

Chronology of the Early and Middle Bronze Age in Hungary. New results

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ABSTRACT

The chronological system established by Paul Reinecke played a significant role in developing a chronological classification of the Hungarian Bronze Age. However, the relative chronology which is currently being used for the Early and Middle Bronze Age by the majority of Hungarian scholars is based on István Bóna's temporal sequence. Although Bóna's relative chronology is still regarded as the 'lingua franca' in Hungary, several attempts have been made to synchronise Bóna's relative chronological system of the Hungarian Bronze Age with the Reinecke scheme in the last two decades. The present paper compares the two relative chronological systems and highlights some common cornerstones, supported by the most recent AMS ¹⁴C dates from the Carpathian Basin.

KEYWORDS

Bronze Age; Hungary; relative chronology; absolute dating.

INTRODUCTION TO BRONZE AGE RELATIVE CHRONOLOGICAL PERIODISATION IN HUNGARY

The basic relative chronological system of the Central European Bronze Age, established by Paul Reinecke, was published 118 years ago, in 1902. Based on the typological evaluation of bronze artefacts, he divided the Bronze Age into four main phases: 'Bronzezeit (Br) A–D', supplemented by two additional phases: Hallstatt A–B (REINECKE 1902). Some decades later, the system was revised and further elaborated by Friedrich Holste and Kurt Willvonseder (WILLVONSEDER 1937; HOLSTE 1939). In the 1970s, Walter Ruckdeschel gave a more detailed division of the Early Bronze Age, splitting Reinecke's phases into Br A1a, A1b, A2a, b, and c, based on the typo-chronology of pin types found in the territory of present-day Germany (RUCKDESCHEL 1979). Due to many further refinements and additions, the chronological system developed by Paul Reinecke has significantly evolved over the last few decades. As a part of this, for example, François Bertemes and Volker Heyd recently proposed the introduction of an Ao period preceding the original A1 phase, at least in Central Europe (BERTEMES – HEYD 2002).

The first attempts at periodisation by Ferenc Tompa based the Hungarian Bronze Age relative chronology on the stratigraphy of the well-known multilayer tell-settlement, Tószeg-Laposhalom (A–D) (TOMPA 1936).

Reinecke's chronology played a significant role in establishing Amália Mozsolics's temporal sequence of the Bronze Age in Hungary. She correlated the Hungarian 'autochthonous Bronze Age' B1b and II phase (Tószeg A and Tószeg B, Kömlőd–Ercsi horizon) with the Reinecke Bronzezeit A1 phase, and the BIIIa phase (Hajdúsámson horizon) with Reinecke's Br A2/B1 phase. The final, BIIIb phase (the period of the concealment of the Koszider hoards) was equated with Reinecke's Br B2 phase according to the modified Holste and Willvonseder

system. In her later works Mozsolics returned to Reinecke's original system (**Fig. 1**) and dated the concealment of the Koszider hoards to the end of the Reinecke Br B phase (MOZSOLICS 1943; 1967; 1984).

Stufenbezeichnung nach		Depothorizont	übergeordneter Kulturbegriff
Reinecke	Mozsolics		
Br. A2 B	B I B II B IIIa B IIIb	Kömlőd — Ercsi Hajdúsámson Koszider	Tellkulturen der Früh- und Altbronzezeit
C	B IVa	Forró	Mittlere Bronzezeit: Hügelgräber- und verwandte Kulturen
D	B IVb	Ópályi	
— — — Ha A	B Va B Vb B Vc	Aranyos Kurd Gyermely	Jungbronzezeit: Brandgräberfelder auch Hügelgräber Gáva- und Čaka-Kultur, dann Vál-Kultur
Ha B	B VIa B VIb B VIc	Hajdúböszörmény Románd Bükkszentlászló	Spätbronzezeit: Brandgräber, in Ostun- garn auch Skelettgräber, Übergang zur älteren Eisenzeit

Fig. 1: Relative chronological system for the Hungarian Bronze Age (after MOZSOLICS 1984, tab. 1).

During the elaboration of the Hungarian Early and Middle Bronze Age chronology, which is commonly used even nowadays, István Bóna relied only a little on the above-mentioned Central European chronological system. He considered the close relations of the Carpathian Basin to Southeast Europe and the Balkans as well as the timeline suggested by the layers of the tell-settlements to be more important. According to him, 'the A/1 Period of Reinecke's Central European chronology is equal to Middle Bronze Age 1 in the Middle Danube Basin'¹ (BÓNA 1961, 4; BÓNA 1975, 9–10, 25–26, 247). Accordingly, the Hungarian Middle Bronze Age 1 = Br A1, Middle Bronze Age 2 = Br A2. This means that the entire Hungarian Early Bronze Age preceded the emergence of Central European Early Bronze Age cultures dated to the Reinecke Br A period (**Fig. 2**), and thus, the Hungarian Bronze Age became largely asynchronous to the Central European Bronze Age chronological scheme. This dichotomy led on the one hand to a decade-long debate between German, Austrian, Slovakian, Romanian, and former Yugoslavian archaeologists adapting Reinecke's system and the Hungarian research (HÄNSEL 1968, Abb. 2), and on the other to the partial disuse of the Central European chronology in Hungary.

1 'Die A/1 Periode der Reinecke-schen mitteleuropäischen Chronologie entspricht dem mittelbronzezeitlichen Abschnitt 1 im mittleren Donaubecken (...) beginnt.'

Later, in the 1980s, Nándor Kalicz and Rózsa Kalicz-Schreiber called attention to the occurrence of metal objects at the end of the third phase of the Hungarian Early Bronze Age that can be dated to Br A1 period (KALICZ-SCHREIBER 1984, 194). For this reason, it has become necessary over the past two decades to review the parallelization of the Hungarian Bronze Age periods and the Reinecke system (KULCSÁR – SZABÓ 1997, 154; DAVID 1998; KISS 2002; KISS *et al.* 2015a; FISCHL *et al.* 2015).

RECENT DISCUSSION CONCERNING THE RELATIVE AND ABSOLUTE CHRONOLOGY OF THE EARLY AND MIDDLE BRONZE AGE IN HUNGARY

Even the earliest works tried to place the Bronze Age of the Carpathian Basin on the absolute time scale: its beginning was set at 2000 BC, while its end was placed around 900 BC (TOMPA 1936). Contemporaneous dating difficulties, however, are well reflected by the thoughts of Amália Mozsolics: ‘We have to admit that we do not have accurate data on which we can offer – so popular – exact dates to museum visitors. [...] Hungarian researchers generally keep the opinion that the Bronze Age started in 2000 BC. These numbers can only be classified as estimates and not as irreducible scientific data’² (MOZSOLICS 1943, 11).

Later on, the absolute chronological scheme of the Hungarian Bronze Age was determined by Bóna’s previously mentioned summaries (BÓNA 1958, 223; BÓNA 1961; BÓNA 1975, 25–27). According to this, the Bronze Age in Hungary commenced in 1950±50 BC, while the Middle Bronze Age (contemporaneous with Br A1) started in 1700 and ended in 1350 BC (parallel with Br B1) (Fig. 2).

	Troja	Hellas	Ungarn	Tószeg	Ungarn u. Tószeg (Mozsolics)	Süddeutschland (Reinecke)	Nordeuropa (Montelius)
2000	IV	EH III	Pécel				
1900	V						
1800		MH I	Frühe BZ	1			
		II		2			
1700		III		3	A	(1800)	
1600			Mittlere BZ	1	B	I A	A/1
1500	VI	LH I		2		II B	A/2
		LH II		3	C	III C	B
1400		LH III A	Späte BZ	1			I
1300	VII A	LH III B		2		(1200)	
1200			Durchgangs-period				II
1100	VII B	LH III C				IV	

Fig. 2: Relative chronological system for the Hungarian Bronze Age (after BÓNA 1958, 223).

