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Editorial

Corded World

In the late 19th century, German researchers Friedrich Klopfleisch and, later, Alfred Götze identified a set of archaeological sources they called "schnurkeramische Kultur" (Corded Ware culture). By the turn of the 20th century, this concept had become widespread in many European countries, effectively defining the phenomenon of cultural unification across a vast area in the 3rd millennium BC. In the first decades of the 20th century, Corded Ware finds inspired the development of studies on European prehistory, transcending local geographical and cultural boundaries. They played a key role in the ethnicising concepts of Gustaf Kossinna's "Siedlugsarchäologie", as well as in the formulation of the first ideas of interregional scope, presented by Vere Gordon Childe, concerning the key role of steppe migrations in the cultural and demographic changes in European prehistory. It was probably the methods of "Siedlugsarchäologie" that decisively influenced Corded Ware researchers' commitment to in-depth typological studies characterising individual regions. The history of research on the Final Eneolithic comprises numerous studies that meticulously characterise finds from specific areas and discuss their chronology. The works of, among others, Miroslav Buchvaldek, Peter Vilhelm Glob, Karl Heinz Struve, Jan Machnik, and Mats Malmer established the direction of research for many years, serving as a starting point for subsequent generations of researchers striving to improve the proposed interpretations. They were the quintessence of the spirit of so-called "cultural-historical archaeology". However, Corded Ware studies did not lose their appeal even in interpretations proposed by new methodological trends in European archaeology, as evidenced in works written in both a processual and postprocessual spirit. They continue to play a leading role today in research inspired by the latest technological advances (including AI and bioarchaeological analyses, primarily those related to ancient DNA studies).

The multitude of authorities and the inherent universality of material studies fostered contacts and collaborations between researchers from various countries. In the second half of the 20th century, the "Schnurkeramik Symposiums", meetings of Corded Ware specialists from multiple regions, became a phenomenon. The last such symposium, organised by Palle Siemen, took place in Esbjerg, Denmark, in

1994. A continuation of the legacy of these meetings was the "Corded Days in Kraków" conference, organised in Kraków in 2011. This was the last major gathering of specialists in Corded Ware studies to date. This 63rd volume of *Archaeologia Polona*, titled *Corded World. Final Eneolithic societies* contains six articles, which are modified versions of the presentations delivered at that time. The contents of other papers published in this volume also remain in the spirit of the "Schnurkeramik Symposium". They present various issues related to the Final Eneolithic, including the publication of new materials, new chronological studies, and detailed analyses of selected groups of objects. These papers, although not a comprehensive summary of the state of Corded Ware research, provide a significant portion of knowledge for specialists working on the prehistory of the 3rd millennium BC. A better understanding of the Corded Ware phenomenon requires a multiplicity of perspectives and consideration of research from all regions. The present volume of *Archaeologia Polona* thus provides diverse information and demonstrates the benefits of confronting different perspectives on the issue of "Corded Ware". It is an invitation to revive the tradition of "Schnurkeramik Symposiums", whether in the traditional format of a meeting or in a new one.

The texts in this volume are complemented by an obituary of archaeologist and museologist Wojciech Piotrowski, written by Jacek Lech. Piotrowski, who was professionally connected with the archaeological site at Biskupin, was also co-editor of volume 47 (2009) of *Archaeologia Polona*.

We also wish to draw readers' attention to the detailed report from the International Symposium "12th International Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times: *Excavating in the Land of the Devil: Past and Current Research on Prehistoric Flint Mines*", held in Worthing (West Sussex), 6–8 May 2025, authored by Aleksandra Wołk.

Piotr Włodarczak
Dagmara H. Werra

Corded Days in Kraków

1st-2nd December 2011

Photo: K. Tunia

CONTENTS

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The Corded Ware Phenomenon Reconsidered

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The author dedicates this article to the memory of Miroslav Buchvaldek, who was born 95 years ago.

This article focuses on the reconsideration of some aspects of the Corded Ware phenomenon in Europe. It highlights the impact of new archaeogenetic data, which challenge traditional views of archaeological cultures as monothetic entities. It critiques interpretations of extensive steppe migrations as simplistic, particularly concerning genetic changes. Additionally, it underscores the importance of sacred landscapes, sacred mountains and natural shrines, in understanding Corded Ware rituals and beliefs. The continuity and transition between the Corded Ware and Bell Beaker periods are explored, with a view that rather than a sharp break, these periods represent evolving cultural and ritual practices, particularly noticeable in their burial customs. The article calls for nuanced interpretations embracing both archaeological and genetic evidence to understand the intricate cultural development of the 3rd millennium BC in Europe.

KEY-WORDS: Corded Ware phenomenon, archaeogenetic data, steppe migration, burial rites, natural shrines, Corded Ware-Bell Beaker transition

When, after fourteen years, I reread my contribution to the Schnurkeramik Symposium "Corded Days" in Kraków (December 2011) I realised how much has changed in the intervening time in the research into the 3rd millennium BC in Europe and how my own views of some questions have developed. Firstly, we now have an ever-increasing volume of archaeogenetic data that cannot be ignored; it is essential to critically evaluate and incorporate these findings into the reconstruction of the cultural and population processes of this period. However, we still grapple with

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a number of other questions, the resolution of which is often burdened by various biases that hinder our ability to develop new models and pose entirely different questions. In this essay, I will attempt to summarise at least some of the questions that have arisen in the ongoing discussion about the Corded Ware phenomenon from the perspective of current archaeology.

Among the traditionally discussed issues of the Corded Ware period are: how do we reconstruct the economy and subsistence of Corded Ware communities? Do we have evidence to support the long-held view of this culture in Central Europe as predominantly nomadic pastoralists, or are there grounds for inferring a preference for arable farming and local variability in agricultural practices? What can be traced as remaining steppe elements? What is the significance of single burials and circular barrows? How do we interpret collective burials? How can we perceive the impact of the Corded Ware phenomenon on the local development of Neolithic cultures and was there a total "colonisation" of the entire landscape during the 3rd millennium BC? What are the visible and invisible transitions to the Bell Beaker period, do they represent continuity or discontinuity? A new culture, new people?

The issue of interpreting archaeogenetic data has been thoughtfully summarised by Martin Furholt (2020), who points out the bias of monothetic perceptions of archaeological units (traditionally classified as cultures) in interpretations that assume massive migrations (Kristiansen *et al.*, 2017). Archaeological cultures of the European Neolithic have traditionally been understood in a monothetic sense, as exclusive units reflecting human communities and perhaps also genetically different groups of populations, as expressed in the formulation of this concept by V. Gordon Childe (1929). This approach has later been described as a misrepresentation of the proper use of archaeological material by David Clarke (1968) and Evžen Neustupný (1976). In the case of the Corded Ware population, the concept of "steppe migration" has been employed. However, Furholt rightly notes that the assumption of a direct link between the genetic origins of the population and the monothetically conceived concept of archaeological cultures complicates the interpretation of cultural population processes in the Neolithic. He states that "it is useful to separate biological patterns from patterns of social traditions or innovations, and also to separately deal with the different categories of finds, seeing them as potentially connected to different social worlds" (Furholt 2020: 9).

In the discussion about population changes in the 3rd millennium BC, I would like to refer to the book in which Johannes Krause from the Max-Planck-Institut für evolutionäre Anthropologie attempted to summarise this issue for the general public (Krause and Trappe 2019). In his genetic concept, he introduces the so-called steppe migration, which is said to have completely transformed the demographic composition of Europe around 4800 years ago. His interpretation revisits the migrationist view of history, which was the dominant idea of the cultural-historical paradigm and the so-called settlement archaeology of Professor Gustaf Kossinna prior to the Second World War, positing that the main motive for cultural changes in prehistory was population exchange and extensive migrations.

Krause's genetic reconstructions assume that during this period, there was a significant shift in Y chromosomes, those inherited through the male line, and that after the steppe migration, the demographic landscape of Europe changed such that in the populations of the following Bronze Age, 80 to 90 percent of the Y chromosomes were entirely new (Krause and Trappe 2019). As a genetic legacy from these "forefathers", around 70% of the West European population today carries the Y chromosome haplogroup R1b, which is associated with the population of the Bell Beaker Culture, while approximately 50% of contemporary East Europeans have the Y chromosome haplogroup R1a, linked to the earlier Corded Ware Culture. Also, due to the interpretational mistake in using the archaeological cultures as monothetic and almost ethnic units, the credibility of haplogroups, wherein the hereditary lines of mitochondrial DNA and Y chromosomes are combined into a single pedigree, is far from convincing. While Krause predicates a 70% change in genetic structure for the area of present-day Germany, he posits that it was over 90% in Britain. An uncritical approach to archaeological sources is also evident in Krause's attempts to explain the genetic changes in the population at the end of the Late Neolithic and the beginning of the Bronze Age in Europe. He assumes that at the beginning of the 3rd millennium BC, a large number of people with the so-called steppe genes must have migrated to Central Europe, significantly altering the genetic structure of the region within just five generations. According to Krause, the population change was so immense that: "if we were to achieve a similar effect today, ten billion people would need to arrive in Europe all at once"… "or, to remain within realistic possibilities, one billion migrants to Germany" (Krause and Trappe 2019).

I believe that these assumptions, primarily due to their implausibility, largely disqualify the interpretation of such extensive genetic changes at the end of the Neolithic, and that in future we will learn how to read and interpret these biological data properly. I am concerned that some archaeologists, particularly those adhering to the cultural-historical paradigm, are to some extent involved in the hasty rewriting of the population history of prehistoric Europe without sufficient critical distance from qualitatively new biological data and with biased and purpose-driven interpretation of archaeological sources. As we know, throughout the later Prehistory (and particularly in the Protohistoric period and the Early Middle Ages) it was precisely migration and the intermingling of peoples that shaped the continent's present ethnic landscape. For

Europe, the synthesis and coexistence of groups of diverse origin is characteristic. Its population has been formed in this manner for millennia, and modern political efforts to preserve the existing ethnic composition and to pursue national isolationism are but a misguided struggle against natural demographic development.

Let us be specific: Johannes Krause refers to archaeological findings in the region around the confluence of the Elbe and Saale rivers, from which he infers that between 3000 and 2800 BC, there was a significant decline in population in this area, and broadly across Central Europe. He mainly cites the absence of human skeletal remains and the general lack of artefactual evidence from this period. He explicitly states: "As if everything disappeared into some kind of black hole" (Krause and Trappe 2019). It is important to highlight that the characterisation of settlement patterns from this period in Bohemia, Moravia, and also in Bavaria, Saxony, and elsewhere in Central Europe (for example, the cultures of Cham, Řivnáč, or Jevišovice, *c.* 3300–2900 BC), is specific by the presence of enclosures on hilltops, generally smaller fortifications rather than sizeable settlements, the relatively sparse record of open-air settlements, and an almost complete absence of burials. However, such archaeological evidence does exist. Archaeologists are well aware that human activities during certain periods of prehistory are highly invisible in the archaeological record, but this does not mean that these activities were not carried out by humans in other, today unrecognisable, ways. For example, incineration of the dead with dispersed ashes on the surface or in rivers is, at present, undetectable in the prehistoric landscape. The same might apply to this transitional period from the Middle to Late Neolithic (Řivnáč/Cham/Jevišovice to Corded Ware).

A general hypothesis of depopulation of the fertile Central European lowland landscape would need to be supported by much more concrete evidence, such as a series of palynological records indicating abandonment of cultivated fields and subsequent reforestation; however, such evidence is lacking. On the contrary, pollen profiles from Zahájí and Vrbka in northern Bohemia, for instance, reveal human presence and expanding deforestation (Pokorný *et al.*, 2015). Krause attempts to address this issue within the cultural-historical framework, adopting a highly positivist stance. The proposed population decline that would permit substantial migration, Krause presents as an indication that "points to a catastrophic epidemic" (Krause and Trappe 2019), a theory linked to the earliest evidence of *Yersinia pestis* genomes, which spread into Europe alongside the Yamna Culture (the term Yamna is derived from the Ukrainian language). It is worth noting that evidence of *Yersinia pestis*, the bacteria responsible for plague, dates back to periods predating the "steppe migration", specifically from the environment of the Trypillia Culture in south-west Ukraine and from a burial of the Funnel Beaker Culture at Frälsegården in western Sweden (Seersholm *et al.*, 2024).

Fig. 1. Map of the distribution of Corded Ware (red) and Bell Beaker (green) phenomena in Europe.

Fig. 2. Typical Corded Ware assemblage of child "male" burial: beaker, amphora and siltstone mace head. Photo: J. Turek.

Krause also considers the possibility of violent extermination of the first farmers (specifically their male members) as part of the process of asserting "steppe" genetic elements introduced by migrants. He adopts a highly positivist view, stating that: "even in such a case, the population in Central Europe would already have been severely decimated prior to the invasion from the east; otherwise, there would be evidence of slain individuals with Neolithic DNA, such as in mass graves or on battlefields, dating back 5000 years". Here, again, lies a fundamental misunderstanding between genetics and archaeology. The idea of a steppe genocide of descendants of Anatolian Neolithic populations is unlikely to the extent that the authors envisage. The absence of evidence for massacres during the steppe migration period cannot be used interpretively; burial rites of the time are generally highly invisible archaeologically, so even if such genocides occurred, they would remain undetectable. Conversely, from the period of the first farmers (Linear Pottery Culture), we have abundant evidence of collective graves representing entire communities including women and children that were killed. These early Neolithic collective burials are, however, not being interpreted as evidence of an invasion by a foreign population.

The regions considered least affected by the steppe invasion were the Iberian Peninsula, Sardinia, and present-day Albania and Greece. Krause also overestimates the pastoral nature of the life of steppe migrants and emphasises the significance of the fenlands, which were comparable to the North European continental plain, as a key terrain for them. Consequently, he presumes that the most suitable route westward would have been across the territory of modern Poland and Germany into northern France and Britain. This notion again presumes that Neolithic farmers, who had lived and cultivated the landscape in this region for two and a half millennia, would have suddenly "vanished to the sunset", leaving the entire landscape to new coming pastoralists who, only after some time, would have realised they could also begin cereal cultivation.

Primarily, if such extensive population movements had indeed occurred, the steppe migrants must have already been farmers. The archaeological consensus (Turek 1995; Neustupný 1997; 2013) is clear that the cultures characterised by Corded Ware and Bell Beakers were of agricultural nature. From a genetic perspective, however, it was by no means a unidirectional movement. Around 2200 BC, at the very dawn of the Bronze Age, populations bearing a mixture of genetic lineages, descendants of "Anatolian Neolithic" farmers and "steppe tribes", migrated eastward across Central Russia to the Altai region.

It is probable that already in the Neolithic, nearly 8000 years ago, Indo-European languages gradually became dominant throughout Europe. Certain evidence suggests that during the 6th millennium BC, an ancestor of the Indo-European language existed, and only later did processes of localisation and further linguistic differentiation commence (Renfrew 1987). However, this hypothesis is challenged by recent genetic research indicating that the real Indo-Europeanisation of Europe occurred only as a consequence of the steppe migration at the beginning of the 3rd millennium BC (Krause and Trappe 2019). Archaeogenetic studies propose that the Indo-European language was confined initially to only the eastern (North Iranian) branch of the Neolithic cultures of the Fertile Crescent, which subsequently spread agriculture to present-day Pakistan, Afghanistan, and northern India. This branch is also believed to be responsible for the dissemination of Indo-European languages both into the Indian subcontinent and through the Caspian region into northern Black Sea territories, and later into Europe via the Yamna Culture.

It is crucial, however, to emphasise that language and genes are not always congruent. In ethnology, there are well-documented cases where different ethnic groups maintain entirely distinct subsistence strategies, yet share a common language and material culture. It is important to recognise that the dominant languages in various regions of the continent may not have corresponded directly to the actual ethnic or genetic composition of populations. For this reason, the question of the spread of Indo-European languages remains unresolved and cannot presently be considered definitively answered.

Fig. 3. Bacín (Vinařice, District Beroun), the prehistoric sacred hill with long term sacrificial activity. The location of a Corded Ware natural shrine. Photo: J. Jiroušek.

SINGLE BURIALS, ROUND BARROWS AND THE QUESTION OF COLLECTIVE BURIALS

Individual inhumations and circular burial mounds are perhaps the most characteristic markers of the Corded Ware phenomenon across its broad distribution. The round form of these barrows belongs to the new ritual package associated with the Single Grave Burial Rite Complex (Furholt 2020). In Central and northwestern Europe, circular barrows first appear with the Corded Ware Culture. The origin of this new round-barrow form is also discussed in this volume by P. Krištuf and J. Turek (2025).

Corded Ware funerary practices show considerable uniformity in material expression, evident in a defined set of prestige goods that occur mainly in graves (Fig. 2). The principles behind Corded Ware burial rites stem from a symbolic system probably mirroring specific social and economic conditions characteristic of the Late Neolithic communities. Burials of males and females are accompanied by different "gendered" artefacts. Female graves often include necklaces of perforated animal teeth as well as their imitations made from bone, small perforated freshwater-shell discs and decorated shell "solar" discs. Typical female-associated pottery comprises ovoid pots and jugs and large amphorae used for storage, though these vessel types do not occur in male graves and persist into the Bell Beaker period. Male assemblages frequently feature weapons that symbolize social power such as polished stone battle-axes, mace heads, or massive axes.

These gendered mortuary expressions probably reflect distinct social roles for men and women. Corded Ware burial evidence also points to social differentiation within communities, affecting individuals of different ages, including children.

Although uncommon, multiple burials are a recurrent element of Corded Ware funerary behaviour. Amongst the multiple burials, attention is drawn by the so-called antipodal burial positions in some graves and on the age, gender category, and possible familial relationships of the interred. A notable case is the bi-ritual Grave 1/95 at Slaný (Kladno District, Turek 2001), containing at least seven individuals (men, women, children), four of whom were cremated. Despite the exceptional choice of cremation, the Slaný grave conforms to the recognized collective Corded Ware burial type documented in Bohemia (e.g., Třebusice, Kladno District; Bylany, Kolín District; Chrášťany, Prague-west District). Comparable, though not identical, collective graves occur at Obrnice (Most District) and Určice (Prostějov District) in Moravia, and at Święte, Site 20 (Grave 43) in Lesser Poland (see Turek 2023). Parallel examples include the Eulau collective burial in Saxony-Anhalt (Meyer *et al.*, 2009; Schroeder *et al.*, 2019).

These communal interments probably reflect a specific funerary ritual type rather than the direct consequence of single catastrophic events (e.g., mass violence or epidemic). Emerging archaeogenetic results promise to clarify whether such graves reflect kin-based arrangements like nuclear families in mortuary practice, and to illuminate the role of collective burial events in past lifeways. Some instances (e.g., Eulau) indicate collective burials could follow violence (conflict or sacrifice); others may result from disease or from the special status of particular individuals or groups.

The patterns of age and gender associations in Corded Ware multiple burials strongly suggest kin and familial links among partners and between parents and children. Recent archaeogenetic insights support these interpretations while indicating that kinship and family organization in Late Neolithic Europe were probably more varied and regionally complex than previously assumed. Multiple burials remain a crucial source for investigating these questions (Turek 2023, with further references).

SACRED MOUNTAINS AND NATURAL SHRINES

From the early Neolithic, notable hills and mountains in Bohemia served non-residential roles such as worship and sacrifice (Zápotocký and Zápotocká 2010). Finds

Fig. 4. Bacín, Corded Ware jar found within the natural shrine as a votive offering. Photo: H. Toušková.

associated with these activities commonly include polished stone axes and battle-axes, along with isolated finds of pottery. Summarizing Neolithic material (5300–2500 BC) from northwest Bohemian hilltops, Zápotocký and Zápotocká (2010) argue that most of these discoveries are sacred in nature. The practice continued into the Bronze Age, when offerings and hoards of copper and bronze items were deposited on many of the same hills and mountains that show Neolithic sacrificial deposits (Smrž and Blažek 2002).

The most emblematic sacred hill in Czech myth is Říp (456 m a.s.l.), which rises from an elevated, waterless plain in the Litoměřice District. Were Říp situated 30–50 km to the northwest, it would merely be one among the Bohemian Central Mountains; its isolated position in the Elbe plain, however, has given it a unique status as Bohemia's sacred mountain. The ancient myths and legends refer to the landscape around this hill as to the hearth of Bohemia, where the Forefather Czech (Čech) brought his people and proclaimed it as their new homeland. Botanical reconstructions indicate the mountain remained treeless for a long period. Its form, resembling more a smooth burial mound than a forested peak, may have contributed to its role within prehistoric mythology.

Distinctive hills, together with rivers, fords, and confluences, were regarded as sacred sites for worship and for depositing offerings (Bradley 2017: 189–198; Turek

2022). Certain mountains functioned as natural shrines throughout prehistory (Bradley 2000). Evidence for cultic and ritual activity related to these natural features includes rock art and sacrifices (of human remains, animals, and artefacts) to mountain spirits or subterranean world of ancestors. Prehistoric life was tightly interwoven with extensive symbolic and ritual systems; ritual behaviour was pervasive and not confined to formal cult ceremonies. In many cases, social norms generated ritualized taboos that governed and sometimes complicated routine, secular actions. After two millennia of monotheism, our perspective on prehistoric cults and religion is heavily filtered by contemporary cultural and religious norms, and we probably misinterpret many clear patterns of past human behaviour.

As noted above, the third millennium BC marks a major shift in attitudes toward verticality in Central Europe (Neustupný 2013). From the Middle Neolithic, people tended to focus some secular and probably largely sacral activities on hilltops; in the Late Neolithic this focus moved to the horizontal plane and hilltops were largely abandoned. There may have been a ritual taboo against digging secular features deeply below the surface. Consequently, especially from the Corded Ware period onward, sunken residential or economic features are absent, unlike in many prehistoric farming communities. This implies adherence to strict, almost fundamentalist, rules governing house placement, household refuse disposal, and extraction of raw materials such as clay or stone. The sole vertical intrusion regularly recorded is burial digging: grave pits were cut into the ground, a corpse placed unburned, and typically covered with an earthwork (burial mound). It appears that only in burial contexts were people permitted to penetrate beneath the surface. This taboo probably relates to a cult oriented vertically toward the underground; for Corded Ware groups the underworld may have begun immediately below the ground, making interference by the living inadvisable.

It seems the Corded Ware communities in Central Europe had a very strong relation towards the different rock formations and "entrances" to the underground. Karst sanctuaries illustrate the practice of depositing sacrifices in rock fissures, for example Bacín Hill near Vinařice in the Beroun region of Central Bohemia (Matoušek and Turek 1998). In one fissure (conceived as an entrance to the underground), alongside offerings from other prehistoric periods, a complete Corded Ware storage vessel was found; it may have contained a sacrificial drink, perhaps beer. Bacín Hill lies on the western margin of the Central Bohemian settlement area for the Corded Ware period, and no other contemporary finds are known nearby. The karst cracks in the hill could have been perceived as sacred entrances to the underworld and thus acted as natural sanctuaries. The existence of natural shrines as counterparts to constructed monuments is well attested in European prehistory and antiquity (Bradley 2000).

Comparable Corded Ware rock sanctuaries are documented at least at three Upper Franconian sites. At Motzenstein near Wattendorf, sacrifices associated with Corded Ware were discovered between two 10–15 m Jurassic limestone outcrops that feature numerous karst fissures (Seregély and Müller 2008), similar to Bacín. Among the artefacts were symbolic miniature clay models of battle-axes, prestigeios objects to the display of warrior prestige (for the souls of dead warriors) in both living ceremonial contexts and burial rites. It is likely these miniature weapons were produced specifically for sacrificial offerings to ancestral spirits believed to dwell within the mountain. Such myth is known from many oral history sources, such as for example the legend on the Blaník hill knights (Turek 2022).

The area around the Czech mythical Mount Říp also produces a high density of Corded Ware burial finds, and a battle-axe and a stone axe were found on the mountain itself, which could be examples of offerings to gods and ancestors, similar to those clay axes in karst shrines in Franconia, or the above-mentioned sacrificial pot at Bacín. The accumulation of Corded Ware sites around the fabled mount of Říp was recorded even within the recent "Ritual landscape" project in the territory of Central/North Bohemia (Turek and Krištuf 2022; 2025).

BEAKER CONTINUITY AND DISCONTINUITY

When discussing the continuity and discontinuity of archaeological cultures in specific regions of Europe, it is important to consider the nature of the continuity being addressed. As mentioned in the introduction to this study, there is a significant difference depending on whether we view archaeological cultures as monothetic or polythetic structures. If we perceive cultures in the traditional cohesive monothetic form, an apparent sharp discontinuity would be observed between the Corded Ware and Bell Beaker cultures. This is, however, primarily because the typological analysis of artefacts from both cultures and their classification is based on burial assemblages, which are strictly defined by the ideological identity principle (see Fig. 5). The lack, or even absence, of settlement finds from the 3rd millennium BC unfortunately does not allow us to transcend this interpretative limitation. In the case of the Corded Ware, particularly with the Bell Beaker phenomenon, it is necessary to consider the cultural substrate of the Middle/Late Neolithic, which, after the decline of the Bell Beaker cultural uniformity, continued into the Early Bronze Age (Turek 2019). Regarding Corded Ware, attention must be paid to the demonstrated continuity of the Cham Culture in western and southwestern Bohemia, where radiocarbon data reach as far back as the mid-3rd millennium BC (John and Kočár 2009; John 2010). Thus, it is

Fig. 5. Cultural identity: A caricature image of communication between the Beaker cultures/people. After Turek 1996: fig. 1.

possible that within the Corded Ware territory, such as Bohemia, there existed certain enclaves of internal periphery where the previous cultural development continued.

Sites dated to the Corded Ware and Bell Beaker periods are relatively rare in southwest Bohemia, especially when contrasted with the much higher site densities in Central and northwest Bohemia. Corded Ware battle-axes from Domažlice and Opálka lie only about 40 km from contemporaneous sites in the Upper Palatinate (Nittenau, Lkr. Schwandorfi. Bay) and Lower Bavaria (Sankt Englmar–Meinstorf, Lkr. Straubing-Bogen), yet these finds appear geographically isolated. It is therefore necessary to reassess whether the disparity between the archaeological signatures of classic farming regions in Central and northwest Bohemia and that of southwest Bohemia reflects merely variation in the record of human activity across the landscape. Scholars propose that Corded Ware settlements featured above-ground dwellings and other features that were not dug into subsoil strata and thus left little or no archaeological trace (Turek 1995; 2019; Neustupný 1997). If regional differences in funerary practice are taken into account, the paucity of finds might also be explained by alternative mortuary treatments that left no visible archaeological residues. A dramatic depopulation of fertile zones such as the Pilsen basin during the period in question seems improbable. Most isolated Corded Ware battle-axe finds in southwest Bohemia are situated in the lowlands of the Pilsen basin. The corpus of Corded Ware battle-axes from southwest Bohemia should not be read solely as evidence for ephemeral or seasonal settlement, or occasional burials of people moving between

Central Bohemia and the Upper Palatinate, Upper Franconia and Lower Bavaria. It is entirely plausible that further Corded Ware and Bell Beaker material will come to light in the region, although the density of the archaeological record in southwest Bohemia will probably never match that of areas with a regular occurrence of Corded Ware and Bell Beaker sites.

During the 3rd millennium BC, the archaeological record indicates not a break but a transformation: a pattern emerges of conspicuous funerary behaviour in the form of single inhumations and concurrently much less visible settlement evidence. Reconstructing the cultural trajectory of the Late Neolithic/Early Bronze Age sequence in Central Europe principally involves recognizing the substantial, uninterrupted continuity of the *Central European Eneolithic–Bronze Age Pottery Complex* (Neustupný 1995).

The phenomena labelled Corded Ware and Bell Beaker in Central Europe can be understood as expressions of a strict or fundamentalist cultural model (Neustupný 2011: 177). With the rise of such strict cultures, arbitrary symbolic and expressive systems change rapidly. These shifts may affect artefact styles, burial practices, settlement patterns, and possibly aspects of social relations and cosmology. The later occurrence of the Bell Beaker package did not produce a wholesale rupture in the preceding prior development; rather, in many respects it continued elements of the Corded Ware period. Strict cultures tend to appear abruptly and, at least initially, exhibit a highly uniform expression that spreads rapidly over wide territories. The symbolic content of the Bell Beaker package was probably locally adapted in different regional contexts and in peripheral zones; beyond those peripheries, neighbouring cultural areas adopted only selected elements, perhaps stripped of some of their original symbolic meanings.

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Old Traditions and New Innovations. The Late Middle Neolithic in Scania, the Southernmost Part of Sweden

Lars Larsson[a]

The Corded Ware Culture complex in Sweden involves a special form of social structure called the Battle Axe Culture. Among well-known features, such as single graves, there are also other forms of expression. A special form of find is illustrated by a place with a significant accumulation of deliberately burned or otherwise destroyed objects. This mass deposit includes both well-known object forms and items indicative of far-reaching contacts. This kind of deposit practice has continuity dating back more than a millennium.
The earliest part of the Late Middle Neolithic (Younger Neolithic I) appears to be a period of multicultural elements that included a continuation of the Funnel Beaker Culture with evident influences from the Pitted Ware Culture. Another form of expression relates to the so-called palisade constructions. Aspects of relations within southern Scandinavia, involving influences from the Corded Ware Culture and older cultural forms, are discussed. It is suggested that a tradition based on Funnel Beaker Culture has a longer existence in parts of Scania, the southernmost part of Sweden, than in the rest of southern Sweden.

KEY-WORDS: southern Scandinavia, Middle Neolithic, Battle Axe Culture, Funnel Beaker Culture, Single Grave Culture

INTRODUCTION

The various manifestations of the Corded Ware Complex in Sweden and Denmark have been exceptionally well presented in several publications by Forssander (1933), Glob (1944), Oldeberg (1952), and Malmer (1962; 2003). More recent research has resulted in several publications, such as Hübner (2005), Ebbesen (2006), and Nielsen and Johannsen (2024), concerning the Danish Single Grave Culture (SGC), as well

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as Brink (2009b), Edenmo (2008), and Å. Larsson (2009) and von Hackwitz (2009), about the Battle Axe Culture (BAC) in Sweden.

In Denmark, the SGC is represented mainly in Jutland, western Denmark, and is dated to the period 2800–2200 cal BC. The influence of SGC on the eastern part of Jutland and the islands to the east is later and occurs in a somewhat different context (Iversen 2015a; 2015b; 2016; 2024). The phase of the BAC in parts of Sweden seems to cover the same time interval as the SGC. However, the material culture, especially the pottery and battle axes, as well as the burial practices, are somewhat different.

This paper will address the BAC, as well as its relationships to other social expressions during the same phase. It will begin with an unusual phenomenon of mass destruction of objects, using this as a basis for studying social elements and cultural relationships.

MASS DESTRUCTION BY FIRE

Studies on the production of material culture as well as technology are well represented in the archaeological literature. The ways in which artefacts go out of use should be as interesting and important an aspect as how they are made. The socially embedded processes of deposition are often a precondition for the rising demand for new raw materials and the need for new tools. Demand is also of great significance from a broader societal perspective, specifically for maintaining contacts and a high level of craft competence, as the demand for new tools meant that distribution and skills in different technologies could be sustained.

In the late 1990s, a survey of prehistoric sites in Scania, Sweden's southernmost region, was conducted. Fire-damaged flint artefacts were found in a field at Kverrestad, about 15 km from the sea (Larsson 2000a; 2000b; Fig. 1). The site is located in a specific setting: in a valley with a brook running from east to west, where the upper part of the southern slope ends in a ridge. The site is on a small plateau on the southern side of the river valley, with gentle slopes on three sides. The bedrock at the site consists of slate. In the main part of the excavated area, the bedrock is covered by only a thin layer of clayey sand, which constitutes the plough zone. Fire-damaged flints could be found on the plateau within an area of approximately 70×70 m (Fig. 2).

The site was surveyed on several occasions, during which every find was recorded to determine patterns of spatial distribution. Based on the distribution of finds, the topsoil within an area of 3000 sq m was removed mechanically to examine whether any features could be detected.

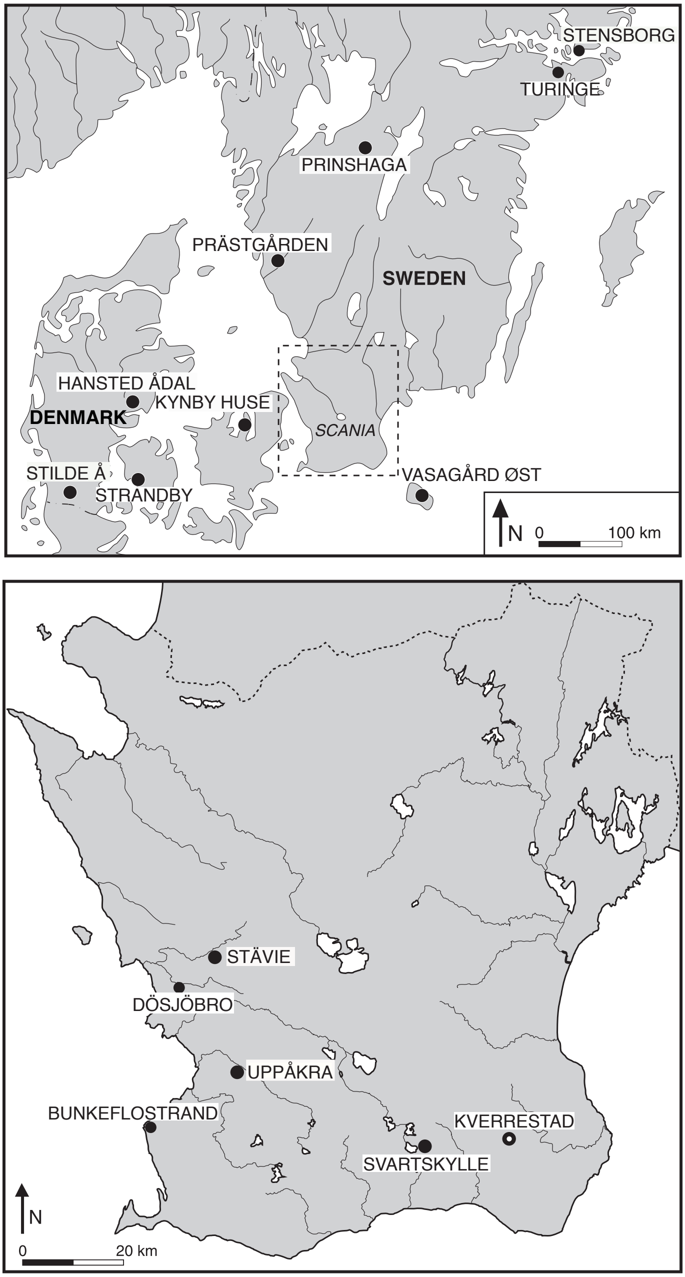

Fig. 1. The location of the sites mentioned in the text.

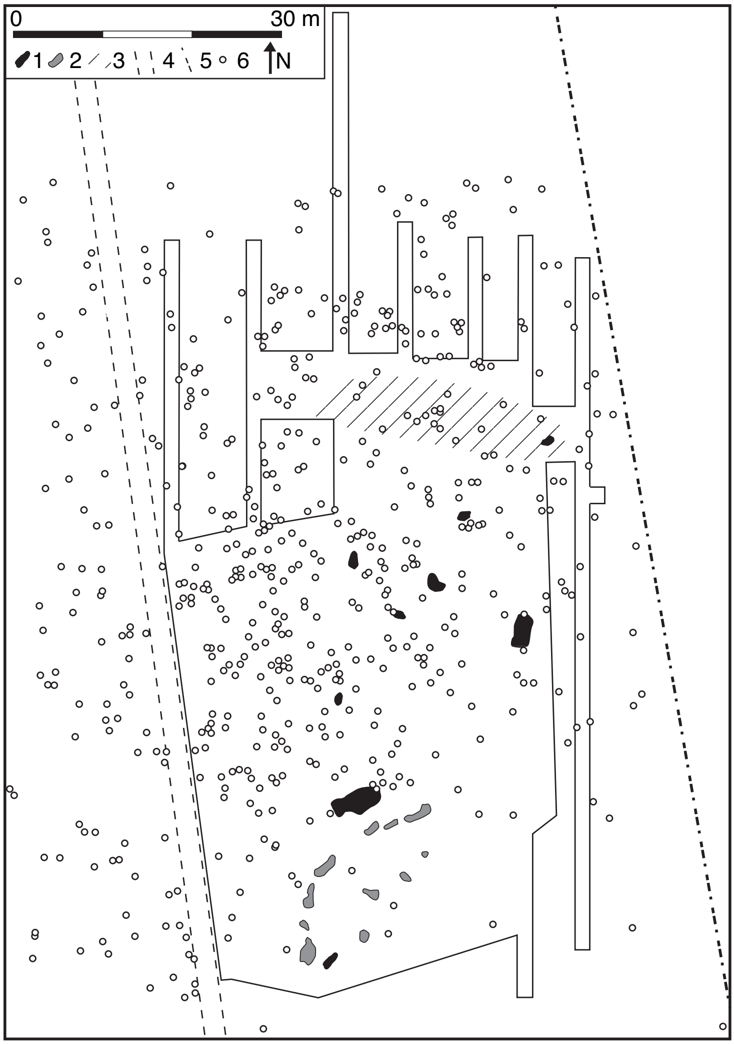

Fig. 2. The spread of finds at Kverrestad recorded on the surface, the area with topsoil removal and features. Legend: 1 – features with deposited finds, 2 – features without finds, 3 – area with topsoil removal, 4 – field road, 5 – property boundary, 6 – recorded surface finds. Drawing: B. Piltz-Williams.

During the excavation, several pits of varying sizes and depths were found, in which damaged flint and stone artefacts had been deposited, along with pottery. The largest pit was approximately 4 m long, while the smallest was less than 0.5 m

(Fig. 2). The depth varied from more than a metre to less than ten centimetres. Finds were made throughout the fill, indicating that the artefacts were deposited during the entire process of filling the pits.

The distribution of surface finds does not coincide with the spread of pits filled with deposited remains (Fig. 2). Those pits that had been cut into the soft bedrock were protected during later ploughing. At the northern edge of the site, an area has been protected from deep ploughing because of the presence of a number of large stones in the till just below the present surface. In this part, a layer, probably part of the Neolithic fossil surface, has been preserved. When excavated, it gave an insight into the deposition conditions. Artefacts were found in small pits, which seem to have been dug just ten to twenty centimetres below the original surface. In other parts of the site, the shallow pits have been destroyed by ploughing. Fragments from about one hundred thick-butted hollow-ground axes and chisels have been found (Fig. 3:1, 2), as well as a small number of thin-bladed axes. There is variation in the degree of final polishing of the axes. The depositions also include axes from earlier manufacturing stages, which are not yet polished. Among the arrowheads, tanged pieces of the so-called D-type have been identified (Fig. 3:4), as well as pressure-flaked projectile points. Some are leaf-shaped (Fig. 3:5), while others have a marked tang (Fig. 3:5). Fragments of flint "food knives" – a prototype for daggers (Nielsen 1976; Madsen 2024) – have been identified as well (Fig. 3:10). Flake scrapers (Fig. 3:11) and large blades have also been damaged by fire (Fig. 3:12). Non-flint tools, such as thick-butted axes (Fig. 3:3) and battle axes (Fig. 3:7), have been exposed to fire. Cracks due to intense heat facilitated the subsequent fragmentation of these stone tools. The find material also includes a small number of slate objects, such as tanged arrowheads and a chisel. Pottery sherds, mainly from vessels with a semicircular cross-section, decorated with horizontal lines and large zigzags, corresponding to types G–J (Malmer 1962), are also present (Fig. 3:8, 9). Due to their deliberately fragmented state, the number of vessels is difficult to calculate. At least 20 vessels were included.

Burnt bones of human origin, intentionally cracked into small pieces, were also found. The discovery of human bones was made throughout the fill of the largest pit, indicating that the artefacts had been deposited during the entire process of filling. Due to the fragmented state of the bones, it is not possible to estimate the number of individuals. Only skull fragments from adults have been identified.

The late types of the vessels, as well as the radiocarbon dates, serve to relate the finds to the later part of BAC.

There is sparse information about the activity of the BAC age in the surroundings of the site at Kverrestad. A few flint axes have been identified in nearby fields.

Fig. 3. Tools found at Kverrestad. 1 – thick-butted hollow-ground axe, 2 – hollow-ground chisel, 3 – thick-butted stone axe, 4 – tanged arrowhead, 5–6 – pressure-flaked projectile points, 7 – battle axe, 8–9 – pottery, 10 – food knife, 11 – flake scraper and 12 – blade fragment. Drawings: B. Wallebom.

DESTRUCTION OF WEALTH

The large number of axes and chisels must in themselves have had great value to the society that left the depositions. The flint type is non-local, originating from the southwestern part of Scania, some 70 km or even further away. However, some of the tools have much more distant origins.

Pressure-flaked projectile points, which at Kverrestad include some leaf-shaped examples, have not previously been identified in southern Sweden. However, a small number have been found in Denmark (Ebbesen 1980; 2006; Hübner 2005). They are present in the Corded Ware Culture of the upper Oder area and even further south (Schröder 1951; Behrens and Schlette 1967; Beran 1990; Schultrich 2022). The finds from Kverrestad, comprising altogether some thirty pieces, form the largest collection of such points in Scandinavia. Fragments of food knives are very rare in southern Sweden. As the best parallels exist in the same area as the projectile points, they might have been introduced through the same distribution contacts.

Among the finds of battle axes, at least one is a typical example from the late SGC, a form well-known in the SGC of western Denmark, but also within the west Baltic coastal area in present-day Germany (Ebbesen 2006). The slate objects are well-known in the central and northern parts of Sweden (Taffinder 1998). This confirms that some of the deposited artefacts arrived via distant networks of contacts and were therefore of exotic origin, probably ranked as artefacts of very high value. It seems to be the highest-valued items of the material culture that have been fragmented and deposited.

This type of mass deposition of rare objects, using fire, may have been practised on special occasions. It could be an act primarily intended to legitimate power (Larsson 2000a; 2000b; 2019).

DESTRUCTION BY FIRE OF TOOLS AND HUMANS

One must keep in mind that this type of flint burning is not equivalent to throwing flint tools directly onto a fire. Experiments have shown that, to preserve a flint tool as intact as possible, it is first necessary to undergo heat treatment and then expose it directly to fire (Larsson 2020).

Of special interest is the degree of destruction by fire exhibited by the different tool types. While more than 90% of the axe finds show changes from fire, about 75% of the scrapers, about half of the tanged arrowheads and one third of the arrowheads made by pressure-flaking have the same kind of alteration by fire. These marked differences indicate intentional selection of which tool type to put in the fire and which not to. However, except for a small number of pressure-flaked arrowheads, all of the tools are in a fragmentary state. This relationship agrees well with the situation on settlement sites, where axes have the highest percentage of fire traces, while other tool types show less fire damage. However, at Kverrestad, the percentage of fire damage is significantly higher than at other sites, where values of fire damage exceeding 20% are considered high (Karsten 1994).

Examples in southern Scandinavia of destruction by fire of one or a few axes are well known; however, the mass destruction of large numbers of artefacts seems to be rare. No other site from the same period in southern Scandinavia has a composition of artefacts equal to that of Kverrestad. However, three sites with mass fire destruction of flint tools have been found in Scandinavia, all dated to the transition between the Early and Middle Neolithic, *c.* 3500–3300 BC, almost a millennium earlier. One is Svartskylle, situated some 15 km to the east of Kverrestad (Larsson 1989); another is Strandby, southern Funen, Denmark (Andersen 2009); and the third, Stensborg, lies some 30 km south of Stockholm in central Sweden (Larsson and Broström 2011; Fig. 1). The last also included features, namely shallow pits of different sizes, similar to those at Kverrestad. There are at least five examples of mass destruction of mainly flint objects from the late FBC: one from the island of Bornholm, Vasagård Øst, one in the western part of Sweden, Prinshaga, another on Zealand, Kyndby huse, and two in Jutland, Hansted Ådal and Stilde Å (Fig. 1) – so the knowledge of damage using fire was being kept alive (Larsson 2015).

CREMATION OF HUMANS

Cremated human remains are not only found on the site. However, they are also mixed with fragmented tools, which promotes a view of complexity in the relationships between social perspectives and material culture. However, a couple of sites, both regarded as mortuary houses, might give a better understanding.

At Prästgården in western Sweden, charcoal marked the limits of a wooden structure measuring 4×3 m (Fig. 4). Cremated human bones were found within this delimited area, as well as in the centre of the building, at both locations mixed with charcoal, burnt flints and daub, along with two vessels dated to the late BAC (Särlvik and Jonsäter 1974; Nordqvist 1997).

A construction measuring 5×3.3 m was erected at Turinge, central Sweden, belonging to the late BAC (Lindström 2006; Fig. 4). In the trench for the walls, several small pits contained the cremated bones of at least 16 individuals, including both new-born children and adults. Typical grave goods, such as battle axes, flint axes, flint blades, and vessels, were found together with the bones. However, only a flint scraper and some bones of sheep exhibit traces of fire. The position of the human remains, as well as the evidence of the rite of cremation, indicates that this building was not an ordinary mortuary house. However, it has some similarities to the structures found above ordinary graves in southernmost Sweden (Larsson 1988) as well as in Jutland, Denmark. In Jutland, the construction surrounding the grave may be rectangular

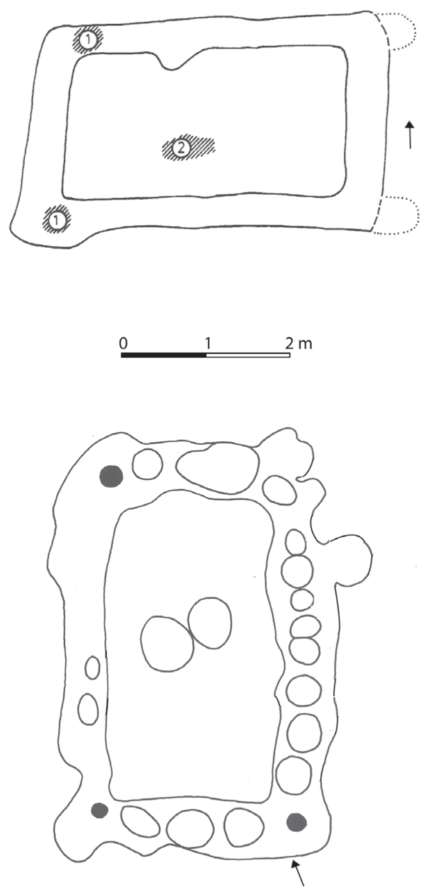

Fig. 4. Mortuary buildings from Prästgården (above) and Turinge (below). After Särlvik and Jonsäter 1974; Lindström 2006.

or round and may include massive posts that indicate a tower-shaped building surrounding the grave (Hübner 2005). Graves from the BAC with cremated bones do exist, but they are rare (Larsson 2009).

The finds and features from the two structures mentioned above demonstrate that cremation of humans occurred in other places during the BAC, and even in conjunction with artefacts affected by fire. However, the bones are too infrequent at Kverrestad, compared with any other site, for it to be regarded as an actual cremation burial. Could this mean that the human bones were intermixed simply as part of the deposition? We are aware of cremated human bones, for example, in causewayed enclosures from earlier in the Neolithic period, where only a small number of bones have been deposited (Andersen 1999). This might mean that the mortuary practices included the possibility of depositing the body at more than one place. Such a practice is very difficult to identify, as cremation might destroy body parts or make accurate osteological analyses difficult. It might also include inhumations with poor preservation. It is possible that the practice of depositing body parts at two or more locations was relatively frequent.

AN "ORDINARY" MORTUARY PRACTICE?

The structures from Prästgården and Turinge are interpreted as mortuary buildings. The burial practices of the BAC in Sweden have been discussed in several publications and will not be addressed in this presentation.

The mortuary practices are based on strict rules (Malmer 1962). A rectangular or funnel-shaped pit was dug, with a stone frame in several layers supporting a wooden coffin and larger stones placed on the lid of the coffin. Both sexes were placed in a crouched position, facing east. Specific rules govern the location and placement of grave goods in relation to the body. This practice is well known, especially in the graves from the early BAC. However, the practice appears to be less time-restricted (Olausson 2015).

In a society that observes strict practices regarding not only the position of the body but also the grave goods, individual characteristics may be hidden in minor departures from regular practice. This could be the case if the axe was placed with the edge towards or away from the body, or if the hollow-edged side of the axe was placed downwards or upwards, or how the battle axe was positioned in relation to the deceased (Malmer 1962; Berggren and Brink 2010). These are elements that were not documented in graves excavated decades ago, but might be important for understanding social signals in a strictly organised society.

Another divergence from the "ordinary" burial customs is exemplified by the finds within a grave from the southernmost part of Sweden. A funnel-shaped grave of the ordinary type was found, featuring several rows of stones that constituted an outer frame and larger stones placed initially on the lid of a wooden coffin (Söderberg 1990). A female had been placed in a crouched position with a flint axe with a hollowed edge, two awls made of sheep bones, a flint scraper, a blade, a couple of waste pieces and a pottery vessel (Fig. 5). The grave was dated to 3730±50 BP, 2308–2020 cal BC (Ua-5361). The most interesting feature is that a total of sixteen phalanges from

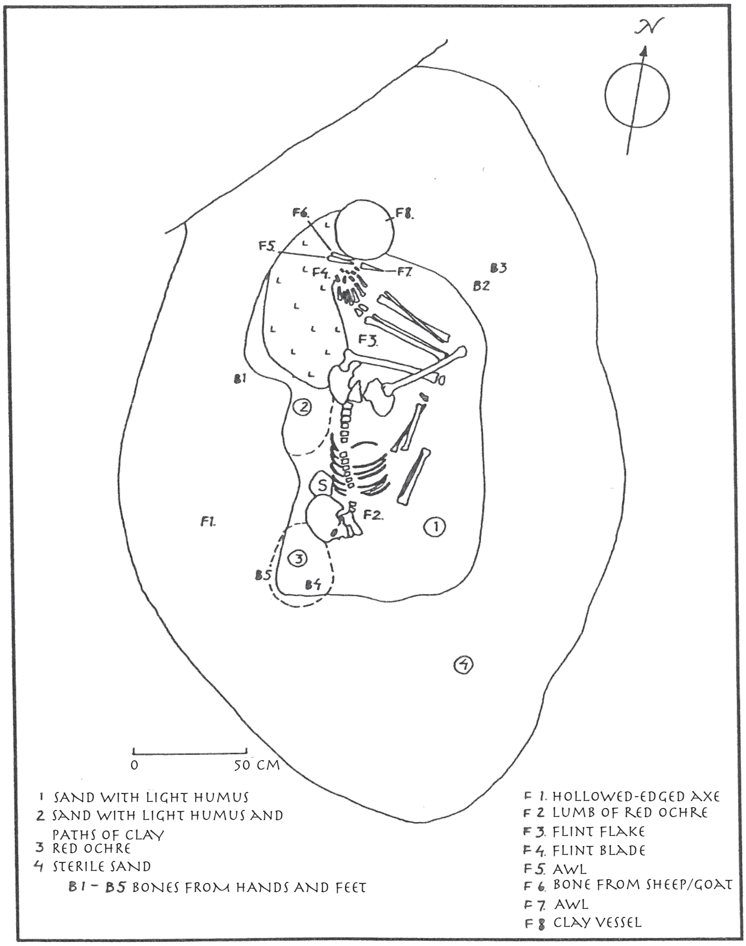

Fig. 5. A grave from the Battle Axe Culture found at Vellinge, in the furthest southwestern part of Scania, Sweden. After Söderberg 1990.

hands as well as feet had been placed at regular distances around the body. A detailed study of the hands and feet of the interred shows that the phalanges originate from both of the buried woman's hands and one of the feet (Arcini 1990). No cut marks were documented, which means that the woman must have been in a rather decomposed state before being buried. All other phalanges were found in the right position.

In this grave, the intention had been to recover all parts of the body and place them around the interred at a distance of a few decimetres.

PALISADE ENCLOSURES

Over recent years, several enclosures featuring palisades have been identified in the eastern part of southern Scandinavia. Within the southwestern part of Scania, five palisade enclosures have so far been excavated, four of them situated so close together as to be intervisible. They vary in length from 175 to 300 m, with an enclosed area of between 3 and 5.5 hectares (Svensson 2002; Nielsen 2004; Brink 2009b; Klatt 2009; Larsson 2012). The enclosures consist of one to four rows of posts (Fig. 6). Most of them have produced relatively few finds. In most cases, there are a few features within the enclosure. The exception, Bunkeflostrand, has a large number of pits, but their contents, namely antlers and a small amount of pottery, differ from ordinary settlement material (Brink *et al.*, 2009; Fig. 1).

There is an interesting link between flint axes and palisades. Flint axes have been found in post-holes, usually associated with an entrance. In most palisades, several post-holes contain flakes characteristic of refuse from axe or chisel production. In some cases, the number of flakes may be significant. In one case, Dösjebro, flint flakes from axe production, except for a large number of finds in some post-holes, were found in large quantities within an area about 150 m from the palisade (Svensson 2008; Runcis 2008; Fig. 1). It seems that in several cases, axe production was directly or indirectly related to palisades. That flakes have deliberately been deposited in the palisades indicates a ritual connection with the "birth" of axes. On the other hand, palisades could be regarded as sites where many people assembled, and it might have been reasonable to locate the production of axes at a site excellent for trade and exchange during short but intensive meetings when flintknapping experts were present.

Another aspect relating to axes at Kverrestad is the fact that a considerable amount of the flint found in post-holes or features connected with palisades has been burnt. This could mean that waste from axe production could not be used for any purpose after being exposed to heat.

At Dösjebro, another link, in this case not chronological, between axes and humans can be discerned. The area between the palisade and the axe production site contained at least three graves typical for the late BAC (Lagergren 2008). These were located more or less in a line. Cemeteries with a linear system are well known in the BAC. Because excavation areas were formerly small, rarely including examination of the surroundings of a grave, the number of linear cemeteries might have been much larger.

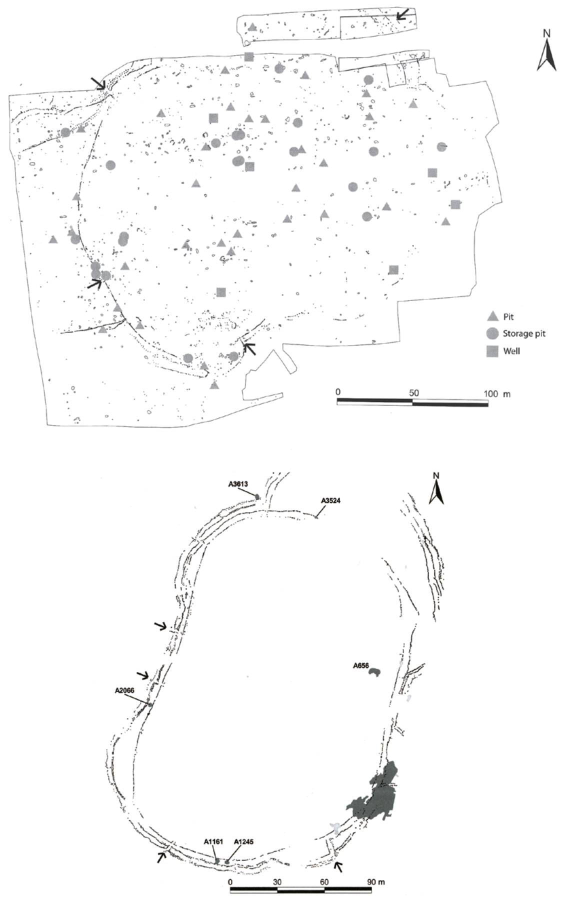

Fig. 6. The palisade enclosures at Hindby and Bunkeflostrand. The entrances are specially marked. After Brink *et al.*, 2009.

CHRONOLOGICAL RELATIONS

The chronology of these palisades is problematic. Based on finds as well as radiocarbon dates, one palisade from southwestern Scania is dated to the late FBC (Forssblad 2003). The rest have provided dates relating to the phase 2800–2600 BC, corresponding to Younger Neolithic I. However, few finds in post-holes and features relating to the palisades have been dated to that phase.

The situation in the eastern part of Denmark and the southernmost part of Sweden seems to be complicated. The graves in the southwestern part of Scania, with grave goods typical of the BAC, date to between 2600 and 2100 BC (Brink 2009b; Fornander 2011). Graves from the early part of the BAC occur in the northeastern part of Scania. Unfortunately, we do not have dates from these graves. Previously, the earliest part of the BAC was considered to be represented in southern Sweden (Malmer 1962). However, new research places the earliest part of the culture in central Sweden with a link to Finland (Larsson 2009).

Based on the dates from the palisades and graves, there appears to be a time difference of some centuries between the erection of the palisades and the deposition of the graves. There may have been a presence of both late FBC and early BAC in southern Sweden for a couple of centuries (Larsson 1992).

Genetic analyses provide a picture of the migration of groups from the southeast (Egfjord *et al.*, 2021). In the western part of Denmark, immigrants appear to be carrying out a rapid takeover, particularly in areas suitable for sheep farming (Iversen 2015b). It is evident that this immigration, likely originating from Finland and moving to central Sweden and southwards (Larsson 2009), had consequences for the southernmost part of Sweden. Theoretical considerations have been presented (Högberg *et al.*, 2025). However, it remains to be understood how this change was implemented and over what time period it occurred.

The situation in eastern Denmark is equally complicated. The late FBC appears to continue for some centuries after the SGC became established in western Denmark (Ebbesen 2006; Iversen 2015b; 2016; Madsen 2020). The palisade enclosures are either dated to the late FBC by the find material or to the phase 2900–2600 BC by radiocarbon dates (Nielsen 1998; Klatt 2009). Later, at approximately 2600 BC, a material culture similar to the late SGC is established, but the old megalithic tombs continue to be used as burial sites. Therefore, the mortuary practices of the SGC are not accepted, and the megalithic tombs continue to be used for burials as before. The markedly individualistic treatment shown by the graves in the SGC is not exemplified in eastern Denmark.

The dating of human bones from megalithic tombs in Scania indicates that they were used during the time corresponding to the BAC (Tornberg 2025). As mentioned, the chronological relationship between the FBC, BAC, and Pitted Ware Culture (PWC) is somewhat uncertain (Iversen *et al.*, 2021).

At the site of Stävie in western Scania, a combination of FBC and PWC is proven by the pottery, which is very late FBC, and the flint technique, typical for the PWC (Larsson 1982; Fig. 1).

The relationship between the BAC and what is characterised as the Late Neolithic is unclear. The boundary has been set at 2200 BC, but several graves of late BAC age are dated later (Brink 2009b). A grave in Uppåkra, western Scania, consisted of a square paving surrounded by a round ditch (Larsson *et al.*, 2015a; 2015b; Fig.1). This is a typical grave form of the SGC in Jutland (Nielsen and Johannsen 2024). However, the grave in question was dated to the Late Neolithic.

During the previous part of the Neolithic, there appears to be a significant connection between eastern Denmark and southern Sweden, which are topographically divided by the Strait of Öresund, with a maximum width of 50 km. The distance from eastern Denmark to the central part of the SGC in the west is at least six times as long.

The exchange of battle axes could be an indication of the intensity of the exchange. About ten "Swedish" battle axes have been found in eastern Denmark and about the same number in western Denmark (Glob 1944). However, the number of "west Danish" battle axes in Scania is at least three times as large as that of "Swedish" battle axes found in eastern Denmark (Malmer 1962). This suggests that the connection with the more distant SGC to the west was more intensive, despite visible contact between the easternmost parts of Denmark and western Scania. The best-represented types are K–L in Scania, but these are not well represented within the central area of the SGC (Ebbesen 2006). However, these types are common in the German Baltic coastal area, with a concentration at the mouth of the River Oder. This might indicate that most of the exchange between Scania and the other version of the Corded Ware Culture was directed to the opposite coast of the Baltic, not to eastern Denmark. The finds at Kverrestad, including pressure-flaked arrowheads and food knives, point in the same direction.

SETTLEMENTS AND HOUSES

Our knowledge of the Younger Neolithic I in Scania is based on finds from palisades and settlements. Pigs are less numerous than earlier, while sheep become more common. The finds from the palisade at Bunkeflostrand, situated near the former seashore, provide an interesting insight, as the preservation of bones is better than on most other sites. Several red deer antlers are regarded as relating to the construction of the enclosure or the digging of pits. Most of the bones belong to fish, with cod as the most important, which is only to be expected in view of the short distance to the sea (Brink *et al.*, 2009). The number of bones from wild animals on Neolithic sites tends to be low. However, in the passage at Bunkeflostrand, they constitute 41% of all mammal bones, with red deer and roe deer as the most important. Among the domesticated animals, sheep/goat clearly shows an inevitable

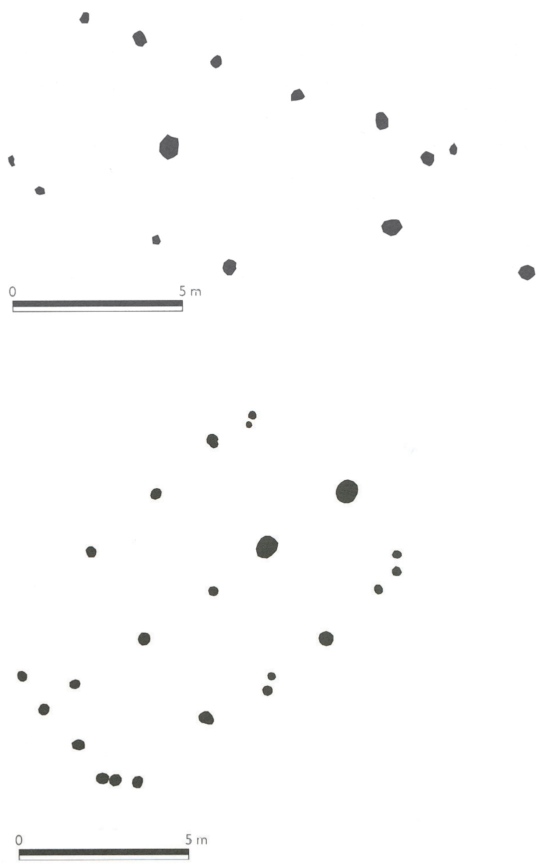

Fig. 7. Documentation of houses from the Battle Axe Culture found in the southwestern part of Scania, Sweden. After Brink 2009.

dominance over cattle. Seasonal indicators demonstrate the use of the area during several months of the summer and early autumn.

The macrofossil remains from layers and imprints include naked barley, emmer, and oats, the first of which is the most common (Brink 2009a).

For decades, knowledge of the BAC's settlement sites and houses was limited. This has partly improved. Few regions, if any, have been as intensively investigated as the areas in the outskirts of the town of Malmö in the southwestern part of Scania

(Brink 2009b). Within the waste areas of several hectares, the topsoil has been removed, and all features have been excavated. In this region, the sites are still difficult to identify, as the find material is very limited. A tendency towards small sites and restricted material culture is already evident during the late FBC and becomes even more pronounced during the BAC. The restrictive attitude concerning the handling of waste is also related to the decoration of the pottery. Objects are rarely found in the post-holes.

The houses are identified as a row of 3–5 post-holes (Brink 2009b; Fig. 7). In a few cases, the posts for the rectangular walls are present. The indoor area is calculated to be between 65 and 120 sq. m. These buildings are dated to a late part of the BAC. During the Late Neolithic, the house structures grew larger, but were based on the same building tradition (Artursson 2009; Brink 2009a; Larsson and Brink 2013).

The lack of bones from most settlement sites has made it difficult to get a good hold of the livelihood and diet of the people of the BAC. Since graves are the most characteristic remains from the BAC, there is a significant possibility of gaining knowledge about humans, as a number of skeletons are well-preserved. These studies are currently in the initial stages. Trace elements have provided interesting values. ^{13}C values from inhumations, most of which have been found in a coastal environment, vary within Scania between -22 o/oo and -18.6 o/oo (Fornander 2011). A terrestrial diet was the most important, but fish also contributed a certain proportion of the food intake.

DISCUSSION

The site at Kverrestad, southern Sweden, presented a mass destruction by fire that at first sight seemed most exotic within the BAC. The large deposits and cremations of tools, as well as humans, are, in combination, still unique. However, the elements taken separately are well represented within the social context. The mass destruction by fire also includes a perspective into the past that linked the BAC to phenomena within the FBC several centuries before. The erection of palisade enclosures appears to be a link between the cultures. In eastern Denmark and the southernmost part of Sweden, the relationship between the FBC and the variations of the Corded Ware Culture appears to be complicated, with a parallel existence for centuries.

Settlements are still relatively few, although the number has increased. The society turns out to have avoided refuse accumulation. However, this is also a behaviour that can be traced back to the late FBC of southern Sweden. Even if the introduction of the BAC marks the introduction of a new material culture and presumably a different worldview, there are still obvious links to the past.

The fact that elements of the SGC in eastern Denmark are very limited during the period from 2800 to 2600 BCE is well known. A community with traditional elements from the FBC remained. However, the question is whether a similar situation prevailed in parts of southernmost Sweden? Early graves from the BAC are missing. The old megalithic tombs are still used for burial. As in eastern Denmark, palisades are also found. A precise combination of FBC and PWC is discernible. A delayed immigration of BAC is highly likely.

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The Corded Ware Phenomenon in the Eastern Baltic Sea Area: 15 Years Later

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This article reflects on developments in Corded Ware-related material and research in the eastern Baltic Sea area (Finland, Estonia, Latvia, Lithuania, north-western Russia). It builds upon a manuscript on the Corded Ware phenomenon in the eastern Baltic, completed nearly 15 years ago. Intended as the first modern review of the topic, this paper was not published at that time. Although now partially outdated due to the passage of time, it nonetheless offers a valuable overview of how the Corded Ware complex was perceived and studied in the early 2010s. Together with the supplementary commentaries appended to the original text, the article provides basic information about the Corded Ware phenomenon in the eastern Baltic and documents changes and an intensification of research on the 3rd millennium BC that occurred during the 2010s and early 2020s.

KEY-WORDS: Corded Ware Culture, material culture, settlement, subsistence, burials, eastern Baltic Sea area, research history

FOREWORD

The original manuscript of this article was written in early 2012 for publication in the proceedings of "Corded Days in Kraków" held in December 2011. Reflecting on it now, many aspects remain largely unchanged; yet, at the same time, much of our understanding of the "Corded Ware world" appears to have undergone a significant transformation. The thirteen years between then and now (spring 2025) have witnessed considerable changes both in the study and perspectives on the Corded Ware

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phenomenon, as well as in prehistoric archaeology more broadly. In the Eastern Baltic area, this period has also seen a marked intensification in research on the Corded Ware phenomenon and the 3rd millennium BC in general.

Given the opportunity to publish this manuscript after so many years, we decided to adopt a "research-into-research" approach. This is partly because updating the old text to bring it into line with today's state-of-the-art would have meant complete rewriting of the manuscript, but also because the text is an apt period piece from a moment just preceding the major shifts in the study of the Corded Ware phenomenon and the 3rd millennium BC. Therefore, we present below largely the original manuscript, albeit shortened and with language revision. This means that the archaeological materials and numbers, the regional research balance, the argumentation, interpretations, and illustrations (except for Fig. 1), as well as the bibliography, reflect the situation of the early 2010s and are not necessarily compatible with the current state of knowledge. To illustrate in general terms the changes over the last decade or so, we have drafted bullet points below each chapter that briefly outline current views on the topic and provide additional literature on recent research. Readers are advised to consult these references for more detailed, up-to-date information.

