

NEW EVIDENCE ON THE EARLY BRONZE AGE MORTUARY PRACTICES IN NORTHEAST BULGARIA

Rositsa Manova,^{1*} Stefan Alexandrov,^{2*} Daniela Kovacheva,³ and Stela Atanasova-Vladimirova⁴

¹Independent researcher, Sofia, Bulgaria, rosi.artist2@gmail.com

²National Archaeological Institute and Museum, Bulgarian Academy of Sciences, stefanalexandrov@abv.bg

³Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, didka@svr.igic.bas.bg

⁴Institute of Physical Chemistry, Bulgarian Academy of Sciences, statanasova@ipc.bas.bg

*Corresponding authors

Abstract

This paper discusses the interdisciplinary analyses of an Early Bronze Age secondary barrow grave related to the Yamnaya culture in northeast Bulgaria. The analytical results produced firm evidence of ritual practices in Yamnaya communities aiming at the preservation of skeletons by coating them with CaCO₃ and/or by additionally painting certain skeletal elements with hematite. This practice could have been related to the preservation of ancestral memory associated with social power.

Keywords: *Early Bronze Age – Yamnaya culture – mortuary practices – secondary burial – pigments.*

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Introduction

In the last five years, a large-scale rescue excavation project was carried out in north-east Bulgaria, including five Bronze Age barrows located near the village of Vetrino, Varna District. Over a hundred Early Bronze Age (EBA) barrows are clustered in the area organized in four extensive cemeteries. They form curved lines (fig. 1), each consisting of several dozen tumuli, some of which are not visible on the ground due to recent agricultural land use (Paukkonen et al. 2025). Three barrows excavated in 2020 yielded 15 EBA graves, which provided new evidence on mortuary practices in northeast Bulgaria in the fourth–third millennium BC, especially regarding the diversity of body positions and the use of different elements in the ritual (Alexandrov et al. 2021).

In 2024, two more barrows were excavated in the area – barrow 20 in necropolis 1 and barrow 4 in necropolis 3 – adding 15 more EBA graves to the investigated lot. The former barrow measured ca. 2 m high and ca. 40 m in diameter (fig. 2), and yielded four EBA graves and a fifth burial dating to the MBA (fig. 3). This paper will focus on feature 6, an EBA burial, which produced new evidence on the use of pigments in mortuary practices as well as on the postmortem treatment of bodies.

The grave

Feature 6 was an inhumation burial cut in the already existing barrow without additional piling of barrow fill. The rectangular grave pit measured 0.73 by 0.59 m, with a depth of 0.43 m, oriented northeast-southwest. The body of a child (Infans I) was placed on the flat bottom in an articulated semi-supine position to the right (head to southwest), with the legs bent at the knees and fallen down to the right. Both arms were bent at the elbows, the left one was placed next to the body, and the right one was in front of the head (fig. 4). Phalanges and metatarsal bones of the right foot as well as phalanges and metacarpal bones of the right hand were found back of the skull (fig. 5). Two lumps of red pigment were placed in front of the face, and an askoid jug lay some 15 cm further south (fig. 6). The pit was covered with two rows of stone slabs measuring up to 0.50 m long (figs. 7 and 8). A sample on an infant's long bone (Poz-196215, 3%N 9.7%C, 9%col) provided an AMS date of 4390 ± 40 BP that would place the grave in the 3100–2900 cal. BC period (fig. 9). Considering all the characteristics of the mortuary practices as well as the radiocarbon date, the burial should be related to the early phase of the Yamnaya culture in the northern Balkans.

The analyses

Upon examination of the skull, traces of white coating were clearly visible on the inner side of the parietal bones (fig. 10). A sample of the coating as well as the two lumps of red pigment were analyzed using scanning electron microscopy (SEM/EDS), X-ray diffraction (XRD), and optical microscopy. The main goal of the analyses was to obtain data on the morphology and colors of the surface, microstructure, elemental, and miner-

