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RESULTS OF NATURAL SCIENCE ANALYSES OF THE BADEN CULTURE MATERIALS IN THE ŠARIŠ REGION, NORTH-EASTERN SLOVAKIA[1]

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The study presents a general characteristic of the Šariš agglomeration of the Baden culture (BaC) following from the data of archaeological and mostly natural science analyses (mineral-petrographic, archaeozoological, archaeobotanical, anthropological and radiocarbon). Representative find contexts from three settlement areas and one locality with burials were selected form the region for comparative analyses. The above-mentioned sites identify the BaC settlement period in the region from the horizon of the Boleráz/Early Classical BaC stage (Baden I/II) to its late classical development stage (Baden III/IV). The published data were excerpted from a more extensive information database containing results of analyses of BaC find contexts from Trans-Carpathian regions of Slovakia (Gemer, Košická kotlina basin, Zemplín, Spiš, Šariš) and Lesser Poland, which were integral parts of the north-eastern regional expansion of the Baden cultural complex.

Keywords: north-eastern Slovakia, Eneolithic, Baden culture, mineral-petrographic, archaeobotanical, archaeozoological, anthropological and radiocarbon analyses.

INTRODUCTION

The Carpathian zone and the adjacent areas of south-eastern Slovakia and western Lesser Poland were the furthest north-east situated territory of the Eneolithic Baden complex in the period 3400–2900 BC. Numerous traces of settlement from that time are known on both sides of the Carpathians and in the Carpathians itself. These mountains, latitudinally separating the Baden culture (BaC) settlement clusters from the basin of the upper Vistula and northern Tisza, were a zone of strong and diverse cultural influences, as well as displacement of population groups. The issues of cultural relations in the period of the development of the BaC, the genesis and chronology of individual settlement regions in eastern Slovakia and Lesser Poland became the subject of detailed research several years ago. They were carried out as part of a project financed by the National Science Centre Poland, with the international cooperation of the Archaeological Museum in Kraków and the Institute of Archaeology of the Slovak Academy of Sciences in Nitra. The issues raised in the project became the subject of several publications. They concerned the scope of research issues and methods (*Zastawny/Horváthová 2016*; *2017*), radiocarbon chronology (*Horváthová/Zastawny 2016*; *Zastawny/Horváthová 2017*), selected materials from settlement sites (*Dobrzańska/Wilczyński/Zastawny 2016*; *Ďuriš 2021*; *Wilczyński 2017a*; *2017b*) and graves (*Horváthová et al. 2017*).

In research on the BaC in eastern Slovakia, the Šariš region plays an important role (Fig. 1). It is situated in the contact zone between Košická kotlina basin in the south, Zemplín in the south-east, Spiš in the west and further Lesser Poland on the northern side of the Carpathians. Convenient location on the line of cultural contacts influenced the development of BaC settlement, which can be noted here already from the transitional phase: Boleráz/Baden Early Classical. This region is distinguished by the presence of large excavated settlements (Šarišské Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina), as well as the few sites with graves in the eastern part of Slovakia (Veľký Šariš-Kaplnka sv. Kunhuty, Veľký Šariš-Kanaš-Sordok).

This article presents the results of natural research of several categories of sources obtained from the objects of the BaC in the Šariš area. In addition to the general characteristics of the BaC settlement region, the results of archaeobotanical, archaeozoological, anthropological analyses, mineral-petrographic analysis of the ceramics and results of radiocarbon dating are presented here. The research materials came from four BaC sites:

[1] The study was written while the project by the National Science Centre Poland (NCN 2013/09/B/HS3/03401) and the project 2/0056/22 of VEGA scientific grant agency was being solved and the Slovak Research, Development Agency on the basis of contract no. APVV-18-0276.

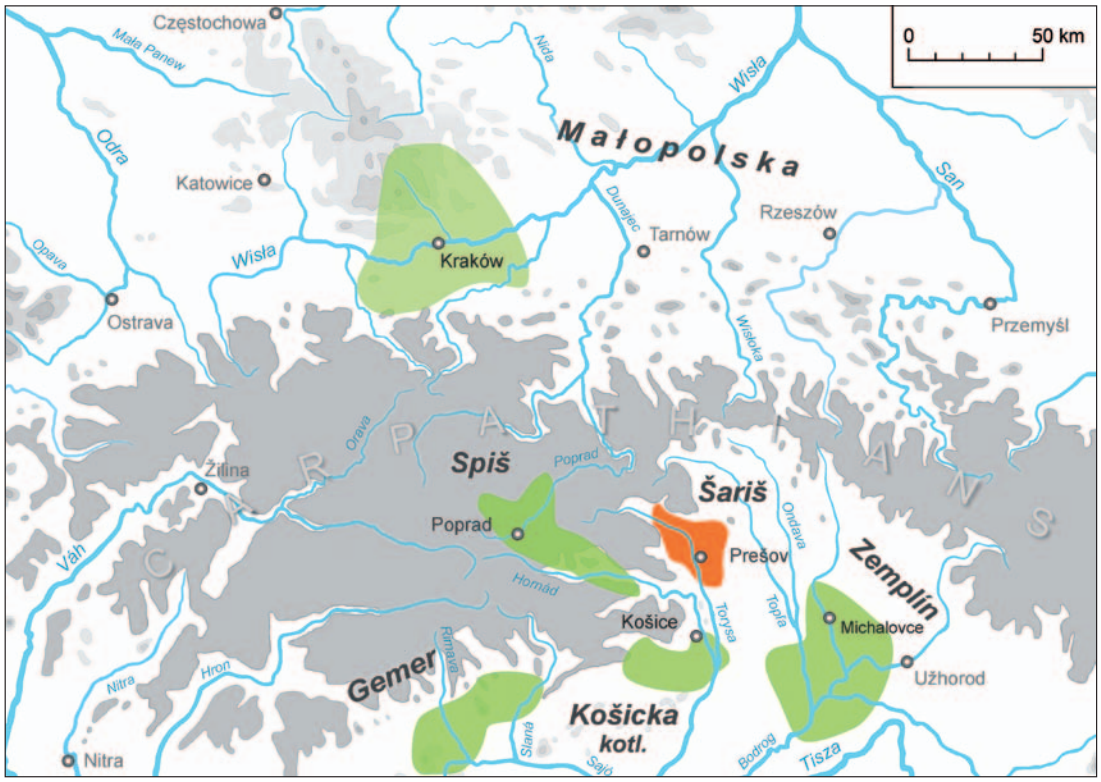


Fig. 1. The Baden culture settlement regions in eastern Slovakia and Lesser Poland (after *Zastawny/Horváthová 2016*).

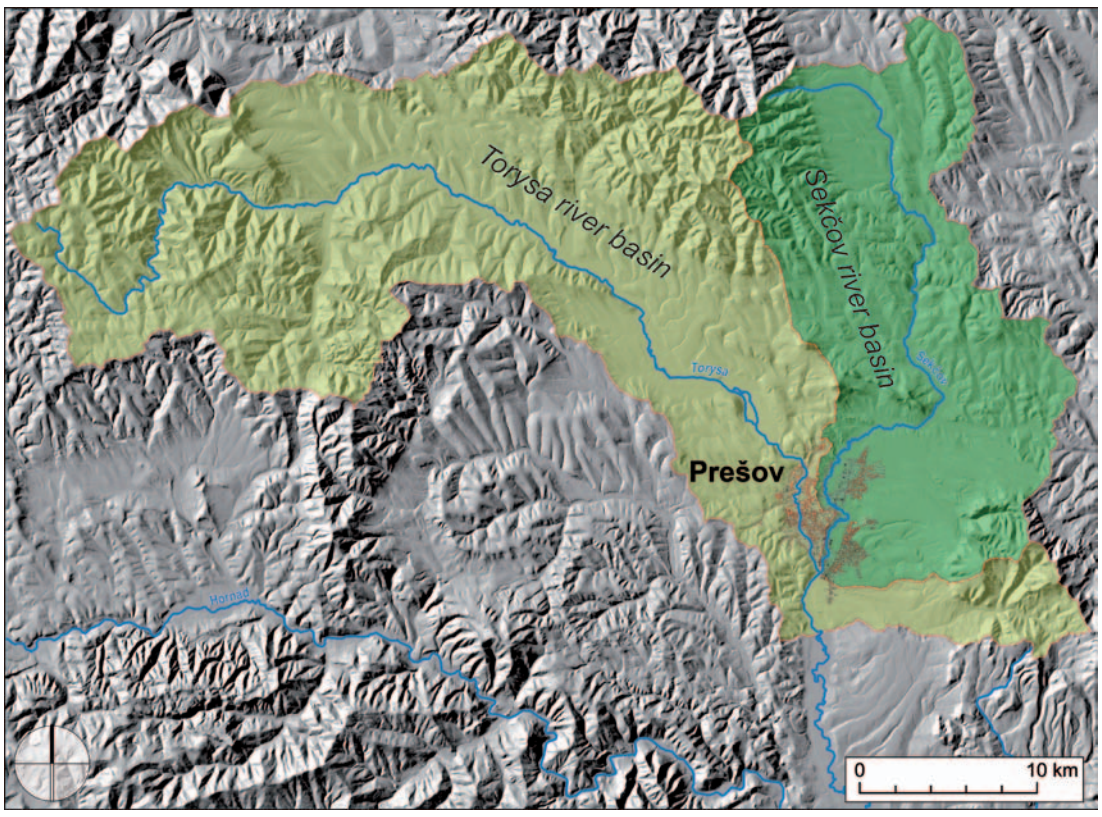


Fig. 2. Selected areas of the Šariš agglomeration of the Baden culture in the Torysa and Sekčov river basins. Author R. Malček.

Šarišské Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina, Prešov-Solivar-Mestský cintorín, Veľký Šariš-Kaplnka sv. Kunhuty site.

GEOGRAPHICAL CHARACTERISTICS OF THE STUDY AREA

The Šariš agglomeration of the BaC shows strong association with the landscape near the main river corridor of the Torysa and its contributory Sekčov (Fig. 2). It is associated with the upper and middle stream of the Torysa river from its source in the Levočské vrchy hills,[2] with the territory of the Spišsko-šarišské medzihorie geomorphological unit and the northern periphery of the Košická kotlina basin. In the monitored section, the Torysa is 81.5 km long from its source to the confluence with the Záborský potok stream. The drainage basin of this territory covers 73,619.95 ha.[3] As for the Sekčov, we considered the whole stream. It starts in the eastern part of the Čergov hills[4] and flows further through the Ondavská vrchovina hills, Beskydské predhorie geomorphological unit, Spišsko-šarišské medzihorie unit and the northern part of the Košická kotlina basin, where the Sekčov flows into the Torysa. Sekčov is 44.3 km long and its drainage basin covers 35,648.19 ha. In the distinctly regionally divided eastern Slovakia, the Šariš agglomeration of the BaC neighboured with the Spiš agglomeration in the west and with the Abov and Dolný Zemplín agglomerations in the south and south-east.

STATE OF RESEARCH ON THE BADEN CULTURE IN THE ŠARIŠ REGION

26 sites with occurrence of BaC finds come from the area near both rivers. There are 18 of them in the Torysa basin and 8 others are in the Sekčov area (Fig. 3; Tab. 1). Other Eneolithic sites which cannot be culturally classified (18 altogether) can – apart from BaC settlement – belong to another settlement documented in the region and corresponding with the Lažňany group[5], Nyírség-Zatín culture[6] and the group of the East Slovak Tumulus culture with Corded Ware[7] (*Budinský-Krička 1953*; *Derfiňák/Vizdal 2007*; *Horváthová 2015*; *2020*; *Horváthová/Luštíková 2013*; *Malček et al. 2018*, tab. 2; *Malček/Horváthová/Luštíková 2021*, tab. 2; *Repčák 1950*).

In the current state of our knowledge of the BaC's development in eastern Slovakia, we consider the Šariš settlement agglomeration the best studied one. Our information follows mainly from results of systematic scientific as well as rescue researches carried out in Šarišské Michaľany, Fedelemka site, and in Prešov-Solivar-Chmeľové-Tichá dolina site. Settlements of the BaC in the above-mentioned sites of promontory type were artificially fortified during the BaC settlement. In some places, they were only enclosed with a trough-shaped ditch combined with an earthen rampart. The site of Fedelemka was studied by S. Šiška in 1981–1985 and 1987 (site no. 17; Fig. 4). Over the excavation area of 3,000 m^2, he documented a polycultural settlement from the Neolithic and Eneolithic with 41 settlement features of the BaC (Pl. I). Location of some sunken pits and their grouping with hearths/stoves detected at several spots of the situation plan of the excavation suggest that there might have been six to eight log structures in the settlement. There was a ditch in the southernmost part of the promontory. Its bottom reached 0.50–2.20 m deep. Width of the ditch was 4.20–5 m. Within the total width of the promontory, the studied length of the ditch was 27 m (*Horváthová 2010*, 15–30, tab. 2; *Šiška 1995*, 48). In Prešov-Solivar-Chmeľové-Tichá dolina site, the Institute of Archaeology of SAS carried out a series of rescue excavations in 2009–2019 (site 12; Fig. 5). During those excavations, settlement features from the Neolithic (Bükk culture), Eneolithic (BaC), Late Bronze Age and Late Roman period were studied (*Horváthová 2016*; *2017*; *in print*; *Horváthová/Luštíková 2013*; *2015*). Settlement of the BaC was concentrated in the naturally best protected western part of the promontory plateau, which rises above the surrounding terrain by 12–19 m in this area (*Horváthová 2015*). With regard to the importance of the contexts detected during the first excavation season, a geophysical survey was executed in the whole extent of the accessible western part of the plateau, over an area of 160 × 100 m (*Horváthová/Tirpák 2012*). Results of the field excavations together with data from geophysical prospecting confirmed the uniqueness of find context at the site with documented organized built-up area inside the settlement. Regular arrangement of features was

[2] In the village of Torysky (Levoča district), 1,080 m a.s.l.

[3] The information on the monitored length of the Torysa river follows from the basic mapping from 1957–1971, scale 1 : 10,000.

[4] In the village of Hertník (Bardejov district), 740 m a.s.l.

[5] Number of sites near the Torysa – 3, near the Sekčov – 2.

[6] Number of sites near the Torysa – 2, near the Sekčov – 1.

[7] Number of sites near the Torysa – 1, near the Sekčov – 2.

