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Corded Ware graves from Obříství, Czech Republic

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Abstract

Three Corded Ware graves excavated in Obříství in 2011 containing four skeletons are described here in detail, including an evaluation of the find situation, archaeological drawings, and photographic documentation. Additionally, typological analysis of grave goods allowed for their relative chronological placement within the wider Czech Corded Ware horizon. Owing to good bone preservation, radiocarbon dates and genetic profiles of all four individuals are also evaluated and contextualised here.

Keywords: Bohemia, Corded Ware, A-horizon, ¹⁴C-dating, archaeogenetics

6.1 Introduction

With around two thousand inhumation graves identified, the Corded Ware culture is the best represented in the archaeological record of Bohemia. Typo-

logically, the furnishings of many graves are similar, while the state of skeletal and grave goods preservation varies greatly. As a result, not all Corded Ware graves yield human remains and artefacts suitable for further analysis, leaving relatively few of these graves that have been thoroughly studied using detailed scientific methods such as ^{14}C and ancient DNA.

The three Corded Ware graves from Obříství belong among these few graves suitable for detailed scientific analysis. They are interesting both in terms of the combination and frequency of grave goods and with respect to the state of preservation of skeletal remains. While their brief description with the relevant analyses have already been published (Papac et al. 2021; Dobeš et al. 2021: 496–501, Figs. 7 and 9), a more detailed analysis of the accompanying finds with new perspectives follows here.

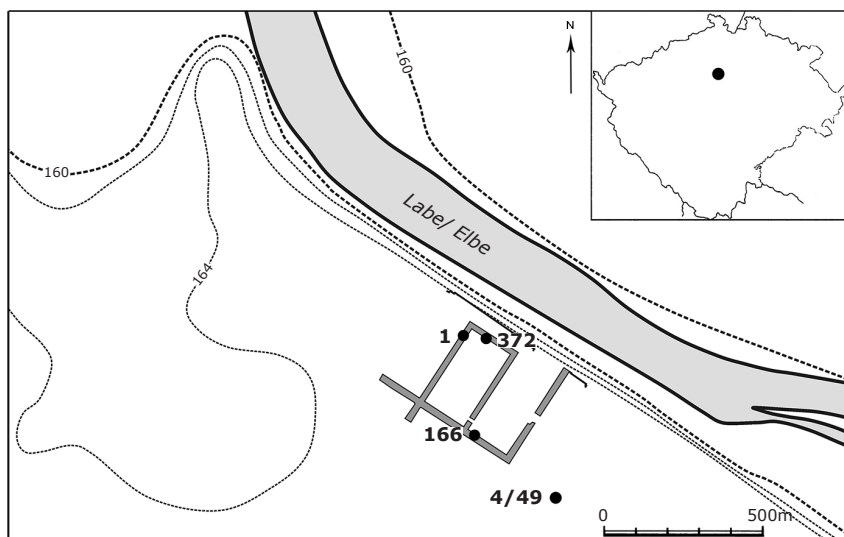


Figure 1. Obříství, Mělník District. Map with marked area of excavation (grey), including the location of the three Corded Ware graves and a Funnel Beaker grave (Feature 4/49). Reconstructed by M. Dobeš using a 1960 military map (sheets M-33-65-B-b-2 and M-33-65-B-b-4, scale 1:10,000).

6.2 Description of site and finds

Three Corded Ware graves were discovered in 2011 during a rescue excavation that preceded the construction of roads and utility lines for a new residential zone at the eastern edge of the village of Obříství (WGS-84: 50.292725 N, 14.484945 E). In addition to these graves, a settlement from the Neolithic (Linear Pottery, Stroked Pottery, c 5500–4500 BC), the Eneolithic (Bell Beaker, c 2500–2200 BC), the Bronze Age, Hallstatt culture and the Roman Period were also identified. Overall, this involved roughly 900 (mainly) settlement features, 300 of which were larger in size (semi-sunken huts, storage pits etc.). However, as the plan (Fig. 1) indicates, this was only a section of the original residential area since the space between the roads could not be investigated.

