Social formation and collapse in the Tisza-Maros region: dating the Maros Group and its Late Bronze Age successors

John M. O'Shea[1,*], Györgyi Parditka[1], Amy Nicodemus[2], Kristian Kristiansen[3], Karl-Göran Sjögren[3], László Paja[4], György Pálfi[4] & Lidija Milašinović[5]

Radiocarbon dating is paramount for chronologically defining the rise of polities in the Middle Bronze Age Carpathian Basin. This article presents a suite of new radiocarbon dates obtained from sites associated with the Early and Middle Bronze Age Maros Group, and its Late Bronze Age successors in the Tisza-Maros region of south-east Hungary, western Romania and northern Serbia. The results indicate tight chronological synchronisation of Middle Bronze Age settlements and cemeteries in the Maros region, while confirming the accuracy of ceramic-based relative chronology for the Szőreg cemetery.

Keywords: Hungary, Serbia, Romania, Bronze Age, Maros Group, Tumulus Culture

Introduction

Few scholars would dispute the importance of radiocarbon dating for our understanding of the rise of peer-polities in the eastern Carpathian Basin during the Bronze Age. These absolute dates demonstrate the contemporaneity and synchronicity of materials that previously had been considered chronologically separate (cf. Stockhammer *et al.* 2015). Relieved of

[1] *Museum of Anthropological Archaeology, University of Michigan, 3010 School of Education Building, 610 East University Avenue, Ann Arbor, MI 48109-1259, USA*

[2] *Department of Archaeology and Anthropology, University of Wisconsin-La Crosse, 435 Wimberly Hall, 1725 State Street, La Crosse, WI 54601, USA*

[3] *Department of Historical Studies, University of Gothenburg, Eklandagatan 86, 412 61 Göteborg, Sweden*

[4] *Department of Biological Anthropology, University of Szeged, Közép Fasor 52, Szeged H-6723, Hungary*

[5] *National Museum of Kikinda, Trg Srpskih Dobrovoljaca 21, 23300 Kikinda, Serbia*

* *Author for correspondence (Email: joshea@umich.edu)*

© Antiquity Publications Ltd, 2019
ANTIQUITY 93 369 (2019): 604–623 https://doi.org/10.15184/aqy.2019.40

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

the burden of supplying dates, the material cultural assemblages can now be viewed more dynamically, allowing archaeologists to study the inner workings of these regional cultures and their patterns of interaction. Likewise, absolute dating has allowed archaeologists to link Bronze Age developments in the Carpathian Basin to concurrent developments across the wider European continent (Raczky *et al.* 1992). While absolute dates allow cultural sequences to be fixed in real time and accurately scaled in terms of duration, the older relative chronologies based on metal and ceramic typologies continue to influence views of European prehistory. They are also still relied upon to provide the chronological assignment for many regional sites—particularly those represented solely by surface collections.

Archaeological research in many parts of the world continues to struggle with the problem of how to mesh advances in archaeological dating with 'legacy' relative dating systems and their associated terminologies. The very concept of a 'Bronze Age', for example, is based upon the use of technological change to create a chronological ordering (Kristiansen 1998: 24–26). For later prehistory in Europe, elaborate continent-wide relative chronologies have been constructed on the basis of observed changes in metal types. Yet, from the beginning, it was clear that these technology-based chronologies distort local realities. The advent of radiocarbon dating emphasised the disconnect still further by demonstrating that the archaeological sequence of the Early, Middle and Late Bronze Ages in Western Europe were out of synch with the chronology of Bronze Age developments in the Carpathian Basin (see Kristiansen 1998: 33–35). One response was to employ terms such as 'Early' or 'Late' Bronze Age to reference broader organisational changes in society. In Hungary, for example, the terminology was shifted to fit general cultural developments, with the effect that the Early Bronze Age in Western Europe is contemporaneous with the Middle Bronze Age in Hungary (cf. Bóna 1992; Kiss 2012: 195–203). While local scholars fully understand this terminological fault line, it can confuse the unsuspecting outsider.

The widespread use of absolute dating provides a means to resolve these terminological issues and to allow researchers to synchronise cultural developments within their study regions and across Europe as a whole. This article presents a suite of new radiocarbon dates obtained from a series of archaeological sites associated with the Maros Group—a cultural entity that spanned the Early and Middle Bronze Ages, and its Late Bronze Age successors in the Tisza-Maros region of the Carpathian Basin. These dates permit further refinement of the regional chronology and the opportunity to assess the validity of a widely used local ceramic-based chronology.

The Maros Group and its chronology

The Maros Group is an Early and Middle Bronze Age complex located in south-eastern Hungary, western Romania and northern Serbia (Bóna 1975; Girić 1984; Soroceanu 1991) (Figure 1). Maros Group sites are found along the River Maros (Mureş/Moriš) and along the east bank of the River Tisza (Tisa) from its confluence with the Maros (near present-day Szeged in Hungary) to the Danube. Sites associated with the Group reached their maximum regional extent during the Middle (or Classic) Phase, which corresponds roughly to the beginning of the Carpathian Basin Middle Bronze Age—*c.* 2000 BC (O'Shea 1996). The Late Phase, which corresponds with the second half of the Middle Bronze Age (from *c.* 1850 BC),

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

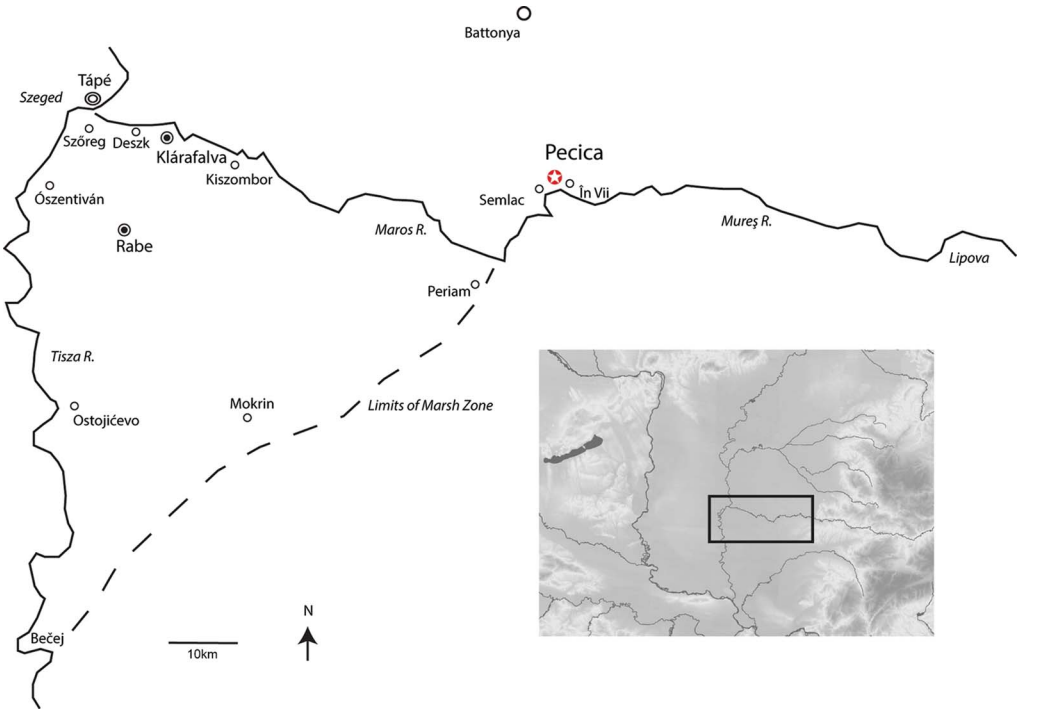

Figure 1. Distribution of major Maros settlements and cemeteries and the Late Bronze Age cemetery at Tápé. The inset shows the location of the Tisza-Maros region within the Carpathian Basin.

sees the intensification of metal production and long-distance trade, along with an increasing emphasis on horse rearing (Nicodemus 2011; Nicodemus *et al.* 2015). Concurrently, many settlements and cemeteries were abandoned, and populations consolidated into a smaller number of centralised sites. The Maros sequence ends relatively abruptly at *c.* 1500 BC. The following period, the early phase of the Late Bronze Age (1500/1450–1300 BC, after Fischl *et al.* 2013), is traditionally defined as the 'Tumulus Grave' period (cf. Csányi 2003; Sánta 2010; Fischl *et al.* 2013).