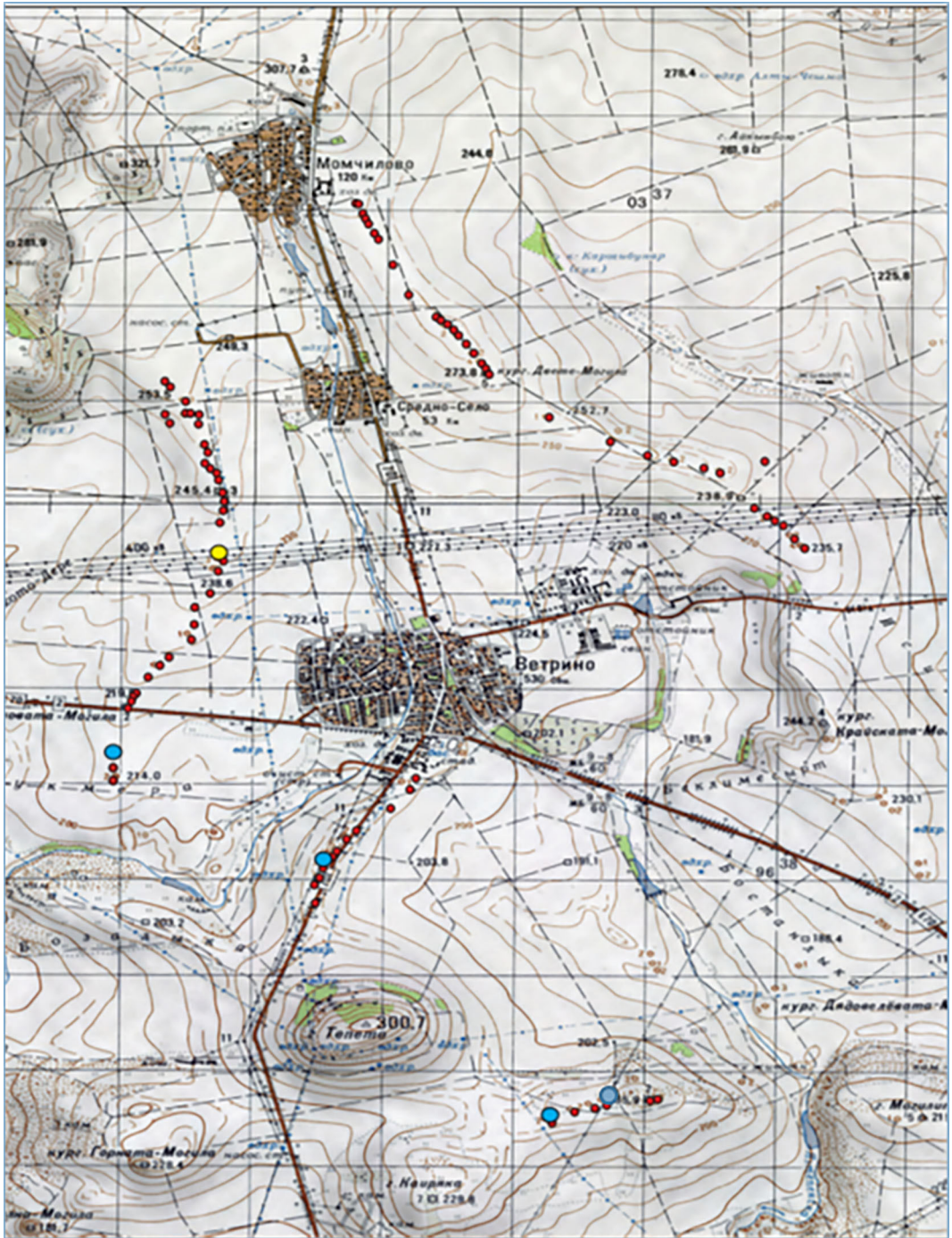


Figure 1. *EBA* barrow cemeteries in the Vetrino area. Image Credit: <https://map.bgmountains.org/> and Stefan Alexandrov.



Figure 2. Barrow 1/20 at Vetrino before the excavations. Image Credit: Radostina Yordanova.