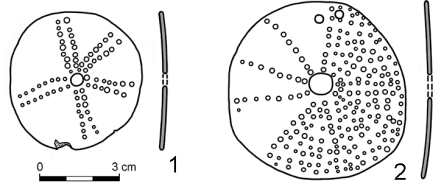
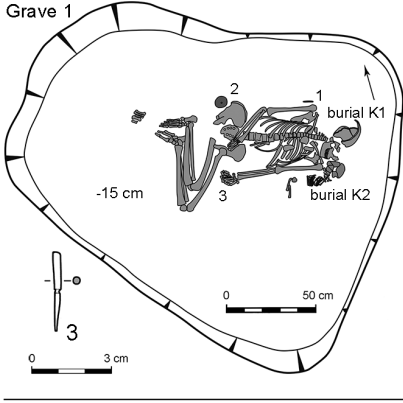
The site is located on the left bank of the Elbe River at the edge of a terrace roughly five metres above the current surface of the river at an elevation of 164 m above sea level. The subsoil at the site consists of Quaternary loess, which, together with favourable temperatures, has provided good conditions for repeated human occupation since the beginning of agricultural prehistory, and the proximity of the Elbe River as one of the main routes in Bohemia only increased the attractiveness of the site.

6.2.1 Grave 1

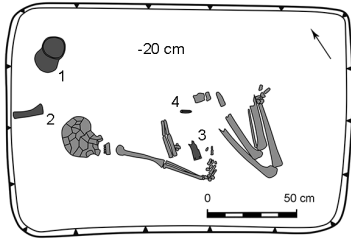
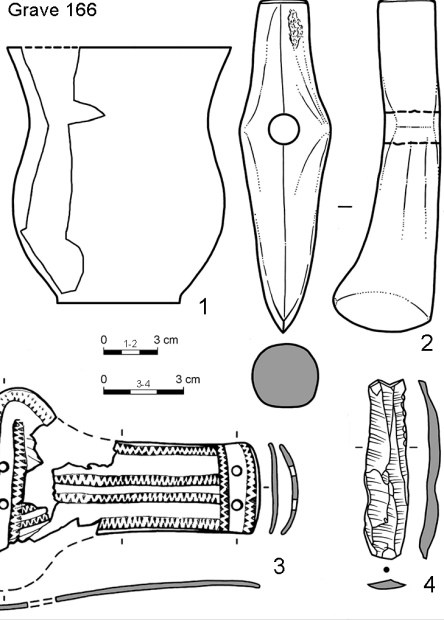
The grave pit had an irregular trapezoidal ground plan (length 210 cm, width 120–180 cm, depth from excavated surface 15 cm). The orientation of the longest axis was northwest–southeast.¹ The grave pit fill was composed of dark brown sandy soil, occasionally with small lenses of yellow loess. Two burials were at the bottom of the pit. Burial K1 (*adultus II – maturus I*, 35–50 years), upper part of body deposited on back, with lower limbs flexed to the left ('Rückenhocker'). The skull-cap faced east and the upper limbs were folded into a 'K' position (see Buchvaldek 1986: 34, 94, Fig. 16; after Fischer 1956:

¹ According to photo documentation, the irregular shape of the grave pit could also be the result of an indistinguishable superposition of a relatively regular rectangular grave pit with an older undated feature.

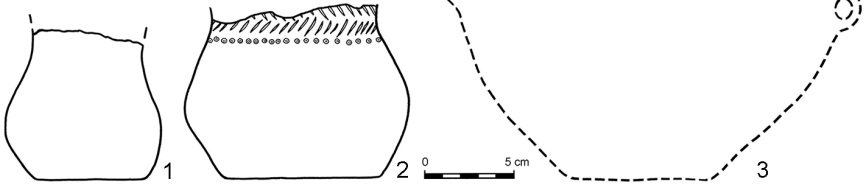
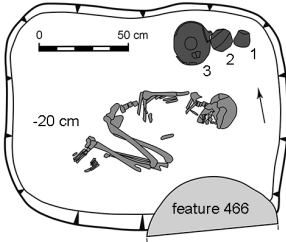
Grave 1



Grave 166



Grave 372



121–123, Taf. 29). Burial K2 (newborn) was deposited in front of the K1 individual's face; the child was on its left side with its skull-cap facing east. DNA analysis indicated that both individuals were female. Two bone/antler discs (1–2) were found behind the back of burial K1, and she was holding a small bone point (3) in her left palm (Figs. 2, 3:5).

Radiocarbon dates: MAMS-30794, 41363 and 53023 (Burial K1); BRAMS-2959 (disk 2); MAMS-38471 and 41364 (Burial K2; see Fig. 4, Table 1).