2 Translated from the Hungarian text by Ágnes Király.

Although Bóna's system is still regarded as the 'lingua franca' of chronological thinking among national scholars, there have been attempts to synchronise his relative chronological classification of the Hungarian Bronze Age with the Reinecke scheme and with other regions of Bronze Age Europe, partly based on the acquisition of absolute dates. One of the first attempts was the publication of the *Bronzezeit in Ungarn* catalogue in 1992 with the collection of available ¹⁴C dates of the area (RACZKY *et al.* 1992). The other method of chronological refinement was made by adopting Johannes-Wolfgang Neugebauer's Lower Austrian periodisation, which was based on Ruckdeschel's pin typology (RUCKDESCHSEL 1979; NEUGEBAUER 1994). By this, the transition between the Hungarian Early and Middle Bronze Age was placed parallel with the shift of Reinecke's Br A1 and A2 around 2000 calBC (KISS 2012; KISS *et al.* 2015a). Another addition to the traditional view of the Hungarian Early Bronze Age was the establishment of a short, approximately 200–300-year long Transitional period between 2800 and 2600/2500 calBC, characterized by the presence of Late Copper Age and Early Bronze Age social and material phenomena side by side (KULCSÁR – SZEVEÉNYI 2013). More recently, a two-period system was suggested for the Hungarian Early Bronze Age that initiated the review of the traditional triple periodisation of the Early Bronze Age established by I. Bóna. On the one hand, this approach emphasized the importance of the Late Copper Age characteristics of the material culture dated between 2800 and 2600 calBC. On the other hand, it specified two separate phases based on a number of earlier and newly published radiocarbon dates: Carpathian Early Bronze Age (CEBA) 1 ranging from 2600/2500 to 2150 and CEBA 2 dating around 2150 to 1900 calBC (SZABÓ 2017, 108, fig. 5).

FIRST RESULTS OF A NEW PROJECT

The present paper focuses upon the chronology of Early and Middle Bronze Age sites in Hungary based on the recent results of a research project granted by the Hungarian Scientific Research Fund and by the Momentum programme of the Hungarian Academy of Sciences (KISS 2016). Both projects aim to complement the already available chronological information with recent AMS radiocarbon dating of human bone samples from several microregions in the central (Bell Beaker and Vátya culture), as well as eastern (Maros, Füzesabony, and Tumulus culture), and western parts of Hungary (Kisapostag, Transdanubian Encrusted Pottery, Gáta-Wieselburg culture; FISCHL *et al.* 2013; 2015). This work will provide more than 100 new AMS dates for the period between 2500 and 1500 BC³ upon completion, which is very important regarding the fact that most of the former Hungarian Bronze Age dates were conventional radiocarbon dates, recovered from samples with mostly uncertain find circumstances. In the following, the most recent relative and absolute dates of 17 sites from Hungary (**Fig. 3**) will be summarized in connection with Reinecke's chronological framework between the Br Ao and B periods, including some of our new dates.

3 All radiocarbon dates are (re)calibrated using OxCal v4. 2. 3 (BRONK RAMSEY 2013), using the IntCal13 atmospheric curve (REIMER *et al.* 2013). Calibrated dates are given with 1 sigma probability, unless otherwise stated.

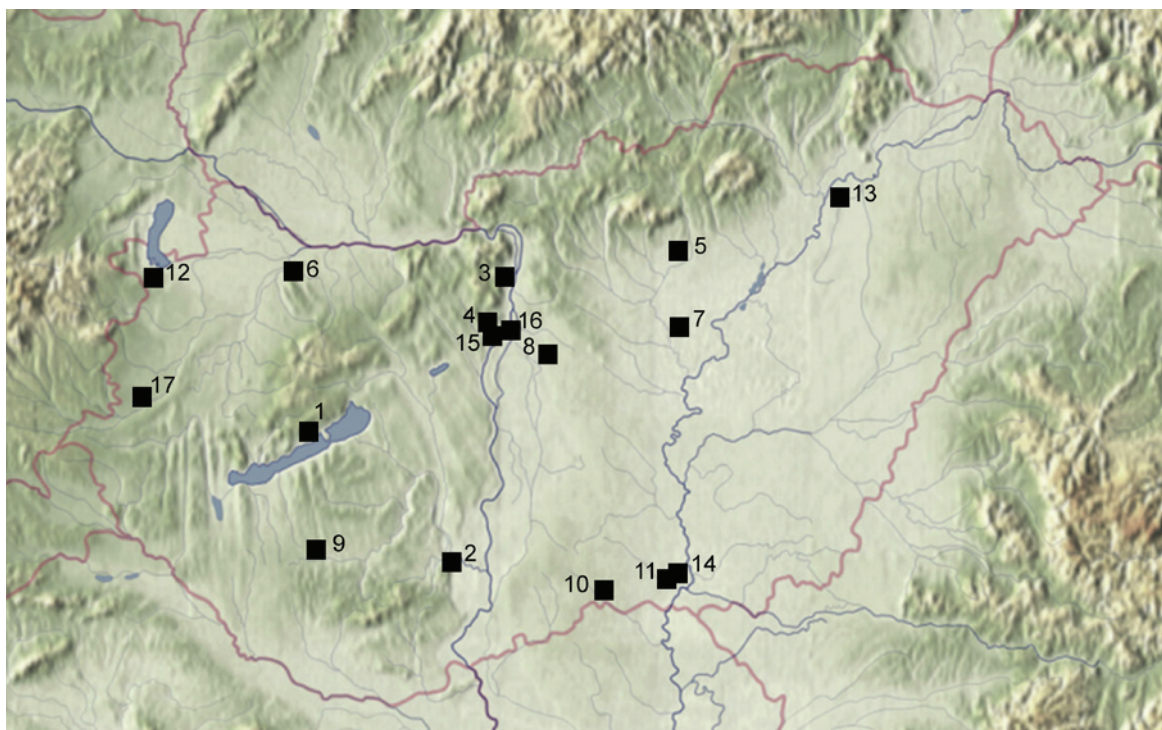


Fig. 3: Map of absolute chronologically dated Bronze Age sites from Hungary mentioned in the text, 1. Balatonakali, 2. Bonyhád, 3. Budapest-Békásmegyer, 4. Érd, 5. Füzesabony, 6. Győr-Ménfőcsanak, 7. Jánoshida, 8. Kakucs, 9. Kaposvár, 10. Kelebia, 11. Kiskundorozsma, 12. Nagycenk, 13. Polgár, 14. Sándorfalva, 15. Százhalombatta, 16. Szigetszentmiklós, 17. Zsennye.

PERIOD BR AO

The Ao period, starting from 2350 BC and preceding Reinecke Br A1 in Central Europe, was introduced by François Bertemes and Volker Heyd (BERTEMES – HEYD 2002).

This phase can be associated with the latest find assemblages of the Bell Beaker culture during the Hungarian Early Bronze Age 2 period. A Bayesian analysis of five AMS radiocarbon dates from the Bell Beaker cemetery of Szigetszentmiklós-Felső Ürge-hegyi dűlő suggests that the cemetery had been used between 2420–2190 calBC (PATAY 2013, fig. 19; FISCHL *et al.* 2015, 503, fig. 6a). A Bayesian analysis of three AMS dates from the cemetery of Budapest-Békásmegyer provided a dating between 2410–2220 calBC (FISCHL *et al.* 2015, 506, fig. 6b). Another cemetery with large amounts of Bell Beaker burials, excavated at the Budakalász-Csajerszke site, is also dated by nine recently published absolute dates between ca. 2560–1900 calBC (CZENE 2017, fig. 18). There are also six newly published ¹⁴C dates, concerning burials with aDNA analysis, from the mentioned three Bell Beaker cemeteries (Fig. 4; OLALDE *et al.* 2018).