INTRODUCTION

The eastern Baltic Sea region represents the northernmost extent of the Corded Ware phenomenon or complex (CWC) in Europe. Settlement sites and burials have been identified in Lithuania, Latvia, and Estonia, southern Finland, as well as around the Gulf of Finland in north-western Russia (Ingria and the Karelian Isthmus; Fig. 1). Stray finds are distributed across an even wider area in the north and east (Finland and Russia). However, although traditionally considered a local variant of the CWC (Machnik 1979; Rimantienė 1984a: 218–219; 1992; Grasis 1996; 2007), finds associated with the Rzucewo (or Bay Coast or Haffküsten) Culture are excluded from this study, since Rzucewo is nowadays recognised as a separate phenomenon with an earlier onset (Saltsman 2004: 153; Brazaitis 2005: 226; Piličiauskas *et al.*, 2011).

Traditionally, the CWC in the eastern Baltic region has been divided into two primary entities: the "Finnish Corded Ware Culture" in the north and the "Baltic Corded Ware Culture" in the south. This paper avoids such a straightforward division, although some regional differences are naturally highlighted. The Eastern Baltic area exhibits a rich assemblage of sites and artefacts, which can significantly contribute to understanding the CWC in Europe. However, no comprehensive presentations of this area exist, especially not in English or other widely known languages.

Therefore, the aim here is to provide an overview of the main features of the CWC in the eastern Baltic Sea region.

– The situation concerning literature and its availability has changed: much recent research is published in international outlets and in widely spoken languages. Much of this literature will be presented in the chapters below. Pan-regional overviews, however, remain scarce (see Nordqvist in press a), and therefore, this, albeit partially outdated, manuscript maintains its relevance.
– In the original manuscript, we also referred to some CWC finds in the Kaliningrad oblast (Russia); since the status of some of them is ambiguous or represents the Rzucewo context (see Zalcman 2019; 2022), we have now excluded this area from the presentation altogether.

RESEARCH HISTORY

The CWC has been the subject of study in the eastern Baltic Sea area for over a hundred years. Research in the Baltic States started in the second half of the 19th century with inspections of CWC sites and the collection of stray finds, primarily battle axes (Tishler 1877; Bezzenberger 1893; Bolz 1914; see Brazaitis and Piličiauskas 2005: 72–73 and cited literature). The first accounts on the CWC and its artefacts appeared in the early 20th century (Ebert 1913; Tallgren 1922), with fieldwork beginning in the 1920s and 1930s. These studies were mostly carried out by Richard Indreko (1935; 1937) in Estonia and Eduards Šturms (1927; 1936a; 1936b; 1946) in Latvia.

The number of scholars investigating the CWC in the eastern Baltic increased between the 1940s and 1960s. Since then, most archaeologists focusing on the Stone Age have engaged with the topic. Notable figures include Rimutė Rimantienė, Algirdas Girininkas, and Adomas Butrimas in Lithuania, Lūcija Vankina and Ilze Loze in Latvia, and Lembit Jaanits in Estonia. These scholars conducted extensive fieldwork and shaped the general understanding of the CWC in the area (Jaanits 1952; 1966; 1973; Vankina 1980; Rimantienė 1984b; Butrimas 1992; Loze 1992; 1997).

From the mid-1990s onwards, the study of settlement sites intensified once again. Particularly in Estonia, the number of known sites has quadrupled over the past two decades, with many of them excavated (Kriiska 1996; 2000; Kriiska and Nordqvist 2007; 2010). Significant insights have been obtained through radiocarbon dating of burials (Zagorska 1997; 2006; Kriiska *et al.,* 2007; Lõugas *et al.*, 2007) and charred crust on pottery sherds (Piličiauskas *et al.*, 2011) by AMS technique. Additionally, the origins of the CWC have been discussed (Lang 1998; Girininkas 2002; Žukauskaitė 2004) and regional overviews compiled (Girininkas 2002; Kriiska and Tvauri 2002).

In Finland, Corded Ware pottery was first described in the early 20th century (Ailio 1909: 92–93), although battle axes were delivered to museums as early as the mid-19th century (Holmberg 1863; Aspelin 1885). The most significant early studies were conducted by Aarne Äyräpää (Europaeus). He linked Finnish pottery finds with European Battle Axe Cultures (Europaeus 1915: 12; 1917: 48) and elucidated various aspects of the CWC in his later works (Europaeus 1922; Äyräpää 1937; 1952a; 1956; 1973; see also Edgren 1989). Äyräpää also discussed CWC materials from neighbouring areas, including Estonia (1952b) and Russia (1933a). That said, the area around the head of the Gulf of Finland and Lake Ladoga has largely been left outside contemporary studies (but see Huurre 2003: 226–236). The Fatyanovo Culture is seen to extend only to the south-eastern corner of Lake Ladoga, not reaching the eastern Baltic Sea region (Krajnov 1972; 1987: 61, fig. 6).

After Äyräpää, Torsten Edgren was the most active researcher of the CWC and especially its ceramics in Finland (Edgren 1959; 1970; 1984a; 1997; see also Malmer 1962). More recently, research on the CWC has been relatively limited, with discussion mostly addressing its origins, dating, subsistence and some individual aspects (Meinander 1984; Luoto 1986; 1988; Torvinen 1984; Korkeakoski-Väisänen 1993; Matiskainen 1994; Carpelan 2004; Mökkönen 2008). Consequently, the most comprehensive and frequently referenced accounts of the CWC in Finland remain those published in general works on Finnish prehistory (Edgren 1984b; 1992).

- Research into the CWC in the eastern Baltic region has generally intensified over the past decades; research intensity in Latvia has been lower but is also increasing.
- Recent studies have included fieldwork, museum-based studies of material culture and other analytical research, significantly enhancing our understanding of the CWC (see below).
- In addition to the topic-specific insights introduced below, new investigations have produced more detailed overviews that compile material and define regional groups (Nordqvist and Häkälä 2014; Piličiauskas 2018; Kriiska and Nordqvist 2021), and also explore the CWC in previously under- or unstudied regions, such as the eastern Gulf of Finland area (Kriiska *et al.*, 2015; 2016; Nordqvist 2016; Gorodilov 2022), northern Estonia (Paavel *et al.*, 2016), or the Finnish inland (Nordqvist in press b).

SITES AND ARTEFACTS

Settlement Sites

Settlement sites of the CWC are more numerous in the eastern Baltic Sea region than anywhere else in Europe, with over 500 identified locations (Fig. 1). However, most

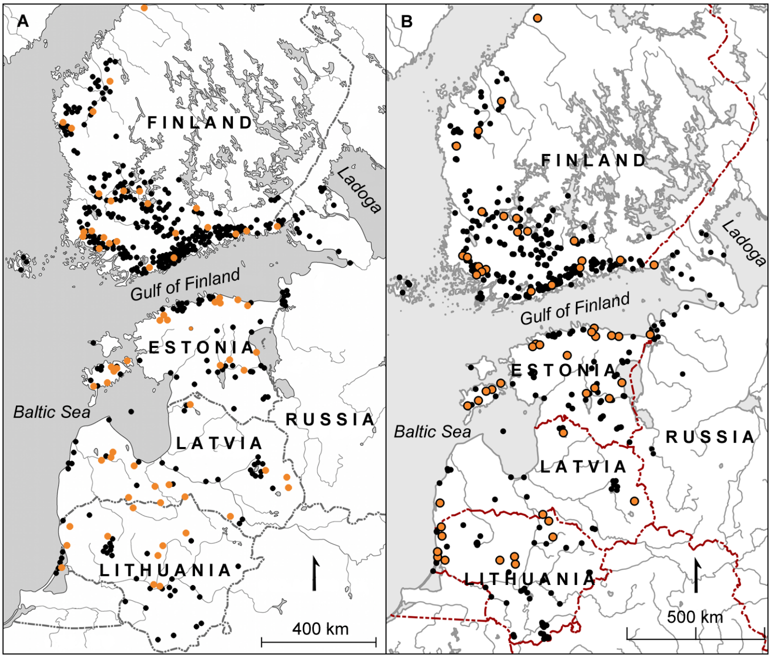

Fig. 1. The distribution of the Corded Ware Culture settlement sites (black dots) and burial sites (orange dots) in the eastern Baltic Sea region; the left map (A) represents the situation in 2011, while the right map (B) shows the present situation. Differences in the distribution of settlement sites arise partly because map A was drawn and plotted by hand (particularly in areas with site concentrations, which are spatially exaggerated to accommodate all points), whereas map B was produced using GIS with precise coordinates. Furthermore, a re-evaluation of data has led to the exclusion of numerous settlements and burial sites from map B. Maps: K. Küljastinen and K. Nordqvist.

investigated sites have been found incidentally during excavations targeting other periods, and undisturbed cultural deposits are rare. Accordingly, assemblages are often mixed with material from other periods and the basic CWC assemblages remain insufficiently known and studied. The difficulties in identifying typical settlement materials of the CWC place emphasis on pottery – the most abundant find category – in site identification (for a discussion on defining settlement sites, see Kriiska 2000; Nordqvist and Häkälä 2014).

The scarcity of excavations and the prevalence of mixed contexts have contributed to a poor understanding of settlement properties. Typically, CWC settlement sites are small, with thin cultural layers and sparse finds. Information on dwellings is equally limited, but it is proposed that they were light, temporary structures (Jaanits *et al.*,

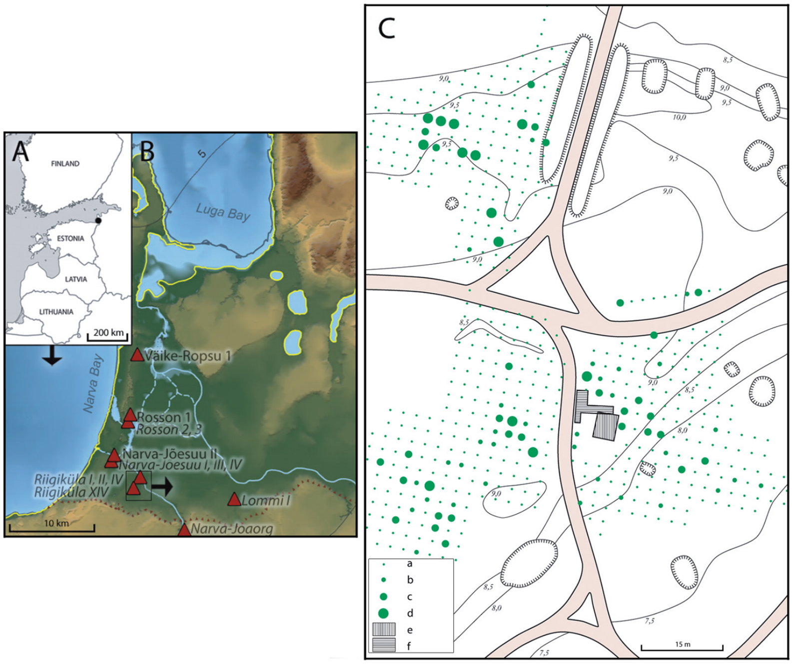

Fig. 2. Riigiküla XIV is an example of an extensive Corded Ware settlement site. Located in north-eastern Estonia (A), it belongs to a cluster of Corded Ware sites found in the early 2000s in the Narva–Luga region (Estonia and Russia; B). The general map (C) indicates: test pits (year 2006) with a – no finds, b – 0.1–2.0 g ceramics, c – 2.1–10.0 g ceramics, d – 10.1–60.0 g ceramics, as well as excavation plots from e – year 2005, and f – year 1998. Drawing: J. Ratas, M. Muru and K. Külljastinen.

1982: 106; Edgren 1992: 87), possibly belonging to small, family-sized units (Kriiska 2000: 74). Other structures encountered include solitary fireplaces and pit features.

Additionally, a few sites with substantial cultural deposits and numerous finds are known, such as Riigiküla XIV and Narva-Jõesuu IIB in north-eastern Estonia (Kriiska 2000; Kriiska and Nordqvist 2007; 2010; Fig. 2) and Tengo Nyåker in southern Finland (Europaeus 1922: 44; Edgren 1970: 66–67). The existence of certain "special purpose locations" has been suggested. Among these is the supposed pottery-manufacturing site of Perkiö in southern Finland, with almost 30,000 pottery sherds from at least 120 vessels (Edgren 1970: 92–94). Nevertheless, only a few dwellings have been associated with the CWC. These include a couple of larger pits in Finland, vaguely described as "dwelling pits" (Edgren 1970: 39–41; Äyräpää 1973: 203), two oblong structures (i.e., paired fireplaces) at Valma in central Estonia (Jaanits *et al.*, 1982: 105–106), and some CWC finds associated with a pithouse at the Meskäärtty site in south-eastern Finland (Mökkönen 2008: 118).

The location of CWC sites within the landscape deviates from that of preceding and contemporary groups in the eastern Baltic Sea area. Even in coastal regions, these sites are not rigidly shore-bound and are often located hundreds of meters or even several kilometres from the shoreline of that time. However, some sites located immediately on the shore are also known (Äyräpää 1973: 202; Kylli 2001: 6; Kriiska and Tvauri 2002: 79). CWC settlements on the Baltic coast and by the larger lakes, such as Lake Burtnieks in northern Latvia, Lake Võrtsjärv in central Estonia and several lakes in southern and western Finland, are frequently found at much older, abandoned forager settlement sites, no longer shore-bound due to isostatic land uplift (Äyräpää 1973: 202; Kriiska 2000: 72).

Settlement sites are typically located on slightly elevated ground, sometimes near rivers and smaller lakes, and generally in places with easy access to soils suitable for fields, as well as wetlands and meadows fit for pastures (Edgren 1992: 87; Kylli 2001: 6; Kriiska and Tvauri 2002: 79). These new settlement pattern features have been interpreted to suggest single farms practicing slash-and-burn cultivation and animal husbandry (Kriiska 2000: 74). At the same time, it has been argued that the same pattern reflects reliance on hunting and gathering, possibly also animal herding (Zvelebil 1981; Edgren 1984a: 14; Kylli 2001: 9). We will return to CWC subsistence later in this paper.

– The number of settlement sites (i.e., pottery find locations that cannot be recognized as burials) is currently about 550 (Nordqvist in press a). Despite their large number, the old fundamental question remains: what do these sites represent? Recent fieldwork has provided new insights, but most sites still appear small and obscure, and settlement properties and assemblages remain insufficiently known.
– Information on dwellings has increased significantly. While, for example, the remains recognised at Valma and Meskäärtty are no longer considered to be CWC dwellings, the enigmatic "dwelling pits" postulated earlier have been complemented by well-documented pit-houses or sunken floors (Piličiauskas 2018; Kriiska and Nordqvist 2021), as well as above-ground buildings (Mökkönen 2023).
– Studies employing modern methodologies have also verified and elaborated previous ideas about the non-shore-bound settlement pattern and other locational aspects (Muru *et al.*, 2017; 2018; Rosentau *et al.*, 2013; 2020; Sikk *et al.*, 2020).

Burials

CWC burials are present at over 80 locations in the eastern Baltic Sea region, comprising at least 180 individual burials. However, as with settlement sites, the distribution of burials is uneven (Fig. 1). This disparity is at least partially due to unequal research as well as natural conditions and geology. The soils north of the Gulf of Finland are poor in preserving organic matter, complicating the identification of burials owing to the absence of skeletal remains. In addition to the confirmed burials, there are numerous find locations where artefacts or assemblages suitable for grave goods have allegedly been found together; dozens of such cases are reported in Finland alone (Nordqvist and Häkälä 2014).

The burial sites are typically located on slightly elevated ground, either within or at some distance from settlements. Burials occur as solitary single graves or in small groups of a few graves; larger cemeteries are rare (Edgren 1992: 89; Kriiska and Tvauri 2002: 81; Loze 2006: 312–313). The largest concentration of burials previously associated with the CWC is at the multi-period cemetery of Zvejnieki in northern Latvia, with 11 interments in bent (crouched) position (Zagorskis 1987: 130; Loze 2006). However, radiocarbon dates have now shown that some of them belong to earlier phases of prehistory (Zagorska 2006: 103). Similarly, bent burials from Tamula cemetery in south-eastern Estonia (Jaanits *et al.,* 1982: 82; Kriiska and Tvauri, 2002: 81) have been dated older than previously expected (Kriiska *et al.,* 2007: 94–95). At present, the largest known CWC burial sites are Sope in north-eastern Estonia with ten burials (Indreko 1935: 14), and Jönsas in southern Finland with five graves (Purhonen 1986).

Burials are inhumations, with the deceased placed in bent (crouched) positions, but sometimes in sitting or supine positions (Fig. 3). While inhumations are typically single, burials with two or more deceased are reported (Purhonen 1986: 116; Edgren 1992: 89; Loze 1992: 315). Bodies were placed in simple pits, usually less than one meter deep, with varying orientations (Jaanits 1952; Edgren 1970: 36; Loze 1995: 35). Generally, the graves lack internal structures. Only occasionally is there reference to the use of hides to wrap or cover the deceased, traces of simple stone settings, grave constructions made of wood, or remains of burial fires (Äyräpää 1932: 11; Kivikoski 1935; Siiriäinen 1974: 13; Torvinen 1984; Purhonen 1986: 119; Edgren 1992: 89; Loze 1995: 35; Kriiska and Tvauri 2002: 81). No burial mounds are known in the area (see Zalcman 2010: 18 and cited literature for the closest examples).

Grave goods are fairly standardised but exhibit regional variation. In Finland, grave assemblages usually include a pottery vessel, a battle axe, and a four-sided (quadrangular) axe or adze of crystalline rock, possibly also a whetstone, although some items may be absent (Äyräpää 1973: 197–198; Torvinen 1984: 23; Edgren 1992: 89). South of the Gulf of Finland, flint artefacts (axes/adzes and knives), bone and antler artefacts (awls, adzes, spearheads, pins, plaques), a few pendants of animal teeth and amber, and even shells have been found (Loze 1995: 37; Kriiska and Tvauri

Fig. 3. Corded Ware Culture burials from Selgas in Latvia (1; after Grasis 1996), and from Ardu (2) and Sope (3) in Estonia. After Indreko 1935.

2002: 81; Žukauskaitė 2004; Tebelškis and Jankauskas 2006: 10). Animal bones, possibly related to food offerings or other ritual practices, have also been identified (Jaanits 1952: 63; Lõugas *et al.,* 2007).

– Recent fieldwork has revealed only a few new CWC burials (Kriiska *et al.*, 2015; Piličiauskas *et al.*, 2018; Kriiska and Nordqvist 2021). In fact, the number of burials presented above has been significantly revised and reduced. Radiocarbon dating and the reanalysis of burials and burial customs (Piličiauskas 2018; Ahola and Heyd 2020; Macāne and Nordqvist 2021) have concluded that many graves previously associated with the CWC are not linked to it. Accordingly, approximately 35 sites and circa 60 individuals can be connected to the CWC (Nordqvist in press a).

– As the number of CWC burials has decreased, so too have the variation and characteristics attributed to them. For example, neither burials in a sitting position nor burials of more than two individuals are now associated with the CWC. No gender-specific rules concerning burial customs or grave goods can be fully confirmed in the eastern Baltic area based on the available material.

Fig. 4. Corded Ware beaker from the Sope burial, and fragments of beakers from the Valma settlement site in north-eastern and central Estonia, respectively (Institute of History, Tallinn University, AI 3175:2, 4022: 3287, 5872, 4317). Photo: P. Kraas.

– Simultaneously, new analyses and reconsiderations of old materials have introduced a richer understanding of burial and associated practices, including, for example, wrapping and secondary burials, as well as broader aspects of worldview (Ahola *et al.*, 2018; Piličiauskas *et al.*, 2018; Varul *et al.*, 2019; Ahola 2020).

Material culture

– Pottery

Pottery comes in three basic forms: beakers (Fig. 4), pots/jars (Fig. 5), and amphorae. Beakers and amphorae are found both at settlement sites and in burials, whereas pots/jars are prevalent at settlement sites and classified as household pottery (Vankina 1980; Edgren 1992: 89–90; Loze 1992: 315; Kriiska 1995: 95).

Typically, vessels feature flat bottoms, a (weakly) profiled globular shape, short necks, and wide mouths with straight or slightly outward-protruding rims (Figs 4 and 5). Decoration is restricted to the upper, rim-neck part of the vessel and includes

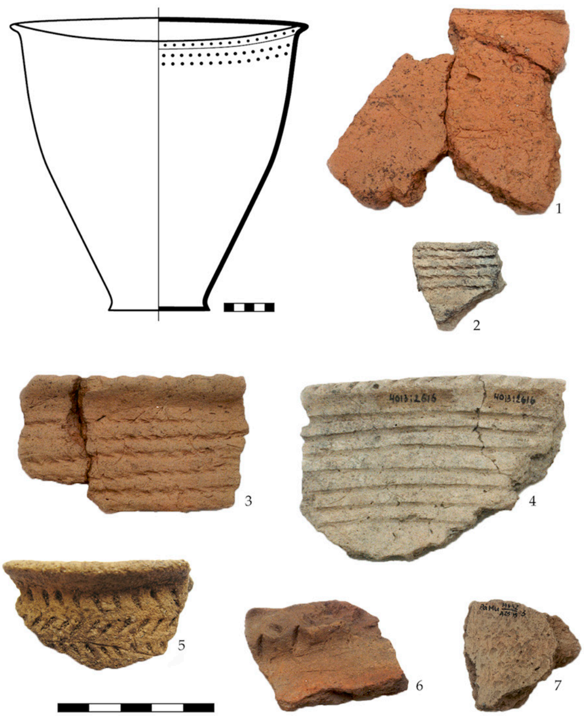

Fig. 5. Reconstruction of a household pottery vessel from the Narva Joaorg site and fragments of Corded Ware pots from the Riigiküla XIV (1, 3), Lemmetsa I (2), Akali (4), Ruhnu Valgi (5), and Valma (6, 7) settlement sites, all in Estonia (Narva Museum, NLM 2181:243 and 672; Pärnu Museum, PäMu 14642/A2515:1, 3; Institute of History, Tallinn University, AI 4013:34 and 4022:119). Drawing: A. Kriiska and K. Külljastinen. Photo: P. Kraas.

cord impressions (Fig. 5:2, 3), incised lines – occasionally forming fishbone pattern or zigzags (Fig. 4:2, 3) – rows or cordons of shallow pits, notches, and other impressions (Figs 4:1; 5:5, 6). Rarely, a comb stamp is used. The decoration is normally horizontal, with vertical elements occurring only on amphorae (Edgren 1970: 19–34; Vankina 1980: Fig. 7; Kriiska 1995: 95, 100). Vessels are often thin and well-fired, with burnished, striated or smoothed surfaces; textile impressions are rarely present (Edgren 1970: 32–33; Vankina 1980: 56–57; Kriiska 2000: 66; Fig. 5:7). While sometimes finely finished, household pottery tends to be thicker and coarser, and undecorated vessels are also known (Fig. 5:1). Household pottery remains little studied but clearly encompasses other kinds of jars/pots than merely the short-wave moulded vessels previously associated with domestic contexts (see also Larsson 2009: 142–146 for Sweden).

Pottery is central to identifying settlements and burials, and it is also seen to convey temporal and regional differences. For example, some amphorae and short-wave moulded pots have been connected to the initial spread of the CWC, or the "A-horizon" (see, e.g., Siemen 1997). Amphorae, however, are primarily found in Latvia and Lithuania, with only three examples recognized in Finland and the Karelian Isthmus, and none in Estonia (Luho 1964; Loze 1994: 15; Mökkönen and Nordqvist 2006: 12). Chronological divisions have also been proposed based on decoration; for example, in Estonia the transformation of fine incised lines forming fishbone decoration into coarser, scattered lines has been considered chronologically significant (Jaanits *et al.*, 1982: 109). Nevertheless, decoration-based divisions do not appear to apply at least in Finland (Edgren 1970: 58–59). Without conclusive radiocarbon dates, defining temporal distinctions in ornamentation remains challenging.

Tempers used in Corded Ware pottery in the eastern Baltic Sea region – sand, rock debris and grog, but also organic admixtures such as crushed plants or feathers – exhibit regional and possibly temporal variation. In Finland, grog and sand predominate (Edgren 1970: 32–33), whereas these are rare in Estonian household pottery, where organic tempers are common (Kriiska 2000: 64). Organic tempers, although not entirely unknown, are considered exceptional in Finland (Korkeakoski-Väisänen 1993: 15–17; Mökkönen 2008) and on the Karelian Isthmus. Published information about Corded Ware pottery in Latvia and Lithuania is limited for the time being.

Overall, pottery serves as a valuable tool for studying connections. For example, links have been identified between pottery produced in south-western Finland and eastern central Sweden (Larsson 2009: 257–261), as well as similarities between Finland and the southern Baltic Sea area (e.g., Luho 1964: 5–7; Edgren 1970: 62; Äyräpää 1973: 204–105). Eastern influences, however, remain largely unexamined. The uneven research landscape and the various scientific traditions involved necessitate further investigation to highlight regional trends and contacts conveyed by ceramics (Mökkönen 2011: 52–53, 62–63).

In addition to pottery, individual clay artefacts have been discovered. These include a battle axe-shaped pendant, broken clay spoons, and unspecified artefact fragments found in Finland (Edgren 1970: 43–44), as well as unclear clay fragments in Estonia (Kriiska 2000: Fig. 7).

– Battle axes

Battle axes constitute the second principal category of artefacts, with over 2000 finds known in the eastern Baltic Sea area (Fig. 6). Most battle axes have been recovered

Fig. 6. Four battle axe types from Estonia: 1 – continental axe (also called the Külasema type) from the Külasema burial on Muhu Island in western Estonia; 2 – Karlova axe from Saaremaa Island in western Estonia, 3 – sharp-butted axe from Tani in south-western Estonia, and 4 – Fatyanovo axe from Langa in northern Estonia (Institute of History, Tallinn University, AI 1228:1; Paide Museum, PM 2301:1; Pärnu Museum, PäMu 1 A 502; Estonian History Museum, AM 60). Photo: P. Kraas and A. Kriiska.

as stay finds, leading to the often-repeated proposition that many originate from destroyed graves (Europaeus 1922: 152; Jaanits 1952: 59; Vankina 1980: 57). Nonetheless, some battle axes appear to have been deposited in the ground for reasons other than human burials. For example, the discovery of three items 150 m from the CWC burial ground of Sope in Estonia has been interpreted as a special burial location for the axes themselves (Johanson 2006: 113). Solitary axes, or more commonly their fragments, are occasionally encountered at settlement sites (Jaanits *et al.*, 1982: 105; Edgren 1970: 44; Loze 1997: 138; Mökkönen 2008: 125).

Broadly speaking, battle axes are typologically divided into two main categories. The so-called continental type (Fig. 6:1) is understood to represent the spread of the CWC in the area and is described relatively uniformly. By contrast, the remaining forms are local variants developed from the former type(s) (Europaeus 1922: 104–106; Äyräpää 1973: 196; Jaanits 1973; Loze 1979: 68–86; 1997: 141–142; Edgren 1992: 92–93; Juodagalvis 2002: 43; Kriiska and Tvauri 2002: 83; Fig. 6:2, 3). The raw materials used to manufacture battle axes are often local but selectively chosen. In Finland, many axes are made from a specific variety of olivine diabase found in a limited area of south-western Finland (Laitakari 1928). Consequently, the existence of workshops specialised in producing battle axes has been proposed (Edgren 1992: 88), although no such locations are actually known. In Estonia, battle axes are commonly made of uralite porphyrite (Kriiska and Tvauri 2002: 83), while published information about raw materials used elsewhere in the eastern Baltic is not known to us.

Similar to pottery, battle axes attest to inter-regional contacts: a few axes typical of the Estonian CWC are known from southern Finland, solitary Finnish axes in Estonia, Sweden, and Belarus, Scandinavian axes in Finland and Estonia, and Russian Fatyanovo types in Finland, Karelia, the Baltic States (Äyräpää 1952b: 82; 1973: 207; Jaanits 1973: 62, 64, 71; Jaanits *et al.,* 1982: Fig. 82; Loze 1992: 316; Juodagalvis 2002: Tab. 1; Mökkönen 2008: 126–127; Fig. 6:4). Nevertheless, the proportion of such imported specimens is modest, comprising only a few percent or less of the known battle axes.

The so-called barbaric imitations – copies of battle axes presumably manufactured among contemporary non-CWC groups – are found primarily in Finland (Äyräpää 1952a: 17; Edgren 1992: 95; 1997; also, Žul'nikov 1999: 79) and are a distinctive feature of the north. Additionally, the so-called animal head axes – shaft-hole or battle axes with bear- or elk-shaped polls – occur roughly in the same area as the imitations. These were possibly produced by the same communities (Äyräpää 1952a: 16; Carpelan 1974: 83; Edgren 1997: 169), although their chronological context remains unverified.

– Other artefacts

Common artefacts include the so-called work axes: four-sided (quadrangular), wedge-shaped, and occasionally shouldered axes. Like battle axes, they are usually well-made and finished with piquetage and intensive polishing. Hundreds, if not a few thousand, four-sided axes are known across the eastern Baltic Sea region. These artefacts are made of flint in Lithuania and Latvia. A few examples of flint are known in Estonia, but none in Finland and north-western Russia, where such objects are made of crystalline rocks. Axes/adzes are usually recovered as stray finds, but some are also found at settlement sites and in graves (Loze 1979: 64, 70; Jaanits *et al.,* 1982: 107; Edgren 1992: 91; Brazaitis and Piličiauskas 2005). Shouldered axes are made of crystalline rocks and found almost exclusively in Finland. These artefacts, numbering fewer than one hundred, are all stray finds but have been connected to the CWC due to analogies in southern Scandinavia (Äyräpää 1973: 197; Edgren 1992: 91; for eastern parallels, see, e.g., Čelâpov and Ivanov 2000).

Flint knives made from long blades (Fig. 7:A) are found in burials, but rarely at settlement sites in the Baltic States (Loze 1992: Fig. 3; Kriiska and Tvauri 2002: 81; Tebelškis and Jankauskas 2006: 10). Heart- or triangle-shaped arrowheads are made

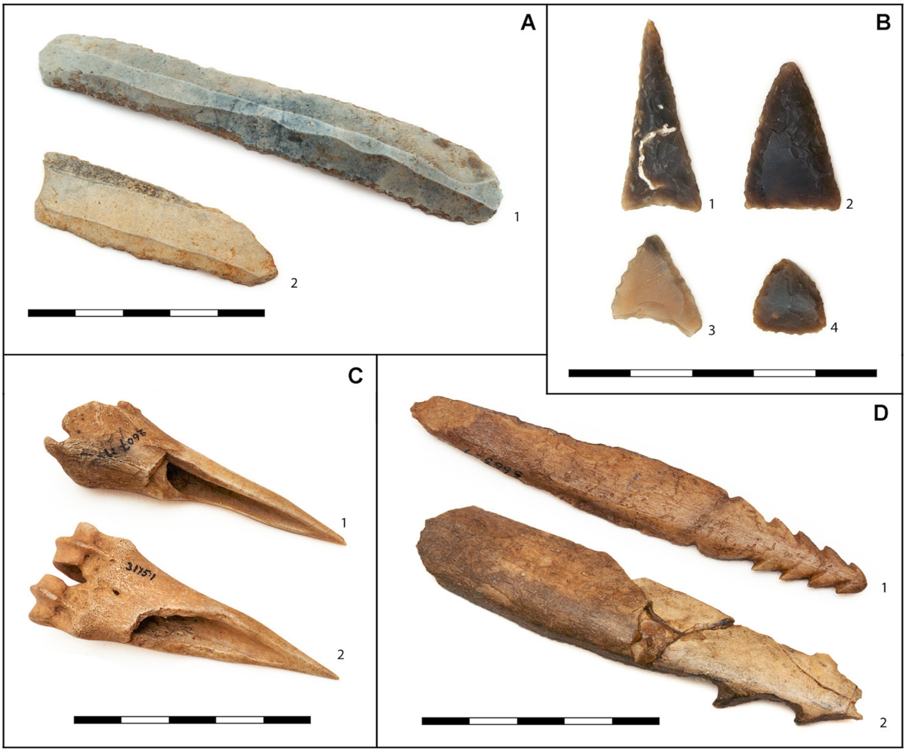

Fig. 7. A – Flint blade knives from the Kunila (1) and Ardu (2) burials in central and northern Estonia, respectively (Institute of History, Tallinn University, AI 3989:12 and AI 2745:3); B – triangular and heart-shaped flint arrowheads from the Tamula I settlement site in south-eastern Estonia (Institute of History, Tallinn University, AI 3960:91, 4118:2757, 3253, 3680); C – awls made of sheep or goat bone from the Sope burial in north-eastern Estonia (Institute of History, Tallinn University, AI 2607:1 and 3175:1); D – fishing spears made of wild animal bone from the Tika burial on Saaremaa Island (1) and the Külasema burial on Muhu Island (2), both in western Estonia (Institute of History, Tallinn University, AI 3663:1 and AI 1228:2). Photo: P. Kraas.

of Cretaceous flint and are most numerous at settlement sites in Lithuania and Latvia (Loze 1979: 62 and cited literature). A few dozen examples are known from six settlement sites in Estonia (Kriiska and Saluäär 2000: 26 and cited literature; Fig. 7:B), but only four artefacts are reported from Finland (Torvinen 1978; Luoto 1988: 12–13). In southern Lithuania, where Cretaceous flint occurs naturally, flint artefacts may have been produced locally (Brazaitis and Piličiauskas 2005: 117), but elsewhere they were imported, possibly as ready-made objects. In Finland, CWC-related flint is

Fig. 8. Whetstones from the Kunila burial in central Estonia (Institute of History, Tallinn University, AI 3989:15, 17). Photo: P. Kraas.

practically unknown. Although some quartz and flint scrapers and knapping debitage have been found (Edgren 1970: 45; Loze 1992: 316), the lithic technology (knapped tool production) remains poorly understood.

Bone and antler artefacts include objects such as awls (Fig. 7:C), fishing spears (Fig. 7:D), adzes, spearheads, pins, antler plaques (locally also called "wrist-guards"), and tooth pendants (Indreko 1937; Loze 1992: 316; Lõugas *et al.*, 2007: Tab. 2). These artefacts are mostly encountered in funerary settings, but sometimes also in domestic contexts in the Baltic States. Amber artefacts are reported especially in Latvia (Loze 1992: 316). No bone or amber artefacts are known from Finland, where four-sided – or "femur-shaped" – whetstones are associated with the CWC (Edgren 1992: 45). Some whetstones are also present in Estonian Corded Ware burials (Fig. 8). Unlike other parts of Europe and central European Russia (Krajnov 1972: 156 ff.; 1987: 65; Malmer 2002: 158–160), no metal finds have been related to the CWC in the eastern Baltic region.

– Much of the recent research into material culture has focused on pottery. Notable contributions include a comprehensive monograph on Lithuanian Corded Ware (Piličiauskas 2018), and discussions on Estonian Corded Ware (Kriiska *et al.*, 2016; Paavel *et al.*, 2016; Kholkina 2017; Kriiska and Nordqvist 2021). The latter

also addresses possible, albeit weak, connections towards the east, while an important study examining mobility through pottery geochemistry has highlighted lively networking across the Baltic Sea (Holmqvist *et al.*, 2018).
- Fewer studies have been published on other aspects of material culture. Nevertheless, battle axes, their provenience, production, and circulation are the focus of ongoing research (Nordqvist and Holmqvist 2025). Whetstones have received a small, separate study (Nordqvist and Kriiska 2023), and initial use-wear analyses of lithic and bone artefacts have been undertaken (Piličiauskas *et al.*, 2018).
- Based on current views, it is not possible to correlate the various typologies with absolute dates, and the use of many types and variants appears to overlap temporally (see also below). In parallel with the re-evaluation of the burial record, a reassessment of the contents of the CWC toolkit is necessary. For example, many amber ornaments and small flint artefacts (arrowheads) may represent types common in broadly contemporary contexts, rather than being exclusively associated with the CWC.

CHRONOLOGY

The chronology of the CWC in the eastern Baltic area is based on a limited number of partly contested dates: a total of 36 radiocarbon determinations has been associated with CWC contexts in the literature (Fig. 9). In the 2000s, several dates were obtained using AMS dating on carbonized crusts on pottery sherds, (burnt) animal bones from settlement sites, and human bones from burials. However, most dates were produced using the conventional radiocarbon method on charcoal, wood and peat from both domestic and funerary contexts.

Previously, the initial appearance of the CWC in Latvia, Lithuania and Finland – and by extension Estonia – was placed around 3200 BC (Edgren 1992: 92; Kriiska and Tvauri 2002: 76; Loze 2006: 322). This chronology was based on dates from Eiņi, Abora I and Ičа settlement sites in Latvia, all conventional determinations from peat and wood (Loze 1992: Tab. 1; Lang and Kriiska 2001: 93). However, owing to unclear contexts and possible contamination, these dates must be considered unreliable. Likewise, the earliest dates associated with the CWC in Finland are conventional determinations from charcoal collected from the bottoms and fills of grave pits at the multiperiod sites of Kukkarkoski and Jönsas (Torvinen 1978; Ojonen 1983; Purhonen 1986). Although their validity has continued to receive support (Carpelan 2004: 49), these dates should be rejected on the grounds of context- and quality-based issues.

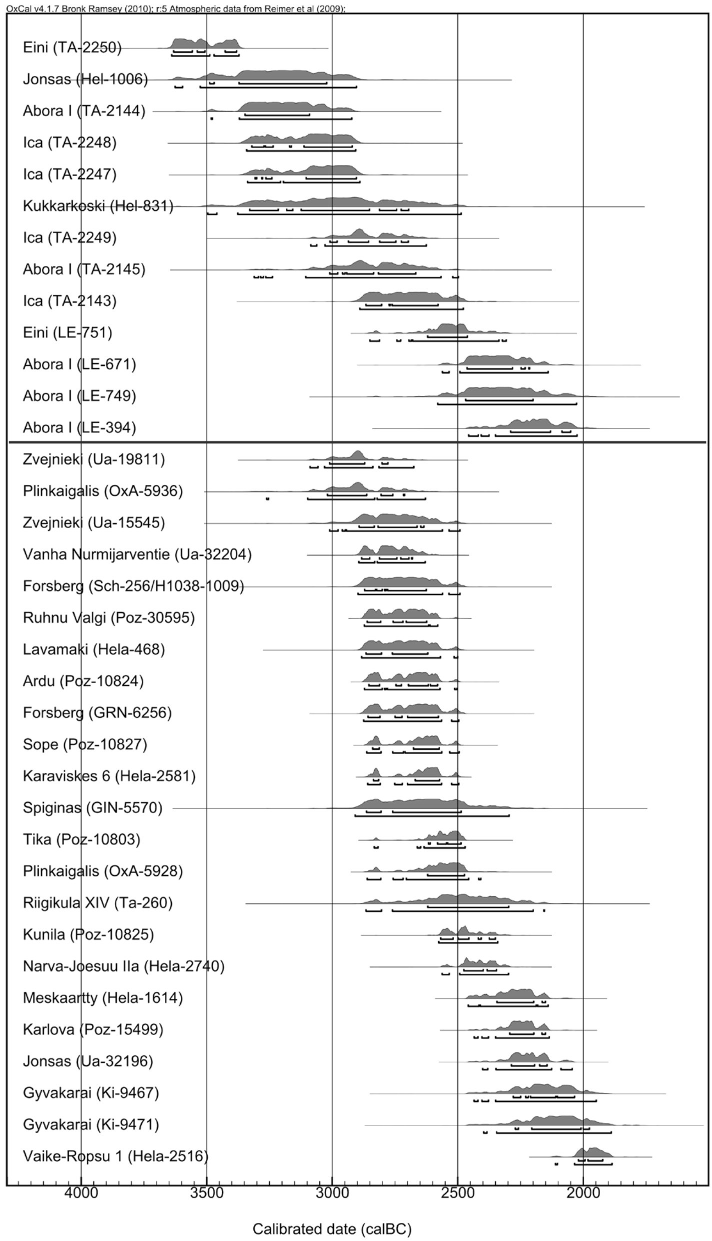

Fig. 9. Published radiocarbon dates associated with the Corded Ware Culture in the eastern Baltic Sea area (as of late 2011); the dates above the solid line are controversial and cannot be regarded as reliable.

When the uncertain dates are excluded, the oldest dates in the eastern Baltic, consistent with the broader CWC area (e.g., Czebreszuk and Szmyt 2000; Furholt 2003; Włodarczak 2009), indicate an initial age around 2900 BC (see also Mökkönen 2011: 17). At the same time, the radiocarbon dates suggest that the CWC in the eastern Baltic persisted slightly longer than elsewhere in Europe (but see Krajnov 1987: 71; Carpelan and Parpola 2001: 86–87 regarding the duration of the Fatyanovo Culture in Russia). The terminal date is suggested by two dates from the sites of Väike-Ropsu 1 in Ingria and Gyvakarai in Lithuania, with median ages of 2100–2000 BC. Nevertheless, it is important to note that the total number of dates is small, and most are single measurements from individual sites, which significantly restricts their controllability.

- Revision of the contexts and quality of the previously existing corpus of dates, in addition to the acquisition of new age determinations, has further aligned the CWC chronology in the eastern Baltic Sea area with that of the rest of Europe. It is now broadly placed between 2900–2800 BC and 2400–2200 BC (Piličiauskas 2018; Pesonen *et al.*, 2019; similarly, the considerably later age previously assigned to the Russian CWC has been brought more into line with other areas; see Krenke 2019; Nordqvist and Heyd 2020; Saag *et al.*, 2020).
- While the late dates from Gyvakarai have since been rejected (Piličiauskas 2018: 169), the CWC legacy does appear to persist as long as the end of the 3rd millennium BC in some regions (Kriiska and Nordqvist 2021).
- Despite these advances, the number of reliable datings remains small – fewer than 70 – and geographically unevenly distributed. Therefore, apart from the general framework, no well-established regional or local chronologies or controlled typo-chronological sequences exist so far.

SUBSISTENCE

Traditionally, the CWC has been credited with introducing a productive economy (cultivation and animal husbandry) to the eastern Baltic area (e.g., Äyräpää 1937: 120; Jaanits *et al.*, 1982: 125). However, some pollen analyses suggest that the initial introduction of the first cultigens may have occurred as early as the 5th–4th millennium BC (Kriiska 2007; 2009; Mökkönen 2010). *Cerealia* (barley and wheat, later also oats and rye – the latter possibly as weeds) dating to the period contemporaneous with the CWC have been identified in several Estonian pollen analyses (Poska and Saarse 2002; Kriiska 2009: 168; see also Levkovskaâ 1987). The presence of barley is further indicated by one seed and a seed imprint on a Corded Ware sherd found at the Iru site in northern Estonia (Vassar 1939; Jaanits 1992: 49). Other changes in flora may also be related to agriculture: for instance, indicators of deforestation, such as *Rumex acetosa/acetosella t.* and *Melampyrum*, have been found in bog and lake sediments in the Narva–Luga region in north-eastern Estonia and western Ingria, and dated to around 2000 BC (Lepland *et al.*, 1996; Sandgren *et al.*, 2004). At the same time, evidence of cultivation in Finland and north-western Russia is scarce, with only two pollen analyses showing weak signs of *Cerealia* cultivation coinciding with the CWC (Tolonen 1978; Vuorela 2002; see also Alhonen 1970; Edgren 1984a; Meinander 1984: 6–7).

The existence of domesticated animals is evidenced by osteological materials from Corded Ware contexts in the Baltic states, particularly graves containing bones of sheep, goat, pig, and cattle, as well as artefacts made of these materials (Lõugas *et al.,* 2007 and cited literature). In Finland, by contrast, bone finds are few and contested (Forstén 1973: 75; Mannermaa and Deckwirth 2010). Given the indirect nature of evidence concerning new subsistence, it has been argued in Finland that the CWC relied entirely on hunting and gathering (Edgren 1984a: 14; 1999: 290; see also Siiriäinen 1981; Zvelebil 1981; Meinander 1984; Carpelan 1999). This perspective has also been emphasised in the Baltic context (Matiskainen 1994: 22; Girininkas 2002: 91).

Interestingly, CWC finds in Finland lack clear hunting and fishing gear (Edgren 1992: 94), whereas Estonian burials have yielded heads of fishing spears and harpoons. Further evidence for hunting and fishing is provided by osteological material from settlements, including bones and bone artefacts from elk, beaver, wild boar, and seal, as well as fish (e.g., perch, pike, and carp) and birds (Kriiska 2000: 74; Lõugas *et al.,* 2007: Tab. 2). Despite the new settlement pattern, sites on the coast, the large islands, and the smaller archipelagos indicate the significance of aquatic hunting and fishing in some areas (Edgren 1984a: 14; Kylli 2001: 9; Asplund 2008: 58–63; Konsa and Ots 2009).

It appears that a mixed economy prevailed among Corded Ware groups in the eastern Baltic Sea area, encompassing gathering, fishing, hunting, and elements of a productive economy. Current data are insufficient to determine regional differences in their relative importance, but they are enough to challenge earlier hypotheses portraying Corded Ware people as fully mobile herders (Jaanits 1966) or pure hunter-gatherers (Edgren 1984a; Matiskainen 1994). The evidence suggests the presence of some domestic animals rather than large-scale cattle farming (Lõugas *et al.*, 2007). The role of these new livelihoods within the subsistence economy may have varied; nevertheless, their cultural, symbolic or other significance was substantial enough to alter settlement patterns, indicating their integration into the CWC lifestyle and its ways of being in the landscape. Accordingly, it is unlikely that these new livelihoods were completely unknown in Finland (for a similar opinion, see also Carpelan 1999; Núñez 2004; Mökkönen 2010).

– Subsistence economy of the CWC has been one of the most extensively studied fields in the eastern Baltic area in recent years. Nonetheless, direct evidence of cultivation remains scarce, even though more pollen data has been gathered (e.g., Alenius *et al.*, 2017). The few new macrofossil studies yielded only wild species (Vanhanen *et al.*, 2023), while some of the previously presented macrofossils were dated to later periods (Grikpėdis and Motuzaite-Matuzeviciute 2017), or could not be verified anymore.
– The presence of domestic animals is proven across the eastern Baltic area by the detection of dairy lipids (Cramp *et al.*, 2014; Robson *et al.*, 2019; Pääkkönen *et al.*, 2020; Piličiauskas *et al.*, 2020; Oras *et al.*, 2023), radiocarbon dating of domesticate bones (with the exception of Finland, see Bläuer and Kantanen 2013), and even the identification of a preserved goat hair in a burial (Ahola *et al.*, 2018).
– Dietary stable isotopes analyses suggest a clear shift to terrestrial foods (Robson *et al.*, 2019; Oras *et al.*, 2023), yet other studies also indicate foraging livelihoods and the use of wild (including aquatic) resources. In the 3rd millennium BC, the eastern Baltic Sea area exhibited a mixed economy, with variation not only between regions but also between and within human groups.

INTERACTION

The Corded Ware groups are considered to differ from the preceding and contemporary inhabitants of the eastern Baltic Sea area in terms of their material culture, subsistence strategies, settlement pattern and burial tradition (including social structure and belief system), as well as genetically (introducing a new population) and linguistically (as assumed Indo-European speakers). The emergence of the CWC in the Baltic States has been attributed variously to rapid and bellicose expansions of people (Krajnov and Loze 1987: 54), migrations occurring in multiple waves (Girininkas 2002: 91), or limited migration of Corded Ware groups (Kriiska and Tvauri 2002: 84). Finnish scholars have almost unanimously connected the CWC with external and rapid migration (Äyräpää 1973: 206–208; Edgren 1992: 96; Matiskainen 1994: 14; Carpelan and Parpola 2001: 67, 84). Views promoting a largely local development, driven by the diffusion of ideas, have been less frequently presented (Luoto 1986; Lang 1998).

Central-eastern Europe is commonly regarded as the region from which the CWC, or its influence, spread to the eastern Baltic Sea area. On the contrary, the east has only been explored as the source of individual parallels to specific artefacts (Edgren

1970: 44; Huurre 2003: 230–231; see also Äyräpää 1933a; 1933b: 246). Consequently, interpretations of intra-group interaction within the CWC may be restricted. The relationship with other, non-CWC groups has also remained a matter of debate. Centuries-long coexistence of different groups has been suggested and is supported by radiocarbon-dated materials in the eastern Baltic Sea area (Lang and Kriiska 2001: 92, Tab. 1). The strict segregation has been attributed to differences in subsistence, language and culture. This view is particularly prominent in Finland, where the northern border of the CWC distribution has even been metaphorically compared to the Great Wall of China (Äyräpää 1973: 207; see also e.g., Edgren 1999: 286; Carpelan 1999: 266).

Nevertheless, the borders were not impregnable. Pottery is customarily considered to mark the core area of the CWC, whereas battle axes exhibit a much wider geographical distribution and reflect the broader sphere of activity, including interaction with other groups beyond the core area. Conversely, sites, finds, and influences attributable to other groups are found within the CWC area, including battle axe imitations and some potential borrowings in pottery decoration (Äyräpää 1952a: 24; Edgren 1992: 90; 1997: 165–166; Carpelan 2004: 59). Frequently presented examples include an adze typical of hunter-gatherers found in a Corded Ware burial at the Dalamalm site in southern Finland (Edgren 1970: 81), and a non-Corded Ware phyllite arrowhead discovered in another CWC grave in Estonia (Hausmann 1912: 63).

The full segregation previously proposed would not have been sustainable for centuries. Instead, it seems more plausible that connections developed and interaction began soon after the emergence of the CWC (Carpelan 1999: 262; Mökkönen 2011: 52–53, 62–63; for Sweden, see Larsson 2009: 356–357). The revision of the chronology, placing the initial date of the CWC several centuries later, also shortens the period previously regarded as characterised by isolation. Nevertheless, the question of interaction merits more attention, and it is noteworthy that many areas remain poorly studied. For example, fieldwork conducted in the early 2000s has shown that the absence of Corded Ware finds in the eastern Gulf of Finland area largely reflects a lack of research activity.

The end of the CWC remains one of the major open questions. Interpretations vary in different parts of the eastern Baltic, ranging from seeing CWC communities as an upper class or elite in subsequent societies to suggesting a complete return to foraging and merging with hunter-gatherers (Carpelan and Parpola 2001: 84; Kriiska and Tvauri 2002: 84). Similarly, the role and impact of the CWC in later cultural developments in the region have been variably assessed.

– The study of origins has undergone a profound transformation since the completion of the original manuscript. Earlier ideas grounded in archaeological typologies,

physical anthropology, and comparative historical linguistics have now been corroborated by aDNA studies. These studies demonstrate that, also in the Eastern Baltic area, the onset of the CWC is linked with the arrival of new people with new genetic ancestry (Jones *et al.*, 2017; Saag *et al.*, 2017; Mittnik *et al.*, 2018; Malmström *et al.*, 2019). Only in Finland have no aDNA studies been pursued due to the lack of preserved bone material. Simultaneously, it is apparent that the eastern Baltic region has its own distinct characteristics, reflecting the impact of local socio-cultural and environmental factors (see Nordqvist in press a).
– Overall, the image of the 3rd millennium BC has become more dynamic and diverse. For example, mobility between different CWC groups has been credibly demonstrated (Holmqvist *et al.*, 2018), while the growing number of radiocarbon dates on non-CWC contexts provides more evidence of overlap and interlacing among different communities.
– Although some previously mentioned hybrids, such as in pottery decoration, may now appear anachronistic, the integration of different traditions is nevertheless evident. This has recently been identified, for example, in burial traditions (Ahola and Heyd 2020) and housing solutions (Mökkönen 2023), which go beyond just plain copying. Nevertheless, despite these advances, inter- and intra-group dynamics, relationships, mobilities, and transformations of traditions are topics that require much more attention in the future.

AFTERWORD – THE CORDED WARE PHENOMENON WANTED

Over 100 years of research on the CWC in the eastern Baltic Sea area has shed light on many fundamental aspects of this phenomenon. However, owing to the research history and local scholarly traditions, studies have tended to remain fairly general and descriptive. It is therefore still pertinent to ask several basic questions: How did the CWC emerge, develop, and spread? To what extent did migration play a role? What kind of interactions did Corded Ware groups of the eastern Baltic Sea region have with neighbouring Corded Ware and non-Corded Ware communities? What, more broadly, was the CWC in the north about? And, finally, is traditional archaeology alone capable of answering these questions?

More archaeological research, combined with contributions from other disciplines, is needed to resolve questions about the essence of the CWC in the eastern Baltic Sea region. This entails comprehensive excavations and documentation of Corded CWC sites, theoretically informed material culture studies, as well as the application of aDNA research, radiocarbon dating, palynological studies, and other scientific methods. We are confident that interdisciplinary research in the border areas of the CWC will generate new ideas on broader developmental trends and offer fresh insights into the study and interpretation of the CWC across Europe.

Traditionally, CWC studies have focused on central European materials. The vast northern and eastern regions are largely overlooked, even though these comprise more than half of the total geographical extent of the phenomenon. To us, this disparity appears, to a significant extent, to be a legacy of past political circumstances. With the collapse of the Iron Curtain already two decades ago, it is timely to discover the CWC in its full diversity. We hope this contribution has provided an overview of current knowledge on the CWC in the eastern Baltic Sea region.

– Although much research has been done during the past years, most of the questions and aspirations outlined in the concluding chapter remain largely valid. Regrettably, the optimistic tones expressed in the original afterword have now been overshadowed by the re-emergence of a barrier across western Eurasia due to Russia's war in Ukraine.

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Location, Location, Location: The Equivocal Interpretation of Spatial Patterns of the Corded Ware Culture in Northern Germany

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This paper examines the economic activities of Corded Ware Culture (CWC) communities in the region of Schleswig-Holstein (SH), Germany. It contextualises them within the concept of taskscapes as well as current discussions on mobility and migration. As a novel approach, it considers whether the spatial variation in battle axe deposition strategies – graves predominating in the west, and isolated finds in the east – may reflect the practices of mobile groups with distinct taskscapes, rather than entirely separate or differently behaving populations, as previously suggested. It is argued that the western part of SH functioned as a ritual core in a long durée, while the eastern regions functioned as economic zones. The known settlements take a position between the ritual and economic zones. The argument is made that the human groups were not static; instead, they continuously formed new and flexible social configurations. Ultimately, this mobile and dynamic spatial system is interpreted as a catalyst for the integration of individuals from diverse backgrounds, giving tangible form to the migrations associated with the CWC phenomenon.

KEY-WORDS: Funnel Beaker Culture, Corded Ware Culture, mobility, taskscapes, settlements, battle axe depositions

INTRODUCTION

This paper examines the spatial organisation of the Corded Ware Culture (CWC) in the German federal state of Schleswig-Holstein (hereafter SH) in northern Germany. While the occurrence of migrations in this period is now broadly acknowledged,

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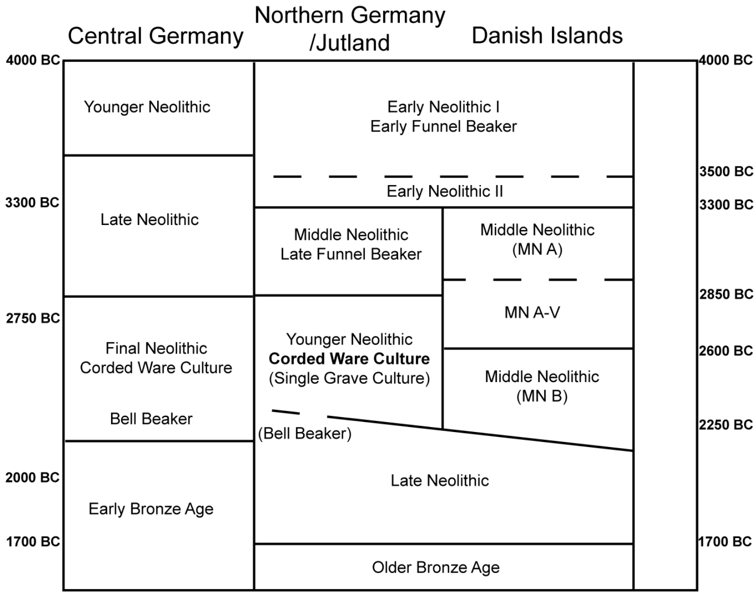

Fig. 1. Periodisation and main archaeological terminologies of the Neolithic of northern Germany in comparison to neighbouring regions.

the present challenge lies in uncovering region-specific dynamics and moving beyond oversimplified, culture-historical models in the tradition of Gustaf Kossinna (e.g., 1911; cf., Furholt 2021; Hofmann *et al.*, 2025: 13–15). For this, regional studies are crucial. For instance, Luka Papac *et al.*, (2021) have demonstrated from a genetic perspective the intricate interactions between newcomers and local populations during the initial formation of the CWC in Bohemia. In the Lower Rhine area, parallel societies have been proposed as a likely scenario (Kroon 2024; Bourgeois *et al.*, 2025), with similar suggestions emerging from Switzerland (Furtwängler *et al.*, 2019: 4–7) and eastern Denmark (Iversen 2015). At sites like Burgerroth in Bavaria, CWC material culture appears within contexts rooted in earlier Late Neolithic (central German terminology, cf., Fig. 1) traditions (Link 2025: 153). For Jutland and SH, recent research has proposed diverse local scenarios, reflecting varying interactions between newcomers and established populations, as well as differing degrees of adoption of new symbols versus adherence to older traditions (Schultrich 2023a; Madsen 2024; Nielsen 2024; Nielsen and Johannsen 2024). Moreover, an observation from Martin Furholt's study (2019) is noteworthy. He demonstrates from a supra-regional perspective that early CWC-related symbols appear in highly diverse contexts: (category 1) in formal single graves, and (category 2) in settlements or re-used megalithic structures. Notably, category 1 appears to be more closely associated with steppe ancestry than category 2 (Furholt 2019: 118–120; cf., Haak *et al.*, 2023).

As such, a growing body of research explores the diversity of mechanisms, motivations, and consequences of human mobility in this period. All of these studies point to a level of complexity far exceeding that suggested by the pioneering ancient DNA analyses (e.g., Haak *et al.*, 2015; Kristiansen *et al.*, 2017). They underscore that each region followed its own historical trajectory and emphasise the central role of mobility in both the formation and further development of CWC societies.

Taskscapes

This paper engages with the concept of taskscapes, introduced by Ingold (1993) and subsequently adopted by many archaeologists (cf., Conneller 2010; Rajala and Mills 2017). In brief, taskscapes are dynamic social spaces shaped both consciously and unconsciously through human activities. These spaces are continuously redefined, thereby maintaining, but also enhancing and potentially altering their meanings over time. The surrounding landscape is also imbued with significance, as activities and movement extend into it and are, in part, dependent upon it (Conneller 2010: 185). To access taskscapes, therefore, it is essential to investigate the site level, its immediate surroundings, its relationship to the wider landscape, and its connections with other sites. Following critiques that the concept of taskscapes was "too romantic", later studies have shifted their focus toward political constraints (such as access and the display of power) that influence the shaping of both taskscapes and taskscape–landscape relations (Conneller 2010: 188). Because the concept of taskscapes acknowledges the character of different arenas of cultural reproduction and their interrelations within the broader landscape, it holds considerable potential for contextualising the spatial organisation of CWC communities in SH within broader debates on migration and mobility.

Approach and research questions

In light of the recent developments concerning regional differentiation outlined above, this paper re-evaluates the economic activities and modes of spatial organisation of CWC communities in SH, situating them within broader discussions on taskscapes, mobility, and migration. The analysis is structured around two central themes: (1) the high mobility of human groups, and (2) the regional diversity of processes associated with the transition to CWC societies. In particular, the paper revisits earlier observations (cf., Schultrich 2018a; 2023a) regarding a distinctive spatial pattern: throughout the entire CWC phase in SH, graves – often containing battle axes – are concentrated in the western and central regions, whereas in the easternmost areas battle axes occur almost exclusively as isolated finds. The study poses the following questions: Are taskscapes discernible? Do spatial differences reflect the practices of mobile groups with distinct taskscapes rather than those of separate, locally bound populations? Moreover, what perspectives does this approach offer for understanding the transition from Funnel Beaker Culture (FBC) to CWC societies in SH?

CONTRASTS WITHIN THE CORDED WARE CULTURE IN SCHLESWIG-HOLSTEIN

The Role of Natural Factors

The landscape of SH can be broadly divided into three natural zones: the tidal flats in the west, the *Geest* in the centre, and the Young Moraine Drift region in the east. Each of these zones is characterised by distinct soil types and varying agricultural potentials.[1] Particularly relevant for this study is the difference in soil quality between the *Geest* and the Young Moraine Drift: the former, shaped by the Saale glaciation in the western part of SH, contains more heavily degraded soils, whereas the latter in the east offers more fertile conditions, which are favourable for modern agricultural use.

For a long time, the apparent absence of CWC houses and other settlement indicators led scholars to characterise CWC societies as mobile pastoralists, primarily engaged in cattle, sheep, or goat herding (cf., Hecht 2007: 193). The concentration of single graves in western SH – on the acidic, nutrient-poor soils of the Saale glaciation – seemed to support this interpretation. In this context, scholars argued that CWC groups had "contented themselves with the barren regions" (Schwantes 1939: 237), thus reinforcing the idea of an extensive, grazing-based economy. This narrative, however, emerged at a time when the chronological relationship between the FBC and the CWC was poorly understood. These two cultures were often viewed as contemporary but distinct, with minimal interaction. However, the known CWC settlements predominantly appear in the east (Fig. 2; see below). Moreover, the frequent appearance of FBC megalithic tombs in the same western regions shows the inconsistency inherent in this line of arguments.

Archaeobotanical evidence shows a decline in cereal diversity across many regions during this period, with barley (*Hordeum vulgare*) often emerging as the dominant

1 A recent summary of the formation and attributes of the landscapes see Feeser and Dörfler 2024; Wolters *et al.,* 2024a; 2024b.

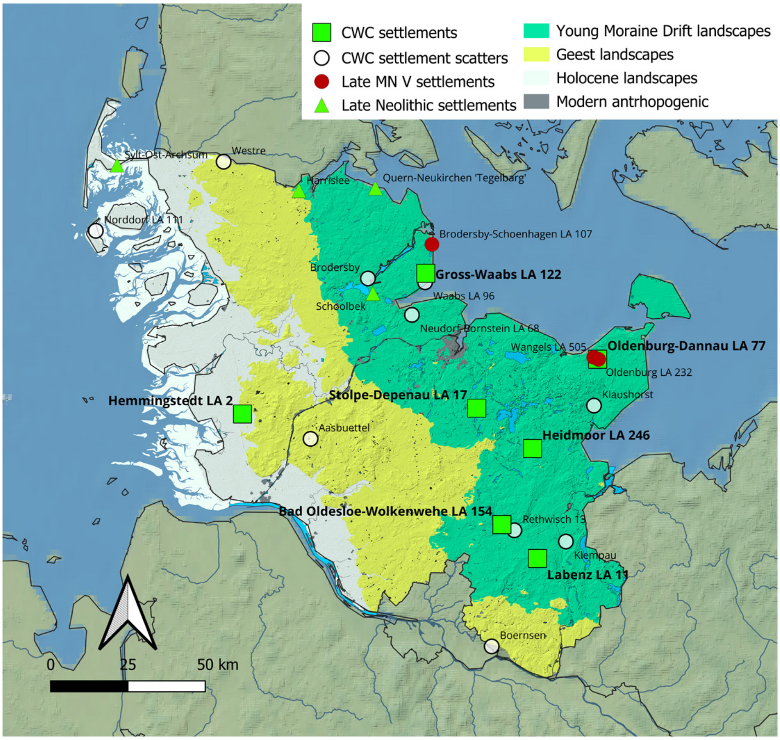

Fig. 2. Main geomorphological units and settlements in SH. Settlements CWC acc. Schultrich 2018a; and LN acc. Kleijne *et al.*, 2020. Geomorphology acc. Data licence Germany – Landesamt für Umwelt Schleswig-Holstein, Jan Willer – Version 2.0; https://umweltgeodienste.schleswig-holstein.de/WFS_OberflaechennaheGeologie?SERVICE=WFS&REQUEST=GetCapabilities

crop (see below). Since barley is more resilient and less demanding than wheat, it thrives even under harsh climatic conditions and on poor soils (Kirleis *et al.*, 2012: 230). This shift further supports the idea that environmental and economic factors played a key role in shaping CWC settlement patterns – especially in the less fertile western zones of SH. However, in recent decades, an increasing number of CWC settlements and house structures have been identified across Central and Northern Europe, indicating a more diversified economic base than previously thought (Hecht 2007: 193). Nevertheless, the image of CWC communities as primarily engaged in mobile livestock farming persists. The present paper provides a regional study-based perspective on this narrative by evaluating persisting spatial structures in the region of SH.

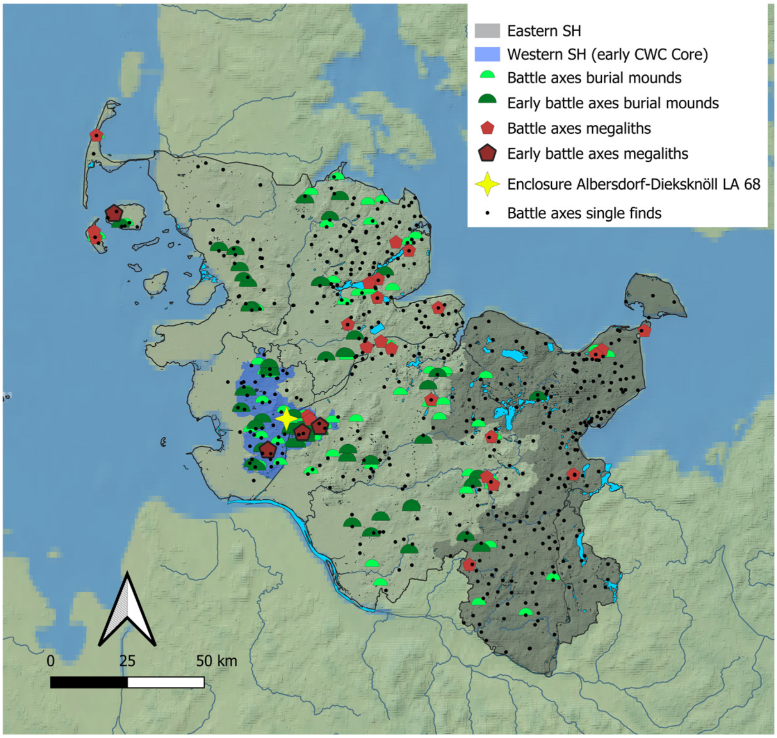

Fig. 3. CWC battle axes (*c*. 2850–2250 BC) from different contexts in Schleswig-Holstein. Two regions are marked: The southwest of the area, with many burials, single finds, and the enclosure; the easternmost parts (districts Ostholstein, Plön, Lübeck, Stormarn, and Duchy of Lauenburg).

Archaeological Phenomena in Western and Eastern Schleswig-Holstein

Recent maps illustrating the CWC on the Cimbrian Peninsula (Iversen 2015; 2016; Müller and Vandkilde 2020: 35, fig. 2: 3) distinguish two phases of CWC expansion, based on the distribution of early and later single-grave burials. These maps reveal a clear concentration of single graves in the western part of SH, a sparser distribution in the central zone – in the western part of the Young Moraine regions – and only a handful of graves in the easternmost areas (Fig. 3). Importantly, the much more even distribution of Bronze Age burial mounds across these same regions indicates that the observed CWC burial pattern is not simply a result of research biases.[2] However, the maps may inadvertently suggest that eastern SH was largely uninhabited during

2 Based on the unpublished database from the Archaeological State Office Schleswig-Holstein (cf., Kneisel *et al.*, 2023: 49).