1. bone/antler disk with radial placed punctuated decoration, Ø 48–50 mm, thickness 2–3 mm. Perforated centre, Ø 5 mm (Figs. 2:1, 3:2).
2. bone/antler disk with radial placed punctuated decoration, Ø 65 mm, thickness 2–3 mm. Perforated roughly in centre, Ø 7–8 mm. The artefact was broken into two parts, probably already during use – two other perforations (Ø 2 mm) are found next to one another on the edge, each on a different half (Figs. 2:2, 3:3).
3. small bone point, round in transverse cross-section. Length 30 mm (Fig. 2:3).

6.2.2 Grave 166

The ground plan of the grave pit was rectangular (length 190 cm, width 130 cm, depth from excavated surface 20 cm). The orientation of the longest axis was northwest–southeast. The grave pit fill was composed of dark brown sandy soil, occasionally with small lenses of yellow loess. An incompletely preserved skeleton (*adultus II – maturus I*, 35–50 years) in a flexed position on the right side (probably 'Rückenhocker'), with the top of the skull oriented northwest

◀ Figure 2. Obříství, Mělník District. Corded Ware Graves 1, 166 and 372. Drawing M. Dobeš & M. Metlička.



Figure 3. Obříství, Mělník District. Selected finds from Corded Ware graves. 1 – belt clasp, Grave 166; 2–3 bone discs, Grave 1; 4 – battle-axe, Grave 166; 5 – burials in Grave 1. Photo M. Dobeš & M. Pecinová.

was discovered on the bottom of the pit. Its upper limbs were folded into the 'A' position. DNA analysis indicates that this was a male individual (Fig. 2).

A stone battle-axe lay on its side c 15 cm from the back of the skull, with the blade facing the skull (2). A beaker (1) with its vertical axis tilted towards the bottom stood in the northern corner of the grave pit. An antler belt clasp

(3) with the ornamented side facing upwards and a blade (4) with the ventral side placed on the bottom of the grave pit were found in the lumbar area of the burial.

Radiocarbon date: MAMS-30795 (see Fig. 4, Table 1).

1. beaker. Height 140 mm, Ø mouth 120 mm, Ø base 70 mm. Glued back together from seven sherds, with c one quarter of the vessel missing. Surface predominantly ochre, very poorly smoothed (Fig. 2:1).
2. battle-axe. Length 186 mm, max. width 51 mm, thickness at the borehole 31 mm. Surface polished, in places with nearly imperceptible facets – only the longitudinal edge in the battle-axe axis is more obvious. The slightly conical borehole has a diameter of 16 mm on the upper side of the artefact, 17 mm on the lower side. Boring traces are very rough and unsmoothed. Material: indeterminable – probably metabasite. Weight 548 g (Figs. 2:2, 3:4).
3. belt clasp. Length 160 mm, thickness ± 3 mm. Given the profile (see cross-sections in Fig. 2:3), the artefact is probably made from a split antler. The decoration composed of negative zigzags is chip-carved combined with engraved lines (Figs. 2:3, 3:1).
4. blade. Length 65 mm, max. width 16 mm, thickness 3 mm. Minor mechanical retouch on the right lateral side from the terminal to the central part, otherwise without secondary modifications. Material: silicite from glacial sediments. Weight 4 g (Fig. 2:4).

6.2.3 Grave 372

The grave pit had a general rectangular ground plan (length 155 cm, width 120 cm, depth from excavated surface 20 cm). The longer axis was approximately oriented in the west–east direction. The southeast side of the pit was disturbed by Feature no. 466. The grave fill was a black-brown sandy soil. At the bottom of the grave pit lay a skeleton heavily flexed on the left side

Grave	Burial	Lab ID	BP	calBC (1σ)	calBC (2σ)	Δ ¹³ C (‰)	C:N	C (%)	Collagen (%)	Sample
1	K1 adult	MAMS-30794	4276±22	2905–2889	2914–2881	6.7	2.9	33.9	6.4	Homo, femur sin.
		MAMS-41363	4064±23	2626–2499	2841–2490	-15.9	3.2	22.3	0.3	Homo, os petrosuum
		MAMS-53023	4053±24	2623–2496	2831–2474	-24.0	3.2	44,2	9.8	Homo, femur sin. (30794 Nachmessung)
		BRAMS-2959	4016±26	2572–2475	2618–2468	-20.6	3.2	43.57	-	animal bone, disc 2
	K2 new-born	MAMS-38471	3941±25	2474–2349	2565–2342	-25.5	2.9	37.4	3.4	Homo, humerus dex.
		MAMS-41364	3861±34	2453–2236	2460–2206	-26.8	3,5	17.5	0.1	Homo, os petrosuum
166		MAMS-30795	4259±23	2900–2883	2912–2786	0.4	3.3	18.7	0.7	Homo, fibula dex.
372		MAMS-38483	4048±26	2622–2494	2829–2472	-18.5	2.9	32.4	5.0	Homo, tibia dex.