At the beginning of the twentieth century, two major tell settlements—Periam-Movila Șanțului (Perjámos-Sánchalom) (Roska 1913, 1914) and Pecica-Şanţul Mare (Pécska-Nagysánc) (Dömötör 1902; Roska 1912) had been excavated, which provided a stratigraphic sequence for the regional Bronze Age. Childe (1929: 219) recognised the chronological importance of these long-lived sites, which he termed the 'Perjámos Culture'. Soon afterwards, a series of large inhumation cemeteries were excavated near the Tisza-Maros confluence, including Szőreg C, Deszk A and F, Ószentiván in Hungary and, more recently, at Mokrin and Ostojićevo in Serbia.

While the metal finds associated with the Maros sites permitted their general placement within the broader European chronological framework (Reinecke 1965), they did not provide sufficient chronological resolution for more detailed local study. To obtain this finer degree of precision, Bóna (1975) examined the extensive assemblage of ceramic vessels recovered from

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

the Szőreg cemetery in order to devise a more refined local chronology. In 1941, Foltiny initially defined three ceramic phases at Szőreg, whereas Bóna (1975) identified five distinct ceramic phases, which he linked to the stratigraphic levels delineated by Roska (1912) at Pecica-Şanţul Mare.

Bóna's chronological seriation of Szőreg ceramics has been widely adopted for Maros sites. While the classification could be directly applied to other funerary deposits, its reliance on complete vessels limits its applicability to other archaeological contexts, particularly those in which sherds rather than whole vessels are the norm, and where a greater range of domestic vessel forms are found. An added problem for Bóna's chronology is that many earlier vessel forms continued to be used, even as the later 'baroque' forms are introduced. While Bóna could control for this problem within individual grave assemblages, it posed a greater problem for graves that lacked diagnostically late vessels. The same mixing of styles has been observed in the excavation of stratified settlement deposits at, for example, Pecica-Şanţul Mare (Nicodemus & O'Shea 2015).

In the late 1980s, excavations at the Maros tells of Klárafalva and Kiszombor, along with a series of six radiocarbon dates from the Maros cemetery of Mokrin, provided the first absolute chronology for the Maros Group (O'Shea 1992). More recently, a 10-year excavation programme at the Pecica-Şanţul Mare tell has generated a large set of dates associated with specific stratigraphic contexts and cultural events for the Maros Group (O'Shea *et al.* 2005, 2006, 2011; Nicodemus *et al.* 2015). Unlike the samples from the 1980s excavations, the Pecica sequence has benefited from the use of AMS dating, which has significantly reduced the error margins associated with each date. From a culture-historical perspective, the most important outcome of this absolute dating is the accurate placement of the Maros Group within the larger chronology of the Carpathian Basin and the wider European Bronze Age. For the purposes of this article, the new Pecica absolute chronology provides the index against which developments at the other Maros settlements and cemeteries are compared.

Although the new settlement dates answer many questions, two chronological issues remain unresolved. The first concerns the Pecica aggregation event (O'Shea & Nicodemus 2019). The aggregation event sees a sudden, large-scale expansion of the Pecica settlement that seems to coincide with the abandonment of most other Maros settlements and cemeteries. The dating programme was designed to assess how closely the expansion of the Pecica settlement coincided with the abandonment of numerous Maros settlements and cemeteries. The second concerns the abrupt end of the Maros occupation and the nature of succeeding occupation in the Tisza-Maros region.

Interpretations concerning the end of the Middle Bronze Age—and the reasons behind it—have shifted significantly over recent decades. Early interpretations described the end of the tell-cultures as an abrupt change, linked to an invading population, which was conventionally known as the 'Tumulus Culture' (c.f. Mozsolics 1957; Bóna 1958). Although the 'Tumulus Culture' term persisted, more recent interpretations contemplate a longer, more complex process and emphasise—to varying degrees—the role of the indigenous Middle Bronze Age populations in the social transformations (e.g. Bóna 1992; Szabó 1999; Csányi 2003; Sánta 2009; Hajdu 2012; Fischl *et al.* 2013). Despite the increasing interest in the Tisza-Maros region and the growing dataset (most recently Sava & Ignat 2016), the nature

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

of the transition, and the role of the Maros Groups' descendants in the subsequent 'Tumulus Culture era', remains unclear (Szabó 1999: 62–66; see also Hajdu 2012).

New dates for the cemeteries and settlements of the Tisza-Maros region

To address these questions, we present new dates from four cemeteries (three from the Maros Group and one local Late Bronze Age cemetery) and two Maros settlements (Figure 1).

Szőreg-C

The Szőreg cemetery is located in the village of Szőreg in south-eastern Hungary, and is the closest of the Maros cemeteries to the Tisza-Maros confluence. Excavated between 1928 and 1930 (Foltiny 1941; O'Shea 1996: 61–63), the site yielded approximately 230 graves and Foltiny (1941: 3) estimated that there might have been an additional 330–400 graves still to be recovered. The ceramics from Szőreg appear to span the entire Maros sequence, except for the earliest Early Bronze Age varieties observed at Pitvaros (Bóna 1965).

Ostojićevo-Stari Vinogradi

The Ostojićevo cemetery is located east of the River Tisza, approximately 40km south of the Tisza-Maros confluence and 20km west of the Mokrin cemetery (Girić 1971; Milašinović 2009). The site was excavated from 1981–1991, yielding approximately 285 graves. Chronologically, the site is important in that Ostojićevo, along with Szőreg C and Deszk A in Hungary, are the only Maros cemeteries that have yielded significant quantities of Late Maros-style ceramics (Girić 1984). Given that most Maros settlements and cemeteries were abandoned during this time (O'Shea & Nicodemus 2019), the persistent use of these sites is of particular importance.

Battonya-Vörös Október MTSZ

The Bronze Age cemetery of Battonya-Vörös Október MTSZ is located just north of the town of Battonya in Hungary, 17km north of Pecica-Şanţul Mare and 65km from the Tisza-Maros confluence. The cemetery was excavated between 1964 and 1966 and again between 1973 and 1979, yielding approximately 130 graves (A. Gazdapusztai 1968; Gy. Gazdapusztai 1968; Szabó 1999). Although the Maros cultural affiliation of the cemetery has been questioned (cf. O'Shea 1996), it would represent the most easterly of the known Maros cemeteries; thus, its dating is of particular significance.

Tápé-Széntéglaégető

The cemetery of Tápé is located on the west side of the River Tisza at the Tisza-Maros confluence in Hungary. The site was excavated in the 1960s and yielded nearly 700 graves (Trogmayer 1975). Applying the conventional Reinecke seriation of common Bronze Age metal types (Reinecke 1965), the cemetery was dated by the excavator to the very end of the Middle

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

to early Late Bronze Age (Reinecke BB2–Reinecke BC, and potentially the beginning of Reinecke BD). As such, the site was interpreted as a Tumulus Culture cemetery (Trogmayer 1975). Subsequent disagreements have emerged concerning the potential use-life of the site (see Bösel 2008: 49). Alternate interpretations that minimise large-scale population change have also been presented (O'Shea 1996: 368; Blischke 2002). This cemetery was included in the current dating programme to help clarify these relationships and to establish the absolute dates associated with the transition from the Middle to Late Bronze Age in the region.

