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Any correspondence will be sent to the editor:
Museum Arad
Piata George Enescu 1, 310131 Arad, RO
e-mail: ziridava2012@gmail.com

The content of the papers totally involve the responsibility of the authors.

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Contents

Research papers

Field reports

Stray Finds

Before the Rise of the Late Bronze Age Mega Sites/Forts in the Lower Mureș Basin (20th–15th centuries BC)

Victor Sava, Florin Gogâltan

Abstract: In the context of our recent interest in the Late Bronze mega-site/fort at Sântana-*Cetatea-Veche*, we take this opportunity to review the settlements, cemeteries, key artifact types and economic activities characteristic of the Middle Bronze Age (ca. 2000/1900–1550 BC) and the beginning of the Late Bronze Age (ca. 1550–1450 BC) periods in the immediate vicinity of this site. Our objective is to present the current state of archaeological research. For this purpose, a database has been compiled that highlights, from a quantitative and qualitative perspective, the knowledge of a period of more than 500 years in the prehistory of the Lower Mureș Basin.

Keywords: Lower Mureș Basin; Middle Bronze Age; Late Bronze Age; tell settlements; mega sites/forts; tradition.

Introduction

The most spectacular Bronze Age settlements in the Lower Mureș Basin are the Middle Bronze Age (MBA) tells and the Late Bronze Age (LBA) mega sites/forts. While the multi-layered settlements spread over a considerable area of the Carpathian Basin[1], the mega sites/forts are concentrated only in the Lower Mureș Basin[2]. From this perspective, the area represented by Arad County (7754 km^2), becomes of maximum interest for understanding the process of transition from tells to mega sites/forts (Fig. 1).

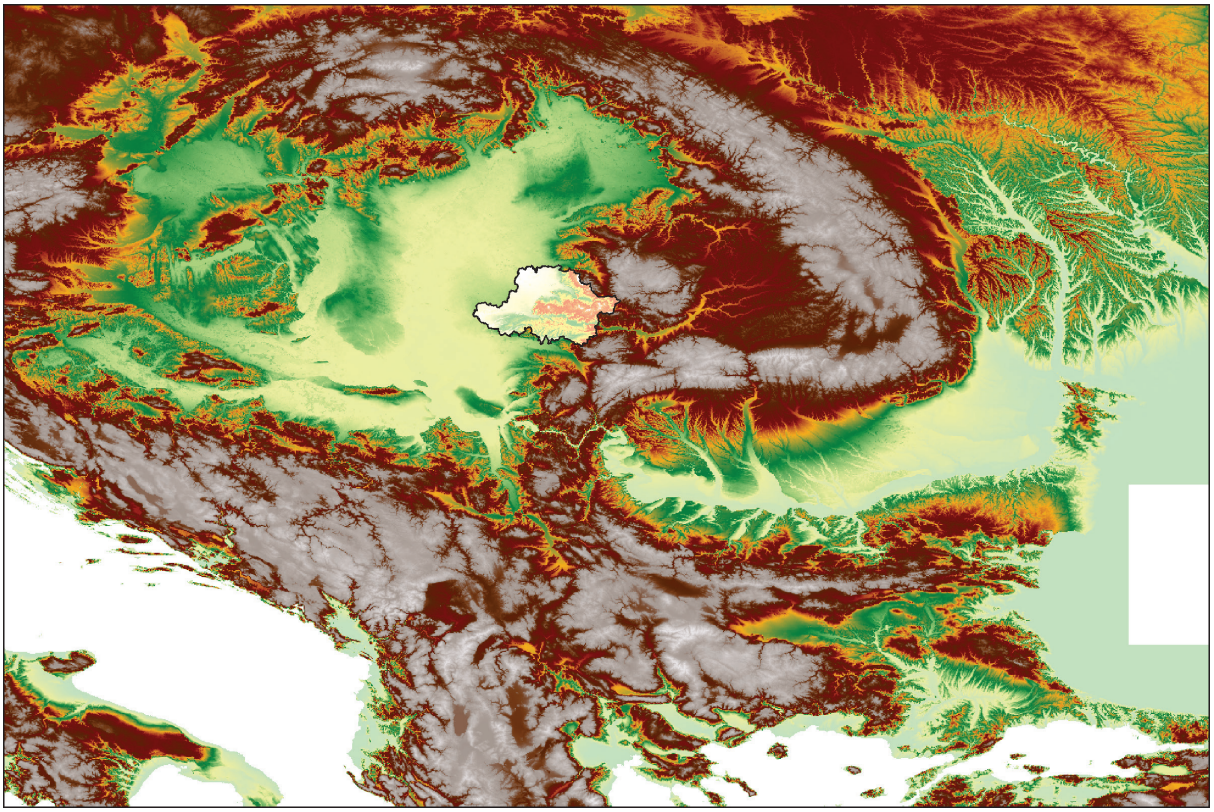

Fig. 1. Map of South-Eastern Europe with the location of the Arad County (map by the authors).

1 Gogâltan 2017, Map 1.

2 Gogâltan, Sava 2010, Fig. 71; Szeverényi *et al.* 2017, Fig. 1; Molloy *et al.* 2020, Fig. 1; Gaydarska, Chapman 2022, 62–75.

Recent research indicates that the multi-layered settlements in this area were formed after 2200 BC, some of them being continuously inhabited until ca. 1500 BC[3]. In the literature, it has been considered that the abandonment of the tells in the Carpathian Basin had various causes: from a violent end (external attacks, fires), to natural disasters (floods, drought, insect invasions, etc.) or internal factors (religious or hygienic reasons, epidemics, depletion of local resources, etc.)[4]. However, we have found that the Lower Mureș Basin has not been depopulated, as a large number of new settlements and cemeteries continued the local cultural tradition after the 16th century BC[5]. The population growth and the success of the new economic, social and political realities lead to the erection of mega sites/forts, as they were named by A. Harding[6]. These large-scale fortifications, enclosing areas ranging from 15 to over 1700 ha, had their heyday between ca. 1450–1250 BC[7].

In the context of our recent interest in the Late Bronze mega-site/fort at Sântana-*Cetatea-Veche*[8], we would like to take this opportunity to review the settlements, cemeteries, key artifact types and economic activities characteristic of the MBA (ca. 2000/1900–1550 BC) and the beginning of the LBA (ca. 1550–1450 BC) periods in the immediate vicinity of this site. The profound social transformations from the beginning of the LBA (ca. 1550 BC) in the Tisza and Lower Mureș region cannot be fully understood without looking back to these finds. Thus, we try to identify possible links between the world of the tells and the world that built the impressive fortified settlements 100 years later. The previous syntheses[9] have been complemented by new research from the last 15 years[10], allowing us to identify the characteristics of MBA and LBA I and to establish possible continuities or discontinuities between the cultural manifestations of the two chronological stages.

In order to carry out our approach, all the finds that can be attributed to MBA and LBA I in the Arad County have been listed. For a better chronological classification of each site, all the information in the specialized literature was checked, unpublished excavation reports were used, and the artifacts preserved in the collections of the museums of Arad, Timișoara, Cluj-Napoca, Oradea and Budapest were studied for a more accurate dating. Our objective is to present the current state of archaeological research. For this purpose, a database has been compiled that highlights, from a quantitative and qualitative perspective, the knowledge of a period encompassing more than 500 years in the prehistory of the Lower Mureș Basin (Tab. 1).

Table 1. List of MBA and LBA I sites in the Lower Mureș Basin. The following abbreviations have been used: **MBAC**: Middle Bronze Age-Cornești-Crvenka; **MBAM**: Middle Bronze Age-Mureș; **MBAO**: Middle Bronze Age-Otomani; **LBA I**: Late Brozne Age I; **FS**: Flat settlement; **T**: Tell; **FD**: Funerary discovery; **H**: Hoard; **SF**: Stray find; **FSV**: Field survey; **SFS**: Systematic field survey; **TT**: Test trench; **E**: Large scale excavation; **AA**: Anthropological analysis; **AZA**: Archaeozoological analysis; **OA**: Other analyses (petrography, soil coring, lithic analysis etc); **C**14: Radiometric measurements; **SI**: Scattered information about the research carried out (various mentions, repertoires, Cronica cercetărilor arheologice, ex. Chișindia-*Podul Vechi;* Horia-*Vest*); **PR**: Partial Report of the research carried out (excavation reports that provide partial pictures of a site; ex. Munar-*Wolfsberg;* Pecica-*Șanțul Mare;* Șagu-*Site A1_1*); **FR**: Full Report of the research carried out (comprehensive studies – monographs or ample studies – about large excavations, which provide a comprehensive picture of the site).

No.	Site name	MBAC	MBAM	MBAO	LBAI	FS	T	FD	H	SF	FSV	SFS	TT	E	AA	AZA	OA	C14	SI	PR	FR
1	Arad-*Bufniți*	x				x					x								x		

[3] Gogâltan 2019a, 205–208; Gogâltan, Sava 2019.

[4] Gogâltan 2005, 171–173, with older bibliography.

[5] Sava, Ignat 2016; Sava 2019; Sava, Gogâltan 2019; Gogâltan, Sava 2019; Sava 2020.

[6] Harding 2017.

[7] Sava 2020, 254–256, Fig. 10.

[8] Gogâltan, Sava 2010; Gogâltan, Sava 2012; Gogâltan *et al.* 2013; Sava *et al.* 2014; Gogâltan, Sava 2018; Sava *et al.* 2019; Gogâltan *et al.* 2019; Krause *et al.* 2022.

[9] Soroceanu 1991; O'Shea 1996; Gumă 1997; Gogâltan 1999a; Barbu *et al.* 1999.

[10] Sava *et al.* 2011; Sava *et al.* 2012; Sava, Andreica 2013; Gogâltan *et al.* 2014; Nicodemus 2014; Duffy 2014; Găvan, Gogâltan 2014; Sava 2014b; Stavilă 2014; Sava, Ignat 2014; Sava, Gogâltan 2014; Găvan 2015; Nicodemus, O'Shea 2015; Sava, Ignat 2016; Sava 2016; Gogâltan 2016a; Sava, Gogâltan 2017; Gogâltan, Fazecaș 2018; Sava, Grumeza 2018; O'Shea *et al.* 2019; Sava 2019; O'Shea, Nicodemus 2019; Gogâltan, Sava 2019; Sava, Gogâltan 2019; Sava 2020; Stavilă *et al.* 2020; Sava, Ursuțiu 2021.

No.	Site name	MBAC	MBAM	MBAO	LBAI	FS	T	FD	H	SF	FSV	SFS	TT	E	AA	AZA	OA	C14	SI	PR	FR
2	Aluniș-*Dealul molizilor*	x				x					x								x		
3	Arad-*Gai I*		x			x					x								x		
4	Arad-*Grădiște/I.A.S. Sere*	x				x					x								x		
5	Arad-*Palatul cultural*		x			x					x								x		
6	Arad-*Uzina de apă*	x				x					x								x		
7	Cicir-*Spinul lui Stanca*	x				x					x								x		
8	Chișindia-*Podul Vechi*	x				x							x						x		
9	Curtici-*Cârciuma lui Vásárhely*	x				x							x						x		
10	Cuvin-*Valea Danciului*	x				x					x								x		
11	Frumușeni–*2,5. km sud de sat*	x				x					x								x		
12	Grăniceri								x	x										x	
13	Horia-*Slatini/Situl V6*	x				x					x								x		
14	Munar-*Wolfsberg*	x					x					x	x				x			x	
15	Munar-*Situl 1*	x				x					x								x		
16	Macea-*Topila*	x				x					x								x		
17	Neudorf-Vest		x			x					x								x		
18	Olari-*Holumb*	x				x							x						x		
19	Păuliș								x	x										x	
20	Pecica-*Cărămidăria C.A.P. Ogorul*		x			x							x							x	
21	Pecica-*În Vii*		x			x					x								x		
22	Pecica-*Rovine*								x	x										x	
23	Pecica-*Șanțul Mare*		x		x		x							x		x	x	x		x	
24	Pecica-*Terasa Nordică-Situl 14*		x			x					x								x		
25	Pilu-Site 1			x		x					x								x		
26	Satu Mare-*Weingarten*	x				x							x						x		
27	Sântana-*Holumb*	x				x					x								x		
28	Sântana-*La nord de oraș*	x					x				x								x		
29	Semlac-*Livada lui Onea*		x				x						x					x	x		
30	Semlac-*Situl 5*		x			x					x								x		
31	Șeitin-*Tăietură*		x			x					x								x		
32	Socodor-*Căvăjdia*	x					x						x							x	
33	Vărșand-*Movila dintre vii*			x			x							x						x	
34	Vărșand I								x				x							x	
35	Vinga-*Izvor/Situl 6*	x				x					x								x		
36	Vinga-*Situl 19*	x				x					x								x		
37	Felnac-*Complexul Zotehnic*				x			x		x										x	
38	Pecica I				x			x		x										x	
39	Pecica-*Site 14*				x			x						x	x	x	x	x		x	
40	Bodrogu Nou-*La Hodaie/Către Vale*				x	x					x								x		
41	Covăsânț-*Site 6*				x	x					x								x		
42	Curtici-*Centură Sud*				x	x					x								x		
43	Horia-*Vest*				x	x					x								x		
44	Lipova-*Băi*				x	x					x								x		
45	Păuliș-*Dealul Bătrân*				x	x					x								x		
46	Pâncota-*Site 16*				x	x					x								x		
47	Sâmbăteni				x	x					x								x		
48	Sântana-*Cetatea Veche*				x	x						x		x						x	
49	Sântana-*La Fântână*				x	x					x								x		
50	Șagu-*Site A1_1*				x	x								x		x	x	x		x	
52	Zimandu Nou-*Fostul I.A.S. Scânteia*				x	x				x									x		

Geographic setting

A synthetic presentation of the evolution of communities in a larger diverse geographical area can best capture how they have been influenced by their environment and how they have adapted to local conditions[11]. The Lower Mureș Basin is located in the contact zone between the Western Romanian Plain – i.e. the eastern Pannonian Plain, and the Western Romanian Carpathians (Apuseni Mountains). The county of Arad, with an area of 7754 km^2, occupies the central part of this region (Fig. 1). The area is geographically characterized by the broad terraces of the Crișul Alb and Mureș Rivers, tributaries of the Tisza. These terraces form a high plain with altitudes between 100 and 190 m towards the mountains and a low plain with altitudes below 100 m towards the west. The high plain developed on Middle to Late Pleistocene river gravels and sands overlying thick loess deposits formed during the last glacial cycle. In the low plain, the loess deposits are overlain by late glacial and Holocene fluvial sands and clays accumulated during flood episodes[12]. Such floods were frequent until the late 19th century. Before the development of the Mureș riverbed, the river had an extremely rich flow in the months of high rainfall, due to its considerable length. A number of historical documents record frequent floods: between 1738 and 1741 floods occurred annually, and between 1738 and 1850 we have information about no less than 32 floods. Most of the floods occurred in February, March, June, and December, the months of snowmelt and spring rains[13].

Following the regularization works, which began in the 18th century, the landscape was severely modified[14]. In recent years there have been several projects that have aimed to reconstruct the environment of the Bronze Age in the Lower Mureș area. The study of the past of the Mureș River in the area of its alluvial cone is the first to be mentioned[15], to which interdisciplinary research in the tell of Pecica-*Șanțul Mare* can be added[16]. Especially relevant for this paper are the studies conducted in the vicinity of the LBA mega-site/fort of Cornești-Iarcuri[17].

Palynological analyses at Csárdaszállás, near the Criș/Körösriver and not far from the Romanian border, have once again proved the gradual increase in human impact on the environment during the Holocene. Massive deforestation in earlier periods, but especially in the Bronze Age, seems to have been the main cause of the transformation of this area into a swamp[18]. In the high plains of Banat, in the Vinga-Suștra area, the situation is different. Thus, from the Early Bronze Age (EBA) onwards, there has been a cessation of deforestation. This gradually lead to increased forest cover in the MBA and, implicitly, to a decrease in agricultural activities[19].

According to some of these studies, the Sub-Boreal climate (ca. 3800 BC – ca. 800 BC), which also corresponds to the period we are now discussing, can be characterized by rising temperatures and an increasingly low precipitation regime[20]. This view is not shared by all specialists, who come up with other reconstructions for the Sub-Boreal climate of the Carpathian Basin. Geochemical data from speleothems in the Mecsek Mountains, not far from Pécs in southern Hungary, have shown that after the eruption of the Santorini volcano, sometime between 1700 and 1600 BC[21], the climate improved relatively quickly, in about 100 years, to today's parameters[22]. Geomorphological research at Pecica shows that somewhere towards the end of the MBA (ca. 1550 BC), at the time of the abandonment of the

11 General environmental facts on the eastern border of the Carpathian Basin at Gogâltan 2019b, 869–871; Gogâltan 2021, 10–17, with older literature.

12 Velcea *et al.* 1979, 33.

13 Velcea *et al.* 1979, 46.

14 The most comprehensive analysis of the human impact on a Bronze Age archaeological site in this area can be found in the recent PhD thesis by M. Nykamp (Nykamp 2017). The situation presented for the lower basin of the Criș Rivers is also relevant (Gyucha *et al.* 2011).

15 Kiss *et al.* 2012, 33–64.

16 Sherwood *et al.* 2013; Nicodemus 2014.

17 Sherwood 2013; Nykamp *et al.* 2015; Nykamp *et al.* 2016; Nykamp *et al.* 2017; Gumnior, Stobbe 2019; Gumnior *et al.* 2019; Gumnior, Stobbe 2021.

18 Salisbury *et al.* 2013, 339.

19 Gumnior, Stobbe 2021, 18.

20 Nykamp 2017, 21, Fig. 8.

21 Data about the Santorini volcano eruption and the impact this event had on contemporary Bronze Age civilizations at Klontza-Jaklová 2016. Most recently, the volcanic eruption on the island of Thera (Santorini) has been dated to the early 16th century BC (Manning 2022).

22 Siklosy *et al.* 2007.

tell here, there was an abrupt aridisation of the area and intense deforestation of the surroundings. This may also be due to human impact in the region[23]. Other scenarios, based on older investigations, suggest some but not extreme temperature fluctuations: 2300–2100 BC (warm/dry), 2100–1900 BC (cold/wet), 1900–1650 BC (warm/dry)[24].

Regarding the climate, Klara P. Fischl and her collaborators consider, based on the Hungarian literature, that this period is characterized by a colder and wetter climate, but they hasten to add that "there is no up-to-date climatic reconstruction for the Sub-Boreal phase in the Carpathian Basin"[25]. Beatrice Ciută and Zsolt Molnár take a similar view, considering that the Carei Plain is turning into a forest, with swamps covering large areas[26].

The new H isotope data from a stalagmite of the Trió Cave, Southern Hungary, as well as stable C and O isotope analyses performed on animal bones and freshwater bivalve shells (Unio sp.) collected from the Bronze Age site of Ordacsehi-*Bugaszeg*, southern Lake Balaton, provided a different scenario for the Middle and Late Bronze Age. Thus: "The data indicate warm and humid conditions with elevated summer precipitation around 3.7 cal ka BP (Before Present, where present is AD 1950), followed by a short-term deterioration in environmental conditions at about 3.5 cal ka BP. The environment became humid and cold with winter precipitation dominance around 3.5 to 3.4 cal ka BP, and then gradually changed to drier conditions at ~3.2 cal ka BP"[27].

Most recent opinion of Maren Gumnior and Astrid Stobbe, who are well acquainted with the paleoclimatic conditions of the eastern Carpathian Basin, is that the entire EBA and MBA (4700–3500 BP) would be characterized by a cold and wet climate[28]. Starting with the LBA (1700–1500 cal BC), in the area of the Cornești fortification, we witness an increase in human impact in a semi-arid climate[29].

In the light of these sometwhat contradictory data, it is clear that there is more that needs to be done to reconstruct the paleoenvironment and to intensify the collection of relevant palynological data in the studied region.

Chronological background

The MBA of the Eastern Carpathian Basin was characterized by the evolution of the so-called "classical" cultures: Periam-Pecica, Otomani and Wietenberg[30]. Archaeological excavations after the Second World War made it possible to establish early, middle, and late stages in the evolution of these archaeological cultures and to identify other ceramic styles[31]. With the widespread use of ^{14}C data, the discourse on relative chronology has become more nuanced, taking into account the realities of some more important or better archaeologically researched sites[32]. Today, the MBA begins in the eastern Carpathian Basin somewhere in the chronological range 2000–1900 BC and ends between 1600–1500 BC[33], or somewhat later (1450 BC) according to colleagues in Hungary[34]. The association of ^{14}C data with the three phases of MBA evolution has led to the following chronological proposal: MBA I is dated to 2000/1900-ca. 1900 BC, MBA II to ca. 1900-ca. 1700 BC, and MBA III to ca. 1700 BC–1600/1500 BC[35]. This chronology will also be applied to the Lower Mureș Basin. LBA I has been defined as a period situated chronologically between the abandonment of the Pecica-*Șanțul Mare* tell (ca. 1550 BC) and the construction of the mega-sites/forts (ca. 1450 BC)[36] (Fig. 2).

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23 Sherwood *et al.* 2013, 143–144.
24 Nicodemus 2014, 53, Tab. 4.1.
25 Fischl *et al.* 2015, 509.
26 Ciută, Molnár 2014, 89.
27 Demény *et al.* 2019, 80.
28 Gumnior, Stobbe 2021, Tab. 1.
29 Gumnior, Stobbe 2021, 19.
30 Nestor 1933, 79–94; Popescu 1944, 54–106.
31 The whole discussion at Gogâltan 1999a, 15–54.
32 Ciugudean, Quinn 2015; Gogâltan 2015; Bălan *et al.* 2016; Bălan *et al.* 2018; Palincaș *et al.* 2019; Quinn *et al.* 2020; etc.
33 Gogâltan 2015, Fig. 10, 23; Gogâltan 2019a, Fig. 3; Gogâltan 2019b, Abb. 4a-b; Quinn *et al.* 2020, Fig. 7; Ciugudean 2021, Fig. 8.
34 Fischl *et al.* 2015, Fig. 1b; Kiss *et al.* 2019, 191; Polányi 2022, Fig. 3.
35 Gogâltan 2019a, 206–207.
36 Sava, Ignat 2016; Sava 2019; Sava 2020.

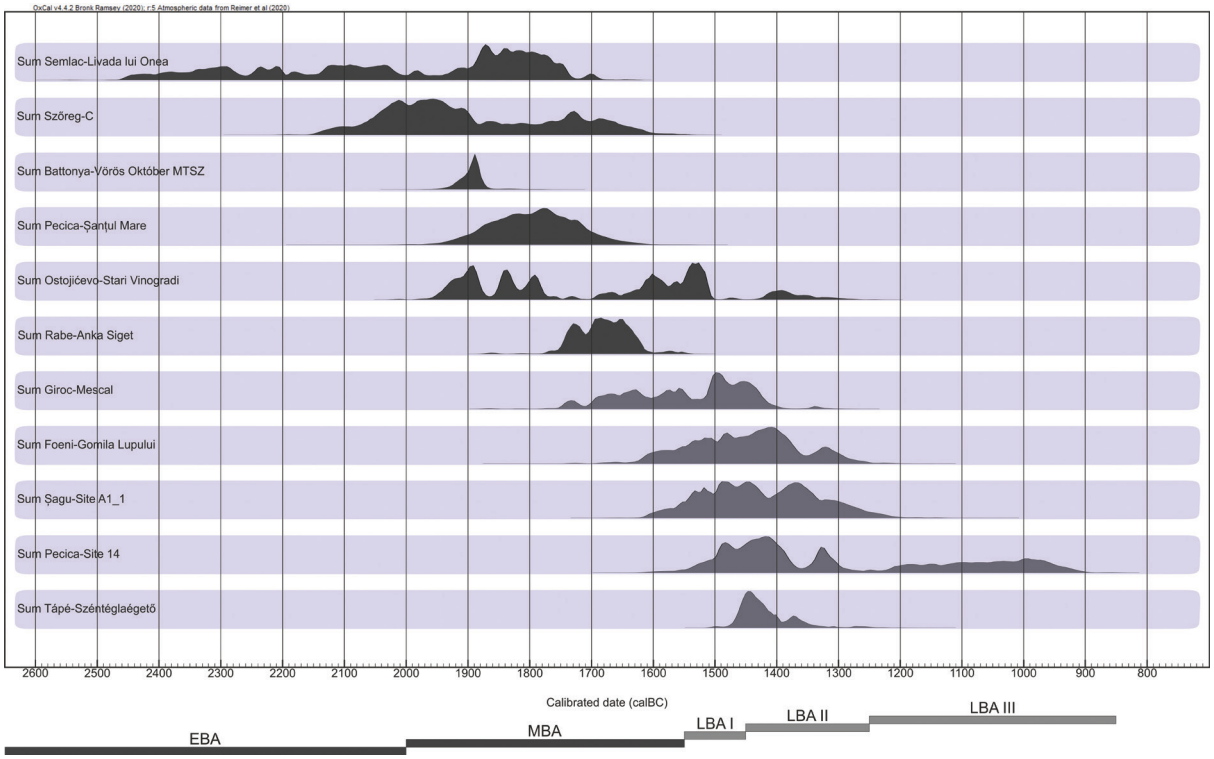

Fig. 2. The chronological diagram showing the comparative image between the Sums of the MBA and LBA I sites of the Lower Mureș Basin and the relative chronology (there were used 110 ^{14}C dates published in O'Shea *et al.* 2019 and Sava 2020) (graphic by the authors).

History of research

Research history on the topic can be found in the main syntheses dedicated to the MBA and LBA I in the Lower Mureș Basin[37]. For an overview of the progress made in the research of these periods, we have statistically organized all the available information (Figs. 3–7 and Tab. 1–2). Thus, it can be seen that during the MBA the most numerous discoveries are represented by flat settlements, followed at a great distance by tells and hoards (Fig. 3). As during the previous chronological phase, flat settlements

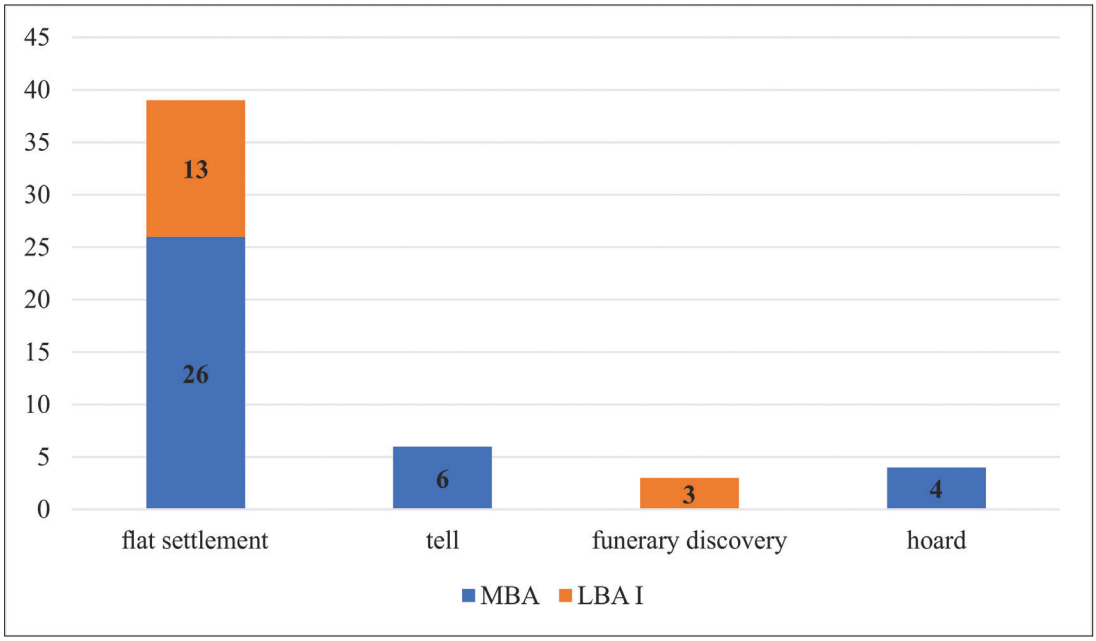

Fig. 3. Site distribution according to relative chronology and site type (graphics by the authors).

[37] Soroceanu 1991, 16–19; Gogâltan, Sava 2010; Sava, Ignat 2016; Sava, Gogâltan 2019; Gogâltan, Sava 2019.

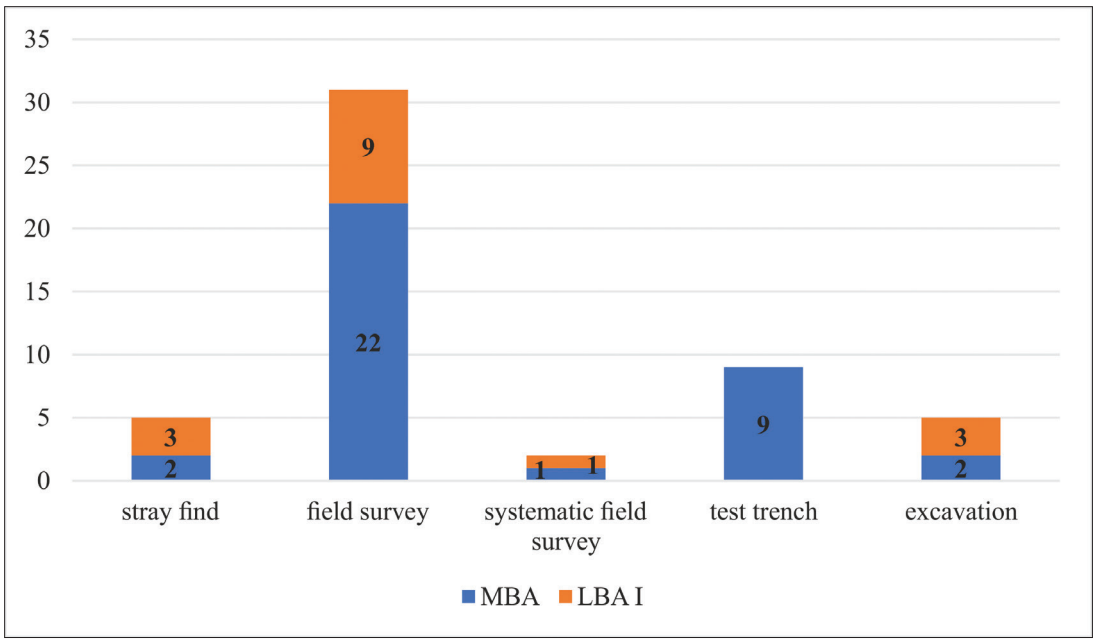

Fig. 4. Site distribution according to relative chronology and investigation method (graphics by the authors).

Table 2. Presentation of MBA and LBA I excavated sites depending on the research type, number of excavation campaigns and investigated area.

No. crt.	Site name	Relative dating	Type of excavation	No. of excavation campaigns	Excavated m²
1	Chișindia-*Podul Vechi*	MBA	amateur excavation	1	?
2	Curtici-*Cârciuma lui Vásárhely*	MBA	amateur excavation	1	?
3	Munar-*Wolfsberg*	MBA	test trench	1	6
4	Olari-*Holumb*	MBA	test trench	1	?
5	Pecica-*Cărămidăria C.A.P. Ogorul*	MBA	test trench	1	41.1
6	Pecica-*Șanțul Mare*	MBA	large scale excavations	24	at least 1829
7	Satu Mare-*Weingarten*	MBA	test trench	1	cca. 135
8	Semlac-*Livada lui Onea*	MBA	test trench	2	74
9	Socodor-*Căvăjdia*	MBA	test trench	2	at least 125
10	Vărșand-*Movila dintre vii*	MBA	large scale excavations	3	805.4
11	Pecica-*Site 14*	LBA I	developer-led excavations	1	7762
12	Sântana-*Cetatea Veche*	LBA I	large scale excavations	8	1518.1
13	Șagu-*Site A1_1*	LBA I	developer-led excavations	1	28800

predominate in LBA I, but this time they are also accompanied by a few finds of a funerary nature (Fig. 3). Most of the sites are known only from field surveys, few of them being investigated through excavations. We note that MBA sites have benefited over time from a greater number of excavations, mainly test trenches (Fig. 4; 5/1; Tab. 2). Only at Pecica-*Șanțul Mare* and Vărșand-*Movila dintre vii* were conducted extensive excavations. The LBA I sites are known in most cases from field surveys, but in some cases extensive rescue excavations have also been carried out. Due to these reasons, we have insufficient published data (Fig. 4; 5/2; Tab. 2).

Comparing the quantity and quality of research undertaken provides additional information on the state of knowledge of MBA and LBA I in the area. The MBA sites were investigated by excavating 3015.5 m², out of which which 2839.4 m² were excavated in tells and only 176.1 m² in the flat settlements (Tab. 2). The areas investigated in the flat settlements represent less than 6% of the total excavated areas in MBA sites. Moreover, the areas excavated in the tells at Vărșand-*Movila dintre vii* and Pecica-*Șanțul Mare* represent 87% (2634.4 m²) of the total areas excavated in the MBA sites. The situation is therefore clear: most of the information we have on this period comes from the two tells alone.

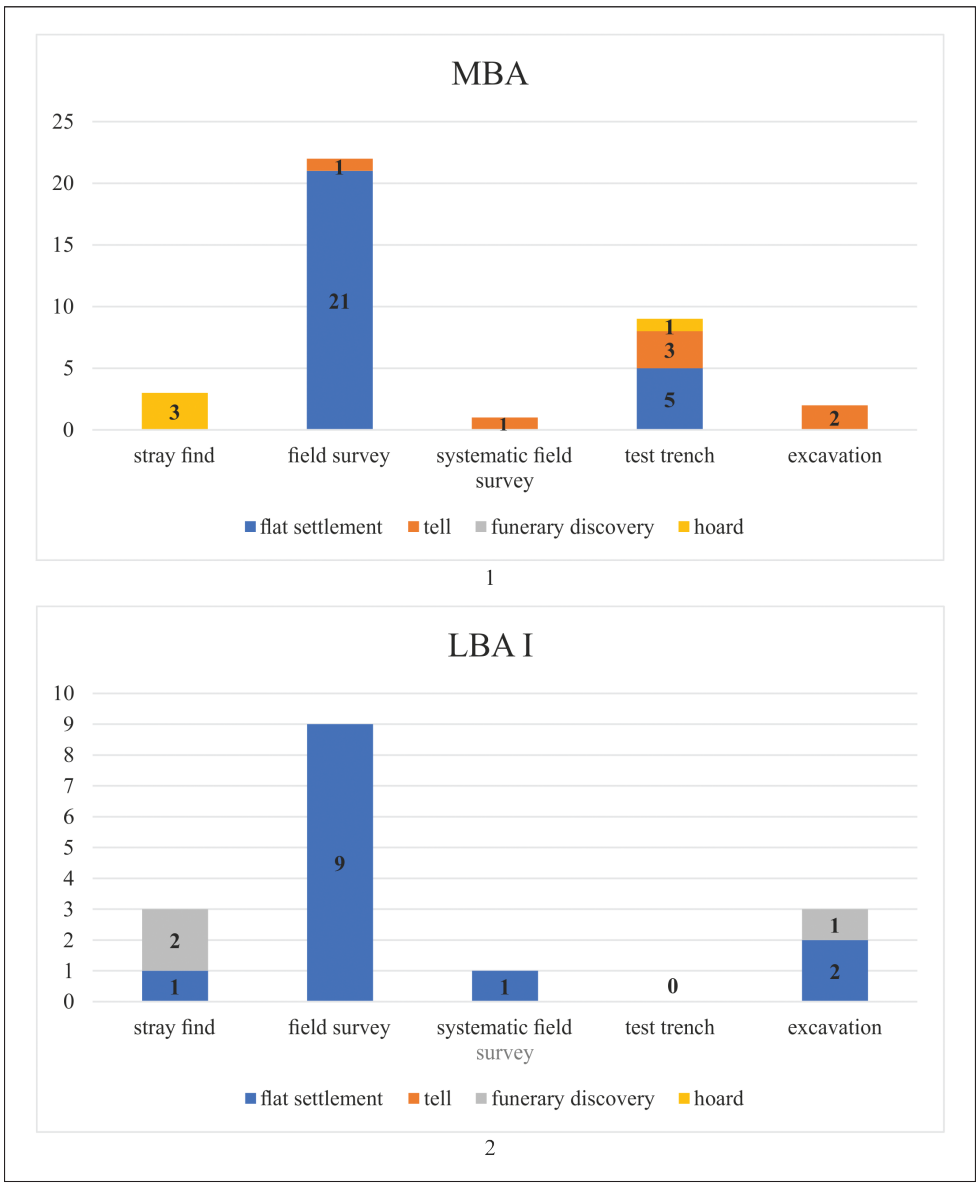

Fig. 5. 1. MBA site distribution according to the investigation method and site type; 2. LBA I site distribution according to the investigation method and site type (graphics by the authors).

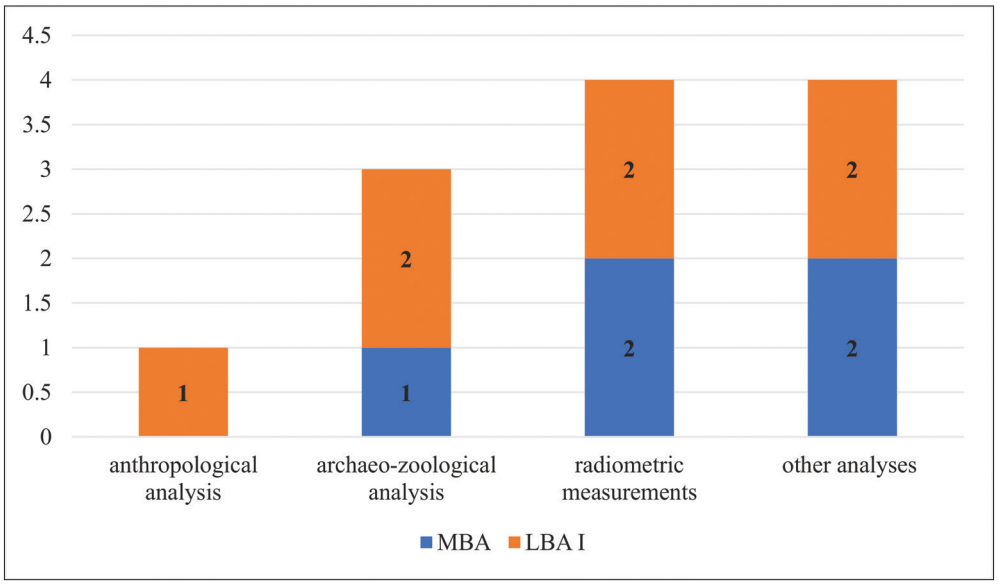

Fig. 6. Site distribution according to relative chronology and analysis type (graphics by the authors).

Of the 16 LBA I sites only three of them have benefited from archaeological excavations. The total excavated area amounts to 38080.1 m^2 (Tab. 2). It should be noted, however, that in the cases of Pecica-*Site 14*, Șagu-*Site A1_1*, and Sântana-*Cetatea Veche*, here are chronological sequences that span the entire LBA. In reality, in the excavated areas, only a small part of the contexts belongs to LBA I.

At a first glance, the number of excavations in the MBA sites is higher than in the LBA I sites (Fig. 4; Tab 2), but it should be remembered that the MBA represents a chronological stage covering almost 500 years, while the LBA I is a much shorter time sequence of about 100 years. Regarding the quantity and quality of the published information, it should be taken into account that the LBA I sites have been excavated in the last 10 years, with final reports still in preparation (Pecica-*Site 14*, Șagu-*Site A1_1*), and in the case of the Sântana-*Cetatea Veche* site excavations are still in progress (Fig. 7).

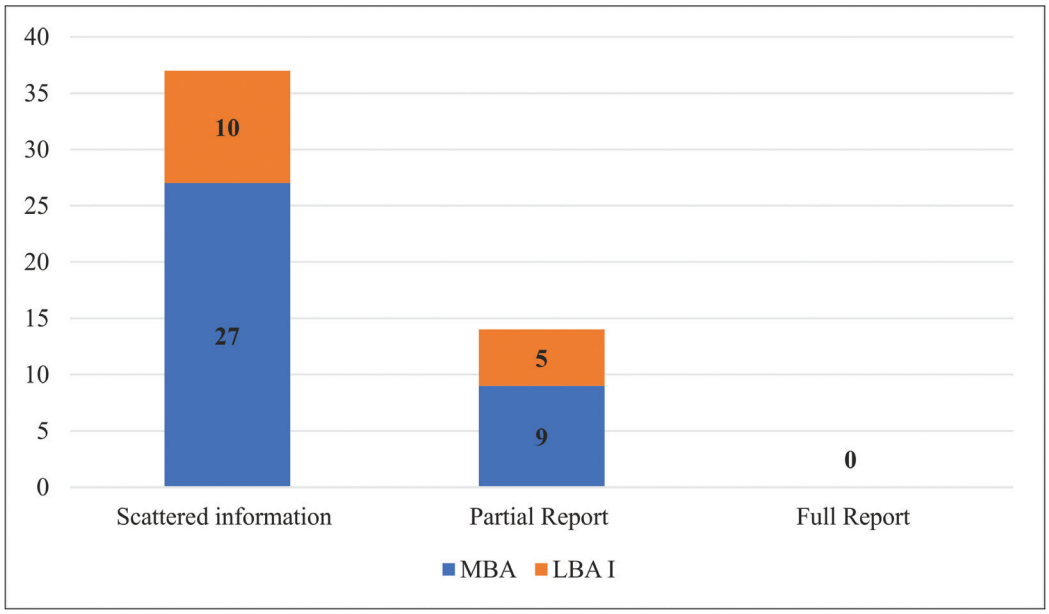

Fig. 7. Site distribution according to relative chronology and publication type (graphics by the authors).

Middle Bronze Age

Settlement data

Multi-layered settlements (tells)

Some archaeologists considered the multi-layered Bronze Age settlements of the Carpathian Basin as "semi-urban" centers[38], "proto-towns"[39] or "proto-urban" settlements[40]. The central function they would have played for a given area would have also been evidenced by their secondary/satellite settlement(s)[41]. These views have not been shared by all those who have studied these settlements[42]. It is preferable, however, that theoretical discussions should give way to field research, which is the only way to get as close as possible to a reasonable understanding of the economic and social issues raised by multi-layered settlements[43].