Table 1. Obříství, Mělník District. Radiocarbon dates from three Corded Ware graves.

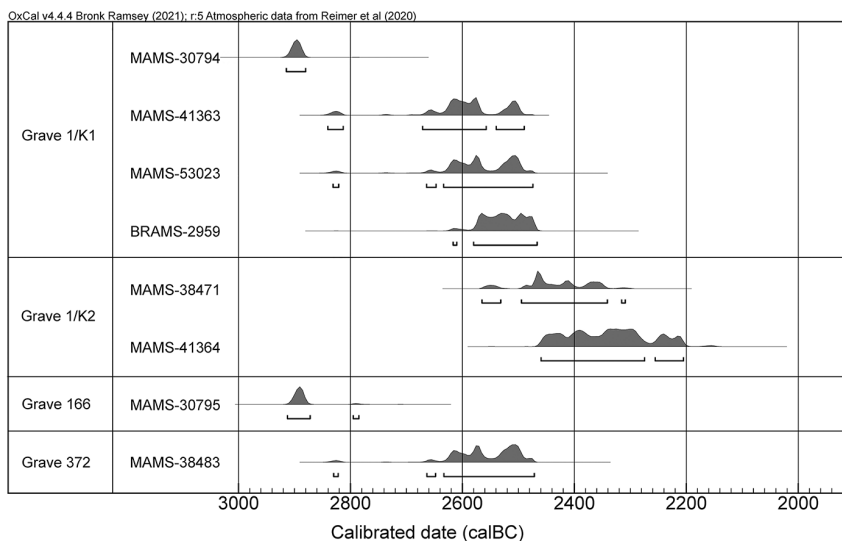


Figure. 4. Obříství, Mělník District. Calibration diagram of radiocarbon dates from three Corded Ware graves. Illustration P. Limburský.

(‘Rückenhocker’), with the top of the skull oriented towards the east (*senilis*, over 60 years). The arms were probably folded in a ‘C’ position. DNA analysis revealed that this was a female individual (Fig. 2).

Radiocarbon date: MAMS-38483 (see Fig. 4, Table 1).

1. biconical vessel made from the lower part of a beaker, rim partially abraded. Height 85 mm, Ø mouth 60 mm, Ø base 60 mm. Preserved complete. Surface smoothed, grey-brown to black (Fig. 2:1).
2. biconical vessel made from the lower part of a beaker, rim partially abraded. Height 100 mm, Ø mouth 90 mm, Ø base 90 mm. Preserved complete. Surface smoothed, brown to black. Decoration composed of a line of round stamps and an incised herringbone pattern (‘Fischgrätenmuster’; Fig. 2:2).
3. amphora (currently unavailable). Height c 200 mm – vessel dimensions were reconstructed after field documentation (Fig. 2:3).
4. fragment of storage vessel from fill of the grave, straw-brushed surface, ochre. Max. dimension 35 mm (Fig. 2:4).
5. fragment of storage vessel from fill of the grave, surface imprinted with blades of grass, ochre. Max. dimension 25 mm (Fig. 2:5).
6. fragment of neck of vessel decorated with cord imprints, from fill of the grave. Smoothed surface, ochre. Max. dimension 20 mm (Fig. 2:6).
7. two worn pieces of daub from fill of the grave, max. dimension 35 mm, weight 25 g.

6.3 Relationship of graves to prehistoric residential area

The site is located in the most favourable region of Bohemia in terms of climate and soil conditions, which was continually settled from the very beginning

of agricultural prehistory. As such, it is not surprising that an archaeological excavation captured settlement features from the Linear Pottery and Stroked Pottery cultures (c 5500–4500 BC). The site was also used for burials, as a Funnel Beaker culture grave discovered nearby in 1949 documents (see Fig. 1: Feature 4/49). Although it was originally dated to the Mesolithic (Vlček & Prošek 1956: 233–237, 278–279, Tab. II:8), according to a later ¹⁴C date (GrA-13710, 4650±50 BP, i.e. 3623–3342 calBC, 2σ), it safely belongs to the Funnel Beaker culture (Svoboda et al. 2002: 959, Table 2). In addition to the graves described above, graves from the Early Bronze Age and Iron Age were also identified at the site (Sklenář 1982: 326–327). As at many other sites, we encounter a burial complex at Obříství that was probably established at the beginning of the Eneolithic and used for a similar purpose in many other prehistoric periods (see Neustupný 2013: 21).

