Lăpuş II-Gáva I horizon.[412]

The dates from Poian belong to a later period, but still belong to the early phase of the Gáva Culture. Even though no grave goods were found near the skeleton, the 1272–1048 cal BC calibrated dating allows us to attribute it to the Gáva period.[413] The pottery at the Poian-Kőhát site has been (partially) published by L. Méder. The author considers that the settlement existed in the later phase of the culture (Ha B period), mentioning that some of the vessel forms and decorations have the best parallels in the Ha A period.[414] On the other hand H. Ciugudean, with reservations, mentioned the site among the early Gáva (Ia?) settlements.[415] Recently from central Transylvania two similar dates have been published, both belonging to the "early Gáva horizon".[416] The first sample is from the Teleac site, while the other is from Alba Iulia-Recea. The two calibrated dates provide the intervals between 1256 and 1051 cal BC, and between 1299 and 1055 cal BC respectively (92.6%).[417]

405 See Footnote 53.

406 Ciugudean 2010, 169–170; Ciugudean 2011b, 74; Ciugudean 2012, 234.

407 During the excavations, aside from the LBA Gáva pottery fragments, a few Copper Age (Ariuşd group), MBA (Wietenberg Culture) and Late Iron Age (La Tène Culture) sherds were also identified. Except the Gáva Culture none of the evolution of these cultures can be placed on the timespan covered by the radiocarbon data.

408 Deb-9674: 3070±40 BP/1423–1223 cal BC (V. Szabó 2007, 146–165).

409 RoAMS 996.80: 3038±28 BP/1398–1216 cal BC (Sava – Ursuţiu 2021, 89, 102–103).

410 Bln-5788: 3056±50 BP/1431–1130 (1431–1195 – 93.1%) cal BC; Bln-5786: 3006±37 BP/1390–1122 cal BC (László 2010, 123–125). Two other dates (Bln-5790: 2987±49 BP/1389–1051 cal BC; Bln-5789: 2929±65 BP/1375–931 cal BC) have a wide standard deviantion, not being suitable for a more detailed chronological analysis.

411 Poz-22792: 3055±35/1412–1222 cal BC; Poz-22795: 3005±30/1383–1126 cal BC; Poz-22788: 2995±35/1385–1116 cal BC (Metzner-Nebelsick et al. 2010, 223).

412 Marta 2009, 54–93; Ciugudean 2010, 168; Marta 2010, 317–328; Ciugudean 2011b, 71; Ciugudean 2012, 232; V. Szabó 2017a, 242. The parallel development of the Lăpuş II and the Gáva Cultures has been highlighted earlier by Kacsó 1990a, 49.

413 We should mention that a significant quantity of archaeological material belonging to the Noua Culture was also discovered. Even so we think the dating is too late for this culture.

414 Méder 2006a, 52; Méder 2006b, 48.

415 Ciugudean 2010, 168; Ciugudean 2011b, 71; Ciugudean 2012, 232.

416 Ciugudean et al. 2019, 106.

417 KIA-37782: 2945±25 BP/1256–1051 cal BC; UA-43723: 2976±36 BP/1374–1055 (1299–1055 [92.6%]) cal BC (Ciugudean et al. 2019, 108, Tab. 1).

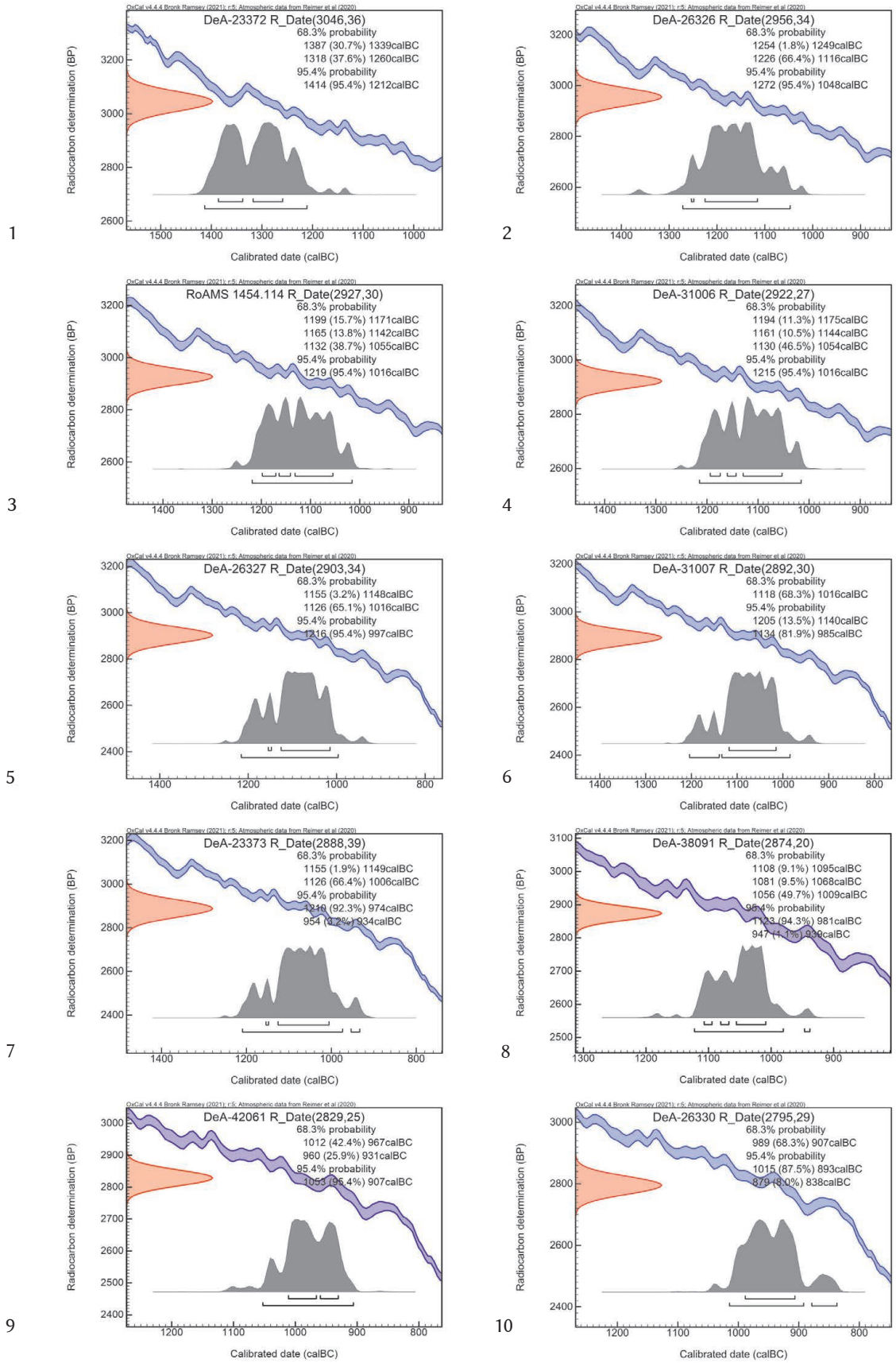


Fig. 42. LBA (Gáva Culture) calibrated ^{14}C dates discussed in the text. 1 – Cernat-Hegyes, 2 – Poian-Kőhát, 3 – Reci-Dobolyka, 4 – Porumbenii Mari-Várfele, 5 – Cernat-Hegyes, 6 – Porumbenii Mari-Várfele, 7 – Turia-Telek, 8 – Bancu-Potovszky-kert, 9 – Covasna-Hankó valley, 10 – Hătuica-Közösláb

Further radicarbon dates from the Ha A2 period are known at the Zsáka site from Hungary, dated between 1250 and 1150 cal BC.[418]

Six other measurements resulted in calibrated dates roughly between the 12th to 11th centuries BC: the material of the pit of the Porumbenii Mari-Várfele fortified settlement was dated between 1215 and 985 cal BC. A similar time interval is covered by the material of the Turia pit (1210–974 cal BC [92.3 %]), the second sample from Cernat (1216–997 cal BC), a sample taken from the hearth of the Bancu-Potovszky-kert (1123–981 cal BC [94.3%]), as well as by the sample from one of the pits of the Reci-Dobolyka settlement (1219–1016 cal BC). This period (i.e. 12th–11th centuries BC) is roughly covered by one sample from Western Transylvania at the Vlaha-Pad site,[419] and two samples recovered from Pecica-Forgaci.[420] If we take a closer look at the calibrated results of the southeastern Transylvanian dates presented above, with a higher probability they stretch between the beginning of the 12th–11th centuries cal BC, while the other three data mostly cover the 11th century and the first half of the 10th century BC. Two more dates come from the Câmpina cemetery. Although the ceramics of the dated tombs lack the channelling motifs typical of this stage, the late dates induce us to mention them here. The two latest data ranges are between 1115 and 931 cal BC, and between 1046 and 906 cal BC, respectively.[421] The latest Noua dates obtained from the Jijila site also match this period.[422] Similar dates were obtained for the Gáva sample at Covasna-Hankó stream valley.

The latest Gáva date comes from a site in Hătuica. The calibrated data situates the age of the sample between 1015 and 838 cal BC. Contemporary dates are known from four locations in central and Northern Transylvania. The calibrated data from the Alba Iulia-Recea (Monolit) deposit resulted in a dating between 1000 BC and 836 cal BC,[423] while the one at Vlaha-Pad gave a date of 930–819 cal BC.[424] Recent research into the fortified site in Teleac has resulted in several measurements. The samples modeled from house T5 date the construction of the house to the 10th century BC,[425] while the destruction of the building and rampart dates to the end of the century.[426] The pottery discovered at the Sânpaul-Usturiş site links the feature to the Gáva Culture. Radiocarbon measurements on human and animal remains place the age of the pit between 1010 and 811 cal BC.[427] 31 radiocarbon dates ranging between 1200/1100 and 800 cal BC period were obtained from samples taken from preserved wooden structures from the Băile Figa salt extraction site.[428] Some of the

418 V. Szabó 2017a, 248. Even though some of graves at the Câmpina cemetery (Hd-29800 and Hd-30840) provided data similar to those discussed above, the pottery has close analogies in the Noua Culture, or even earlier, rather than in the following period (Frînculeasa 2014, 68).

419 DeA-5095: 2856±25 BP/1113–931 cal BC (Gogâltan et al. 2015, 94).

420 RoAMS 1526.80: 2876±27 BP/1191–933 cal BC; RoAMS 1525.80: 2854±34 BP/1124–916 cal BC (Sava – Ursuțiu 2021, 89–90).

421 Hd-30836: 2858±23 BP/1115–931 cal BC; Hd-30837: 2819±24 BP/1046–906 cal BC (Frînculeasa 2014, 81, Tab. 9).

422 RoAMS:1356.46: 2819±27 BP/1049–903 calBC (Ailincăi et al. 2023, 15, Tab. 3, 17).

423 Hd-29365: 2775±21 BP/1000–836 cal BC (Ciugudean 2012, 238, Fig. 11, 239).

424 DeA-5097: 2743±23 BP/930–819 cal BC (Gogâltan 2019a, 50, Tab. 1.28).

425 MAMS 35003: 2794±21 BP/1011–854 cal BC; MAMS 35004: 2801±21 BP/1011–901 cal BC; MAMS 35005: 2773±21 BP/990–836 cal BC; MAMS 35006: 2842±22 BP/1107–921 cal BC (Uhnér et al. 2019, 198, Fig. 20).

426 MAMS 35007: 2767±21 BP/982–833 cal BC; MAMS 35008: 2773±21 BP/990–836 cal BC; MAMS 35009: 2809±22 BP/1042–902 cal BC; MAMS 35010: 2789±22 BP/1009–846 cal BC (Uhnér et al. 2019, 196–198, Fig. 20); MAMS 4012: 2745±20 BP/928–827 cal BC (Ciugudean 2021, 73).

427 RoAMS 5000.47: 2785±27 BP/1010–837 cal BC; RoAMS 5001.47: 2743±37 BP/982–811 cal BC (Rotea et al. 2021, 17–43).

428 Harding – Kavruk 2013, 116, Tab. 4.2; Kavruk et al. 2019, 35–36, Tab. 1.

recovered pottery has been definitely attributed to the Gáva Culture.[429] Another date, also related to the extraction of salt during the Late Bronze Age, comes from the Valea Florilor deposit, covering the 1426 to 1011 cal BC interval.[430]

From the Lower Danube region in Romania similar dates have been obtained for the stamped pottery horizon from sites at Babadag[431] and Niculiţel.[432] These dates cover mostly the second half of the 11th and the 10th centuries cal BC, being more or less contemporary with the Gáva-type discoveries.

Many of the dates presented above suggest an earlier beginning of the Gáva Culture in southeastern Transylvania. These are earlier than the suggested Ha B1 period. Most of the calibrated data fall between 1200 and 1000 cal BC. In the light of new research the beginnings of the Cernat-Hegyes fortified site can be dated earlier than previously thought. The plateau was resettled probably at the very end of the 13th century BC, having been continuously inhabited during the 'Hallstatt' period (Ha A1–Ha B2/B3). Noteworthy are the overlapping of the earlier dates from Cernat and the date at Sânizeni-Táncospad. This suggests that probably the late Noua communities present in the area adapted to the technology and life-style of the new-comers (i.e. Gáva communities), resulting in the 'hallstattization' of their pottery.[433] The rate of this transformation is hard to specify in the present state of research.

The spread of Gáva-type pottery in southeastern Transylvania is under debate. A direct route from the upper Tisza region seems plausible. However, the central Transylvanian ^{14}C dates available at the present time are later than those from the study area. This causes us to raise the possibility of another route. The contemporaneity of some data from the Siret and the Cernat sites may suggest a northern origin (from Bukovina) of the Gáva elements, using the communication routes established in the earlier (Noua) period. This could have happened as early as the end of the 13th century cal BC, or, more probably in the first half of the 12th century cal BC,[434] these elements remaining the dominant ceramic style until the 9th century cal BC.

Compared to the Noua period we can now see a transformation of the settlement structures. Fortified settlements began to appear that were unknown in earlier periods. The number of open settlements decreased, but they became more extended, often exceeding 30 ha. The characteristic Noua settlement features, the 'ash mounds', seem to disappear. In some Gáva settlements some light-coloured spots have been identified, similar to the above-mentioned features. For now it is unclear if these are the remains of former Noua settlements or if they are evidence of the survival of subsistence technologies, a continuation of the phenomenon of creating 'ash mounds' in the Gáva period.

Recently the typochronology of the Gáva Culture in Transylvania has been discussed by H. Ciugudean in several articles.[435] His research is based mostly on the discoveries with proper stratigraphical observations in the western part of Transylvania, as well as some older discoveries from eastern Transylvania that are not so well documented or published.[436] Contrary to earlier assumptions, which considered

429 Kavruk et al. 2019, 26.

430 Without laboratory number: 3000±80 BP (Wollmann – Ciugudean 2006, 100–101; Ciugudean et al. 2006, 49, 50, Fig. 10).

431 Poz-49881: 2820±30 BP/1106–898 cal BC; Poz-49880: 2805±30 BP/1047–845 cal BC; Poz-49882: 2805±30 BP/1047–845 cal BC (Ailincăi et al. 2022, 22, Tab. 1).

432 Poz-72606: 2730±35 BP/971–808 cal BC (Ailincăi et al. 2022, 22, Note 7).

433 Horedt 1967, 152–153; Ciugudean 2010, 164.

434 László 2018, 284. In an earlier study A. László suggested a later turning point between the Noua and the Gáva Cultures, around "3000–2950 BP" (László 2015, 303).

435 Ciugudean 2010, 167–171; Ciugudean 2011b, 69–102; Ciugudean 2012, 229–243.

436 The only exception is the feature published from Porumbenii Mari-Várfele, which was fully presented. The other mentioned sites (Sâncrăieni, Cernat, Reci, etc.) were investigated in the second half of the 20th century, in many cases the proper contexts of the finds not being recorded.