The first significant stratigraphic accumulations in Bronze Age settlements in the Lower Mureș Basin were found at Semlac-*Livada lui Onea*. The site was first excavated by Dorin Popescu in 1943 and then in 1994 by Florin Gogâltan[44]. Of the entire stratigraphic column of the site, ca. 130 cm of deposits have been attributed to EBA III (Mureș I ceramic style). In 2007, with the reopening of the 1994 excavation block, samples were taken for ^{14}C dating. They are contradictory[45],

[38] Kristiansen 2000, 9; Uhnér 2005, 745.
[39] Kadrow 2001, 266–267.
[40] Hänsel 2003, 80.
[41] Gogâltan 2010, 39–40; Fischl, Reményi 2013, 729; Molnár, Nagy 2013; Metzner-Nebelsick 2013, 332–336; etc.
[42] Kienlin 2015, 57–58; Harding 2018.
[43] Gogâltan 2016a, 104 with further references.
[44] Gogâltan 2014b, with older literature.
[45] Gogâltan 2019a, 205, note 7, Fig. 4.

but ensure the dating of the tell to the late 3rd millennium BC and the beginning of the next one[46]. The pottery found and the absolute data suggest that this settlement predates the tell at Pecica-*Șanțul Mare*. Our field surveys have shown that the settlement is about 4 ha, probably fortified with a ditch. The dimensions of the ditch are impressive (35–40 m wide, 2.5 m deep), even though the natural topography was also exploited. No Bronze Age pottery fragments were identified outside the ditch[47] (Fig. 56/1).

Certainly, the most representative MBA settlement in the area is Pecica-*Șanțul Mare*. Since the end of the 19th century, the site has been the subject of numerous archaeological investigations. The first excavations were carried out by László Dömötör, a teacher from Arad and amateur archaeologist, during several campaigns (1898, 1900, 1901 and 1902). The results of the excavations were briefly presented in several archaeological notes[48], while some of his unpublished reports can still be found in the archives of the Arad Museum. The excavations were continued, after a short break, by Márton Roska. During the excavation campaigns of 1910–1911 and 1923–1924, Roska identified the main phases in the evolution of the tell. At the same time, he adopted an innovative system of investigation by excavating and documenting the horizontal levels of the site[49]. D. Popescu's short excavation season in 1943[50] was followed by systematic excavations led by Ioan Horațiu Crișan and Egon Dörner between 1960–1962 and 1964. Although the main objective of the research was the Dacian settlement[51], in a single trench (S II) all the Bronze Age levels were investigated[52]. In 1964, at about 120 m from the tell, the outer settlement was also excavated, and five Bronze Age habitation layers were identified below the medieval and Dacian ones[53]. Nearly three decades later, the finds unearthed during these investigations were processed and published by Tudor Soroceanu[54]. Recently, the tell was the subject of other excavations, this time under the aegis of an American-Romanian project[55]. Unfortunately, this latest research, carried out between 2005 and 2015, has only been partially published, which is why a comprehensive overview of the site is still lacking[56].

About the tell itself, we can say that it is positioned on the edge of the high terrace of the Mureș River, the difference in level between the base of the terrace and the upper part of the tell being almost 15 m (Fig. 8; 56/2). The earliest Bronze Age deposits are dated between ca. 2000–1900 BC, the settlement evolving until sometime around 1550 BC. According to the latest excavations, these almost 500 years of continuous habitation correspond to several settlement phases, all associated with Mureș pottery. It appears that the entire tell was occupied by houses, some with storeys (or at least arranged attics). After ca. 1820 BC the houses were arranged around a central "square" in the form of a burnt platform which in time reached a thickness of up to 1 m. Also, at this time a defensive ditch was dug, later widened in the Dacian period[57]. The semicircular ditch cut through the terrace, creating an impressive artificial barrier between it and an area measuring approx. 140 × 80 m at the base and approx. 100 × 55 m at the top. The limited test trenches carried out outside the ditch show that a settlement probably contemporary with the tell lies beneath the medieval and Dacian settlement. It appears to have formed subsequent to the excavation of the ditch, after ca. 1820 BC[58]. Many spectacular artifacts have been discovered over the years. Among these, rich evidence of metalworking stands out[59]. Tools and ornaments made of bone[60] or materials imported from far away such as *Columbella* and *Cardium*

46 O'Shea *et al.* 2019, Tab. 1, Fig. 6.
47 Gogâltan 2016a, 95–96.
48 Dömötör 1901; Dömötör 1902. A complete history of research at Găvan, Ignat 2014, 148–150.
49 Roska 1912.
50 Popescu 1944a, 67; Popescu 1944b, 71–72; Dörner 1978, 28–29.
51 Crișan 1978.
52 In trench E1, opened in 1964, Bronze Age habitation levels were also investigated, but the base of the tell was not reached (Crișan 1978, 61–63).
53 Crișan 1978, 64.
54 Soroceanu 1991, 20–95, Fig. 5–23, Taf. 1–40.
55 O'Shea *et al.* 2005; O'Shea *et al.* 2006; Nicodemus 2011; O'Shea *et al.* 2011; Nicodemus 2014; Nicodemus *et al.* 2015; Nicodemus, O'Shea 2015; Nicodemus, Lemke 2016; Nicodemus 2018b; Meyer 2018; O'Shea, Nicodemus 2019.
56 Gogâltan, Sava 2019, 67–68, Fig. 2–3.
57 O'Shea, Nicodemus 2019, 71.
58 O'Shea, Nicodemus 2019, 67.
59 Gogâltan, Găvan 2014.
60 Nicodemus, Lemke 2016.

Fig. 8. Aerial photography of the Pecica-*Șanțul Mare* MBA tell (photo by the authors).

shells or amber[61] were also worked at the site. Horse breeding also seems to have been one of the basic occupations of the community here, an activity reflected in the importance the local elites attached to this animal in ritual practices or festive events[62].

Although known since the early 20th century, the Munar-*Wolfsberg* tell has been investigated over the last few years through a series of non-invasive investigations[63]. The pottery found here is specific to the Cornești-Crvenka style, although only 6.5 km away, on the other bank of the Mureș, we can find the most representative Mureș-type settlement, Pecica-*Șanțul Mare*. Geophysic measurements and systematic field surveys show that this settlement is different in many respects from the tells at Socodor, Vărșand or Sântana. Like the multi-layered settlements at Semlac and Pecica, it is located on the edge of the high terrace of the Aranca stream. The four concentric ditches mark an area of almost 8 ha. They start from the edge of the terrace and describe circular arcs. Most of the finds coming from the surface survey, were found between the second and fourth ditches. In addition to these ditches (that probably belong to the MBA settlement), a fifth fortification system, consisting of a rampart, ditch and palisade, enclosing an area of ca. 15 ha, was noted (Fig. 9). Judging by its construction system, it seems more likely that it belongs to the LBA, as evidenced by the numerous ceramic fragments we discovered on the surface. In addition to the systematic investigations we carried out in the area of the fortifications, a perimeter of about 10 km around *Wolfsberg* was also checked. The only settlement contemporary with the Cornești-Crvenka tell was identified at about 2.5 km to the west, also on the high terrace of the Mureș River (Fig. 31, item 15).

After the Second World War, two tell sites in the Crișul Alb River Basin were also investigated.

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61 Nicodemus *et al.* 2015, 113, Fig. 10/c; O'Shea, Nicodemus 2019, 70. For older amber finds see Gogâltan 2016b, 148, Fig. 3/1, with older literature.

62 Nicodemus 2018a.

63 Sava, Gogâltan 2014, with the history of research; Gogâltan 2016a, 90–94; Sava, Gogâltan 2017; Gogâltan, Sava 2019, 68–69, Fig. 4.

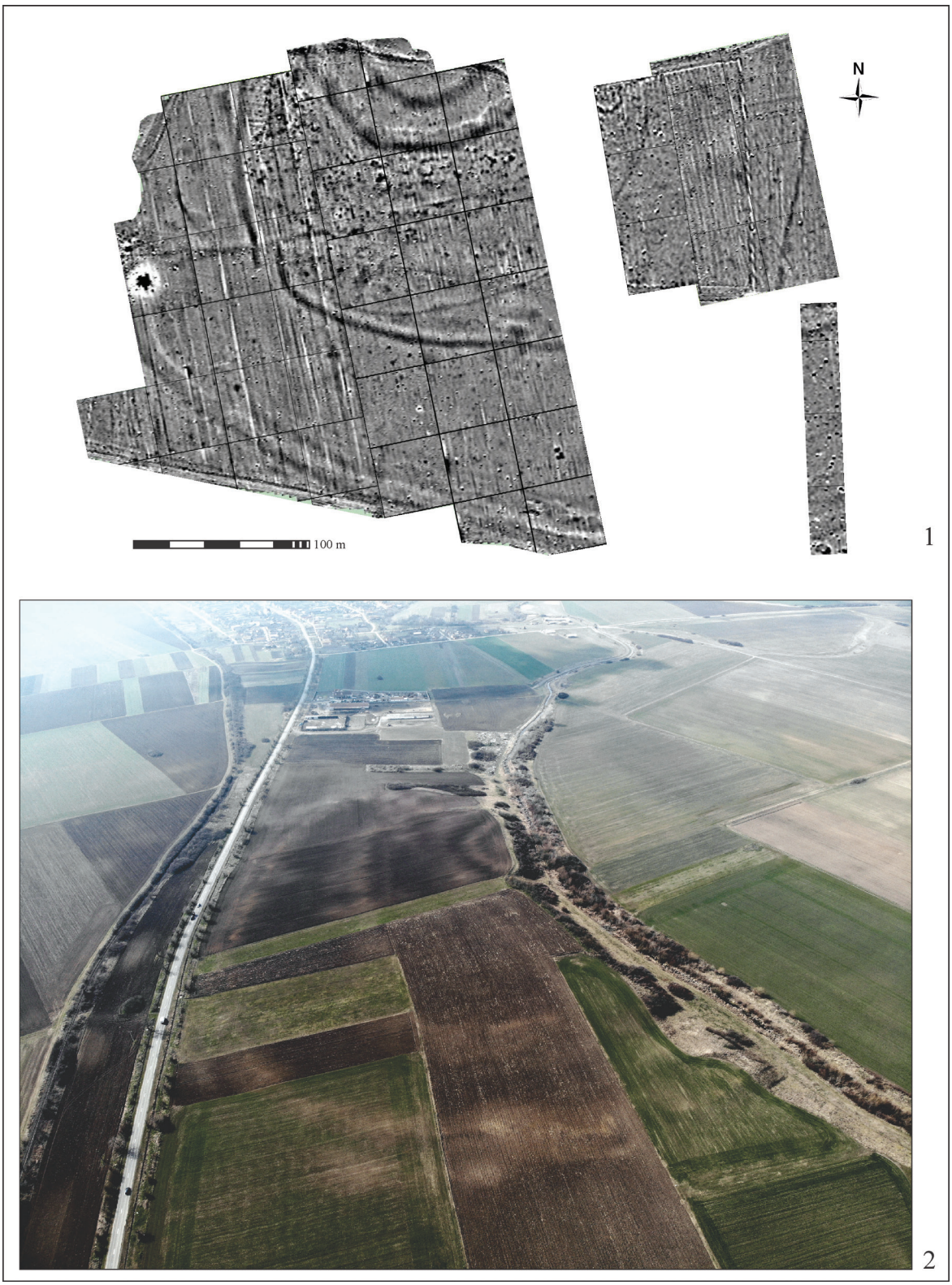

Fig. 9. The MBA tell and mega-fort at Munar-*Wolfsberg*. 1. Results of the magnetometric measurements; 2. Aerial photography (illustration by the authors).

D. Popescu made excavations during 1948–1949 in some of the most interesting prehistoric monuments in Arad County: the tells of Socodor-*Căvăjdia*[64] and Vărșand-*Movila dintre vii*[65]. It should be noted that in 1930 the tell at Socodor was excavated by M. Roska and Nestor Covaciu, and excavations were also made at Vărșand, also in 1930, by the same Roska and Covaciu. The new surveys

[64] Popescu 1956a. A complete history of research at Petric 2014.
[65] Popescu 1956b. A complete history of research at Găvan 2014.

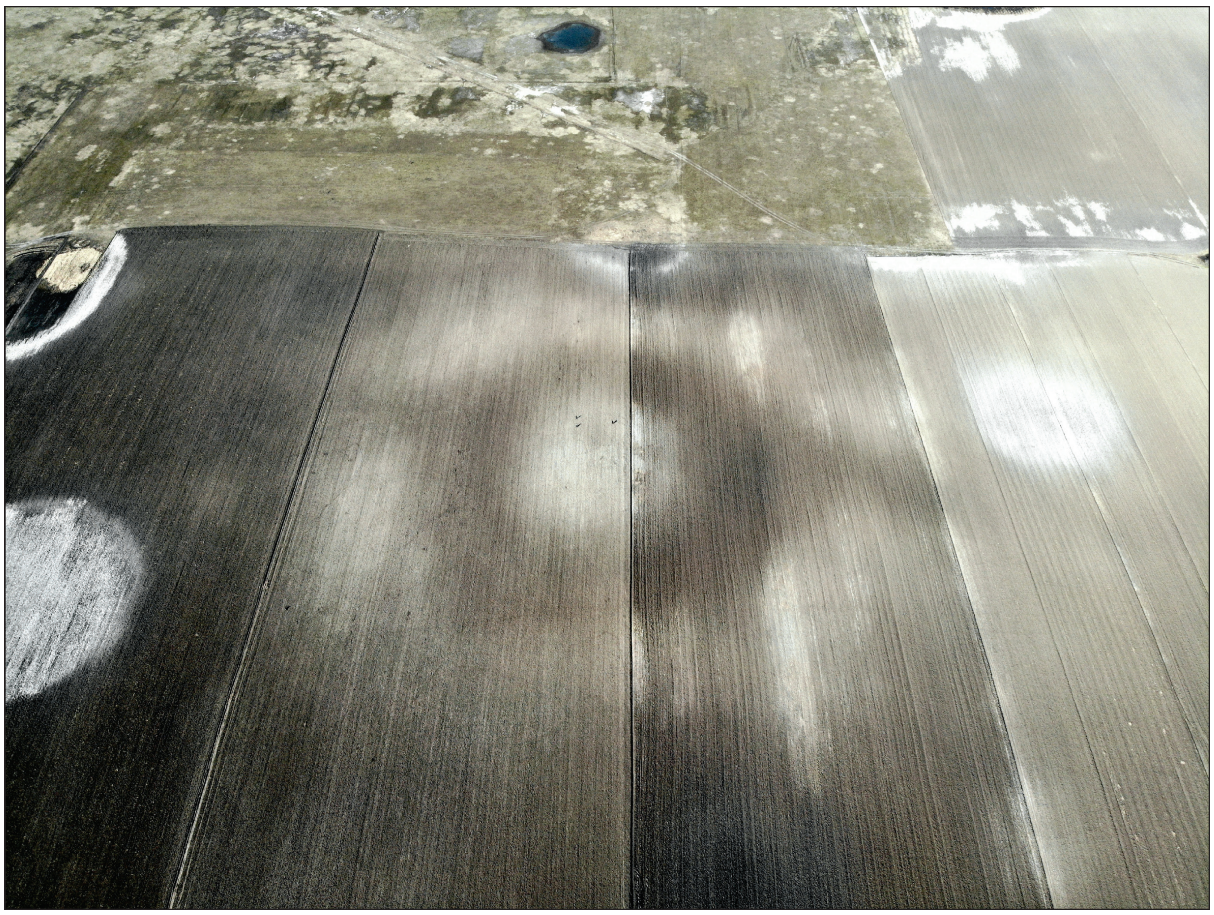

Fig. 10. Aerial photography of the Socodor-*Căvăjdia* MBA tell (photo by the authors).

that we carried out in 2015 and 2016 as part of the project *Living in the Bronze Age Tell Settlements. A Study of Settlement Archaeology at the Eastern Frontier of the Carpathian Basin*, brought new information on the geographical environment in which these sites were formed, their dimensions and their fortification elements[66]. Both are surrounded by circular ditches, and outside of these ditches, as in the case of the tells at Pecica-*Șanțul Mare* or Periam-*Movila Șanțului*, we have identified traces of contemporary habitation. The ditch of the Socodor tell, visible both on the surface and in aerial photographs, encloses an area of approx. 90 × 75/80 m (Fig. 10). The excavations of D. Popescu, who also sectioned the ditch, indicate that it was likely abandoned at some point, and the settlement was extended over it. The archaeological material uncovered here has been attributed to the Cornești-Crvenka ceramic style and not to the Otomani culture as initially proposed[67]. As for the tell at Vărșand, the circular ditch surrounds an area of 130 × 110 m. Here too we found traces of settlement outside the ditch, the site having a total area of approx. 5–6 ha. It is thus much larger than previously thought[68]. From a cultural point of view the settlement at Vărșand is located on the periphery of the Otomani-Füzesabony world[69].

In 2007, Lucian Mercea discovered numerous artifacts in the vicinity of Sântana. Following the report of this find, surface investigations were carried out, which led to the conclusion that the tell can be dated in the MBA[70] (Fig. 11). As in the case of the Socodor and Vărșand tells, here too, a higher circular area is visible, surrounded by a ditch. The area inside the ditch is about 80 × 75/80 m. Surface surveys indicate that the settlement extends beyond this ditch, the entire site occupying an area of

66 Gogâltan, Fazecaș 2018, Fig. 2/1. Unfortunately, the aerial photographs taken by Dan Ștefan in 2016 and the digital elevation models have not been delivered to us, as per contract, to this day. Therefore, it was necessary to redo the aerial photographs at Socodor in spring 2022; Fazecaș, Gogâltan 2020, 26, no. 22 (Socodor), 27, no. 31 (Vărșand).

67 Gogâltan, Fazecaș 2018, 47–49 with older literature.

68 Duffy 2014, 160–161; Gogâltan 2016a, 100; Gogâltan, Sava 2019, 71, Fig. 7.

69 Gogâltan 1999b, 56; Gogâltan, Fazecaș 2018, 49, Fig. 3/1.

70 Sava 2014a; Gogâltan, Sava 2019, 71–72, Fig. 8.

Fig. 11. Aerial photography of the Sântana-*La nord de oraș* MBA tell (photo by the authors).

about 8 ha[71]. The ceramic fragments found on the surface can be attributed to the Cornești-Crvenka ceramic style. While doing field surveys at Sântana-*Holumb/Dealul Popilor* (2009, 2014), we also identified a MBA flat settlement partially overlapping the Eneolithic Tiszapolgár tell[72]; it lies 5 km southwest of the MBA tell.

The tell at Alioș-*Valea Alioșu*, attributed to the Cornești-Crvenka communities, is part of the MBA cultural settlement of the Lower Mureș Basin, but as it is administratively located in Timiș county, it will not be discussed in this paper[73].

Flat settlements

In addition to the aforementioned multi-layered settlements, several flat settlements have been investigated in this area since the first half of the 20th century. These include the one at Satu Mare-*Weingarten*, where Bódog Milleker and István Berkeszi were excavating in the summer of 1905[74], Marius Moga also excavated the site in 1948, but without publishing the results. These investigations led to the collection of a rich number of MBA artifacts, including a mixed hoard (bronze, gold and amber)[75]. A number of older finds from this settlement, such as the seal-headed pins or several pots, indicate an evolution of this site until the LBA[76]. Field investigations in spring 2022 revealed that the whole settlement is much larger than previously considered[77], having in fact an area of ca. 28 ha (Fig. 12).

[71] In this case too, we did not benefit from the aerial photographs, digital elevation models and geophysics done by D. Ștefan in 2015. The aerial photographs were taken in spring 2022.
[72] Sava 2015, 178, with older literature.
[73] Stavilă *et al.* 2020.
[74] Gogâltan 2014a, with older literature. See also Morteanu, Gogâltan 2015.
[75] Kacsó 1998.
[76] Sava, Ignat 2016, 189–190; Sava, Gogâltan 2019, 223, 227.
[77] Gogâltan 2016a, 95, Fig. 7; Gogâltan, Sava 2019, 72–73, Fig. 9 (ca. 7 ha).

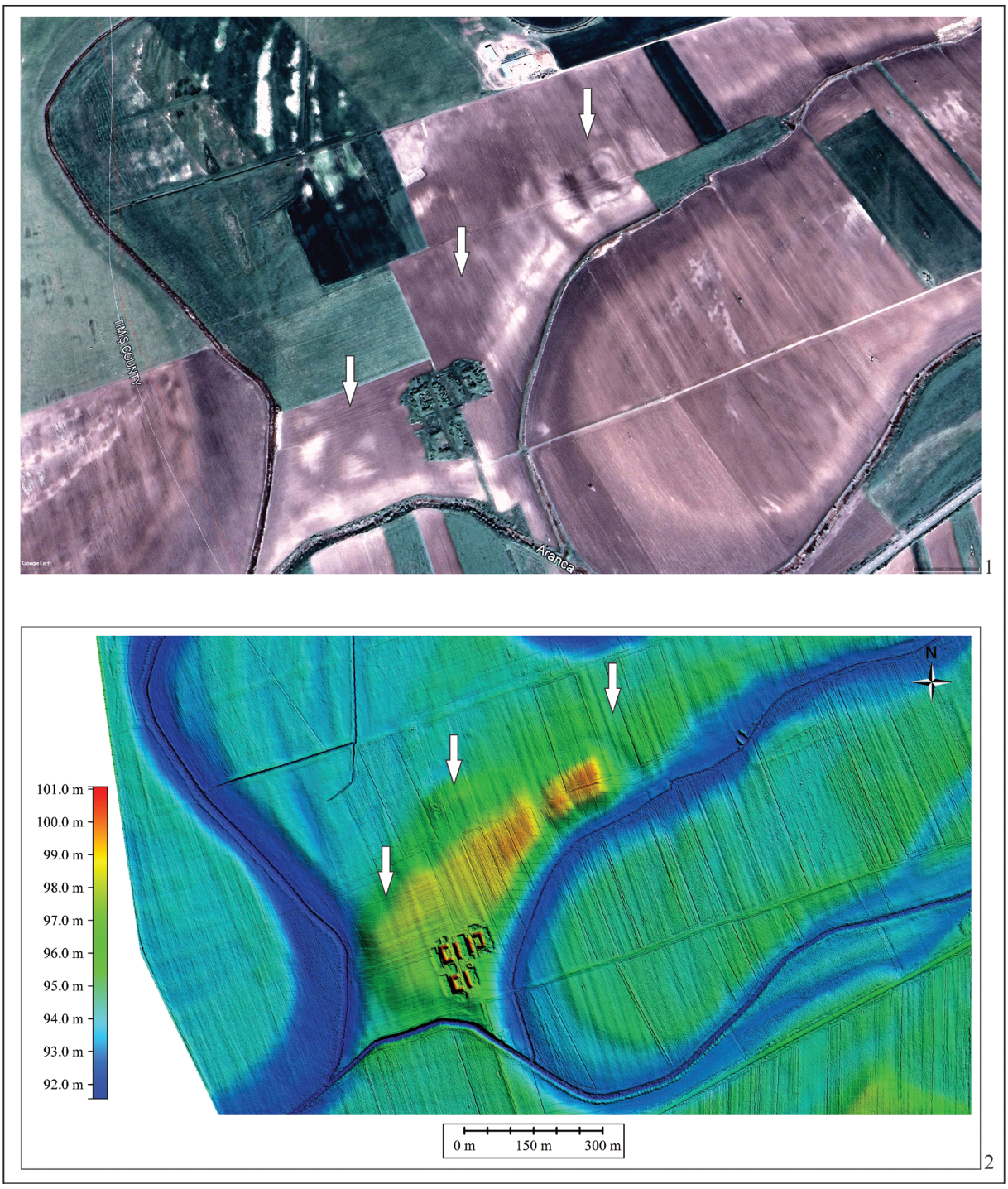

Fig. 12. The MBA settlement at Satu Mare-*Weingarten*. 1. Satellite photography (taken from GoogleEarth); 2. Digital elevation model of the settlement (by the authors).

On the occasion of the construction by the C.A.P.[78] of Olari of a facility for the processing and preservation of dairy products, traces of prehistoric settlements and graves were discovered. After informing Oradea's Museum, Ivan Ordentlich carried out several test trenches in 1964 and 1966. However, information about the site is incomplete. The archaeological material discovered was attributed to the Otomani I phase and the graves to the following phase. Neolithic and Eneolithic ceramic fragments and graves belonging to these two periods were also discovered[79]. Following field research in the summer of 2018 and 2019, we can state that the *Holumb* site is located around a pond and an old water course,

[78] In the Romanian communism regime (1947–1989) collective farms were known as: C.A.P./Cooperativa Agricolă de Producție (Agricultural Production Cooperatives).

[79] Ordentlich 1971, 25, no. 39. See also Sava 2015, 126, Pl. 85/1.

at about 4.4 km west-north-west of the center of Olari, between DC 111 (to the north-east) and the Sântana – Ciumeghiu railway (to the south-west). There has been a sheep pen on the mound for many years, and every time we visited the site there were agricultural crops on the terrace in its immediate vicinity. However, we found a few Bronze Age and 2nd–4th centuries AD pottery fragments[80].

In 1967 and 1968 E. Dörner excavated at Pecica – *Cărămidăria C.A.P. Ogorul* where he identified a settlement with several horizons: "*toarte pastilate/knobbed-handles/Scheibenhenkel*" (Hunyadihalom pottery), MBA and 2nd–4th centuries AD[81]. To the MBA settlement belong four pits. The few ceramic fragments from these excavations, preserved in the collection of the Museum of Arad, can be attributed to the Mureș ceramic style[82].

Another settlement investigated by a test trench is that of Chișindia-*Podul Vechi*, situated at the foot of the Apuseni Mountains[83]. In 1969, Marius M. Moga, a former teacher in the locality, discovered ceramic fragments in the creek bed near the site, which he donated to the Timișoara Museum. A year later, in 1970, Florian Dudaș together with the students of the Sebiș high school carried out a small archaeological excavation. On this occasion, the profile of the Chișindia stream, which runs through the middle of the MBA settlement, was documented. In this profile, numerous ceramic fragments were discovered, as well as other clay and bronze objects. From a stratigraphic point of view, Dudaș's observations reveal the existence of a 0.70 m thick cultural layer, overlain by a yellow alluvial deposition and contemporary humus. The ceramic style developed by the community here can also be found in the tell at Vărșand or in other settlements in the Crișul Alb area, and combines the Cornești-Crvenka and Otomani-Füzesabony traditions[84].

Most MBA settlements in the Lower Mureș Basin are known only from field surveys. From the end of the 19th century there is information about such a settlement at Curtici-*Cârciuma lui Vásárhely*[85]. The ceramic fragments found at that time can be attributed to the Cornești-Crvenka pottery style[86]. A settlement contemporary with the tell at Pecica-*Șanțul Mare* has been identified in the area of Șeitin, more precisely on the high terrace of the Mureș River[87]. Eugen D. Pădureanu has distinguished himself through numerous field surveys, which have led to the discovery of an impressive number of sites. These are the flat settlements of Arad-*Gai*[88], Aluniș-*Dealul molizilor*[89], several settlements within the city of Arad (Grădiște-*I.A.S. Sere*[90], *Palatul cultural*[91], *Uzina de apă*[92], *Bufnița 1*[93]), Cicir-*Spinul lui Stanca*[94], Cuvin-*Valea Danciului*[95], Frumușeni–*2,5. km sud de șa*[96], Nădlac[97], Vinga-*Izvor*[98]. With the exception of the site Arad-*Palatul cultural*, which according to the information provided by E. Dörner belongs to the Mureș culture, all these sites were attributed to the Otomani culture[99]. They are, however, characteristic of the Cornești-Crvenka ceramic style[100].

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80 Field surveys by Gruia Fazecaș, Victor Sava, Marian Lie, Florin Gogâltan (Gogâltan, Sava 2019, 73, Fig. 10).

81 Sava 2010. Among the artifacts preserved in the collections of the Museum of Arad there are no La Tène materials. On the other hand, during the 2008 field survey, pottery characteristic of the 2nd–4th centuries AD were discovered.

82 Gogâltan, Sava 2019, 73–74.

83 Dudaș 1975.

84 Gogâltan 1999b, 56; Gogâltan, Sava 2019, 74.

85 Pósta 1899.

86 Gogâltan, Sava 2019, 74.

87 Blăjan *et al.* 1976.

88 Pădureanu 1988b, 39; Pădureanu 2018 (without the Bronze Age finds). The settlement of Arad-*Gai* is actually known since 1899. See a history of research at Sava, Pădureanu 2009, 36–37. The unpublished materials in the collection of the Arad Museum belong to the Mureș ceramic style (not to the Otomani culture as it appears in Pădureanu) and to the LBA.

89 Pădureanu 1973, 395, Fig. 1; Pădureanu 1985, 30, Pl. IV/1–2. See also Stavilă 2014 (Aluniș 1).

90 Pădureanu 1985, 28.

91 Crișan, Hügel 1999, 27. This settlement was discovered by the collector Gheorghe Miloia from Arad. Part of his collection was donated to the Arad Museum by E. D. Pădurean.

92 Pădureanu 1985, 29; Pădureanu 1988a, 509, Pl. IV/1–20; V/1–15.

93 Pădureanu 1985, 29; Pădureanu 1988a, 507–508, Pl. II/1–15; III/1–7.

94 Pădureranu 1973, 399–400, Fig. 3; Pădureanu 1985, 31, Pl. IV/6–10.

95 Pădureanu 1988a, 510, Pl. VI/9–12.

96 Pădureanu 1985, 33–34; Pădureanu 1988a, 510, Pl. VII/1–4.

97 Pădureanu 1988a, 39. It is possible that the 5 pots and a bronze ring referred to by I. Ordentlich, following information from E. Dörner, and discovered in the area of Nădlac, come from the same settlement (Ordentlich 1971, 25, no. 38).

98 Pădureanu 1985, 41; Pădureanu 1988b, Pl. XIV/7.

99 Ordentlich 1971.

100 Gogâltan 1999b; Gogâltan 2004; Gogâltan, Sava 2019, 74–75.

Some of these settlements and also some new ones from the Vinga Plain, which we are interested in, were visited and studied by Octavian Rogozea (Vinga- *Izvor/Site 6*)[101]. Victor Sava recovered information about the settlement of Macea-*Topila*, where there is also a MBA settlement that can be attributed to the Cornești-Crvenka ceramic style[102].

In the last decade, the members of the Museum of Arad have carried out a series of field surveyss in order to locate and delimit several sites mentioned in the literature or to identify new ones. These include Horia-*Slatini/Site V6* (covering approx. 9 ha), previously found by E.D. Pădureanu, two sites belonging to the Mureș ceramic style at Pecica-*Terasa Nordică-Site 14* (approx. 7–8 ha) and Semlac-*Site 5* and a very interesting Cornești-Crvenka settlement of approx. 5 ha at Vinga-*Site 19*. A large amount of pottery and adobe were observed on the surface of the sites at Horia and Vinga[103].

Material Culture

In the following section we will present the most characteristic MBA types of artifacts, such as metal and pottery, as they are able to provide answers about a possible material continuity between the MBA and LBA. Another argument in favor of discussing the above mentioned objects is that the entire relative chronology of the MBA has been based on their analysis.

Metals

Bronze artifacts are also a barometer of the social and economic development of the MBA communities in Lower Mureș Basin. Isolated discoveries, bronze or gold hoards have constantly attracted the attention of specialists for the technological innovations they represent, their artistic value, but above all for establishing relative chronological landmarks[104]. From today's perspective, they also represent evidence of the social inequalities that also characterize the MBA society[105].

A representative discovery in this respect is the hoard found in 1905 in the Satu Mare-*Weingarten* settlement. Towards the end of the MBA, four different types of axes, two knives, two arm guards, a harpoon, two simple bracelets, 14 pendants of various shapes, a fragmentary spiral tube, 7 gold rings and 3 amber beads were deposited, probably under a hearth[106] (Fig. 13–14). The combination of weapons and ornaments is thus remarkable, as is the symbolic value of the bronze-gold-amber association. These are not the only objects found at Satu Mare that can be linked to the existence of elites. In addition to these, there are two other stray finds: an arm guard and a fragmentary clay mould for casting daggers[107].

Vladimir Dumitrescu published in 1941 a discovery acquired in 1938 by the National Museum in Bucharest from the village of Rovine, on the right bank of the Mureș River, near the the town of Pecica. During agricultural work at *Pruniște*, a small clay pot was found, in which 48 conical gold pendants, a decorated knob made of the same material and two *Columbella* shells were deposited[108] (Fig. 15). The find has entered the literature under the name of Pecica-*Rovine* and is dated to MBA II[109]. It should be noted that the place name *Rovine* is found on older maps in the western part of the present town of Pecica, also known as Hungarian Pecica (Magyarpécska)[110]. D. Popescu stated that in 1943, when he was excavating at *Șanțul Mare*, he checked the information concerning this discovery and came to the conclusion that it was in fact made on the tell at *Șanțul Mare*[111]. In support of this hypothesis comes the information provided by I. H. Crișan, who also made excavations at *Șanțul Mare*

[101] Rogozea, Rogozea 2016, 170–171.
[102] Sava 2009.
[103] Gogâltan, Sava 2019, 75.
[104] Gogâltan 1999a; Soroceanu 2012; Găvan 2015.
[105] Dani *et al.* 2016, 219.
[106] Kacsó 1998; Gogâltan 1999a, 104–105; Soroceanu 2012, 100–103.
[107] Gogâltan 1999a, 106–107; Gogâltan, Sava 2019, 75.
[108] Dumitrescu 1941.
[109] Gogâltan 1999a, 101, no. 32, with older literature.
[110] https://www.arcanum.com/hu/online-kiadvanyok/ErdelyHelysegnevTar-erdely-bansag-es-partium-torteneti-es-kozigazgatasi-helysegnevtara–1/telepulesek–1C9/r–1190/rovine–1249/?list=eyJmaWx0ZXJzIjogeyJNVSI6IFsiTkZPX0tPTllfRXJkZWx5SGVseXNlZ25ldlRhcl8xIl19LCAicXVlcnkiOiAiUm92aW5lIn0.
[111] Popescu 1944a, 130, no. 1 („Nach von uns an Ort und Stelle im Laufe des Jahres 1943 eingeholten Erkundingungen, ist diser Fund auf dem bekannten bronzezeitlichen Hügel «Șanțul Mare» (vgl. Oben S. 60 ff.) bei Pecica-Rovine zu Tage gekommen. Gleichzeitig konnten wir die Erfahrung bringen, dass die Goldsachen tatsächlich in dem mitveröffentlichtem Gefäss lagen").

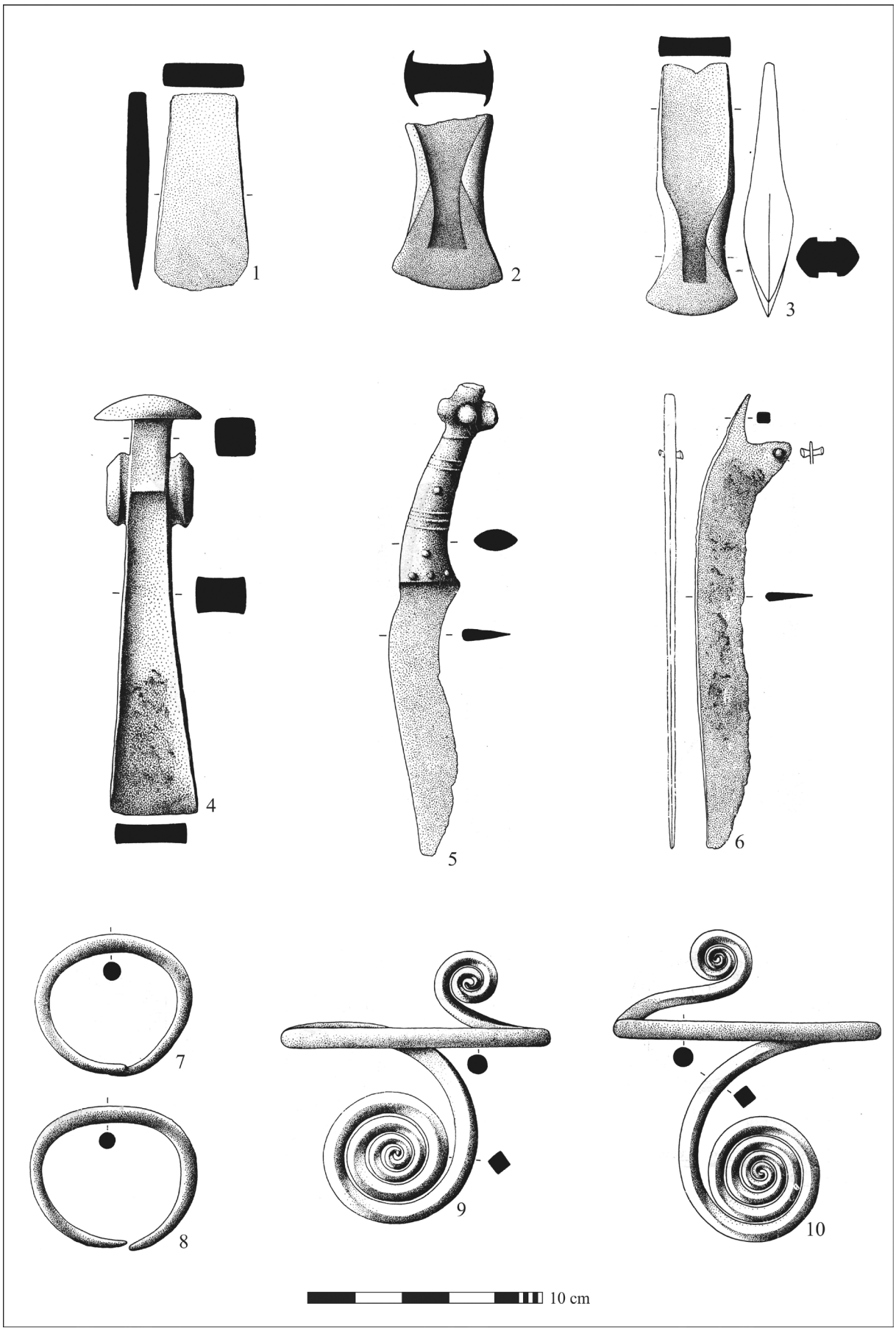

Fig. 13. MBA hoard of Satu Mare-*Weingarten* (after Kacsó 1998).

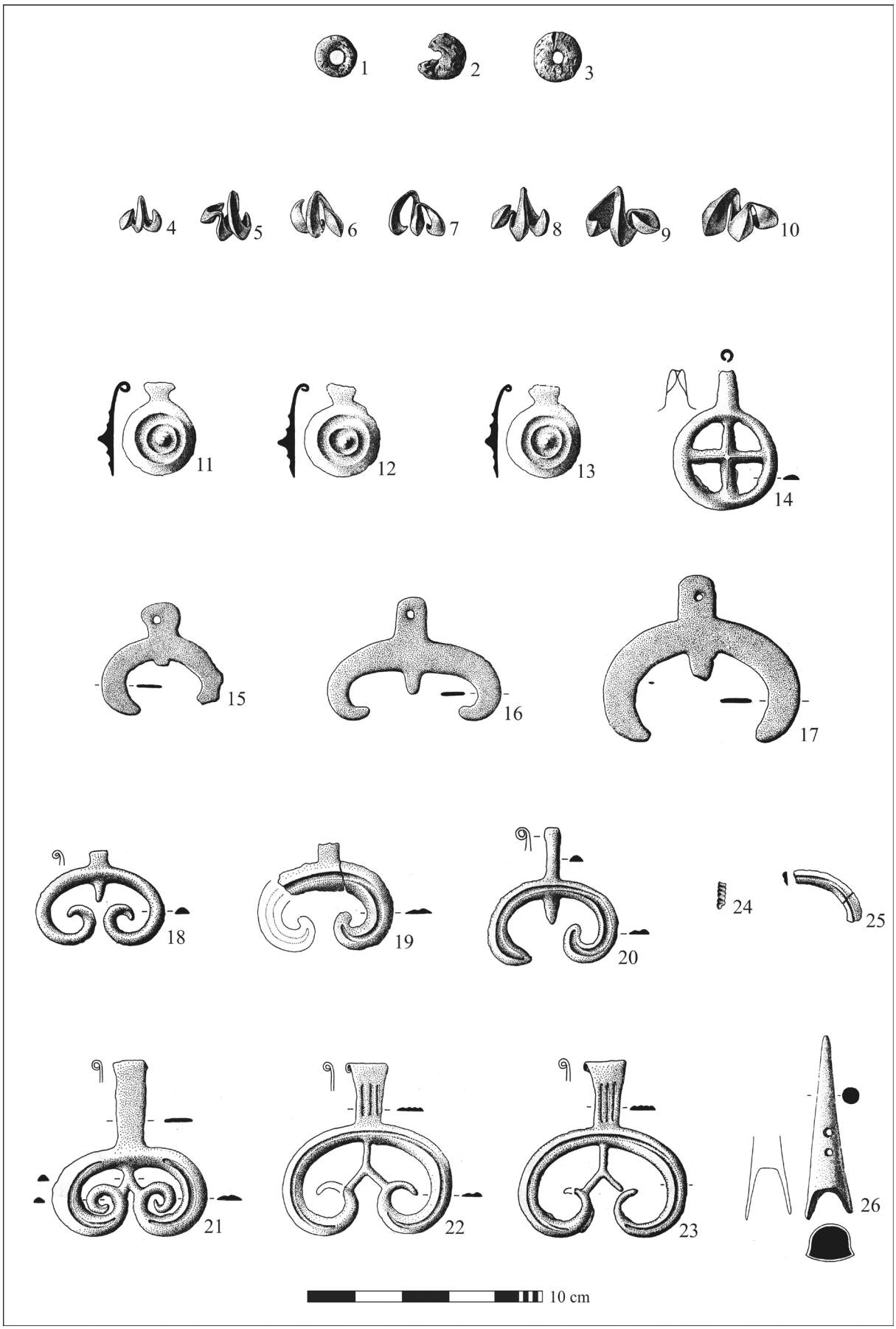

Fig. 14. MBA hoard of Satu Mare-*Weingarten* (after Kacsó 1998).