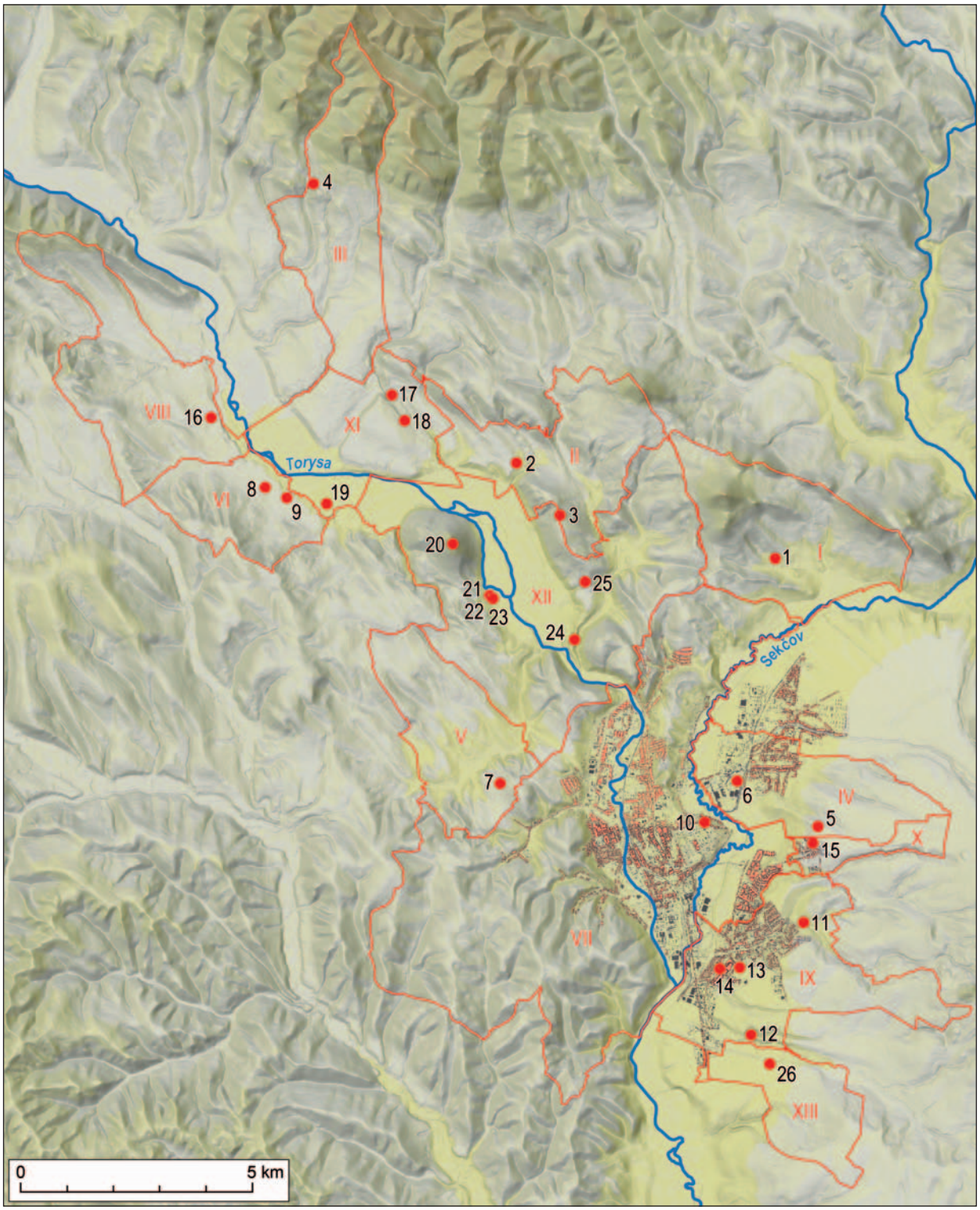


Fig. 3. Mapped sites of the Šariš agglomeration of the Baden culture in the Torysa and Sekčov river basins. Author R. Malček.

also recognized along the external circumference of the fortification. From the results of geophysical measuring and terrain configuration, we assume that the fortified settlement's dimensions were at least 55 m in the southwest-northeast direction and 75 m in the southeast-northwest direction. The total number of BaC features studied by the Institute of Archaeology of SAS by 2019 is 34. The total length of the ditch, excluding the entrance in the settlement (5.5 m wide), reaches 63.05 m in 2019 (*Horváthová*

Tab. 1. The Baden culture sites in the Šariš agglomeration.

Site number (on the maps)	Village	Part of the village	District	Name of site	Type of site	Literature
1	Fintice	Fisky-Tormáš	Prešov	Martinec	settlement	*Šimčík 2014*
2	Gregorovce	–	Prešov	Lány/Dlžiny (kóta 298)	settlement	*Derfiňák/Vizdal 2013*
3	Gregorovce	–	Prešov	Tanarok (pod Šarišským hradom, kóta 208)	settlement	*Budinský-Krička 1948*; *Šiška 1966*, 51
4	Jakubovany	–	Sabinov	Poloha 1	settlement	*Béreš 1993*, 27
5	Ľubotice	–	Prešov	Vodojem	settlement	*Blahuta 1961*, 188
6	Ľubotice	Šarišské lúky	Prešov	Závod na spracovanie dreva	settlement	*Šiška 1976*, 96–98
7	Malý Šariš	–	Prešov	Na horu (Zibota)	settlement	*Tomášová/Uličný/Miroššayová 1998*, 3
8	Ostrovany	–	Sabinov	Intravilán	settlement	*Kaminská 1983*, 125; *Tokárová/Vizdal 2013*
9	Ostrovany	–	Sabinov	Za cestou naproti cintorínu	settlement	*Šiška 1983*
10	Prešov	–	Prešov	Táborisko (severovýchodné úbočie pod Okresným ústavom národného zdravia)	settlement	*Blahuta 1961*, 188
11	Prešov	Solivar	Prešov	Východne od Soľnej bane, južne od kóty 287,3 a cesty do Teriakoviec	settlement	*Budinský-Krička 1979*, 54
12	Prešov	Solivar	Prešov	Chmeľové pri Tichej doline	fortified settlement	*Horváthová 2015*; *2016*; *2017*; *2020*, 13–21; *in print*; *Horváthová/Luštíková 2013*; *2015*; *Horváthová/Tirpák 2012*
13	Prešov	Solivar, časť Šváby	Prešov	Mestský cintorín (Za cintorínom)	settlement	*Šebesta et al. 2015*
14	Prešov	Solivar, časť Šváby	Prešov	Šváby	settlement	*Blahuta 1960*, 103; *Šiška 1966*, 55
15	Prešov	Šalgovík	Prešov	Za kostolom (medzi ulicami Drozdia a Vrchná)	settlement	*Kotorová-Jenčová 2017*; *Švaňa 2017*
16	Ražňany	–	Sabinov	Juhovýchodne od obce	settlement	*Kolektív 1966*, 82
17	Šarišské Michaľany	–	Sabinov	Fedelemka (Pod lesom Giráš)	settlement	*Horváthová 2010* (with other literature)
18	Šarišské Michaľany	–	Sabinov	Za verchom	settlement	*Budinský-Krička 1980*, 47, 48
19	Šarišské Michaľany	–	Sabinov	Imuna	settlement	*Illášová 1990*
20	Veľký Šariš	–	Prešov	Hradný vrch	settlement	*Slivka 1980*; *Slivka/Olexa 1977*
21	Veľký Šariš	–	Prešov	Ihrisko (park Rákocziho kaštieľa)	settlement	*Čaplovič/Gašaj/Olexa 1978*, 67; *Slivka 1974*
22	Veľký Šariš	–	Prešov	Na Harminy	settlement	*Tomášová/Karabinoš 2006*
23	Veľký Šariš	–	Prešov	Kaplnka sv. Kunhuty	cremation burials	*Horváthová et al. 2017*
24	Veľký Šariš	–	Prešov	Terasa nad Dzikovým potokom	settlement	*Blahuta 1963*, 169–171; *Kolektív 1962*, 294; *Šiška 1966*, 55; *Vizdal/Derfiňák 2006*
25	Veľký Šariš	Kanaš	Prešov	Sordok	cremation burial	*Budinský-Krička 1967*, 340; *1984*, 56
26	Záborské		Prešov	Južne od mlyna	settlement	*Budinský-Krička 1953*

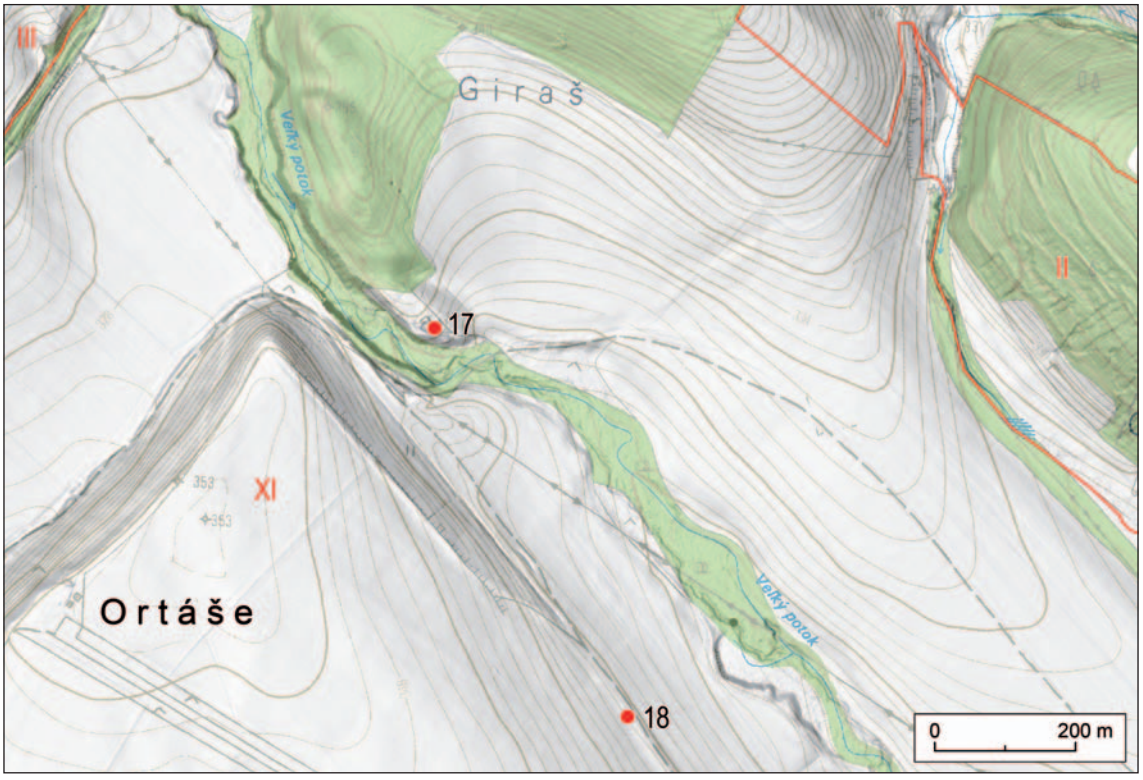


Fig. 4. Šarišské Michaľany-Fedelemka (site no. 17). Location of the site on the map. Author R. Malček.

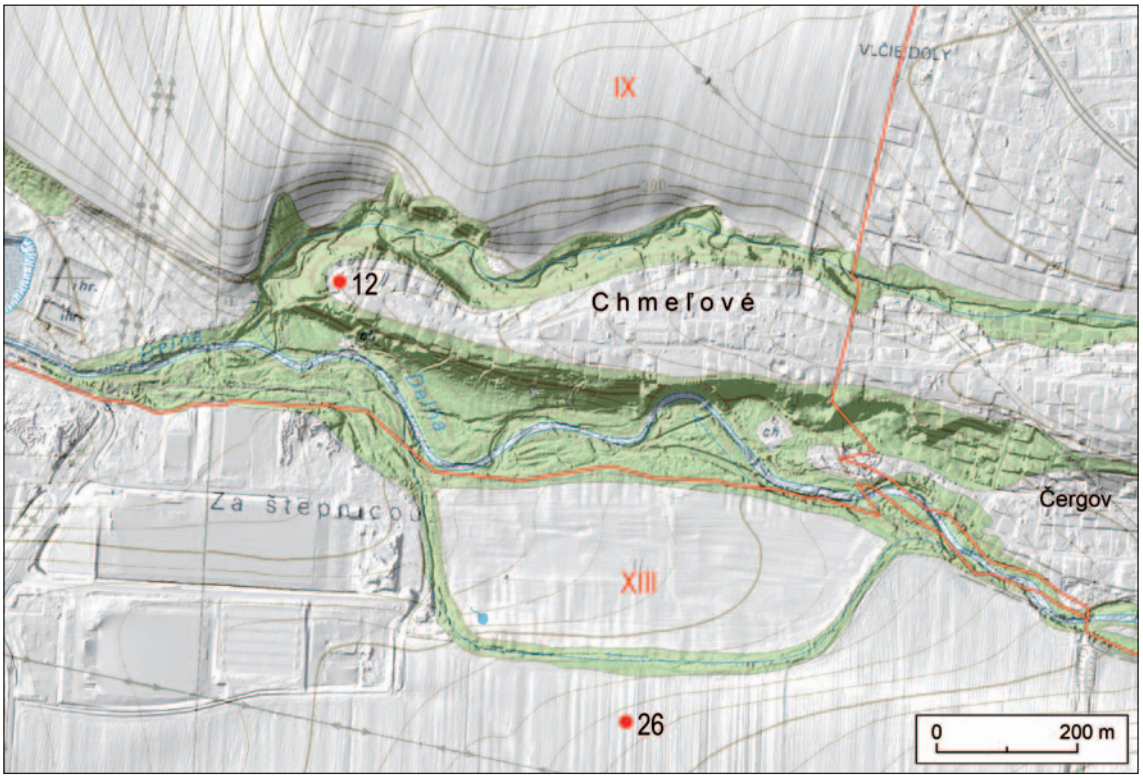


Fig. 5. Prešov-Solivar-Chmeľové-Tichá dolina (site no. 12). Location of the site on the map. Author R. Malček.

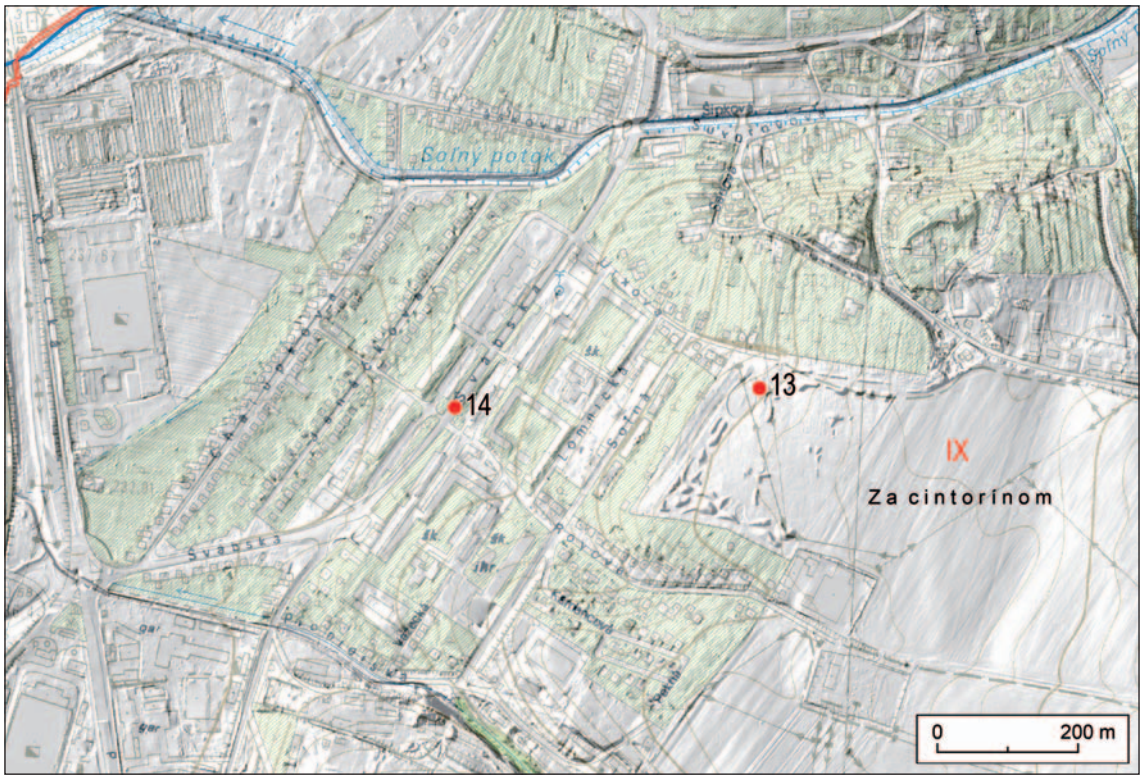


Fig. 6. Prešov-Solivar-Mestský cintorín (site no. 13). Location of the site on the map. Author R. Malček.

2020). Another section of the BaC ditch – 15.75 m long – was studied in 2018 by Archeovýskum, s. r. o. company.[8]

Rescue excavations which resulted in discovery of chronologically sensitive finds from the Middle Eneolithic were carried out also in Ľubotice-Šarišské lúky, in the area of a wood-processing plant (site no. 6; *Šiška 1976*, 96–98), in Fintice-Martinec site (site no. 1; *Šimčík 2014*), Prešov-Solivar in Šváby, Mestský cintorín (Municipal cemetery) site, which is indicated on maps as Za cintorínom site (site no. 13; Fig. 6, Pl. II; *Šebesta et al. 2015*) and in Veľký Šariš-Kaplnka sv. Kunhuty (site n. 23; Fig. 7; *Horváthová et al. 2017*) and Terasa nad Dzikovým potokom (*Blahuta 1963*, 169–171; *Kolektív 1962*, 294; *Šiška 1966*, 55; *Vizdal/Derfiňák 2006*) sites.