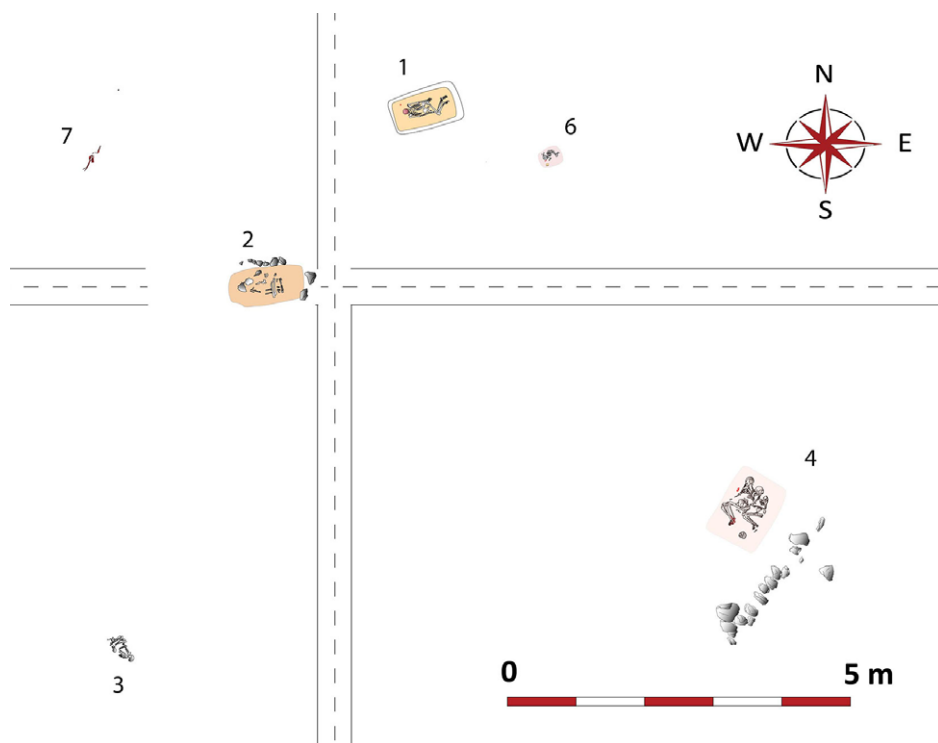


Figure 3. Barrow 1/20, layout of the investigated feature. Image Credit: Stefan Alexandrov.



Figure 4. Barrow 1/20, feature 6. Image Credit: Radostina Yordanova.

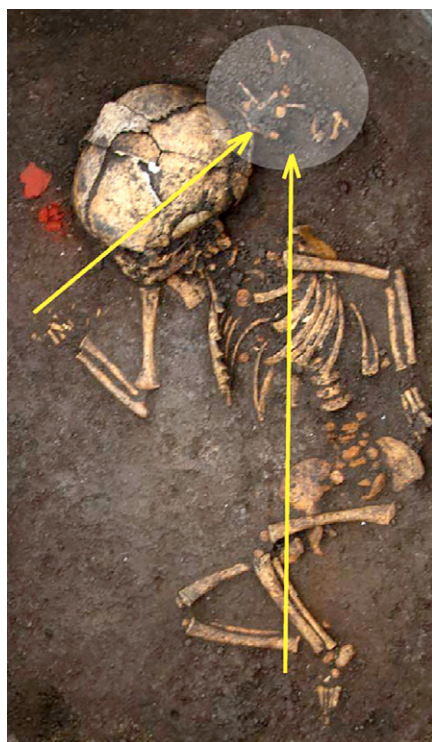


Figure 5. Barrow 1/20 at Vetrino, feature 6, disarticulated bones. Image Credit: Radostina Yordanova.



Figure 6. Barrow 1/20 at Vetrino, feature 6, red ochre lumps and askos. Image Credit: Radostina Yordanova.



Figure 7. Barrow 1/20 at Vetrino, feature 6, stone covering of the grave. Image Credit: Radostina Yordanova.