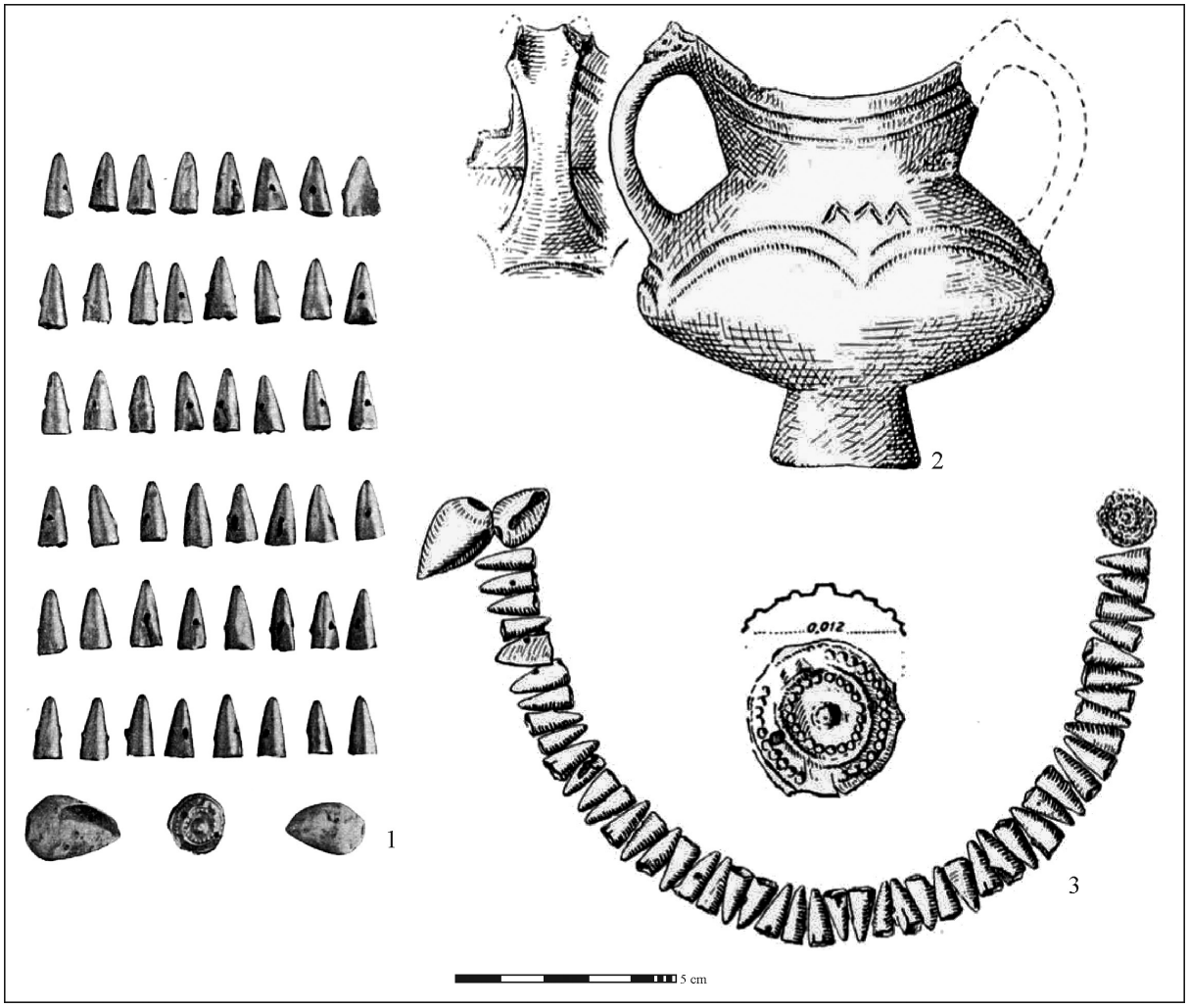

Fig. 15. MBA hoard of Pecica-*Rovine* (after Dumitrescu, 1941).

and who states that: "In the vicinity of "*Șanțul Mare*" on the place called "Pruniște", an inhabitant of the Rovine village discovered by chance, in 1938, occurred during the plowing, a clay pot containing 48 gold cones..."[112]. In the same vein, we should also mention that in some reports written by E. Dörner and I. H. Crișan, concerning the archaeological excavations at *Șanțul Mare* in the 1960s, the location "Rovine" is equated with "Șanțul Mare"[113]. It is therefore very likely that this hoard was discovered on the tell, or at least in the settlement outside the ditch. In fact, in level II after Roska at Pecica-*Șanțul Mare* a gold button was found, similar to the one in the Rovine hoard but undecorated[114]. The two gold hair rings, which D. Popescu considers as coming from Pecica-*Rovine*[115], are in fact part of the so-called Pecica I hoard[116].

A hoard composed of bronze artifacts and three canines from an undeterminable species of animal, was found in 1949 during the excavations of D. Popescu at Vărșand-*Movila dintre vii*[117]. T. Soroceanu also discussed the possibility of the existence of two other hoards discovered during the earlier excavations of N. Krammer and B. Posta[118]. It is difficult to say whether the latter really represent unitary collections of artifacts or are isolated objects found during excavations in the settlement. What is certain is that some of them belong to the LBA, a fact also stated by T. Soroceanu. This is why

[112] Crișan, Hügel 1999, 96, nr. 3.
[113] Unpublished reports in the archives of the Arad Museum.
[114] Găvan 2015, 210, footnote no. 20, with older literature.
[115] Popescu 1956c, 200, Fig. 118/4, 6.
[116] See Márki 1892, 16; Popescu, Rusu 1966, R 14/5–6; Soroceanu 2012, 73, Taf. 21/2a,b–3a, b.
[117] Popescu, Rusu 1966, R9/1–9.
[118] Soroceanu 2012, 118–126.

Fig. 16. MBA golden hoard of Grăniceri (1–2, 4–5, 7–8 after Márton 1909; 3, 6, 9 after Mozsolics 1968).

Alexandra Găvan considered the existence in the tell at Vărșand of a number of 56 finished artifacts, two of which are gold, besides the 1949 hoard[119].

Three beautifully decorated gold phalera, whose context of discovery is unknown, come from the locality of Grăniceri, also located in the Crișul Alb River Basin (Fig. 16). They entered the collection of the Hungarian National Museum in Budapest during 1903 and were considered by József Hampel and Lajos Márton to be made in the "Hallstattian" style of late bronze[120]. The phaleras have diameters of 13.5, 13.6 and 15.4 cm and weigh 82.31, 79.6 and 85.55 grams respectively[121]. They are decorated with small beads in the *au repoussé* technique suggesting linear, circular, spiral or figurative motifs. There is a phalera showing the silhouettes of facing waterfowl (Fig. 16/4–6), or another, destroyed since antiquity and repaired with silver wire, on which two stallions, a waterfowl and a human figure holding a triangular container are found in the same register (Fig. 16/7–9). Behind it we suspect the existence of another figure, which led L. Márton to assume a coitus scene[122]. The representations on this phalera

[119] Găvan 2015, 227–229.
[120] Hampel 1903, 427–428; Márton 1909.
[121] Mozsolics 1968, 31–32.
[122] Márton 1909, 414.

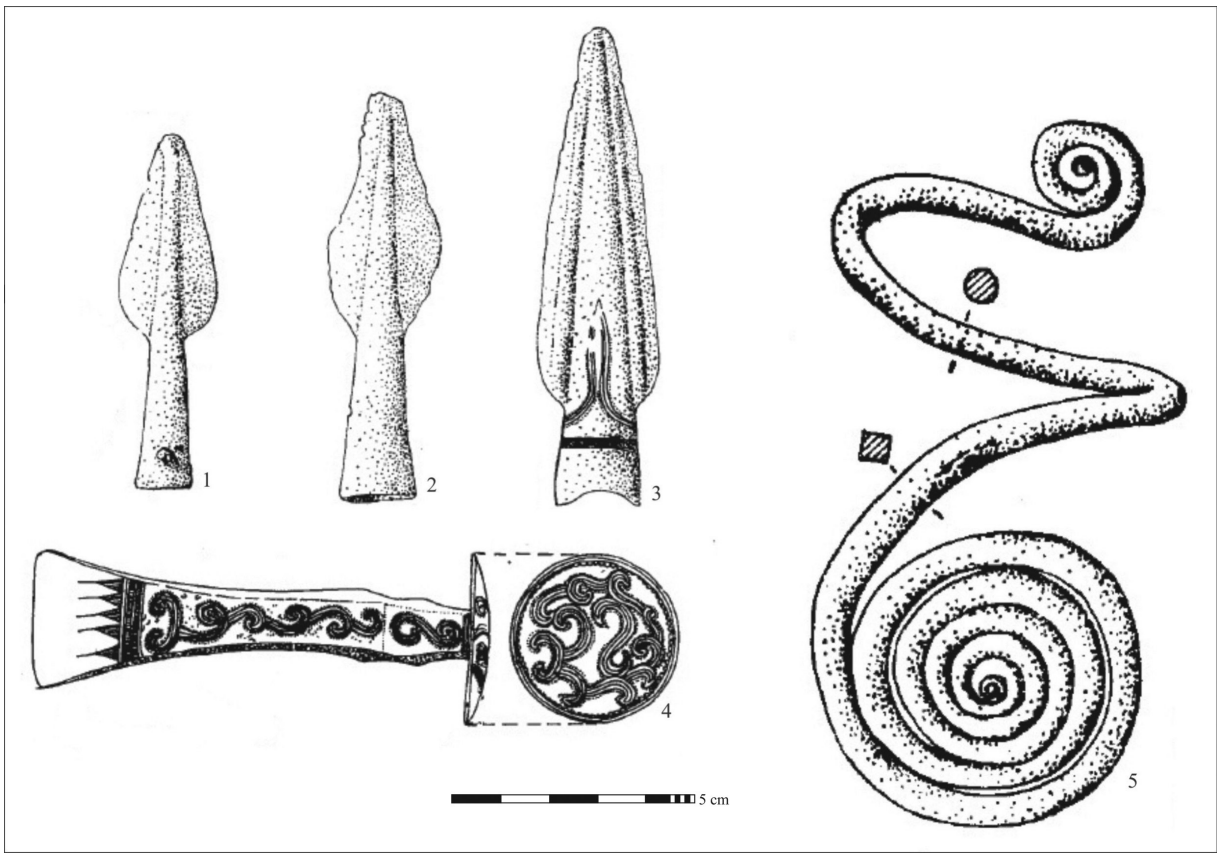

Fig. 17. MBA bronze hoard of Păuliș (after Popescu, Rusu, 1966).

are so far unique in the Carpathian Basin, but the shape of the artifacts and the rest of the decorative elements would allow us to date them to the first half (Hajdúsámson horizon) or the middle of the 2nd millennium BC[123].

In this context, it is worth mentioning the alleged bronze hoard at Păuliș, discovered in unclear conditions sometime in the late 19th century (Fig. 17). The supposed hoard consists of an axe, three spearheads and an arm guard[124]. To these would be added a bracelet with pointed ends[125]. It should be noted, however, that one of the spearheads, with inv. no. 1686 (Museum of Arad), is in the museum's records from 1898, a year before the other objects listed[126]. From the archives of the museum in Arad and from the old inventory register we learn that during this period L. Dömötör carried out excavations on the territory of the locality, and the artifacts may have come from one or more sites[127].

From a chronological point of view, the Pecica-*Rovine* hoard has been dated during MBA II and the beginning of the following period (MBA III)[128]. The gold phaleras from Grăniceri can probably be dated to the same timespan. The Satu Mare hoard and Păuliș assemblage are obviously later, being attributed to the MBA III period, possibly LBA I, as this period has been defined for the studied region[129]. They would be contemporary with the Koszider horizon, which has traditionally been associated with the end of the MBA in the Carpathian Basin[130]. The new ^{14}C data would indicate for this horizon the chronological interval of ca. 1600–1450 BC[131]. However, there is a consistent overlay of the Koszider period with the Lower Mureș LBA I, as shown by the existing data. This fact may imply

123 Mozsolics 1968, 31–32, 49, Taf. 23/2, 24/1–2; Kovács 1999, 55–56, Abb. 21, 21a; Kemenczei 1999, 123, no. 25.
124 Popescu, Rusu 1966, R5/1–5.
125 Soroceanu 2012, 69, 71.
126 Gogâltan 1999a, 99.
127 Hügel *et al.* 2012, 9; Gogâltan, Sava 2019, 76–77.
128 Gogâltan 1999a, 190.
129 Sava, Gogâltan 2019.
130 Vicze *et al.* 2013; Fischl *et al.* 2013; Jaeger, Kulcsár 2013, Tab. 1; Kiss *et al.* 2019, 187–190, 191; Polányi 2022, Fig. 3.
131 Kiss *et al.* 2019, 187–190, 191.

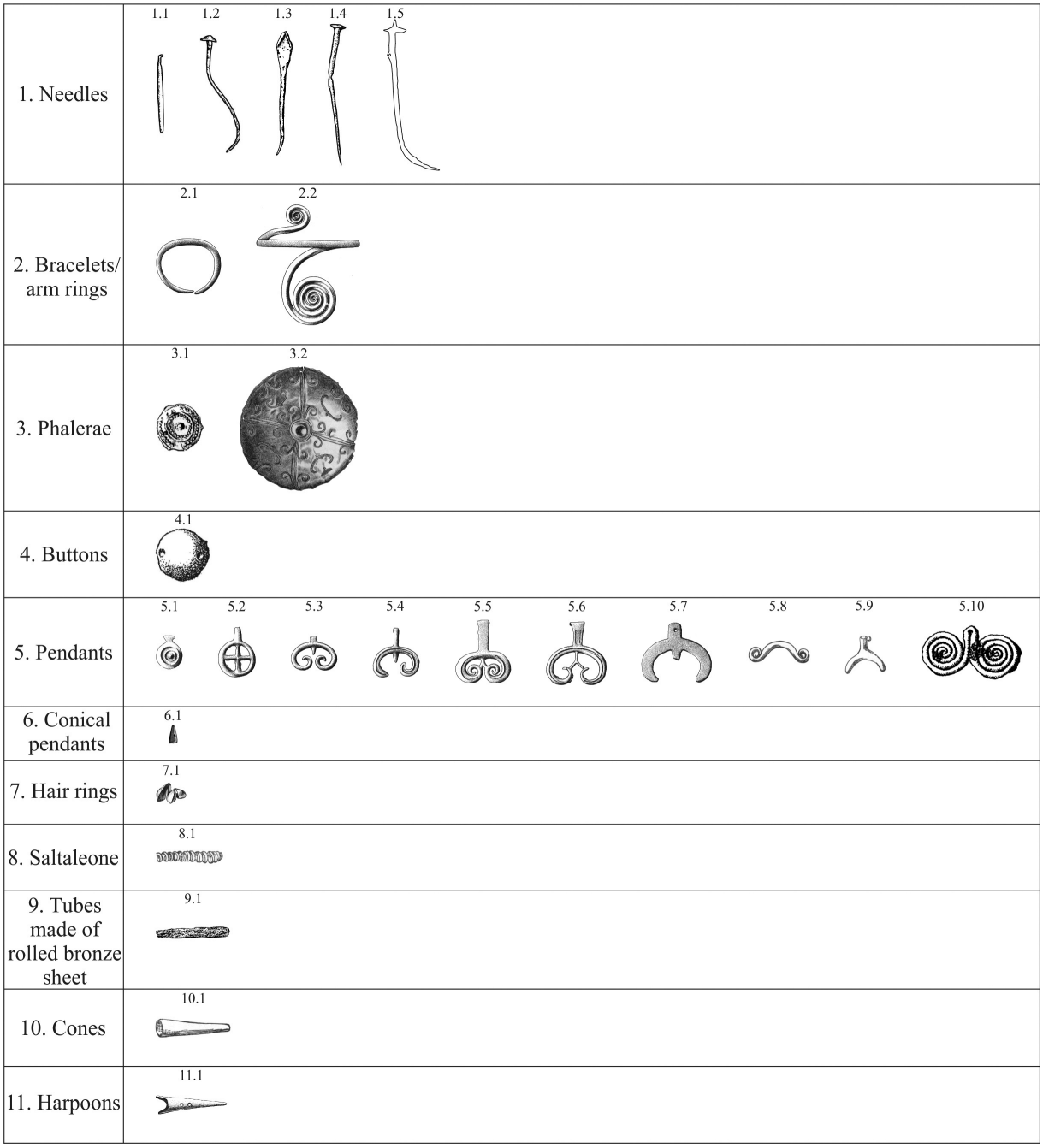

Fig. 18. Typology of the MBA metal made jewellery discovered in the studied area (graphics by the authors).

the possibility that these hoards may actually belong to the LBA I and change our perspective on this topic. Consequently, hoards become visible in the archaeological contexts of this area with MBA II, but during MBA III the amount of metal accumulated in such contexts increases exponentially, a fact also observed in other areas[132].

Most metal artifacts, made of both bronze and gold, come from tells. There are 124 objects compared to 50 artifacts from hoards found outside the settlements[133]. The very large number of gold objects is a further argument in favor of discussing the social and economic status of those who lived in these settlements. A special situation among the Bronze Age tells in the Carpathian Basin was found at Pecica-*Șanțul Mare*, where consistent evidence of metalworking was uncovered. Thus, from the old excavations, 23 metal objects, and 31 artifacts related to metalworking are known, mainly

[132] Dani *et al.* 2016, 235, Fig. 14.
[133] This statistic does not include moulds.

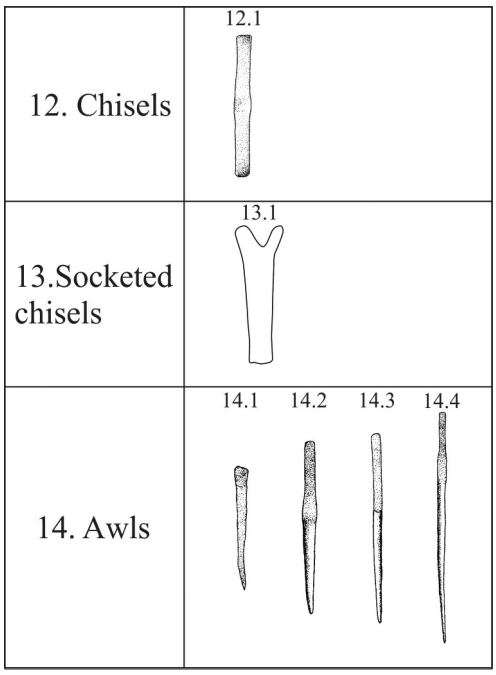

Fig. 19. Typology of the MBA metal made tools discovered in the studied area (graphics by the authors).

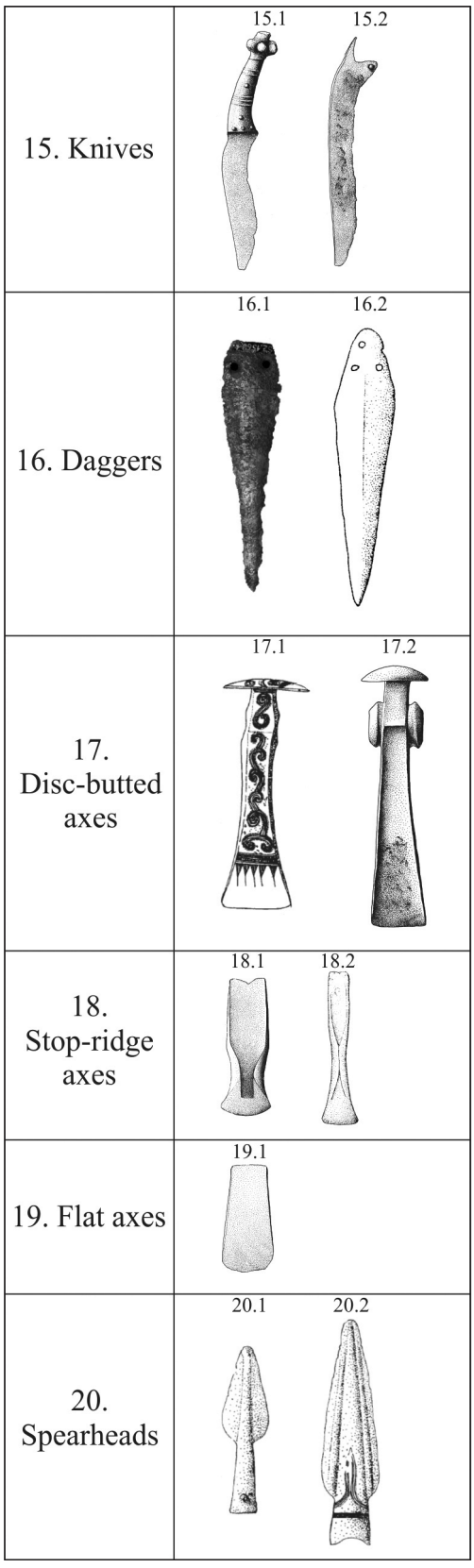

Fig. 20. Typology of the MBA metal made weapons discovered in the studied area (graphics by the authors).

moulds for casting axes[134]. In addition to these, there are numerous fragments of slag or crucibles or small bronze objects found during the 2005–2015 excavations[135]. What is also very clear is the large difference between the number of metal artifacts found in the tell settlements and the flat settlements. This observation is certainly also strongly influenced by the larger number of excavation campaigns carried out in the tell of Pecica-*Șanțul Mare* (24 campaigns) and Vărșand-*Movila dintre vii* (3 campaigns). As we have seen, the areas excavated in the two tells account for 87% (2634.4 m^2) of the total areas excavated in the MBA sites (Tab. 2). In the absence of MBA funerary contexts in the area studied, we cannot speak of any preference for the deposition of certain types of metal artifacts.

Statistically, by far the most numerous metal objects found in the tells from the Lower Mureș region are ornaments (Fig. 18; 21–23). Within this category the most diverse types are pendants, followed by needles. Most types of ornaments are made of bronze, but phaleras, loop earrings and conical pendants are exclusively made of gold (Fig. 22). Tools are obviously made of bronze, with only a few types being noted (Figs. 19; 22–23). Weapons represent another category (Fig. 20), and of these the most common are spearheads (Figs. 22–23), in contrast to the large number of

[134] Gogâltan, Găvan 2014; Găvan, Gogâltan 2014; Găvan 2015, 209–212; Găvan 2020; Găvan, Gogâltan 2022. The moulds were not included in our statistics on the number of metal artifacts in the tells.

[135] O'Shea *et al.* 2011, 73; Nicodemus *et al.* 2015, 112.

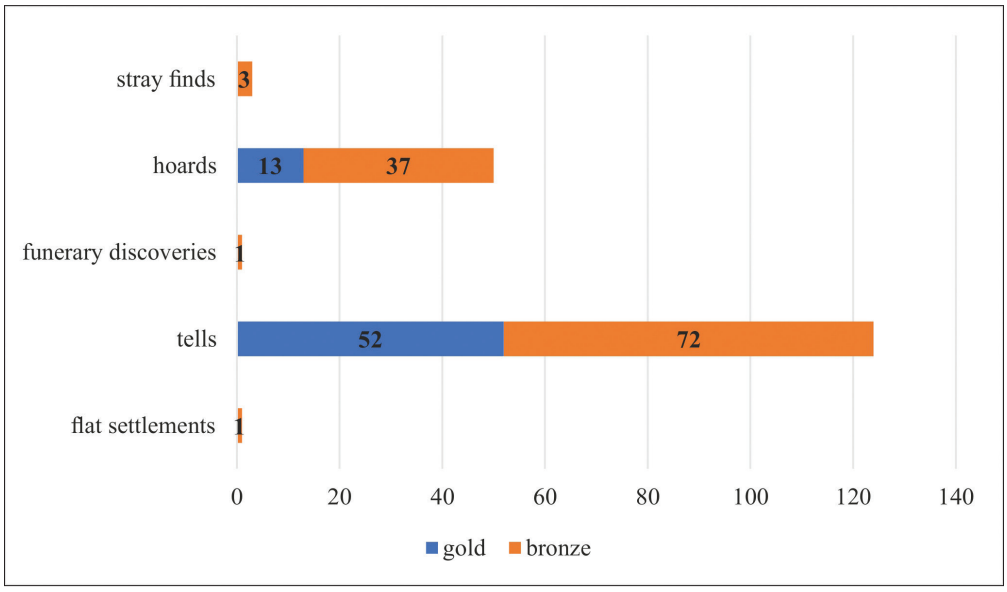

Fig. 21. Distribution of metal items according to the find context (graphics by the authors).

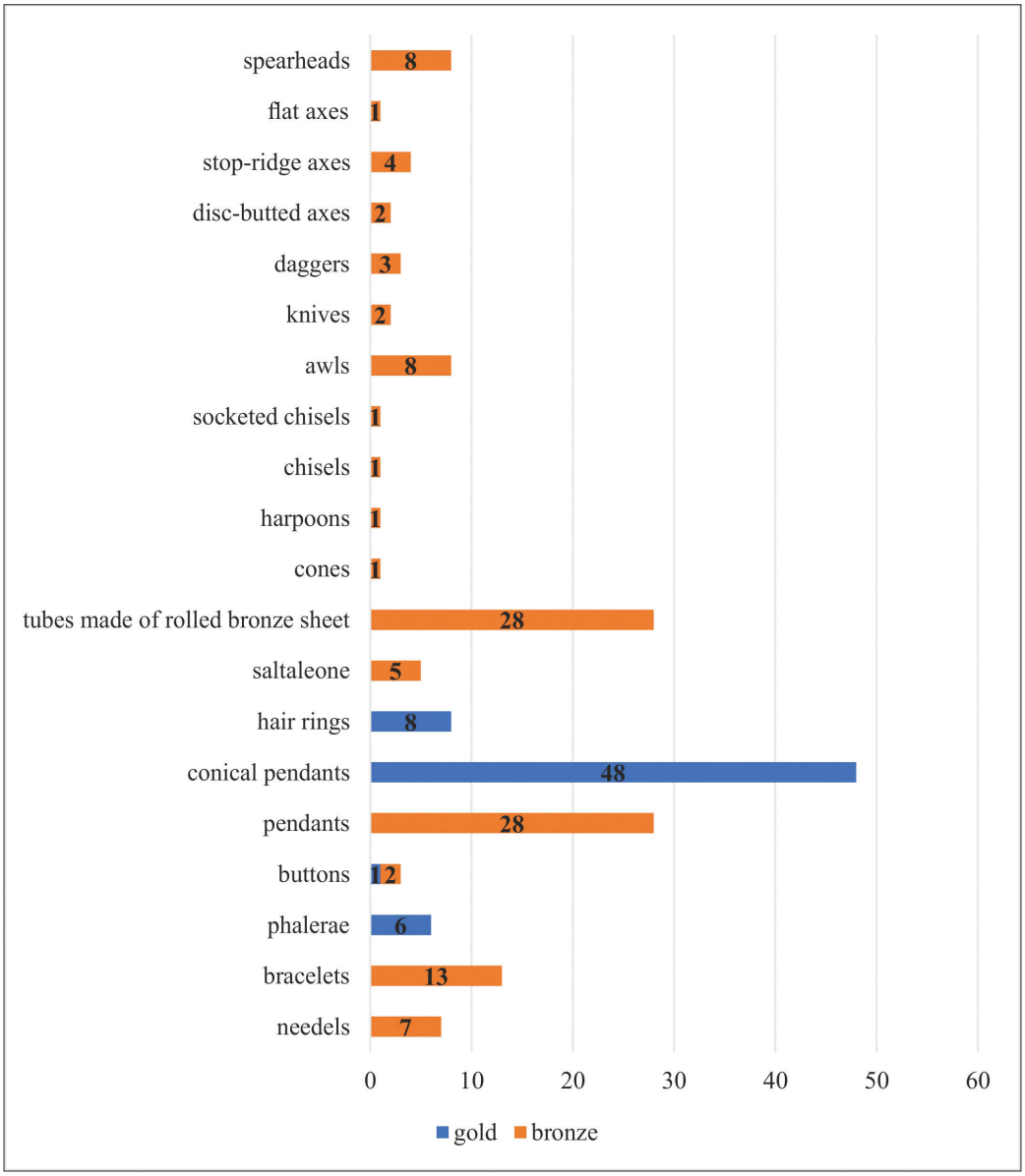

Fig. 22. Distribution of metal items according to types (graphics by the authors).

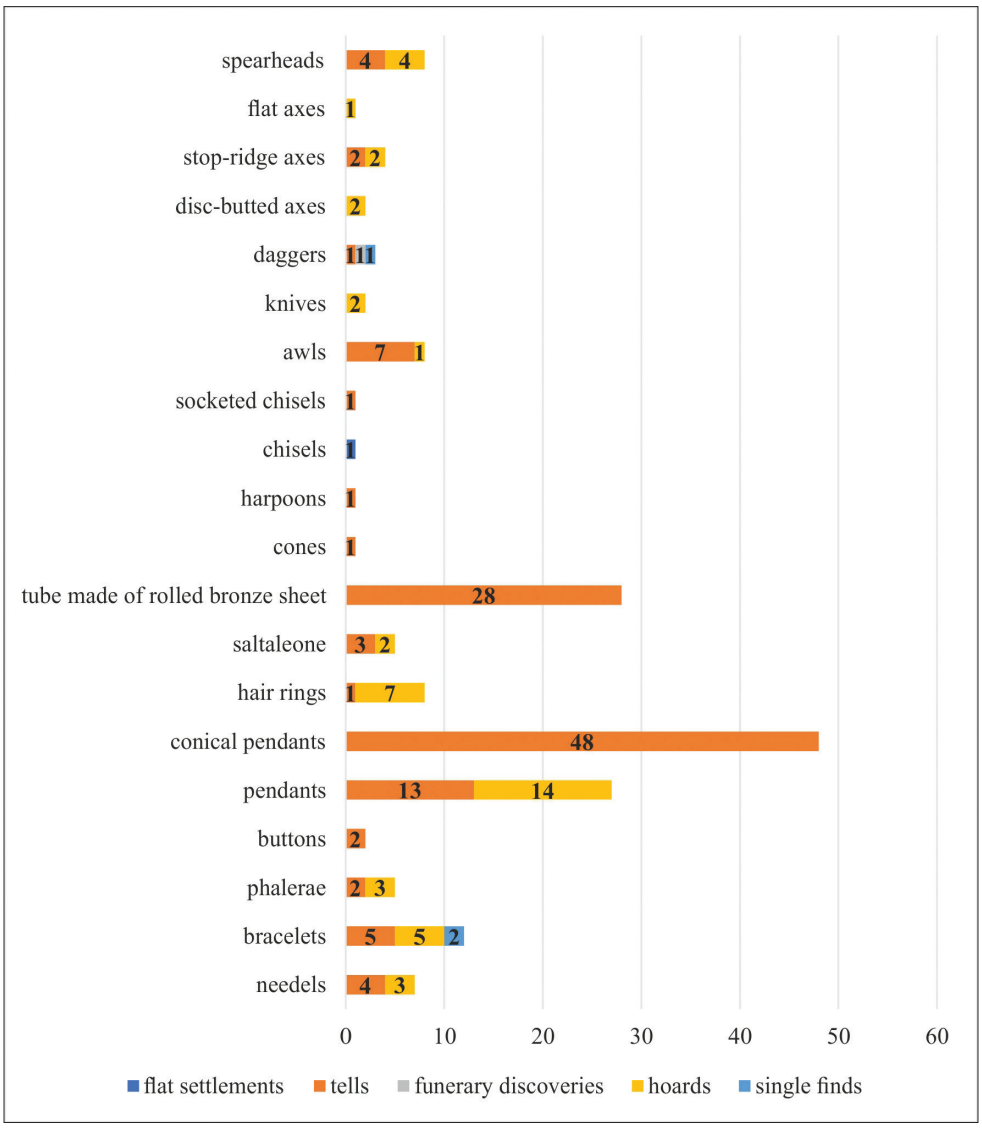

Fig. 23. Distribution of metal items according to types and find context (graphics by the authors).

moulds for various types of axes found in the Pecica tell (Fig. 33). Although towards the end of the MBA the new Apa-Hajdúsámson swords appear in some parts of the Carpathian Basin[136], we did not find them in the Lower Mureș Valley.

Ceramics

MBA ceramics from the Eastern Carpathian Basin are illustrated by a range of regional and micro-regional styles. In the Romanian Banat and north of the Mureș River up to the Crișul Alb River, the ceramic style called Cornești-Crvenka is widespread[137]. The western part of the Lower Mureș Basin, in the triangle formed by the Mureș, Aranca and Tisa rivers, is characterized by Mureș/Maros pottery[138], while the Criș, Barcău, Ier and Lower Șomeș Basins represent the eastern and south-eastern area of the Otomani-Füzesabony cultural complex[139], while the Wietenberg ceramic style is used in Transylvania[140].

Thus, in the region there are three ceramic styles, distributed in distinct geographical areas. The most widespread communities are those using Cornești-Crvenka pottery (Figs. 24; 30–31). They

136 Bader 1991, 37–51; Kemenczei 1991, 8–10; David 2002, 369–383, 388–390, 408–409.
137 Gogâltan 2004; Gogâltan, Sava 2019, Fig. 12. It represents the northern variant of the Vatina culture. For the rest of the area see recently Ljuština 2022.
138 Soroceanu 1991, Abb. 1–2.
139 Molnár 2014; Fazecaș, Gogâltan 2019.
140 Boroffka 1994; Bălan *et al.* 2016.

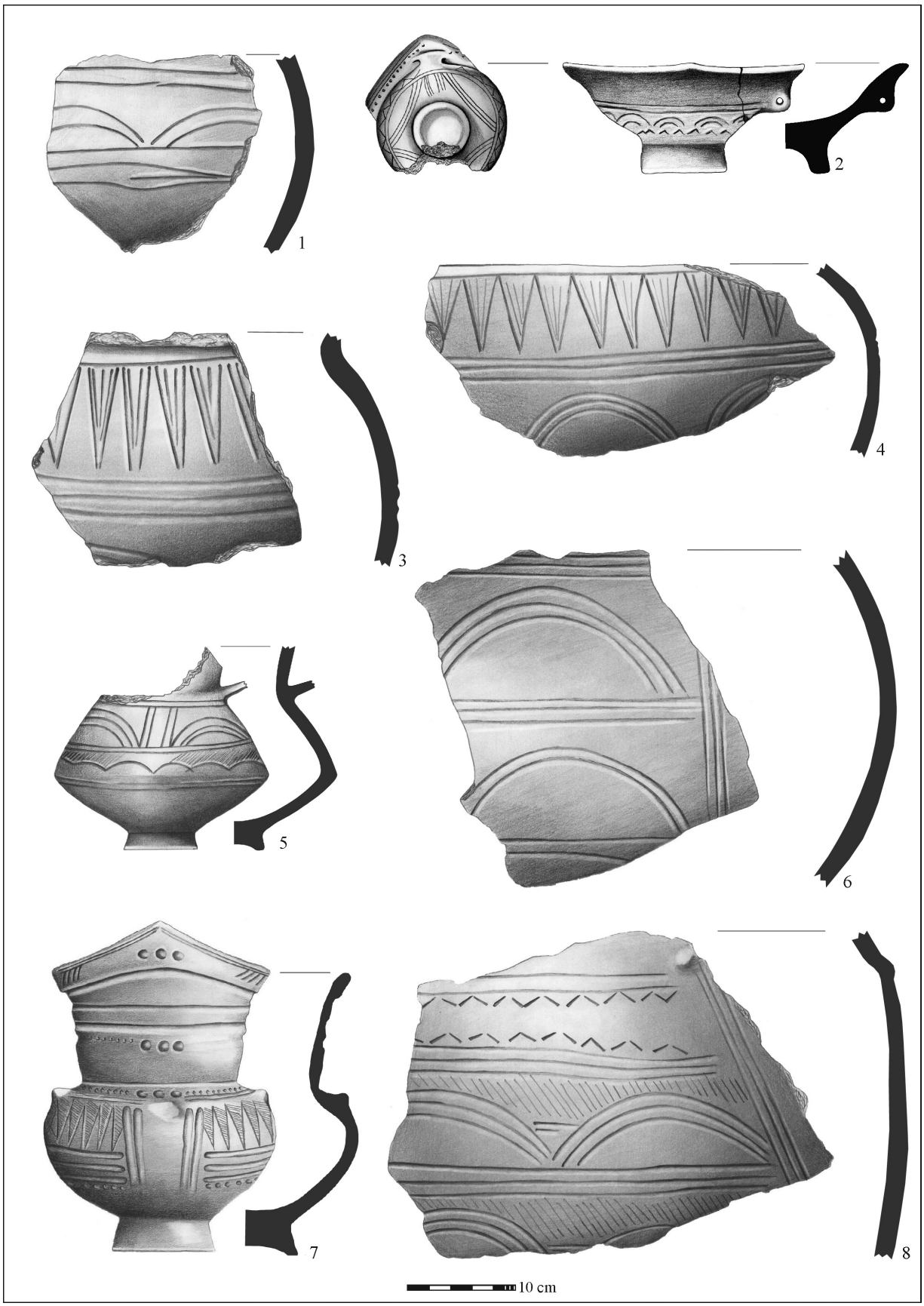

Fig. 24. MBA Cornești-Crvenka pottery from Socodor-*Căvăjdia* (Roska and Covaciu's excavations from 1930) (drawings by Paul Petric).

populated the high plains at the base of the Apuseni Mountains, the southern bank of the Mureș River up to the valley of the Crișul Alb River. The Mureș pottery is widespread in the Aranca valley and on the northern bank of the Mureș Rivers, while the Otomani-Füzesabony pottery is known only in the Criș area (Fig. 31).

Before these classical MBA styles appeared, pottery from the end of the EBA was decorated in general with broom and comb (Early Mureș phase)[141], to which were added so-called pseudo-textile impressions („Besenstrich und Textilmuster" pottery horizon)[142]. This type of pottery ornamentation is specific to ca. 2200/2000–1900/1800 BC and has been documented mainly in the Semlac-*Livada lui Onea* tell[143], but also in the early levels of the Pecica-*Șanțul Mare*[144] and Socodor-*Căvăjdia*[145] tells or in the Cicir-*Spicul lui Stanca* settlement[146]. The importance of these decoration techniques becomes less and less used after about 1800 BC.

The main elements that define the Cornești-Crvenka pottery are the carinated or lobed dishes with massive handles, biconical dishes, globular vessels with cylindrical necks, cups with one or two raised handles. All of these are usually decorated with incisions arranged in registers composed of triangles, rhombuses and incised or hatched arches (Fig. 24). It seems that in the last stage of evolution of this ceramic style, globular cups with handles rising above the rim with small knobs and tall base are increasing in number[147]. From a chronological point of view, Cornești-Crvenka pottery is used throughout the MBA[148].

Mureș pottery also covers the entire MBA period. The numerous excavations carried out in the Pecica-*Șanțul Mare* tell have produced the largest Mureș pottery assemblage. The analysis of the pottery from the excavations of the 1960s at Pecica revealed the existence of specific pottery forms, such as pyriform cups with two handles, biconical cups with one or two handles, cone-shaped vessels with a slightly flared rim, or large vessels with a biconical body and flared rim. In most cases the vessels are decorated with incisions arranged in several registers and channeled bands arranged horizontally, vertically or obliquely (Figs. 25–29)[149].

To the north, in the Crișana and the Carei Plain, the Otomani-Füzesabony cultural complex is encountered. Widespread forms of this pottery style are the single-handled cups, the biconical dishes, or the wide-necked pots, usually decorated with incisions arranged in various geometric patterns, or channeled stripes arranged horizontally, vertically or obliquely[150].

It is worth noting that throughout the MBA channeled decoration is present on pottery from most sites. Evidence of a larger percentage of channeled pottery can be observed, especially in the upper levels of the Pecica-*Șanțul Mare* tell[151]. The same phenomenon can be found in the final evolution phase of the Otomani-Füzesabony pottery[152] and in the Suciu de Sus I phase of the Sătmar Plain[153]. As will be seen, the share of channeled pottery increases in some regions during the LBA, reaching up to 70–80 % of the total decorated ceramics in the LBA III phase[154].

The study of pottery may indicate certain contacts between communities both regionally and extra-regionally[155]. In the tell of Pecica some ceramic vessels decorated in the manner of other styles have been identified. As is to be expected, most of the "imports" belong to the Otomani and Cornești-Crvenka styles, which indicates strong micro-regional connections. On the other hand, pottery decorated in the Hatvan, Transdanubian Encrusted Pottery Culture, or Aunjetitz/Únětice manner indicates extra-regional links with some communities in the western and northern Carpathian Basin, as well as

141 Soroceanu 1991; Gogâltan 2014b; Nicodemus, O'Shea 2015.
142 Gogâltan, Stavilă 2021, with older literature.
143 Gogâltan 2014b.
144 Nicodemus, O'Shea 2015, 695–698.
145 Popescu 1956a, 46, Fig. 7/3–5.
146 Pădureranu 1973, 399–400, Fig. 3; Pădureanu 1985, 31, Pl. IV/6–10.
147 Gumă 1997, 43.
148 Gogâltan 2004.
149 Soroceanu 1991, 32–87. See also recent Bertea 2020.
150 Newest Fazecaș 2010; Molnár 2014, 35–92; Fazecaș, Gogâltan 2018; Lie 2021.
151 Soroceanu 1991, Abb. 13/b.
152 Molnár 2014, Chart 35.
153 Pop 2009.
154 Sava, Ursuțiu 2021, 94–95.
155 Soroceanu 1991, 68–81, Abb. 17–20.

Fig. 25. MBA Mureș pottery from Pecica-*Șanțul Mare* (Dömötör's excavations) (drawings by Roberto Tănăsache).

Fig. 26. Late 19th century photos of Mureș pottery from Pecica-*Șanțul Mare* (Museum of Arad archaeological archive).

Fig. 27. Late 19th century photo of Mureș pottery from Pecica-*Șanțul Mare* (Museum of Arad archaeological archive).

Fig. 28. Late 19th century photo of Mureș pottery from Pecica-*Șanțul Mare* (Museum of Arad archaeological archive).

Fig. 29. Late 19th century photo of Mureș pottery from Pecica-*Șanțul Mare* (Museum of Arad archaeological archive).

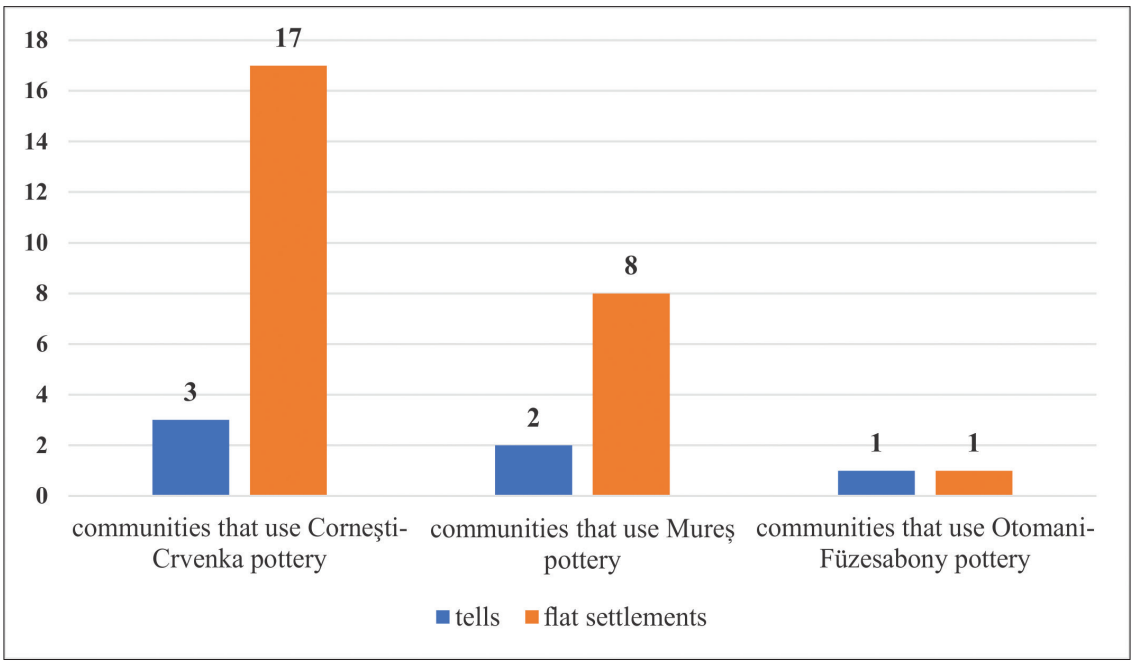

Fig. 30. MBA settlements, organized according to pottery styles (graphic by the authors).

