



Tracing Late Bronze Age transitions in the Eastern Carpathian Basin: insights from a new Cruceni–Belegiš type settlement from Dumbrăvița–Parohia Ortodoxă III (Timiș County, Romania)

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ABSTRACT

This study presents the results of preventive archaeological investigations of the prehistoric settlement Dumbrăvița–Parohia Ortodoxă III, one of many sites identified in the peri-urban area of Timișoara. The site is one of the few settlements attributed to the Cruceni–Belegiš ceramic style, known from central Banat. This style developed across a wide area that includes present-day Romania, Serbia, and Croatia during the Late Bronze Age (LBA) of the eastern Carpathian Basin (ca. 1600–1200 BC).

No dwellings were found during the excavation. However, the presence of daub fragments with wattle impressions indicates the existence of architectural structures at the site. Among the many refuse pits, a small but informative pottery assemblage was found, along with five beads and a metal artefact. The ceramics were analysed for manufacturing technology, vessel typology and ornamentation. This analysis provided information for the relative chronology of the site and facilitated comparison with the LBA settlement of Giroc–Mescal (Timiș county) using multivariate statistics. Additionally, an AMS radiocarbon date provided absolute chronological context for the assemblage, establishing a firmer timeline for the site.

The main contribution of the Dumbrăvița–Parohia Ortodoxă III discoveries is in documenting a transitional chronological sequence. Certain regional LBA I traits were abandoned, others persisted, and new elements were adopted. The ceramic assemblage reveals transformations from the old to the newer phase of the discussed ceramic style. The discovery of beads in the Cruceni–Belegiš cultural area is unique so far. Also, the metal artefact – a saw blade – provides insights into metal utilisation on this site.

KEYWORDS

Cruceni–Belegiš ceramic style, Late Bronze Age, transition, Eastern Carpathian Basin, beads, pXRF

Introduction

The Cruceni–Belegiš ceramic style is characteristic for the Late Bronze Age (LBA) and documented over a wide area encompassing the territories of present-day Romania, Serbia, and Croatia. Within present-day Romania, this ceramic style is found in the Banat lowlands, where the first communities with this characteristic pottery appeared around 1600 BC. This period marks also the onset

of the LBA I chronological horizon in the eastern Carpathian Basin. The main benchmark of the Cruceni–Belegiș I is the pseudo-corded ornament, which after 1400 BC becomes rare, marking the transition to the next stage. The Cruceni–Belegiș II phase corresponds to the LBA II horizon (Bz C2/D – Ha A1 in the Central Europe chronology), spanning approximately 1350 to 1200/1150 BC. This stage is characterised by the emergence of earthen mega-forts (e.g., Cornești–Iarcu, Sântana–Cetatea Veche, Gradiște–Idžoș, Csanádpalota etc.) and in pottery by both the widespread diffusion of channelled decoration and a standardisation of vessel shapes. The LBA III stage (1200/1150–1050 BC; Ha A in CE chronology) in Banat is characterized by three major events: the destruction of the mega-forts, the emergence of black-and-red channelled pottery, which is contemporaneous with the Gáva I ceramic style, and the dissolution of the Cruceni–Belegiș tradition (Gogâltan 2019; Sava 2020).

For a long period, Cruceni–Belegiș ceramic style was known through discoveries related to necropolises of these communities, thereby integrated into the broader tradition of the Urnfield Culture. Typically, the graves contained a “standardised assemblage” comprising what the scholar F. Medeleț (1995), referred to the “triad” of vessels: the urn, the jug and the bowl. Given this, until recently, we had little information about both the settlements and the material culture of these communities, particularly on the typological variation of their pottery assemblages. In recent years, significant efforts were undertaken in this direction, the most notable being that of Al. Szentmikosi (2021) who published a monograph dedicated to the settlements of the communities utilising these ceramic style. Starting with the findings from the Lower Mureș basin, V. Sava (2020) also conducted an analysis of LBA pottery in southeastern Carpathian Basin, which integrates the published data from ¹⁴C-dated Cruceni–Belegiș archaeological contexts. He attempted to establish the evolution of forms and ornaments, as well as the markers of each stage, thereby providing a clearer chronological framework and facilitating cross-regional comparisons of LBA pottery traditions. In 2023, an edited volume summarised the work on what is called Belegiș–Gáva or Kannelierte Keramik, which represents the cultural marker of LBA II in Southeast Europe (Bălărie et al. 2023). Other studies have been published as *restitutio* papers, in which old research has been valorised (Stavilă 2012; Gogâltan, Stavilă 2020).

In this context, the current paper discusses the results of preventive archaeological investigations conducted at the Dumbrăvița–Parohia Ortodoxă III/Obiectiv 13 site (Timiș County). The primary objective is to summarise the information about the stratigraphic units and archaeological structures identified during the excavations. In doing so, the study documents one of the northernmost Cruceni–Belegiș settlements and one of the few such sites investigated in central Banat. Special emphasis is placed on the principal categories of finds: the ceramic assemblage, metal artefacts and beads. Systematic analysis of these, in conjunction with radiocarbon dating, yields new insights into the Cruceni–Belegiș material culture. The contribution of the ceramic assemblage to vessel typology and ornamentation will also be examined. A further aim is to establish the relative and absolute chronology of the discoveries. This will be accomplished by using typological analogies, radiocarbon data and statistical comparison (PCA analysis). Finally, the regional significance of Dumbrăvița discoveries will be considered.

The archaeological site. Geographical and archaeological contexts

The present study area is located in the south-eastern corner of the Pannonian Basin. It lies within one of the most complex fluvial systems in Europe and one of the lowest relief units in the entire Basin. The site is placed in the historical region of Banat, now part of the Western Plain of Romania (Kiss et al. 2014, 1; Floca 2024, 71).

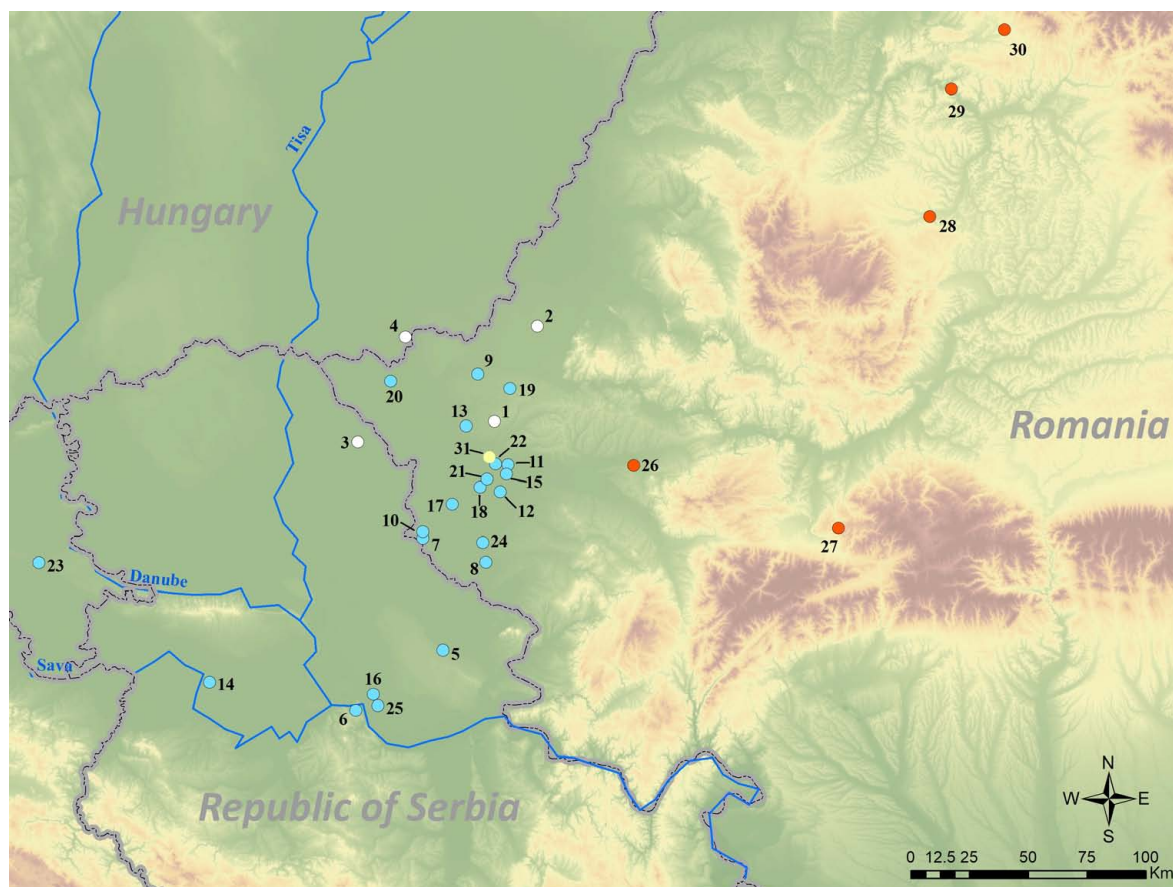


Fig. 1. Archaeological discoveries contemporary with the Dumbrăvița–Parohia Ortodoxă III (31) archaeological site, mentioned in the text. Mega-forts (white) – 1. Cornești–Iarcuri; 2. Sântana–Cetatea Veche; 3. Gradiște–Idžoș; 4. Csanádpalota. Settlements (light blue): 5. Banatski Karlovac–Kalvarija; 6. Beograd–Karaburma; 7. Cruceni; 8. Deta–Dudărie; 9. Felnac–Complexul Zootehnic; 10. Foeni–Gomila Lupului II; 11. Ghiroda–Site 1; 12. Giroc–Mescal; 13. Hodoni–Pustă; 14. Hrtkovci–Gomolava (level IVc); 15. Moșnița–Dealul Sălaș; 16. Pančevo; 17. Peciu Nou–Bociar; 18. Șag–Site 5; 19. Șagu–Site A1_1; 20. Sânnicolau Mare–Săliște; 21. Timișoara–Fratelia; 22. Timișoara–Pădurea Verde; 23. Vinkovci–Duga ulica Br. 23; 24. Voiteni–Groapa cu Vulpi; 25. Vojlovica–Rafineria nafta. Beads discoveries (orange): 26. Susani–Grămurada de la Jupani; 27. Cioclovina cu Apă cave; 28. Cluj-Napoca–Strada Banatului; 29. Dobrocina; 30. Lăpuș (author A. Stăvilă)

The investigated archaeological site lies within the administrative territory of Dumbrăvița (Timiș County), in the peri-urban area of Timișoara. Geographically, it is situated in the Low Plain of Timișoara, in a sector shaped by the hydrographic activity of the Behela stream, which was once connected to the ancient fluvial network of the Bega River (fig. 1). The studied section is located on the fluvial terrace of a former meandering branch of the Behela, now a fossil watercourse. This small valley, incised up to 2 m, lies to the north and west of the investigated area.

The preventive archaeological project was conducted by Romanian Academy–Timișoara Branch and initiated in response to the planned construction of a church on a vacant plot at Dumbrăvița–Obiectiv 13, adjacent to the former military unit in Dumbrăvița.

The preventive archaeological work covered an area of 335 m². This included three excavation units situated on the footprints of the planned buildings (fig. 2.1). The stratigraphic sequence encountered is relatively simple, consisting of four layers (fig. 2.2–3). Only one of these layers can be considered archaeological.



Fig. 2. Archaeological contexts documented at Dumbrăvița–Parohia Ortodoxă III: 1. General archaeological excavation plan; 2. Stratigraphy drawing; 3. Field photograph of the northern profile of S.1 (author Cristian Floca)

Layer 1 consists of recent soil and rubble deposits. These were documented in the eastern part of Surface 1 and across all of Surface 3, forming a deposit that is 0.40–0.45 m thick. Layer 2 lies directly beneath layer 1 and corresponds to the former ploughsoil. This layer is composed of dark, granular soil with a low density of small artefacts and measures 0.25–0.30 m in thickness. Except in the eastern area, where rubble was present, layer 2 represents the initial natural accumulation of sediments. Its upper portion coincides with the present ground surface. The base of layer 2 marks the transition to the underlying features, as immediately beneath it, three modern features were identified (features 1, 10 and 17), most likely army practice trenches.

Layer 3 is a dark-brown to blackish, clayey-granular soil, 0.15–0.20 m thick. It yielded many artefacts, including daub, ceramics, animal bones and contains Bronze Age (BA) features. Layer 4 is the natural subsoil beneath the habitation level, composed of yellow to yellow-brown clay at various depths, as determined by excavation. This layer contains no artefacts (fig. 2.2–3).

Within layer 3 and at its interface with the natural subsoil (archaeologically sterile), several archaeological features were found. These archaeological features stood out due to differences in soil colour or material content. They were spread across the entire Surface no. 1 (S.1). Aside from the three modern trenches, likely linked to the former military unit, there were 14 circular archaeological features. Most had a biconical profile. These are attributed to the LBA occupation level and will be described in detail below.

Feature no. 2 (fig. 3.1) was found in the eastern part of S.1 at a depth of 0.8 m. After excavating half of the pit (northern sector), the fill consisted of brown soil with numerous daub fragments and one atypical pottery sherd of prehistoric fabric. The pit was 0.7 m in diameter and 0.35 m deep.

Feature no. 3 (fig. 3.2) was also discovered in the eastern part of S.1. It cut into the eastern trench profile and appeared at a depth of 0.85 m. The feature was fully excavated and recorded in the eastern profile of S.1. The fill included two clear layers. Layer 1 was dark-brown, compact and granular, with some ceramic sherds and daub. Layer 2 was loose, grey and contained more artefacts. Feature no. 3 reached a depth of 0.9 m. It contained several ceramic fragments. The profile of a small cup was nearly complete, allowing reconstruction of its shape.