Two recently published studies partly dealt with the BaC settlement near the upper and middle Torysa and Sekčov. The authors attempted to analyse the extent of the landscape's influence on the settlement using new methodologies with spatial analyses in GIS environment (*Malček et al. 2018*, 35–37; *Malček/Horváthová/Luštíková 2021*, 26–35).[9] It followed from the findings that BaC sites in the monitored section of the Torysa concentrated in three settlement zones. The first one includes the sites accumulated on the right bank of the Torysa river (sites no. 8, 9, 16, 19, 21, 22, 23). They are settlements and one site with occurrence of two cremation burials (no. 23). Altitude of these sites is between 268 and 311 m a.s.l. Their elevation above the valley's bottom and their nearest surroundings is indistinct (0–18 and 0–4 m). Distance of the studied sites from the current bed of the Torysa is also rather short (303–607 m). Their soil cover consisted of fluvisols, i.e. soils fertile in the local context, but waterlogged and flooded. The second zone contained settlements situated on slopes and juts of hills, mainly on the left bank of the Torysa river (sites no. 2, 3, 4, 12, 17, 18, 24, 25).[10] Terrain's altitude at the sites reaches 284–362 m. Although the recorded sites rise above the Torysa's river bottom rather significantly (by 23–79 m), they

[8] Unpublished.

[9] In them, attention is focused on monitoring of the following factors: landscape relief (altitude, elevation above the main river stream, elevation above the surrounding area with diameter of 100 m, terrain slope, orientation), specification of distance (air distance to the main river stream and air distance to the local stream) and environmental conditions (composition of soils at the site).

[10] For now, only one site (no. 7; Malý Šariš-Na horu/Žibota) located on the right-bank terrace of the Torysa in the valley of the Šarišský potok stream is an exception.

Fig. 7. Veľký Šariš-Kaplnka sv. Kunhuty (site no. 23). Location of the site on the map. Author R. Malček.

do not dominate the area (their elevation varies between 6 and 12 m) and they are rather remote from the central river corridor (1,295–2,475 m). Infertile soils occur at these sites. The third settlement zone is represented by the site of Hradný vrch located in the cadastral area of Veľký Šariš (site no. 20). It is an upland and central site up to 271 m above the main Torysa's basin, which it distinctly dominates. The altitude parameters of Šariš castle hill clearly suggest other than economic importance of this place.

Environmental data from the BaC sites obtained from the landscape context of the Sekčov basin, on the other hand, show signs of stereotypical exploitation of the land in two settlement zones. The remote third zone of the Eneolithic settlement of the Sekčov was located in the Ondavská vrchovina hills, where sites of the group of East Slovak Tumulus culture with Corded Ware were culturally identified (Klušov-Kobyľska hora, Oľšavce/Kochanovce-Roveňky). The first settlement zone of the BaC is represented by the settlements on the lower stream in the Sekčov's basin (sites no. 1, 6, 11, 13, 14). The settlements were situated on slightly declining slopes rising above the valley bottom. They are considerably rich in arable soils and they are also sites suitable for stockbreeding. Another advantage of this zone is control over the main trade route. The second zone contains only two sites near the Šalgovický potok stream (sites no. 5, 15), which also suggest a strategy of searching for islands of more fertile soils despite the fact that fertile soils occur much less frequently in the surrounding hills. The fact that we do not know about any upland sites of the BaC – a typical expression of its final phase in the neighbouring regions – in the Sekčov basin so far might suggest the end of settlement in the Sekčov basin as early as the classical stage of the relevant cultural complex (*Malček/Horváthová/Luštíková 2021*, 33).

THE ŠARIŠ REGION ON THE BACKGROUND OF THE BADEN CULTURE SETTLEMENT IN EASTERN SLOVAKIA

Archaeological finds of the Šariš agglomeration rank among important sources for explanation of development of the Middle Eneolithic in the territory of eastern Slovakia. They reflect the transformation of the material culture, starting with the stage of the Boleráz/Early Classical horizon of the BaC (Baden I/II) and ending with its Late Classical development stage (Baden III/IV).

Relics of the BaC in eastern Slovakia were preceded by settlement of the Polgár cultural complex

represented by the Lažňany group in its latest stage. In the monitored section of the Torysa and Sekčov streams, we have recorded settlement finds from the sites in Ostrovany, Prešov, Ľubotice-Šarišské lúky, Šarišské Michaľany, Fulianka and Dulová Ves (*Budinský-Krička 1964*, fig. 2; *1981*, 43; *Budinský-Krička/Mačala 1990*, 42; *Horváthová 2010*, 14; *Horváthová/Malec 2021*; *Kaminská 1983*, 125; *Lamiová-Schmiedlová 1964*, 247; *Šiška 1964*, 74; *1976*, 92–96). As for settlement of the Lažňany group, ^{14}C AMS data are available only from the Košická kotlina basin (Košice-Barca, burial ground at the site of Baloty, burial 18 – MAMS-14243, 5208 ± 27 BP; burial 18 – MAMS-14244, 5102 ± 24 BP; burial 21 – MAMS-14253, 5102 ± 26 BP; burial 17 – MAMS-14252, 5096 ± 27 BP; burial 22 – MAMS 14245, 5088 ± 27 BP; burial 21 – MAMS-14250, 5074 ± 27 BP; burial 18 – MAMS-14242, 5002 ± 29 BP; *Brummack 2015*, table 2–5). Their final values delimit the burying period at the site between 5208 ± 27 BP until 5002 ± 19 BP (i.e. 4012 ± 25 cal. BC to 3814 ± 80 cal. BC). As for settlement of the Hunyadihalom culture, available ^{14}C AMS data come from the site of Tiszalúc-Sarkad (burial 2 – Poz-36361, 5070 ± 40 BP; burial 8 – Poz-36363, 5050 ± 40 BP; burial 7 – Poz-36362, 5020 ± 40 BP; *Raczky/Siklósi 2013*, 561). Comparing them with the data from the Košice burial ground at the site of Barca-Baloty, the time span between 4000/3950 cal. BC and 3800/3750 cal. BC seems to be acceptable for the cultural complex of Hunyadihalom-Lažňany (*Brummack 2015*, 13).

If we confront the data with more ^{14}C AMS data corresponding with the earliest BaC settlement in the south of eastern Slovakia from the Východoslovenská rovina plain (Kašov, the lower backfill layer from feature 1/2011, 4575 BP–4480 BP, 3498 cal. BC–3029 cal. BC; Baden I/II; *Horváthová/Zastawny 2016*, 964), we find an unreasonably long hiatus of almost 300 years between demise of the previous and appearance of the new settlement in the transitional Boleráz/Early Classical horizon of the BaC (Baden I/II). On the contrary, the oldest radiocarbon chronological data from the sites of western Slovakia can be classified to the Proto-Boleráz stage of settlement (Červený Hrádok-Kopanice, feat. 7D/1970 – GrN-11992, 4820 ± 70 BP, 3695 cal. BC–3520 cal. BC, 2σ 68.2%; Bratislava-Jiráskova ul. – GrN-11993, 4710 ± 100 BP, 3635 cal. BC–3370 cal. BC, 2σ 68.2%; *Horváth/Svingor 2015*, 50; *Němejcová-Pavúková 1985*, 25; *Wild et al. 2001*, 1061).

Between 2001 and 2016, seven ^{14}C AMS data of the BaC altogether were published from the sites in the region of Šariš. Five of them relate to the settlement in Šarišské Michaľany-Fedelemka (*Horváthová/Zastawny 2016*, 962, 963; *Wild et al. 2001*, 1061, pl. 1) and two to the settlement in Prešov-Solivar-Chmeľové-Tichá dolina site (*Horváthová 2015*, 392, fig. 5–8). High values of radiocarbon dating of one sample from Šarišské Michaľany – feature 61/1982 – Poz-71496, 4665 ± 35 BP, 3514 cal. BC–3371 cal. BC (68.2%), 3621 cal. BC–3364 cal. BC (95.4%) contradict the relative dating of the feature as well as dating of the BaC settlement at the site, which was limited by the period of its classical to late classical development (Baden III/IV; *Horváthová 2010*, 89; *Horváthová/Zastawny 2016*, 959, 962, 963). For purposes of further research, only four absolute data were accepted from the above mentioned site of Šarišské Michaľany-Fedelemka – feature 241/1985, VERA-769, 4385 ± 35 BP, 3078 cal. BC–2925 cal. BC (62.2%) and 3096 cal. BC–2909 cal. BC (95.4%); feature 205/1985, Poz-41494, 4480 ± 35 BP, 3331 cal. BC–3096 cal. BC (68.2%), 3342 cal. BC–3029 cal. BC (95.4%); feature 28/1981, Poz-71497, 4425 ± 35 BP, 3264 cal. BC–2938 cal. BC (68.2%), 3327 cal. BC–2922 cal. BC (95.4%) and feature 48/1982, Poz-71495, 4285 ± 35 BP, 2916 cal. BC–2886 cal. BC (68.2%), 3013 cal. BC–2873 cal. BC (95.4%). Published radiocarbon data from the site of Prešov-Solivar-Chmeľové-Tichá dolina, suggest possible earlier settlement comparable with the older classical stage of the BaC (Baden III – feature 10/2009, Poz-46313, 4440 ± 35 BP, 3321 cal. BC–3018 cal. BC (68.2%), 3332 cal. BC–2929 cal. BC (95%); feature 18/2009, Poz-46312, 4550 ± 35 BP, 3365 cal. BC–3121 cal. BC (68.2%), 3370 cal. BC–3102 cal. BC (95.4%).

Apart from the exactly dated finds, obviously older pottery fragments bearing signs of the previous Boleráz/Early Classical pottery style of the BaC (Baden I/II, sites no. 6, 13) or its ending phase (Baden II, site no. 23) also come from Prešov and its surroundings. Analogies to these finds can be found at some sites in the Košická kotlina basin and Východoslovenská rovina plain or Dolný Zemplín (*Horváthová/Gašaj 2021*, 199; *Šiška 1997*). In the horizon of the BaC relics in eastern Slovakia, pottery of foreign shapes and decoration also occurs. It is usually associated with finds of the Coţofeni and Yamnaya cultures (*Blahuta 1960*, 103, fig. 2; *Hájek 1961*, 61–65; *Horváthová/Gašaj 2021*, 206–208; *Horváthová/Chovanec 2006*, 133, 134; *Horváthová/Nevizánsky 2017*, 70; *Vladár 1966*, 93–96; *2008*). The final horizon of the BaC settlement in the region is unknown. Further development of the Eneolithic contains tumulus mounds of the group of East Slovak Tumulus culture with Corded Ware. In some excavations, fragments of older pottery with features of the Baden, Coţofeni and Funnel Beaker cultures occur.[11]

[11] More details on this topic in *Jarosz 2010*, 281–284.

Tab. 2. List of analysed samples. The temperature of firing in degrees Celsius: redox – reducing atmosphere of firing with a small inflow of air; ox – oxidizing atmosphere of firing; red – reducing atmosphere of firing.

Symbol	Number of thin section	Site	Localization on the site	Inv. Number	Form	Approx. firing temperature	Atmosphere of firing	Ceramic fabric type
Pre Ba1	13	Prešov-Solivar-Chmeľové-Tichá dolina	feature 10/2B, 37–63 cm	PRESol/154/09	pot	800	redox	IIb
Pre Ba2	14	Prešov-Solivar-Chmeľové-Tichá dolina	feature 10/2B	PRESol/169/09	bowl	750	ox	IIb
Pre Ba3	15	Prešov-Solivar-Chmeľové-Tichá dolina	feature 18, 0–60 cm	PRESol/1047/09	coarse vessel	750	redox	IIa
Pre Ba4	16	Prešov-Solivar-Chmeľové-Tichá dolina	feature 18, 0–60 cm	PRESol/1042/09	cup	750	red?	IIa
Sar Ba1	23	Šarišské Michaľany-Fedelemka	feature 28/1983/1	ŠM/28/1983/1	pot	800–850	redox	IIa
Sar Ba2	24	Šarišské Michaľany-Fedelemka	feature 28/1983/2	ŠM/28/1983/2	bowl	750	redox	IIa
Sar Ba3	25	Šarišské Michaľany-Fedelemka	feature 48/1983/1	ŠM/48/1983/1	cup	850	redox	IIa
Sar Ba4	26	Šarišské Michaľany-Fedelemka	feature 48/1983/2	ŠM/48/1983/2	jug	850	redox	IIa
Sar Ba5	27	Šarišské Michaľany-Fedelemka	feature 61/1982	ŠM/61/1982	amphora	850	redox	IIa
Sar Ba6	28	Šarišské Michaľany-Fedelemka	feature 205/1985	ŠM/205/1985	jug	750	ox	IIa
PreMC/1	43	Prešov-Solivar-Mestský cintorín	F8/2011, 1305/2014	s. 2, s. 452	bowl	750–800	red	Ic
PreMC/2	44	Prešov-Solivar-Mestský cintorín	F8/2011	s. 1	pot	850	redox	IIc
PreMC/3	45	Prešov-Solivar-Mestský cintorín	F8/2011	s. 1	cup	700–750	redox	Ic
VSK/1	46	Veľký Šariš-Kaplnka sv. Kunhuty	trench 2/10; 50–82 cm	59h	jug/amfora	700–750	ox	Ic
VSK/2	47	Veľký Šariš-Kaplnka sv. Kunhuty	trench 2/10; 76–82 cm	59o	bowl	750	redox	Ic

MINERAL-PETROGRAPHIC ANALYSIS OF THE CERAMICS

Materials

The following analysis is part of a broader study on the pottery of the BaC. The vessels were selected from archaeological sites located in Poland (17 sites) and Slovakia (15 sites). The samples come from settlements as well as caves and graves. All represent the BaC with its wide variety of vessel forms. This article presents the results of analyses of 15 vessel fragments from five archaeological sites located in the area of Šariš in Northeast Slovakia (Tab. 2). They are in various forms: bowls, pots, cups, amphoras, pitchers, and thick-walled vessels. Samples were labelled with site name abbreviations and sequential numbers, separate for each site. During the analysis, all samples were assigned a continuous numbering for ease of sample designation. Table 2 shows the selection of 15 pieces, considering the numbering previously assigned.

Methods and the aim of the study

Thin sections were made from the sherds for examination under a polarized transmitted light microscope. Point counting microscopic analysis was used for the percentage of, among others, clay minerals, quartz, potassium feldspar, plagioclase, muscovite, biotite, carbonates, fragments of sedimentary, igneous and metamorphic rocks, pieces of recycled ceramics, as well as organic material (*Bolewski/ Żabiński 1988*). Petrographic descriptions of the ceramic sections were also made. The collected

Tab. 3. Results of analysis of ceramics samples of the Baden culture. Grain fractions (after *Polskie Towarzystwo Gleboznawcze 2009*).

Grain fractions	
Name	Value
Clay fraction	d < 0.002 mm
Silt fraction	0.002 < d < 0.05 mm
Fine silt	0.002–0.02 mm
Coarse silt	0.02–0.05 mm
Sand fraction	0.05 < d < 2 mm
Very fine sand	0.05 < d < 0.1 mm
Fine sand	0.1 < d < 0.25 mm
Medium sand	0.25 < d < 0.5 mm
Coarse sand	0.5 < d < 1 mm
Very coarse sand	1 < d < 2 mm

Tab. 4. Results of analysis of ceramics samples of the Baden culture. Mineral composition. Value in per cent.