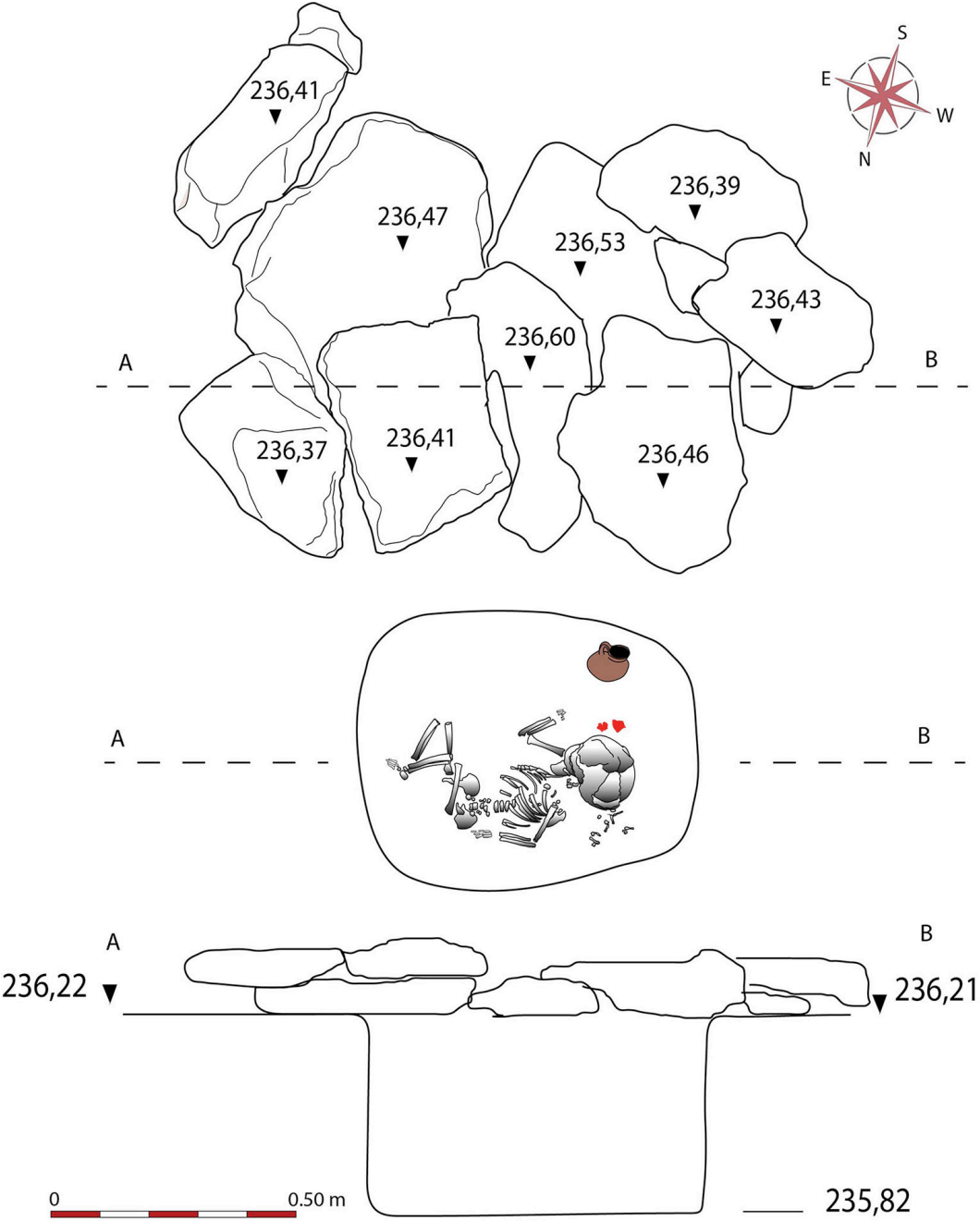


Figure 8. Barrow 1/20 at Vetrino, feature 6. Image Credit: Stefan Alexandrov.

