

## EARLY BRONZE AGE HOARD OF COPPER JEWELLERY FROM BOJNÁ (WESTERN SLOVAKIA)<sup>1</sup>

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The hoard of copper objects from Bojná, Topoľčany district in western Slovakia, on the eastern slope of the Považský Inovec Mountains fits within the chronological framework of the existence of Early Bronze Age tribes. Such items were most widespread in the late (transitional), Nitra-Únětice phase of the Nitra culture, with a gradual fading and disappearance of the tradition during the classical phase of the Únětice culture. In the absence of additional data, the find of copper objects at the Bojná settlement probably can be dated broadly on the basis of <sup>14</sup>C data to the time interval 1930–1730 cal. BC. The analysis of burial materials from different archaeological cultures of Eastern Europe of the Bronze Age allows us to state the following: jewellery made of thin wire – spiral rings with open ends – are universal and multifunctional products, which in the context of funerary rites could be used just as bracelets or rings for hairstyles and headdresses. Apart from economic reasons (storage, concealment), ritual reasons for the burial of the hoard cannot be ruled out. It is possible that the items from the Bojná complex are not just a hoard of metal objects, but also the result of ritual-magical activities related to the manipulation of human hair.

Keywords: Western Slovakia, Bojná, Early Bronze Age, Nitra culture, Únětice culture, copper hoard, XRF analysis.

### INTRODUCTION

In the cadastre of Bojná, Topoľčany district in western Slovakia, on the eastern slope of the Považský Inovec Mountains, there is a system of Early Medieval fortifications, which was investigated in 2007–2023 (Fig. 1). Bojná is one of the sites that came to the attention of the public and experts relatively late. Also, although the first mention of the Valy settlement in the Bojná cadastre dates to the beginning of the last century, a larger-scale research effort began here only in 2003, after amateur discoveries of several massive finds and numerous valuable artefacts that were included in several private and museum collections. This remains a great merit of a few enthusiasts, who purchased most of the objects found at their own expense and donated them to the Institute of Archaeology of the Slovak Academy of Sciences (further IA SAS). This institute undertook to guarantee the preservation of the heritage site, and in 2007, systematic research began here, which continues to this day (Pieta 2017, 11).

In the summer of 2022, the archaeological expedition of the IA SAS, led by K. Pieta<sup>2</sup>, continued scientific research of the medieval agglomeration of fortified settlements in the outskirts of Bojná (Fig. 2). During the detector exploration of the southern slopes of the fortifications and the interior of the

Bojná I-Valy hillfort south of Site 8, a collection of Bronze Age copper objects was found, which was a hoard consisting of several round spiral jewels and their fragments. Later, an additional excavation was made at the site of the hoard discovery to clarify the circumstances and context of the find – trench LXXIII with dimensions of 5 × 9 m (Fig. 3). However, the search for other artefacts from the Bronze Age did not yield any results. Subsequently, numerous finds were discovered here exclusively from the Early Middle Ages. This fact largely limits the comprehensive assessment of the hoard and its interpretative possibilities.

According to modern knowledge gained from field research, the first traces of human activity in the village cadastre date back to the Neolithic/Eneolithic and Bronze Age (Cheben 2014; Pieta/Ruttikay 2006, 27). The radiocarbon dating of the oldest settlement horizon of the Bojná I-Valy site is based on a charred plum pit (*prunus – acuticarpa?*) found in a pedological profile in the central part of the site, analysed by A. Volkmann (1863 ± 67 cal. BC; Henning/Ruttikay 2011, tab. 8).

A fragment of a bronze spearhead, found at the Bojná I-Valy settlement, is probably only indirect evidence of hunting activity in the Early or Late Bronze Age. A damaged bronze spearhead was also found in the foreground of the Bojná II

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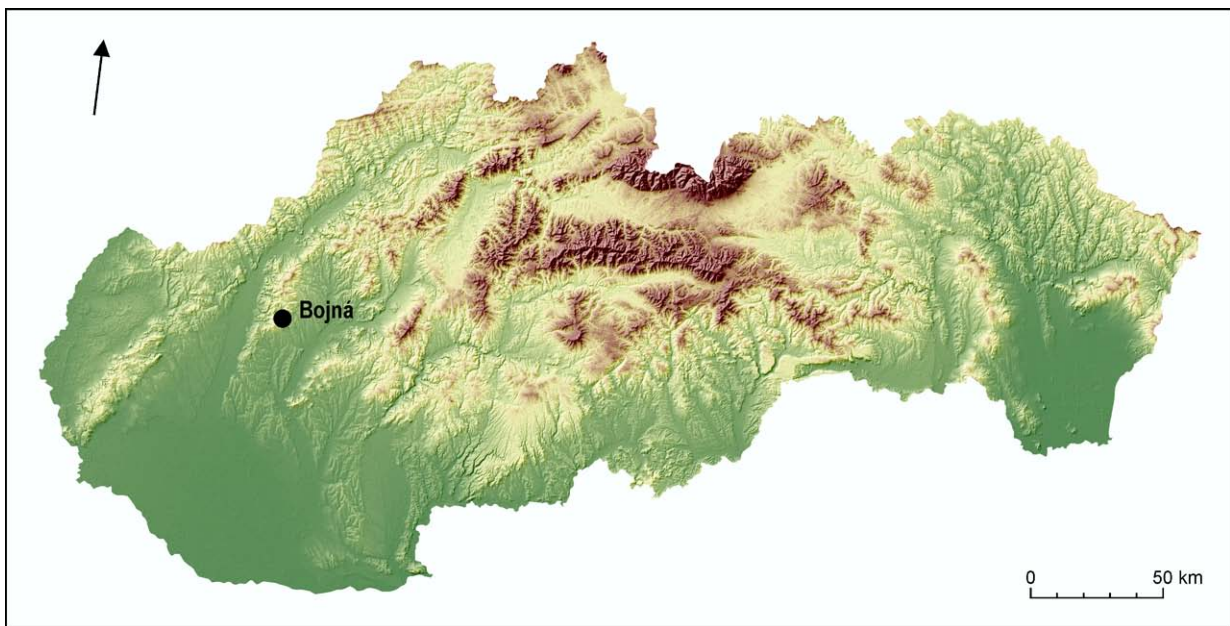


Fig. 1. Location of the hoard near Bojná site on the map of Slovakia. Map V. Zabavin.

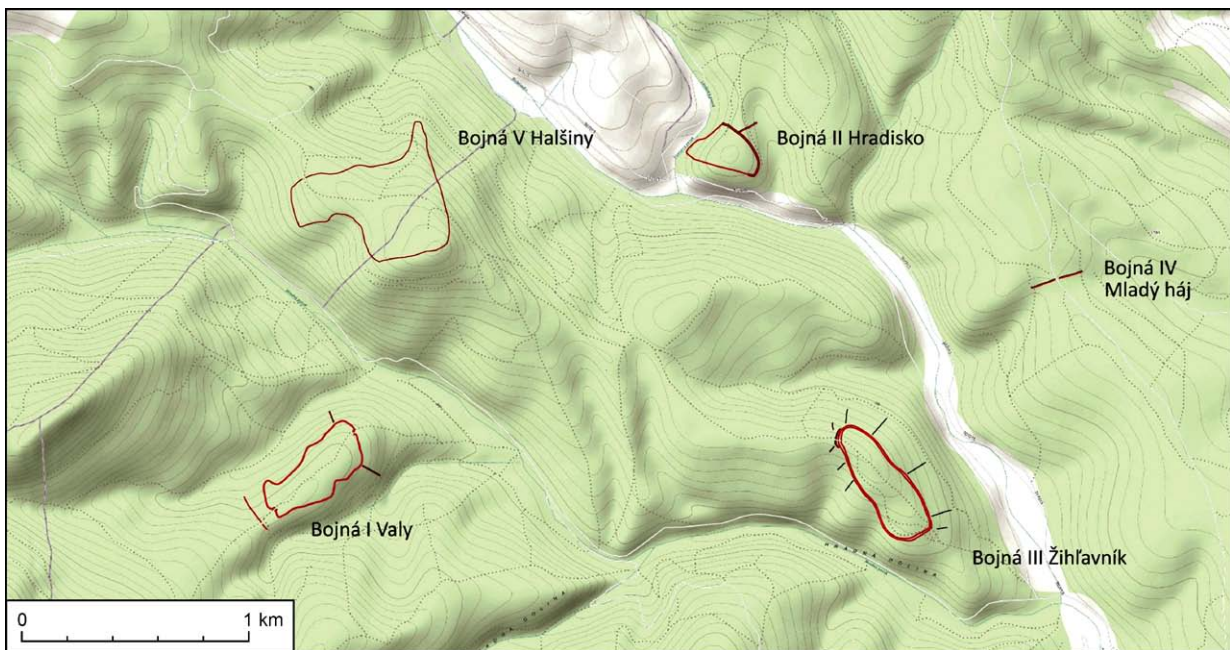


Fig. 2. Bojná. Plan of the agglomeration of medieval settlements. Map M. Bartík, K. Pieta.

fortification. The remains of an Early and Late Bronze Age settlement were also found in the vicinity of Nová Lehota (Bojná V; Pieta 2017, 13). In addition, it should be noted the accidental find of a metal pin with a vertical hole in the round head at the settlement Bojná V.<sup>3</sup> Finds of similar objects are widely known from the Early and early Mid-

dle Bronze Age of Slovakia (Bátora 2018, 180–186, fig. 136: 15, 18).

The Late Bronze Age and Early Iron Age in the immediate neighbourhood of Bojná is represented by two large concentrations of prehistoric settlements in the vast areas of the Marhát (748 m) and Úhrad (685 m) hills, with fortifications on the

<sup>3</sup> Unpublished, information of Karol Pieta.