Number of thin section	Symbol	Country	Clay minerals	Silt fraction	Quartz	Chalcedony	K-feldspars	Plagioclases	Fragments of sedimentary rocks	Fragments of igneous rocks	Fragments of metamorphic rocks	Muskovite	Biotite	Opaque minerals	Iron oxides and hydroxides	Grog	Clay pellet	Organic fragments	Voids	Carbonates	Others
13	PreBa-1	Slovakia	44.1	9	13.6	0.1	4	0.1	0	1.1	2.5	0.3	0	0.6	0.3	17.5	0.5	0	5.9	0	0.4
14	PreBa-2	Slovakia	45	10.2	12.5	0	3.8	0	0.8	0.1	0.4	1.5	0	0.8	0.8	16.8	0.5	0	6.4	0	0.4
15	PreBa-3	Slovakia	51.5	4	16.9	0.1	3.3	0	0.8	9.3	0.8	1.3	0	0	0.8	5.3	2	0	3.5	0	0.4
16	PreBa-4	Slovakia	53	7	17.5	0	4.4	0	1.2	0.5	1.2	1.6	0.3	1	0	7.5	0.6	0	3.4	0	0.8
23	Sar Ba-1	Slovakia	42	17.3	20	0	2.6	0	0	0	0.2	3	1.5	0.4	0.4	8.2	2.2	0	1.1	0	1.1
24	Sar Ba-2	Slovakia	48	9	16.2	0.3	2.4	0	0	0	1.4	1	0.7	0.5	0.5	15.2	0.3	0	3.8	0	0.7
25	Sar Ba-3	Slovakia	43.2	15.4	15.7	0.3	6.1	0	0	0	1	3	0.5	0	0.8	5.1	4.3	0	3.8	0	0.8
26	Sar Ba-4	Slovakia	46.2	14.8	18.5	1.3	3.6	0	0	0	0.1	2.6	0	0	0.3	5.7	2.3	0.3	3.9	0	0.4
27	Sar Ba-5	Slovakia	39.2	11.7	22.5	0	3.9	0.7	0	0	0.7	2	0.7	0.7	0.3	7.8	3.3	0.7	5.5	0	0.3
28	Sar Ba-6	Slovakia	56.8	11.5	14	0	3.7	0	0.3	0	1	0.9	0	0	0.6	3.4	3.4	0.3	4	0	0.1
43	PreMC/1	Slovakia	42.6	18.7	7	0	2.4	0	0	0	0	0	0	0.5	0	20.6	1.4	0.1	6.6	0	0.1
44	PreMC/2	Slovakia	53.7	16	9.5	0	3.7	0	0	0.5	0	0.8	0	1.6	0.8	0	7.6	0	4.2	0	1.6
45	PreMC/3	Slovakia	49.8	23	12.3	0	1.4	0	3.4	0.3	0	1	0.7	0.7	0	4.8	0.3	0.3	1.7	0	0.3
46	VSK/1	Slovakia	54.3	12.8	15.3	0	3.4	0	0.3	0	0.5	0	0.3	1	1.8	8.4	1.3	0	0.5	0	0.1
47	VSK/2	Slovakia	44.7	16.3	13.8	0.2	4.7	0	0.7	0	0.9	2.6	0.5	0.9	0.7	9.1	0.9	0.2	2.8	0	1

data was used for comparative studies and made it possible to divide the samples according to the technology of clay preparation and finished product firing. The approximate firing temperature was determined based on thermal transformations of clay minerals – observation of the degree of alteration into an amorphous, vitrified isotropic substance, and observation of biotite, hornblende, and glauconite minerals (*Quinn 2013*, 190–203). The research was aimed at describing the mineral composition of the ceramic masses. In addition, efforts were made to distinguish intentional admixtures that were added to the raw materials and thus establish trends in the preparation of ceramic fabrics. The descriptions take into account the percentage of individual components, the degree of mixing of the masses, as well as the conditions and temperature of firing. The study adopts the division into grain fractions according to the Polish Soil Science Society (Tab. 3).

Results

The studied series shows little differentiation in composition (Tab. 4). We can distinguish between homogeneous, fine-grained clays and poorly sorted, medium and coarse-grained clays. Pottery masses contain clay minerals (39.2–56.8%) and silt grains (4–23%). In addition, the masses include fine mica flakes, heavy minerals, opaque minerals, iron oxides and hydroxides. The coarser fraction (> 0.05 mm) consists of various mineral grains: quartz, feldspars, polycrystalline quartz, chalcedony, less often amphibole, pyroxenes, and rutile. There are metamorphic rock fragments in all samples, except those from the Prešov-Solivar-Mestský cintorín site (mainly slate and mica-slate). Less common are crumbs of magmatic rocks identified in samples from the Prešov-Solivar-Chmeľové-Tichá dolina and Prešov-Solivar-Mestský cintorín site. Fragments of extrusive rocks (e. g. andesites) were also recorded in samples from the sites of Prešov-Solivar-Chmeľové-Tichá dolina (PreBa-2, 3, 4, cuts no. 14, 15, 16) and Prešov-Solivar-Mestský cintorín (Fig. 8: c, d; PreMC-2, cut no. 44). There are also a few fragments of sedimentary rock in the examined masses, mainly in form clay pellets observed in samples from the sites Prešov-Solivar-Chmeľové-Tichá dolina, Prešov-Solivar-Mestský cintorín and Veľký Šariš-Kaplnka sv. Kunhuty.

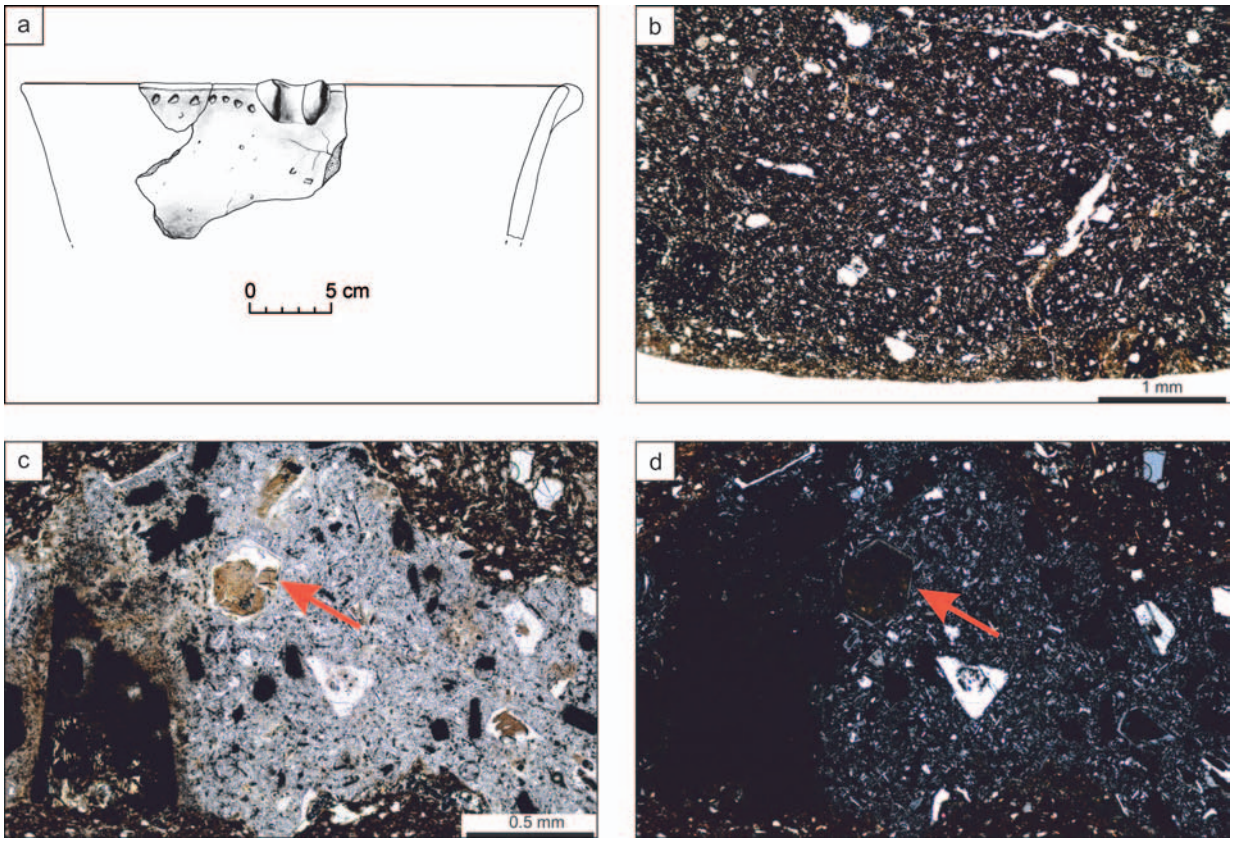


Fig. 8. Prešov-Solivar-Mestský cintorín site. Sample PreMC/2 (cut no 44), ceramic fabric type IIc. a – drawing of the vessel; b, c, d – photographs of the section; b – dark brown, fine-grained ceramic matrix; c, d – lithic inclusion of extrusive rock fragment in which six-sided phenocryst is visible (red arrow); b, c – plane-polarized light (PPL); d – crossed polarized light (XPL). Drawing by B. Grabowska, photo by A. Rauba-Bukowska.

Most of the samples show raw materials with a high content of fine grains (> 10%). Only four vessels (Fig. 9; PreBa-1, 3, 4 and SarMich Ba-2, cuts no. 13, 15, 16, 24) are made of clay poor in silty grains. No carbonate components were found in the tested samples, only small chalcedony grains.

Admixtures

The common component of the studied pastes is fragments of older ceramic – grog. The fragments have various sizes (approx. 0.1–100 mm) and colours. Sometimes two-colour pieces of grog are visible (Fig. 9: c; cut 13). Two-colour grog fragments indicate a reducing atmosphere of firing with a little air inflow, which causes the outer wall layer to oxidize. Grog fragments show similar raw materials as the ceramic mass in which they are located. Only one fabric does not contain grog temper – PreMC-2, cut no. 44. Fragments of rocks present in ceramic fabrics cannot be treated as intentional additives. Most probably, they are a natural component of clays used. However, such coarse-grained clays probably could have been used on purpose.

Firing

Most of the tested vessel fragments show traces of firing with limited air supply (Tab. 1). The vast majority of them were fired at temperatures of about 750–850 °C. Vessels fired with air supply have a lower firing temperature, approx. 700–750 °C.

Conclusions

Based on the analysis of the textures and composition of the ceramic masses, several types of ceramic fabrics were distinguished. Their diversity is influenced by the raw materials used, the preparation of clay, the admixtures used, and the preparation of the finished mass. Seven types and sub-types of ceramic fabrics were distinguished for the 90 fragments studied in the project. The selection of 15 ceramic fragments described in this

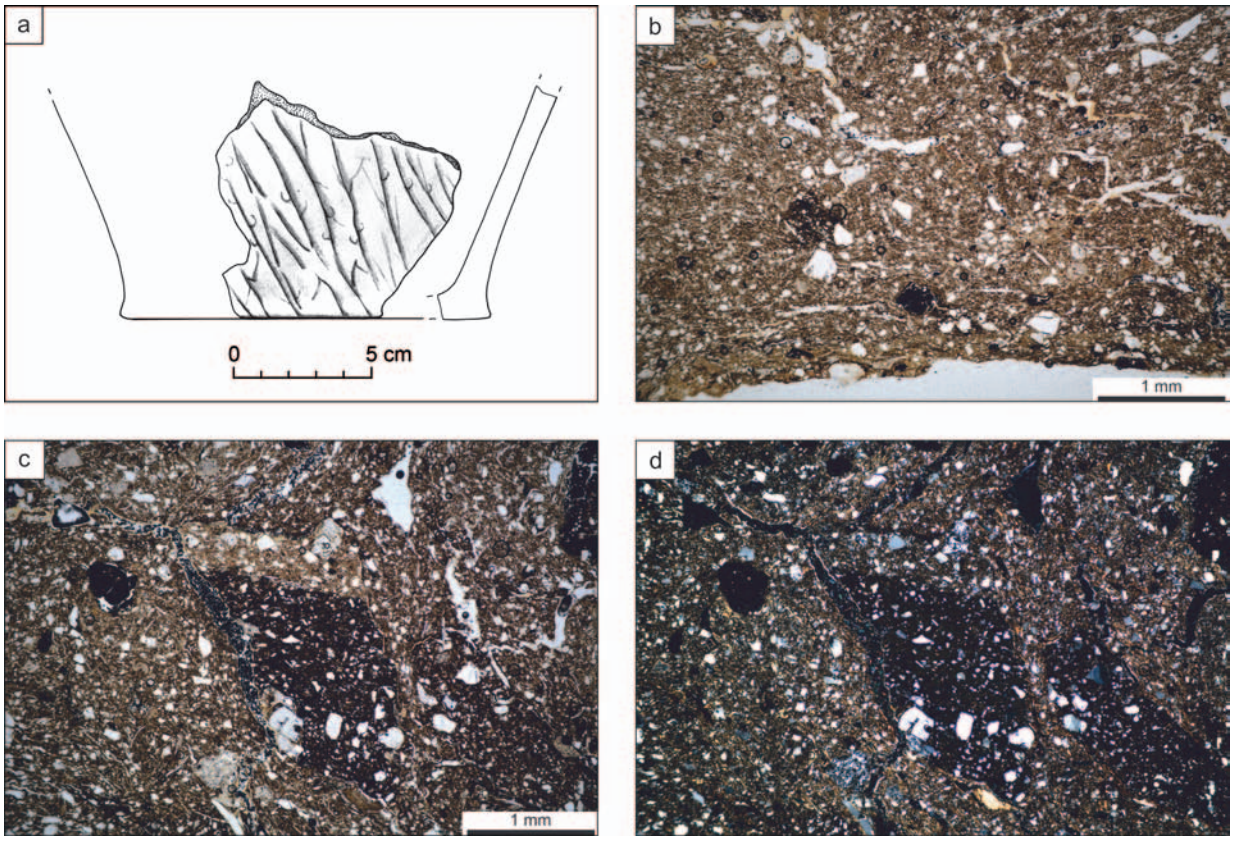


Fig. 9. Prešov-Solivar-Chmeľové-Tichá dolina site. Sample PreBa-1 (cut no 13), ceramic fabric type IIb. a – drawing of the vessel; b, c, d – photographs of the section; b, c, d – fine-grained matrix with grog admixture; c – two-colour grog crumb; b, c – PPL; d – XPL. Drawing by B. Grabowska, photo by A. Rauba-Bukowska.

article presents four types of ceramic masses: Ic, IIa, IIb, and IIc.

- Type Ic consists of fine-grained masses with a significant amount of silty fraction grains with an intentional admixture of grog and a small content of coarse grains (samples from the sites of Prešov-Solivar-Mestský cintorín and Veľký Šariš-Kaplnka sv. Kunhuty, cuts no. 43, 45, 46, 47; Fig. 10; 11).
- Type IIa consists of medium and coarse-grained masses with a significant content of mineral grains and rock fragments with a deliberate admixture of a small amount of grog (samples from the sites of Prešov-Solivar-Chmeľové-Tichá dolina, Šarišské Michaľany-Fedelemka, cuts no. 15, 16, 23–28; Fig. 12).
- Type IIb pottery pastes, like IIa, are characterized by coarser graining. Still, the admixture of chamotte is dominant over the mineral components (samples from the Prešov-Solivar-Chmeľové-Tichá dolina site, cuts no. 13 and 14; Fig. 9).
- Type IIc masses are fine-grained mixtures with single larger crystalline grains without any additions of grog (sample from the Prešov-Solivar-Mestský cintorín site, cut no. 44; Fig. 8).

Sample 44 stands out in the whole set. The ceramic mass does not contain the intentional admixture of grog, which is present in the other tested preparations. Furthermore, it contains coarse volcanic rock fragments. The ceramic material from the Šarišské Michaľany-Fedelemka site is characterized by the most significant technological homogeneity. The dishes, despite the various forms, present a compact technology. They are also fired at slightly higher temperatures than the other tested vessels – up to approx. 850 °C. At the Prešov-Solivar-Chmeľové-Tichá dolina site, the vessels were made of medium and coarse-grained ceramic mass (type IIa and IIb of the ceramic fabrics). In Veľký Šariš-Kaplnka sv. Kunhuty and Prešov-Solivar-Mestský cintorín site, on the other hand, technology based on fine-grained, silty clays with a significant admixture of grog dominates.