The area of the archaeological excavation was limited only on the future streets of the new residential zone, hence it is clear that only a small part of the cemetery was captured. The graves were 50 m from each other (Grave 1 to Grave 372), or 150 m from each other (Grave 1 to Grave 166; see Fig. 1). Based on the situation at burial sites that have been more thoroughly investigated, it could be estimated that the four identified graves represent about a tenth of the original number (on the number of Corded Ware graves at sites, see Buchvaldek 1986: 134–135; Dobeš & Limburský 2013: 165–166, Fig. 38).

The fills of Corded Ware graves in Bohemia have repeatedly produced potsherds from the Řivnáč and Globular Amphora cultures (c 3100–2800 BC), which immediately preceded the Corded Ware culture or which could even have been partially contemporary with it. It is highly likely that these are traces of often unpreserved or unfound settlements of these two cultures. This is also the case in Obříství, where the fill of Grave 372 contained one straw-brushed potsherd and one potsherd with a grass imprint from the Řivnáč culture (Fig. 2:4–5) and one potsherd decorated with cord imprints (Fig. 2:6), which could have occurred in either the Řivnáč (Zápotocký & Zápotocká 2008: Figs. 63:111, 65) or Globular Amphora culture (e.g. Vokolek

& Zápotocký 1990: Figs. 13–14). The reasons for the frequent occurrence of potsherds of Řivnáč and Globular Amphora culture pottery in the fill of Corded Ware graves can vary. It is possible to consider the intentional building of barrows (and settlements?) of the Corded Ware culture at earlier settlements of the local population or the simple use of deforested residential areas of older (and current?) domestic population.

6.4 Burial ritual

Since the Neolithic in Bohemia, the inhumation burial ritual had been most prevalent, with the deceased being placed in a crouching position in a single grave pits (see Zápotocká 1998: 22, 101), e.g. unlike the situation in northern Europe. And while the Corded Ware culture does not represent any novelty in this respect, it features the consistently opposite deposition of male and female bodies. Roughly in the east–west direction, males are placed on the right side with the top of the skull towards the west, while females are on the left side with the top of the skull towards the east (e.g. Buchvaldek 1986: 94). Conclusions reached earlier on the basis of the anthropological determination of sex are currently well supported by genetics (see Papac et al. 2021). The graves from Obříství do not deviate from the given image – one is a male burial (Grave 166), while the others are female burials, including one newborn girl (see Figs. 2, 3:5).

The dark earthy fill of all of the graves again suggests that these were probably originally hollow spaces, i.e. burial chambers. Over time, the dark earth/topsoil from the burial mound fell into these chambers. Also supporting this interpretation is the fact that skeletons and grave goods in graves are often in an unanatomical position, i.e. shifted, turned over, etc. However, the shifting of grave goods and skeletons is not conclusive in the Obříství graves.

6.5 Culture-chronological evaluation of grave goods

Two bone disks with radial decoration, likely clothing accessories, were found in Grave 1 (Fig. 3:2–3). Many close analogies to these disks come from Bohemia and central Germany, though mainly they are made from freshwater mussel *Margaritifera auricularia*, or *Margaritifera Margaritifera* (on these disks, see Kyselý et al. 2019: 94, 116, 123, Table 4 and Kalábek & Peška 2006: 89–94, 105, Figs. 12–18). Besides their material, the two specimens from Obříství differ from the majority of these ornaments not only in decorative details (on the vast majority of known artefacts, these are punctulated decorations arranged in a cross or concentric circles), but also by having a single perforation in the middle of the disk (the majority of disks have two perforations in the centre – like buttons). The described disks are dated to the second and especially third find group of the Corded Ware culture according to Buchvaldek (1967: 96; 1986: 95–105).

An interesting detail can be observed on the disk in Figure 3:3. The original product broke and two opposing holes were made at the perimeter to enable further use. The small bone point found in the palm of the adult woman's left hand has no analogy thus far in the Bohemian Corded Ware culture and it is only possible to speculate about its specific function (Fig. 2:3; a tattoo needle?, see Zimmermann 2009).