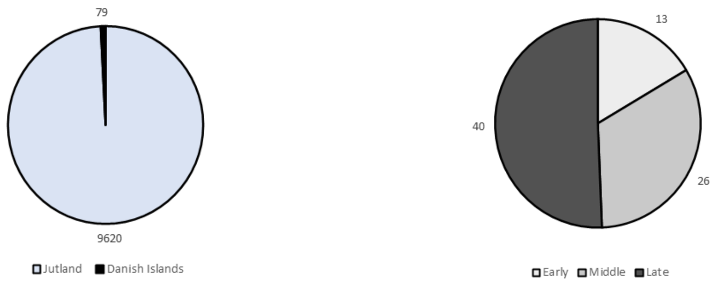

Fig. 4. To the left, the relation of the number of battle axes from diverse contexts in the west and east of Denmark. Data for Jutland were calculated based on Hübner (2005) and Schultrich (2018), while the data for the Danish Islands are according to Iversen (2016). To the right, the proportions of early, middle and late battle axes found in the eastern parts of Denmark (acc. to Iversen 2016).

both the early and late phases of the CWC period. This impression arises because single finds – especially of iconic CWC artefacts, such as battle axes – were excluded from the datasets and explanatory models. Moreover, observations on the situation in Denmark prompted the interpretation in SH. In Denmark, much more CWC-related material appears in Jutland to the west, and very few finds have been made on the Danish islands (Fig. 4). Most of this material dates to the late CWC phase, implying a late expansion to the east (Iversen 2015; 2016). This idea was suggested for SH without checking the local situation in detail. The fact that megaliths were reused more often in the late CWC period and more often in the east (cf., Hübner 2005: 605; Schultrich 2018a: 36, 215) contributes to such a scenario.

However, as demonstrated in Figures 3 and 5, numerous battle axes (mainly single finds) are documented in the eastern and easternmost parts of SH, particularly in the district of Ostholstein. These findings clearly indicate that eastern SH was not a cultural void, neither in the late CWC period nor in the early CWC period. Instead, the lack of formal CWC single burials in this region requires an alternative explanation.

Both western and eastern SH witnessed the construction of megalithic tombs during the late Early and Middle Neolithic (*c.* 3650–3100 BC). However, as Ingo Feeser and Martin Furholt (2014) have shown, the patterns of land use during this period differed significantly between the two regions. In the east, megalithic construction is linked to pronounced land-use indicators in pollen records – especially the presence of *Plantago lanceolata* – suggesting intensive agricultural activity and, according to the authors, collective forms of organisation and production

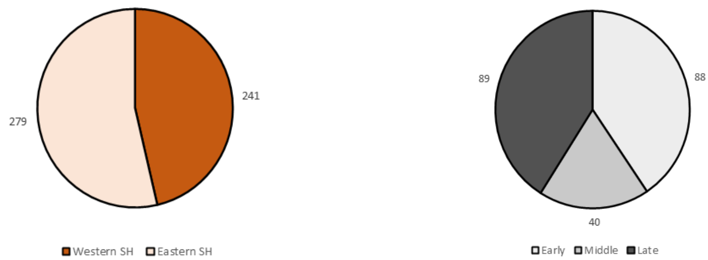

Fig. 5. To the left, the relation of the number of battle axes from diverse contexts in the west and east of Schleswig-Holstein (west: Districts Dithmarschen, Steinburg, and Pinneberg, east: District Ostholstein). To the right, the proportions of early, middle and late battle axes found in the eastern part of Schleswig-Holstein (acc. to Schultrich 2018a).

(Feeser and Furholt 2014: 129–131). In contrast, this correlation is absent in the west, implying that while megalithic tombs were constructed there as well, they were not accompanied by a corresponding intensification in land use or collective action (Feeser and Furholt 2014: 133). Building on this, earlier interpretations (Schultrich 2018a; 2023a) proposed that the spatial differences observed during the CWC period reflected enduring divergences in social organisation. In this view, eastern communities, which refrained from using battle axes as grave goods and instead deposited them as isolated objects in the landscape, may have retained collective traditions rooted in earlier FBC practices (cf., Brozio 2025: 267). In contrast, western groups were interpreted as more receptive to innovation and inclined toward individualising burial customs.

However, this interpretation presupposes that the human groups remained geographically fixed and socially distinct for centuries. Such an assumption appears to contradict current models emphasising the high mobility and heterogeneity of CWC societies.

SPATIALLY DIFFERENT BEHAVIOURS?

What if the spatial differences observed in CWC practices in SH do not reflect distinct, tradition-bound groups, but instead point to mobile populations who used different taskscapes for different social or ritual practices? To explore this alternative, the following sections provide a brief outline of key lines of evidence related to mobility, environmental conditions, settlement patterns, and deposition strategies.

Mobility patterns during the 3rd millennium BC
The emergence of the CWC around 2900 BC is closely associated with large-scale migrations, as evidenced by the sudden appearance of novel genome variants in central European populations (Papac *et al.*, 2021; Haak *et al.*, 2023). In addition, multiple lines of evidence – ranging from strontium isotope analyses and ancient DNA to widespread material culture patterns – point to sustained supra-regional interaction and mobility across vast areas (cf., Furholt 2014; Sjögren *et al.*, 2016; Papac *et al.*, 2021).

As Claudia Gerling (2015: 230–241) has shown, even in earlier cultural contexts, such as the Globular Amphora Culture (GAC), individuals could traverse distances of up to 50 km as part of herding routines (cf., Müller 2023: 265). Janusz Czebreszuk and Marzena Szmyt (2011) further highlight the particularly high mobility of CWC-associated populations in the Polish Lowlands. One notable distinction from GAC societies lies in the absence of fixed burial grounds for the CWC, suggesting a more fluid and possibly seasonal pattern of movement among small, kin-based groups.

Beyond herding and economic necessity, social practices such as exogamy, child exchange, and other forms of interpersonal connectivity – driven by both "push" and "pull" factors – played key roles in shaping mobility patterns (see Hofmann *et al.*, 2024; Stockhammer 2025; Högberg *et al.*, 2025). These dynamics challenge models that rely on stable, localised communities. In this context, Furholt's (2016; 2017) conceptual model of mobile societies becomes particularly relevant. Drawing on spatial sociology (especially Hillier and Hanson 1984), Furholt argues that residential and social groups need not be identical. Instead of sedentary, kin-based village structures, individuals may have moved between loosely connected, temporary communities, maintaining far-reaching social ties across regions. This translocal organisation, he proposes, was especially pronounced during the 3rd millennium BC. Such a model helps explain the striking homogeneity of the CWC's material and symbolic repertoire across Europe. When social networks span long distances, social proximity can be maintained even over geographic separation. People across the vast CWC distribution may have been linked through just a few intermediary contacts ("knots"), which facilitated the circulation of ideas, practices, and technologies. Shared symbols – such as pottery styles, burial practices, and tools – would have served to reinforce a sense of cultural connectedness and mutual understanding across these networks. Furthermore, processes such as exogamy, wet nursing, child mobility, trade relations, and even conflict (cf., Stockhammer 2023; 2025; Hofmann *et al.*, 2024) are all consistent with Furholt's translocal community model. These various mobility patterns open the door to considering differentiated behaviours among individuals and groups. Some may have travelled over large distances, while others may have remained within smaller, seasonally used territories, as also indicated by the study of Bourgeois and Kroon (2023). Periodic long-distance gatherings – perhaps for funerary or ritual activities – may also have played a role in maintaining cultural cohesion across regions.

Pollendiagrams and land-use patterns
Pollen archives provide insights into landscape use over the long durée and, consequently, into the development of spatial practices during the transition to and throughout the CWC period. In SH, however, these archives are unevenly distributed, with significantly more profiles available in the east than in the west (Feeser *et al.*, 2019: 1589, fig. 1), which complicates direct comparison. Alongside the proportion of distinct wood species, the proportion of *Plantago lanceolata* is a reasonable estimate for reconstructing land-use and its changes. It grows on open lands, and its increasing presence indicates open lands for animal grazing and crop growing (as it grows on wastelands).

In the western region, where most CWC burials are found, only one relevant profile from Horstenmoor is available. It shows no interruption in open-land use between the latest FBC and early CWC period. However, a local minimum of *Plantago lanceolata* is observed at approximately 3200/3100 BC, with subsequent increases in values. From around 2400 BC, cereal pollen increased, suggesting intensified or altered land use (Feeser and Furholt 2014: 128; 2016: 24).

Based on a few lakes and bogs, there is a standard diagram for the Young Moraine landscape of eastern SH and western Mecklenburg (Feeser and Dörfler 2024). Between *c.* 3150–3000 BC, it shows a brief phase of forest regeneration, followed by a renewed increase in open-land indicators like *Plantago lanceolata*, which persist until about 2400 BC – suggesting small-scale, varied land use throughout the CWC period – with different local anomalies. In the profiles of the lakes Poggensee and Seefelder See, along with the increasing open land from 3000 BC, *Cerealia* also appears, indicating an increase in land use and crop growing (Feeser and Dörfler 2012: 178; 2024). Especially in the southern part of the study area, signs of more intensive land use emerge at the onset of the CWC period (Feeser *et al.*, 2012: 187; cf., Feeser and Dörfler 2024). In the on-site profile from Bad Oldesloe-Wolkenwehe LA 154, cereal pollen (as indicative of processing at the site) drops around 3000 BC, while *Plantago lanceolata* (possibly a regional signal) increases sharply after 2800 BC (Fig. 6) – alongside high charcoal values, possibly indicating slash-and-burn activities (Feeser and Dörfler 2019: 202; Brozio 2025: 265). This coincides with hut

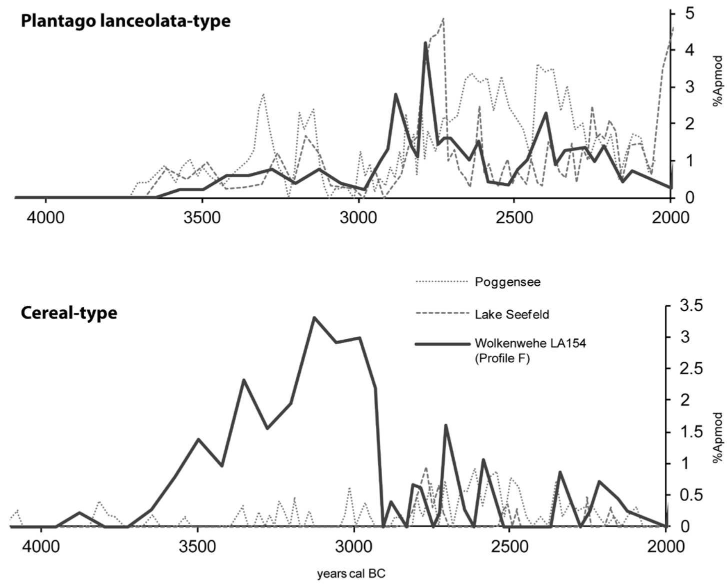

Fig. 6. The relative abundance of *Plantago lanceolata*-type and cereal-type pollen from Bad Oldesloe-Wolkenwehe LA 154 and the pollen profiles of Lake Seefeld and Poggensee (Feeser and Dörfler 2019: fig. 23; Brozio 2025: 265).

constructions in the area (*c.* 2750 calBC[3]; Mischka *et al.*, 2007: 40), pointing to significant shifts in settlement and land use. However, it is unclear whether the land use is associated with grazing or agriculture in the surroundings, as indicators of animal dung are lacking. Such an indicator – *Coprophilous fungi* – has been observed at Poggensee during the entire CWC period, clearly pointing to ongoing grazing activities there (Feeser *et al.*, 2012: 185).

Summing up, despite the limited number of available archives, it is possible to identify different patterns of landscape use, including their alterations, which may be understood as indicative of taskscapes. The general line is that everywhere pollen profiles are available, open land for grazing and crop growing can be documented for the CWC period. In the east, a short interruption of activities is documented for the late FBC period, which ends, however, before the CWC potentially emerges. As

3 KIA-30915: 4150+-29 (*Alnus*), 2870–2670 cal. BC. KIA30914: 4188+-38 (*Alnus*), 2890–2690 cal. BC (Mischka *et al.*, 2007).

such, the FBC-CWC transition is relatively continuous everywhere. This point becomes more apparent when examining settlements and economic activities.

Settlements

Notwithstanding the potential for bias arising from the probability of finding, Figure 3 provides compelling evidence that the eastern region of SH was subject to significantly more intensive settlement activity compared to the western region. A juxtaposition of the distribution of burial sites (Fig. 3) with the settlement patterns reveals an interesting phenomenon. The settlements appear to be situated at the periphery of the primary burial areas. The only striking exception to this is the area of the Oldenburg ditch (Oldenburg-Dannau LA 77 on Fig. 2). While multiple contemporaneous houses characterise the late FBC in SH at several sites (Brozio 2016; Hage 2016; Müller 2019), evidence for multiple structures during the CWC period has so far only been documented at Bad Oldesloe-Wolkenwehe LA 154. Additional indications of huts come from Labenz LA 11 and Heidmoor LA 246 (Fig. 1), while a single house structure was found at Stolpe-Depenau LA 17. Beyond these, proper two-aisled longhouses appear in the Late Neolithic from *c*. 2200 BC (cf., Kleijne *et al.*, 2020). This scarcity of settlement evidence is paralleled across the North European Plain. For instance, in Jutland, only a few tent-like structures dating to the early and middle CWC are known. As in SH, post-built houses become more common towards the Late Neolithic; however, this process starts slightly earlier than in SH in a late CWC context (Sarauw 2006; Siemen 2008). A similar developmental trajectory is observed in the Polish Lowlands and southeastern Poland (Czebreszuk and Szmyt 2011: 262; Włodarczak 2017: 289). The small size of house structures may be directly related to the small size of the groups. While many construction steps can be performed by a few individuals, erecting large façade posts requires a larger group. Paula Dieck (2014) calculated that constructing the FBC house from Rastorf, SH (3500–3300 BC), required 28 participants, whereas a smaller house from Hornstaad-Hörnle, Switzerland (3912/3911 BC), could be built by only two people (2014: 271). Accordingly, the absence of substantial house structures in SH during the CWC period can be interpreted as a further indicator of small-sized groups. In this context, the numerous scatter finds in SH are particularly noteworthy (cf., Schultrich 2018a: 55–56), as they are not associated with permanent structures[4] and likely represent short-term

4 E.g., at the site of Westre, North Frisia, a private person collected many finds including diagnostic flint axes, but the excavation did not reveal anything (unpublished: https://www.archiv.sfb1266.uni-kiel.de/en/projects/cluster-c-horticulturalists/c1-neolithic-transformations-1/research-activities-2016-2020?set_language=en, accessed April 24, 2025.)

occupations involving lightweight constructions – a parallel to observations from the Polish Lowlands (Czebreszuk and Szmyt 2011).

The situation in Lower Saxony shows some variation. Only a few settlements are known, but the sites of Heede (Emsland) and Hunte 1 (Dümmer) feature post-built longhouses measuring up to 10 meters in length (Hecht 2007: 130–133), implying the involvement of larger construction groups (cf., Dieck 2014). Both sites have yielded material from the late FBC and the CWC (Hecht 2007: 130–133). Notably, the settlement at Hunte 1 is also associated with a palisade.[5] In contrast, the nearby site of Hunte 4 – located 2.5 km from Hunte 1 and containing CWC and Bell Beaker material – shows no evidence of permanent structures and is likely to have been a repeatedly visited temporary site. Together, these sites indicate a broader settlement system composed of one or more permanent locations surrounded by ephemeral activity sites (Brozio *et al.*, 2023). In the Netherlands, the number of documented CWC contexts is significantly higher. Here too, evidence suggests a system of settlements used for different purposes, including specialised hunting or fishing camps (Nobles 2015: 306–308). Gary Nobles (2015) proposes that individual households operated multiple camps for distinct tasks. To evaluate whether such a system is plausible for SH, it is necessary first to introduce the economic practices attested at the settlements.

Economy

Diverse structures and practices characterise the settlements. The data indicate that, in addition to flint tool production – which is present at nearly all sites – both domesticated and wild animals and plants were utilized (Table 1). Consistent with data from Denmark, the CWC period appears to be associated with a narrower crop spectrum compared to the FBC period and the subsequent Late Neolithic period (Møbjerg *et al.*, 2007; Kirleis *et al.*, 2012: fig. 3). At some Danish sites, an increasing significance of barley (*Hordeum vulgare*) has been documented starting in the late FBC (MN V; Andersen 1997: 123; Rasmussen 2016: 152) and continuing into the CWC period (Møbjerg *et al.*, 2007; Kirleis *et al.*, 2012). Both in Denmark and SH, Emmer (*Triticum dicoccum*) was the second most common cereal. At the same time, common wheat (*Triticum aestivum*) and pea (*Pisum sativum*) also appear in minor quantities (Kirleis *et al.*, 2012: fig. 4). The use of wild plants is evident, for instance, at the settlement of Bad Oldesloe-Wolkenwehe LA 154, where charred seeds of water lily (*Nymphaea*), yellow pond lily (*Nuphar*), and club rush (*Schoenoplectus*) were found (Kirleis *et al.*, 2012). At Labenz LA 11, a range of wild plant species typical of the surrounding bog environment was identified (Brozio *et al.*, 2021). Among domesticated animals, cattle,

5 The palisade around the settlement was built between 2837 and 2744 BCE (Brozio *et al.*, 2023).

Table 1. The settlement sites of the CWC period of SH. Economic activities are indicated with 1–7. 1 – Flint tool production / 1.1 specialised tools (daggers). 2 – Keeping domesticated animals / 2.1 processing, 2.2 stockbreeding in the surroundings. 3 – Processing of wild animals / 3.1 hunting (arrowheads). 4 – Cereal production / 4.1 direct / 4.2 indirect / 4.3 cereal processing. 5 – Gathering and use of wild plants. 6 – Fishing fish / processing mammals. 7 – Salt production.

NAME	DATING	ACTIVITIES	HOUSES	INFORMATION	REFERENCES
Labenz LA 11 (Wohnplatz 15)	2700–2500 BC	1, 2.1, 2.2, 3, 3.1, 4.3, 5	Light huts (indirectly)	Especially sheep/ goat. Wildplants typical taxa from boggy areas.	Brozio *et al.*, 2021
Bad Oldesloe- -Wolkenwehe LA 154	4000– 1000 BC). CWC phase 2900–2500 BC (peak 2800– 2750 calBC)	1, 2 (2.1+2.2), 3, 3.1, 6, 7?,	Light huts/ tent-like structures	Not all activities are to be differentiated chronologically.	Schwabedissen 1958; Mischka *et al.*, 2007; Hinz 2014; Brozio 2016
Heidmoor LA 246	Late Mesolithic to Late Neoltihc (>4000 BC– 1900 BC).	1, 3.1 (2, 3, 6)	Light huts/ tent-like structures	Many activities indicated, but unclear chronologically (and many probably Meso- or early Neolithic). A lot of 'Heidmoor pottery' (wave mould beakers).	Schwabedissen 1958; Clausen 1996
Stolpe-Depenau LA 17	2800– 2200 BC, peak 2500 – 2200 BC.	3.1, 4.1, 5	Rectangular house 8.4 x 5.4 m. Wall trench with splitted woods: "*Schwellen-balkenbau*".	House similar to FBC houses of Flögeln and MN-V houses on Bornholm (cf. Mennenga 2017).	Harten *et al.*, 2011; Schultrich 2018a: cat. 817
Oldenburg LA 77	Main occupation 3200– 2900 BC, re-visited in middle/late CWC.	2. Many activities, but unclear for the CWC phase.	Unclear for CWC	Stone-clubhead with preserved shaft (^{14}C: 2470– 2341 calBC).	Brozio 2016

NAME	DATING	ACTIVITIES	HOUSES	INFORMATION	REFERENCES
Groß-Waabs LA 122	Transition CWC to LN (*c.* 25/2400 – 2300 BC)	1, 1.1, 3.1	Scatter	Pseudo-Grand-Pressigny dagger production site	Arnold 1985; Schultrich 2018a
Hemming-stedt LA 2	Middle to Younger Neoltihc (^{14}C: 2890–2470 calBC)	1	Houses and ard-marks however FBC-phase.		Krause-Kyora 2008; Schultrich 2018a
Wangels LA 505	Transition FBC/CWC (2900–2600 BC)	1, 2.1, 3, 3.1, 4.1, 5, 6	Indication of a massive house.	Almost no diagnostic CWC finds, only a sherd of wave mould beaker. ^{14}C indicate an early CWC-period date.	Klooß 2008
Brodersby-Schönhagen LA 107	Late FBC (overlapping with early CWC)	1	Scatter (no structures)		Brozio *et al.*, 2019a
Oldenburg LA 232		3.1	Various activites earlier phase, but CWC only few indications		Brozio *et al.*, 2019b

sheep/goats, and pigs were all present in significant numbers. Notably, by the end of the 4th millennium BC, domesticated animals accounted for approximately 90% of all faunal remains at the sites. Around 3000/2900 BC, this proportion declined to about 60% (Brozio 2025: 266). Moreover, at three sites located near lakes or the sea, the processing of fish and/or marine mammals is documented (Table 1). Some sites stand out due to their specific functions. Bad Oldesloe-Wolkenwehe LA 154 was a seasonally occupied, non-permanent site with a specialised role within a broader settlement network. Because the River Trave seasonally flooded the area, it was only inhabitable at certain times (Mischka *et al.*, 2007). After an initial phase of intensive grain cultivation near the site – indirectly indicated by pollen data – there is no further evidence of grain production or processing from around 2900 BC. In contrast, land openness values increase markedly from circa 3000 BC, indicating a significant shift in land use (Feeser and Dörfler 2019: 202; Brozio 2025: 264–266). The proportion of domesticated animal bones is around 65%. Interestingly, pigs (*Sus scrofa*) dominate among the domestic species (Mischka *et al.*, 2007: 61), a pattern also observed at sites in Central Germany and Switzerland (Hecht 2007: 229), and generally interpreted as indicative of more permanent settlement patterns (Hecht 2007: 193). The presence of unexplained ditch structures further suggests that the site served a special function (Mischka *et al.*, 2007: 61). In this context, the nearby brine springs are noteworthy, potentially indicating salt extraction activities, although definitive evidence is lacking (Brozio 2016: 202). Another noteworthy site is Groß-Waabs LA 122, a specialised camp for the production of Pseudo-Grand-Pressigny flint daggers (Arnold 1985; Fig. 1). This site is located near the Baltic coast, where large flint nodules are still scattered across the stony beach (cf., Hughes *et al.*, 2012).

The simplistic notion that CWC-related groups exclusively settled in western regions due to soil suitability for their subsistence strategies must be reconsidered. Firstly, most settlements appear in the east. Secondly, the alleged focus of pastoral activities must be questioned, as the number of wild animal taxa increases at the onset of the CWC period (Brozio 2025: 265). Thirdly, the pollen profiles indicate that during the CWC period, cereals were grown both in the west and the east (see above). In this regard, also the assumed correlation between poor soils and barley cultivation does not hold under closer scrutiny, as both CWC and FBC contexts exhibit a preference for sandy soils, likely due to their ease of cultivation (Sherratt 2004: 422; Hecht 2007: 98; Hinz 2014: 65). As noted above, in the CWC contexts of Lower Saxony and the Netherlands, a spatial pattern emerges in which camps with differing architecture, economic activities, and durations can be identified. This has been interpreted as evidence that individual households operated multiple camps for distinct tasks (Nobles 2015: 306–308). A similar system is suggested by the limited but diverse dataset from SH: settlements with house features and short-lived scatters coexisted, and individual sites appear to have been specialised. In addition, several pollen records indicate the presence of extensive open land suitable for grazing and cereal cultivation. Taken together, these observations suggest the existence of multiple taskscapes, interconnected within a broader taskscape-landscape. A key question is whether such a system was also subject to political restrictions. The deposition of battle axes may offer a critical perspective for investigating this issue, serving as potential evidence of practices related to access, control, or the display of power within and between taskscapes.

Battle axe depositions as a claim on pastoral land?

It is now widely accepted that single finds of Neolithic stone tools may represent intentional individual depositions (cf., Müller 2024), much like the single finds of copper and bronze artefacts from the Neolithic and Bronze Age (cf., Hansen 2002). Numerous interpretations have been proposed regarding the significance of such artefact depositions for various prehistoric societies (e.g., Müller 2024: 438–444). One particularly compelling idea is that these depositions served to mark the landscape or even to claim territory on behalf of specific groups. More broadly, they may be understood as symbolic expressions of political restrictions governing access to and use of taskscapes.

For example, Jeanette Varberg (2015) discusses this interpretation in relation to the deposition of flint daggers in southern Scandinavia and northern Germany. Such acts of marking the landscape are broadly linked to the phenomenon of prehistoric hoards, which may have structured the land by associating it with memory and meaning (cf., Ballmer 2010). Josef Winiger (1998) observed that from the 4th millennium BC onwards, individual finds of tools and weapons began to appear on grassy highland pastures above the forest line in the western Alpine region (1998: 224; cf., Guilbeau 2015 for the Italian Alps). At the same time, faunal and environmental data point to a shift in pastoral practices – becoming more intensive, more focused on cattle and sheep/goat, and increasingly mobile (cf., Gerling *et al.*, 2017). These higher altitudes were likely used more systematically for grazing, and Winiger (1998) interprets the associated artefact depositions as being directly linked to this new spatial-economic system. The objects were deposited in areas regularly used in everyday pastoral routines. In a similar vein, Robert Hoffmann (in prep.) has identified a rise in both the number and altitude of flint axe depositions in Michelsberg contexts (4400–3600 BC) in the Westliches Mittelgebirge region (Rhineland-Palatinate, North Rhine-Westphalia, Hesse). He likewise interprets these findings as evidence for intensified pastoralism and the expansion into previously unused areas for grazing.

Considering the location of the settlements and burial areas of SH, there is a kind of tripartite spatial system in the eastern part. The burials appear in the Geest and western Young Moraine Drift landscape, while the settlements are located at the eastern edge of the burial areas. East of that, numerous single finds have been discovered. Pollen profiles from several sites indicate the presence of open landscapes and suggestive indicators of pasturing and wastelands. The frequent single finds of battle axes throughout the region – some in proximity to settlements or burials, but many in isolated locations far from any known context – may likewise be interpreted as intentional depositions within a landscape actively used by CWC communities for their economic activities.

This interpretation contrasts with earlier views (Schultrich 2018a; 2018b; 2023a), which proposed a cultural taboo among eastern CWC groups concerning the inclusion of battle axes in graves. Instead, these objects may be understood as markers of pastoral use and territorial claims within an economically structured and symbolically charged landscape. In this sense, the depositions are linked to the political significance of the taskscape concept: they demarcate boundaries, signal rights, and potentially reflect unequal access to specific areas. The persistence of this pattern from the early to the late CWC, and beyond into the Late Neolithic (cf., Schultrich 2023b), demonstrates the longevity of taskscapes.

CONSEQUENCES

The spatial patterns observed during the CWC period in SH warrant a fundamental reinterpretation. Rather than indicating culturally distinct and independently acting groups in the west and east, the evidence supports a model in which the landscape was structured into overlapping taskscapes – spatial zones defined by their function within a shared socio-economic system.

Throughout this paper, various types of sites have been discussed: small, short-term camps, more substantial and repeatedly used locations, and highly specialised activity areas. These include sites for fish and mammal processing, pig keeping, flint dagger production, and possibly salt extraction. Individuals or small groups may have moved seasonally or according to specific tasks, while others remained at more permanent or semi-permanent settlements focused on cereal cultivation or husbandry. This mosaic of use implies flexible group compositions, changing in response to task, season, or socio-political context. Local de- and increases of human activity in the pollen profiles may be a consequence of mobile groups. Renate Ebersbach's (2010) model for lakeshore settlements in the western Alpine Foreland resonates with this interpretation. Her basic idea is that the local residence group is not fixed and there is a dynamic re-arrangement during the formation of short-lived settlements at different places with households forming the basic units (2010: 198–202). Similarly, Nobles (2015) has shown that mobile households in the Dutch CWC context used different camps with specialised functions. Furholt's (2016) suggestion to move beyond the household as a static social unit is particularly useful here. Instead, we might envisage short-lived groupings – sometimes even just individuals – mobilising for specific activities. Within this framework, mobility becomes a core principle of social organisation. This model aligns with other mobility aspects, such as exogamy, seasonal movement, childhood relocation, or travel linked to trade, alliance, or conflict.

The landscape was not divided by rigid group boundaries; rather, enduring taskscapes shaped it.

This interpretation also sheds new light on ritual behaviour. As shown earlier, the eastern SH enclosures were abandoned by the end of the 4th millennium BC, in line with many FBC enclosures elsewhere (Müller 2019: 60). In contrast, the western enclosure at Albersdorf-Diekstnöll LA 68 was re-used well into the 3rd millennium BC (Dibbern 2016: 49–50; Schultrich 2023a: 285–286). This persistence undermines previous interpretations of a cultural separation (Schultrich 2018a; 2023a), according to which the western groups were more open to innovation while eastern groups adhered to tradition. If the absence of burials in the east reflects conservatism, why then was a traditional enclosure maintained only in the supposedly "innovative" west? Rather, the distribution of settlements and ritual areas across SH suggests a high degree of spatial differentiation and mobility. In fact, the situation in SH, especially in the southwest, contrasts with that in the Polish Lowlands (cf., Czebreszuk and Szmyt 2011). In SH, we see fixed ritual centres revisited over generations, as attested by the density and continuity of burial mounds (Fig. 3; Hübner 2005: 468; Schultrich 2018a: 26). This suggests that, despite high mobility and functional diversity in daily life, ritual practices were tied to specific locations that retained long-term significance.

Within the concept of taskscapes, the landscape is understood as a space imbued with meaning (Ingold 1993; Conneller 2010). The repeated performance of tasks over generations contributes to the maintenance of specific activities in designated areas. As a result, a complex taskscape–landscape network emerges. In SH, this network includes the long-term ritual centre in the west, the sustained use of central-eastern areas for settlements, and extensive grazing areas – often associated with battle axe depositions – in the east.

It remains unclear whether political restrictions were in operation, although their presence is suggested by the distribution of battle axe depositions and the ritual centre. The latter is related to specific customs of the northern branch of the CWC. Particularly during the early and middle phases, it is characterised by a strong predominance of male graves (Hübner 2005: 632). Despite potential biases in the identification of female graves (cf., Furholt and Burmeister 2023: 221), the contrast with other CWC groups remains striking. The pattern provides a framework for the discussion of social differences, which may be linked to rights concerning burial in specific locations. Thus, the taskscape-landscape of SH provides significant potential for exploring issues of unequal rights at both the individual level (graves) and the group level (depositions within the economic landscape).

In summary, rather than distinct cultural entities, the archaeological record in SH points to a socially and spatially dynamic system of mobile groups using the entire landscape for different tasks. The landscape is composed of different taskscapes, in which mobility, cooperation and political restriction, as well as memory, played crucial roles in shaping a complex spatial organisation.

CONCLUDING THOUGHTS: THE TRANSITION TO CWC SOCIETIES

The questions posed at the outset have been partially addressed: enduring taskscapes are discernible, and they likely reflect the practices of mobile groups rather than those of separate, sedentary populations. What remains to be explored is whether, and in what ways, the approach adopted in this paper can shed light on the transition from FBC to CWC societies in SH. When the late 29th century BC is taken as a chronological benchmark for the onset of the CWC, the evidence indicates that most major changes had already occurred before the formal onset. Fundamental shifts in settlement activities – characterised by a move towards more extensive land-use systems and more dispersed, short-lived, and mobile settlement systems, including a reduction in the number and size of sites and a decline in permanent house structures – already emerged during the late FBC period (cf., Brozio 2025). These developments temporally coincide with what has been referred to as the "Neolithic Decline" (cf., Hinz *et al.*, 2012: fig. 3; Feeser *et al.*, 2019: figs 5–6), for which climate change and the outbreak of plague (*Yersinia pestis*) have been proposed as potential drivers (Rascovan *et al.*, 2018). Currently, there are recent studies that both support the occurrence of such an outbreak in the Neolithic (Seersholm *et al.*, 2024) and studies that do not confirm this interpretation (Susat *et al.*, 2024). Anyway, palaeoenvironmental data from lakes and bogs – both near-site and off-site – suggest that, despite regional variability, a few centuries after the "Neolithic Decline", the transition to the CWC was marked by continuity rather than abrupt change. In line with recent aDNA research, the focus has shifted away from questioning whether migration occurred to examining how it occurred and how it interacted with local social dynamics (Nielsen 2024: 403; Bourgeois *et al.*, 2025). The archaeological and theoretical evidence presented here suggests a model in which incoming groups were integrated into already flexible, mobile, and socially dynamic communities.

Mobile societies are often characterised by flat hierarchies and open "membranes" – a greater receptiveness to new ideas and people (Rogers 1995: 289; Furholt 2016; 2017). Rather than a scenario of abrupt population replacement, the data from SH support a more nuanced process of cultural and demographic integration. Many FBC traditions were carried over into the CWC, such as flint axe production techniques and typological developments (cf., Iversen 2015; Schultrich 2018a). In southwestern SH, long-used path systems dating back to the Early Neolithic I (4000–3500 BC) remained in use during both the FBC and CWC periods (Dibbern 2016: 163–165, 170). The same applies to ritual spaces such as the Albersdorf-Dieksknöll enclosure (LA 68), which continued to be used throughout the 3rd millennium BC (Dibbern 2016: 46–50). Even some megalithic graves were reused in the early CWC (Schultrich 2018a: 35–36), though the specific practices differ from those in the Lower Rhine area, where CWC pottery was deposited in accordance with FBC conventions (Bourgeois *et al.*, 2025: 297–298). In SH, CWC battle axes were integrated into earlier burial contexts (Schultrich 2018a: 35–36, 215), likely reflecting a selective adoption of new symbols within enduring ritual frameworks – similar to the syncretic dynamics described by Furholt (2020) for CWC groups in Mecklenburg-Western Pomerania. Consequently, the system of mobile and open societies facilitated the incorporation of new ideas and individuals of foreign descent, yet it also contributed to the visible continuities. The area under discussion thus demonstrates a distinct manifestation of syncretism, a phenomenon that stands in contrast to models of parallel societies, as evidenced in the Lower Rhine region (Kroon 2024; Bourgeois *et al.*, 2025).

In conclusion, the evidence strongly suggests that human mobility was high and that various areas within SH were utilised for a wide range of spatially and functionally distinct purposes – a landscape composed of interacting taskscapes. The western part of SH retained its character as a ritual core, while the eastern regions functioned more as economic zones, as evidenced by the widespread deposition of battle axes. The known settlements take a position between the ritual and economic zones (Figs 2 and 3). Due to ongoing social reproduction, the taskscapes-landscape remained largely unchanged for centuries. The observed regional differentiation persisted well beyond the CWC period, extending into the Late Neolithic (23/2250–1700 BC), when flint daggers and metal artefacts (especially flanged axes) were buried in western graves, while similar items appeared primarily as single or hoard finds in the east (Schultrich 2018b). Remarkably, this east-west pattern seems to have continued into the Early Bronze Age (Periods I and II, 1700–1300 BC), as seen in the distribution of bronze daggers, axes, and swords (Schultrich 2023b). Thus, we are not dealing with a cultural rupture but with a long-term continuity of spatial practice and symbolic taskscape-landscapes, largely unaffected by broader ideological or technological changes over the course of several centuries.

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Continuity or Great Transformation? Corded Ware Culture Communities in the Lower Oder Region at the Threshold of the Bronze Age (2300–2000 BCE)

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This article explores the issue of continuity versus socio-cultural transformation in the Lower Oder region during the Late Neolithic and Early Bronze Age (2300–2000 BCE). An integrated analysis of material culture, settlement patterns, and environmental data highlights the complexity of cultural dynamics in this area. Elements of the Corded Ware Culture (CWC), the Bell Beaker phenomenon (BB), and southern influences linked to the Proto-Únětice Culture (PÚC) have been identified; however, their interrelations cannot be reduced to a simple chronological succession. Particular attention is given to ceramic forms and flint daggers, which reflect local adaptations of the cultural "packages" characteristic of the BB phenomenon, alongside the persistence of CWC traditions. Moreover, palynological evidence provides insights into landscape use and subsistence strategies during this transitional period. The study argues that, rather than undergoing an abrupt cultural rupture, the region experienced a gradual, multifaceted transformation marked by considerable microregional diversity.

KEYWORDS: Lower Oder region, Late Neolithic, Early Bronze Age, pottery, flint daggers, radiocarbon dating, palynological data

INTRODUCTION

Around the mid-third millennium BCE, the Lower Oder region witnessed the intensive development and consolidation of regional settlement patterns associated with the Corded Ware Culture (CWC) communities (Matuszewska 2011: 148–149). In the following centuries, this region exerted a notable influence on adjacent areas,

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including Mecklenburg, southern Brandenburg, western Kuyavia, and Greater Poland. As early as 2300 BCE, CWC groups from Pomerania came into contact with Proto-Bronze Age communities, selectively incorporating elements of their material culture. These interactions laid the groundwork for the region's gradual integration into Early Bronze Age cultural networks.

The initial phase of this process, lasting until approximately 2000 BCE and often referred to as the "dagger period", was distinctly transitional. Traditional cultural patterns were increasingly overlaid by emergent Early Bronze Age traits, as evidenced by grave assemblages from this time. The fully developed Early Bronze Age in the Pomeranian zone is generally considered to begin only with the substantial influx of Únětice-type bronze artefacts.

For many years, research on the Late Neolithic and Early Bronze Age in this region remained stagnant (Matuszewska 2011: 50–56), resulting in a degree of scholarly inertia. Archaeologists frequently described the cultural dynamics of this period as ambiguous (e.g., Kaczmarek 2018: 10), and synthetic studies tended to focus primarily on metal artefacts (e.g., Bugaj 2017). In recent years, however, this situation has changed thanks to comprehensive, source-based studies encompassing the entire Lower Oder region (Matuszewska 2011; Kozłowska 2024). This renewed scholarly attention justifies a re-examination of the cultural transformations at the threshold of the Bronze Age and highlights the interpretive potential of ongoing research.

This study focuses on three interrelated cultural phenomena observed in northern Poland at the dawn of the Early Bronze Age: the CWC, the Bell Beaker phenomenon (BB), and the Proto-Únětice Culture (PÚC). These categories do not represent homogeneous or sharply defined cultural entities but rather broad cultural currents exhibiting considerable regional and chronological diversity. In the Lower Oder region, the latest phase of the CWC is represented by a well-established local group which, although regionally distinctive, maintained cultural contacts with neighbouring areas (Matuszewska 2011). In the following discussion, the terms BB and PÚC are used as convenient analytical labels referring primarily to typological and stylistic features rather than to uniform cultural systems. The materials associated with these phenomena in the Lower Oder area should therefore be interpreted as evidence of the transmission of ideas and prestige goods rather than indicators of coherent cultural formations.

The issues addressed in this article concern broader questions related to developments in the Lower Oder region during the transitional phase from the Neolithic to the so-called Proto-Bronze Age (2300–2000 BCE), as well as during the subsequent Early Bronze Age IA phase (2000–1700 BCE; cf., Czebreszuk and Kozłowska-Skoczka 2008: 32, table 5; Matuszewska 2011: 95–96). A significant cultural shift occurred around 2400/2300 BCE, corresponding to the onset of the CWC Phase 3 (Matuszewska 2011: 148–149). This period was characterised by the consolidation and spatial expansion of CWC groups from the Lower Oder region, accompanied by the gradual incorporation of Proto-Bronze Age elements. The CWC communities thus became part of broader cultural processes, including the emergence of distinctly allochthonous elements associated with the BB phenomenon and the PÚC.

This stage represents a phase of cultural consolidation within the CWC, reflected in increased settlement density. Notably, Phase 3 of the CWC is associated with the highest number of sites, including burial grounds. Among these are collective graves, some of which have been interpreted as family burials (e.g., Czelin, Melz; cf., Kowalski *et al.*, 2010). At the same time, an expansion of the Lower Oder CWC groups occurred — certainly multidirectional, though limited in scale. This process probably involved relocating small population groups into adjacent territories. Material culture traits associated with these communities appear northward and northwestward, reaching Mecklenburg and the island of Rügen (Berlekamp 1955; Kaufmann 1969: fig. 3; Jacobs 1991: map 4). Similarly, evidence of cultural influence is visible along the Noteć River, extending into the Krajna and western Kuyavia (Pałuki) regions, preceding the emergence of groups linked to the earliest phase of the Únětice Culture (ÚC; cf., Kośko 1979: 141). These patterns most likely reflect networks of interaction and the diffusion of material traditions rather than direct population movements.

As a result of these developments, the Kruszki group emerged along the Greater Poland–Kuyavia borderland, rooted in the Lower Oder tradition. In the second half of the 3rd millennium BCE, Lower Oder elements also appear in Greater Poland. In contrast, the southern trajectory and the influence of the Lower Oder groups on the latest (Phase III) stage of the CWC in Silesia seem to have been minimal. Materials bearing traits of the Lower Oder territorial group found in this region suggest only a fleeting presence. The southwestern area (southern Brandenburg) also warrants mention, where sites genetically linked to this phenomenon can be clearly identified (Wetzel 1969: fig. 6; Seyer 1971).

From approximately 2350/2300 BCE onward, Early Bronze Age patterns from the west (BB) and the south (PÚC) were increasingly adopted. The CWC communities actively participated in this transformative process, serving as a key substrate for emerging cultural changes. This adoption was selective and limited to particular categories of material culture. While the indicators of these external influences have been previously discussed (Matuszewska 2011: 98–102), the present paper focuses on issues of innovation, standardisation, and the potential scope of changes in material culture. It should be emphasised from the outset that this study relies on typological and stylistic comparison rather than technological analysis. The central question is:

how did local communities incorporate elements associated with the BB phenomenon and the PÚC sphere? An attempt to answer this question involves an analysis of ceramic materials, considering both macromorphological features and decorative styles. Another crucial aspect is the spread of flint dagger production, which is undoubtedly linked to the BB tradition.

The Lower Oder region has been repeatedly defined in the literature as the area bounded to the west by the Randow River valley and to the east by the Parsęta River valley, which also marks the north-eastern limit of the Szczecin Lowland. The region's northern boundary coincides with the Baltic coast, while the southern and eastern margins follow the limits of the same lowland (cf., Matuszewska 2011: 11, fig. 1; Kozłowska 2024: 8, fig. 1). From this area, approximately one hundred sites have been identified as belonging to the latest stage of the CWC marked by Proto-Bronze Age traits. These comprise burial assemblages, probable graves, and stray pottery finds (Matuszewska 2011, Catalogue; 2016; Kowalski *et al.*, 2011; Kozłowska 2024: Catalogue). In addition, 250 flint daggers are known from the Lower Oder region, 54 of them originating from well-documented contexts and 196 as stray finds (Matuszewska *et al.*, in print).

CERAMICS

One of the fundamental approaches to studying cultural transformations is the analysis of ceramic techniques and forms, which provides insights into evolving production practices and their socio-cultural implications (cf., Gosselain 2000; Wallaert-Petre 2001). Changes in pottery, manifested in aspects such as macromorphology and decoration, may reflect the assimilation of new cultural patterns and shifts in social organisation. Beyond taxonomic and chronological considerations, a socio-cognitive perspective on ceramic production is essential. In this regard, ethnographic research, particularly from the French School of the Anthropology of Techniques, offers valuable analytical frameworks. Central among these is the concept of the *chaîne opératoire*, the sequence of production steps, which serves as a key marker of artisans' social identity. Behavioural studies indicate that technical gestures employed in pottery-making are internalised during the learning process and become motor habits that are difficult to modify later in life (Gomart *et al.*, 2017: 1502). As Valentine Roux notes, "the transmission process of techniques takes place within socially related groups" (Roux 2016: 102). Consequently, pottery-making practices are embedded within kinship, ethnic, or linguistic structures, forming distinct "communities of practice".

In this context, vessel morphology functions not only as a classificatory tool but also as evidence of production norms, intergroup interactions, and artisanal competencies (cf., Heitz and Stapfer 2017; Kleijne 2019). Several questions arise: Do new vessel forms appear in the final phase of the CWC in the studied region? If so, do these forms reflect the traditions of two or more distinct communities occupying the same area at different times, or were they produced by a single group employing diverse techniques? Did the emergence of new cultural phenomena (BB, PÚC) influence — and if so, how — the local traditions of ceramic decoration? Did these innovations require changes in potters' motor habits? Can we speak of ceramic standardisation in the context of grave goods?

Cultural, semantic, and communicative dimensions of pottery have a long and well-established research tradition in archaeological literature (e.g., Gosselain 1992; Lemonnier 1993; Czebreszuk 2001: 83, 105; Stark 2003, cf., for further references; Roux 2015; 2016; 2019; Spataro and Furholteds 2020; Pyzel and Gomart 2023). The significant changes in production methods, including decoration techniques, were not merely technical. While they involved the acquisition and consolidation of new skills — building upon existing knowledge — they also entailed overcoming certain cognitive boundaries. Social organisation was a key factor in the emergence of these innovations, which were socio-symbolic rather than economic. Alterations in commonly used domestic items, as well as grave goods, may have been prompted by intercultural contact and the gradual acceptance of foreign elements into local traditions.

The ceramic assemblage of the final (Lower Oder) phase of the CWC comprises primarily S-profile cups, amphorae, pots, mugs, vase-shaped vessels, bowls, and a few beaker-type vessels. Compared to earlier phases, there is a marked diversification of forms, even within specific typological categories. While some vessels retain features typical of the CWC tradition (notably S-profile cups), the majority represent new forms. Additionally, a suite of techniques and decorative motifs characteristic of the BB tradition is present, including knurling, zonal and zonal-metopic decoration, and occasionally, barbed-wire ornamentation.

A detailed analysis of the ceramic material reveals several noteworthy observations. In the studied region, some vessels can be directly attributed to the BB tradition. Sites such as Angermünde, Pinnow, Wrzosowo, and Żdżary are particularly illustrative (cf., Fig. 1). Graves containing ceramics explicitly referencing the CWC tradition continue to occur (e.g., Szczecin-Podjuchy 2; Grünz 1), though Proto-Bronze Age elements invariably accompany them. Another group comprises assemblages with "beaker" elements, primarily vessel forms, decorative styles, and flint daggers, sometimes accompanied by flint or stone axes (e.g., Brüssow, Grenz, Kolin, Trampe, Wolin; cf., Fig. 2).

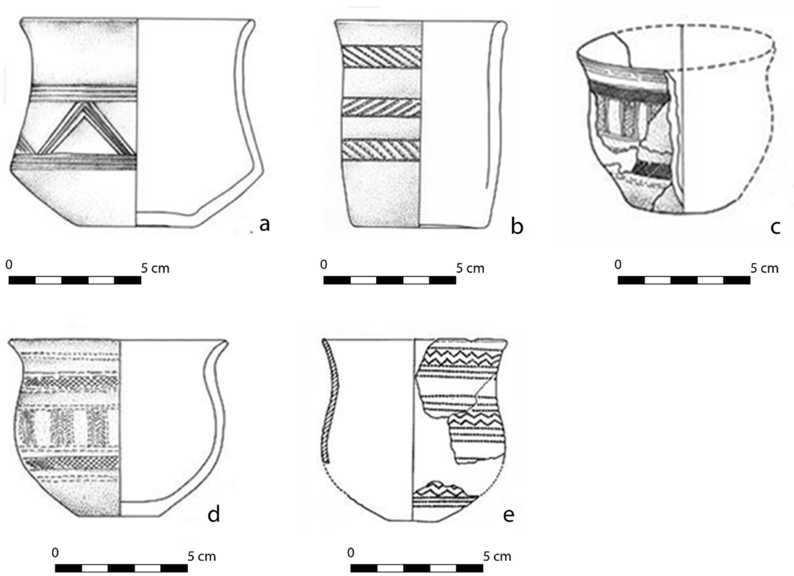

Fig. 1. Examples of vessels directly associated with the BB tradition. a – Wrzosowo; b – Żdżary 15; c, d – Pinnow; e – Angermünde. After: Kozłowska 2024.

A final group includes graves containing materials associated with BB, CWC, and PÚC traditions, or combinations thereof (e.g., Babin, Casekow, Dębogóra, Grünz, Letnin, Liepe, Melzow, Pinnow, Siadło Górne).

Regarding decoration, zonal and zonal-metopic motifs predominate, with the latter more frequently observed on vessels from this period. Of particular note is a distinctive ornamentation style known as *Gurtband*, consisting of bands encircling the vessel and filled with decorative elements. These may represent a local evolution of zonal ornamentation and a specific innovation of the Lower Oder region under BB influence (Czebreszuk 2001: 120–124; Matuszewska 2011: 99).

Concerning standardisation, identical or nearly identical vessels occur across the region (cf., Fig. 3). These are most often S-profile cups and vases, occasionally amphorae, pots, mugs, and jugs, decorated with bands of circumferential lines in repeated sequences, separated by a rib-like band. Many feature a plastic knob, a particularly popular decorative element during this period. This motif is typically executed via incision, though examples using cord impressions (mostly on mugs and jugs) or knurling also exist. Another group

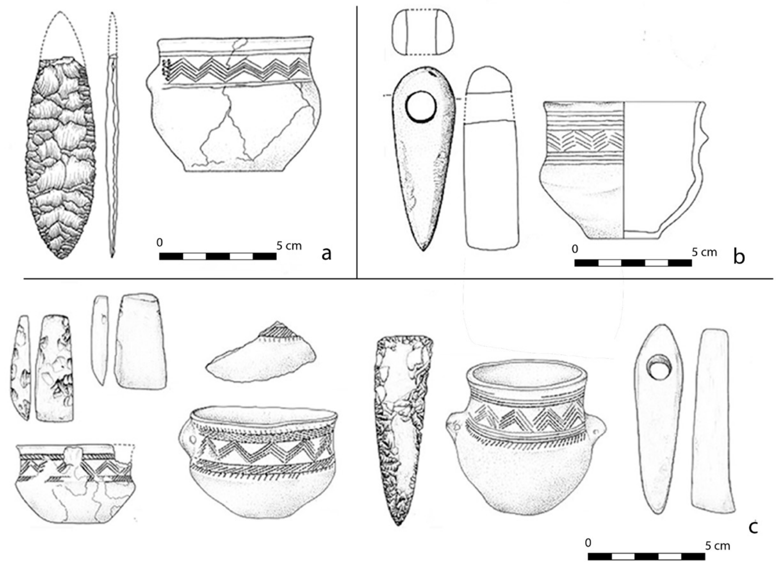

Fig. 2. Examples of assemblages containing beaker-type vessels, flint daggers, stone axes and battle axes. a – Wolin 8; b – Kolin 13; c – Grenz 3. After: a – Matuszewska 2016; b – Kozłowska 2024; c – Matuszewska 2011.

includes cups and pots with knobs ornamented with all-around cord impressions (e.g., Czelin, Dębogóra, Liepe, Schönow).

The most distinctive feature of pottery from this period is its marked multiculturalism, understood as the coexistence of elements characteristic of the Lower Oder CWC, BB, and PÚC. These elements often appear not only within a single assemblage but also on individual vessels. Decorative motifs typical of the BB tradition are found on vessels associated with both the CWC and, often, the PÚC. Such motifs were executed using a variety of techniques, including cord impressions, incisions, and knurling.

FLINT DAGGERS

During the 3rd millennium BCE, the specialised production of characteristic lanceolate flint daggers, including the Grand-Pressigny forms and their derivative variants

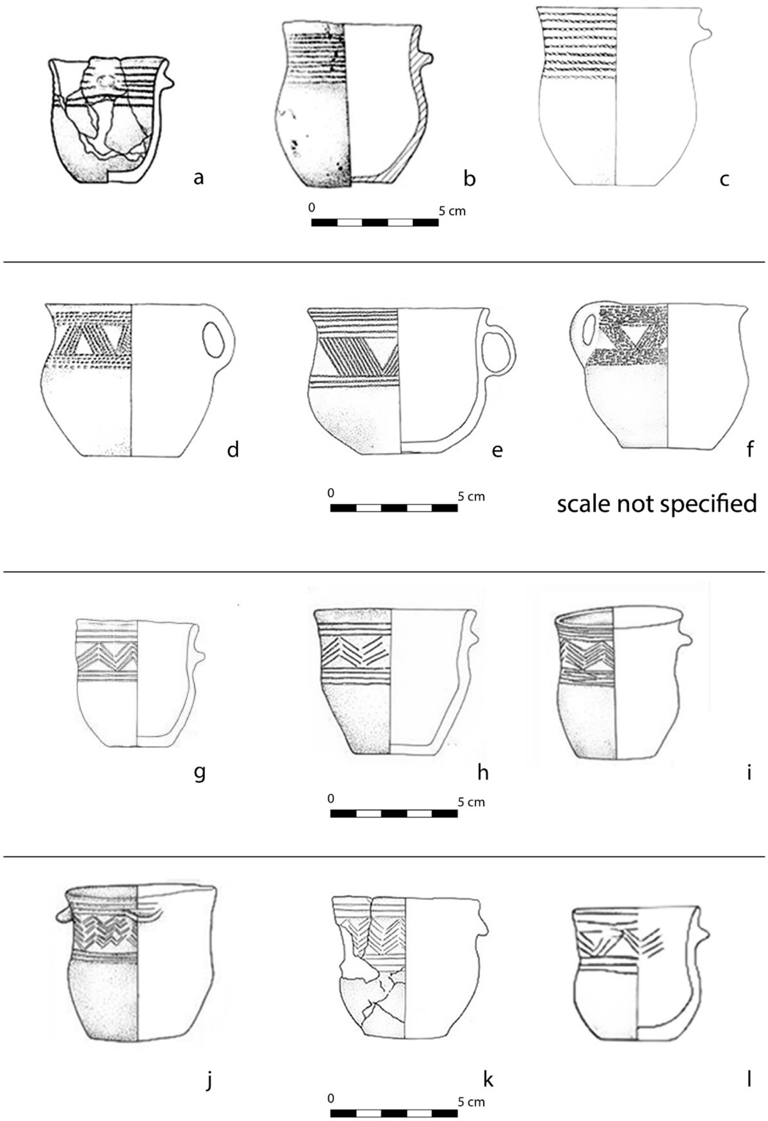

Fig. 3. Examples of standardised vessels from the Lower Oder region. a – Czelin 23; b – Dębogóra 2; c, d – Liepe; e – Dębogóra 2; f – Pinnow; g – Ramin; h – Casekow; i – Röpersdorf; j – Wollschow 1; k – Wollschow 20; l – Letnin. After: a – Kowalski and Matuszewska 2011; b–l – Matuszewska 2011.

(German *Spandolchderivate*; see Czebreszuk and Kozłowska-Skoczka 2008: 11), spread across a wide area of Europe. Their distribution extends from the Rhine through central Germany to western Norway and northwestern Poland (Czebreszuk and Kozłowska-Skoczka 2008: 10–11).

Lanceolate flint daggers are widely distributed across Central and Northern Europe, and their origins and significance cannot be confined to a single cultural sphere. As emphasised by Czebreszuk and Kozłowska-Skoczka (2008: 41; and references therein), scholarly debate has long focused on the relationship between the idea of using flint daggers (particularly the lanceolate type) and the BB phenomenon. In the south-western Baltic zone — including the Lower Oder basin — both phenomena appear simultaneously, around 2350–2300 BCE, suggesting coexistence rather than a coincidental overlap (Czebreszuk 2001; 2003a). However, it should be stressed that the presence of daggers in the materials from the Lower Oder region is not solely the result of BB influence but reflects a broader process of ideological and social transformation that began already within the framework of the Single Grave Culture. The BB idea merely allowed for the development and reinterpretation of pre-existing patterns – particularly those associated with individualisation and the prestige of the male warrior (Czebreszuk 2003).

Within present-day Poland, the Lower Oder River basin stands out as the principal area of occurrence of these objects. From Western Pomerania alone, 236 daggers and fragments have been recorded (Fig. 4), classified into six main types (I–VI; cf., Czebreszuk and Kozłowska-Skoczka 2008; Matuszewska 2011; Kozłowska 2024). The earliest examples in this region appear in the Late Neolithic; however, their peak distribution corresponds to the Late Neolithic/Proto-Bronze Age phase, contemporaneous with the Scandinavian Late Neolithic I (LN I) and the pre-classical phase of the Únětice Culture (ÚC; Czebreszuk and Kozłowska-Skoczka 2008: 42).

An analysis of the metrical characteristics of these artefacts, in conjunction with comparative materials from other regions, suggests that at least some daggers were produced locally using regionally sourced raw materials (Czebreszuk and Kozłowska-Skoczka 2008: 42–43). In CWC graves from the Lower Oder region, lanceolate dagger forms predominate. These often lack a clearly defined tang or possess only a poorly developed one. Notably, such forms account for over 50% of all known flint dagger finds in the region (Matuszewska *et al.*, 2025). Typologically, they are linked to the BB tradition (Czebreszuk and Kozłowska-Skoczka 2008: 41).

The concentration of finds in the Lower Oder region aligns with a broader distribution pattern that extends across Mecklenburg and Western Pomerania. Within this network, the Lower Oder may have functioned as a significant hub of interaction, which, according to Jan Apel (Apel 2001: 272–273; 2008: 93), also included southern

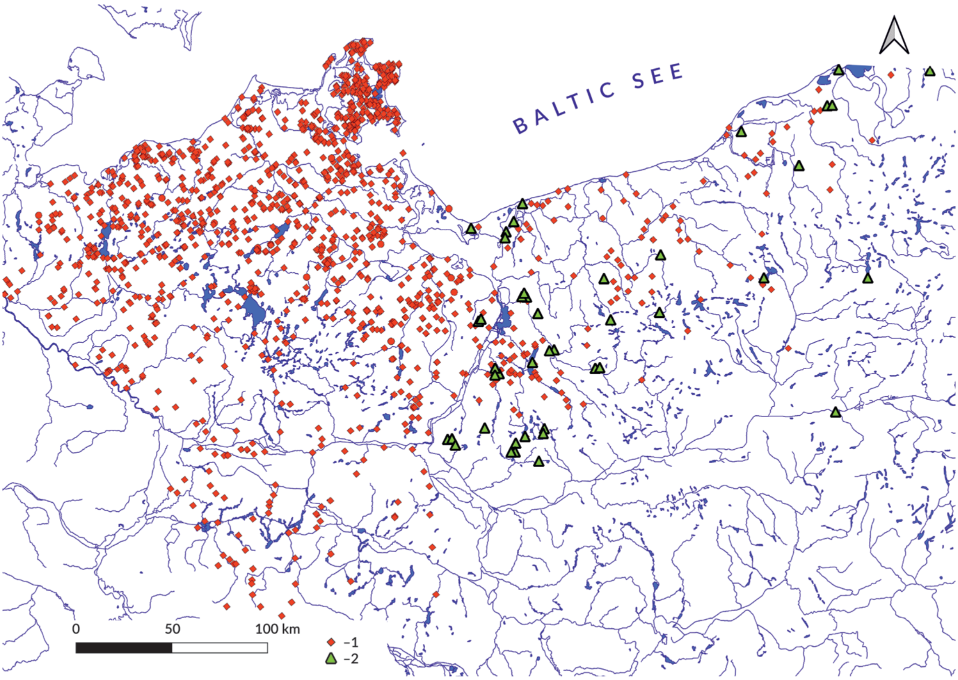

Fig. 4. Spatial distribution of flint dagger finds from Pomerania, contextualized against a part of the territories of neighboring Mecklenburg-Vorpommern and Brandenburg: 1 – based on Czebreszuk and Kozłowska-Skoczka 2008; Rassmann 1993; 2 – unpublished dagger discoveries not included in the 2008 monograph, compiled from dagger finds according to Kozłowska 2022. After: Matuszewska *et al*., in press.

and central Scandinavia, the western coast of Norway, the northeastern Netherlands, and northern Germany. Whether the region acted primarily as a producer, a recipient, or a site of intensive contact remains an open question.

The function of flint daggers appears to have been complex, combining both practical and symbolic dimensions. In some regions, such as the Netherlands, they primarily served as prestige goods displayed in social and ritual contexts (van Gijn 2010: 147, 189–192). At the same time, a significant proportion of specimens, over 50% in Western Pomerania, and 80–88% in some Scandinavian regions, show traces of resharpening and repair (Czebreszuk and Kozłowska-Skoczka 2008: 27–31; table 3). These traces include restoration of cutting edges, repair of tangs, and shifts of the blade's maximum width toward the handle. Such evidence demonstrates that the daggers were not solely symbols of prestige but also served practical functions, as tools or thrusting weapons, and were subsequently adapted for new purposes after damage. Their significance, therefore, combined utilitarian and symbolic aspects, with the boundary between them being fluid and context-dependent.

By contrast, flint daggers are rare and widely dispersed in the neighbouring regions of Greater Poland and Kuyavia (Teska *et al.*, 2018: 170, fig. 1). This contrast underscores the exceptional nature of the Western Pomeranian concentration and its integration into the broader transregional exchange network.

CHRONOLOGY

From the Lower Oder region, five radiocarbon dates currently fall within the range of 2300–2000 BCE. Four of these derive from collective graves: one from Site 23 in Czelin (cf., Kowalski *et al.*, 2010; 2011; Kowalski and Matuszewska 2011), and three from graves at Site 2 in Dębogóra (Matuszewska 2011: 110–113). The fifth sample comes from west of the Oder River, from a single grave at Site 3 in Storkow (Matuszewska 2011: 111–112).

At Dębogóra, an elongated grave pit (approximately 1 × 2 m), oriented northwest–southeast, contained the remains of four adult males (aged 30–45 years, with one of indeterminate adult age) and four ceramic vessels covered with large stones (Fig. 5). Near the torso of Skeleton I, a beaker with a strap handle decorated below the rim with cord impressions was found. Osteological analysis yielded a radiocarbon date of 3820 ± 35 BP, calibrated to 2356–2192 BCE (77.2% probability). By the lower limbs of Skeleton II, an undecorated bowl with a knob was discovered. Near the skull of Skeleton III, a shallow, slightly profiled cup with a knob and cord-impressed decoration on the neck was deposited, yielding a radiocarbon date of 3770 ± 35 BP, calibrated to 2296–2121 BCE (83.8% probability). Adjacent to the skull of Skeleton IV, a two-handled, undecorated cup was found, dated to 3795 ± 35 BP, calibrated to 2346–2133 BCE (92.2% probability).

At Site 23 in Czelin, a Roman Period cemetery, a heavily disturbed grave attributed to the CWC in 2008 was documented. Only part of the grave pit, a ceramic vessel (Fig. 6), and scattered skeletal remains were preserved. The grave pit, probably circular or oval in plan with a diameter of approximately 1.5 m, oriented north–south and reaching 0.8 m in depth, contained the remains of three individuals: a mature woman (aged 40–45), a child (*infans* II), and an adult of indeterminate sex (Kowalski *et al.*, 2010: 226–227). Grave goods included a single S-profiled small cup with a lug, decorated with a band of cord impressions around the neck. Subsequent investigations

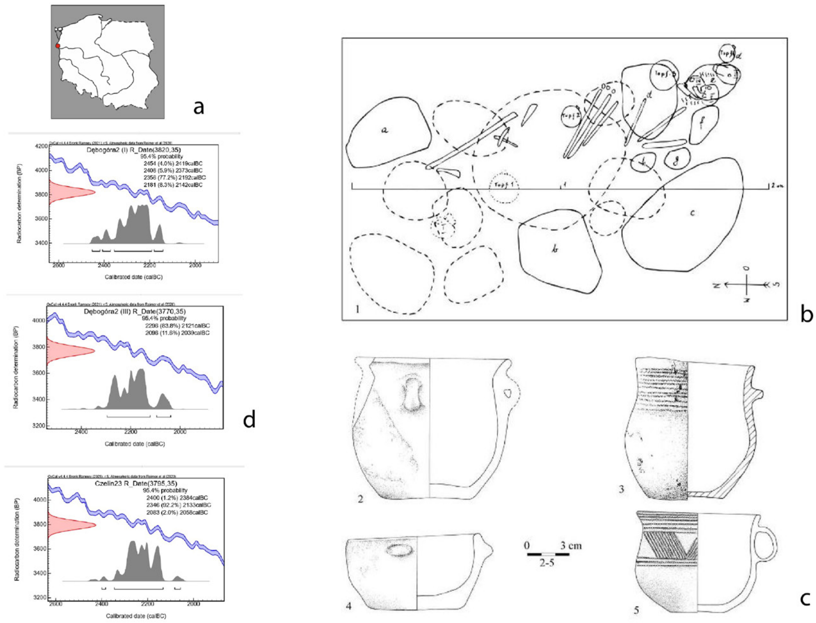

Fig. 5. Dębogóra, site no. 2, a – site location; b – sketch of the structure and contents of the grave; c – vessels from the grave goods; d – calibration of radiocarbon dates from grave. After: b, c – Matuszewska 2011.

uncovered a second vessel of the same type and a stone axe classified as K5–K8 according to Glob and Struve, or type C1a following Schroeder (Glob 1944; Schroeder 1951; Struve 1955; cf., Jacobs 1991: 24–25; Matuszewska 2011: 85). The vessels share similar macromorphological features, including profiling, rim and base shapes, and a single applied handle, differing mainly in size (heights of 8.4 cm and 12 cm), lug form, and decorative technique.

A radiocarbon determination from the adult woman yielded 3785 ± 35 BP, calibrated to 2346–2133 BCE (92.2% probability). The similarity between this Czelin cup and a vessel from Dębogóra, along with the collective burial character of both graves, indicates a comparable chronology, subsequently confirmed by radiocarbon dating. These graves are associated with the final phase of the Lower Oder CWC (Matuszewska 2011: 107–110), corresponding to the Late Neolithic/Early Bronze Age transition (2300–2000 BCE), as defined by Czebreszuk and Kozłowska-Skoczka (2008: 31–33, table 6; see also Kowalski and Kozłowska-Skoczka 2011: 67, table 1).

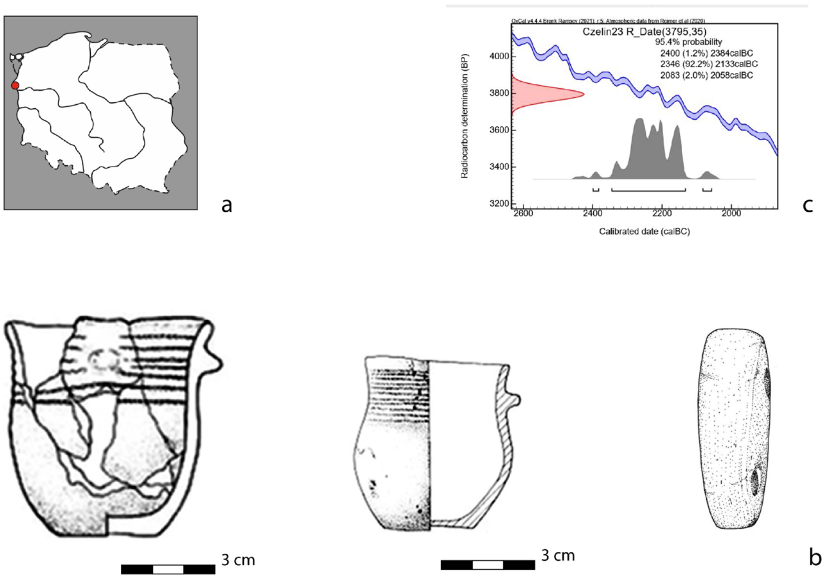

Fig. 6. Czelin, site No. 23, a – site location; b – beakers and stone axe from the grave goods; c – calibration of radiocarbon dates from grave. After: b – Kowalski and Matuszewska 2011.