Feature no. 4 (fig. 3.3) was discovered in the central-eastern part of S.1 at a depth of 0.5 m below the present ground surface, appearing as a circular pit with a diameter of 0.6 m. Initially, only the eastern half was excavated; the pit exhibited heavily fired walls and was considerably deepened, which required full excavation after the upper 0.2 m were removed. The maximum recorded depth was 0.8 m from the contour. The fill consisted of heterogeneous, loose brown-grey soil. The inventory included a substantial quantity of ceramic fragments and animal bones.

Feature no. 5 (fig. 3.4) was located in the southeastern corner of S.1, partially exposed, with part of it extending into the southern trench profile. It appeared semicircular, measuring 1.5 m along its length and 0.7 m along its short side. This feature intersected the trench profile and was distinct from adjacent features. Excavation revealed a pit with strongly fired walls, which was deepened to 0.9 m and flared to 1.9 m. The profile showed three distinct layers: layer 1 was 0.4 m thick, consisted of dark-brown, compact, granular soil with abundant daub fragments; layer 2 was grey, loose soil with numerous ceramic fragments and occasional animal bones; layer 3 was grey, loose soil with abundant charcoal and ceramic fragments. Near the base, a bronze blade with a fine longitudinal rib and a serrated edge toward its rounded end was found. The recorded depth was 0.9 m.

Subsequently, feature no. 6 (fig. 3.5), in the eastern area of S.1, appeared as a small oval pit, measuring 0.6 × 0.5 m and 0.35 m deep from the contour. Its fill consisted of brown clayey soil with two ceramic sherds and many daub fragments, suggesting a possible connection to other nearby pits or features.

Feature no. 7 (fig. 3.6), found in the eastern part of S.1, was a circular, strongly fired pit. Its

opening measured 1.3 m in diameter; the walls reached a maximum diameter of 1.8 m. The pit was 0.5 m deep. The fill was a loose, brown-grey soil with numerous ceramic fragments and animal bones.

Feature no. 8 was situated in the central part of S.1. This feature was identified at the BA walking surface as a concentration of heavily burnt ceramic fragments mixed with daub (fig. 2).

Feature no. 9 (fig. 4.1), also found in central area of S.1, appeared as a greyish, circular stain at a depth of 0.5 m below the surface. The pit, initially halved, was heavily fired. Its fill had two layers: layer 1 – a dark-brown, compact, granular soil with occasional ceramic sherds and daub, about 0.2 m thick; layer 2 – a loose, grey soil richer in artefacts. The pit reached 0.6 m deep. The inventory comprised numerous pottery fragments and animal bones. The opening of the pit measured 0.65 m and its maximum diameter was 1.65 m.

Feature no. 11 (fig. 4.2) was identified in the central-northern part of S.1, at a depth of 0.45 m beneath the ground surface. This feature comprised a deepened circular pit with slightly fired walls. It measured 1.5 m in diameter at the mouth and reached a maximum depth of 1.15 m. This makes it the largest feature to have been fully excavated. The stratigraphy of the fill was clearly discernible. It was documented in the profile exposed after the pit was sectioned. Three principal layers were identified: layer 1 – dark brownish-black, granular soil containing a moderate density of ceramic and bone fragments; layer 2 – a substantial deposit of daub and ash, measuring 0.2–0.3 m in thickness and almost devoid of artefacts; layer 3/3A – loose grey soil layers, alternating with layer 2. In comparison with 3A, layer 3 contained a greater quantity of charcoal and a significant concentration of ceramic artefacts.

Feature no. 11 (fig. 4.2) is particularly noteworthy amongst all the pits due to its rich ceramic assemblage. Near the base, within layer 3, were recovered large quantities of pottery fragments. Several small cups were found preserved in restorable condition, (figs 11.1–5; 12.1–4; 15.5–6). At the bottom, five beads – apparently part of a necklace – and a fragment of a possible bronze ring were also discovered. In addition to the pottery, the same household refuse deposits yielded numerous animal bones.

Two further deposits were documented on the upper margins of the pit. Layer 4 was dark brown soil with ceramic and daub inclusions. Layer 5 had similar soil but was nearly devoid of artefacts. These are interpreted as lateral accumulations that resulted from the rapid infilling of the pit, as corroborated by the stratigraphy.

Feature no. 12 (fig. 4.3) was found in the central sector of S.1. This feature appeared as a greyish circular stain, 0.5 m beneath the ground surface. The initial excavation proceeded in half-section, exposing a heavily fired pit. Examination of its profile revealed two distinct layers: layer 1 – a dark-brown, compact, granular soil with occasional ceramic sherds and daub inclusions, approximately 0.3 m thick; layer 2 – a loose, grey soil richer in artefacts. The pit attained a depth of 0.85 m. The inventory included numerous pottery fragments and animal bones. At the opening, the pit measured 0.6 m in diameter, expanding to a maximum diameter of 1.65 m.

Feature no. 13 (fig. 4.4) was uncovered in the north-western sector of S.1. This pit was only partially investigated, as approximately half extended into the northern profile of the trench. It exhibited a semicircular outline and a depth of 0.85 m, with strongly fired walls flaring to a maximum diameter of 1.7 m. Two layers were distinguished in the profile: layer 1 – dark-brown, compact, granular soil with occasional ceramic fragments, approximately 0.4 m thick; layer 2 – brown-grey, loose soil with a relatively high density of pottery and bone fragments.

Continuing in the north-western area, feature no. 14 (fig. 4.5) was located near the corner of S.1. This was a circular pit that was slightly atypical compared to the others. It measured 0.9 m in the pit opening and 1.1 m at the base, with a maximum depth of 0.45 m. The pit exhibited only light

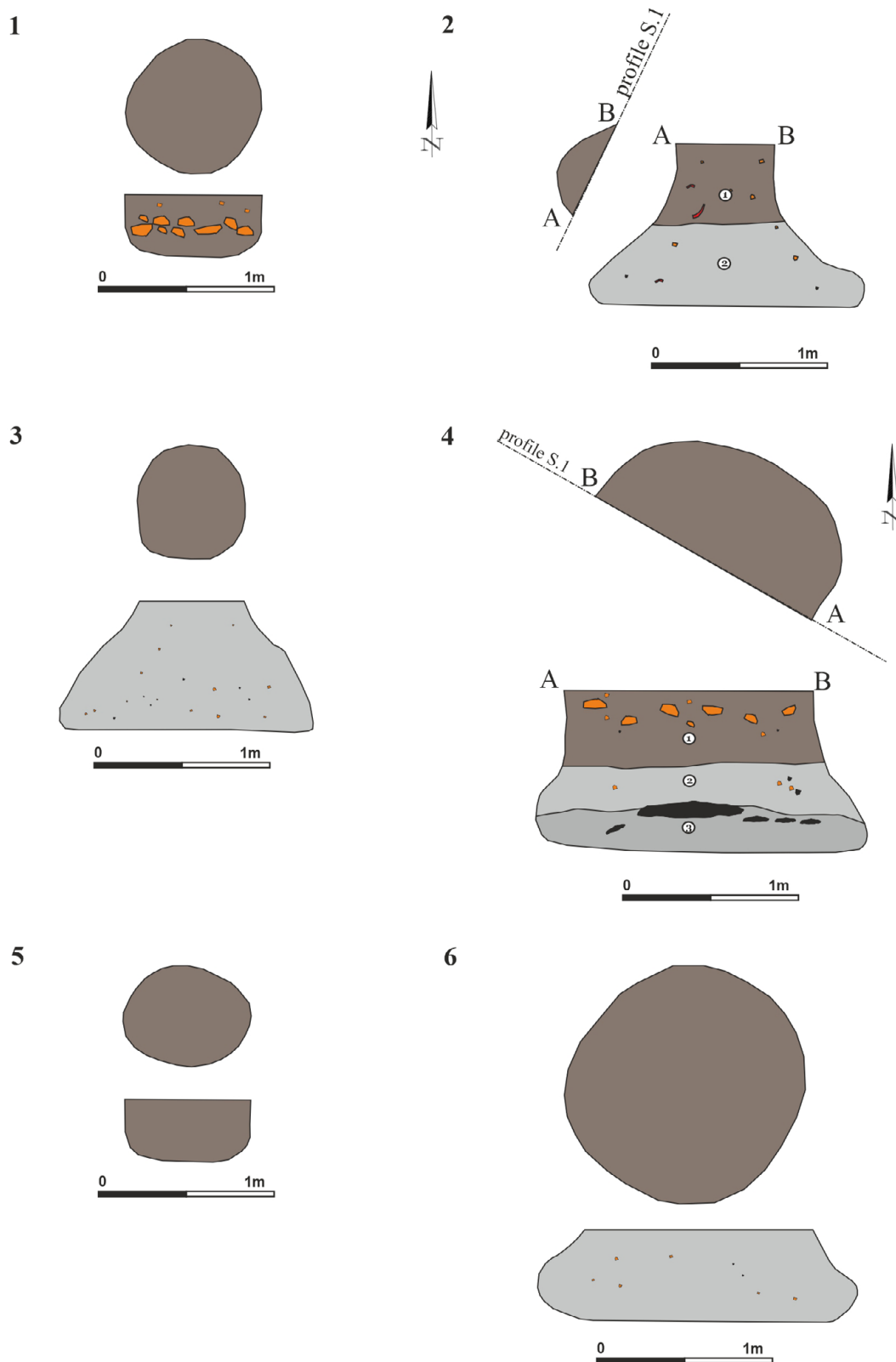


Fig. 3. Excavated Bronze Age features at Dumbrăvița-Parohia Ortodoxă III archaeological site: 1. Feature no. 2; 2. Feature no. 3; 3. Feature no. 4; 4. Feature no. 5; 5. Feature no. 6; 6. Feature no. 7 (author Cristian Floca)

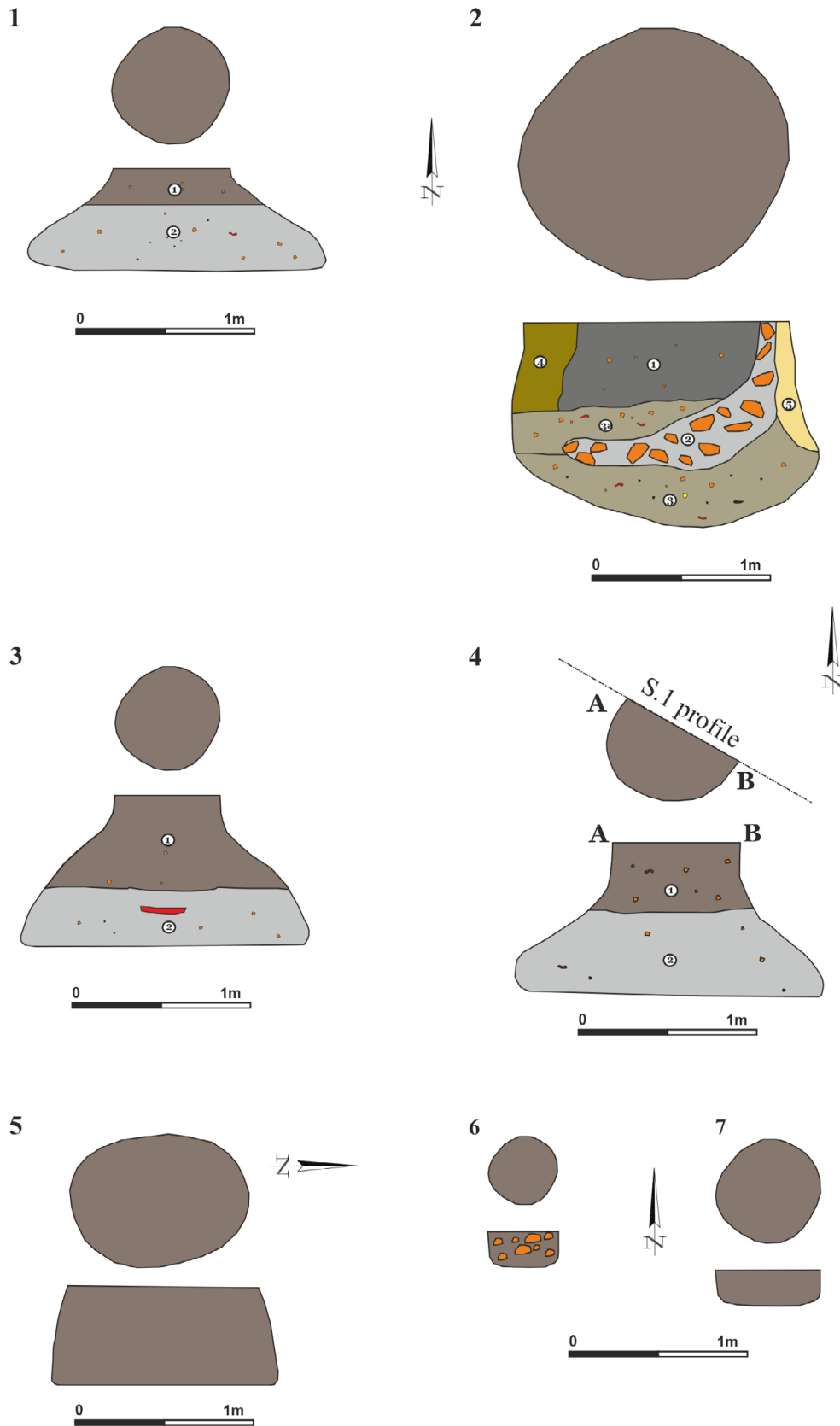


Fig. 4. Excavated Bronze Age features at Dumbrăvița–Parohia Ortodoxă III archaeological site: 1. Feature no. 9; 2. Feature no. 11; 3. Feature no. 12; 4. Feature no. 13; 5. Feature no. 14; 6. Feature no. 15; 7. Feature no. 16 (author Cristian Floca)

firing and contained compact brown-grey soil with sparse pottery fragments.

Situated nearby, feature no. 15 (fig. 4.6) was also near the north-western corner of S.1. This was a small circular pit, 0.4 m in diameter and 0.2 m deep. It was filled with compact brown soil containing numerous daub fragments, amongst which a fragment with ornamentation was recovered, most likely part of a hearth.