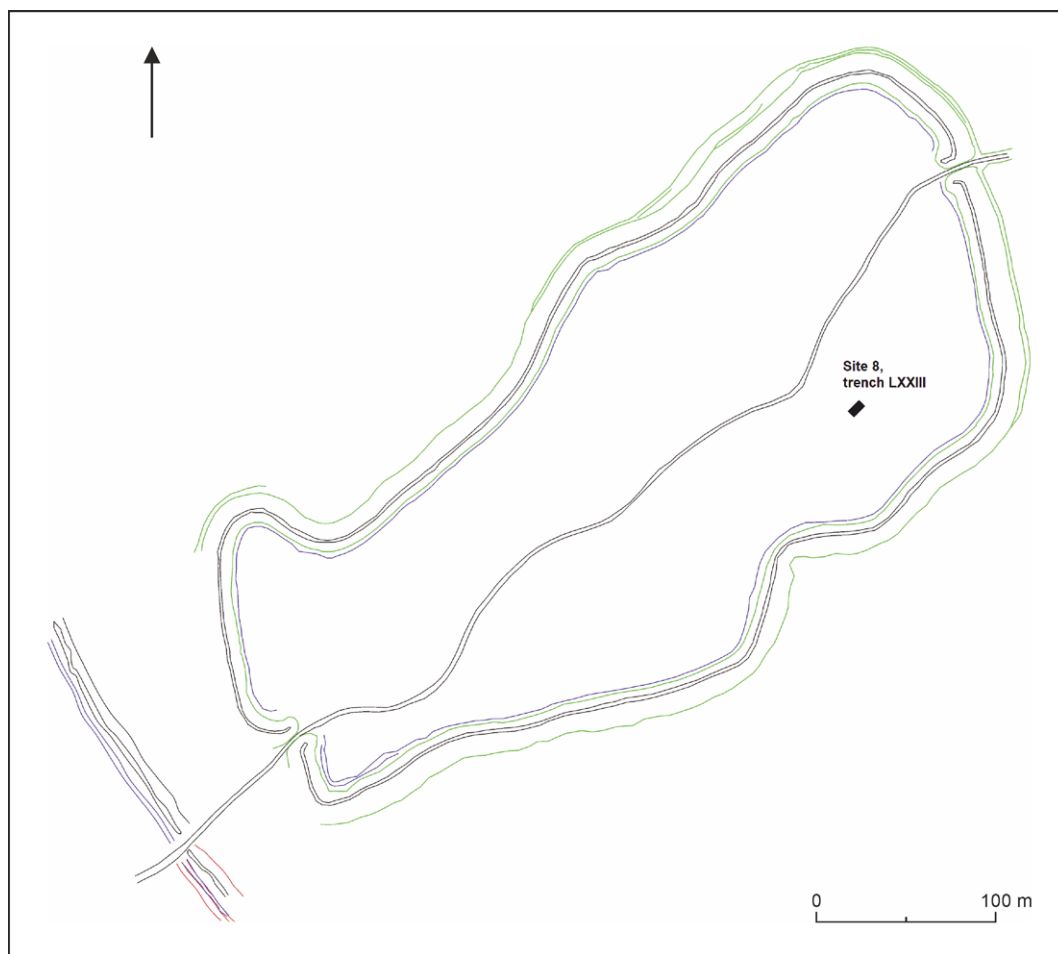


Fig. 3. Bojná I-Valy. Settlement outline. Site 8, trench LXXIII.

summit and settlements on the slopes. At least three hoards of bronze jewellery were reportedly discovered on a stone hill below the summit of the Marhát. Hoards of bronze jewellery were published from this site (Bartík/Jelínek/Gábríková 2022). Sporadic settlement finds are known near Nitrianska Blatnica-Jurko (Ondrkál 2020; Oždáni 2007; 2018; Ruttkay 2012, 343).

#### DESCRIPTION OF ARTEFACTS

Bojná I-Valy, site 8, trench LXXIII, measuring  $9 \times 5$  m, connected to older boreholes by three old stakes. Here, during the detector search, even before the uncovering began, a mass find of copper objects was discovered at a depth of 0.25 m from the current surface.

The complex was a compact deposit of all finds, totalling approximately  $21 \times 9$  cm. The items of the hoard were located at almost the same level, stretched in one direction along the horizontal

plane: three blocks (bundles), one after another, with a slight inclination down the slope of the surface and a slight deviation from the axis. The rings have ends that have been bent, twisted or broken off since in ancient times. Near and under the lower bundle of the rings were remnants of bark (old root?). During the fieldwork, the hoard was excavated as a monolithic block together with the soil that filled it, leaving the objects *in situ* for further study in the laboratory (Fig. 4).

The hoard collection consists of 37 objects – round jewellery (temple pendant rings [?] wrist bracelets [?] as well as their fragments) made of thin copper wire, rounded in cross-section. The pieces are not covered with a continuous layer of high quality dark green patina. As a result of prolonged contact with negative soil factors, the structure of the products was partially damaged. Corrosion products – large layered hard growths – began to accumulate on the surface of the material. They are layered on top of each other; the surface layer has become loose and heterogeneous. In some places, the body of





Fig. 4. Bojná I-Valy. Site 8. 1 – trench LXXIII, view from the south (photo M. Jakubčinová); 2 – purification (photo K. Pieta); 3 – lab processing (photo V. Mezey).

the objects is thinned and damaged by corrosion or covered with amorphous oxide growths due to aggressive environmental influences.

The finds are currently held in the funds of the IA SAS in Nitra under temporary registration numbers 85/22–121/22.

1. A spiral ring with open ends consisting of two complete coils tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.6–2.2 mm; wire length 46 cm; outer diameter 7–7.7 cm; inner diameter 6.6–7.1 cm; weight 10.478 g. Reg. no. 85/22 (Fig. 5: 1).
2. A spiral ring with open ends consisting of three complete coils tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.4–2 mm; wire length 69 cm; outer diameter 7–7.2 cm; inner diameter 6.9–7 cm; weight 13.222 g. Reg. no. 86/22 (Fig. 5: 2).
3. A spiral ring with open ends consisting of two incomplete coils (1 3/4) tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.4–2.5 mm; wire length 42 cm; outer diameter 7.2–7.4 cm; inner diameter 6.6–6.7 cm; weight 9.942 g. Reg. no. 87/22 (Fig. 5: 3).
4. A spiral ring with open ends consisting of two complete coils tightly pressed together. The ends are pointed.

- Dimensions: wire diameter 1.8–2.2 mm; wire length 46.5 cm; outer diameter 7.1–7.3 cm; inner diameter 6.5–6.6 cm; weight 10.11 g. Reg. no. 88/22 (Fig. 5: 4).
5. A spiral ring with open ends consisting of four incomplete coils (3 1/2) tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.6–2.1 mm; wire length 79.5 cm; outer diameter 7.2–7.4 cm; inner diameter 6.4–6.6 cm; weight 14.602 g. Reg. no. 89/22 (Fig. 5: 5).
  6. A spiral ring with open ends consisting of two incomplete coils (1 1/2) tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.1–2.3 mm; wire length 38.5 cm; outer diameter 7.4–7.6 cm; inner diameter 6.8–6.9 cm; weight 8.062 g. Reg. no. 90/22 (Fig. 5: 6).
  7. A spiral ring with open ends consisting of two complete coils with wire overlap at one third of the radius, tightly pressed together. One edge is slightly bent relative to the plane of the ring. The ends are pointed.  
Dimensions: wire diameter 1.6–2.6 mm; wire length 55 cm; outer diameter 7–7.5 cm; inner diameter 6.4–6.6 cm; weight 11.634 g. Reg. no. 91/22 (Fig. 5: 7).
  8. A spiral ring with open ends consisting of two incomplete coils (1 3/4) tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.8–2.2 mm; wire length 42.5 cm; outer diameter 7.3–7.5 cm; inner diameter 6.5–6.7 cm; weight 8.512 g. Reg. no. 92/22 (Fig. 5: 8).