Period	Site/Feature	Laboratory no.	BP date	cal BC	References
Bell Beaker Budapest					
	Budakalász-Csajerszke, Site M0/12, Grave 276	DeA-11507	3931 ± 31	2476-2348 (68.2%) 2559-2301 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
	Budapest-Békásmegyer, Grave 193	DeA-2875	3845 ± 36	2430-2208 (68.2%) 2458-2204 (95.4%)	FISCHL <i>et al.</i> 2015, Appendix
A0	Budapest-Békásmegyer, Grave 219/B	DeA-6749	3779 ± 28	2278-2143 (68.2%) 2293-2046 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0?	Budapest-Békásmegyer, Grave 219/B	DeA-7216	3883 ± 29	2457-2310 (68.2%) 2469-2286 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0	Budapest-Békásmegyer, Grave 432a	DeA-2876	3831 ± 35	2339-2205 (68.2%) 2458-2151 (95.4%)	FISCHL <i>et al.</i> 2015, Appendix
A0?	Budapest-Békásmegyer, Grave 445	DeA-2877	3874 ± 33	2454-2296 (68.2%) 2467-2211 (95.4%)	FISCHL <i>et al.</i> 2015, Appendix
A0?	Budapest-Békásmegyer, Grave 452	DeA-6762	3858 ± 32	2453-2234 (68.2%) 2461-2208 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0?	Budapest-Békásmegyer, Grave 452	DeA-7220	3871 ± 29	2454-2294 (68.2%) 2465-2213 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0?	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 10	VERA-4748	3920 ± 40	2472-2346 (68.2%) 2561-2290 (95.4%)	PATAY 2013, fig. 19
A0	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 49	Poz-83641	3835 ± 35	2344-2206 (68.2%) 2458-2154 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 49	VERA-4749	3830 ± 40	2389-2202 (68.2%) 2459-2148 (95.4%)	PATAY 2013, fig. 19
A0?	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 50	DeA-8227	3905 ± 21	2464-2349 (68.2%) 2470-2307 (95.4%)	PATAY 2013, fig. 19
A0?	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 133	Poz-83639	3850 ± 35	2435-2210 (68.2%) 2459-2206 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
A0?	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 367	VERA-4755	3875 ± 40	2455-2297 (68.2%) 2469-2209 (95.4%)	PATAY 2013, fig. 19
A0?	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 626	VERA-4757	3845 ± 35	2429-2209 (68.2%) 2458-2204 (95.4%)	PATAY 2013, fig. 19
A0	Szigetszentmiklós-Felső Űrgehegyi-dűlő, Grave 688	Poz-83640	3840 ± 35	2397-2207 (68.2%) 2458-2202 (95.4%)	OLALDE <i>et al.</i> 2018, Suppl.
EARLY MAROS					
A1	Sándorfalva-Eperjes, Grave 158	DeA-8222	3719 ± 21	2191-2045 (68.2%) 2198-2035 (95.4%)	unpubl.
KISAPOSTAG/ EARLIEST ENCRUSTED POTTERY					
A2	Balatonakali, grave	DeA-8219	3579 ± 20	1948-1897 (68.2%) 2011-1885 (95.4%)	Kiss in press
A1	Bonyhád-Biogas factory, Grave 226	DeA-6763	3668 ± 32	2131-1980 (68.2%) 2140-1950 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
A2	Bonyhád-Biogas factory, Grave 242	DeA-6224	3583 ± 30	1971-1891 (68.2%) 2028-1834 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
A2	Bonyhád-Biogas factory, Grave 243	DeA-6225	3584 ± 29	1971-1892 (68.2%) 2027-1881 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
A1	Kaposvár-Road 61, Site 12, Grave 45	DeA-7223	3674 ± 28	2132-1984 (68.2%) 2140-1964 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
A2	Győr-Ménfőcsanak, Széles földek, Grave 8464	DeA-1742.1.1.	3562 ± 32	1957-1833 (68.2%) 2018-1776 (95.4%)	MELIS 2013

GÁTA-WIESELBURG					
A1	Nagycenk-Lapos-rét, Grave 51	DeA-10076	3612 ± 27	2022-1937 (68.2%) 2034-1895 (95.4%)	GÖMÖRI – MELIS – KISS 2018
A2	Nagycenk-Lapos-rét, Grave 55	DeA-8020	3617 ± 25	2022-1943 (68.2%) 2035-1897 (95.4%)	GÖMÖRI – MELIS – KISS 2018
A2	Nagycenk-Lapos-rét, Grave 61	DeA-10114	3489 ± 31	1879-1767 (68.2%) 1893-1699 (95.4%)	GÖMÖRI – MELIS – KISS 2018
A2	Zsennye-Kavicsbánya, Grave 13	Beta-224847	3520 ± 40	1905-1772 (68.2%) 1951-1703 (95.4%)	NAGY 2013
A2	Zsennye-Kavicsbánya, Grave 15	Beta-224846	3430 ± 40	1866-1666 (68.2%) 1879-1637 (95.4%)	NAGY 2013
A2	Zsennye-Kavicsbánya, Grave 16	Beta-224849	3480 ± 50	1881-1746 (68.2%) 1933-1683 (95.4%)	NAGY 2013
A2/B	Zsennye-Kavicsbánya, Grave 19	Beta-224848	3410 ± 40	1751-1644 (68.2%) 1876-1617 (95.4%)	NAGY 2013
FÜZESABONY					
A2	Füzesabony-Öregdomb, Pit 3	DeA-10120	3527 ± 31	1912-1776 (68.2%) 1939-1757 (95.4%)	SZATHMÁRI – GUBA – KULCSÁR 2018
B	Füzesabony-Öregdomb, Layer 1	DeA-10119	3339 ± 32	1684-1562 (68.2%) 1731-1530 (95.4%)	SZATHMÁRI – GUBA – KULCSÁR 2018
B	Füzesabony-Pusztaszikszó, Grave 10	DeA-6747	3373 ± 28	1691-1628 (68.2%) 1744-1613 (95.4%)	unpubl.
B	Gelej-Kanális-dűlő, Grave 273	DeA-11506	3423 ± 29	1759-1683 (68.2%) 1872-1639 (95.4%)	unpubl.
A2	Polgár-Homok-dűlő, Grave 60	deb-9794 (non AMS)	3460 ± 40	1877-1696 (68.2%) 1890-1668 (95.4%)	unpubl.
VATYA					
B	Kelebia, Grave 90	DeA-6745	3250 ± 27	1606-1461 (68.2%) 1612-1452 (95.4%)	unpubl.
TRANSDANUBIAN ENCRUSTED POTTERY					
B	Bonyhád-Biogas factory, Grave 42 (cremation)	DeA-5915	3314 ± 21	1626-1535 (68.2%) 1657-1527 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
B	Bonyhád-Biogas factory, Grave 43 (cremation)	DeA-5917	3249 ± 21	1600-1456 (68.2%) 1611-1452 (95.4%)	Kiss <i>et al.</i> in press, fig. 6
TUMULUS					
B	Jánoshida-Berek, Grave 61	DeA-7940	3218 ± 25	1506-1450 (68.2%) 1593-1430 (95.4%)	unpubl.

Fig. 4: Radiocarbon dates for the Early and Middle Bronze Age period from Hungary (of the sites mentioned in the text) The dates were calibrated using the OxCal v4.3 program and the IntCal13 calibration curve (<https://c14.arch.ox.ac.uk/oxcal/OxCal.html>)

Besides inhumations, among the cremation graves from this period, the first burial to be dated in the frames of our project was Grave 128 from Szigetszentmiklós-Felső Úrge-hegyi dűlő, which contained two bell beakers, a wrist-guard, a tanged dagger, and a halberd beside the remains of a 23–59 year-old man (**Fig. 5**; PATAY 2013, fig. 21). The combined average date of five measurements (between 3690±25 and 3575±25 BP) is 2020–1950 calBC (3620±44 BP) (MAJOR *et al.* 2019, tab. 2). This date seems somewhat later than what would be expected for the Bell Beakers, however, it fits well with Central European halberds radiocarbon dated between 3900 and 3000 BP (SCHUHMACHER 2002, fig. 9; LULL *et al.* 2017, fig. 3). This suggests that some Bell Beaker groups might have kept using their cemeteries in Central Hungary

until the beginning of the Br A1 phase. However, we have to call attention to the fact that the dating of cremated bones requires careful consideration (OLSEN *et al.* 2013; SCHNOECK *et al.* 2014; MAJOR *et al.* 2019; DANI *et al.* 2019).

Grave 128

Grave goods:

1. Copper halberd
2. Copper dagger
3. Stone wrist-guard
4. Bell beaker
5. Bell beaker
6. Jug
7. Bowl
8. Decorated lunular amulet