The composition of the ceramic masses of the tested series of dishes was determined by the available raw material and the local tradition. The examined group of monuments shows a homogeneous collection in terms of the method of preparation of the raw material. There are no clear correlations between the vessel shapes and the ceramic masses

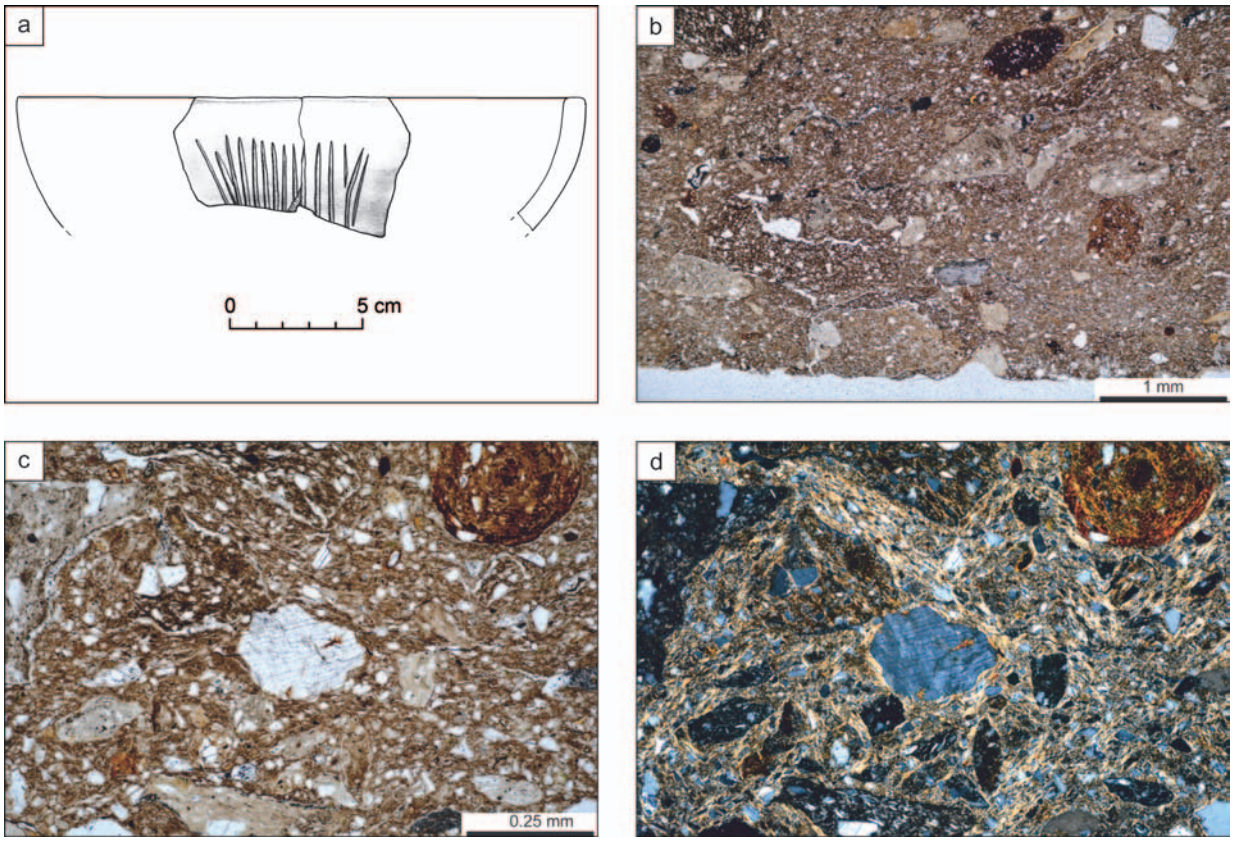


Fig. 10. Prešov-Solivar-Mestský cintorín site. Sample PreMC/1 (cut no 43), ceramic fabric type Ic. a – drawing of the vessel; b, c, d – photographs of the section; b – fine-grained fabric with grog admixture; c, d – different sizes of grog in clay mass, in the centre feldspar grain; b, c – PPL; d – XPL. Drawing by B. Grabowska, photo by A. Rauba-Bukowska.

used. This may indicate a high standardization and homogeneity in the technology of ceramic cookware production. The form of the pots was a priority, but not the physical properties of individual containers. It can be cautiously assumed that the form of the vessel or its purpose was not a priority in choosing the ceramic mass, although such deliberations require in-depth study.

What is interesting is the observation of the domination of fine-grained masses only in pottery from the sites in Prešov-Solivar-Mestský cintorín and Veľký Šariš-Kaplnka sv. Kunhuty. Both sites represent the oldest horizon of the BaC in the Šariš region. The indicated technological feature may therefore have a chronological basis.

Compared to the neighbouring areas to the north-west and south, i.e. the area of Spiš (n = 16) and Zemplín (n = 10), the structure of the ceramics technology in Šariš resembles that of Spiš (unpublished results). Fine and coarse masses occur equally in both regions, although Šariš has more coarse masses. In the Zemplín region (n = 10), coarse-grained masses with abundant mineral admixture, mainly quartz, feldspar, and crumbs of various rocks (type IIa), predominate. Fine-grained masses or with a predominantly admixture of fireclay are single here.

ARCHAEOBOTANICAL ANALYZES

Archaeobotanical analyses were carried out on a small number of burnt clay preserved at two archaeological sites of the BaC: Šarišské Michaľany-Fedelemka and Prešov-Solivar-Chmeľové-Tichá dolina. From the first of them, only two pieces of daub from feature 61/1982 were examined, while from the second one, 37 fragments excavated from three features Nos. 10/2B, 14 and 18 were studied. The examined lumps were orange in colour, and some of them were black inside. They were very different on account of their size of size and structure. Some of them were relatively well fired, light and brittle, while other chunks had a compact structure with a small admixture of the large-grained clastic admixture.

In order to identify possible plant traces in the reflected light microscope, using magnification

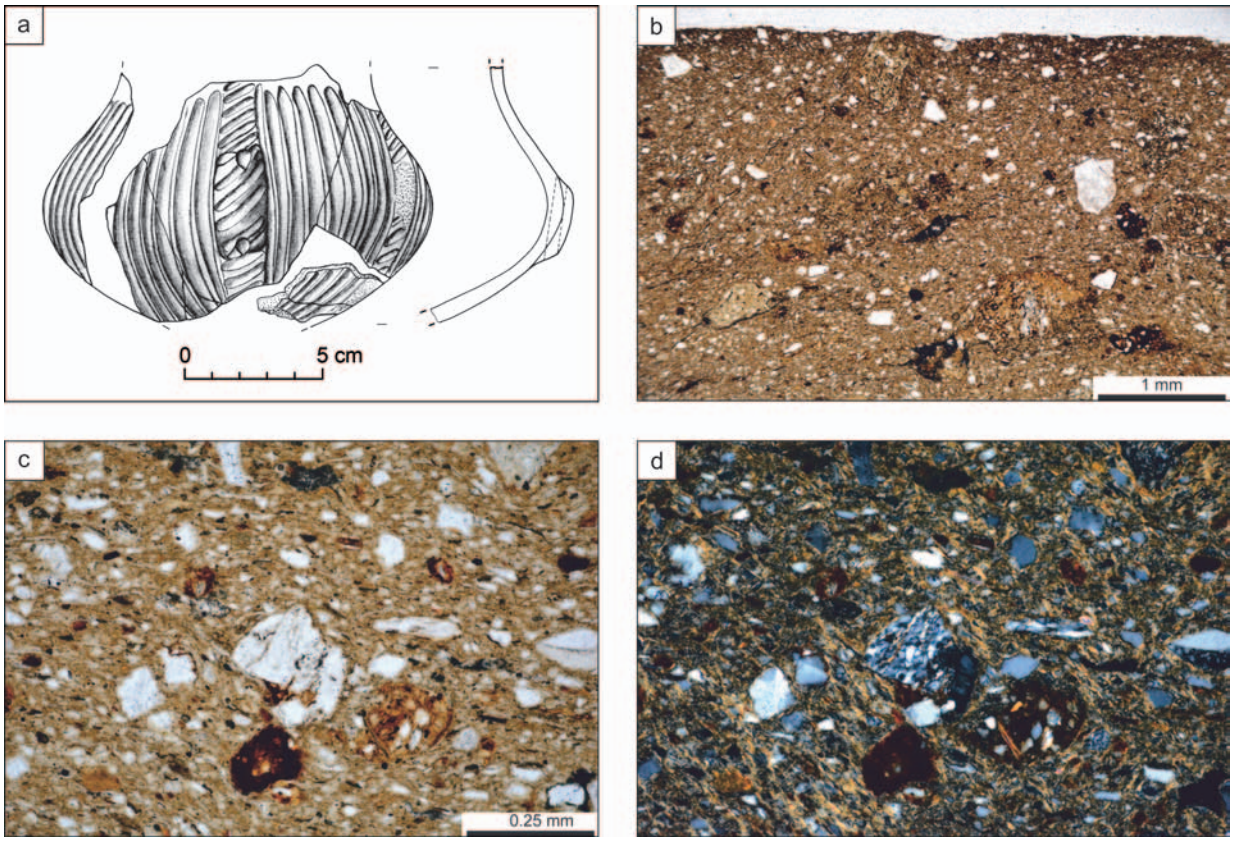


Fig. 11. Veľký Šariš-Kaplnka sv. Kunhuty. Sample VSK/1 (cut 46), ceramic fabric type Ic. a – drawing of the vessel; b, c, d – photographs of the section; b – fine-grained fabric with a little grog admixture; c, d – different inclusion including slate fragment, clay pellet, and iron oxides and hydroxides; b, c – PPL; d – XPL. Drawing by B. Grabowska, photo by A. Rauba-Bukowska.

up to 40×, the cleaned surface of the burnt clay pieces and its fresh fractures were observed. Plant prints were determined with the morphological-comparative method, characteristic for this type of botanical sources (*Lityńska-Zając/Wasylikowa 2005*, 295–300).

Burnt clay, from the point of view of archaeobotanical studies, is a kind of material that can provide a lot of interesting data on the charred and dried remains of plants and the imprints of plant organs or tissues (e.g. *Lityńska-Zając/Wasylikowa 2005*, 295–300; *Moskal-del Hoyo et al. 2017*; *Tolar/Jacomet/Valušček 2016*). In the case of the discussed sites, plant remains were found in some of the daub pieces, which were preserved in the form of negative caryopsis impressions, as well as reflections as well as burnt and dried vegetative parts of herbaceous plants, wild or cultivated. Imprints of laths or branches were visible on the surface of several pieces.

From the site at Šarišské Michaľany-Fedelemka a construction imprint was noted on the surface of one analysed piece of daub in the form of a branch reflection. In the second one, there were impressions of three straw fragments belonging to grasses family *Poaceae indet*. Many more remains have been preserved in the materials from the Prešov-Solivar-Chmeľové-Tichá dolina site. Negative grain impressions, impressions, dried and charred spikelets or their basal parts (the so-called spikelet forks) belonging to emmer wheat *Triticum diccocon* (Tab. 5) were noted here. Some of the preserved specimens, with less pronounced distinctive features, have been described as belonging to one of the two (or both) species of emmer or einkorn wheat *Triticum diccocon* vel *T. monococcum*. In a few daub clumps from features 10/2B and 18, they were very numerous and formed layers. The reflections of not fully developed caryopses or their fragments belonged to undetermined cereals. There were also many traces of pieces of straw classified generally as *Cerealia indet* and for cereals and/or wild grasses *Cerealia* indet. vel *Poaceae* indet. There have also been not many reflections of taxonomically undetermined branches and/or laths. Finally, in feature 10/2B there were dozen specimens that could not be assigned to any taxonomic unit. They

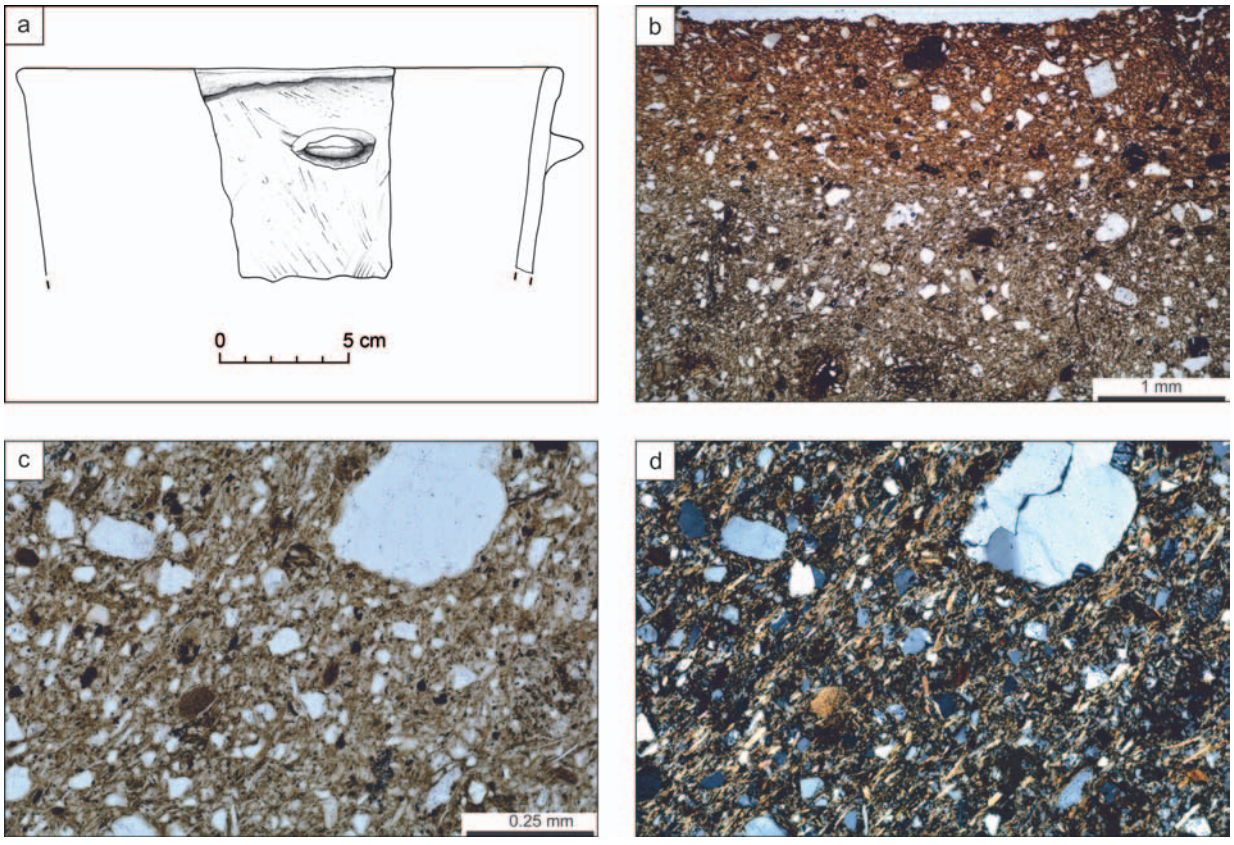


Fig. 12. Šarišské Michaľany-Fedelemka site. Sample SarBa1 (cut no. 23), ceramic fabric type IIa. a – drawing of the vessel; b, c, d – photographs of the section; b – an outer oxidizing layer of wall section; c, d – micaceous clay matrix with evenly distributed silty grains, one coarse quartz grain is visible (upper right); b, c – PPL; d – XPL. Drawing by B. Grabowska, photo by A. Rauba-Bukowska.

Tab. 5. Šarišské Michaľany-Fedelemka site and Prešov-Solivar-Chmeľové-Tichá dolina site. Results of analysis of plant materials of the Baden culture. State of preservation: im – imprint, dr – dried remains inside the imprint, ch – charred remains inside the imprint; kind of remains: ca – caryopsis, bsp – basal part of spikelet, sp – spikelet, d – wood, con – constructional (branches and/or laths); number of specimens: # – branches or laths imprints, * – numerous imprints, ** – accumulation of specimens.

Taxa name	State of preservations	Kind of remains	Šarišské Michaľany	Prešov-Solivar-Chmeľové-Tichá dolina			Total
			61/1982	10/2B	14	18	
Triticum dioccocon	im	ca	–	11	4	7	22
	im	sp, bsp	–	2	1	8	11
	ch	bsp	–	–	2	3	5
	dr	sp	–	1	–	–	1
	dr	bsp	–	–	1	5	6
Triticum dioccocon vel *T. monococcum*	dr	sp, bsp	–	**	–	**	**
	im	sp	–	**	–	–	**
	ch	bsp	–	–	–	**	**
Cerealia indet.	im	ca	–	19	–	–	19
	im	chaff	3	28	4. *	17. *	51. *
Cerealia indet. vel *Poaceae* indet.	im	chaff	–	8	*	*	8. *
Not signet	ch	tissue	–	11	–	–	11
	im	con	1	#	#	–	1. #
Total			4	79	12	40	135

were remains preserved in form of charred thin, amorphous tissues of plants.