Shifting to the western sector of S.1, feature no. 16 (fig. 4.7) was a small circular pit with straight walls, 0.5 m in diameter and 0.2 m deep. The fill consisted of compact, dark-brown soil with daub inclusions and a single ceramic fragment.

Materials and methods

The pottery assemblage

The Bronze Age pottery assemblage from the Cruceni–Belegiš were analysed and included rims, bases, decorated wall fragments and complete or restorable vessels. For each fragment, data were recorded concerning manufacturing technique, dimensions and type of ornamentation; where possible, the vessel form was also determined. Both ornaments and vessel shapes were classified according to the typology established by F. Gogâltan and A. Stăvilă (2020), which was further supplemented where new items were identified, as presented in figs 5–6. On the basis of the recorded characteristics, the ceramic fragments were grouped into three categories: fine, semi-fine and coarse.

The semi-fine ware category predominates within the analysed assemblage (60.6%). It is characterised by a well-kneaded fabric tempered with sand, grog or a combination of both (98%). The firing of vessels in this category was undertaken using both known technologies with occasional qualitative variations or mixed firing. The resulting colours are consistent with these techniques: black (39.5%), grey (5.3%), orange (9.3%), light to dark brown (43.8%), and only sporadically black-grey, reddish, or reddish-brown (2.1%). With regard to surface treatment, vessels in this category are smoothed on both the interior and exterior, and are usually coated with a slip applied for waterproofing. Statistically, wall thickness ranges from 0.3 to 1.5 cm, with an average of 0.76 cm.

Typologically, the semi-fine ware includes cooking and storage pots, as well as smaller vessels such as cups and bowls. The pots documented at Dumbrăvița encompass all previously defined types, whilst also permitting the definition of new variants. One such example is a new variant of the truncated-conical pot with slightly outward-curved walls, where the maximum diameter is equivalent to the rim diameter, classified as variant AII2 (figs 5.1; 9.1, 3). Another newly documented type pertains to the storage vessels in which the rim opening and the maximum diameter are identical in dimension (figs 5.2; 9.4). These vessels have slightly everted rims, often with a carination immediately below, where handles are affixed (fig. 9.4–5). Vessels and storage jars in this category exhibit an average wall thickness of 0.8 cm and rim diameters range between 8 and 13 cm where measurable.

Bowls are less frequently represented within the semi-fine category but include a new variant (figs 5.7; 10.5–6; 15.2), which differs from those already defined in the typology due to its high walls. In this instance, the rim is typically faceted, with conical knobs or horizontally positioned handles beneath it (figs 5.10; 10.5–6; 15.2). Of the analysed pottery, 28.6% belong to the fine ware category. These were made with fine sand or clay temper (88.7%), while grog or mixed tempers occur rarely. Most vessels (78.1%) were fired in a reductive atmosphere, producing predominantly dark surfaces (black to grey), whereas oxidising firing (21.9%) yielded brown or orange tones. In 98% of cases, both surfaces share the same colour, reflecting high firing quality. Nearly all were burnished, with smoothing occurring only occasionally. The vessels in this category have thinner walls, with an average thickness of 0.5 cm.

Typologically, the fine ware is represented by cups (figs 5.3–7; 11.4–6, 8; 12.1–4; 15.5–6),

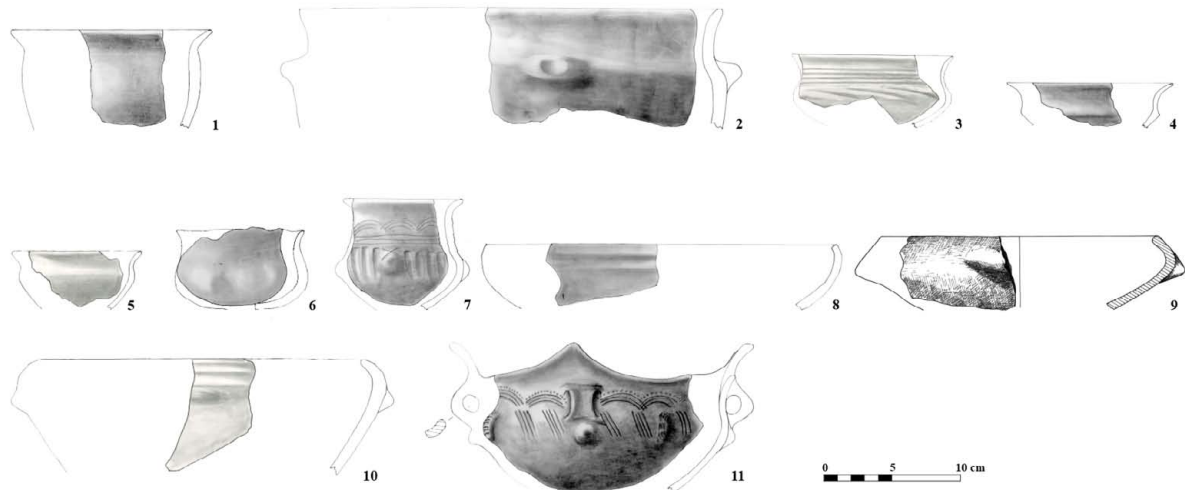


Fig. 5. Crucieni-Belegiș vessel types in the pottery assemblage from Dumbrăvița-Parohia Ortodoxă III: 1. Cooking pot (AII2 type); 2. Storage pot (BIII type); 3-7. Cups (CI1, 4-5, CII1, CIII1 types); 8-9. Plates (DI3, DII1 types); 10-11. Bowls (EI3, EII1 type) (author A. Stavilă)

plates (figs 5.8-9; 10.1-4), and lobed-rim bowls (figs 5.11; 13.6). In comparison with the previously published typology, several new forms were identified within the Dumbrăvița assemblage. The category of truncated-conical cups is expanded with a new variant (fig. 11.4, 6), characterised by a strongly everted rim and walls slanting obliquely towards the base (fig. 5). This form is distinguished by its slender profile, with a height-to-rim diameter ratio of 1:2, whilst the maximum diameter, marked by a carination, is situated at mid-height (fig. 11.4-6). The cup of CI5 type (fig. 15.5) retains the general attribute of the preceding variant but differs in the positioning of the maximum diameter in the upper third of the vessel and in its higher walls (fig. 5; 15.5). Within this category, the majority of fragments belong to the bowl with its high walls and in-turned rims (figs 5.10; 10.5-6; 15.2), but the other types are also present. Moreover, within the fine ware category we also find variants of the three defined cup types (figs 11; 12.1-4).

Coarse ware represents only 10.9% of the assemblage. These vessels were more roughly made, using fabric exclusively tempered with large pieces of grog. Oxidising firing predominates (75.9%), with minor qualitative variants, while reductive firing is less frequent (16.6%). The colour palette reflects this, being mainly light to dark brown and orange, with occasional reddish or coffee tones; black and grey surfaces are rare. Surface treatment varies from smoothed to unsmoothed and wall thickness averages 0.93 cm. Coarse ware is represented mainly by cooking pots, with all established types present (figs 9.1-3, 15.1). Rim diameter, where measurable, ranges from 9 to 30 cm.

Beyond descriptive statistics, the Dumbrăvița pottery assemblage was compared with that from Giroc-Mescal (Gogâltan, Stavilă 2020). These are the only Crucieni-Belegiș pottery assemblages to have been systematically evaluated from a typological and stylistic perspective. Multivariate statistical methods were employed, specifically the Principal Component Analysis (PCA) method, which identifies patterns by reducing data complexity into principal components. The analysis was conducted using the software Past 4.03. The ceramic data were organized in a contingency table (0/1 type), in which 0 indicates the absence and 1 the presence of an attribute. The rows corresponded to studied units (distinct archaeological features), and the columns to attributes (vessel forms and ornament types). Sixteen archaeological contexts were compared across seventy-two attributes. The most significant loadings were observed on the first four components, which produced consistent results. In this paper, we illustrate the analysis performed only on the first two components, the results being

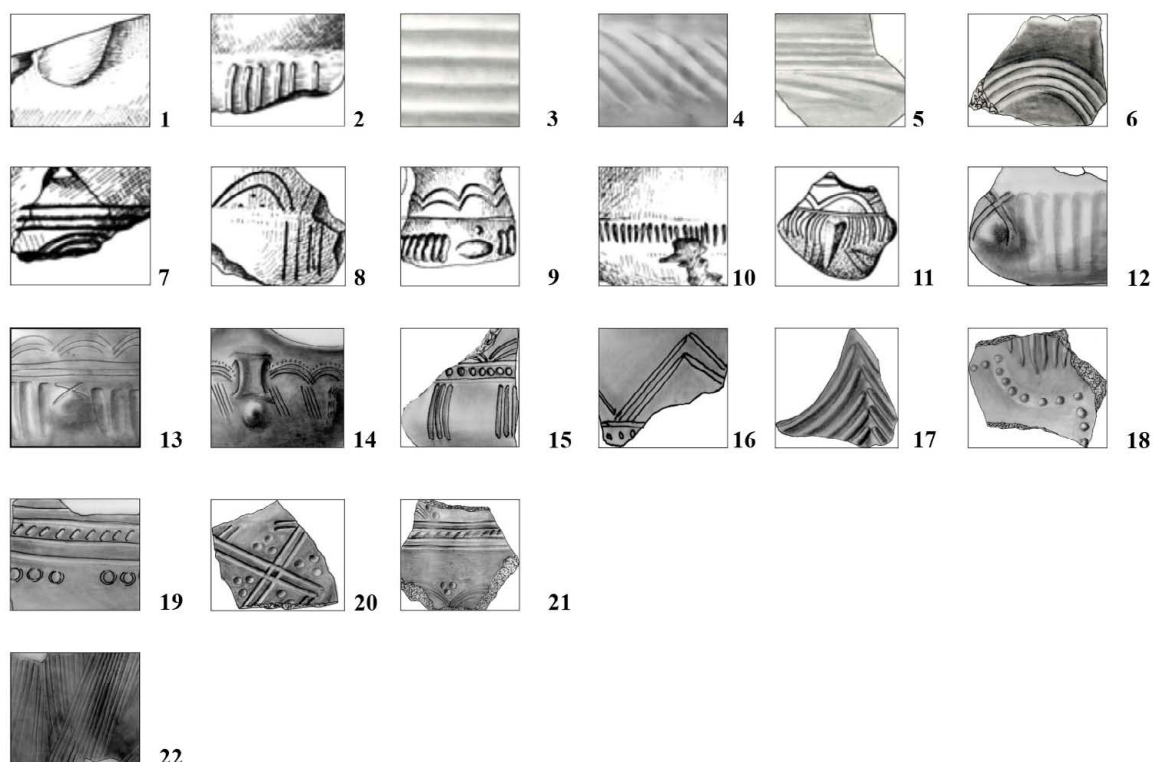


Fig. 6. Typology of decoration types found in the Cruceni-Belegiš pottery assemblage from Dumbrăvița-
 arohia Ortodoxă: 1-6. Channels (B1-6 types); 7-21. Incisions (D4, D8-21 types); 22. Combed ware (H1)
 (author A. Stăvilă)

similar for any other combinations of the four main components (fig. 8).

The metal object (fig. 16.3a-e)

A metal artefact was found in archaeological feature no. 5. This is covered with a green oxidation layer, except for a few small areas. This object is the blade of a cutting tool – likely a saw – with rounded distal end and proximal end that is broken (in prehistory) and bent. On the proximal area, along one edge, there is a perforation, probably for attaching a handle with a rivet. Notably, one face of the blade features a longitudinal central rib, while the other face is flat and one edge is serrated. Its dimensions are: length – 16.1 cm; width – extremities 1.6 cm, midsection 1.8 cm; thickness – 0.2 cm.

The artefact was subjected to elemental analysis using a portable X-ray fluorescence spectrometer (pXRF), Elvax Prospector 3, which can detect elements ranging from sulphur (S) to uranium (U). The device is equipped with an X-ray tube featuring a tungsten anode and a 12 μm thick beryllium detector window. Its operating parameters allow for voltage adjustments from 4 to 40 kV, a current range of 0 to 200 μA, and a maximum output of 5 V. Eight measurements were performed on both surfaces of the object and the results are presented in Table 1. Notably, one sample (P.5) targeted the compact core material of the blade. All analyses were conducted using the automatic “Alloy” module, with a reading time of 20 seconds for each determination.

The results indicate that the object was made from a copper-tin-lead alloy, with element proportions that vary slightly across the measurements. The mean values show a composition dominated by copper (88.53–84.71 wt%), followed by tin (9.03–11.22 wt%) and lead (1.39–2.34 wt%). Additionally, traces of other elements – including iron, antimony, titanium, nickel, cobalt and silver – were also identified, all present in low concentrations (<0.7 wt%).

No	Cu ± 0.05	Sn ± 0.04	Pb ± 0.04	Fe ± 0.03	Sb ± 0.03	Ti ± 0.09	Ni ± 0.02	Co ± 0.02	Ag ± 0.01
P1	84.71	11.22	2.34	0.48	0.55	0.19	0.34	0.06	0.09
P2	86.73	9.89	1.71	0.56	0.45	0.23	0.26	0.05	0.08
P3	86.74	9.58	1.63	0.79	0.5	0.31	0.27	0.03	0.08
P4	86.94	9.65	1.39	0.74	0.44	0.33	0.32	0.03	0.09
P5	88.53	9.25	1.58	0.55	0.4	0.23	0.29	0.05	0.07
P6	86.5	9.82	2.05	0.42	0.47	0.22	0.34	0.05	0.08
P7	87.49	9.03	1.53	0.71	0.44	0.28	0.32	0.06	0.08
P8	85.52	10.42	1.6	1.2	0.49	0.33	0.28	0.03	0.08

Table 1 Elemental composition of the metal artefact

Nr.crt	Diameter (Ø)	Height (h)
fig.16.1a	9 mm	5 mm
fig. 16.1b	8 mm	3.5 mm
fig. 16.1c	7.5 mm	4 mm
fig. 16.1d	7.5 mm	4 mm
fig. 16.1e	7 mm	4 mm

Table 2. Dimensions of the beads discovered at Dumbrăvița–Parohia Ortodoxă III

Lab#	Material	RU	$\delta^{13}\text{C}$ (‰)	^{14}C Age $\pm 1\sigma$ (years BP)	Unmodelled Calib. Age Range (BC) 68.3 % prob.	Unmodelled Calib. Age Range (BC) 95.4 % prob.
DeA-45943	bone	Cx. 11	-25‰	3110 \pm 20	1420-1386 calBC (42.7%) 1339-1317 calBC (25.6%)	1434-1372 calBC (55.6%) 1353-1300 calBC (39.8%)

Table 3. Radiocarbon date from archaeological feature no. 11

The Beads (fig. 16.1a–e)

Five beads were recovered from archaeological feature no. 11. It is most likely that the beads were made of ceramics, although this subject will be addressed in a separate study. Found together, they formed part of a necklace. Their dimensions are presented in Table 2.