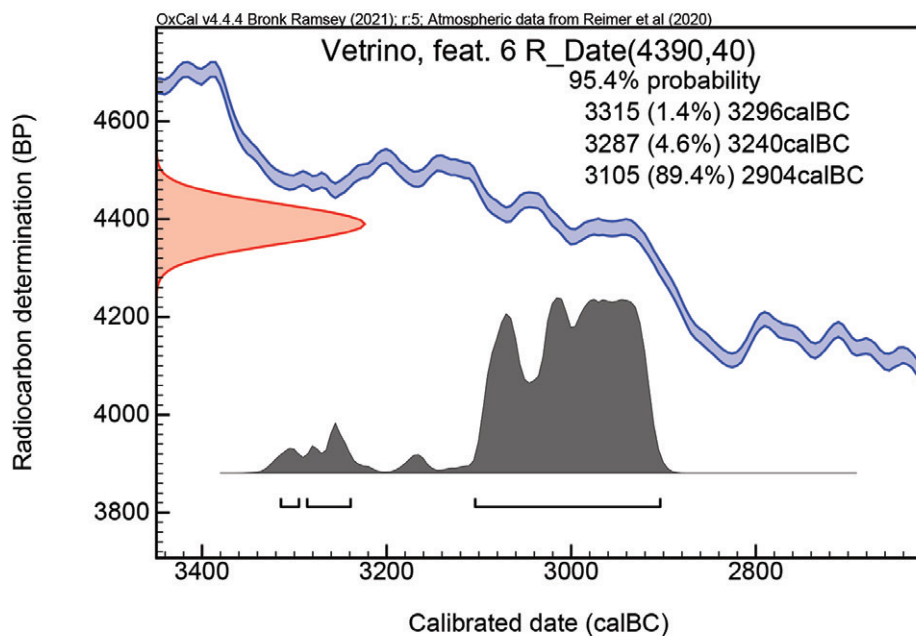


Figure 9. Barrow 1/20 at Vetrino, feature 6, radiocarbon date. Image Credit: OxCal 4.4.

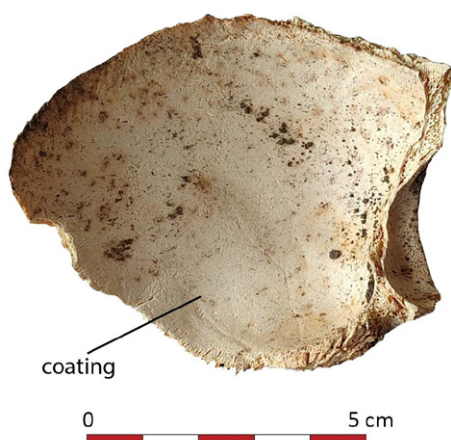


Figure 10. Barrow 1/20 at Vetrino, feature 6, white coating of the inner surface of the parietal bone. Image Credit: Rositsa Manova.

alogical composition of the samples, the technique of their preparation, and their possible source. The SEM/EDS analyses were performed with JEOL 6390 and INCA Oxford equipment; optical microscopy was performed with Zeiss Axioscope 5 and Zeiss Stemi 305 stereomicroscope, and XRD analyses were performed with a Panalytical Empyrean system. Phase analysis was performed using Match software, a freely accessible tool for comparing phase analysis with a database of reference models (<https://www.crystalim-pact.de/match>). Additional reference data for analysis was taken from the Crystallography Open Database (<https://www.crystallography.net/cod/>). The samples were examined as powders. The results are presented below:

The red pigment

SEM-EDS analyses revealed that the main elements in the investigated sample are iron (Fe), aluminum (Al), silicon (Si), oxygen (O), and carbon (C); secondary elements are potassium (K) and calcium (Ca); magnesium (Mg) and titanium (Ti) were noted as microelements (table 1).

Result type	Weight %								
Statistics	C	O	Mg	Al	Si	K	Ca	Ti	Fe
Max	8.85	40.19	0.63	7.40	13.31	1.41	1.11	0.51	28.66
Min	7.82	39.35	0.55	7.24	12.44	1.25	0.96	0.39	27.72
Average	8.49	39.82	0.58	7.31	12.86	1.32	1.03	0.44	28.16
Result type	Atomic %								
Statistics	C	O	Mg	Al	Si	K	Ca	Ti	Fe
Max	16.19	55.20	0.58	6.14	10.61	0.81	0.61	0.23	11.49
Min	14.57	54.89	0.50	5.90	9.73	0.70	0.53	0.18	10.93
Average	15.63	55.05	0.53	5.99	10.13	0.75	0.57	0.20	11.16

Table 1. *Vetrino, barrow 1/20. SEM-EDS analyses of the red pigment.*

The results of the X-ray diffraction (XRD) analyses (fig. 13) show that the mineral composition of the sample consists of hematite (Fe_2O_3), quartz (SiO_2), and muscovite ($\text{KAl}_2(\text{AlSi}_3\text{O}_{10})(\text{OH})_2$). The morphology and intensity of the samples (figs. 11 and 12) as well as the data for elemental composition, atomic ratio and weight, and mineral composition give us reason to consider the red pigment as hematite obtained from natural deposits.

The white coating

SEM-EDS analyses revealed potassium (K), sodium (Na), magnesium (Mg), manganese (Mn), and barium (Ba), which may be related to the infant's diet; the aluminum (Al) and silicon (Si) may be attributed to soil composition, while the presence of iron (Fe) and titanium (Ti) could actually be red pigment particles that penetrated the skull.