"that only the classical phase of the culture was present in this area," he argues for the presence of an early phase of the culture,[437] placing the Gáva Ib phase in the first half of the 11th century BC.[438] The pottery of this phase has its origins in earlier traditions, from the Br D–Ha A period.[439]

The new radiocarbon dates for the Gáva Culture presented above bring additional details to its periodization. First of all most of the dates suggest an earlier spread of the Gáva type pottery in the region, i.e. during the 12th century BC, or even earlier, suggested by the earliest data from Cernat. For now there is no proper context for these dates, but some of the pottery fragments recovered from the site could belong to an earlier period (Br D? – Ha A). Pottery belonging to the classical period of Gáva Culture from context as early as the 14th–12th centuries cal BC has also been documented in the western part of the distribution area of the Gáva Culture, namely from Pecica-Est.[440]

The attribution of different types of pottery and decorative motifs proposed by Ciugudean to the Gáva evolutionary phases can be applied only partially to southeastern Transylvania. Most of the vessel forms (mostly the coarse type, like bag-shaped vessels of various forms, and simple bowls) were used for a lengthy period of time, being represented throughout the evolution of the culture. Some characteristic elements can be recognized. Compared to the rest of Transylvania in the southeastern part of the region some vessel fragments covered with *Besenstrich* also occur during the Gáva period. This type of surface treatment has rarely been attested in the Szatmár plain,[441] but they are almost completely absent in inner Transylvania.[442] It seems that they were characteristic for the territories to the west from the Transylvanian Metaliferi Mountains[443] and there is reason to suggest that they represent a survival of middle Bronze Age traditions.[444] In southeastern Transylvania bag-like vessels with surfaces covered by *Besenstrich* decoration are rarely found among Middle Bronze Age Wietenberg finds.[445] This changed at the beginning of the Late Bronze Age, when such vessels became characteristic for the Noua Culture.[446] Although in much smaller numbers, in the subsequent Gáva Culture they continued to occur, as attested in the discoveries at Sâncrăieni[447] and Bancu. At Bancu the bowl with *Besenstrich* on the outer surface came from a feature dated between 1123 and 981 cal BC. For the origin of this technique in Gáva Culture two possibilities can be considered.

- It has a local origin, having been adopted from the late Noua communities. The succession of the two cultures has been highlighted above,[448] with the support of radiocarbon datings. A short coexistence might also be considered, based on the two radiocarbon datings at Sânzieni and Cernat.

437 Ciugudean 2010, 167–168.

438 Ciugudean 2010, 169.

439 Ciugudean 2012, 230.

440 Sava – Ursuţiu 2021, 89.

441 Marta 2020, 42.

442 At Mediaş and Reci for example, vessels with similar surface treatment were not found (Székely 1966a, 5–16; Pankau 2004, 81) Among the pottery finds from Teleac only comb-decorated fragments were mentioned (Vasiliev et al. 1991, 93–94). From the site at Cernat-Hegyes a single bag-shape vessel has *Besenstrich* decoration on the outer surface.

443 Kemenczei 1984, 71–72; Hellebrandt 2016, 69, 94, 51. kép 5.

444 Kemenczei 1984, 71–72; Motzoi-Chicideanu 2004, 74–77.

445 Puskás – Darvas 2021a, 148.

446 Puskás – Darvas 2021a, 148.

447 Puskás – Darvas 2021b, 51–78.

448 Vasiliev 1983, 38; Vasiliev 1989, 63.

- The *Besenstrich* technique occurring in the Gáva repertoire has its origins in the Lăpuş II group, from where it spread into Bucovina.[449] From there, using the earlier communication routes of the Noua Culture, it reached the southeastern part of Transylvania particularly quickly, which is suggested by the radiocarbon date at Cernat.

In the later period of the Gáva Culture most of the earlier elements persisted, but also new ones occurred. From our data we have seen that the lobed vessels became widespread in this period. Among the radiocarbon-dated features only the pit at Covasna contained two examples of this vessel type, being dated after 1050 cal BC. Similar vessels were discovered at the fortified site at Cernat, but also frequently appear in the Teleac levels II–III.[450] P. Kósa has proposed a similar dating, placing the C.9. type in her typology in the Ha A2–Ha B1 period.[451] To this period can be linked another bowl with four horizontal, narrow channels on the inner surface of the vessel, which was also found in Teleac level II.[452] Ciugudean suggests that the organized barbotine on the surface of the vessels is characteristic for the early period of the culture, and was probably derived from the Band–Cugir group.[453] Similar surface treatment has not been attested in the Gáva II period until now.[454] In the pit at Covasna a small fragment with vertical barbotine covering was recovered. The radiocarbon dates suggest that similar pottery was still present after 1050 cal BC, in the Gáva milieu. The *Kammstrich* decoration technique was present in Transylvania from the earliest phase of the culture, likely having also been inherited from the Band–Cugir group.[455] In southeastern Transylvania this type of surface treatment occurs only rarely. Some fragments with wavy patterns are documented at Reci,[456] while being absent from the ceramic repertoire of the Cernat site. From radiocarbon dated contexts a single fragment is known from the pit at Covasna, dated after 1050 cal BC. Also we should mention another sherd with *Kammstrich* decoration discovered in a Noua settlement.[457] Since it is not a common element in that culture, it can be interpreted probably as an 'import', originating from central Transylvania, perhaps from the area of the Band–Cugir group.

The small amount of archaeological material found in well-defined contexts does not allow a detailed chronological analysis. In the present state of research on Gáva pottery in southeastern Transylvania it is hard to detect any clear evolution of the pottery (Fig. 43). As we have seen above most of the vessel types and decorative motifs are present for lengthy periods of time. Even if some types and motifs appear in a particular period, in other parts of Transylvania they can appear in different timespans. For relevant results and for a better understanding of the pottery evolution, a substantial quantity of material needs to be analysed from well-documented contexts found across the whole distribution area of the culture. Also the long evolution time suggests that the Gáva pottery style could have been used alongside other pottery styles (such as late Noua pottery in the study area), as suggested by new observations in the Banat region.[458] In the present state of research we think that in southeastern Transylvania the wide circulation of the Gáva pottery can probably be dated from the end of the 13th century cal BC or the beginning of the 12th century cal BC, and it lasted until the mid-9th century cal BC (Ha A–Ha B1). A transitional period ('pottery hallstattization') dated to the 13th century BC may also be a possibility.

449 László 1994, 93–94; Marta 2020, 54.
450 Vasiliev et al. 1991, 83–84, Fig. 30.13, Fig. 33.10,13,15.
451 Kósa 2020, 37, Fig. 20.
452 Ciugudean 2011b, 100, Pl. 13.1.
453 Ciugudean 2012, 232.
454 Ciugudean 2010, 170.
455 Ciugudean 2012, 232.
456 Székely 1966a, Pl. 5.2–3.
457 Puskás 2020a, 128, 139, Pl. 2.8.
458 Sava – Ursuţiu 2021, 104.

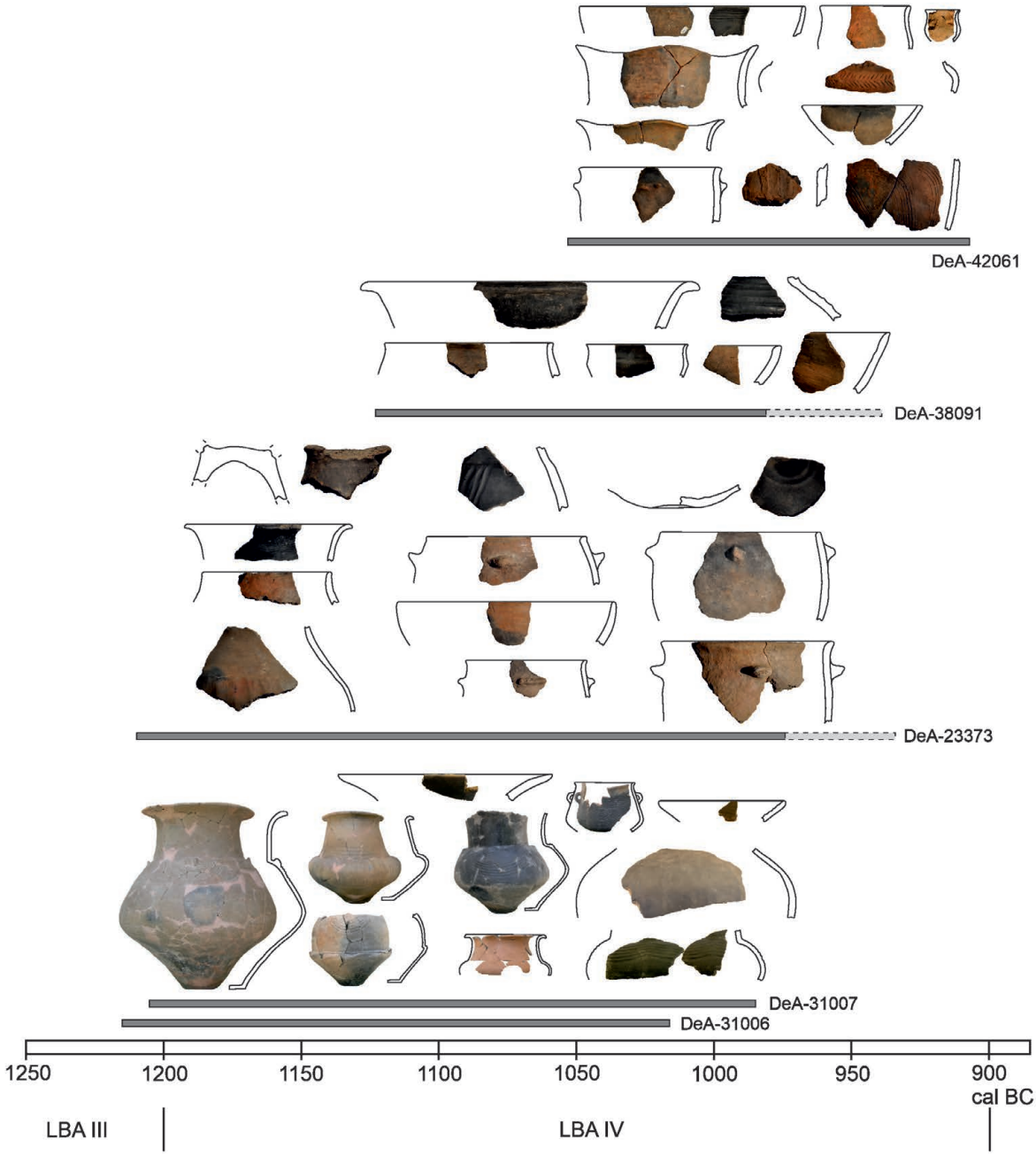


Fig. 43. LBA Gáva-type pottery from radiocarbon-dated features from reliable contexts. The light-grey segment represents less than 10% probability of dating

Contacts between the southeastern Transylvanian Gáva communities and the neighbouring regions are highlighted by the presence of a few pottery fragments that are alien to the area. These items can be considered to have been imported goods. During the excavations at Bancu, alongside the Gáva type pottery two fragments belonging to the Babadag or the Cozia–Saharna Cultures were also discovered (Fig. 3.8–9).[459] Unfortunately they came from a secondary position (from the filling of a former excavation trench), but very likely they belong to the same chronological horizon as the LBA material around the hearth, dated more or less to the 11th century cal BC. This is an important detail regarding the contacts between the Gáva Culture and the communities living in the Lower Danube area. One of the sherds is decorated with impressed concentric circles and parallel stamped

459 Niculiţă – Nicic 2007, 245–246.

lines, characteristic motifs for the Lower Danube area.[460] The decorative elements have good parallels found in the Beidaud and Garvăn settlements,[461] as well as from the Saharna settlement.[462] Even though the stamped decoration was considered characteristic for Babadag phase II,[463] recent studies have shown that they occur during the whole evolution of the culture.[464] Probably the bowl with inverted rim and decorated with a knob is also an imported type. This is a common form in the Babadag Culture, without chronological value, being documented in all three phases of evolution.[465] Even though the Babadag Culture was dated to the 10th–9th centuries BC,[466] the recent ^{14}C dates on sites with stamped pottery have made it possible to date this ceramic style somewhat earlier.[467] Another sherd decorated with foreign elements was found at Cernat-Hegyes. The motif is made of narrow, garland channels, bordered by two double-rows of impressed dots. Pottery with similar decoration is known also from the Lower Danube area, from Garvăn, dated to the Tămăoani–Babadag I horizon.[468]

During the final stage of the LBA the metallurgy of bronze reached its maximum development. The great variety of objects points beyond experimental smithing. The local production of bronze tools is proven by several casting moulds.[469] Comparing the metal objects found in the radiocarbon-dated Gáva settlements (Porumbenii Mari-Várfele, Reci-Telek, and Cernat-Hegyes) and the results of radiocarbon measurements brings to light some contradictions. Until now all the metal discoveries in the relevant sites have been dated to the Ha B1 or B2 periods (1050/1000–800 BC).[470] Despite this, for all the radiocarbon dates the highest probability lies approximately between 1200 and 1000 cal BC. It is hard to give a reasonable explanation for this in the present state of research. First, we have to take into account the possibility that similar objects could be dated earlier than previously thought. Second, there could be different depositional patterns between the periods: the radiocarbon-dated features belong to the occupation period of the settlements, while the hoards are the result of a later depositional practice (perhaps the final abandonment?). A third possibility is the problem of 'late chronology': as yet, for unknown reasons the radiocarbon dates are earlier than the conventional chronologies, on which the typochronologies of the metal objects have been built.[471]

Conclusions

Even though the present study sheds light on some of the chronological problems of the Bronze Age in southeastern Transylvania, it has also raised new questions which cannot be answered in the present state of research. The scarce number of overlapping dates of EBA period I in local cultural manifestations does not allow us to refine our chronological divisions. The EBA set of dates

460 Ailincăi 2020, 447.

461 Jugănaru 2005, 122, Fig. 28.1–5, 123, Fig. 29.1–7.

462 Niculiţă – Nicic 2007, 232, Fig. 6.1, 240, Fig. 11.12, 242, Fig. 13.2.

463 Jugănaru 2005, 49; Ailincăi 2016, 320.

464 Ailincăi 2016, 334.

465 Jugănaru 2005, 48, 53, 57–58, 62–63. Similar vessels were also documented in the Cozia–Saharna Culture. See for example: Niculiţă – Nicic 2007, 240, Fig. 11.11.

466 Jugănaru 2005, 78–79; Ailincăi 2013a, 118–119; Ailincăi 2013b, 270.

467 Ailincăi 2020, 464.

468 Jugănaru 1997, 105–106, 109, Fig. 3.1.

469 Dietrich 2021; Ilon 2022, 148, Fig. 3, 180–186; Kósa et al. 2023, 57–81.

470 Porumbenii Mari (Székely 1966a, 35; Vasiliev 1983, 44; Dietrich 2021, 274–275: nr. 340, 523: nr. 1853, 551: nr. 1968, 624: nr. 2399, 657: nr. 2609, 673: nr. 2740); Reci (Székely 1966a, 14; Vasiliev 1983, 43 with further literature); Cernat (Székely 1966a, 25–27; V. Szabó 2011, 339; V. Szabó 2017b, 122).

471 László 2019, 57–58.

cover the whole period, but some gaps may be observed between 2600 and 2500, and between 2300 and 2200 cal BC. For now we are not certain if these are a real gaps, or, more likely, merely a reflexion of the present state of research, such that further radiocarbon dates will fill these gaps. Also the periods of LBA I and LBA III have been defined by one or two dates, which are not enough to permit far reaching conclusions.

The growing number of radiocarbon dates covering large regions seem to highlight the uneven use of different pottery styles over time within archaeological cultures. The typochronologies built on one or two key sites has been be problematic, as suggested by earlier studies.[472] What seems to be successful is the analysis of pottery styles at a microregional level. Similar studies require new research, clear stratigraphical observations and many more radiocarbon dates.