Radiocarbon Dating

A sample from Bronze Age feature no. 11 at Dumbrăvița–Parohia Ortodoxă III was radiocarbon dated. This sample is a fragment of cattle bone that was recovered from the fill deposit of the archaeological pit. Radiocarbon dating was conducted at the AMS laboratory Isotoptech Zrt. in Debrecen, Hungary (Molnár et al. 2013a–b; Major et al. 2019a–b). The results, including the radiocarbon age (^{14}C years BP) and calibrated probability ranges of 68.3% and 95.4% (BC), are presented in the Table 3. The μ value for the unmodelled calibrated age is 1371 cal BC. Calibration was performed using the OxCal 4.4 program and the IntCal20 curve (fig. 7.1).

Results and Discussions. The archaeological finds and chronology

The archaeological investigation at Dumbrăvița–Parohia Ortodoxă III provided the first overview of the site's internal stratigraphy and structure types. Key results include the identification of settlement type despite limited evidence. The archaeological feature no. 8 indicates a floor and those

such as features nos 2, 6, 15, 16, and possibly 14, are interpreted as postholes, suggesting construction elements (fig. 2). A large daub fragment with wattle impressions from feature no. 11 points to above-ground architecture. The discovery of a plastic ornament in archaeological feature no. 15 implies hearths (fig. 16.2), echoing typical LBA practices in Banat, also documented at Hodoni–Pustă (Bejan, Benea 1985, 188), Timișoara–Fratelia (Szentmiklosi 2021, Pl. LXXXVIII.14), Cornești–Iarcuiri (Bălărie et al. 2016, 52–53, Abb. 4) or Șagu–Site A1_1 (Sava et al. 2011, fig. 49). Most refuse pits fit biconical type (figs 3.2–4, 6; 4.1, 3–5), thus corresponding to types Ib and IIb, according to Al. Szentmiklosi’s typology (Szentmiklosi 2021, 117). Archaeological feature no. 11 stands out as cylindrical with more complex fill, differing from other pits (fig. 4.2).

To establish and contextualise the chronological position of the Cruceni–Belegiș settlement at Dumbrăvița, we rely on analogies provided by the archaeological material. These are complemented by the results of radiocarbon dating. The analysis of the ceramic assemblage from closed archaeological features underscores the absence of the pseudo-corded ornament. This ornament was identified only on a single fragment (fig. 15.3) recovered from the cultural layer (layer 3), which is attributed to the LBA (fig. 2.2–3). The significance of this absence is considerable. The pseudo-corded ornamentation constitutes a benchmark of the first phase of the Cruceni–Belegiș ceramic style. It was adopted by the communities of the Banat lowlands during the LBA I stage (Gumă 1997, 68; Tasić 2001, 315–316; Gogâltan 2019, 49; Gogâltan, Stavilă 2020, 201). In the subsequent stage (LBA II in Banat region), with the widespread adoption of channelled pottery, this type of ornament disappears from the repertoire.

Conversely, the Dumbrăvița pottery assemblage exhibits a predominance of channelled ornaments (fig. 6.1–6). Wide channels (fig. 6.2) are especially significant. This decorative element persisted in the Cruceni–Belegiș ceramic style, originating from its formative background in the Cornești–Crvenka group of the Vatin culture (Gogâltan 2022). Analogies for this ornament occur on the cup from grave M.2/1996 at Voiteni (Szentmiklosi 1998, Pl. III.2), the vessel from grave M. 298 in the necropolis of Beograd–Karaburma (Todorović 1977, 96, 106, 145), on pottery fragments from Giroc–Mescal (Gogâltan, Stavilă 2020, Pl. 9.2; 14.3; Szentmiklosi 2021, Pl. LXVI.1, 3, 6, 8; LXIX.4, 6–9) and on discoveries in the vicinity of Pančevo town (Ćuković 2013, Taf. II.11; V.19; VI.1). In the recent stage of Cruceni–Belegiș development, such channels evolve and become narrower.

Horizontally arranged channels (figs 6.3; 10.2,4; 14.2; 15.4) are frequently observed on vessel walls whose profiles cannot be reconstructed owing to fragmentation (figs 10.2–4, 6; 14.2; 15.4). However, in two instances, this type of decoration is associated with truncated-conical bowls of EI3 type (figs 10.5–6; 15.2), as well as with a rim fragment that, with some caution, may be attributed to an amphora. This ornament is attested in most Cruceni–Belegiș settlements of the Banat lowlands. Relevant analogies can be identified at Deta–Dudărie, Foeni–Gomila Lupului II, Giroc–Mescal, Timișoara–Fratelia (Szentmiklosi 2021, Pl. XXIII.1; XXVI.6, 9; XXVIII.3; XLVI.1, 5, 7; LVIII.3; LXVI.6, 8, 14; LXIX.4, 8–9; CXVII.1, 4–5; CXX.8; CXXVI.3; CXXVIII.4; CXXXVIII.2, 5, 8, 10), Voiteg–Groapa cu vulpi (Szentmiklosi, Medeleț 2016, Pl. III.2; V.3) and Peciu Nou–Bociar (Szentmiklosi 2016, Pl. XV.6–7, 9). The contexts from which these analogies originate may be assigned to both the first and second stages of development of the Cruceni–Belegiș ceramic style.

Obliquely arranged channels (figs 6.4; 11.7; 14.6) occur either individually or in combination with horizontal channels (figs 6.5; 11.7; 15.6; 16.6), and have parallels in Cruceni–Belegiș settlements of the Romanian Banat (Szentmiklosi 2021, Pl. XLII.5; Pl. XLVI.9; Pl. XLVI.1; Pl. CXXXIII.3; Pl. CLXI.7); these discoveries are attributed to LBA II. Comparable finds from the pre-Gáva context of the Tisza Plain at Igrici (Szabó 2004, fig. 11.8; Szabó, Váczi 2023, fig. 3) also belong to this chronological horizon. Similarly, discoveries from eastern Slavonia (Forenbaher 1991, fig. 7.4b), as well as from Srem at Vinkovci–Duga ulica Br. 23 (Dizdar 1996, Taf. 5.1), can be included within the same stage.

Of particular chronological significance is the bowl fragment from archaeological feature no. 7 (fig. 13.1), ornamented on the interior with circular channels (fig. 6.6). This type of decoration is specific, in Banat, to discoveries of Bobda–Susani type (Stratan, Vulpe 1977, Taf. 12.121; Taf. 14.127), chronologically situated within stage LBA II and corresponding to a post-1400 cal BC horizon (Gogâltan 2019, 51–52). The motif is widely distributed, with similarly decorated bowls attested also in north-western Bulgaria, in the necropolis of Baley, where they are securely dated between the late 14th and the 11th c. BC (Alexandrov et al. 2016, 453, fig. 6.b, f, k, m; fig. 8.a–b).

In contrast to the Banat lowlands, the northern part of this micro-region and the Lower Mureş Valley exhibit a different trajectory regarding the use of channelled ornament. In these areas, it dominates the decorative repertoire and has been widely employed since LBA I; 1600–1400 BC (Sava 2019; 2020).

A significant proportion of the Dumbrăviţa ceramic assemblage is constituted by incised ornaments (figs 6.7–21; 11.1, 3; 12.1–4; 13.4, 6; 14.1, 3–4, 7–8). These include fragments decorated with incisions and impressions, which appear either in rows or grouped (figs 11.1, 3; 12.1–2, 4; 13.6; 14.1, 3–4, 7–8). Relevant analogies for these decorations have been identified in ceramic materials from Timișoara–Pădurea Verde (Moga et al. 2017, fig. 1.2b, d; 2.4a; 4.1; 5.1; 6–7), Foeni–Gomila Lupului II, Timișoara–Fratelia (Szentmiklosi 2021, Pl. XXXVIII.6; LI.1–2; LXXXIX.1, 6; XCII.11), and Voiteni (Szentmiklosi, Medeleţ 2016, Pl. III.3). Most of these finds originate from archaeological contexts dated to the LBA II stage. The exception is Fratelia, which pertains to the earlier phase of the ceramic style under discussion.

No satisfactory analogy has been identified regarding ornament D19 type (fig. 6.19; fig. 14.1). The closest variant is from the archaeological feature L.VIII at Timișoara–Fratelia, attributed to the first phase of the Cruceni–Belegiș ceramic style (Szentmiklosi 2021, Pl. CVIII.1). The lobed-rim bowl from Feature no. 11 (fig. 13.6) has close parallels in the material from Timișoara–Fratelia (Szentmiklosi 2021, Pl. XCVI). Imperfect formal analogies also appear in funerary inventories from graves at Cruceni (Radu 1973, Pl. 2.5) and Șag–Site 5 (Bălan, Burlacu-Timofte 2024, Pl. 11.3). All these finds belong to the first phase of Cruceni–Belegiș ceramic style development. A fragment from feature no. 5 (fig. 14.7) also comes from a lobed vessel. Due to its fragmentary condition, a more precise chronological attribution is not possible. Vessels of this type circulated widely over time (LBA I–III in the eastern Carpathian Basin).

The Kammstrich ornament (figs 6.22; 12.5–6; 13.2; 14.7) appears in the Banat lowlands near the end of the Early Bronze Age (Gogâltan, Stavilă 2021, 499) and, except for short gaps, continues in use until Antiquity (Măruia et al. 2019, 145). In the LBA, it is adopted by Cruceni–Belegiș communities; for example, at Timișoara–Fratelia, it makes up to 4.4% of all decorated pottery fragments (Stavilă 2012). The ornament is also present at Foeni–Gomila Lupului II and Peciu Nou–Bociar in LBA I–II contexts (Stavilă 2012, 40; Szentmiklosi 2021, Pl. XXVIII.8; XXXVIII.8, 12; LIII.2; LXXXII.1; CLXV.3–4). At Ghiroda–Site 1, a bowl from a vessel deposit displays comb-made striations on its lower half, although this example appears to be later in date (LBA III). Similar examples occur in Transylvanian settlements of the Cugir-Band group, where vessels are often decorated with bands of vertical lines using the same method (Bălan et al. 2019, 58, Pl. 12.6. Ciugudean 2021, 68).

For the discussion of the relative chronology of the Dumbrăviţa finds, the variety of cup types is especially important (figs 11; 12.1–4). The CI1 type cup (fig. 15.6) is also found at Giroc–Mescal, in the Cruceni–Belegiș I horizon, but are less common in settlements or cemeteries from this time. Later, this type spread widely and is seen in Banat (Georgescu et al. 2019, Pl. 5.1; Szentmiklosi 2021, Pl. LXXXIX.5; XCIX.4; CLIX.1; Bălan, Burlacu–Timofte 2024, Pl. 12.4, 7; Rogozea, Stavilă 2024, 52, Pl. 2.2), Serbia (Perić 1997, Abb. 3.7, 9), Croatia (Forenbaher 1991, fig. 7.4b; Kempotić 2009, Taf. 14.5) and in vessel deposits typical of the pre-Gáva period in the Tisza region (Szabó 2004,

Abb. 11.46, 49–50). The cup fragment from feature no. 3 is hard to classify (fig. 11.7), but similar examples were found at Deta–Dudărie (Szentmiklosi 2021, Pl. IV.6), Felnac–Complexul Zootehnic (Sava 2016, Pl. 4.1a–b) and in the Beograd–Karaburma cemetery (Todorović 1977, 37, 70). These finds are linked with either the transition from LBA I to II or LBA II itself in the Banat region and surrounding areas.

Truncated-conical cups with carinated rims, whether short or long (figs 11.4, 6; 15.5), typically appear in the ceramic inventories of Bronze Age settlements in Banat from the 14th c. BC onwards. Parallels for the Dumbrăvița material can be found at Timișoara–Fratelia, Voiteni (Szentmiklosi 2021, Pl. C.5, CXXIX.6; CXLII.6; CIVII.10; CLIX.2,5) and Banatski Karlovac–Kalvarija (Perić 1997, Abb. 3.7–8). Similarly, short globular cups (fig. 11.2, 5) have close correspondences in Romanian Banat at Giroc–Mescal, Timișoara–Fratelia, Sânnicolau Mare–Săliște, Felnac–Complexul Zootehnic and Cornești–Iarcuri (Stavilă 2015, 239; Sava 2016, Pl. 4.3a–b; Krause et al. 2019, Abb. 30.6; Gogâltan, Stavilă 2020, Pl. 16.1; Szentmiklosi 2021, Pl. LXXXIX.8;), as well as in the funerary milieu of the Tumulus Culture, in the necropolis of Velebit, Serbia (Kapuran 2019, Pl. 55.1, 71.2). The discoveries from Banat originate from contexts dated to LBA I, while the finds from Velebit are attributed to the 14th c. BC, based on a ¹⁴C date and typological analogies.