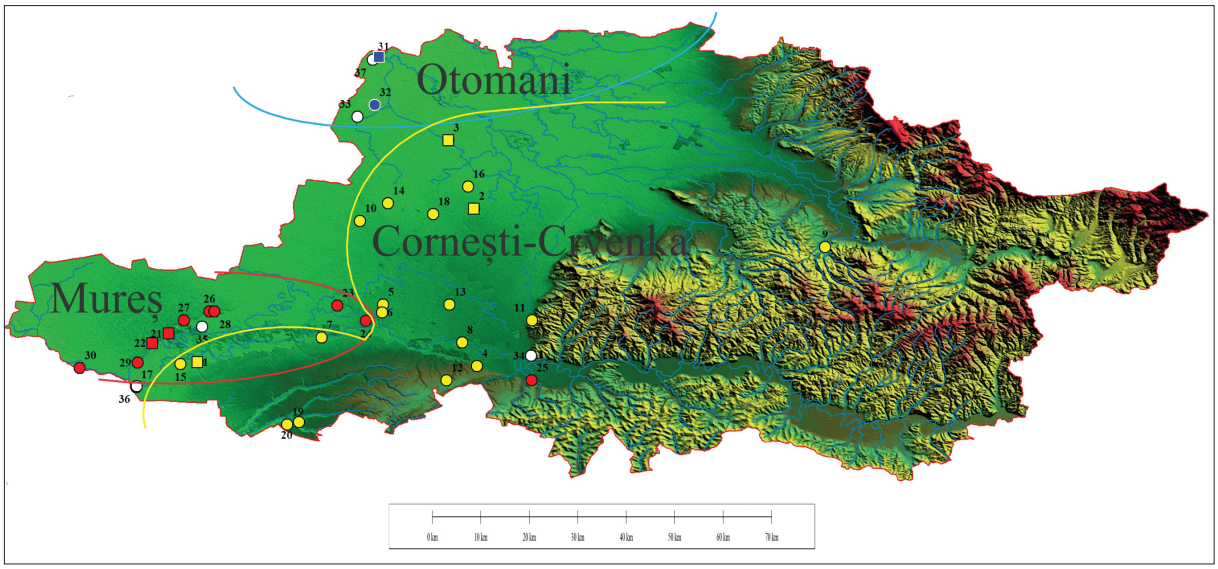

Fig. 31. Map of the MBA sites from Arad County. Finds associated to Cornești-Crvenka pottery (yellow). *Tells (square)*: 1. Munar-*Wolfsberg*; 2. Sântana-*La nord de oraș*; 3. Socodor-*Căvăjdia*. *Flat settlements (circle)*: 4. Aluniș-*Dealul molizilor*; 5. Arad-*Grădiște/I.A.S. Sere*; 6. Arad-*Uzina de apă*; 7. Arad-*Bufniți*; 8. Cicir-*Spinul lui Stanca*; 9. Chișindia-*Podul Vechi*; 10. Curtici-*Cârciuma lui Vásárhely*; 11. Cuvin-*Valea Danciului*; 12. Frumușeni–*2.5. km south the village*; 13. Horia-*Slatini/Situl V6*; 14. Macea-*Topila*; 15. Munar-*Site 1*; 16. Olari-*Holumb*; 17. Satu Mare-*Weingarten*; 18. Sântana-*Holumb*; 19. Vinga-*Izvor/Site 6*; 20. Vinga-*Site 19*. Finds associated to Mureș pottery (red). *Tells (square)*: 21. Pecica-*Șanțul Mare*; 22. Semlac-*Livada lui Onea*. *Flat settlements (circle)*: 23. Arad-*Gai I*; 24. Arad-*Palatul cultural*; 25. Neudorf-Vest; 26. Pecica-*Cărămidăria C.A.P. Ogorul*; 27. Pecica-În Vii; 28. Pecica-*Terasa Nordică-Situl 14*; 29. Semlac-*Situl 5*; 30. Șeitin-*Tăietură*. Finds associated with Otomani pottery (blue). *Tells (square)*: 31. Vărșand-*Movila dintre vii*. *Flat settlements (circle)*: 32. Pilu-Sit 1. Hoards (white) (circle): 33. Grăniceri; 34. Păuliș; 35. Pecica-*Rovine*; 36. Satu Mare-*Weingarten*; 37. Vărșand I.

with more distant regions. Another example of this can be found in the Socodor-*Căvăjdia* tell, where excavations by D. Popescu led to the discovery of pottery fragments decorated in the Transylvanian Wietenberg style[156].

[156] Popescu 1956a, Fig. 33/3; 35/4.

Economy

Plant cultivation and animal husbandry complete the picture of the MBA society, providing answers about subsistence strategies. Although for the studied area we have few archaeozoological and palaeobotanical analysis, these will be briefly discussed in the wider context of the Carpathian Basin.

Plant cultivation

The analysis of individual sites in the Carpathian Basin sometimes indicates different trajectories from what we know at the macro-regional level[157], an important indication for how communities adapt to local environmental conditions[158]. During this period the clearly dominant crops are einkorn or barley among the cereals, and lentil and bitter vetch among oil and fiber crops[159].

Returning to our area of interest, we note that in the settlements of Semlac-*Livada lui Onea*[160], Pecica-*Șanțul Mare* and Kiszombor-*Új-Élet* einkorn wheat predominates, followed by barley and to a lesser extent vegetables such as lentils, peas, beans and bitter vetch. On the other hand, barley is the main crop in the Klárafalva-*Hajdova* tell, followed by einkorn[161].

Towards the end of the MBA and the beginning of the LBA there are a number of changes in crop cultivation. Perhaps the most important of these is the spread of broomcorn millet cultivation, introduced in the Carpathian Basin during the 16–15th century[162]. For the Lower Mureș Basin archaeobotanical analysis shows that millet was used at least in three of the mega site/forts: Cornești[163], Csanádpalota[164] and Sântana[165].

Animal husbandry

Existing archeozoological data for EBA show that a substantial part of the studied assemblages are dominated by cattle, followed by sheep and goats, pigs, rarely dogs and horses[166]. Of course, some assemblages, such as those from Kiszombor-*Új-Élet* phases 3–4 or Csongrád-*Sertéstelep*, differ from the general trend: here sheep and goats have the largest share, followed by cattle[167]. Another peculiar situation is illustrated by the EBA settlement at Pecica-*Site 14* where, although cattle have the largest share, a surprisingly high percentage is also accounted for by horses[168].

With the emergence and spread of multi-layered settlements in the Carpathian Basin, some changes in the subsistence patterns of local communities are also observed. While during the EBA cattle were the most common domestic animals, in the MBA the ratio changes, with sheep and goats being the most common, followed by cattle, pigs and horses[169]. An interesting aspect of the Pecica-*Șanțul Mare* faunal assemblage is the high proportion of horses (19%) found in the habitation sequences attributed to the "Florescent Period (c. 2000–1700 BC)"[170]. In addition to consumption, horses were used for transport and riding, as evidenced by the harness cheek pieces found in the older and newer excavations[171].

The archeozoological analysis carried out at Pecica-*Șanțul Mare* also suggests the existence of slaughtering strategies to ensure the community's meat needs[172]. The importance of sheep/goat farming in the MBA is also due to the growing importance of by-products. Wool is becoming more and

157 Stika, Heiss 2013.
158 Filatova 2022, Fig. 2–3.
159 Ciută, Molnár 2014, 91; Filatova 2022, 49.
160 In Nicodemus 2014, 381 the author erroneously calls this site Șanțul Mic.
161 Nicodemus 2014, 268–277, 381–385.
162 Filipović *et al.* 2020; McCall *et al.* 2022.
163 Gumnior *et al.* 2019; Gumnior, Stobbe 2021.
164 Szeverényi *et al.* 2015.
165 Krause *et al.* 2022.
166 Pop *et al.* 2018, 130–131, Fig. 2.
167 Nicodemus 2014, 366–367, Tab. 13.4; Pop *et al.* 2018, Fig. 2.
168 Pop *et al.* 2018.
169 Choyke, Bartosiewicz 1999–2000; Nicodemus 2014, 215–267, 363–381.
170 Nicodemus 2014, 228.
171 Soroceanu 1991, 92, Abb. 23/ 7, 10; Boroffka 1998, 92, no. 21; Nicodemus 2014, 480–481, Fig. 11.6A left. A new synthesis on the human-horse relationship in the Hungarian Bronze Age at Kanne 2018; Kanne 2022.
172 Nicodemus 2014, 328–344.

more necessary for making fabrics, gradually replacing vegetable fibers. This has been convincingly demonstrated for the contemporary Százhalombatta-*Földvár* tell by the number of different textile tools, high percentages of sheep/goat among the faunal remains and by genetic analyses[173]. The existence of wool production centers and long-distance trade in wool/textile support the hypothesis of a textile "revolution" in the European Bronze Age[174].

Craft production

Metallurgy

As in the rest of the Carpathian Basin, during the MBA, metal production is concentrated inside tells, although sometimes this activity took place also in flat settlements[175]. A special situation among the MBA tells in the Carpathian Basin was found at Pecica-*Șanțul Mare*, where rich evidence has been discovered that can be linked to metal processing. We have mentioned above the discovery of various artifacts related to metal working, mainly moulds for casting axes (Fig. 32)[176], numerous slag frag-

Fig. 32. Metalworking-related artifacts discovered in the Pecica-*Șanțul Mare* MBA tell (clay and sandstone moulds, clay cores and a clay tuyère) (photo by the authors).

ments and crucibles[177]. Most of the artifacts were discovered in excavations carried out in the late 19th and early 20th century, for this reason the contexts from which they were recovered are not known. It is possible that the moulds belong to one or more workshops similar to the one at Mošorin-*Feudvar*[178]. The new excavations at Pecica indicate that the intensity of finds that can be linked to metallurgical activities is concentrated between ca. 1820–1680 BC[179].

[173] Vretemark 2010; Bergerbrant 2018; Sabatini *et al.* 2019.
[174] Kristiansen, Sørensen 2020.
[175] Găvan 2015, 168–173; Găvan 2020; Olexa *et al.* 2021.
[176] Gogâltan, Găvan 2014; Găvan, Gogâltan 2014; Găvan 2015, 209–212; Găvan 2020; Găvan, Gogâltan 2022.
[177] O'Shea *et al.* 2011, 73; Nicodemus *et al.* 2015, 112.
[178] Hänsel, Medović 2004. A. Găvan demonstrates that these moulds from Pecica actually belong the different phases (Găvan 2015, 74–75).
[179] Nicodemus 2018b, 82.

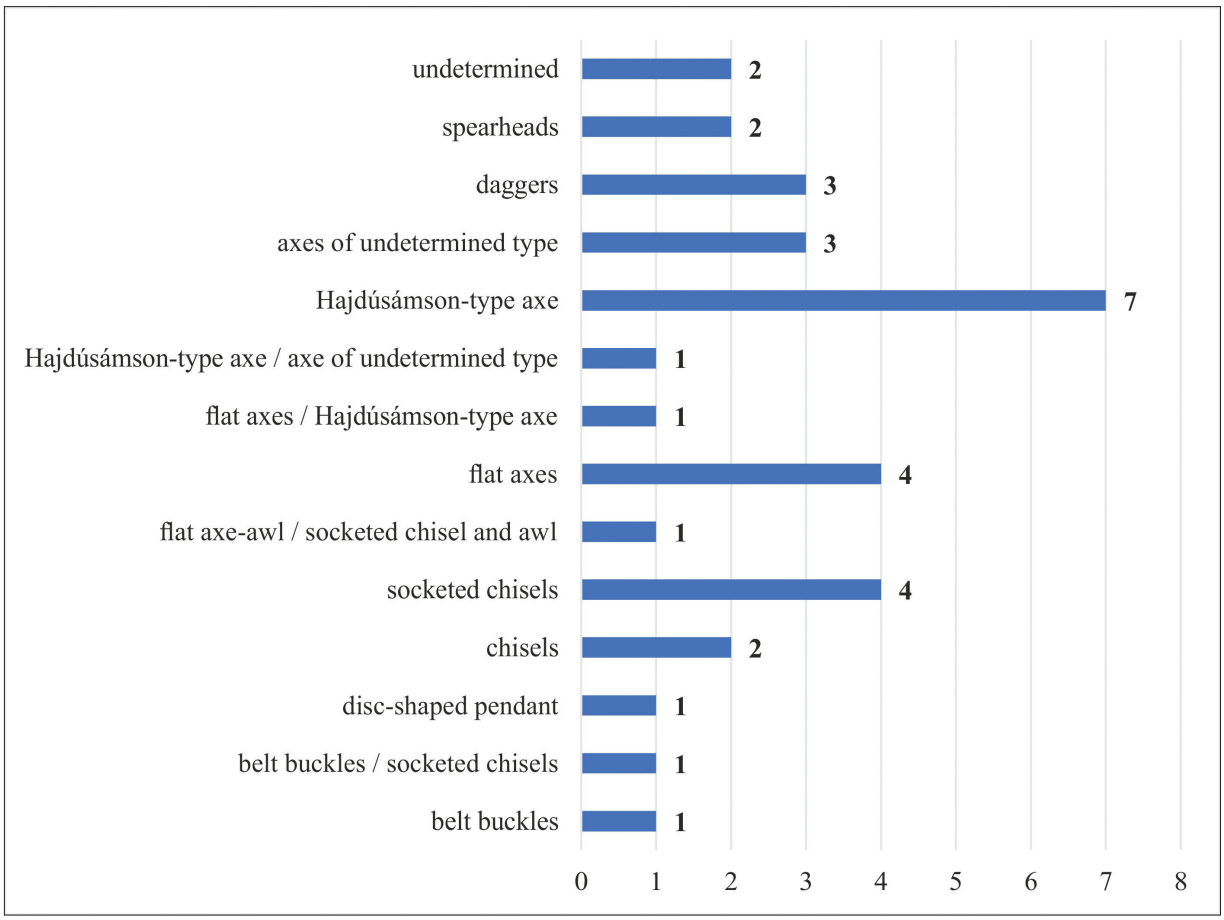

Fig. 33. Distribution of MBA moulds matrices from Pecica-*Șanțul Mare* by artefact types (graphic by the authors).

The moulds made of sandstone and clay found at Pecica were mainly used to cast weapons, followed by tools and ornaments (Fig. 33). Although evidence of metalworking has been found in other contemporary tells in the region, the large number of objects related to this craft make Pecica-*Șanțul Mare* by far the most representative metalworking centre in the region. We do not know whether the artifacts were produced for members of the community or traded regionally or extra-regionally. At the present stage of research, it is difficult to trace the process of distribution of the metal artifacts produced in the Pecica center to potential beneficiaries[180].

Bone Working

Alongside metalworking, another economic activity that has left various evidence is the processing of animal bone. The finds from the Semlac-*Livada lui Onea*[181], Pecica-*Șanțul Mare*[182], Socodor-*Căvăjdia*[183], and Vărșand-*Movila dintre vii*[184] tell sites suggest that the most numerous types of artifacts are tools (scrapers, perforators, needles, smoothers/polishers etc.), followed by ornaments (bead/pendant, cheek piece) (Fig. 34). The items were mostly made from red deer, pigs, sheep or cattle bones, with marine or freshwater shells being used less frequently for ornaments. We can argue that at least the beautifully decorated ornaments were made by skilled craftsmen.

[180] Găvan, Gogâltan 2014.
[181] Gogâltan 2014b, Pl. 1/7–8.
[182] Nicodemus, Lemke 2016.
[183] Popescu 1956a, Fig. 4–6, 19/7, 15; 20/4, 6–9.
[184] Popescu 1956b, Fig. 76/7–13; 77/5–9.

Fig. 34. Late 19th century photo of worked bone materials from Pecica-*Șanțul Mare* MBA tell (Museum of Arad archaeological archive).

Stone Working

As with other crafts, stone working meets the community's need for certain types of tools. Most of the evidence related to stone working comes from Pecica-*Șanțul Mare* (Fig. 35)[185]. It is obvious

Fig. 35. Stone axes discovered in the MBA tell Pecica-*Șanțul Mare* (photo by the authors).

[185] Drașovean 2015; Nicodemus 2018b, 78–81. Stone tools have also been published from other sites: Socodor (Popescu 1956a, Fig. 4/4; 21/1–3), Vărșand (Popescu 1956b, Fig. 77/2–4), etc.

that the raw material was imported, as the site is located in a lowland area. Obsidian seems to have been brought from the area of Slovakia and northern Hungary (sources C1 and C2), while other raw materials were sourced from the Mátra Mountains, Transdanubia, the Poiana Ruscă Mountains and northern Bulgaria[186]. The finished products of this craft include grinders, axes, blades and arrowheads. Based on the flakes discovered, it can be concluded that some items were produced on the spot. The spatial distribution from Pecica would suggest their production and use at the level of individual households[187]. This is unlikely given that it was a craft that required particular technical skills and the raw material was hard to come by in the lowland area. Therefore, in this case too, we assume that the stone tools were made by skilled craftsmen, with only basic repairs or sharpening of tools being possible at the household level.

Weaving, knitting and other craft activities

As mentioned above in connection with the intensive sheep farming for wool, the practice of spinning and weaving is also proven by the large number of clay weights and spindles identified in the tells of Pecica-*Șanțul Mare*[188], Socodor-*Căvăjdia*[189], and Vărșand-*Movila dintre vii*[190]. The most important craft activity is obviously the production of pottery and other clay objects[191]. The general characteristics of ceramics in the area have been presented above, but detailed analyses of the biography of ceramic vessels are still lacking, as has been done for other tells in the Carpathian Basin[192]. Other economic activities were certainly carried out during this period, such as weaving, woodworking or animal hide processing, but the evidence is far too limited to discuss them now.

Late Bronze Age I

Settlement data

Most of the tell settlements are gradually abandoned during the 16th century BC[193]. By studying the artifacts found in settlements such as Pecica-*Șanțul Mare*, Periam-*Movila Șanțului*, or Satu Mare-*Weingarten* we find the existence of some pottery and metal artifacts that are traditionally ascribed to the LBA I.

Surface investigations have identified settlements with pottery decorated in the LBA I manner. These include Bodrogu Nou-*La Hodaie/Către Vale*[194], Horia-*Vest*[195], Lipova-*Băi*[196], or Sâmbăteni[197]. In the absence of archaeological excavations, it is difficult to assess the exact chronology of each of these sites. We cannot say whether these settlements evolved both in the MBA and during LBA I, or whether they represent a mixture of ornaments and ceramic forms specific to the area and to this period[198].

A special situation can be found in the settlement of Păuliș-*Dealul Bătrân*[199]. The pottery assemblage uncovered here led Florin Gogâltan to consider the existence in this area of a so-called Păuliș group[200]. This group would be characteristic of the LBA I period. The pottery is specific to a mixture of MBA tradition, – i.e., Mureș and Cornești-Crvenka, and tumulus culture tradition (*Hügelgräberkultur*). Even on further analysis of the shapes and decorations of the pottery from Păuliș, we cannot clearly specify their association to any one of these ceramic styles. We can say with certainty that the pottery here does not have the classical MBA elements, but neither those of the settlement at Șagu-*Site A1_1*, nor those of the cemetery at Pecica-*Site 14*, specific to the LBA I of the plain area.

186 Nicodemus 2018b, 79–80.
187 Nicodemus 2014, 295–301.
188 Soroceanu 1991, Taf. 20/28.
189 Popescu 1956a, Fig. 19/8; 20/1–3.
190 Popescu 1956b, Fig. 75/10–12; Fig. 76/1–3.
191 Sofaer 2015.
192 Michelaki 2006; Kreiter 2007; Sofaer 2010; Earle *et al.* 2011; etc.
193 Gogâltan 2017, 31–36; Gogâltan 2019a, 207–208.
194 Pădureanu 1988a, Pl. VI/3, 6, 8.
195 Pădureanu 1988a, Pl. X/15, 20–22; XI/17, 18; XII/4–8.
196 Pădureanu 1988a, Pl. XIII/8, 11, 14; Pl. XIV/2, 5.
197 Pădureanu 1988a, Pl. VII/20; VIII/5, 10–13.
198 On other occasion we have already discussed about the pottery and funerary rites and rituals continuity between MBA and LBA I (Sava, Ignat 2016, 195).
199 Pădureanu 1990, Pl. 2–20.
200 Gogâltan 1999a, 210.

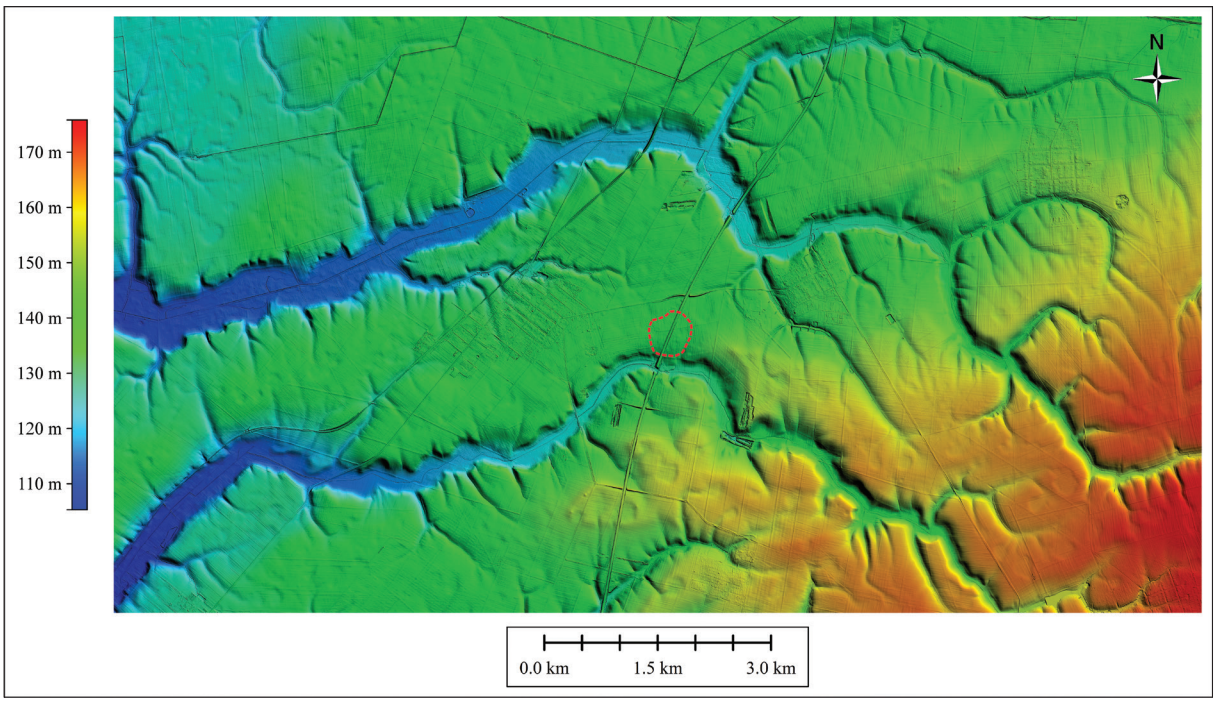

Fig. 36. Geographical location of the LBA settlement of Șagu-*Site A1_1* (with red line) (map by the authors).

The most representative unfortified LBA settlement investigated in Arad County is Șagu-*Site A1_1*. The settlement was known since the early 1980s[201]. Rescue excavations took place in 2010[202]. At the same time, systematic field survey was also carried out to estimate the extent of the settlement. We thus found that it occupies an area of ca. 23 ha. The site is located on a high terrace, protected from flooding, with very good visibility, especially to the north (Fig. 36). After excavation of the entire area to be affected by the construction of the motorway, we concluded that the LBA settlement had a length over 530 m, which means that more than 2 ha (almost 10%) of the entire site was excavated (Fig. 37). 306 LBA archaeological features were identified. Their overall density is 1 per 69 m^2. Chronologically, the settlement was first inhabited during the LBA I (16th–15th century BC) and continues into the LBA II (15th–13th century BC), when it reaches its maximum development[203]. During the 16th century BC, the archaeological remains identified in the investigated area are scarce. Starting with the 15th century BC, archaeological deposits become much more consistent, and evidence of metallurgy, agriculture or other craft activities increases exponentially.

It is very likely that the mega-site/fort at Cornești-*Iarcuri* also had its beginnings towards the end of the 16th century BC, or at the beginning of the 15th century BC. For example, at Cornești, in several contexts there has been found similar pottery[204] to the 16th–15th century BC[205] assemblages from Șagu-*Site A1_1* cx. 291[206], or Pecica-*Site 14* cx. 67[207]. Ralf Lehmphul and his collaborators argue pertinently that the nucleus from which the entire fortification developed was located in the northern part of Ring I, the area where the earliest finds were identified[208].

Burial data

In contrast to the MBA, several funerary finds are known from this later period. Of these, only the cemetery at Pecica-*Site 14* has benefited from proper excavations. In our opinion, the so-called Pecica I hoard and the stray finds from Felnac-*Complexul Zotehnic* also have a funerary character.

[201] Barbu, Hügel 1999, 62; here the settlement is erroneous assigned to the village of Cruceni.
[202] Sava *et al.* 2011.
[203] Sava 2019, 112, Fig. 5–6, Tab. 1.
[204] Krause *et al.* 2019, Abb. 30/1–3.
[205] Sava 2020, Fig. 13.
[206] Sava 2019, Pl. 3/3, 7, 10–11, 15.
[207] Sava, Ignat 2016, Fig. 5/5.
[208] Lehmphul *et al.* 2019, 274.

Fig. 37. Photo taken during the excavation conducted in the LBA settlement of Șagu-*Site A1_1* (2010) (photo by the authors).

The cemetery at Pecica-*Site 14* was identified and investigated during 2011. So far, the cemetery has not been published in a full report, but it is known in the literature through the publication of several burial inventories[209]. In the 7762 m^2 of excavated area, 38 graves were identified, of which 24 were inhumated and 14 cremated (Figs. 38–39). Given the 19 ^{14}C data we have so far, we can state that the

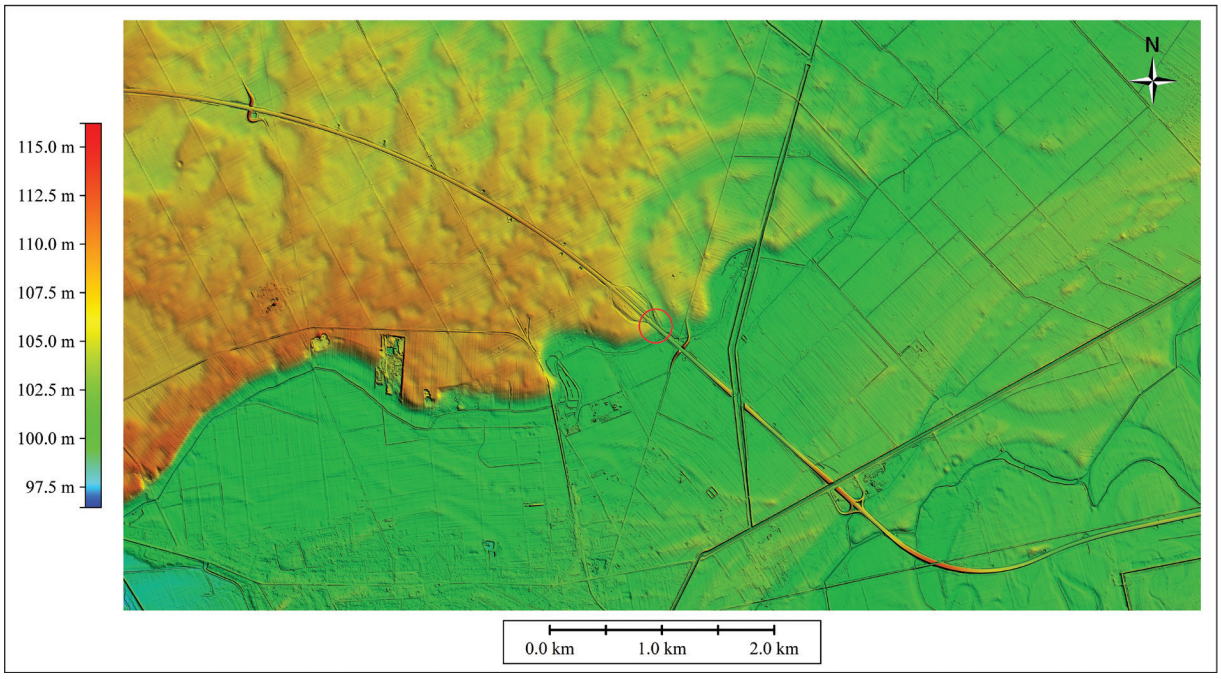

Fig. 38. Geographical location of the LBA cemetery of Pecica-*Site 14* (map by the authors).

[209] Sava, Andreica 2013; Sava, Ignat 2014; Sava, Ignat 2016; Ignat, Sava 2019.

Fig. 39. Photo taken during the excavation conducted in the LBA cemetery of Pecica-*Site 14* (2011) (photo by the authors).

burial space was used for a longer period of time, from the 16th century BC to the 10th/9th centuries BC. During the first three centuries (16th–13th century BC) we are dealing with inhumation graves, in which most of the deceased were laid in a crouched position. The burial inventory consists of amber beads, bronze items, ceramic vessels and meat offerings (Figs. 40–41). During the 13th century BC, the funerary rite of the cemetery becomes cremation. The funerary inventory of these graves consists mainly of bronze ornaments.

Fig. 40. Photo taken during the excavation conducted in the LBA cemetery of Pecica-*Site 14* (2011) (photo by the authors).

During the construction of the Arad-Cenad railway between 1882 and 1883, several bronze and gold objects were discovered. It seems that the items come from the current section of the railway, somewhere north of Pecica[210]. We have no information on how some of the objects got to the Museum in Budapest, and the other part in the collection of the High School in Arad, later integrated into the collection of the Museum in Arad. These include two loop rings made of gold, two disc-butted axes type B1, two spirals, three decorated bracelets, a dagger and a

[210] Soroceanu 2012, 72–76 with older literature.

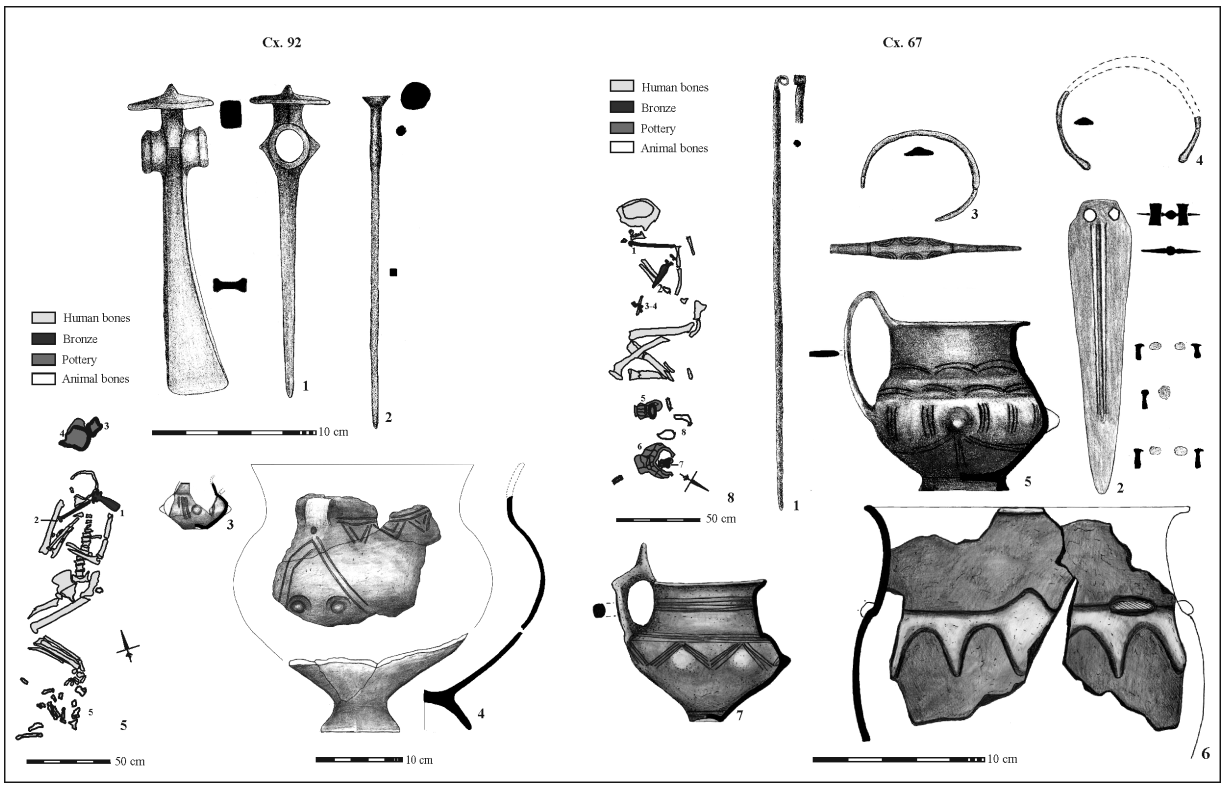

Fig. 41. LBA I graves discovered in the cemetery of Pecica-*Site 14* (drawings by the authors).

pin with a seal-shaped head, all made of bronze (Fig. 42). Although the conditions in which the assemblage was found are not known, most specialists who have dealt with this find have considered it a hoard[211]. There were, however, also somewhat more reserved opinions[212]. It must be said at the outset that the structure of this supposed hoard has no parallels in the region. In contemporary hoards, we are not aware of any such association of artifacts, but rather funerary inventories[213]. To this argument we can also add Sándor Márki's statement, who noted in the register of the antiquities collection of the Arad High School that the metal items were accompanied by 50 vessels[214].

The construction of a zootechnical platform near Felnac in 1971 led to the accidental discovery of several bronze items and ceramic vessels. The items were donated by the workers to several museums in Transylvania, but the largest assemblage ended up in the Museum of Arad[215]. Over time, the bronze artifacts were considered to be part of a Cincu-Suseni hoard (Ha A1)[216]. However, the study of the whole assemblage led to the conclusion that the earliest artifacts, like pins with seal-shaped heads, ribbed bracelets, heart-shaped pendants and arched decorated pottery, belong to LBA I, while the several bracelets, pins with biconical head and channeled decorated cups indicate an evolution of the site during LBA II. Such artifacts are often encountered as grave goods[217]. The testimony of the finders, confirm that the assemblage belonged to a cemetery that was used during LBA I and LBA II[218].

The funerary discoveries are completed by the excavation in the Șagu-*Site A1_1* settlement of a lidded vessel containing the skull of a foetus (8–8.6 months)[219]. The vessel was deposited

211 Popescu, Rusu 1966, R 14; Vulpe 1970, 74–75; Petrescu-Dîmbovița 1977, 41–42, Pl. 6.
212 Mozsolics 1973, 168; Soroceanu 2012, 72, 75.
213 Sava, Ignat 2016, 184–185.
214 Barbu *et al.* 2002, 489–491, no. 160–175.
215 A full description of the archaeological situation at Felnac-*Complexul Zotehnic* can be found in Sava 2016.
216 Petrescu-Dâmboviţa 1977, 93, Pl. 142/9–17; Chirilă *et al.* 1999, 67–68, no. 2–3; Bejinariu 2003, 68.
217 We refer to the following cemeteries: Szeged-*Fehértó-Székhát*, Szeged-*Bogárzó* (Foltiny 1957; Trogmayer, Vörös 1994, 27; Sánta 2004, 67, no. 23), Tápé (Trogmayer 1975), Szentes (Nagy 2004) and Kiskundorozsma (Foltiny 1957).
218 Kacsó 2015; Sava 2016 considers these finds to be part of a graveyard.
219 Sava *et al.* 2011, 80–84, Fig. 153–158; Andreica 2012; Urák *et al.* 2015.

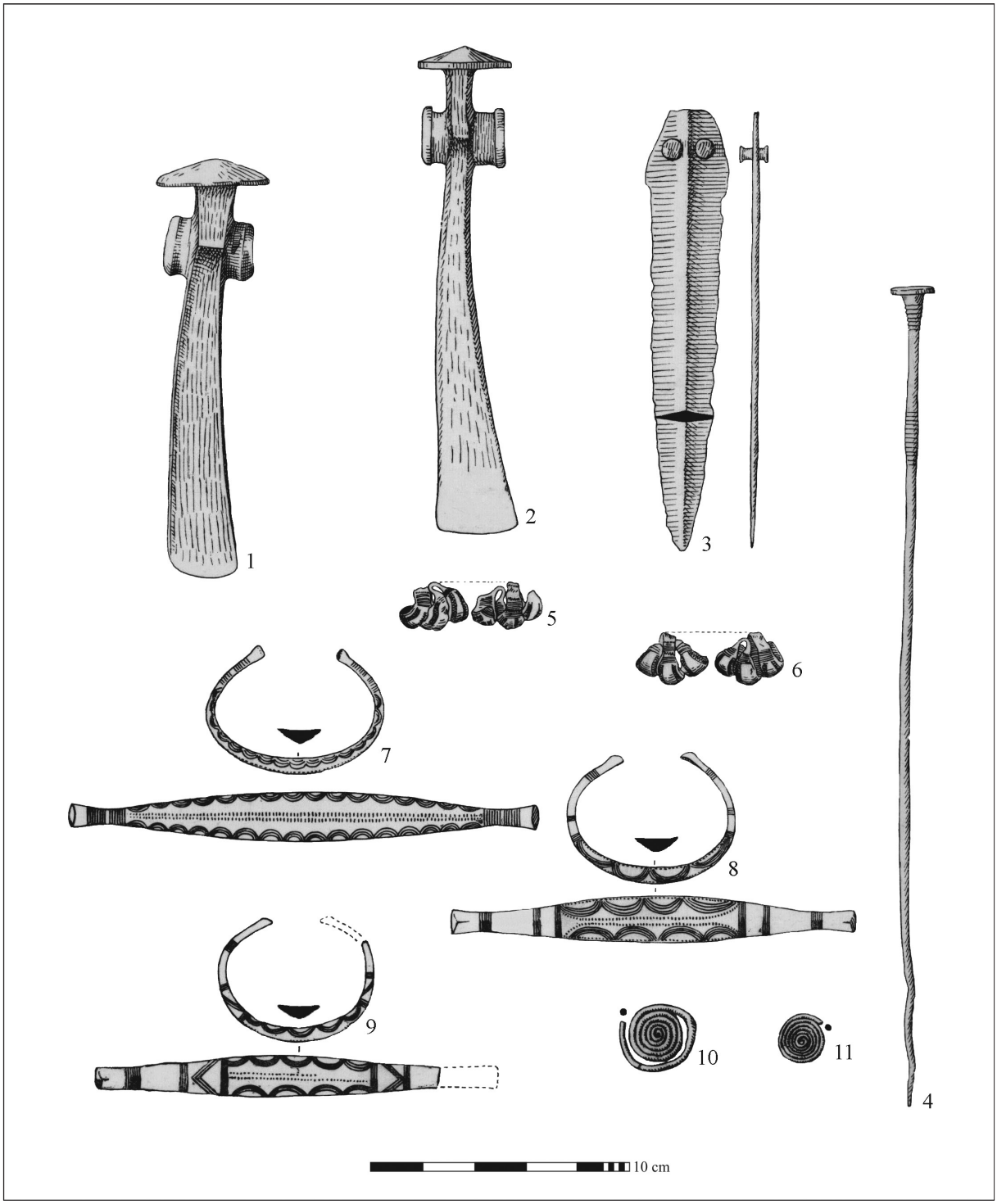

Fig. 42. Gold and bronze artefacts, probably parts of grave goods, discovered at Pecica (the so-called Pecica I deposit) (after Popescu, Rusu 1966).

horizontally in the cultural layer of the settlement, near a large pit used for clay extraction. The deposition of the human remains inside the settlement reinforces our conviction that sometimes, exceptional events, such as the premature loss of a child, provoke singular attitudes, difficult to catalogue and generalize[220].

[220] See Burlacu-Timofte, Gogâltan 2016.

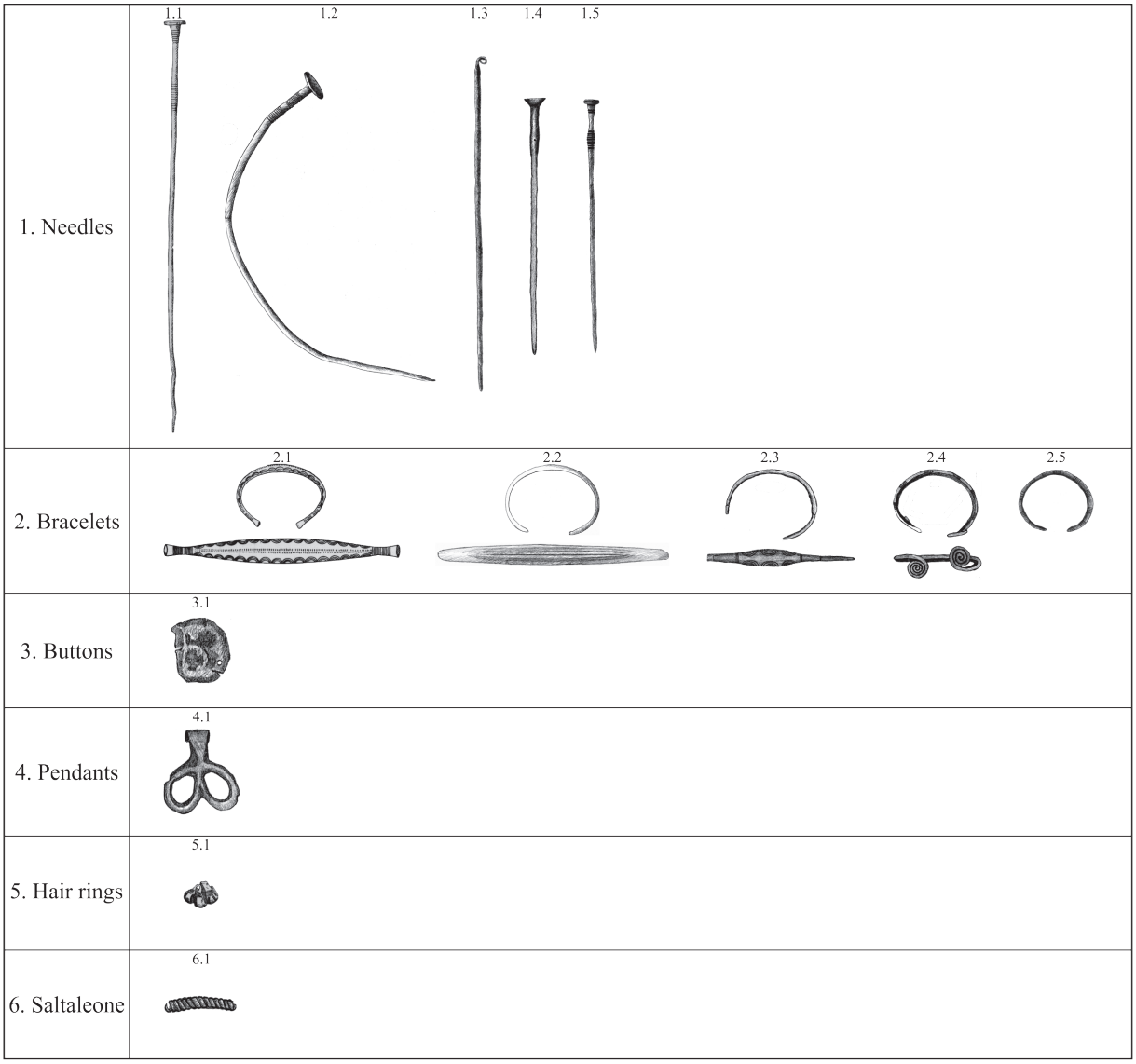

Fig. 43. Typology of the LBA I metal made jewellery discovered in the studied area (graphics by the authors).