9. A spiral ring with open ends consisting of two complete coils with overlapping of the wire by one third of the radius, tightly pressed together. One end is pointed, the other is cut off at right angles.  
Dimensions: wire diameter 2–2.4 mm; wire length 55.5 cm; outer diameter 7.1–7.4 cm; inner diameter 6.4–6.7 cm; weight 14.763 g. Reg. no. 93/22 (Fig. 5: 9).
10. A spiral ring with open ends consisting of three incomplete coils (2 1/2) tightly pressed together. The ends are cut off at right angles.  
Dimensions: wire diameter 1.6–2.1 mm; wire length 60 cm; outer diameter 7.2–7.5 cm; inner diameter 6.5–6.8 cm; weight 12.804 g. Reg. no. 94/22 (Fig. 5: 10).
11. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed.  
Dimensions: wire diameter 1.8–2.2 mm; wire length 14.5 cm; outer diameter 7.2 cm; inner diameter 7 cm; weight 3.046 g. Reg. no. 95/22 (Fig. 5: 11).
12. A spiral ring with open ends consisting of two incomplete coils (1 1/2) tightly pressed together. One end pointed, the other cut off at right angles.  
Dimensions: wire diameter 1.6–1.9 mm; wire length 42.5 cm; outer diameter 6.9–7.1 cm; inner diameter 6.6–6.8 cm; weight 9.135 g. Reg. no. 96/22 (Fig. 5: 12).
13. A ring with open ends consisting of one incomplete coil. The ends are separated by 1 cm and cut at right angles.  
Dimensions: wire diameter 1.9–2.1 mm; wire length 21 cm; outer diameter 6.9–7.2 cm; inner diameter 6.7–6.9 cm; weight 4.677 g. Reg. no. 97/22 (Fig. 5: 13).
14. A ring with open ends consisting of one incomplete coil. The ends are pointed and separated by 1 cm.  
Dimensions: wire diameter 1.7–2.3 mm; wire length 20.5 cm; outer diameter 6.8–7.4 cm; inner diameter 6.6–7.2 cm; weight 4.459 g. Reg. no. 98/22 (Fig. 5: 14).
15. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed.  
Dimensions: wire diameter 2.1–2.2 mm; wire length 17.5 cm; outer diameter 7 cm; inner diameter 6.8 cm; weight 4.103 g. Reg. no. 99/22 (Fig. 5: 15).
16. A spiral ring with open ends consisting of one complete coil with overlapping ends at 1 cm, tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.8–2 mm; wire length 23.5 cm; outer diameter 6.8–7.1 cm; inner diameter 6.6–6.9 cm; weight 5.135 g. Reg. no. 100/22 (Fig. 5: 16).
17. A ring with open ends consisting of one incomplete coil. The ends are separated by 1 cm, one end pointed, and the other cut at right angles.  
Dimensions: wire diameter 1.9–2.2 mm; wire length 18.5 cm; outer diameter 6.7 cm; inner diameter 6.5 cm; weight 4.027 g. Reg. no. 101/22 (Fig. 5: 17).
18. A ring with open ends consisting of one incomplete coil (3/4). One end is broken off in ancient times, the other is strongly bent relative to the radius of the ring and shaped in the form of a volute (twisted into a ring). The volute was damaged during the clearing, it is partially preserved.  
Dimensions: wire diameter 1.7–2.2 mm; wire length 17.5 cm; outer diameter of the ring approximately 7.2 cm; inner diameter of the piece approximately 7 cm; weight 3.732 g.  
Reconstructed dimensions of the volute: outer diameter 5.5 mm; inner diameter 2.9 mm. Reg. no. 102/22 (Fig. 5: 18).
19. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed.  
Dimensions: wire diameter 2–2.2 mm; wire length 15.5 cm; outer diameter 7 cm; inner diameter 6.8 cm; weight 2.882 g. Reg. no. 103/22 (Fig. 6: 19).
20. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed.  
Dimensions: wire diameter 2–2.1 mm; wire length 19.5 cm; outer diameter 7 cm; inner diameter 6.8 cm; weight 3.392 g. Reg. no. 104/22 (Fig. 6: 20).
21. A spiral ring with open ends consisting of one complete coil with overlapping ends at 2.5 cm, tightly pressed together. The ends are pointed.  
Dimensions: wire diameter 1.9–2.2 mm; wire length 25 cm; outer diameter 6.7–7.4 cm; inner diameter 6.5–7.2 cm; weight 5.597 g. Reg. no. 105/22 (Fig. 6: 21).
22. A ring with open ends consisting of one incomplete coil. The ends are separated by 2.5 cm, one end is pointed, the other is cut off at right angles.  
Dimensions: wire diameter 1.9–2.2 mm; wire length 20.5 cm; outer diameter about 7.2 cm; inner diameter about 7 cm; weight 3.758 g. Reg. no. 106/22 (Fig. 6: 22).
23. A ring with open ends consisting of one incomplete coil. The ends are separated by 2.5 cm, one end is pointed and strongly bent relative to the plane and radius of the ring, the other is cut off at right angles.  
Dimensions: wire diameter 1.9–2.4 mm; wire length 20.5 cm; outer diameter about 7 cm; inner diameter about 6.8 cm; weight 4.947 g. Reg. no. 107/22 (Fig. 6: 23).
24. A ring segment, approximately half of the radius of the coil. The ends are pointed.  
Dimensions: wire diameter 2.2–2.5 mm; wire length 11.5 cm; outer diameter approximately 7.5 cm; inner diameter approximately 7.3 cm; weight 2.743 g. Reg. no. 108/22 (Fig. 6: 24).
25. A ring with open ends consisting of one complete coil with overlapping of the ends by 1 cm, not tightly pressed together. The piece is slightly deformed relative to the radius of the ring. The ends are pointed.  
Dimensions: wire diameter 1.7–2.2 mm; wire length 24.5 cm; outer diameter 6.7–7.5 cm; inner diameter 6.5–7.3 cm; weight 5.075 g. Reg. no. 109/22 (Fig. 6: 25).
26. Fragment of a ring, with open ends, consisting of approximately one complete coil. One end pointed, the other broken off.  
Dimensions: wire diameter 1.8–2 mm; wire length 20 cm; outer diameter approximately 7 cm; inner diameter approximately 6.8 cm; weight 4.114 g. Reg. no. 110/22 (Fig. 6: 26).
27. A ring with open ends consisting of one incomplete coil (3/4). The piece is slightly deformed relative to the plane of the ring. The ends are pointed.  
Dimensions: wire diameter 1.8–2.3 mm; wire length 16.5 cm; outer diameter approximately 7.3 cm; inner diameter approximately 7.1 cm; weight 3.713 g. Reg. no. 111/22 (Fig. 6: 27).
28. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed.  
Dimensions: wire diameter 1.8–2.2 mm; wire length 17.5 cm; outer diameter approximately 7.2 cm; inner diameter approximately 7 cm; weight 2.254 g. Reg. no. 112/22 (Fig. 6: 28).
29. Fragment of a ring, with open ends, consisting of approximately half of a complete coil. The piece is heavily deformed relative to the plane and radius of the ring. One end is pointed, the other is broken off.

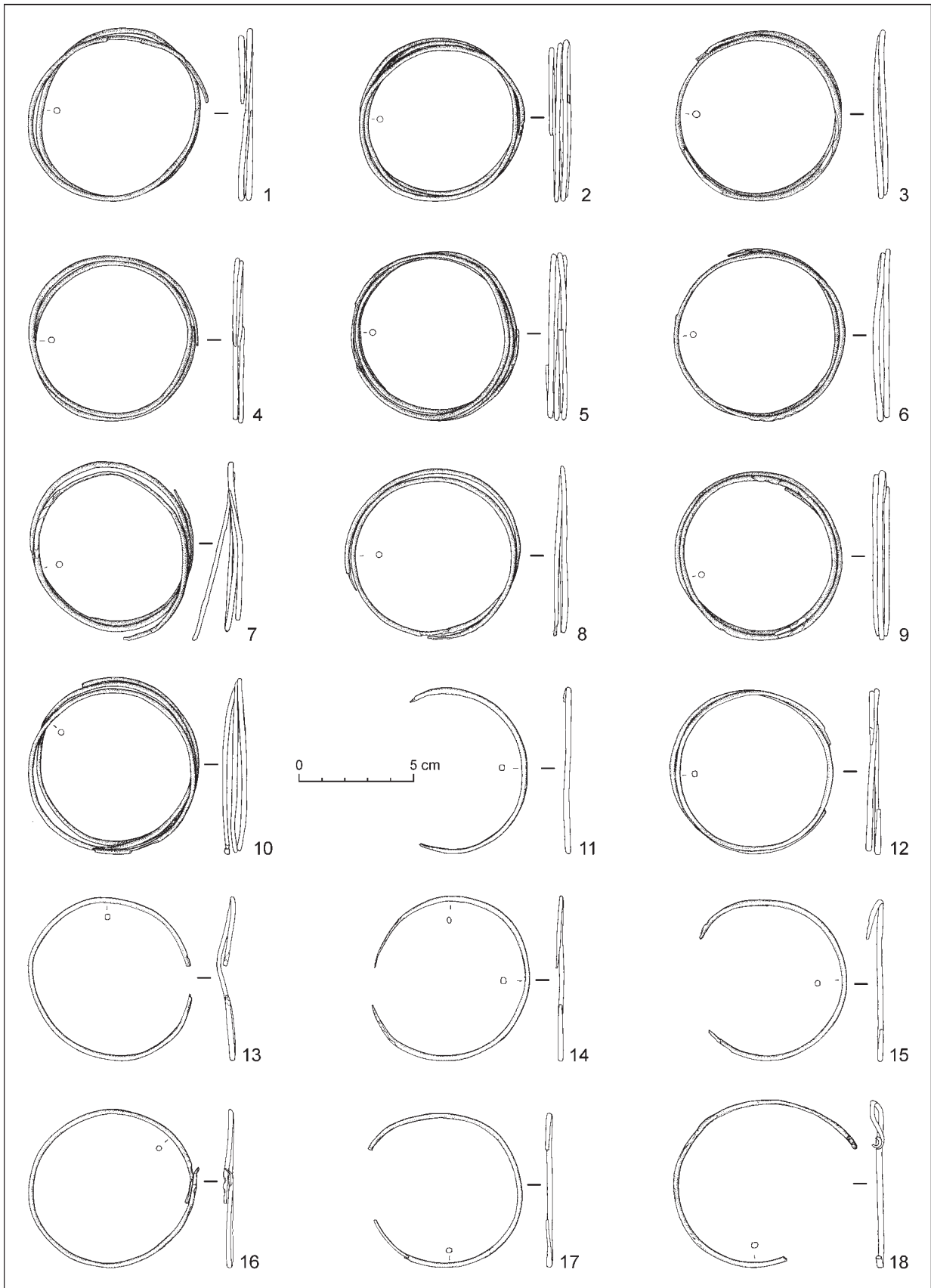


Fig. 5. Bojná I-Valy. Site 8, trench LXXIII. A hoard of copper rings. Part I. Drawing Z. Nagyová.