The analyses indicate large qualitative and quantitative disproportions in the obtained results of botanical studies for both discussed sites. This condition is influenced, on the one hand, by the number of preserved and examined daub pieces from the Šarišské Michaľany and Prešov, and, on the other hand, the degree of supersaturation of lumps with plant material. The preservation of significant amounts of prints of spikelets, basal part of spikelet, larger or smaller pieces of straw and chaff clearly indicates that fragments of threshing waste were added to the constructional clay as the tempering admixture and were probably intentionally used as such (e.g. *Kohler-Schneider 2007*; *Lityńska-Zając/Czekaj-Zastawny 2021*; *Lityńska-Zając/Wasylikowa 2005*; *Moskal-del Hoyo et al. 2017*; *Tolar/Jacomet/Valušček 2016*).

The developed plant material yields important data on the cultivated plants. It found the remains of one or two species of hulled wheats, emmer and possibly einkorn. Emmer was probably dominant in the crops of the time. The caryopsis of these cereals could be used for groats or ground into flour. It could also be used as animal feed. Straw could be used, for example, to cover roofs (*Gluza 1994* and cited therein) and with other threshing waste was undoubtedly added to clay.

Identification of plant material ascribed to the BaC in Central Europe is relatively poor (e.g. *Endrődi/Gyulai 2002*; *Hajnalová 2007*; *Kenéz/Pető/Gyulai 2014*; *Kohler-Schneider/Caneppele 2009*; *Lityńska-Zając 2019*; *Nowak et al. 2019*). From the territory of Slovakia, botanical data come only from a dozen archaeological sites (*Hajnalová 2007,* 304, 305). At these sites, soil samples containing charred remains, plant impressions on daub and ceramics as well as charcoal were examined. Recognized crop remains indicate that the population of the BaC sowed mainly hulled wheat – emmer *Triticum dicoccon* and einkorn *T. monococcum*, which confirms the results obtained for the sites of Šarišské Michaľany and Prešov-Solivar-Chmeľové-Tichá dolina. Common barley *Hordeum vulgare* (*Hajnalová 2007,* 304, 305; *Lityńska-Zając 2019*), and spelt *T. spelta* and free-threshing wheat, millet *Panicum miliaceum* and plants from the family *Fabaceae indet*., including pea *Pisum* and bitter vetch *Vicia cf. ervilia* were probably sown as well (*Hajnalová 2007,* 304, 305).

Recognized remains of crops from the sites of Šarišské Michaľany-Fedelemka and Prešov-Solivar-Chmeľové-Tichá dolina indicate that mainly hulled wheat was sown, including frequently occurring emmer *Triticum dicoccon* and possibly einkorn *T. monococcum*. However, this does not correspond to the entire spectrum of cultivated species known from other sites of the Baden culture in Slovakia, which also include barley, spelt wheat, free-threshing wheat, millet and, moreover, plants from the pulses family *Fabacea eindet*., including pea *Pisum* and bitter vetch *Vicia cf. ervilia*. This picture is undoubtedly influenced by the kind of the examined material, which were the remnants of plant preserved in the daub pieces.

ARCHAEOZOOLOGICAL ANALYZES

At the BaC sites in the Šariš region, animal bone remains from three settlement sites were analysed: Šarišské Michaľany-Fedelemka, Prešov-Solivar-Mestský cintorín and Prešov-Solivar-Chmeľové-Tichá dolina. Since from both sites in Prešov we have four pieces of unidentified bones altogether, the Šariš region is in practice represented only by animal remains from the Šarišské Michaľany site. At the same time, this assemblage including total of 726 animal remains is the most numerous osteological collection among all the BaC sites known from the entire eastern Slovakia.

Material and method

During archaeological fieldworks at Šarišské Michaľany-Fedelemka (*Horváthová 2010*), 27 anthropogenic features that bear animal remains were discovered. All animal remains included in this study come from features in which recovery methods included hand-collection but not wet-sieving. The sites with bone remains were identified based on comparative material stored in the collection of the Institute of Systematics and Evolution of Animals, the Polish Academy of Sciences in Kraków, Archaeological Research Collection, Tallinn University, and publications concerning animal bone identifications (*Hillson 1992*; *Schmid 1972*). Two quantified calculations were made of the remains – NISP (Number of Identified Specimens) and MNI (Minimum Number of Individual Animals; *Klein/Cruz-Uribe 1984*; *Lee Lyman 1994*; *Reitz/Wing 1999*). The MNI value was calculated globally for whole site, and not, as it is done in some studies, for each object separately. Due to significant fragmentation and lack of characteristic features, part of the bone remains has been generally assigned to three size of animal categories: large (cattle/horse size), medium (pig/goat/sheep size) and small mammals (hare size). Further, bone fragments without visible morphological features were classified as undetermined. All the bone remains were subjected to

Tab. 6. Šarišské Michaľany-Fedelemka site. Number of identified bones (NISP) of particular animal species discovered in particular features.

Feature number	Clams (*Unio* sp.)	Roman snail (*Helix pomatia*)	Birds (*Aves*)	Cattle (*Bos taurus*)	Goat/sheep (*Capra hircus/Ovies*)	Pig (*Sus scrofa* f. *domestica*)	Dog (*Canis familiaris*)	Wild horse (*Equus ferus*)	Red deer (*Cervus elaphus*)	Roe deer (*Capreolus capreolus*)	Wild boar (*Sus scrofa*)	Beaver (*Castor fiber*)	European hare (*Lepus europaeus*)	Large mammal	Medium mammal	Unidentified	Total
28	1	62	–	2	5	2	–	–	–	–	1	–	–	–	–	–	73
34	–	–	–	12	8	7	–	–	3	–	1	1	–	2	–	2	36
37	–	–	–	4	1	9	–	–	–	–	–	–	–	1	1	–	16
40	–	–	–	–	1	9	–	–	–	–	–	–	–	–	1	–	11
41	–	–	–	10	1	3	–	–	–	–	–	–	–	–	–	–	14
42	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
48	–	22	–	124	34	38	4	27	4	1	–	–	1	28	6	–	289
49	–	–	–	1	8	5	–	–	–	–	–	–	–	–	–	–	14
61	–	–	–	8	13	8	–	–	2	–	2	–	2	2	–	–	37
70	–	–	–	3	4	–	1	–	–	–	–	–	–	1	–	–	9
71	–	–	–	–	1	3	–	–	–	–	–	–	–	–	–	–	4
120	–	–	–	1	1	–	–	1	–	–	–	–	–	1	–	–	4
161	–	–	–	4	8	6	–	–	1	1	–	3	–	1	–	–	24
172	–	–	–	1	–	4	–	–	–	–	–	–	–	1	–	–	6
186	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
192	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
197	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
205	–	–	–	–	5	15	–	–	–	1	–	–	–	–	–	–	21
211	–	–	–	1	2	–	–	–	–	–	–	–	–	–	–	–	3
241	–	–	–	–	1	2	–	–	–	–	–	–	–	–	–	–	3
253	–	–	–	–	–	3	–	–	–	–	–	–	–	1	–	–	4
264	–	–	–	–	3	2	–	–	–	–	–	–	–	–	5	2	12
265	–	–	1	2	12	2	–	–	–	–	–	–	–	2	11	–	30
271	–	–	–	2	2	14	–	–	–	–	–	–	–	3	5	6	32
278	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1
283	–	–	–	4	3	–	25	–	–	–	–	–	–	4	3	7	46
287	–	–	–	2	9	16	–	–	–	–	–	–	–	1	5	–	33
Total	1	84	1	181	123	151	30	28	10	4	4	4	3	48	37	17	726

detailed observations in order to identify the marks left by humans, carnivores and rodents, or root plant activity.

In this study, horse remains were included into wild species, despite the fact that on the basis of morphometric features of the skeleton it is not possible to determine whether the animal belonged to a domestic or wild animals. However, this solution is supported by the fact that the remains of the horse discovered on this site are present in Funnel Beaker culture whose absolute age precedes the moment of appearance of a domesticated horse in this area (*Benecke 1994*; *Levine 2005*). Although at the territory of the Czech Republic presence of domesticated horse during TRB culture is suggested (*Kyselý/Peške 2016*), according to recent a DNA studies, this assumption seems less likely (*Librado et al. 2021*).

Results – animal bone assemblage

Animal remains discovered at Šarišské Michaľany-Fedelemka site are generally well preserved. Bones are compact, slightly fossilized and yellow or waxy in colour. Signs of strong weathering are visible only on six bones. Only the presence of relatively numerous traces of root etching and carbonate cover, visible at ca. 5% of the whole bone assemblage (around 10% if we take into considera-

Tab. 7. Šarišské Michaľany-Fedelemka site. Number of identified bones (NISP) and minimal number of individuals (MNI) of particular animal species.

Species	NISP	% NISP	MNI
Clams (*Unio* sp.)	1	–	1
Roman snail (*Helix pomatia*)	84	–	84
Bird (*Aves*)	1	0.2	1
Cattle (*Bos taurus*)	181	33.6	5
Goat/sheep (*Capra hircus*/*Ovies aries*)	123	22.8	7
Pig (*Sus scrofa* f. *domestica*)	151	28	10
Dog (*Canis familiaris*)	30	5.6	8
Total domestic mammals	484	90	30
Wild horse (*Equus ferus*)	28	5.2	1
Red deer (*Cervus elaphus*)	10	1.9	1
Roe deer (*Capreolus capreolus*)	4	0.7	1
Wild boar (*Sus scrofa*)	4	0.7	1
Beaver (*Castor fiber*)	4	0.7	1
European hare (*Lepus europaeus*)	3	0.6	1
Total wild mammals	53	9.8	6
Total identified mammals	539	100	36
Large mammal	48	–	–
Medium mammal	37	–	–
Unidentified	17	–	–
Total	726	100	36

tion only bones determinate to the taxon), impeded the archaeozoological analysis.

During the excavations, more than seven hundred remains of different groups of animals altogether were found. All animal remains including land snails can be undoubtedly considered as collected by humans. The most numerous animal remains belong to mammals, which dominate both in terms of the amount of bones and the number of species. Discovered mammal remains belong to a minimum of 10 species, representing both domestic and wild animals (Tab. 6; 7).

Domestic mammals represent typical spectrum of species, dominated by cattle *Bos taurus*, pig *Sus scofra f. domestica*, and goat/sheep *Capra hircus*/*Ovis aries* (Tab. 6; 7). Among domestic mammals' goat/sheep and pig remains are numerous, equally in terms of NISP and MNI. This clearly shows that the livestock economy of BaC population of Šarišské Michaľany-Fedelemka was based on alike cattle, small ruminants and omnivorous pig. High share of dog *Canis familiaris* remains in this assemblage is connected with discovery in feature no. 283 – numerous dog teeth used for production of a necklace (22 pieces).

Wild mammals represent typical spectrum of game species like wild horse *Equus ferus*, roe deer *Capreolus capreolus*, red deer *Cervus elaphus* and wild boar *Sus scrofa*. Among them, the most numerous are wild horse (Fig. 13: 3), although according to calculated minimal number of individuals share of all wild species is similar (Tab. 7). Among remains of roe and red deer, antler fragments are the most numerous, some of them were used as a raw material for tool production. The assemblage of wild mammals is complemented by remains of beaver *Castor fiber* and hare *Lepus europaeus* (Tab. 6; 7).

Most of the identified animal remains collected during excavation can be connected with human activity, and should be seen as consumption waste. This observation does not concern osseous tools and ornaments. The animals whose bone remains were discovered in the settlement were probably slaughtered within the site, as evidenced by the presence of remains having low consumption value, such as skull fragments and distal parts of limbs. This information relates especially to domestic animals as well as some wild species e.g. wild horse and beaver. Only antler fragment of red deer and roe deer overrepresented in this material can be an effect of shed collecting from immediate vicinity of the site. Processing of carcasses, i.e. skinning and dismembering (traces of human activity in the form of cut marks), as well as consumption (traces of fileting, breaking, and burning of bones) most likely took place within the settlement as well. The cut marks are especially numerous on remains belonging to domestic animals (Fig. 13: 1) like cattle [N = 11], sheep/goat [N = 7], and pig [N = 5], but are also recorded on wild horse [N = 3] and beaver [N = 1]. We can consider the presence of numerous Roman snail *Helix pomatia* shells that were discovered in two features at the site as a curiosity (Fig. 13: 2, Tab. 6). Possibly, their presence may testify gathering of this species by the BaC societies for consumption as a supplement to the human and/or animal diet. Unfortunately, these shells are devoid of obvious traces of direct human use that could confirm this assumption, and as such are part of the few finds of this type known from the Central Europe (*Kurzawska 2019*).

In materials discovered from Šarišské Michaľany-Fedelemka site (Fig. 14), many tools, waste products from their production and teeth adornments were discovered [N = 46]. Among tools, awls are the most numerous [N = 10]. Other osseous tool types like spatulas [N = 3], chisels [N = 3] and antler axe [N = 1] are less frequent. For awl production, bones

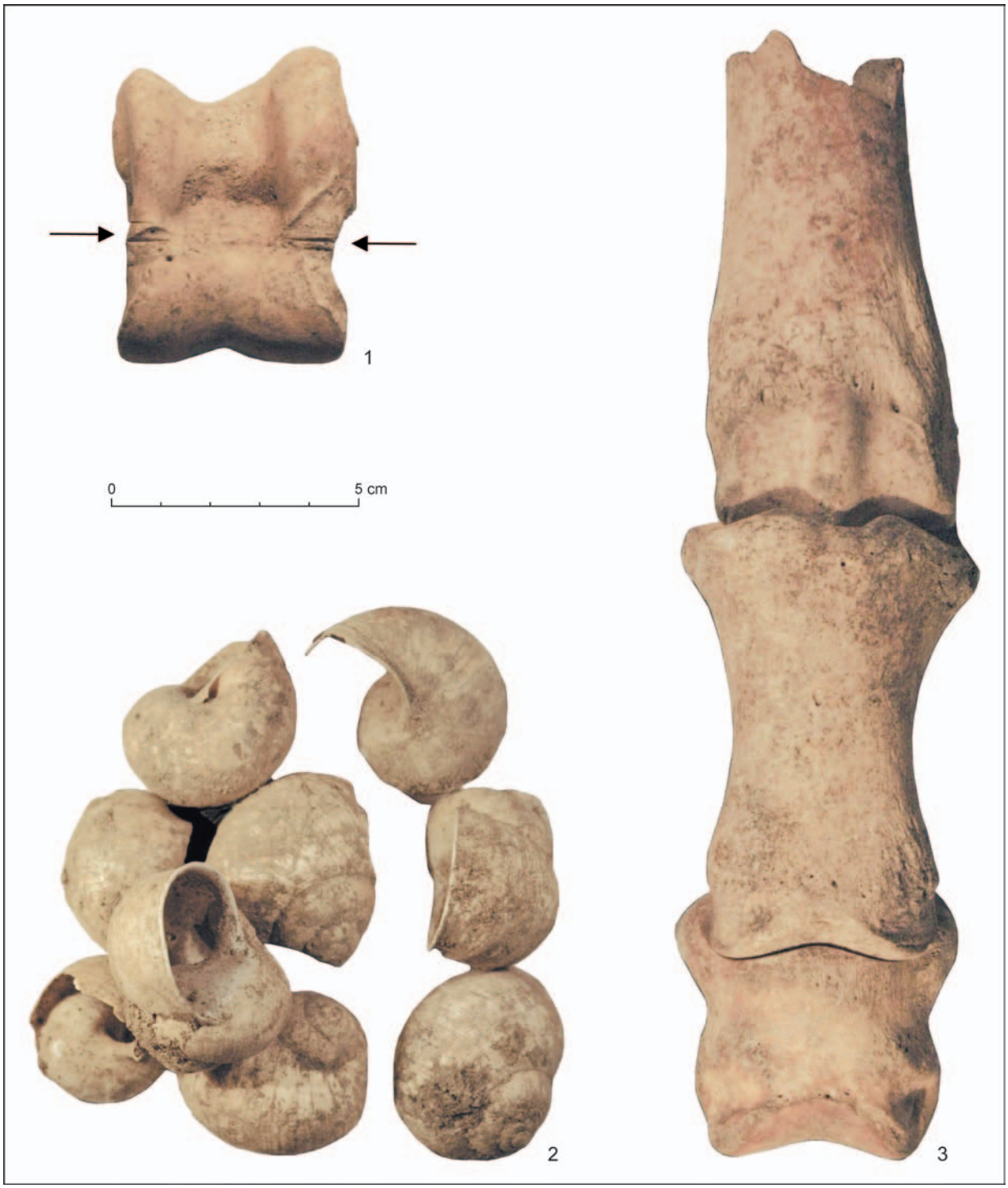


Fig. 13. Šarišské Michaľany-Fedelemka site. 1 – cattle astragalus with transversal cut marks created during dismembering (feature 48); 2 – Roman snail shells (feature 28); 3 – wild horse metapodial bone and phalanges in anatomical order (feature 48). Photo by J. Wilczyński.