Material Culture

Metals

In contrast to the previous period, the number of metal artifacts is smaller. The ornaments still predominate (Fig. 43). Of these, the most numerous types are bracelets and pins. Another category of artifacts specific to LBA I are weapons: daggers and disc-butted axes of type B1 (Fig. 44). Most metals were found in funerary contexts (Fig. 45), mainly at Pecica-*Site 14* and Pecica I. Bronze is by far the most numerous (Fig. 46), with only hair rings, a MBA tradition, being made of gold. Regarding the distribution of the types according to find context, we note the exclusive presence of weapons in the funerary contexts, while ornaments, although most of them are deposited in graves, were also found in several settlements (Fig. 47).

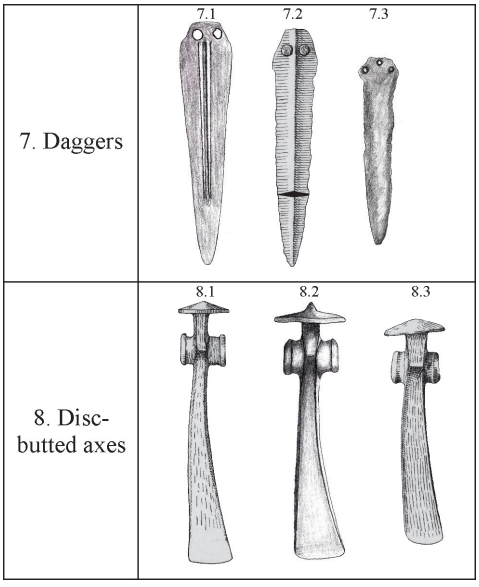

Fig. 44. Typology of the LBA I metal made weapons discovered in the studied area (graphics by the authors).

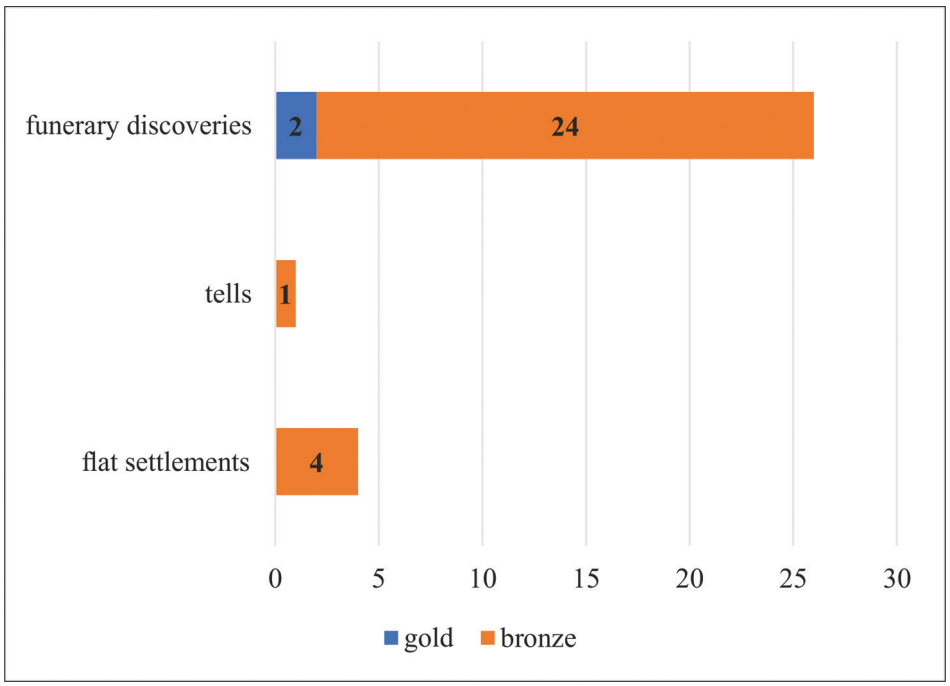

Fig. 45. Distribution of the metal artifacts according to the find context (graphics by the authors).

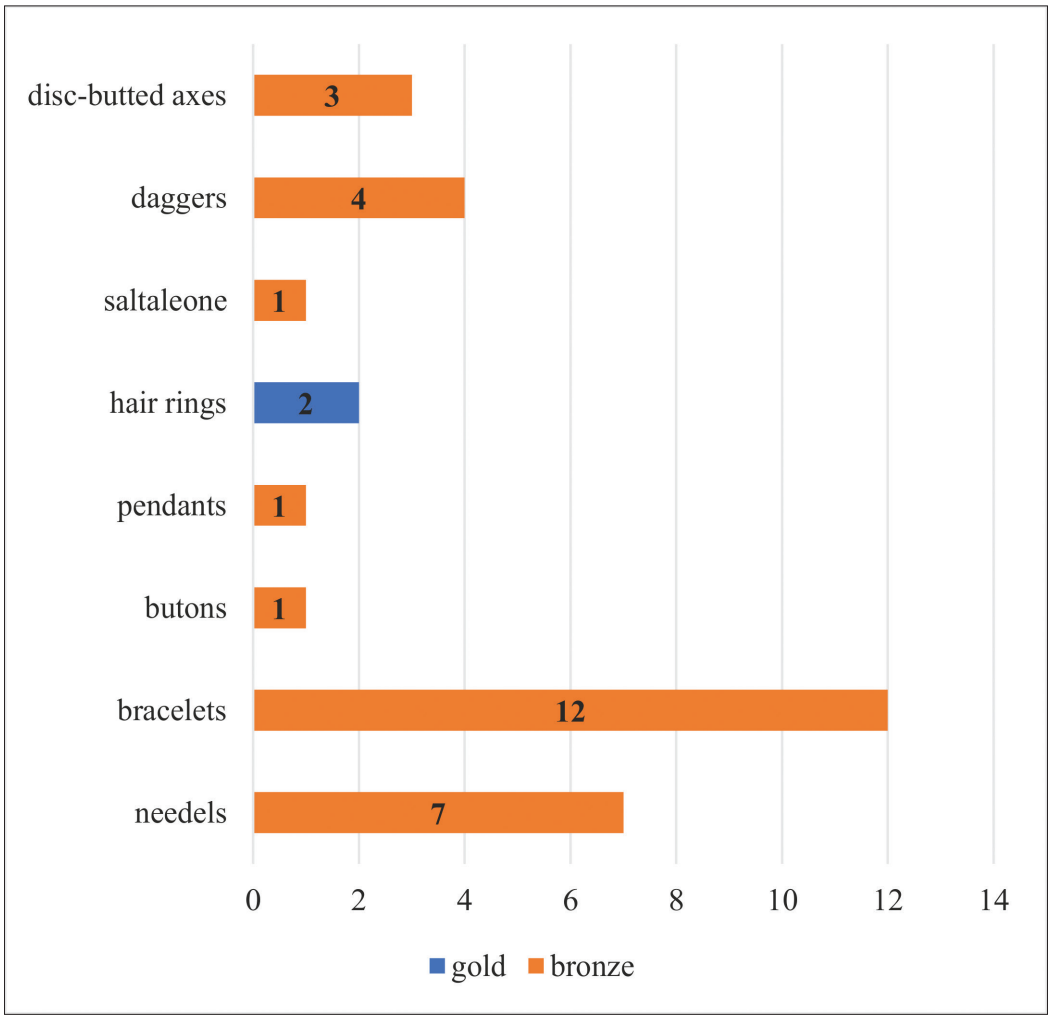

Fig. 46. Distribution of the metal artifacts according to the types (graphics by the authors).

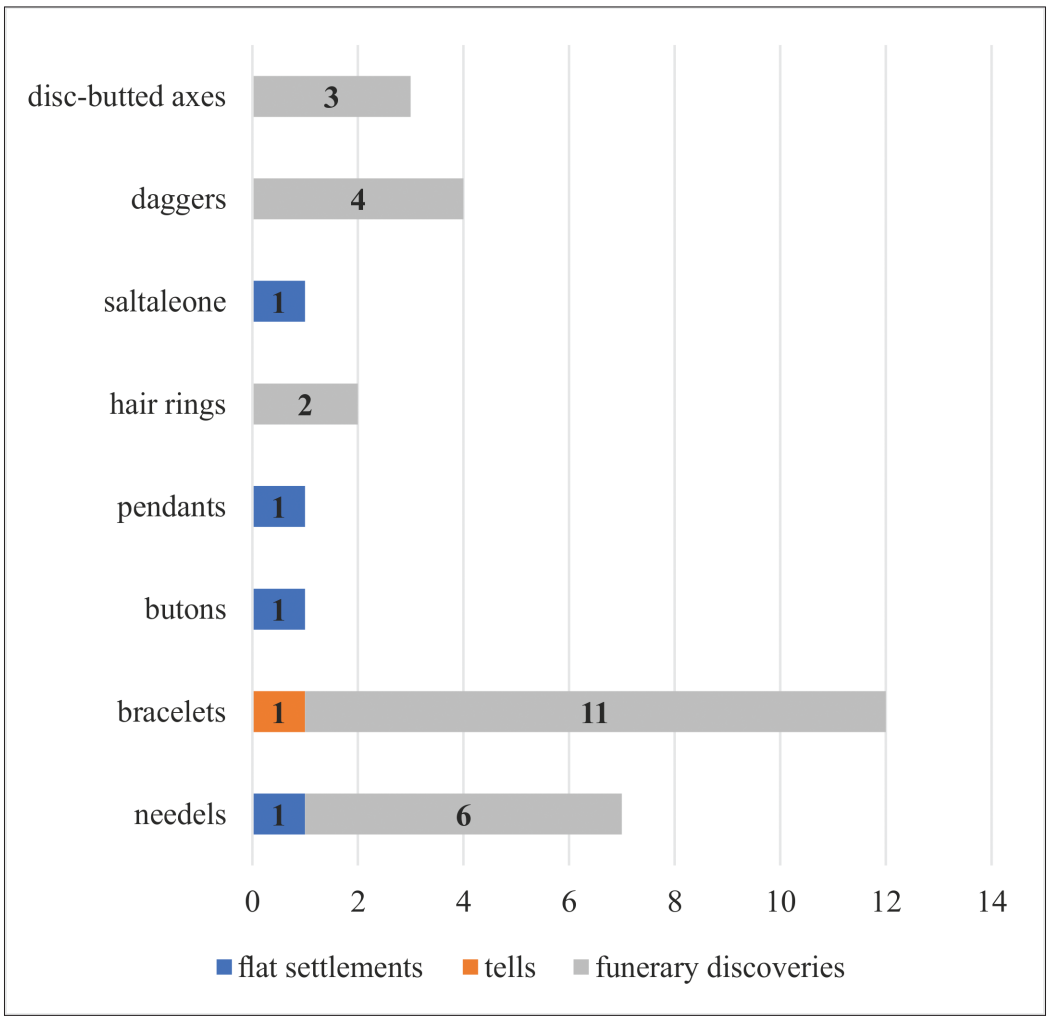

Fig. 47. Distribution of metal artifacts according to types and find context (graphics by the authors).

Ceramics

Studying the pottery already published, we observe that in several settlements, such as Bodrogu Nou-*La Hodaie/Către Vale* (Fig. 48/1–4), Horia-*Vest* (Fig. 49), Sâmbăteni (Fig. 48/5–15), and Păuliș-*Dealul Bătrân* (Fig. 50–52), we find similar ornamental motifs to Pecica-*Site 14* (Fig. 53), Șagu-*Site A1_1* (Fig. 54), as well as to the Cruceni-Belegiš area at Giroc-*Mescal*[221] and Foeni-*Gomila Lupului II*[222]. Contexts that contain the aforementioned pottery were dated during the 16th and the 15th century BC[223]. Among these common ornamental motifs are: schematic arches, rows of short incisions arranged vertically, incised triangles, knobs framed by circular impressions, vertical channels, etc. Such finds were attributed more than 20 years ago to a so-called Păuliș group, which would have been characteristic of the LBA I in this area (Bz. B2-C)[224].

At the present state of research, it is difficult to attribute the pottery found in the study area to a distinct archaeological group or culture. It should be recalled that several ceramic styles coexisted in this area during the MBA. The analysis of the excavations at Pecica-*Șanțul Mare*[225] indicates a perpetuation of certain shapes, techniques and ornamental motifs in the LBA repertoire, especially type 2D cups (small cups with a globular body, umbo-shaped base and a handle rising slightly above the rim), the 1A (dishes with straight rim – of reduced size), and 1G (dishes with straight rim – of a large size) type dishes, trays (8), and type 7 vessels (vessels with slightly flaring rim, short neck, long and slightly

[221] Gogâltan, Stavilă 2020; Szentmiklosi 2021, Pl. LXII-LXXXVI.
[222] Szentmiklosi 2021, Pl. XXVI-LXI.
[223] Sava 2020, Fig. 13.
[224] Gogâltan 1999a, 210.
[225] Soroceanu 1991.

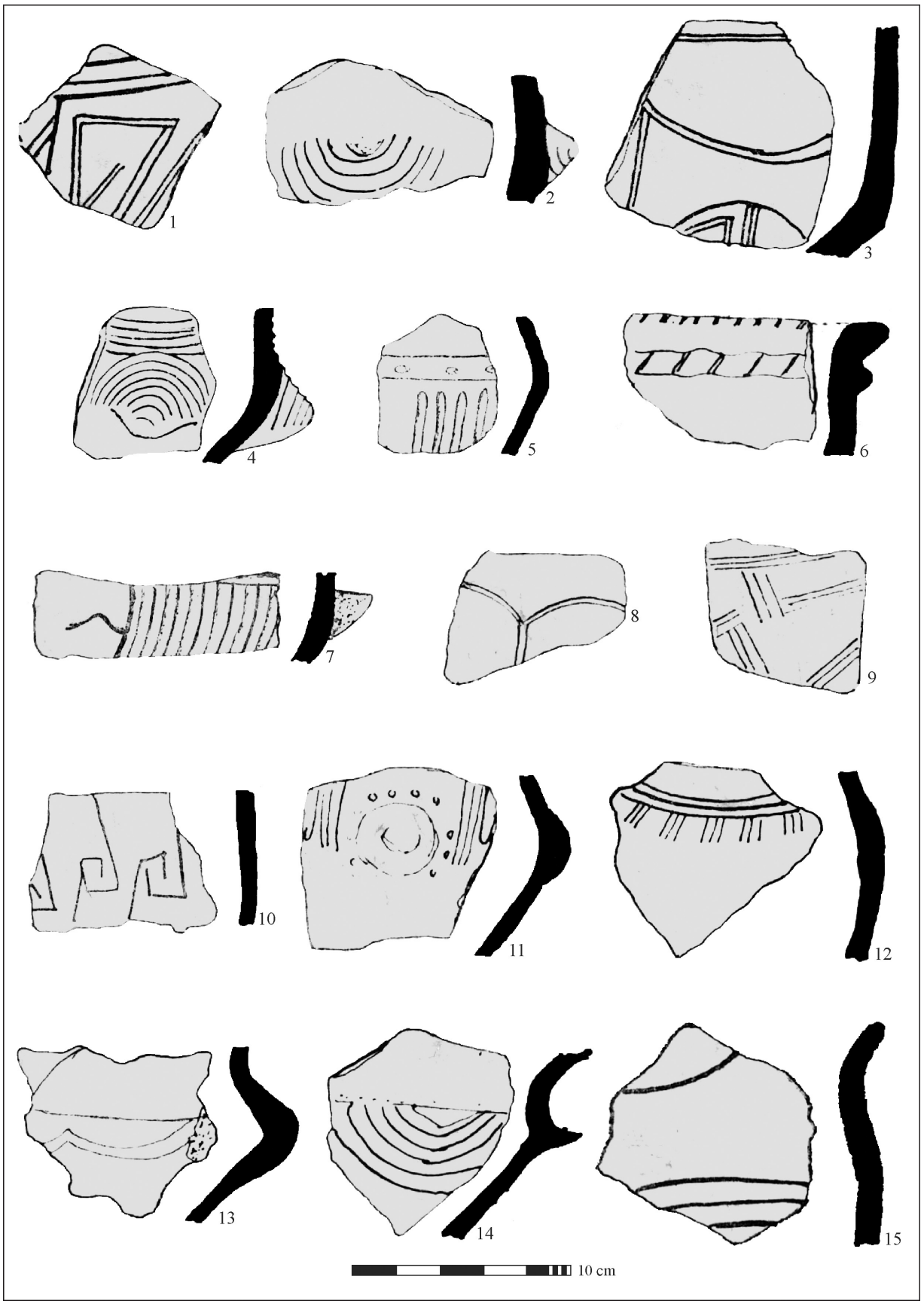

Fig. 48. LBA I pottery from: 1–4. Bodrogul Nou; 5–15. Sâmbăteni (after Pădureanu 1988).

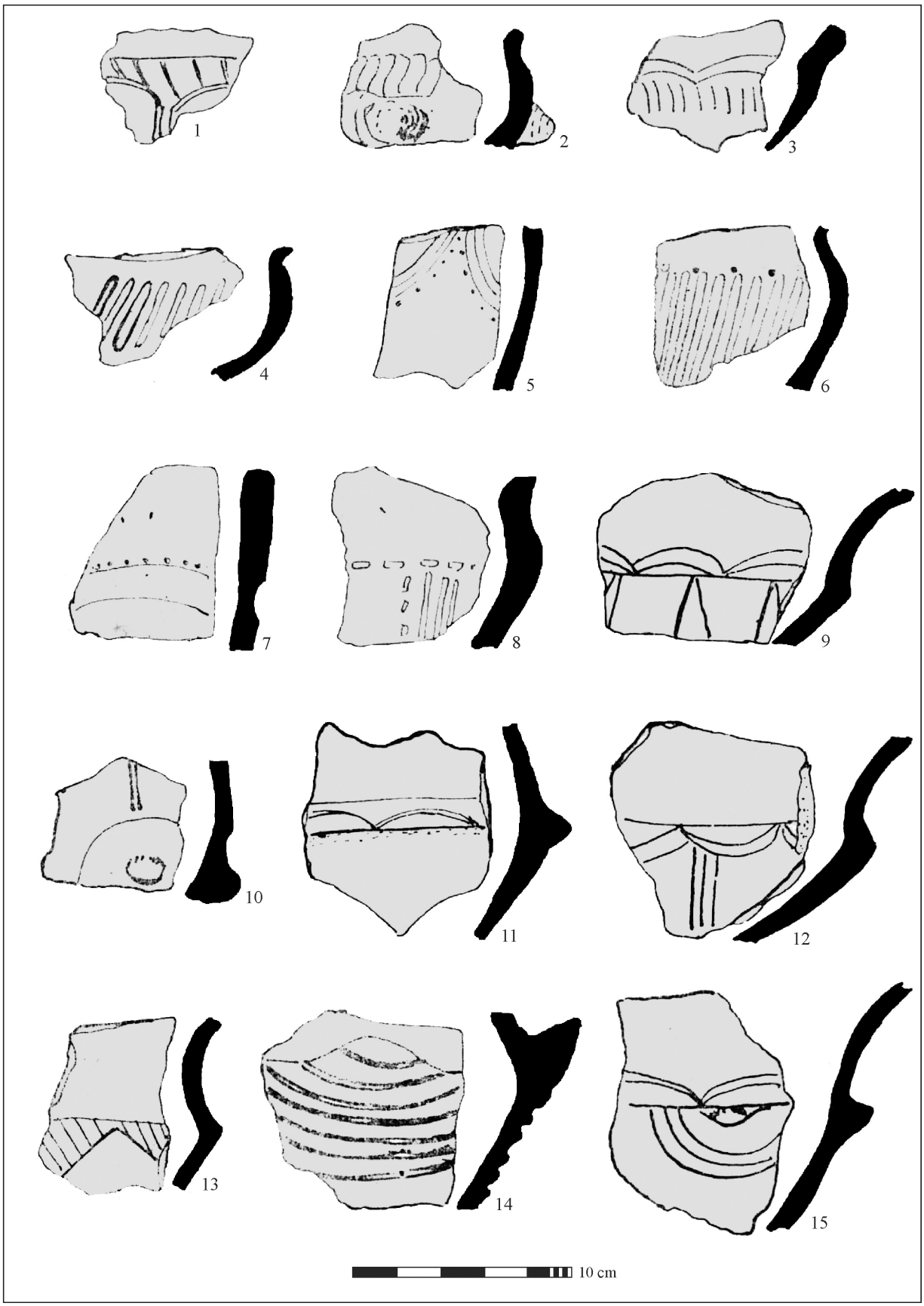

Fig. 49. LBA I pottery from Horia-*Vest* (after Pădureanu 1988).

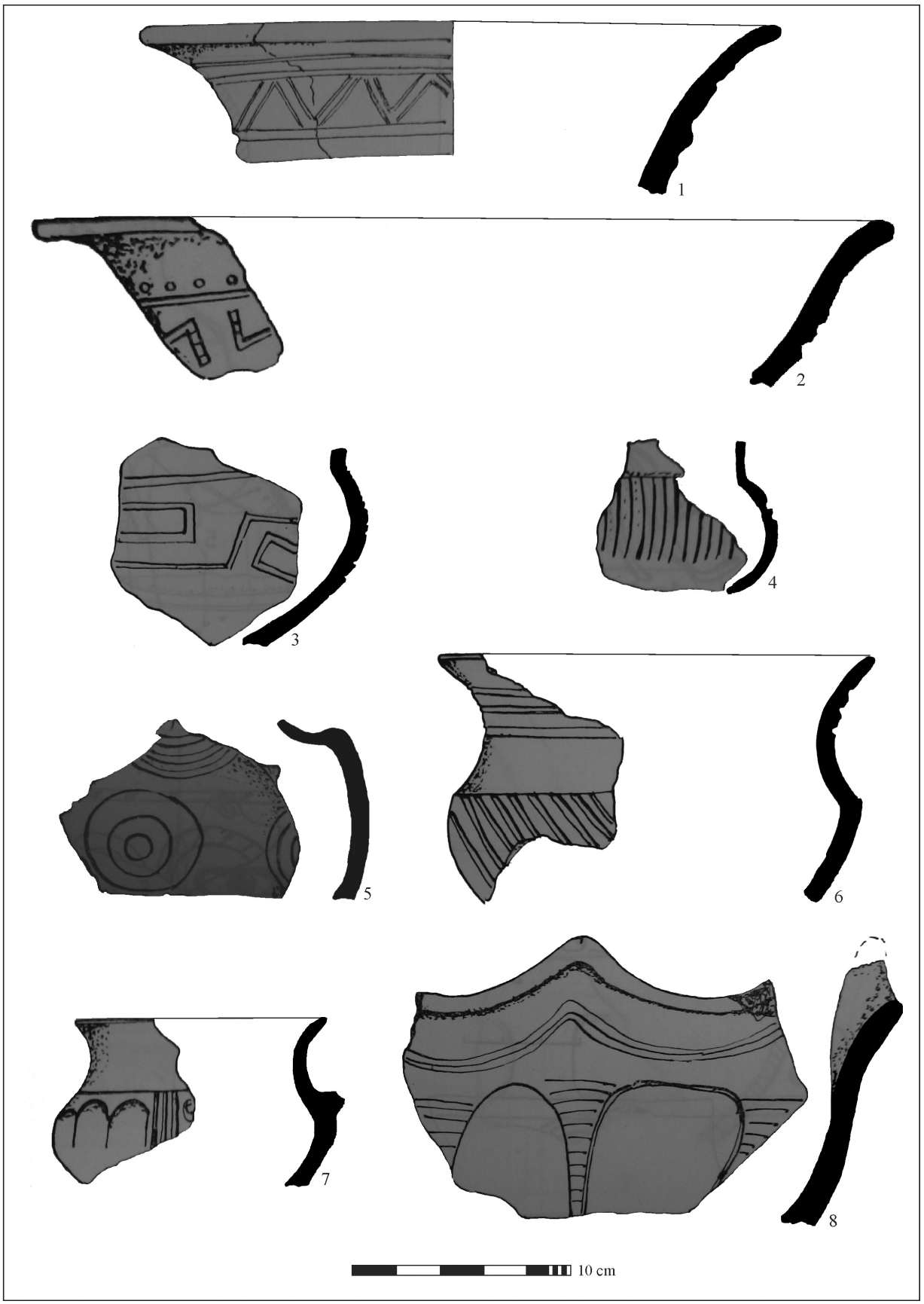

Fig. 50. LBA I pottery from Păuliș-*Dealul Bătrân* (after Pădureanu 1988).

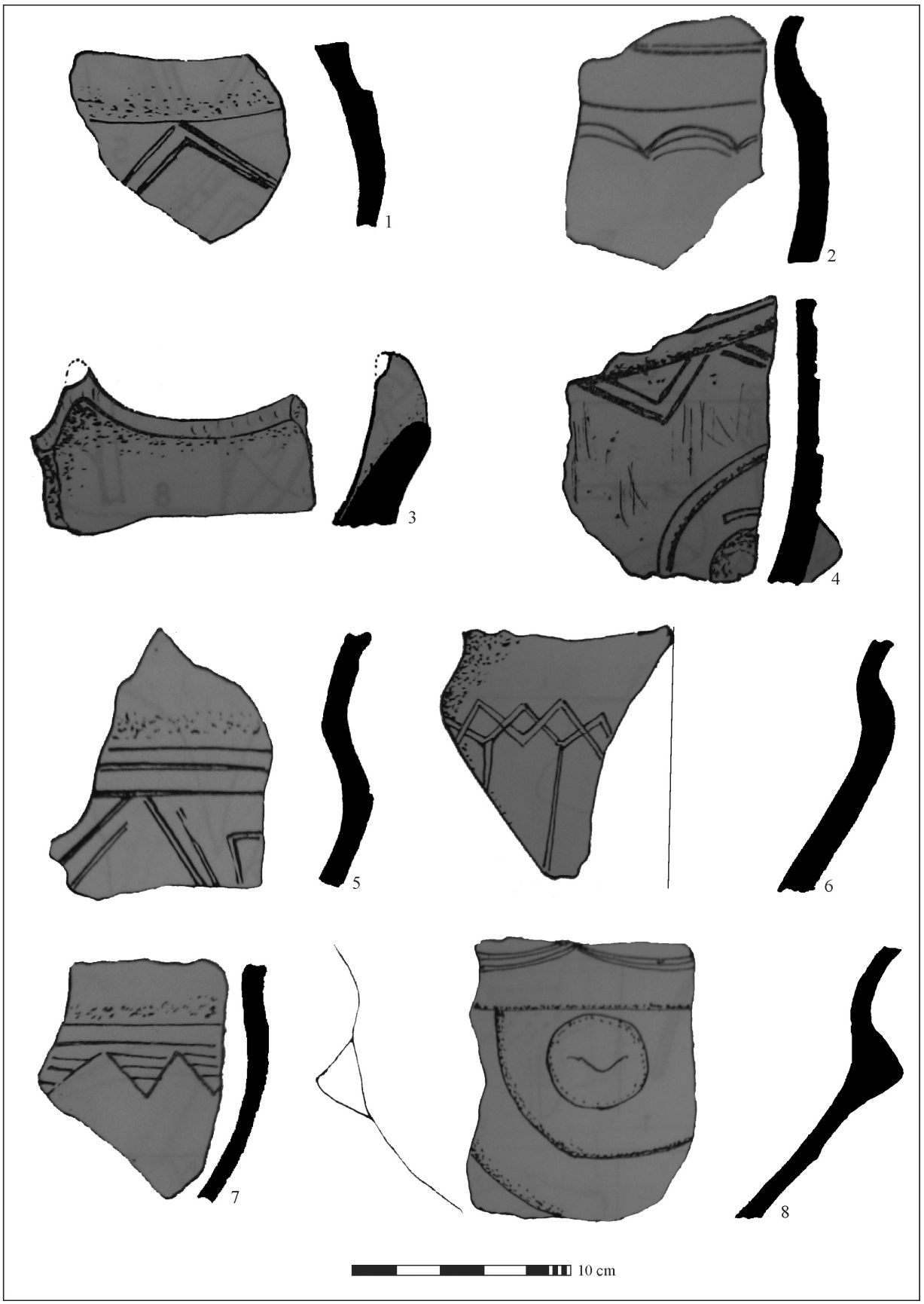

Fig. 51. LBA I pottery from Păuliș-*Dealul Bătrân* (after Pădureanu 1988).

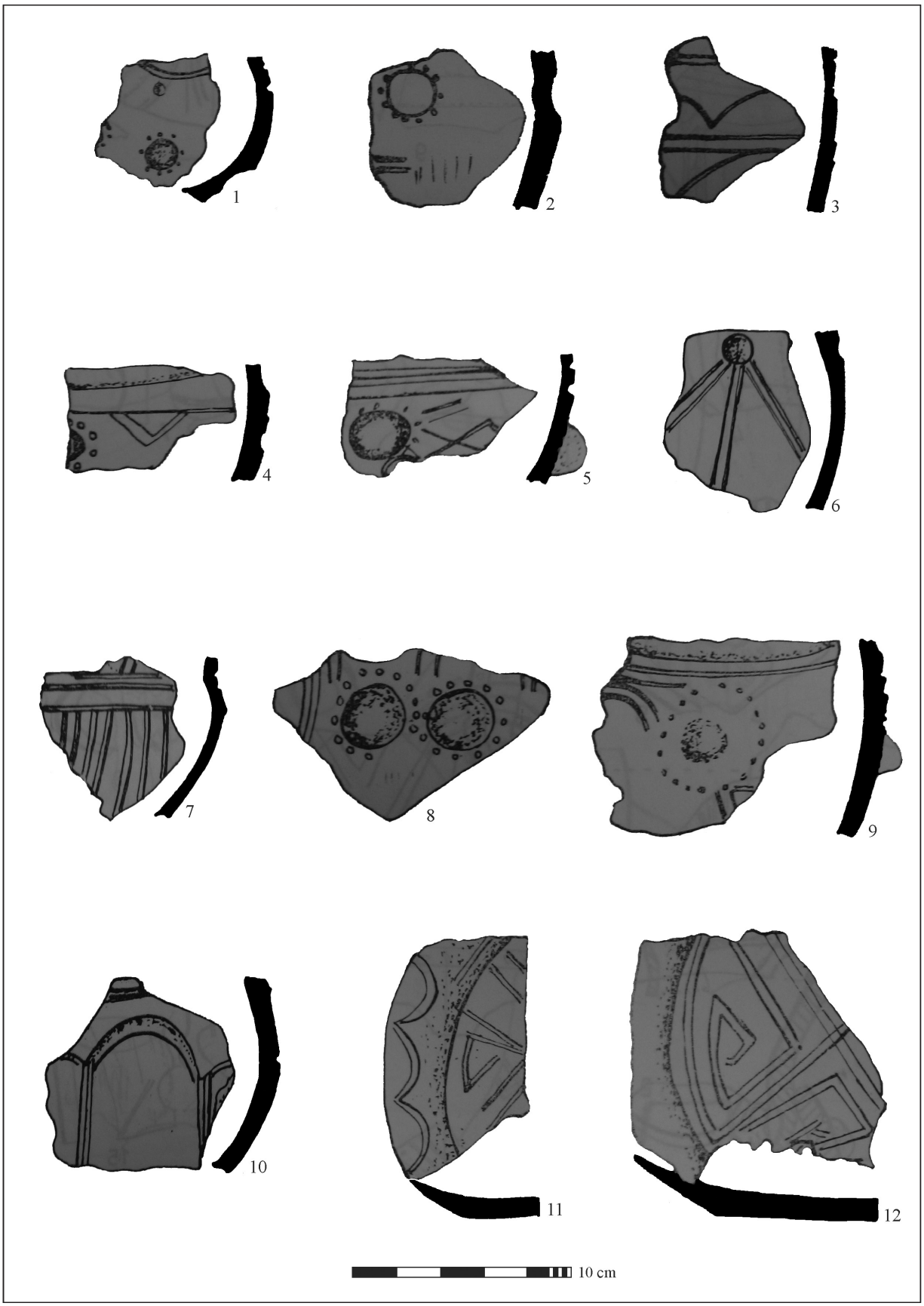

Fig. 52. LBA I pottery from Păuliș-*Dealul Bătrân* (after Pădureanu 1988).

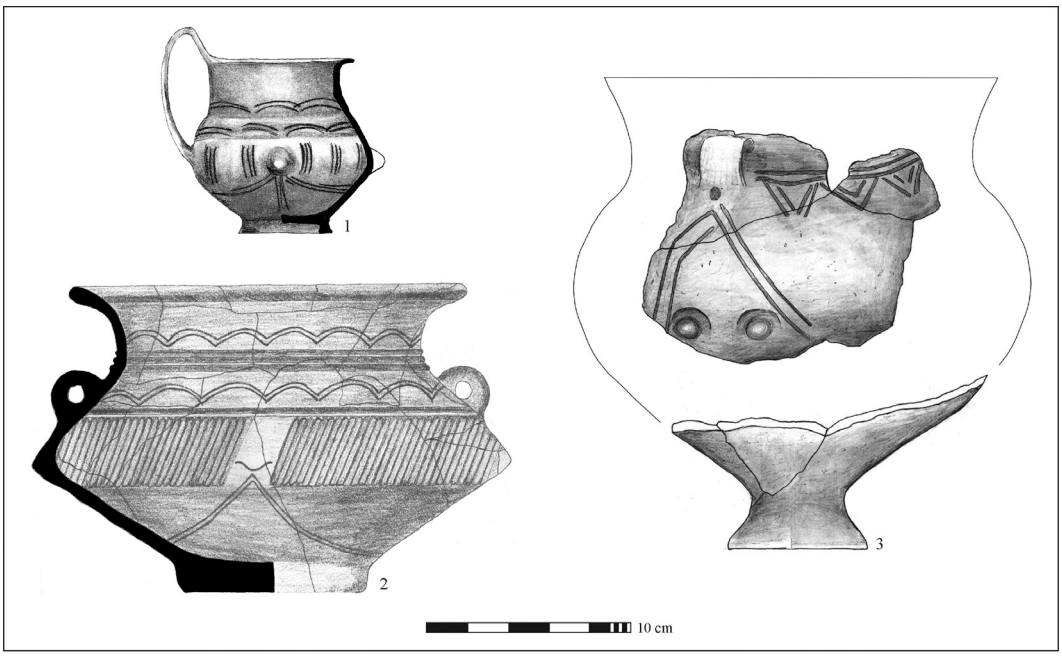

Fig. 53. LBA I pottery from Pecica-*Site 14* (drawing by the authors).

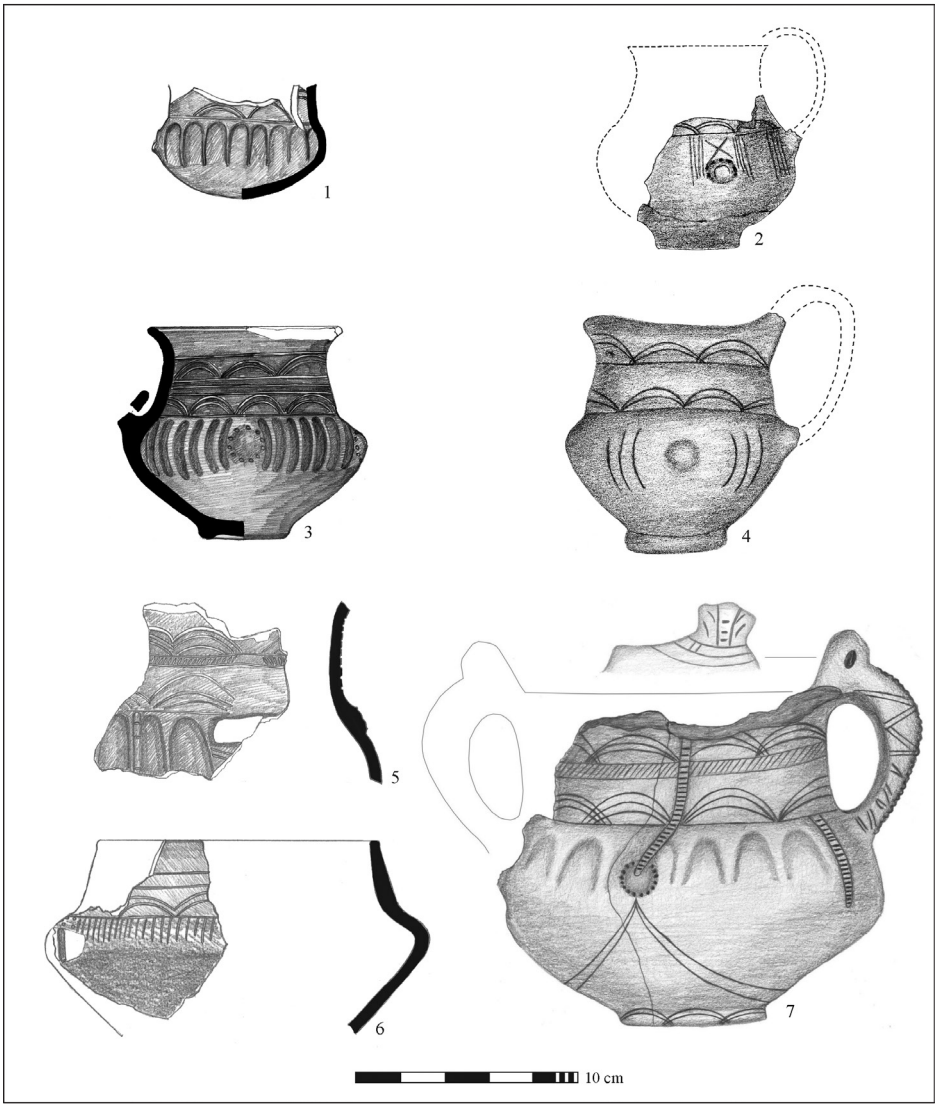

Fig. 54. LBA I pottery from: 1–3, 5–7. Șagu-*Site A1_1*; 4. Zimandu Nou-*Fostul I.A.S. Scânteia* (drawing by the authors).

biconical body and flat base)[226]. As regards the decoration techniques, we can observe, especially in the upper levels of the Pecica tell, a significant proportion of channeled ceramics. Ornamental motifs that were certainly taken from the Mureș pottery style are[227]: narrow channelings displayed semi-circularly (2.5), circular knobs (4.2), and impressions displayed in a circle (5.7). A more significant number of ceramic elements are perpetuated in the LBA repertoire from the Cornești-Crvenka style, such as type 2G cups (cups with a globular belly, ringed base and wide mouth), type 3A pots (pots with constricted neck), type 1E dishes (dishes with lobed rim), as well as incised ornamental motifs such as rows of slightly concave incisions (1.6), rows of incised arches (1.12), wide incisions displayed in a garland pattern (1.14), wide incisions displayed in a garland pattern on the inner rim (1.15), rows of narrow incisions displayed in a triangle shape (1.18), and rows of triangular incisions displayed on the inner rim (1.19). In addition to the obvious MBA background, we note that the pottery from the Lower Mureș Basin shows good analogies with the Cruceni-Belegiš phase I pottery characteristic of the lowland communities of Banat (ex. Giroc-*Mescal* and Foeni-*Gomila Lupului II*).

Craft production

Compared to the MBA, the evidence on metallurgical activities is limited. The only evidence for this came from the settlement at Șagu-*Site A1_1*, where in pit cx. 71, three crucible fragments were found that preserved traces of molten metal on the interior, and a valve from a clay mould for casting socketed axes (Fig. 55). The whole context is dated to the 16th century BC[228], the Șagu mould joining an early horizon of socketed axes in the Carpathian Basin[229]. During LBA II other finds from Șagu-*Site A1_1* confirm the existence here of an important metallurgical center[230].

Fig. 55. Photo of the feature 71, part of the LBA I settlement of Șagu-*Site A1_1*, where a socketed axe casting mould was discovered (photo by the authors).

Conclusions

The time of the MBA tells

First of all, it can be noted that the tells identified in our study area are located in different micro-regions. In addition to the more or less high terraces of some main or secondary watercourses (ex.

[226] The terminology of pottery forms were retrieved from Sava 2020, Tab. 2, Fig. 16.
[227] The terminology of decorative motifs was retrieved from Sava 2020, Fig. 26, Tab. 3.
[228] Sava 2019, Tab. 1, Fig. 5.
[229] Dietrich 2015. The artifact is unpublished and was not discussed at Dietrich 2021.
[230] Orfanou *et al.* 2022.