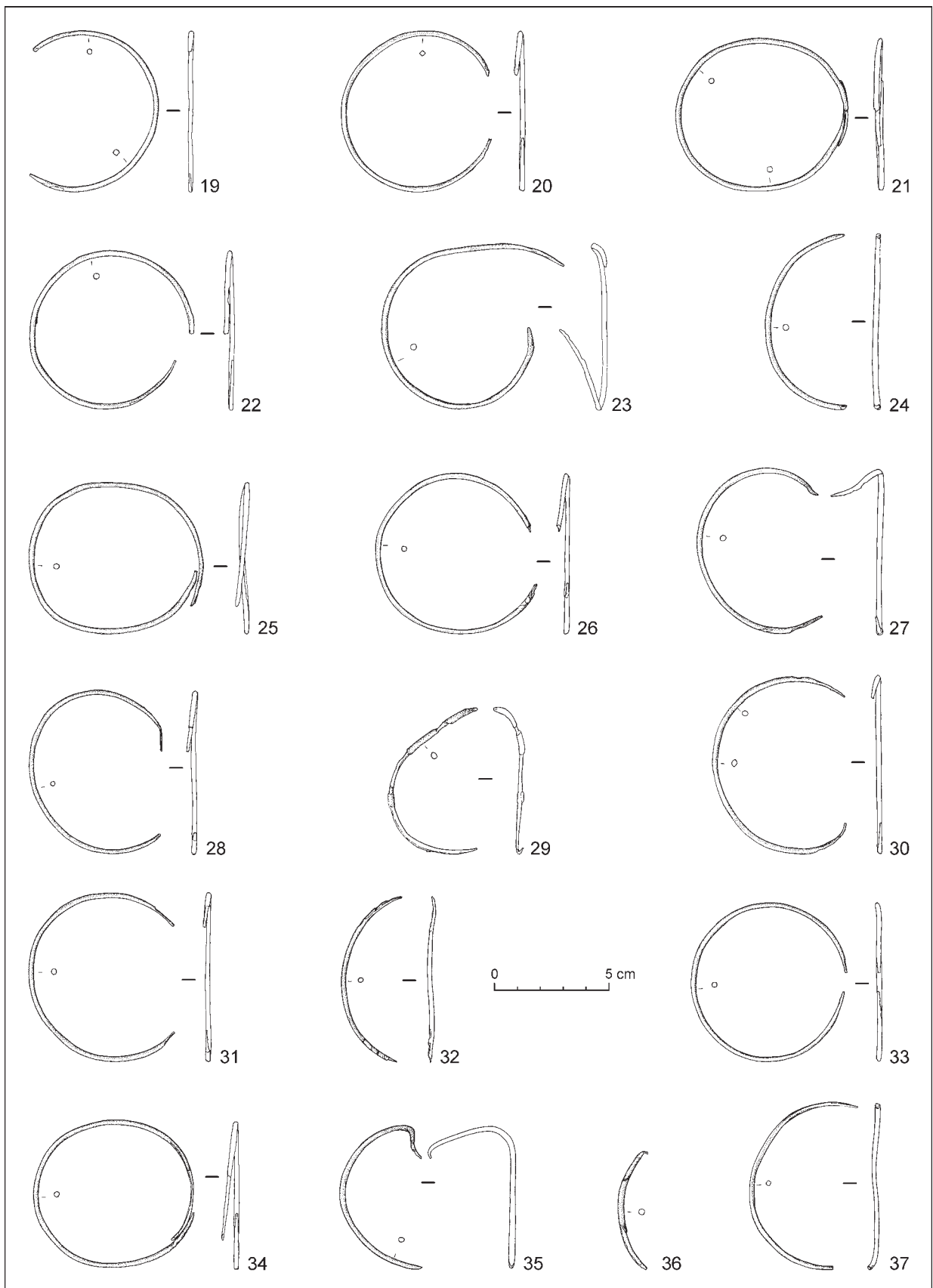


Fig. 5. Bojná I-Valy. Site 8, trench LXXIII. A hoard of copper rings. Part II. Drawing Z. Nagyová.



- Dimensions: wire diameter 1.2–2.4 mm; wire length 11.5 cm; outer diameter approximately 7 cm; inner diameter approximately 6.8 cm; weight 1.854 g. Reg. no. 113/22 (Fig. 6: 29).
30. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed, one edge slightly bent inwards. Dimensions: wire diameter 1.9–2.2 mm; wire length 16.5 cm; outer diameter 7.6 cm; inner diameter 7.4 cm; weight 3.865 g. Reg. no. 114/22 (Fig. 6: 30).
  31. A ring with open ends consisting of one incomplete coil (3/4). The ends are pointed. Dimensions: wire diameter 1.6–2 mm; wire length 18 cm; outer diameter approximately 7.2 cm; inner diameter approximately 7 cm; weight 3.657 g. Reg. no. 115/22 (Fig. 6: 31).
  32. A ring segment, approximately one third of the radius of the coil. The ends are pointed. Dimensions: wire diameter 1.8–2 mm; wire length 9.5 cm; outer diameter approximately 7.5 cm; inner diameter approximately 7.3 cm; weight 1.111 g. Reg. no. 116/22 (Fig. 6: 32).
  33. A ring with open ends consisting of one incomplete coil. The ends are pointed and separated by 0.7 cm. Dimensions: wire diameter 1.8–2 mm; wire length 21 cm; outer diameter about 7 cm; inner diameter about 6.8 cm; weight 3.711 g. Reg. no. 117/22 (Fig. 6: 33).
  34. A ring with open ends consisting of one complete coil with overlapping of the ends by 1 cm, not tightly pressed together. The ends are pointed. Dimensions: wire diameter 1.7–2.2 mm; wire length 22.5 cm; outer diameter 6.4–7.2 cm; inner diameter 6.2–7 cm; weight 4.05 g. Reg. no. 118/22 (Fig. 6: 34).
  35. A ring segment, approximately half of the radius of the coil. The ends are pointed. Dimensions: wire diameter 1.9–2.2 mm; wire length 13 cm; outer diameter approximately 7.5 cm; inner diameter approximately 7.3 cm; weight 2.953 g. Reg. no. 119/22 (Fig. 6: 35).
  36. A ring segment, approximately one quarter of the radius of the coil. The product is slightly deformed relative to the plane of the ring. The ends are pointed. Dimensions: wire diameter 1.6–2.5 mm; wire length 6 cm; product diameter set approximately 7.5 cm; weight 1.15 g. Reg. no. 120/22 (Fig. 6: 36).
  37. Fragment of a ring, with open ends, consisting of approximately half of a complete coil. One end pointed, the other broken off. Dimensions: wire diameter 1.8–2 mm; wire length 12.5 cm; outer diameter approximately 7 cm; inner diameter approximately 6.8 cm; weight 1.813 g. Reg. no. 121/22 (Fig. 6: 37).

The authors carried out a visual analysis of the complex of hoard items considering metric and morphological data (radius of the item and wire diameter, structure and colour of fragment fractures) with the aim of possible reconstruction of whole rings. Comparison of the results of the visual analysis with the field photographs of the hoard allowed sorting of the artefacts according to the principle of the integrity of the item.

Whole objects and ring segments, with no signs of fracture, were sorted. The analysis of the remain-

ing fragments allowed us to identify two similar elements (registration numbers 110/22 and 121/22), which, with a high degree of probability, were parts of one whole object – a spiral ring of one and a half turns. This conclusion is not contradicted by the data of X-ray fluorescence spectrometry of the chemical composition of the objects. The chemical composition parameters of the fragments and the ligature content were found to be as close as possible according to the analyses (Cu 98.2%; Zn 0.255%; Ag 0.222%; Sb 0.81% and Cu 98.27%; Zn 0.21%; Ag 0.237%; Sb 0.714%, respectively).

Thus, all 37 artefacts from the Bojná I-Valy hoard were made of thin wire rounded in cross-section, with a diameter of 1.1–2.6 mm and an average ring diameter of 65–75 mm. The total weight of the hoard is 215 g. Based on the analysis of metric and morphological data, the finds can be subdivided into: spiral rings with open ends, tightly/not tightly pressed together and consisting of one and a half – four coils (16 pieces); rings with open ends consisting of one incomplete coil or their segments (19 pieces); open ring with the end twisted into a ring (1 piece).

## PALAEOMETALLURGY

### Chemical structure and raw material base

The Bojná I-Valy hoard was analysed at the Division of the Restoration laboratories of the Department of the scientific-technical information and restoration laboratories of the IA SAS in Nitra. The main purpose of the analysis carried out is to determine the alloys of the finished products. Prior to measurement, the surface of the artefacts was cleaned of oxides, fine corrosion and grease. The chemical composition of the objects was determined by applying a non-destructive method – X-ray fluorescence spectrometry. Data on the mass percentage content of individual elements were measured using a Niton XL3 XRF analyser designed for non-destructive analysis of the chemical composition of objects. In this case, the measurement was carried out from the surface of the investigated object.

The elemental composition of all fragments and whole items was investigated. Each item was measured in two places, with a measurement time of 30 seconds. Both the layer covered with patina and the place where patina was absent were analysed. At the same time, only the results of analyses from the original metal part were considered significant, since the patina on the surface is in most cases contaminated, and therefore their informative value is significantly reduced.



Table 1. Hoard Bojná I-Valy. Results of X-ray fluorescence spectrometry (measured by V. Mezey).

No.	Type and percentage of individual metals in the analysed objects						Result
	Registration No.	Cu [%]	Zn [%]	Ag [%]	Sb [%]	Weight [g]	
1	85/22 (Fig. 5: 1)	97.2	0.345	0.249	0.596	10.478	Cu
2	86/22 (Fig. 5: 2)	98.78	0.286	0.199	0.354	13.222	Cu
3	87/22 (Fig. 5: 3)	98.89	0.253	0.27	0.425	9.942	Cu
4	88/22 (Fig. 5: 4)	98.77	0.34	0.317	0.792	10.11	Cu
5	89/22 (Fig. 5: 5)	98.92	0.522	0.297	0.605	14.602	Cu
6	90/22 (Fig. 5: 6)	97.85	0.252	0.242	0.31	8.062	Cu
7	91/22 (Fig. 5: 7)	98.66	0.253	0.457	0.313	11.634	Cu
8	92/22 (Fig. 5: 8)	97.09	0.431	0.375	0.81	8.512	Cu
9	93/22 (Fig. 5: 9)	97.94	0.409	0.293	0.272	14.763	Cu
10	94/22 (Fig. 5: 10)	98.87	0.305	0.191	0.327	12.804	Cu
11	95/22 (Fig. 5: 11)	97.28	0.293	0.389	1.28	3.046	Cu
12	96/22 (Fig. 5: 12)	97.33	0.247	0.4	0.921	9.135	Cu
13	97/22 (Fig. 5: 13)	97.5	0.217	0.275	0.966	4.677	Cu
14	98/22 (Fig. 5: 14)	98.75	0.164	0.212	0.46	4.459	Cu
15	99/22 (Fig. 5: 15)	97.86	0.228	0.389	0.924	4.103	Cu
16	100/22 (Fig. 5: 16)	96.88	0.252	0.806	1.17	5.135	Cu
17	101/22 (Fig. 5: 17)	97.98	0.178	0.228	0.663	4.027	Cu
18	102/22 (Fig. 5: 18)	97.65	0.192	0.616	0.695	3.732	Cu
19	103/22 (Fig. 6: 19)	98.22	0.128	0.205	0.665	2.882	Cu
20	104/22 (Fig. 6: 20)	97.86	0.155	0.23	0.701	3.392	Cu
21	105/22 (Fig. 6: 21)	97.21	0.264	0.349	0.318	5.597	Cu
22	106/22 (Fig. 6: 22)	98.21	0.251	0.363	0.24	3.758	Cu
23	107/22 (Fig. 6: 23)	96.56	0.286	0.2	0.224	4.947	Cu
24	108/22 (Fig. 6: 24)	99.41	0.208	–	0.275	2.743	Cu
25	109/22 (Fig. 6: 25)	98.29	0.265	0.45	0.593	5.075	Cu
26	110/22 (Fig. 6: 26)	98.2	0.255	0.222	0.81	4.114	Cu
27	111/22 (Fig. 6: 27)	98.99	0.241	0.201	0.312	3.713	Cu
28	112/21 (Fig. 6: 28)	96.16	0.376	0.381	1.17	2.254	Cu
29	113/22 (Fig. 6: 29)	97.31	0.421	1.22	0.93	1.854	Cu
30	114/22 (Fig. 6: 30)	98.26	0.21	0.138	0.225	3.865	Cu
31	115/22 (Fig. 6: 31)	98.91	0.235	0.223	0.287	3.657	Cu
32	116/22 (Fig. 6: 32)	96.6	0.209	0.639	0.503	1.111	Cu
33	117/22 (Fig. 6: 33)	96.92	0.222	0.307	0.89	3.711	Cu
34	118/22 (Fig. 6: 34)	97.21	0.297	0.266	0.35	4.5	Cu
35	119/22 (Fig. 6: 35)	99.25	0.226	0.222	0.227	2.953	Cu
36	120/22 (Fig. 6: 36)	96.89	0.218	0.217	0.245	1.15	Cu
37	121/22 (Fig. 6: 37)	98.27	0.21	0.237	0.714	1.813	Cu

The results of spectral X-ray diffraction analysis showed that the elemental composition of all whole rings and their fragments is very similar (Table 1). Even though there were slight deviations in the elemental composition of individual items, the chemical composition was very similar. The main metal was copper (96.56–99.41%). In addition, there is a very close percentage of ligature (separate impurities of metals): zinc (0.128–0.522%), silver (0–0.806%) and antimony (0.224–1.28%). Thus, based on the results of metallographic analysis, all the objects from the hoard can be confidently considered to be copper items.