Semlac-Livada lui Onea

The Semlac tell settlement is located on a bluff overlooking the Maros flood plain, approximately 1km west of Pecica-Şanţul Mare (Drașovean 1999: 116–17). The site was initially tested by Popescu in 1943, and, later, by Gogâltan in 1994 (Popescu 1944; Gogâltan 1996). The surface-roughened coarse wares and an absence of baroque-style ceramics at the site indicate an early Maros date (Nicodemus & O'Shea 2015). The charcoal samples analysed for the present study were recovered in 2007, when the still-exposed 1994 trench profile was cleaned and recorded.

Rabe-Anka Siget

The Anka Siget (Anka Sziget) site is a tell settlement located just south of the village of Rabe, in northern Serbia. The tell is located due south of the Deszk area cemeteries in Hungary and approximately 16km from the Tisza-Maros confluence. The site was first investigated archaeologically in 1891 (Reizner 1891). Since then, it has been the subject of periodic small-scale tests, but has never been extensively excavated (Grčki-Stanimirov & Stanimirov-Grčki 1998). The settlement is chronologically significant in that it has produced Late Maros-type, baroque-style ceramics—a distinction shared only with Pecica-Şanţul Mare and Klárafalva-Hajdova (O'Shea & Nicodemus 2019). The charcoal samples analysed for the present study were recovered during coring at the site in 2017.

Results

The new radiocarbon dates for the six sites are presented in Tables 1–3 and Figures 2–7. In addition to the raw and calibrated dates, Tables 1–3 also place the dates within the regional Bronze Age sequence, and within the site phases established for Pecica-Şanţul Mare (see O'Shea & Nicodemus 2019).

The Semlac tell site dates to the beginning of the Maros sequence (Figure 8)—a placement consistent with the ceramics recovered from the site (Nicodemus & O'Shea 2015). The site appears to have been established somewhat after Kiszombor—the earliest-dated Maros settlement (O'Shea 1992)—but well before the establishment of Pecica. While the Semlac tell significantly overlaps in time with Pecica, it was abandoned by the time the Pecica polity was at its zenith during the population aggregation event. There is no evidence that any population returned to Semlac after the decline of the Pecica polity, in contrast to the re-occupation that may have occurred in the Ostojićevo locality (see below).

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

Table 1. New radiocarbon dates for the Maros Group; calibrated date spans represent 95 per cent confidence. Most of the samples were unburned human bone; samples of different material are marked with an asterisks: * the dated material was cremated bone; ** the dated material was charcoal.

Lab number	Sample	Radiocarbon years, BP	+/−	From BC	To BC	Median BC	Pecica period	Regional Bronze Age chronology
Beta-237727	Semlac 123**	3490	40	−1918	−1694	−1815	Florescent	Middle
Beta-237728	Semlac 153**	3690	40	−2199	−1960	−2081		Early
Beta-237729	Semlac 159**	3870	40	−2467	−2208	−2354		Early
Beta-237730	Semlac 160**	3510	40	−1941	−1700	−1830	Florescent	Middle
UGAMS-30841	RabeC-2-1**	3420	25	−1867	−1642	−1718	Late	Middle
UGAMS-30842	RabeC-2-2**	3410	25	−1768	−1634	−1710	Late	Middle
UGAMS-30843	RabeC-3-1**	3350	20	−1729	−1563	−1644	Late	Middle
UGAMS-30844	RabeC-3-2**	3660	25	−2135	−1952	−2034		Early
OxA-31082	Szőreg 5	3615	30	−2113	−1892	−1975	Early	Early
OxA-31083	Szőreg 7	3593	29	−2027	−1886	−1948	Early	Early
OxA-31084	Szőreg 38	3595	29	−2027	−1887	−1951	Early	Early
OxA-31085	Szőreg 58	3671	29	−2139	−1960	−2058		Early
OxA-31086	Szőreg 64	3609	29	−2034	−1890	−1968	Early	Early
OxA-31099	Szőreg 70	3716	32	−2204	−2026	−2100		Early
OxA-31100	Szőreg 75	3405	31	−1861	−1624	−1703	Late	Middle
OxA-31101	Szőreg 95	3470	31	−1885	−1694	−1800	Florescent	Middle
OxA-31102	Szőreg 99	3335	30	−1691	−1528	−1623	Late	Middle
OxA-30988	Szőreg 105	3653	32	−2136	−1941	−2024		Early
OxA-31103	Szőreg 110	3552	32	−2011	−1772	−1899	Early	Early
OxA-31104	Szőreg 123	3476	30	−1886	−1696	−1806	Florescent	Middle
OxA-30989	Szőreg 147	3402	34	−1866	−1619	−1699	Late	Middle
OxA-31105	Szőreg 168	3589	31	−2031	−1881	−1944	Early	Early
UGAMS-30845	Osto25*	3070	25	−1409	−1265	−1340		Late
UGAMS-30846	Osto63	3540	20	−1942	−1776	−1887	Early	Middle
UGAMS-30847	Osto107	3530	20	−1931	−1772	−1843	Florescent	Middle
UGAMS-30848	Osto124	3280	20	−1613	−1509	−1561	Final	Middle

© Antiquity Publications Ltd, 2019

Table 1. (Continued)
New radiocarbon dates for the Maros Group; calibrated date spans represent 95 per cent confidence. Most of the samples were unburned human bone; samples of different material are marked with an asterisks: * the dated material was cremated bone; ** the dated material was charcoal.

Lab number	Sample	Radiocarbon years, BP	+/−	From BC	To BC	Median BC	Pecica period	Regional Bronze Age chronology
UGAMS-30849	Osto158	3360	20	−1731	−1614	−1654	Late	Middle
UGAMS-30850	Osto170	3570	20	−2010	−1881	−1920	Early	Early
UGAMS-30851	Osto208	3270	20	−1611	−1503	−1551	Final	Middle
UGAMS-30852	Osto212	3300	25	−1631	−1509	−1573	Final	Middle
UGAMS-30853	Osto232	3540	20	−1942	−1776	−1887	Early	Middle
UGAMS-30854	Osto264	3290	20	−1618	−1513	−1568	Final	Middle
UGAMS-30855	Osto265	3500	20	−1886	−1756	−1821	Florescent	Middle

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

Table 2. New radiocarbon dates for the Battonya cemetery; calibrated date spans represent 95 per cent confidence. The samples were unburned human bone; * the two dates are from the same sample.

Lab number	Sample	Radiocarbon years, BP	+/−	From BC	To BC	Median BC	Pecica period	Regional Bronze Age chronology
OxA-31068	Batt 7	3576	29	−2025	−1785	−1928	Early	Early
OxA-31069	Batt 19	3566	28	−2017	−1779	−1917	Early	Early
OxA-31070	Batt 20	3510	27	−1909	−1751	−1827	Florescent	Middle
OxA-30986	Batt 29	3485	37	−1905	−1693	−1811	Florescent	Middle
OxA-30987	Batt 33	3588	34	−2034	−1784	−1943	Early	Early
OxA-31071	Batt 38	3532	29	−1945	−1766	−1853	Early	Middle
OxA-31072	Batt 55	3514	28	−1918	−1752	−1830	Florescent	Middle
OxA-31073	Batt 67*	3525	29	−1935	−1758	−1839	Florescent	Early/Middle
OxA-31074	Batt 67*	3556	29	−2011	−1776	−1905	Early	
OxA-31075	Batt 77	3528	32	−1941	−1756	−1843	Florescent	Middle
OxA-31076	Batt 83	3572	28	−2023	−1782	−1924	Early	Early
OxA-31077	Batt 92	3623	29	−2120	−1897	−1984	Early	Early
OxA-31078	Batt 104	3569	31	−2022	−1779	−1921	Early	Early
OxA-31079	Batt 105	3496	31	−1904	−1700	−1819	Florescent	Middle
OxA-31080	Batt 110	3554	29	−2009	−1775	−1902	Early	Early
OxA-31081	Batt 111	3574	29	−2024	−1783	−1926	Early	Early

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

Table 3. New radiocarbon dates for the Tápé cemetery; calibrated date spans represent 95 per cent confidence. Most of the samples were unburned human bone; samples of cremated bone are marked with an asterisk.