Based on the distribution of different pottery styles in the study area relatively short and rapid changes may be assumed for some of the phases of the Bronze Age. In neighbouring microregions (basins) different types of pottery were used in the same time interval, changes in burial rites have been documented or new settlement types have arisen. This suggests population movements or other (natural) phenomena that triggered so-called 'crisis horizons'. Significant changes in the local evolution of Bronze Age communities may be observed in the EBA I, at the turn of EBA III and MBA I, at the end of the MBA III/beginning of the LBA (LBA I), and probably during the transition between the LBA III and LBA IV. Some of these changes were not just local, but on a European scale. The first major change during the EBA I may be assigned to the movement of Yamnaya communities to the west, as well as the movement of the GAC population to the east. Even though the presence of these cultures has only been sporadically documented in southeastern Transylvania, the effect caused by their movement is visible. Similar changes may be suspected during the EBA III/MBA I (approximately between 2200 and 2000 cal BC), when Zoltan, Ciomortan and early Monteoru pottery was present in the area. During this time large-scale migrations are supposed all over Europe.[473] With the beginning of the LBA new cultural realities appeared, ending or transforming the 'classical' MBA cultures.[474] In southeast Transylvania these changes may be assigned to the migration of the Noua communities in the 16th century cal BC. The expansion of Gáva Culture in the 13th–12th centuries cal BC may also be linked to a more or less European crisis documented in the period. Probably the best known event around 1200 BC is the 'collapse' of the LBA societies in the eastern part of the Mediterranean.[475] The processes (being natural, social and demographic) leading to this crisis very likely made an impact on the communities in the Carpathian Basin as well.

As a final remark the chronology of the Bronze Age in southeast Transylvania may be summarized as follows (Tab. 2). The EBA I period is covering the 29th–26th centuries BC. In southeastern Transylvania at least three different influences can be traced during this timespan: GAC penetration from northeast, Zăbala-type discoveries (linked probably to the Folteşti II communities), and Schneckenberg A-type discoveries (probably in close relation with the Sânzieni–Turia–Mlăjet-type manifestations). Because of the wide calibration plateau finer divisions cannot yet be made. Very likely all these cultural phenomena had chronological differences with shorter or longer overlaps. During this period most of the burial mounds were constructed, and the contemporary spread of stone cist graves can be documented. The small number of cord-decorated pottery vessels may be the result of eastern contacts.

472 Boroffka 1994, 246; Dietrich 2014a, 146.

473 Grigoriev 2023.

474 Probably one of the most visible transformations in the Carpathian Basin were the abandonement of the tells and tell-like settlements around 1600–1500 cal BC (Gogâltan 2019a, 48–49; Gogâltan 2019b, 198–214; Ciugudean 2021, 65).

475 Knapp – Manning 2016.

Tab. 2. Chronological table of the Bronze Age in southeastern Transylvania

cal BC	Relative Chronology		Southeastern Transylvania			
			Ciuc Basin	Brașovului Basin		
				Bârsei Basin (Dietrich 2014a)	Sfântu Gheorghe Basin	Târgu Secuiesc Basin
900	Ha B2-B3	LBA IV	classical Gáva	classical Gáva (Rt. 6)	classical Gáva	classical Gáva
1000	Ha B1					
1100	Ha A2?					
1200	Ha A1	LBA III	Noua III ?	Noua late (Rt. 5)	Noua III ?	early Gáva ? / Noua III
1300	Bz D					
1400	Bz C2	LBA II	Noua II	Noua early (Rt. 4)	Noua II	Noua II
1500	Bz C1					
1600	Bz B	LBA I	Noua I	?	Noua I	Noua I
1700	Bz A2	MBA III	Classical Wietenberg (III/C) Monteoru IIb / IIa	Classical Wietenberg (III/C - Rt. 3)	Classical Wietenberg (III/C)	Classical Wietenberg (III/C) Monteoru IIb / IIa
1800		MBA II	Early Wietenberg (II/A2-B)	Wietenberg II/A2-B (Rt. 2)	Early Wietenberg (I-II/A-B)	Early Wietenberg (I-II/A-B)
1900						
2000				Wietenberg I/A (Rt. 1) ?		
2100	Bz A1	MBA I / EBA III	Ciomortan	?	? ? Zoltan-Iernut group ?	Monteoru IC3 ? ?
2200						
2300			?	Schneckenberg culture		Jigodin Culture
2400		EBA II	Jigodin Culture	?	Jigodin Culture	
2500						
2600		EBA I	Schneckenberg culture ? / G A C / Tumular Graves ?	Schneckenberg culture ? / Tumular Graves	Schneckenberg culture ? / Tumular Graves ?	Schneckenberg culture ? / Zăbala / Tumular Graves
2700						
2800						
2900		LCA III	Coțofeni (II) Culture	Coțofeni (II) Culture	Coțofeni (II) Culture	Coțofeni (II) Culture

During the following EBA II phase, covering aproximately the 2550/2500–2200/2100 cal BC period, some earlier pottery styles keep being used in a more evolved form (Schneckenberg B), but new ones have also been documented, such as Jigodin-type pottery. This latter ceramic style has common elements with the Schneckenberg pottery, but the most outstanding characteristics are the cord-decorated vessels. Some of the shaft-hole axes and daggers with a middle rib are produced locally, probably using raw material from nearby (e.g., Bălan).[476] On the apices of mountains burial mounds are still erected (some of the mounds at Ocland, Brăduţ and Biborţeni).

The EBA III and MBA I periods are difficult to separate, since we have only one radiocarbon date. It seems plausible to place the beginning of the MBA in southeastern Transylvania somewhere around 2100 cal BC. The archaeological material suggests the penetration of MBA communities (Monteoru Ic3) from Moldavia into the Târgu Secuiesc Basin, and this could mark the beginning of the MBA in the area. On the other hand, late EBA traditions persist in the neighbouring regions (Iernut–Zoltan type pottery in the Sfântu Gheorghe Basin).

The homogenization of pottery styles can be observed beginning with the MBA II, with the appearance and spread of the Wietenberg Culture in the area, around 2000/1900 cal BC. The earliest dated features have the characteristic vessel forms and decorative motifs. In this early phase some elements of the Monteoru Ic3 pottery style can be traced on Wietenberg vessels, suggesting contacts between the two cultures. Probably this influence was the result of a short period of parallel evolution, sometime in the first century of the 2nd millennium BC. These elements appear only in the earliest Wietenberg features (Turia cemetery), not being present later on.

The spread of meandric decorative elements and the *Zahnstempelung* technique is characteristic for the MBA III period, and also marks the third phase of evolution of the Wietenberg Culture. This change in the pottery styles in southeastern Transylvania can be traced approximately from the middle of the 18th century cal BC, lasting into the first half of the 16th century cal BC, at the latest. It is very likely that in various parts of Transylvania Wietenberg III-type pottery was used even later, but probably not past the end of the 16th century cal BC. In this period late Monteoru elements (single or small groups of graves and settlement traces) are documented in the area, suggesting the infiltration of small groups from the Subcarpathian Curvature. The cause is as yet unclear, but we have to take into consideration population movements from the northern Pontic area, causing pressure on the MBA communities.

During the LBA I the evolution of the MBA cultures in the study area was disrupted by the arrival of the Noua communities from east, probably during the 16th century cal BC. From here they spread to central and western Transylvania. In southeastern Transylvania the pottery of the period has strong MBA (late Monteoru) elements, while in the western region there is a mixture with the local style, resulting in the Gligoreşti-type ceramics. New tools (crenated scapulae) and settlement features appeared ('ash mounds'), suggesting the emergence of a new economical lifestyle. In the classical phase of the Noua Culture (LBA II – Noua II) we can see the homogenization of the vessel forms and ornamentation. The earlier, more complex MBA elements were no longer present, and some decorative techniques (like channels) were adapted to the new, low-key pottery styles. The end of the Noua Culture (Noua III) can be situated between the beginning of the 13th and the first part of the 12th centuries BC, covering the LBA III period. Alongside the well-known vessel forms, new shapes appeared. However, the small number of the finds makes it hard to define a well-defined distribution area, and we are lacking proper stratigraphical contexts and observations. In the present state of research, it seems that similar finds are concentrated in the southeastern part of Transylvania (Sânzieni, Olteni, Feldioara). Around this time Gáva elements come into view, causing

476 For the local use of copper ore we have only some inconclusive arguments, see: Barabási 1996, 17.

a transformation of the local pottery style. The fourth and final phase of the LBA (LBA IV) is covered by the evolution of the classical Gáva pottery, beginning from the 12th century BC. We can witness the transformation of the settlement structures, the pottery styles and the spread of a wide range of bronze tools and weapons. A transformation of the social structure is also visible: imposing fortified settlements are built, which were probably the seat of the local elite.[477]

The end of the Bronze Age is as yet hard to outline in southeastern Transylvania. In the centre of the Carpathian Basin during the Ha B2–B3 a new culture appeared, the Mezőcsát Culture.[478] In Transylvania the first iron objects from well-documented contexts appeared around 9th–8th centuries BC, being widespread after 800 BC.[479] Probably to this horizon may be attributed the iron objects hoard and small objects at Cernat-Hegyes. What happened in the study area during the Ha B2–B3 and Ha C period is harder to describe. There is no clear evidence for the evolution of the Basarabi Culture, characteristic to central and western Transylvania. In the light of the Cernat discoveries a longer evolution of Gáva Culture may be supposed, as suggested by the radiocarbon dates and some bronze hoards,[480] covering the period between Ha A and Ha B3. The appearance of iron objects "in the second half of the 10th century BC, is the earliest well-dated complex [i.e. blacksmith's workshop – the authors] and, for Transylvania, might be taken to mark the start of [...] Aegean influence and normative change", as stated by C. Pare.[481]

Acknowledgements

The performed radicarbon measurements were possible thanks to several grants provided by the Ministry of Human Resources of Hungary. Between 2019 and 2022 four grants of *A Nemzet Fiatal Tehetségeiért Ösztöndíj* were awarded to J. Puskás (NTP-NFTÖ-19-B-0126: *Csontba zárt idő. Adatok Háromszék középső bronzkori kronológiájához*; NTP-NFTÖ-20-B-0141: *Késő bronzkori elitek nyomában. Délkelet-erdélyi hatalmi központok természettudományos keltezése*; NTP-NFTÖ-21-B-0078: *A bronzkori világ hajnala. Radiokarbon elemzésekkel a délkelet-erdélyi kora bronzkori népek nyomában*; NTP-NFTÖ-22-B-0078: *Az idő kereke. További lépések délkelet-Erdély bronzkori kronológiájának megismerésére*). In 2018 and 2019 two scholarships of the Eötvös Lóránd University contributed to the research. For the radiocarbon date at Reci our thanks goes to Maria-Magdalena Ștefan. Three of the measurements (Peteni and Sânzieni) were made within a project lead by Zsolt Molnár-Kovács, whom we would like to thank on this occasion. We are also grateful to Robin P. Symonds for the English revision of the paper and for his useful advice.

References

Ailincăi, S.-C. 2013a: *Începuturile epocii fierului în Dobrogea. Cercetările arheologice de la Revărsarea, Isaccea, județul Tulcea.* Biblioteca Istro-Pontica 8. Brăila.

Ailincăi, S.-C. 2013b: Începuturile epocii fierului în Dobrogea. *Studii și Cercetări de Istorie Veche și Arheologie* 64, 223–292.

Ailincăi, S.-C. 2016: Analysis and interpretation of the Babadag Culture pottery decorating style. In: Zanoci, A. – Kaiser, E. – Kashuba, M. – Izbitser, E. – Băț, M. (eds): *Mensch, Kultur und Gesellschaft von der Kupferzeit bis zur frühen Eisenzeit im nördlichen Eurasien. Beiträge zu Ehren 60. Geburtstag von Eugen Sava.* Tyragetia International 1. Chişinău, 319–336.

477 V. Szabó 2019, 109–145.

478 V. Szabó 2017a, 256–257.

479 Ciugudean 2021, 73.

480 V. Szabó 2011, 339; Hansen 2019, 216.

481 Pare 2015, 287.

Ailincăi, S.-C. 2020: Early Iron Age Stamped Pottery in Southeastern Europe. Analysis, Chronology and Interpretation. In: Maran, J. – Băjenaru, R. – Ailincăi, S.-C. – Popescu, A.-D. – Hansen, S. (eds): *Objects, Ideas and Travelers. Contacts between the Balkans, the Aegean and Western Anatolia during the Bronze and Early Iron Age*. Universitätforschungen zur prähistorischen Archäologie 350. Bonn, 447–472.

Ailincăi, S.-C. – Mihail, F. – Carozza, L. – Constantinescu, M. – Soficaru, A. – Micu, C. 2014: Une découverte funéraire de début de l'Âge de Bronze en Dobroudja (Sud-est de la Roumanie). Le tumulus de Rahman (com. Casimcea, dép. de Tulcea). *Prilozi Instituta za arheologiju u Zagrebu* 31, 73–87.

Ailincăi, S.-C. – Mihail, F. – Constantinescu, M. – Carozza, L. – Micu, C. – Burens, A. 2016: Découverte d'un tumulus de l'âge du bronze à Rahman, sur la commune de Casimcea (dép. de Tulcea*). Studii şi Cercetări de Istorie Veche şi Arheologie* 67, 29–52.

Ailincăi, S.-C. – Constantinescu, M. – Dima, A. – Sava, G. – Mihail, F. – Micu, C. – Mocanu, M. – Stănică, A.-D. 2021: Bronze Age graves at Jijila (Southeastern Romania). In: Heyd, V. – Kulcsár, V. – Preda-Bălănică, B. (eds): *Yamnaya Interactions. Proceedings of the International Workshop held in Helsinki, 25–26 April 2019*. The Yamnaya Impact on Prehistoric Europe 2. Budapest, 207–242.

Ailincăi, S.-C. – Carozza, L. – Ţârlea, A. 2022: Once again on the Early Iron Age Chronology at the Lower Danube. New Radiocarbon data from Babadag. In: Delev, P. – Stoyanov, T. – Yanakieva, S. – Popov, H. – Bozkova, A. – Vassileva, M. – Tzvetkova, J. – Damyanov, M. – Ilieva, P. – Emilov, J. (eds): *Ancient Thrace: Myth and Reality. The proceedings of the thirteenth International Congress of Thracology. Kazanlak, September 3–7, 2017*. Sofia, 21–28.

Ailincăi, S.-C. – Bălăşescu, A. – Radu, V. – Dima, A. – Sava, G. – Ţârlea, A. – Sîrbu, G. – Mihail, F. – Stănică, A.-D. – Mocanu, M. – Micu, C. – Cernamoriţi, R. 2023: Jijila – A Late Bronze Age Site on the Lower Danube. *Archaeologia Bulgarica* 27, 1–28.

Andriţoiu, I. 1992: *Civilizaţia tracilor din sud-vestul Transilvaniei în epoca bronzului.* Symposia Thracologica 2. Bucureşti.

Bader, T. 1991: *Die Schwerter in Rumänien.* Prähistorische Bronzefunde IV/8. Stuttgart.

Baltag, G. – Boroffka, N. 1996: Materiale arheologice preistorice de la Albeşti, jud. Mureş. *Studii şi Cercetări de Istorie Veche şi Arheologie* 46, 375–393.

Barabási, L. 1996: *Balánbánya története.* Csíkszereda.

Băjenaru, I. 1998: Discuţii privind cronologia absolută a culturii Glina. *Studii şi Cercetări de Istorie Veche şi Arheologie* 49, 3–22.

Băjenaru, I. 2002: Date noi privind cronologia bronzului timpuriu în jumătatea sudică a României. *Apulum* 39, 107–143.

Băjenaru, I. 2014: *Sfârşitul bronzului timpuriu în regiunea dintre Carpaţi şi Dunăre.* Cluj-Napoca.

Băjenaru, I. 2017: Toporul de metal din zona Roşiorii de Vede şi câteva precizări cu privire la tipul Pădureni. *Buletinul Muzeului Judeţean Teleorman – Seria Arheologie* 9, 117–127.

Băjenaru, I. 2021: The Glina-type flanged axes revisited. In: Dobrescu, R. – Boroneanţ, A. – Doboş, A. (eds): *Scripta Praehistorica. Miscellanea in honorem Mariae Bitiri dicata.* Materiale şi Cercetări Arheologice – Supplementum 1. Cetatea de scaun, 553–568. https://doi.org/10.3406/mcarh.2021.2229

Bălan, G. 2014: Deviant burials of Wietenberg culture at Miceşti-Cigaş (Alba County, Romania). *Annales Universitatis Apulensis – Series Historica* 18, 95–118. https://doi.org/10.29302/AUASH/article-122

Bălan, G. 2017: Necropola de la Sebeş-Între răstoace în contextual standardului funerar al culturii Wietenberg. In: Fântâneanu, C. – Bălan, G. – Popa, S. – Tentiş, D. (eds): *Necropola din epoca bronzului de la Sebeş.* Brăila–Alba Iulia, 133–165.