In addition to bowls and plates with straight or lobed rims (figs 10.1–4; 13.6), the Dumbrăvița assemblage also comprises forms with in-turned rims (figs 10.5–6; 15.2). According to current research, the emergence of this type marks the beginning of the LBA II phase in Banat and Transylvania, after which such vessels become common in typological repertoires. For the earlier phase of the Cruceni–Belegiš ceramic style, only truncated-conical bowls with a “slightly in-turned rim” are attested (Gumă 1997, 56). Towards the end of this phase, however, contexts characterised by a heterogeneous mix of decorations and vessel forms also include bowls with in-turned rims, illustrating an evolution in ceramic form. For example, at Foeni–Gomila Lupului II, a plate lacking knobs on the shoulder, decorated with vertical incised stripes, was discovered and securely dated to after 1400 BC (Szentmiklosi 2021, 150–151). Similarly, at Giroc–Mescal, in-turned plates are rare, appearing in the middle of the statistical seriation of the assemblage, alongside elements common to the investigated contexts (Gogâltan, Stavilă 2020). Furthermore, recently published material from Moșnița–Dealul Sălaș includes, alongside a miniature vessel and a figurine (both decorated with white inlay), fragments of three in-turned plates. The context was attributed to a horizon marking the transition between LBA I and II (Rogozea, Stavilă 2024). A similar chronological attribution (Br. B2–C1 in Central European chronology) is assigned to the slightly in-turned plate from grave no. 251 in the necropolis of Beograd-Karaburma (Todorović 1977, 145).

The metal object (fig. 16.3a–b) is composed of a copper-tin-lead alloy (Cu-Sn-Pb) and has no chronological significance. In the Romanian Banat, similar artefacts are found both in hoards and as isolated items. For instance, an early example comes from a field survey at Becicherecu Mic (Timiș County), associated with materials belonging to the Cornești–Crvenka ceramic style (Rogozea, Rogozea 2016, Pl. 8.12). Two saw fragments originate from the settlement at Șagu–Site A1_1, and another from the archaeological site of Ghiroda–Site 1, both being dated to the later phase of the LBA III stage (Sava et al. 2012, 86, Pl. 3/5, 8; Bălan et al. 2019, 58, 60, Pl. 17.8). The largest number of analogies, however, come from hoards in Banat, such as those from Caransebeș, Moldova Veche I, and Sînpetru German (Petrescu-Dâmbovița 1977, 87, 99, 107). Comparable finds from Transylvania include those at Dipșa, Gușterița II, Șpălnaca II, and Tășad (Petrescu-Dâmbovița 1977, 92, 96, 108, 112). Notably, these bronze hoards belong to the Cincu–Suseni–Kurd horizon, which corresponds to LBA III (Gogâltan 2019, 54).

For the analysed artefact, high concentrations of Sn and Pb were recorded, a phenomenon influenced by the presence of corrosion. It is well understood that corrosion processes can increase the

content of these elements, sometimes up to three to four times higher than in the compact core material (Figueiredo et al. 2007; Maróti, Káli 2021; Tarbay, Maróti 2023). Additionally, the presence of reddish spots or small areas of iron (fig. 16.3d–e) on the object indicates incomplete removal of iron during the smelting of copper ore (Czajlik 2012, 96–97). The average measured value of antimony is 0.47 wt%, which in this context is regarded as an impurity, as are the other elements identified in low concentrations (Table 1).

Elemental studies of metal artifacts from this period in Banat region remain scarce, which limits the discussion on the subject (Stavilă, Rogozea 2022, 312–313). On the other hand, several comparative references can be highlighted for Transylvania. From Dipșa hoard, forty-nine samples were collected and analysed using the drilling method. With the exception of a single artefact, all samples display a copper–tin alloy composition, with tin concentrations ranging between 4% and 8% and a few outliers reaching 16–17%. Lead is also present in all analysed pieces, with concentrations varying between 0.07% and 1.71%. One of the samples corresponds to a saw blade, composed of 12% tin and only 0.37% lead. In addition, traces of other elements – such as arsenic, antimony, silver, nickel, bismuth, zinc, cobalt and iron – were identified in varying proportions (Kienlin, Pernicka 2006, 53–54, Tables 1–2).

Several artefacts from the hoards discovered in Sălaj County have also been subjected to elemental analyses. In the Gâlpaia hoard, the analysed items exhibit high tin concentrations, reaching up to 43.84% in finished objects and nearly 60% in semifinished ones. These high values are most likely the result of a decuprification process occurring over time, concomitant with the formation of the patina. Further measurements of the compact metallic core may yield more accurate elemental ratios (Olariu, Bejinariu 2018, 72). High tin concentrations were likewise identified in the artefacts from Domănești hoard – ranging between 10% and 30% – which belongs to the same Uriu–Ópályi hoard series as the Gâlpaia (Olariu 2015, 42, fig. 84). Similar to the artefact from Dumbrăvița, the Gâlpaia items show variable lead contents, reaching up to 3.13%, suggesting the deliberate addition of this element.

From the Aghireș hoard, four XRF measurements were performed on the sickles included in the assemblage, as well as on four fragments of raw bronze. The discussion below focuses on the sickles, as these represent finished objects. Copper content in the four specimens ranges between 89.18% and 97.73%. Tin and lead values are relatively consistent across three of the analysed artefacts, while the fourth shows increased concentrations of 7.29% tin and 2.17% lead (Olariu, Bejinariu 2018, 74). This last piece closely resembles the metal object presented by us in terms of its elemental composition.

The examples discussed above provide useful comparative data regarding the elemental composition of our artefact. However, a more comprehensive comparative discussion requires the systematic compilation and contextualization of all available elemental analyses from the eastern Carpathian Basin.

In the context of Bronze Age discoveries in Banat, beads – regardless of material – are rare finds (fig. 16.1). Within the distribution area of the Cruceni–Belegiș ceramic style, such a discovery is unique. To better appreciate its significance, it is necessary to compare this find with similar LBA discoveries.

From the inventory of a secondary cremation burial at the Susani–Grămurada de la Jupani mound (Timiș County), several beads were recovered and analysed for composition. Analyses revealed that these were ceramic, either containing glass-like elements or with small vitrified areas resulting from thermal treatment. The archaeological context dates to around 1200 cal BC; while μ value of the radiocarbon date is 1240 cal BC (Vlase et al. 2020, 1068, 1073).

In the Lower Mureș area, excavations at Sântana–Cetatea Veche uncovered over one hundred

Lab#	Material	Site	RU	¹⁴ C Age (yr BP)	Unmodelled Calib.Age Range – 95.4 % prob.	μ value (calBC)	Bibliography
KIA 51810	seed	Gradište Idoš	Context 6011 (Trench 6)	3172 ± 19	1498-1415 calBC (95.4%)	1453	Molloy et al. 2020, Tab. 3
KIA 51804	bone	Gradište Idoš	Context 6006 (Trench 6)	3132 ± 21	1492-1481 calBC (1.9%) 1451-1379 calBC (75.8%) 1344-1308 calBC (13.8%)	1400	Molloy et al. 2020, Tab. 3
KIA 51813	charcoal	Gradište Idoš	Context 6010 (Trench 6)	3098 ± 20	1425-1293 calBC (95.4%)	1359	Molloy et al. 2020, Tab. 3
KIA 51807	bone	Gradište Idoš	Context 6006 (Trench 6)	3069 ± 20	1407-1270 calBC (95.4%)	1333	Molloy et al. 2020, Tab. 3
Beta-256557	charcoal	Foeni-Gomila Lupului	L1/2000	3100 ± 40	1489-1484 calBC (0.5%) 1449-1260 calBC (94.9%)	1357	Szentmiklosi 2021, 82, 150
GrN 7370	charcoal	Hrtkovci-Gomolava	Level IVc	3090 ± 55	1496-1475 calBC (2.3%) 1460-1213 calBC (93.2%)	1343	Waterbolk 1988, 119–121
AAR-31657	human bone	Vojlovica II	Grv 69b	3089 ± 23	1421-1282 calBC (95.4%)	1351	Daróczy et al. 2023, Tab. 1

Table 4. ¹⁴C Data from Cruceni–Belegiš archaeological contexts used for contextualise the radiocarbon date of Dumbrăvița–Parohia Ortodoxă

blue glass beads. Ninety were found in the lower fill of the ditch of Enclosure I. Radiocarbon dating places the context in the 14th c. BC (Krause et al. 2022, 79, 82–83). Additionally, within the Pecica II hoard, alongside bronze artefacts, eight amber beads and two glass beads were discovered, attributed to the Cincu–Suseni–Kurd horizon; LBA III chronological horizon (Petrescu-Dâmbovița 1977, 101).

One of the most remarkable finds of Romanian prehistory is the Cioclovina cu Apă cave hoard in Transylvania. Part of the votive assemblage consists of beads made of blue glass, tin, amber or faience. The hoard is accumulated over an extended period but does not appear to extend beyond the LBA II horizon. This is confirmed by an absolute date from Hall B (Rotea 2017).

Bead discoveries from Cluj–Napoca–Strada Banatului funerary context, the Dobrocina hoard (Sălaj County), and those from tumulus no. 20 in the Lăpuș necropolis are also assigned to the same chronological horizon (Petrescu-Dâmbovița 1977, 57; Metzner-Nebelsick et al. 2010, 219–233).

Analogies between the archaeological material from Dumbrăvița and comparable finds have provided reference points. These help establish a relative chronological framework. The radiocarbon date obtained from a sample recovered from feature no. 11 complements this information. It situates the discoveries in the first half of the 14th c. cal BC. Conventionally, in terms of relative chronology, this interval corresponds to the second phase of the Cruceni–Belegiš ceramic style. We selected published absolute dates for this ceramic style with calibrated ranges and μ values comparable to our result. These derive from the sites Foeni–Gomila Lupului II (L.1/2000), Hrtkovci–Gomolava (level IVc), Gradište–Idoš and grave 69b from the necropolis at Vojlovica (Table 4).

The calibrated date from Dumbrăvița (fig. 7.1) shows posterior density estimate of 1434–1372 cal BC (55.6% probability) and 1353–1300 cal BC (39.8% probability). The μ value is 1371 cal BC. At Foeni–Gomila Lupului, the calibrated date has posterior density estimate of 1489–1484 cal BC (0.5% probability) and 1449–1260 cal BC (94.9% probability). The pottery assemblage associated with this absolute date combines elements of both the first and second stages of the Cruceni–Belegiš ceramic style. Vessels feature pseudo-corded motifs and incisions, with one example having white inlay. There are also vessels decorated only with channelled ornament. Bowls and dishes with straight rims are most frequent. Variants with in-turned rims are also present (Szentmiklosi 2021, 82–84).

The sample from Hrtkovci–Gomolava was collected from level IVc (Waterbolk 1988, 121). The calibrated date has posterior density estimate of 1496–1475 cal BC (2.3% probability) and 1460–1213 cal BC (93.2% probability). After the radiocarbon result was published, N. Tasić divided

this level into two horizons. The first (IVc1) marks “the emergence of pottery decorated with simple channels”, whilst the second (IVc2) is considered later and fully attributed to the Gáva horizon (Tasić 2005, 12). The precise association of the radiocarbon date with either sub-level was not clarified. The calibrated date suggests it is more likely to belong to horizon IVc1.

A more recent absolute date comes from grave no. 69b in the necropolis of Vojlovica–Rafinéria nafta (Daróczy et al. 2023, Tab.1). This sample produced posterior density estimate of 1421–1282 cal BC (95.4% probability). L. Bukvić (2000) attributed the finds from this grave to the Gáva cultural manifestations. Other researchers consider them part of LBA II, the channelled horizon of the Cruceeni–Belegiš ceramic style (Motzoi-Chicideanu 2011, 134, no. 695; Szentmiklosi 2021, 352–353, no. 279).

From Gradište–Iđoš, four absolute dates are available which originate from the same context, pit 6005. These provide broad 2-sigma intervals, spanning from the first half of the 15th c. cal BC to the first half of the 13th c. cal BC. The pottery from this context is stylistically attributable to the Cruceeni–Belegiš II ceramic style. In addition, several fragments characteristic of the Tumulus Culture were also identified. Additionally, two stamped sherds represent imports from the southern Danubian area (Molloy et al. 2020).

As previously noted, northern Banat and the lower Mureş Basin follow a distinct trajectory in the development of Late Bronze Age pottery. Extensive data are available from the settlement at Şagu–Site A1_1, where pottery assemblages from six archaeological features were correlated with radiocarbon results. These document a span between 1660 and 1265 cal BC, with most dates falling within LBA I, and only one closely corresponding to that from Dumbrăviţa (Sava 2019, Tab. 1). In contrast to Dumbrăviţa, where the adoption of vessel forms and ornamentation techniques characteristic of LBA II occurs at a later stage, at Şagu, vessel forms such as the in-turned plate were assimilated as early as 1500–1400 cal BC. Furthermore, in the earliest archaeological contexts, the channelled ornamentation was already in frequent use, alongside incised, embossed and impressed motifs. A process common to both settlements, as well as to the entire eastern part of the Carpathian Basin, is the increasing use of channelled ornamentation, corroborated by a decline in the frequency of incised decoration in pottery assemblages after 1400 cal BC (Sava 2019, 212–215). Finally, similar to the settlement at Dumbrăviţa, investigations at Şagu identified pits with various functions and a very low number of dwellings (Sava et al. 2011, 29–30).

A substantial number of absolute dates come from research conducted at the most significant LBA site in the eastern Carpathian Basin, Corneşti–Iarcuri mega-fort (Lemphul et al. 2019). Only a few ceramic vessels have been published so far (Szentmiklosi et al. 2011, fig. 8; Heeb et al. 2015, Abb. 10; Lemphul et al. 2018, Abb. 3–5; Krause et al. 2019, Abb. 30), which limits understanding of the site’s material culture in the late 15th and early 14th c. cal BC. Still, formal and stylistic analogies suggest a closer affinity with the ceramic assemblage from Şagu than with that from Dumbrăviţa.