Lab number	Sample	Radiocarbon years, BP	+/−	From BC	To BC	Median BC	Regional Bronze Age chronology
UGAMS-2655	Tápé25	3117	24	−1440	−1301	−1393	Late
UGAMS-30829	Tápé54	3130	20	−1447	−1309	−1411	Late
UGAMS-23656	Tápé73	3128	24	−1451	−1303	−1407	Late
UGAMS-30830	Tápé188*	2920	20	−1209	−1038	−1113	Late
UGAMS-30831	Tápé215	3170	25	−1500	−1410	−1447	Late
UGAMS-30832	Tápé283	3090	20	−1416	−1291	−1345	Late
UGAMS-23657	Tápé324	3055	24	−1403	−1233	−1322	Late
UGAMS-30833	Tápé356	3140	20	−1492	−1319	−1420	Late
UGAMS-30834	Tápé415	3160	20	−1497	−1406	−1436	Late
UGAMS-30835	Tápé462	3160	20	−1497	−1406	−1436	Late
UGAMS-30836	Tápé491	3060	20	−1402	−1262	−1337	Late
UGAMS-30837	Tápé508	3090	20	−1416	−1291	−1345	Late
UGAMS-30838	Tápé510	3070	20	−1407	−1276	−1341	Late
UGAMS-23658	Tápé517	3122	25	−1447	−1301	−1399	Late
UGAMS-23659	Tápé518	3115	25	−1438	−1299	−1390	Late
UGAMS-23660	Tápé534	3187	24	−1501	−1420	−1462	Late
UGAMS-30839	Tápé560*	3110	25	−1435	−1297	−1381	Late
UGAMS-30840	Tápé627	3120	20	−1437	−1304	−1400	Late

© Antiquity Publications Ltd, 2019

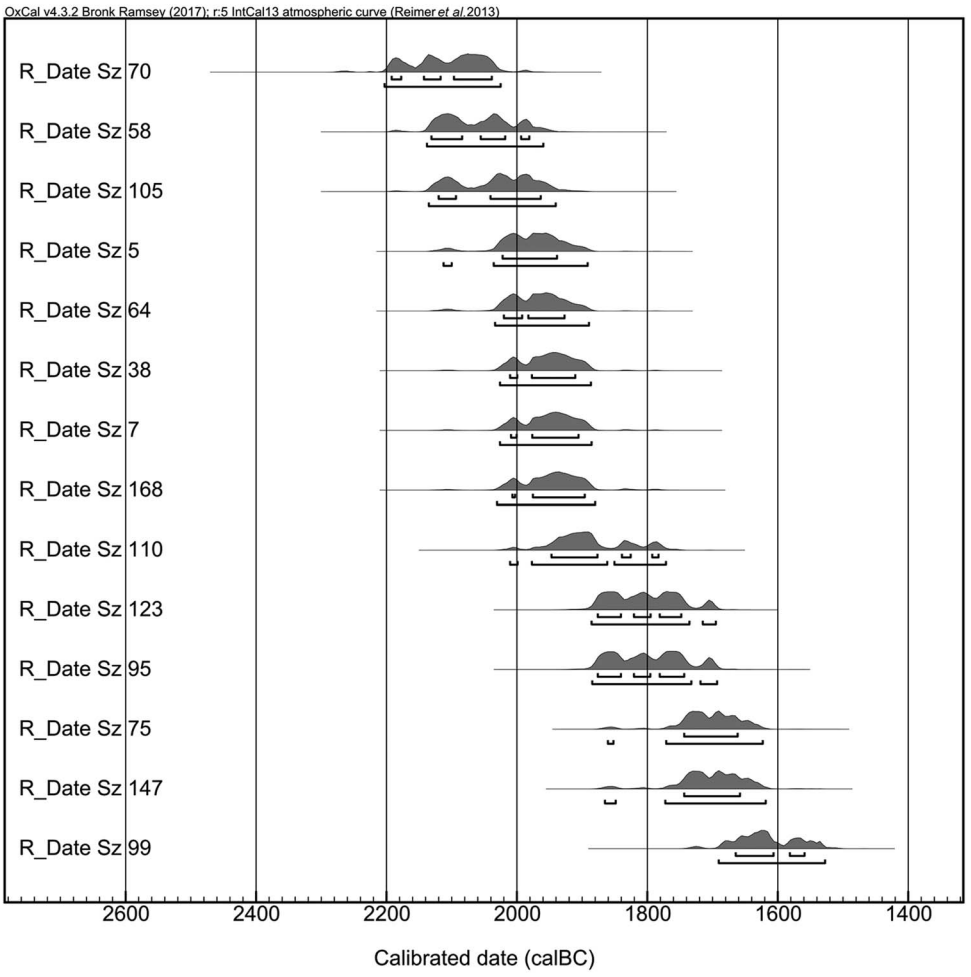

Figure 2. Calibrated dates and two-sigma range for the Szőreg cemetery samples. In this and the following figures, calibrations were performed using OxCal (Bronk Ramsey 2009; Reimer et al. *2013).*

The dates from the Rabe tell suggest that the settlement was contemporaneous with Pecica-Şanţul Mare; both were founded at the same time and share a final date coinciding with the effective collapse of the complex polity (Figure 8). Although the dated samples from Rabe derive from a pair of cores taken in the central area of the tell, and therefore may not represent the site's entire occupation sequence, the dates are consistent with ceramics recovered from the site. The apparent synchronisation of events at Pecica and Rabe supports their linkage within the Maros regional system, with Rabe operating as a secondary centre to Pecica—as has been recently proposed (O'Shea & Nicodemus 2019). It will be interesting to see whether future investigations at Rabe reveal a pattern of rapid settlement aggregation during its peak, followed by abrupt abandonment—as observed at Pecica. The dating of the

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

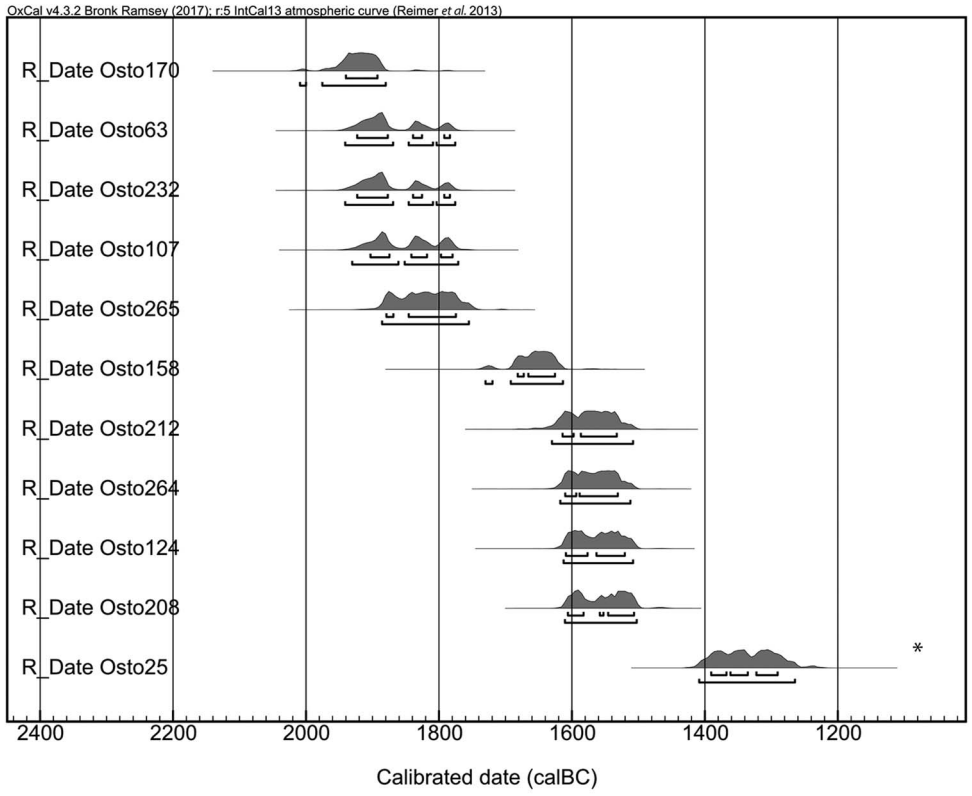

Figure 3. Calibrated dates and two-sigma range for the Ostojićevo cemetery samples; the asterisk denotes a cremated bone sample.

southern Maros cemeteries of Mokrin and Ostojićevo may support such a scenario (see below).