Semlac, Pecica, Munar), the slightly higher areas between Mureș and Crișul Alb River (Sântana, Socodor, Vărșand) were also used (Fig. 56). The choice of these locations was based on several criteria, such as the existence of an important water source, the possibility of fortifying the settlement, a territory that

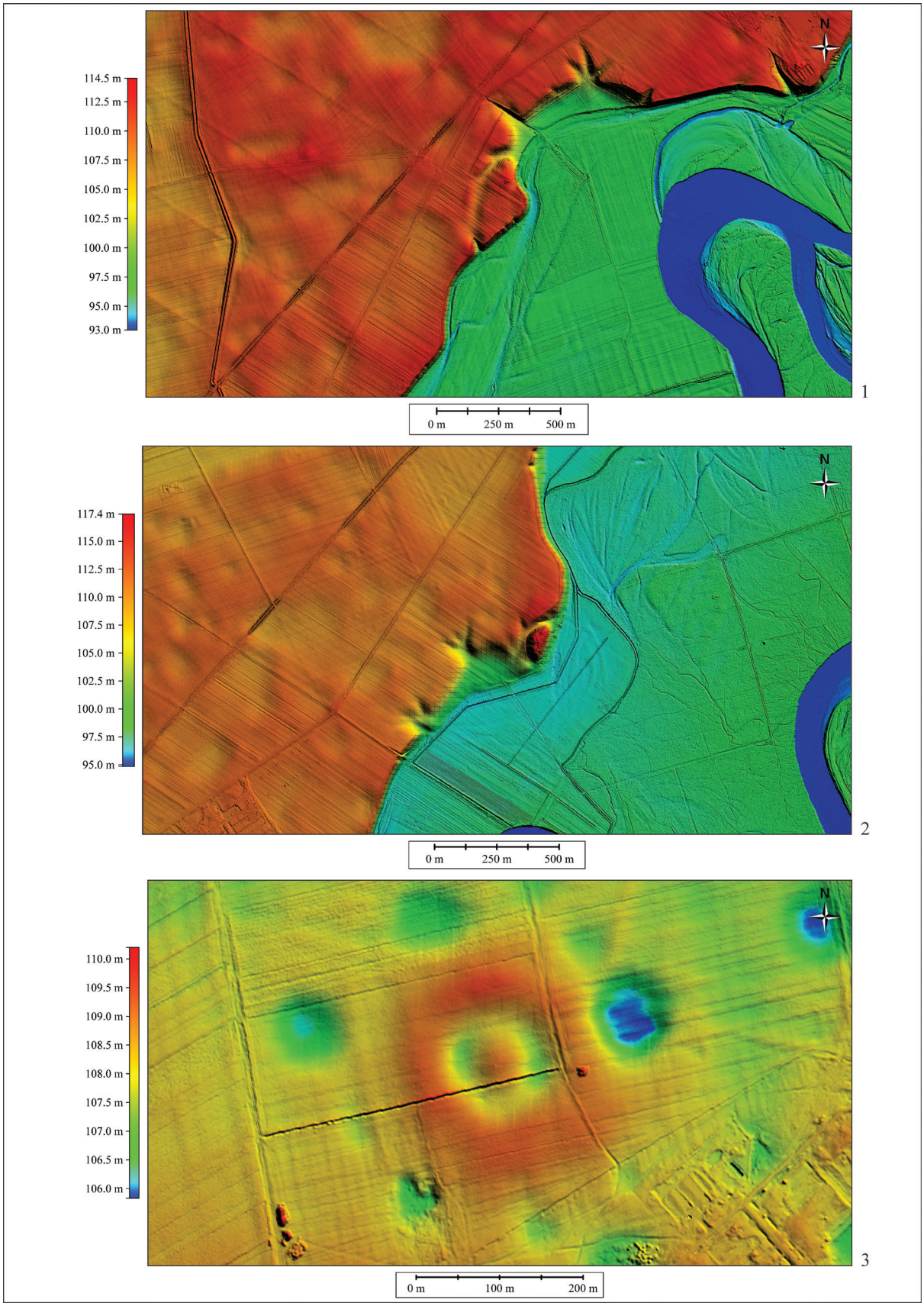

Figura 56. Digital elevation model showing the following *tells*: 1. Semlac-*Livada lui Onea*; 2. Pecica-*Șanțul Mare*; 3. Sântana-*La nord de oraș* (by the authors).

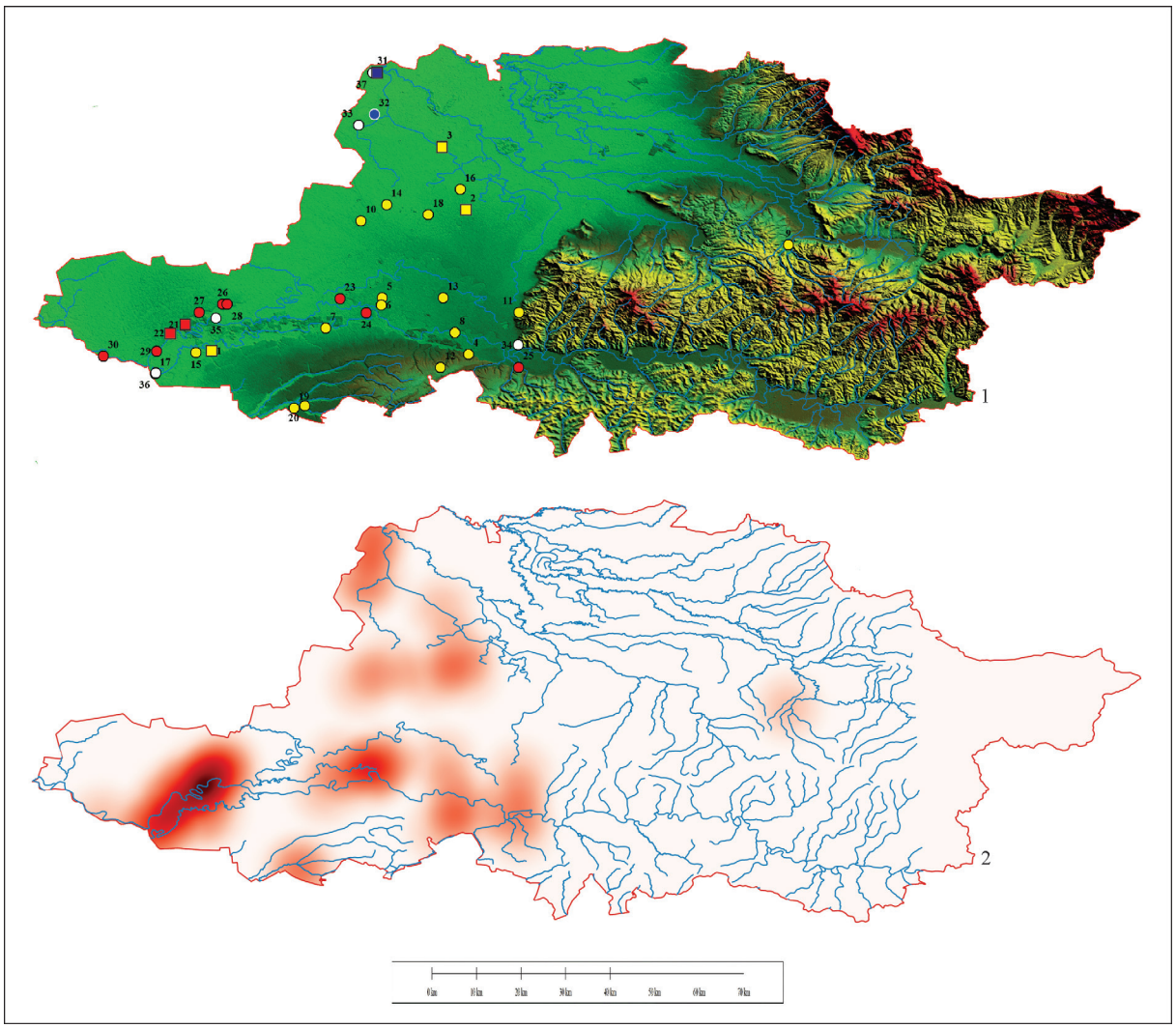

Fig. 57. 1. Map of the MBA sites from Arad County: finds associated with the Corneşti-Crvenka pottery with yellow; finds associated to the Mureș pottery with red; finds associated with Otomani pottery with blue; hoards with white; 2. Heat map of the MBA sites (maps by the authors).

would satisfy the economic needs of the community and, last but not least, the existence of passes over major watercourses or roads that could not be flooded in marshy areas[231]. The tells situated on the terraces were delimited from the rest of the area by one or more ditches, which in some cases (Pecica, Socodor) were abandoned by the subsequent expansion of the settlement. The ditches enclose an area of between 0.5 ha and 1.3 ha, and together with the surrounding outer settlement the tells occupy an area of between 4 and 8 ha. We do not yet know whether the outer settlements were also fortified.

In the vicinity of the tells and their outer settlements, several flat settlements have also been identified (Fig. 57). Systematic field surveys in the area of Munar, Semlac, Pecica, and Sântana have confirmed the existence in the *hinterland* of these tells of small settlements which, based on the ceramics, appear to be contemporary. The nearest settlement is found at ca. 2.5 km from the Munar tell, but in general they are more than 5 km away (ex. Semlac, Pecica, Sântana). In the absence of excavations and ^{14}C data it is not possible to specify the chronological relationships between the tells, their outer settlements and the surrounding flat settlements. Therefore, in the present state of research, it is difficult to assess the political-economic relations between these communities.

The hydrographic regime of the region is formed by two main rivers: Mureș and Crișul Alb. To these are added numerous streams, such as the Aranca, and a vast network of marshes and puddles that have intensely fragmented the entire Lower Mureș Basin[232]. This situation explains, at least

[231] Gogâltan 2006.
[232] Sava 2015, 12–15.

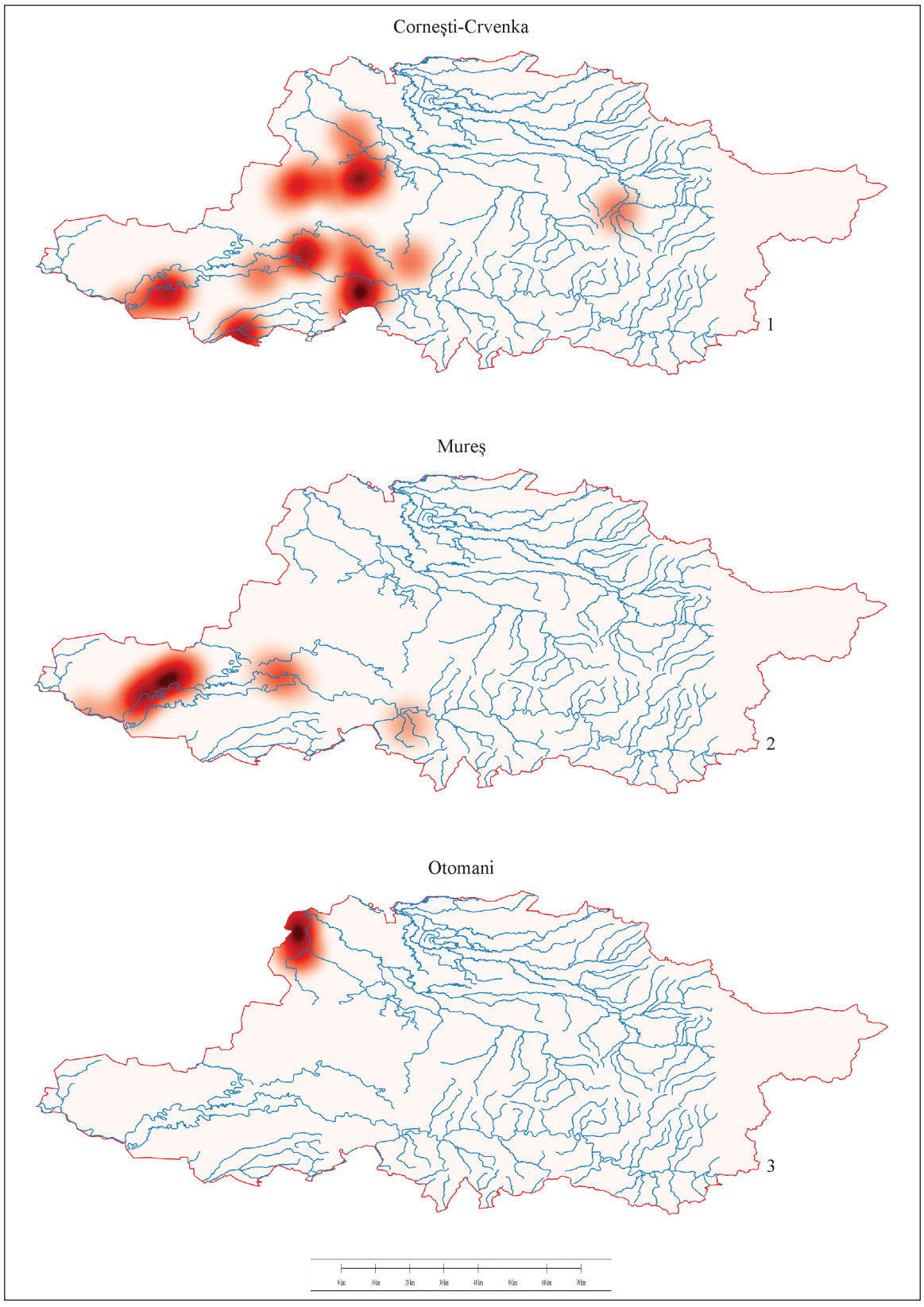

Fig. 58. Heat maps of the MBA sites, organized according to pottery styles (maps by the authors).

partially, the diversity of ceramic styles used in both tells and flat settlements. In this region, three such ceramic styles are known (Fig. 57). On the Lower Mureș region, from Lipova to Szeged, the Mureș pottery style is characteristic, and the most representative site is Pecica-*Șanțul Mare*. The highest concentration of Mureș settlements is to be found in the Pecica-Periam area, where Aranca branches off from the Mureș (Fig. 58/2). Much more widespread is the Cornești-Crvenka pottery

style, characteristic of the tells of Munar or Sântana, which is placed like an arc around the area covered by Mureș pottery. The spatial distribution of the Cornești-Crvenka settlements indicates the existence of three important clusters: Sântana-Socodor, Arad-Aluniș and Munar (Fig. 58/1). Towards the north, in the Crișul Alb valley, ceramic styles combining the Otomani and Cornești-Crvenka traditions were used, as can be seen in the Socodor and Vărșand tells or in other flat settlements[233]. The Otomani settlements are concentrated in the Crișul Alb region, in the north-western corner of Arad County (Fig. 58/3).

To illustrate the complexity of these cultural realities, let us also mention the case of the Periam tell, where Mureș ceramics are used in the lower level and Cornești-Crvenka ceramics in the upper levels[234]. Another significant example in this respect is the tell at Munar-*Wolfsberg* where almost exclusively Cornești-Crvenka pottery is used, while 7 km to the north, on the other side of the Mureș river, in the tell at Pecica-*Șanțul Mare*, Mureș pottery was used.

At present, we have insufficient data on the internal spatial organisation of tell and lowland settlements. At Pecica-*Șanțul Mare* the buildings of the early phase were constructed around a central square. At both Semlac and Pecica the houses were rebuilt on the same place, respecting a certain plan. Indirectly, in the absence of buildings with a precise functionality, we have information about a series of economic activities that took place here. Metalworking stands out in particular. The existence of a large number of moulds and many other items that were part of the technological process, ex. remnants of casting, finished objects, etc., raises the question of the origin of the raw material. Not far away, between 45 and 60 km from Pecica, in the Zarandului Mountains and the Lipova Hills, there are important copper and gold ores, but at present we have no certainty that they were exploited in the Bronze Age. It has not been possible to prove the existence of a "centre-periphery" economic model between the tell of Pecica and its neighbors, whereby prestige objects and other goods were offered in exchange for raw materials. Even less can be said about the existence of any economic, political or social effects of such possible contacts. We must therefore consider other inter-community exchange relations in order to explain the presence at the Lower Mureș Basin, in addition to essential raw materials (salt, copper, tin, gold), of exotic items such as *Columbella* and *Cardium* seashells or amber. The latter was also processed on site, producing specific items that were of local demand[235]. The same can be said about the lithic material. Interesting is the observation made in the Pecica tell about the orientation of the community here towards horse breeding, as a possible prestige good that could be traded on wide areas. It is possible that such an economic niche generated the necessary surplus that ensured the success and social stability of this settlement. Alongside the prestige economy, a number of other daily activities related to various crafts were also carried out in a multi-layered settlement. In the hinterland of the tells, mainly sheep and goats were reared, but also cattle and pigs, and einkorn and barley was cultivated.

The case of Pecica-*Șanțul Mare*, the tell with the best-known evolution in the area, is by no means unique. János Dani came to the same conclusion when discussing the situation in the multi-layered settlements in the lower Barcău/Berettyó valley, based on the same categories of finds as those presented above[236]. Equally convincing is the position occupied by the Vráble[237], or Feudvar tells[238] in their micro-areas at the western, central and south-eastern extremities of the distribution area of the Bronze Age tell phenomenon in the Carpathian Basin.

The perspective offered by the colleagues who have investigated the MBA habitat in the Benta river valley, in central Hungary[239] or in the Criș/Körös area[240] has aroused various critical reactions[241]. One thing is certain, however: systematic research of the tells in central[242], and north-eastern Hungary[243]

[233] Gogâltan 1999b; Fazecaș 2010.
[234] Roska 1911; Roska 1913; Roska 1914; Roska 1923; Soroceanu 1991, 96–122, 138–139, Taf. 41–84; Gogâltan, Ignat 2014.
[235] Gogâltan 2016b.
[236] Dani 2012.
[237] Bátora *et al.* 2015, with older literature. New research at Skorna *et al.*2018.
[238] Hänsel, Medović 1991; Falkenstein 1998.
[239] Earle, Kristiansen 2010.
[240] Duffy 2014.
[241] Kienlin 2015; Gogâltan 2016a; Kienlin 2020.
[242] Jaeger *et al.*2018.
[243] Kienlin *et al.* 2018.

or western Romania[244] has revealed a reality which Tobias Kienlin has defined in an inspired way as *'Diversity in Uniformity'*[245]. Tells or tell-like settlements have different development trajectories. Geographical position and social factors have made some tells more economically dynamic. Others, due to their limited living space, rose vertically and became monuments with a strong visual impact on the surrounding landscape both in the Bronze Age and today.

The stratigraphic accumulations in the tells could not have formed without ditches, and possibly palisades, marking a previously well-established area[246]. Their purpose was to protect the community and at the same time to symbolically demarcate the inner and outer space. They were built through a community effort which required decisions accepted by all those involved in this effort. This initiated a project with repercussions for several generations. On the other hand, the production of a large number of weapons, gold ornaments, amber and other exotic materials are also clear evidence of the increasingly sophisticated degree of social stratification in MBA. Moreover, towards the end of the MBA, as in other areas of the Carpathian Basin, the phenomenon of hoarding precious objects developed. We find both in the settlements and in their immediate vicinity hoards composed of gold, bronze or amber objects. In contrast to the EBA, weapons such as daggers, axes and, less commonly, spears are now widespread. Competition between different communities or between members of the same community has certainly led to violent conflict. Evidence of such conflicts can be found, for example in the Battonya cemetery, where a healed wound can be seen on the front of the skull of an adult man, who was buried with an axe in his right hand and a dagger in his left[247]. The existence of a authority thus led to the creation of a stable and complex social system, well integrated into the network of interregional exchanges[248].

The presence of several pottery styles may be further evidence of the existence of a community authority, capable of perpetuating over a long period of time certain local and/or micro-regional traditions and identities, connected at regional and intra-regional level through a network of exchanges or other types (ex. gifts). The above arguments reinforce the view that the Lower Mureș Basin MBA society contained the seeds of the emergence of a strongly hierarchical system during LBA II, as evidenced by the effort to build impressive fortifications and accumulate prestigious goods.

The presence of competition between groups and persons capable of reproducing social hierarchies in the Bronze Age tell society of the Carpathian Basin is denied by some scholars. There would also be no difference in economic strategies between tell and flat settlements[249]. Recent interdisciplinary analyses of contemporary cemeteries in the Lech River valley in southern Germany[250] once again show the existence of social trajectories in the Bronze Age that leave no room for theoretical discussions about the existence of a society with more or less communist ideals. The same has been demonstrated for the MBA communities in Banat (Mokrin cemetery),[251] or central Hungary, in the case of Szigetszentmiklós-*Ürgehegy*, one of the largest cemeteries in the Carpathian Basin. This cemetery also provides evidence for the existence of women who were part of the local elite[252].

Of course, at this state of research we have a number of questions which unfortunately we cannot answer, but which may set future directions for the MBA research in the area. Perhaps the most important step in a new systematic investigation is to clarify the absolute chronological relationship between the settlements of the period. Only in this way will it be possible to answer the question of the relationship between the tells and the flat settlements around them[253].

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244 Németi, Molnár 2012; Molnár 2014; Gogâltan 2016a; Kienlin *et al.* 2017; Lie *et al.* 2019; Gogâltan *et al.* 2020; Găvan, Lie 2020; Stavilă *et al.* 2020; Găvan *et al.* 2021; Găvan, Kienlin 2021; Kienlin 2021a; Kienlin 2021b; Cappenberg, Găvan 2021; Röpke 2021; Lie 2021; Marta 2021; Fazecaș, Gogâltan 2021.

245 Kienlin 2018; Kienlin 2021a.

246 Gogâltan 2008; Jaeger 2016.

247 Szalai 1999, Abb. 5/2.

248 Gogâlta, Sava 2019, 79.

249 Kienlin 2015, 64, 66.

250 Mittnik *et al.* 2019.

251 Žegarac *et al.* 2021.

252 Cavazzuti *et al.* 2021.

253 Gogâltan *et al.* 2020, 91; Găvan *et al.* 2021, 61.

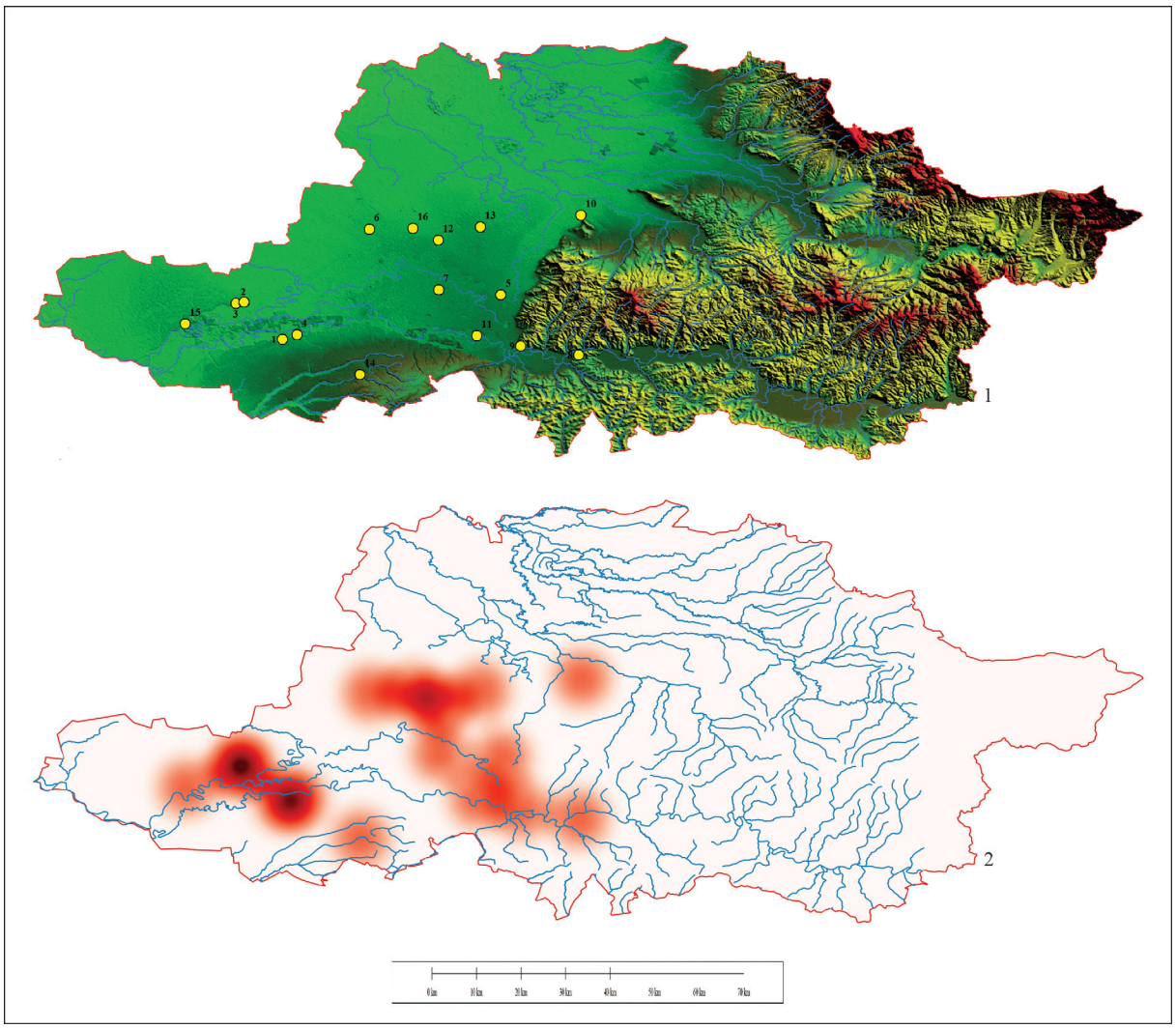

Fig. 59. 1. Map of the LBA I sites from Arad County. *Burial finds*. 1. Felnac-*Complexul Zotehnic*; 2. Pecica I; 3. Pecica-*Site 14*. *Flat settlements*: 4. Bodrogu Nou-*La Hodaie/Către Vale*; 5. Covăsânț-*Site 6*; 6. Curtici-*Centură Sud*; 7. Horia-*Vest*; 8. Lipova-*Băi*; 9. Păuliș-*Dealul Bătrân*; 10. Pâncota-*Site 16*; 11. Sâmbăteni; 12. Sântana-*Cetatea Veche*; 13. Sântana-*La Fântână*; 14. Şagu-*Site A1_1*. *Uncertain metal finds*: 15. Pecica-*Şanțul Mare*. *Unspecified finds*: 16. Zimandu Nou-*Fostul I.A.S. Scânteia*; 2. Heat map of the LBA I sites (maps by the authors).

LBA I. Forging a new world

A hotly debated topic has been the chronology and possible cause of the abandonment of MBA tells. Today, at least from a chronological point of view, the end of the way of life characteristic of multi-layered settlements can be established between ca. 1600–1500 BC. Their abandonment had various causes and was not due to a single 'catastrophic' event[254]. We know of a significant number of new settlements and necropolises that continue the local MBA tradition. In the short chronological stage, LBA I, we observed the existence of three settlement clusters arranged along the Mureș River and on the foot of the Apuseni Mountains. As during the MBA, the Pecica area is very well represented both by settlements and burial finds. Other clusters are to be found in the Sântana-Curtici and Sâmbăteni-Lipova area, up to the Mureș Mountain gorge (Fig. 59).

In the upper level of certain MBA tells and flat settlements, pottery characteristic of the LBA I phase has been discovered. Regarding burial rites and rituals, both in the MBA and in LBA I burials inhumation prevails. The deceased are usually buried in a crouched position, and bronze weapons and ornaments, ceramic vessels and meat offerings have been deposited alongside them. The LBA I burial finds indicate a perpetuation of MBA traditions, both in terms of rite and rituals[255].

[254] David 1998; Gogâltan 2005, 171–173; Metzner-Nebelsick 2013, 342–345; Fischl *et al.* 2013, 366; etc.
[255] Ignat, Sava 2019, 12.

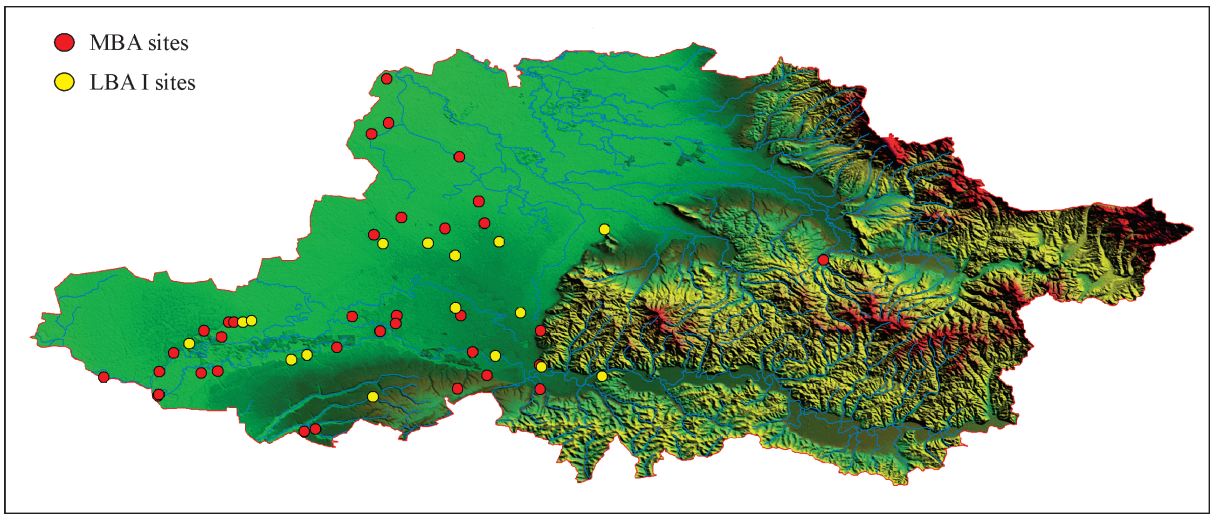

Fig. 60. Map of the MBA and LBA I sites from Arad County (map by the authors).

The largest LBA I pottery assemblage was discovered in the settlement of Șagu-*Site A1_1* and the cemetery of Pecica-*Site 14*. The pottery is characterized by the use of incised decoration, with channeling being used less frequently. The most common motifs are incisions arranged in arches, reminiscent of the Cornești-Crvenka ceramic style, but conical knobs or oblique channels can also be found, as in Mureș pottery. However some shapes, such as short biconical vessels and cups with raised rims, differ from the previous periods. As we can see, LBA I pottery has a number of MBA characteristic elements. Another aspect related to the pottery is the presence of elements common to both the southern area of the Cruceni-Belegiš I style and the northern area of Pișcolt-Cehăluț/Hajdúbagos one.

Out of the MBA and LBA I settlement patterns analysis derive several characteristics for the study area. It is quite evident that during both periods the lowland area was intensively inhabited and exploited. A good part of the sites are located along the Mureș River, with fewer being located in the catchment area of the Crișul Alb River (Fig. 60). Often the overlap of MBA and LBA I sites is evident, but during LBA I there is a narrowing of the exploited territory towards the Mureș and the Pâncota-Sântana-Curtici line.

In order to approximate the territory of these settlements we have resorted to establishing distances from the nearest contemporary neighbor (Fig. 61). It should be noted that the contemporaneity of the settlements was generally established on the basis of archaeological material. Thus, the majority of the MBA settlements are located between 2 and 8 km apart (Figs. 61/1, 62/1), the average distance being approx. 5.7 km. A slightly higher ratio could be established for LBA I settlements (between 4 and 9 km apart) (Figs. 61/2, 62/2), with an average distance of approx. 7.6 km. However, when comparing the distances between the MBA settlements and the nearest LBA I settlement, we obtained very similar results to those when calculating the distances between the nearest contemporary MBA neighbor (Tab. 3), which is also supported by the average distance of approx. 5.8 km.

In order to identify some patterns concerning the distribution of settlements during the two periods, we calculated the coefficient of variation of the distances between the nearest contemporary neighbors (Fig. 62/1–2). Furthermore, in order to observe possible correlations between the MBA and later LBA I settlements, we have also calculated the combined coefficient of variation (Fig. 62/3), based on the data presented in Tab. 3. Supported by the results presented in these graphs and tables, we can state that the coefficient of variation of the distances between the nearest MBA (Fig. 6/1) and LBA I (Fig. 6/2) neighbor do not show significant changes. We find that most of the LBA I settlements are founded at small or medium distances (ranging from 0 to 7.1 km) from the nearest previous MBA settlement. However, some of the LBA I settlements were founded at distances greater than 10 km from the nearest MBA settlement (e.g. Șagu-*Site A1_1* and Pâncota-*Site 16*). The tendencies shown may reflect at least two development trajectories for the LBA I. On the one hand, the existence in the Pecica area of important sites both during the MBA and the LBA I may reflect an indicator of a strong continuing local tradition. On the other hand, settlements founded at a greater distance from MBA

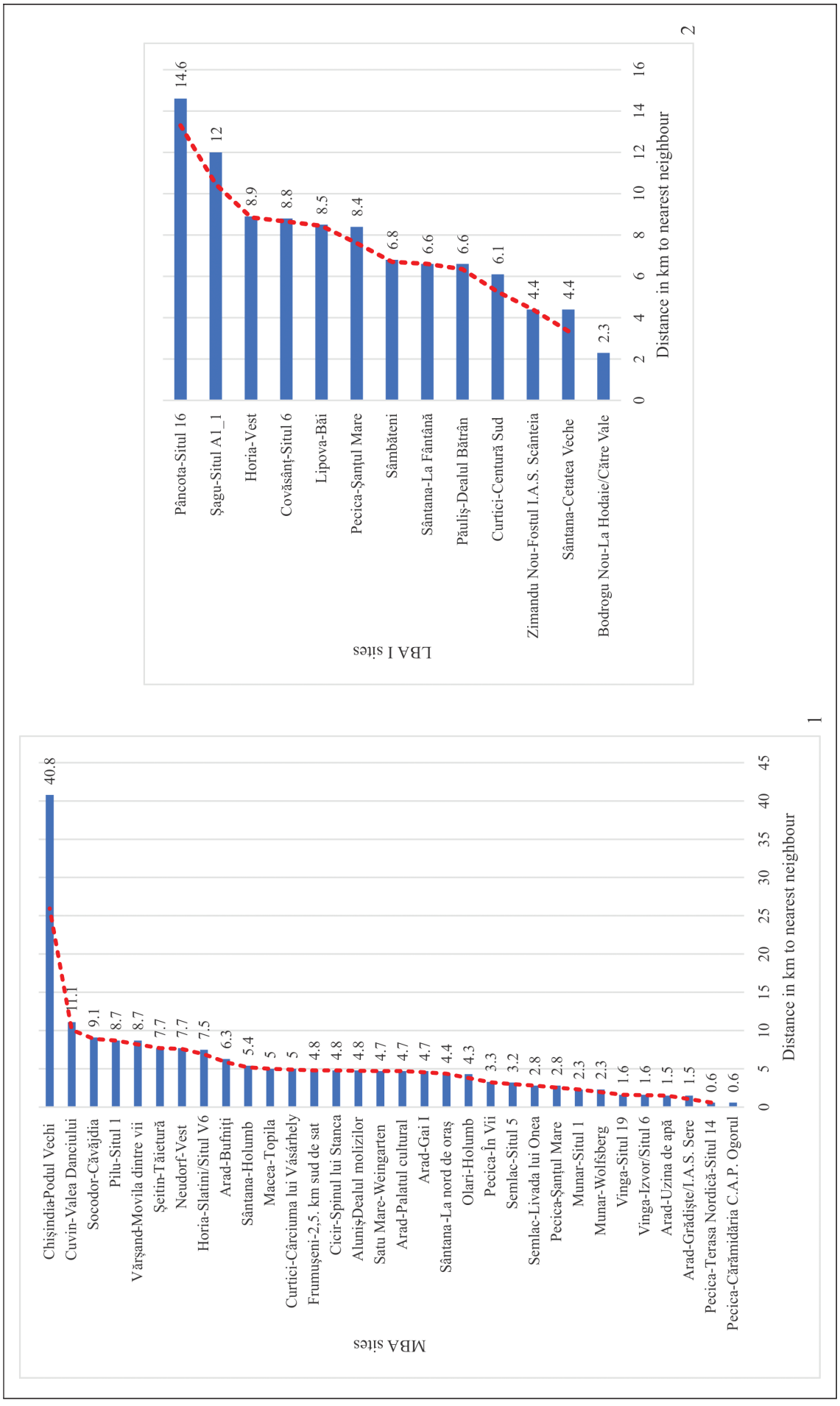

Fig. 61. Distance in km to the nearest contemporary neighbour (MBA and LBA I sites) (graphics by the authors).

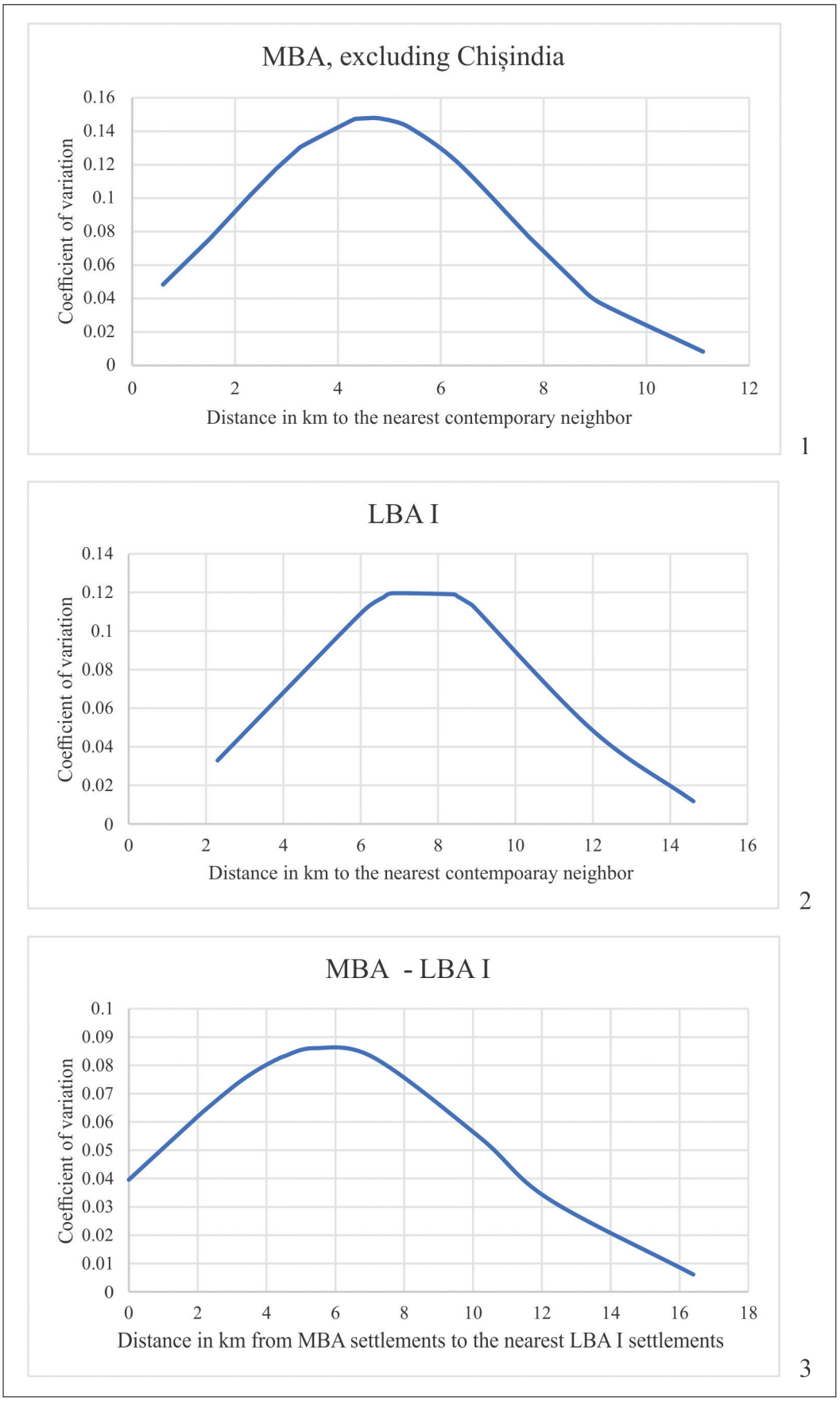

Fig. 62. 1. Variation coefficient of distances in km between the nearest contemporary neighbour of MBA settlements; 2. Variation coefficient of distances in km between the nearest contemporary neighbour of LBA I settlements; 3. Variation coefficient of distances in km between MBA settlements and the nearest LBA I settlement (graphics by the authors).

settlements, such as Șagu, show more of a departure from the MBA tradition. The fact that the settlement of Șagu would become one of the most important centers of metalworking and pottery production in the region strengthens the argument presented[256].

Table 3. Distances in km between the MBA settlement and the nearest LBA I settlement.

MBA settlements	Km distance	LBA I settlements
Pecica-Șanțul Mare	0	Pecica-Șanțul Mare
Horia-Slatini/Situl V6	1.7	Horia-Vest
Curtici-Cârciuma lui Vásárhely	2.2	Curtici-Centură Sud
Cicir-Șpinul lui Stanca	3.1	Sâmbăteni
Sântana-Holumb	3.7	Zimandu Nou-Fostul I.A.S. Scânteia
Sântana-La nord de oraș	4.2	Sântana-La Fântână
Arad-Bufniți	4.3	Bodrogu Nou-La Hodaie/Către Vale
Cuvin-Valea Danciului	4.5	Covăsânț-Situl 6
Sântana-Holumb	5.4	Sântana-Cetatea Veche
Cuvin-Valea Danciului	7.1	Păuliș-Dealul Bătrân
Vinga-Izvor/Situl 6	10.2	Șagu-Situl A1_1
Cuvin-Valea Danciului	12.2	Lipova-Băi
Sântana-La nord de oraș	16.4	Pâncota-Situl 16

In order to capture the similarities and differences between the two periods, it would have been interesting to compare the surface area of the settlements. Based on the existing data for the MBA, most settlements range between 4 and 8 ha in size (Fig. 63). Unfortunately, the LBA I settlements could not be included in this analysis, because at the current level of research it is impossible to assess the area occupied by these settlements. The main impediment is the fact that all LBA I settlements investigated by us continue to be used during LBA II, when the habitation increases considerably. It is obvious that relying only on surface surveys, the LBA I sequence cannot be spatially delineated.

Based on the studied pottery, it appears that although some MBA settlements were abandoned towards the end of the period, others continued their existence during LBA I. All this led to the perpetuation of local traditions reflected mainly in material culture and burial customs. This trajectory identified in the Lower Mureș Basin has recently been observed in the Criș/Körös Basin as well. Thus, in the Békés area, the ^{14}C data, put in accordance with the funerary rites and rituals, to which are added the ceramic styles used, show that although some tells were abandoned between 1600–1500 BC, some of the flat settlements continued their evolution until the late Bronze Age[257]. A suggestive example is the multi-layered settlement at Toboliu-*Dâmbu Zănăcanului*. The tell, with its deposits of almost 4 m thickness, has been dated to approximately 19th to 16th centuries BC[258]. The new research project focused on the outer settlement[259]. Excavations have revealed contexts associated with the Pișcolt-Cehăluț/Hajdúbagos pottery, – i.e. LBA I[260].

*

Without a strong local socio-economic substratum, the huge LBA settlements and fortifications of the Lower Mureș Basin would not have appeared. They are an expression of great prosperity. That is why it was possible to shift from fortifying a settlement of up to 1 ha with a ditch to enclosing a space comprising tens, hundreds or even thousands of ha with ditches, earthen ramparts and complex palisades. Metal artifacts also complete the picture of this new LBA I world. Times are changing, but the values of the local elite remain the same as in the MBA. The gold and bronze weapons and ornaments found in settlements or gathered in hoards may indicate social status and power obtain by certain individuals.

256 Sava 2019; Orfanou *et al.* 2022.
257 Duffy *et al.* 2019.
258 Lie *et al.* 2019, 363.
259 Găvan *et al.* 2021.
260 Găvan *et al.* 2020.