Bălan, G. – Quinn, C. P. 2014: Radiocarbon data of funerary discoveries from Middle Bronze Age settlement at Miceşti-Cigaş (Alba County, Romania). *Annales Universitatis Apulensis – Series Historica* 18, 119–126. https://doi.org/10.29302/AUASH/article-123

Bălan, G. – Quinn, C. P. – Hodgins, G. 2016: The Wietenberg Culture: Periodization and Chronology. *Dacia* 60, 67–92.

Bălan, G. – Quinn, C. P. – Hodgins, G. 2017: Contextul cultural şi cronologic al necropolei de la Sebeş-Între răstoace. In: Fântâneanu, C. – Bălan, G. – Popa, S. – Tentiş, D. (eds): *Necropola din epoca bronzului de la Sebeş.* Brăila–Alba Iulia, 167–190.

Bârzu, L. 1989: La station de Sărata Monteoru: La Nécropole n. 4 de l'époque du bronze. *Dacia* 33, 39–78.

Berecki, S. 2016: *The Bronze Age Site from Luduş.* Târgu Mureş.

Bertemes, F. 1998: Überlegungen zur Datierung und Bedeutung der schnurverzierte Keramik in nordöstlichen Karpatenbecken und Siebenbürgen. In: Hänsel, B. – Machnik, J. (eds): *Das Karpatenbecken und die Osteuropäische Steppe. Nomadenbewegungen und Kulturaustausch in den vorchristlichen Metallzeiten (4000–500 v. Chr).* Südosteuropa Schriften 20, Prähistorische Archäologie in Südosteuropa 12. München–Rahden, 191–210.

Bolohan, N. 2010: "All in one". Issues of methodology, paradigms and radiocarbon datings concerning the outern Eastern Carpathian area. In: Bolohan, N. – Măţău, F. – Tencariu, F. A. (eds): *Signa Praehistorica. Studia in honorem magistri Attila László septuagesimo anno.* Iaşi, 229–244.

Bolohan, N. – Gafincu, A. – Stoleriu, I. 2015: Middle Bronze Age Chronology East of the Carpathian area. A Bayesian model. In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureş, 131–146.

Boroffka, N. 1987: Folosirea fierului în România de la începuturi pînă în secolul al VIII-lea î. e. n. *Apulum* 24, 55–77.

Boroffka, N. G. O. 1994: *Die Wietenberg-Kultur. Ein Beitrag zur Erforschung der Bronzezeit in Südosteuropa.* Universitätforschungen zur prähistorischen Archäologie 19. Bonn.

Boroffka, N. – Boroffka, R. 2020: Prähistorische Siedlungsfunde und Bestattungen. In: Harhoiu, R. – Boroffka, N. – Boroffka, R. – Gáll, E. – Ioniţă, A. – Spânu, D. (eds): *Schäßburg – Weinberg / Sighişoara –* Dealul Viilor *II. Archäologische Grabungen bei der Fundstelle "Gräberfeld" / "Necropolă."* Archaeologia Romanica 6. Târgovişte, 51–83.

Boroneanţ, A. 2020: Locuirea Coţofeni de la Cuina Turcului-Dubova. O nouă imagine. *Acta Musei Tutovensis* 16, 20–53.

Burtănescu, F. 2002: *Epoca timpurie a bronzului între Carpaţi şi Prut.* Bibliotheca Thracologica 37. Bucureşti.

Buzea, D. 2006: Descoperirile arheologice de la Olteni, jud. Covasna. *Corviniana. Acta Musei Corvinensis* 10, 67–122.

Buzea, D. – Puskás, J. in press: Raport preliminar asupra cercetărilor arheologice preventive efectuate în situl de la Covasna-Valea Hankó/Valea Porumbeilor. *Angustia* 27, in press.

Cavruc, V. 1997: The final stage of the Early Bronze Age in southeastern Transylvania (in the light of new excavations at Zoltan). *Thraco-Dacica* 18, 97–133.

Cavruc, V. (ed.) 1998: *Repertoriul arheologic al judeţului Covasna.* Seria Monografii Arheologice 1. Sfântu Gheorghe.

Cavruc, V. 2002: Noi consideraţii privind grupul Ciomortan. *Angustia* 7, 89–98.

Cavruc, V. 2005: The Ciomortan group in the light of new researches. *Marmatia* 8, 81–123.

Cavruc, V. – Dumitroaia, G. 2000: Descoperirile aparţinând aspectului cultural Ciomortan de la Păuleni. *Angustia* 5, 131–154.

Cavruc, V. – Rotea, M. 2000: Locuirea Wietenberg de la Păuleni (campaniile 1999–2000). *Angustia* 5, 155–172.

Cavruc, V. – Buzea, D. 2002: Noi cercetări privind epoca bronzului în aşezarea Păuleni (Ciomortan). Campaniile din anul 2001–2002. Raport preliminar. *Angustia* 7, 41–88.

Cârciumaru, M. 1996: *Paleoetnobotanica.* Iaşi.

Chidioşan, N. 1980: *Contribuţii la istoria tracilor din nord-vestul României. Aşezarea Wietenberg de la Derşida.* Oradea.

Ciugudean, H. 1996: *Epoca timpurie a bronzului în centrul şi sud-vestul Transilvaniei.* Bibliotheca Thracologica 13. Bucureşti.

Ciugudean, H. 1997: *Cercetări privind epoca bronzului şi prima vârstă a fierului în Transilvania* (Studies on the Bronze and First Iron Age in Transylvania). Bibliotheca Musei Apulensis 7. Alba Iulia.

Ciugudean, H. 2000: *Eneoliticul final în Transilvania şi Banat: Cultura Coţofeni.* Bibliotheca Historica et Archaeologica Banatica 26. Timişoara.

Ciugudean, H. 2010: The Late Bronze Age in Transylvania (With primary focus on the central and Southern area). In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania – Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 157–202.

Ciugudean, H. 2011a: Mounds and Mountains: Burial Rituals in Early Bronze Age Transylvania. In: Berecki, S. – Németh, R. E. – Rezi, B. (eds): *Bronze Age Rites and Rituals in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 8–10 October 2010.* Târgu Mureş, 21–57.

Ciugudean, H. 2011b: Periodizarea culturii Gáva în Transilvania în lumina noilor cercetări. *Apulum* 48, 69–102.

Ciugudean, H. 2012: The chronology of the Gáva culture in Transylvania. In: Blajer, W. (ed.): *Peregrinationes Archaeologicae in Asia et Europa Joanni Chochorowski Dedicate.* Kraków, 229–243.

Ciugudean, H. 2015: Contacte între Cultura Amforelor Sferice şi comunităţile Coţofeni din spaţiul transilvan. In: Schuster, C. – Tulugea, C. – Terteci, C. (eds): *Volum dedicat profesorului Petre I. Roman la cea de-a 80-a aniversare* (Volume dedicated to Professor Petre I. Roman on his 80th anniversary). Buridava 12 – Symposia Thracologica 10. Râmnicu Vâlcea, 164–175.

Ciugudean, H. 2021: Epoca bronzului în Transilvania: o privire de ansamblu (The Bronze Age in Transylvania: An Overview). *Apulum* 58, 55–97.

Ciugudean, H. – Quinn, C. P. 2015: The End of the Wietenberg Culture in the Light of new ^{14}C Dates and its Chronological Relation Towards the Noua Culture. In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureş, 147–178.

Ciugudean, H. – Luca, S. A. – Georgescu, A. 2006: *Depozitul de bronzuri de la Dipşa (The Bronze Hoard from Dipşa).* Bibliotheca Brukenthal 5. Sibiu.

Ciugudean, H. – Uhnér, C. – Quinn, C. – Bălan, G. – Oargă, O. – Bolog, A. – Balteş, G. 2019: După 25 de ani: grupul Band-Cugir în lumina noilor cercetări (Twenty-five years later: The Cugir-Band group in the light of recent research). *Apulum* 56, 89–130.

Ciugudean, H. – Quinn, C. – Uhnér, C. 2022: Consideraţii privind evoluţia culturii Coţofeni în lumina noilor date radiocarbon (Considerations regarding the evolution of Coţofeni culture in the light of new radiocarbon dates). *Apulum* 59, 23–53.

Ciugudean, H. I. – Quinn, C. – Uhner, C. – Beck, J. 2023: From West to East and East to West: Yamnaya migration and interaction with Copper Age/Early Bronze Age Carpathian communities in Transylvania. In: Preda-Bălănică, B. E. – Ahola, M. (eds): *Steppe Transmissions.* The Yamnaya Impact on Prehistoric Europe 4. Budapest, 205–245.

Ciută, M.-M. – Quinn, C. P. – Totoianu, R. V. 2021: Radiocaron data of funerary descoveries from Middle Bronze Age in the Mureş valley. The Wietenberg cemetery from Limba-Oarda de Jos (Alba County, Romania). *Journal of Ancient History and Archaeology* 8, 75–83. https://doi.org/10.14795/j.v8i2.653

Constantinescu, M. 2020: *Începuturile culturii Monteoru. Aşezarea de la Năeni-Zănoaga Cetatea 2.* Biblioteca Mousaios 15. Cluj-Napoca.

Dani, J. 2011: Research on Pit-Grave culture kurgans in Hungary in the last three decades. In: Pető, Á. – Barczi, A. (eds): *Kurgan Studies: An environmental and archaeological multiproxy study of burial mounds in the Eurasian steppe zone.* British Archaeological Reports – International Series 2238. Oxford, 25–69.

Dani, J. 2013: The Significance of Metallurgy at the Beginning of the Third Millennium BC in the Carpathian Basin. In: Heyd, V. – Kulcsár, G. – Szeverényi, V. (eds): *Transitions to the Bronze Age. Interregional Interaction and Socio-Cultural Change in the Third Millennium BC Carpathian Basin and Neighbouring Regions.* Budapest, 203–231.

Dani, J. – Nepper, I. M. 2006: Sárrétudvari-Őrhalom Tumulus Grave from the beginning of the EBA in Eastern Hungary. *Communicationea Archaeologicae Hungariae*, 29–49.

Dani, J. – Kulcsár, G. 2021: Yamnaya interactions in the Carpathian Basin. In: Heyd, V. – Kulcsár, V. – Preda-Bălănică, B. (eds): *Yamnaya Interactions. Proceedings of the International Workshop held in Helsinki, 25–26 April 2019.* The Yamnaya Impact on Prehistoric Europe 2. Budapest, 329–360.

Daróczi, T.-T. 2021: Crescent Rising. Semi-Circular-Shaped Pendants from Bronze Age Funerary Contexts of the Eastern Carpathian Basin. *Marisia* 3, 15–50.

Daróczi, T.-T. – Ursuțiu, A. 2015: *Worship, Habitation, Refuge. Bronze and Iron Age Sites of the Lower Feneș Valley. Vols 1–2.* Patrimonium Archaeologicum Transylvanicum 8. Cluj-Napoca.

Daróczi, T.-T. – Rotea, M. – Comșa, A. – Olsen, J. 2022: Radiocarbon dating the Bronze Age burial grounds of Dumbrăvița – "Stricata" and Tureni – "La furci" from the Eastern Carpathian Basin. In: Mustață, S. – Lăzărescu, V.-A. – Bârcă, V. – Rusu-Bolindeț, V. – Matei, D. (eds): *Faber. Studies in Honour of Sorin Cociș at his 65th Anniversary*. Bibliotheca Ephemeris Napocensis 10. Cluj-Napoca, 41–57.

Daróczi, T.-T. – Csányi, M. – Tárnoki, J. – Nagy, F. – Olsen, J. 2023: Túrkeve-Terehalom in the Eastern Carpathian Basin. Bronze Age multi-stratified site provides high-precision chronology with continental implications. *Prähistorische Zeitschrift* 98, 136–190. https://doi.org/10.1515/pz-2022-2024

Davis, J. L. – Stocker, S. R. 2016: The Lord of the Gold Rings. The Griffin Warrior of Pylos. *Hesperia* 85, 627–655. https://doi.org/10.2972/hesperia.85.4.0627

Dénes, I. – V. Szabó, G. 1998: Der Frühbronzezeitliche bronzedepotfund aus der Höhle 1200/9 in der Enge des Vargyas-Baches (Cheile Vârghișului) in Südost-Siebenbürgen. In: Ciugudean, H. – Gogâltan, F. (eds): *The Early and Middle Bronze Age in the Carpathian Basin. Proceedings of the International Symposium in Alba Iulia. 24–28 September 1997.* Bibliotheca Musei Apulensis 8. Alba Iulia, 89–110.

Diaconescu, D. 2020: Step by Steppe: Yamnaya culture in Transylvania. *Prähistorische Zeitschrift* 95, 17–47. https://doi.org/10.1515/pz-2020-0010

Diaconescu, D. – Tincu, S. 2016: Considerații arheologice privind necropola tumulară de la Silvașu de Jos-"Dealu Țapului" (oraș Hațeg, jud. Hunedoara). *Analele Banatului* 24, 107–141. https://doi.org/10.55201/ZXJT4321

Dietrich, L. 2010: Eliten der frühen und mittleren Bronzezeit im südöstlichen Karpatenbecken. *Prähistorische Zeitschrift* 85, 191–206. https://doi.org/10.1515/pz.2010.011

Dietrich, L. 2014a: *Die mittlere und späte Bronzezeit und die* ältere *Eisenzeit in Südostsiebenbürgen aufgrund der Siedlung von Rotbav*. Universitätforschungen zur prähistorischen Archäologie 248. Bonn.

Dietrich, L. 2014b: Datele radiocarbon din așezarea aparținând epocii bronzului de la Rotbav (jud. Brașov, România) (The Radiocarbon Dates from the Bronze Age Settlement at Rotbav [Brașov County, Romania]). *Studii și Cercetări de Istorie Veche și Arheologie* 65, 59–70.

Dietrich, L. – Bălășescu, A. – Dietrich, O. 2018: Deciphering Feasting in the Late Bronze Age Settlement of Rotbav, Transylvania. *European Journal of Archaeology* 21, 572–589. https://doi.org/10.1017/eaa.2017.87

Dietrich, O. 2021: *Bronzezeitliche Tüllenbeile aus Rumänien. Studien zu Chronologie, Chorologie und Hortung.* Berlin. (Manuscript) https://www.academia.edu/49337819/Bronzezeitliche_T%C3%BCllenbeile_aus_Rum%C3%A4nien_Studien_zu_Chronologie_Chorologie_und_Hortung_Teil_1_Berlin_2021_ (last access: 21. 01. 2023).

Florek, M. – Witkowska, B. 2021: Absolute Chronology of settlement remains of the Globular Amphora Culture in the Sandomierz Upland (site Gałkowice-Ocin, Mierzanowice, Złota-Nad Wawrem). *Baltic-Pontic Studies* 25, 159–188. https://doi.org/10.14746/bps.2021.25.5

Florescu, M. 1966: Contribuții la cunoașterea etapelor timpurii ale culturii Monteoru în Moldova. *Arheologia Moldovei* 4, 39–118.

Florescu, M. 1971: Elemente Wietenberg descoperite în complexele de locuire aparținînd fazelor timpurii ale culturii Monteoru din Moldova. *Danubius* 5, 37–73.

Florescu, A. C. 1991: *Repertoriul culturii Noua-Coslogeni din România. Așezări și necropole.* Cultură și Civilizație la Dunărea de Jos 9. Călărași.

Frînculeasa, A. 2014: *Cimitirul din epoca bronzului de la Câmpina (jud. Prahova).* Târgoviște.

Frînculeasa, A. 2019: The Children of the Steppe: descendance as a key to Yamnaya success. *Studii de Preistorie* 16, 129–168.

Frînculeasa, A. 2020: Contributions regarding the Middle Bronze Age period in northern Muntenia. In: Matei, S. (ed.): *Bronze and Iron Ages in Eurasia: Rituals and Grave Goods as Possible Markers of the Social Identity of the Dead. Proceedings of the 18th International Colloquium of Funerary Archaeology, Buzău (Romania), 17th–20th of October 2019.* Mousaios 23. Buzău, 127–144.