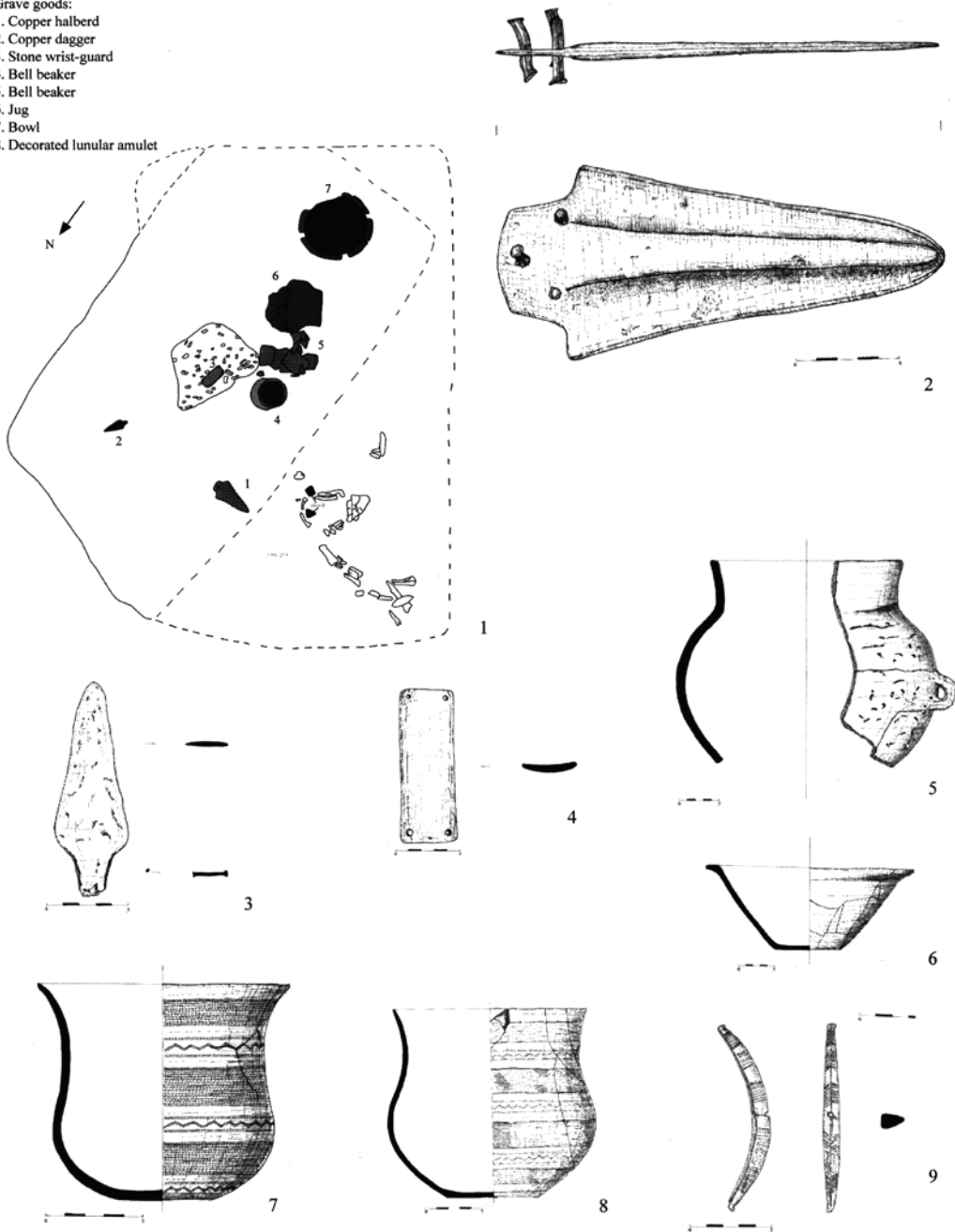


Fig. 5: Szigetszentmiklós-Felső Úrge-hegyi dűlő, grave 128 (PATAY 2013, fig. 21).

REINECKE BR A1

This period, covering the end of the Hungarian Early Bronze Age 2 and the entire Early Bronze Age 3 phase, is characterized by the disappearance of the Bell Beaker type material in central Hungary, the appearance of Bronze Age tell settlements in large portions of the Carpathian Basin (mainly in its eastern part and along the Danube), and the formation of smaller, distinct ceramic styles that indicate the formation of new social networks and identities within the region. The beginning of this period, dated to around 2200 BC, was suggested to be changed to 2150 BC by Philipp Stockhammer and his colleagues based on the recently revisited dating of the Singen cemetery material (STOCKHAMMER *et al.* 2015).

The first Early Maros groups of a supposedly southern origin, but maintaining significant northwestern contacts, make their appearance at the confluence of the Tisza and Maros Rivers around 2200 BC. The Bayesian analysis of the six conventional dates from Mokrin and four dates from Kiskundorozsma (near Szeged) shows that the two cemeteries were used contemporaneously. The typo-chronologically early, single-phase cemetery of Kiskundorozsma is dated to 2250–2050 calBC, while the second and third phases of the Mokrin cemetery are dated to 2170–2020 calBC (FISCHL – KULCSÁR 2011; FISCHL *et al.* 2015, fig. 7a–b). We had the opportunity to provide AMS radiocarbon dating of a burial from Sándorfalva-Eperjes with Early Maros pottery style (Fig. 6: 1–3; Grave 158; TROGMAYER 2001, Abb. 2. 3, 5–6). The 2190–2050 calBC (Fig. 4) date of this burial confirms that the mentioned material can be associated with the Reinecke Br A1 period, in agreement with the periodization of F. Bertemes and V. Heyd (BERTEMES – HEYD 2015).

The Hungarian Early Bronze Age 3 in the central part of Transdanubia is characterized by the inhumation burials of the earliest phase of the Kisapostag/earliest Transdanubian Encrusted Pottery style. Grave 45 from Kaposvár-Road 61/site no. 12 (Fig. 6: 4) accompanied by a golden wire hair ring (*Noppenring*), dated to 2130–1980 calBC (Fig. 4), indicates the appearance of this particular pottery style around 2100 BC (KISS *et al. in print*). Within our research project, several inhumations from the Bonyhád-Biogas factory could be dated to this period as well (Fig. 4; Grave 226: 2130–1980 calBC) (SZABÓ 2012; 2017, tab. 1).

Based on the daggers, neckrings, arm spirals, and pin types that can be dated to the earlier phase of the Gáta-Wieselburg culture (SZATHMÁRI 1988; NEUGEBAUER 1994, Abb. 28), the cemetery at Nagycenk, northwestern Hungary, was also established during the Reinecke Br A1 phase. In Grave 55, a high-status man was buried with bronze artefacts of considerable weight (a neck ring, a spiral arm ring, a dagger, and an axe). Furthermore, four gold, tripartite hair rings with thick solid bent ends (*Lockenring*) and a typical, two-handled Gáta-Wieselburg type vessel (Figs. 4 and 7; 2020–1940 calBC; GÖMÖRI *et al.* 2018, figs. 9, 41) were also recovered from the grave. The radiocarbon date of the burial is considered to be the earliest one among the published absolute dates in the context of this culture (MELIS 2017, tab. 1).

REINECKE BR A2

The Hungarian Middle Bronze Age began around 2000/1900 BC, parallel to the Br A2 period. During the Middle Bronze Age 1, the continuous development of the Gáta-Wieselburg culture can be observed at the Nagycenk cemetery. Among the latest burials of the excavated cemetery section, Grave 61 with a *Rollenkopfnadel* (Fig. 8) was dated to 1880–1770 calBC (Fig. 4; GÖMÖRI *et al.* 2018, figs. 14 and 41). Another recently published cemetery of this culture at Zsennye was dated between 1900 and 1600 calBC (based on four ¹⁴C dates), spanning the entire Br A2 period and the Hungarian Middle Bronze Age (Fig. 4; NAGY 2013, Abb. 3–6). According



Fig. 6: Early Bronze Age burials. 1-3. Sándorfalva-Eperjes, grave 158 (TROGMAYER 2001, Abb. 2:3, 5-6); 4. Kaposvár, Road 61/Site no. 12, grave 45 (BÁRDOS 2000); Bonyhád-Biogas factory, 5-8. burial no. 242, 9-14. burial no. 243 (SZABÓ 2012).