from small ruminants [goat/sheep N = 5, medium mammal N = 3] were used in most cases (Fig. 14: 2–5). The remaining pieces were made on large mammal bone fragments, probably cattle [N = 2]. Spatulas were made only on shafts of large mammal ribs [N = 3]. Chisels represent a diverse tool group for production of which different materials were used. Red deer antler, goat horn core and bone of a large mammal. Additionally, a single fragment of an axe made of red deer antler was noted (Fig. 14: 1). In the animal material, semi-products of tools or waste from their production

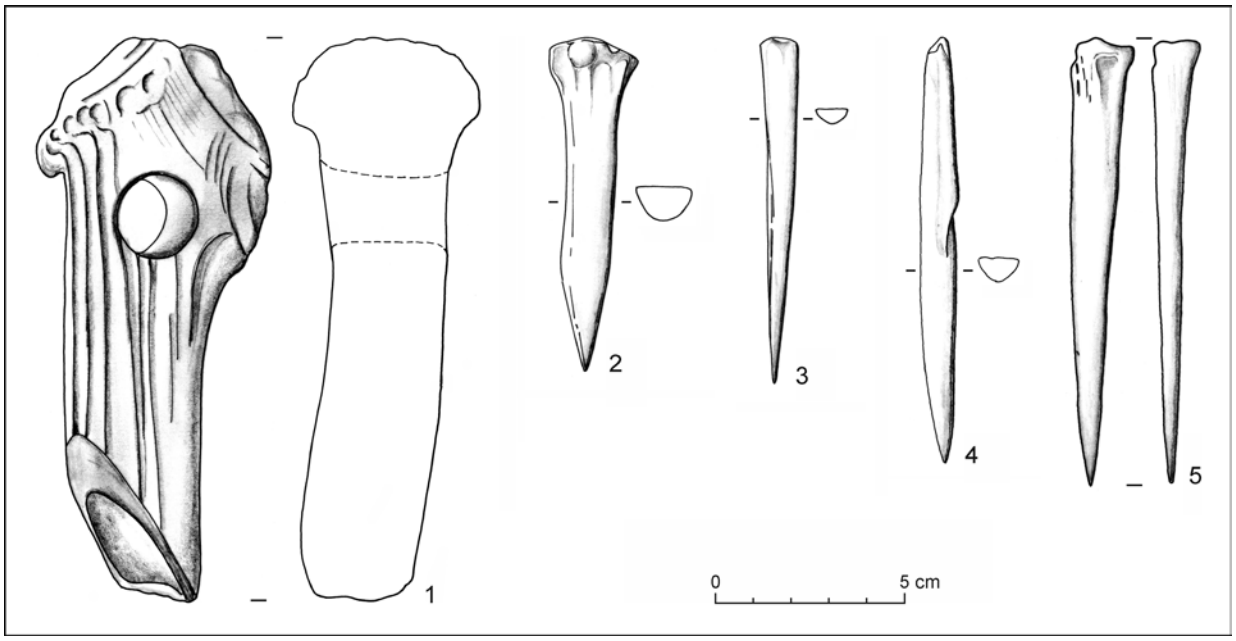


Fig. 14. Šarišské Michaľany-Fedelemka site. Osseous tools. 1 – hammer adze made of red deer antler (feature 48); 2–5 – bone awls (2–4 – feature 48, 5 – feature 28). Drawing by B. Grabowska.

Fig. 15. Šarišské Michaľany-Fedelemka site. Dog canines pendants discovered in feature 283. Photo by A. Zastawny.

were also identified [N = 7]. We can consider the set of 22 teeth pendants discovered in feature number 283 unique (Fig. 15). For their production, dog's canine (10 upper and 12 lower) that belonged to a minimum of 8 individuals were used. These items are carefully made and show signs of polishing as a result of long-term use.

Faunal remains bearing traces of carnivore activity constitute a large part of animal bones. They account 7.7% of the total bone assemblage

[N = 56], which will constitute as much as 8.7% if we eliminate snail shells. The traces of dogs gnawing are visible not only on goat/sheep [N = 23], pig [N = 16] and cattle [N = 11] bones, but also on wild horse [N = 1], dog [N = 1], hare [N = 1] as well as general large mammal [N = 3]. All gnawing traces visible on animal bones were created by dogs who accompanied the human group, and probably they are the results of dog feeding.

Discussion

When trying to reconstruct stockbreeding practices of the Baden communities from the area of eastern Slovakia, we come across the problem of the availability of archaeological sources. From this area, only single sites containing osteological material are known. Furthermore, the number of animal remains discovered there usually does not exceed one hundred specimens, e.g. Veľká Lomnica-Burbrich 4, Brehov-Pod Veľkým vrchom 12, Zemplínske Hradište 16, Zemplínske Kopčany 66, Žehra-Dvojvchodová jaskyňa 68, Kašov-Šarkan 132, Stránska-Magyorós 239 (*Wilczyński 2017a*; unpublished data). The data provided above reflect the state of archaeozoological research, which we can consider as highly unsatisfactory, thereby the importance of the studied Šarišské Michaľany-Fedelemka site increases significantly.

The animal bone assemblage numbers 726 remains, primarily bones and teeth of four domesticated species: cattle, sheep/goat, and pig. Among them cattle remains dominate, although comparing the MNI value, share of pig and goat/sheep is higher. This may indicate that the significance of pigs and small ruminants for the Baden community was much higher than it would appear from a simple calculation of the number of remains (NISP). From that point of view, also the herding structure observed on the studied site differ from other Baden localities from eastern Slovakia, where cattle is the most numerous taxon, equally in terms of NISP and MNI (*Wilczyński 2017a*; unpublished data). In the studied material, wild animal remains are also numerous. They constitute a total of 9.8% of all vertebrate remains identified to species level [N = 53]. This allows us to conclude that herding was the basic mode of food supply strategies for Baden societies of Šarišské Michaľany-Fedelemka site, with important, but still supplementary role of hunting. Such a high proportion of wild species remains is unusual at Baden sites in eastern Slovakia. From the second most numerous assemblage known from Stránska, Magyorós site this share is only 2.5% (*Wilczyński 2017a*). This makes the Šarišské Michaľany-Fedelemka an exceptional site.

At the present stage of the research, it is difficult to clearly indicate the reasons for creation of such subsistence practices, which relied less on cattle breeding (for the benefit of pigs and small ruminants), as well as on high proportion of wild mammals. It was probably related to the specific environmental conditions that prevailed in the immediate vicinity of the site. However, to be considered probable, this statement should be supported by the results of paleoenvironmental studies, as well as analyses of the more numerous osteological collections discovered from the eastern Slovakia BaC.

ANTHROPOLOGICAL ANALYZES

We know only three BaC graves from the Šariš region, all of them cremated (Tab. 1). They were discovered at two sites. One cremation grave comes from Veľký Šariš-Kanaš- Sordok (*Budinský-Krička 1967*, 340; *1984*, 56) and from Veľký Šariš-Kaplnka sv. Kunhuty there are two cremation graves (Grave A, Grave B). The finds from the site of Kaplnka sv. Kunhuty have been published (*Horváthová et al. 2017*). Burnt human bones were found in two vessels in Grave A. The results of the anthropological analysis are as follows (*Horváthová et al. 2017*, 8, 9).

The result of analysis was the determination of the extent to which the bones have been burned, the number of individuals buried in a given object and the age at death of the designated individual. On the basis of the colour of the bones, it was possible to estimate the temperature at which the remains were burned. Establishing the number of individuals buried in a single object is possible due to the presence of diagnostic components in human skeleton which come as single or paired. As archaeological feature usually contains only part of the remains burned at the pyre, anthropological analysis offers the possibility of determining the smallest possible number of the individuals buried inside a single grave (MNI – minimum number of individuals). Age at death was established based on anatomical and morphological criteria commonly applied in anthropology. In the case of child skeletons, the analysis also includes the ossification level of long bones.

Bones from a cup (*Horváthová et al. 2017*, pl. I: 1, 2). Bones strongly and evenly burnt, cream-white in colour, weight 7 g. The preserved elements include small fragments of cranial vault (the largest ones are 22 × 18 mm in size), all sutures are unfused. Postcranial skeleton is represented by small pieces of long bones' diaphyses.

Bones from a jug or small amphora (*Horváthová et al. 2017*, pl. I: 1, 4). Bones strongly and evenly burnt, cream-white and grey-white in colour, weight 40 g. The preserved elements include small fragments of cranial vault (the largest ones are 24 × 20 mm in size), one of them is a piece of squamous part of occipital bone with transversal sinus. All present sutures are unfused. Postcranial skeleton is represented by fragments of long bones' diaphyses (the biggest ones are 51 mm long) and epiphyses as well as small pieces of ribs shafts.

White colour of analysed bones indicates that the bone reached a temperature higher than 8,000 °C, meaning that the temperature at the cremation site was about 1,000–12,000 °C (*Piontek 2002*). The preserved elements of skeleton enable to conclude that the remains belong to an individual aged *Infans*, the sex was undetermined (*Horváthová et al. 2017*, 8, 9).

CONCLUSIONS

In the North Tisza region of Slovakia, the BaC is known for over 240 sites (*Horváthová 2010*, pl. 19; *2017*, fig. 21). They form five distinct settlement regions, varied in terms of the size of the acreage and the number of sites (*Horváthová 2010*, 10–15; *Malček 2013*, 89–104). The Šariš region (Fig. 1) discussed in this article is one of the smallest of them, together with the Košice basin /Abov/. At present, 26 BaC sites are known from the area of Šariš. For comparison, Gemer represents 41 sites, Košice basin 32 sites, Zemplín ca. 60 sites and Spiš ca. 80 sites (*Horváthová 2010*, tab. 19). Despite the relatively small area and the number of traces of settlement discovered there, the Šariš region is the most studied and, above all, the most fully researched archaeological group of the BaC in Eastern Slovakia. There are two main sites here: Šarišské Michaľany-Fedelemka – the largest settlement site in Eastern Slovakia (*Horváthová 2010*) and Prešov-Solivar-Chmeľové-Tichá dolina – a settlement site with traces of fortifications (*Horváthová 2015*; *2020*). From both of these sites comes a series of seven radiocarbon dates (*Horváthová 2015*, 392; *Horváthová/Zastawny 2016*). They make it possible to date the settlement of the BaC in the time frame around 3350–2900 BC (Classical and Late Classical Baden: III–III/IV). It is supplemented by data on the relative chronology for the oldest stage of settlement development. Ceramics from the settlement site in Prešov-Solivar-Mestský cintorín and from the cremation graves from Veľký Šariš-Kaplnka sv. Kunhuty shows the characteristics of the transition phase: Boleráz/Baden Early Classical (before 3400 BC; Baden I/II). Materials from the sites of the Šariš agglomeration are currently the best source for research on the relative and absolute chronology of the BaC in Eastern Slovakia. The long period of development of the BaC in the Šariš region is probably related to its location between the two most important and largest regions of the discussed culture in the Slovak part of the northern Tisza area: Zemplín and Spiš. It was along the SE – NW line that cultural contacts, as well as the chronological sequence of the development phases of the Baden culture (*Zastawny/Horváthová 2017*, 246–253). We also know a similar direction of contacts and movements of the population from the Lažňany group from the Pre-Baden horizon.

This article presents the results of natural analyses of materials from four BaC sites: Šarišske Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina site, Prešov-Solivar-Mestský cintorín, Veľky Šariš-Kaplnka sv. Kunhuty. The materials were not very numerous, but it should be emphasized that the conducted analyses are the first studies of this kind for the BaC in eastern Slovakia.

The most numerous source of data was ceramics, which was subjected to mineralogical and petrographic analyses. Fifteen samples taken from various types of vessels (cups, amphorae, bowls, pots, jugs) from all four sites mentioned above were examined, i.e. from seven pits in three settlement sites and from one grave. The analyses showed a high homogeneity in the method of preparing pottery masses and a high standardization in the technology of pottery production. The composition of the pottery mass was determined by the available raw material and was not very diversified. The pottery masses mainly contain clay minerals and dust grains. An interesting observation is the domination of fine-grained masses only in pottery from the sites in Prešov-Solivar-Mestský cintorín site and Veľky Šariš- Kaplnka sv. Kunhuty. Both sites represent the oldest BaC horizon in the Šariš region. The indicated technological feature may therefore have a chronological basis. The structure of the ceramics technology in the Šariš region is similar to that of Spiš (unpublished results). Coarse-grained and fine-grained masses were found to be equally present in both regions, although in Šariš pottery, there are more coarse-grained masses.

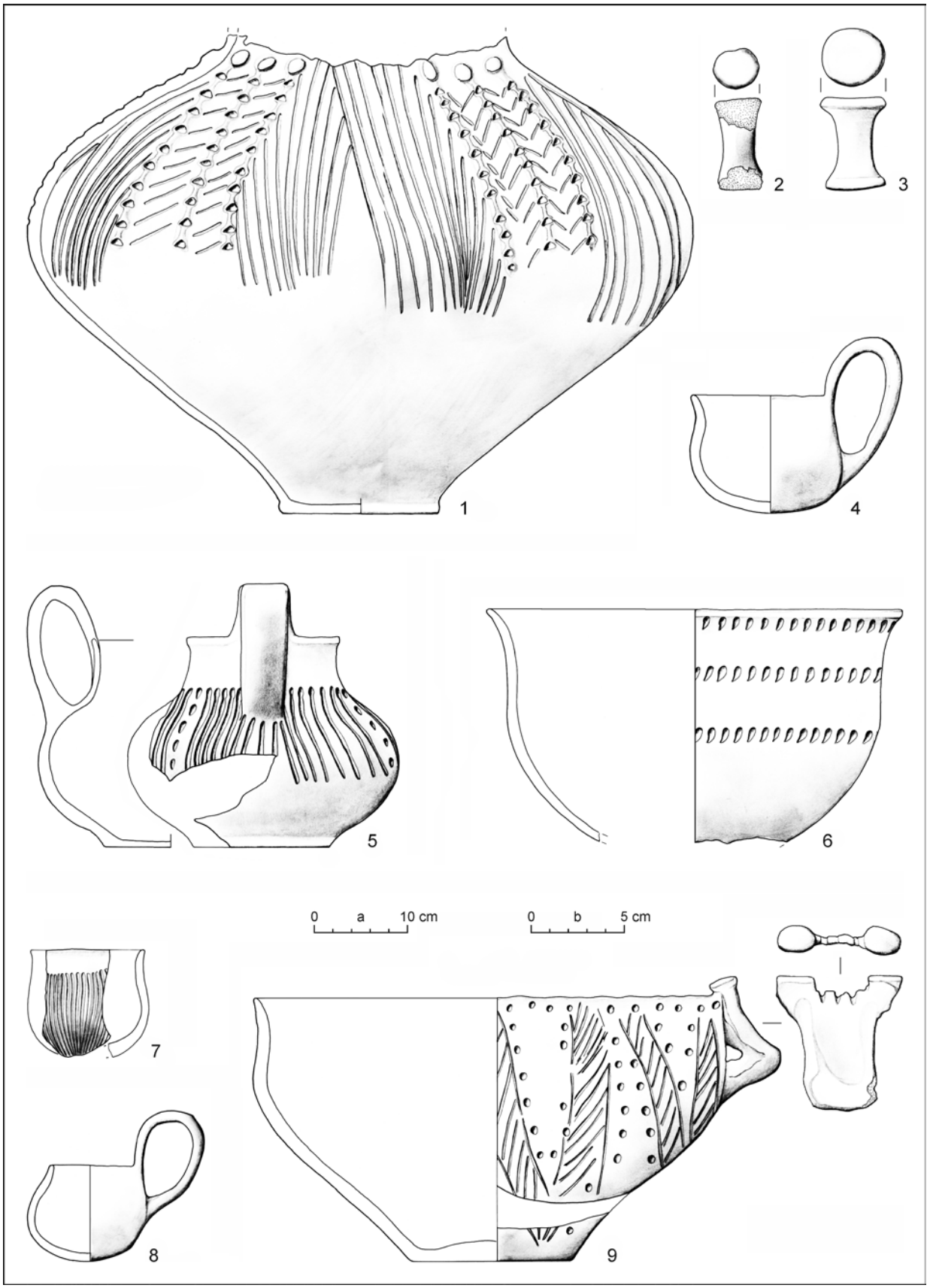
Plant remains have been preserved in the daub originating from settlement pits in Prešov-Solivar-Chmeľové-Tichá dolina and in Šarišske Michaľany-Fedelemka. In total, 39 pieces of daub were analysed, of which 135 plant remains and imprints were identified. The vast majority of them comes from three pits from the settlement site in Prešov, including the fill of the defensive ditch (site 10/B).