At Site 3 in Storkow, a grave pit measuring 1.4 × 1.2 m with a stone setting was uncovered directly beneath the humus layer. It contained an S-profile cup decorated with circumferential incised lines and angular motifs on the rim and belly, as well as fragments of a second vessel. Additional ceramic fragments were recovered among the stones. A bone sample from this grave yielded a radiocarbon date of 3670 ± 50 BP, calibrated to 2152–1921 BCE (88.2% probability).

THE POTENTIAL OF PALYNOLOGICAL ANALYSIS

Palynological analysis represents one of the most promising tools for investigating environmental and settlement changes at the microregional scale. When high-resolution pollen profiles are available, they can effectively complement typochronological studies by enabling the identification of changes over relatively short time intervals.

Although palaeobotanical data from the Lower Oder region do not fully meet these criteria, they nonetheless allow for several significant observations.

This discussion draws on analyses conducted on both the Polish side (Lake Racze, Lake Ostrów, the Kołczewo and Wolin peat bogs; cf., Latałowa 1992; Herking 2004) and the German side (lakes Felchowsee, Unter-Ückersee, Kleiner Fauler See, and Ahlbecker See; cf., Jahns and Herking 2002). Pollen diagrams from the region reveal two distinct models of environmental transformation:

Model 1 – Relative Forest Stability

In several diagrams, sustained forest cover or reforestation of previously cleared areas is evident. These profiles are dominated by mixed forests, most commonly pine-oak or oak-hazel. The relatively low values of cereal pollen indicators, particularly in Unter-Ückersee during 2730–2100 BCE, may reflect limited small-scale agriculture (as in Felchowsee) or, in some cases, its near-complete absence (e.g., Ahlbecker See, Lake Ostrów).

Model 2 – Intensive Anthropogenic Pressure

A contrasting pattern is observed at Kleiner Fauler See and in the Wolin region, where advanced deforestation and traces of slash-and-burn practices are apparent, primarily related to animal grazing and, in Wolin, also to cereal cultivation. While these features reflect typical pastoral practices, evidence of agriculture is also notable. Some researchers attribute these traces to late groups of the Funnel Beaker Culture (Latałowa 1992: 200), but this interpretation appears oversimplified. It is plausible that cereal cultivation, alongside animal husbandry, remained an important economic activity in some areas. Notably, around the mid-3rd millennium BCE, the first — albeit rare — cereal pollen grains, such as barley and millet, were recorded at other sites, for example, Rathsdorf 5 (Märkisch-Oderland district), dated to the Late Neolithic (2460–2140 BCE; Jahns *et al.*, 2018: 17).

Similar processes have been documented elsewhere in Europe, where remains of wild and domesticated animals occur alongside traces of cereals such as wheat, barley, and oats (Kleijne 2019: 55–56). In parts of the southern Baltic zone (e.g., Schleswig-Holstein and western Mecklenburg), pollen and archaeobotanical data indicate a marked decline in settlement activity and land-use intensity between *c.* 2400 and 2300 BCE, interpreted as a phase of environmental and economic crisis. Around 2200–2100 BCE, a renewed increase in human impact, settlement activity, and agricultural production is evident (Brozio *et al.*, 2019: 1567; Feeser *et al.*, 2019: 1602–1603). As emphasised by Brozio *et al.*, (2019), research in southern Schleswig-Holstein and western Mecklenburg reveals a clear correlation between economic expansion, agricultural intensification, and the development of supra-regional exchange networks of raw materials and metals. This phenomenon is interpreted as an adaptive response to environmental stress and a component of broader social and economic transformations.

DISCUSSION AND CONCLUSIONS

The study area functioned as a dynamic hub within the broader pan-European BB network, specifically associated with the Northern Group (cf., Czebreszuk 2001; 2003: 481–482; Czebreszuk and Szmyt 2012: 162), facilitating interactions, exchanges, and the circulation of ideas and materials. In Northern Europe, the BB phenomenon either replaced local CWC groups (Vander Linden 2024: 47) or enriched the existing repertoire of "corded" cultural traits (Czebreszuk 2001: 138). The emergence of BB groups in the southern Baltic zone, particularly in Western Pomerania and Mecklenburg, has been variously dated. Earlier studies placed their beginnings around 2450/2400 BCE (Czebreszuk 2001; 2003), while more recent analyses suggest a slightly later development, around 2350 BCE, corresponding to the early phase of BB adoption in northern Germany and southern Scandinavia (Kleijne 2019: 188). Compared to the rest of the BB province, the northernmost groups started relatively late, no earlier than 2350 BCE (Vander Linden 2024: 47).

Pomerania — particularly the Lower Oder region — together with Greater Poland and Kuyavia, maintained long-standing ties with northern Germany and Jutland (Czebreszuk and Szmyt 2012: 162). These connections sustained supra-regional exchange networks involving raw materials (flint, amber, and metal), technological know-how, and prestige-related practices, expressed primarily through the production and use of flint daggers.

In the northern zone, BB features appear in varied contexts, with archaeological visibility differing between subregions. In Kuyavia, BB traits are primarily found in settlement contexts (Czebreszuk 2001: 134; Czebreszuk and Szmyt 2012: 168), while in the Netherlands they are best known from burial contexts (Kleijne and Drenth 2019: 295). In Schleswig-Holstein, both settlements and burials containing BB material are recorded, though relatively rare (Kleijne *et al.*, 2020). In the Lower Oder region, BB elements are predominantly associated with graves. This does not imply the absence of permanent settlements; the multi-phase settlement at Altgaul (Site 2) west of the Oder River illustrates this point (Lehmpuhl 2020: 52, table 2). Difficulties in settlement identification may reflect both the limited state of research and challenges in ceramic classification, as well as the absence of standardised technological analyses (cf., Vander Linden 2024: 48; Gibson 2019).

The pottery analysis indicates the presence of components foreshadowing the Bronze Age, with BB-associated traits predominating (macromorphology, decoration, flint daggers). Southern elements linked to the PÚC appear to a lesser extent, mainly in vessel forms such as S-profiled beakers with lugs, S-profiled cups with strap handles, handleless amphorae, and certain amphora and bowl variants (cf., Matuszewska 2011: 100, fig. 35). The legacy of the CWC remains visible in ornamental motifs and select macromorphological features (cf., Lehmpuhl 2020: 102; Kozłowska 2024). Radiocarbon-dated graves reveal influences from all these cultural traditions. Graves from the period 2300–2000 BCE, sometimes referred to as the "final group", display a complex mixture of CWC, BB, and PÚC elements, illustrating the culmination of transitional cultural processes in the Lower Oder region.

What distinguishes the Lower Oder region from other parts of the northern BB ecumene in Poland is the unusually high concentration of flint daggers. This is attributed not only to the proximity of the Rügen centre, whose influence is evident in Lower Oder assemblages (Czebreszuk and Kozłowska-Skoczka 2008: 26, 42), but also to the availability of high-quality local flint sources, exploited during the Final Neolithic and Early Bronze Age (Czebreszuk and Kozłowska-Skoczka 2008: 19).

The cultural synthesis observed in the Lower Oder region is also manifested in Kuyavia and northern Greater Poland (Bokiniec and Czebreszuk 1993; Czebreszuk 1996: 248, 250; 2001: 134, 142; Czebreszuk and Szmyt 2012: fig. 12). However, the intensity of individual cultural components varies, and artefact assemblages remain heterogeneous. This complexity challenges traditional interpretations. One approach interprets these phenomena within established cultural units (e.g., Grobia-Śmiardowo, Iwno, or Iwno/BB cultures). Alternatively, analysing material culture in terms of transformation, innovation, and adaptation highlights the concept of "social landscapes", encompassing networks of exchange, practices, and traditions (cf., Matuszewska 2011: 50–54; Kleijne 2019).

A single taxonomic label cannot fully capture these processes. Meaningful interpretation requires attention to microregional specificities and internal variability. Regarding the central research question — whether a profound social transformation occurred at the threshold of the Bronze Age — there is no clear evidence of mass migration in the Lower Oder region. Nonetheless, substantial changes in material culture are apparent. These do not represent classic BB assemblages but rather a fluid constellation of artefacts that partially conform to the Beaker canon.

No radical shifts are observed in funerary practices; differences between cemeteries are more pronounced in grave-goods composition than in burial rites themselves. Future research should explore how different groups utilise landscape areas. High-resolution palynological studies may provide insights into economic intensity and demographic changes.

Further investigation of ceramic assemblages, including detailed analyses of vessel morphology and technological proficiency, is recommended. Evaluating potters' skill levels may clarify mechanisms underlying ceramic change, reintroducing the human dimension into pottery studies (cf., Roux 2011: 80).

Finally, the adoption of BB-related traits was neither uniform nor synchronous. Regional differences in pace, scope, and character are evident. Innovations diffused through multiple mechanisms, including object exchange and human mobility (Kleijne 2019: 194), with knowledge transfer enabling local reinterpretations. The term "Bell Beaker" thus functions as a broad label encompassing diverse local expressions, and understanding the phenomenon requires treating regional variation as central to interpretation.

I am aware of the limitations of the present analysis and the potential of methods not yet incorporated into this study, including isotopic analyses (e.g., strontium) that can reconstruct human mobility. The contextual and interdisciplinary approach adopted here, encompassing the analysis of pottery, flint daggers, and palynological data, enables a comprehensive understanding of the complex cultural situation in the Lower Oder region at the threshold of the Bronze Age. These results provide a starting point for future research that will further clarify the mechanisms of cultural synthesis in this area and elucidate the dynamics of material and social transformations during the transitional period between the Late CWC and the Early Bronze Age.

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Corded Ware Burial of the Thuringian Basin – Evidence for Social Differentiation and Inequality?

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This study examines 401 Corded Ware Culture (CWC) burials from the Thuringian Basin using exploratory and principal component analyses within Bourdieu's framework of habitus and capital. Results reveal a marked gender dichotomy: male graves emphasise weapons and bone tools, while female graves highlight ornaments and different bowls. At the same time, amphorae, beakers, and flint artefacts occur across sexes and ages, reflecting communal practices of feasting, exchange, and symbolic consumption. Age-based differentiation follows a life-course model: subadults were modestly furnished, while adults – especially mature individuals – received increasingly elaborate goods. Women gained recognition earlier through kinship and ritual roles, whereas men accrued status gradually through achievement and material display. Exceptional burials with rare or abundant objects signal inequality, framed within a shared habitus of burial practices. The Thuringian evidence thus portrays CWC society as gender-differentiated and hierarchically stratified, yet unified by common ritual traditions and cross-cutting practices of community life.

KEY-WORDS: Corded Ware Culture, Thuringian Basin, grave goods distribution, social differentiation, social inequality

INTRODUCTION

The Corded Ware Culture (CWC), a major phenomenon of the late 3rd millennium BCE, spanned from the Low Countries and Scandinavia to the Pontic steppe. Characterised by a mixed subsistence strategy encompassing agriculture, herding, and gathering, it is generally considered a relatively mobile society (Lechterbeck *et al.*, 2013; Sjögren *et al.*, 2016; Heyd 2021) that emphasised individual and nuclear family units

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more than earlier farming communities (Harrison and Heyd 2007; Kristiansen *et al.*, 2017: 343).

Ancient genomic studies indicate a substantial, male-driven migration from the Pontic–Caspian steppe into Central and Northern Europe during the early 3rd millennium BCE (Linderholm *et al.*, 2020; Papac *et al.*, 2021; Scorrano *et al.*, 2021), potentially linked to demographic expansion driven by intensified steppe herding and secondary animal products in the late 4th millennium BCE (Wilkin *et al.*, 2021). These populations appear to have been predominantly patrilineal and practised female exogamy (Mittnik *et al.*, 2019; Sjögren *et al.*, 2020; Papac *et al.*, 2021), consistent with reconstructed Indo-European kinship systems (Olsen 2019; Sjögren *et al.*, 2020). A decline in Y-haplogroup diversity from early to late CWC phases, observed in Bohemia and elsewhere, may reflect competition among male lineages or highly restrictive marriage networks (Zeng *et al.*, 2018; Papac *et al.*, 2021).

Within the research, two main positions dominate: one suggests strong genetic links between Corded Ware and Yamnaya individuals (Allentoft *et al.*, 2015; Haak *et al.*, 2015; Olalde *et al.*, 2018), supporting the idea of massive migration into Europe (Kristiansen *et al.*, 2017). In contrast, others highlight local variability and critique invasion models, arguing instead for the role of individual mobility (Vander Linden 2004; 2016; Furholt 2014; 2018; 2019; Heyd 2017).

Recent research integrating stratigraphic, typological, and absolute dating evidence suggests an initial CWC phase around 2900 BCE, accompanied by a gradual population increase (Großmann-Klabunde 2025). After 2500 BCE, significant stylistic shifts in pottery occur (Müller 1999; Furholt 2003; Ullrich 2008; Großmann 2016), and the subsequent expansion of the Bell Beaker phenomenon appears to displace Corded Ware populations, contributing to a decline in the latter by 2300 BCE, with further cultural transition towards the Early Bronze Age Únětice culture after 2250 BCE (Großmann 2016).

The CWC is most clearly defined by its highly uniform burial ritual, found across regions such as the Netherlands, Denmark, Poland and Central Germany (Furholt 2014; Kristiansen *et al.*, 2017). This uniformity rests on three elements: funerary architecture, body position, and grave goods. Burials typically consist of single-person burial pits, sometimes covered by barrows with surrounding palisades, a practice shared across the Corded Ware distribution (Hübner 2005; Šmejda ed. 2006; Bourgeois 2013; Pospieszny *et al.*, 2015; Großmann 2016; Bourgeois and Kroon 2017; 2023). The deceased were interred in semi-flexed positions with a marked gender dichotomy: men usually on their right side, head westward, women on their left side, head eastward, both facing south (Furholt 2014; Turek 2016). Finally, grave goods belong to a restricted yet widespread set, including flint and battle axes, beakers, amphorae, ceramic vessels, flint blades or daggers, amber beads, copper, shell and animal teeth ornaments (Furholt 2014; Bourgeois and Kroon 2017).

The shared idea of dressing the dead embodied transmitted information that circulated and transformed across regions. Burials are particularly suited to trace this process (Sørensen 2015; Wentink 2020): they are discrete, ritualised events rooted in worldviews and emotionally charged acts (Barraud and Platenkamp 1990; Metcalf and Huntington 2005; Oestigaard and Goldhahn 2006). Similarity in burial practice thus reflects shared conceptual frameworks rather than identical meanings. Furthermore, Bourgeois *et al.* could prove that long-range similarities of right-flexed (mostly male) graves, contrasted with the rather regionality of left-flexed (mostly female) burials, highlight the role of gender in mortuary conventions (Bourgeois and Kroon 2023).

CORDED WARE CULTURE – CENTRAL GERMANY

Research on the Corded Ware Culture in Central Germany has a long tradition, beginning with Klopfleisch's 1884 identification of cord decoration on pottery and his distinction between Linear Pottery and Corded Ware (Hein 1987). Systematic descriptions of ornamentation, vessel types, and burial practices were later provided by Götze (1891; 1909) recognizing the CWC as a supra-regional European phenomenon. Mid-20th-century studies by Ulrich Fischer refined the typology and chronology of the CWC, distinguishing early, mixed, and late phases and exploring social relationships (Fischer 1951; 1956; 1958). Large-scale catalogues and typological studies (Loewe 1959; Matthias 1968; 1974; 1982; 1987; Bach and Bach 1975; Beier ed. 1994) established a detailed empirical foundation.

In terms of grave goods, items such as shell and animal tooth jewellery (primarily found in adult and mature female graves) and boar tusks (primarily found in adult and mature male graves) were generally considered to be status symbols in Thuringia and central Germany (Gessner 2005; Menke *et al.*, 2017; Küßner 2022; Schmalfuß and Conrad 2022).

Subsequent studies by Stock (Stock 1998) and, in particular, the ^{14}C dating compiled by J. Müller (1999) expanded the chronological theories. In the post-war period, urban development measures also resulted in an increase in the number of finds. Moreover, in the aftermath of Germans reunification, a substantial number of finds have been unearthed in the Thuringian Basin and the Leipzig Lowland Bay. This phenomenon can be attributed to the construction of routes for gas pipelines, motorways (A38, A71), federal highways (B6n) and bypasses (Meller ed. 2006; Meller and Dresely eds 2006; Meller and Friederich eds 2011). These studies have resulted in a substantial corpus of ^{14}C data, particularly in Saxony-Anhalt, which has facilitated the chronological localisation of corded ware pottery (Schwarz 2015; Großmann-Klabunde 2025). In Central Germany, continuity in material culture since the Western Globular Amphora Culture and temporal overlap with the Bell Beaker phenomenon are evident (Beran 1992; Woidich 2014; Großmann 2016; Müller 2023).

Settlement evidence in Central Germany, including trapezoidal houses up to 20 m long at Brachwitz and Wennungen, highlights the domestic dimension of CWC communities (Friederich 2019; Küßner 2019). Nevertheless, in Thuringia, most data derive from burial grounds and isolated finds, necessitating careful contextual interpretation.

CORDED WARE CULTURE – SOCIAL INEQUALITY AND DIFFERENTIATION

Previous social analyses suggest that the CWC burials reflect hierarchical differentiation. Strahm interprets frequent status symbols as indicative of elite burials, with distinctions by age and family structure, often organised around lineages or clans and central figures such as a "big man" (Strahm 2002). Status is defined as a formal, recognised position of an individual within a society, and is often linked to kinship and origin. In contrast, the term "prestige" refers to the reputation of an individual or group that is widely known and often viewed as a sign of success or achievement. Prestige can be defined as the social respect or admiration a person earns through their skills, achievements, or valued possessions, which may exist independently of formal status (Díaz-Andreu 2005; Dornheim *et al.*, 2005). Kolář emphasises gendered and age-based social structures, highlighting idealised expressions of masculinity and femininity, and distinguishing skill-based "big men" from hereditary "great men" (Kolář 2018). Wiermann's studies in Bohemia further show the selective distribution of status objects, with economically active individuals receiving elaborated burials, while infants and the elderly often lacked grave goods (Wiermann 1996; 2002). Wentink frames grave goods as collective social representations, linking living communities to deceased ancestors (Wentink 2020). Ralph Großmann demonstrated that the Lauda-Königshofen burial ground exhibited gender-specific differences in terms of orientation and grave goods. Furthermore, he showed that the quantity and quality of grave goods varied according to age. Furthermore, he proved that the calculated value of the grave goods increased with age (Großmann 2021a).

In interpreting the Corded Ware burial record, it is important to distinguish between social differentiation and social inequality. Social differentiation refers to distinctions in identity and role, such as the clear gendered patterning of grave goods or age-specific treatment of the dead. These horizontal differences do not necessarily imply ranking but rather mark social categories within the community. By contrast, social inequality involves hierarchical relationships and unequal access to resources, prestige, or symbolic value (cf., Beck and Quinn 2022).

BOURDIEU'S THEORETICAL MODEL AS FRAME

This study builds upon these empirical and theoretical foundations, employing Bourdieu's framework of habitus and capital to interpret burial practices. Bourdieu conceptualises social positions through the distribution of economic, cultural, social, and symbolic capital, shaping durable dispositions (habitus) that influence practices (Bourdieu and Schwibs 1984).

By dividing the concept of capital into these different forms, he provides a useful theoretical framework that can also be applied to the categorisation of archaeological material (Kadrow and Müller 2019).

Economic capital encompasses all forms of material wealth (e.g., income, movable assets, land ownership; Bourdieu 1986: 17–21). In archaeological contexts, this might be reflected in the accumulation of artefacts, grave goods, or evidence of surplus production.

Social capital consists of social networks (Bourdieu 1986). These networks can structure the collective ownership of resources, which presupposes a willingness to cooperate. Archaeologically, such cooperation may be visible in activities like communal house-building or the construction of graves.

Cultural capital, according to Bourdieu (1986), exists in three forms: embodied, objectified, and institutionalised.

Embodied cultural capital is ingrained in individuals – it is acquired through upbringing and education, and manifests in taste, knowledge, or personal behaviour.

Objectified cultural capital is expressed through cultural goods. In archaeology, this might correspond to artefacts, especially everyday items such as pottery or flint tools.

Institutionalised cultural capital refers to formal titles or qualifications acquired during one's life. In prehistory, this could be understood as social roles linked to decision-making or the regulation of resource distribution.

Finally, symbolic capital denotes an individual's standing within society, which in prehistoric contexts may not always have been strictly hierarchical. It could be expressed through prestige goods, symbolic representations, or differential burial practices, such as the distinction between those granted special graves and those who were not.

AIM OF THE PROJECT

The objective of this study is to examine whether the patterns observed in grave goods, body position and orientation in Thuringian Corded Ware Culture burials reflect a socially diverse yet egalitarian community or a hierarchical one. The objective of this study is to ascertain the extent to which biological sex, social gender and age are responsible for the observed patterns of burial orientations/positions and grave goods distribution. The following question is posited: how ought this distribution to be interpreted? The subsequent analysis of the results is undertaken with reference to Bourdieu's concept of habitus and capital forms. This study makes a significant contribution to our understanding of the complexity of third-millennium BCE societies in Europe by situating local burial patterns within a broader research framework on CWC mobility, demography, and social organisation.

METHOD AND MATERIAL

The present study employs exploratory data analysis, which utilises visual and statistical techniques to identify patterns, correlations, outliers and significance, with the assistance of descriptive statistics and univariate analysis. The study employs principal component analysis (PCA) on 401 Corded Ware Culture burials from the Thuringian Basin. Principal component analysis (PCA) serves as a multivariate ordering procedure, visualising relationships between variables and individual burials. PCA serves to visualise complex facts and can be classified as a structure-discovering method. PCA condenses all the variation in a dataset into a number of dimensions (or principal components, PCs) ranked by how much of the variation (inertia) in the data they account for (termed "inertia", defined by eigenvalues). Usually, only the first two or three PCs (dimensions) are used. I showed PCA as a biplot of both the variables (as arrows) and the individual graves (as dots), where the x-axis represents PC1 (the most important), and the y-axis represents PC2 (the second most important). Thus, the PCA represents a multidimensional "grave distribution space" showing the position of each grave in the overall space, and how they correlate with each other. Additionally, where available, the sex/gender and age of the individual are highlighted (Baxter 2003: 73ff; Backhaus 2008; Nørtoft 2024). While such multivariate methods are standard exploratory tools, their interpretation requires careful methodological consideration.

The PCA was implemented using PAST 5 (https://www.nhm.uio.no/english/research/resources/past/) I also used boxplots for univariate data to show the interquartile range (the middle 50% of the data) for a variable. In this context, Mann-Whitney post hoc tests were performed to reveal age- and gender-specific trends in the accumulation of grave goods.

In this study, distribution results are not treated as chronological sequences; rather, clusters are interpreted as contemporaneous groupings reflecting social practice. This approach is based on two considerations: (1) Chronological subdivision of the dataset was deemed unnecessary. Burial practices have remained stable for centuries. Analysed object categories were used throughout the Corded Ware period, and changes occurred only in the design and decoration of the objects, not in their composition (Großmann 2016; 2021b). (2) the recurrence of similar clusters in other CWC contexts with independent chronological control (Großmann 2021a; Bourgeois and Kroon 2023; Nørtoft 2024). Consequently, the analysis emphasises horizontal social variation rather than diachronic change.

The selection of Thuringia as the region under investigation was predicated on the existence of already compiled data relating to a separate issue (Großmann 2016), in addition to the presence of a high density of well-documented burials within the specified area. The database draws primarily on catalogues and publications by Waldemar Matthias, Gudrun Loewe, and others (Loewe 1959; Feustel *et al.*, 1966; Matthias 1974; 1987; Bach and Bach 1975; Bücke *et al.*, 1989) from the Central German Thuringia region. Recorded data include grave goods, burial orientation and position, and anthropologically determined sex and age.

The analysis covered the burial orientation and all types of grave goods. References to additional “grave construction” elements or installations were also included in the analysis. However, no distinction was made between different types of structures, e.g., stone packs, stone chambers, burial huts, stone cists, or wooden structures. As the mound has often been destroyed or not recorded, this burial element could not be included in the analysis.

To reduce data complexity and enhance interpretive value, individual object types were consolidated. For example, “bowl-shaped vessel” encompasses bowls, small dishes, and footed bowls, while all flint artefacts – blades, flakes, and scrapers – were grouped under “flint”. Object frequency was considered for most categories, except for shell and animal teeth jewellery, which were recorded as present/absent due to potentially high quantities in a single grave. Individual decorative elements were also grouped together. The shell, bone and amber jewellery, for example, includes various pierced and non-pierced discs, beads and buttons.

Multiple burials, particularly in mounds or chambers, were excluded because artefacts could not be reliably assigned to individual interments. Of the 402 burials analysed, anthropological sex was recorded in only 70 cases: 30 (7%) were identified as anthropological female and 40 (10%) as male. The remaining 334 burials (82%) lack reliable bioanthropological sex information. Based on the results of the principal component analyses, individuals for whom no anthropological assignments are available are assigned as gender female or male. Gender is considered to be socially created and culturally specific, and distinct from the fixed biological categories of sex (Gilchrist 2012).

All data are available online at: https://www.uni-kiel.de/en/jma/research-infrastructure/research-data/data-exchange-platform *(Das dialektische Verhältnis von Schnurkeramik und Glockenbecher zwischen Rhein und Saale)* and can be filtered using the ID_Individuum (ID_no.).

The results should be interpreted with caution when considering taphonomic processes, including natural decay and human-caused disturbances such as ploughing and careless removal, as well as the limitations of archaeological documentation from the 20th century.

RESULTS

Principal component analysis (PCA)

Examination of the PCA reveals a clear biplot arrangement of variables and objects (see Fig. 1). Most variables are situated on the positive side of the first component, whereas only a subset, such as body position information and the "no grave goods" variable, appear on the negative side. The loading on the first component clearly shows that amphorae, beakers and flint, which are often found as grave goods, have the highest positive correlation impact, whereas the "no grave goods" variable has the highest correlation impact on the negative side.

Individuals differentiated by anthropological sex are distinctly separated along the second component, indicating the existence of clear gender-specific burial practices. This also means that anthropologically non-determined individuals align with a particular gender category. Loadings (Fig. 2) clearly show that female-associated graves cluster in the negative area of the second component and are characterised by amber, shell, animal teeth and copper/bronze jewellery, amphora, beaker and bowls. In particular, the grave orientation and position (east-west, left flexed position) and jewellery categories have a significant impact on the correlation. Male-associated graves occupy the positive side of the second component and feature axes, hatchets, bone chisels and special grave constructions. The orientation (west-east, right flexed position), weapons (axe, hatchet), flint tools, as well as bone chisel have the highest correlation impact.

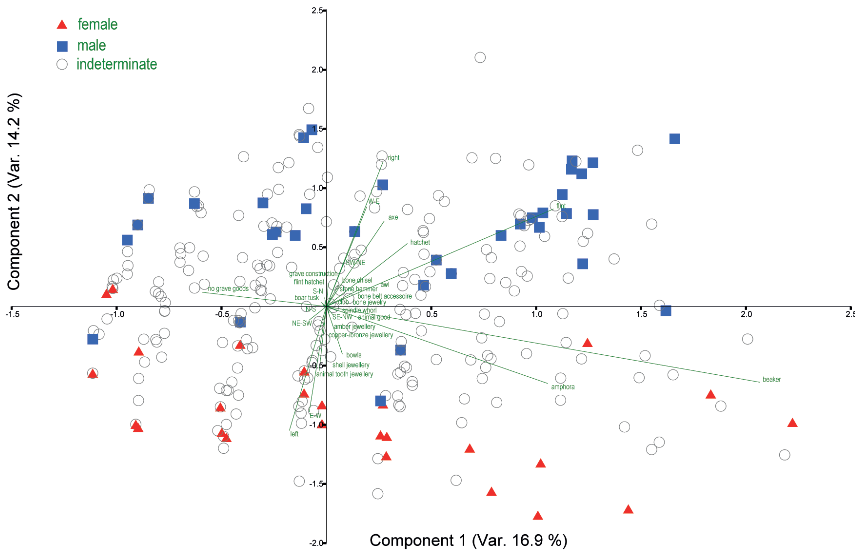

Fig. 1. PCA biplot of Corded Ware graves from Thuringia. The variables are presented as grave goods and burial orientation. Anthropologically determined female graves (red triangles) contrast with male graves (blue squares).

These results support gender-specific burial customs regarding grave goods and body position. However, objects such as beakers, amphorae and flint are positioned far along the positive end of the first component, emphasising their importance across gender and ages.

Anthropological data on age were added to the same PCA. This includes infants (0.5 to 14 years), juveniles (14 to 20 years), adults (21 to 40 years), mature adults (41 to 60 years) and seniles (> 60 years). When contextualised by anthropological age, the first principal component particularly differentiates infants from mature and elderly individuals (Fig. 3). Most mature individuals appear on the positive side of the first component, while most infants cluster on the negative side, closely associated with the "no grave goods" variable. Strong loading on the positive side demonstrates amphora, beaker and flint artefacts (Fig. 4). Interestingly, many infants are located on the negative second component, i.e., in the female-associated area. Additionally, a smaller number are in positions corresponding to female-equipped graves along the positive first component. Very few infants appear in the mature male-associated area (the first and second positive components).

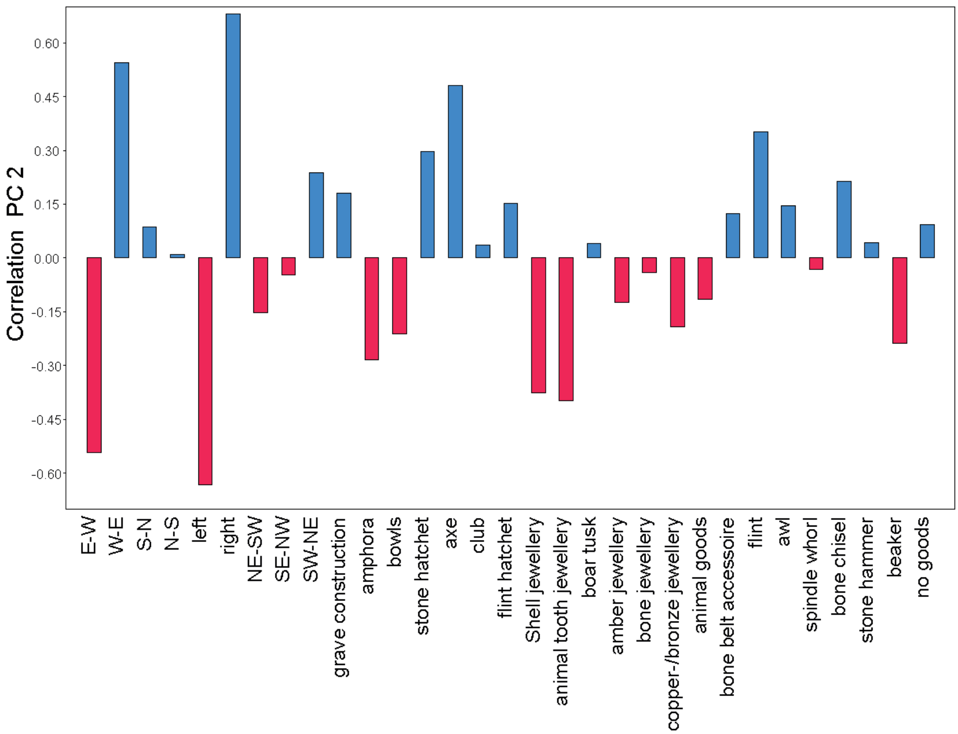

Fig. 2. PCA loadings of the second axis: Positive values stand for male-associated grave goods and grave orientation. Negative values stand for female-associated grave goods and burial orientation.

Comparison Between Adult and Subadult Burials

The following section distinguishes between adult and mature individual burials, and subadult burials (i.e., infant and juvenile), in terms of grave goods composition. Adult incl. mature graves contain a wide variety of utilitarian and symbolic items. The most common items are amphorae (19.4%) and beakers (18%), followed by flint tools (14.7%) and stone hatchets (6.5%). Further object categories include jewellery made from shells (4.6%), animal teeth (3.7%), bone awls (3.2%), stone axes (2.8%), bone chisels (2.3%), and bone jewellery (2.3%). Around 6.5% of adult graves contain no goods. A relatively high percentage of objects categorised as "other" are found in adult burials. This category includes items such as clubs (0.9%), flint hatchets (0.5%), copper jewellery (1.4%), amber jewellery (0.5%), and bone belts (0.5%). None of these objects is found in subadult graves (Fig. 5:a).

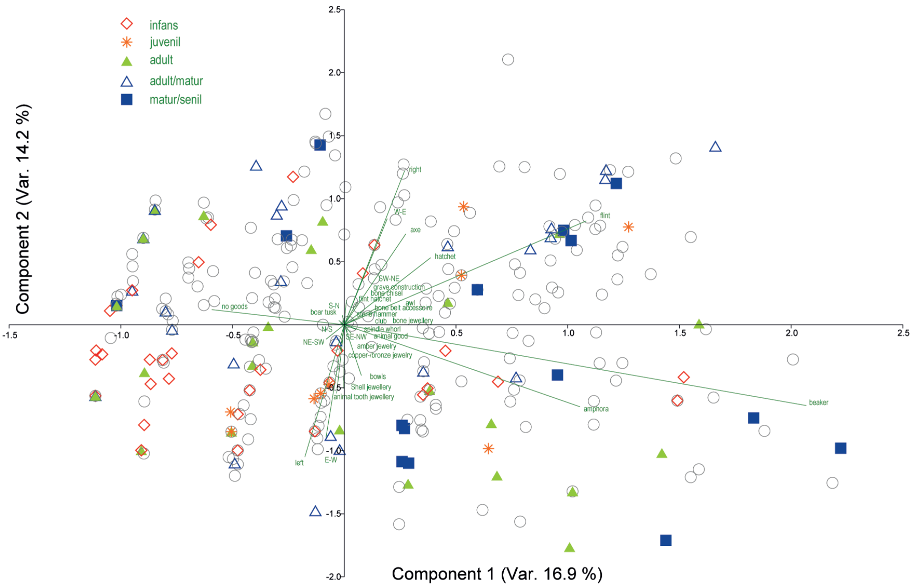

Fig. 3. PCA biplot of Corded Ware graves from Thuringia. The variables are presented as grave goods and burial orientation. The figure shows individuals for whom anthropological age data is available.

Subadult graves emphasise ceramics and ornamental items. Beakers (22.6%) and amphorae (17.9%) account for over 40% of the objects found, while bowls account for a further 11.9%. Jewellery, particularly that made from shells (10.7%) and animal teeth (7.1%), is more prevalent than in adult graves. Prominent objects such as hatchets, axes and bone awls are absent from subadult burials. Around 10.7% of subadult graves contain no grave goods, compared to 6.4% of adult graves. Objects such as bone chisels and boar tusks are present in adult/mature burials and in small numbers in subadult graves (both 1.2%; Fig. 5:b).

Focusing on subadult graves in the CWC of the Thuringian Basin, these graves are typically modest and exhibit distinct patterns in terms of the type of grave goods and gender-specific attributes. Infant female graves often contain jewellery made of shell and animal teeth. They may also contain bowls or bowl-shaped vessels, reflecting attributes similar to those seen in the burials of adult women.

Subadult graves fall into distinct categories: jewellery-only, beaker-only, bowl or vessel burials, or burials without any grave goods. This pattern highlights early gender differentiation, with female infants receiving items, such as jewellery, associated with femininity, while subadult males are almost excluded from grave goods associated

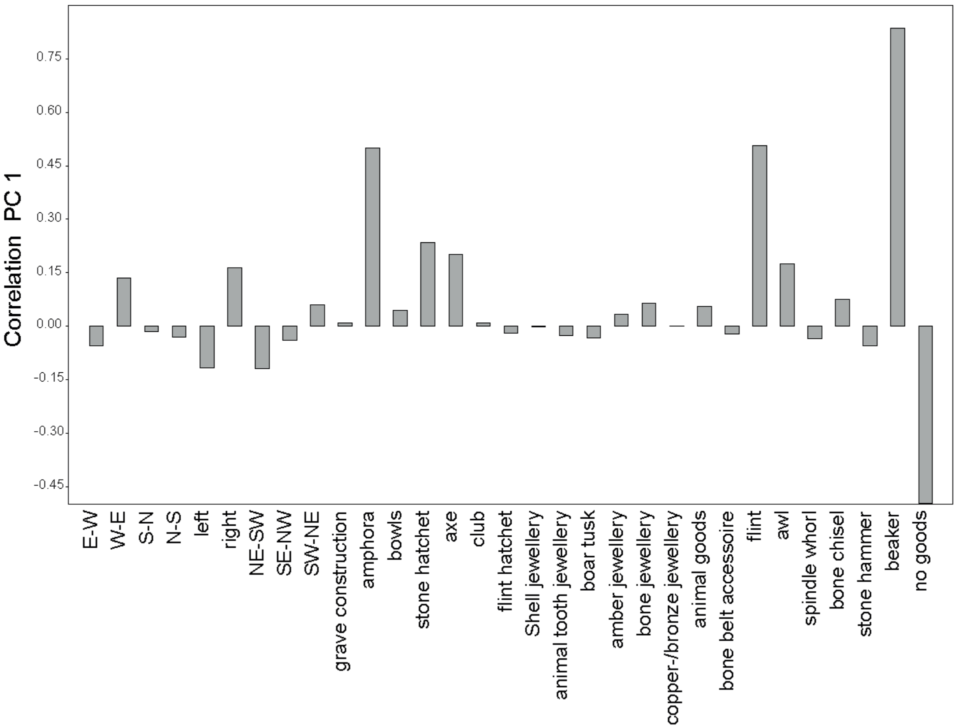

Fig. 4. PCA loadings of the first axis: Positive values stand for grave goods and grave orientation associated with maturity. Negative values correspond to infant-associated grave goods and burial orientation.

with male artefacts. Objects, such as weapons and certain male status symbols like clubs, boar tusks and bone belts, were reserved for adults or mature individuals.

These contrasts suggest that adults were buried with objects reflecting productive, craft-related, labour-related and in the male case, warrior-related roles, whereas subadults were associated with ceramics and ornamental items, which may have symbolised nourishment, communal feasting, or rites of passage. Exceptions include, for example, the infant burial from Großbrembach, Sömmerda district (ID 1649; Bach and Bach 1975: 44). The burial contains two beakers, an amphora, shell jewellery, and a flint object and the infant burial from Berlstedt (Küßner 2022) contains a beaker, boar tusks, and bone jewellery. The elevated grave goods ensemble of the infant burial from Berlstedt is indicative of high status derived from kinship.

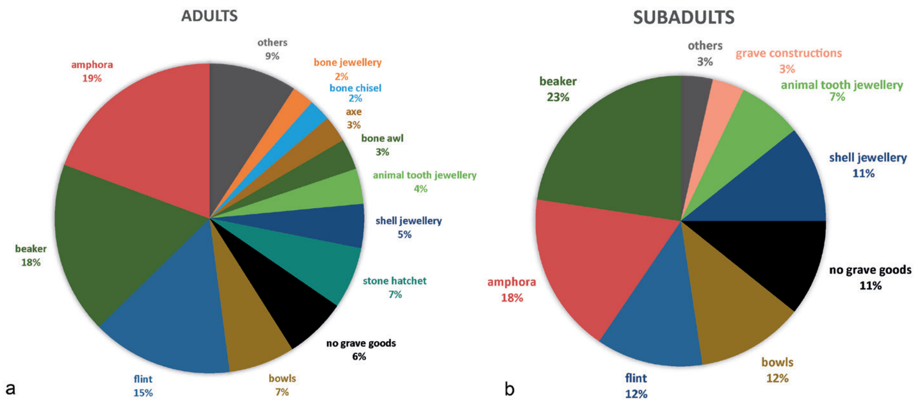

Fig. 5. This pie chart shows the percentages of grave goods found in adult (a, left) and subadult (b, right) graves, as determined by anthropological analysis.

Gendered Patterns in Corded Ware Grave Goods

The distribution of grave goods within CWC burials in Thuringia shows distinct patterns between female and male interments, reflecting both shared cultural practices and gender-specific roles. For female burials (Fig. 6:a), the most frequent grave goods are amphorae (21.3%) and beakers (17.2%), followed by flint artefacts (11.8%), animal tooth jewellery (9.5%), and shell jewellery (9.1%). Other items, such as bowls (7.8%), copper/bronze jewellery (2.7%), and bone awls (2.4%), occur less frequently. A small percentage (6.8%) of female burials contain no goods at all. The prominence of ceramic vessels, particularly amphorae and beakers, suggests a strong association between women and practices related to feasting, food storage, and possibly ritualised consumption. The relatively high proportion of ornaments, such as jewellery and animal goods, further indicates an emphasis on personal adornment and symbolic expression of identity.

In male burials (Fig. 6:b), the most common items are beakers (19.2%), amphorae (18.7%), and flint artefacts (18.1%), followed by axes (8.8%) and stone hatchets (7.7%). Compared to female graves, male assemblages feature a greater diversity of tools and weapons, including flint hatchets (1.1%), bone chisels (2.5%), and boar tusks (1.4%). Jewellery occurs less frequently among men (shell 1.9%, animal tooth 1.1%, bone 1.6%) than among women. Notably, a smaller proportion of male burials (5.2%) lack grave goods, suggesting a more consistent association of men with material culture in funerary contexts.

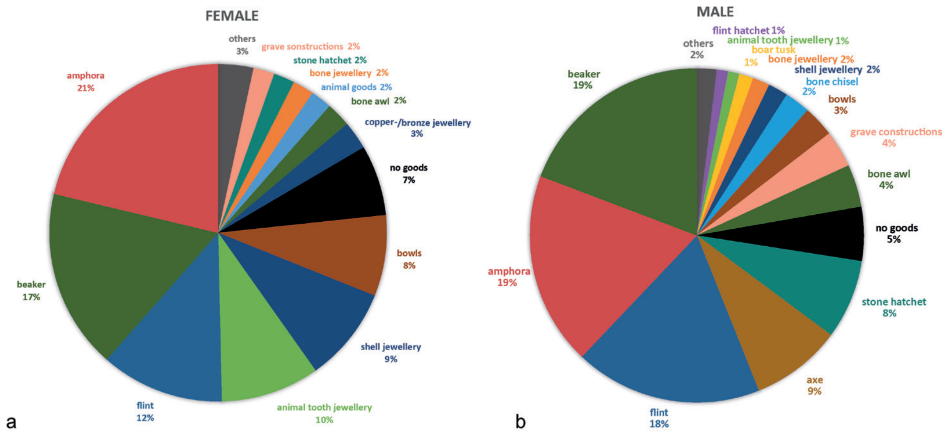

Fig. 6. This pie chart shows the percentages of grave goods found in female graves (a, left) and male graves (b, right), as determined by anthropological and archaeological analysis.

Despite these differences, many burials contain only beakers, amphorae, and flint, or combinations thereof. These objects appear as cross-gender or gender-neutral grave goods, perhaps signifying shared community values or baseline burial traditions. By contrast, the presence of weapons or jewellery in only a minority of graves underscores that explicitly gendered markers were reserved for specific individuals. Such differentiation likely reflects variations in prestige, social identity, or ritual significance within the broader community.

Age- and sex-specific patterns in the number of grave goods

Furthermore, questions arise about how the objects are distributed by gender and age, and whether access to them differs across age categories. Boxplots (Fig. 7) demonstrate the sum of grave goods in each grave, correlated with age and gender categories, and reveal an age-based unequal distribution of grave goods. Where no anthropological information regarding sex was available, the orientation and position of the graves were used as proven markers for gender (Bourgeois and Kroon 2017). In addition to the adult and mature age categories, an adult/mature category was introduced. This category is intended for individuals who have not been clearly identified as either adult or mature in the literature.

Analysis of the Thuringia CWC graves reveals significant variation in the quantity of grave goods across age and gender categories. Infants and juveniles consistently

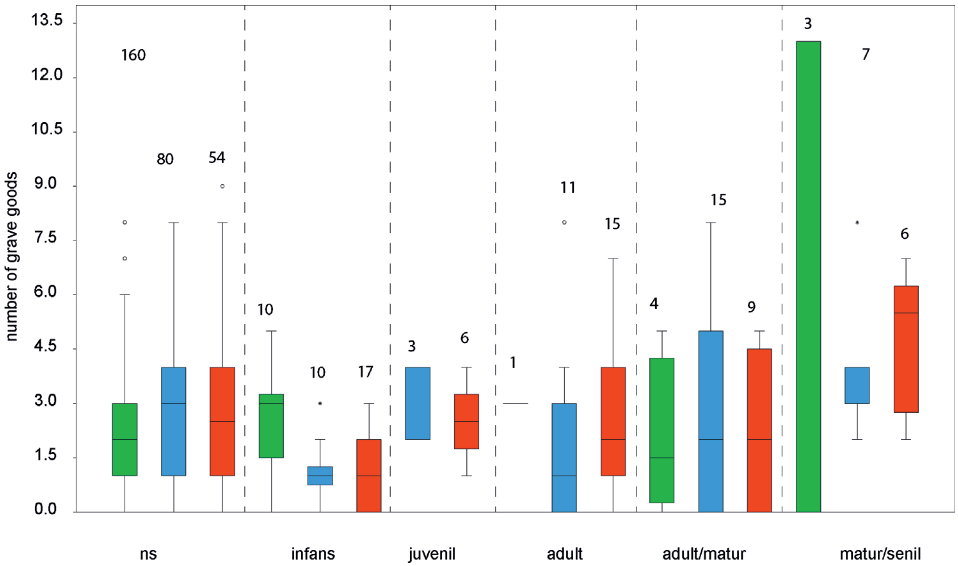

Fig. 7. Boxplot of the number of grave goods (y-axis) in the context of anthropologically determined ages and gender determined archaeologically. The number of burials is noted above the box plots.

have fewer grave goods. Male infants have an average of 1.1 items, and female infants have an average of 0.9 items. Juveniles exhibit slightly higher averages (2.6 for males and 2.5 for females), yet these remain below adult levels. Adult females have an average of 2.6 grave goods, significantly higher than the 1.9 for adult males. Within the adult/mature category, males have an average of 2.6 grave goods, slightly higher than the average for females (2.3), suggesting a shift in prestige with age. The mature/senile categories include particularly high numbers of grave goods. Mature males have an average of 4.0 grave goods, while mature females have an average of 4.8. Thus, mature and senile individuals have gained greater recognition in burial rites linked to social achievements, leadership, or culturally valued roles.

A high proportion of graves lack information on gender or age (n = 160), and a large number lack age information (male = 80; female = 54). However, it should be noted that significant social inequalities exist within the respective age cohorts regarding the distribution of grave goods. This is clearly illustrated by the inequality within the adult age cohort, for example. An adult male burial in Freienbessingen, Kyffhäuser district (ID no. 1706, Bücke *et al.*, 1989: 48), contained eight grave goods, whereas many other burials contained none. Similarly, an adult female burial in Erfurt-Gispersleben (ID no. 1681, Bücke *et al.*, 1989: 39) contained seven grave goods, while many other adult female burials contained none.

Richly furnished adult or mature female graves are typically characterised by a combination of jewellery, vessels, flint tools or bone awls. The jewellery is often made of shell and animal teeth. Ornaments made of amber, copper or bronze are rarer. Commonly found vessels in these graves include bowls, beakers and amphorae, with some graves containing multiple vessels of different types. These graves generally do not include weapons, which distinguishes them from male burials. The richness of a female grave is often indicated by the number and variety of jewellery and vessels found in it.

Opulently furnished adult female graves from the CWC include the Apfelstädt grave (ID no. 2240, Küßner 2006; Fig. 8:a), which contained five vessels: one beaker, one amphora, and three different bowls. Additionally, it contained tools (a bone awl and a flint tool) and animal and shell jewellery. This grave stands out for the quantity and variety of vessels and jewellery, indicating it is a high-status adult female burial. The mature female grave from Abtbessing (ID no. 1677, Bücke *et al.*, 1989) contained two amphorae, two beakers, animal bones and two flint tools.

Richly furnished graves of adult or mature males in the CWC typically contain a combination of weapons (frequently a stone hatchet) and flint tools, occasionally alongside rare or exceptional grave goods. Rare items include stone and flint axes, often accompanied by tools such as bone awls and bone chisels. Some graves contain very rare and exclusive items, such as clubs, boar tusks or bone belt plates, which suggest a higher social standing.

Several notable examples of richly furnished adult male graves in the CWC have been found. For example, Grave 3 from barrow 1/64 in Freienbessingen (ID no. 1706, Bücke *et al.*, 1989: 48) contained a copper ring, four pierced boar tusks, a club, a flint hatchet, a flint blade, an axe, an amphora, and a beaker. The number and diversity of the grave goods indicate an exceptional status. The Apfelstädt grave contains a beaker, an amphora, two hatchets, tools made of flint and a bone awl. The burial had a burial hut, a special construction element (Küßner 2006; Fig. 8:b).

Other notable male graves containing bone chisels include Erfurt pit 11 (ID no. 1703, Bücke *et al.*, 1989: 45) and Blankenburg mound II/1967 (ID no. 1679, Bücke *et al.*, 1989). These burials combined bone chisels with beakers, amphorae, axes, stone hatchets and flint flakes or blades, and sometimes additional tools. These graves frequently contain multiple weapons of the same type, suggesting an overabundance and display of social prominence. Special grave constructions or installations are also commonly associated with male burials and further signal elevated prestige. Such graves may also include pottery (beakers and amphorae), flint blades

Fig. 8. Richly-equipped female (a, left) and male (b, right) graves from Apfelstädt (see Küßner 2006; © B. Stefan, Thüringer Landesamt für Denkmalpflege und Archäologie, Weimar).

and rare items such as boar tusks, clubs or bone chisels. The heterogeneity and richness of grave goods, the presence of rare items, and the construction of graves mark these mature male burials as high-ranking and sometimes reflect specific roles, such as those of a craftsman or a socially prominent individual.

These patterns clearly demonstrate the significant influence of age and gender on burial practices. While adults and mature individuals generally received the most grave goods, infants and juveniles usually received the fewest. However, there was also inequality in access to grave goods within each age category.

POST-HOC ANALYSIS

Mann–Whitney post-hoc tests confirm distinct trajectories of burial elaboration between males and females. For males, significant differences occur mainly at the transition to maturity. Mature men received significantly more goods than adults ($p = 0.027$) and infants ($p = 0.0013$). This pattern suggests that male social recognition increased sharply later in life, reflecting achievements, leadership, or accumulated prestige.

For females, the decisive threshold lies between infants and older categories. Infants were buried with significantly fewer goods than adults ($p = 0.026$), juveniles

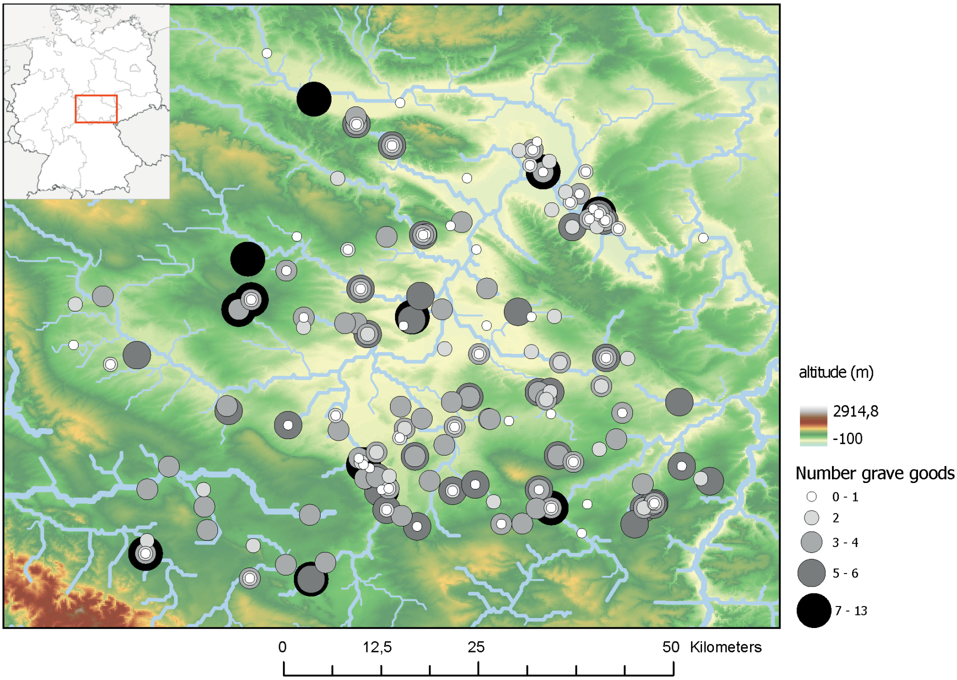

Fig. 9. Distribution of the CWC graves within the Thuringia region.

(p = 0.0091), and mature/senile women (p = 0.00074). However, differences among juveniles, adults, and mature females were not statistically significant. This indicates that female social status was established relatively early and maintained throughout life, likely reflecting kinship ties, ritual roles, or gendered identities recognised from childhood onward. Males experienced a delayed accumulation of funerary wealth, linked to achievements over the life course.

DISTRIBUTION OF CWC BURIALS

Figure 9 illustrates the distribution of CWC graves in Thuringia. Categorising graves according to the number of grave goods does not reveal any particularly striking patterns. However, graves containing the greatest number of grave goods are concentrated in the northern and southern peripheral areas at higher altitudes. There are no graves with the highest number of grave goods in the Thuringian Basin itself (the flat regions shown in light green here).

DISCUSSION

The analysis of CW burials in the Thuringian Basin highlights a pronounced age- and gender-specific differentiation in mortuary practice, while also underscoring the central role of a limited set of cross-gender grave goods. These results deepen our understanding of how CWC communities organized social life and how these structures were materially expressed in funerary contexts.

The PCA results show a clear dichotomy between male and female burials. Male graves are primarily associated with weapons (axes, stone hatchets), flint tools, and special grave constructions, whereas female graves are marked by ornamentation (shell and animal-tooth jewellery, bone ornaments, copper/bronze objects) and ceramic bowls. These distinctions confirm long-recognised gendered patterns in CWC burial customs across Europe (Furholt 2014; Kristiansen *et al.*, 2017; Bourgeois and Kroon 2023).

Within Bourdieu's framework, they can be interpreted as expressions of symbolic capital: male burials emphasise martial, productive, and tool-based identities, while female burials highlight adornment, ritualised consumption, and relational roles tied to kinship and household spheres. At the same time, amphorae, beakers, and flint artefacts appear in both male and female graves, suggesting a category of gender-neutral goods linked to shared practices such as food preparation, feasting, and exchange. These items likely reflect activities central to community life irrespective of gender or age. Burials furnished solely with such objects may represent individuals of lower prestige, excluded from the gender-specific roles emphasised in more elaborate graves.

The distribution of grave goods across age categories suggests that burial elaboration intensified in adulthood and peaked in maturity. Subadult burials, though occasionally furnished with ornaments or ceramics, rarely contain weapons or tools, reflecting a life-course model of social capital accumulation. Infants and juveniles appear excluded from productive or martial identities, whereas mature adults were commemorated with items that marked accrued achievement and social recognition.

The trajectories of male and female diverge in striking ways. Male graves show a strong increase in elaboration only later in life, suggesting that male status was closely tied to cumulative achievements and possibly competitive dynamics within lineages. Female graves, in contrast, already display elevated recognition in adulthood, with richly furnished burials attesting to stable symbolic roles rooted in kinship and ritual life. This pattern aligns with models of patrilineal exogamy, where women gained recognition not through individual accumulation but through their central role in alliance-building and maintaining domestic and ritual continuity (Mittnik *et al.*, 2019; Papac *et al.*, 2021).

The CWC is characterised by pronounced social capital, reflected in uniform burial practices across vast regions (Wentink 2020). The social capital of individual members, particularly women, is evident in the form of jewellery elements from beyond the local area, such as animal teeth. These demonstrate the extensive networks of the Corded Ware culture, which were based on exogamous marriage customs and patrilineal systems. This has also been proven by aDNA analyses (Linderholm *et al.*, 2020; Papac *et al.*, 2021).

While many graves are modest or unfurnished, a few stand out through their exceptional richness – multiple vessels, abundant jewellery, or rare objects such as boar tusks, clubs, or bone chisels. These exceptional burials likely mark individuals of elevated standing, whose status was expressed through economic capital in the form of numerous grave goods and many different vessels indicating a surplus, as well as symbolic capital in the form of special grave constructions such as burial huts, and a variety of jewellery and boar tusks. Thus, social inequality in the Thuringian Basin is evident not only in gender and age distinctions but also in the uneven distribution of economic and symbolic resources. Nonetheless, the recurrence of similar clusters of grave goods across gender and ages points to a shared habitus: a set of durable dispositions shaping burial practice in socially recognisable ways. The uniformity of orientation and body position reinforces this impression. Social differentiation and inequality were thus expressed not through radically different funerary traditions but through variations in the quantity, exclusivity, and combination of broadly shared categories of goods.

Placed in the broader CWC context, the Thuringian evidence both confirms and nuances prevailing models. The gendered dichotomy mirrors patterns from Central Germany, Bohemia, and Scandinavia, where male graves tend to foreground weaponry while female graves emphasise ornamentation and vessels (Wiermann 2002; Bourgeois and Kroon 2023; Nørtoft 2024). However, the unusually high proportion of gender-neutral goods in Thuringia suggests that communal practices such as feasting and exchange were particularly important in structuring mortuary display. Moreover, the concentration of richly furnished graves along the basin's peripheries hints at regional dynamics of prestige, possibly linked to inter-community competition, lineage-based differentiation, or the symbolic marking of territorial boundaries.

Taken together, the evidence portrays CW society in Thuringia as both gender-differentiated and hierarchically stratified, but within a flexible framework. The shared habitus of burial practice provided cohesion, while differential access to capital – economic, social, cultural, and symbolic – was distributed according to gender, age, and life-course achievements. Women attained recognition earlier through relational and symbolic roles, while men accumulated prestige gradually through achievements and material display. Subadults remained marginal, though their modest burials already reflected gendered expectations. This interplay between shared habitus and unequal access to capital demonstrates the utility of Bourdieu's framework for prehistoric societies. The Thuringian CWC burials do not reflect a simple binary of egalitarian versus hierarchical order; rather, they reveal a status-conscious community where gender, age, and achievement intersected to structure social memory and the material commemoration of the dead.

CONCLUSION

Analysing Corded Ware burials in Central Germany, Thuringia highlights the complexity of social organisation in the late 3rd millennium BCE. Mortuary practices reveal a society structured by age and gender, as well as by unequal access to symbolic and material resources. While women gained recognition early on through their roles in kinship and ritual spheres, men accrued status later in life through achievement and the competitive accumulation of prestigious goods. Subadult burials, modestly furnished yet already gendered, highlight the early transmission of social expectations.

Concurrently, the recurrence of cross-gender grave goods, such as amphorae, beakers and flint artefacts, indicates shared practices that anchored community identity. The uniformity of burial positions and orientations reflects a consistent habitus that structured differentiation within a shared cosmological framework. Rather than being expressed through radically divergent traditions, inequality was expressed through the quantity, exclusivity, and symbolic weight of goods within this shared repertoire.

Situated within the broader European context, the Thuringian evidence both aligns with and complicates prevailing models of CWC society. While it mirrors the pan-European gendered dichotomy of weapons versus ornamentation, the unusually strong presence of gender-neutral goods suggests a particular emphasis on communal feasting and exchange. Furthermore, the clustering of richly furnished graves along the basin's edges hints at regional dynamics of prestige and territorial display.

Ultimately, this study demonstrates that CWC society in Thuringia was status-conscious, flexible, and deeply embedded in shared ritual practices, but neither fully egalitarian nor rigidly stratified. Bourdieu's framework highlights how habitus and differential access to capital intersect to determine and accompany life in the Corded Ware culture.

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Chronology and Distribution of Corded Ware Groups in Saxony-Anhalt

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The article examines the chronology and distribution of regional and local groups within the Corded Ware Culture in Saxony-Anhalt, Germany. It begins with a brief overview of the research history. Until the early 1990s, the approach to chronology was typological, sometimes based on some stratigraphically "dated" graves. Multivariate procedures have been applied since the late 1990s. At the same time, chronological research is based on graves dated by ^{14}C. In this study, radiocarbon-dated graves form a basis for typological work. Using the radiocarbon dates, three main stages of the Corded Ware Culture can be identified (Stages 1–3). Furthermore, the first stage can be subdivided into three sub-stages (1a1, 1a2, 1b). Each stage lasted about 150 years, the sub-stages 1a2 and 1b even half this time. The number of radiocarbon-dated graves of Stage 1 of the Corded Ware Culture has increased from four to 52, at least reliably dated graves, since the studies of Johannes Müller and Martin Furholt. Thus, the focus of the chronological study is on this early stage. Beyond chronology, the shapes and decorations of the ceramics allow us to define regional and local groups of the Corded Ware Culture (CWC) in Saxony-Anhalt. Regional groups include the Saale estuary Group (SEG), the North Harz Group (NHG), the South Harz Group (SHG), and the Middle Saale Group (MSG), which may define the territories of ethnic groups or sub-groups. In contrast, four local sections in the north, middle, centre, southeast, and southwest of the Middle Saale Group may define the territories of leading clans.

KEY-WORDS: Corded Ware Culture, Central Germany, chronology, radiocarbon dating

PRELIMINARY REMARKS

The following text was written in 2012 based on a lecture at the 2011 "Corded Days in Kraków" conference and submitted to Piotr Włodarczak, the organiser. Since the conference proceedings he planned were never published, the text remained unpublished in its original form. Therefore, I thank Piotr Włodarczak for remembering

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the article and arranging to have it published in the journal *Archaeologia Polona*. For this purpose, the ^{14}C data were recalibrated using the IntCal20 calibration curve (Reimer *et al.*, 2020), and new ^{14}C data were added. Some additions have been made to the original text.

I would like to thank the excavator, Robert Ganslmeier, for providing the drawings from the Eulau graves, and the state archaeologist of Saxony-Anhalt, Harald Meller, for funding the ^{14}C data.

The article deals with two aspects of the Corded Ware Culture (CWC) in Saxony-Anhalt, there is a consideration of the chronology, with a focus on the early CWC, and this is followed by a presentation of the division of the material into regional and local groups (see Schwarz 2015: 672–677).

CHRONOLOGY OF THE CWC IN SAXONY-ANHALT

The chronological study of the CWC in Central Germany is based on a wealth of radiocarbon dates. Also, it incorporates a typochronological aspect, informed by the grave inventories of the Saale Estuary Group (SEG) of the CWC (see Part 3 below). The typochronology is primarily based on changes in amphorae shapes, which have shoulder handles in Stage 1 and belly handles in Stages 2 and 3. For the shoulder-handled amphorae, the handles are initially located close to the base of the neck (Stage 1a) and later move down to the shoulder arch (Stage 1b). Since a considerable number of CWC grave finds were discovered in Central Germany (Lucas 1965; Matthias 1968; 1974; 1982; 1987), these were already the subject of chronological and regional studies at an early stage of research, the results of which are outlined in an overview in the introduction:

Ulrich Fischer (1958):
Classification by Stage:
Stage 1. Pre-Corded Ware stage: Kalbsrieth Group (after the end of the Salzmünde period and still during the period of the late Walternienburg Group):
- burial mounds with simple inventories, equipped with flint knives at most.
- "The graves of the Kalbsrieth Group are not Corded Ware in the true sense; they precede and point to the Corded Ware".

Stage 2. Simple Corded Ware Beakers and "Strichbündelamphoren" (Fischer 1969); faceted battle axes, necklaces made of canid canines, and shell beads.
Stage 3. Chevron Style (Mansfeld Style). In addition to amphorae and corded beakers, there are lidded jars, tubular beakers, tubs, cylindrical beakers, and eyelet pots.

Regional Groups (letters added for clarity):
A: Mansfeld Group (Chevron Style): Funnel Beaker tradition, linked to the Tiefstichkeramik heritage.
B: East Harz Amphora Group: This emerged "from the combination of the Southern Schönfeld Group with the pure Corded Ware of Stage I".
C: West Thuringian Group (beakers and amphorae with funnel-shaped widened mouths).
D: East Thuringian-Saxon Group (vessels with triangular zones, faceted axes with protruding shaft-hole edges).

Ulrich Fischer (1969):
E: Group of North Harz amphorae (small amphorae with engraved bundles of lines).

Charlotte Fischer (1959):
Mansfeld Group: The core area of the Mansfeld Group extends from the rivulet Geisel in the south to the rivulet Schlenze in the north, is limited to the western Saale region, and is divided into two sub-areas that meet in the Halle area: a northern area with amphorae with a furrow-stitched ornament of the Adendorf type and a southern area with cord-decorated amphorae of the Braunsdorf type, with the former appearing earlier and being replaced by the latter. Amphorae with braided bands without recessed angular bands characterise a Mansfeld mixed group, which adjoins the Mansfeld Group to the east. It is younger overall and increasingly establishes itself in the core area of the Mansfeld Group, displacing it and "finally leading back to the common Corded Ware".

Classification (numbers added for clarity):
1a: Adendorf-type amphorae with furrowed ornament.
1b: Braunsdorf-type amphorae with cord decoration.
2: Mansfeld mixed group amphorae with braided decoration.

Regional subgroups (letters added for clarity):
A: Northern Mansfeld subgroup: Adendorf-type amphorae.
B: Southern Mansfeld subgroup: Braunsdorf-type amphorae.
C: Mansfeld mixed group: Amphorae with braided decoration.

Miroslav Buchvaldek (1969; 1986a; 1986b):
Chronology:
I: Standard horizon: Line-bundle amphorae, beakers decorated with cord and incised lines, A-type hammer axes, faceted hammer axes with broad edges.

II: 7 subgroups, each with an amphora as the leading form (primary type):
IIa: Amphorae with incised chevron pattern.
IIb: Amphorae with feathered bundles of lines.
IIc: Amphorae with fir branch patterns, beakers with herringbone decoration, and groups of three corded lines.
IId: Amphorae of the Schraplau type (corded bundle amphorae) with 4–6 bundles of double-corded lines.
IIe: East Harz amphorae.
IIf: Amphorae with bundles of stitch lines (North Harz amphorae).
IIg: Amphorae with 1–3 horizontal stitch lines.
III: Surface ornamentation using hatched triangular motifs: five subgroups, each with an amphora as the leading form:
IIIa: Northern Mansfeld subgroup: Adendorf-type amphorae, beakers with furrowed engraving and cord decoration, lidded jars, cylindrical beakers, etc.
IIIb: Southern Mansfeld subgroup: Braunsdorf-type amphorae, amphorae with braided band patterns, beakers with cord decoration, cylindrical beakers, etc.
IIIc: Amphorae with hanging triangles, horizontal two- to three-fold cord impressions.
IIId: Schraplau-type amphorae (cord bundle amphorae) with three-row cord impressions.
IIIe: East Harz amphorae, East Harz beakers.