In terms of the combination of grave goods, the most interesting is certainly the equipment of male Grave 166. In addition to a typical silicite long blade (Fig. 2:4; see Vencl 1970: 238, Abb. 132) the grave inventory also included an A-type battle-axe (Fig. 3:4), an antler/bone belt clasp (Fig. 3:1; on clasps, see Dobeš et al. 2021: 498–501) and a beaker (Fig. 2:1). The battle-axe belongs to a set of roughly 25 similar pieces from Bohemia, with which it is connected not only by form but also by the characteristic hole with rough traces of boring (Fig. 3:4a; see Buchvaldek 2002: 61, Fig. 3). However, faint facets are visible in certain places, perhaps suggesting its later typological position among A-type battle-axes. While with its indent base and S-shaped profile the beaker also corresponds to archaic forms, the absence of decoration prevents

the precise determination of a more detailed typological position (Fig. 2:1; see Buchvaldek 1986: Figs. 12, 45, types B1, B10, etc.).²

Vessels from Grave 372 represent a typical equipment of graves in the ‘second find group’ (after Buchvaldek 1986: 91, 95). This was a combination of the bottoms of two beakers (Fig. 2:1–2) and an amphora (Fig. 2:3). The two intentionally modified beakers replace in this case the biconical vessels (in German terminology ‘Dosen’), which occur in Bohemia exclusively in pairs and only in female graves (Buchvaldek 1974: 57, Abb. 2). The intentional modification of beakers into the form of biconical vessels is not entirely exceptional and is found in other female graves of the second find group.

6.6 Radiocarbon dating

Figure 4 summarises the inconsistent results of radiocarbon dating. Whereas the absolute dates from Graves 166 and 372 fully correspond to the results of the archaeological typological-chronological analysis (in the case of the male from Grave 166, also his Y-chromosome haplogroup and position on the PCA diagram are both consistent with early Corded Ware; see Fig. 5), the same cannot be said for the dates from Grave 1.

According to the DNA analysis, Grave 1 contained a mother-daughter burial, and we can therefore assume that the ¹⁴C dates will be similar. Unfortunately, they sometimes differ to such an extent that their intervals don’t even overlap. While some of the values of the discussed samples are nonstandard (positive $\delta^{13}\text{C}$ values, low collagen content), the question remains whether the exclusion of the relevant samples would be justified (specifically, samples MAMS-30794, 41363 and 41364). Sample BRAMS-2959 from animal bone (disk 2, Fig. 3:3) could have a certain corrective effect in this sense; its chronological interval is roughly identical to the other dates, and according to this interpretation Grave 1 could therefore fall sometime into the middle of

² The appearance of the beaker on a previously published photograph is misleading because the vessel’s sherds were badly glued together (see Dobeš et al. 2021: Fig. 7).

the third millennium BC. This is naturally only one possible solution to the situation, which certainly merits more detailed analysis.

6.7 Genetic analysis of burials

Of the four Obříství individuals sampled for ancient DNA analysis, all four yielded enough DNA (91,125–426,482 single-nucleotide polymorphisms)