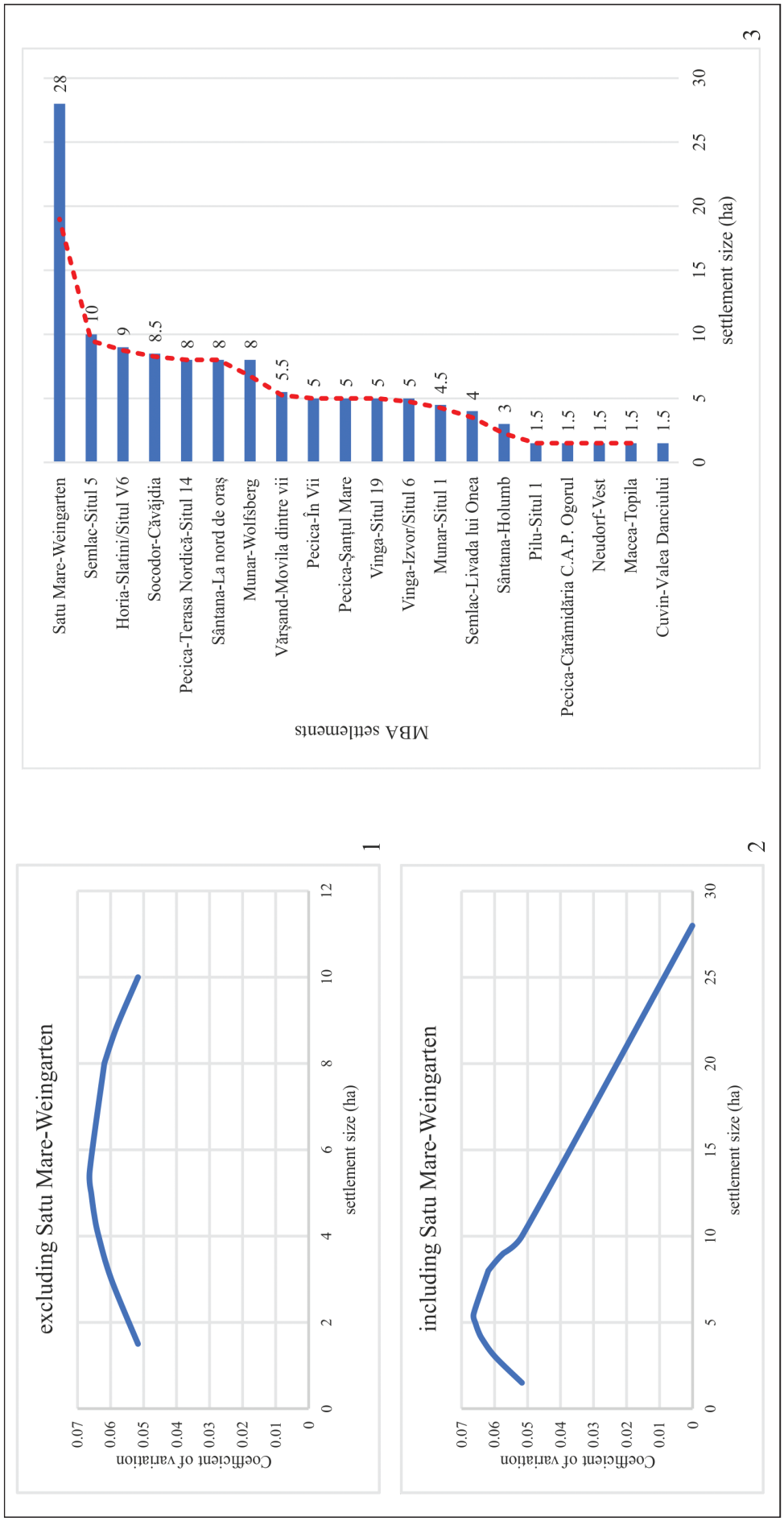

Fig. 63. MBA settlement size (graphics by the authors).

The transformations taking place in the Lower Mureș Basin starting with the 16th century BC can also be traced on a macro-regional scale[261]. In northern Italy, in the Po river valley, the *Terramare* civilization developed in the second half of the 2nd millennium BC[262]. Through strontium and oxygen isotope analysis it is argued that, from a demographic perspective, the process towards a more complex socio-political system in Bronze Age Northern Italy was triggered largely, but not completely, by internal processes[263]. Communities defended themselves behind quadrangular fortifications of up to 20 ha in size. They bear a striking resemblance to the fortification I at Sântana, also dated to the 14th and 13th centuries BC[264]. There are other interesting aspects that demonstrate connections between the Carpathian Basin and northern Italy[265].

Over time, many scholars have discussed, more or less convincingly, the links between the Mycenaean civilization and the eastern Carpathian Basin[266]. Recently the results of lead isotope analyses show that the raw material from which the silver vessels discovered in shaft grave no. 4 from Mycenae were made came from Transylvania[267]. Moreover, a woman from shaft grave no. 3, a grave in which a series of earrings, bracelets and other ornaments ending in spiral heads similar to those of the Carpathian Basin were identified among many other ornaments of non-local origin [268], shows a different strontium isotope composition from the local one[269]. Starting with the 16th century BC, the time of the grave circle A[270], the links between the eastern Carpathian Basin and the Aegean space intensified. This explains the appearance of hundreds of blue glass beads at Sântana or in the Cioclovina Cave[271]. Also, the floor plan of the largest structure at Sântana seems to resemble that of the central building of the Mycenaean palaces (the so-called megaron)[272]. We will discuss however the interregional contacts that can be established between the LBA mega-forts/sites of the Lower Mureș Basin and other contemporary centers on another occasion.

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Victor Sava
Museum of Arad
Arad
sava_vic@yahoo.com;
victor.sava.cma@gmail.com

Florin Gogâltan
Institute of Archaeology and Art History, Cluj-Napoca
Cluj-Napoca
floringogaltan@gmail.com

261 Iacono *et al.* 2021.
262 Cardarelli 2009; Vanzetti 2013; etc.
263 Cavazzuti *et al.* 2019.
264 Gogâltan *et al.* 2019, Fig. 6–7, 11.
265 Cardarelli *et al.* 2020 with older literature.
266 David 2007 with older literature. More recently see Gogâltan, Marinescu 2020.
267 Stos-Gale 2014, 199, Tab. 1.
268 Mozsolics 1967, Taf. 17/4; 27/4–5; 37/3–4; 41/10; 51/3–4; 59/9–10; 63/1–2; 65/3; 67/4; 69/1–4; 70/7; Gogâltan 1999a, 165, 169–170; Fig. 29–30; 32/1–10; David 2002, Taf. 96; 113/2–3; 115/4–5; 120/3; 124/2; 128/2; 129/1–4; 133/5–6; 135/5–6; 138; 152/25; 159/3–4; 166/7–8; 171/9–10; 175/3–4; 179/4–6; 184/1–2; 185/4; 234/3–4; 261/4; 262/2; 347/4; Soroceanu 2012, Taf. 13/3; 18; 21/4–5; 25/3–4; 29/3–4; 45/5; 47/4; 48/8; Sava, Ignat 2014, Fig. 6/3.
269 Nafplioti 2009, 286, 289; Dickinson *et al.* 2012, 13–15, 21–22.
270 Shelmerdine 1997, 539–541, Tab. 1; Voutsaki *et al.* 2013, 134, Tab. 1; Jones *et al.* 2017, Tab. 1.
271 Walton *et al.* 2009; Polikreti *et al.* 2011; Varberg *et al.* 2015; Varberg *et al.* 2016.
272 Gogâltan *et al.* 2019, 199–201, Fig. 9; Krause *et al.* 2022. For the so-called megarons see recently Thaler 2018.

REFERENCES

Andreica 2012 — M.L. Andreica, *Studiu antropologic asupra unui craniu de copil, descoperit la Șagu (județul Arad)*. Studii și cercetări de antropologie 2, 2012, 3–7.

Bader 1991 — T. Bader, *Die Schwerter in Rumänien*. PBF, IV, 8. Stuttgart 1991.

Barbu, Hügel 1999 — M. Barbu, P. Hügel, *Cruceni (Cheresteș, Keresztes, Temeskeresztes, Kreuzstadten, Kreuzstatten), com. Șagu*. In: M. Barbu, P. Hügel, G.P. Hurezan, E.D. Pădureanu (eds.), Repertoriul arheologic al Mureșului Inferior. Judeţul Arad. Timișoara 1999, 62.

Barbu *et al.* 1999 — M. Barbu, P. Hügel, G.P. Hurezan, E. Pădureanu (eds.), *Repertoriul arheologic al Mureşului Inferior. Judeţul Arad*. Timişoara 1999.

Barbu *et al.* 2002 — M. Barbu, P. Hurezan, I. Szatmári, *Márki Sándor şi colecţia de antichităţi a Liceului din Arad (1882–1887). II*. Ziridava XXIII, 2002, 459–557.

Bălan *et al.* 2016 — G. Bălan, C.P. Quinn, G. Hodgins, *The Wietenberg culture: periodization and chronology*. Dacia N.S. LX, 2016, 67–92.

Bălan *et al.* 2018 — G. Bălan, C.P. Quinn, G. Hodgins, *The Cultural and Chronological Context of the Bronze Age Cemetery from Sebeș–Între răstoace*. In: B. Rezi, R.E Németh (eds.), Bronze Age connectivity in the Carpathian Basin. Târgu Mureș 2018, 183–216

Bátora *et al.* 2015 — J. Bátora, P. Tóth, K. Rassmann, *Centrálne sídlisko zo staršej doby bronzovej vo Vrábľoch*. In: J. Bátora, P. Tóth (eds.), Keď bronz vystriedal meď. Zborník príspevkov z XXIII. medzinárodného symposia "Staršia doba bronzová v Čechách, na Morave a na Slovensku" Levice 8.–11. októbra 2013. Bratislava, Nitra 2015, 123–138.

Bejinariu 2003 — I. Bejinariu, *Piese din necropola de epoca bronzului de la Felnac (jud. Arad) aflate în colecţia Muzeului din Zalău*. AB X-XI, 2002–2003, 57–72.

Bergerbrant 2018 — S. Bergerbrant, *Creativity and spindle whorls at the Bronze Age tell of Százhalombatta-Földvár, Hungary*. In: L. Bender Jørgensen, J. Sofaer, M.L.S. Sørensen (eds.), Creativity in the Bronze Age: understanding innovation in pottery, textiles, and metalwork production. Cambridge 2018, 91–98

Bertea 2020 — S. Bertea, *Preliminary analysis of the bronze age pottery from Dudeștii Vechi-Cociohatul Mic*. ZSA 34, 2020, 125–156.

Blăjan *et al.* 1976 — M. Blăjan, Ș. Bozian, C. Şiclovan, *Descoperiri arheologice la Șeitin (jud. Arad)*. Apulum XIV, 1976, 423–432.

Boroffka 1994 — N.G.O. Boroffka, *Die Wietenberg-Kultur. Ein Beitrag zur Erforschung der Bronzezeit in Südosteuropa*. Bonn 1994.

Boroffka 1998 — N. Boroffka, *Bronze- und früheisenzeitliche Geweihtrensenknebel aus Rumänien und ihre Bezihungen. Alte Funde aus dem Museum für Geschichte Aiud, Teil II*. Eurasia Antiqua 4, 1998, 81–135.

Burlacu-Timofte, Gogâltan 2016 — R. Burlacu-Timofte, F. Gogâltan, *Human Bone Remains in the Bronze Age Tell Settlements of the Carpathian Basin*: In: F. Gogâltan, S. Ailincăi (eds.), Settlements of life and death. Studies from Prehistory to Middle Ages. Proceedings of an International Colloquium Tulcea, Romania 25th–28th of May 2016. Cluj-Napoca 2016, 89–122.

Cappenberg, Găvan 2021 — K. Cappenberg, A. Găvan, *Results of Aerial Survey*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 217–239.

Cardarelli 2009 — A. Cardarelli, *The collapse of the Terramare culture and growth of new economic and social systems during the Late Bronze Age in Italy*. Scienze dell'antichità. Storia Archeologia Antropologia 15, 2009, 449–520.

Cardarelli *et al.* 2020 — A. Cardarelli, C. Cavazzuti, M. Fritzl, M. Gavranovic, T. Hajdu, V. Kiss, K. Köhler, G. Kulcsár, E. Melis, K. Rebay Salisbury, G. Szabó, V. Szeverényi, *The connections between the plains of the Po and the Danube during the Bronze Age seen through the spread of the 'urnfield model'*. Rivista di Scienze Preistoriche LXX-S1, 2020, 231–243.

Cavazzuti *et al.* 2019 — C. Cavazzuti, R. Skeates, A.R. Millard, G. Nowell, J. Peterkin, M.B. Brea, A. Cardarelli, L. Salzani, *Flows of people in villages and large centres in Bronze Age Italy through strontium and oxygen isotopes*. PLoS One 14(1): e0209693. https://doi.org/10.1371/journal.pone.0209693

Cavazzuti *et al.* 2021	C. Cavazzuti, T. Hajdu, F. Lugli, A. Sperduti, M. Vicze, A. Horváth, I. Major, M. Molnár, L. Palcsu, V. Kiss, *Human mobility in a Bronze Age Vatya 'urnfield' and the life history of a high-status woman*. PLoS ONE 16(7): e0254360. https://doi.org/10.1371/journal.pone.0254360
Chirilă *et al.* 1999	E. Chirilă, M. Barbu, P. Hügel, *Felnac (Falnic, Fenlac, Felnak, Fönlak)*. In: M. Barbu, P. Hügel, G.P. Hurezan, E.D. Pădureanu (eds.), Repertoriul arheologic al Mureșului Inferior. Judeţul Arad. Timișoara 1999, 67–69.
Choyke, Bartosiewicz 1999–2000	A.M. Choyke, L. Bartosiewicz, *Bronze Age animal exploitation on the Central Great Hungarian Plain*. ActaArchHung 51, 1999/2000, 43–70.
Ciugudean, Quinn 2015	H. Ciugudean, C.P. Quinn, *The End of the Wietenberg Culture in the light of new ^{14}C Dates and its Chronological Relation Towards the Noua Culture*. In: R.E. Németh, R. Botond (eds.), Bronze Age Chronology in the Carpathian Basin. Cluj-Napoca 2015, 147–178.
Ciută, Molnár 2014	B. Ciută, Z. Molnár, *Contribuţii la dieta comunităţilor Otomani din situl de la Carei-Bobald*. Terra Sebus 6, 2014, 87–99.
Crișan 1978	I.H. Crișan, *Ziridava. Săpăturile de la "Șanţul Mare" din anii 1960, 1961, 1962, 1964. Ziridava. Die Ausgrabung der Jahre 1960, 1961, 1962 und 1964 vom "Șanţul Mare"*. Arad 1978.
Crișan, Hügel 1999	I.H. Crișan, P. Hügel, *Pecica (Pecica Romană, Pecica Veche, Opecska)*. In: M. Barbu, P. Hügel, G.P. Hurezan, E.D. Pădureanu (eds.), Repertoriul arheologic al Mureșului Inferior. Judeţul Arad. Timișoara 1999, 92–101.
Dani 2012	J. Dani, *Fortified Tell Settlements from the Middle Bronze Age in the Hungarian Reach of the Berettyó Valley*. In: M. Jaeger, J. Czebreszuk, K.P.Fischl (eds.), Enclosed Space – Open Society Contact and Exchange in the Context of Bronze Age Fortified Settlements in Central Europe. Poznań, Bonn 2012, 27–37.
Dani *et al.* 2016	J. Dani, K.P.Fischl, G. Kulcsár, V. Szeverényi, V. Kiss, *Visible and invisible inequality: changing patterns of wealth consumption in Early and Middle Bronze Age Hungar.* In: H. Meller, H.P. Hahn, R. Jung, R. Risch (Hrsg.), Arm und Reich – Zur Ressourcenverteilung in prähistorischen Gesellschaften. Rich and Poor – Competing for resources in prehistoric societies. Halle 2016, 219–241.
David 1998	W. David, *Zum Ende der bronzezeitlichen Tellsiedlungen im Karpatenbecken*. In: H. Küster, A. Lang, P. Schauer (Hrsg.), Archäologische Forschungen in urgeschichtlichen Siedlungslandschaften. Festschrift für Georg Kossack zum 75. Geburtstag. Regensburg 1998, 231–267.
David 2002	W. David, *Studien zu Ornamentik und Datierung der bronzezeitlichen Depotfundgruppe Hajdúsámson-Apa-Ighiel-Zajta*. Alba Iulia 2002.
David 2007	W. David, *Gold and Bone Artefacts as Evidence of Mutual Contact between the Aegean, the Carpathian Basin and Southern Germany in the Second Millennium BC*. In: I. Galanaki, H. Tomas, Y. Galanakis, R. Laffineur (eds.), Between the Aegaean and Baltic Sees. Prehistory across borders. Liège, Austin 2007, 363–370.
Demény *et al.* 2019	A. Demény, Z. Kern, Gy. Czuppon, A. Németh, G. Schöll-Barna, Z. Siklósy, Sz. Leél-Őssy, G. Cook, G. Serlegi, B. Bajnóczi, P. Sümegi, Á. Király, V. Kiss, G. Kulcsár, M. Bondár, *Middle Bronze Age humidity and temperature variations, and societal changes in East-Central Europe*. Quaternary International 504, 2019, 80–95.
Dickinson *et al.* 2012	O.T.P.K. Dickinson, L. Papazoglou-Manioudaki, A. Nafplioti, A. J.N.W. Prag, *Mycenae Revisited part 4: assessing the data*. The Annual of the British School at Athens, 2012, 1–28.
Dietrich 2015	O. Dietrich, *The Earliest Socketed Axes in Southeastern Europe: Tracking the Spread of a Bronze Age Technological Innovation*. In: P. Suchowska-Ducke, S. Scott Reiter, H. Vandkilde (eds.), Forging Identities. The Mobility of Culture in Bronze Age Europe: Volume 2. Oxford 2015, 39–46.
Dietrich 2021	O. Dietrich, *Bronzezeitliche Tüllenbeile aus Rumänien. Studien zu Chronologie, Chorologie und Hortung*. Berlin 2021. https://refubium.fu-berlin.de/handle/fub188/31025.
Domonkos 1908	J. Domonkos, *A lapós halom (Arad m.)*. AÉ XXVIII, 1908, 55–78.
Dömötör 1901	L. Dömötör, *Római korbeli edények a pécskai Nagy-sáncban*. AÉ XXI, 1901, 327–335.
Dömötör 1902	L. Dömötör, *A pécskai ösztelepröl származó öntömintákról*. AÉ XXII, 1902, 271–274.

Drașovean 2015 — L. Drașovean, *Small lithic assemblages from the Bronze Age tell Pecica-Şanţul Mare (2008–2011 campaigns)*. ReDIVA III, 2015, 53–70.

Dudaș 1975 — F. Dudaș, *Așezarea de tip Otomani de la Chisindia (Zărand)*. Crisia V, 1975, 245–249.

Duffy 2014 — P.R. Duffy, *Complexity and Autonomy in Bronze Age Europe. Assessing Cultural Developments in Eastern Hungary*. Budapest 2014.

Duffy *et al.* 2019 — P.R. Duffy, G.M. Parditka, J.I. Giblin, L. Paja, *The problem with tells: Lessons learned from absolute dating of Bronze Age mortuary ceramics in Hungary*. Antiquity 93, 2019, 63–79.

Dumitrescu 1941 — V. Dumitrescu, *Funde aus der zweiten Periode der Bronzezeit im Bezirk Arad*. Dacia VII-VIII, 1937–1940 (1941), 127–131.

Earle, Kristiansen 2010 — T. Earle, K. Kristiansen (eds.), *Organizing Bronze Age Societies. The Mediterranean, Central Europe, and Scandinavia Compared*. Cambridge 2010.

Earle *et al.* 2011 — T. Earle, A. Kreiter, C. Klehm, J. Ferguson, M. Vicze, *Bronze Age Ceramic Economy: The Benta Valley, Hungary*. European Journal of Archaeology, 14, 3, 2011, 419–440.

Falkenstein 1998 — F. Falkenstein, *Die Siedlungsgeschichte des Titeler Plateaus*. Kiel 1998.

Fazecaș 2010 — G. Fazecaș, *Așezarea aparținând epocii bronzului de la Salonta – Testhalom. Sondajul arheologic din anul 1958*. In: H. Pop, I. Bejinariu, S. Băcueţ, D. Băcueţ (coord.), Identităţi culturale și regionale în context european. Studii de arheologie și antropologie. In memoriam Alexandri V. Matei. Zalău 2010, 111–121.

Fazecaș, Gogâltan 2018 — G. Fazecaș, F. Gogâltan, *Situl aparținând epocii bronzului de la Diosig "Colonie". O reevaluare*. Crisia XLVIII, 2018, 2005, 39–55.

Fazecaș, Gogâltan 2019 — G. Fazecaș. F. Gogâltan, *The Otomani Communities in the Crişuri Rivers Basin. A New Perspective on the South-eastern Border of the Otomani-Füzesabony Cultural Complex (OFCC)*. In: K.P.Fischl, T.L. Kienlin (eds.), Beyond Divides – The Otomani-Füzesabony Phenomenon. Current Approaches to Settlement and Burial in the North-eastern Carpathian Basin and Adjacent Areas. Bonn 2019, 317–349.

Fazecaș, Gogâltan 2020 — G. Fazecaș, F. Gogâltan, *Multilayered settlements of the Bronze Age in the Crișuri Rivers Basin. State of research (2016)*. Crisia L, 2020, 19-44.

Fazecaș, Gogâltan 2021 — G. Fazecaș, F. Gogâltan, *Research History of the Bronze Age Multi-Layered Settlements in Bihor County*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 317–338.

Filatova 2022 — S. Filatova, *Bronze Age plant spectra in Hungary before and after the introduction of millet cultivation*. In: W. Kirleis, M. Dal Corso, D. Filipović (eds.), Millet and what else? The wider context of the adoption of millet cultivation in Europe. Leiden 2022, 39–68.

Filipović *et al.* 2020 — D. Filipović, J. Meadows, M. Dal Corso1, W. Kirleis, A. Alsleben, Ö. Akeret, F. Bittmann, G. Bosi, B. Ciută, D. Dreslerová, H. Effenberger, F. Gyulai, A.G. Heiss, M. Hellmund, S. Jahns, T. Jakobitsch, M. Kapcia, S. Klooß, M. Kohler-Schneider, H. Kroll, P. Makarowicz, E. Marinova, T. Märkle, A. Medović, A.M. Mercuri, A. Mueller-Bieniek, R. Nisbet, G. Pashkevich, R. Perego, P. Pokorný, Ł. Pospieszny, M. Przybyła, K. Reed, J. Rennwanz, H.-P. Stika, A. Stobbe, T. Tolar, K. Wasylikowa, J. Wiethold, T. Zerl, *New AMS 14C dates track the arrival and spread of broomcorn millet cultivation and agricultural change in prehistoric Europe*. Nature 2020 10:13698. // doi.org/10.1038/s41598–020–70495-z

Fischl, Reményi 2013 — K.P. Fischl, L. Reményi, *Interpretation Possibilities of the Bronze Age Tell Sites in the Carpathian Basin*. In: A. Anders, G. Kulcsár, G. Kalla, V. Kiss, G. V. Szabó (eds.), Moments in Time. Papers Presented to Pál Raczky on His 60th Birthday. Budapest 2013, 725–738.

Fischl *et al.* 2013 — K.P. Fischl, V. Kiss, G. Kulcsár, V. Szeverényi, *Transformations in the Carpathian Basin around 1600 B.C.* In: H. Meller, F. Bertemes, H.R. Bork, R. Risch (Hrsg.), 1600 – Kultureller Umbruch im Schatten des Thera Ausbruchs? 1600 – Cultural change in the shadow of the Thera–Eruption? Halle 2013, 355–371.

Fischl *et al.* 2015 — K.P. Fischl, V. Kiss, G. Kulcsár, V. Szeverényi, *Old and new narratives for the Carpathian Basin around 2200 BC*. In: H. Meller, W.H Arz, R. Jung, R. Risch (eds.), 2200 BC – A climatic breakdown as a cause for the collapse of the old world?. Halle 2015, 503–523.

Foltiny 1957 — I. Foltiny, *A halomsíros és lausitzi kultúra nyomai Szeged környékén. Die Spuren der Hügelgräberkultur und der Lausitzer Kultur in der Umgebung von Szeged*. Budapest 1957.

Gaydarska, Chapman 2022 — B. Gaydarska, J. Chapman, *Megasites in Prehistoric Europe. Where Strangers and Kinsfolk Met*. Cambridge 2022.

Găvan 2014 — A. Găvan, *Vărșand "Movila dintre vii = Lapóshalom", Arad County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 274–285.

Găvan 2015 — A. Găvan, *Metal and metalworking in the Bronze Age Tells from the Carpathian Basin*. Cluj-Napoca 2015.

Găvan 2020 — A. Găvan, *Metalworking as a Craft in Bronze Age Europe: The Organization of Metal Production Within Tell Settlements in the Carpathian Basin*. In: S.W. E. Blum, T. Efe, T.L. Kienlin, E. Pernicka (eds.), From Past to Present. Studies in Memory of Manfred O. Korfmann. Bonn 2020, 459–482.

Găvan, Gogâltan 2014 — A. Găvan, F. Gogâltan, *"Zentrum un Peripherie?" Der bronzezeitliche Tell von Pecica "Șanțul Mare" (Kreis Arad, Rumänien)*. In: B. Nessel, I. Heske, D. Brandherm (Hrsg.). Ressourcen und Rohstoffe in der Bronzezeit. Nutzug – Distribution – Kontrolle. Wünsdorf 2014, 28–40.

Găvan, Ignat 2014 — A. Găvan, A. Ignat, *Pecica "Șanțul Mare = Nagysánc", Arad County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 148–167.

Găvan, Lie 2020 — A. Găvan, M.A. Lie, *A casting mould uncovered in the Bronze Age tell settlement from Toboliu. Notes on the origin and distribution of socketed chisels*. ZSA 34, 2020, 157–168.

Găvan, Kienlin 2021 — A. Găvan, T.L. Kienlin, *Introduction: Bronze Age Settlements in North-Western Romania*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 9–20.

Găvan, Gogâltan 2022 — A. Găvan, F. Gogâltan, *Tell-ul epocii bronzului de la Pecica "Șanțul Mare". Un centru metalurgic al Bazinului Carpatic (II)*. Studii și Comunicări Satu Mare. Seria Arheologie XXXVII–XXXVIII/I, 2021–2022, 85–105.

Găvan *et al.* 2020 — A. Găvan, M.A. Lie, T. Kienlin, *Preliminary report on the 2019 excavation undertaken on the outer settlement of the tell from Toboliu (Bihor County)*. Crisia L, 2020, 59–74.

Găvan *et al.* 2021 — A. Găvan, T.L. Kienlin, A. Röpke, N. Nolde, T. Zerl, M. Zickel, M.A. Lie, G. Fazecaș, F. Gogâltan, *Living together or apart? Unravelling the development, internal organization and social structure of a complex Bronze Age tell settlement at Toboliu, western Romania*. Crisia LI, 2021, 59–76.

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

Gogâltan 1999b — F. Gogâltan, *The Southern Border of the Otomani Culture*. A Móra Ferenc Múzeum Évkönyvei. Studia Archaeologica V, 1999, 51–76.

Gogâltan 2004 — F. Gogâltan, *Bronzul mijlociu în Banat. Opinii privind grupul Cornești-Crvenka*. In: P. Rogozea, V. Cedică (Hrsg.), Festschrift für Florin Medeleț. Zum 60. Geburtstag. Timișoara 2004, 79–153.

Gogâltan 2005 — Fl. Gogâltan, *Der Beginn der bronzezeitlichen Tellsiedlungen im Karpatenbecken: Chronologische Probleme*. In: B. Horejs, R. Jung, E. Kaiser, B. Teržan, (Hrsg.), Interpretationsraum Bronzezeit. Bernhard Hänsel von seinen Schülern gewidment. Bonn 2005, 161–179.

Gogâltan 2006 — F. Gogâltan, *Zur Entsthehung der bronzezeitlichen Tellkulturen im Karpatenbecken. Ein allgemeiner Überblick*. In: C. Gaiu, C. Găzdac (eds.), Fontes Historiae. Studia in honorem Demetrii Protase. Bistrița, Cluj-Napoca 2006, 61–74.

Gogâltan 2008 — F. Gogâltan, *Fortified Bronze Age Tell Settlements in the Carpathian Basin. A General Overview*. In: J. Czebreszuk, S. Kadrow, J. Müller (eds.), Defensive Structures from Central Europe to the Aegean in the 3rd and 2nd millennia BC. Poznań, Bonn 2008, 39–56.

Gogâltan 2010 — Fl. Gogâltan, *Die Tells und der Urbanisierungsprozess*. In: B. Horejs, T.L. Kienlin (Hrsg.), Siedlung und Handwerk. Studien zu sozialen Kontexten in der Bronzezeit. Bonn 2010, 13–46.

Gogâltan 2014a — F. Gogâltan, *Satu Mare "Weingarten", Timiș County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 196–199.

Gogâltan 2014b — F. Gogâltan, *Semlac "Livada lui Onea", Arad County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 242–246.

Gogâltan 2015 — F. Gogâltan, *The Early and Middle Bronze Age Chronology on the Eastern Frontier of the Carpathian Basin: Revisited after 15 Years*. In: R.E. Németh, R. Botond (eds.), Bronze Age Chronology in the Carpathian Basin. Cluj-Napoca 2015, 53–95.

Gogâltan 2016a — F. Gogâltan, *Building power without power? Bronze Age fortified settlements on the Lower Mureș Basin*. In: F. Gogâltan, C. Cordoș (eds.), Prehistoric settlements: social, economic and cultural aspects. Seven studies in the Carpathian area. Cluj- Napoca 2016, 87–113.

Gogâltan 2016b — Fl. Gogâltan, *Chihlimbarul preistoric de la frontiera estică a Bazinului Carpatic*. AB XXIV, 2016, 143–169.

Gogâltan 2017 — F. Gogâltan, *The Bronze Age Multilayered Settlements in the Carpathian Basin (cca. 2500–1600/1500 BC). An old catalogue and some chronological problems*. Journal of Ancient History and Archaeology 4, 4, 2017, 28–63.

Gogâltan 2019a — F. Gogâltan, *The Chronology of the Bronze Age Tell and Tell-like Settlements in the Carpathian Basin. Revisited after 15 Years*. Studia Hercynia XXIII/2, 198–214.

Gogâltan 2019b — F. Gogâltan, *Neuere siedlungsarchäologische Forschungen im östlichen Karpatenbecken (2800–1500 v.Chr.)*. In: H. Meller, S. Friederich, M. Küßner, H. Stäuble, R. Risch (Hrsg.), Siedlungsarchäologie des Endneolithikums und der frühen Bronzezeit. Late Neolithic and Early Bronze Age Settlement Archaeology. Halle 2019, 869–891.

Gogâltan 2021 — F. Gogâltan, *Bronzul timpuriu și mijlociu la frontiera estică a Bazinului Carpatic* (cca. 2700/2600–1600/*1500 BC). I. Despre mediul ambiant și istoricul cercetărilor*. Terra Sebus 13, 2021, 9–43.

Gogâltan, Sava 2010 — F. Gogâltan, V. Sava, *Sântana Cetatea Veche. O fortificație de pământ a epocii bronzului la Mureșul de jos. / Sântana Cetatea Veche. A Bronze Age earthwork on the lower Mureș*. Arad 2010.

Gogâltan, Sava 2012 — F. Gogâltan, V. Sava, *War and Warriors during the Late Bronze Age within the Lower Mureș Valley*. ZSA 26/1, 2012, 61–81.

Gogâltan, Găvan 2014 — F. Gogâltan, A. Găvan, *Der bronzezeitliche Tell von Pecica "Șanțul Mare". Ein metallurgisches Zentrum des Karpatenbeckens (I)*. EphNap XXIV, 2014, 7–38.

Gogâltan, Ignat 2014 — F. Gogâltan, A. Ignat, *Periam "Movila Șanțului = Sánczhalom = Schantzhügel", Timiș County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 168–176.

Gogâltan, Fazecaș 2018 — F. Gogâltan, G. Fazecaș, *At the South-Eastern edge of the Otomani-Füzsabony Cultural Complex*. Gesta XVII/2, 2018, 47–62.

Gogâltan, Sava 2018 — F. Gogâltan, V. Sava, *A Violent End. An Attack with Clay Sling Projectiles against the Late Bronze Age Fortification in Sântana, South-Western Romania*. In: S. Hansen, R. Krause (Hrsg.), Bronzezeitliche Burgen zwischen Taunus und Karpaten. Beiträge der Ersten Internationalen LOEWE-Konferenz vom 7. bis 9. Dezember 2016 in Frankfurt/M. Bronze Age Hillforts between Taunus and Carpathian Mountains. Proceedings of the First International LOEWE Conference, 7–9 December 2016 in Frankfurt/M. Bonn 2018, 349–369.

Gogâltan, Sava 2019 — F. Gogâltan, V. Sava, *Înainte de apariția mega-forturilor bronzului târziu de la Mureșul de Jos (2000/1900–1600/1500 BC)*. Crisia XLIX, 2019, 65–94.

Gogâltan, Stavilă 2020 — F. Gogâltan, A. Stavilă, *The Late Bronze Age Settlement from Giroc (Timiș County). The 1992–1993 archaeological excavations*. ZSA 34, 2020, 189–242.

Gogâltan, Marinescu 2020 — F. Gogâltan, G.G. Marinescu, *Kurt Horedt's "Siebenbürgen und Mykenä". After more than 50 years*. In: J. Maran, R. Băjenaru, S.-C. Ailincăi, A.-D. Popescu, S. Hansen (eds.), Objects, Ideas and Travelers. Contacts between the Balkans, the Aegean and Western Anatolia during the Bronze and Early Iron Age. Volume to the memory of Alexandru Vulpe. Proceedings of the Conference in Tulcea, 10–13 November, 2017. Bonn 2020, 205–219.

Gogâltan, Stavilă 2021 — F. Gogâltan, A. Stavilă, *The Bronze Age Findings*. In: F. Drașovean, F. Gogâltan (eds.), Foeni-Cimitirul Ortodox. Archaeological Monography. Cluj-Napoca 2021.

Gogâltan *et al.* 2013 — F. Gogâltan, V. Sava, L. Mercea, *Sântana "Cetatea Veche". Metal and power*. ZSA 27, 2013, 21–72.

Gogâltan *et al.* 2014 — F. Gogâltan, C. Cordoș, A. Ignat (eds.), *Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research*. Cluj-Napoca 2014.

Gogâltan *et al.* 2019 — F. Gogâltan, V. Sava, R. Krause, *Sântana "Cetatea Veche". A Late Bronze Age Mega-fort in the Lower Mureș Basin in Southwestern Romania*. In: S. Hansen, R. Krause (Hrsg.), Materialisierung von Konflikten. Beiträge der Dritten Internationalen LOEWE-Konferenz vom 24. bis 27. September 2018 in Fulda. Materialisation of Conflicts. Proceedings of the Third International LOEWE Conference, 24–27 September 2018 in Fulda. Bonn 2019, 191–221.

Gogâltan *et al.* 2020 — F. Gogâltan, A. Găvan, M.A. Lie, G. Fazecaș, C. Cordoș, T.L. Kienlin, *Exploring the Bronze Age tells and tell-like settlements from the eastern Carpathian Basin. Results of a research project*. In: A. Blanco-González, T.L. Kienlin (eds.), Current approaches to tells in the prehistoric Old World. A cross-cultural comparison from Early Neolithic to the Iron Age. Oxford 2020, 73–95.

Gumă 1997 — M. Gumă, *Epoca Bronzului în Banat. Orizonturi cronologice și manifestări culturale*. Timișoara 1997.

Gumnior, Stobbe 2019 — M. Gumnior, A. Stobbe, *Palaeoenvironmental reconstructions at Corneşti-Iarcuri (SW Romania) – preliminary results from geomorphogical, pedological and palynological on-site studies*. In: S. Hansen, R. Krause (eds.), Bronze Age Fortresses in Europe. Proceedings of the Second International LOEWE Conference, 9–13 October 2017 in Alba Julia. Bonn 2019, 237–250.

Gumnior, Stobbe 2021 — M. Gumnior, A. Stobbe, *First palynological results from lowland sites in the Romanian Banat and their implications for settlement and land use dynamics in the southeastern Carpathian Basin*. Quaternary International 583, 2021, 48–61.

Gumnior *et al.* 2019 — M. Gumnior, C. Herbig, R. Krause, P. Urdea, A.C. Ardelean, A. Bălărie, A. Stobbe, *Palaeoecological evidence from buried topsoils and colluvial layers at the Bronze Age fortification Corneşti-Iarcuri, SW Romania: results from palynological, sedimentological, chronostratigraphical and plant macrofossil analyses*. Vegetation History and Archaeobotany 29, 2, 2019, 173–188.

Gyucha *et al.* 2011 — A. Gyucha, P.R. Duffy, T. Frolking, *The Körös Basin from Neolithic to the Habsburgs: Linking Settlement Distributions with Pre-Regulation Hydrology Through Multiple Data Set Overlay*. Geoarchaeology 26, 3, 2011, 393–419.

Hampel 1903 — J. Hampel (Hpl.), *A m. n. múzeumi régiségosztály gyarapodása az 1903-ik évben*. AÉ XXIII, 1903, 425–447.

Harding 2017 — A. Harding, *Cornești-Iarcuri and the rise of mega-forts in Bronze Age Europe*. In: B.S. Heeb, A. Szentmiklosi, R. Krause, M. Wemhoff (eds.), Fortifications: The Rise and Fall of Defended Sites in the Late Bronze Age and Early Iron Age of South-East Europe. Berlin 2017, 9–14.

Harding 2018 — A. Harding, *The question of "proto-urban" sites in later prehistoric Europe*. Origini XLII, 2018, 317–338.

Hänsel 2003 — B. Hänsel, *Stationen der Bronzezeit zwischen Griechenland und Mitteleuropa*. BerRGK 83, 2002 (2003), 69–97.

Hänsel, Medović 1991 — B. Hänsel, P. Medović, *Vorbericht über die jugoslawisch-deutschen Ausgrabungen in der Siedlung von Feudvar bei Mošorin (Gem. Titel, Vojvodina) von 1986–1990. Bronzezeit-Vorrömische Eisenzeit*. BerRGK 72, 1991, 45–204.

Hänsel, Medović 2004 — B. Hänsel, P. Medović, *Eine Bronzegießerwerkstatt der Frühen Bronzezeit in Feudvar bei Mošorin in der Vojvodina*. In: B. Hänsel (Hrsg.), Parerga Praehistorica. Jubiläumsschrift zur Prähistorischen Archäologie. 15 Jahre UPA. Bonn 2004, 83–111.

Hügel *et al.* 2012 — P. Hügel, G.P. Hurezan, F. Mărginean, V. Sava, *One and a Half Century of Archaeology on the Lower Mureș*. ZSA 26, 2012, 7–34.

Iacono *et al.* 2021 — F. Iacono, E. Borgna, M. Cattani, C. Cavazzuti, H. Dawson, Y. Galanakis, M. Gori, C. Iaia, N. Ialongo, T. Lachenal, A. Lorrio, R. Micó, B. Molloy, A. Nafplioti, K. Peche-Quilichini, C. Rihuete Herrada, R. Risch, *Establishing the Middle Sea: The Late Bronze Age of Mediterranean Europe (1700–900 BC)*. Journal of Archaeological Research 2021, https://doi.org/10.1007/s10814–021–09165–1.

Ignat, Sava 2019 — A. Ignat, V. Sava, *Late Bronze Age funerary practices in the Lower Mureș Basin*. Revista Arheologică XV, 1, 2019, 5–20.

Jaeger 2016 — M. Jaeger, *Bronze Age Fortified Settlements in Central Europe*. Poznań 2016.

Jaeger, Kulcsár 2013 — M. Jaeger, G. Kulcsár, *Kakucs–Balla-domb a case study in the absolute and relative chronology of the Vatya culture*. ActaArchHung 64, 2013, 289–320.

Jaeger *et al.* 2018 — M. Jaeger, G. Kulcsár, N. Taylor, R. Staniuk (eds.), *Kakucs-Turján a Middle Bronze Age multi-layered fortied settlement in Central Hungary*. Bonn 2018.

Jones *et al.* 2017 — O. A. Jones, J. van der Plicht, L. Papazoglou-Manioudaki, M. Petropoulos, *Timing is everything: radiocarbon dating multiple levels in the Mycenaean tholos tomb of Petroto, Achaia, Greece*. STAR: Science & Technology of Archaeological Research, 3, 2, 456–465, DOI: 10.1080/20548923.2018.1428408.

Kacsó 1998 — C. Kacsó, *Das Depot von Satu Mare*. A Nyiregyhazái Jósa András Múzeum Évkönyve XXXIX–XL, 1998, 11–31.

Kacsó 2015 — C. Kacsó, *Descoperiri din epoca bronzului de la Felnac (jud. Arad)*. Revista Bistriței XXIX, 2015, 23–41.

Kadrow 2001 — S. Kadrow, *U progu nowej epoki. Gospodarka i społeczeństwo wczesnego okresu epoki brązu w Europie*. Kraków 2001.

Kanne 2018 — K. Kanne, *Becoming Equestrian: People and Horses in Bronze Age Hungary*. Evanston 2018 (https://arch.library.northwestern.edu/concern/generic_works/db78tc26g?locale=en).

Kanne 2022 — K. Kanne, Riding, *Ruling, and Resistance: Equestrianism and Political Authority in the Hungarian Bronze Age*. Current Anthropology 63, 3, 2022, https://www.journals.uchicago.edu/doi/abs/10.1086/720271?journalCode=ca

Kemenczei 1991 — T. Kemenczei, *Die Schwerter in Ungarn II (Vollgriffschwerter)*. PBF IV, 9. Stuttgart 1991.

Kemenczei 1999 — T. Kemenczei, *Katalog der ausgestellten Funde*. In: T. Kovács, P. Raczky (Hrsg.), Prähistorische Goldschätze aus dem Ungarischen Nationalmuseum. Budapest 1999, 119–130.

Kienlin 2015 — T.L. Kienlin, *Bronze Age Tell Communities in Context. An Exploration Into Culture, Society and the Study of European Prehistory. Part 1: Critique. Europe and the Mediterranean*. Oxford 2015.

Kienlin 2018 — T.L. Kienlin, *Borsod Region Bronze Age Settlement: 'Diversity in Uniformity'*. In: T.L. Kienlin, K.P. Fischl, T. Pusztai (eds.), Borsod Region Bronze Age Settlement (BORBAS). Catalogue of the Early to Middle Bronze Age Tell Sites Covered by Magnetometry and Surface Survey. Bonn 2018, 11–92.

Kienlin 2020 — T.L. Kienlin, *Bronze Age Tell Communities in Context. An Exploration Into Culture, Society and the Study of European Prehistory. Part 2*. Oxford 2020.

Kienlin 2021a — T.L. Kienlin, *Diversity rather than Uniformity: Bronze Age Tell Settlement in North-Western Romania. Part I*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 21–78.

Kienlin 2021b — T.L. Kienlin, *Diversity rather than Uniformity: Bronze Age Tell Settlement in North-Western Romania. Part II. Catalogue of Sites Covered by Magnetometry in Bihor and Satu Mare Counties* In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 79–216.

Kienlin *et al.* 2017 — T.L. Kienlin, K.P. Fischl, L. Marta, *Exploring Divergent Trajectories in Bronze Age Landscapes: Tell Settlement in the Hungarian Borsod Plain and the Romanian Ier Valley*. ZSA 31, 2017, 93–128.