Frînculeasa, A. 2021: The Yamnaya mounds and the local cultural traditions of the first half of the 3rd millennium in Muntenia. The archaeological excavations of Moara Vlăsiei (Ilfov County). *Ziridava – Studia Archaeologica* 35, 49–105.

Frînculeasa, A. 2022: Completare la cronologia absolută a cimitirului din epoca bronzului de la Câmpina (Prahova). In: Diaconu, V. (ed.): *Ab lapide ad metallum. Studia in honorem Professoris Marin Cârciumaru.* Brăila–Piatra-Neamț, 289–308.

Frînculeasa, A. – Preda, B. – Heyd, V. 2015: Pit-Graves, Yamnaya and Kurgans along the Lower Danube: Disentangling IVth and IIIrd Millennium BC Burial Customs, Equipment and Chronology. *Prähistorische Zeitschrift* 90, 45–113. https://doi.org/10.1515/pz-2015-0002

Frînculeasa, A. – Simalcsik, A. – Preda, B. – Garvăn, D. 2017: *Smeeni – Movila Mare. Monografia unui sit arheologic regăsit.* Biblioteca Mousaios 13. Târgoviște.

Frînculeasa, A. – Preda-Bălănică, B. – Simalcsik, A. – Negrea, O. – Constantinescu, B. – Cristea-Stan, D. 2019: Morminte Iamnaia într-un tumul redescoperit și salvat în localitatea Blejoi (jud. Prahova) (Yamnaya graves found in a burial mound, rediscovered and saved at Blejoi [Prahova County]). *Buletinul Muzeului Județean Teleorman* 11, 35–78.

Frînculeasa, A. – Garvăn, D. – Mărgărit, M. – Bălășescu, A. – Lazăr, I. – Frînculeasa, M. N. – Soficaru, D. A. – Molnár, M. – Georgescu, M. 2020: Between worlds and elites at the beginning of the Early Bronze Age in the Lower Danube Basin: A pluridisciplinary approach to personal ornaments. *Archaeological and Anthropological Sciences* 12:213. https://doi.org/10.1007/s12520-020-01177-0

Frînculeasa, A. – Negrea, O. – Dîscă, C. – Simalcsik, A. 2021: Tumulul II de la Strejnicu (jud. Prahova) – o prezentare arheologică și bio-antropologică (Archaeological and bio-anthropological research in mound II from Strejnicu [Prahova County]). *Revista de Arheologie, Antropologie și Studii Interdisciplinare* 3, 67–104.

Frînculeasa, A. – Garvăn, D. – Simlacsik, A. – Negrea, O. – Munteanu, R. – Dinu, C. – Ilie, A. – Grigoraș, L. 2022: Ritualul Iamnaia și persistențe locale în prima jumătate a mileniului al III-lea (complexe funerare cercetate în anul 2021 în nordul Munteniei) (The Yamnaya ritual and local persistence in the first half of the third millennium BC [funerary features researched in 2021 in northern Muntenia]). *Revista de Arheologie, Antropologie și Studii Interdisciplinare* 4, 127–165.

Gerling, C. – Ciugudean, H. 2013: Insights into the Transylvanian Early Bronze Age Using Stroncium and Oxygen Isotop Analysis: A Pilot Study. In: Heyd, V. – Kulcsár, G. – Szeverényi, V. (eds): *Transitions to the Bronze Age. Interregional Interaction and Socio-Cultural Change in the Third Millennium BC Carpathian Basin and Neighbouring Regions.* Budapest, 181–202.

Gogâltan, F. 1999: *Bronzul timpuriu și mijlociu în Banatul Românesc și pe cursul inferior al Mureșului. Cronologia și descoperirile de metal.* Timișoara.

Gogâltan, F. 2009: A Late Bronze Age Dwelling at Iernut-Sfântu Gheorghe-Monument, Mureș County. In: Berecki, S. – Németh, R. E. – Rezi, B. (eds): *Bronze Age Communities in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureș. 24–26 October 2008.* Bibliotheca Musei Marisiensis – Seria Archaeologica 1. Târgu Mureș, 103–141.

Gogâltan, F. 2013: Transilvania și spațiul nord-pontic. Relații intercultural între sfârșitul epocii cuprului și începutul epocii bronzului (cca. 3500–2500 A. Chr.) (Die Beziehungen zwischen Siebenbürgen und dem Schwarzmeerraum in der Kupfer- undam Anfang der Bronzezeit [cca. 3500 – cca. 2500 v. Chr.]). *Terra Sebus – Acta Musei Sabesiensis* 5, 31–76.

Gogâltan, F. 2015: The Early and Middle Bronze Age Chronology of the Eastern Frontier of the Carpathian Basin. Revisited after 15 Years. In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureș. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureș, 53–95.

Gogâltan, F. 2019a: Despre cronologia absolută a bronzului târziu în estul Bazinului Carpatic (About the Absolute Chronology of the Late Bronze in the Eastern Carpathian Basin). *Tyragetia* 13, 45–70.

Gogâltan, F. 2019b: The Chronology of the Bronze Age Tell and Tell-like Settlements in the Carpathian Basin. Revisited after 15 years. *Studia Hercynia* 23, 198–214.

Gogâltan, F. 2021: Transylvania. Within or outside the Yamnaya World? In: Heyd, V. – Kulcsár, V. – Preda-Bălănică, B. (eds): *Yamnaya Interactions. Proceedings of the International Workshop held in Helsinki, 25–26 April 2019.* The Yamnaya Impact on Prehistoric Europe 2. Budapest, 243–270.

Gogâltan, F. – Popa, C. I. 2016: Gligoreşti-Holoame. O aşezare a bronzului târziu în Transilvania. *Terra Sebus – Acta Musei Sabesiensis* 8, 35–82.

Gogâltan, F. – Aldea, I. A. – Ursuţiu, A. 2004: Raport preliminar asupra investigaţiilor arheologice de la Gligoreşti-"Holoame", com. Luna, jud. Cluj (1994–1996) (Preliminary report concerning the archaeological excavations from Gligoreşti-"Holoame", Cluj district [1994–1996]). *Apulum* 41, 61–101.

Gogâltan, F. – Savu, M. – Kelemen, I. 2015: Mâini magice? Un complex aparţinând bronzului târziu de la Vlaha-Pad (jud. Cluj) (Magic Hands? A Late Bronze Age Feature from Vlaha-Pad [Cluj County]). *Terra Sebus – Acta Musei Sabesiensis* 7, 73–122.

Grigoriev, S. 2023: Absolute Chronology of the Early Bronze Age in Central Europe, Middle Bronze Age in Eastern Europe and the '2200 event.' *Journal of Ancient History and Archaeology* 10, 22–46. https://doi.org/10.14795/j.v10i1.817

Hansen, S. 2019: The Hillfort of Teleac and Early Iron in Southern Europe. In: Hansen, S. – Krause, R. (eds): *Bronze Age Fortresses in Europe. Proceedings of the Second International LOEWE Conference, 9–13 October 2017 in Alba Iulia.* Prähistorische Konfliktforschung 3. Bonn, 201–225. https://doi.org/10.21248/gups.50959

Harding, A. – Kavruk, V. 2013: *Explorations in Salt Archaeology in the Carpathian Zone.* Budapest.

Harrison, R. – Heyd, V. 2007: The Transformation of Europe in the Third Millennium BC: The example of 'Le Petit-Chasseur I+III' (Sion, Valais, Switzerland). *Prähistorische Zeitschrift* 82, 129–214. https://doi.org/10.1515/PZ.2007.010

Hellebrandt, M. 2016: A Gáva-kultúra települése Köröm-Kápolna-dombon (A settlement of the Gáva culture on Köröm-Kápolna-Domb). *A Herman Ottó Múzeum Évkönyve* 55, 11–124.

Hervella, M. – Rotea, M. – Izagirre, N. – Constantinescu, M. – Alonso, S. – Ioana, M. – Cătălin, L. – Ridiche, F. – Soficaru, A. D. – Netea, M. G. – de-la-Rua, C. 2015: Ancient DNA from South-East Europe Reveals Different Events during Early and Middle Neolithic Influencing the European Genetic Heritage. *PLoS ONE* 10(6), 1–20. https://doi.org/10.1371/journal.pone.0128810

Heyd, V. 2021: Yamnaya, Corded Wares, and Bell Beakers on the move. In: Heyd, V. – Kulcsár, V. – Preda-Bălănică, B. (eds): *Yamnaya Interactions. Proceedings of the International Workshop held in Helsinki, 25–26 April 2019.* The Yamnaya Impact on Prehistoric Europe 2. Budapest, 383–414.

Hochstetter, A. 1981: Eine Nadel der Noua-Kultur aus Nordgriechenland. Ein Beitrag zur absoluten Chronologic der späten Bronzezeit im Karpatenbecken. *Germania* 59, 239–259. https://doi.org/10.11588/ger.1981.91653

Horedt, K. 1967: Problemele ceramicii din perioada bronzului evoluat în Transilvania. *Muzeul Brukenthal. Studii şi Comunicări* 13, 137–155.

Horváth, T. 2011: Hajdúnánás-Tedej-Lyukas-halom. An interdisciplinary survey of a typical kurgan from the Great Hungarian Plain region: A case study (The revision of the kurgans from the territory of Hungary). In: Pető, Á – Barczi, A. (eds): *Kurgan Studies: An environmental and archaeological multiproxy study of burial mounds in the Eurasian steppe zone.* British Archaeological Reports – International Series 2238. Oxford, 71–133.

Horváth, T. – Dani, J. – Pető, Á. – Pospieszny, Ł. – Svingor, É. 2013: Multidisciplinary Contributions to the Study of Pit Grave Culture Kurgans of the Great Hungarian Plain. In: Heyd, V. – Kulcsár, G. – Szeverényi, V. (eds): *Transitions to the Bronze Age. Interregional Interaction and Socio-Cultural Change in the Third Millennium BC Carpathian Basin and Neighbouring Regions.* Budapest, 153–179.

Ilon, G. 2022: Casting moulds in the Bronze Age of the Carpathian Basin. A catalogue of sites and finds. *Antaeus* 38, 143–186. https://doi.org/10.62149/Antaeus.38.2022_05

Ivanova, S. V. 2022: The North-West frontier of the Black Sea steppe in the Early Bronze Age. *Revista de Arheologie, Antropologie şi Studii Interdisciplinare* 4, 89–125.

Ivanova, S. V. – Toschev, G. N. 2015: The Middle-Dniester cultural contact area of early metal age societies. The frontier of Pontic and Baltic Drainage Basins in the 4th/3rd – 2nd Millennium BC. *Baltic-Pontic Studies* 20, 336–405. https://doi.org/10.1515/bps-2017-0008

Irimia, M. 2008: Sceptre de piatră inedite din judeţul Constanţa şi unele consideraţii privind legăturile zonei vest-pontice cu spaţiul Egeean în bronzul târziu. *Pontica* 41, 79–117.

JSzNM 1910: *Jelentés a Székely Nemzeti Múzeum 1908. és 1909. évi állapotáról.* Sepsiszentgyörgy.

JSzNM 1914: *A Székely Nemzeti Múzeum igazgató-választmányának jelentése a Múzeumok és Könyvtárak Országos Országos Főfelügyelőségéhez a Múzeum 1913. évi fejlődéséről és állapotáról.* Sepsiszentgyörgy.

JSzNM 1915: *A Székely Nemzeti Múzeum igazgató-választmányának jelentése a Múzeumok és Könyvtárak Országos Országos Főfelügyelőségéhez a Múzeum 1914. évi fejlődéséről és állapotáról.* Sepsiszentgyörgy.

Jugănaru, G. 1997: Manifestări timpurii ale primei epoci a fierului în Dobrogea (Descoperirile de la Garvăn-Mlăjitul Florilor jud. Tulcea). In: Simion, G. (ed.): *Premier Age du Fer auc bouches du Danube et dans le Regions autour de la Mer Noire. Actes du Colloque International. Septembre 1993, Tulcea.* Tulcea, 103–110.

Jugănaru, G. 2005: *Cultura Babadag I.* Biblioteca Istro-Pontică 7. Constanţa.

Kacsó, C. 1990a: Bronzul târziu în nord-vestul României. *Symposia Thracologica* 8, 41–50.

Kacsó, C. 1990b: Piese inedite din depozitul de bronzuri de la Crăciuneşti. *Studii şi Cercetări de Istorie Veche şi Arheologie* 41, 235–250.

Kacsó, C. 2004: *Mărturii arheologice.* Seria "Colecţii Muzeale" 1. Baia Mare.

Kacsó, C. 2011: Repertoriul arheologic al judeţului Maramureş. *Bibliotheca Marmatia* 3. Baia Mare.

Kacsó, C. 2015: Bronzefunde vom Typ Uriu–Ópályi in der Maramuresch (Rumänien). In: Szathmári, I. (ed.): *An der Grenze der Bronze- und Eisenzeit. Festschrift für Tibor Kemenczei zum 75. Geburtstag.* Budapest, 253–272.

Kavruk, V. – Buzea, D. L. – Puskás, J. – Ştefan, D. – Ştefan, M.-M. – Harding, A. – Alexianu, M. – Roibu, C. – Ăgreanu, R. 2019: Cercetări efectuate la Băile Figa în anii 2016–2019 şi consideraţii privind deslușirea valenţelor unui peisaj salinhibrid (Research carried out at Băile Figa during 2016–2019. Revealing the potential of a hybrid saltscape). *Angustia* 23, 9–108. https://doi.org/10.36935/ang.v23.1

Kavruk, V. – Buzea, D. – Puskás, J. – Ştefan, D. 2022: The Păuleni-Ciuc – Dâmbul Cetăţii fortified site at the Crossroads of trans-mountain Connection Routes: The Dynamics of Cultural Diversity. Interplay, Ritual and Power in the Southeast Carpathian Region from ca. 4500 BC to 350 AD. In: Sîrbu, V. – Ştefan, D. – Ştefan, M.-M. (eds): *Hidden Landscapes. The Lost Roads, Borders and Battlefields of the Southeastern Carpathians.* Târgovişte, 97–150.

Kelemen, I. 2010: Animal Bones from the Early Iron Age Pit at Porumbenii Mari-Várfele (Harghita County). In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania – Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 153–156.

Kemenczei, T. 1984: *Die Spätbronzezeit Nordostungarns.* Archaeologia Hungarica 51. Budapest.

Kiss, V. – Csányi, M. – Dani, J. – P. Fischl, K. – Kulcsár, G. – Szathmári, I. 2019: Chronology of the Early and Middle Bronze Age in Hungary. New Results. *Studia Hercynia* 23, 173–197.

Klochko, V. 2020: Metal Axes of the Kozarac-Stublo type from Carpathian-Volhynia Metallurgy Center of 'Willow Leaf' ff Ukrainian Corded Ware Culture Circle and its Connections to Danubian Region. In: Kozubová, A. – Makarová, E. – Neumann, M. (eds): *Ultra velum temporis. Venované Jozefovi Bátorovi k 70. narodeninám.* Slovenská Archeológia – Supplementum 1. Nitra, 317–326. https://doi.org/10.31577/slovarch.2020.suppl.1.26

Klochko, V. I. – Hoshko, T. Y. – Kozymenko, A. V. – Klochko, D. D. 2020: *The era of early metals in Ukraine (history of metallurgy and cultural genesis).* Kyiv.