From the radiocarbon dates and archaeological contexts analysis it is known that during the chronological sequence outlined above – within which the Dumbrăviţa settlement also developed – the Corneşti–Iarcuri mega-fort experienced several turbulent episodes. These appear in the successive phases of rapid construction, reconstruction and destruction that occurred within relatively short periods of time. Around 1400 cal BC, Phase B of Ring I was erected. In the same period, Phase I of Ring II was constructed and shortly after that destroyed by fire. The second occupation phase at Corneşti evolved within this century (1410–1305 cal BC, modelled dating interval; 2 σ range) and based on available data ended no later than about 1305 cal BC. The two rings were destroyed somewhat later than the second occupation level, at some point during the first half of the 13th c. BC; Ring I, Phase B, around 1250 cal BC and Ring II, second phase, around 1265 cal BC (Lemphul et al. 2019, 273–277, Table 8).

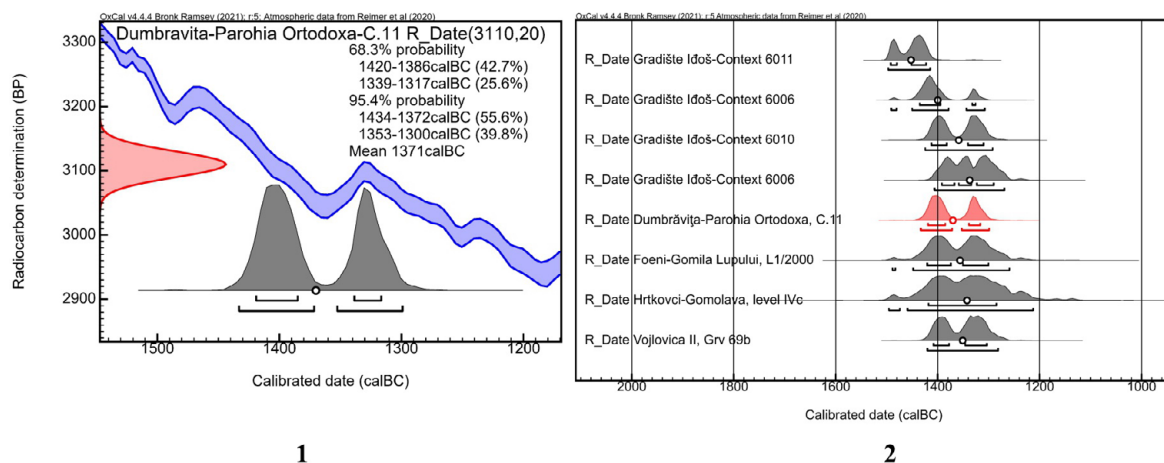


Fig. 7. 1. The calibrated date from Dumbrăvița–Parohia Ortodoxă; 2. Plot of absolute dates from archaeological features with Cruceni–Belegiș-type finds (author A. Stăvilă)

Similarly, the settlement at Dumbrăvița developed synchronously with Sântana–Cetatea Veche mega-fort. Radiocarbon data indicate that the mega-fort evolved over the course of the 14th c. cal BC. In this case, the material culture is better documented. By the beginning of the century, ceramic assemblages already showed vessel forms and decorative motifs that, within the Cruceni–Belegiș area, are generally attributed to the fully developed second phase of the ceramic style (Sava et al. 2019; Gogâltan et al. 2019; Krause et al. 2022).

By PCA analysis we compared the pottery assemblages from Giroc–Mescal and Dumbrăvița (fig. 8). The analysis highlights several points. First, two archaeological features (no. 11 from Dumbrăvița and C1/1993 – 0.75–0.90 m from Giroc–Mescal) are outliers, as they contain the most unique variables in the dataset. Archaeological feature no. 11 is distinct for its incised ornaments (fig. 6.12, 14–16, 19–21), channel ornament of B5 type (fig. 6.5), vessel forms such as BII-type storage pots (figs 5.2; 9.4) and lobed-rim bowl (figs 5.11; 13.6). For the Giroc outlier, level 0.75–0.90 m from Feature 1/1993 stands out for its various cup types (Gogâltan, Stăvilă 2020, 204–205, fig. 5) and certain incised ornaments (fig. 6.8–10).

Beyond these cases, a cluster appears homogeneous at first, but differences exist between the Dumbrăvița and Giroc archaeological features (fig. 8). They are distributed separately along the two principal components of the graph. A key distinction is the absence of pseudo-corded ornament in the Dumbrăvița assemblage; it is entirely absent there but found only at Giroc. Conversely, a series of channelled ornaments (fig. 6.3–6) occurs only at Dumbrăvița. Regarding vessel forms, several elements are common to both assemblages. For example, both have truncated-conical bowls with straight rims. However, in the Dumbrăvița subgroup, cups of CI4 type (fig. 11.4, 6) and in-turned plates (fig. 10.1) occur frequently.

The database remains limited, but the statistical results show clear differences between the two ceramic assemblages. Alongside shared features, Dumbrăvița exhibits distinctive stylistic and morphological traits that are absent at Giroc–Mescal. The Giroc pottery assemblage displays all attributes typical of the first phase of the Cruceni–Belegiș ceramic style. In contrast, the situation at Dumbrăvița is distinct. The pseudo-corded decoration – a benchmark of the earlier phase – is absent. Certain established ornaments and vessel forms persist, but new elements also emerge. These would later become widespread within the channelled horizon of this ceramic style.

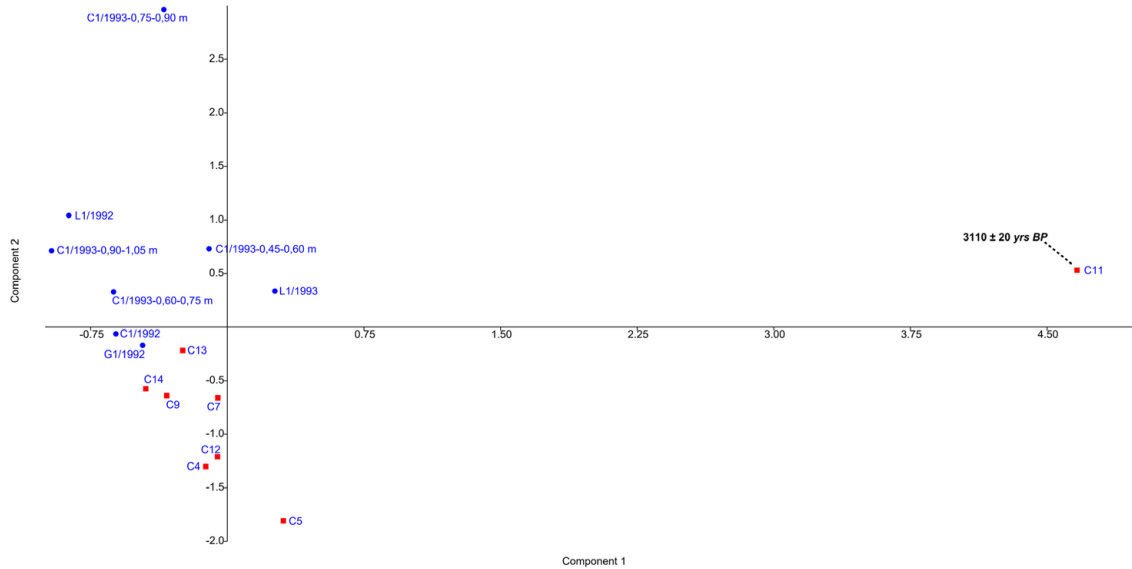


Fig. 8. PCA ordination plot of Giroc–Mescal (blue) and Dumbrăvița–Parohia Ortodoxă III (red) pottery assemblages (author A. Stavilă)

Conclusions

Archaeological investigations at the Dumbrăvița–Parohia Ortodoxă III site yielded valuable information about a new Cruceni–Belegiș settlement, one of the few investigated in central Banat. The simple stratigraphy revealed features such as refuse pits and postholes. These, along with the finds, document a LBA habitation. Limited architectural evidence, including daub fragments with wattle impressions, suggests the use of semi-sunken dwellings, a construction technique common in communities of this ceramic style.

The ceramic assemblage is modest but informative. The pseudo-corded ornament, a benchmark of the Cruceni–Belegiș I, is absent from the features and appears only on a single sherd found in a secondary position in layer 3. In contrast, incised ornaments and vessel forms of the earlier phase, like truncated-conical bowls and straight-rimmed plates, persist. Newer Cruceni–Belegiș II elements are also present, such as channelled ornaments – including circular channels inside vessels (figs 6.6; 13.1) – as well as truncated-conical cups with flaring rims and oblique walls (figs 11.4, 6; 15.5) and in-turned bowls and plates (figs 10.1, 5–6; 15.2). This trait combination became clearer through PCA analysis comparing Dumbrăvița and Giroc-Mescal materials. At first glance, the results suggest one large cluster, but distinct subgroups for each site are evident, each with unique features.

The radiocarbon date from feature no. 11 places the Dumbrăvița finds in the 14th c. cal BC. This aligns with results from Foeni–Gomila Lupului II, Hrtkovci–Gomolava, Vojlovica, and Gradiște–Idoș. Typological and stylistic comparisons, however, show differences. Dumbrăvița most closely resembles Foeni, and possibly Hrtkovci–Gomolava, if the date fits horizon IVc1. By contrast, contexts from Gradiște–Idoș and Vojlovica–Rafneria nafta show a fully developed channelled horizon, corresponding to Cruceni–Belegiș II and the broader LBA II stage in eastern and southeastern Carpathian Basin. The data from Dumbrăvița once again reinforce the notion that the material culture of Late Bronze Age pottery in the northern Banat area developed upon the same cultural foundation. However, its evolution subsequently followed a different trajectory. Another noteworthy result is the discovery at Dumbrăvița of the first documented beads in the Cruceni–Belegiș cultural area. While not chronologically significant, these finds carry symbolic and prestige value. They suggest the community was familiar with prized adornments of the time.

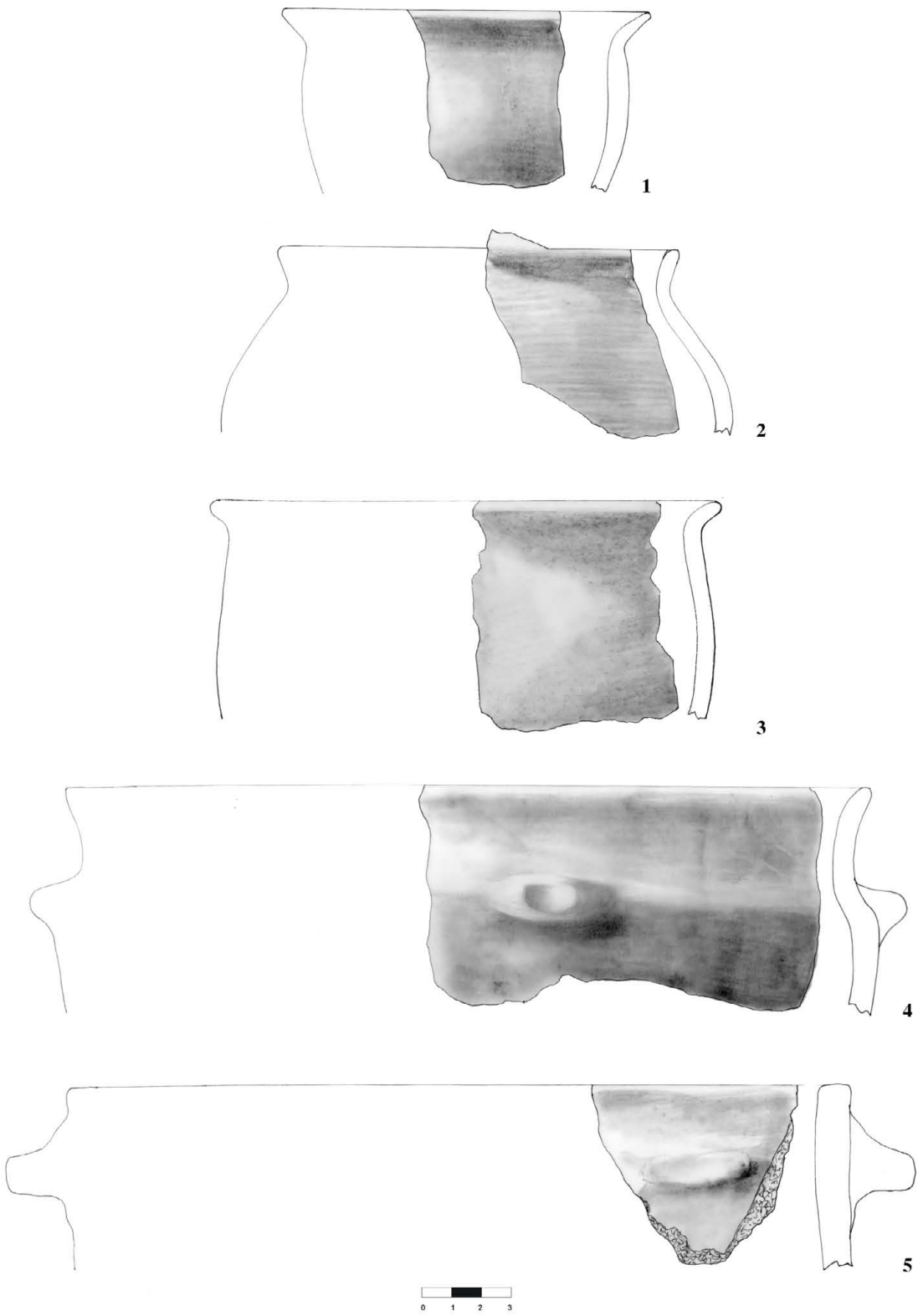


Fig. 9. Cooking pots (1–3) and storage vessels (4–5) from Dumbrăvița–Parohia Ortodoxă III (author A. Stăvilă)