The search for and exploitation of copper ores was important for the development of Bronze Age civilisation. It is logical to assume that the nearest territorially copper ore deposits of the Carpathian-Danube region, which are close to copper in their chemical parameters, could serve as a raw material base for the production of the ring jewellery found in the hoard near Bojná. The geological structure of Slovakia is extremely favourable for copper ore mining.

The importance of Slovak copper for the birth of European copper and bronze metallurgy has been proven and emphasised on numerous occasions (*Furmánek 2015; Schreiner/Heyd/Pernicka 2012; etc.*). Copper ores were of dominant importance in the Bronze Age. They are mainly concentrated in central Slovakia in the Kremnické vrchy Mountains, the Low Tatras and the Spiš-Gemer mines. Pure copper deposits in Slovakia are currently virtually unknown. However, in the context of the prehistoric exploitation of these ore deposits, localised surface copper deposits, which may have been fully exploited in the Bronze Age, must also be considered. In addition to the concentration of the oldest copper artefacts, indirect evidence of prehistoric copper ore mining in Slovakia also includes finds of specific stone tools. They are known here in several localities – Lontov, Malé Kosihy, Stará Bystrica, Špania Dolina, Španie Pole, Šurany-Nitriansky Hrádok (*Furmánek 2015, 275*).

The nearest geographically large copper deposit – approximately 80 km northeast of Bojná – is in the Špania Dolina in the vicinity of Piesky. Years of archaeological research have proven that copper ore has been mined at this site since the end of the Stone Age. During the Bronze Age, ore was crushed and roasted here, and copper was smelted. The research uncovered evidence of local smelting – pottery, dozens of stone mortars with grooves, ore crushing washers and copper flakes (*Furmánek 2015, 276*).

## CULTURAL AND CHRONOLOGICAL INTERPRETATION

The funerary inventory of several Bronze Age cultures in Europe is characterised by the presence of a remarkable category of jewellery made of rounded wire. Their metric and morphological data may vary considerably, but the principle of radial (spiral) design of the product remains unified. Spiral rings with open ends consisting of one or more coils, rings with open ends consisting of one incomplete coil or segments thereof are a simple but expressive category of Bronze Age metal jewellery. Their transformation in time and space can be explained by the development of technologies (the use of annealing, anvil with a groove, etc.), the influence of samples of imported spiral jewellery, as well as cultural preferences reflected in the form, material and ways of wearing these items. Thus, items such as the rings from the Bojná hoard can be considered jewellery with a supra cultural, universal status (*Primas 1995, 77–93*). Their mass distribution is explained by the achievement of a certain level of development of metallurgy and metalworking.

The prevalence of such small rounded and spiral-shaped objects in the jewellery complex of a number of cultures can be explained by the small amount of metal produced at one time and, as a consequence, the low expediency of experiments on shape. The simplicity and conservatism of the morphology may stem from the standard forms of metal ingots – bars or skeins of wire that required minimal forging to produce the finished product. A bar or a fragment of wire was quite simply transformed into a spiral-shaped semi-finished product by conventional forging. The ingot, or part of it, thus constituted a convenient initial blank for the jeweller (*Bortnikova 2023, 26, 31*).

The Bronze Age as a historical epoch in the Carpathian Basin in general and in Slovakia in particular is a period of intensive contacts between Eurasian civilisations, technological innovations and revolutionary changes in worldviews. At the same time, the intense ethnically anonymous communities that settled, lived and worked in the territory of modern Slovakia at the time. This was largely manifested in metallurgy and the further processing of copper. The techniques and technologies associated with copper ore prospecting, metallurgy and other related crafts became one of the significant phenomena in the civilizational development of the entire Central European region (*Furmánek/Vladár 2015, 11*).

Metal rings made of thin copper wire, round or square in cross-section, belong to the simplest jew-

ellery or clothing accessories with a long evolution over time. The first evidence of copper jewellery appears in the Carpathian Basin already in the materials of the Neolithic stage of the Lengyel-culture. Copper bracelets in several spiral coils, known in the burials of the Neolithic phase of this culture, were made mainly of round wire with more or less thinned ends (Zalai-Gaál 1996, 18). These include bracelets from the graves at Zengővárkony in Hungary, which were also mostly made of round wires. On the territory of Slovakia during this period, many similar products made of copper wire with round, square and flat cross-sections are also known (Dombay 1960; Ecsedy 1990; Farkaš/Peška/Ondrkál 2023, 8, 9).

In the metallurgical tradition of the Balkan-Carpathian metallurgical province, from the beginning of the Eneolithic period, the number of copper items has been increasing, among which bracelets of several types occupy an important place. Due to its simple, but at the same time spectacular form, this type of jewellery was widely used even later, in the Bronze Age (Peška 2022). In the Early Bronze Age they developed into one of the most characteristic types of wares for the entire Circumpontian metallurgical province.

For the cultural and chronological interpretation of the published materials, it is logical to firstly turn to the search for analogies in territorially close materials. Despite the long development of simple spiral wares, massive Early Bronze Age finds from eastern Moravia and western Slovakia perhaps suggest that the Bojná hoard items made of thin circular copper wire twisted into simple or multi-stranded rings may belong to a relatively narrow time period. Although the period under consideration is called the Early Bronze Age, copper was still the main metal in its older part, represented by the Nitra and Únětice cultures. The absolute predominance of bronze industry can be spoken about only from the later period, represented by the cultural complexes of the Maďarovce-Věteřov-Böheimkirchen and Otomani-Füzesabony Cultural Complex (Bátora 2018, 156).

The closest metrical and morphological analogies to the items from the Bojná hoard are found in the materials of the Early Bronze Age Nitra culture, which was widespread in southwestern Slovakia and eastern Moravia. Here, according to grave finds, there are known multiple jewellery (armrings, spiral bracelets and rings for hairstyles or headdresses, etc.) made of thin wire, round, oval or rectangular in cross-section. The wires around the entire circumference of the piece are approximately the same thickness, only slightly thinned and pointed at the ends. Their ends are usually slightly open, touching or partially overlapping each other.

Copper and bronze metallurgy, including the tradition of making such jewellery, was further developed by the bearers of the Únětice culture. Its territory of permanent habitation in Slovakia occupies almost the entire southwestern part of the country. The genesis of Únětice culture took place outside Slovakia, in regions that are more western. Its appearance in southwestern Slovakia during and at the end of the Nitra culture thus testifies not to a genetic connection but to chronological simultaneity and continuity. This eventually led to the identification of the transitional Nitra-Únětice phase of the Nitra culture, which represents, on the one hand, the end of the development of the Nitra culture and, on the other hand, the initial (early) phase of the development of the Únětice culture in Slovakia (Bátora/Vladár 2015, 28).

There is a wide range of analogues in the Early Bronze Age burial ground in Branč. Earrings and hair jewellery made of thin copper wire round in cross-section, 1–2 mm thick and 35–75 mm in diameter, including their segments, have been studied in a number of female and children's (girls) burials (graves 58, 82, 90, 130, 300). In a number of cases, one end was pointed and slightly bent, the other was cut off at a right angle. There are known cases of deformation of items (Fig. 7: 1–5; Vladár 1973, tab. VII: 10; IX: 4, 12, 14, 15; XI: 13, 14; XIII: 2; XXXII: 4). Several analogues are also found in the Early Bronze Age burials of the cemetery in Jelšovce (Fig. 7: 6–17; Bátora 2000, fig. 358; tab. 34: 23, 25, 29; 35: 9–11; 37: 17–19; 43: 5, 6, 26; 44: 5, 14; 46: 19; 50: 11, 12). In addition, we note the fact that in the cemeteries of Branč, Jelšovce and Nitra-Čermáň there are also known repeated cases where the ring was located at the base of the skull (Bátora 2000, fig. 284; 293; Bátora/Felcanová/Vladár 2022, fig. 53; Vladár 1973, fig. 22).

In the graves of the Branč and Jelšovce cemeteries, similar wire jewellery with narrowed and pointed ends, wire thickness 2–5 mm and diameter 50–89 mm, which in the context of the burial inventory were used as bracelets, were also recorded. Rings and spiral bracelets are known in both female and male burials, including child burials (Fig. 7: 18–26; Bátora 2000, tab. 34: 10; 37: 5, 6; 41: 9, 23–25; 42: 29; 45: 11; 64: 8; Vladár 1973, tab. XIII: 15; XV: 18; XVI: 10; XIX: 7, 8; XXIII: 11; XXVI: 9).