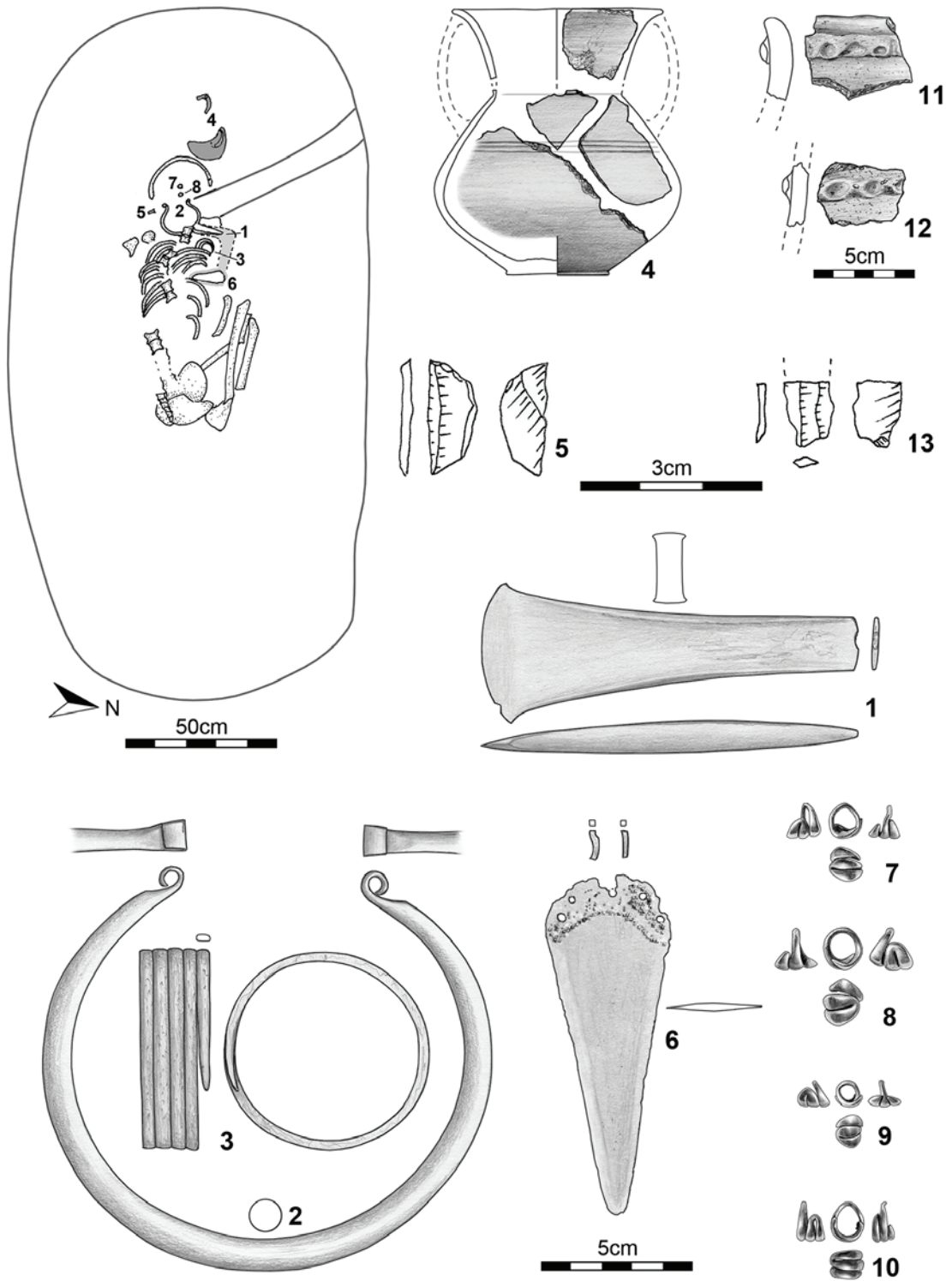


Fig. 7: Burial from the end of the Early Bronze Age. Nagycenk, grave 55 (GÖMÖRI et al. 2018, fig. 9).

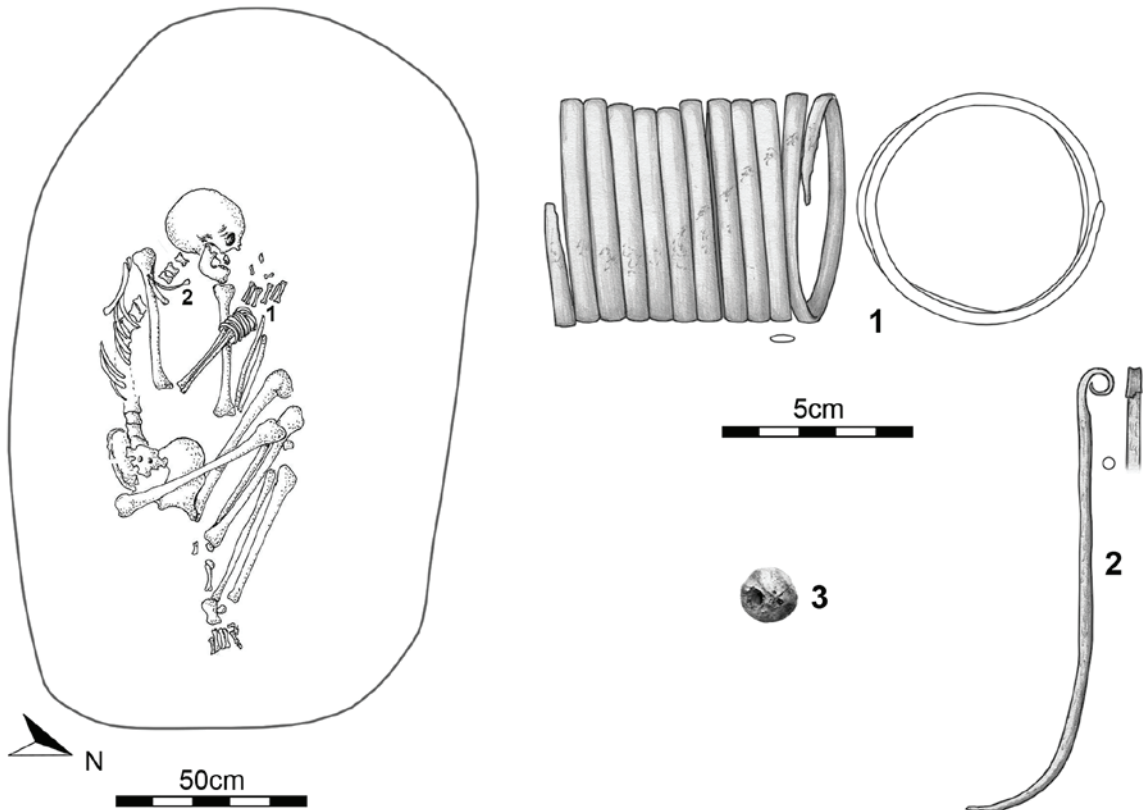


Fig. 8: Burial from the beginning of the Middle Bronze Age. Nagycenk, grave 61 (GÖMÖRI *et al.* 2018, fig. 14).

to our present knowledge, this and most of the published cemeteries from the region (MELIS 2017, tab. 1) can be dated to the later phase of the Gáta-Wieselburg culture.

In central Transdanubia, the Hungarian Middle Bronze Age 1 was characterized by the further inhumations (Figs. 4 and 6:5-14; Grave 242: 1970-1890 calBC; Grave 243: 1970-1890 calBC) (SZABÓ 2012; HAJDU *et al.* 2016, fig. 3:2; SZABÓ 2017, tab. 1; KISS *et al. in print*, fig. 4), and cremation burials of the younger period of the Kisapostag/earliest Encrusted Pottery culture population. Burial 8464 from Győr-Ménfőcsanak, Szélesföldek, containing a pair of gold hair rings (*Noppenring*) and two spiral bracelets, a necklace made of animal teeth and a small urn, dates between 1960 and 1830 calBC (Figs. 4 and 9:1-4; MELIS 2013). Similar burials have traditionally been dated to the EBA; thus, the exact periodisation needs to be revisited (KISS *et al. in print*).

A noteworthy burial of this period was uncovered at Balatonakali, accompanied by specific metal finds and a stone construction. A heavy gold hair ring and several bronze grave goods (a spiral arm ring, an axe, a flanged axe, a dagger, and a socketed chisel) suggest that the deceased was a high-status man (Fig. 9:5-9). According to the most recent AMS dating, he was buried between 1950-1900 calBC (Fig. 4; DANI *et al.* 2016; KISS *in print*). Either the absolute date or the metal finds show connections with the archaeological traces of the *Únětice* culture elite, like the Leubingen princely burial dendrochronologically dated to 1942 BC, and the Melz hoard dated between 2200 and 2000 BC (the early date is possibly due to the 'old wood' effect; SCHWENZER 2004). Non-destructive analysis of the metal finds, detecting a high tin concen-



Fig. 9: Burials from the beginning of the Middle Bronze Age. 1-4. Cremation burial no. 8464 from Győr-Ménfőcsanak, Széles-földek (MELIS 2013); 5-9. Balatonakali (Kiss *in print*, fig. 3).

tration in bronze artefacts between 7 and 12% (Kiss *in print*), prove that the grave belongs to the time of the appearance of the earliest tin bronzes in the region during Br A2a (PARE 2000).