Knapp, A. B. – Manning, S. W. 2016: Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean. *American Journal of Archaeology* 120, 99–149. https://doi.org/10.3764/aja.120.1.0099

Koledin, J. – Bugaj, U. – Jarisz, P. – Novak, M. – Przybyła, M. M. – Podsiadło, M. – Szczepanek, A. – Spasić, M. – Włodarczak, P. 2020: First archaeological investigations of barrows in the Bačka region and the question of the Eneolithic/Early Bronze Age barrows in Vojvodina. *Prähistorische Zeitschrift* 95, 350–375. https://doi.org/10.1515/pz-2020-0003

Kósa, P. 2020: Baks-Temetőpart. Analysis of a Gáva-ceramic style mega-settlement. *Communicationes Archaeologicae Hungariae*, 5–87. https://doi.org/10.54640/CAH.2018.5

Kósa, P. – Tarbay, J. G. – Miklós, D. G. 2023: The Late Bronze Age Casting Moulds from Poroszló-Aponhát. *Communicationes Archaeologicae Hungariae*, 57–81. https://doi.org/10.54640/CAH.2022.57

Krauss, R. – Ciubotaru, D. 2013: Daten zum Ende des Badener Keramikstils und dem Beginn der Frühbronzezeit aus Foeni-Gaz im rumänischen Banat. Mit Beiträgen zur absoluten Datierung und zu den bronzezeitlichen Tierknochen von Bernhard Weninger und Georgeta El Susi. *Prähistorische Zeitschrift* 88, 38–113. https://doi.org/10.1515/pz-2013-0003

Krauss, R. – Schmid, C. – Ciubotaru, D. – Slavchev, V. 2013: Varna und die Folgen – Überlegungen zu den Ockergräbern zwischen Karpatenbecken und der nördlichen Ägäis. In: Bartelheim, M. – Horejs, B. – Krauß, R. (eds): *Von Baden bis Troia. Ressourcennutzung, Metallurgie und Wissenstransfer. Eine Jubiläumschrift für Ernst Pernicka.* Oriental and European Archaeology 3. Rahden, 274–315.

Lazarovici, G. – Luca, S. A. – Buzea, D. – Suciu, C. 2000: Descoperirile Cucuteni-Ariuşd de la Păuleni (The Cucuteni – Ariuşd Discoveries from Păuleni Cioc – Ciomortan "Dâmbul Cetăţii". 2003–2005 Campaigns. Preliminary Report). *Angustia* 5, 103–130.

László, A. 1994: *Începuturile epocii fierului la est de Carpaţi. Culturile Gáva-Holihrady şi Corlăteni-Chişinău pe teritoriul Moldovei.* Bibliotheca Thracologica 6. Bucureşti.

László, A. 2006a: Über die Beziehungen, die kulturelle und chronologische Lage der Bronzefunde vom typ Ópályi-Uriu-Drajna de Jos-Lozova-Pobit Kamăk. In: *Bronzezeitliche Depotfunde – Problem der Interpretation. Materialen der Festkonferenz für Tivodor Lehoczky zum 175. Geburtstag. Ushhorod, 5.-6. Oktober 2005.* Uzhhorod, 124–143.

László, A. 2006b: Drajna De Jos – Lozova – Pobit Kamăk – Uluburun. Sur les Relations a Longue Distance dans L'age Tardif du Bronze. *Studia Antiqua et Archaeologica* 12, 43–55.

László, A. 2010: Zur Chronologie der späten Bronzezeit und die älteren Hallstattperiode im nord-östlichen Karpatenraum. Die Radiokarbon-Datierung der Gáva-Holihrady Siedlung von Siret (Bukowina). In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania/Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 121–132.

László, A. 2012: Troy and the lower Danube region at the end of the Bronze Age. In: Korres, G. – Karadimas, N. – Flouda, G. (eds): *Archaeology and Heinrich Schliemann. A Century after his Death. Assessments and Prospects. Myth – History – Science.* Athens, 50–60.

László, A. 2015: Über die Chronologie des kulturellen Wechsels zwischen der Noua-Coslogeni Kultur und der Nachfolger-Kulturen mit kannelierter und mit ritz- und stempelverzierter Keramik in den innen- und aussenkarpatischen Gebieten. Einige Lehren der Radiokarbondatierungen. In: Németh, R. E. – Rezi, B. (eds.): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureş, 297–310.

László, A. 2018: Differences in the Development of Cultural Changing Processes in the Late Bronze Age. Once more about the Chronology of the Replacement of the Noua-Coslogeni Culture by the Succeeding Cultures in the Intra- and Extra Carpathian Territories. In: Rezi, B. – Németh, R. E. (eds): *Bronze Age Connectivity in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş 13–15 October 2016.* Bibliotheca Musei Marisiensis – Series Archaeologica 15. Târgu Mureş, 279–294.

László, A. 2019: Archaeological-Historical Information and Radiocarbon Dating: Problems of the Late Bronze – Early Iron Age Chronology of the Carpathian–Danubian–Balkan Region. In: Palincaş, N. – Ponta, C. C. (eds): *Bridging Science and Heritage in the Balkans: Studies in archaeometry, cultural heritage restoration and conservation.* Oxford, 52–63.

Leahu, V. 2003: *Cultura Tei. Grupul cultural Fundenii Doamnei. Probleme ale epocii bronzului în Muntenia.* Bibliotheca Thracologica 38. Bucureşti.

Marta, L. 2009: *The Late Bronze Age Settlement of Petea–Csengersima.* Satu Mare.

Marta, L. 2010: Lăpuş II – Gáva I Discoveries in the Plain of Satu Mare. In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania/Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 317–328.

Marta, L. 2020: *Gáva Culture in the Someş Plain. The Settlements of Călineşti-Oaş and Lazuri.* Nyíregyháza.

Meller, H. 2013: Der Hortfund von Nebra im Spiegel frühbronzezeitlicher Deponierungssitten. In: Meller, H. – Bertemes, F. – Bork, H. R. – Risch, R. (eds): *1600 – Kultureller Umbruch im Schatten des Thera-Ausbruch? 4. Mitteldeutscher Archäologentag vom 14. bis 16. Oktober 2011 in Halle (Saale) / 1600 – Cultural*

change in the shadow of the Thera-Eruption? 4th Archaeological Conference of Central Germany October 14–16, 2011 in Halle (Saale). Tagungen des Landesmuseums für Vorgschichte Halle 9. Halle, 493–526.

Metzner-Nebelsick, C. – Kacsó, C. – Nebelsick, L. D. 2010: A Bronze Age ritual structure on the edge of the Carpathian Basin. In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania – Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 219–233.

Metzner-Nebelsick, C. 2013: Gedanken zur Frage des kulturellen Wandels in der Zeit um 1600 v. Chr. in Nordwest-Rumänien und Nordost-Ungarn. In: Meller, H. – Bertemes, F. – Bork, H. R. – Risch, R. (eds): *1600 – Kultureller Umbruch im Schatten des Thera-Ausbruch? 4. Mitteldeutscher Archäologentag vom 14. bis 16. Oktober 2011 in Halle (Saale) / 1600 – Cultural change in the shadow of the Thera-Eruption? 4th Archaeological Conference of Central Germany October 14–16, 2011 in Halle (Saale).* Tagungen des Landesmuseums für Vorgschichte Halle 9. Halle, 327–353.

Méder L. L. 2006a: Hallstatt-kori kerámia Kézdipolyán-Kőhát lelőhelyről (Hallstatt Pottery from the Settlement of Kézdipolyán-Kőhát [Poian, Covasna County]). *Acta Siculica* 2, 49–63.

Méder, L. L. 2006b: Hallstattische-keramik aus Poian-Kőhát. *Marisia* 28, 43–59.

Mihăilescu-Bîrliba, V. – Szmyt, M. 2003: Radiocarbon Chronology of the Moldavian (Siret) subgroup of the Globular Amphorae Culture. In: Kośko, A. – Klochko, V. (eds): *The Foundations of Radiocarbon Chronology of the Cultures between the Vistula and Dnieper: 4000–1000 BC.* Baltic-Pontic Studies 12. Poznań, 82–112.

Mirea, P. – Frînculeasa, A. 2021: Descoperirile de tip Glina din sud-vestul Munteniei – o evaluare (An assessment of Glina-type discoveries from southwest Muntenia). *Buletinul Muzeului Judeţean Teleorman – Seria Arheologie* 13, 21–85.

Motzoi-Chicideanu, I. 2004: Observaţii asupra cimitirului din epoca bronzului de la Pietroasa Mică (Observations Concerning the Bronze Age Cemetery of Pietroasa Mică). *Mousaios* 9, 57–100.

Motzoi-Chicideanu, I. 2011: *Obiceiuri funerare în epoca bronzului la Dunărea Mijlocie şi Inferioară.* Bucureşti.

Motzoi-Chicideanu, I. – Olteanu, G. 2000: Un mormânt din cistă de piatră descoperit la Văleni-Dâmboviţa (A slab-cist grave discovered at Văleni-Dâmboviţa). *Studii şi Cercetări de Istorie Veche şi Arheologie* 51, 3–70.

Motzoi-Chicideanu, I. – Gugiu, D. 2004: Un mormânt din epoca bronzului descoperit la Cârlomăneşti (jud. Buzău). *Studii şi Cercetări de Istorie Veche şi Arheologie* 52–53, 5–41.

Motzoi-Chicideanu, I. – Şandor-Chicideanu, M. 2015: Câteva date noi privind cronologia culturii Monteoru (Some new data regarding the chronology of the Monteoru culture). *Mousaios* 20, 9–52.

Munteanu, R. 2010a: Reconsiderarea unei descoperiri funerare: mormântul de la Poian, jud. Covasna (The re-evaluation of a funerary discovery: the MBA inhumation tomb from Poian, Covasna County). *Angustia* 14, 271–276.

Munteanu, R. 2010b: *Începutul bronzului mijlociu în depresiunile marginale ale Carpaţilor Orientali.* Bibliotheca Memoriae Antiquitatis 24. Piatra-Neamţ.

Nagy, J.-G. – Köröfői, Zs. 2010: Early Iron Age Storage Pit at Porumbenii Mari-Várfele (Harghita County). In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei şi Transilvania – Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii şi Comunicări Satu Mare 26. Satu Mare, 133–156.

Nestor, I. 1960: *Istoria Romîniei. Vol 1.* Bucureşti.

Németh, R. E. 2015: The Middle Bronze Age "Mass Grave" from Voivodeni–La Şcoală. A Chronological Approach. In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureş, 179–199.

Niculiţă, I. – Nicic, A. 2007: Cercetări arheologce la situl Saharna-Dealul Mănăstirii (Archaeological research conducted at the settlement Saharna-Dealul Mănăstirii). *Tyragetia* 16, 225–248.

Oancea, A. 1976: Unele observaţii cu privire la fazele finale ale culturii Monteoru în lumina cercetărilor de la Cîrlomăneşti, judeţul Buzău. *Cercetări Arheologice* 2, 191–237.

Oancea, A. 1981: Considérations sur l'étap finale de la culture de Monteoru. *Dacia* 25, 131–191.

Oancea, A – Drâmbocianu, V. 1977: Noi descoperiri din epoca bronzului în județul Buzău. Obeservații asupra cronologiei Monteoru. *Studii și Cercetări de Istorie Veche și Arheologie* 28, 509–529.

Palincaș, N. 1996: Valorificarea arheologică a probelor ^{14}C din fortificația aparținând bronzului târziu de la Popești (jud. Giurgiu). *Studii și Cercetări de Istorie Veche și Arheologie* 47, 239–295.

Palincaș, N. – Rotea, M. – Sava, T. B. – Sava, G. O. – Gâza, O. – Bodea, M. – David, C. 2019: Revisiting the Radiocarbona-Based Chronology of the Wietenberg Culture (Middle Bronze Age Transylvania): A Debate of Supra-Regional Relevance. In: Palincaș, N. – Ponta, C. C. (eds): *Bridging Science and Heritage in the Balkans: Studies in archaeometry, cultural heritage restoration and conservation.* Oxford, 38–51.

Pankau, C. 2004: *Die älterhallstattzeitliche Keramik aus Mediaş/Siebenbürgen.* Universitätforschungen zur prähistorischen Archäologie 109. Bonn.

Pare, C. 2015: Normative Change at the start of the Iron Age: The case of Transylvania. In: Esposito, A. (ed.): *Autour du « banquet». Modèles de consommation et usages sociaux.* Dijon, 275–312.

Petrescu-Dîmboviţa, M. 1977: *Depozitele de bronzuri din România.* Biblioteca de Arheologie 30. Bucureşti.

Popa, C. I. 2005: Modificări culturale la finalul bronzului timpuriu şi începutul bronzului mijlociu în Transilvania. In: Popa, C. I. – Rustoiu, G. T. (eds): *Omagiu profesorului Ioan Andriţoiu cu prilejiul împlinirii a 65 de ani. Studii şi Cercetări Arheologice.* Alba Iulia, 51–183.

Popa, C. I. 2010: Modificări culturale la finalul Bronzului timpuriu şi începutul Bronzului mijlociu în Transilvania. In: Popa, C. I. – Totoianu, R. (eds): *Aspecte ale Epocii Bronzului în Transilvania. (între vechile şi noile cercetări).* Bibliotheca Musei Sabesiensis 1. Sebeş, 11–170.

Popa, C. I. 2012: *Contribuții la preistoria Văii Sebeşului (I). Locuiri Coțofeni din zona deluroasă* (Contributions for a prehistory of Sebeş Valley (I) Coțofeni habitations in the hill area). Bibliotheca Musei Sabesiensis 3. Alba Iulia.

Popa, C. I. 2019: Când din morți nu mai rămâne decât cenușa – *Restitutio* Iuliu Paul și unele remarci privitoare la necropola Wietenberg de la Sibișeni (When the Dead Turn to Ashes – *Restitutio* for Iuliu Paul and Some Remarks about the Wietenberg Necropolis in Sibişeni). *Terra Sebus – Acta Musei Sabesiensis* 11, 37–97.

Popa, C. I. – Totoianu, R. 2010: The Late Bronze Age settlement at Sebeş–Podul Pripocului (County of Alba). In: Marta, L. (ed.): *Amurgul mileniului II a. Chr. în Câmpia Tisei și Transilvania – Das ende des 2. Jahrtausendes v. Chr. auf der Theiß-Ebene und Siebenbürgen.* Studii și Comunicări Satu Mare 26. Satu Mare, 85–119.

Popa, D. – Boroffka, N. 1996: Consideraţii privind cultura Noua. Aşezarea de la Ţichindeal, jud. Sibiu (Consideration on the Nous culture the settlement of Ţichindeal, Jud. Sibiu). *Studii și Cercetări de Istorie Veche și Arheologie* 47, 51–61.

Popescu, A. 2001: Bone Accessory of a Bronze Age Necklace. *Dacia* 43–45, 17–30.

Popescu, A.-D. 2008: Piesele de tip Wietenberg de la Costişa (jud. Neamţ). *Carpica* 37, 194–201.

Popescu, A-D. 2013: Contextele, cronologia şi analogiile unor piese de os decorate din Moldova. In: Ciobotaru, P. – Nedu, O-C. (eds): *Studii și Cercetări privind Arheologia Spațiului Nord-Vest Pontic. In honorem Nicu Mircea septuagenarii.* Danubius 31 – Supliment. Galați, 179–202.

Popescu, A.-D. – Băjenaru, R. 2008: Mormântul colectiv din perioada timpurie a epocii bronzului de la Costişa (jud. Neamț). *Acta Moldaviae Meridionalis* 28–29, 63–80.

Preda-Bălănică, B. – Frînculeasa, A. – Heyd, V. 2020: The Yamnaya Impact North of the Lower Danube: A Tale of Newcomers and Locals. *Bulletin de la Société préhistorique française* 117, 85–101. https://doi.org/10.3406/bspf.2020.15079

Przybyła, M. S. 2009: *Intercultural Contacts in the Western Carpatian Area at the Turn of the 2nd and 1st Millennia BC.* Warsaw.

Puskás, J. 2012: Adatok Kovászna megye régészeti repertóriumához II. (Contributions to the Archaeological Repertory of Covasna County. Vol 2). *A Csíki Székely Múzeum Évkönyve* 8, 115–150.

Puskás, J. 2015a: Contact Zone: Middle Bronze Age Cultural Connections in the Valley of the Black River (Covasna County, Romania). In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Chronology in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 2–4 October 2014.* Bibliotheca Musei Marisiensis – Seria Archaeologica 8. Târgu Mureş, 97–129.