Thus, the bracelets made of thin simple wire of rounded cross-section in one or several turns with open or intertwined ends were most widespread in the Nitra culture, especially in its final phase. Although, it should be noted that their oldest examples are found in southwestern Slovakia in the Chľopice-Veselé culture. They are represented by a torsion bracelet made of double twisted thin copper wire, which was found in the grave 10



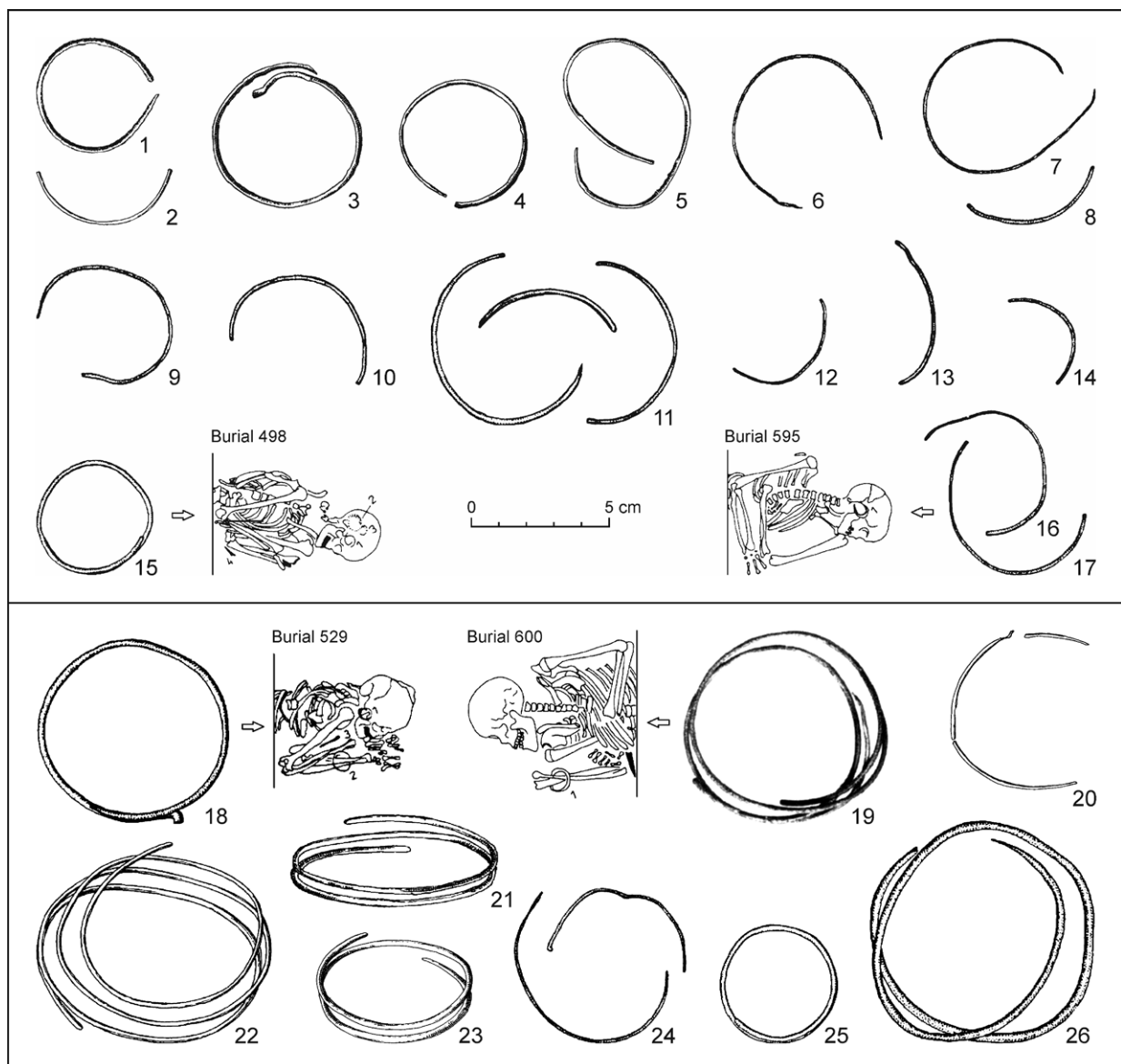


Fig. 7. Rings in funerary rites. 1–17 – rings for hairstyles or headdresses; 18–26 – arm rings or spiral bracelets. 1–5 – Branč, graves 58, 82; 6–19 – Jelšovce, graves 389, 394, 398, 441, 493, 498, 512, 526, 539, 595, 600; 20–23 – Branč, graves 160, 168, 188; 24–26 – Jelšovce, graves 433, 463, 477 (1–5, 20–23 according to *Vladár 1973*; 6–19, 24–26 according to *Bátora 2000*).

of the cemetery in Ivanka pri Dunaji (*Pichlerová 1966*, 42). As the researchers note, both variants of wire bracelets are also found in the following Únětice culture – in its early and classical phases. In the final period of the Early Bronze Age, simple round-shaped bracelets made of round wire are not known (*Bátora 2018*, 178).

No direct analogues to the jewellery from the Bojná hoard with open ends, consisting of one incomplete coil with one end designed as a volute (the wire at the end is coiled into a loop or ring), could be found among the bracelets in the Early Bronze Age funerary sites of Slovakia (Fig. 8: 4). However, a similar technological approach in the decoration of wire

ends is found among neck jewellery widespread in the Carpathian-Danube region. Neck jewellery made of thin or massive wire is known among the antiquities of the Únětice culture. At the ends, the wire is either hook-shaped curved or completely spirally twisted into an ear. Their appearance is mainly characteristic for the classical stage of Únětice culture. This is confirmed by well-dated burials from cemeteries in Abrahám, Bánov, Matúškov, Šurany, Vinodol (*Bátora 2018*, 177; *Cheben 2012*, 124–127; *Novotná 1984*; *Točík 1964*, 127–156). Necklaces (neck jewellery) are often found in Únětice culture hoards in Slovakia and Bohemia (Fig. 8: 1; *Bátora 2018*, 177; *Moucha 2007*; *Novotná 1984*). Only single objects from

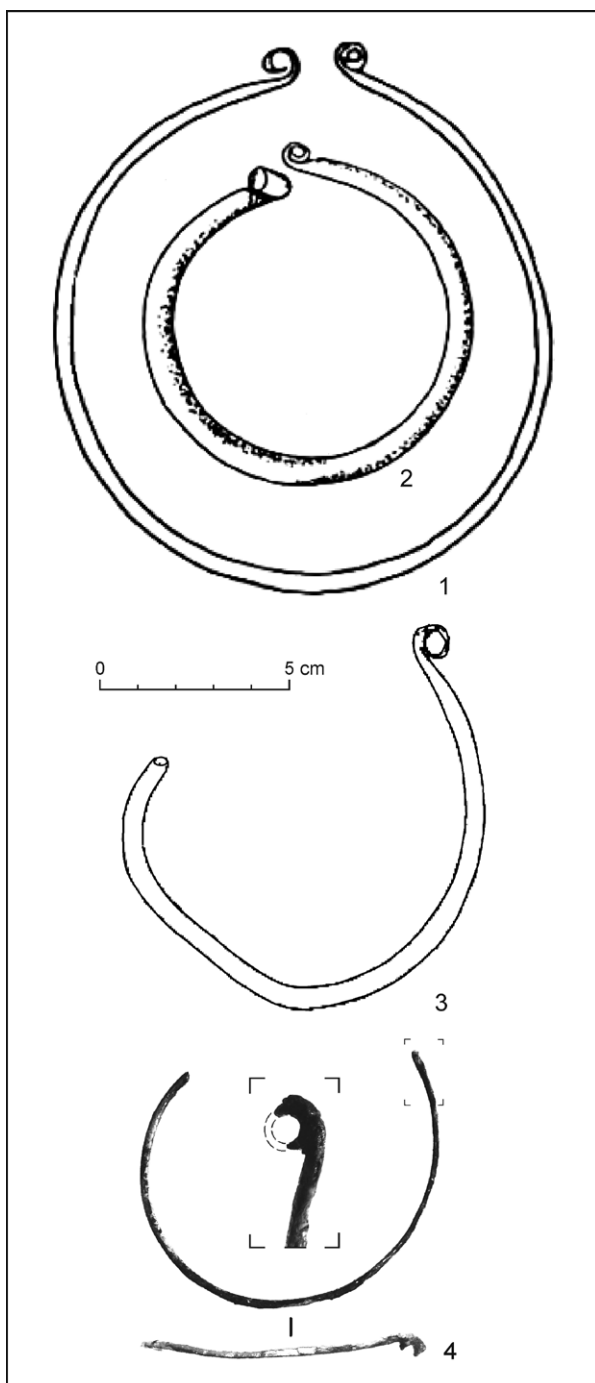


Fig. 8. Neck jewellery and bracelets with twisted ends (in the form of a volute) from hoards. 1 – Dušníky nad Vltavou (Moucha 2007, pl. 39: 14); 2 – Mory (Moucha 2007, pl. 28: 6); 3 – Museum Chomutov (Moucha 2007, pl. 191: 53); 4 – Bojná I-Valy.

hoards made of wire with open ends, where one or both ends are coiled into a loop or ring, can be classified as bracelets based on their metric values (Fig. 8: 2, 3). Researchers have dated such finds to the period BA1–BA2 according to Reinecke (Moucha 2007, pl. 28: 6; 191: 53).

In absolute chronology, the Nitra culture can be dated based on  $^{14}\text{C}$  data from the burial site in Jelšovce, to the period 2200–1870 cal. BC (Bátora 2000; Görsdorf/Marková/Furmánek 2004). Its late phase (Nitra-Únětice) has been dated as follows 1930–1870 cal. BC (Bátora/Vladár 2015, 24). In absolute chronology, the Únětice culture can be dated based on  $^{14}\text{C}$  data from the burial site in Jelšovce to the period 1930–1700 cal. BC (Bátora 2000; Görsdorf/Marková/Furmánek 2004). Its early phase (Nitra-Únětice) dates from 1930–1870 cal. BC, its classical phase from 1870–1730 cal. BC (Bátora/Vladár 2015, 28).

In the absence of additional data, the find of copper objects at the Bojná settlement probably fits into the chronological framework of the Early Bronze Age tribes: the late (transitional) Nitra-Únětice phase of the Nitra culture – the classical phase of the Únětice culture. In absolute chronology, the hoard can be dated broadly based on  $^{14}\text{C}$  data to the time interval 1930–1730 cal. BC. The only radiocarbon date known for the oldest settlement horizon of the Bojná I-Valy ( $1863 \pm 67$  cal. BC) does not contradict this conclusion.