Figure 11. Barrow 1/20 at Vetrino. Mineral composition of the red pigment. Image Credit: Stela Atanassova-Vladimirova.

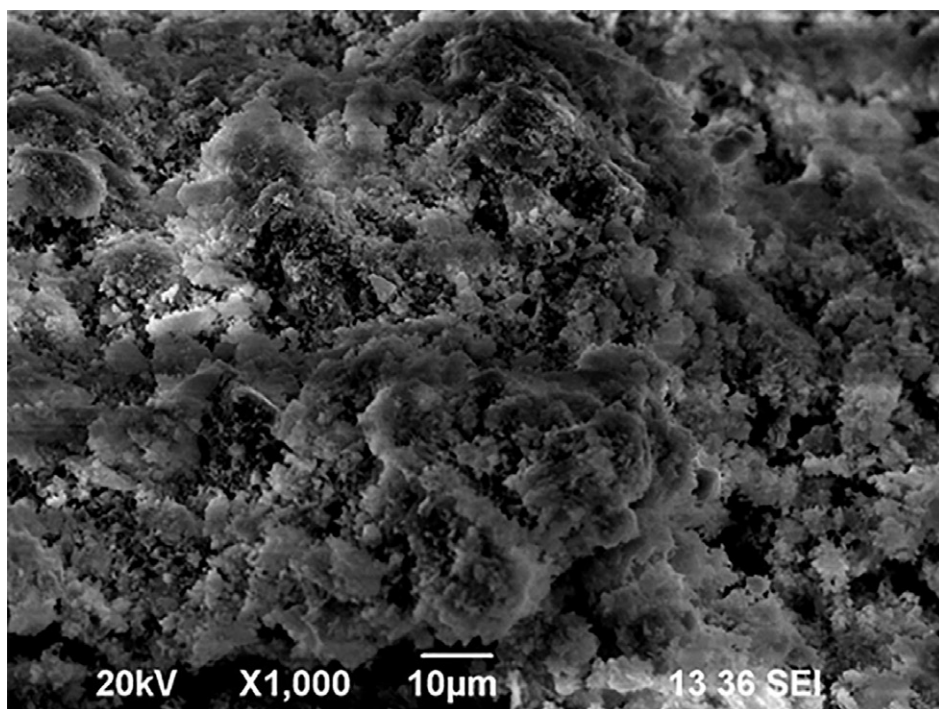


Figure 12. Barrow 1/20 at Vetrino. Optical microscopy. Morphology and color density of the red pigment. Image Credit: Stela Atanassova-Vladimirova.

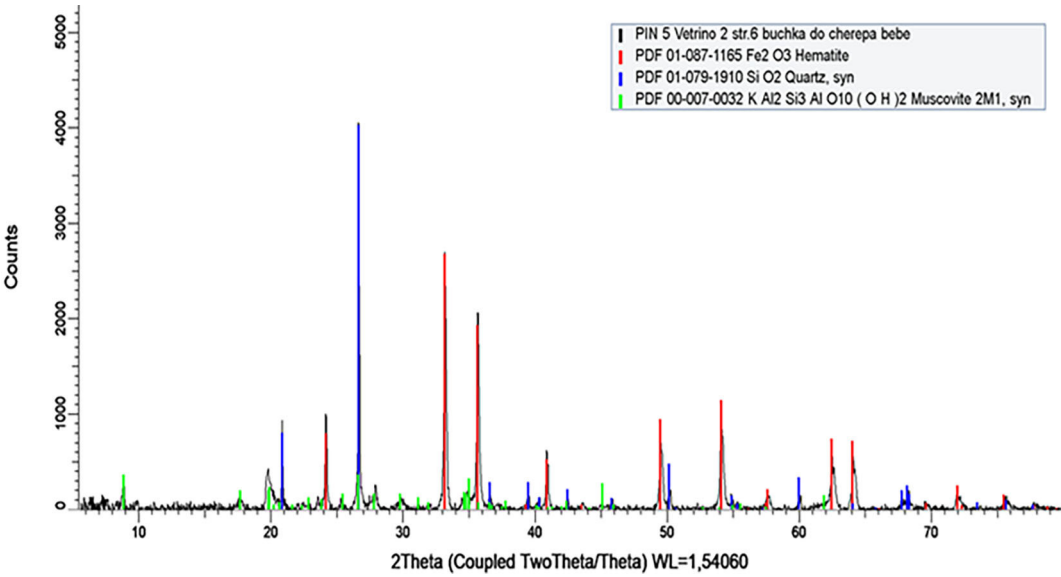


Figure 13. Barrow 1/20 at Vetrino. Surface morphology of the red pigment; secondary electron image. Image Credit: Daniela Kovacheva.