In the central part of Hungary, lying along the north-south flowing Danube section, Vatyá style pottery was distributed in the 1-3 phases of the Hungarian Middle Bronze Age. This period corresponds to Reinecke's Br A2 and B phases. In terms of absolute chronology, the time span of the Vatyá sequence can be placed to some 400-500 years between 2000/1900 and 1500/1450 calBC (Fig. 10). Regarding ceramic styles and typology, this period starts with the Nagyrév/Vatyá transition, continues with the Vatyá I-III phases and ends with the Koszider period (BUDDEN – SOFAER 2009, fig. 2; VICZE 2011; 2013). The recently obtained AMS dates of the settlements at Százhalombatta-Földvár and Kakucs-Balla-domb (Fig. 11; JAEGER – KULCSÁR 2013, tab. 1, fig. 19-20), together with the dates of pit burials from the Érd settlement ranging between ca. 2000 and 1450 calBC (ALLENTOFT *et al.* 2015; SZEVEÉNYI – KISS 2018), contribute to our knowledge of the chronological dimensions of the occupation at various Vatyá sites.

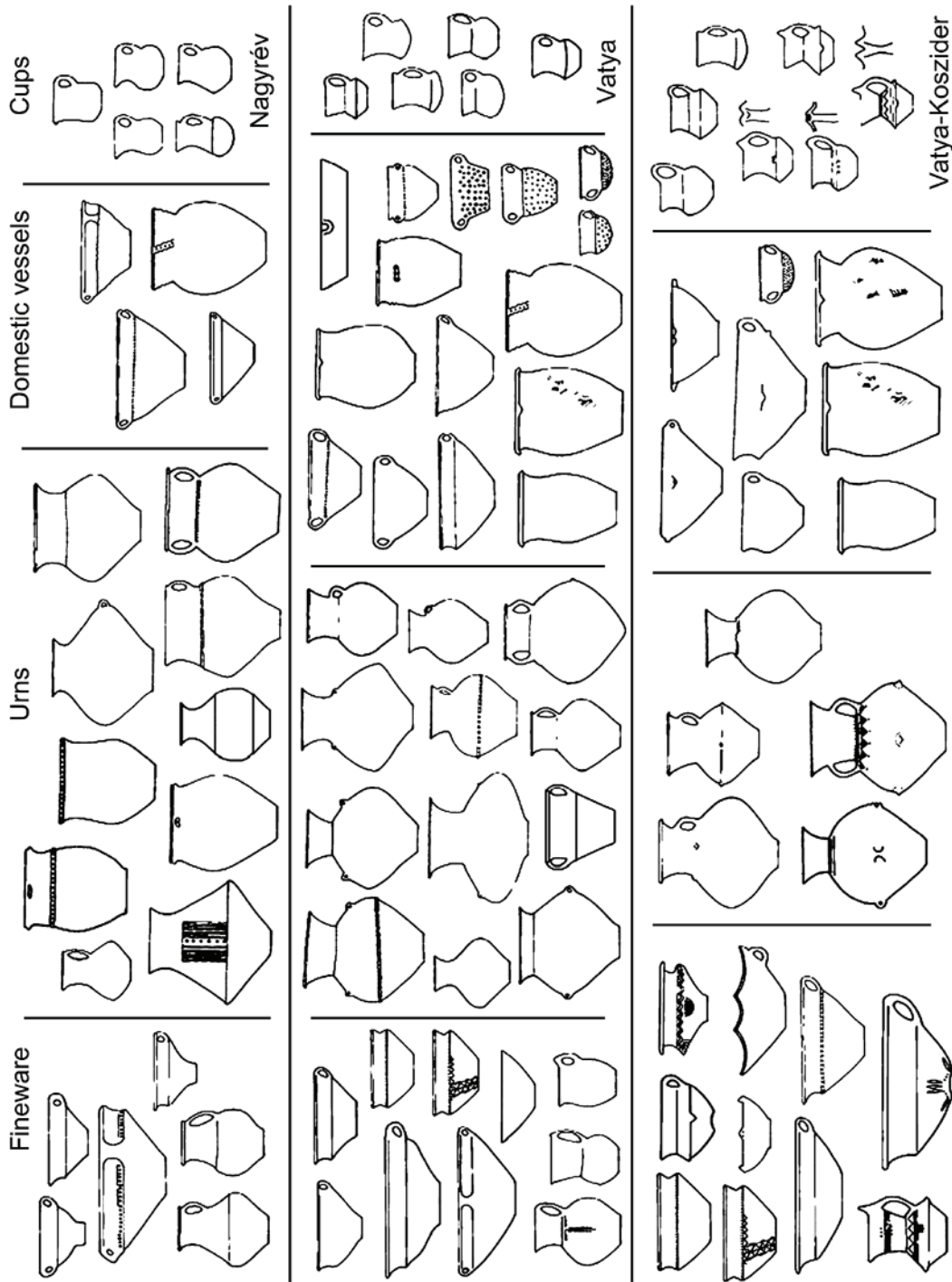


Fig. 10: Typochronology of pottery forms for the Hungarian Early and Middle Bronze Age at Százhalombatta (BUDDEN - SOFAER 2009, fig. 2).

At the moment, we lack a similarly precise radiocarbon chronology for the Great Hungarian Plain. However, Füzesabony style burials from the Polgár region can be dated to the Hungarian Middle Bronze Age 1-3 period in accordance with Br A2 phase (DANI - MÁTHÉ - SZABÓ 2003; DANI - SZABÓ 2004). At Polgár-Homok-dűlő Grave 60 (Fig. 12), the remains of a woman buried in a wooden coffin (Fig. 12:1-2, 9), with several vessels and two pins, were non-AMS dated between 1880-1700 calBC (Fig. 4). The oldest radiocarbon date for the occupation layers of

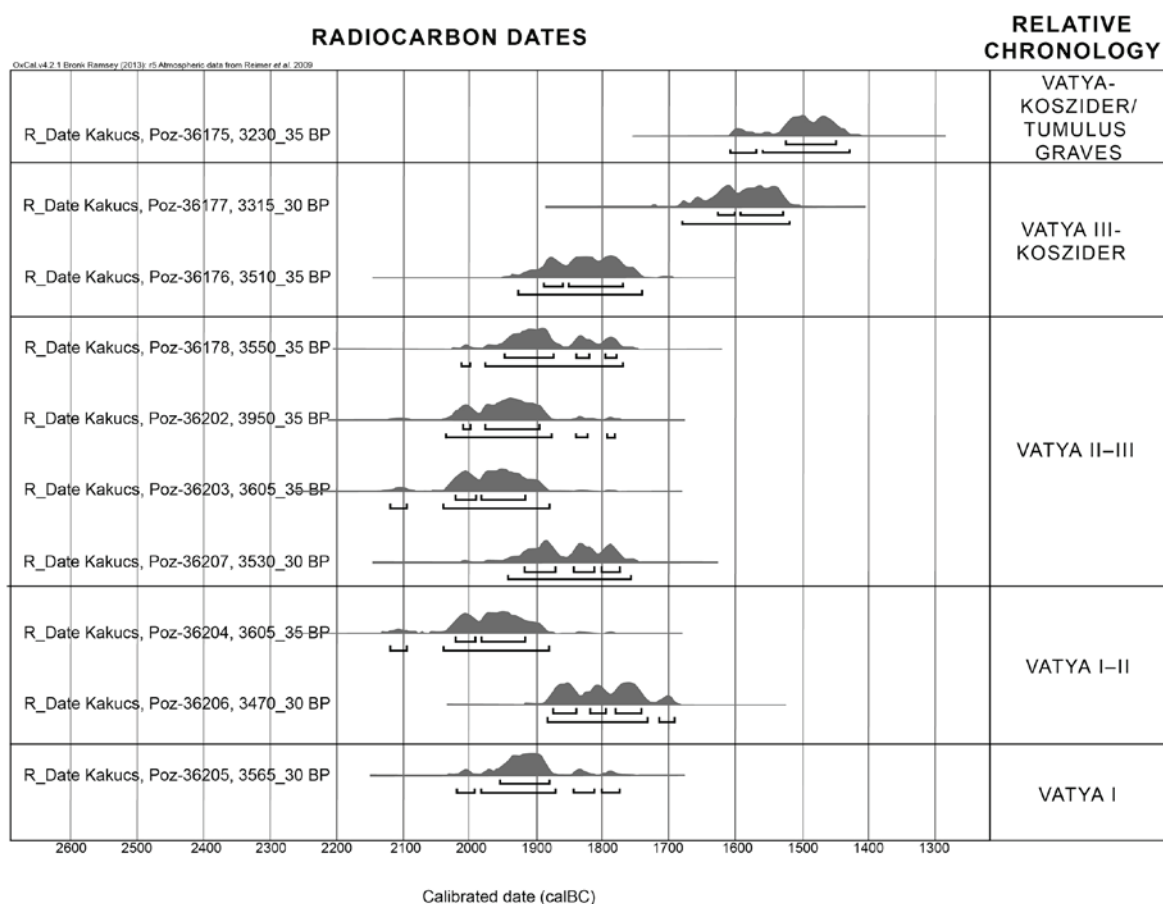


Fig. 11: Radiocarbon dates from Kakucs-Balla-domb (JAEGER – KULCSÁR 2013, fig. 19).

the eponymous tell settlement, Füzesabony-Öregdomb (from the typochronological Megyaszó B=Füzesabony C phase) falls between 1910–1780 calBC (**Fig. 4**) (SZATHMÁRI 2003; 2011; 2017a; SZATHMÁRI – GUBA – KULCSÁR 2018).