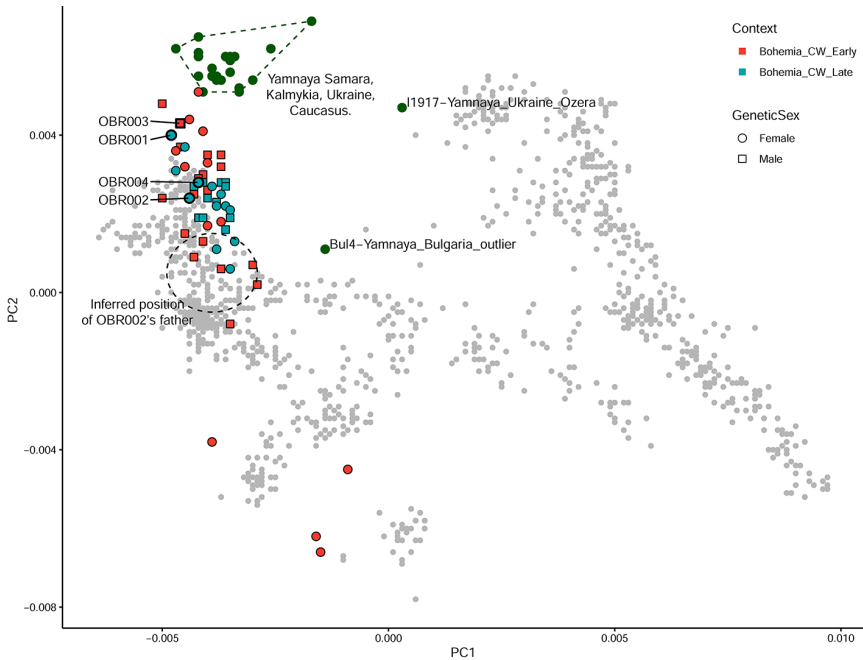


Figure 5. PCA on modern-day west Eurasian genetic diversity projecting published Yamnaya (green) and Bohemian CW individuals (Patterson et al. 2006; Lazaridis et al. 2014; Allentoft et al. 2015; Haak et al. 2015; Mathieson et al. 2015; Wang et al. 2019; Papac et al. 2021). Illustration L. Papac.

for further downstream analyses. Principal component analysis (PCA) revealed that all four individuals carried a high degree of steppe-related ancestry, characteristic of Corded Ware (CW) individuals more generally (Fig. 5). Consistent with his early ^{14}C date, OBR003 (Grave 166) plots the highest on PC2 of the four Obříství individuals and is among the closest CW individuals genetically to the Yamnaya steppe pastoralists (green). He carries the most common Y chromosome haplogroup among early CW (R1b-L151), a lineage hitherto not found in Yamnaya males (Allentoft et al. 2015; Haak et al. 2015; Mathieson et al. 2015; Wang et al. 2019; Papac et al. 2021) or late CW males from Bohemia.

OBR001 (Grave 1/K1) can be confidently identified as the mother of OBR002 (Grave 1/K2). No other biological relationships within 4th-degree related can be found either among the Obříství individuals themselves or between the Obříství individuals and other published ancient individuals from Bohemia. Given the PCA position of OBR001 and OBR002 and the linear properties of PCA, it can be inferred that the father of OBR002 must have carried significantly less steppe-related ancestry than OBR002 (Fig. 5). This suggests that even CW males with relatively low levels of steppe-related ancestry could father offspring.

6.8 Conclusion

While the three Corded Ware culture graves discovered near Obříství, Czech Republic, in 2011, likely represent only a small part of the original cemetery, their informational value, especially in the case of Grave 1 and 166, is extraordinary and is enhanced by the relevant scientific analyses (^{14}C , aDNA) discussed here. Grave 1 is noteworthy for the burial of a mother with her newborn daughter. In addition to the find of two uniquely decorated bone disks, it is also important from a methodological perspective for an interpretation of the radiocarbon dates from archaeological features. In terms of finds,

male Grave 166 belongs to the rarely represented A-horizon of the Corded Ware culture in Bohemia. In the given context, it is also remarkable across the whole of Europe for its unusual combination of antler/bone belt clasps, battle-axe and ceramics.

Acknowledgements

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References

- Allentoft, M. E., Sikora, M., Sjögren, K.-G., Rasmussen, S., Rasmussen, M., et al. 2015. Population genomics of Bronze Age Eurasia. *Nature* 522: 167–172.
- Buchvaldek, M. 1967. *Die Schnurkeramik in Böhmen*. Acta Universitatis Carolinae, Philosophica et historica monographia 19.
- Buchvaldek, M. 1974. Zur Bedeutung der Bestattungsbräuche der mitteleuropäischen Schnurkeramik. *Zborník Filozofickej fakulty Univerzity Komenského* 13: 51–62.
- Buchvaldek, M. 1986. Kultura se šňůrovou keramikou ve střední Evropě I: Skupiny mezi Harcem a Bílými Karpaty. *Praehistorica* 12: 1–160.
- Buchvaldek, M. 2002. Poznámky k A-sekeromlatům v Čechách, na Moravě a v Bavorsku. In P. Čech & Z. Smrž (eds.) *Sborník Drabomíru Kouteckému*: 61–65. Příspěvky k pravěku a rané době dějinné v severozápadních Čechách 9.
- Dobeš, M. & Limburský, P. 2013. *Pohřebiště staršího eneolitu a šňůrové keramiky ve Vlněvsi*. Archeologické studijní materiály 22.