Table 2 shows the elemental composition of the skull coating as well as the elements of inorganic salts from the bone structure – mainly CaSO_4 and CaCO_3 . The main elements are to be associated with the mineral component found in human bones – hydroxyapatite $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ and vaterite (CaCO_3).

Result type	Weight %												
Statistics	C	O	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Ba
Max	12.94	50.88	0.72	1.34	6.90	17.78	3.61	1.47	9.08	0.30	0.17	3.11	0.59
Min	11.44	50.10	0.62	1.22	5.72	13.19	0.83	1.20	4.28	0.19	0.07	2.39	0.13
Average	12.27	50.52	0.69	1.26	6.25	15.38	2.19	1.32	6.76	0.23	0.12	2.67	0.33
Result type	Atomic %												
Statistics	C	O	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe	Ba
Max	20.00	59.81	0.58	1.02	4.73	11.70	2.19	0.69	4.26	0.12	0.06	1.03	0.08
Min	17.92	58.13	0.51	0.94	3.99	8.83	0.49	0.58	1.97	0.07	0.02	0.80	0.02
Average	19.02	58.80	0.56	0.97	4.31	10.18	1.32	0.63	3.15	0.09	0.04	0.89	0.04

Table 2. Vetrino, barrow 1/20. SEM–EDS analyses of the white coating.

The results of the X-ray diffraction (XRD) analyses (fig. 14) demonstrated that the mineral composition of the sample consists of hydroxyapatite $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$, silicon oxide (SiO_2), periclase (MgO), and vaterite (CaCO_3).

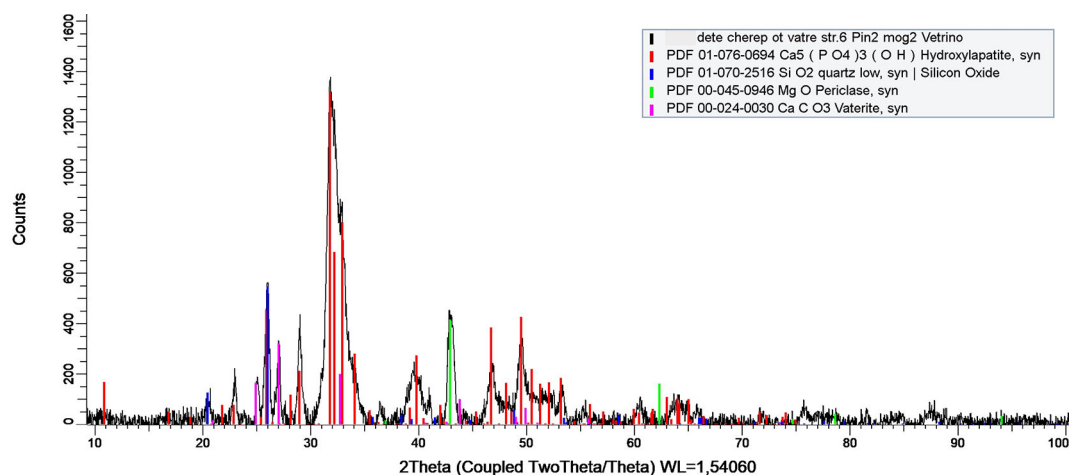


Figure 14. Barrow 1/20 at Vetrino. Mineral composition of the white coating. Image Credit: Daniela Kovacheva.



Figure 15. Barrow 1/20 at Vetrino. Optical microscopy. Morphology and color density of the white coating. Image Credit: Stela Atanassova-Vladimirova.