Puskás, J. 2015b: Contribuţii la repertoriul archeologic al judeţului Covasna III. (Contributions to the Archaeological Repertory of Covasna County. Vol 3). *Materiale şi Cercetări Arheologice* 11, 257–290. https://doi.org/10.3406/mcarh.2015.1005

Puskás, J. 2016: Descoperiri funerare din epoca mijlocie a bronzului în valea Râului Negru (jud. Covasna). *Materiale şi Cercetări Arheologice* 12, 89–103. https://doi.org/10.3406/mcarh.2016.1018

Puskás, J. 2018a: Middle Bronze Age Settlement patterns and metal discoveries in the valley of the Black River. In: Németh, R. E. – Rezi, B. (eds): *Bronze Age Connectivity in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 13–15 October 2016.* Bibliotheca Musei Marisiensis – Series Archaeologica 15. Târgu Mureş, 217–278.

Puskás, J. 2018b: Kincs és táj. A cófalvi aranydepó településtörténeti vonatkozásai – Treasure and Landscape. Middle Bronze Age settlement patterns in the light of the Cófalva/Ţufalău hoard. *Magyar Régészet – Hungarian Archaeology* 7/1, 1–12. http://files.archaeolingua.hu/2018TA/Puska%b4s_E18TA.pdf (last access: 04. 10. 2023).

Puskás, J. 2019: Egy középső bronzkori balta Csernátonból (Cernat, RO). Adatok a "Pădureni" típusú balták tipológiájához és deponálási szokásához (A Middle Bronze Age Axe from Csernáton/Cernat [Covasna County, Romania]. Contributions to the typology and deposition of the Pădureni-type axes). *Archaeologiai Értesítő* 144, 97–119. https://doi.org/10.1556/0208.2019.144.4

Puskás, J. 2020a: Aşezarea culturii Noua de la Albiş/Kézdialbis-Rétremenő (judeţul Covasna) (The settlement of the Noua culture from Albiş/Kézdialbis-Rétremenő [Covasna County]). *Revista de Arheologie, Antropologie şi Studii Interdisciplinare* 2, 111–150.

Puskás, J. 2020b: The Middle Bronze Age Cemetery at Ţufalău/Cófalva-Alámenő I (Covasna County, Romania). *Marisia* 2, 51–66.

Puskás, J. 2023: Középső bronzkori települések és területiumok a Felsőháromszéki-medencében (Kovászna megye, Románia) (Middle Bronze Age Settlements and Territories in the Felsőháromszék Depression [Covasna County, Romania]). In: Tóth, Farkas M. – Szilas, G. – Anders, A.– Kalla, G. – Kiss, V. – Kulcsár, G. – Mester, Zs. (eds): *ΜΩΜΟΣ XI. Őskoros Kutatók Összejövetele. Környezet és ember. A BTM Aquincumi Múzeumban 2019. április 10–12-én megrendezett konferencia tanulmánykötete* – ΜΩΜΟΣ XI. *Meeting of Researchers of Prehistory. Environment and Humans. Proceedings of the Conference Held at the BHM Aquincum Museum between 10 to 12 April 2019.* Budapest, 285–296. https://doi.org/10.21862/momosz11.21

Puskás, J. – Buzea, D. 2021: Raport preliminar asupra cercetărilor sitului din epoca bronzului de la Sântimbru/Csíkszentimre-Dealul Mic/Kis-hegy, jud. Harghita (Preliminary report on the research in the Bronze Age site at Sântimbru/Csíkszentimre-Dealul Mic/Kis-hegy, Harghita County). *Angustia* 25, 23–42. https://doi.org/10.36935/ang.v25.2

Puskás, J. – Darvas, L. 2021a: A Middle Bronze Age Pit at Miercurea Ciuc/Csíkszereda-Fodor-kert (Harghita County, Romania). *Revista de Arheologie, Antropologie şi Studii Interdisciplinare* 3, 141–164.

Puskás, J. – Darvas, L. 2021b: Late Bronze Age Pottery Deposits from the site of Sâncrăieni/Csíkszentkirály-Kőoldal (Harghita County, Romania). *Marisia* 3, 51–78.

Puskás, J. – Botha, Z.-J. 2022: Contacts between southeastern Transylvania and the Upper Tisza Basin during the Middle and the Late Bronze Age. *Revista de Arheologie, Antropologie şi Studii Interdisciplinare* 4, 187–212.

Quinn, C. P. – Ciugudean, H. – Bălan, G. – Hodgins, G. 2020: Rethinking time, culture and socioeconomic organisation in Bronze Age Transylvania. *Antiquity* 94, 44–61. https://doi.org/10.15184/aqy.2019.231

Reimer, P. J. – Austin, W. E. N. – Bard, E. – Bayliss, A. – Blackwell, P. G. – Ramsey, C. B. – Butzin, M. – Cheng, H. – Edwards, R. L. – Friedrich, M. – Grootes, P. M. – Guilderson, T. P. – Hajdas, I. – Heaton, T. J. – Hogg, A. G. – A Hughen, K. A. – Kromer, B. – Manning, S. W. – Muscheler, R. – Palmer, J. G. – Pearson, C. – van der Plicht, J. Reimer, R. W. – Richards, D. A. – Scott, E. M. – Southon, J. R. – Turney, C. S. M. – Wacker, L. – Adolphi, F. – Büntgen, U. – Capano, M. – Fahrni, S. M. – Fogtmann-Schulz, A. – Friedrich, R. – Köhler, P. – Kudsk, S. – Miyake, F. – Olsen, J. – Reinig, F. – Sakamoto, M. – Sookdeo, A. – Talamo, S. 2020: The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0-55 kBP). *Radiocarbon* 62, 725–757. https://doi.org/10.1017/RDC.2020.41

Rezi, B. 2011: Voluntary Destruction and Fragmentation in Late Bronze Age Hoards from Central Transylvania. In: Berecki, S. – Németh, R. E. – Rezi, B. (eds): *Bronze Age Rites and Rituals in the Carpathian Basin.*

Proceedings of the International Colloquium from Târgu Mureş. 8–10 October 2010. Bibliotheca Musei Marisiensis – Seria archaeologica 4. Târgu Mureş, 303–334.

Rezi, B. 2016: Metal objects. In: Berecki, S. (ed.): *The Bronze Age Site from Luduş.* Târgu Mureş, 122–127.

Roman, P. I. 1986: Perioada timpurie a epocii bronzului pe teritoriul României. *Studii şi Cercetări de Istorie Veche şi Arheologie* 37, 29–55.

Roman, P. – János, P. – Horváth, Cs. 1973: Cultura Jigodin. O cultură cu ceramică şnurată în estul Transilvaniei. *Studii şi Cercetări de Istorie Veche şi Arheologie* 24, 559–574.

Roman, P. I. – Dodd-Opriţescu, A. – János, P. 1992: *Beiträge zur Problematik der Schnurverzierten Keramik Südosteuropas.* Mainz am Rhein.

Rotea, M. 1994: Penetraţia culturii Otomani în Transilvania. Între realitate şi himeră (La penetration de la civilisaţion D'oţomani en Transylvanie, entre realite et hymere). *Apulum 31*, 39–57.

Rotea, M. 1997: Cercetări arheologice la Palatca – "Togul lui Mândruşcă". Observaţii preliminare. *Revista Bistriţei* 10–11, 13–19.

Rotea, M. – Netea, M. G. – de-la-Rua, C. – Tecar, T. – Hervella, M. – Alonso, S. – Maxim, Z. – Răchită, M. 2014: The Archaeological Contexts of DNA Samples Collected from Prehistoric Sites in Transylvania. *Acta Musei Napocensis* 51, 21–60.

Rotea, M. – Palincaş, N. – Netea, M. – Petiş, I. – Bindea, D. – Răchită, M. – Cordoş, C. – Valea, D.-A. – Bereteu, D. – Grumeza, L. – Jeican, I. – Sava, T. – Sava, G. – Danciu, S. 2021: A Feature (Cx 96) of the Gáva Culture from Sânpaul-Usturiş (Cluj County): A First Assessment of Its Absolute Chronology. *Revista Bistriţei* 34–35, 17–43.

Sava, E. 2002: *Die Besteattungen der Noua-Kultur. Ein Beitrag zur Erforschung spätbronzezitlicher Bestattungsriten zwischen Dnestr und Westkarpaten.* Prähistorische Archäologie in Südosteuropa 19. Kiel.

Sava, E. 2014: *Aşezări din perioada târzie a epocii bronzului în spaţiul pruto-nistrean (Noua-Sabatinovka).* Biblioteca Tyragetia 19. Chişinău.

Sava, E. – Kaiser, E. 2011: *Poseleniye s «zol'nikami» v sele Odaya-Michurin, Respublika Moldova. Arkheologicheskiye i yestestvennonauchnyye issledovaniya – Die Siedlung mit "Aschehügeln" beim Dorf Odaia-Miciurin, Republik Moldova. Archäologische und naturwissenschaftliche Untersuchungen.* Biblioteca Tyragetia 19. Chişinău.

Sava, V. – Ursuţiu, A. 2021: The Late Bronze Age Gáva pottery from the Lower Mureş. *Journal of Ancient History and Archaeology* 8, 84–127. https://doi.org/10.14795/j.v8i2.642

Schuster, C. F. 1997: *Perioada timpurie a epocii bronzului în bazinele Argeşului şi Ialomiţei superioare.* Bibliotheca Thracologica 20. Bucureşti.

Solymossy, E. 1895: Solymossy Endre az oklándi kúnhalmokról Udvarhely vármegyében. *Archaeologiai Értesítő* 15, 417–419.

Soroceanu, T. 2012: *Die Kupfer- und Bronzedepots der frühen und mittlere Bronzezeit in Rumänien – Depozitele de obiecte din cupru şi bronz din România. Epoca timpurie şi mijlocie a bronzului.* Archaeologica Romanica 5. Cluj-Napoca–Bistriţa.

Stocker, S. R. – Davis, J. L. 2017: The Combat Agate from the Grave of the Griffin Warrior at Pylos. *Hesperia* 86, 583–605. https://doi.org/10.2972/hesperia.86.4.0583

Szabó, A. 1999: Történelmi korkérdés a csíkszentmártoni lelet kapcsán. *Hargita Kalendárium*, 129–132.

V. Szabó, G. 2007: Polgár határában előkerült késő bronzkori kút feltárása és rekonstrukciója (Freilegung und Rekonstruktion eines Brunnens in der Gemarkung von Polgár). *Ősrégészeti Levelek – Praehistoric Newsletters* 7, 146–165.

V. Szabó, G. 2011: Spätbronzezeitliche Bronzehortfunde im Siedlungkontext – Neue Forschungsergebnisse aus Ostungarn. In: Berecki, S. – Németh, R. E. – Rezi, B. (eds): *Bronze age Rites and Rituals in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 8–10 October 2010.* Bibliotheca Musei Marisiensis – Seria Archaeologica 4. Târgu Mureş, 335–356.

V. Szabó, G. 2017a: A Gáva kerámiastílus kora. Az Alföld a hajdúböszörményi szitulák földbekerülésének időszakában (The age of the Gáva pottery style. The Great Hungarian Plain in the time of the burying of the Hajdúböszörmény situlae). In: V. Szabó, G. – Bálint, M. –Váczi, G. (eds): *A második hajdúböszörményi*

szitula és kapcsolatrendszere – The second situla of Hajdúböszörmény and its relations. Studia Oppidorum Haidonicalium 13. Budapest–Hajdúböszörmény, 231–278.

V. Szabó, G. 2017b: 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. International Conference in Timişoara, Romania from November 11th to 13th, 2015*. Berliner Beiträge zur Vor- und Frühgeschichte 21. Berlin, 107–134.

V. Szabó, G. – Dénes, I. 1999: A délkelet-erdélyi Vargyas-patak szorosának 1200/9. számú barlangjában talált kora bronzkori depólelet (The Archaeological Findings of the Early Bronze Age Discovered in Cave No. 1200/9 in the Vargyas [Vârghiş]-Gorge [Mereşti, Harghita County]). *Acta – A Csíki Székely Múzeum és a Székely Nemzeti Múzeum Évkönyve*, 123–138.

V. Szabó, G. 2019: *Bronze Age Treasures in Hungary. The Quest for Buried Weapons, Tools and Jewellery*. Hereditas Archaeologica Hungariae 3. Budapest.

Szeverényi, V. 2013: The Earliest Copper Shaft-Hole Axes in the Carpathian Basin: Interaction, Chronology and Transformations of Meaning. In: Anders, A. – Kulcsár, G. (eds): *Moments in Time. Papers Presented to Pál Raczky on His 60th Birthday*. Őrségészeti Tanulmányok – Prehistoric Studies 1. Budapest, 661–669.

Székely, Z. 1959a: Raport preliminar asupra sondajelor executate de Muzeul Regional din Sf. Gheorghe în anul 1956. *Materiale şi Cercetări Arheologice* 5, 231–245. https://doi.org/10.3406/mcarh.1959.1148

Székely, Z. 1959b: Cercetări arheologice la Sf. Gheorghe, Gémvára-Avasalja (Cetatea Cocorului). *Materiale şi Cercetări Arheologice* 5, 709–722. https://doi.org/10.3406/mcarh.1959.2026

Székely, Z. 1965: Contribuţii la dezvoltarea culturii Noua în sud-estul Transilvaniei. *Muzeul Brukenthal. Studii şi Comunicări* 12, 21–34.

Székely, Z. 1966a: *Aşezări din prima vîrstă a fierului în sud-estul Transilvaniei*. Braşov.

Székely, Z. 1966b: Beiträge zur Kenntnis der Frühhallstattzeit und zum Gebrauch des Eisens in Rumänien. *Dacia* 34, 209–219.

Székely, Z. 1968: Contribuţii la problema începutului epocii bronzului în sud-estul Transilvaniei. *Studii şi Cercetări de Istorie Veche* 19, 423–428.

Székely, Z. 1970: Săpăturile executate de Muzeul din Sf. Gheorghe (1959–1966). *Materiale şi Cercetări Arheologice* 9, 297–315. https://doi.org/10.3406/mcarh.1970.1365

Székely, Z. 1971: Contribuţii la cunoaşterea epocii bronzului în sud-estul Transilvaniei, *Studii şi Cercetări de Istorie Veche şi Arheologie* 22, 387–400.

Székely, Z. 1973: Aşezările de la Vârful cu Stejari (Miercurea Ciuc, jud. Harghita) şi de la Piatra de Veghe (Sf. Gheorghe, jud. Covasna). *Aluta* 5, 125–151.

Székely, Z. 1993: Staţiunile arheologice de la Turia şi Valea Crişului, jud. Covasna. *Materiale şi Cercetări Arheologice* 17, 299–306. https://doi.org/10.3406/mcarh.1993.1948

Székely, Z. 1994: A zabolai (Zăbala - România) kora középkori temető (Das mittelalterliche Gräberfeld von Zabola [Zăbala-Rumänien]). *A Veszprém megyei Múzeumok Közleményei* 19–20, 277–304.

Székely, Z. – Székely, Zs. 1979: Aşezarea din epoca bronzului de la Peteni. *Materiale şi Cercetări Arheologice* 13, 71–72. https://doi.org/10.3406/mcarh.1979.1434

Székely, Zs. 1980a: Date noi privind ritul de înmormîntare al culturii Schneckenberg în judeţul Covasna. *Aluta* 10–11, 39–46.

Székely, Zs. 1980b: Consideraţii arheologice privind aşezarea din epoca bronzului de la Peteni. *Materiale şi Cercetări Arheologice* 14, 129–133. https://doi.org/10.3406/mcarh.1980.1531

Székely, Zs. 1983: Rezultatul ultimelor cercetări din judeţul Covasna, în aşezări din epoca bronzului şi prima vîrstă a fierului. *Materiale şi Cercetări Arheologice* 15, 143–148. https://doi.org/10.3406/mcarh.1983.1795

Székely, Zs. 1995: Necropola de incineraţie de la Turia, judeţul Covasna (Das Urnengräberfeld von Turia, Bezirk Covasna). *Cercetări arheologice în aria nord-tracă* 1, 127–146.

Székely, Zs. 1997a: *Perioada timpurie şi începutul celei mijlocii a epocii bronzului în sud-estul Transilvaniei*. Bibliotheca Thracologica 21. Bucureşti.

Székely, Zs. 1997b: Necropola tumulară de la Brăduţ, judeţul Covasna. Rezultatele săpăturilor din anii 1995–1996 (The tumulary cemetery from Brăduţ, Covasna County. Results of 1995–1996 archaeological campaigns). *Cercetări arheologice în aria nord-tracă* 2, 41–53.