With the exception of six radiocarbon dates from the Mokrin cemetery (O'Shea 1996: 37), none of the Maros cemeteries in the Tisza-Maros region have previously been dated using radiocarbon, despite the research attention concentrated on these cemeteries. For the Szőreg cemetery, the aims of the current dating programme were twofold: to determine the overall chronological span of the cemetery, and to assess the relative ceramic chronology previously developed for it. The new radiocarbon dates confirm that the cemetery was used throughout the Early and Middle Bronze Age portions of the Maros sequence. They also provide general support for Bóna's (1975) five-phase relative chronology for the cemetery (Table 4).

The dated samples from Szőreg confirm that the cemetery began its active use in the Early Bronze Age, during the earlier part of the Maros sequence. The earliest-dated graves pre-date the establishment of Pecica-Şanţul Mare, and are concurrent with the earliest radiocarbon dates for the Mokrin cemetery. Unlike the Mokrin cemetery, however, Szőreg's use continued through Pecica's Florescent period—a time when many other Maros settlements and cemeteries were abandoned—and into the later stages of the Maros occupation. Indeed,

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

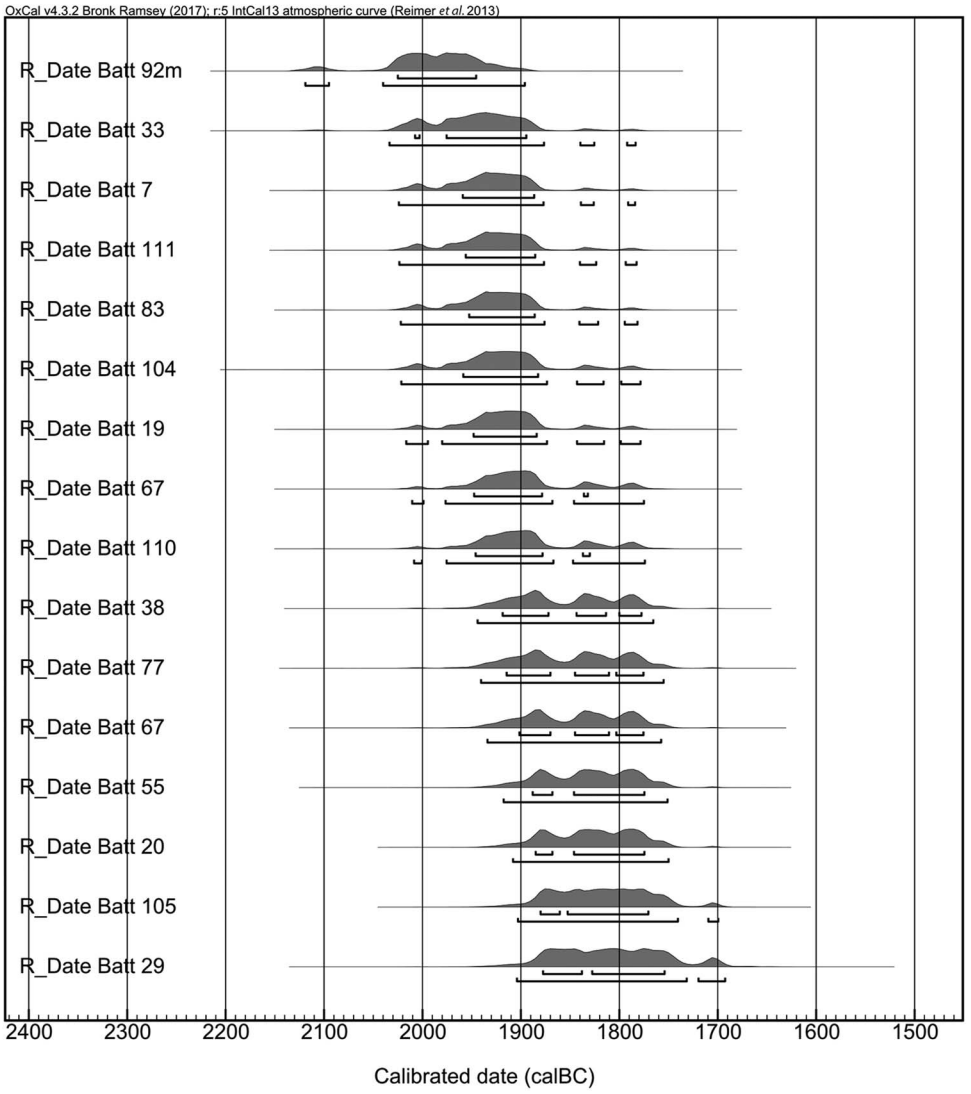

Figure 4. Calibrated dates and two-sigma range for the Battonya cemetery samples.

Szőreg post-dates the collapse of the Pecica polity. This chronology is important, as Szőreg is located at the opposite end of the Maros Group's geographic distribution to Pecica, although the two sites are still clearly interlinked.

The Szőreg dates also provide a useful test for the five-phase ceramic chronology proposed by Bóna for the site (Table 4). The attribution of the associated ceramics to a chronological period is based on Bóna's (1975) published assessment. The relative ordering of the ceramics fits well with the ordering produced by radiometric dates, with Szőreg grave 99 producing the only clear outlier. Interestingly, ceramics from grave 99 are attributable to Bóna's problematic phase 3.