REINECKE BR B

The Middle Bronze Age 3 or the so-called Koszider phase in Hungary is characterised by the uniformisation of distinct pottery styles. This can be explained by the increasing intensity of contacts between MBA communities within the Carpathian Basin, as well as by the transformation of identities.

In the central part of Hungary, as was mentioned above, the Vatyá sequence (Vatyá-Koszider period) ended in the Koszider period around 1500/1450 calBC. Beside the latest dates from Érd, Kakucs, and Százhalombatta, other material, e.g. biritual cemetery of the Vatyá culture at Kelebia, excavated in the 1950s, are traditionally dated to the Koszider period (BÁNDI – KOVÁCS 1974). As inhumation graves in this cemetery were furnished with chronologically indecisive find material or did not include any grave goods at all, their relative dating is extremely difficult (FISCHL 1999). All new AMS dates from the cemetery yielded a period younger than 1700 calBC. For example, Grave 90, a burial with a skeleton in a sitting

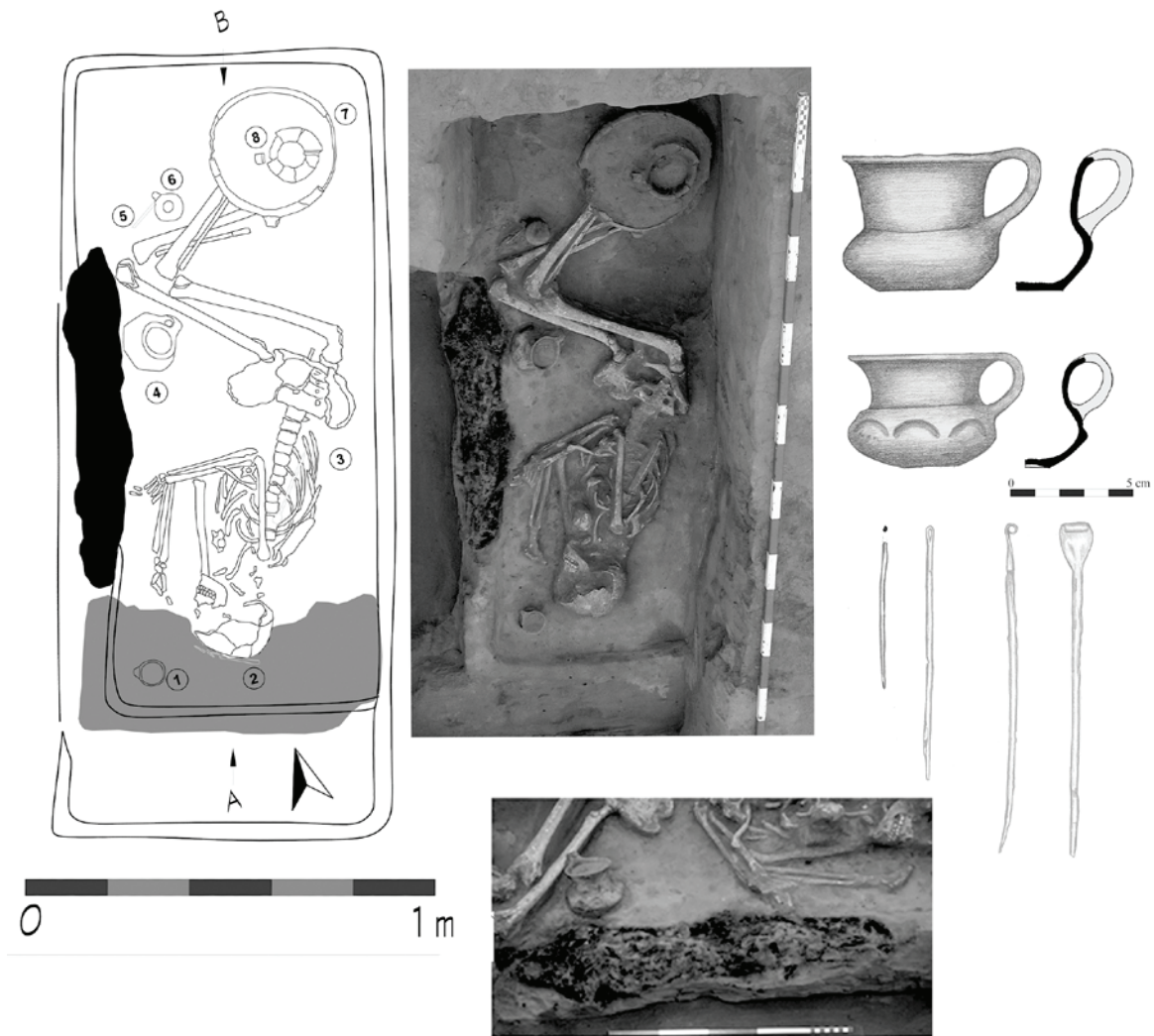


Fig. 12: Polgár-Homok-dűlő grave 68.

position (similar to the one from Csanytelek-Palé Grave 27; LŐRINCZY – TROGMAYER 1995, 53, Abb. 4⁴) with some undiagnostic pottery sherds as grave goods, is dated between 1610–1460 calBC (Fig. 4).

According to relative chronological observations, the late phase of the Transdanubian Encrusted Pottery was also dated to the Koszider period (KOVÁCS 1994; KISS 2012, 67, 150, 174). To provide absolute chronological data, cremation burials of the later phase from the Bonyhád cemetery were chosen for sampling.⁵ Among the typochronologically latest burials, Grave no. 42 and 43 both yielded dates that correlated with the end of the Hungarian Middle Bronze Age. Urn burial no. 42 was slightly older, dating between 1630–1540 calBC (Fig. 4), while scattered cremation burial no. 43 including a unique bronze axe (KISS *et al.* 2015b) yielded the latest date so far, between 1600–1460 calBC (Figs. 4 and 13; SZABÓ 2012; KISS *et al.* *in print*).

4 With wrong grave number on the published plate.

5 There are a few radiocarbon dates Early and Middle Bronze Age from cremation burials (DANI *et al.* 2019; DUFFY *et al.* 2019), but we still lack absolute dated cremations of the Hatvan culture.



Fig. 13: Bonyhád-Biogas factory grave 43 (after SZABÓ 2012).

The upper occupation layers of the Füzesabony-Öregdomb settlement were typologically dated to the beginning of the Koszider period (SZATHMÁRI 2003; 2017a; 2017b; SZATHMÁRI – GUBA – KULCSÁR 2018, tab. 1). The AMS dating of five bone samples from these layers provided dates between 1680–1560 calBC (e.g. Layer 1; **Fig. 4**). Pottery recovered from these layers and contemporaneous burials in the vicinity of the tell is partly identical to the Streda nad Bodrogom style, that is the latest phase of the Füzesabony culture. At present, it is an open question as to whether the still observable typological differences are of a chronological or regional nature. The cemetery of the Füzesabony-Öregdomb settlement was excavated at Füzesabony-Pusztaszikszó including 24 inhumations and six cremation burials (KŐSZEGI 1968). Radiocarbon samples from three graves of this cemetery (Grave 8, 10, 11) provided dates between 1770 and 1570 calBC. Grave 10 furnished with pottery elaborated in the latest Otomani-Füzesabony style and biconical-headed bronze pins with an oblique perforation and twisted haft (*Nadel mit doppelkonischen, schräg durchbortem Kopf und tordiertem Schaft*) is dated to 1690–1630 calBC (**Fig. 4**). Based on the revisited typo-chronology of the Gelej cemetery, we can find close similarities with the pottery forms of Füzesabony-Pusztaszikszó. The AMS date obtained for Grave 273 at Gelej (KEMENCZEI 1979) with several vessels (**Fig. 14:1–5**) falls between 1760–1680 calBC (**Fig. 4**), which also suggests the (partly) contemporaneous existence of the two cemeteries.