Székely, Zs. 1997c: Aşezarea şi necropola de incineraţie în urne de la Ozun-Lisnău (The Settlement and Cremated Urns Necropolis from Ozun-Lisnău [Uzon-Lisznyó, Covasna County]). *Acta – A Csíki Székely Múzeum és a Székely Nemzeti Múzeum Évkönyve* 1, 101–106.

Székely, Zs. 1998: Comon elements and chronological relations between the Zăbala culture and the Livezile Group. In: Ciugudean, H. – Gogâltan, F. (eds): *The Early and Middle Bronze Age in the Carpathian Basin. Proceedings of the International Symposium in Alba Iulia. 24–28 September 1997.* Bibliotheca Musei Apulensis 8, 143–160.

Székely, Zs. 2002: A gömbamforás műveltség emléke Délkelet-Erdélyben (The Globular Amphora culture in southeast-Transylvania). *Ősrégészeti Levelek – Prehistoric Newsletters* 4, 40–44.

Székely, Zs. 2007: *Csernáton község régészeti monográfiája.* Csíkszereda.

Székely, Zs. 2009: The beginning of Early Bronze Age in Southeastern Transylvania. Problems of Chronology. In: Berecki, S. – Németh, R. E. – Rezi, B. (eds): *Bronze Age Communities in the Carpathian Basin. Proceedings of the International Colloquium from Târgu Mureş. 24–26 October 2008.* Bibliotheca Musei Marisiensis – Seria Archaeologica 1. Târgu Mureş, 39–44.

Szmyt, M. 2010: *Between West and East. People of the Globular Amphorae Culture in Eastern Europe: 2950–2350 BC.* Baltic-Pontic Studies 8. Poznań.

Szmyt, M. 2013: View from the Northwest: Interaction Network in the Dnieper–Carpathian Area and the People of the Globular Amphora Culture in the Third Millenium BC. In: Heyd, V. – Kulcsár, G. – Szeverényi, V. (eds): *Transitions to the Bronze Age. Interregional Interaction and Socio-Cultural Change in the Third Millennium BC Carpathian Basin and Neighbouring Regions.* Budapest, 94–111.

Szmyt, M. 2014: Fourth-Third Millennium BC stone cist graves between the Carpathians and Crimeea. An outline of issues. In: Kośko, A. (ed.): *Reception zones of 'Early Bronze Age' Pontic Culture Traditions: Baltic Basin – Baltic and Black Sea Drainage Borderlands, 4/3 mil. to first half 2 mil. BC.* Baltic-Pontic Studies 19. Poznań, 107–147.

Sztáncsuj, S. J. – Körösfői, Zs. 2009: Késő rézkori telepnyomok Fiatfalva-Alsó-kövesföld lelőhelyen. In: Körösfői, Zs. (ed.): *Kutatások a Nagy-Küküllő felső folyása mentén.* Molnár István Múzeum Közleményei 1. Székelykeresztúr, 15–36.

Sztáncsuj, S. J. – Puskás, J. 2022: Prehistory of the Ciomadul Region from the Neolithic to the Late Iron Age. In: Kartson, D. – Veres, D. – Gertisser, R. – K. Magyari, E. – Jánosi, Cs. – Hambach, U. (eds): *Ciomadul (Csomád), The Youngest Volcano in the Carpathians. Volcanism, Paleoenvironment, Human Impact.* Cham, 217–236. https://doi.org/10.1007/978-3-030-89140-4_15

Ştefan, C. E. 2021: Aşezarea de epoca bronzului de la Bălăceanca, judeţul Ilfov, România. Unele consideraţii privind cronologia absolută a culturii Tei (The Bronze Age settlement of Bălăceanca, Ilfov County, Romania. Some considerations about the absolute chronology of Tei culture). *Revista de Arheologie, Antropologie şi Studii Interdisciplinare* 3, 119–140.

Ştefan, C. E. – Vasile, G. – Petcu, R. – Heroiu, A. – Preda-Bălănică, B. – Trautmann, M. 2023: The Bronze Age mounds from Aliman (Constanţa County, Romania). In: Preda-Bălănică, B. – Ahola, M. (eds): *Steppe Transmissions.* The Yamnaya Impact on Prehistoric Europe 4. Budapest, 95–133.

Ştefan, M. – Buzea, D. L. – Ştefan, D. – Kovács, A. – Puskás, J. 2018: Raport preliminar asupra cercetărilor desfăşurate la Reci-Doboika, jud. Covasna, un sit cu depuneri în gropi din epoca fierului (Preliminary report on the researches in Reci-Doboika [Covasna County] a 1st millennium BC site with deposits in pits). *Angustia* 22, 137–166. https://doi.org/10.36935/ang.v22.2

Uhnér, C. – Ciugudean, H. – Hansen, S. – Becker, F. – Bălan, G. – Burlacu-Timofte, R. 2019: The Teleac Hillfort in Southwestern Transylvania: The Role of the Settlement, War and the Destruction of the Fortification System. In: Hansen, S. – Krause, R. (eds): *Bronze Age Fortresses in Europe. Proceedings of the Second International LOEWE Conference, 9–13 October 2017 in Alba Iulia.* Prähistorische Konfliktforschung 3. Bonn, 177–200.

Ursulescu, N. – Petrescu-Dîmboviţa, M. – Monah, D. 2010: Neo-eneoliticul. In: Petrescu-Dîmboviţa, M. – Vulpe, A. (eds): *Istoria românilor. Vol. 1. Moştenirea timpurilor îndepărtate.* Bucureşti, 103–205.

Vandkilde, H. 2016: Breakthrough of the Nordic Bronze Age: Transcultural warriorhood and a Carpathian crossroad in the sixteenth century BC. *European Journal of Archaeology* 17, 602–633. https://doi.org/10.1179/1461957114Y.0000000064

Vasilescu, T. 2013: O dată ^{14}C de la Năeni – Zănoaga-Cetatea 1 (A ^{14}C data from Năeni: Zănoaga-Cetatea 1). *Studii de Preistorie* 10, 171–187.

Vasiliev, V. 1983: Probleme ale cronologiei Hallstattului în Transilvania (Einige Probleme der Hallstattzeit-Chronologie in Siebenbürgen). *Acta Musei Napocensis* 20, 33–57.

Vasiliev, V. 1989: Probleme ale cronologiei Hallstattului pe teritoriul României (II). *Sargetia* 20, 64–80.

Vasiliev, V. 1992: Probleme privind cronologia epocii Hallstattiene în aria intracarpatică a României (III). *Ephemeris Napocensis* 2, 19–26.

Vasiliev, V. 2007: Bemerkungen zu den Bitronkonischen Gefässen die für die Gáva-Kultur kennzeichnend sind, *Ephemeris Napocensis* 16–17, 7–16.

Vasiliev, V. – Aldea, I. A. – Ciugudean, H. 1991: *Civilizația dacică timpurie în aria intracarpatică a României. Contribuții arheologice: așezarea fortificată de la Teleac.* Cluj-Napoca.

Vulpe, A. 1970: *Die Äxte und Beile in Rumäniein.* Prähistorische Bronzefunde IX/2. München.

Vulpe, A. – Petrescu-Dîmboviţa, M. – László, A. 2010: Epoca metalelor. In: Petrescu-Dîmboviţa, M. – Vulpe, A. (eds): *Istoria românilor. Vol. I. Moştenirea timpurilor îndepărtate.* Bucureşti, 207–395.

Wiener, M. H. 2020: Helladic Greece from the Middle Bronze Age to c. 1350 BCE. In: Blum, S. W. E. – Efe, T. – Kienlin, T. L. – Pernicka, E. (eds): *From Past to Present. Studies in Memory of Manfred O. Korfmann.* Studia Troica – Monographien 11. Bonn, 279–331.

Witkowska, B. – Włodarczak, P. 2021: Relationships between Globular Amphorae and Corded Ware occupation phases in Złota-Nad Wawrem site, Sandomierz Upland: Chronometric and Stratigraphic evidence. *Baltic-Pontic Studies* 25, 117–158. https://doi.org/10.14746/bps.2021.25.4

Witkowska, B. – Przybyła, M. M. – Podsiadło, M. – Szczepanek, A. – Włodarczak, P. 2021: Absolute Chronology of the Globula Amphora Funeral Complex at Malice, Sandomierz Upland. *Baltic-Pontic Studies* 25, 49–78. https://doi.org/10.14746/bps.2021.25.2

Wollmann, V. – Ciugudean, H. 2006: Noi cercetări privind mineritul antic în Transilvania (I) (New research regarding ancient mining in Transylvania. Vol. 1). *Apulum* 42, 95–116.

Whitlow, R. – Kavruk, V. – Buzea, D.-L. – Briewig, B. 2013: Radiocarbon data from the Cucuteni–Ariuşd levels at Păuleni–Ciuc (Ciomortan)-'Dâmbul Cetăţii', Harghita County. *Acta Terrae Septemcastrensis* 12, 37–64.

Zaharia, E. 1963: Das Gräberfeld von Balinteşti-Cioinagi und Einige Fragen der Bronzezeit in der Moldau. *Dacia* 7, 139–176.

Zaharia, E. 1987: La culture Monteoru. L'étape de débuts á la lumiére des fouilles de Sărata Monteoru. *Dacia* 31, 21–49.

Zaharia, E. 1990a: Descoperiri ale culturii Monteoru în sud-estul Transilvaniei. *Thraco-Dacica* 11, 33–37.

Zaharia, E. 1990b: La culture de Monteoru. Sa deuxiéme étape de developpement á la lumiére des fouilles de Sărata Monteoru (dép. De Buzău), *Dacia* 34, 23–51.

Tab. 1. The new set of radiocarbon dates from southeastern Transylvania

Number	*Lab no.*	*Site*	*Culture/Pottery style*	*Age ^{14}C (BP)*	*Standard deviance (±)*	*1 σ calibration (cal BC)*	*2 σ calibration (cal BC)*	*Context type*	*Material*
1	DeA-37591	Moacşa-Óriáspince-tető	Schneckenberg culture?	4186	22	2879–2703	2886–2673	Stone cist burial with tumuli	Human bone (humerus)
2	DeA-37590	Zăbala-Tatárhalom	Zăbala culture	4154	24	2869–2673	2876–2631	Cultural layer	Animal teeth
3	DeA-37595	Leliceni-Kőhegy	Schneckenberg culture?	4133	23	2857–2631	2871–2584	Filling of dwelling 2	Bone fragment
4	DeA-38089	Sânmartin-Tankó-kert	Globular Amphorae culture (GAC)	4098	22	2838–2580	2855–2505 (2855–2572 [94.8%])	Stone cist burial	Human teeth
5	DeA-37593	Leliceni-Kőhegy	Jigodin culture	3951	22	2561–2360	2567–2347	Cultural layer above dwelling 3	Animal teeth
6	DeA-37596	Leliceni-Kőhegy	Jigodin culture	3922	22	2468–2350	2471–2305 (2471–2340 [92.3%])	Cultural layer -15 cm below dwelling 3	Animal bone
7	DeA-37594	Leliceni-Kőhegy	Jigodin culture	3913	21	2464–2349	2469–2305	Filling of dwelling 3	Animal bone
8	DeA-37755	Leliceni-Kőhegy	Jigodin culture	3879	23	2453–2299	2463–2287	Cultural layer -1.6 m	Animal bone
9	DeA-42060	Covasna-Hankó valley	Jigodin culture	3711	29	2191–2038	2200–1985 (2200–2026 [94.6%])	Filling of ditch Cx 02 -95 cm	Animal bone
10	DeA-23493	Turia-Vármegye	Wietenberg culture	3556	30	1948–1826	2016–1773 (1978–1773 [92.1%])	Grave 19	Cremated bone
11	DeA-31009	Torja-Rétiláb II.	Wietenberg culture	3478	23	1876–1748	1883–1701 (1883–1742 [93.2%])	Cultural layer	Animal bone
12	DeA-23370	Sfântu Gheorghe-Avasalja	Wietenberg culture	3412	35	1745–1632	1874–1616 (1776–1616 [86.7%])	Pit 1 (G1)	Animal teeth
13	DeA-23492	Ozun-Kupántag	Wietenberg culture	3377	28	1732–1622	1745–1545 (1745–1607 [90.5%])	Grave	Cremated bone
14	DeA-23371	Sfântu Gheorghe-Avasalja	Wietenberg culture	3373	32	1734–1618	1744–1543 (1744–1600 [85.6%])	Pit 1 (G1)	Animal bone
15	DeA-38093	Sâncrăieni-Karimósarka	Monteoru culture ?	3342	23	1666–1543	1728–1536 (1687–1536 [94.7%])	Pit 9/B (G9/B)	Animal teeth

Number	*Lab no.*	*Site*	*Culture/Pottery style*	*Age ^{14}C (BP)*	*Standard deviance (±)*	*1 σ calibration (cal BC)*	*2 σ calibration (cal BC)*	*Context type*	*Material*
16	DeA-24130	Peteni-Alsóhatár	Noua culture	3294	24	1609–1518	1616–1508	'ashmound'/cultural layer	Animal bone (crenated scapula)
17	DeA-38094	Sâncrăieni-Karimó-sarka	Monteoru culture ?	3275	19	1599–1505	1612–1501	Pit 19 (G19)	Animal bone
18	DeA-24131	Peteni-Alsóhatár	Noua culture	3241	24	1531–1457	1598–1438 (1541–1438 [94.8%])	'ashmound'/cultural layer	Animal teeth
19	DeA-26328	Turia-Belső rétiláb	Noua culture	3220	29	1507–1449	1533–1428	'ashmound' 1/ cultural layer	Animal bone
20	DeA-31010	Săsăuși-Középső határ	Noua culture	3185	39	1498–1428	1530–1325 (1530–1393 [94.3%])	'ashmound' 3/ cultural layer	Animal teeth
21	DeA-26329	Mărtineni-Völgyoldal	Noua culture	3161	31	1495–1411	1503–1322 (1503–1390 [92.1%])	'ashmound' 1/ cultural layer	Animal bone (crenated scapula)
22	DeA-23375	Țufalău-Alámenő II.	Noua culture	3148	32	1493–1398	1500–1310 (1500–1382 [84.5%])	'ashmound' 1/ cultural layer	Animal bone (crenated scapula)
23	DeA-23372	Cernat-Hegyes	Gáva culture	3046	36	1387–1260	1414–1212	Hearth 1	Animal bone
24	DeA-24242	Sânzieni-Táncospad	Noua culture	3005	24	1365–1208	1380–1128	Pit	Chared seeds
25	DeA-26326	Poian-Kőhát	Gáva culture	2956	34	1254–1116	1272–1048	Grave 1	Humerus (human bone)
26	RoAMS 1454.114	Reci-Dobolyka	Gáva culture	2927	30	1199–1055	1219–1016	Pit Cx 30	Charcoal
27	DeA-31006	Porumbenii Mari-Várfele	Gáva culture	2922	27	1194–1054	1215–1016	Pit	Animal teeth
28	DeA-26327	Cernat-Hegyes	Gáva culture	2903	24	1155–1016	1216–997	Layer	Animal bone
29	DeA-31007	Porumbenii Mari-Várfele	Gáva culture	2892	30	1118–1016	1205–985 (1134–985 [81.9%])	Pit	Animal bone

Number	*Lab no.*	*Site*	*Culture/Pottery style*	*Age ^{14}C (BP)*	*Standard deviance (±)*	*1 σ calibration (cal BC)*	*2 σ calibration (cal BC)*	*Context type*	*Material*
30	DeA-23373	Turia-Telek	Gáva culture	2888	39	1155–1006	1210–934 (1210–974 [92.3%])	Pit	Animal bone
31	DeA-38091	Bancu-Potovszky-kert	Gáva culture	2874	20	1108–1009	1123–939 (1123–981 [94.3%])	Near hearth 1	Animal bone
32	DeA-42061	Covasna-Hankó valley	Gáva culture	2829	25	1012–931	1053–907	Pit Cx 01	Animal teeth
33	DeA-26330	Hătuica-Közösláb	Gáva culture	2795	29	989–907	1015–838 (1015–893 [87.5%])	Feature 5/cultural layer	Animal bone