Regional differences:
IIa: Absent in the Saale estuary area.
IIc: Barely present in the Saale estuary area and in the Saale district.
IId: Distribution similar to IIc, but absent in the Saale area.
IIe: Predominantly distributed in the Saale estuary area.
IIIa: Between Halle and the rivulet Schlenze.
IIIb: Between Halle and the rivulet Geisel.

Manfred Hein (1987; 1992):
M. Hein assumes a reverse temporal development of the Corded Ware Culture in Central Germany. He considered the Mansfeld style the oldest (Stage I), following the Bernburg culture (Hein 1992: 25). Since the Mansfeld style is regionally limited, the earliest Corded Ware Culture is absent outside its distribution area. Therefore, Hein assumes a continuous settlement by the Globular Amphora Culture (GAC) in this area. This area would only be settled with the spread of the younger Corded Ware Culture.
I: Mansfeld Group: chevron band decoration.
Ia: Line bundle and ladder band decoration.

Ib: Braided band main decoration.
II: Cord and furrow stitch amphorae.
III: Line and stitch amphorae, herringbone beakers.

Michael Stock (1998):
Phase 1: Strichbündelamphoren, simple cord-ornamented beakers (= A-Horizon).
Phase 2: Trend towards simplicity, the relocation of horizontally encircling multi-row motifs from the neck to the underlying areas, the shortening of the beaker necks, and the relocation of the amphora handles from the shoulder to the belly; the Mansfeld style undergoes a development from comprehensive multi-row patterns to horizontally running triangles, trapezoids, chevrons, and multi-row chevron bands under multi-row motifs running horizontally around the neck.

Regional Differences:
I. Northern Group: between the rivers Bode, Saale, and Unstrut.
II. Southwestern Group: south of the rivers Unstrut and Helme and west of the river Saale.
III. Southeastern Group: east of the Saale river.

Johannes Müller (1999; Dresely and Müller 2001):
Based on radiocarbon dates, the following chronology is derived:
2500–2200 BC: Beakers of variable shape, briefly decorated or only above the base of the belly, with horizontally applied simple decoration, Strichbündelamphoren, and faceted axes.
2500–2200 BC: More complex decorative patterns (Mansfeld), handled vessels; no formal changes (e.g., concerning the amphora and beaker shapes) can be identified; faceted axes appear to be replaced by unfaceted axes.
2200–2000 BC: The proportion of handled vessels increases.

Martin Furholt (2003):
Classification according to wiggle ranges: D (2880–2580 BC), E (2620–2480 BC), F (2460–2200 BC), G (2200–2020 BC).
D: Around 2700 BC: A-type beakers with a final row of punctures, amphorae. In addition:
E: around 2620 BC: straight-sided beakers,
F: around 2460 BC: bowls, cups, undecorated beakers, handled beakers, Schönfeld and Mansfeld pottery.
G: Around 2200 BC: A-type beakers, handled beakers, and amphorae are still found.

While the chronologies of F. Fischer, C. Fischer, M. Buchvaldek, and also M. Hein were based on a few stratigraphic determinations in burial mounds (as already done by Mildenberger 1953), but primarily on typological assessments of individual vessel forms and their patterns, M. Stock employed multivariate mathematical methods to analyse the variety of combinations of patterns and decorative elements. However, these seriations are based on only a few closed inventories. Since typology is subjective, even the analysis of features, considered objective, cannot disguise this. C. Strahm (Strahm 1992; Buchvaldek and Strahm 1992) called for scientific dating methods as a typology-independent corrective as the basis for further chronological studies. This demand was first met by J. Müller (1999) and subsequently by M. Furholt (2003). When using radiocarbon dates, one is inevitably confronted with wiggle effects, which can serve as a starting point for the temporal evaluation of inventories (according to Furholt). However, they sometimes also have the property of a wiggle trap, since all dates falling into a wiggle range suggest a simultaneity of the inventories, which is not always the case, or even necessarily true, since transitions can also occur within such wiggle ranges or plateaus.

As the map in Fig. 1 clearly shows, the number of radiocarbon-dated graves of the early CWC, referred to as CWC Stage 1 and covering the period from 2820 to 2450 BC, has increased considerably in Saxony-Anhalt. While only four of the CWC graves listed by J. Müller and M. Furholt fell into this early stage, the number has now increased to 52. Of central importance are the burial grounds of Eulau and Karsdorf, with ten and six, respectively, and Oechlitz, with 17 radiocarbon-dated inventories of CWC 1 level (Haak *et al.*, 2008; Behnke 2015; Fröhlich and Becker 2015). Radiocarbon dates are also available from a settlement of the early CWC in Queis (Petzschmann 2003). From Pömmelte, in addition to the ^{14}C date of a grave, further dates are available from charcoal from a quadrangular ditch system (Spatzier 2018). For this reason, the picture of the early CWC has undergone considerable changes. Based on the ^{14}C data (also taking into account the wiggle areas) and the grave finds dated by these, Stage 1 of the CWC can be divided into three sub-stages:

1a1: 2825–2635 BC
1a2: 2635–2575 BC
1b: 2575–2450 BC

Of the inventories published by Furholt 2003, the grave of the GAC from Weißandt-Gölzau (Furholt 2003: MES 24: 4150±30 BP: 2780–2660 BC [48.3%]), which includes a cord-ornamented beaker, represents Stage 1a1, the grave from Egeln-Nord (formerly Bleckendorf) represents Stage 1a2 (Furholt 2003: MES 9: 4080±20 BP: 2640–2570 BC [59.3%]), and the graves from Egeln (Furholt 2003:

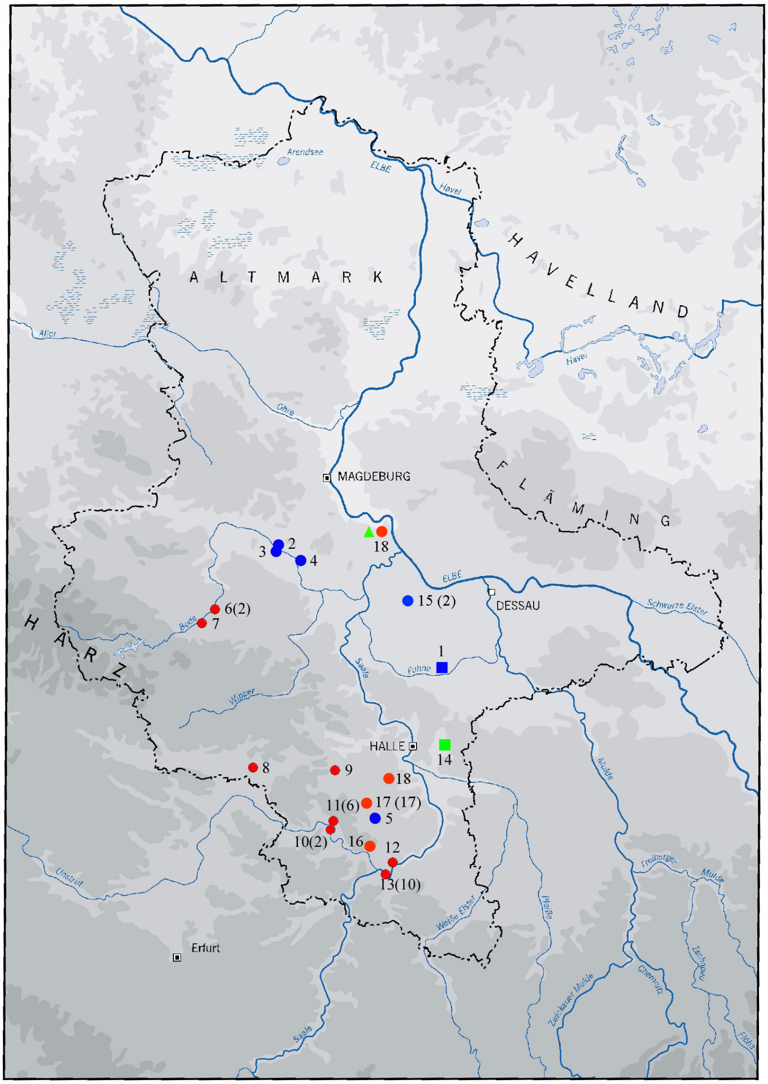

Fig. 1. Locations of sites with radiocarbon-dated finds of the early Corded Ware Culture in Saxony--Anhalt (Stage CWC 1: 2825–2450 BC): 1. Weißandt-Gölzau, 2. Egeln-Nord, 3. Egeln, 4. Unseburg, 5. Mücheln, 6. Quedlinburg, 7. Quedlinburg-Moorberg, 8. Niederröblingen, 9. Esperstedt, 10. Wetzendorf, 11. Karsdorf, 12. Goseck, 13. Eulau, 14. Queis, 15. Drosa, 16. Freyburg (Unstrut), 17. Oechlitz, 18. Pömmelte, 19. Bad Lauchstädt, 20. "Hettstedt" (Klostermansfeld). Grave finds (circle) with ^{14}C dates made before (blue) and after (red) 2001. Blue square: Grave find of the Globular Amphora Culture, green square: settlement find of the CWC, green triangle: ditch system of the CWC.

MES 15: 3991±54 BP: 2579–2460 BC [67.4%]), Mücheln (Furholt 2003: MES 31: 4024±27 BP: 2575–2490 BC) and Unseburg (Furholt 2003: MES 31: 4013±56 BP: 2620–2460 BC) belong to Stage 1b, although the ^{14}C ages of the graves from Egeln and Unseburg are of limited use due to their high standard deviations. This also applies to other dates with high standard deviations. For Grave 6 from Nohra, J. Müller cited a ^{14}C date of 2490–2330 BC, which led him to assign the burial to Stage 2. In contrast, the newly initiated ^{14}C age from 2007 places the grave in the early period of the CWC (Stage 1a1: 2760–2630 BC [49.1%]), now in concordance with the typochronological dating of the grave goods. The new dating of the Wetzendorf graves by M. Becker and M. Fröhlich (Fröhlich and Becker 2015: 765–768) also led to corresponding corrections, which is why these are preferred in the following over the older ^{14}C dates, which also have high standard deviations. Particular attention should be drawn to the deviations in the ^{14}C data from Erlangen and Mannheim for the CWC Graves 4/163 (Erl-4838: 4174±60 BP – MAMS-21675: 4064±29 BP), 4/589 (Erl-4841: 3843±77 BP – MAMS-21668: 3889±32 BP), 4/590 (Erl-4842: 3967±79 BP – MAMS-21677: 3997±28 BP) and 4/774 (Erl-4846: 4077±45 BP – MAMS-21672: 4007±29 BP; Jarecki 2007: 229, pl. 3; 230, pl. 4; 231, pl. 5; Fröhlich and Becker 2015: 766, fig. 1; for the laboratory numbers see Becker *et al.*, 2015: 727–745).

Since no settlement or grave find of the Bernburg culture (3075–2800 BC) provides evidence for the existence of the CWC and the Bernburg culture can not be proved after 2800 BC (see Schwarz 2018: 35–37), and acknowledging that the Bernburg culture may even end somewhat earlier, I date the beginning of the CWC in Saxony-Anhalt only from 2825 BC, even though the time spans of the ^{14}C data for graves of Stage 1a1 of the CWC start earlier. The modelling of the ^{14}C data sets the beginning even later, to the year 2781/2768 BC (see below). If the CWC population had already settled in the vicinity of the Bernburg culture in the first half of the 29th century, some evidence of cohabitation would have emerged there, as is the case with the GAC (3150–2700 BC). For example, in the grave of Weißandt-Gölzau, which belongs to Stage 3 of the GAC according to the amphora (see Schwarz 2021a: 79–81) and thus to a time when the Bernburg culture no longer existed, beside the amphora, a cord-ornamented beaker of the CWC was found. One reason the ^{14}C ranges began before 1830 BC is that the calibration curve dips downward shortly beforehand, reaching its lowest point around 2830 BC, and then rises again, so that all early ^{14}C ages always include a portion of the calibration curve before 2830 BC. It can be observed from the dating intervals of the 1σ ranges that during Stages 1a1 and 1a2, the beginning of the second interval shifts successively toward younger ages. In contrast, the beginning of the first interval consistently shows values before 2830 BC.

Therefore, the individual intervals must be included in the considerations for dating the graves, whereby only the 1 sigma values of the calibrated ^{14}C data (68.2%) are considered below.

Based on radiocarbon dates, the following graves can be assigned to the individual sub-stages of Stage 1:

Stage CWC 1a1 (2825–2635 BC):

1. "Hettstedt" (Klostermansfeld), Grave IV/1800: 4216±49 BP (without lab. nr.): 2897/2807–2723/2701 BC (Selent and Koch 2012).

2a. Quedlinburg-Moorberg, Grave 704: 4215±50 BP (Erl-7542): 2898/2808–2699 BC (Schwarz and Tucker 2022).

2b. Quedlinburg-Moorberg, Grave 704: 4112±25 BP (MAMS-36652): 2848/2744–2622/2585 (Schwarz and Tucker 2022).

3. Weißandt-Gölzau: 4150±30 BP (KIA-354): 2869/2816–2669 BC (Furholt 2003: MES 24).
4. Quedlinburg-Moorberg 171: 4140±23 BP (MAMS-36651): 2863/2821–2634 (Schwarz and Tucker 2023).
5. Nohra, Grave 6: 4135±28 BP (KIA-32304): 2860/2754–2631 BC (Schmidt--Thielbeer 1955); although Nohra is a community in Thuringia, the grave goods of this cemetery are stored in Halle (Saale).
6. Karsdorf, Grave 95: 4127±25 BP (KIA-29549): 2852/2748–2630 BC (Behnke 2015).
7. Eulau, Grave VI/172u: 4113±25 BP (KIA-34261): 2848/2744–2622/2585 BC (Friederich *et al.*, in prep.).

By combining the ^{14}C dates, the duration of sub-stage CWC 1a1 can be determined to be 2852/2820–2665/2635 BC, taking into account only the younger ^{14}C date for Quedlinburg-Moorberg, Grave 704. Taking the older ^{14}C date into account does not change this dating: 2856/2819–2666/2636 BC. The BP ages range from 4216 to 4112 BP.

The ^{14}C age determined by the Erlangen laboratory for the Grave 704 from Quedlinburg-Moorberg represents one of the oldest radiocarbon dates that can be attributed to Stage 1a by means of grave goods: 4215±50 BP (although the oldest ^{14}C date of a grave of the CWC in Saxony-Anhalt comes from Kalzendorf Grave 490 (KIA 38984): 4305±30 BP: 2926–2887 BC (68.3%), but the measurement falls into a period with very unreliable results from the Kiel laboratory (see Friederich *et al.*, 2014) and the fragments of an amphora do not fit this old date (Hüser 2012: 200, fig. 7; 205); the same is true for Grave 489 which dates to Stage 2, but the ^{14}C date is again one of the oldest (Hüser 2012: 199, fig. 6; 205; KIA 38983; 4115±25 BP); therefore both ^{14}C data are not taken into account; see also Lenneis and Stadler

1995). A control measurement by the Mannheim laboratory for Grave 704 yielded a 100-year younger ^{14}C age: 4112±25 BP. Grave 704 contained the skeleton of a man who, following the CWC burial rite, was buried on the right body side with his head to the west. Nearby was the grave of a woman (Grave 171), who, following the CWC burial rite, was buried on the left side of her body with her head to the east. Since the Mannheim ^{14}C date of the female burial is identical to the Mannheim ^{14}C date of the male burial, the Erlangen ^{14}C date, which is 100 years older, is likely too old. Since both are probably a couple, the ^{14}C date of the woman's grave provides a corrective for the man's dating. The chronological correspondence of both burials also attests to the gender-differentiated burial practices of the CWC from its beginning (Schwarz and Tucker 2022). The grave goods from the male grave consist of a trapezoidal flint axe made of Krzemionki flint, only 5.5 cm in diameter, and a flint blade almost twice as long at 10.5 cm (Fig. 2:b; Schwarz and Tucker 2023). The axe is a part of the GAC tradition.

Other graves from the CWC 1a1 stage also contain short and long flint blades (Nohra 6, Eulau VI/172 u, Karsdorf 95), corded beakers (Weißandt-Gölzau), bone needles with crutch-shaped heads (Karsdorf 95), hammer axes with a trapezoidal (Nohra 6) or an elliptical (Hettstedt 1800) neck (when viewed from above; referred to here as the Eulau type), triangular shaped flat axes (Hettstedt 1800), belt plates (Nohra 6), and small beads made of bone discs (Eulau VI/172 u; Fig. 2).

The Stage 1a1 graves from Eulau and Karsdorf, as well as others from Stage 1a2 from Freyburg and Wetzendorf, refute M. Becker's and M. Fröhlich's idea that the first Corded Ware graves in the area between the Saale and Unstrut rivers only appeared between 2600 and 2500 BC (Fröhlich and Becker 2015: 771), with Becker even shortening the existence of the CWC to the years 2550–2250 BC (Becker *et al.*, 2015: 720). However, this merely reflects the occupancy in the grave groups from Oechlitz.

Stage CWC 1a2 (2625–2575 BC):

1a. Eulau, Grave VI/93: 4101±27 BP (KIA-27879): 2843/2672–2580 BC (Haak *et al.*, 2008).
1b. Eulau, Grave VI/93: 4078±30 BP (KIA-34264): 2836/2667–2571/2502 BC (Haak *et al.*, 2008).
2. Pömmelte, Feature 575: 4096±18 BP (MAMS-19530): 2836/2667–2580 BC (Spatzier 2018).
3. Karsdorf, Grave 290: 4095±26 BP (KIA-29552): 2839/2669–2578 BC (Behnke 2015).
4. Quedlinburg, Grave 15128: 4091±52 BP (Erl-7855): 2851/2697–2572/2503 BC (Moos 2006; Rinne 2006).

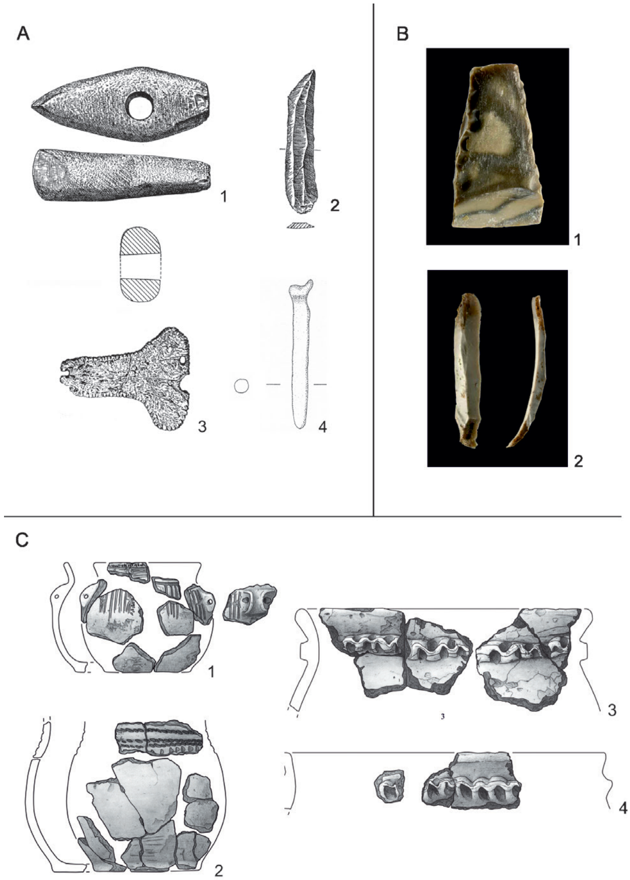

Fig. 2. Materials of the CWC 1a1 stage from radiocarbon-dated graves. A: 1–3 Nohra, grave 6; 4 Karsdorf, grave 95. B: Quedlinburg-Moorberg, grave 704. C: selected ceramic finds from the ritual ditch quadrangle feature 1120 of Pömmelte-Zackmünde. Image credits: Schmidt-Thielbeer 1955; Behnke 2015; Schwarz and Tucker 2022; Spatzier 2018.

5. Egeln-Nord: 4080±20 BP (KI-162): 2829/2633–2573 BC (Furholt 2003: MES 9).
6. Eulau, Grave VI/66: 4078±31 BP (KIA-29116): 2837/2668–2571/2501 BC (Haak *et al.*, 2008).
7. Wetzendorf Grave 4/774: 4077±45 BP (Erl-4846): 2845/2674–2568/2497 BC (Jarecki 2007).
8a. Eulau, Grave VI/99: 4074±24 BP (KIA-27849): 2829/2632–2571/2501 BC (Haak *et al.*, 2008).

8b. Eulau, Grave VI/99: 4073±27 BP (KIA-27850): 2828/2632–2571/2501 BC (Haak *et al.*, 2008).
9. Karsdorf, Grave: 4073±33 BP (KIA-29548): 2835/2667–2569/2499 BC (Behnke 2015).
10. Wetzendorf, Grave 4/163: 4064±29 BP: 2881/2815–2671 BC (Fröhlich and Becker 2015).
11. Freyburg, Lower Grave: 4056±29 BP: 2626–2566/2495 BC (Hille 2012).
12a. Eulau, Grave VI/98: 4053±27 BP (KIA-27852): 2624–2567/2496 BC (Haak *et al.*, 2008).
12b. Eulau, Grave VI/98: 4049±26 BP (KIA-27851): 2622–2566/2495 BC (Haak *et al.*, 2008).
13. Quedlinburg, Grave 15128: 4051±53 BP (Erl-7853): 2663/2632–2475 BC (Schwerdtfeger 2006).

Based on the combination of ^{14}C data, the CWC 1a2 stage can be limited to 2623–2579 BC. The BP ages range from 4101 to 4049 BP.

The inventories of Stage 1a2 correspond to those of Stage 1a1 – e.g., axes with, when viewed from above, a rounded (Eulau VI/93), sometimes slightly chipped neck (Eulau VI/98, VI/99), a roughly faceted axe with a triangular neck (Freyburg), a shell-faced, round-necked flint axe with a ground edge (Eulau VI/66), needles with crutch heads (Eulau VI/66; Karsdorf 290), but are supplemented by additional artifacts (Fig. 3). New additions include bone needles with hammer heads (Egeln-Nord), and bone chisels (Eulau VI/66, Karsdorf 22). Furthermore, in Karsdorf, Grave 22, a broad shoulder-handled amphora with handles over the shoulder arch, an unarticulated cord-ornamented beaker (Fig. 3:c), and a shell brooch were found. Grave 4/163 from Wetzendorf also features the combination of a shoulder-handled amphora and a beaker, each in pairs (Fig. 3:d: Jarecki 2007: 229, Pl. 3). The handles are located below a stitch band on the shoulder arch. While the ^{14}C date of 4147±60 BP obtained in the Erlangen laboratory, which has a high standard deviation, initially appeared too old for the development stage of shoulder-handled amphorae, a new dating now places the grave in the context of Stage 1a2 (Fröhlich and Becker 2015: 765–766, fig. 2). The grave of the mortuary hut (Feature 575) from Pömmelte can also be assigned to Stage 1a2. The deceased's grave goods consist of a partially ground flint axe, a type A2 hammer axe, and two flint blades (Fig. 3:e; Spatzier 2018: 14–16, fig. 6).

The grave from Egeln-Nord (formerly Bleckendorf) possesses a remarkable inventory: in addition to a herringbone-ornamented beaker with small punctures, it includes a copper dagger, a copper awl, and a bone hammer-head needle (Fig. 3:a), thus representing a combination found in the Pit-Grave (Yamna) culture of the northern Black Sea region (Furholt 2003: 48; Schwarz 2022), while the north-south orientation of the deceased is common in the Złota Culture and CWC of Lesser Poland (Furholt 2003: 28; 2008). The cultural affiliation of the grave to the CWC was already recognised by H. Behrens in 1952, then questioned in 1989 by D. W. Müller due to the orientation of the deceased and assigned to the Bell Beaker culture (Stock 2001), and finally corrected again by M. Furholt in 2003 based on the ^{14}C data (Schwarz 2022).

Stage CWC 1b (2575–2450 v. Chr.):

1. Oechlitz[1], Grave 25569: 4033±19 BP (MAMS-17071; recorded in Becker *et al.*, 2015 in the appendix p. 743 under Grave 26569): 2578–2492 BC (Fröhlich and Wüstemann 2017).
2. Goseck, Grave 133: 4032±30 BP (KIA-35412): 2579–2477 BC (unpublished).
3. Oechlitz, Grave 25493: 4032±20 BP (MAMS-17070): 2577–2492 BC (Fröhlich and Wüstemann 2017).
4. Eulau, Grave VII/103: 4027±34 BP (KIA-26664): 2576–2476 BC (Friederich *et al.,* in prep.).
5. Oechlitz, Grave 25665: 4027±23 BP (MAMS-17117): 2576–2489 BC (Fröhlich and Becker 2015).
6. Oechlitz, Grave 15109: 4027±20 BP (MAMS-17173): 2575–2490 BC (Fröhlich and Becker 2015).
7. Mücheln: 4024±27 BP (HD-19534): 2575–2478 BC (Furholt 2003: MES 31).
8. Oechlitz, Grave 25346: 4019±20 BP (MAMS-17095): 2573–2477 BC (Fröhlich and Becker 2015).
9. Oechlitz, Grave 70036: 4015±33 BP (KIA-40716): 2571–2476 BC (Fröhlich and Becker 2015).
10. Oechlitz, Grave 2111: 4014±21 BP (MAMS-17050): 2571–2476 BC (Fröhlich and Becker 2015).
11. Unseburg: 4013±56 BP (Erl-4195): 2621/2584–2466 BC (Furholt 2003: MES 39).
12. Eulau Grave VI/174: 4009±32 BP (KIA-29118): 2569–2475 BC (Friederich *et al.,* in prep.).
13. Eulau Grave VI/172 o: 4009±22 BP (KIA-34260): 2568–2476 BC (Friederich *et al.,* in prep.; o = Obergrab).
14. Karsdorf, Grave 294: 4006±26 BP (KIA-29553): 2568–2475 BC (Behnke 2015).
15. Niederröblingen 3925: 4001±30 BP (KIA-35834): 2568–2473 BC (Müller 2011).
16. Oechlitz, Grave 25576: 3999±20 BP (MAMS-17064): 2566–2474 BC (Fröhlich and Wüstemann 2017).
17. Egeln: 3991±54 BP (KN-4866): 2618/2581–2456 BC (Furholt 2003: MES 15).
18. Oechlitz, Grave 25334: 3989±29 BP (MAMS-11174): 2566–2469 BC (Fröhlich and Becker 2015).

1 For the laboratory numbers of the ^{14}C data from Oechlitz, see Becker *et al.*, 2015: 727–745.

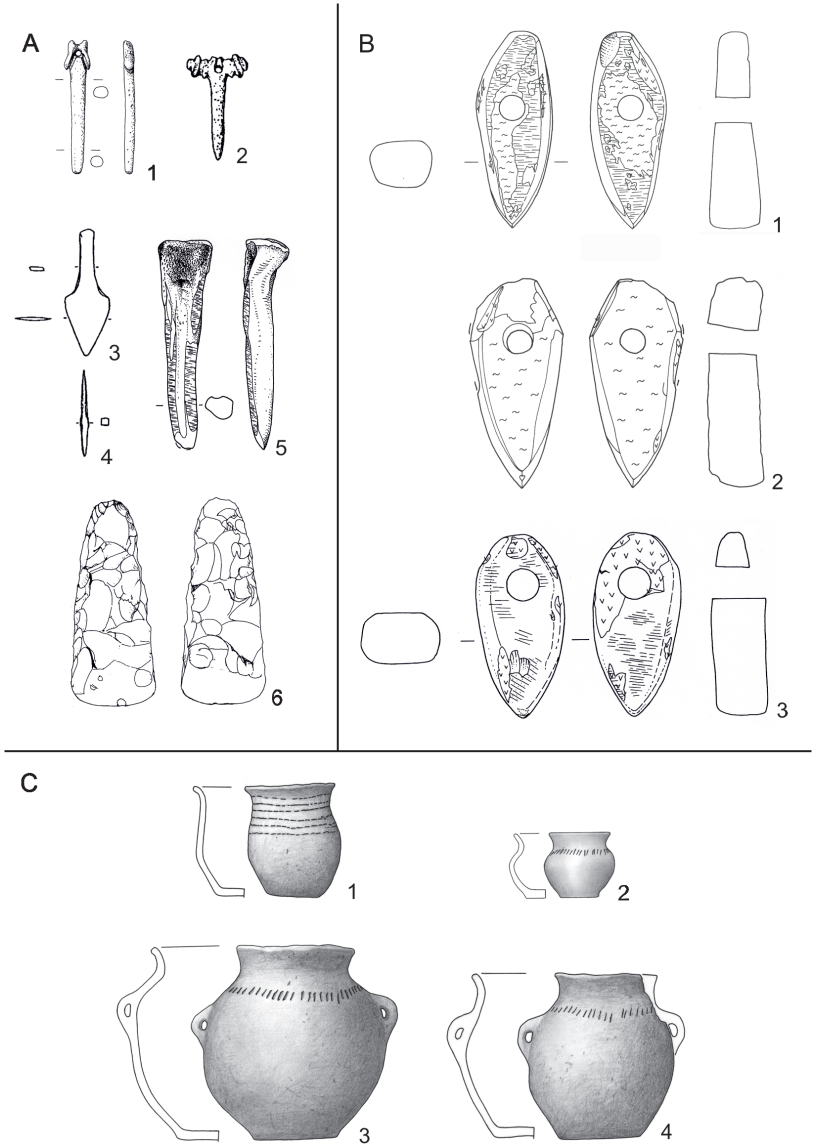

Fig. 3. Materials of stage CWC 1a2 from radiocarbon-dated graves. A: 1, 5–6 Eulau, grave VI/66, 2–4 Egeln-Nord (Bleckendorf); B: 1 Eulau, grave VI/99, 2 Eulau, grave VI/98, 3 Eulau, grave VI/93; C: 1 – Quedlinburg, grave XII/7853, 2 – Egeln-Nord (Bleckendorf), 3, 4 – Karsdorf, grave 22; D: Wetzendorf, grave 4/163; E: Pömmelte, grave 575. Image credits: drawings by L. Kaudelka, Halle (Saale); Matthias 1968; Schwerdtfeger 2006; Schwarz 2022; Behnke 2015; Jarecki 2007; Spatzier 2018.

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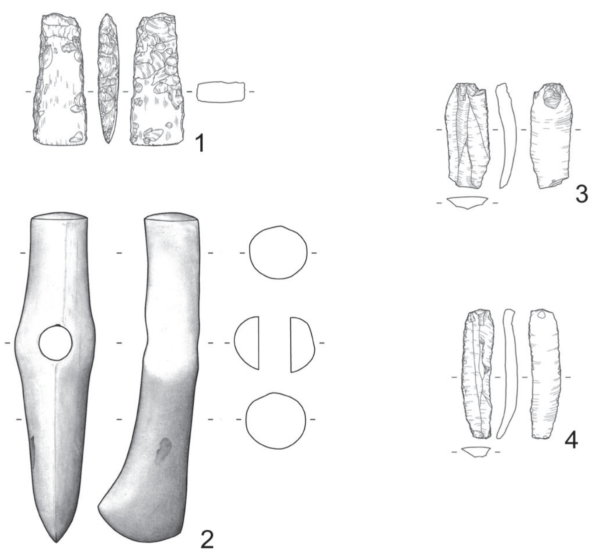


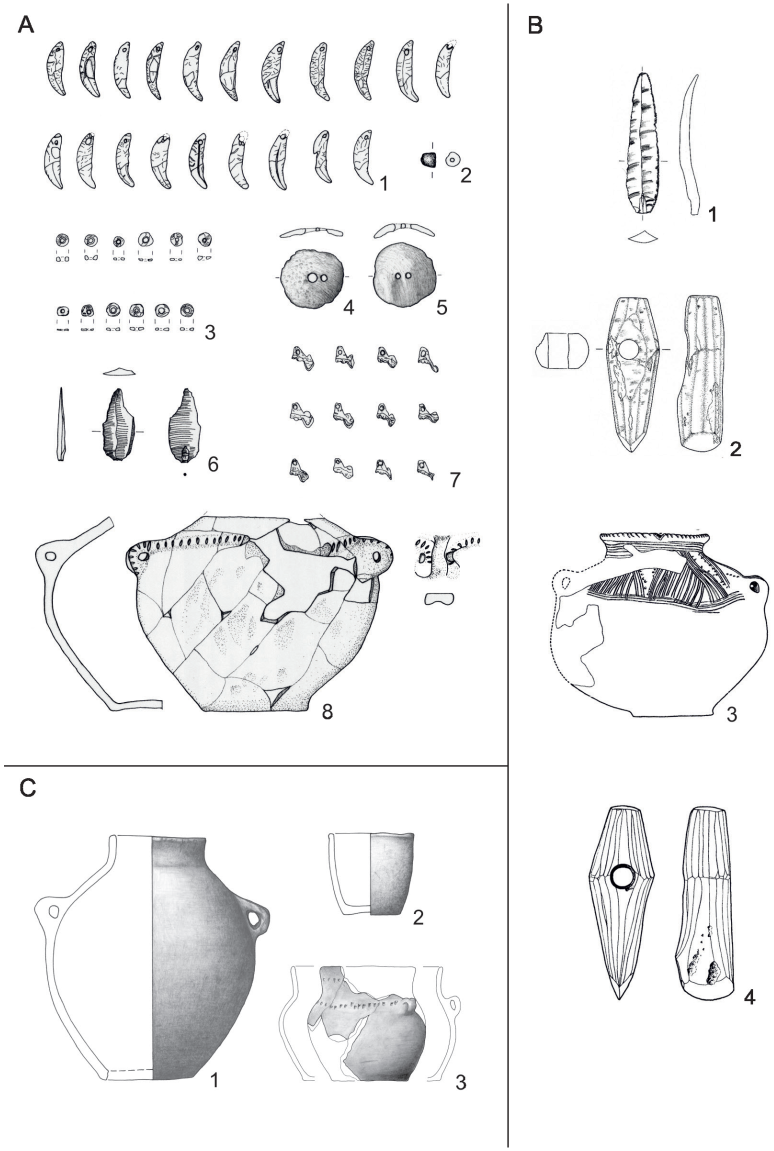
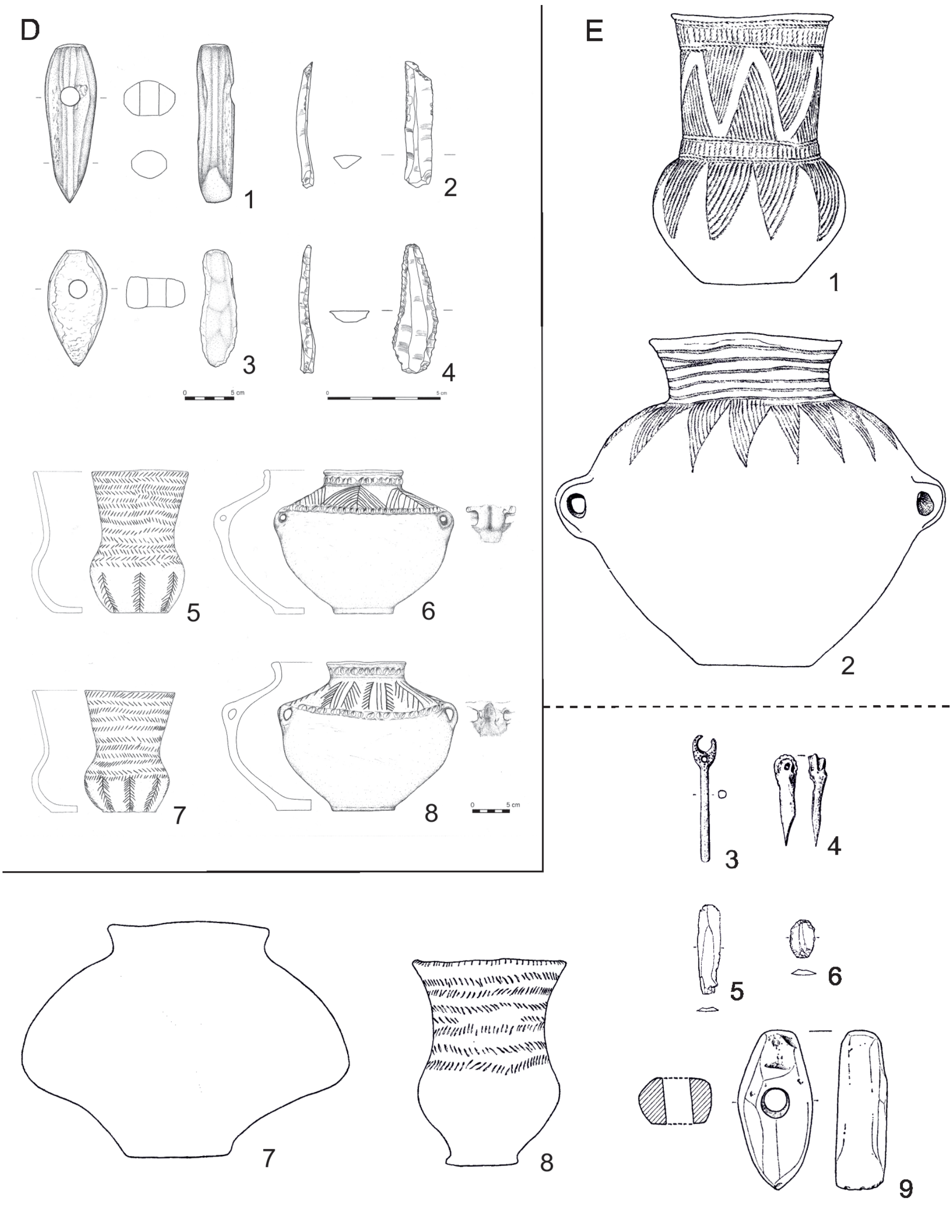


Fig. 4. Materials of stage CWC 1b from radiocarbon-dated graves. A: Esperstedt, grave 4179. B: 1, 2 – Niederröblingen, grave 3925; 3, 4 – Milzau. C: Karsdorf, grave 294. D: Niederröblingen, finding 3448. E: Materials of stages CWC 1b and 2 in two graves in a stratigraphic position one above the other: Peißen: 3–9 lower grave (stage CWC 1b); 1, 2 upper grave (stage CWC 2). Image credits: Leinthaler *et al.*, 2006; Müller 2011; Matthias 1982; Behnke 2015; Müller 2011.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19. Karsdorf, Grave 8: 3987±38 BP (KIA-29547): 2569–2467 BC (Behnke 2015).
20. Eulau, Grave VI/90: 3969±29 BP: 2566–2462 BC (Haak *et al.*, 2008).
21. Esperstedt, Grave 4179: 3967±57 BP (Erl-7779): 2573–2446/2350 BC (Leinthaler *et al.*, 2006).
22. Bad Lauchstädt, Grave 70044: 3963±29 BP (KIA-40717): 2567–2458 BC (Fröhlich and Wüstemann 2017).
23. Eulau, Grave VI/128: 3957±30 BP (KIA-29117): 2566–2454/2360 BC (Friederich *et al.,* in prep.).
24. Oechlitz, Grave 25467: 3949±23 BP (MAMS-17118): 2560–2355 BC (Fröhlich and Becker 2015).

Based on the combination of the ^{14}C data, the duration of Stage CWC 1b can be limited to the years 2567–2476 BC. The BP ages range from 4033 to 3949 BP.

The grave inventories of Stage 1b (Fig. 4) are characterised by herringbone-ornamented beakers with long punctures (Goseck 133, Eulau VII/103; Oechlitz, Graves 25493 and 25576), narrow flint blades with a pointed oval outline (Eulau VI/174, 7/103, Niederröblingen 3925; Oechlitz, Graves 25493, 25569, 25576), and narrowly faceted axes (Niederröblingen 3925). Axes of the Eulau type (Oechlitz, Grave 25576) and weakly faceted axes (Oechlitz, Grave 25493) are still standard. This applies to partially ground flint axes (Graves 25569 and 25576). Axes made of rock appear recently (Bad Lauchstädt, Grave 70044; Oechlitz, Grave 25493). A crutch-headed pin is also found in Oechlitz, Grave 25493.

For the shoulder-handle amphorae, the handle continues to sit on the shoulder arch (Egeln, Karsdorf 294, Mücheln, Niederröblingen 3925, Oechlitz, Graves 2111, 21505, 25334, 25346, 25467, 25493, 25665 and 70036; Bad Lauchstädt, Grave 70044), namely in the case of puncture rows or notch strips below (Mücheln, Niederröblingen 3925, Oechlitz, Graves 25493 and 25665; see also Oechlitz, Grave 25467) and in the case of more complex patterns within the decorative zone (Mücheln; Oechlitz Graves 2111, 21505, 25334 and 25346). Undecorated shoulder-handled amphorae come from Bad Lauchstädt, Grave 70044, and Karsdorf, Grave 294, whose inventory also includes a conical beaker and an amphora-like vessel with a shoulder handle beneath a row of punctures (Fig. 4:c). The position of the handles on the amphora from Karsdorf, Grave 8, is unclear.

The amphora from the "Auf dem Haine" grave in Reichardtswerben (Fig. 5:e; Matthias 1982, pl. 86: 6–9) corresponds in form and decoration to the examples from Milzau (Fig. 4:b) and Niederröblingen (Fig. 4:d). The decoration consists of diagonally hatched triangles, the sides of which are fringed. The handles are positioned below the decoration, almost at the level of the rim. From a typological point of view, this amphora would represent the transition to the belly-handled amphorae.

The connection to the CWC 1 stage is evidenced by the bone crutch-head pin and the faceted axe with flanks that flare out on both sides at the shaft hole (Fig. 5:e). The ^{14}C date (MAMS-44116: 4063±21 BP) encompasses two intervals, the stages CWC 1a2 (2624–2571 BC [53.9%]) and CWC 1b (2516–2501 BC [14.3%]). The BP age of 4063 falls within the range of the ^{14}C data of the CWC 1a2 stage. However, the Reicherdtswerben grave belongs to a series of ^{14}C data from the Mannheim laboratory, which, in my opinion, were comparatively old.

The combination of grave goods, consisting of an axe (Eulau type), a ring-headed pin, and a bone chisel, as well as a herringbone-ornamented beaker, also places the lower grave from Peißen in Stage 1b (Fig. 4:e; Matthias 1982: 133, Pl. 84). This is overlaid by a burial of Stage 2 (upper grave). Its inventory consists of a belly-handled amphora with a short neck of the Braunsdorf type and a high-necked beaker, the shoulders of which are decorated with line-hatched triangles. In contrast, the neck of the beaker is decorated with a recessed zigzag band between line-hatched triangles (Matthias 1982: 133, Pl. 84). For this reason, the grave goods from the Peißen lower grave are depicted in the type table of Stage 1b. The same is true for the inventory from Niederröblingen, Locus 3448 (Fig. 4:d; Müller 2011: 92, fig. 2). Its axe and blade correspond to those of the ^{14}C-dated grave 3925 from Niederröblingen (Fig. 4:b). The inventory from Niederröblingen, interpreted as a depository (Müller 2011: 91), includes the equipment of two graves: an axe, a blade, an amphora, and a beaker. The beakers feature herringbone decoration, while the amphorae are decorated with fir branch patterns, either as a triangular motif or as a fringe of bundles of lines. The handles sit below a notched ledge. One of the axes is faceted, while the other represents the Eulau type and has a blunt, rounded neck. The faceted axe has a narrow blade, while the one from Niederöblingen Grave 3925 is wider (Fig. 4b). In this context, it is also worth mentioning a grave from Milzau, in which a faceted axe with a widened blade was found, together with a shoulder-handled amphora featuring a triangular motif with fir branch decoration (Fig. 4:b: 3 and 4; Matthias 1982: pl. 71; Buchvaldek 1986a). An amphora comparable in shape and decoration to the example from Milzau comes from Grave 21505 in Oechlitz (Fröhlich and Becker 2015: 773, fig. 13). According to the ^{14}C date, it would belong to Stage 1a2 or 1b: 4070±28 BP: 2892/2663–2499 BC, although, based on the analogies just mentioned, dating to Stage 1b would be preferable.

Radiocarbon-dated shoulder-handle amphorae with handles resting on the shoulder arch also come from two ^{14}C-dated graves in Thuringia: Straußfurt, Grave 6/84 (Furholt 2003: MES 38): (KI-4158) 3960±40 BP: 2569–2452/2352 BC; Erfurt, Pit 11b (Furholt 2003: MES 16): (KI-4143): 4040±45 BP: 2622/2585–2476 BC – here in combination with a hammer axe with seam, a trapezoidal axe, a bone chisel, a flint blade and a high-necked cord cup. Grave 2/73 from Großbrembach, illustrated by Furholt (2003: MES 23), contains a shoulder-handled amphora with handles resting on the shoulder arch; one of these handles sits completely below the shoulder band, while the other extends into the decoration from below, features characteristic of Stage 1b of the Central German CWC. However, its ^{14}C age, at 3920±50 BP: 2471–2340/2305 BC, falls chronologically only within Stage 2.

Based on the ^{14}C data, 14 burials with tooth necklaces from the Oechlitz cemetery could be assigned to Stages 1a2–1b based on their time spans. However, the ^{14}C data are not listed in Menke *et al.*'s catalogue of findings (Menke *et al.*, 2017: 280–291). Moreover, they are only entered summarily on the calibration curve without reference to findspots or BP age (Becker and Fröhlich 2017: 293, 294, fig. 2). The time intervals visible in the graph begin around 2625 BC and end around 2450 BC (see also Fröhlich and Becker 2015: 772). The laboratory numbers and ^{14}C data for the graves with tooth necklaces can be found in the appendix by Becker *et al.* (2015: 727–745).

Of 13 graves with animal tooth ornaments from Oechlitz, two (Graves 25355 and 25370) could already be assigned to Stage 1a1 of the CWC based on their ^{14}C data. One grave could be dated to Stage 1a2 or 1b (Grave 25334), while all other graves belong to Stage 1b of the CWC. The graves Esperstedt 4179 and Eulau VI/128 also represent Stage 1b, with the deceased from Esperstedt possessing two shell disc brooches (Leinthaler *et al.*, 2006: 80). Looking at the two earliest ^{14}C dates, it is noticeable that the periods determined based on their calibration are split into four intervals for Grave 25355 (2846–2812 BC [21.1%], 2743–2731 BC [5.6%], 2676–2621 BC [33.3%], 2601–2584 BC [8.2%]) and three intervals for Grave 25370 (2838–2816 BC [14.8%], 2668–2617 BC [33.9%], 2611–2581 BC [19.6%]). This makes it difficult to determine the age of the tooth chains (according to Kahlke 1953/1954) insofar as the intervals in both cases correspond to the Stages CWC 1a1 and 1a2. In contrast, combining all ^{14}C data from the Oechlitz graves narrows the animal tooth necklace fittings to 2573–2491 BC, thus to Stage CWC 1b, excluding the oldest graves. Regardless, Stage CWC 1a2 should be considered when dating the burials with tooth necklaces. The ^{14}C date of Grave 59 from Karsdorf could be assessed differently (Behnke 2015: 183–185; Schwarz and Strahm respect this old ^{14}C date in 2022): 4163±27 BP: 2873/2812–2676 BC, which would suggest a dating of the burials with tooth ornaments already in Stage CWC 1a1, but this may be too old, which is why the vessels here cannot be assigned to one of the sub-stages of level CWC 1. Even if the data from the Oechlitz graves gives the impression that the use of animal tooth ornaments ends at the end of Stage CWC 1b, it can still be found elsewhere in graves of Stage CWC 2. This applies to almost all of the graves with tooth chains from Thuringia compiled by Kahlke in 1953/1954: Niederzimmern

(Kahlke 1953/1954: 163–167, fig. 5: 1–3), Udestedt (Kahlke 1953/1954: 167–169, fig. 6), Hardisleben (Kahlke 1953/1954: 169–171, fig. 7), Gotha-Siebleben (Kahlke 1953/1954: 171–173, fig. 8), Weimar-Lützendorf Grave VII (Kahlke 1953/1954: 174–176, fig. 10), Neumark (Kahlke 1953/1954: 177–178, fig. 12).

Burials with tooth necklaces are found in the following ^{14}C-dated Oechlitz graves:
Grave 25355: MAMS-17088: 4110±22 BP: 2846/2676–2584 BC.
Grave 25370: MAMS-17067: 4100±19 BP: 2838/2668–2581 BC.
Grave 25334: MAMS-111778: 4059±31 BP: 2630–2494 BC.
Grave 25334: MAMS-111777: 4053±31 BP: 2626–2494 BC.
Grave 25570: MAMS-17074: 4031±20 BP: 2577–2492 BC.
Grave 20055: MAMS-111751: 4027±22 BP: 2576–2489 BC.
Grave 25496: MAMS-25570: 4026±21 BP: 2575–2489 BC.
Grave 26517: MAMS-17077: 4016±22 BP: 2571–2476 BC.
Grave 26615: MAMS-17083: 4014±22 BP: 2571–2476 BC.
Grave 20055: MAMS-111750: 4007±28 BP: 2568–2475 BC.
Grave 15109: MAMS-17174: 4002±23 BP: 2567–2475 BC.
Grave 26617: MAMS-17086: 3995±23 BP: 2566–2471 BC.
Grave 15115: MAMS-17176: 3977±20 BP: 2561–2468 BC.
Grave 164: MAMS-21679: 3761±28 BP: 2276–2136 BC.

Stage CWC 2 (2450–2325 BC)
In contrast to the CWC Level 1, radiocarbon-dated graves from CWC Level 2, as revealed by recent excavations, have been rarely published. An exception are ten graves from Oechlitz, whose ^{14}C ages fall within the period (3930–3875 BP) of the ^{14}C data determined for CWC Level 2, but whose inventories are only depicted in postage stamp format (Fröhlich and Becker 2015: 773, fig. 13 [Feat. 25341]; 774, fig. 14). Therefore, one must also rely on the grave finds published by J. Müller and M. Furholt with ^{14}C data with higher standard deviations, which are less significant in this area of the ^{14}C curve.

1. Stotternheim, Grave 5/76: 3930±45 BP (KI-4157): 2475–2341/2309 BC (Furholt 2003: MES 37).
2. Oechlitz[2], Grave 25341: 3914±25 BP (MAMS-17097): 2465–2349 BP (Fröhlich and Becker 2015).
3. Oechlitz, Grave 25645.2: 3909±20 BP (MAMS-111790): 2462–2349 BC (Fröhlich and Becker 2015).
4. Oechlitz, Grave 25675: 3900±22 BP (MAMS-17110): 2459–2346 BC (Fröhlich and Becker 2015).

2 For the laboratory numbers of the ^{14}C data from Oechlitz, see Becker *et al.*, 2015: 727–745.

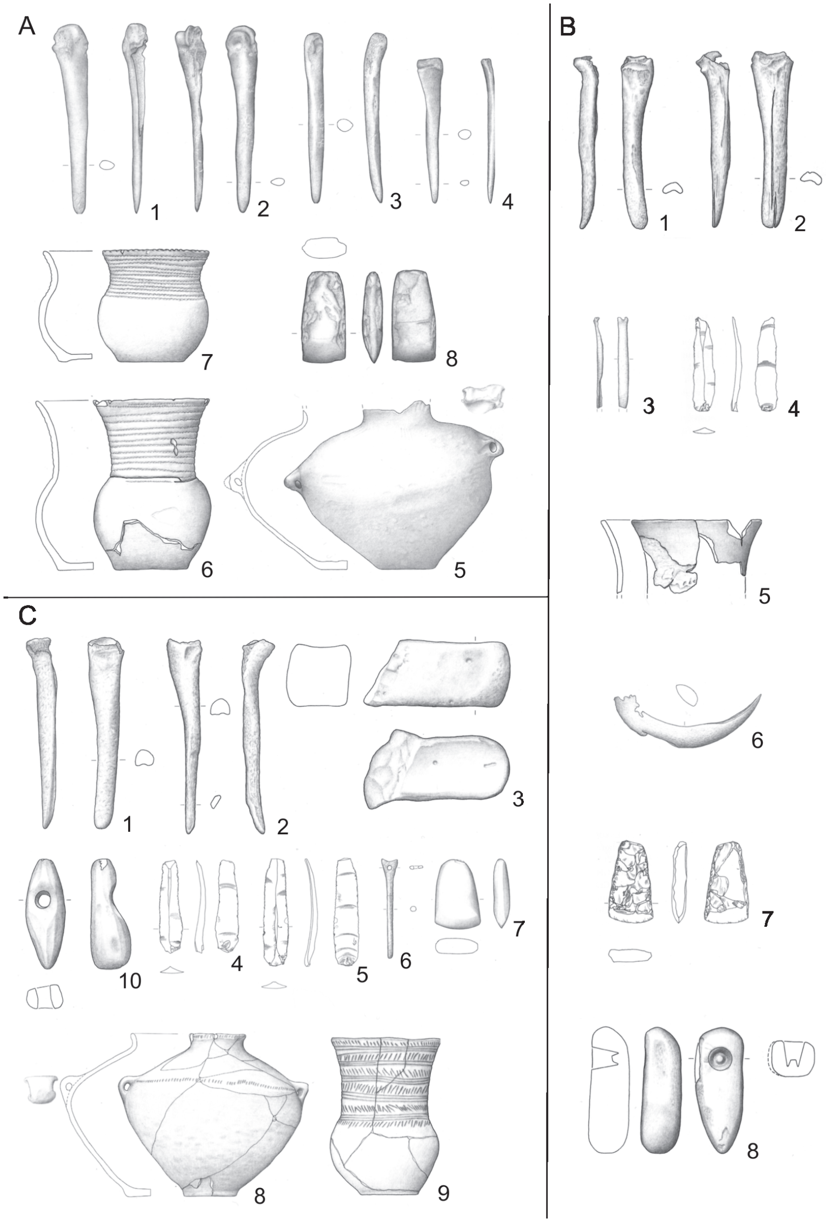

Fig. 5. Materials of stage CWC 1b from radiocarbon-dated graves. A: Bad Lauchstädt, grave 70044. B: Oechlitz, grave 25493. C: Oechlitz, grave 25569. D: Oechlitz, grave 25576. E: Reichardtswerben, "Auf dem Haine". Image credits: Fröhlich and Wüstemann 2017; Matthias 1982.

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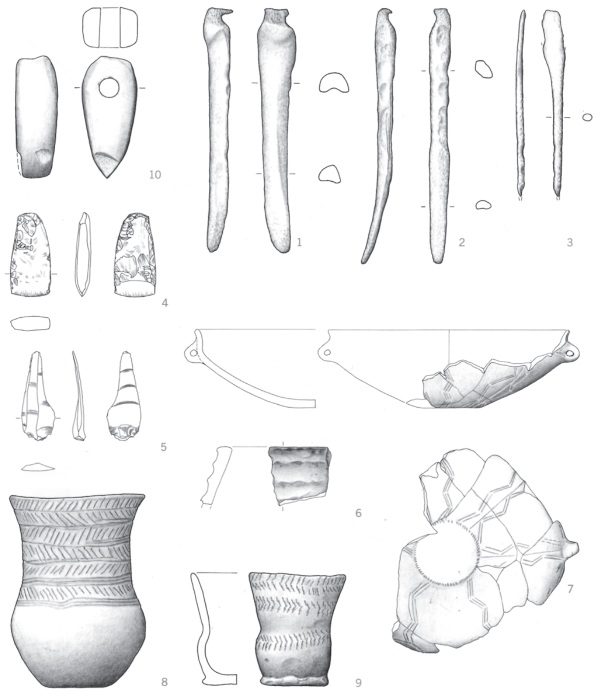

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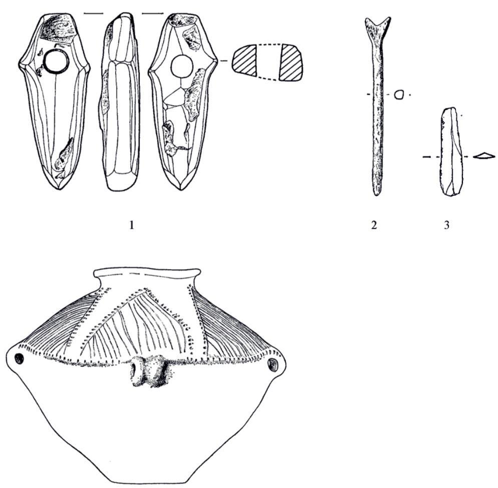

5. Oechlitz, Grave 20787: 3898±18 BP (MAMS-18137): 2458–2347 BC (Fröhlich and Becker 2015).
6. ForstLeina, Grave 33/3: 3890±40 BP (KN-I.319): 2458–2307 BC (Furholt 2003: MES 20).
7. Erfurt-Gispersleben: 3890±40 BP (KIA-2689): 2458–2307 BC (Furholt 2003: MES 18).
8. Oechlitz, Grave 25645.4: 3886±23 BP (MAMS-17272): 2456–2341/2310 BC (Fröhlich and Becker 2015).
9. Oechlitz, Grave 30090: 3882±21 BP (MAMS-111808): 2454–2303 BC (Fröhlich and Becker 2015).
10. Oechlitz, Grave 25645: 3880±10 BP: 2452–2304 BC (Fröhlich and Becker 2017).
10a. Oechlitz, Grave 25645-1: 3846±18 BP (MAMS-17268): 2394–2210 BC (Fröhlich and Becker 2017).
10b. Oechlitz, Grave 25645-2: 3935±24 BP (MAMS-17269): 2472–2350 BC (Fröhlich and Becker 2017).
10c. Oechlitz, Grave 25645-3: 3879±24 BP (MAMS-17270): 2453–2299 BC (Fröhlich and Becker 2017).
10d. Oechlitz, Grave 25645-4: 3881±23 BP (MAMS-17271): 2454–2301 BC (Fröhlich and Becker 2017).
10e. Oechlitz, Grave 25645-5: 3886±23 BP (MAMS-17272): 2456–2310 BC (Fröhlich and Becker 2017).
11. Hausneindorf, Grave 1: 3876±52 BP (KN-4893): 2456–2294 BC (Furholt 2003: MES 26).
12. Braunsdorf, Grave 12: 3875±40 BP (KN-4891): 2454–2295 BC (Furholt 2003: MES 10).

Based on the combination of the ^{14}C data, the duration of Stage CWC 2 can be limited to the years 2455–2345 BC, whereby a typical ^{14}C age was determined based on the combination of a series (green series) of five ^{14}C dates from the multiple Grave 25645 from Oechlitz (3880±10 BP: 2452–2304 BC) and calibrated with the ^{14}C dates from the other graves (Fröhlich and Becker 2017: 312, fig. 11). Compared to the dating range of the multiple grave calculated based on the combination of the five ^{14}C dates, the modelling, assuming their contemporaneity, leads to no difference: 2452–2298 BC (Fröhlich and Becker 2017: 313, fig. 12; contrary to Becker and Fröhlich's view that it is "obviously a mixed inventory of the Corded Ware and Bell Beaker cultures" (Fröhlich and Becker 2017: 312), the grave must be attributed exclusively to the CWC, because the postulated bell beaker represents a beaker of the Central German CWC.

Belly-handled amphorae are characteristic of the CWC 2 stage (Fig. 6; Fröhlich and Becker 2015: 774, fig. 14: Oechlitz, Graves 20787, 25638.2 and 25645.4).

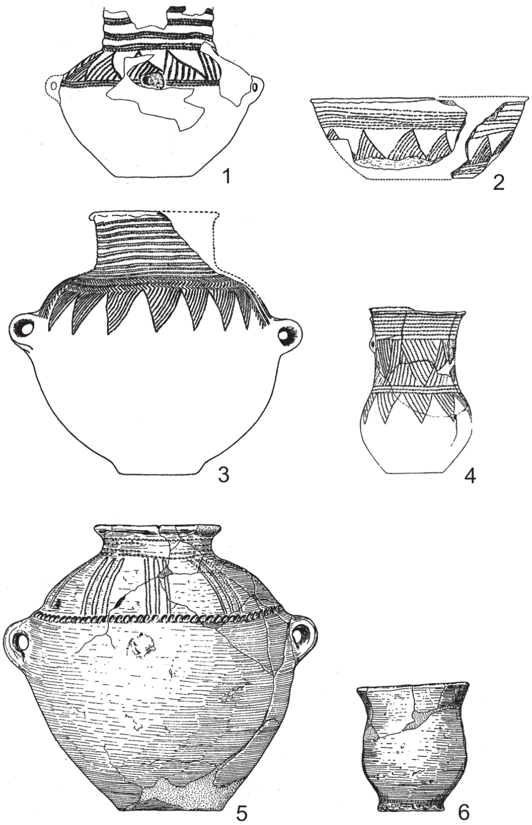

Fig. 6. Forms of stage CWC 2 from radiocarbon-dated grave finds. 1–2 – Hausneindorf, Grave 1; 3 – Braunsdorf, Grave 12; 4 – Forst Leina, Grave 33/3; 5–6 – Erfurt-Gispersleben. Image credits: Furholt 2003.

In the Middle Saale Group (MSG), Stage 2 is characterised by high-necked amphorae of the Adendorf type and short-necked amphorae of the Braunsdorf type. In addition, there are high-necked beakers (see also Fröhlich and Becker 2015: 774, fig. 14: Oechlitz, Graves 25645.2 and 30090). Furthermore, there are special vessels not found in other regional groups, such as cylindrical beakers and lidded jars. All vessels specific to the MSG share a decoration consisting of vertical ladder bands or triangles hatched horizontally, more rarely vertically or parallel to the catheti, with furrowed stitch lines, incised lines, or cord lines, which were applied suspended or offset from one another. The offset triangles either leave a zigzag band free or butt flush together in a braided band pattern, with no discernible chronological difference between the two patterns (for example, the high-necked beaker from Grave 33/3 from the Leina Forest, with a wide braided band decoration, dates to the beginning of Stage CWC 2).

Based on the combination of a belly-handled amphora and a handled vessel, Wetzendorf Grave 4/590 can also be assigned to the CWC 2 stage (Jarecki 2007: 207, 231, Pl. 5). Two ^{14}C dates are available for this grave, both of which are too old compared to the otherwise determined values. One sample comes from Erlangen (Erl-4842; 3967±79 BP: 2578–2342 BC; Jarecki 2007: 220, table 4), while the other comes from Mannheim (MAMS-21677; 3997±28 BP: 2567–2471 BC; Becker *et al.*, 2015; Fröhlich and Becker 2015). Only the Erlangen ^{14}C date also covers the period of 3450–2325 BC determined for Stage CWC 2, while the Mannheim ^{14}C date falls entirely within the period of Stage CWC 1b.

Stage CWC 3 (2325-2200 BC):

1. Drosa, Grave 2: 3843±39 BP (KN-4892): 2402/2348–2205 BC (Furholt 2003: MES 14).
2. Drosa, Grave 9: 3830±18 BP (HD-18963): 2333–2206 BC (Furholt 2003: MES 13).
3. Karsdorf, Grave 67: 3829±26 BP (KIA-29550): 2308–2204 BC (Behnke 2015).
4. Quedlinburg, Grave XII/6256: 3820±42 BP (Erl-7038): 2342–2199/2152 BC (Peters 2006; Rinne 2006).
5. Oechlitz[3], Grave 30115: 3816±24 BP (MAMS-17273): 2291–2204 BP (Fröhlich and Becker 2015).
6. Oechlitz Grave 25632: 3805±22 BP (MAMS-17111): 2286–2202 BP (Fröhlich and Becker 2015).

Based on the combination of ^{14}C data, the duration of the CWC 3 stage can be limited to 2290–2207 BC. The BP ages range from 3843 to 3805 BP.

Of the inventories assigned to Stage CWC 3, primarily based on their ^{14}C ages, only the two graves from the Saale estuary group from Drosa provide a typochronological basis. The belly-handled amphorae differ from the typologically older (although not yet radiocarbon-dated) representatives of the CWC 2 stage of the Saale estuary group by a shortened neck that has degenerated into a steep rim, with a zigzag band possibly running along the base. A similar development to a belly-handled amphora with a rudimentary neck is depicted by Furholt (2003: MES 8) from Bilzingsleben, Grave 23, whose radiocarbon date has a high standard deviation and, considering its origin from the Saale estuary group, dates it too late into the 22nd century BC: (KN-4890)

3 Regarding the laboratory numbers: the ^{14}C data from Oechlitz, see Becker *et al.*, 2015: 727–745.

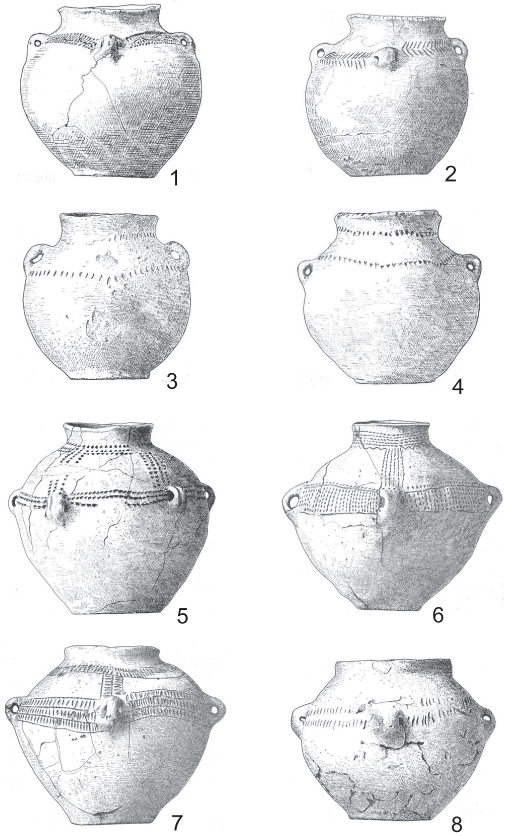

Fig. 7. Chronological sequence of the amphorae of the Saale Estuary Group. 1–3 – shoulder-handle amphoras from stage CWC 1a; 4 – shoulder-handle amphoras from stage 1a2; 5–6 – belly-handle amphoras from stage CWC 2; 7–8 – belly-handle amphoras with rudimentary necks from stage CWC 3. Locations: 1. Schwarz, 2. Wulfen, 3. Hohsdorf, 4. Bobbe, 5. Drosa, 6. Gerlebogk, 7. Latdorf, 8. Kleinpaschleben. Image credits: Lucas 1965.