## DISCUSSION

### Functional purpose as a representation of cults

Costume and its elements are one of the most important sources for studying the material and spiritual culture of ancient populations, the social structure of society and cultural relations. The impossibility of reconstructing ancient clothing as such, however, does not exclude the need to search for common features of the costume complex and elements of decoration. The sources for such constructions are the joint finding of jewellery in closed complexes (burials, hoards), rare cases of mutual arrangement of jewellery relative to skeletal bones, as well as analysis of jewellery parameters and empirical studies of possible variants of wearing them (Lysenko, S. S./Lysenko, S. D. 2017, 330).

Obviously, to understand how this or that jewellery was worn, it is necessary to analyse how this category of things was located in the burials. There is some documented evidence of the location of the jewellery in relation to the skeleton in funerary rites, similar to the items found in the Bojná hoard. It is difficult to say exactly what the way of wearing these jewellers was. The analysis of burial materials from different archaeological cultures of Eastern Europe of the Bronze Age allows us to state the following: 1. jewellery similar to the Bojná

hoard was found in close proximity to the skulls of the deceased, which suggests that it was attached to headdresses and/or woven into the hair; 2. spiral and simple rings of various styles, shapes and sizes were worn as bracelets. The wearing of bracelets in the Early Bronze Age in the Carpathian region was not only for women. In the period of the Nitra culture, we find them mainly in male graves. In the period of the Únětice culture, they prevail in female graves (Bátora 2018, 180).

Thus, jewellery made of thin wire with narrowed and pointed ends – spiral rings with open ends, consisting of one or several coils, as well as rings consisting of one incomplete coil – are universal and multifunctional products, which in the context of funerary rites could be used just as bracelets or rings for hairstyles and headdresses.

Spiral-shaped jewellery and simple rings were repeatedly found in hoards from the Balkan-Carpathian region throughout the Bronze Age (for example Bátora 2018, 177; Čambal/Makarová 2020; Moucha 2007; Novotná 1984). It is worth saying at once that jewellery found in burials and jewellery from hoards to all appearances, had different symbolic load. While in the first case, the items were an element of an ancient person's garniture or costume, in the second case the purpose of the item remains not quite clear. In this case, we are faced with the problem of defining the term 'hoard' in modern archaeological literature and the problem of developing classifications of hoards.

V. Bochkarev and A. Klimushina analysed the European archaeological literature on hoards (mainly German and English) and proposed the following definition of the term 'hoard':

*'The hoard is a separate type of archaeological site consisting of one, or more often a complex, of identical and dissimilar artefacts of value to their owner(s) and hidden for temporary storage in the ground or in some other hidden place. Researchers have identified five types of hoards:*

1. *Treasures-hoards that contain precious metal objects or high-quality bronze items.*
2. *Raw hoards, which include ingots of copper or bronze, as well as containing items close in size and shape. Such ingots or items could have the function of primitive money.*
3. *Hoard of foundry men, including both finished products and fragments of them.*
4. *Trade hoards, which are hidden finished or semi-finished goods.*
5. *Personal hoards – items that belonged to an individual person.'* (Bochkarev/Klimushina 2022, 29–31).

However, the researchers believe that any of these hoards can be defined as a votive, economic

or social deposit. According to the authors, only a deposit that is subject to return can be recognised as a hoard (Bochkarev/Klimushina 2022, 31).

It is possible that the hoard of copper jewellery from Bojná belongs to one of the listed categories of hoards. Necklaces are often found in depots (Bratislava, Stupava), where they are accompanied by roughly worked manes (*Ringbarren*), which have the shape of a triangle, horseshoe, or have more edges in the cut. They did not serve as body ornaments but served as a general equivalent of an exchange of goods for goods as raw material (Bátora 2018, 177; Lernerz de Wilde 1991, 25–48). Spiral-shaped jewellery (rings for hairstyles or headdresses, arm rings or spiral bracelets) was in demand among the bearers of the Nitra and Únětice cultures, as evidenced by burial materials.

Concerning the purpose of hiding things, it will be curious to cite a passage from the Anglo-Saxon epic *Beowulf*:

*'Death had taken them, one  
by one, and the warrior who watched over all  
that remained mourned their fate, expecting,  
soon, the same for himself, knowing  
the gold and jewels he had guarded so long.  
Could not bring him pleasure much longer. He brought  
the precious cups, the armor and the ancient  
swords, to a stone tower built  
near the sea, below a cliff, a sealed  
fortress with no windows, no doors, waves.  
In front of it, rocks behind. Then he spoke:  
take these treasures, earth, now that no one  
living can enjoy them. They were yours,  
in the beginning;  
Allow them to return...'*  
(*Beowulf*, 2237–2249).

Is it always possible to consider this or that complex of things as a hoard (a place of temporary storage), or should it be considered as a sacrifice? It is not excluded that the Bojná jewellery hoard could be a sacrifice. Irreversible hoards are likely to be associated with ritual motivation, communication through gift exchange, or the practice of depositing votive gifts (Bartík/Farkaš/Jelínek 2019, 78).

It is worth paying attention to the nature of the location of the finds at the time of discovery. The rings were placed at approximately the same level, stretched in the same direction along the horizontal plane, which is possible if they were all strung on the same base (wood or some other organic material?). It is not excluded that human hair braided into a braid could serve as such a base. This idea may be indirectly prompted by a discovery made by Romanian archaeologists in



2022, which points to the connection of jewellery in the form of rings with hair braided into a braid (it should also be noted that researchers do not record this type of wearing hair ornaments in local burials). The analogy is far from our find both culturally and chronologically and in terms of the material of the wares, it gives us only comparative possibilities in terms of interpretation. Near the Biharia commune in Bihor County, Romania, a female burial from the Eneolithic period (Tiszapolgár culture) was investigated. The inventory complex contained 169 gold rings adorning the hair of the buried woman. There was also a multi-spiral copper bracelet.<sup>4</sup>

The burial of a braid with jewellery woven into it can be regarded as some kind of ritual-magical action. The motif of cutting off hair (braids) is recorded in written and ethnographic sources in the culture of various peoples. The attitude to the hair on the head in ancient times was cautious and careful: it was imagined that hair is a shelter for one of the human souls (Cirlot 1994, 264, 265).

According to ancient Jewish beliefs, the strength of the biblical hero Samson lies in his hair. After the Philistine woman Delilah cuts his hair, Samson loses his strength: *'Then she lulled him to sleep on her knees, and called for a man and had him shave off the seven locks of his head. Then she began to torment him, and his strength left him...'* (Bible, Judges 16: 19).

Hair sacrifice was practised by the ancient Greeks. Standing at the funeral pyre of Patroclus, Achilles cuts off his long hair, which he had previously promised to donate to his native river. Some Greek boys and girls, entering the age of maturity, cut their hair and dedicated it to a deity, a river, a local hero, or one of the gods (Burkert 2004, 124).

The Scythians, nomads of the steppes of the Northern Black Sea region, according to the ancient Greek author Herodotus, had a custom of scalping the heads of slain enemies: *'And he takes off the skin of the head by cutting it round about the ears and then taking hold of the scalp and shaking it off; afterwards he scrapes off the flesh with the rib of an ox, and works the skin about with his hands...'* (Hdt., IV, 64).

In the medieval population of Western Siberia, the custom of cutting off hair (in particular, together with the scalp) was considered as a way to get a trophy (Razhev/Poshekhonova 2009). The peoples of Dagestan in the Caucasus practised a custom according to which women had to cut off a braid in case of death of a relative. In some cases, it was placed in the grave (Gadzhiev 1991, 143). Cutting

off a woman's braid in the Caucasus, for example, among the Circassians, is regarded as a shameful punishment for unworthy behaviour. In such cases, the braid is cut off with several strokes at the very back of the head (Besolova/Gabunia 2017, 122; Nal'chikova et al. 2017, 134).

Numerous parallels can be traced in the culture of Slavic peoples. The attitude to hairstyle and hair in Ancient Rus' was special, as noted by Ukrainian ethnographer and folklorist O. Voropay. To cut a man's hair was considered an offence, as cut hair in the Slavs has long been considered a sign of slavery. Thus, in the time of the Grand Prince of Kyiv Yaroslav the Wise, the law stipulated punishment for anyone who cut someone else's hair or beard (Voropay 1958, 232). Cases of cutting off the bride's braid in order to have magical power over it are recorded among Ukrainians. It could be cut off with scissors (Podolia) or cut off with an axe (Transcarpathia; Ponomarov 1994, 176). In ritual practice there are known cases when hair from the head of a boy could be buried under a pear tree to make him grow curly, and a strand of a girl's hair was buried under a willow tree to have long braids (Suprunenko 1993, 62). Quite rare evidence of cutting off the bride's braid instead of ritual unbraiding is found in the wedding rites of Carpathian Hutsuls. At the same time, hair, acting as a substitute for the deceased, could serve as an independent agent of the funeral rite. In Bulgaria, if they could not bury the deceased, they often buried a strand of his hair. A braid could act as a double of a dead girl (Mykytenko 1998, 127).

As we can see, the reasons for people of the past to manipulate their hair (braids) were quite different. The motives were the following: 1. magical infliction of harm, deprivation of power; 2. votive sacrifices; 3. funeral rites; 4. wedding ritual; 5. punishment for violation of social norms; 6. infliction of insult; 7. taking a trophy.

All these examples encourage the idea that some archaeological finds may well be the result of similar ritual-magical activities related to the manipulation of human hair. It is possible that the Bojná jewellery complex is not just a hoard of metal objects, but the result of ritual practice. Jewellery depots in mountainous areas from the period of the Únětice culture could indicate this. Deposits of ring jewellery from the Late Bronze Age, which may not have been the property of one person, but could have been a collection of several persons, could also be interesting for interpretation.

<sup>4</sup> M. Milligan: *Researchers find Prehistoric grave containing 169 gold rings*. Available at: <https://www.heritagedaily.com/2022/08/researchers-find-prehistoric-grave-containing-169-gold-rings/144425> [20. 2. 2024]

## CONCLUSIONS

The Bronze Age as a historical epoch in the Carpathian Basin in general and in Slovakia in particular is a period of intensive contacts between Eurasian civilisations, technological innovations and revolutionary changes in worldviews. Largely, this was manifested in metallurgy and the further processing of copper. The techniques and technologies associated with copper ore prospecting, metallurgy and other related crafts became one of the significant phenomena in the civilizational development of the entire Central European region.