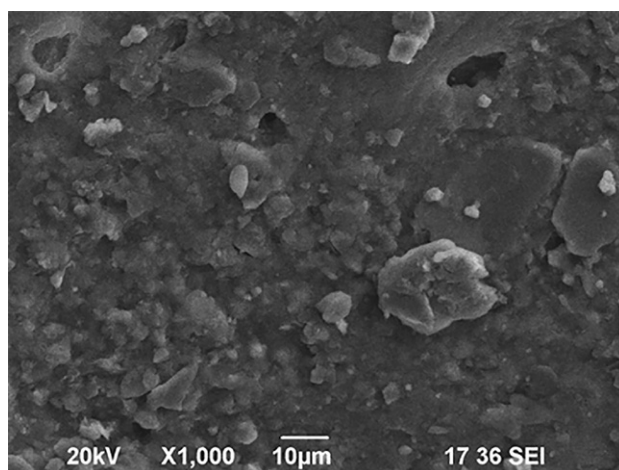


Figure 16. Barrow 1/20 at Vetrino. Surface morphology of the white coating; secondary electron image. Image Credit: Stela Atanassova-Vladimirova.

Discussion

Red ochre

As mentioned earlier, the infant grave should be dated to the 3100–2900 cal. BC timespan. This is the period of the largest use of red ochre in barrow graves in the northern Balkans. It is to be related to the religious beliefs of the cattle-breeding population known as the ‘Yamnaya culture’ that migrated from the northwest part of the Black Sea steppes, occupying regions with a ‘steppe’ landscape in northeast and north central Bulgaria (Panayotov 1989; Alexandrov 2021) and the Middle Tundzha River Valley (Alexandrov & Włodarczak 2024; Manova et al. 2024). A large-scale analyses of pigments from EBA barrow graves from Bulgaria, Romania, Moldova, Ukraine, and Serbia clearly showed that two types of red ochre were used in mortuary practices; the latter, with minimum amounts of titanium (Ti), was most likely extracted from a local source in northeast Bulgaria (Alexandrov et al., in print). Considering the results of the SEM/EDS analyses of the hematite from Vetrino and its unique titanium signature, we are inclined to relate it to the same source.

Vaterite

Feature 6 of barrow 1/20 at Vetrino would be the first case demonstrating the practice of coating the inner surface of the parietal bones of the skull with calcium carbonate (CaCO_3) published in Bulgaria. It is well known that calcium carbonate has a preservative function as it is very poorly soluble in water and neutralizes acids (forming carbon dioxide and the corresponding calcium salt). It repels microorganisms and protects against decay and decomposition. Inside coating of the skull was also attested at grave 5 of the Kriva bara barrow in northwest Bulgaria, where traces of red coating were clearly visible on the inner surface of the parietal bones of the skull, around the so-called lambda point. The grave is dated to 2900–2650 cal. BC and could be related to the late Yamnaya period.¹ Another example comes from the site of Chekon-2 (3300–3100 cal. BC) of the Majkop culture, where parietal bones of an adult male were painted from the inside with cinnabar (Korenevskii et al. 2015, 35ff).

On the other hand, applying pigments to the inner surface of the skull is impossible without removing it from the corpse. Considering the position the skeleton (figs. 4–6), we can assume that after having been painted on the inside, the skull was placed in its original position in the grave. The presence of disarticulated bones (metatarsal and metacarpal phalanges) that were not found in their original position is additional evidence of postmortem manipulation (secondary burial) at feature 6 of Vetrino. Such mortuary practices (dismemberment, also named ‘demembration’) are common for the EBA Yamnaya communities. For example, 31 such Yamnaya culture burials were excavated until 2010 in the Dniester–Prut Rivers region (Agul’nikov & Popovich 2010). Such practices are attested in Moravia as well as in other regions of Bronze age Europe (Pankowská 2018,

¹ 2024 excavations directed by Stefan Alexandrov.

with references). In Bronze Age Britain, such disarticulated bones are even considered as a clue for the possible mummification of the body (Booth et al. 2015).

In conclusion, the analytical results discussed here demonstrate that the Yamnaya culture communities practiced rituals that were aimed at the preservation of skeletons by coating them with CaCO₃ and/or additionally painting of certain parts of the skeletons with hematite. This practice could be related to the collective social memory or to the ‘... growing role of deceased ancestors in the legitimization of rights over land and property’ (Booth et al. 2015). As was suggested by Mircea Eliade, cultural memory is never lost but is passed down and modified from generation to generation (e.g., 1961). It’s thus quite possible that mortuary practices discussed here were related to the process of preserving particular individual, or, in other words, preserving the ancestral memory associated with social power.

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