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

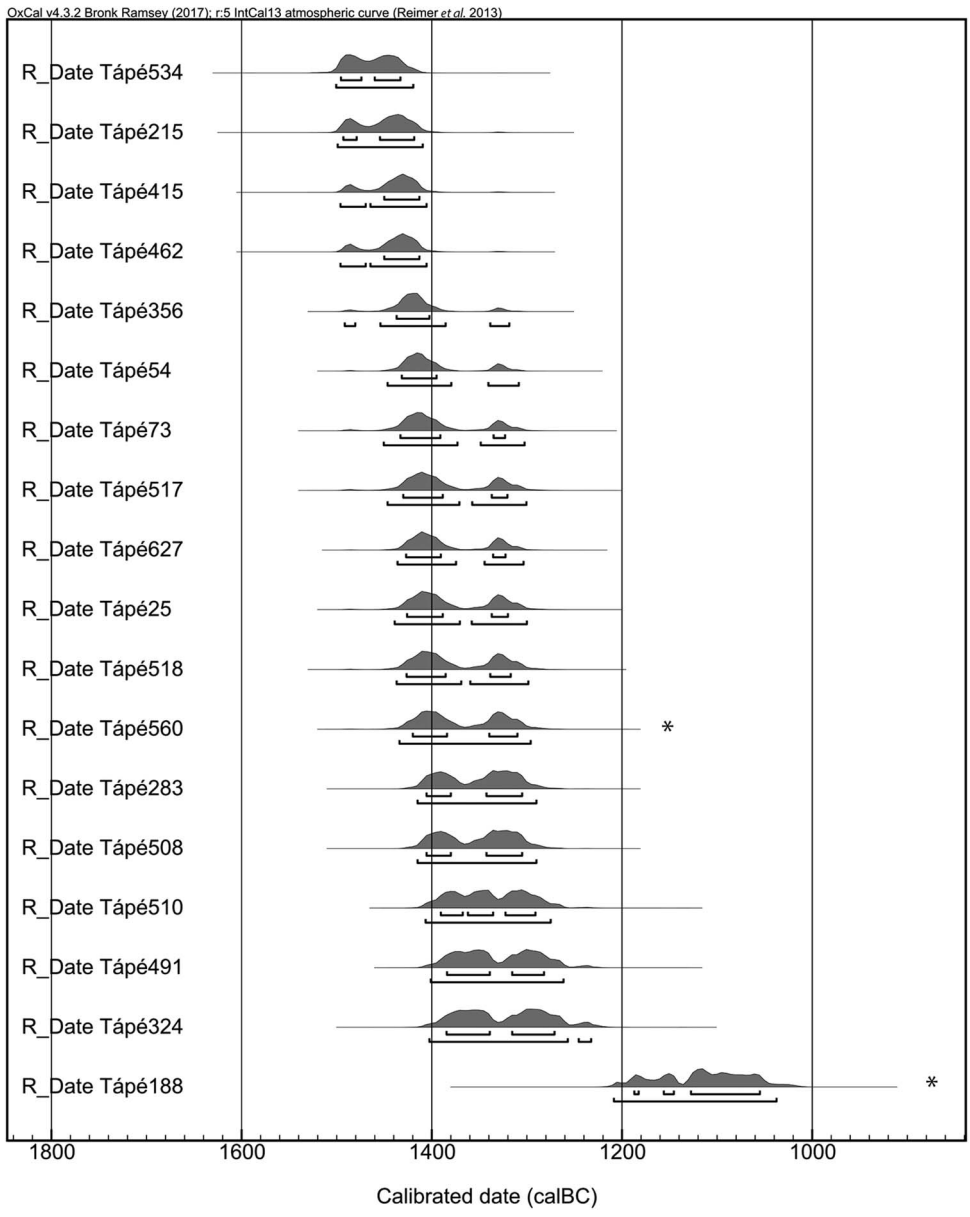

Figure 5. Calibrated dates and two-sigma range for the Tápé cemetery samples; the asterisks denote cremated bone samples.

The Ostojićevo cemetery dates confirm that it was used during and after the Pecica Florescent period. Furthermore, the dates indicate that the site was founded several hundred years *after* the Mokrin cemetery. As such, Ostojićevo (and Battonya—see below) run counter to the pattern of Maros cemeteries being abandoned at the end of the Early Bronze Age. Instead,

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

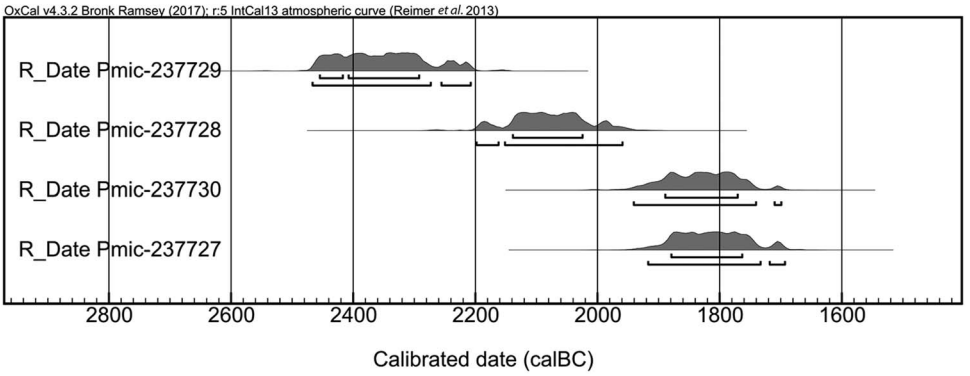

Figure 6. Calibrated dates and two-sigma range for the Semlac tell samples.

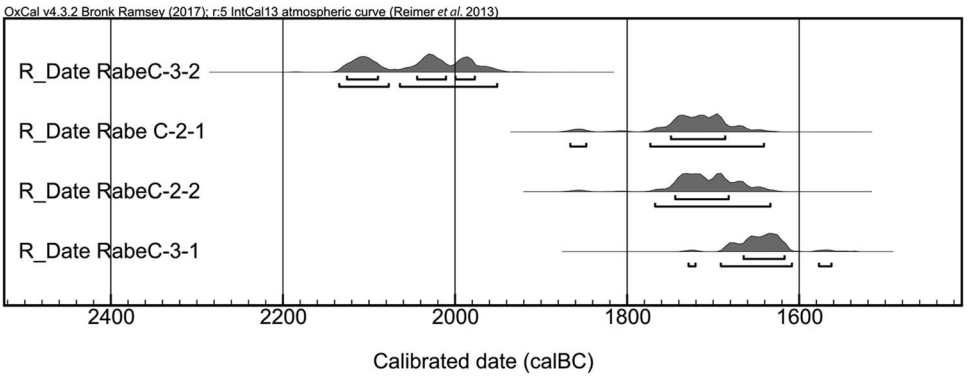

Figure 7. Calibrated dates and two-sigma range for the Rabe tell samples.

it seems that both cemeteries were established during the time that the Pecica site was rising to prominence.

The dates produced from the Ostojićevo cemetery may also suggest a hiatus in the site's use after *c.* 1800 BC, concurrent with the major aggregation event at Pecica, which drew populations away from surrounding settlements. It is possible that this hiatus of activity at Ostojićevo represents a similar event occurring in the south-western portion of the Maros territory—perhaps focused on aggregation at the Rabe tell. If so, then the resumption of site use after 1600 BC may represent a return to the locality as people dispersed from the central Maros tells.

Battonya is the final Early/Middle Bronze Age cemetery considered here. As noted previously, it is the most easterly of the Maros cemeteries and, given its weak adherence to the core Maros funerary programme and material culture, its link to the Maros Group has been questioned (O'Shea 1996). These new radiocarbon dates indicate that the site began its use during

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

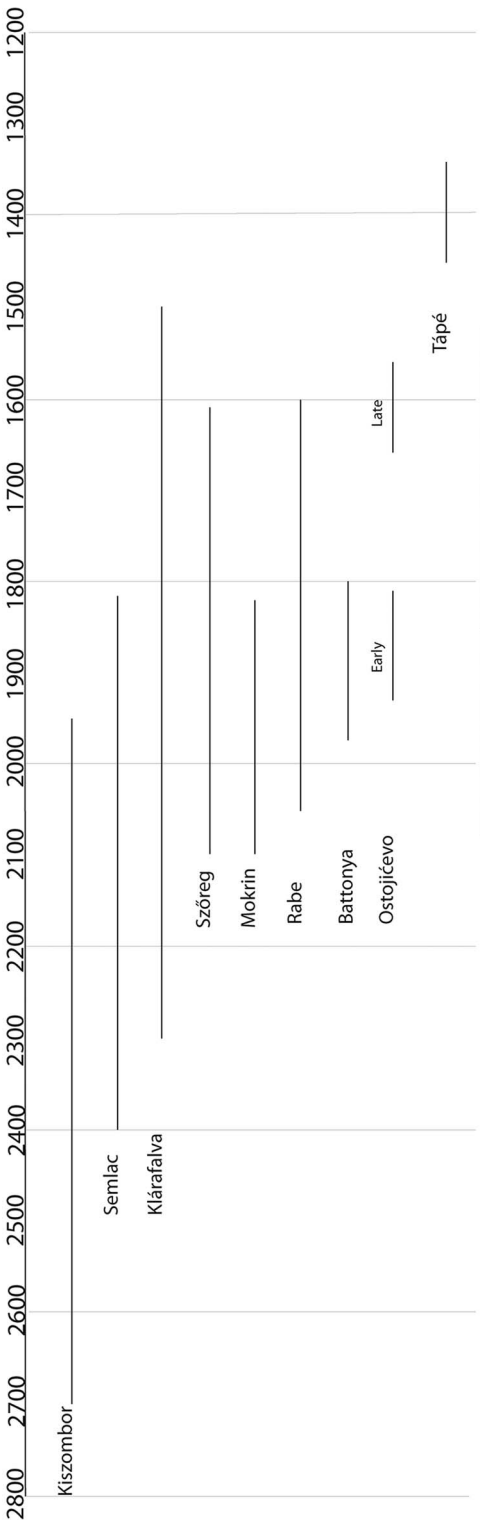

Figure 8. Age range comparison (cal BC) for all dated Maros settlements, cemeteries and the Tápé cemetery; age ranges are summarised using median values.