3700±60 BP: 2198–2021/1981BC. In addition to the belly-handled amphorae from Drosa, the beakers from Quedlinburg XII/6256 and Karsdorf 67 also differ from older examples by their faded profile and rudimentary decoration. The decoration on the Quedlinburg beaker consists of narrow bundles of horizontal incised lines (Peters 2006: 115, fig. 7), while the decoration on the Karsdorf beaker consists of widely spaced cord lines intersected by vertical cord lines in a grid pattern (Behnke 2015). The beaker from Quedlinburg XII/6256, which resembles those of the Single Grave

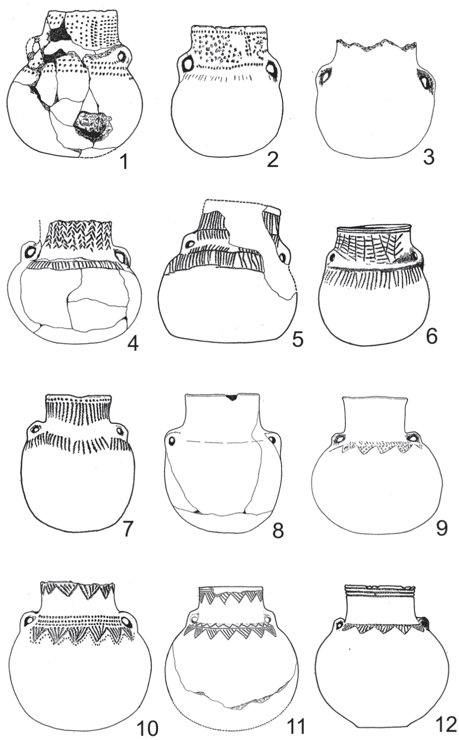

Fig. 8. Late globular amphorae of stage GAC 3: 1 – Wölpke, OT Badeleben; 2 – Diebzig; 3 – Groß Quenstedt; 4 – Deesdorf; 5 – Weißandt-Gälzau; 6 – Hillersleben, OT Paxförde; 7 – Bertkow, OT Plätz; 8 – Barby; 9 – Mittelhausen; 10 – Barby; 11 – Quenstedt; 12 – Meseberg. Image credits: Beier 1988.

Culture (see also Peters 2006: 114), was found as a contact find with a four-fox bowl featuring metope decoration in a Bell Beaker culture grave (right SE–NW burial, with the head facing SE and the view to NNE). The vessel decorated with cord lines from Oechlitz, Grave 25632, is also a new form (Fröhlich and Becker 2015: 774, fig. 14), while the amphora found fragmentarily in Oechlitz Grave 30115 is striking due to its narrow bottle-shaped neck (Fröhlich and Becker 2015: 774, fig. 14).

The extent to which the CWC continued to exist after 2200 BC until 2125 or 2050 BC, and whether a form representative of an assumed CWC 4 stage can be identified, must be clarified based on further ^{14}C data. The grave with the corded beaker from Quedlinburg falls within this horizon, Grave XII/1266 (Schwerdtfeger

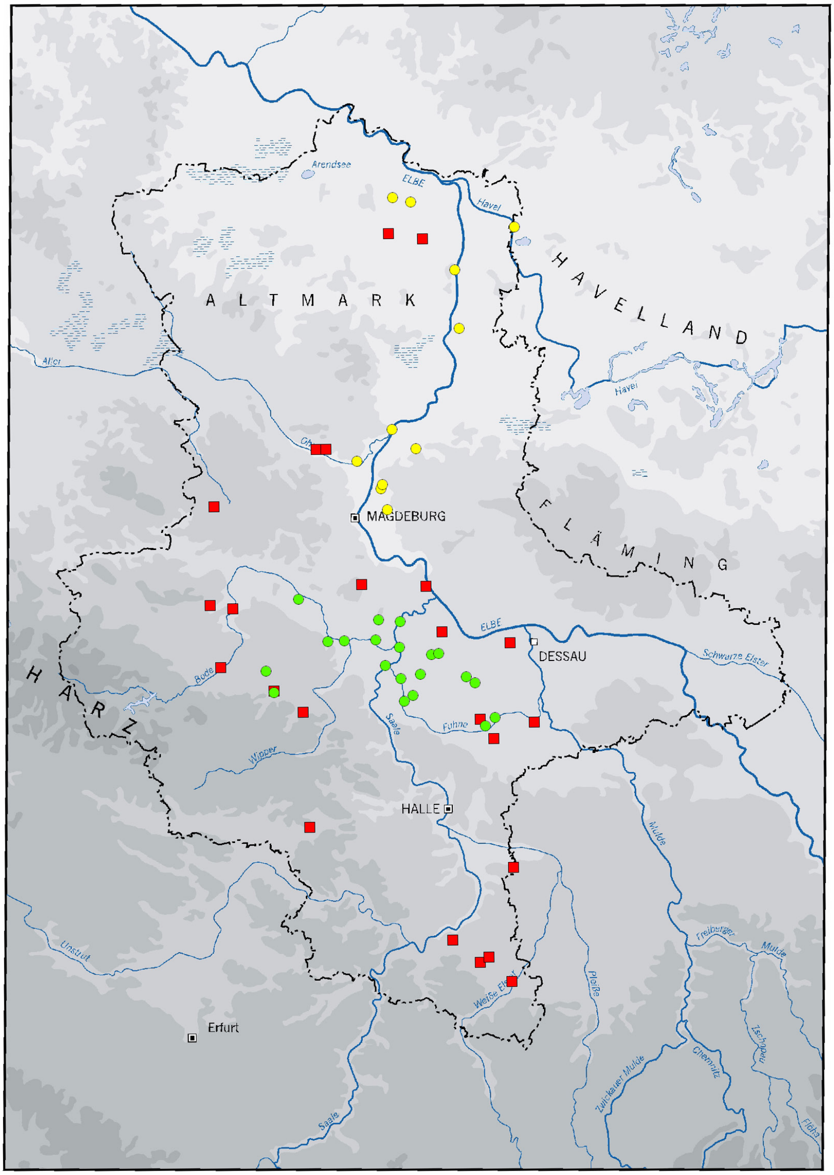

Fig. 9. Distribution of grave finds from the late Globular Amphora Culture (stage GAC 3: red), the CWC 1 stage of the Saale Estuary Group (green), and the early stage of the Schönfeld Culture (Fischbeck Group according to Wetzel 1978: yellow).

2006: 107, fig. 4): 3792±50 BP (Erl-7042), 2297–2139 BC. The SSW–NNE orientation of the right body position corresponds to the rite of the Bell Beaker or Únětice culture (Schwerdtfeger 2006: 107). From another perspective, the longer cultural autonomy of CWC communities in the northern Harz region is only suggested by the emergence of the Únětice Culture, which dates back to around 2125 BC. Late evidence is found in Thuringia, in Kleinromstedt, Grave 4/76 (Furholt 2003: MES 27), whose inventory consists of two bowls with rimmed eyelets: 3760±30 BP (KIA-2968), 2276–2136/2067 BC. The cord-decorated vessel from Aspenstedt, Grave 3 (Furholt 2003: MES 1), on the other hand, is a funnel-shaped beaker of the Únětice Culture, so the dating after 2200 BC is not surprising: 3728±48 BP (KN-4886), 2200–2037 BC.

The typochronological development of amphorae can be traced most clearly in the Saale Estuary Group – SEG (Fig. 7). There, the shoulder-handled amphorae of Stage CWC 1 are followed by the belly-handled amphorae with a pronounced neck in Stage CWC 2, and the belly-handled amphorae with a rudimentary neck in Stage CWC 3. Based on grave finds, only Stage CWC 3 has been ^{14}C-dated. However, a ^{14}C-dated find exists for a shoulder-handled amphora of Stage 1a1 from Pömmelte, in the form of a quadrangle in the northern corner of which "about 0.10–0.15 m above the trench floor at the boundary of the two backfill layers" contained an accumulation of sherds (Spatzier 2018: 11). This "contained the fragments of a beaker with a cord-decorated neck [...], a small line-bundle amphora [...], and sherds of five to seven large wavy-ribbon vessels" (Spatzier 2018: 11, fig. 2: c). Based on charcoal remains, two ^{14}C dates were established in Mannheim (Spatzier 2018: 14, fig. 5): 4253±23 BP (MAMS 12314), 2901–2881 BC and 4206±23 BP (MAMS 12315), 2887/2803–2707 BC. The first is too old for the CWC in Saxony-Anhalt (with an old wood effect), while the second fits well within the framework of Stage 1a1. However, other aspects also support the early dating of the shoulder-handle amphorae. First, shoulder-handle amphorae from the SEG refer to the amphorae of the late GAC (Fig. 8), which is clearly expressed in the shoulder decoration (rows of punctures, triangles, ladder band). This is particularly elucidated by the amphorae from Baalberge, Crüchern, Neugattersleben, and the Köthen region, which are characteristic of Stage 1 of the SEG (Lucas 1965: pls. 2, 7, 16 and 20). If one maps the globular amphorae claimed for Level 3 (Figs 8 and 9; Schwarz 2015), they exclude each other in their distribution with the shoulder-handle amphoras of the SEG, which suggests contemporaneity. By the way, this also applies to the early stage of the Schönfeld culture, represented by the Fischbeck group (Wetzel 1978; Schwarz 2015: 675, fig. 3). The ^{14}C age of the grave of Stage GAC 3 from Weißandt-Gölzau (4150±30 BP, 2869/2816–2669 BC agrees with that of the SKK 1a1 stage.

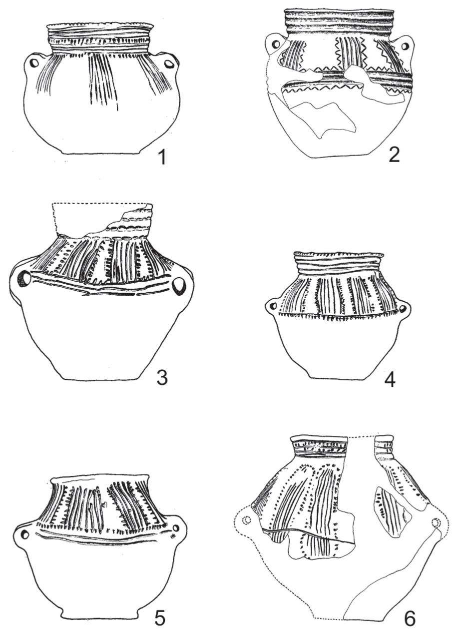

Fig. 10. Chronology of amphorae from the North Harz Group. 1–2 – Shoulder-handled amphoras from stage CWC 1: 1 Egeln, 2: Emersleben; 3–6 – Belly-handled amphoras from stage CWC 2: 3 Schneidlingen, 4: Westerhausen, 5: Tarthun, 6: Schwanebeck. Image credits: Matthias 1968.

Since the shoulder-handle amphorae of the SEG typologically include early examples, where the handles are attached close to the neck and integrated into the shoulder decoration, and those where they move onto the shoulder arch and sit below the shoulder decoration, the amphorae of the SKK 1 stage of the SEG could be divided into two stages, CWC-SEG 1a and 1b, which probably correspond to Stages 1a and 1b of the Central German CWC, where the first shoulder-handle amphorae with handles sitting above the shoulder arch appear in Stage 1b of the CWC (Karsdorf 22). Figure 7 provides an overview of the chronology of the SEG amphorae.

If one assumes that shoulder-handle amphorae are older than belly-handle amphorae, then the so-called North Harz amphorae can no longer be assigned solely to the early CWC, as U. Fischer *et al.* suggested (Fischer 1969). Instead, they are distributed at least between the CWC 1 and 2 stages, as shown in Fig. 10. However, the bundle of cords does not allow for further differentiation of the shoulder-handle amphorae due to the position of the handles within or below the decoration. Shoulder-handle amphorae with handles below the decoration are primarily found in the Middle Saale and South Harz groups of the CWC (see below). However, there are also occasional shoulder-handle amphorae whose handles are incorporated into the decoration. Some of these early shoulder-handle amphorae exhibit ornamentation of the late GAC, such as lattice rhombi (Bottendorf: Matthias 1974: pl. 23: 1) and dotted lines (Bottendorf: Matthias 1974: pl. 18: 15; Stößen: unpublished). The group of early shoulder-handle amphorae includes several other amphorae, such as an amphora from Halle with a checkerboard decoration (Matthias 1982: pl. 44: 1), an amphora from Stößen with hatched triangles and a recessed notched zigzag band (unpublished), and an amphora from Naumburg-Grochlitz with a fir branch pattern (Matthias 1974: pl. 84: 2). The fir branch pattern is particularly common in shoulder-handle amphorae with handles below the decoration, where it appears in several variants: as a branch, as a triangle, as a fringe of bundles of lines of varying widths (Fig. 4d). Despite their multifaceted nature, the ornaments of the so-called Mansfeld style do not yet appear on shoulder--handled amphorae, and thus in the CWC 1 stage, but only on belly-handled amphorae of the CWC 2 stage.

Modelling of the radiocarbon dates with the stage boundary function in Oxcal v.4.4 of the successive sub-stages 1a1, 1a2, 1b, 2 and 3 (Fig. 14) leads to the following narrow dating ranges when only the 1σ values are considered (2σ values added in parentheses):

Stage 1a1 Start 2781–2674 BC (2896–2633 BC).
Stage 1a1 Duration 2768–2629 BC (2880–2605 BC).
Transition Stages 1a1/1a2 2671–2619 BC (2682–2586 BC).
Stage 1a2 Duration 2665–2509 BC (2673–2504 BC).
Transition Stages 1a2/1b 2579–2502 BC (2581–2498 BC).
Stage 1b Duration 2576–2460 BC (2579–2451 BC).
Transition Stages 1b/2 2471–2455 BC (2556–2442 BC).
Stage 2 Duration 2467–2291 (2476–2281 BC).
Transition Stages 2/3 2356–2281 BC (2432–2245 BC).
Stage 3 Duration 2339–2205 BC (2392–2197 BC).
Stage 3 End 2283–2200 (2292–2149 BC).

According to the 1σ values, Stage 1 of the CWC would not begin until 2781/2768 BC, which is significantly later than would be assumed based on the combined dates (2852/2820 BC). According to the calculations, Stage CWC 1b begins around 2575 BC, Stage CWC 2 shortly before 2450 BC, and Stage 3 shortly after 2350 BC. The end of Stage 3, around 2200 BC, is marked by the selection of graves, but it aligns well with the beginning of the Únětice Culture (Schwarz

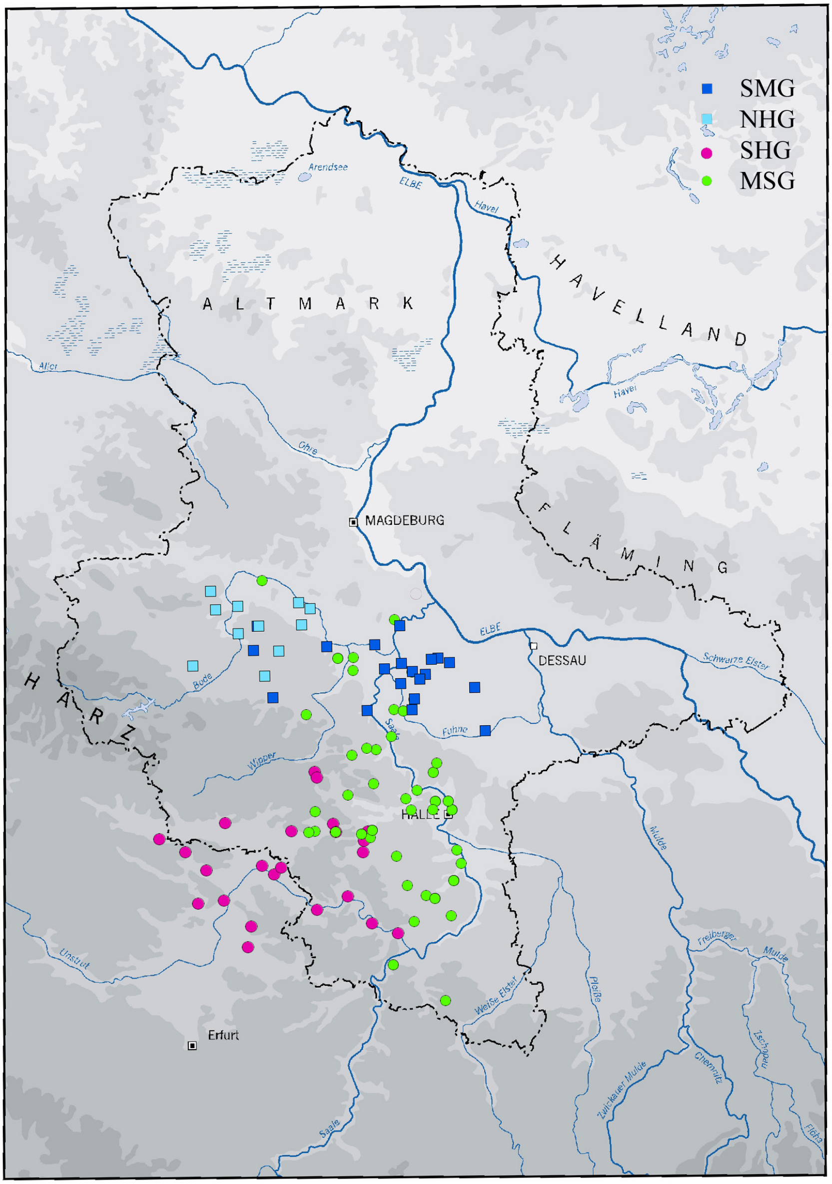

Fig. 11. Distribution of the four regional groups of the Middle German Corded Ware Culture in Saxony-Anhalt: dark blue: Saale Estuary Group (SEG), light blue: North Harz Group (NHG), red: South Harz Group (SHG), green: Middle Saale Group (MSG).

2021c). The beginning of Stage 1a2 is more challenging to determine and falls within the period between 2665 BC and 2629 BC based on the end of Stage 1a1 and the beginning of Stage 1a2. Its end is determined by the beginning of Stage 1b around 2575 BC.

A number of ^{14}C data were compiled and published in tabular form from the Corded Ware graves of Salzmünde and Gimritz, particularly with regard to Stage 1 of the SKK (Meller and Friederich 2019: 294–309). However, since with three exceptions (Grave 183: Ergold 2019: 60 fig. 2; 62 fig. 4,1–3; Grave 4652: Schunke 2019; find 12472: Jarecki 2019: 75, 76, fig. 11), which all belong to Stage SKK 2, no accompanying finds are described or depicted, they are, although based on the ^{14}C data they might belong to Stages 1a1 (Graves 3205, 3877, 12020, 12141), 1a2/1b (Graves 4650, 12237, 12355 and Hoard find 12472) and 1b (Graves 3207, 4204, 12021, 12233, 12238,12239) not dealt with in this article, which is concerned with a typochronological assessment of the finds.

DISTRIBUTION OF CORDED WARE GROUPS IN SAXONY-ANHALT

From 2450 BC onwards, a rich repertoire of vessel shapes and ornaments developed, allowing the CWC in Saxony-Anhalt to be divided into four regional groups. Their designations are based on the catalogues of Central German Corded Ware (Lucas 1965; Matthias 1968; 1974; 1982): the Saale Estuary Group (SEG), the Middle Saale Group (MSG), the North Harz Group (NHG), and the South Harz Group (SHG). Their distribution areas are shown in Fig. 11.

1. East Harz amphorae are characteristic of the SEG, although with the caveat that the specimens of the CWC-SEG 3 stage with stunted necks are also distributed outside the boundaries of the SEG, especially in the NHG (Fig. 12:a).
2. The North Harz amphorae define the NHG, as was stated by U. Fischer (1969). In addition, there are curved cord-ornamented beakers, characterised by a rim-mounted nose or eyelet, which probably represent the late CWC 3 stage of the NHG (e.g., the beakers from Gröningen and Rhoden: Matthias 1968: pl. 14, 36; Fig. 12:b).
3. The distribution area of the SHG is best described based on the amphorae with eyelets at the base of the neck. In addition, other specific ornamental details appear on the belly-handled amphorae, such as the horizontal lines covering the shoulder from the neck to the upper attachment of the handle. These also show a peripheral scattering into the MSG and delimit the distribution area less sharply than the amphorae with eyelets (Fig. 12:c).

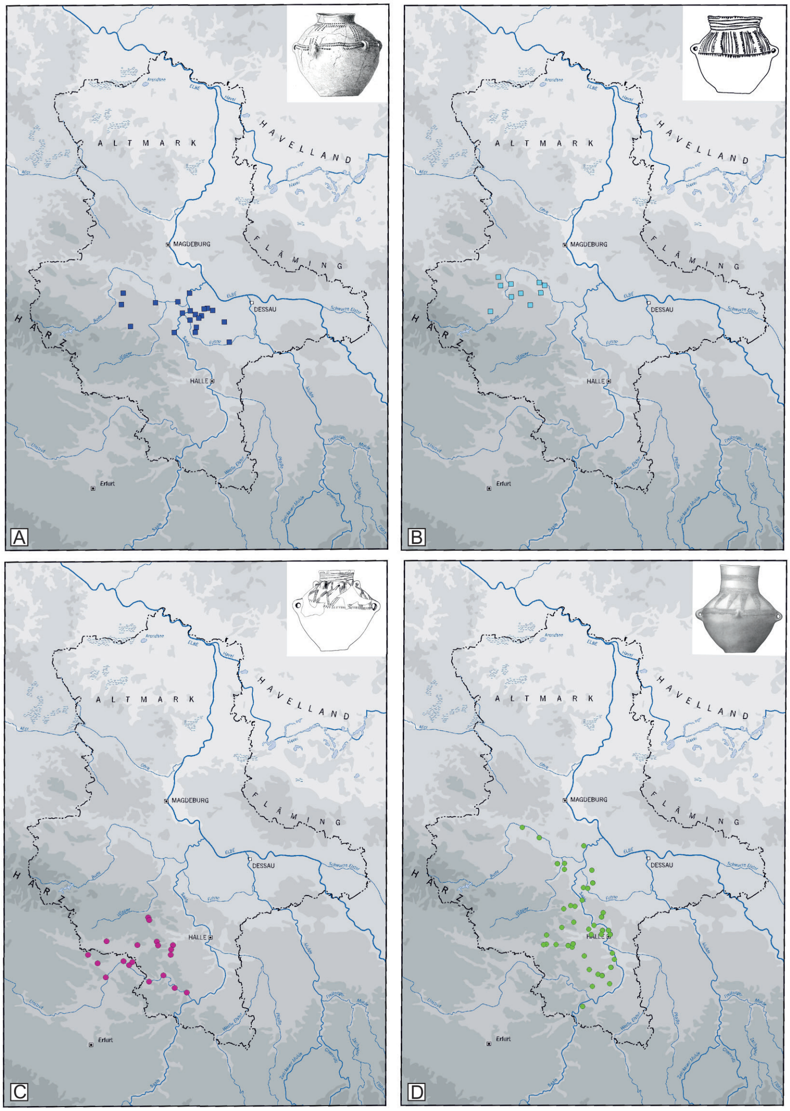

Fig. 12. A – Distribution of the Saale Estuary Group based on the East Harz amphorae (stages CWC 1–2). Image credits: Lucas 1965: pl. 11: 1; B – Distribution of the North Harz Group based on the North Harz amphorae and North Harz beakers (stages CWC 1–2). Image credits: Matthias 1968: pl. 46: 14; C – Distribution of the South Harz Group based on the eyelet-ring amphorae (stage CWC 2). Image credits: Matthias 1974: pl. 35: 2; D – Distribution of the Mittelsaale Group based on the Adendorf-type high-neck amphorae and high-neck beakers, as well as the vessel shapes and decoration types listed in Figs 13:a–e (stage CWC 2). Drawing by L. Kaudelka, Halle (Saale).

4. The MSG is characterized by a rich variety of forms, so that four additional local groups appear here (Fig. 12:d): a. a northern local group along the lower reaches of the Fuhne, Wipper, and Bode rivers; b. a middle and c. a central local group that meet in the Halle area; d. a southeastern local group whose distribution is closely aligned with the Saale; and e. a southwestern local group that follows an east-west line. Except for the last-mentioned local group, which stands out due to its short-necked amphorae of the Braunsdorf type, the other local groups are characterised by: high-necked amphorae of the Adendorf type, high-necked beakers, and vessel forms such as lidded boxes and cylindrical beakers, and vertical bands with horizontal hatching (ladder bands) in the decoration. While high-neck amphorae with cord line decoration are scattered throughout the SEG region, high-neck amphorae with furrowed engravings are restricted to the northern and middle local group and thus to an area that C. Fischer designates as the northern Mansfeld subgroup. Ornaments in the form of recessed zigzag bands and triangles hatched parallel to the catheti and horizontally with cord lines are absent only in the northern local group, while short-neck amphorae with triangles hatched parallel to the catheti with cord lines on the shoulders are only widespread in the southern MSG, but absent in the middle local group, characterising C. Fischer's southern Mansfeld subgroup.

The following ornaments and their decorative style are characteristic of the local groups (at 4a–4d on high-necked amphorae, high-necked beakers, cylindrical beakers, and lidded jars):

4a. Northern local group: zigzag lines cut out of areas of circumferential furrowed or incised lines (Fig. 13:a).

4b. Middle local group: vertical bands with horizontal hatching (ladder bands) in the form of furrowed lines (Fig. 13:b).

4c. Central local group: vertical bands with horizontal hatching (ladder bands) in the form of incised lines (Fig. 13:c).

4d. Southeastern local group: vertical bands with horizontal hatching (ladder bands) in the form of corded lines (Fig. 13:d).

4e. Southwestern local Group: short-necked amphorae of the Braunsdorf type and high-necked beakers with recessed zigzag bands between triangles with hatching in the form of cord lines running parallel to the catheti (Fig. 13:e).

The differences between the regional groups derive from the different autochthonous substrates and are, in my opinion, ethnically determined, as they result from a presumed assimilation of the native population by the immigrant population of the CWC (see e.g., Allentoft *et al.*, 2015: 3; Haak *et al.*, 2015: 208–211, in particular 210; Brandt 2017: 105, 115 fig. 7.8; see also Furholt 2020: 11). The differences

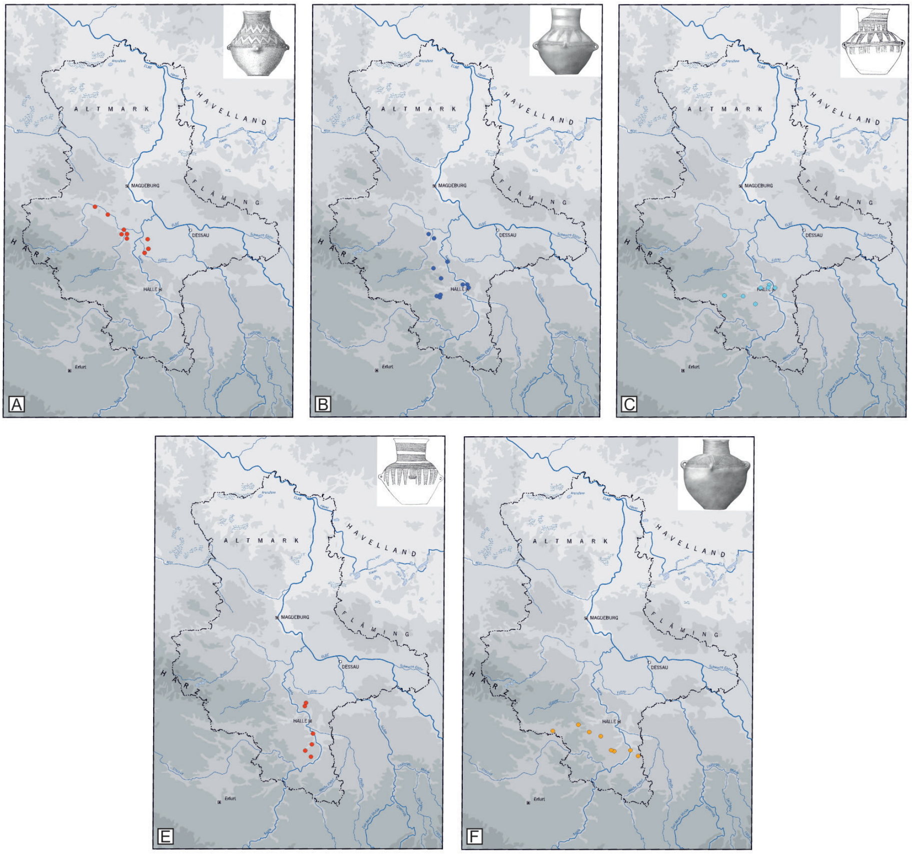

Fig. 13. A – Distribution of the northern local group of the Mittelsaale Group based on the Weddegast-type amphorae with patterns of zigzag bands cut out of areas of circumferential furrowed or incised lines (stage CWC 2). Image credits: Lucas 1965: pl. 26: 2; B – Distribution of the middle local group of the Middle Saale Group based on the Adendorf-type amphorae and the high-necked beakers with patterns of vertical bands with horizontal hatching (ladder bands) in the form of furrowed lines (stage CWC 2). Drawing by L. Kaudelka, Halle (Saale); C – Distribution of the central local group of the Middle Saale Group based on the Adendorf-type amphorae and the high-necked beakers with patterns of vertical bands with horizontal hatching (ladder bands) in the form of incised lines (stage CWC 2). Image credits: Matthias 1982: pl. 40: 12; D – Distribution of the southeastern local group of the Mittelsaale Group based on the Adendorf-type amphorae and the high-necked beakers with patterns of vertical bands with horizontal hatching (ladder bands) in the form of string lines (stage CWC 2). Image credits: Matthias 1982: pl. 57: 4; E – Distribution of the southwestern local group of the Mittelsaale Group based on the Braunsdorf-type short-necked amphorae and the high-necked beakers with patterns of recessed zigzag bands between triangles with oblique hatching in the form of string lines. Drawing by L. Kaudelka, Halle (Saale).

between the local groups of the MSG, primarily reflected in decorative ceramics, may indicate clan structures – or rather, sections of ethnic groups – that find identity-forming expression in the pottery. The differences between the MSG and the SEG result from the latter being based on a GAC substrate (see also Beran 1997); a similar phenomenon is observed in the Złota Culture (Furholt 2008). In contrast, the former may be based on a previously invisible Bernburg substrate. Even Furholt considers that "on a scale beyond this supra-regional network there are regional coherences in the way the practices and symbols are concretely performed, and […] these could be interpreted as expressions of identities on a regional level" (Furholt 2014: 82). The Bernburg cultural background, for example, is evidenced by the grave forms, as seen in the case of the stone chamber from Göhlitzsch, in which a warrior of the CWC was buried during Stage 1b, which has been variously attributed to the Bernburg culture (Müller 1994; see Schwarz 2021b). The Bernburg pre-population may also have influenced the SHG, but its distinctive character appears less pronounced. On the other hand, the relatively small NHG succumbed to influences from the Ammensleben group of the Schönfeld culture, directly to the north. The evidence that the CWC population in Central Germany belongs to a specific ethnic group stems from the complementary schismogenesis of their culture with the Bell Beaker population (for definition, see Bateson 1935).

The term ethnic group was already introduced by M. Weber, who wrote: "We want to call those groups of people who, based on similarities in external habitus or customs, or both, or on memories of colonization and migration, harbor a subjective belief in a community of descent, such that this belief becomes important for the propagation of community formations, 'ethnic' groups, if they do not represent 'clans,' regardless of whether a blood community objectively exists or not" (Weber 1922: 237). According to Barth, it is essential for an ethnic group that its members see themselves as members, identify with it, and feel a sense of belonging to it (Barth 1998: 10). He defines an ethnic group as a population: 1. That reproduces within the group (biologically self-perpetuating), 2. shares fundamental cultural values, which is expressed in the uniformity of cultural manifestations, 3. maintains a network of communication and relationships (fields of communication and interaction), 4. whose members are identified with the group by outsiders and are distinguishable from members of other groups (Barth 1998: 10). To Barth, the cultural context of ethnic dichotomy encompasses two types: 1. Signals or signs that the people display to demonstrate identity; these often include clothing, language, house forms, or lifestyles; 2. Value systems such as moral standards, etc. (Barth 1998: 14). So, it can be seen that ethnic identity is closely linked to the entire way of life. Individuals who leave the ethnic group and abandon the associated way of life are no longer considered full members and have thus lost parts of their identity — even if they are still genealogically connected to the ethnic group (e.g., among the Arsi in Ethiopia: Knutsson 1998: 90).

An ethnic group, therefore, is not the group reconstructed by molecular biology and does not require a standard genetic profile; it is generally, biologically speaking, not a reproductive community (see e.g., Krause and Haak 2017: 15). Therefore it is with Furholt, that "at a conceptual level, […] useful to separate biological patterns from patterns of social traditions or innovations, and also deal with the different categories of finds, seein them as potentially connected to different social worlds" (Furholt 2020: 7). However, since the term "ethnic group" is broader, it consists also of groups that are linked by kinship relationships such as lineages of different orders (e.g., nuclear families, minimal lineages [= extended families], maximal lineages), clans, etc. (Hahn 2012; Schwarz 2021a: 232). Since the different ethnic groups or clans of the CWCs represent at least proto-chiefdoms, if not chiefdoms at all (Schwarz 2021a: 263), there may have been not just a mere ranking between clans or lineages based on age or prestige, but an institutionalised hierarchy between them. Therefore, it cannot be ruled out that they use specific symbols to demonstrate their elite status. Highly decorated pottery may have been a particularly significant symbol, especially in burial contexts. Ethnicity is best reflected in burial practices, as the deceased traditionally desires to unite with his ancestors, and his relatives must therefore follow many culture-specific ritual practices to complete the rite of passage into the ancestral world. The ethnic character of the CWC's burial practices is evident in their dichotomy with those of contemporary cultures, such as the Bell Beaker culture, to which a complementary schismogenesis developed, or the Schönfeld Culture, in which the dead were cremated. "Since Barth [Barth 1998] at the latest, we now know that ethnicity plays a comparatively minor role in ethnically homogeneous spaces and that its investigation is much more productive in border situations in which certain ethnicities have to deal with other ethnicities" (Schlee 2007: 15). In this context, "the development of a common 'we-consciousness' […] necessarily requires interaction with another social group that differs from one's own in certain fundamental ways" (Kohl 2017: 5). "Ethnic identities are thus constituted in a process of mutual attributions by others and by oneself" (Kohl 2017: 5). Central Germany offers such a multi-ethnic situation, which is why the dichotomy is so pronounced there.

The limited distribution and regional and local specificities of the ceramics, as well as the differences between the vessels placed in the graves and those found in the settlements – as far as is known – reflects a ceramic production at the clan level, regardless of whether these were made by individual clan lineages, by households, or by specialized female or male potters (for comparable conditions in traditional

African pottery, see for example Stößel and Kecskesi 1984; e.g., women of the artisan group called numu as an ethnically independent population group who live in economic symbiosis with the farmers of a tribe; Stößel and Kecskesi 1984: 101). In any case, the limited distribution is likely to reflect an exchange circle ("community in practice", according to Furholt 2020, particularly 10) within a kinship territory. This does not mean that all inhabitants are related to each other. The high quality and, in particular, the elaborate ornamentation of vessels, in connection with the consistency of style within individual regions and areas over 150 years can probably only be explained by the fact that individual potters (especially women) worked for the leading families and passed on their skills to their successors (see e.g., Stößel and Kecskesi 1984: 111–112). Additionally, graves with simple ceramics can also be regularly found in cemeteries.

In this respect, O. P. Gosselain's studies of traditional pottery in Cameroon are important. Concerning "technical choices and social boundaries in pottery-making traditions", Gosselain found that "the distribution of fashioning techniques generally coincides with linguistic boundaries" (Gosselain 1998: 92 with fig. 4.5), with the caveat that "there are, of course, several exceptions here: some different populations share similar technical traditions; and some potters use techniques that differ completely from those used by other members of their group" (Gosselain 1998: 92)."However," Gosselain continues, "the situation becomes even more interesting […] since a series of technical groupings and (apparent) affiliations also correspond to linguistic groupings and affiliations […] Populations that are linguistically affiliated and share a common history tend to fashion their vessels in much the same way, or tend to use similar techniques that differ significantly from those of their nearest neighbors. These observations have a clear archaeological implication since they show that the analysis of pottery fashioning processes may lead to a rather precise recognition of cultural boundaries" (Gosselain 1998: 92). The reason for this is that "some three-quarters of the teachers had moved within a radius of 50 km before transmitting their knowledge to their apprentice(s)", whereby "most of them do not cross cultural boundaries, even though the territories concerned are small". Therefore, "technical knowledge and, by extension, traditions or styles [...] circulate mainly in an intra-ethnic manner" (Gosselain 1998: 97). "If techniques such as slipping, burning, or applying an organic coating can either be easily adopted or remain unchanged for a long time, it is not so much because of the performance characteristics they allow as it is the visual aspect they confer to vessels and because of the symbolic meaning put into them by both producers and users" (Gosselain 1998: 99). "A series of examples collected in the ethnographic (and ethno-archaeological) literature reveal, however, that the situation observed in southern Cameroon is not exceptional and that technical diversity must be explained in terms other than purely materialistic ones [...].

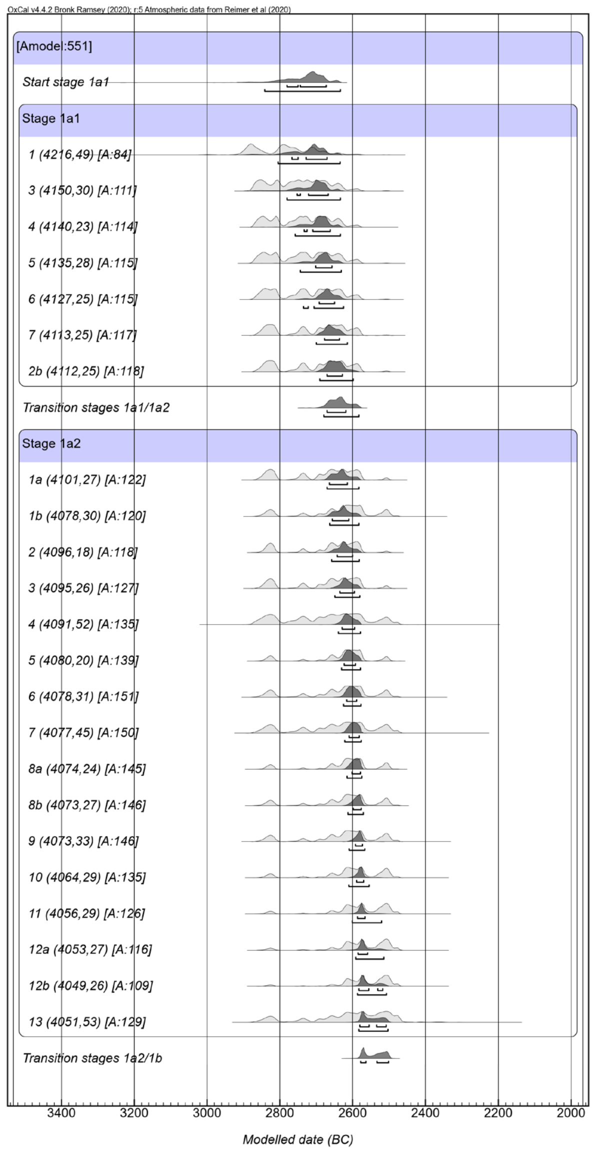

Fig. 14a. The graphic displays the results of a Bayesian model of the radiocarbon-dated graves using OxCal 4.4 (Bronk Ramsey 2020) and the IntCal20 Northern Hemisphere radiocarbon age calibration curve (Reimer *et al.*, 2020). The numbers correlate with those of the graves in the text. The BP ages and standard deviations are given in () parentheses, and the agreement values of the modelled data are given in [] parentheses.

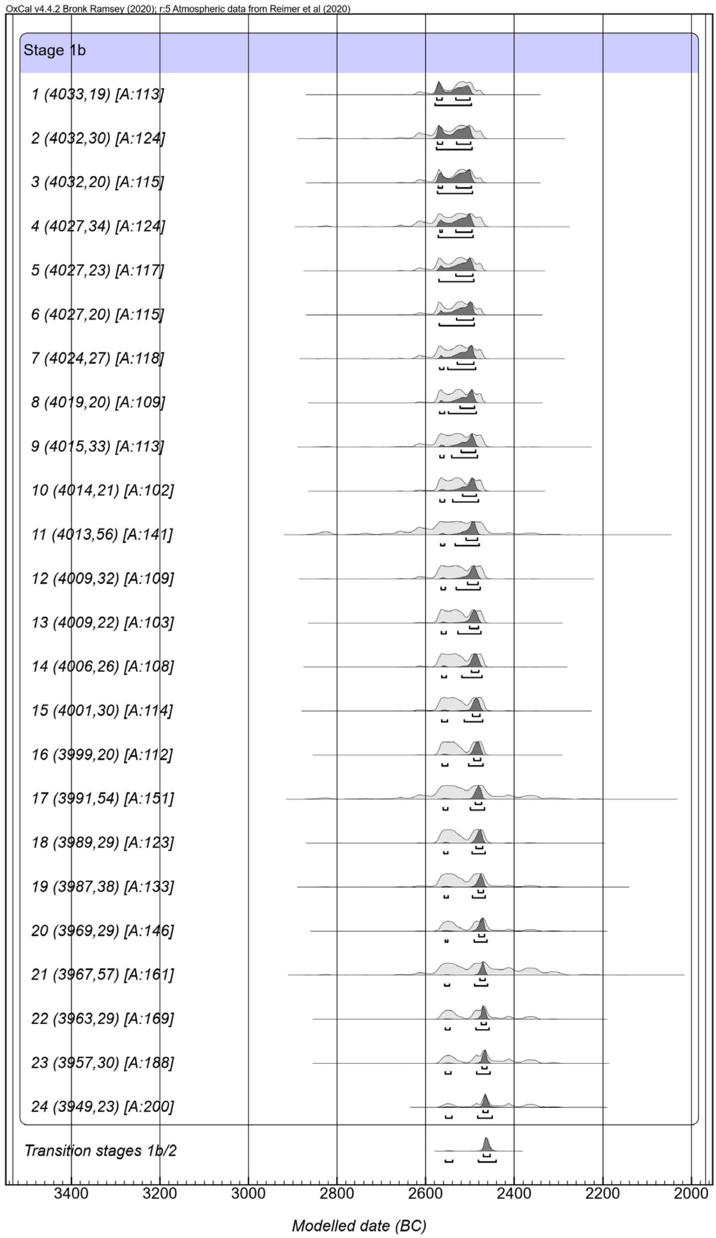

Fig. 14b. The graphic displays the results of a Bayesian model… (continued).

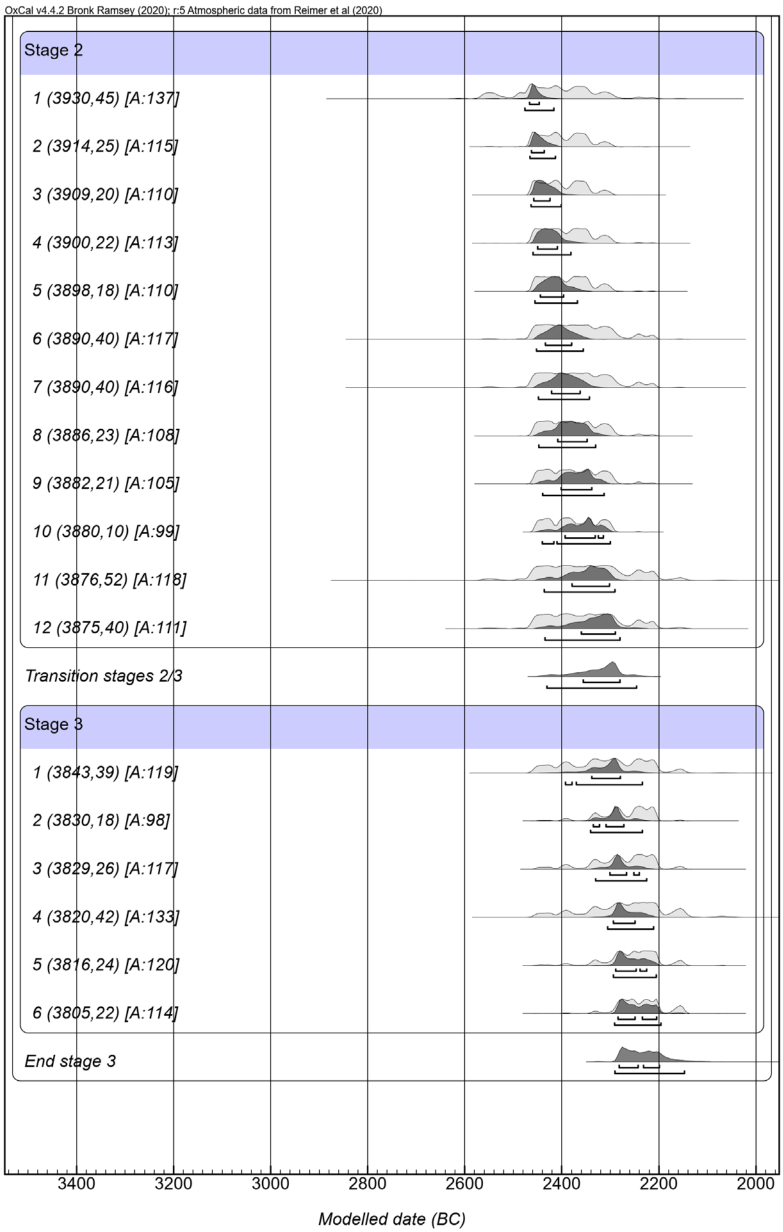

Fig. 14c. The graphic displays the results of a Bayesian model… (continued).

If [...] cross-cultural regularities exist in the selection of mechanically – or ecologically – dependent attributes and behaviours, then patterns of technical distribution should not correspond to individuals, village communities, or other kinds of social groupings. However, such a correspondence is rather common" (Gosselain 1998: 100). "[...] of all stages of the *chaîne opératoire*, is it precisely the shaping stage whose variations best match the geographic extent of learning networks and thus, the linguistic boundaries" (Gosselain 1998: 102). Nevertheless, "although frequently associated with language [...] variations in the way that vessels are fashioned may also relate to larger and smaller spatial units than linguistic boundaries". Gosselain considers more limited distribution areas to be "typical of those societies where pottery technical knowledge is transmitted informally along kinship/friendship/neighbor networks and through small-scale individual movements" (Gosselain 1998: 103). "Among the patrilineal and patrilocal Luo of Kenya, for example, new wives are submitted to a severe postmarital resocialization process under the supervision of their mothers-in-law. Those who marry into a homestead of potters will learn (or re-learn) to produce vessels according to the local norms. One observes, therefore, a series of potting microstyles whose distribution closely matches that of extended-family homesteads or clusters of homesteads" (Gosselain 1998: 103). But, "in those societies where pottery-making is restricted to female members of a caste […] potting traditions are distributed over large territories […]" (Gosselain 1998: 103).

RESULTS

A pre-Corded Ware Kalbsrieth group did not exist in the exclusive form defined by U. Fischer in 1958, based on burials with a flint blade and graves without grave goods. These can now be identified as a Stage 1 equipment category based on the ^{14}C data. The radiocarbon data support Fischer's division of the CWC into two stages. While simple Corded Ware beakers and slash-bundle amphorae appear early, they are not limited to the early stage as previously assumed. The regional groups of Level II attributable to Saxony-Anhalt, i.e., the Mansfeld Group, the North Harz Group, and the East Harz Amphorae Group, have been confirmed. However, the latter did not arise from the combination of the "Schönfeld Southern Group" with the Corded Ware of Level I, since the "Schönfeld Southern Group", due to inhumation, does not belong to the Schönfeld culture at all, which proves its identity through cremation, but instead forms part of the CWC.

The subdivision of the Mansfeld region by C. Fischer in 1959 can be maintained spatially, but not chronologically. Instead, the differences in decoration reflect local groups. The northern Mansfeld subgroup corresponds to the middle and central local groups of the Middle Saale Group, the southern Mansfeld subgroup to the southeastern and southwestern local groups of the Middle Saale Group, which also applies to the Mansfeld mixed group.

M. Buchvaldek incorporates the inventory assigned to Level I by U. Fischer into his Level I, but expands it to include A-hammer axes and faceted hammer axes with broad edges. However, they are rarely represented in the inventories of the Central German CWC and are therefore irrelevant for chronological studies, despite their high value for the chronology of the Single Grave Culture. The radiocarbon-dated grave finds from the early CWC, on the other hand, show quite different axe shapes (Eulau type). The decorations assigned by M. Buchvaldek to his Stage II equally appear on shoulder- and on belly-handled amphorae and are thus distributed across Stages CWC 1b and 2 of the chronology presented here. As the ^{14}C-dated grave finds show, shoulder-handled amphorae decorated in this way (Buchvaldek's Stage II) are contemporary with those with line-bundle decoration (Buchvaldek's Stage I), as well as with cord- and incised beakers and faceted axes (Buchvaldek's Stage I). Buchvaldek's Stage II is therefore justified if it is restricted to shoulder-handled amphorae, because the surface ornaments associated with Stage III using hatched triangular motifs do not yet appear on shoulder-handled amphorae.

The contents of Level I, according to U. Fischer and M. Buchvaldek, are adopted as the unity horizon by M. Stock, J. Müller, and M. Furholt in their early level of the CWC. The latter two authors indicate that the A-Beakers had a long lifespan and are documented in inventories up to the end of the CWC (see e.g., Furholt 2014). However, for J. Beran, the unity horizon is "an archaeological fact that is as clear as almost any other. It no longer requires fundamental discussion, but rather further, in-depth research" (Beran 1997: 32, point 3; 1998). At Level 2, M. Stock can observe chronologically relevant trends, of which the shift of amphora handles from the shoulder to the belly can be confirmed based on radiocarbon-dated inventories (Levels CWC 1b and 2). In contrast, other trends conceal local decorative styles. As for the four regional groups identified by M. Stock, they cannot be clearly defined spatially based on specific patterns and vessel shapes.

In 1999, J. Müller was able to substantiate the early dating of the line-bundle amphorae using a ^{14}C date from the Egeln grave (see above, Stage 1b; Furholt 2003: MES 15), although this was not enough to establish a time-limited period of use for such amphorae. The line-bundle decoration is not a chronological feature, but a regionally typical feature that also appears on belly-handled amphorae. J. Müller was also able to identify the grave from Egeln-Nord (formerly Bleckendorf), which D. W. Müller in 1989, based on the copper dagger and the north-south orientation of the squat burial, assigned to the Bell Beaker culture (Müller 1989: 283 ff.;

Stock 2001), as an early grave of the CWC (Müller 1999: 82). J. Müller also defines a Stage 2 based on the pottery with complex patterns (in the Mansfeld style). He derives the idea that undecorated axes replaced faceted axes in Stage 2 from the chronological relationship between the usually early-dated faceted axes and the axe from Nohra, Grave 6, for which he provided an age of 2490–2330 BC. However, new radiocarbon dates now prove that such unspecific-looking axes began appearing before 2650 BC. The statement that the proportion of handled vessels in Stage 3 increased from 2200 BC onwards is not supported. The CWC ends with the appearance of the Únětice Culture around 2200 BC. Only in the northern Harz region does this culture appear until around 2125 BC, so the CWC may have persisted longer there, as is at least documented for the Bell Beaker Culture (Schwarz 2015). M. Furholt, who essentially adopts J. Müller's chronology, inserts another stage (wiggle area E) between Müller's Earlier Stage (wiggle area D according to Furholt) and the Middle Stage (wiggle area F). The content of this stage is limited to straight-walled beakers and, due to its isolated occurrence, has no relevance for Central Germany.

While the chronologies of U. Fischer, M. Buchvaldek, M. Stock, J. Müller and M. Furholt point in the right direction with some reservations, the chronology of M. Hein (1987; 1992) has turned out to be incorrect. His early dating of the Mansfeld style, based on the alleged Bernburg decoration, cannot be verified using the ^{14}C data. The radiocarbon dates now allow a better insight into the early stage of the CWC than was possible ten years ago. However, the early inventories could not have been chronologically evaluated without the use of scientific dating methods. While Stages 1 and 2 can now be easily assessed chronologically, Stage 3 still requires clarification. Furthermore, there remains insufficient clarity regarding when the SKK ended in Saxony-Anhalt. The coexistence of the CWC and the Bell Beaker culture between 2500 and 2200 BC resulted in displacements, with distinct settlement patterns evident in the districts. Settling together or in neighbouring villages is not noticeable; cultures constantly change within the immediate area, with the CWC being replaced by the Bell Beaker culture either around 2450 BC (Eulau, Karsdorf, Nohra) or around 2325 BC (Schafstädt), or by the Únětice Culture around 2200 BC (Quenstedt).

NOTES

Radiocarbon-dated graves with belly-handled amphorae are available from Thuringia, some of which have high standard deviations: The oldest BP age of a belly-handled amphora comes from Auleben Mound 2, Grave 1 (Furholt 2003: MES 3): 4040±45 BP (KI-4140), 2622–2476 BC and would therefore belong to the CWC 1b stage; in the amphora from Erfurt Grave 7 (Furholt 2003: MES 17), the handle position is unclear and the standard deviation of ±95 years is too high for chronological conclusions (KI-4144: 4060±95: 2850/2697–2472 BC); the ^{14}C age of the Abtbessingen grave (Furholt 2003: MES 1) does not allow dating of the belly-handled amphorae in Stage 1b due to the high standard deviation of ±85 years, mainly since the dating range also includes Stage 2: 3960±85 BP (KI-4139), 2576–2339/2303 BC; see also Auleben Barrow 2 Grave 2 (Furholt 2003: MES 4): 3939±45 BP (KI-4141), 2557/2489–2346 BC; Stotternheim Grave 5/76 (Furholt 2003: MES 37): 3930±45 BP (KI-4157), 2475–2341/2309 BC; Stotternheim Grave 2/76 (Furholt 2003: MES 35): 3890±35 BP (KI-4155), 2458–2341–2310 BC; Orlishausen Grave 3/68 (Furholt 2003: MES 32): 3890±35 BP (KI-4153), 2458–2341/2310 BC; Bilzingsleben Grave 42 (Furholt 2003: MES 5: handle type unclear): 3868±40 BP (KN-4887), 2454–2289 BC; Stotternheim Grave 3/76 (Furholt 2003: MES 36: handle type unclear): 3850±35 BP, 2434–2208 BC. Already representing the CWC 3 stage: Stotternheim Grave 1/76 (Furholt 2003: MES 34): 3800±45 BP (KI-4154), 2334/2298–2143 BC, Bilzingsleben Grave 68 (Furholt 2003: MES 6): 3789±59 BP (KN-4888), 2338/2301–2136/2067 BC, Kleinromstedt Grave 10/76 (Furholt 2003: MES 28): 3770±50 BP (KI-4150), 2286–2135/2063 BC, Greußen Grave 2/65 (Furholt 2003: MES 22): 3760±45 BP (KI-4146), 2282–2132/2051 BC. The youngest ^{14}C age is from Erfurt-Kühnhausen (Furholt 2003: MES 29): 3740±55 BP (KI-4148), corresponding to 2275–2036 BC.

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Returns to Ancestral Monuments. The Transition of Funerary Areas During the 4th and 3rd Millennia BC in Bohemia

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The earliest manifestation of funerary monumentality in Central Europe is represented by long barrows from the 4th millennium BC. The latest discoveries suggest that it was the long barrows that initiated the tradition of shaping ritual landscapes. Besides their funerary function, these monuments also served as ancestral shrines. Current research indicates the existence of approximately a thousand-year hiatus in the use of these sacred places in Bohemia. Secondary burials associated with the Corded Ware and Únětice Cultures have been recorded in long barrows. Similar sequences can also be observed in other sites where evidence of long barrows is currently not secure. Beaker cultures of the 3rd millennium BC are represented primarily by funerary monuments in the form of round barrows. This form of funerary monuments did not evolve from the long barrows. On the contrary, it represents a new phenomenon originating from the North Pontic/Caspian region, associated with the Yamna Culture.

KEY-WORDS: long barrows, round barrows, secondary burials, Corded Ware Culture, ancestral monuments, Czech Republic, Central Europe

INTRODUCTION

Burial mounds are one of the fundamental expressions of monumentality in the funerary rites of prehistoric cultures in Europe. Their origins can be traced back to the so-called long barrows, which began to appear in Europe as early as the 5th millennium BC. Since then, burial mounds have been constructed at prehistoric cemeteries for millennia, and this phenomenon only truly disappeared with the advent of Christianity.

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Over this long period, burial mounds underwent many formal transformations, which may reflect changes in religious beliefs, ideology, or social norms (Bradley 2002; Bourgeois 2013; Jeunesse 2014; Ahola 2020). Perhaps the most significant transformation was the shift from long barrows to round barrows, which occurred in Central Europe during the 3rd millennium BC. From that point on, round barrows dominated prehistoric cemeteries in Central Europe, while the tradition of long barrows came to a definitive end. The use of long barrows for burials by subsequent communities has been observed at several sites in Bohemia. Secondary graves were inserted into the mounds more than 1000 years after their construction. Long barrows seem to have been an important part of the cultural landscape for a long time, structuring its perception. Mound builders and their immediate followers apparently perceived the site as sacred, associated with ancestor worship, but initially adding more burials was perhaps taboo. Over time, however, the perception of the mound changed. After a certain period, the direct link and memory of the ancestors who built the mound were lost, and only the mound itself, and in some cases the surrounding ditches, remained visible (Turek *et al.*, 2025). Such situations occurred mainly in the times of the Corded Ware, Bell Beaker, and Únětice cultures

This text aims to explore the background of this change. Are round barrows the result of a gradual shortening and fragmentation of long barrows? This perspective on the emergence of the round barrow phenomenon has been proposed in the past, based on research at certain barrow cemeteries in Central Europe (Neustupný 2001). During the 4th millennium BC, a gradual shortening of long barrows can indeed be observed (Turek and Krištuf 2025). At the same time, we see continuity in barrow burial practices from long to round barrows at some cemeteries. Evžen Neustupný suggested that the original concept of collective long barrows in Central Europe was eventually transformed into individual burials beneath round barrows (Neustupný 2001; 2013).

However, it is important to note that in Eastern Europe, for example, round barrows appear much earlier and without any preceding tradition of long barrows. This raises the question of whether the shift to round barrows in Central Europe may reflect the adoption of new cultural models from external influences rather than a continuous development of the local long barrow tradition.

Long barrows represent the earliest known funerary monuments in prehistoric Europe. In Central Europe, these structures appear at the beginning of the 4th millennium BC (Król 2021; Turek and Krištuf 2025). By this time, agricultural populations had already been developing in the region for 1500 years. Monumentality had been a part of their cultural expression from the start. This had primarily been manifested in the construction of so-called longhouses, which were the traditional dwellings of both the Linear Pottery Culture and the subsequent Stroke Pottery Culture. Longhouses were an expression of a sedentary lifestyle, playing a significant role in asserting community identity and land ownership rights.

It is typical for the first farming communities in Bohemia not to have created designated cemeteries; instead, they buried their dead within the settlement area, sometimes directly beneath the floors of their homes. Several instances have been documented where burials were located within residential houses (Bradley 2001). It is possible that such a house lost its residential function and became a funerary monument. This probably marks the beginning of funerary monumentality in Central Europe. The ruins of longhouses, serving as houses of the dead, continued to attract burial activity. This can be observed, for example, at the Miskovice cemetery in Central Bohemia, where around 70 graves from the Stroke Pottery Culture were located in an area where three Linear Pottery Culture houses had once stood (Květina *et al.*, 2016). The ruins of these houses, possibly even partially modified into barrow-like forms, became the foundation of one of the largest Neolithic cemeteries in Bohemia.

For Neolithic communities in Central Europe, the residential quarter held significance as a place for depositing the dead. Their houses, after being abandoned, served as homes for deceased ancestors. When we look at this context of destroyed longhouses with the dead preserved inside, we can begin to see where the idea of building long funerary barrows as designated burial structures originated. It took approximately 1000 years for this concept to evolve in Central Europe into the construction of independent funerary barrows (Turek and Krištuf 2025). However, the earliest examples of long barrows do not originate from this region; they first developed in northwestern France during the first half of the 5th millennium BC (cf., Chambon 2020). The tradition then spread northward to the British Isles, the Low Countries, southern Scandinavia, and also to Central Europe – though a case can be made for convergent development in this region as well (Turek and Krištuf 2025). If we seek for the origin of long barrows in Europe we should follow the occurrence of longhouses of a distinctly trapezoidal layout that appeared in the Stroke Pottery Culture and the Lengyel Culture around 4800 BC and later in the Brześć Kujawski Culture in about 4300–4200 BC, but they did not yet have a funerary counterpart of a similar plan. This process of diversification and the emergence of the first trapezoidal barrows in Kujawy sites, such as Sarnowo or Wietrzychowice (Chmielewski 1952), did not occur until around 3900–3800 BC (Król 2021), that is 600–700 years later than in the Paris Basin and almost 1000 years after the first trapezoidal houses in Western Europe. It should be borne in mind that trapezoidal houses were no longer being built by the time of the construction of long trapezoidal mounds in Greater Poland (Król 2021), Silesia, and Bohemia (Zápotocký 2023; Turek and Krištuf 2025), which is

3700–3500 BC. Typical houses in the Funnel Beaker Culture period were of rectangular ground plan. The trapezoidal shapes of the long barrows were not therefore clearly based on the contemporary Funnel Beaker houses, but were derived from ground plans of houses 1000 years older.

Neolithic long barrows remain a visible part of the cultural landscape of northern and northwestern Europe to this day, so it is no surprise that they have attracted scholarly interest at least since the emergence of archaeology as a scientific discipline in the 19th century. Intensive research on these barrows is especially linked to the first half of the 20th century, when both megalithic (e.g., Piggott 1962) and non-megalithic (e.g., Ashbee 1966) structures were excavated in the British Isles and northern Europe, along with the first long barrows in Central Europe (e.g., Chmielewski 1952), where they are primarily associated with the Funnel Beaker Culture. However, in Bohemia, no above-ground remains of such barrows had been recorded, and so they remained long outside archaeological evidence. The first indications of their existence were brought to light by Ivana Pleinerová (1980) following the discovery of two long structures in Březno near Louny. Subsequent activities by Czech archaeologists, culminating in a systematic research project on long barrows from 2021 to 2023, identified more than 60 potential long barrows in Bohemia (Krištuf *et al.*, 2024).

These investigations show that various types of long barrows in Bohemia are connected to the Funnel Beaker Culture, and in some cases also to the earlier Michelsberg tradition (Krištuf *et al.*, 2024). They do not form cemeteries but are built individually, usually outside the residential area proper (Krištuf *et al.*, 2023). Burial under long barrows thus becomes spatially separated from settlement activity and houses, which had once served as their prototype. In some regions of Bohemia, long barrows are even the first structures with which people entered previously uninhabited parts of the landscape (Krištuf and Fišer 2025), and their construction marks the beginning of a change in the use of these places and a transformation of the environment (Strouhalová *et al.*, 2025).

Crucially, in the context of this article, recent research on long barrows in Bohemia has shown that these structures were not built as collective or family tombs. Most of the excavated barrows contained only a single burial that could be dated to the time of construction. Other potential graves in the barrow were secondary burials made hundreds or even thousands of years later (Turek and Krištuf 2025). Thus, the significance of these structures for Neolithic communities appears to have been more religious and social than purely funerary. The barrows served as community sanctuaries dedicated to the worship of gods and ancestors, often in use for decades or even centuries. The burial of a selected community member was probably connected more to the founding or initiation of the structure.

Equally important was the very existence of the barrow, which remained in the landscape for thousands of years, even long after its primary function as a sanctuary had ended. The barrow continued to influence the perception and use of the surrounding landscape (Krištuf *et al.*, 2023). The monumentality of the first barrows was thus a key factor in the development of the Neolithic landscape, and it probably continued to shape human behaviour during the subsequent Bronze and Iron Ages. The significance of monumental funerary structures may have survived in the form of legends well into the modern era (Turek and Krištuf 2025).

EVIDENCE OF SECONDARY CORDED WARE BURIALS IN BOHEMIAN LONG BARROWS

A characteristic feature of Neolithic long barrows in Bohemia is that they were constructed for the burial of a single individual. Interestingly, we currently have almost no evidence of additional burials being inserted into these barrows during the Funnel Beaker Culture period or even in subsequent ones. This situation changes during the 3rd millennium BC, when, in several cases, secondary burials of the Corded Ware Culture and later the Únětice Culture of the Early Bronze Age were inserted into Neolithic long barrows. These are cases in which burials were added to partially eroded long barrows more than 1000 years after their original construction. The best examples of this practice have so far been documented at the site of Březno in northwestern Bohemia (Pleinerová 1980) and at the sites of Vražkov and Račiněves in the vicinity of the sacred Mount Říp (Krištuf *et al.*, 2024; Turek and Krištuf 2025).

Březno long barrows

During systematic excavations in the 1960s and 1970s near the village of Březno, the ground plans of two long barrows were discovered (Fig. 1). These were barrow mounds originally reinforced with wooden palisades. The first (No. 62) measured 24 metres in length and contained two graves. The second (No. 86) measured over 144 metres, contained three graves, and had a wooden chamber in its eastern part that served as a sanctuary (Pleinerová 1980). The graves contained almost no artefacts. Based on the typological similarity of one bowl, Evžen Neustupný dated the construction of the longer barrow to the Michelsberg Culture. The shorter barrow is dated by a radiocarbon result (GrN 8803 – Grave LXXIII: 5090±45 BP) to the interval 3980–3777 cal BC. This suggests both barrows were built around the same time.

Another radiocarbon date comes from the westernmost grave in the longer barrow. Although this burial was entirely without grave goods, the date (GrN 8802 –

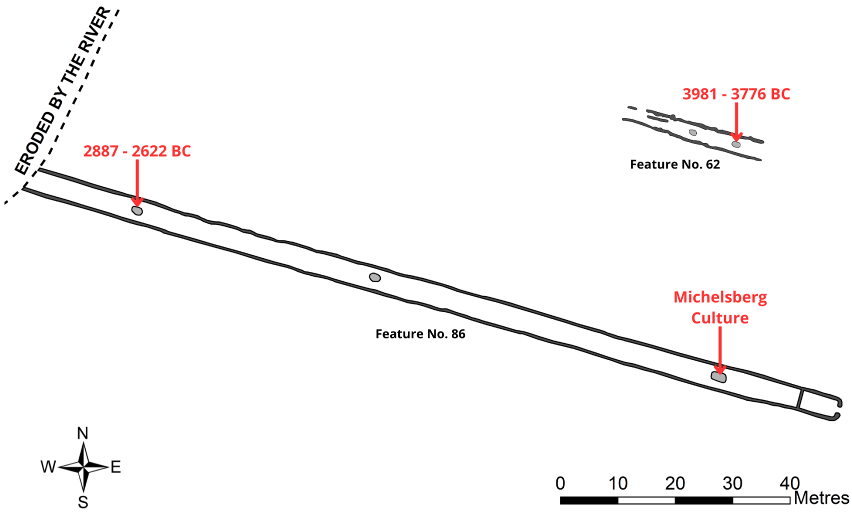

Fig. 1. Březno long barrows (Louny District). Ground plan of the barrows with dating of individual features.

Grave LXXXI: 4165±45 BP) places it within the Corded Ware Culture. This is also supported by the body position (Pleinerová 1980; Neustupný 2013). It can be assumed that the grave was inserted into the already partially eroded barrow mound more than 1000 years after its construction. However, evidence of burials from the 3rd millennium BC at this site does not end there. The barrow was also partially disturbed by a burial associated with the Bell Beaker Culture (Pleinerová 1980).

In the area of Structure 86 and its immediate surroundings, a Únětice Culture cemetery with 23 graves was also discovered. The fact that this cemetery was established on a narrow 80-metre-long strip, and that 20 of the graves were located within structure No. 86, with three more in its immediate vicinity, suggests the presence of a slight elevation in the terrain, probably the remnant of a barrow mound, into which the Únětice graves were inserted (Pleinerová 1980: 39).

The long barrows at Březno represent one of the best examples of the reuse of early 4th millennium BC funerary monuments by communities of the Corded Ware Culture, the Bell Beaker Culture, and the Únětice Culture.