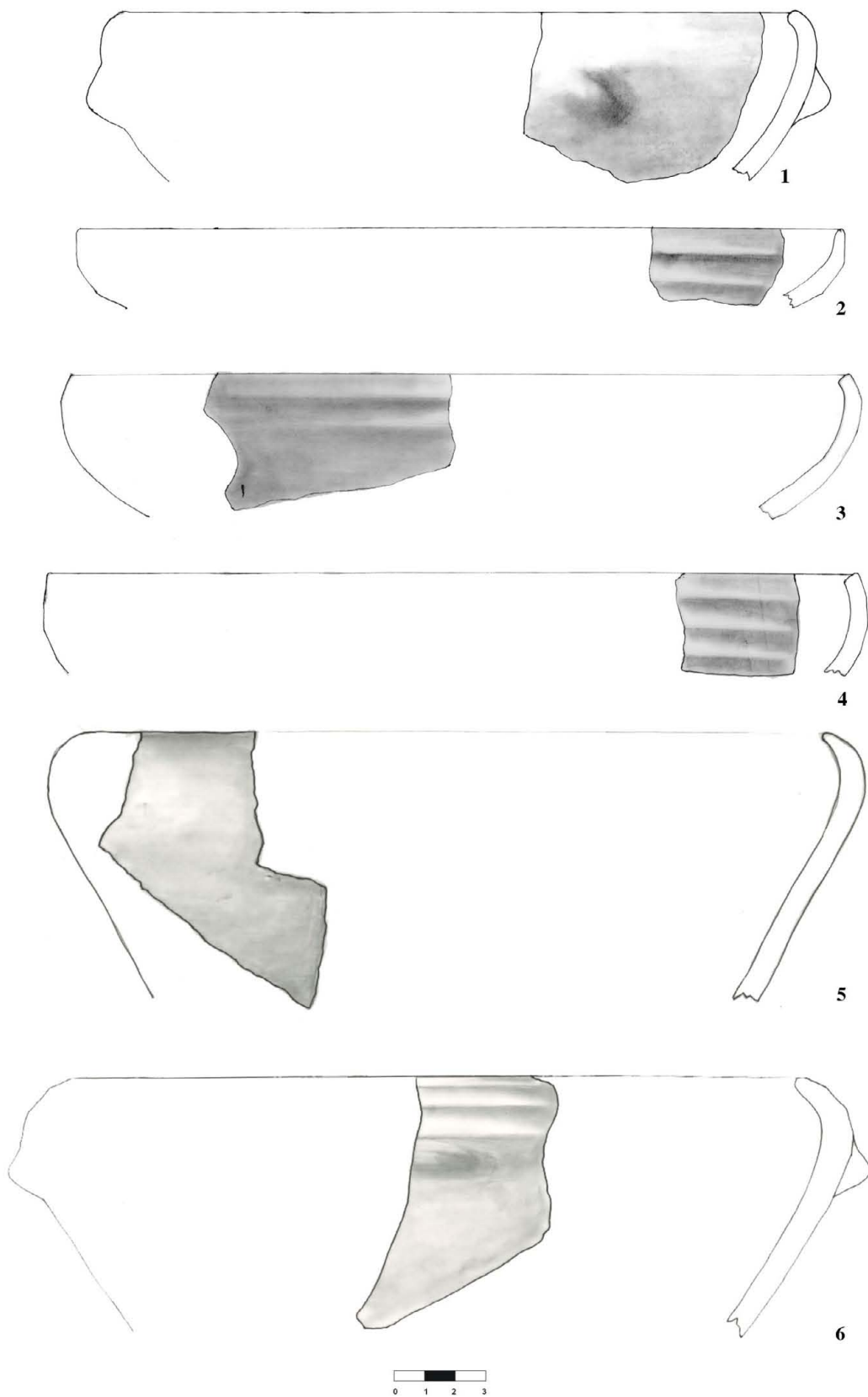


Fig. 10. Plates (1–4) and bowls (5–6) from Dumbrăvița–Parohia Ortodoxă III (author A. Stavilă)

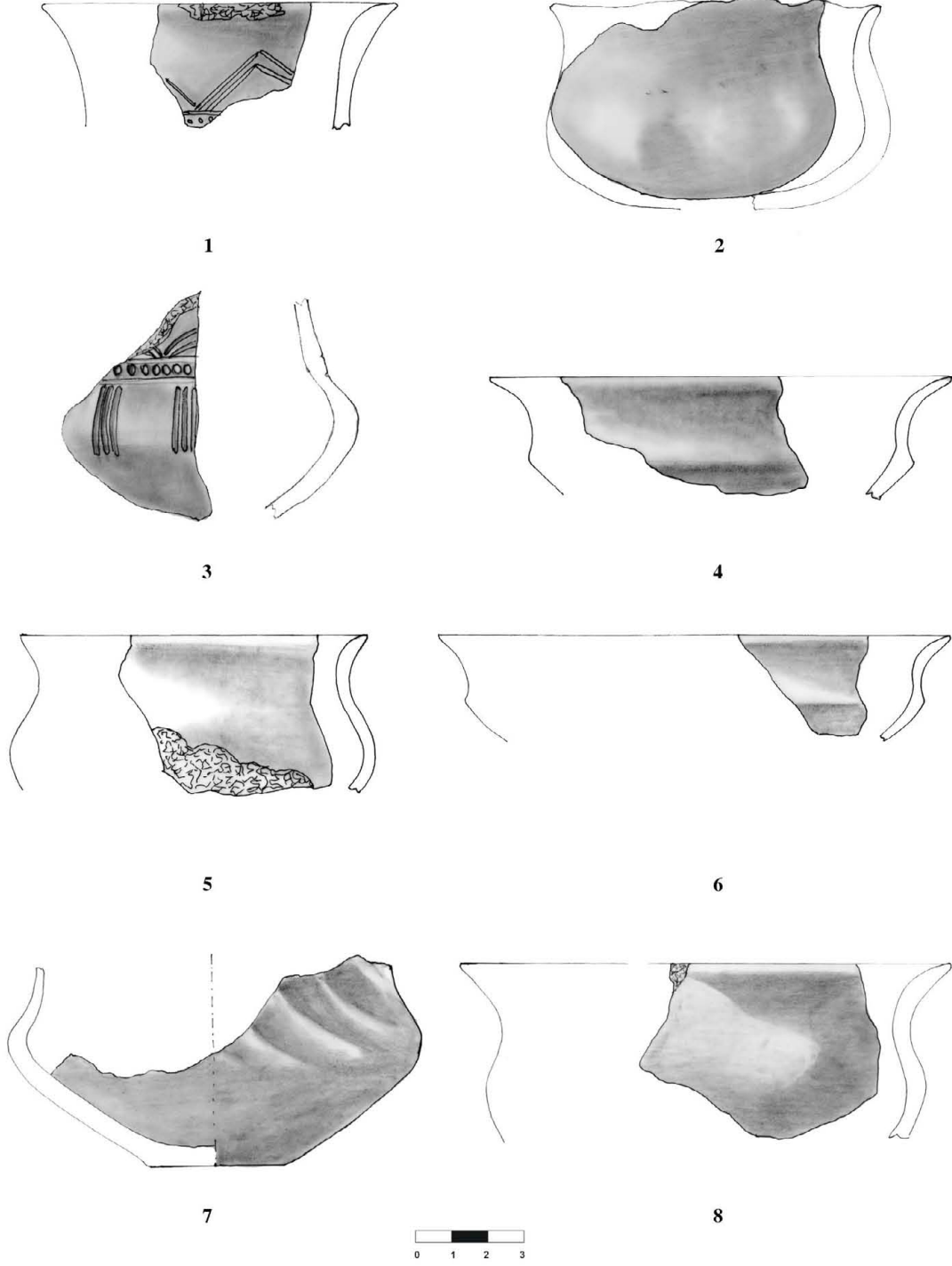


Fig. 11. Cups from Dumbrăvița-Parohia Ortodoxă III (author A. Stăvilă)

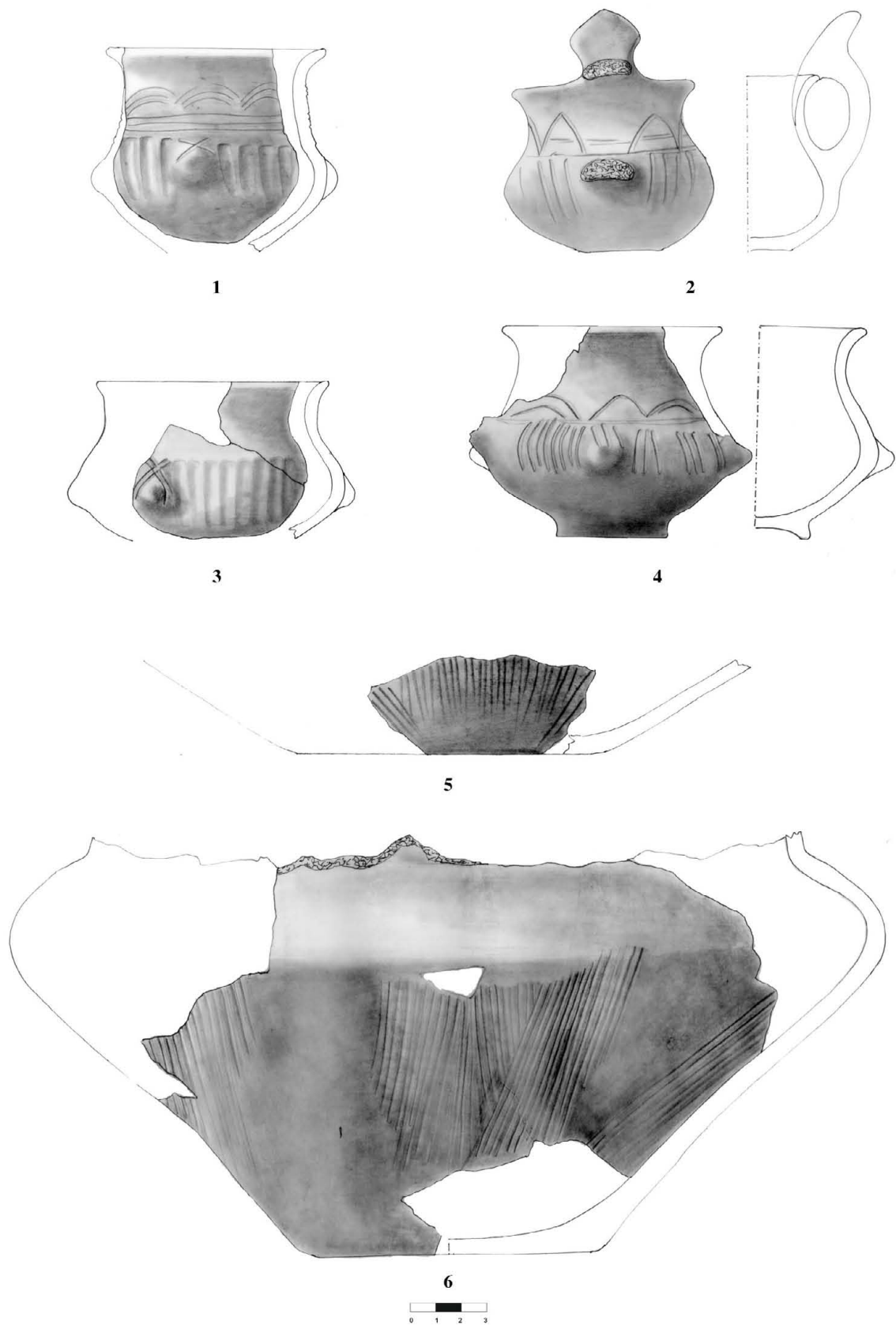


Fig. 12. Cups (1–4) and parts of amphorae (5–6) from Dumbrăvița–Parohia Ortodoxă III (author A. Stavilă)

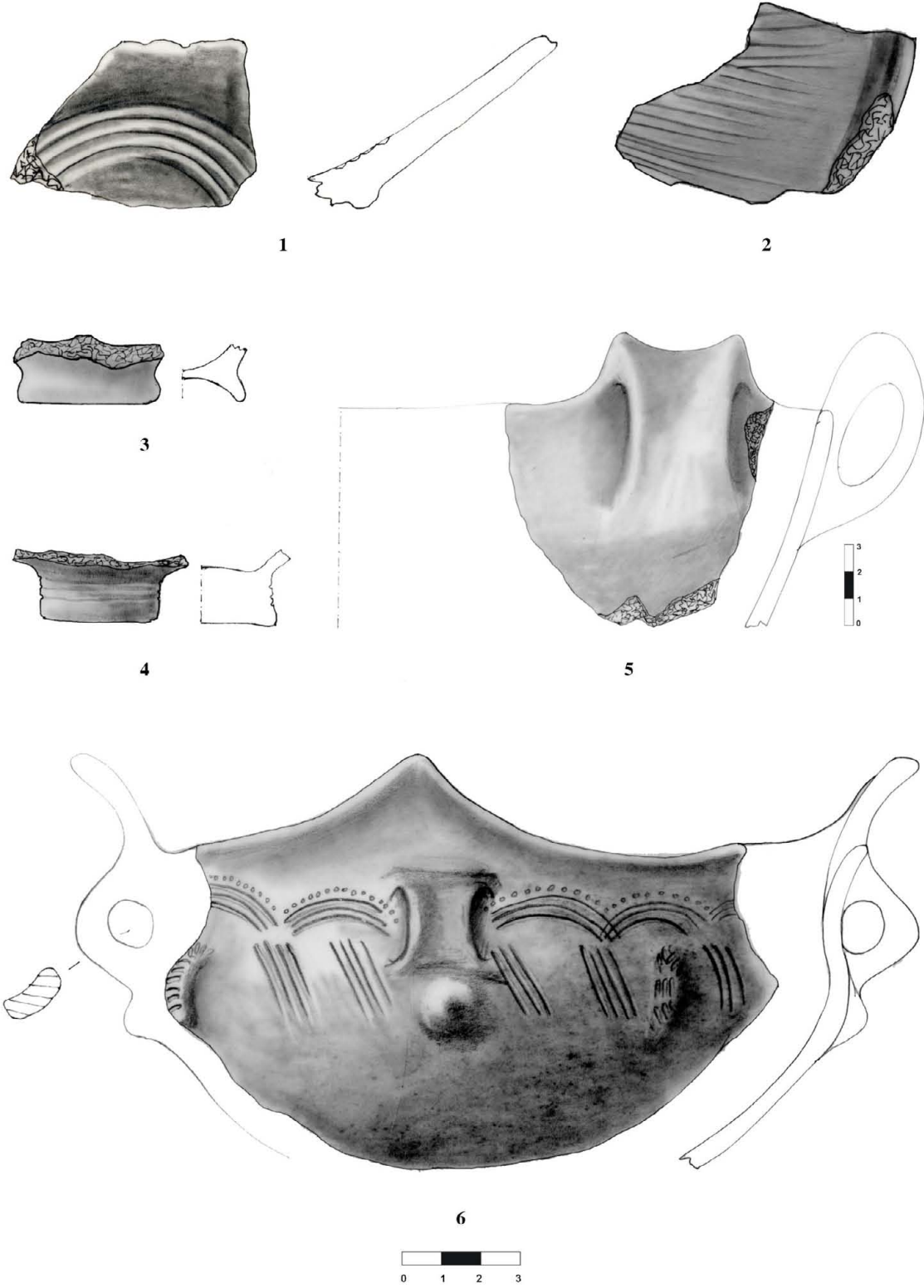


Fig. 13. Fragments of vessels (1–5) and a lobed-rim bowl (6) from Dumbrăvița–Parohia Ortodoxă III (author A. Stăvilă)