Former analyses of non-AMS dates suggested that the appearance of the early Tumulus culture can be correlated with the latest period of the Hungarian Middle Bronze Age (FISCHL *et al.* 2013, fig. 6). In order to examine the correctness of the assumption, ten burials from Jánoshida, classified to the earlier period of the Tumulus culture (CSÁNYI 1980; 2003; 2017), were dated between 1510–1410 calBC. The recently obtained radiocarbon date of Grave 61 containing a solid-hilted dagger, a tweezer, and a cup (**Fig. 14:6–9**) is 1510–1450 calBC (**Fig. 4**), which suggests that several groups of the Koszider period (see the above-mentioned burials of the Vátya and Transdanubian Encrusted Pottery culture) are at least partly contemporaneous with the Tumulus culture. There is also good agreement between these dates and the most

recent radiocarbon chronology for the Br B phase of Tumulus Grave assemblages in southern Germany, that were dated to ca. 1550–1450 calBC after a Bayesian analysis (MÜLLER – LOHRKE 2011, Abb. 6).

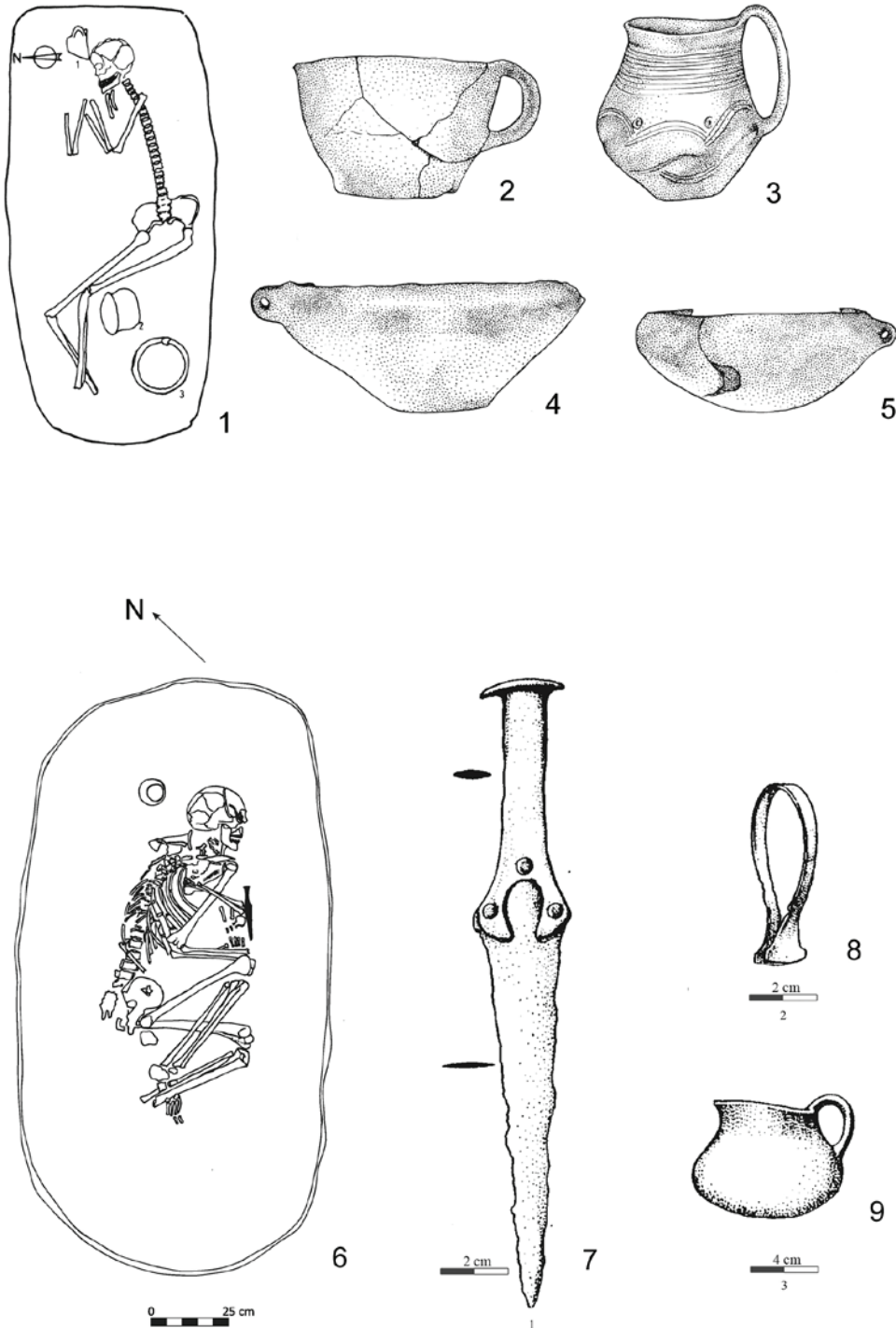


Fig. 14: 1-5. Füzesabony-Pusztaszikszó grave 10 (after KŐSZEGI 1968), 6-9. Jánoshida-Berek, grave 61 (CsÁNYI 2017, fig. 11).

SUMMARY

In the 1980s and 1990s, the gradually increasing number of ^{14}C and dendrochronological data enabled Central European archaeologists to place Reinecke's relative chronological system more accurately on the absolute time scale. The classic Únětice period (Reinecke's Br A2) was dated around 1950–1900 calBC on the basis of the radiocarbon dating of wooden remains from the Early Bronze Age princely grave of Leubingen (MÜLLER 2001; SCHWENZER 2004), while the tree ring dating of the same samples resulted in exactly 1942 calBC (MELLER 2014, Abb. 18; MELLER 2017). The more appropriate dating of the earlier phase of the Central European Early Bronze Age (Br A1) was based on data from the cemetery of Singen (BECKER *et al.* 1989, 428–430, Tab. 4–5). According to these results, Br A1 was placed between 2200 and 2000 calBC, Br A2 is mostly between 2000 and 1600/1500 calBC, while Br B and C is between 1600/1500–1300/1250 calBC (FORENBAHER 1993; NEUGEBAUER 1994; KRAUSE 1996, 76–81, Abb. 1, 5). Bertemes and Heyd introduced the so-called Br Ao period dating between 2350 and 2250 BC, preceding Br A1 in Central Europe (BERTEMES – HEYD 2002). In 2015, however, Philipp Stockhammer and his colleagues suggested the revision of the absolute dates parallel to Reinecke's chronology after re-dating the Singen cemetery and by publishing 100 new AMS radiocarbon dates from Southeast Germany. In their opinion, Br A1 began in 2150 instead of 2200 calBC, while Br B began in 1700 instead of 1600 calBC (STOCKHAMMER *et al.* 2015). This opinion, however, was criticized by Ralph Schwarz (SCHWARZ 2016).

The mentioned recent research projects, granted by the Hungarian Scientific Research Fund and by the Momentum Programme of the Hungarian Academy of Sciences, give the possibility of providing more than 100 new Bronze Age AMS radiocarbon dates from Hungary. Here we compared several recently dated burial assemblages from eastern and western Hungary to absolute dates from the western area of Central Europe. This comparison helped us synchronize Central European Early Bronze Age relative chronology established by Paul Reinecke with István Bóna's chronological scheme of the Early and Middle Bronze Age in Hungary. According to the above, Hungarian EBA 2 is partly contemporaneous with Br Ao between 2500/2400–2200/2150 calBC, while EBA 3 is parallel with Reinecke's Br A1 between 2200/2150 and 2000/1900 calBC. The MBA 1–2 period in Hungary is contemporaneous with Br A2 between 2000/1900 and 1700/1600 calBC. The MBA 3 period can be aligned with Br B phase, traditionally dated between 1600 and 1450 calBC. Our data sequence, however, shows a break around 1700/1600 BC (see STOCKHAMMER *et al.* 2015); based on this, G. Szabó has already suggested an earlier dating of the Br B phase in Hungary, too (SZABÓ 2017). Further Bayesian analysis of recently obtained data may bring us closer to answering whether the break in the radiocarbon sequence reflects real historical processes or if it cannot be connected to social changes and are due to methodological reasons (i.e. to plateaus appearing in the calibration curve, as was observed in connection with the Late Copper Age dates; KULCSÁR – SZEVEÉNYI 2013, 70; FRÎNCULEASCA – PREDA – HEYD 2015).

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