- Dobeš, M., Pecinová, M. & Ernée, M. 2021. On the earliest Corded Ware in Bohemia. In V. Heyd, G. Kulcsár & B. Preda-Bălănică (eds.) *Yamnaya interactions: Proceedings of the International Workshop held in Helsinki, 25–26 April 2019*: 487–511. The Yamnaya Impact in Prehistoric Europe 2.
- Fischer, U. 1956. *Die Gräber der Steinzeit im Saalegebiet: Studien über neolithische und frühbronzezeitliche Grab- und Bestattungsformen in Sachsen-Thüringen*. Vorgeschichtliche Forschungen 15.
- Haak, W., Lazaridis, I., Patterson, N., Rohland, N., Mallick, S., et al. 2015. Massive migration from the steppe is a source for Indo-European languages in Europe. *Nature* 522: 207–211.
- Kalábek, M. & Peška, J. 2006. Pozdně eneolitický hrob se zdobeným kostěným terčem z Olomouce-Nemilan. *Ročenka* 2005: 72–107.
- Kyselý, R., Dobeš, M. & Svoboda, K. 2019. Drilled teeth and shell artefacts from a grave at Prague-Březiněves and a review of decorative artefacts made from animal material from Corded Ware culture in the Czech Republic. *Archaeological and Anthropological Sciences* 11(1): 87–131.
- Lazaridis, I., Patterson, N., Mittnik, A., Renaud, G., Mallick, S., et al. 2014. Ancient human genomes suggest three ancestral populations for present-day Europeans. *Nature* 513: 409–413.
- Mathieson, I., Lazaridis, I., Rohland, N., Mallick, S., Patterson, N., et al. 2015. Genome-wide patterns of selection in 230 ancient Eurasians. *Nature* 528(7583): 499–503.
- Neustupný, E. 2013. General overview of the Eneolithic period. In E. Neustupný, M. Dobeš, J. Turek & M. Zápotocký (eds.) *The Prehistory of Bohemia 3: The Eneolithic*: 11–39. Praha: Archeologický ústav AV ČR.
- Papac, L., Ernée, M., Dobeš, M., Langová, M., Rohrlach, A. B., et al. 2021. Dynamic changes in genomic and social structures in third millennium BCE central Europe. *Science Advances* 7(35): eabi6941.
- Patterson, N., Price, A. L. & Reich, D. 2006. Population structure and eigenanalysis. *PLoS Genetics* 2(12): e190.
- Sklenář, K. 1982. *Pravěké nálezy na Mělnicku a Kralupsku: Archeologický místopis okresu Mělník v pravěku a rané době dějinné*. Mělník: Okresní Muzeum.
- Svoboda, J. A., van der Plicht, J. & Kuželka, V. 2002. Upper Paleolithic and Mesolithic human fossils from Moravia and Bohemia (Czech Republic): some new ¹⁴C dates. *Antiquity* 76(4): 957–962.
- Vencl, S. 1970. Das Silexgerät. In M. Buchvaldek & D. Koutecký (eds.) *Vikletice, ein schnurkeramisches Gräberfeld*: 236–252. Praehistorica 3.
- Vlček, E. & Prošek, F. 1956: Staroholocenní kostrové pohřby z Obříství u Mělníka. *Anthropozoikum* 5(1955): 233–285.

Vokolek, V. & Zápotocký, M. 1990. Východní Čechy ve středním eneolitu (otázka zásahu bošácké skupiny). *Památky archeologické* 81: 28–58.

Wang, C.-C., Reinhold, S., Kalmykov, A., Wissgott, A., Brandt, G., et al. 2019. Ancient human genome-wide data from a 3000-year interval in the Caucasus corresponds with ecogeographic regions. *Nature Communications* 10(1): 590.

Zápotocká, M. 1998. *Bestattungsritus des böhmischen Neolithikums (5500–4200 B.C.): Gräber und Bestattungen der Kultur mit Linear-, Stichband- und Lengyelkeramik*. Praha: Archäologisches Institut der Akademie der Wissenschaften der Tschechischen Republik.

Zápotocký, M. & Zápotocká, M. 2008. *Kutná Hora–Denemark: Hradiště řivnáčské kultury (ca 3000–2800 př. Kr.)*. *Památky archeologické: Supplementum* 18.

Zimmermann, T. 2009. Zu möglichem Tatauierbesteck und Treibstacheln (Stimuli) in frühbronzezeitlichen Prunkgräbern aus Alaca Höyük, Türkei. *Prähistorische Zeitschrift* 84: 141–150.