Račiněves long barrow

The long barrow at Račiněves represents a similar type of construction as the barrows at Březno near Louny. It was discovered during a rescue excavation in the 1990s but was not thoroughly investigated until 2022 (Turek and Krištuf 2025). The barrow

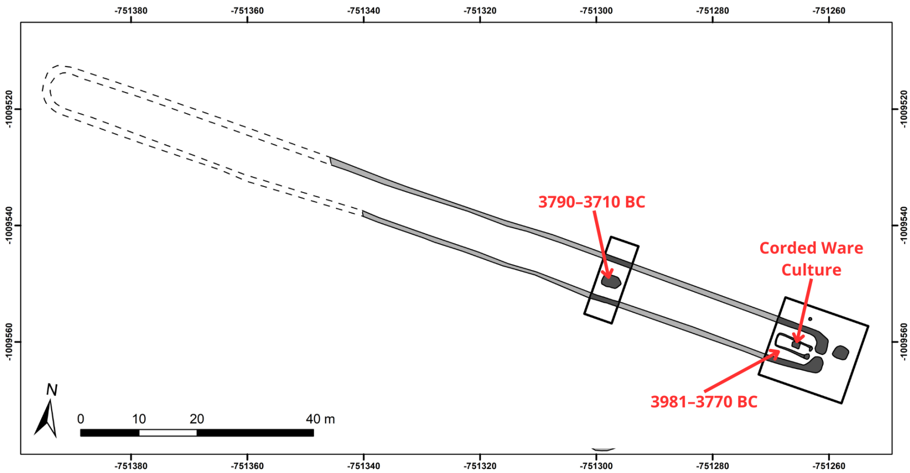

Fig. 2. Račiněves long barrow (Litoměřice District). Ground plan of the barrow with dating of individual features.

is 122 metres long and was probably surrounded by a wooden palisade (Fig. 2). In its eastern part, there was an open-access wooden chamber that served as a sanctuary. The primary burial was located approximately 28 metres behind this chamber. The burial of an adult male in a monumentally sized grave pit was accompanied by a set of 12 quartzite arrowheads. The dating of the barrow is based primarily on a collection of radiocarbon dates from charred remains of the wooden structure (Turek and Krištuf 2025: table 4.3). Nine radiocarbon dates suggest the barrow was built some time between 3981–3770 cal BC. Another radiocarbon date was obtained from the primary burial. Due to poor collagen preservation, bioapatite was used for dating. The resulting date (UGAMS 66882, 4990±25 BP, 3790–3710 cal BC) coincides with the upper boundary of dates from the wooden structure but bioapatite dates are generally younger than those from collagen. The barrow may have been constructed within the period of the Funnel Beaker Culture. However, the types of quartzite arrowheads found, which in Bohemia appear in graves associated with pottery of the later Michelsberg Culture, also suggest a possible pre-Baalberge origin of the barrow structure.

A later burial, associated with the Corded Ware Culture, was added to this barrow (Fig. 3). The burial, probably of a woman in a crouched position on her left side, was placed in the area of the wooden chamber in the eastern part of the barrow. Given the presence of a large amount of charcoal from the destroyed wooden structure of the chamber, this burial must have taken place after the chamber's

Fig. 3. Račiněves long barrow (Litoměřice District). Detail of the Corded Ware grave and burial assemblage.

destruction. Based on current knowledge of the chronology of the Corded Ware Culture in Bohemia, the burial was inserted into the partially eroded barrow roughly 1000–1500 years after its original construction.

In addition, another Corded Ware Culture burial was discovered near the barrow during a rescue excavation in the 1990s. Burials from the Late Bronze Age and the Hallstatt period have also been recorded in the vicinity (Turek and Krištuf 2025).

Vražkov long barrow

The Vražkov long barrow represents one of the first long barrows discovered in Bohemia. It is a closed linear feature with a trapezoidal ground plan (Fig. 4). Its longer axis is oriented WNW–ESE. The length of the feature is 32 metres. The length of the

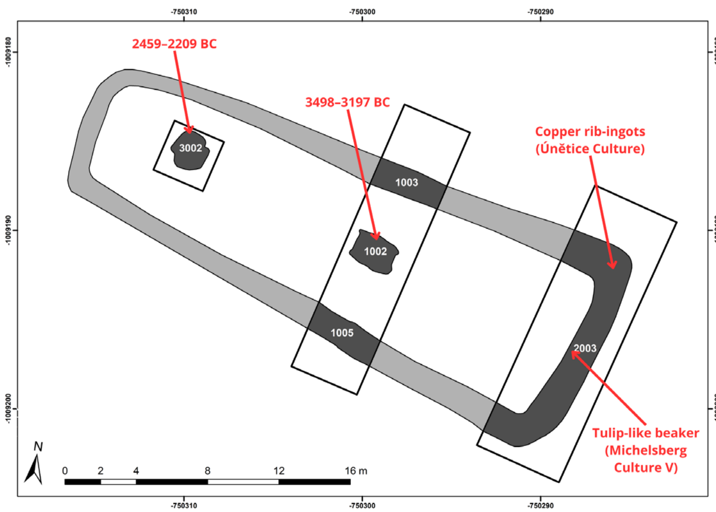

Fig. 4. Vražkov long barrow (Litoměřice District). Ground plan of the barrow with dating of individual features.

eastern side is 11 m. Towards the west, the feature narrows, and the western wall is 7 m long. It was excavated in 2021.

It was most likely a simple earthen mound without any wooden or stone construction. The barrow was surrounded by a V-shaped ditch approximately 2 metres wide and about 1 metre deep. Two graves were discovered within the area of the barrow.

The first burial pit has a rectangular plan. The dimensions of the grave are 230 x 120 cm and it was dug 50 cm into sandy substrate. Post impressions are visible in the corners of the grave pit, probably remnants of wall reinforcement using a wooden construction. An adult male was buried here. He was lying on his right side, oriented in a W–E direction with the head to the west and facing south. The burial did not contain any grave goods. Dating of the Vražkov barrow is challenging due to the absence of artefacts in the primary burial pit and also lack of suitable charcoal for radiocarbon dating. Therefore, the only option was absolute dating based on human bones. However, their poor preservation did not allow for collagen extraction. As a result, radiocarbon dating was conducted based on carbon from bioapatite. The obtained date UGA66881: 4600±25 BP (3498–3197 cal BC) suggests a relatively recent origin of the barrow, but comparing it with dates obtained from collagen is problematic. Generally, bioapatite seems to provide significantly later data. The exact dating of the barrow remains unclear. Nevertheless, the almost complete tulip-shaped beaker in the ditch fill in front of the eastern facade of the barrow links the construction to the V phase of the Michelsberg Culture.

The second grave was located in the western part of the barrow. It reached a depth of up to 8 cm into the substrate and was massively damaged by modern ploughing. Due to this, it is not possible to accurately reconstruct the shape or dimensions of the grave pit. The remains of an adult individual were preserved only in isolated fragments scattered throughout the grave pit. This is most likely a consequence of damage caused by ploughing. The grave goods consisted of at least three vessels, the fragments of which are concentrated in the northern part of the grave. This included an Únětice Culture jug and two additional vessels whose character does not exclude the same cultural classification. The ^{14}C date comes from the Únětice Culture grave, supporting its placement in the Early Bronze Age CRL22_1398: 3864±21 BP (2459–2209 cal BC).

The ditch surrounding the barrow on all sides was practically devoid of finds. The exception is the beaker mentioned above, which dates the construction and use of the monument. In the northwest corner of the ditch, a deposit of 100 bronze rib ingots (*Spangenbarren*) was discovered, buried in the Early Bronze Age in the partially filled ditch. Fragments of another two bronze ribs were also found elsewhere in the topsoil of the barrow, suggesting that the sacrificial activity was carried out on multiple events on this site. Even in the case of this barrow, we record the continuation of burials about 1000 years after its construction.

Continuity of barrow cemeteries

The three aforementioned cases do not necessarily represent a clear trend. However, it is important to note that they involve some of the best-explored long barrows in Bohemia, and all of them contain secondary burials from the 3rd millennium BC. Given that only a minimal number of long barrows in Bohemia have been thoroughly investigated (Krištuf *et al.*, 2024), we decided to examine the use of all Funnel Beaker Culture cemeteries throughout the periods of the Corded Ware, Bell Beaker, and Únětice Cultures.

The Archaeological Map of the Czech Republic (https://www.aiscr.cz/), which is the most extensive archaeological information system in the country, records 75 Funnel Beaker Culture cemeteries in Bohemia (Table 2). Most of these have no evidence of long barrows, which is not surprising and does not necessarily mean that barrows were never constructed over the graves. At many of these cemeteries, we can observe continual burial activity during the 3rd millennium BC. We examined whether burials from the 3rd millennium BC occur within a 500-metre radius of Funnel Beaker Culture graves.

At 24 sites (32%), Corded Ware Culture burials are recorded (Fig. 5:1). Bell Beaker Culture burials are also recorded at 24 sites (32%; Fig. 5:2). Most frequently, we

Table 1. Number of Funnel Beaker Culture cemeteries in Bohemia with evidence of burials from the Late Neolithic and Early Bronze Age.

	Corded Ware Culture	**Bell Beaker Culture**	**Únětice Culture**	**Corded Ware Culture + Bell Beaker Culture**	**Corded Ware Culture + Únětice Culture**	**Bell Beaker Culture + Únětice Culture**	**All Cultures**	**SUM**
No. of Funnel Beaker cemeteries	3	4	11	3	8	7	10	46
%	6,5	8,7	23,9	6,5	17,4	15,2	21,7	100,0

encounter Únětice Culture graves at Funnel Beaker cemeteries – 36 sites in total, representing 48% of all known Funnel Beaker cemeteries (Fig. 5:3). Overall, we can state that 62% of known Funnel Beaker cemeteries in Bohemia show evidence of subsequent burials from the Corded Ware, Bell Beaker, or Únětice Cultures. In some cases, evidence comes from just one of these cultures (18 sites), but we also encounter instances with burials from two (18 sites) or even all three cultures (10 sites; Fig. 6 and Table 1). The data used come from excavations conducted from the late 19th century to the present day and are of varying quality. They include both large-scale excavations and isolated grave finds whose surroundings were not further investigated. It is therefore possible that in many cases, continuity of cemeteries has escaped our detection. In this context, we consider the postulated subsequent use of 62% of Funnel Beaker Culture cemeteries as evidence of a significant spatial continuity of the funerary areas of this culture and those of the Late Neolithic/Early Bronze Age.

It is thus evident that the earlier Funnel Beaker cemeteries, defined by long barrows, continued to be used in Bohemia for more than 1000 years by cultures whose members typically constructed round barrows. This did not involve just isolated graves inserted into the mounds of earlier barrows. For example, at the Brandýsek site (Central Bohemia; Fig. 7), it appears that a barrow cemetery of the Corded Ware and Bell Beaker cultures, containing at least 24 graves, was established around what was probably a single long barrow (Šmejda 2001). At Velké Žernoseky (North Bohemia), the area of approximately two to three long barrows was reused to establish a large Únětice Culture cemetery (Krištuf and Švejcar 2013).

Table 2. List of known Funnel Beaker Culture burial sites in Bohemia used in this study, based on the aiscr.cz database. The presence of later burials of the Corded Ware, Bell Beaker, and the Únětice cultures is indicated. The site number (No. of site) follows the aiscr.cz database, where further details can be found (https://digiarchiv.aiscr.cz/home).

Site	District	No. of site	Corded Ware Culture	Bell Beaker Culture	Únětice Culture
Běchovice	Hlavní město Praha	C-9145996A-K023	no	no	yes
Bílina	Teplice	C-9163319A-K001	no	yes	no
Brandýs nad Labem 1	Praha-východ	C-9152623A-K001	no	no	yes
Brandýs nad Labem 2	Praha-východ	C-9152627A-K001	no	yes	yes
Braník	Hlavní město Praha	C-9142977A-K001	no	no	no
Brázdim	Praha-východ	C-9152849A-K010	yes	no	yes
Brozany nad Ohří	Litoměřice	C-9134141A-K001	no	no	no
Břežany u Žatce	Louny	C-9103298A-K004	no	yes	no
Bubeneč 1	Hlavní město Praha	C-9144654A-K001	yes	yes	yes
Bubeneč 2	Hlavní město Praha	C-9144757A-K003	yes	yes	yes
Černuc	Kladno	C-9128043A-K001	no	no	yes
Červené Pečky	Kolín	C-9129323A-K001	no	no	no
Dejvice	Hlavní město Praha	C-9144836A-K001	yes	no	yes
Dolínek	Praha-východ	C-9153064A-K001	no	no	yes
Dolní Chabry	Hlavní město Praha	C-9145708A-K001	no	no	no
Drnov	Kladno	C-9128077A-K001	no	no	no
Dřísy	Praha-východ	C-9136768A-K001	no	no	no
Hořín	Mělník	C-9136819A-K001	no	yes	yes
Chbany 1	Chomutov	C-9110053A-K001	yes	yes	no
Chbany 2	Chomutov	C-9110052A-K001	yes	yes	no
Chržín	Kladno	C-9102662A-K002	yes	no	yes
Chudeřín	Louny	C-9133038A-K001	yes	yes	yes
Jenštejn	Praha-východ	C-9153309A-K001	no	no	yes

Site	District	No. of site	Corded Ware Culture	Bell Beaker Culture	Únětice Culture
Jinonice	Hlavní město Praha	C-9143796A-K001	yes	yes	yes
Kbely	Hlavní město Praha	C-9146377A-K007	no	no	yes
Keblice	Litoměřice	C-9134499A-K001	yes	no	no
Klecany	Praha-východ	C-201772965A-K001	no	no	yes
Kluk	Nymburk	C-9140861A-K001	no	no	no
Kolín	Kolín	C-200912982O-K005	no	no	yes
Kopidlno	Jičín	C-201225932A-K003	no	no	no
Kostelec nad Labem 1	Mělník	C-9137092A-K006	yes	yes	yes
Kostelec nad Labem 2	Mělník	C-9137099A-K001	no	yes	yes
Kouty u Poděbrad	Nymburk	C-9140967A-K001	no	no	no
Kutná Hora	Kutná Hora	C-9126910A-K001	no	no	no
Ledčice	Mělník	C-9137382A-K001	no	no	no
Libenice	Kolín	C-9130421A-K002	no	no	no
Litovice 1	Praha-západ	C-9107889A-K002	yes	yes	yes
Litovice 2	Praha-západ	C-9107892A-K001	no	yes	no
Louny	Louny	C-9133236A-K002	no	no	yes
Lužec nad Vltavou	Mělník	C-9137678A-K002	no	no	no
Máslovice	Praha-východ	C-9153545A-K002	no	no	no
Měšice u Prahy	Praha-východ	C-9001324A-K002	no	no	yes
Mlékojedy u Neratovic	Mělník	C-9138000A-K005	no	yes	yes
Mradice	Louny	C-9133304A-K001	no	no	no
Neratovice	Mělník	C-9138153A-K002	yes	yes	yes
Neuměřice	Kladno	C-9128583A-K001	no	no	no
Nížebohy	Litoměřice	C-9135202A-K001	no	no	yes
Ovčáry u Kolína	Kolín	C-9130697A-K001	no	no	no

Site	District	No. of site	Corded Ware Culture	Bell Beaker Culture	Únětice Culture
Polerady	Most	C-9139472A-K001	yes	no	no
Postoloprty	Louny	C-9133514A-K002	yes	no	no
Ratboř	Kolín	C-9130962A-K002	no	no	no
Rybitví	Pardubice	C-9147544A-K001	no	no	no
Selibice	Louny	C-9133596A-K001	no	yes	yes
Siřem	Louny	C-9133597A-K001	no	no	no
Soběsuky nad Ohří	Chomutov	C-9120871A-K001	yes	yes	yes
Světec	Teplice	C-9164314A-K003	no	no	no
Svinčice	Most	C-9139550A-K001	no	no	no
Svojšice u Kouřimi	Kolín	C-9131147A-K001	no	yes	yes
Tatce	Kolín	C-9142025A-K001	no	no	no
Teplice	Teplice	C-9164332A-K001	no	no	no
Tišice	Mělník	C-9138502A-K011	no	yes	yes
Třebusice	Kladno	C-9128956A-K008	yes	yes	no
Veliká Ves u Prahy	Praha-východ	C-9154550A-K001	yes	no	yes
Velké Žernoseky	Litoměřice	C-9135710A-K001	no	yes	no
Vikletice	Chomutov	C-9000551A-K004	yes	no	yes
Vliněves	Mělník	C-9111440A-K014	yes	yes	yes
Vražkov	Litoměřice	C-9135762A-K001	yes	no	yes
Vrbčany	Kolín	C-9131597A-K001	no	no	no
Vrbice u Mšeného-lázní	Litoměřice	C-9135773A-K001	no	no	no
Všetaty	Mělník	C-9138754A-K001	no	no	no
Zdětín u Benátek nad Jizerou	Mladá Boleslav	C-9136565A-K001	no	no	no
Žabovřesky nad Ohří	Litoměřice	C-9135798A-K002	yes	yes	yes
Žatec 1	Louny	C-9133875A-K001	no	no	no
Žatec 2	Louny	C-9133909A-K001	yes	no	yes
Žatec 3	Louny	C-9133957A-K001	yes	no	yes

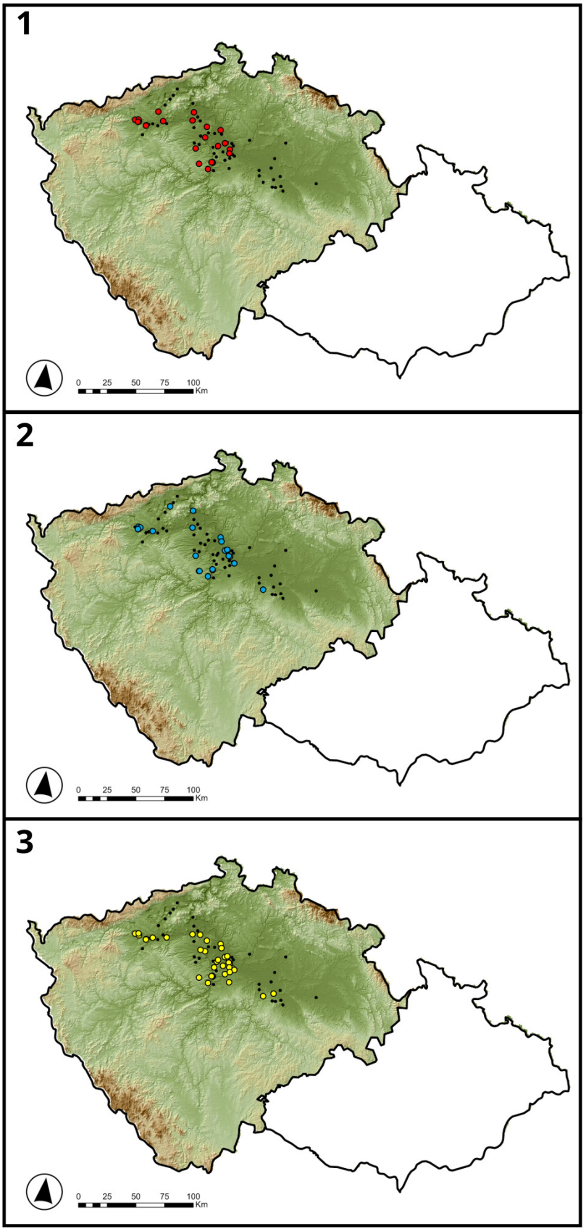

Fig. 5. Spatial distribution of Funnel Beaker Culture cemeteries in Bohemia. Black – Funnel Beaker Culture only, Red – with Corded Ware Culture burials, Blue – with Bell Beaker Culture burials, Yellow – with Únětice Culture burials.

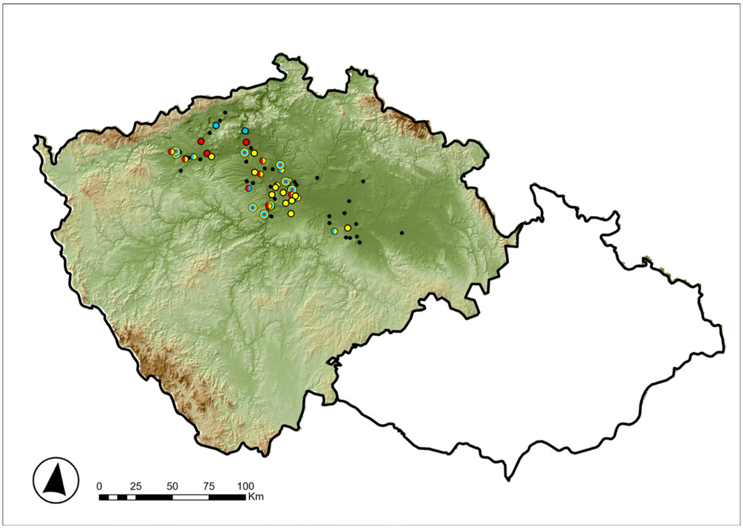

Fig. 6. Synthesis of spatial distribution of Funnel Beaker Culture cemeteries in Bohemia, demonstrating the continuity of Late Neolithic/Early Bronze Age funerary activities. Black – Funnel Beaker Culture only, Red – with Corded Ware Culture burials, Blue – with Bell Beaker Culture burials, Yellow – with Únětice Culture burials.

It thus appears that the communities who increasingly began to construct circular barrows in Central Europe often reused old barrow cemeteries that, from their perspective, were defined by archaic long barrows.

CONTINUITY OR NEW BARROW TRADITION?

One of the key questions regarding the emergence of the Corded Ware phenomenon is the origin of the new form of round barrows. Indeed, the circular shape of these barrows, also known as kurgans, forms part of the new expression of ritual behaviour associated with the *Single Grave Burial Rite Complex* (Furholt 2020). In Central and Northwestern Europe, circular barrows first appeared with the Corded Ware Culture.

Certainly, there were numerous intergroup contacts, particularly those between the steppe pastoralists and Corded Ware groups (e.g., Furholt 2021; Heyd *et al.*, 2021; Haak *et al.*, 2023; Hofmann *et al.*, 2025), and between the local Funnel Beaker and Corded Ware communities (e.g., Van der Velde and Bouma 2023; Bourgeois *et al.*, 2025). This cultural context clearly implies the environment in which

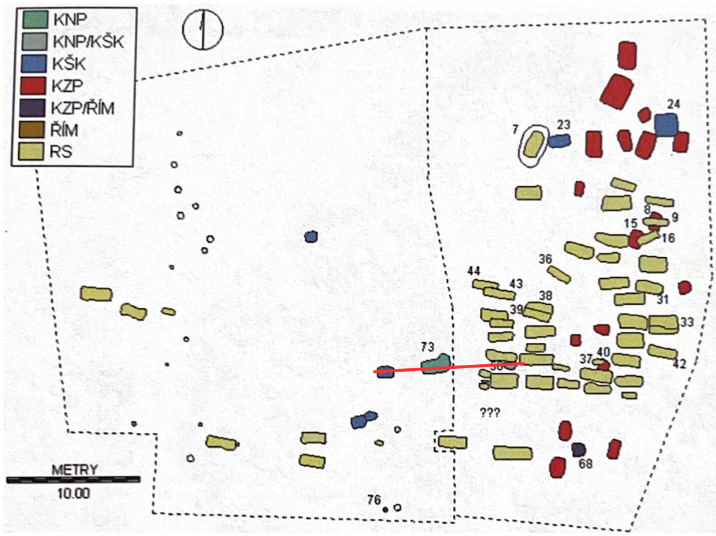

Fig. 7. Digitised overall plan of the cemetery in Brandýsek (Kladno District), with the chronological phases represented by colours: KNP – Funnel Beaker Culture; KŠK – Corded Ware Culture; KZP – Bell Beaker Culture, ŘÍM – Roman Period; RS – Early Middle Ages. The long barrow probably covered Graves 73 and 56 (the axis of the presumed long barrow is marked with a red line). The layout of the Early Medieval graves respects the original round mounds of the Corded Ware Culture and the Bell Beaker Culture. After Šmejda 2001.

such developments could have occurred, and this process should be understood as a synthesis of cultural elements rather than merely as an isolated impact of alien population infiltration. Let us now focus on the question of how and where this new burial tradition originated. Theoretically, there are two possible explanations. The first, an autochthonous interpretation, assumes a continuity in the development of the Middle Neolithic (in British/German chronological terminology) Funnel Beaker long barrows, with a trend of their shortening and division into segments. Such a process can be observed, for example, at burial sites of late Funnel Beaker and Boleráz long barrows in the forests of Central Moravia (Šmíd 2003). At cemeteries such as Křemela 1, we can still observe long barrows of various lengths in combination with "circular" barrows. At first glance, it appears as if the ground plan of a long barrow had disintegrated into a series of individual circular barrows arranged in a row. While this process of shortening the barrows is possible, excavations of some of these mounds show that the original shape defined by features such as stone kerbs was still rectangular. This is evidenced by uncovered perimeter stone constructions. The seemingly circular mounds are, in fact, the result of later erosion. This transformation preserves purely rectangular layouts and has nothing to do with the emergence of circular structures. Additionally, the relatively latest long barrow in Bohemia (dated to the Globular Amphora Culture) at Ctiněves, cannot be regarded as a direct predecessor to later round barrows. It is of trapezoidal ground plan and measures 14 metres in length and 10 and 8 metres in width (Turek and Krištuf 2025). Therefore represents the continuation of the preceding trend of long barrow design. Given the current state of knowledge, it does not seem likely that there is a direct continuity between the tradition of Neolithic long barrows and the barrows of the Corded Ware Culture. Similar observations of spatial affinity of the Funnel Beaker long barrow and later Corded Ware and Mierzanowice culture round barrow burials was uncovered during excavation of part of an extensive barrow cemetery in Malżyce the Czarnocin commune district of Kazimierza Wielka, Świętokrzyskie Voivodeship (Tunia and Włodarczak 2011; Jarosz *et al.*, 2013a; 2013b).

The second, allochthonous interpretation, involves the introduction of a new tradition of circular barrows with single burials. The origin of this type of funerary monument can be traced to the North Black Sea/Pontic-Caspian region, where members of the Yamna Culture buried their dead under circular mounds around 3300 BC (Włodarczak 2021 with further references). Round barrows of the Yamna Culture spread across a large territory from the North Caspian area to the Eastern Hungarian Plain and Bulgaria. It is plausible to suppose that the new "kurghan" element of circular ground-plan monuments spread along with the Yamna population. On the northwestern edge of Yamna expansion, in the north-west of present day Ukraine, there is a contact zone with the Subcarpathian group of the Corded Ware Culture. Therefore, it is likely that the typical round burial mounds originated here and then expanded into Central Europe alongside the Corded Ware and later the Bell Beaker phenomenon.

Ring ditches encircling some 3rd millennium graves are a widely spread phenomenon in Central and North-Western Europe. Corded Ware ring ditches are known from Bohemia, Moravia, Lower Austria, Lesser Poland, Silesia, central Germany, Bavaria and the Netherlands. Bell Beaker ring ditches have been recorded in Bohemia, Moravia, Bavaria, Central Germany, Tuscany, Middle and Lower Rhine valley etc. In Bohemia and Moravia, ring ditches occurred in both the Corded Ware and Bell Beaker periods. Their shape is roughly circular, with a grave pit in the centre (such as in Chudeřín in North Bohemia; see Fig. 8). Diameters of these round ditches vary from 5.64 m to 10.50 m in the Corded Ware period and from 3.0 m to 12.0 m in the Bell Beaker period, with medians for Corded Ware ring ditches about 9.4 m in diameter and just over 7 m for Bell Beaker ring ditches. The ring ditches are clearly the result

Fig. 8. Chudeřín (Chomutov District). The ring ditch originally encircling the Corded Ware round barrow. Photo: J. Turek.

of a new round design of funerary monuments in the form of barrows or funerary ditch enclosures (Turek 2006).

From the very inception of the Corded Ware Culture, its spread was associated with this new phenomenon of single-grave round barrows. It is also important to emphasise that round barrows as symbolic artefacts entered the range of burial customs of prehistoric Europeans at that time, and in the northern part of the continent, they persisted – though with short gaps – until the end of the Early Medieval period.

CONCLUSION

By examining the transition of funerary practices from the 4th to the 3rd millennia BC in Bohemia, this study highlights a complex interaction between continuity and innovation in burial traditions. The evidence of long barrows, originally constructed by the Funnel Beaker Culture, underscores their multiple roles as funerary, ancestral and ritual monuments. These structures, representing the earliest form of monumental funerary architecture in Central Europe, were in Bohemia primarily used for single burials.

The rise of the Corded Ware Culture after 2900 BC marks a major shift in perception of funerary landscapes, signified by the introduction of round barrows. While these new structures appear to delineate a cultural departure from the long barrows, they also reflect an intriguing cultural continuity. The secondary use of existing long barrows by Corded Ware and later Bell Beaker and Únětice cultures illustrates an ongoing reverence for these funerary areas. This reuse suggests that newly established communities sought to establish connections with the sacred landscapes of their ancestors, perhaps to legitimise their own cultural and territorial claims.

The transition from long to round barrows in Bohemia cannot be attributed merely to an evolution in architectural style but rather to the influence of external cultural exchanges, particularly with the Yamna Culture from the Pontic-Caspian steppes (Anthony 2023). The introduction of round barrows aligns with the broader dissemination of the Corded Ware, a phenomenon probably spurred by northward and westward migrations, which brought new funerary rites to the area. This process of cultural assimilation indicates an incorporation of new burial customs alongside a retention of certain local traditions.

Despite their differing origins, both the long and round barrows served as enduring structures within the cultural landscape, embodying the ritual and social values of the farming communities. Since the Corded Ware period, the utilisation of round barrows became a fundamental aspect of burial customs and funerary architecture across Europe north of the Alps. Despite intermittent interruptions, this tradition endured throughout later prehistoric periods and persisted until the conclusion of the Early Middle Ages.

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The Oldest Hammer-Axes of the Corded Ware Culture in Bohemia

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The aim of this study is to analyse hammer-axes assigned to the so-called A-horizon of the Corded Ware Culture (*c*. 3000–2350 BC). The focus area is Bohemia. The main emphasis is placed on the raw materials of these artefacts, which were analysed non-destructively using optical stereomicroscopy, X-ray diffraction and magnetic susceptibility measurements. Although archaeogenetic analyses indicate that the Corded Ware Culture arrived in Bohemia as an intrusive element, the raw material spectrum demonstrates continuity with sources exploited in preceding periods. In particular, Jizera Mountains-type (Jizerské hory) metabasite is the principal material of the assemblage of 32 analysed artefacts. The other raw materials used most likely also originate within the Bohemian Massif. These results thus point to a continuity in the use of raw material sources and distribution networks.

KEY-WORDS: Corded Ware Culture, A-type hammer-axes, archaeogenetics, raw material sourcing, Jizera Mountains-type metabasite, Bohemia

INTRODUCTION[1]

The Corded Ware Culture (*c*. 3000–2350 BC; hereinafter CW) has been a significant subject of Central European archaeological research since the late nineteenth century (Götze 1891; for Bohemia see Stocký 1929: 88–101, pl. LXV–LXXXI; Buchvaldek

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1 The authors would like to thank all staff members of museums and collection institutions who assisted in tracing the finds and kindly made them available for study and documentation. Their large number is reflected in the catalogue of this paper. The authors dedicate this article to the forthcoming life anniversary of Vít Vokolek (b. 1936), a distinguished Czech archaeologist.

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1967; 1986a; Neustupný 2013; for the broader European context see Heyd *et al.*, 2021). This prominence is due, among other factors, to its hypothesised central role in the dissemination of Indo-European languages (Brami 2021). Over the past decade, scholarship has drawn upon groundbreaking findings in archaeogenetics (Allentoft *et al.*, 2015; Haak *et al.*, 2015), which have definitively resolved the question of the origin of the CW bearers in favour of a migration from Eastern Europe, an interpretation already proposed by I. Borkovskyj (1933; 1934) and T. Sulimirski (1933). Nevertheless, the biological ancestry of a population and its material culture are inherently distinct phenomena, which may coincide yet do not necessarily do so. Consequently, the origins of specific aspects of CW material culture remain a matter of ongoing investigation, frequently yielding conflicting interpretations.

One of the characteristic artefacts of Corded Ware material culture is the stone hammer-axes, which has given the group its alternative designation – the *Battle Axe culture*. A type distributed more or less throughout the entire CW oecumene is the so-called *A-type hammer-axe*, a typical representative of the aforementioned artefacts. As will be demonstrated below, interpretations of its origin and chronological position within the CW framework are often contradictory. In this context, particular attention has been paid to aspects that have previously received limited emphasis, namely the raw material composition and, where possible, the manufacturing details of the studied artefacts. Such data may contribute to addressing questions related to the mobility and modes of penetration of incoming communities and their relationship to preceding Neolithic settlement.

The geographical scope of this study is confined to Bohemia (Fig. 1). The aim was to locate and examine all available CW *A-type hammer-axes* from this region. For each specimen, a metric analysis was conducted, accompanied by newly standardised graphic and photographic documentation. Subsequently, the raw material was determined through petrographic analysis.

A-TYPE HAMMER-AXES: DEFINITION, CHRONOLOGY, ORIGIN

The term “A-type hammer-axe” was first introduced into the literature by P. V. Glob (1945: 17–19), who placed it at the beginning of the typological sequence of Scandinavian hammer-axes and thus at the outset of the development of the Scandinavian Single Grave culture, which he interpreted as an expression of an Indo-European population arriving from the east. In terms of formal characteristics, these are stone specimens that, in lateral view, exhibit a slightly curved axis or a slightly convex upper surface, a straight butt end, and a dropped blade edge. In plan view, the body of the

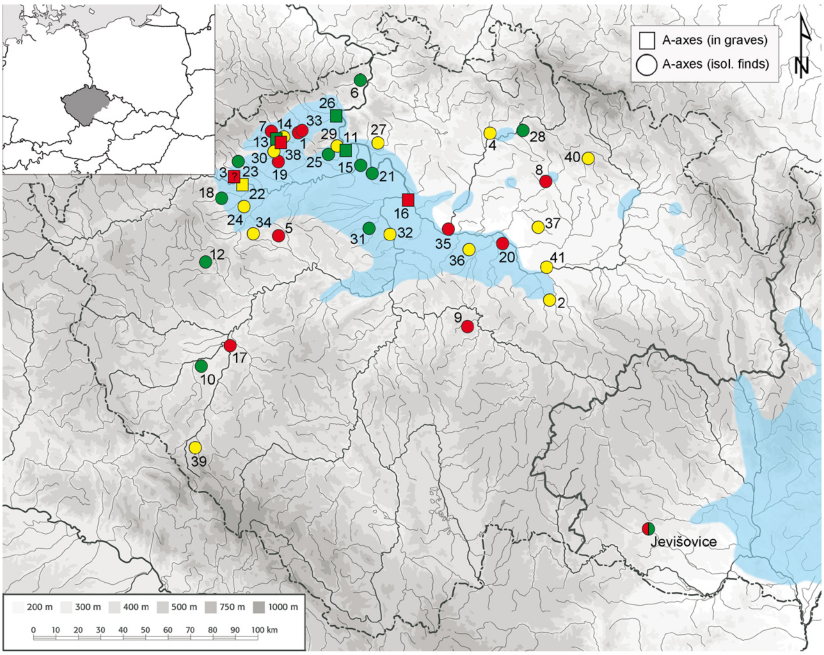

Fig. 1. Distribution of A-type hammer-axes in Bohemia according to find context (isolated find or grave context) and one of three morphological-evidential groups. Red indicates A-type hammer-axes approaching the typological ideal ("true" examples); green indicates less formally worked specimens ("degenerate" examples); yellow marks the remainder (hybrid forms, typologically inconspicuous fragments and unidentified hammer-axes mentioned only in Buchvaldek 1967: 163, Abb. 24). The numbering of the points corresponds to the numbering of sites in the catalogue. In blue is depicted the settlement oecumene of the Corded Ware Culture in Bohemia and Moravia.

hammer-axe is smoothly thickened at the shaft hole, while the butt end is essentially cylindrical. In cross-section, the artefact is oval to slightly flattened. Notably, Scandinavian specimens often display a longitudinal central ridge on the upper surface, sometimes expressed as a pair of shallow grooves or simply as a ridged, roof-like edge. In addition to these "true" A-type hammer-axes, the assemblage also includes "degenerate" pieces, whose main feature is the absence of the dropped blade edge and a more or less straight lateral axis; altogether, four variants of the A-type hammer-axe are generally distinguished (Brandt 1967: 43–49, Taf. 6.).

This type occurs, with varying degrees of frequency, throughout the entire Corded Ware complex, including the Scandinavian Single Grave culture. From the outset (see above), it has been associated with the penetration of Indo-Europeans from the east into Central Europe and, alongside specific types of amphorae and beakers, has been regarded as part of the so-called A-horizon – that is, a pan-European, earliest horizon of the Corded Ware Culture in Europe (Struve 1955: 13–14, 27–29, 98–119). The notion of a uniform initial A-horizon has subsequently been called into question, particularly in the context of research seeking prototypes for A-type hammer-axes within the local Central European cultural milieu at the turn of the 4th to 3rd millennia BC (for the latest overview of interpretations, see Schultrich 2022).

In the current discourse, the problem of A-type hammer-axes is primarily linked to two questions: what chronological position these hammer-axes occupy within the Corded Ware Culture, and where their origins are to be sought.

Despite doubts about their occurrence already in the earliest Corded Ware contexts (Hübner 2005: 143–146; Furholt 2014: 73; Schultrich 2022: 49–50), evidence from Central Europe increasingly confirms that they indeed belong to its initial phase. In Bohemia, their chronological position within the Early Corded Ware Culture has recently been demonstrated by a male burial from Obříství, in which an A-type hammer-axe was found together with a beaker, a belt clasp and a silicite blade. The radiocarbon date for this assemblage oscillates around 2900 BC (Dobeš *et al.*, 2023: 103–105, figs 2 and 3). A hammer-axe of similar age, with an interval extending slightly, due to the calibration plateau, down to around 2700 BC, was part of the grave goods of a ploughed-out barrow burial at Żygląd in the Kuyavian-Pomeranian Voivodeship (4265±35 BP = 3005–2703 BC 2σ; Kurzyk 2011: 463, ryc. 4–5). The occurrence of such finds in Layer B at Jevišovice (Medunová-Benešová 1972: 144–154, Taf. 91–93, for details see below) may also be cited as valid evidence; this context belongs to the post-Baden eponymous culture dated just before and overlapping with the Early Corded Ware (Peška 2013: 23–52, tab. 3 and 5; Peška 2021: 514, fig. 3 and 22). A similar pattern can be observed in the occasional occurrence of these hammer-axes within the Złota culture, which falls within roughly the same chronological framework (site Grodzisko I, Graves 17 and 43, Krzak 1961: 17, 43, ryc. 48c and 100b; for absolute dating of the Złota culture see Włodarczak 2019: 190–191, tab. 4, ryc. 7). Noteworthy is also their appearance already in the earliest dendro-dated layers of the western Swiss Lüscherz group in the mid-28th century BC, where, as in the Złota culture, one can observe a blending of indigenous Neolithic/Eneolithic elements with Corded Ware traits. Paradoxically, A-type hammer-axes are not particularly common on settlements of the eastern Swiss "pure" Corded Ware, being attested there mostly as isolated finds (Strahm 1971: 40, 134–135, Taf. 17:31, Karte 1; Winiger 1993: 37–88, Abb. 20, 24, 39–41; Hafner and Suter 2003: 14–15, Abb. 7).

Their occurrence within these marginal groups, which are culturally and genetically derived from the preceding local development of entirely different traditions, is

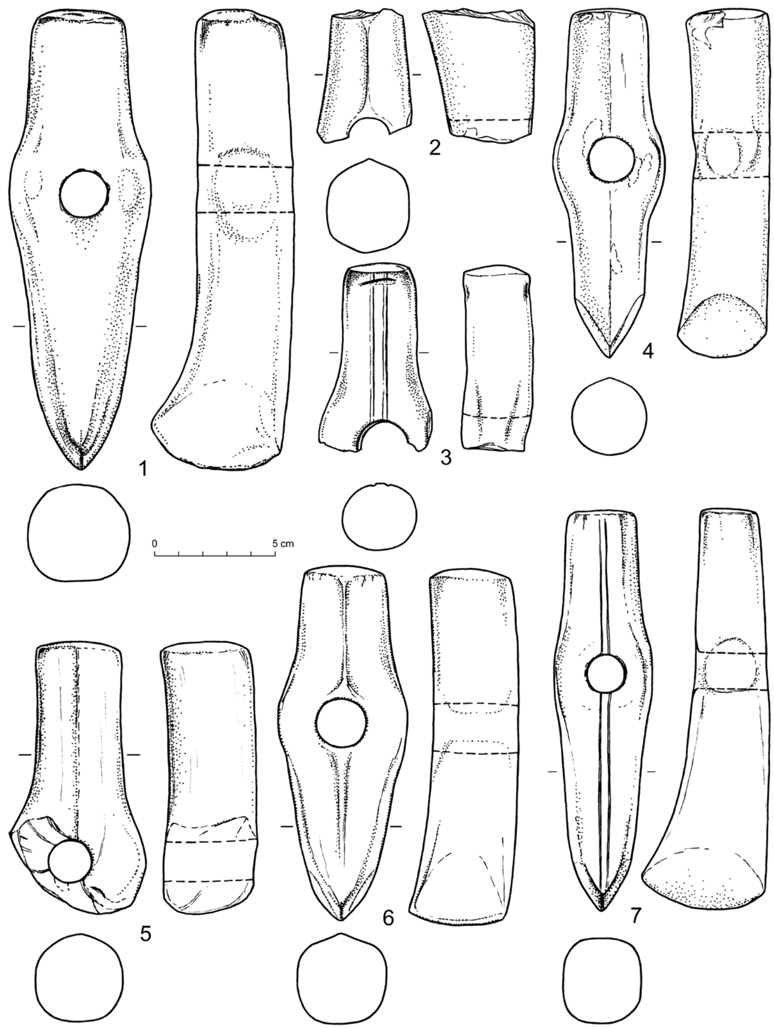

Fig. 2. A-type hammer-axes from Bohemia. 1 – Čermníky, Nr. 3; 2 – Žalov, Nr. 32; 3 – Dolní Jiřetín, Nr. 7; 4 – Roudnice nad Labem, Nr. 21; 5 – Přední Lhota, Nr. 20; 6 – Chrášťany, Nr. 5; 7 – Jičíněves, Nr. 8. Drawing: L. Raslová.

best explained by the mediating role of Corded Ware communities during the initial stage of their spread across Europe. The A-type hammer-axe is also the only type distributed across the entire territory of this cultural complex; other types are more or

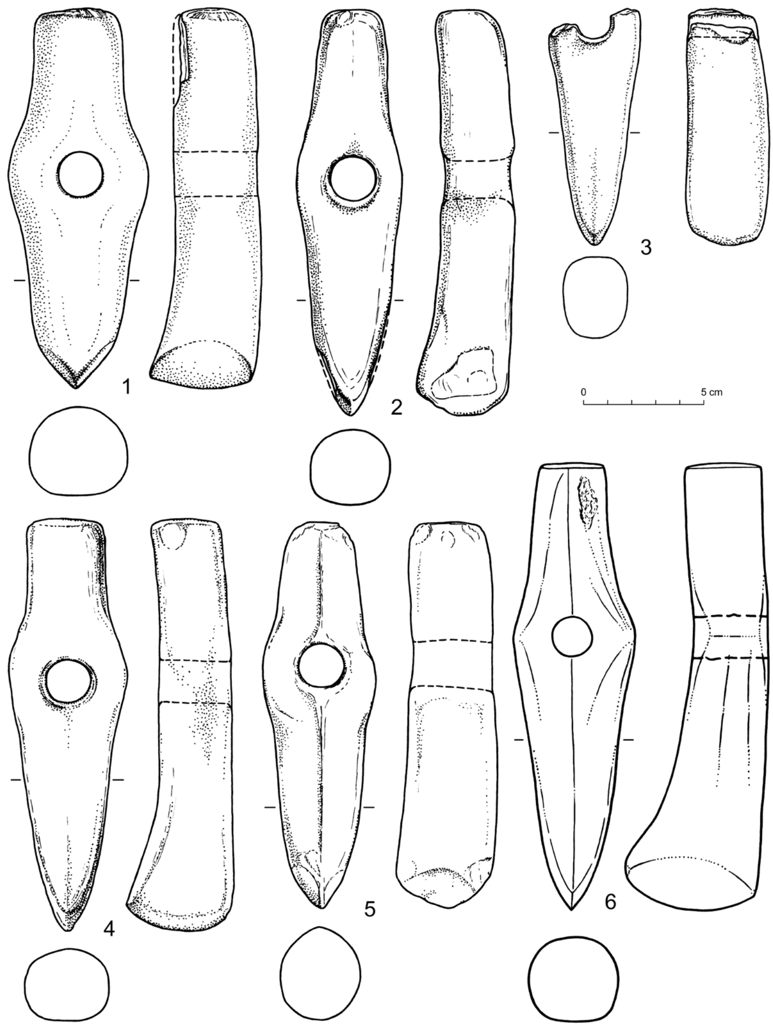

Fig. 3. A-type hammer-axes from Bohemia. 1 – Lbosín, Nr. 9; 2 – Plzeň, Nr. 17; 3 – Děčín District (?), Nr. 6; 4 – Polerady, Nr. 19; 5 – Spořice, Nr. 23; 6 – Obříství, Nr. 16. Drawing: L. Raslová.

less localised, and in the context of the demonstrable demographic diffusion of Corded Ware bearers, it is hardly conceivable that they could have preceded the A-type.

A separate question, of course, is where the inspiration for this particular hammer-axe type is to be sought. This issue is, and will remain, difficult to resolve, as the hammer-axe – whether as a warrior's symbol, a mark of social rank or an insignia of power – is a chronologically and geographically fairly universal artefact, and in the 3rd millennium BC, artefacts stylistically similar to A-type hammer-axes can be found across wide areas of Europe (and the Near East – Heyd 2016: 75, Abb. 11; Klimscha 2016: 91–94). In addition to classic three-dimensional artefacts, depictions can also be identified in this horizon in Central and Southeastern Europe, appearing on anthropomorphic stelae/menhirs, which further highlight the hammer-axe's role as an indicator of social status (Kerig 2010; Alexandrov 2021: 283, 296, fig. 19; Gogăltan 2021: 254, pl. 3). The relatively frequent longitudinal ridge on the upper side of A-type hammer-axes, or its imitation in the form of grooves, is commonly interpreted as a reflection of metal hammer-axes cast in two-part moulds. This technology, too, was already widespread in Europe around 3000 BC, meaning that no geographically more specific source of inspiration can be pointed out (cf., Hell 1943; Maran 2008; Dani and Kulcsár 2021: 336–337, fig. 6; Schultrich 2022: 62–65, Abb. 9–10).

THE ISSUE OF A-TYPE HAMMER-AXES IN BOHEMIA

As in other parts of Europe, the foundation for the study of hammer-axes of the Corded Ware Culture in Bohemia was laid by the work of P. V. Glob (1945). The first to draw attention to their occurrence was M. Buchvaldek, who linked them to other finds assigned to the earliest, that is, pan-European horizon of the Corded Ware Culture. By the late 1950s, he had recorded a total of ten specimens. In addition to defining their shape, he also pointed out other consistent features, namely the clear traces of drilling and the direction of drilling from the upper side, similar to the Scandinavian examples (Buchvaldek 1957: 368, 377, fig. 155). He returned to this topic a few years later when publishing one typical example (Buchvaldek 1964), but above all in his monograph on the Corded Ware Culture in Bohemia (1967). At that time, the author had access to 31 specimens displaying features of the A-type. He later revisited them while defending the concept of the A-horizon in discussions of the European Corded Ware (Buchvaldek 1971: 556–559; 1986b: 147–148; 1997: 47–49), but he never published them comprehensively. Both older and more recent specimens have thus occasionally appeared either in catalogues of the Corded Ware published in the journal *Praehistorica* (specific references are given below for individual specimens) or as part of overview studies (Dobeš *et al.*, 2021: 496–498, fig. 4, 7–9). It should be noted that Czech scholarship has never really questioned the A-type hammer-axes as part of the earliest horizon of the Corded Ware Culture in Europe, although this has always been viewed within the context

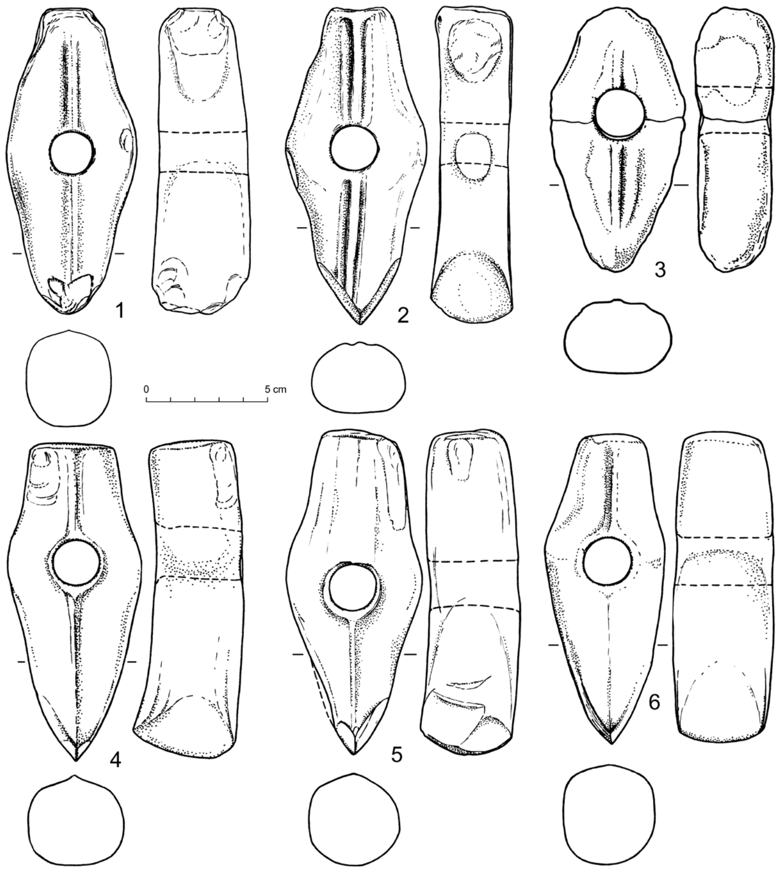

Fig. 4. A-type hammer-axes from Bohemia. 1 – Nové Dvory, Nr. 15; 2 – Podlesice, Nr. 18; 3 – Most, Nr. 13; 4 – Bílina, Nr. 1; 5 – Třebenice, Nr. 25; 6 – Močidlec, Nr. 12. Drawing: L. Raslová.

of a fundamentally different understanding of the genesis and, to some extent, the chronology of this cultural complex (Neustupný 2013: 132–133).

CATALOGUE OF A-TYPE HAMMER-AXES OF THE CORDED WARE CULTURE FROM BOHEMIA

The following catalogue summarises the available information on finds of A-type hammer-axes from the territory of Bohemia (Figs 2–8 and 11). In the first section (I), artefacts that were available for closer examination are listed in alphabetical order. The statistical analysis of raw materials presented in previous chapters is based on this part of the catalogue. The second section (II) includes a smaller number of hammer-axes that could not be traced; the data for these entries are derived from the literature. The catalogue is linked to Fig. 1.

The primary source of information for this catalogue was the list of A-type hammer-axes presented in map form by M. Buchvaldek in his foundational monograph on the Corded Ware Culture in Bohemia (Buchvaldek 1967: 163, Karte 24). At present, 41 items have been identified, although some may be considered typologically ambiguous, so-called hybrids (see detailed classification in Fig. 1).

Abbreviations used in the catalogue: *AAH* – A-type hammer-axe; č. př. – accession number; *DE* – density; *inv. č.* – inventory number; *M* – museum; *MS* – Magnetic susceptibility; *NM Praha* – National Museum Prague; *r* – reconstructed dimension; *OS* – Optical stereomicroscopy; *SGS* – silicites of glacigene or glacial sediments; *u* – preserved dimension; *XRD* – X-ray diffraction.

I. ANALYSED A-TYPE HAMMER-AXES

1. Bílina, Teplice District (Fig. 4:4)
Find circumstances: Windmühle location, isolated find from 1938.
Dimensions and weight: 140 × 56 × 38 mm, 470 g.
Surface: Smoothed; traces of earlier pecking visible in places; an imitation seam runs along the longitudinal axis on the upper side. Grinding marks are apparent – fine striations oriented in various directions.
Shaft hole: Indistinct V-shaped bore, most likely drilled from the top; Ø 21 mm (top), 20 mm (bottom); pronounced drilling traces only superficially smoothed. A small ledge is present at the bottom exit of the borehole.
Raw material: Tertiary porphyritic basaltoid, partially hydrothermally altered.
Analytical methods used: OS, MS, XRD, DE.
Repository: Bílina M, inv. no. 129 (4023).
References: Buchvaldek 1967: 163, Karte 24:2; Buchvaldek and Velímský 1987: 79–80, fig. 25:1.

2. Čáslav, Kutná Hora District (Fig. 7:3)
Find circumstances: Balkán IV Street; found in a “cultural pit” during sewer works in 1936.
Dimensions and weight: 153 × 50 × 30 mm, 398 g.

Surface: Carefully smoothed; no visible traces of pecking. One side of the blade preserves part of the original surface, left unground – clearly an attempt to correct a shaping imperfection in the blank. Grinding traces visible: fine, parallel striations oriented almost exclusively transversely to the hammer-axe's main axis.
Shaft hole: V-shaped to asymmetrical X-shaped bore, evidently drilled from the top; Ø 23 mm (top), 19 mm (bottom); borehole clearly ground down, though its original irregularities remain visible.
Raw material: Jizera Mountains-type (Jizerské hory) metabasite.
Analytical methods used: OS, MS, XRD.
Repository: Čáslav M, inv. no. 1291 (old number).
References: Buchvaldek 1967: 163, Karte 24:24; Zápotocký 2002: 161, fig. 16:1.

3. Čermníky, Chomutov District (Fig. 2:1)
Find circumstances: Probable grave (?) find from a field owned by Mr Gassauer, dating to the 1880s; donated by the landowner.
Dimensions and weight: 191 × 58 × 38 mm, 728 g.
Surface: Incompletely smoothed traces of pecking, which appear on the surface with varying intensity. Grinding marks are visible: fine, parallel striations oriented transversely to the artefact's longitudinal axis, also present on the blade.
Shaft hole: V-shaped bore drilled from the top; Ø 19 mm (top), 18 mm (bottom); bore traces are finer but clearly visible, partially smoothed.
Raw material: Porphyritic microdiorite.
Analytical methods used: OS, MS, XRD, DE.
Repository: Chomutov M, inv. no. 841.
References: Buchvaldek 1967: 163, Karte 24:5; Dobeš 1993: 177, fig. 2.

4. Chocnějovice, Mladá Boleslav District (Fig. 6:5)
Find circumstances: Isolated find north of the village near the hamlet of Sovinky; collected by the priest Kára.
Dimensions and weight: 157 × 42 × 34 mm, 420 g.
Surface: Carelessly smoothed; several areas show incompletely erased pecking marks. Occasional transverse parallel grinding striations are visible.
Shaft hole: Indistinct V-shaped bore, drilled from the top; Ø 18 mm (top), 17 mm (bottom). Very fine parallel striations, in places seemingly overlaid with a thin crust obscuring the bore marks (secondary? varnish? crust resulting from contact with the haft?).
Raw material: Tertiary porphyritic basaltoid.
Analytical methods used: OS, MS.

Repository: Turnov M, inv. no. A590.
References: Filip 1947: 107, pl. 16:17; Buchvaldek 1967: 163, Karte 24:17 (as atypical AAH); Kalferst and Prostředník 1993: 31, pl. IV:1; Prostředník and Šída 2004: 317, 346, fig. 22:1.

5. Chrášťany, Rakovník District (Fig. 2:6)
Find circumstances: Isolated find from the cadastral area of the village, donated by Prof. Haken.
Dimensions and weight: 147 × 53 × 34 mm, 428 g.
Surface: Carefully smoothed; occasional small traces of pecking visible in places. Grinding marks visible: fine parallel striations, predominantly transverse.
Shaft hole: Slightly widened bore internally; Ø 20 mm (top), 18 mm (bottom), approximately 24 mm in the middle; distinct drilling traces, only lightly ground over.
Raw material: Tertiary porphyritic basaltoid, probably hydrothermally altered (low magnetic susceptibility).
Analytical methods used: OS, MS.
Repository: NM Praha, inv. no. 19491.
References: Buchvaldek 1967: 163, Karte 24:8.

6. Děčín District (?) (Fig. 3:3)
Find circumstances: Dredged from the Elbe River; purchased from the estate of Jul. Michel.
Dimensions and weight: u100 × r40 × 30 mm, 200 g.
Surface: Originally probably smoothed; secondarily abraded by water. No observable or preserved grinding traces.
Shaft hole: Symmetrical (?) irregular bore; Ø approx. 16 mm; coarse drilling traces heavily abraded due to secondary water exposure.
Raw material: Tertiary basaltoid?
Analytical methods used: OS, MS, DE.
Repository: Děčín M, inv. no. L1.
References: Buchvaldek 1967: 163.

7. Dolní Jiřetín, Most District (Fig. 2:3)
Find circumstances: Isolated find from the village's cadastral area.
Dimensions and weight: u80 × r50 × 29 mm, 142 g.
Surface: Carefully smoothed, only occasional small traces of pecking visible in places; on the upper side of the butt end, two parallel grooves along the axis of the

artefact, 1–1.5 mm wide. Grinding marks visible: fine parallel striations oriented in all directions.

Shaft hole: X-shaped bore; Ø approx. 21 mm; drilling traces almost entirely smoothed out. Along the vertical axis of the bore, fine parallel smoothing traces of the originally rough surface are visible (the X-shaped profile of the hole may have resulted from bilateral smoothing of an originally one-sided bore).

Raw material: Serpentinite.

Analytical methods used: OS, MS, XRD, DE.

Repository: Duchcov M, inv. no. 1551 (B122-2/85).

References: Buchvaldek 1967: 163, Karte 24:3; Dobeš and Buchvaldek 1993: 200, fig. 1.

8. Jičíněves, Jičín District (Fig. 2:7)

Find circumstances: Isolated find from the village's cadastral area, purchased by the museum from Fr. Papoušek in 1955 along with other items from the Jičín region.

Dimensions and weight: 166 × 41 × 29 mm, 401 g.

Surface: Smoothed, with only occasional remnants of the original surface of the blank visible; no pecking observed. On the upper side, two parallel grooves along the axis of the artefact, 1 mm wide. Grinding marks occasionally visible, almost imperceptible, mostly transverse to the main longitudinal axis of the artefact.

Shaft hole: Slight V-shaped bore, drilled from the top; Ø 15 mm (top), 14 mm (bottom); distinct drilling traces, only roughly smoothed (ground along the bore axis, as observed in other hammer-axes).

Raw material: Jizera Mountains-type (Jizerské hory) metabasite.

Analytical methods used: OS, MS, XRD, DE.

Repository: Jihlava M, inv. no. 251 (3/91).

References: Šebela 1993.

9. Lbosín, Benešov District (Fig. 3:1)

Find circumstances: Limestone quarry near the village; isolated find by J. Filas in 1942.

Dimensions and weight: 167 × 61 × 38 mm, 560 g.

Surface: Very finely pecked (?) or possibly corroded (?), carelessly smoothed, with smoothing particularly evident on the butt end. Any grinding traces are indistinct, possibly removed by corrosion (?).

Shaft hole: Symmetrical; Ø 19 mm (top), 19 mm (bottom); fine drilling traces clearly visible (closely spaced concentric rings), not smoothed.

Raw material: Palaeozoic amphibole diorite (?).

Analytical methods used: OS, MS.

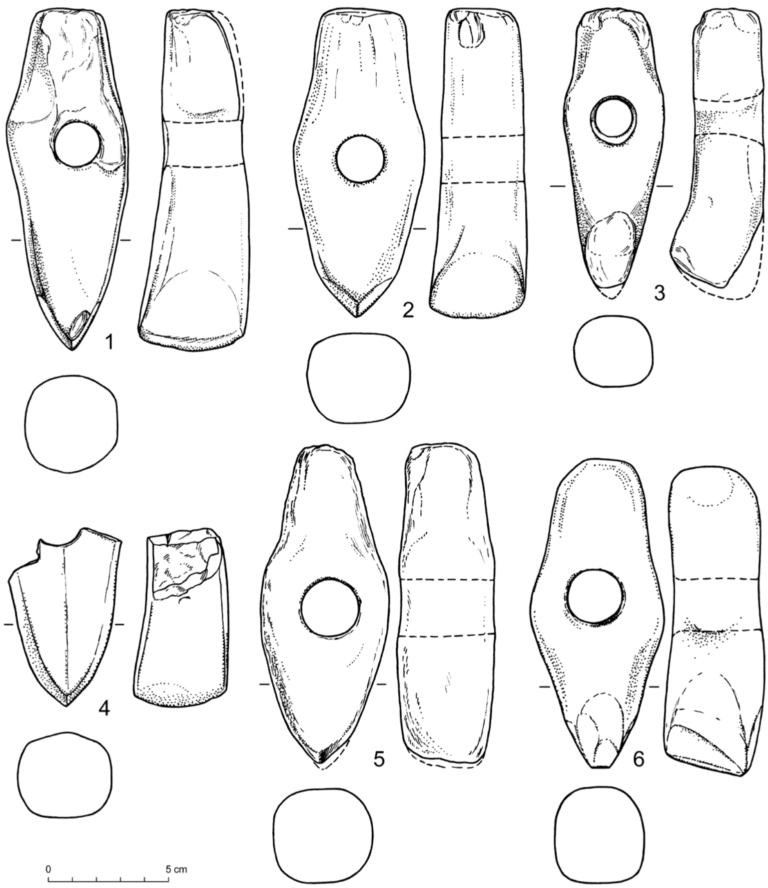

Fig. 5. A-type hammer-axes from Bohemia. 1 – Trmice, Nr. 26; 2 – Lovosice, Nr. 11; 3 – Losina, Nr. 10; 4 – Vchynice, Nr. 29; 5 – Most, Nr. 14; 6 – Zákolany, Nr. 31. Drawing: L. Raslová.

Repository: Vlašim M, inv. no. 100045.
References: Buchvaldek 1964: 107 with fig.; Buchvaldek 1967: 163, Karte 24:25.

10. Losina, Plzeň-jih District (Fig. 5:3)
Find circumstances: Isolated find from the village's cadastral area; donated by E. Liška in 1965.
Dimensions and weight: 116 × 42 × 28 mm, 208 g.
Surface: Ground, corroded. Due to corrosion, grinding traces are no longer visible. Both the blade and the butt are heavily battered.

Shaft hole: Asymmetrical X-shaped bore, primarily drilled from the top; Ø 17–18 mm (top), 15 mm (inner), 13 mm (middle); drilling traces distinct, not smoothed.
Raw material: Palaeozoic porphyritic microdiorite (?).
Analytical methods used: OS, MS.
Repository: Stříbro M, inv. no. A647, reg. no. 776/65.
References: Buchvaldek 1992: 17; Metlička *et al.*, 2007: 110, fig. 4:6.

11. Lovosice, Litoměřice District (Fig. 5:2)
Find circumstances: Grave find from the Reiser brickyard; a "cauldron-shaped pit" with a "sitting crouched skeleton"; fill consisted of loam with ash and charcoal. The hammer-axe was reportedly found beneath the skeleton; no other finds were recorded. Information obtained from workers and the finds secured by R. von Weinzierl in 1884.
Dimensions and weight: 128 × 54 × 34 mm, 396 g.
Surface: Imperfectly smoothed; any traces of surface pecking are nearly polished over but still visible across most of the surface. Grinding traces are occasionally visible, both transverse and longitudinal (coarser?).
Shaft hole: V-shaped bore, drilled from the top; Ø 21 mm (top), 19 mm (bottom); originally pronounced drilling traces are partially smoothed.
Raw material: Chloritized biotite amphibolite.
Analytical methods used: OS, MS, XRD.
Repository: Teplice Museum, inv. no. K7170, W469.
References: von Weinzierl 1894: 145, figs 102–103; Buchvaldek 1967: 142 (73/68): 163, Karte 24:12.

12. Močidlec, Karlovy Vary District (Fig. 4:6)
Find circumstances: Isolated find from the village's cadastral area, made before 1940.
Dimensions and weight: 134 × 52 × 42 mm, 462 g.
Surface: Smoothed; any traces of surface pecking are nearly obliterated. On the top side along the artefact's longitudinal axis is an imitation seam, an edge. Grinding traces are visible: fine, parallel striations, mostly transverse.
Shaft hole: Symmetrical bore; the drilling direction is unclear; Ø 20 mm (top), 20 mm (bottom); the bore is clearly ground (fine striations along the vertical axis), but the original rough irregularities are still clearly apparent.
Raw material: Palaeozoic or Proterozoic diabase/dolerite.
Analytical methods used: OS, MS.
Repository: Karlovy Vary Museum, inv. no. A280.
References: Anonymus 1941: 111; Metlička *et al.*, 2007: 110, fig. 3:4.

13. Most, Most District (Fig. 4:3)

Find circumstances: Grave find scattered by an excavator near the marshalling yard in 1931. In addition to the hammer-axe, two blades from SGS likely originate from the same context.

Dimensions and weight: u115 × u61 × 33 mm, 334 g.

Surface: Originally smoothed; a rib is present along the longitudinal axis on the top side; secondarily heavily chipped/reused, especially the butt and the blade. Traces of grinding are indistinct; only a small patch of the original surface is preserved.

Shaft hole: V-shaped bore, probably drilled from the top; Ø 22 mm (top), 20 mm (bottom); originally distinct drilling traces are partially smoothed; surface partially flaked off (weathering?).

Raw material: Tertiary porphyritic basaltoid.

Analytical methods used: OS, MS, DE.

Repository: Most Museum, inv. no. P33a (reg. no. 2357/90).

References: Buchvaldek 1967: 163, Karte 24:27; Dobeš and Buchvaldek 1993: 208, fig. 12.

14. Most, Most District (Fig. 5:5)

Find circumstances: Location "Henkerteich", near the former gasworks of Most, isolated find from 1895.

Dimensions and weight: 132 × 53 × 37 mm, 364 g.

Surface: Heavily corroded; the original surface has not been preserved and cannot be observed.

Shaft hole: Symmetrical bore, corroded, all features only faintly visible; probably drilled from the top; Ø 24 mm (top), 23–25 mm (bottom); a small step is present on the underside, suggesting the bore "slipped" in its final stage (?).

Raw material: Biotite gneiss?

Analytical methods used: OS, MS.

Repository: Most Museum, inv. no. 179 (reg. nos. 5827, 2350/90).

References: Buchvaldek 1967: 163, Karte 24:27 (as atypical AAH); Dobeš and Buchvaldek 1993: 214, fig. 19.

15. Nové Dvory, Litoměřice District (Fig. 4:1)

Find circumstances: Isolated find from the village's cadastral area, donated by Husák in 1896.

Dimensions and weight: 133 × 57 × 38 mm, 448 g.

Surface: Fine pecking across the surface; along a slightly raised seam in the longitudinal axis of the axe, only roughly smoothed in two narrow strips (2 × approx. 5 mm).