The hoard of copper objects from Bojná I-Valy settlement, despite the fact that it was not found during regular archaeological excavations and not together with other related materials, fits within the chronological framework of the existence of Early Bronze Age tribes.

Metal rings made of thin copper wire, round in cross-section, belong to the simplest jewellery or clothing accessories with a long evolution over time. The first evidence of copper jewellery appears in the Carpathian Basin already in the materials of the Neolithic and Eneolithic cultures. Due to its simple, but at the same time spectacular form, this type of jewellery was widely used even later, in the Bronze Age. In the Early Bronze Age, they developed into one of the most characteristic types of wares.

For the cultural and chronological interpretation of the published materials, it is logical to firstly turn to the search for analogies in territorially close materials. Despite the long development of simple spiral wares, massive Early Bronze Age finds from eastern Moravia and western Slovakia perhaps suggest that the Bojná hoard items made of thin circular copper wire twisted into simple or multi-stranded rings may belong to a relatively narrow period.

Their most widespread use occurred in the late (transitional) Nitra-Únětice phase of the Nitra culture, with a gradual fading and disappearance of the tradition during the classical phase of the Únětice culture. In the later period with the development of the bronze industry (Maďarovce-Věteřov-Böheimkirchen and Otomani-Füzesabony Cultural Complex), wares with similar metric and morphological data are practically unknown. In the absence

of additional data, the find of copper objects at the Bojná settlement probably can be dated broadly based on <sup>14</sup>C data to the time interval 1930–1730 cal. BC. The only radiocarbon date known for the oldest settlement horizon of the Bojná I-Valy (1863 ± 67 cal. BC) does not contradict this conclusion.

The production of long, strong, flexible and profiled copper wire with subsequent length adjustment for jewellery making was probably connected with the progress in metallurgy and the subsequent mastering of technological procedures for processing molten metal. Giving the required parameters was probably carried out in specialised workshops of artisans of that time.

It is difficult to say exactly what the way of wearing these jewellery was. The analysis of burial materials from different archaeological cultures of Eastern Europe of the Bronze Age allows us to state the following: jewellery similar to the Bojná hoard was found in close proximity to the skulls of the deceased, which suggests that it was attached to headdresses and/or woven into the hair; spiral and simple rings of various styles, shapes and sizes were worn as bracelets.

Thus, jewellery made of thin wire with narrowed and pointed ends – spiral rings with open ends, consisting of one or several coils, as well as rings consisting of one incomplete coil – are universal and multifunctional products, which in the context of funerary rites could be used just as bracelets or rings for hairstyles and headdresses. Thus, the mass find from Bojná represents an interesting set of metal objects – accessories of ceremonial or ritual clothing. In the context of funerary rites, this jewellery was not strictly associated with a certain gender or any age group. In general, the set represented in its time a significant social and material value, the burial of which in the ground in a hilly area, outside of permanent settlements, had a special significance.

Apart from economic reasons (hiding, storage, etc.), we cannot rule out ritual reasons for burying the hoard. Metal, a valuable material obtained in a 'magical' way, was certainly an extremely suitable and valuable sacrifice. Such archaeological finds may be the result of ritual-magical activities related to the manipulation of human hair. It is possible that the Bojná jewellery complex is not just a hoard of metal objects, but also the result of ritual practice.

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## Depot medených šperkov zo staršej doby bronzovej z Bojnei (západné Slovensko)

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### SÚHRN

Depot medených predmetov bol objavený na východnom svahu pohoria Považský Inovec, na známej včasnostredovekej lokalite Bojná I-Valy, okres Topoľčany. V roku 2022 na lokalite pokračoval systematický výskum Archeologického ústavu SAV, v. v. i. pod vedením K. Pietu. Počas výskumu hradiska bol pomocou detektora kovov lokalizovaný súbor medených predmetov z doby bronzovej, ktorý tvorí kolekcia kruhových špirálovitých ozdôb a ich fragmentov. Miesto nálezu bolo následne plošne preskúmané s cieľom objasniť okolnosti a kontext nálezu. Pátranie po ďalších súdobých artefaktoch však bolo bezvýsledné. Táto okolnosť do značnej miery obmedzuje komplexné posúdenie nálezu a jeho interpretačné možnosti.

Krúžky z tenkého medeného drôtu okrúhleho prierezu patria k najjednoduchším šperkom alebo odevným doplnkom s dlhým časovým vývojom. Prvé doklady medených šperkov sa v Karpatskej kotline objavujú už v materiáloch neolitických a eneolitických kultúr. Vďaka svojej jednoduchej, ale zároveň efektnej forme sa však tento typ šperku vo veľkej miere používal aj neskôr. V staršej dobe bronzovej sa z neho vyvinul jeden z najcharakteristickejších typov ozdôb. Pre kultúrnu a chronologickú interpretáciu publikovaných artefaktov je logické hľadať ich analógie predovšetkým v geograficky blízkych materiáloch. Napriek dlhému vývoju jednoduchých špirálovitých šperkov, hromadné nálezy zo staršej doby bronzovej z východnej Moravy a západného Slovenska azda naznačujú, že predmety z bojnianskeho náleziska, zhotovené z tenkého okrúhleho medeného drôtu stočeného do jednoduchých alebo viacnásobných krúžkov, môžu patriť do pomerne úzkeho časového obdobia.

Rozšírené boli najmä v prechodnej nitriansko-únětickej fáze nitrianskej kultúry, zatiaľ čo v klasickej fáze únětickej kultúry sa tradícia tohto šperku postupne vytrácala a zanikala. V neskoršom období s rozvojom bronzovej industrie (Maďarovce-Věteřov-Böheimkirchen a otomansko-füzesabonský kultúrny komplex) sú výrobky s podobnými metrickými a morfológickými údajmi prakticky neznáme. Preto, vzhľadom na absenciu ďalších údajov, môžeme nález medených predmetov z Bojnei

rámcovo datovať do spomenutej prechodnej nitriansko-únětickej fázy (1930–1730 cal. BC). Jediný doteraz známy rádiouhlíkový údaj z najstaršieho sídliskového horizontu z lokality Bojná I-Valy (1863 ± 67 cal. BC) tomuto záveru neodporuje.

Výroba dlhého, pevného, pružného a profilovaného medeného drôtu na zhotovovanie ozdôb súvisela s rozvojom metalurgie a následným zvládnutím technologických postupov spracovania roztaveného kovu. Požadované parametre pravdepodobne zvládali dosiahnuť špecializované dielne vtedajších remeselníkov. Ťažko povedať, aký bol presný spôsob nosenia týchto ozdôb. Analýza pohrebných areálov rôznych archeologických kultúr východnej Európy z doby bronzovej nám umožňuje konštatovať, že šperky, podobné depotu z Bojnei, sa našli v tesnej blízkosti lebiek zomrelých. To naznačuje, že boli pripevnené k pokrývkam hlavy a/alebo boli vpletené do vlasov. Špirálové i jednoduché kruhy rôznych tvarov a veľkostí sa nosili aj ako náramky. Špirálové krúžky s otvorenými koncami s jedným alebo viacerými závitmi, ako aj kruhy s jedným neúplným závitom sú teda univerzálnymi a multifunkčnými ozdôbami, ktoré sa v kontexte kroja mohli podľa veľkosti používať ako náramky i ako krúžky do účesov a čeleniek.

Hromadný nález z Bojnei predstavuje zaujímavý súbor kovových predmetov – doplnkov slávnostného odevu. V kontexte pohrebných obradov neboli tieto šperky striktné spojené s určitým pohlavím alebo vekovou skupinou. Celkovo súbor predstavoval vo svojej dobe významnú spoločenskú a materiálnu hodnotu. Jeho uloženie do zeme v kopcovitom teréne, mimo trvalého osídlenia, malo nepochybne osobitný význam. Okrem ekonomických dôvodov (skladovanie, ukrytie) nemôžeme vylúčiť ani rituálne dôvody zakopania depotu. Kov, cenný materiál získaný „magickým“ spôsobom, bol určite mimoriadne vhodnou a cennou obetou. Je možné, že takéto archeologické nálezy mohli byť výsledkom rituálno-magických činností spojených s manipuláciou s ľudskými vlasmi. Súbor ozdôb z Bojnei bol teda pravdepodobne nielen pokladom kovových predmetov, ale aj výsledkom rituálnej praxe.

Obr. 1. Poloha predmetného hromadného nálezu v blízkosti lokality Bojná. Mapa V. Zabavin.

Obr. 2. Bojná. Plán aglomerácie stredovekého osídlenia. Mapa M. Bartík, K. Pietu.

Obr. 3. Bojná I-Valy. Náčrt rozsahu osídlenia. Lokalita 8, sonda LXXIII.

Obr. 4. Bojná I-Valy. Lokalita 8. 1 – sonda LXXIII, pohľad z juhu (foto M. Jakubčinová); 2 – začistenie (foto K. Pietu); 3 – laboratórne spracovanie (foto V. Mezey).

Obr. 5. Bojná I-Valy. Lokalita 8, sonda LXXIII. Depot medených kruhov. I. časť. Kresba Z. Nagyová.

Obr. 6. Bojná I-Valy. Lokalita 8, sonda LXXIII. Depot medených kruhov. II. časť. Kresba Z. Nagyová.

Obr. 7. Medené kruhy vyskytujúce sa v hrobách. 1–17 – kruhy ako súčasť účesu alebo pokrývky hlavy; 18–26 – jednoduché kruhy alebo špirálové náramky ako ozdoba rúk. 1–5 – Branč, hroby 58, 82; 6–19 – Jelšovce, hroby 389, 394, 398, 441, 493, 498, 512, 526, 539, 595, 600; 20–23 –

Branč, hroby 160, 168, 188; 24–26 – Jelšovce, hroby 433, 463, 477 (1–5, 20–23 podľa *Vladár 1973*; 6–19, 24–26 podľa *Bátora 2000*).

Obr. 8. Ozdoby krku a náramky so skrúteným koncom (do tvaru volúty) z hromadných nálezov. 1 – Dušníky nad Vltavou (*Moucha 2007*, tab. 39: 14); 2 – Mory (*Moucha*

*2007*, tab. 28: 6); 3 – Múzeum Chomutov (*Moucha 2007*, tab. 191: 53); 4 – Bojná I-Valy.

Tabela 1. Depot Bojná I-Valy. Výsledky röntgenovej fluorescenčnej spektrometrie (meranie V. Mezey).