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

Table 4. Comparison of Szőreg calibrated dates and Bóna's (1975) ceramic phases.

Szőreg grave assemblage	Median calibrated age (BC)	Szőreg phase	Pecica phase	Pecica period	Regional Bronze Age chronology
Sz 70	−2100	1–2	Pre-7	–	Early
Sz 58	−2058	2	Pre-7	–	Early
Sz 105	−2024	2	7	–	Early
Sz 5	−1975	1–2	7	Early	Early
Sz 64	−1968	2	7	Early	Early
Sz 168	−1944	2	7	Early	Early
Sz 38	−1951	2	7	Early	Early
Sz 7	−1948	2	7	Early	Early
Sz 110	−1899	2–3	7	Early	Early
Sz 123	−1806	3–4	4	Florescent	Middle
Sz 95	−1800	4	4	Florescent	Middle
Sz 147	−1699	5	2	Late	Middle
Sz 75	−1703	5	2	Late	Middle
Sz 99	−1623	3	1	Late	Middle

the major expansion of the Maros Group and was roughly contemporaneous with the establishment of Pecica-Şanţul Mare. The site continued in use into the Pecica Florescent period, but was abandoned around the time of the Pecica aggregation event (*c.* 1800 BC). This abandonment corresponds to the cessation in use at Ostojićevo. Unlike at Ostojićevo, however, Battonya was not reused following the collapse of the Pecica polity.

The last set of radiocarbon dates derives from the Late Bronze Age cemetery at Tápé. The dates confirm that the cemetery was established immediately following the abandonment of the Middle Bronze Age Maros settlements and cemeteries. The dates also suggest that, despite its large size, the cemetery was used only for a short period (excluding the one anomalously late date from burial 188).

While the new dates confirm the general chronological placement of Tápé, and suggest that there was no significant gap between the end of the Middle Bronze Age regional cultures and the establishment of Tápé, they do not conclusively rule out either of the competing explanations for the site. The relatively large size and short use-life, however, may provide more support for a locally displaced population model as opposed to one driven by external migration.

Discussion

The new radiometric dates presented in this article expand our knowledge of the chronological span of the Maros Group—particularly the final stages of the Maros/Middle Bronze Age occupation—and help to establish the chronology for the succeeding period. The dates indicate a tight chronological synchronisation of the settlements and cemeteries of the lower and middle Maros regions, while confirming the usefulness of the relative chronological ordering based on fine-ware ceramics at the Szőreg cemetery. This refined chronological

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

framework allows for a more accurate and less speculative description of the cultural processes of social formation and collapse represented at the Tisza-Maros Bronze Age sites. This, in turn, will provide a stronger basis for comparison with contemporaneous developments in the Carpathian Basin and across Europe.

The two outlier dates from cremated bone at Tápé and Ostojićevo warrant additional comment. There has been considerable debate concerning the accuracy of radiocarbon determinations from cremated bone samples (cf. Van Strydonck *et al.* 2009; Zazzo *et al.* 2012; Chatters *et al.* 2017). While the two outliers in our sample can be distinguished by the incongruence with their associated material culture assemblages, it is not clear whether the radiocarbon determinations can be attributed simply to random error or to a systemic issue affecting cremated bone. Regardless, these results suggest that dates based on cremated bone need to be treated with caution.

Finally, the results presented here inevitably raise the question of whether the legacy Bronze Age terminology has outlived its usefulness. The large collection of high-precision radiocarbon dates now available provide a timeline for the major social transitions that occurred within the Maros Group; as such, is there still need for, or value in, attributing Early, Middle or Late distinctions to these developments? From a comparative perspective too, it makes much more sense to compare cultural developments and transitions in absolute time, rather than attempting to use the events in questions to synchronise time. Such systems of terminology may still be useful, but only if they are stripped of their chronological connotations and viewed as reflecting points when comparable kinds of cultural transitions occur.

Acknowledgements

The compilation of samples and dates reported in the article would not have been possible without the generous assistance of a number of institutions and projects. The authors wish to acknowledge and thank the National Museum of Kikinda (Serbia), the Arad County Museum (Romania), the Department of Biological Anthropology at the University of Szeged (Hungary), the Móra Ferenc Museum at Szeged and The RISE project at the University of Gothenburg. Funding for the dating was provided in part by the European Research Council (FP/2007–2013, grant 269442), the Museum of Anthropological Archaeology and the Department of Anthropology at the University of Michigan, and NSF awards BCS 0620147, BCS 1039380 and BCS 1264315. The authors also acknowledge Paul R. Duffy for selecting the samples from the Battonya and Szőreg cemeteries, in collaboration with The RISE Project, and two anonymous reviewers for their constructive comments on the paper.

References

Blischke, J. 2002. *Gräberfelder als Spiegel der historischen Entwicklung während der mittleren Bronzezeit im mittleren Donaugebiet* (Universitätsforschungen zur prähistorischen Archäologie 80). Bonn: R. Habelt.

Bóna, I. 1958. Die Chronologie der Hortfunde vom Koszider Typus. *Acta Archaeologica Academiae Scientiarum Hungaricae* 9: 213–43.

– 1965. The peoples of southern origin of the Early Bronze Age in Hungary I–II. *Alba Regia* 4–5: 17–63.

– 1975. *Die Mittlere Bronzezeit Ungarns und Ihre südöstlichen Beziehungen*. Budapest: Akadémiai Kiadó.

– 1992. Bronzezeitliche Tell-Kulturen in Ungarn, in W. Meier-Arendt (ed.) *Bronzezeit in Ungarn. Forschungen in Tell-Siedlungen an Donau und Theiß*: 9–41. Frankfurt: Museum für Vor- und Frühgeschichte, Archäologisches Museum.

Bösel, M. 2008. Wandel durch Bronze?—Vergleichende Untersuchung sozialer Strukturen auf früh- und mittelbronzezeitlichen Gräberfeldern im Theißgebiet. *Prähistorische Zeitschrift* 83: 45–108.

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

Bronk Ramsey, C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51: 337–60. https://doi.org/10.1017/S0033822200033865

Chatters, J., J. Brown, S. Hackenberger, P. McCutcheon & J. Adler. 2017. Calcined bone as a reliable medium for radiocarbon dating: a test using paired North American samples. *American Antiquity* 82: 593–608. https://doi.org/10.1017/aaq.2017.27

Childe, G. 1929. *The Danube in prehistory*. Oxford: Clarendon.

Csányi, M. 2003. The Tumulus culture: invaders from the west, in Zs. Visy (ed.) *Hungarian archaeology at the turn of the millennium*: 161–63. Budapest: Szekszárdi Nyomda.

Dömötör, L. 1902. A pécskai őstelepről származó öntőmintákról (Zu den aus der urzeitlichen Siedlung von Pécska stammenden Gussformen). *Archeologiai Értesítő* 22: 271–74.

Drașovean, F. (ed.). 1999. *Repertoriul Archeological Mureșului Inferior, Județul Arad* (Bibliotheca Historica et Archaeologica Banatica 24). Timișoara: Editura Orizonturi Universitare.

Fischl, K.P., V. Kiss, G. Kulcsár & V. Szeverényi. 2013. Transformations in the Carpathian Basin around 1600 B.C., in H. Meller, F. Bertemes, H.-R. Bork & R. Risch (ed.) *1600—cultural change in the shadow of the Thera eruption? 4th Archaeological Conference of Central Germany, October 14–16, 2011 in Halle (Saale)*: 355–71. Halle (Saale): Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, Landesmuseum für vorgeschichte.

Foltiny, I. 1941. A szőregi bronzkori temető. *Dolgozatok Szeged* 17: 1–89.

Gazdapusztai, A. 1968. Das Bronzezeitliche Gräberfeld von Battonya. *Acta Antiqua et Archaeologica* 12: 5–37.