Kienlin *et al.* 2018 — T.L. Kienlin, K.P. Fischl, T. Pusztai, *Borsod Region Bronze Age Settlement (BORBAS). Catalogue of the Early to Middle Bronze Age Tell Sites Covered by Magnetometry and Surface Survey*. Bonn 2018.

Kiss *et al.* 2012 — T. Kiss, P. Urdea, G. Sipos, B. Sümeghy, O. Katona, O. Tóth, A. Onaca, F. Ardelean, F. Timofte, C. Ardelean, *Trecutul râului*. In: G. Sipos (ed.), A Maros folyó múltja, jelene, jövője. Trecutul, prezentul, viitorul râului Mureș. Past, Present, Future of the Maros/Mureș River. Timișoara 2012, 33–64.

Kiss *et al.* 2019 — V. Kiss, M. Csányi, J. Dani, K.P. Fischl, G. Kulcsár, I. Szathmári, *Chronology of the Early and Middle Bronze Age in Hungary. New results*. Studia Hercynia XXIII/2, 173–197.

Klontza-Jaklová 2016 — V. Klontza-Jaklová, *What's wrong? Hard science and humanities – tackling the question of the absolute chronology of Santorini eruption*. Brno 2016.

Kovács 1999 — T. Kovács, *Bronzezeitliche Schmuckgegenstände, Waffen und Goldschätze*. In: T. Kovács, P. Raczky (Hrsg.), Prähistorische Goldschätze aus dem Ungarischen Nationalmuseum. Budapest 1999, 37–62.

Krause *et al.* 2019 — R. Krause, A. Szentmiklosi, B. Heeb, R. Lehmphul, K. Teinz, A. Bălărie, C. Herbig, A. Stobbe, J. Schmid, D. Schäffler, M. Wemhoff, *Cornești-Iarcuri. Die Ausgrabungen 2013 und 2014 in der befestigten Großsiedlung der späten Bronzezeit im rumänischen Banat*. Eurasia Antiqua 22, 2016 (2019), 133–184.

Krause *et al.* 2022 — R. Krause, V. Sava, A. Stobbe, F. Gogâltan, *Zentrale Großbauten der spätbronzezeitlichen Mega-Site von Sântana im rumänischen Kreischland*. In: E. Kaiser, M. Meyer, S. Scharl, S. Suhrbier (Hrsg.), Wissensschichten. Festschrift für Wolfram Schier zu seinem 65. Geburtstag. Rahden/Westf. 2022, 411–426.

Kreiter 2007 — A. Kreiter, *Technological Choices and Material Meanings in Early and Middle Bronze Age Hungary. Understanding the active role of material culture through ceramic analysis*. Oxford 2007.

Kristiansen 2000 — K. Kristiansen, *The emergence of European Communities: household, settlement and territory in Later Prehistory (2300–300 BC). A comparative project base don: Monte Polizzo, Sicily, Százhalombatta, Hungary and Tanum, Sweden*. In: I. Poroszlai, M. Vicze (eds.), SAX. Százhalombatta Archaeological Expedition. Annual Report 1 – Field Season 1998. Százhalombatta 2000, 7–11.

Kristiansen, Sørensen 2020 — K. Kristiansen, M.L.S. Sørensen, *Wool in the Bronze Age. Concluding Reflections*. In: S. Sabatini, S. Bergerbrant (eds.), The Textile Revolution in Bronze Age Europe. Production, Sepecialisation, Consuption. Cambridge 2020, 317–332.

Lehmphul *et al.* 2019 — R. Lehmphul, B. Heeb, A. Szentmiklosi, A. Stobbe, R. Krause, *The genesis of the fortification of Cornești-larcuri near the Mureș lower course (Romanian Banat) – A phase model on the chronology of the settlement and fortification structures*. In: S. Hansen, R. Krause (eds.), Bronze Age Fortresses in Europe. Proceedings of the Second International LOEWE Conference, 9–13 October 2017 in Alba Julia. Bonn 2019, 253–278.

Lie 2021 — M.A. Lie, *A Particular Case of Bronze Age Household*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 253–275.

Lie *et al.* 2019 — M. Lie, A. Găvan, C. Cordoș, T.L. Kienlin, G. Fazecaș, F. Gogâltan, *The Bronze Age tell settlement at Toboliu (Bihor County, Romania). A brief outline of recent investigations*. In: K.P. Fischl, T.L. Kienlin (eds.), Beyond Divides – The Otomani-Füzesabony Phenomenon. Current Approaches to Settlement and Burial in the North-Eastern Carpathian Basin and Adjacent Areas. Bonn 2019, 351–368.

Ljuština 2022 — M. Ljuština, *Izazovi srednjeg bronzanog doba: vatinska kultura i balkanski susedi*. Beograd 2022

Manning 2022 — S.W. Manning, *Second Intermediate Period date for the Thera (Santorini) eruption and historical implications*. PLoS ONE 17(9), e0274835. https://doi.org/10.1371/journal.pone.0274835

Marta 2021 — L. Marta, *Tell Sites in Satu Mare County: History of Research, Reconstruction of the Natural Environment and Archaeology*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 277–316.

Márki 1892 — S. Márki, *Aradvármegye és Arad szabad királyi város története*. Arad 1892.

Márton 1909 — L. Márton, *Az ottlakai őskori aranykincs*. AÉ XXIX, 1909, 405–414.

McCall *et al.* 2022 — A. McCall, B. Gamarra, K.S. Dufett Carlson, Z. Bernert, A. Cséki, P. Csengeri, L. Domboróczki, A. Endrődi, M. Hellebrandt, A. Horváth, Á. Király, K. Kiss, J. Koós, P. Kovács, K. Köhler, L. Szolnoki, Z.K. Zofmann, K. Sirak, T. Szeniczey, J. Dani, T. Hajdu, R. Pinhasi, *Stable carbon and nitrogen isotopes identify nuanced dietary changes from the Bronze and Iron Ages on the Great Hungarian Plain*. Nature. Scientifc Reports 12:16982. https://doi.org/10.1038/s41598–022–21138-y

Meyer 2018 — B. Meyer, *Faunal Remanins as an Indicator of Change in Social Stratification at Pecica Șanțul Mare*. American Journal of Undergraduate Research 15, 3, 2018, 5–21.

Metzner-Nebelsick 2013 — C. Metzner-Nebelsick, *Gedanken zur Frage des kulturellen Wandels in der Zeit um 1600 v. Chr. in Nordwest-Rumänien und Nordost-Ungarn.* In: H. Meller, F. Bertemes, H.-R. Bork, R. Risch (Hrsg.), 1600 – Kultureller Umbruch im Schatten des Thera-Ausbruchs? 1600 – Cultural change in the shadow of the Thera-Eruption?. Halle 2013, 327–353.

Michelaki 2006 — K. Michelaki, *Household Ceramic Economies: Production and Consumption of Household Ceramins among the Maros Villagers of Bronze Age Hungary*. Oxford 2006.

Mittnik *et al.* 2019 — A. Mittnik, K. Massy, C. Knipper, F. Wittenborn, S. Pfrengle, N. Carlichi-Witjes, H. Deeg, A. Furtwängler, M. Harbeck, K. Heyking, C. Kociumaka, I. Kucukkalipci, S. Lindauer, S. Metz, A. Staskiewicz, A. Thiel, J. Wahl, W. Haak, E. Pernicka, S. Schiffels, P. W. Stockhammer, J. Krause, *Kinship-based social inequality in Bronze Age Europe.* Science, Vol. 366, Issue 6462, 11 october 2019, 168.

Molloy *et al.* 2020 — B. Molloy, D. Jovanović, C. Bruyère, M. Marić, J. Bulatović, P. Mertl, C. Horn, L. Milašinović, N. Mirković-Marić, *A New Bronze Age Mega-fort in Southeastern Europe: Recent Archaeological Investigations at Gradište Iđoš and their Regional Significance*. Journal of Field Archaeology, DOI: 10.1080/00934690.2020.1734899.

Molnár 2014 — Z. Molnár, *Contribuții la cunoașterea culturii Otomani din nord-vestul Transilvaniei. Ceramică și metal*. Cluj-Napoca 2014.

Molnár, Nagy 2013 — Z. Molnár, J.-G. Nagy, *Habitat Models and Social Systems in Middle Bronze Age Central north-western Transylvania. State of research*. Acta Archaeologica Carpathica XLVIII, 2013, 5–85.

Morteanu, Gogâltan 2015 — R. Morteanu, F. Gogâltan, *O protomă ornitomorfă din epoca bronzului de la Satu Mare, jud. Arad.* In: S. Forțiu, A. Stavilă (eds.), ArheoVest, Nr. III: In Memoriam Florin Medeleț. Szeged 2015, 205–228.

Mozsolics 1967 — A. Mozsolics, *Bronzefunde des Karpatenbeckens. Depotfundhorizonte von Hajdúsámson und Kosziderpadlás*. Budapest 1967.

Mozsolics 1968 — A. Mozsolics, *Goldfunde des Depotfundhorizontes von Hajdúsámson*. BerRGK, 45–47, 1965–1966 (1968), 1–76.

Mozsolics 1973 — A. Mozsolics, *Bronze- und Goldfunde des Karpatenbeckens. Depotfundhorizonte von Forró und Ópályi*. Budapest 1973.

Nafplioti 2009 — A. Nafplioti, *Mycenae Revisited 2. Exploring the Local versus Nonlocal Geographical Origin of the Individuals from Grave Circle A: Evidence from Strontium Isotope Ratio ($^{87}Sr/^{86}Sr$) Analysis*. Annual of the British School at Athens 104, 2009, 279–291.

Nagy 2004 — M. Nagy, *A halomsíros kultúra leletei Szentes környékén*. A Móra Ferenc Múzeum Évkönyve – Studia Archaeologica 11, 2005, 7–36.

Nestor 1960 — I. Nestor, *Începuturile societăţii gentilice patriarhale şi ale destrămării orânduirii comunei primitive. Epoca bronzului*. In: Istoria Romaniei I. București 1960, 90–113, 114–132.

Németi, Molnár 2012 — J. Németi, Z. Molnár, *Bronzkori hatalmi központok északnyugat-erdélyben: A Nagykároly-Bobáld-tell. Bronzezeitliche Machtzentren in Nordwest-Siebenbürgen: Der Tell von Carei-Bobáld.* Szeged 2012.

Nicodemus 2011 — A. Nicodemus, *The Bronze Age and Dacian Fauna from New Excavations at Pecica Șanțul Mare*. AB XVIII, 2011, 79–84.

Nicodemus 2014 — A. Nicodemus, *Bronze Age Economies of the Carpathian Basin: Trade, Craft Production, and Agro-Pastoral Intensification.* Michigan 2014 (https://www.researchgate.net/publication/295404491_Bronze_Age_Economies_of_the_Carpathian_Basin_Trade_Craft_Production_and_Agro-Pastoral_Intensification).

Nicodemus 2018a — A. Nicodemus, *Food, Status, and Power: Animal Production and Consumption Practices during the Carpathian Basin Bronze Age*. In: M. Ivanova, B. Athanassov, V. Petrova, D. Takorova, P.W. Stockhammer (eds.), Social Dimensions of Food in the Prehistory of the Eastern Balkans and Neighbouring Areas. Oxford 2018, 248–262.

Nicodemus 2018b — A. Nicodemus, *Pecica–Șanțul Mare: A Bronze Age Entrepôt in the Lower Mureș Region*. In: B. Rezi, R.E. Németh (eds.), Bronze Age Connectivity in the Carpathian Basin. Târgu Mureș 2018, 75–86.

Nicodemus, O'Shea 2015 — A. Nicodemus, J.M. O'Shea, *From Relative to Absolute: The Radiometric Dating of Mureș Culture Ceramics at Pecica- Șanțul Mare*. In: S. Forțiu, A. Stavilă (eds.), ArheoVest, Nr. III: In Memoriam Florin Medeleț. Szeged 2015, 691–702.

Nicodemus, Lemke 2016 — A. Nicodemus, A.K. Lemke, *Specialized bone working in the Bronze Age? The organization of production at Pecica-Șanțul Mare, Romania*. Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano – Series Especiales 3, 2, 2016, 103–120.

Nicodemus *et al.* 2015 — A. Nicodemus, L. Motta, J.M. O'Shea, *Archaeological Investigations at Pecica "Șanțul Mare" 2013–2014*. ZSA 29, 2015, 105–118.

Nykamp 2017 — M. Nykamp, *Human–environment interactions in the environs of the Late Bronze Age enclosure Corneşti-Iarcuri, western Romania*. Berlin 2017 (https://www.researchgate.net/publication/320907765_Human-environment_interactions_in_the_environs_of_the_Late_Bronze_Age_enclosure_Cornesti-Iarcuri_western_Romania).

Nykamp *et al.* 2015 — M. Nykamp, B.S. Heeb, D. Knitter, J. Krause, R. Krause, A. Szentmiklosi, B. Schütt, *Linking Hydrological Anomalies to Archaeological Evidences – Identification of Late Bronze Age Pathways at the Fortification Enclosure Iarcuri in Western Romania*. In: D. Knitter, W. Bebermeier, O. Nakoinz (eds.), Bridging the Gap – Integrated Approaches in Landscape Archaeology/eTopoi Journal of Ancient Studies, Special Volume, 4, 2015, 77–92.

Nykamp *et al.* 2016 — M. Nykamp, P. Hoelzmann, B.S. Heeb, A. Szentmiklosi, B. Schütt, *Holocene sediment dynamics in the environs of the fortification enclosure of Cornești-Iarcuri in the Romanian Banat*. Quaternary International 415, 2016, 190–203.

Nykamp *et al.* 2017 — M. Nykamp, D. Knitter, G. Timár, J. Krause, B.S. Heeb, A. Szentmiklosi, B. Schütt, *Estimation of wind-driven soil erosion of a loess-like sediment and its implications for the occurrence of archaeological surface and subsurface finds – An example from the environs of Cornești-Iarcuri, western Romania*. Journal of Archaeological Science: Reports 12, 2017, 601–612.

Olexa *et al.* 2021 — L. Olexa, Š. Olšav, L. Szabová, *Vybrané doklady remeselnej činnosti na opevnenom sídlisku II v N ižnej Myšli*. Slovenská Archeológia LXIX–2, 2021, 217–257.

Orfanou *et al.* 2022 — V. Orfanou, S. Amicone, V. Sava, B. O'Neill, L. Brown, C. Bruyere, B.P.C. Molloy, *Forging a new world order? Interdisciplinary perspectives on the management of metalworking and ideological change in the Late Bronze Age Carpathian Basin*. Journal of Archaeological Method and Theory. https://doi.org/10.1007/s10816–022–09566–6.

Ordentlich 1971 — I. Ordentlich, *Aria de răspândire a culturii Otomani de pe teritoriul*. Marmația II, 1971, 19–35.

O'Shea 1996 — J.M. O'Shea, *Villagers of the Maros. A Portrait of an Early Bronze Age Society*. New York 1996.

O'Shea, Nicodemus 2019 — J.M. O'Shea, A. Nicodemus,*'…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 population aggregation and early urbanization. Albany 2019, 61–80.

O'Shea *et al.* 2005 — J.M. O'Shea, A.W. Barker, S. Sherwood, A. Szentmiklosi, *New Archaeological Investigations at Pecica Șanțul Mare*. AB XII-XIII, 2005, 81–109.

O'Shea *et al.* 2006 — J.M. O'Shea, A.W. Barker, A. Nicodemus, S. Sherwood, A. Szentmiklosi, *Archaeological Investigations at Pecica Șanțul Mare: The 2006 Campaign*. AB XIV, 2006, 211–228.

O'Shea *et al.* 2011 — J.M. O'Shea, A.W. Barker, L. Motta, A. Szentmiklosi, *Archaeolgoical Investigations at Pecica "Șanțul Mare" 2006–2009*. AB XVIII, 2011, 67–74.

O'Shea *et al.* 2019 — J.M. O'Shea, G. Parditka, A. Nicodemus. K. Kristiansen, K.-G. Sjögren, L. Paja, G. Pálfi, L. Milašinović, *Social formation and collapse in the Tisza-Maros region: dating the Maros Group an its Late Bronze Age successors*. Antiquity 93, 2019, 604–623.

Quinn *et al.* 2020 — C.P. Quinn, H. Ciugudean, G. Bălan, G. Hodgins, *Rethinking time, culture and socio-economic organisation in Bronze Age Transylvania*. Antiquity 94, 2020, 44–61.

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

Pădureanu 1973 — E.D. Pădureanu, *Descoperiri neolitice și din epoca bronzului în județul Arad*. Banatica II, 1973, 395–402.

Pădureanu 1985 — E.D. Pădurean, *Contribuții la repertoriul arheologic de pe valea Mureșului inferior și a Crișului Alb*. Crisia XV, 1985, 27–52.

Pădureanu 1988a — E.D. Pădureanu, *Noi așezări din epoca bronzului în județul Arad*. AMN XXIV-XXV, 1987–1988, 507–528.

Pădureanu 1988b — E.D. Pădureanu, *Preliminariile epocii bronzului și epoca bronzului în județul Arad*. Symposia Thracologica 6, 1988, 38–39.

Pădureanu 1990 — E.D. Pădurean, *Noi descoperiri arheologice în așezarea fortificată de la Păuliș-Dealul Bătrân, jud. Arad*. Thraco-Dacica, XI, 1990, 157–192.

Pădureanu 2018 — E.D. Pădurean, *Contribuții la monografia arheologică a municipiului Arad. Arad-Gai 1 (I)*. In: S. Forțiu (ed.), ArheoVest, Nr. VI: In memoriam Marian Gumă. Szeged 2018, 515–536.

Petrescu-Dîmbovița 1977 — M. Petrescu-Dîmbovița, *Depozitele de bronzuri din România*. București 1977.

Petric 2014 — P.I. Petric, *Socodor "Căvăjdia", Arad County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 247–257.

Polányi 2022 — T. Polányi, *The rise of idiôtês: Micro-politics of death and community reproduction in Bronze Age Hungary*. Journal of Anthropological Archaeology 68, 2022, https://doi.org/10.1016/j.jaa.2022.101445.

Polikreti *et al.* 2011 — K. Polikreti, J.M.A. Murphy, V. Kantarelou, A.G. Karydas, *XRF analysis of glass beads from the Mycenaean palace of Nestor at Pylos, Peloponnesus, Greece: new insight into the LBA glass trade*. Journal of Archaeological Science 38, 2011, 2889–2896.

Pop 2009 — D. Pop, *The Middle Bronze Age Settlement of Petea-Csengersima*. Satu Mare 2009.

Pop *et al.* 2018 — X. Pop, A. Gudea, A. Damian, *Gospodărirea animalelor în așezarea Makó de bronz timpuriu de la Pecica – Sit 14*. Studii de Preistorie 15, 2018, 127–141.

Popescu 1944a — D. Popescu, *Die frühe und mittlere Bronzezeit in Siebenbürgen*. București 1944.

Popescu 1944b — D. Popescu, *Raport asupra săpăturilor arheologice de la Pecica-Rovine și Semlac (jud. Arad)*. Raport asupra activității științifice a Muzeului Național de Antichități în anii 1942 și 1943. București 1944, 71–73.

Popescu 1956a — D. Popescu, *Cercetări arheologice în Transilvania. I. Sondajele de la Socodor –1948-*. Materiale II, 1956, 43–88.

Popescu 1956b — D. Popescu, *Cercetări arheologice în Transilvania. I. Săpăturile de la Vărșand –1949-*. Materiale II, 1956, 108–152.

Popescu 1956c — D. Popescu, *Cercetări arheologice în Transilvania. IV. Prelucrarea aurului în Transilvania înainte de cucerirea romană*. Materiale II, 1956, 196–250.

Popescu, Rusu 1966 — D. Popescu, M. Rusu, *Inventaria Archaeologica. Corpus des ensembles Archéologiques. Roumanie, fascicule 1 (R1-R14, 17 feuilles). Dépôts de l'âge du bronze moyen*. București 1966.

Pósta 1899 — B. Pósta, *Kurticsi ostelepek (Arad_m.)*. AÉ XIX, 1899, 18–28.

Rogozea, Rogozea 2016 — O.C. Rogozea, P. Rogozea, *Contribuții la repertoriul așezărilor atribuite epocii bronzului din vestul României (I)*. Sargetia VII (XLIII), 2016, 139–200

Roska 1911 — M. Roska, *Ásatás a perjámosi Sánc-halmon. Fouilles aux remparts (Sánc-halom) Perjamos*. Földrajzi Közlemények XXXIX, 1911, 2–29, 2–39 (extrase).

Roska 1912 — M. Roska, *Ásatás a pécska-szemláki határbam levő Nagy Sáczon*. Dolgozatok az Erdélyi Nemzeti Érem- és Régiségtárából. Klozsvár 3, 1912, 1–73.

Roska 1913 — M. Roska, *Ásatás a perjámosi Sánchalmon.* Múzeumi és Könyvtári Értesitő VII, 2–3, 1913, 81–122.

Roska 1914 — M. Roska, *Ásatás a perjámosi Sánchalmon.* Múzeumi és Könyvtári Értesitő VIII, 2–3, 1914, 73–104.

Roska 1923 — M. Roska, *Săpăturile arheologice de la Periamoș-Banat*. Gemina 1, 1923, 9–15; 51–56; 78–93; 128–137.

Roska 1941 — M. Roska, *A gyulavarsándi (Arad M.) laposhalom rétegtani viszonyai*. Folia Archaeologica 3–4, 1941, 45–61.

Rusu *et al.* 1999 — M. Rusu, E. Dörner, I. Ordentlich, *Die Erdburg von Sântana-Arad in dem zeitgleichen archäologischen Kontext*. In: N. Boroffka, T. Soroceanu (Hrsg.), Transsilvanica. Archäologische Untersuchungen zur älteren Geschichte des südöstlichen Mitteleuropa. Gedenkschrift für Kurt Horedt. Rahden/Westf. 1999, 143–165.

Röpke 2021 — A. Röpke, *In the Swamp – First Palynological Results for the Bronze Age Tell Otomani-Cetatea de pământ (Romania)*. In: T.L. Kienlin, A. Găvan (eds.), Bronze Age Tell Settlements in North-Western Romania Current Approaches and Recent Investigations. Bonn 2021, 241–251.

Sabatini *et al.* 2019 — S. Sabatini, S. Bergerbrant, L. Ø. Brandt, A. Margaryan, M.E. Allentoft, *Approaching sheep herds origins and the emergence of the wool economy in continental Europe during the Bronze Age*. Archaeological and Anthropological Sciences, 2019, 1–17 https://doi.org/10.1007/s12520–019–00856-x

Salisbury *et al.* 2013 — R.B. Salisbury, G. Bácsmegi, P. Sümegi, *Preliminary environmental historical results to reconstruct prehistoric human-environmental interactions in Eastern Hungary*. Central European Journal of Geosciences 5, 3, 2013, 331–343.

Sava 2009 — V. Sava, *Descoperiri ale culturii Baden şi din prima epocă a fierului de pe teritoriul actual al municipiului Arad*. Brukenthal Acta Musei IV, 1, 2009, 31–55.

Sava 2010 — V. Sava, *Spătura lui Egon Dörner de la Pecica "Cărămidăria C.A.P. Ogorul", județul Arad. Descoperirile preistorice.* Brukenthal. Acta Musei V, 1, 2010, 53–81.

Sava 2014a — V. Sava, *Sântana "La nord de oraș", Arad County*. In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tells and tell-like settlements on the eastern frontier of the Carpathian Basin History of research. Cluj-Napoca 2014, 233–234.

Sava 2014b — V. Sava, *Un vas de tip butoi descoperit în așezarea aparținând epocii bronzului de la Șagu "Sit A1_1"*. Terra Sebus 6, 2014, 127–146.

Sava 2015 — V. Sava, *Neolithic and Eneolithic in the Lower Mureș Valley*. Cluj-Napoca 2015.

Sava 2016 — V. Sava, *The Archaeological Site of Felnac "Complexul Zootehnic" (Arad County). Discussions on the Late Bronze Age Settlement and Cemetery*. ZSA 30, 2016, 69–108.

Sava 2019 — V. Sava, *The Late Bronze Age settlement at Șagu and the early use of the channeled pottery*. AB 27, 2019, 109–145.

Sava 2020 — V. Sava, *The Late Bronze Age pottery in the South-Eastern Carpathian Basin*. Slovenská Archeológia LXVIII–2, 2020, 253–296.

Sava, Pădureanu 2009 — V. Sava, E. D. Pădurean, *Descoperiri ale culturii Baden şi din prima epocă a fierului de pe teritoriul actural al municipiului Arad.* Brukenthal Acta Musei IV, 1, 2009, 31–55.

Sava, Andreica 2013 — V. Sava, L. Andreica, *Social Identity in the Lower Mureș Basin During the Late Bronze Age: Two Seal-Headed Pins from Pecica "Site 14" Cemetery*. In: I.V. Ferencz, N.C. Rișcuța, O.T. Bărbat (eds.), Archaeological Small Finds and Their Significance. Proceedings of the Symposion: Costume as an Identity Expression. Cluj-Napoca 2013, 49–76.

Sava, Gogâltan 2014 — V. Sava, F. Gogâltan, *Munar "Weingarten = Wolfsberg", Arad County.* In: F. Gogâltan, C. Cordoș, A. Ignat (eds.), Bronze Age tell, tell-like and mound-like settlements at the eastern frontier of the Carpathian Basin. History of research. Cluj-Napoca 2014, 123–128.

Sava, Ignat 2014 — V. Sava, A. Ignat, *Acquiring significance. Constructing warrior's identity at the Lower Mureș Basin*. Annales D'Universite "Valahia" Targoviste. Section D'Archeologie et D'Histoire XVI, 1, 2014, 7–35.

Sava, Ignat 2016 — V. Sava, A. Ignat, *The Beginning of the Late Bronze Age in the Lower Mureș Basin.* In: F. Gogâltan, C. Cordoș (eds.), Prehistoric settlements: social, economic and cultural aspects. Seven studies in the Carpathian area. Cluj- Napoca 2016, 181–199.

Sava, Gogâltan 2017 — V. Sava, F. Gogâltan, *The Bronze Age Fortifications in Munar "Wolfsberg", Arad County. The 2014 and 2017 Archaeological Researches*. Analecta Archaeologica Ressoviensia 12, 2017, 75–100.

Sava, Grumeza 2018 — V. Sava, L. Grumeza, *The Archaeological Site in Zădăreni, Arad County. History of Research and the Bronze Age Discoveries*. ZSA 32, 2018, 41–76.

Sava, Gogâltan 2019 — V. Sava, F. Gogâltan, *Bazinul Mureșului de Jos la începutul bronzului târziu (1600/1500–1400 BC)*. In: R.M. Teodorescu, A. C. Chituță, A. Georgescu, A. Tudorie (Coord.), In honorem prof. univ. dr. Sabin Adrian Luca: Istorie și destin. Sibiu 2019, 223–234.

Sava, Ursuțiu 2021 — V. Sava, A. Ursuțiu, *The Late Bronze Age Gáva pottery from the Lower Mureș*. Journal of Ancient History and Archaeology 8.2, 2021, 84–127.

Sava *et al.* 2012 — V. Sava, G.P. Hurezan, F. Mărginean, *Late Bronze Age Metal Artifacts Discovered in Șagu*, Site "A1_1", *Arad – Timișoara Highway (km 0+19.900 –0+20.620)*. ZSA 26/1, 2012, 83–107.

Sava *et al.* 2014 — V. Sava, L. Andreica, X. Pop, F. Gogâltan, *Out of ordinary or common burial practice? A Funerary Discovery from the Baden Settlement at Sântana "Cetatea Veche"*. ZSA 28, 2014, 39–76.

Sava *et al.* 2011 — V. Sava, G.P. Hurezan, F. Mărginean, *Şagu "Sit A1_1" o aşezare a epocii finale a bronzului la Mureşul de jos/A Late Bronzea Age Settlement on the Lower Mureş*. Cluj-Napoca 2011.

Sava *et al.* 2019 — V. Sava, F. Gogâltan, R. Krause, *First Steps in the Dating of the Bronze Age Mega-Fort in Sântana-CetateaVeche (Southwestern Romania)*. In: S. Hansen, R. Krause (eds.), Bronze Age Fortresses in Europe. Proceedings of the Second International LOEWE Conference, 9–13 October 2017 in Alba Julia. Bonn 2019, 161–176.

Sánta 2004 — G. Sánta, *A halomsíros kultúra Zákányszék határában*. A Móra Ferenc Múzeum Évkönyve – Studia Archaeologica 10, 2004, 53–80.

Shelmerdine 1997 — C.W. Shelmerdine, *Review of Aegean Prehistory VI: The Palatial Bronze Age of the Southern and Central Greek Mainland*. American Journal of Archaeology 101, 3, 1997, 537–585.

Sherwood 2013 — S.C. Sherwood, *Ground Truthing Magnetometer Data Using Soil Coring: Initial Results from Cornești-Iarcuri, Timiș County, Romania*. AB 21, 2013, 61–74.

Sherwood *et al.* 2013 — S. Sherwood, J. Windingstad, A. Barker, J. O'Shea, W. Cullen Sherwood, *Evidence for Holocene Aeolian Activity at the Close of the Middle Bronze Age in the Eastern Carpathian Basin: Geoarchaeological Results from the Mures¸ River Valley, Romania*. Geoarchaeology: An International Journal 28, 2013, 131–146.

Siklosy *et al.* 2007 — Z. Siklosy, A. Demeny, T.W. Vennemann, J. Kramers, S.E. Lauritzen, S. Leel-Ossy, *Middle Bronze Age Climate Change Recorded in a Hungarian Stalagmite: Triggering by Volcanic Activity?*. *GAS* 9, 2007 (https://meetings.copernicus.org/www.cosis.net/abstracts/EGU2007/00777/EGU2007-J–00777.pdf.).

Skorna *et al.* 2018 — H. Skorna, J. Kalmbach, J. Bátora, *Vráble, Slowakei. Herausbildung und Niedergang des frühbronzezeitlichen Siedlungszentrums – Untersuchungen zu Wirtschaft, Sozialstruktur und politischer Organisation eines Sozialverbandes und seines Umfeldes. Überblick und die Arbeiten in der Siedlung 2017*. e-Forschungsberichte des Deutschen Archäologischen Instituts 1, 2018, 101–108.

Sofaer 2010 — J. Sofaer, *Technology and craft*. In: T. Earle, K. Kristiansen (eds.), Organizing Bronze Age Societies. Cambridge 2010, 153–182.

Sofaer 2015 — J. Sofaer, *Clay in the Age of Bronze. Essays in the Archaeology of Prehistoric Creativity*. Cambridge 2015.

Soroceanu 1991 — T. Soroceanu, *Studien zur Mureș-Kultur*. Buch am Erlbach 1991.

Soroceanu 2012 — T. Soroceanu, *Die Kupfer- und Bronzedepots der frühen und mittleren Bronzezeit in Rumänien/ Depozitele de obiecte din cupru și bronz din România. Epoca timpurie și mijlocie a bronzului*. Cluj-Napoca – Bistrița 2012.

Stavilă 2014 — A. Stavilă, *Epoca bronzului în Câmpia Vinga în contextul arheologiei peisajului*. Târgoviște 2014. (unpublish PhD).

Stavilă *et al.* 2020 — A. Stavilă, A. Hegyi, B.A. Craiovan, *Non-invasive archaeological researches performed in the Middle Bronze Age settlement from Alioș-Valea Alioșu (Timiș County, Romania). Structures, chronology, and perspectives*. ZSA 34, 2020, 169–188.

Stika, Heiss 2013 — H.-P. Stika, A. G. Heiss, *Plant cultivation in the Bronze Age*. In: H. Fokkens, A. Harding (eds.), The Oxford Handbook of the European Bronze Age. Oxford 2013, 348–369.

Stos-Gale 2014 — Z.A. Stos-Gale, *Silver vessels in the Mycenaean Shaft Graves and their origin in the context of the metal supply in the Bronze Age Aegean*. In: H. Meller, R. Risch, E. Pernicka (Hrsg.), Metalle der Macht – Frühes Gold und Silber / Metals of power – Early gold and silver. Haale 2014, 183–208.

Szalai 1999 — F. Szalai, *Anthropologische Untersuchung der Skelette und der Reste von Leichenbränden aus den früh- und mittelbronzezeitlichen Gräberfeldern von Battonya*. In: J.J. Szabó, Früh- und Mittelbronzezeitliche Gräberfelder von Battonya. Budapest 1999, 125–163.

Szentmiklosi 2021 — A. Szentmiklosi, *Așezările culturii Cruceni-Belegiș în Banat*. Cluj-Napoca 2021.

Szeverényi *et al.* 2015 — V. Szeverényi, A. Priskin, P. Czukor, A. Torma, A. Tóth, *Subsistence, Settlement and Society in the Late Bronze Age of Southeast Hungary: A Case Study of the Fortified Settlement at Csanádpalota–Földvár*. In: J. Kneisel, M. Dal Corso, W. Kirleis, H. Scholz, N. Taylor, V. Tiedtke (eds.), The third food revolution? Setting the Bronze Age table: common trends in economic and subsistence strategies in Bronze Age Europe. Bonn 2015, 98–117.

Szeverényi *et al.* 2017 — V. Szeverenyi, P. Czukor, A. Priskin, C. Szalontai, *Recent work on Late Bronze Age fortified settlements in south-east Hungary*. In: B.S. Heeb, A. Szentmiklosi, R. Krause, M. Wemhoff (eds.), Fortifications: The Rise and Fall of Defended Sites in the Late Bronze Age and Early Iron Age of South-East Europe. Berlin 2017, 135–148.

Thaler 2018 — U. Thaler, *me-ka-ro-de. Mykenische Paläste als Dokument und Gestaltungsrahmen frühgeschichtlicher Sozialordnung*. Bonn 2018.

Trogmayer 1975 — O. Trogmayer, *Das Bronzezeitliche Gräberfeld bei Tápé*. Budapest 1975.

Trogmayer, Vörös 1994 — O. Trogmayer, G. Vörös, *Sie sahen der Mauern Trojas. Kunstgewerbe der Bronzezeit in Südostungarn. Sonderausstellung im Museum für Urgeschichte Aspern/Zaya 1. April–15. November 1994*. Aspern 1994.

Urák *et al.* 2015 — M. Urák, V. Sava, M. Dimache, *Bringing to light an ancient miscarriage. A Late Bronze Age jar with human remains from the Lower Mureș*. In: A. Dobos, D. Petruț, S. Berecki, L. Vass, S. P. Pánczél, Z. Molnár-Kovács, P. Forisek (eds.), Archaeologica Transylvanica. Studia in honorem Stephani Bajusz. Cluj-Napoca, Budapest 2015, 23–33.

Uhnér 2005 — C. Uhnér, *Tells and the tell-building tradition in the Carpathian basin during the Middle Bronze Age*. In: J. Goldhahn (red.), Mellan sten och järn, II. Göteborg 2005, 745–753

Vanzetti 2013 — A. Vanzetti, *1600? The rise of the Terramara system (Northern Italy)*. In: H. Meller, F. Bertemes, H.-R. Bork, R. Risch (Hrsg.), 1600 – Kultureller Umbruch im Schatten des Thera-Ausbruchs? / 1600 – Cultural change in the shadow of the Thera Eruption?. Halle (Saale) 2013, 267–282.

Varberg *et al.* 2015 — J. Varberg, B. Gratuze, F. Kaul, Between Egypt, *Mesopotamia and Scandinavia: Late Bronze Age glass beads found in Denmark*. Journal of Archaeological Science 54, 2015, 168–181.

Varberg *et al.* 2016 — J. Varberg, B. Gratuze, F. Kaul, A. H. Hansen, M. Rotea, M. Wittenberger, *Mesopotamian glass from Late Bronze Age Egypt, Romania, Germany, and Denmark*. Journal of Archaeological Science 74, 2016, 184–194.

Velcea *et al.* 1979 — V. Velcea, I. Velcea, O. Mîndruț, *Județul Arad*. București 1979.

Vretemark 2010 — M. Vretemark, *Subsistence strategies*. In: T. Earle, K. Kristiansen (eds.) Organizing Bronze Age Societies: The Mediterranean, Central Europe, and Scandinavia Compared. Cambridge 2010, 155–184.

Vicze *et al.* 2013 — M. Vicze, I. Poroszlai, P. Sümegi (eds.), *Koszider: Hoard, Phase, Period? Round table conference on the Koszider problem*. Százhalombatta 2013.

Voutsaki *et al.* 2013 — S. Voutsaki, E. Milka, S. Triantaphyllou, C. Zerner, *Middle Helladic Lerna: Diet, Ecomony, and Society*. In: S. Voutsaki, S. M. Valamoti (eds.), Diet, Economy and Society in the Ancient Greek World: Towards a Better Integration of Archaeology and Science (Pharos Supplement 1). Leuven 2013, 133–147.

Vulpe 1970 — A. Vulpe, *Die Äxte und Beile in Rumänien I*. PBF IX, 2. München 1970.

Walton *et al.* 2009 — M. S. Walton, A. Shortland, S. Kirk, P. Degryse, *Evidence for the trade of Mesopotamian and Egyptian glass to Mycenaean Greece*. Journal of Archaeological Science 36, 2009, 1496–1503.

Žegarac *et al.* 2021 — A. Žegarac, L. Winkelbach, J. Blöcher, Y. Diekmann, M. Krečković Gavrilović, M. Porčić, B. Stojković, L. Milašinović, M. Schreiber, D. Wegmann, K.R. Veeramah, S. Stefanović, J. Burger, *Ancient genomes provide insights into family structure and the heredity of social status in the early Bronze Age of southeastern Europe*. Nature: Scientifica reports, 10072 (2021). https://doi.org/10.1038/s41598-021-89090-x

Abbreviations

AB	Analele Banatului, I-IV 1928–1931; S.N. I 1981-, The Museum of Banat/The National Museum of Banat, Timişoara.
ACTA	Yearbook of the Székely Museum in Csík and the Székely National Museum, Miercurea Ciuc – Sepsiszentgyörgy.
ActaArchHung	Acta Archaeologica Academiae Scentiarum Hungaricae, Budapest.
AÉ	Archaeologiai Értesitö, Budapest.
Acta Historica	Acta Universitatis Szegediensis (Szeged).
ArchHung	Archaeologia Hungarica.
ArhMed	Arheologia Medievală.
AM	Mitteilungen des Kaiserlich Deutschen Archaeologischen Instituts, Athenische Abteilung (Athenische Mitteilungen), Athen, (1876-).
AMM	Acta MoldaviaeMeridionalis (Vaslui).
AMN	Acta Musei Napocensis, The National History Museum of Transylvania, Cluj – Napoca.
AMP	Acta Musei Porolisensis, County History and Art Museum of Zalău.
ArhMold	Arheologia Moldovei, Iași.
BCH	Bulletin de Correspondence Hellénique, Paris, 1 (1877-).
BerRGK	Berichte der Römisch-Germanischen Kommission.Roman-Germanic Commission. Frankfurt am Main.
EphNap	Ephemeris Napocensis, Cluj-Napoca.
CCA	Cronica Cercetărilor Arheologice din România, Ministry of Culture.
CCCA I	M. J. Vermaseren, Corpus cultus Cybelae Attidisque (CCCA), I. Asia Minor, Leiden, New York, København, Köln, 1987.
CIG	Corpus Inscriptionum Graecarum, I-IV, (ed. A. Boeckh), Berlin, 1828–1877.
CIL	Corpus Inscriptionum Latinarum, consilio et auctoritate Academiae litterarum regiae Borussicae editum. (1863-).
Dacia	Dacia. Recherches et découverts archéologiques en Roumanie, S.V. I-XII; N.S. Revue d´archéologie et d´histoire ancienne, I. 1957 şi urm., Vasile Pârvan Institute of Archaeology, Bucharest.
DAGR	Dictionnaire des Antiquités grecques et romaines, I-X, sous la direction de Ch. Daremberg et E. Saglio, Paris, 1877–1929.
DolgSzeged	Dolgozatok a Szegedi Josef Tudomanyegyetem Archaeologiai Interzetbol (I, 1925…XIX, 1943).
IGB V	Inscriptiones Graecae in Bulgaria repertae, (ed. Georgi Mihailov), vol. V: Supplementum, addenda et corrigenda. Sofia, 1997.
IGDOP	Inscriptions grecques dialectales d'Olbia du Pont, (ed. L. Dubois), Genève, 1996.
IGRR IV	Inscriptiones Graecae ad Res Romanas Pertinentes, IV (ed. G. Lafaye), Paris, 1927.
ISM I, II	Inscriptiones Scythiae Minoris – Inscripţiile din Scythia Minor, I: Histria şi împrejurimile (ed. D. M. Pippidi), Bucharest, 1983; II: Tomis şi teritoriul său, (ed. Iorgu Stoian), Bucharest, 1987.
LIMC	Lexicon Iconographicum Mythologiae Classicae, I–VIII + index vol., (eds. J. Ch. Balty, E. Berger, J. Boardman, Ph. Bruneau, F. Canciani, L. Kahil, V. Lambrinoudakis, E. Simon), Zürich, München, Düsseldorf, 1981–1999.
LSJ	Liddell H. G., Scott R., Jones H. S., A Greek-English Lexicon, with a revised supplement. Oxford, 1996.
MAA	Monumenta Avarorum Archaeologica.
OM	*Orbis Mediaevalis*.
PBF	Prähistorische Bronzefunde, München.

RA	Revue Archéologique, Paris (1844-).
RAC	Rivista di archeologia cristiana, Rome (1924-).
RevBistr	Revista Bistritei, Bistrița-Năsăud Museum Complex, Bistrița.
RH	Revue historique, Paris, (1876-).
RIG	Recueil d'inscriptions grecques, par Ch. Michel, Bruxelles, 1900.
Sargetia	Sargetia. Acta Musei Devensis, Deva.
SCIV(A)	Studii şi Cercetări de Istorie Veche, tom 1–25, Bucharest, 1950–1974; începând din 1974 (tom 25): Studii şi Cercetări de Istorie Veche şi Arheologie, Bucharest.
SCN	Studii *şi* Cercetări de Numismatică, Bucharest.
SEG	Supplementum epigraphicum graecum, Lugdunum Batavorum, Leiden, 1923–1971; Alphen aan den Rijn 1979–1980; Amsterdam, 1979–2005; Boston, 2006-.
StCl	Studii Clasice, Bucharest.
Syll^3	Sylloge inscriptionum Graecarum, (3rd edition), (ed. W. Dittenberger), 1915–1924.
Terra Sebus	Terra Sebus, Sebeș.
ThesCRA	Thesaurus Cultus et Rituum Antiquorum, I–V + index vol., (eds. J. Ch. Balty, J. Boardman, Ph. Bruneau, R. G. A. Buxton, G. Camporeale, F. Canciani, F. Graf, T. Hölscher, V. Lambrinoudakis, E. Simon), Basel, Los Angeles, (2004–2006).
UPA	Uiversitätsforchungen zur Prähistorischen Archäologie, Institut für Ur-und Frühgeschichte der Universität Kiel.
ZSA	Ziridava. Studia Archaeologica, Arad Museum, Cluj-Napoca.