The identified plant specimens include, first of all, emmer wheat *Triticum dicoccon* and possibly einkorn wheat *Triticum dicoccon* vel *T. monococcum*. There were also many traces of pieces of straw classified generally as *Cerealia indet* and for cereals and/or wild grasses *Cerealia* indet. vel *Poaceae* indet. There have also been not many reflections of taxonomically unmarked branches or laths. In the daub from the pit (no. 18) and from the defensive ditch from the settlement in Prešov-Solivar-Chmeľové-Tichá dolina, wheat remains were very numerous and formed layers. Discovered remains and traces of plants on BaC sites from the Šariš region do not constitute the entire spectrum of arable plant species identified in materials from other regions of this culture in Slovakia (*Hajnalová 2007*; *Lityńska-Zając 2019*). In addition to emmer wheat *Triticum dicoccon* and emmer wheat or einkorn *Triticum dicoccon* vel *T. monococcum*, the list of plants also includes barley, spelt wheat, free-threshing wheat, millet, and also plants from the pulses family *Fabaceae indet*., including pea *Pisum* and bitter vetch *Vicia cf. ervilia*.

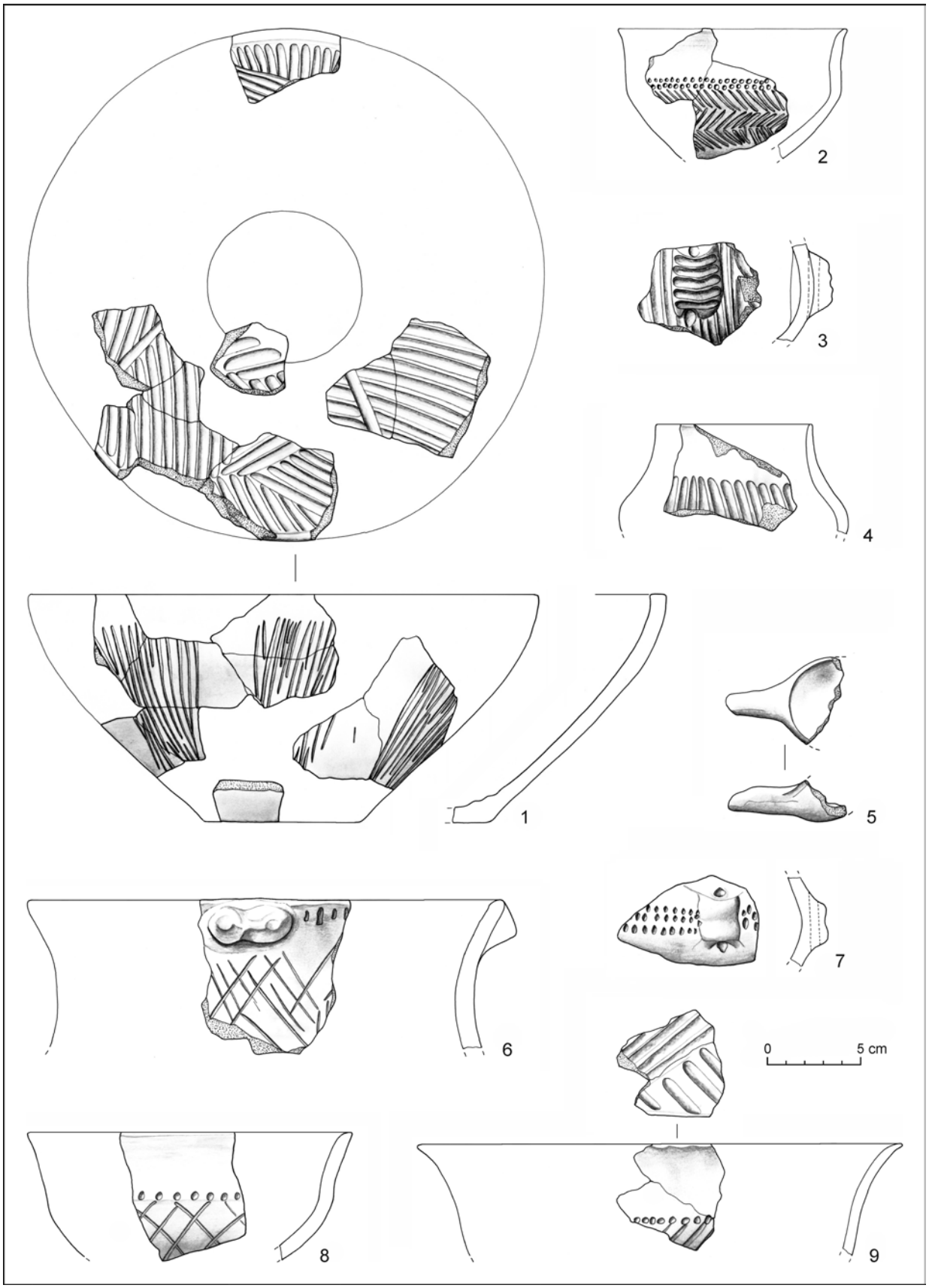
Animal bone remains have been preserved in materials from three BaC sites (Šarišské Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina, Prešov-Solivar-Mestský cintorín), although in practice only bones from Šarišské Michaľany were species-defined and were the subject of the analysis. From this settlement site, 726 bone and tooth fragments were examined. It is the largest collection of animal remains obtained from the BaC sites in eastern Slovakia. Out of 41 pits examined in Šarišské Michaľany, bones and teeth have been preserved in 27 features of various functions (utility pits, open hearths, kilns, above-ground buildings?). The analysis showed a similar proportion of cattle and pig remains and small mammals (goat/sheep), the presence of dog, and a high proportion of wild animals. Pigs and small mammals played a larger role in breeding, and cattle played a smaller role (comparing the MNI value). This regularity is different than in other regions of eastern Slovakia, where cattle clearly pre-dominate (*Wilczyński 2017a*, unpublished data). Even greater differentiation of Šarišské Michaľany compared to the sites in other regions is visible in the largest share of wild mammals (9.8%), represented by typical game species, such as wild horse (the most numerous), roe deer, red deer and wild boar (*Wilczyński 2017a*). All this may be evidence of the specific environmental conditions of the Šariš area during the BaC development period.

The BaC human burials are the least numerous sources of research material in eastern Slovakia, similarly to, for example, Lesser Poland. Thus, there are no actual anthropological analyses of human remains. The first expertise was made for the remains of the cremation grave in Veľky Šariš-Kaplnka sv. Kunhuty (*Horváthová et al. 2017*, 8, 9). On the basis of severely burned, small bones (including fragments of the cranial vault), it can be concluded that the buried was an individual of infans age (gender unspecified).

The obtained results of the analyses are an important source in the reconstruction of the BaC settlement in the Šariš region. They are especially interesting in comparison with other settlement regions in eastern Slovakia (Gemer, Košice basin, Zemplín, Spiš), and also in Lesser Poland. It will be possible to describe the differences in settlement and the environmental specificity of the above-mentioned regions after the publication of all the results of research on archaeological and natural sources.



Pl. I. Šarišské Michaľany-Fedelemka site. Pottery vessels and clay spools of the Baden culture. Scale: a – 1; b – 2–9. Drawing by B. Grabowska (after *Horváthová 2010*).



Pl. II. Prešov-Solivar-Mestský cintorín site. Pottery vessels and clay spoon of the Baden culture. Drawing by B. Grabowska.

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Výsledky prírodovedných analýz nálezov badenskej kultúry v Šarišskom regióne, severovýchodné Slovensko

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SÚHRN

Zo severopotiskej oblasti Slovenska je badenská kultúra (BaC) známa z viac ako 240 lokalít. Pozostáva z piatich samostatných regiónov (Gemer, Košická kotlina, Zemplín, Spiš, Šariš), ktoré sú diferencované z hľadiska rozlohy a počtu nálezísk. Šarišská sídlisková aglomerácia, o ktorej pojednáva táto štúdia, patrí spolu s aglomeráciou v Košickej kotline medzi najmenšie z nich. V súčasnosti je z oblasti Šariša známych 26 archeologických lokalít BaC. Pre porovnanie, v regióne Gemera evidujeme približne 41 lokalít, v Košickej kotline 32 lokalít, na Zemplíne 60 lokalít a na Spiši 80 lokalít. Napriek relatívne malej rozlohe a počtu tu objavených sídlisk, považujeme šarišskú sídliskovú aglomeráciu BaC za najlepšie preskúmanú. K najvýznamnejším lokalitám v regióne patria dve sídliská ostrožného typu v Šarišských Michaľanoch v polohe Fedelemka a v Prešove-Solivare v polohe Chmeľové-Tichá dolina. Z nálezových kontextov oboch sídlisk máme k dispozícii spolu sedem rádiouhlíkových dát, ktoré vymedzujú osídlenie na lokalitách do obdobia rokov 3350–2900 BC (Baden III–III/IV). Dopĺňajú ich relatívne chronologické údaje z najstaršej fázy osídlenia. Keramika z Prešova-Solivaru z polohy Mestský cintorín a žiarové hroby z Veľkého Šariša z polohy Kaplnka sv. Kunhuty vykazujú znaky prechodnej fázy bolerázsko-včasnoklasického horizontu BaC, ktorej datovanie predchádzalo rok 3400 BC (Baden I/II). Dlhé obdobie vývoja BaC v šarišskom regióne mohlo súvisieť s jeho výhodnou polohou medzi dvoma významnými a rozlohou veľkými regiónmi predmetnej kultúry v severnom Potisí (Zemplínom a Spišom), ako aj s jeho plynulým prepojením s Košickou kotlinou. Práve pozdĺž línie JV–SZ prenikali kultúrne kontakty, ako aj chronologická postupnosť vývojových fáz BaC.

V štúdii sú prezentované výsledky prírodovedných analýz reprezentatívnych nálezových kontextov vybraných zo štyroch lokalít BaC: Šarišské Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina, Prešov-Solivar-Mestský cintorín a Veľký Šariš- Kaplnka sv. Kunhuty.

Keramika bola podrobená mineralogicko-petrografickým analýzam. Na tento účel bolo vyselektovaných 15 vzoriek, odobratých z rôznych typov nádob, ktoré pochádzali zo siedmich jám troch sídlisk a z jedného hrobu. Analýzy ukázali vysokú homogenitu prípravy keramických hmôt a vysokú štandardizáciu technológie výroby nádob. Zloženie keramických hmôt bolo dané dostupnou surovinou a výrazne sa nelíšilo. Zistilo sa, že keramické hmoty obsahujú najmä ílové minerály a prachové zrná. Zaujímavé je zistenie o dominancii jemnozrnnej hmoty len v keramike z lokalít Prešov-Solivar-Mestský cintorín a Veľký Šariš- Kaplnka sv. Kunhuty. Obe lokality predstavujú najstarší horizont šarišskej aglomerácie BaC. Uvedený technologický znak môže mať aj chronologický základ. Technológia výroby posudzovanej keramiky je veľmi podobná keramike zo Spiša (nepublikované výsledky). Hrubozrnná a jemnozrnná hmota sa vyskytovala rovnako v oboch regiónoch, hoci hrubozrnná hmota prevažovala v keramike zo Šariša.

Rastlinné zvyšky sa zachovali v mazanici zo sídliskových objektov z Prešova-Solivaru-Chmeľového-Tichej doliny a zo Šarišských Michalian-Fedelemky. Celkovo bolo analyzovaných 39 kusov mazanice, z ktorých máme identifikovaných 135 zvyškov a odtlačkov rastlín. Prevažná väčšina z nich pochádza z troch objektov z osady Prešov-Solivar-Chmeľové-Tichá dolina. Označené exempláre rastlín patria druhom pšenice *Triticum dicoccon* a *Triticum dicoccon vel T. monococcum*. Našlo sa aj pomerne veľa zvyškov slamy, ktoré sa všeobecne klasifikujú ako obilniny *Cerealia ident.* alebo obilniny, resp. trávy *Cerealia indet. vel Poaceae indet*. V mazanici z hospodárskej jamy (obj. 18) a z priekopy zo sídliska v Prešove-Solivare-Chmeľového-Tichej doliny boli pozostatky pšenice veľmi hojné a tvorili samostatné vrstvy. Pozostatky rastlín šarišskej aglomerácie BaC netvoria celé spektrum rastlinných druhov, aké poznáme z nálezových kontextoch ďalších regiónov predmetnej kultúry na Slovensku.

Zvieracie kostrové pozostatky sa zachovali v nálezových kontextoch troch lokalít BaC (Šarišské Michaľany-Fedelemka, Prešov-Solivar-Chmeľové-Tichá dolina, Prešov-Solivar-Mestský cintorín), avšak druhovo určené mohli byť len kosti zo Šarišských Michalian-Fedelemky. Z tohto sídliska bolo preskúmaných 726 fragmentov zvieracích kostí a zubov. Ide o najväčšiu zbierku živočíšnych pozostatkov získaných z lokalít BaC na východnom Slovensku. Zo 41 preskúmaných objektov na sídlisku v Šarišských Michaľanoch sa kosti a zuby zachovali v 27 objektoch. Analýza odhalila podobný podiel pozostatkov hovädzieho dobytka, ako aj ošípaných a malých cicavcov (koza/ovca), prítomnosť psa a vysoký podiel voľne žijúcich cicavcov. Ošípané a malé cicavce zohrávali v chove väčšiu úlohu a hovädzí dobytok menšiu (porovnanie hodnoty MNI). Ide o odlišný model v porovnaní s ostatnými regiónmi východného Slovenska, kde jednoznačne prevažuje hovädzí dobytok. Ešte výraznejšiu odlišnosť Šarišských Michalian v porovnaní s lokalitami iných regiónoch sledujeme vo vysokom podiele voľne žijúcich cicavcov (9,8 %), zastúpených typickými druhmi zvierat, akými sú divý kôň (najpočetnejší), srnec, jeleň a diviak. Tento poznatok môže

poukazovať na špecifické environmentálne podmienky šarišského regiónu v období vývoja BaC.

Pohrebiská BaC sú na území východného Slovenska a Malopoľska takmer neznáme. Z tohto dôvodu neexistuje antropologická analýza ľudských pozostatkov. Prvý odborný posudok bol vyhodnotený z pozostatkov žiarového hrobu z Veľkého Šariša-Kaplnky sv. Kunhuty. Na základe silne prepálených drobných kostí (vrátane fragmentov lebečnej klenby) možno usudzovať, že pochovaný bol jedinec vo veku infans. Pohlavie nebolo špecifikované.

Získané výsledky analýz hodnotíme ako dôležitý prameň poznania pre rekonštrukciu osídlenia komunít BaC v oblasti Šariša. Ich význam vidíme najmä v možnosti porovnania s niektorými regiónmi v severnom Potisí (Gemer, Košická kotlina, Zemplín, Spiš) a v Malopoľsku. Rozdiely v osídlení a environmentálnych špecifikách uvedených regiónov bude možné charakterizovať až po zverejnení všetkých výsledkov výskumu archeologických a prírodných analýz.