Gazdapusztai, Gy. 1968. Einige Probleme des Gräberfeldes bei Battonya und der Bronzezeit in Südostungarn. *Acta Antiqua et Archaeologica* 12: 39–44.

Girić, M (ed.). 1971. *Mokrin, the Early Bronze Age necropolis I* (Dissertationes et Monographie 11). Kikinda: Narodni muzej.

Girić, M 1984. Die Maros (Moriš, Mureş) Kultur, in N. Tasić (ed.) *Kulturen der Frühbronzezeit des Karpatenbeckens und Nordbalkans*: 33–58. Belgrade: Balkanološki Institut Sanu.

Gogâltan, F. 1996. About the Early Bronze Age in the Romanian Banat, in N. Tasic (ed.) *The Yugoslav Danube basin and the neighbouring regions in the 2nd millennium BC*: 43–68. Belgrade: Serbian Academy of Sciences and Arts Institute for Balkan Studies.

Grčki-Stanimirov, S. & S. Sava Stanimirov-Grčki. 1998. Nalazi sa naselja iz bronzanog doba Anka Siget u Delti Moriša (Okolina Novog Kneževca). *Glasnik muzeja Banata 8, Pančevo*: 18–28. Pančevo: Museum of the Banat.

Hajdu, T. 2012. A bronzkori Füzesabony- és Halomsíros kultúra népességének biológiai rekonstrukciója. Unpublished PhD dissertation, Eötvös Loránd University.

Kiss, V. 2012. *Middle Bronze Age encrusted pottery in western Hungary*. Budapest: Archaeolingua.

Kristiansen, K. 1998. *Europe before history*. Cambridge: Cambridge University Press.

Milašinović, L. 2009. Review on possibility of social structure reconstruction on the Maros Culture finds from the Necropolis in Ostojićevo. *Рад музеја Војводине* 51: 65–70.

Mozsolics, A. 1957. Archäologische Beiträge zur Geschichte der großen Wanderung. *Acta Archaeologica Academiae Scientiarum Hungaricae* 8: 119–56.

Nicodemus, A. 2011. The Bronze Age and Dacian fauna from new excavations at Pecica 'Santul Mare'. *Analele Banatului* 19: 79–84.

Nicodemus, A. & J.M. O'Shea. 2015. From relative to absolute: the radiometric dating of Mureş Culture ceramics at Pecica-Şanţul Mare, in S. Forţiu & A. Stavilă (ed.) *ArheoVest, Nr. III: In Memoriam Florin Medelet, Interdisciplinaritate în Arheologie și Istorie*: 691–702. Szeged: JATEPress Kiadó.

Nicodemus, A., L. Motta & J. O'Shea. 2015. Archaeological investigations at Pecica 'Şanţul Mare' 2013–2014. *Ziridava Studia Archaeologica* 29: 105–18.

O'Shea, J.M. 1992. A radiocarbon-based chronology for the Maros Group of southeastern Hungary. *Antiquity* 65: 97–102. https://doi.org/10.1017/S0003598X00081084

– 1996. *Villagers of the Maros. Portrait of an Early Bronze Age society*. New York: Plenum.

O'Shea, J.M. & A. Nicodemus. 2019. '…the nearest run thing…' the genesis and collapse of a Bronze Age polity in the Maros Valley of Southeastern Europe, in A. Gyucha (ed) *Coming together: comparative approaches to*

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press

population aggregation and early urbanization: 61–80. Albany: State University of New York Press.

O'Shea, J., A.W. Barker, S. Sherwood & A. Szentmiklosi. 2005. New archaeological investigations at Pecica Şanţul Mare. *Analele Banatului* 12–13: 81–109.

O'Shea, J., A.W. Barker, A. Nicodemus, S. Sherwood & A. Szentmiklosi. 2006. Archaeological investigations at Pecica Şanţul Mare: the 2006 campaign. *Analele Banatului* 14: 211–28.

O'Shea, J., A. Barker, L. Motta & A. Szentmiklosi. 2011. Archaeological investigations at Pecica 'Şanţul Mare' 2006–2009. *Analele Banatului* 19: 67–78.

Popescu, D. 1944. Raport asupra săpăturilor arheologice de la Pecica-Rovine şi Semlac (jud. Arad), in *Raport asupra activităţii ştiinţifice a Muzeului Naţional de Antichităţi în anii 1942 şi 1943*: 71–73. Bucharest: Muzeului National de Antichitati.

Raczky, P., E. Hertelendi & F. Horváth. 1992. Zur absoluten Datierung der bronzezeitlichen Tell-Kulturen in Ungarn, in W. Meier-Arendt (ed.) *Bronzezeit in Ungarn. Forschungen in Tell-Siedlungen an Donau und Theiss*: 42–47. Frankfurt: Museum für Vor- und Frühgeschichte, Archäologisches Museum.

Reinecke, P. 1965. *Mainzer Aufsätze zur Chronologie der Bronze- und Eisenzeit*. Bonn: Habelt.

Reizner, J. 1891. Rábéi ásatások. *Archaeologiai Értesítő* 11: 206–10.

Reimer, P.J. *et al.* 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. *Radiocarbon* 55: 1869–87. https://doi.org/10.2458/azu_js_rc.55.16947

Roska, M. 1912. Ásatás a pécska-szemlaki határban levő Nagy Sánczon. *Dolgozatok* 3: 1–73.

– 1913. Ásatás a perjámosi Sánczhalmon. *Múzeumi és Könyvtári Értesítő* 7: 81–122.

– 1914. Ásatás a perjámosi Sánczhalmon. *Múzeumi és Könyvtári Értesítő* 8: 73–104.

Sánta, G. 2009. A Halomsíros kultúra Domaszék-Börcsök-tanyai településének legkorábbi szakasza és a telep szerkezete (Die früheste Phase und die Struktur der Siedlung der Hügelgraber-Kultur in Domaszék-Börcsök Gehöft). *Tisicum—A Jász-Nagykun-Szolnok Megyei Múz. Évk* 19: 255–80.

– 2010. Settlements of the Tumulus Culture in Hungary. *Antaeus* 31–32: 513–28.

Sava, V. & A. Ignat. 2016. The beginning of the Late Bronze Age in the Lower Mureş Basin. An overview, in F. Golgâltan & C. Cordoş (ed.) *Prehistoric settlements: social, economic and cultural aspects*: 181–99. Cluj–Napoca: Editura Mega.

Soroceanu, T. 1991. *Studien zur Mures Kultur*. Leidorf: Buch am Erlbach.

Stockhammer, P.W., K. Massy, C. Knipper, R. Friedrich, B. Kromer, S. Lindauer, J. Radosavljević, F. Wittenborn, J. Krause & P.F. Biehl. 2015. Rewriting the Central European Early Bronze Age chronology: evidence from large-scale radiocarbon dating. *PLoS ONE* 10: e0139705. https://doi.org/10.1371/journal.pone.0139705

Szabó, J.J. 1999. *Früh- und mittelbronzezeitliche Gräberfelder von Battonya. Inventaria Praehistorica Hungariae I*. Budapest: Hungarian National Museum.

Trogmayer, O. 1975. *Das Bronzezeitliche Gräberfeld bei Tápé, Fontes Archaeologici Hungariae*. Budapest: Akadémiai Kiadó.

Van Strydonck, M., M. Boudin & G. De Mulder. 2009. ^{14}C dating of cremated bones: the issue of sample contamination. *Radiocarbon* 51: 553–68. https://doi.org/10.1017/S0033822200055922

Zazzo, A., J.-F. Saliège, M. Lebon, S. Lepetz & C. Moreau. 2012. Radiocarbon dating of calcined bones: insights from combustion experiments under natural conditions. *Radiocarbon* 54: 855–66. https://doi.org/10.1017/S0033822200047500

Received: 5 June 2018; Revised: 14 August 2018; Accepted: 6 September 2018

© Antiquity Publications Ltd, 2019

https://doi.org/10.15184/aqy.2019.40 Published online by Cambridge University Press