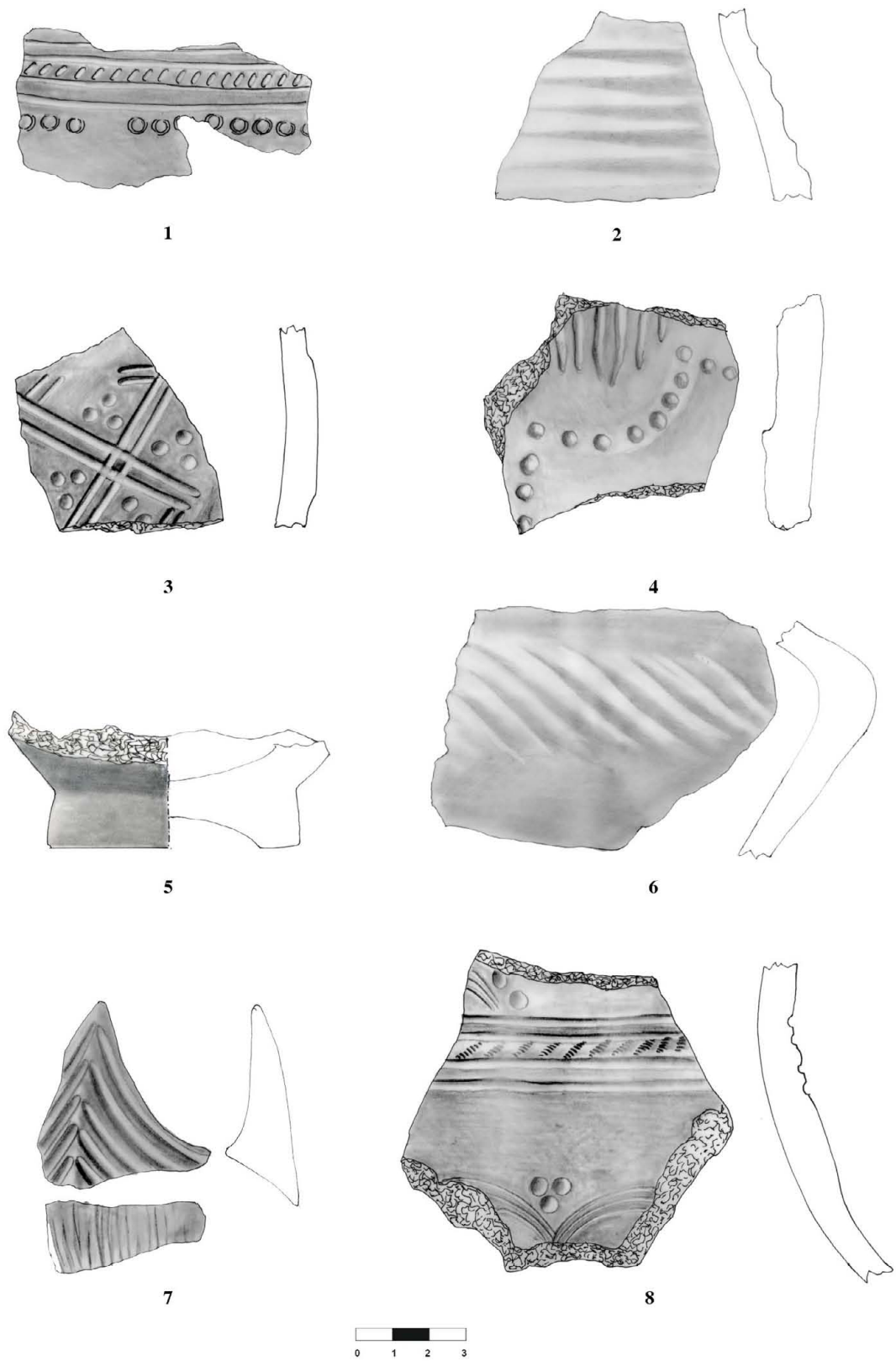


Fig. 14. Fragments of vessels from Dumbrăvița–Parohia Ortodoxă III (author A. Stavilă)

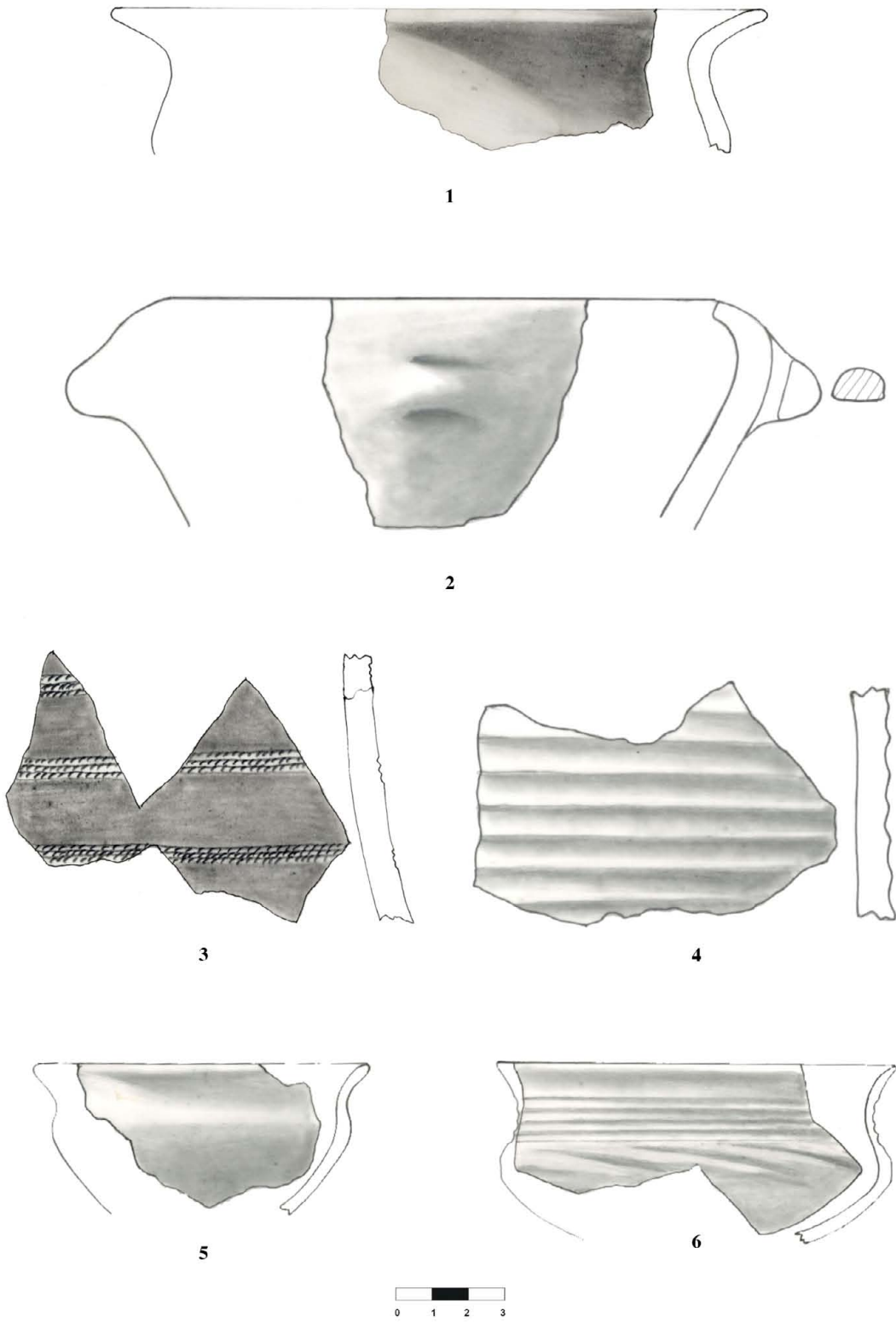


Fig. 15. Fragments of vessels and complete vessels from Dumbrăvița-Parohia Ortodoxă III (author A. Stăvilă)

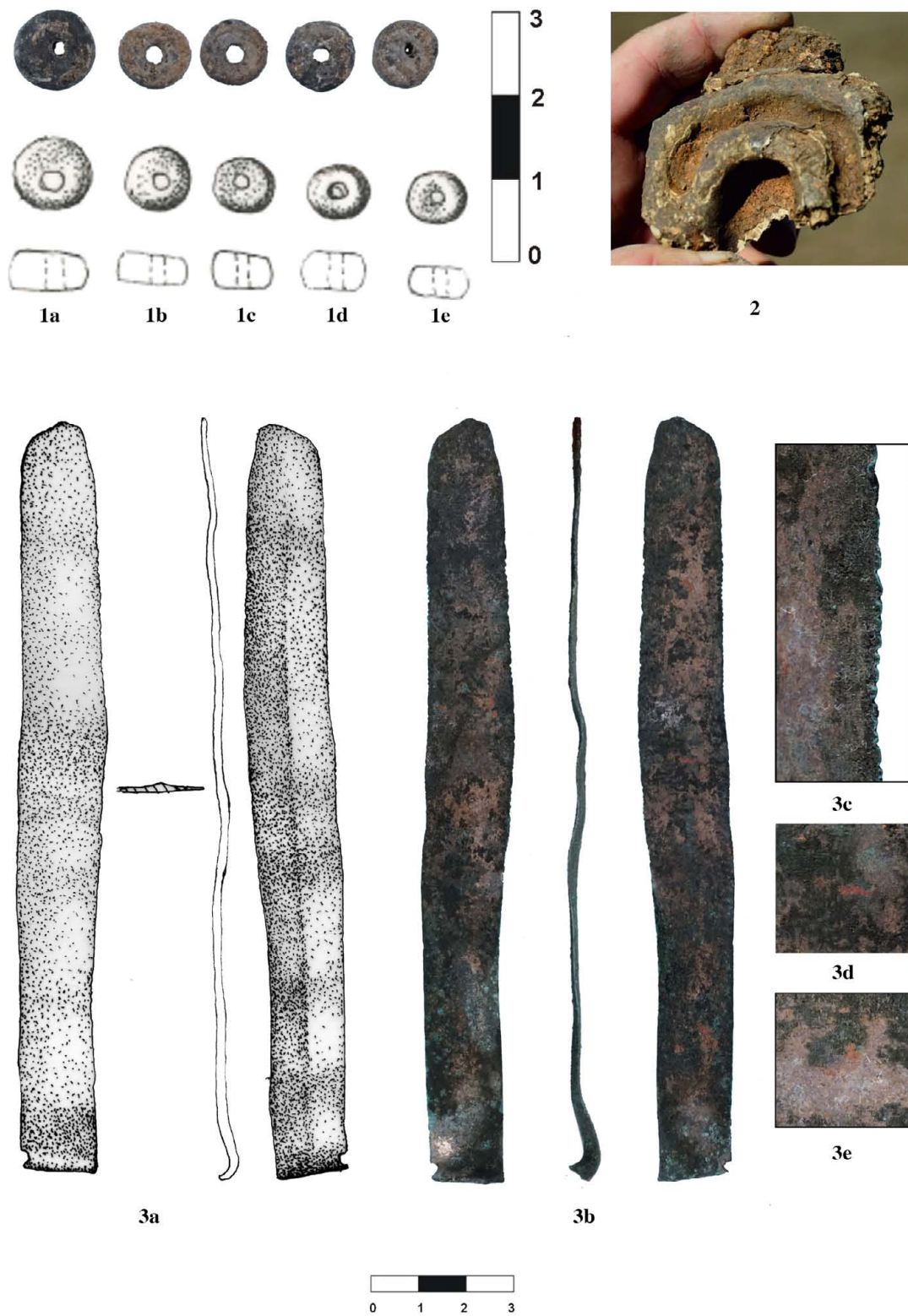


Fig. 16. Beads (1a–e), fragment of a hearth ornament (2) and the metal object (3a–e) from Dumbrăvița–Parohia Ortodoxă III (author A. Stavilă)

Cultural transitions are often difficult to trace archaeologically. The results presented here show that the Dumbrăvița–Parohia Ortodoxă III settlement marks the transition between the Cruceni–Belegiș I and II phases at the beginning of the 14th c. cal BC. As such, it provides an important reference point for cross-regional comparisons in the eastern Carpathian Basin and south-east Europe.

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