Shaft hole: Slight V-shaped bore, drilled from the top; Ø 20 mm (top), 18 mm (bottom); distinct drilling traces, only roughly smoothed.
Raw material: Fine-grained diorite?
Analytical methods used: OS, MS, XRD, DE.
Repository: Roudnice Museum, inv. no. st. no. 34, reg. no. 65.
References: Buchvaldek 1967: 163, Karte 24:14.

16. Obříství, Mělník District (Fig. 3:6 and 7:1)
Find circumstances: Inhumation grave 166 discovered during rescue excavation in 2011. It contained remains of a male (adultus II – maturus, 35–50 years) and grave goods including the hammer-axe, two antler strap fasteners, a beaker, and a piece of silicite.
Dimensions and weight: 186 × 51 × 31 mm, 548 g.
Surface: Perfectly smoothed; no traces of pecking observed. A seam-like ridge runs along the top side in the longitudinal axis of the artefact, with faint facets occasionally formed by grinding. Traces of grinding visible: fine parallel striations, predominantly transverse.
Shaft hole: Symmetrical bore, probably drilled from the bottom; Ø 16 mm (top), 17 mm (bottom); distinct drilling traces, not smoothed.
Raw material: Jizera Mountains-type (Jizerské hory) metabasite.
Analytical methods used: OS, MS.
Repository: Institute of Archaeology Prague, inv. no. OB11/546.
References: Dobeš *et al.*, 2023: 103–105, figs 2–4.
Note: Radiocarbon date: MAMS-30795, 4259±23 BP, 2912–2786 BC (2σ).

17. Plzeň-Hradiště, Plzeň District (Fig. 3:2)
Find circumstances: Isolated find by Mr Dědek around 1926, between the Úhlava River and Pod Bručnou Street.
Dimensions and weight: 178 × 48 × 29 mm, 384 g.
Surface: Heavily corroded, including the inner walls of the shaft hole; any further surface modifications cannot be observed.
Shaft hole: Symmetrical bore, probably drilled from the top; Ø 20 mm (top), 20 mm (bottom).
Raw material: Proterozoic greywacke.
Analytical methods used: OS, MS, DE.
Repository: Plzeň M, inv. no. P8687.
References: Buchvaldek 1967: 163, Karte 24:9, pl. XIX:1; Buchvaldek 1992: 17, fig. 1:1; Metlička *et al.*, 2007: 110, fig. 4:1.

18. Podlesice, Chomutov District (Fig. 4:2)
Find circumstances: Isolated find from the village's cadastral area, originally part of Fr. Steiner's collection.
Dimensions and weight: 138 × 59 × 29 mm, 396 g.
Surface: Smoothed; pecking traces visible across the surface (or perhaps a result of the stone's texture during grinding?). A longitudinal seam on the top of the artefact is asymmetrically positioned, not aligned with the central axis. The blade is centred, but the front of the artefact is secondarily shortened, the hammer-axe has been reworked. Grinding marks are transverse on the body and longitudinal on the blade and part of the side.
Shaft hole: X-shaped bore with a central step, drilled from the bottom and later re-drilled from the top halfway through? Ø 19 mm (top and bottom), 17 mm (centre); coarsely made and only partially polished.
Raw material: Partly altered metamorphosed Palaeozoic diorite/diabase.
Analytical methods used: OS, MS, XRD, DE.
Repository: Chomutov M, inv. no. 924 (St5).
References: Buchvaldek 1967: 163, Karte 24:6; Dobeš 1997: 82, fig. 6.

19. Polerady, Most District (Fig. 3:4 and 7:4)
Find circumstances: Isolated find from the village's cadastral area, acquired by A. Pobel in 1900.
Dimensions and weight: 185 × 53 × 30 mm, 444 g.
Surface: Originally probably carefully polished, only remnants preserved. Most of the surface is secondarily chipped (an oblique lamination seam is visible on the upper side, indicating secondary corrosion). There was likely also a longitudinal seam/ridge on the top originally. Traces of grinding are visible in the preserved areas: fine parallel striations, predominantly transverse.
Shaft hole: Symmetrical bore, drilling direction indeterminable; Ø 19 mm (top), 19 mm (bottom); roughly made, incompletely ground out (drill marks still visible), in places also chipped like the rest of the artefact surface.
Raw material: Proterozoic greywacke.
Analytical methods used: OS, MS, DE.
Repository: Teplice M, inv. no. K2667 (31-4/75).
References: Buchvaldek 1967: 163, Karte 24:4; Dobeš and Buchvaldek 1993: 218, fig. 23.

20. Přední Lhota, Nymburk District (Fig. 2:5)
Find circumstances: Isolated find from the village's cadastral area.
Dimensions and weight: approx. 112 × approx. 60 × 37 mm, 326 g.

Surface: Lightly corroded, originally carefully polished. A ridge imitating a seam runs along the longitudinal axis on the upper side of the artefact. Traces of grinding are not observable due to corrosion.
Shaft hole: Symmetrical bore, drilling direction indeterminable; Ø 16 mm (bottom), diameter from the top not measurable; fine drill traces (tightly spaced concentric rings) well visible, unpolished.
Raw material: Jizera Mountains-type (Jizerské hory) metabasite.
Analytical methods used: OS, MS.
Repository: Charles University, Prague (possibly Poděbrady M), inv. no. P160.
References: Buchvaldek 1967: 163, Karte 24:21.

21. Roudnice nad Labem, Litoměřice District (Fig. 2:4)
Find circumstances: Isolated find from the village's cadastral area.
Dimensions and weight: 145 × 46 × 30 mm, 331 g.
Surface: Polished, with only minor remnants of the original rough surface and pecking visible in places; almost imperceptible facets, the most distinct of which forms a longitudinal seam on the upper side. Fine grinding marks, mostly transverse, clearly visible.
Shaft hole: Slight V-shaped bore, drilled from the top; Ø 18 mm (top), 17 mm (bottom); very prominent drilling traces, only superficially ground (as in other axe-hammers, grinding along the axis of the bore).
Raw material: Jizera Mountains-type (Jizerské hory) metabasite.
Analytical methods used: OS, MS, XRD, DE.
Repository: Roudnice M, inv. no. 53.
References: Buchvaldek 1967: 163, Karte 24:15; Buchvaldek 2002: 65, fig. 3.

22. Roztyly, Louny District (Fig. 6:1)
Find circumstances: Inhumation grave 8A discovered in a sandpit near the village in 2002. It contained the remains of a male (based on the flexed position on the right side) and grave goods including an axe-hammer and a blade of the Corded Ware type. The grave was disturbed by a feature of the same type belonging to the Únětice culture.
Dimensions and weight: 161 × 55 × 41 mm, 592 g.
Surface: Pecked overall, only very roughly and superficially smoothed.
Shaft hole: Symmetrical bore, drilling direction undetermined; Ø 18 mm from both sides; faint fine drilling traces visible, no signs of additional grinding.
Raw material: Porphyritic microdiorite.
Analytical methods used: OS, MS, XRD, DE.
Repository: Žatec M, reg. no. 15/00-125.
References: Holodňák and Holodňáková 2002: 136, fig. 2:5.

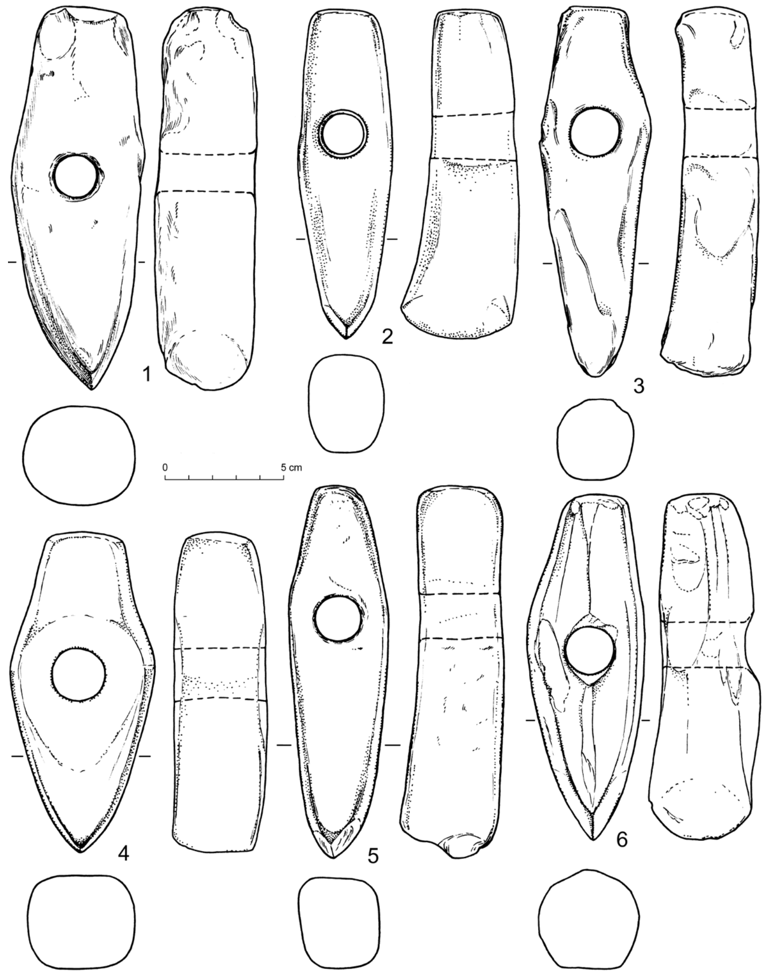

Fig. 6. A-type hammer-axes from Bohemia. 1 – Roztyly, Nr. 22; 2 – Trnová, Nr. 27; 3 – Turnov, Nr. 28; 4 – Velebudice, Nr. 30; 5 – Chocnějovice, Nr. 4; 6 – Sýrovice, Nr. 24. Drawing: L. Raslová.

23. Spořice, Chomutov District (Fig. 3:5)

Find circumstances: Isolated find from the village's cadastral area, originally from the collection of H. Palme.

Dimensions and weight: 167 × 50 × 37 mm, 458 g.

Surface: Smoothed; traces of possible pecking visible in several places. In the longitudinal axis of the artefact, an imitation seam (a ridge) is present on the upper side, and

also on the bottom of the butt end. In places, the surface is secondarily naturally flaked. Grinding traces visible: fine parallel striations, predominantly transverse.
Shaft hole: Symmetrical drilling, probably from the top; Ø 20 mm from the top, 18 mm from the bottom; coarse drilling marks, only roughly smoothed.
Raw material: Serpentinite (?)
Analytical methods used: OS, MS.
Repository: Děčín M, inv. no. Ar4424, Palme L/7, cat. no. 1/86.
References: Buchvaldek 1967: 163, Karte 24:1, pl. XIX:2 (as Děčínsko?).

24. Sýrovice, Louny District (Fig. 6:6)
Find circumstances: Isolated find from the village's cadastral area, from Mr Schuh's sandpit, originally from the collection of Fr. Steiner.
Dimensions and weight: 147 × 48 × 35 mm, 446 g.
Surface: Smoothed (with faint facets); no traces of possible pecking observed. In several places, unpolished traces of more roughly hewn preform. Grinding traces visible: fine parallel striations, a combination of longitudinal and transverse.
Shaft hole: Multi-phase drilling? There is a small step in the middle, probably primarily drilled from the top; Ø 20 mm from the top, 19 mm from the bottom; coarse drilling marks, only faintly smoothed.
Raw material: Jizera Mountains-type (Jizerské hory) metabasite.
Analytical methods used: OS, MS, XRD, DE.
Repository: Chomutov M, inv. no. 920 (St355).
References: Dobeš 1997: 83, Fig. 8.

25. Třebenice, Litoměřice District (Fig. 4:5)
Find circumstances: Isolated find from the village's cadastral area.
Dimensions and weight: 138 × 59 × 38 mm, 466 g.
Surface: Polished; traces of pecking visible only locally. Rough surfaces of the originally flaked preform preserved at the blade and butt (probably not due to secondary damage). Grinding traces visible: fine parallel striations, mostly transverse.
Shaft hole: Asymmetrical X-shaped perforation; the drilling direction is unclear, perhaps from below (a ledge at the upper outlet of the hole), later drilled/modified from above; Ø 20 mm from above, 20 mm from below, 18 mm in the centre. Drilling traces nearly completely smoothed out, very fine in places.
Raw material: Metabasite (?).
Analytical methods used: OS, MS, XRD.
Repository: Litoměřice M, inv. no. T22 (Třebenice collection).
References: Buchvaldek 1967: 163, Karte 24:10; Zápotocký 1964: 301, fig. 16:1.

26. Trmice, Ústí nad Labem District (Fig. 5:1)

Find circumstances: Grave no. 14 discovered during rescue excavation related to the D8 highway in 1987. The only artefact found was the hammer-axes; the burial contained the remains of a man (*adultus*, 20–40 years old) lying on his right side, along with dislocated bones of another individual.

Dimensions and weight: 141 × 50 × 34 mm, 384 g.

Surface: Polished; no traces of prior pecking observed. Parts of the original surface of the preform preserved, only faintly ground. Grinding traces visible: fine parallel striations, mostly transverse.

Shaft hole: Symmetrical perforation, probably drilled from above; Ø 18 mm from above, 18 mm from below. Very rough drilling traces, not smoothed.

Raw material: Proterozoic metatuffite (?)

Analytical methods used: OS, MS, XRD.

Repository: Ústí nad Labem M, inv. no. 13034.

References: Cvrková *et al.*, 1991: 14, fig. 10; Pavelková 1991: 41.

27. Trnová u Polep, Litoměřice District (Fig. 6:2)

Find circumstances: Discovered during the establishment of a hop field near the village in 1894; originally from the collection of R. von Weinzierl.

Dimensions and weight: 140 × 38 at sh. hole (max. width 39) × 35 mm, 366 g.

Surface: Smoothed, with only occasional traces of possible pecking or the original surface of the blank. Grinding marks visible: fine parallel striations, predominantly transverse.

Shaft hole: Slight V-shaped perforation, drilled from the top; Ø 20 mm at the top, 17 mm at the bottom; coarse drilling traces visible, but partially smoothed.

Raw material: Jizera Mountains-type (Jizerské hory) metabasite (probably).

Analytical methods used: OS, MS, XRD.

Repository: Teplice M, inv. no. W1326 (acq. no. 155/80).

References: Buchvaldek 1967: 163, Karte 24:13 (as atypical AAH); Budinský 1985: 73.

28. Turnov, Semily District (Fig. 6:3)

Find circumstances: Isolated find from the village's cadastral area, in the Durychov locality, near house no. 522.

Dimensions and weight: 156 × 47 × 29 mm, 352 g.

Surface: Indeterminateeither strongly weathered, corroded, or chopped and pecked.

Shaft hole: Slightly V-shaped, drilled from the top; Ø 20 mm at the top, 19 mm at the bottom; perforation corroded, occasionally with traces of coarser drilling

marks. Unlike the surface, some smoothed patches visible in the perforation, suggesting partially ground drilling traces.
Raw material: Tertiary volcanic (trachytic) rock.
Analytical methods used: OS, MS.
Repository: Turnov M, inv. no. A3818.
References: Buchvaldek 1967: 163, Karte 24:18; Kalferst and Prostředník 1993: 28, tab. IV:2; Prostředník and Šída 2004: 314, 348, fig. 21:2.

29. Vchynice, district Litoměřice (Fig. 5:4)
Find circumstances: Isolated find from the village's cadastral area, originally from the collection of R. von Weinzierl.
Dimensions and weight: approx. 75 × unknown × 29 mm, 180 g.
Surface: smoothed, slightly corroded, polishing traces unobservable due to corrosion.
Shaft hole: preserved only slightly, most likely symmetrical or V-shaped; Ø cannot be measured; drilling traces probably smoothed and unobservable.
Raw material: Tertiary porphyritic basaltoid.
Analytical methods used: OS, MS, DE.
Repository: Teplice M, inv. no. K5182.
References: Buchvaldek 1967: 163, Karte 24:11; Budinský 1985: 97.

30. Velebudice, district Most (Fig. 6:4)
Find circumstances: Isolated find from the Scheithauer field, gift from 1894.
Dimensions and weight: 136 × 62 × 39 mm, 448 g.
Surface: carefully smoothed, slightly corroded in places, traces of possible previous pitting not observed or completely smoothed out. Occasional traces of grinding, barely visible, mostly transverse.
Shaft hole: bore slightly X-shaped; Ø 22 mm top, 22 mm bottom, 21 mm middle; drilling traces almost perfectly smoothed, visible grinding traces in the bore axis (fine scratches).
Raw material: Serpentinite.
Analytical methods used: OS, MS, XRD.
Repository: Most M, inv. no. 187 (acc. nos. 5302 and 2339/90).
References: Buchvaldek 1967: 163, Karte 24:28 (as atypical AAH); Dobeš and Buchvaldek 1993: 221, fig. 28.

31. Zákolany, district Kladno (Fig. 5:6)
Find circumstances: Budeč hillfort, isolated find acquired before 1925.
Dimensions and weight: 129 × 56 × 36 mm, 414 g.

Surface: imperfectly smoothed traces of pitting, i.e., rougher surface (probably not corrosion). Occasional transverse grinding traces. Edge secondarily (recently) ground into a narrow hammer shape.
Shaft hole: V-shaped bore, drilled from above; Ø 23 mm top, 21 mm bottom; coarse drilling traces visible, partially smoothed.
Raw material: diabase / dolerite.
Analytical methods used: OS, MS.
Repository: NM Praha, inv. no. 10051.
References: Buchvaldek *et al.*, 1997: 156, fig. 50.

32. Žalov, district Praha-západ (Fig. 2:2)
Find circumstances: Levý Hradec hillfort, no further details.
Dimensions and weight: approx. 56 × approx. 42 × 35 mm, 128 g.
Surface: carefully smoothed, no traces of possible previous pitting observed. Traces of grinding visible: fine parallel scratches, mostly transversely oriented.
Shaft hole: symmetrical bore, drilling direction unknown; Ø approx. 16 mm; coarse drilling traces, only partially smoothed.
Raw material: serpentinite.
Analytical methods used: OS, MS, DE.
Repository: NM Praha, inv. no. 16720.
References: Buchvaldek 1967: 163, Karte 24:26 (as Levý Hradec, classified as atypical AAH); Buchvaldek *et al.*, 1997: 169, fig. 68.

II. UNANALYSED A-TYPE HAMMER-AXES

33. Bílina, Teplice District
Find circumstances: Blade section of an A-type battle axe without further details.
Dimensions and weight: *c.* 95 × 45 × 30 mm.
Surface: Smoothed; two parallel grooves along the axis of the artefact on the upper face.
Repository: Teplice M, inv. no. K2686 (not located).
References: Buchvaldek 1967: 163, Karte 24:2 (plus personal archive of M. Buchvaldek).

34. Hořovičky, Rakovník District
Find circumstances: Unknown.
References: Buchvaldek 1967: 163, Karte 24:7 (as atypical AAH).

35. Káraný – surroundings, Prague-East District (Fig. 7:2)
Find circumstances: From the River Jizera.
Dimensions and weight: L. 149 × 50 × 30 mm, 447 g.
Surface: Original surface not preserved; the object was most likely secondarily water-worn due to its origin (the protruding lamina on the butt end of the axe can be considered evidence of secondary abrasion). Any grinding marks not observed or preserved.
Shaft hole: Faint V-shaped bore, drilled from the top; Ø 18 mm (top), 17 mm (bottom); coarse drilling marks visible, partially smoothed.
Repository: Department of Archaeology, Faculty of Arts, Charles University, without inventory number.
References: Buchvaldek 1967: 163, Karte 24:16, pl. XIX:3.

36. Kounice, Nymburk District
Find circumstances: Unknown.
References: Buchvaldek 1967: 163, Karte 24:23 (as atypical AAH).

37. Městec Králové – surroundings, Nymburk District
Find circumstances: Unknown.
References: Buchvaldek 1967: 163, Karte 24:20 (as atypical AAH).

38. Most, Most District (Fig. 8:1)
Find circumstances: Inhumation grave discovered during the excavation of factory foundations in 1864. According to descriptions, in addition to the hammer-axe, the grave contained an item of silicite (not preserved) and pottery (not preserved).
Dimensions and weight: approx. 99 (originally 120) × 53 × 38 mm, 355 g.
Surface: Polished (in the 20th century the item was secondarily exposed to fire); an indistinct ridge on the upper side.
Shaft hole: V-shaped bore; Ø 21 mm from above, 20 mm from below; very coarse drilling marks.
Repository: Municipal Office in Petrohrad, inv. no. 148.
References: Dobeš and Buchvaldek 1993: 212, fig. 17.

39. Opálka, Klatovy District (Fig. 8:2)
Find circumstances: Isolated find from field plot no. 82/2, discovered by V. Soušek in 1934.
Dimensions and weight: approx. 95 × ca 50 × 30 mm, 236 g.
Surface: Ground.

Fig. 7. A-type hammer-axes from Bohemia. 1 – Obříství, Nr. 16; 2 – Káraný – surroudings, Nr. 35; 3 – Čáslav, Nr. 2; 4 – Polerady, Nr. 19. Photo: I. Hrušková.

Shaft hole: According to description, drilled from both sides, approx. Ø 16 mm.
Raw material: According to B. Šreinová, very fine-grained metatuffite, "probably from a local or nearby source".
Repository: Klatovy Museum, inv. no. 5.
References: Metlička *et al*., 2007: 110, fig. 4:2.

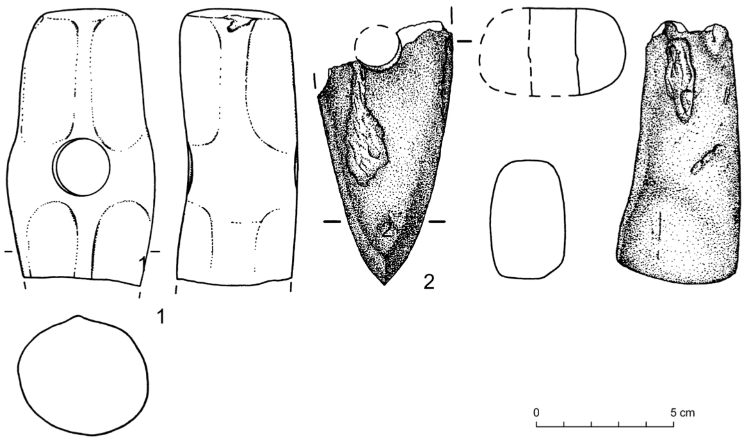

Fig. 8. A-type hammer-axes from Bohemia (not located). 1 – Most, Nr. 38; 2 – Opálka, Nr. 39. After Dobeš, Buchvaldek 1993; Metlička *et al.*, 2007.

40. Pecka (near Nová Paka), Jičín District
Find circumstances: Unknown.
References: Buchvaldek 1967: 163, Karte 24:19.

41. Týnec nad Labem, Kolín District
Find circumstances: Unknown.
References: Buchvaldek 1967: 163, Karte 24:22 (as atypical AAH).

FIND CONTEXTS AND DISTRIBUTION OF A-TYPE HAMMER-AXES IN BOHEMIA

At present, around 40 examples of the discussed type of hammer-axes are recorded in Bohemia; our study includes 41 specimens. For various reasons, however, the presented assemblage, as is often the case, cannot be regarded as complete. Some of the recorded pieces have not been revised (i.e., found but not re-examined; see the second group in the catalogue), so we remain reliant on their listing by M. Buchvaldek, which is probably reliable (Buchvaldek 1967: 163, Abb. 24). The inclusion of some typologically problematic pieces (especially so-called hybrid forms, see below) also presents difficulties. On the other hand, additional pieces may be concealed in museum collections. Compared with geographically neighbouring areas – for example, Moravia (fewer than 10 pieces, excluding the examples from Jevišovice and Peška 2021: 514, fig. 1) or Bavaria (around 25 pieces; Buchvaldek 1998: 26, fig. 14:5) – the Bohemian assemblage is relatively large.

As in other regions, this is a group of artefacts with varying combinations of features that define the ideal type. We have attempted to divide them into *three morphological and evidential categories*. The first two categories broadly follow the earlier distinction between shapes that adhere to the ideal form – that is, the "true" A-type hammer-axes – and less formally shaped pieces lacking, in particular, the curved lateral axis and dropped blade edge, that is, the "degenerate" forms (essentially following Brandt 1967: 43–49, Pl. 6). The third, heterogeneous category consists of specimens displaying features of other types, such as faceted hammer-axes (Sýrovice, item 24), simple variants of hammer-axes of the Ślęża type (see e.g., Šebela 1999: 73, Pl. 134:5), or A-type derivatives from Silesia and Lesser Poland (Włodarczak 2006: 33, table XXII:B). Given their looser connection with the ideal A-type, this category also includes other problematic pieces for simplicity, namely typologically inconspicuous fragments and artefacts of unknown form listed in M. Buchvaldek's 1967 inventory (see above).

Based on find contexts, the hammer-axes can be divided into artefacts originating from (inhumation) graves (6 to 7 specimens) and isolated finds, the latter clearly predominating (accounting for about 85% of the total; see Fig. 1). In graves, A-type hammer-axes are accompanied at most by a flint blade, as is typical throughout the European Corded Ware oecumene. A notable exception is formed by two cases: the find from Most (Catalogue item no. 38) and a male inhumation grave from Obříství (Catalogue item no. 16). No pottery has survived from the former, but the latter yielded a typologically archaic beaker, a silicite blade and, importantly, a pair of antler belt clasps. According to the radiocarbon date, the grave falls around the 29th century BC, making it an important element not only for dating A-type hammer-axes but also for the belt clasps.

Isolated finds are generally interpreted as the last remains of ploughed-out graves (Buchvaldek 1997: 44). In many cases this was undoubtedly so, but other possibilities must also be considered. The votive aspects may be recalled by practices associated with roughly contemporary copper hammer-axes of the Eschollbrücken type, which are found exclusively in bogs and similar contexts, never in graves (Maran 2008; see Malmer 1962: 666–671 for the votive function of stone artefacts). Certain find circumstances of Czech A-type hammer-axes allow for this interpretation (Items 6 and 35 in the Catalogue). In terms of provenance, isolated finds without more precise information are especially problematic, as they may have served as so-called thunderstones, meaning that their original deposition need not correspond to what is stated in museum documentation. Certainly, in the Czech lands too, trade in these artefacts

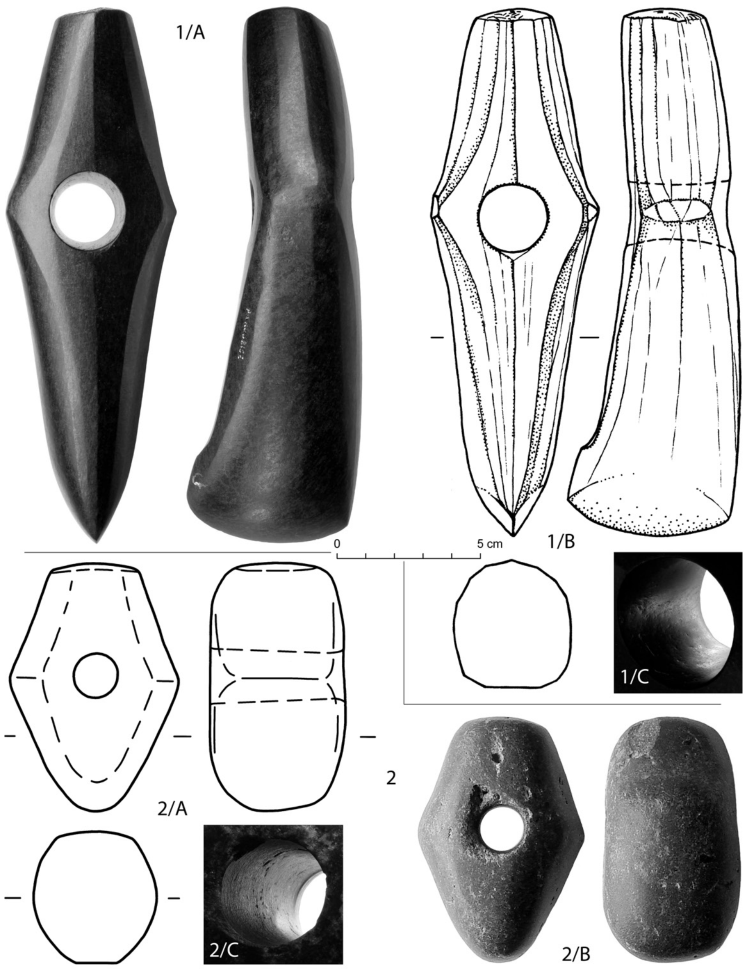

Fig. 9. Examples of other types of hammer-axes of the Corded Ware Culture from Bohemia. 1 – Faceted hammer-axe (Pardubice); 2 – Battle axe of Bohemian type (Kozárovice). Photo: I. Hrušková. Drawing: L. Raslová.

based on belief in their protective powers was still flourishing at the beginning of the 20th century (see e.g., Sklenář 1999: 23–65). The occurrence of A-type hammer-axes in the context of other archaeological cultures (Jevišovice, layer B, Medunová-Benešová 1972: 144–154, Pl. 91–93) or mixed groups (Lüscherz; Winiger 1993) at the same time suggests their potential connection with local Late Neolithic/Eneolithic groups (e.g., the Cham Culture in western Bohemia). It cannot be ruled out either that they may relate to actual settlement by Corded Ware communities (see for example the hill-top settlement Wattendorf-Motzenstein in Upper Franconia; Seregély 2008).

In light of the above, the distribution pattern of A-type hammer-axes in Bohemia must be considered carefully. Compared with the settlement oecumene of the Corded Ware Culture, which is itself constructed on the basis of grave finds, two anomalies can be observed (Fig. 1). Firstly, there is a marked concentration of finds in north-western Bohemia, which could at first sight be interpreted as the initial penetration of a migrating Corded Ware population from the neighbouring Middle Elbe–Saale region. However, the distribution of contemporary ceramic forms of the A-horizon does not fully support this picture (Dobeš *et al.*, 2021: 492–496, fig. 2). This may thus reflect the current state of research, differing chronological dynamics in the use of A-type hammer-axes in central and north-western Bohemia, or other reasons. Secondly, differences can be observed when comparing the distribution of A-type hammer-axes with their typological (and broadly chronological) successors, i.e., faceted hammer-axes and Bohemian-type hammer-axes (Fig. 1 versus Buchvaldek 1986a: fig. 56). A-type hammer-axes tend to concentrate on the periphery of the Corded Ware settlement oecumene and beyond it, particularly in contrast to the distribution of the local Bohemian-type hammer-axe, which occurs predominantly at its centre. Given the above-mentioned interpretative issues surrounding isolated finds of stone hammer-axes, this could be an indication reflecting the initial stages of necessary contact between incoming and local populations, when Corded Ware communities moved within or settled rather on the fringes of areas continuously inhabited since the Early Neolithic (cf., Buchvaldek 1964: 4).

RAW MATERIALS OF THE BOHEMIAN A-TYPE HAMMER-AXES

In this chapter, we assess a collection of 32 ground tools from the perspective of the raw materials used. These are specimens that were available for more detailed non--destructive analysis. The petrographic classification of the artefacts often allowed identification only to a broader lithological group, without the possibility of determining a more precise provenance. This limitation is due to the fact that the analysis was restricted to non-destructive research methods. The primary tool for identifying specific raw materials was optical stereomicroscopy, complemented by measurements of magnetic susceptibility and density, and in selected cases also X-ray diffraction (approximately half of the analysed artefacts). The list of methods applied to individual artefacts is provided in the catalogue.

The most common raw material identified in the Bohemian assemblage is *metabasite* (8 specimens, representing 25% of the collection). In six cases, this was specifically determined to be *Jizera Mountains-type (Jizerské hory) metabasite*. In two instances, a more precise provenance could not be established, but their attribution to the Jizera Mountains sources is probable. These artefacts are found mainly in eastern Bohemia (Čáslav, Přední Lhota and Jičíněves) and also along or near the Elbe River (Roudnice nad Labem, Obříství near Mělník, Trnová and Třebenice near Litoměřice). The only site beyond this area is Sýrovice in the Louny district. Given the dimensions of the hammer-axes, it appears unlikely that they were produced by reworking older Neolithic shoe-last adzes or axes. It must therefore be assumed that the Jizera Mountains sources were known and exploited during the Corded Ware period as well.

In second place are *basaltic rocks* (basaltoids) of Tertiary age (7 specimens, representing 22% of the assemblage). Their precise classification (basalt, basanite, tephrite, phonolite, nephelinite and others) is not possible without preparing thin sections and determining the chemical composition, i.e., by means of destructive analyses. These young volcanic rocks form not only the Central Bohemian Uplands and the Doupov Mountains, but also numerous morphologically prominent features within, for example, the Bohemian Cretaceous Basin (Kunětická hora near Pardubice, Bezděz, Lůž, Čeřovka, Zebín and Veliš near Jičín /Pacák 1957/, Čertova zeď hill near Český Dub, the summit of Mužský near Mnichovo Hradiště, Hazmburk and others). These dominant landscape features may have attracted attention. A number of Corded Ware hammer-axe finds lie in the vicinity of potential sources (Bílina, the Elbe near Děčín, Most, Vchynice near Litoměřice, Chocnějovice near Mnichovo Hradiště), and in the case of other finds, occurrences of basaltoid neovolcanics can always be found relatively nearby.

The third most numerous group comprises rocks identified as *amphibole diorite or porphyritic microdiorite* (6 specimens, representing 19% of the assemblage). These are predominantly dyke rocks, and the occurrences of artefacts made from them are concentrated in Central Bohemia. In the case of the Bohemian Corded Ware hammer-axes, their provenance is very likely linked to dyke rocks associated with the Central Bohemian Pluton.

In fourth place are *serpentinites* (4 specimens, representing 13% of the assemblage). Three of these finds come from the Podkrušnohoří region, specifically from the Chomutov-Teplice Basin. Nearby natural occurrences of high-quality serpentinites are found at Zöblitz, Kuhschnappel and Hohenstein-Ernstthal on the Saxon side of the Ore Mountains, while more distant serpentinite sources lie near Mnichov within the Mariánské Lázně metabasite complex.

Other rocks – *Proterozoic greywacke* (2 specimens, 7%) and probably *Proterozoic/Palaeozoic diabase* (2 specimens, 7%) – are only marginally represented. The origin

Fig. 10. Jevišovice, Znojmo District. A-type hammer-axes (1–8) and a clay model of a hammer-axe, probably of the same type (9). After Medunová-Benešová 1972, redrawn and supplemented by M. Dobeš.

of these rocks can be assumed to lie within the Proterozoic formations of the Barrandian area, i.e., within the region of Central and Western Bohemia.

Other rock types were each recorded in a single specimen. These include *amphibolite* (Lovosice), *biotite gneiss* (Most) and probably *Proterozoic metatuff* (Trmice near Ústí nad Labem). Their provenance can theoretically be inferred from the nearest occurrences of such rocks (for example, for Most, the slopes of the Ore Mountains).

As part of our study, the assemblage of A-type hammer-axes and their preforms from layer B at Jevišovice (Fig. 10) was also re-evaluated petrographically. In terms of raw material, this assemblage differs from the Bohemian finds – as, indeed, does the entire assemblage of Moravian A-type hammer-axes of the Corded Ware Culture compared with those from Bohemia (Přichystal and Šebela 1992; Přichystal 1999). The raw material of the available artefacts was newly analysed microscopically (non-destructively). Within the assemblage, a hypabyssal igneous rock related to the lamprophyre or lamproite group clearly predominates. The nearest occurrences of comparable rocks lie some 18–20 km to the west in a straight line. It is therefore highly probable that the Jevišovice workshop processed local raw material.

BASIC TECHNOLOGICAL OBSERVATIONS ON BOHEMIAN A-TYPE HAMMER-AXES

Comments on the manufacturing technology of A-type hammer-axes are relatively rare in the literature (an exception is Malmer 1962: 607–610, figs 107–109). The works cited above are primarily focused on describing the shape—that is, detailed typological characterisation and its spatial and chronological context. A detailed comparison with non-Bohemian A-type hammer-axes from Corded Ware contexts is therefore currently impossible due to the lack of relevant observations.

A basic idea of the manufacturing sequence of A-type hammer-axes can paradoxically be gained from assemblages at the fringes of the Corded Ware settlement oecumene, namely at the Lüscherz group settlements in western Switzerland (Winiger 1993: 68–78, figs 39–41) and layer B at Jevišovice in Moravia, belonging to the eponymous archaeological culture (Medunová-Benešová 1972: 144–147, 172, Pls 91–93; Peška 2021: 514, fig. 3). The artefacts from the latter site have received detailed attention, including new evaluation of the raw material used for their production (see above) and the revision and supplementation of the relevant drawings (Fig. 10).

Due to the absence of related remains at the settlements (Lüscherz, Jevišovice), it is not possible to determine how the raw material was initially processed at this stage of the production chain. This stage was very likely conditioned by the mechanical properties of the material (for example, in the case of Jizera Mountains-type metabasite, cutting of fractured slabs is documented for the Neolithic; Stolz 2016). Subsequent working involved pecking, by which the rough shape of the preform was prepared for drilling. Traces of pecking are mostly visible even on polished finished products, though often the process remained at this stage only (see, for example, the hammer-axe from the grave at Roztyly, Catalogue item 22). Except for two cases

(Fig. 10:4 and 8), all the studied artefacts from Jevišovice have a rough surface, although these are often clearly unfinished or defective pieces. On some specimens, it is difficult to distinguish whether this represents a roughly worked surface or the result of later corrosion of originally polished material. The latter interpretation is supported by protruding laminae of harder rock components (observed, for example, on Catalogue items 19 and 35, see Fig. 7:2 and 4). Fine traces of surface polishing are almost always oriented perpendicular to the longitudinal axis of the artefact.

For drilling, two possible approaches can be distinguished: "false drilling" and "true drilling" using a solid or hollow drill. The "false drilling" technique – i.e., creating the perforation by pecking through – is different from "true drilling" (Goldhammer *et al.*, 2012: 127). In the past, solid and hollow drilling were the subject of debate regarding their respective chronological status (Malmer 1962; Zápotocký 1992). However, in his extensive study of hammer-axes of the Funnel Beaker Culture, M. Zápotocký (1992: 144–148) pointed out that both technologies were used simultaneously for all major hammer-axe types, but to varying degrees depending on geographical distribution. It appears that solid drilling is more characteristic of the northern distribution area of the Funnel Beaker Culture, whereas hollow drilling is more typical of the southern area. This may relate to the preceding tradition of the Stroke-Ornamented Ware Culture (5100/5000–4500/4400 BC), for whose later phase hammer-axes drilled with a hollow drill are typical (Pavlů and Zápotocká 2013: 78–81). Simplified, drilling with a hollow drill can be associated with the Danubian tradition, while drilling with a solid drill reflects the northern tradition – although both techniques overlap.

Looking at unfinished boreholes on hammer-axes from Jevišovice and Lüscherz, it is clear that a hollow drill was used from one side, combined with a cup-shaped countersink from the opposite side to maintain axial stability of the preform during the drilling process. However, the use of a hollow drill is not documented for the earliest hammer-axes of the northern Single Grave Culture and Boat Axe Culture, where the borehole profile suggests drilling with a solid drill from both sides (Malmer 1962: 607–610, 618, Fig. 107; Beran 1990: 34). This situation would thus correspond with regional differences in the preceding period. For the Bohemian specimens, the same method is typical as for the Jevišovice artefacts – drilling with a hollow drill from one side; in no case was a marked central widening of the borehole found that would indicate the use of a solid drill (cf., Figs 12–14 and Malmer 1962: Abb. 107). The hollow drill is also indicated by the borehole profile, which is symmetrical or slightly conically narrowing from one side (V-profile). The traces of drilling are mostly very coarse, occasionally carelessly smoothed, and only rarely carefully finished.

Where the drilling direction could be determined, it was almost exclusively from the upper side of the hammer-axe, just as with pieces from the two cited settlements

(Winiger 1993: Abb. 40:4–5, 10; Medunová-Benešová 1972: Pl. 93:7, 11; here Fig. 10:1–2, 7). A similar drilling direction can be observed on isolated finds of preforms of Bohemian hammer-axes with formal features corresponding to the earlier Corded Ware phase (Fig. 11). Here, it is worth recalling an early observation by M. Buchvaldek, who pointed out significant differences in the method of drilling and the final finishing of the shaft hole. Whereas A-type hammer-axes were drilled from the top and the borehole was left unsmoothed, faceted hammer-axes are characterised by a borehole drilled from both sides (X-profile borehole) which is, however, very carefully polished. Bohemian-type hammer-axes, that is, the local and chronologically youngest type, were again drilled from one side (V-profile borehole), but unlike the first group, from the bottom. However, the drilling traces are not as coarse as on the A-type hammer-axes but much finer and more regular (compare Figs 12–14 with Fig. 9). For the boreholes of faceted hammer-axes, an alternative interpretation is that they may not have been drilled from both sides but from one side and subsequently carefully polished from both ends to create the characteristic X-profile.

In addition to the stone pieces, clay hammer-axes or hammer-axe models – probably toys or cult objects – should also be mentioned. An interesting example with a central rib and a stylised representation of pecking (?) comes from Jevišovice (Fig. 10:9), but similar finds are also documented in Lüscherz (Winiger 1993: 77, fig. 35:5) and in multiple examples from Wattendorf-Motzenstein (Seregély 2008: 62–63, Pl. 6:1–2, 26:3 and others). They probably formed a standard and functionally important part of Corded Ware inventories (and of contemporary and earlier cultures: Zápotocký and Zápotocká 2008: 194–195, fig. 80:1–2).

Some of the analysed hammer-axes show signs of slight asymmetry compared to others. This is most evident at the blade, which was probably resharpened secondarily. This asymmetry is most pronounced on the hammer-axes from Roudnice (Fig. 2:4) and Podlesice (Fig. 4:2). Both are isolated finds, so their repair could have taken place outside the contemporary Corded Ware context. Otherwise, this would indicate their longer use within the Corded Ware Culture. The fact that only a few cases of repair were documented may conversely suggest that the hammer-axes were not used for activities that would have caused significant damage. The secondary use of a fragment of a hammer-axe as a smoothing tool can be observed on one specimen from Jevišovice (see arrow in Fig. 10:4).

DISCUSSION

In this study, we have for the first time comprehensively assessed the Bohemian assemblage of hammer-axes of the Corded Ware Culture in terms of the raw materials

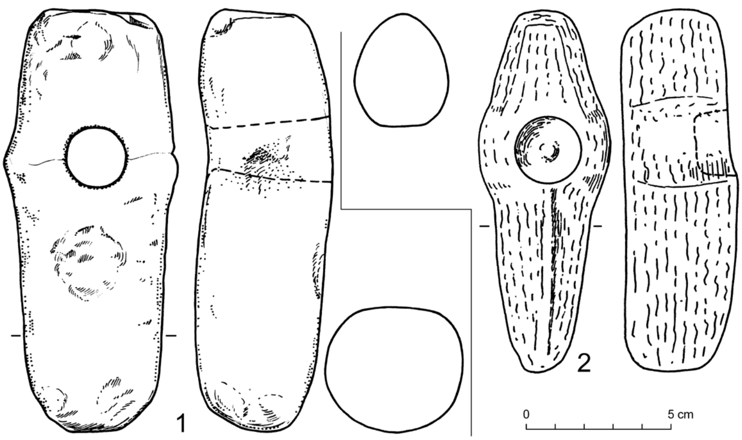

Fig. 11. Presumed preforms of A-type hammer-axes from Bohemia. 1 – Zákolany; 2 – Prague–Libeň. Drawing: L. Raslová (1), see Buchvaldek *et al.*, 1997; no. 2 after Buchvaldek *et al.*, 1991.

used, focusing on the locally earliest phase of this culture, the so-called A-horizon. In Bohemia, the raw material composition of these artefacts in the Late Neolithic (Eneolithic/Chalcolithic) is of particular significance, as this region contains an important source of raw material for the production of polished tools, the Jizera Mountains-type metabasite. This resource was exploited as early as the Linear Pottery Culture (LBK; 5500/5400–5100/5000 BC) and represents the principal source of this raw material during the LBK period for the whole of Central Europe (Burgert *et al.*, 2024). This source is located outside the traditional prehistoric oecumene, and knowledge of it – or rather, the continuity or discontinuity in its exploitation – may indirectly indicate the continuity or discontinuity of settlement and distribution networks.

From the perspective of raw material use, we consider it a fundamental finding that Jizera Mountains-type metabasite accounts for the highest proportion of the hammer-axes analysed, making up a quarter of the artefacts. Another important observation is that the other identified raw materials also most likely originate within the region of Bohemia.

As noted above, the Corded Ware Culture is understood within Czech prehistoric research as an intrusive element whose origins can be traced archaeogenetically to the area of present-day western Ukraine, or further east. According to DNA analyses of material from Czech Corded Ware cemeteries, this origin (steppe ancestry) is detectable in up to 100% of men and 80% of women (Papac *et al.*, 2021). It seems that the remaining 20% of the original population, which we infer from the archaeogenetic record, played an important role in maintaining knowledge of the Jizera Mountains metabasite sources.

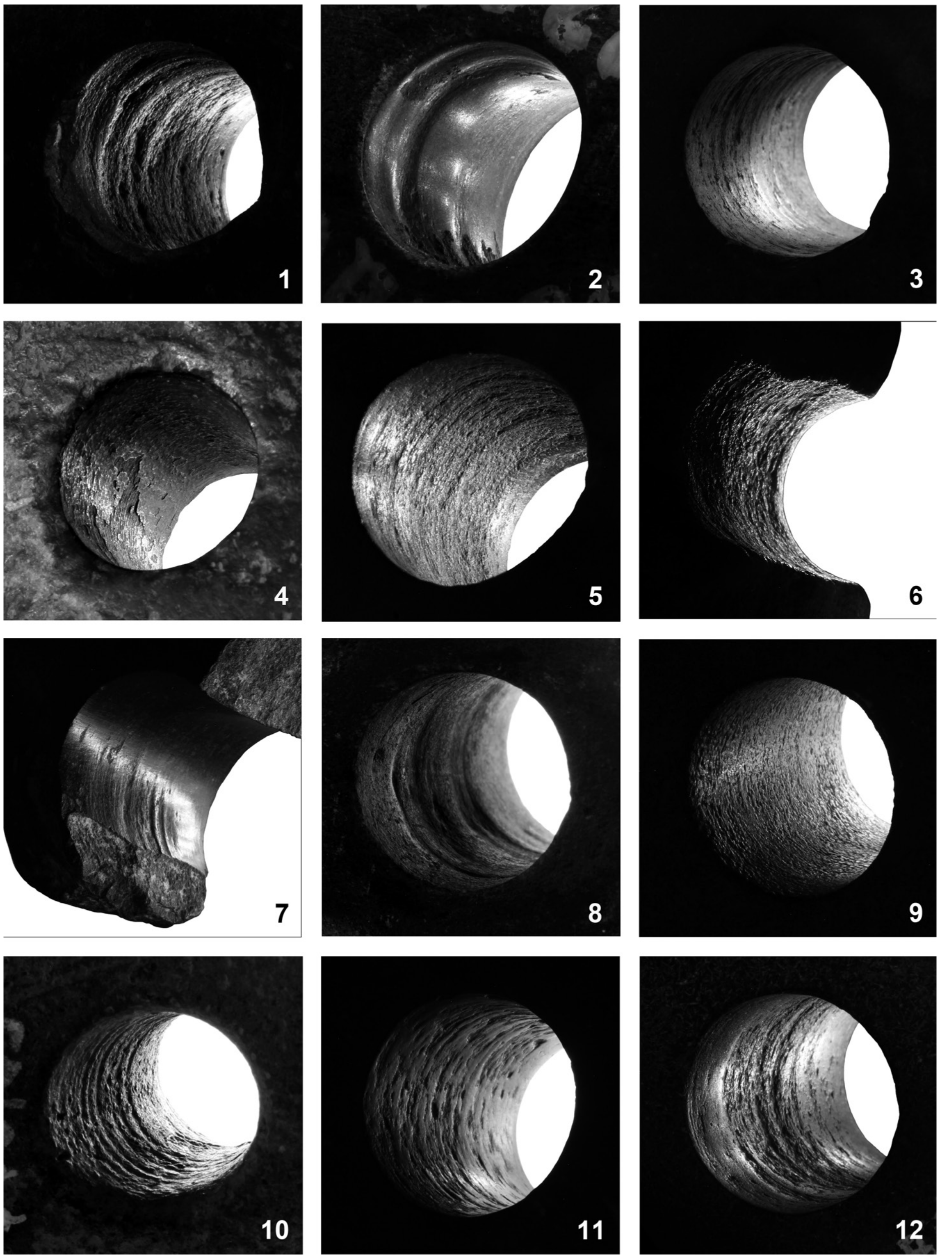

Fig. 12. Detail of the boreholes of A-type hammer-axes of the Corded Ware Culture from Bohemia. The numbering of the images corresponds to the numbering of sites in the catalogue. Photo: I. Hrušková.

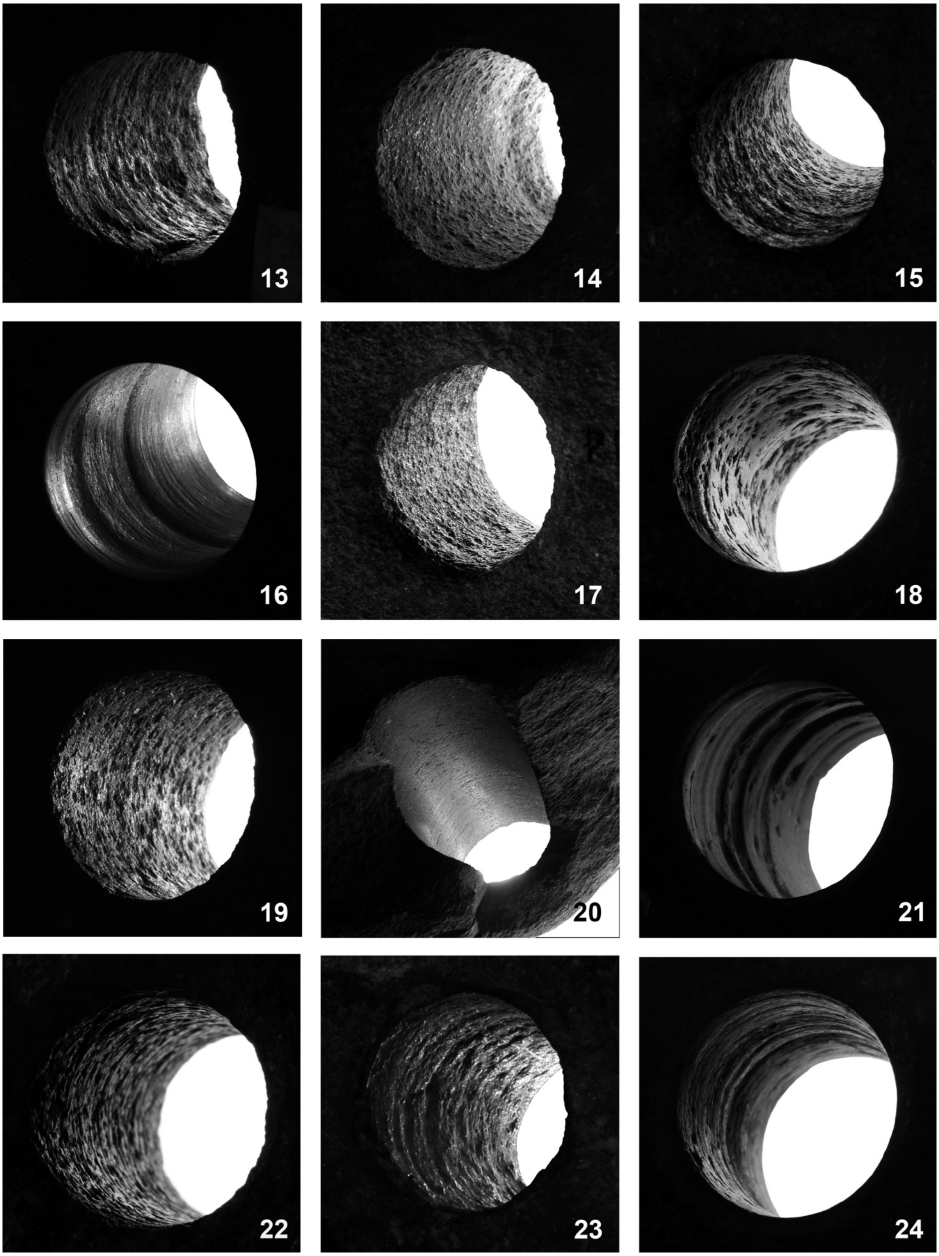

Fig. 13. Detail of the boreholes of A-type hammer-axes of the Corded Ware Culture from Bohemia. The numbering of the images corresponds to the numbering of sites in the catalogue. Photo: I. Hrušková.

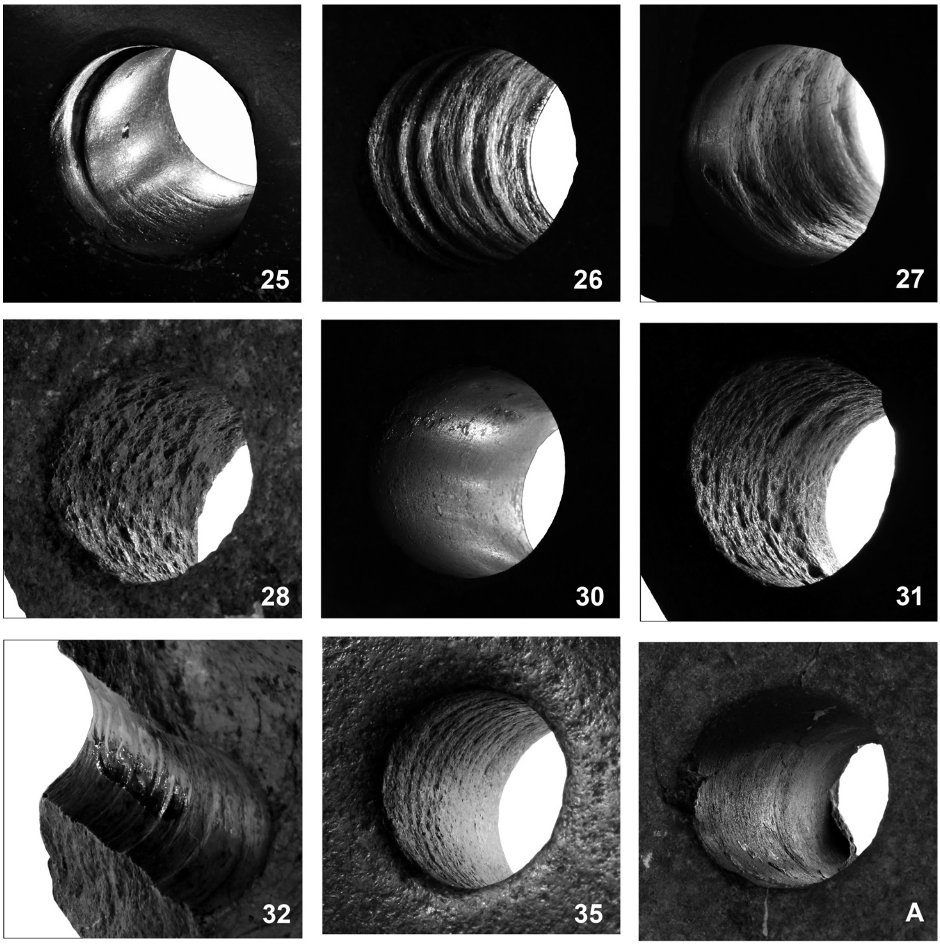

Fig. 14. Detail of the boreholes of A-type hammer-axes of the Corded Ware Culture from Bohemia. The numbering of the images corresponds to the numbering of sites in the catalogue. The final image (A) shows the borehole of a presumed preform from the Zákolany site (Fig. 11:1). Photo: I. Hrušková.

Another important step for future research is the identification and quantification of this raw material in the period following the decline of the Stroke-Ornamented Pottery Culture, when it is still represented in Bohemian assemblages by 85–90% (Burgert *et al.*, 2023). This concerns in particular the Funnel Beaker Culture and subsequent cultures of the Baden circle. Finally, the ground tools of the Early Bronze Age – specifically the Únětice Culture – remains virtually unexplored from this perspective.

An important aspect is the manufacturing technology of the hammer-axes themselves, specifically the method used to drill their shaft holes. As described above, the Bohemian A-type hammer-axes are characterised by a borehole drilled from the top using a hollow drill, which clearly differs from the boreholes of the two typologically later hammer-axe types of the Corded Ware Culture. This indicates distinct manufacturing traditions linked to specific groups of artefacts, which in turn may reflect different groups of producers. In the context of existing ancient DNA analyses, it is noteworthy that the Bohemian Corded Ware (and not only there) is characterised by a sequence of different male kinship lines (Y-chromosome DNA haplogroups), which supports the idea that the migration of Corded Ware populations was a process consisting of several waves during the first half of the 3rd millennium BC (see Papac *et al.*, 2021; cf., Włodarczak 2021). The seemingly simple study of drilling techniques and their comparison in chronological and geographical terms could therefore contribute to the discussion of the population and cultural dynamics of this period.

CONCLUSION

The analysis of the earliest hammer-axes of the Corded Ware Culture from Bohemia has revealed several important findings. Of the total of 41 recorded pieces that meet the parameters of the so-called A-type hammer-axes, 32 were available for detailed study. Of these, 25% were made from Jizera Mountains-type metabasite, 22% from Tertiary basaltic rocks (basaltoids), and 19% from amphibole diorite or porphyritic microdiorite. Other raw materials are represented by only four or fewer pieces: serpentinites (13%), Proterozoic greywacke and Proterozoic/Palaeozoic diabase (both 7%), as well as single finds of amphibolite, biotite gneiss, and Proterozoic metatuff.

The origins of these raw materials can be sought within the Bohemian Massif, although more precise localisation of the sources is mostly not possible. The exception is the most commonly used material, the Jizera Mountains-type metabasite. This raw material comes from quarrying areas around Jistebsko or Velké Hamry in north-eastern Bohemia and represents the principal source for the production of ground tools in the Linear Pottery Culture in Central Europe (Burgert *et al.*, 2024). In Bohemia, this material continued to be predominantly exploited during the Stroke-Ornamented Ware Culture. For the subsequent period (the Funnel Beaker Culture) no data are yet available. However, as this study has demonstrated, the continuity of metabasite exploitation in the Jizera Mountains extends into the Corded Ware Culture.

From the perspective of manufacturing technology, we have demonstrated that the Bohemian A-type hammer-axes of the Corded Ware Culture were consistently drilled from the upper side using a hollow drill. This clearly distinguishes this group from other typological categories within the Corded Ware Culture (faceted hammer-axes and Bohemian-type hammer-axes). Although the raw materials used are of regional origin, no workshop sites from this period have so far been identified in Bohemia.

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Descendants of Great Ancestors? Corded Ware Culture Barrows in Trzciniec Circle Cultural Landscapes

Przemysław Makarowicz[a]

The paper focuses on the influence of the Corded Ware culture barrow landscape on the rise of barrow building among Trzciniec Cultural circle communities. It presents a research thesis that explains the mechanisms of the trans-cultural and "timeless" impact of "Corded" mounds, which formed part of the cultural landscape of east-central European uplands in the 2nd millennium BC. The barrows of both cultures certainly combined several functions. They were burial grounds not only where ancestors lay, but also boundary markers defining the familiar area. "Corded Ware" monuments and their arrangements were a source of inspiration and imitation for "Trzciniec" arrivals. The revival of kurgan building by these newcomers and their use of earthen mounds as instruments for asserting their rights to a specific territory, can be viewed a sort of "posthumous heritage" left behind by Corded Ware communities.

KEY-WORDS: Corded Ware culture, Trzciniec Cultural circle, barrow, kurgan, barrows' arrangements, cultural landscape, newcomers, impact, under-mound space

INTRODUCTION

In the late 5th and 4th millennia BC, across the vast expanses of Europe, new architectural monuments – round barrows – began to stand out against the landscape. Their origins are related to the pre-Yamna cultures of the Eurasian steppes, but their successive dispersal in the Carpathian Basin and the Balkans and then central and western part of the continent in the late 4th and early 3rd millennia BC is owed to Yamna culture and Corded Ware culture (CWC) communities (Kośko 1997; Rassamakin 1997: 360–362; 2002: 61; Kruk and Milisauskas 1999; Włodarczak 2006: 156–158; 2011; 2021; Anthony 2007; Kowalewska-Marszałek and Włodarczak 2011; Furholt 2014).

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Fig. 1. Spatial range of the Corded Ware culture. After Cunliffe 2011.

Leaving aside the mechanisms that brought these communities to life as it were, it is certain that in a short time, spanning only a few generations, the CWC, owing to its mobility and a new type of socio-organization, settled the lands stretching between the Volga and the Rhine rivers (Fig. 1; see Sulimirski 1968; Machnik 1979; Buchvaldek 1986; Siemen 1997; Furholt 2003; 2014; Włodarczak 2006: 156–158; Kristiansen *et al.*, 2017; Nordquist and Heyd 2020). Moreover, it disseminated spectacular ritual behaviour and attractive models of material culture among local Late Neolithic communities. Further, the CWC developed an entirely new type of individualised elites, standing in contrast to the rather egalitarian and collectivist elites of earlier stable groups, relying on the parallel forms of farming and animal raising economy. Extended barrow cemeteries, and with time also flat ones, frequently standardised furniture in "flat" burials and those under mounds. The main characteristics of this cultural formation are a binary division into male and female roles and a social structure dominated by groups of men endowed with a clear hunter/warrior identity, and both of these features are often reflected in inventories of grave goods (e.g., Vandkilde 2006: 410–417; Szmyt and Czebreszuk 2010; Furholt 2014).

Fig. 2. Spatial range of the Trzciniec Cultural circle. After Makarowicz 2010a.

In the 18th century BC, about 300 years after CWC communities had built their last barrows on the uplands of east-central Europe, there appeared Trzciniec cultural circle (TCC) groups (Fig. 2; Makarowicz 2011: fig. 1; Jarosz and Włodarczak 2022). Their presence in this area is explained well by the conception of migrations from the north – from the lowlands (Kempisty 1978: 404; Górski 1996: 207f.; Górski and Kadrow 1996; Makarowicz 2010a: 372; 2010b; 2011; Chyleński *et al.*, 2023). The new cultural formation represented the type of polymorphic culture, visible in TCC communities flexibly adjusting to almost any conditions, penetrating different types of landscape, and successfully subsisting on farming and animal raising, by supplementing this dual economy with foraging strategies. However, their social structure and funerary rituals, and thus the ideological and mental spheres of their life, were absolutely conservative. Egalitarian social relations were organized by strictly followed kinship rules and the division of labour depending on sex (Makarowicz 2010a). For several hundred years, these communities laid out barrow and "flat" cemeteries, built single and collective graves, cremated and inhumed their dead, and interred them keeping the anatomical order or dismembering corpses (Makarowicz

2010a: 263–269; Górski 2017). The status and rank of the dead – especially in predominant collective graves – were rarely underscored with grave goods. The most intriguing aspect of the funerary ritual was the fact that barrow raising was unknown in the oldest phase of the TCC on the lowlands. In the uplands, it was started only in the classic phase by "Trzciniec" colonists, which is borne out by radiocarbon dates and the examination of materials from barrows (Górski 1996; 2007; Makarowicz 2010a; 2010b; 2011; Makarowicz *et al.*, 2021).

This paper gives a brief comparison of "Corded" and "Trzciniec" barrows, focusing on their construction, spatial arrangement, function and funerary ritual elements. The greatest emphasis, however, is laid on the impact of the CWC barrow landscape on the rise of barrow building among TCC communities in the 2nd millennium BC. This custom was of utmost importance for the "taming" of the east-central European uplands by the northern migrants.

STRUCTURE AND UNDERGROUND BARROW DESIGN

Generally speaking, TCC barrows are usually larger than CWC ones. This regularity is noticed mainly on the Lesser Poland Upland, the Roztocze region and in the drainage basin of the upper Dnister (Kempisty 1978; Machnik 1979; Kruk and Milisauskas 1999; Machnik *et al.*, 2006a; 2006b; 2006c; 2011; Włodarczak 2006; Górski and Jarosz 2007: 243, 245; Makarowicz 2010a: 375; Kowalewska-Marszałek and Włodarczak 2011; Makarowicz *et al.*, 2016; Szczepanek *et al.*, 2022). This can be explained in two ways. One interpretation involves the state of preservation of barrows. CWC monuments were often more damaged due to natural factors and human activity (deforestation, terrain levelling by ploughing, etc.). The other relies on actual differences in size between such mounds. Many observations of barrows of both cultures located in the same environment, sometimes next to each other, suggest that the latter explanation is more plausible (Makarowicz 2010a).

Communities of both cultures used a similar way of barrows' raising (Table 1). They were built from "bricks" of sod (turf) and earth cut from the ground close to the monument and arranged in layers next to each other (Hildebrandt-Radke *et al.*, 2019), hence sometimes, around barrows, semi-circular, crescent or circular depressions were formed, ditches several metres wide. In some places, they are noticeable until today. Barrows were built usually on the ancient ground but their construction was preceded by ground-preparing rituals: levelling and smoothing of the surface and cleaning it with fire (e.g., Florek and Taras 2003; Makarowicz 2010a; Jarosz 2011: 258).

Table 1. Comparison of Corded Ware culture and Trzciniec Cultural circle barrows

Characteristic	Corded Ware Culture	Trzciniec Cultural Circle
Topography	Higher grounds, elevations on higher or meadow terraces, promontories	Higher grounds, elevations on higher or meadow terraces, promontories
Spatial arrangement	Individual occurrence or in pairs, linear and linear-group arrangements	Individual occurrence or in pairs, less often in threes, linear and linear-group arrangements
Construction	Turf blocks and soil taken from the immediate environs, usually multi-layer	Turf blocks taken from the immediate environs, usually multi-layer
Primary function	Sepulchral	Sepulchral
'Secondary' functions	Boundary markers, social functions	Boundary markers, social functions, religious functions
Ground-level and underground design	Occurrence of graves, cenotaphs, hearths, bonfires, pits, ditches, palisades, ritual structures	Occurrence of graves, cenotaphs, hearths, bonfires, charred layers, ritual structures
Kinds of graves	Simple pits, timber structures, rarely stone or timber-stone structures	Simple pits, timber structures, stone and timber-stone structures ("mortuary houses")
Grave location and orientation	In the centre of a barrow as a rule; incidental accompanying burials; dominant orientation: E-W	In the centre of a barrow or in other portions; rarely accompanying burials; dominant orientation: NW-SE
Kinds of burials	Individual burials – dominant, collective burials – incidental Sex of deceased: male – dominant	Individual and collective Sex of decedased: male, female and children
Ritual structures	Ditches with a palisade	Various non-grave timber and stone structures
Manner of disposing of the dead	Inhumation – a dominant rule, anatomical order	Inhumation and cremation, anatomical and non-anatomical order, corpse dismemberment
Categories of grave goods	Grave goods showing identity, personal and individualized	Few grave goods for the selected dead. Goods showing identity or sex. In collective burials: depersonalization and de-individualization of grave goods
Funerary rituals	Funerary feasts: libations? Ritual destruction of vessels, consumption of meals, burning of fires	Funerary feasts: libations? Ritual destruction of vessels, consumption of meals, burning of fires

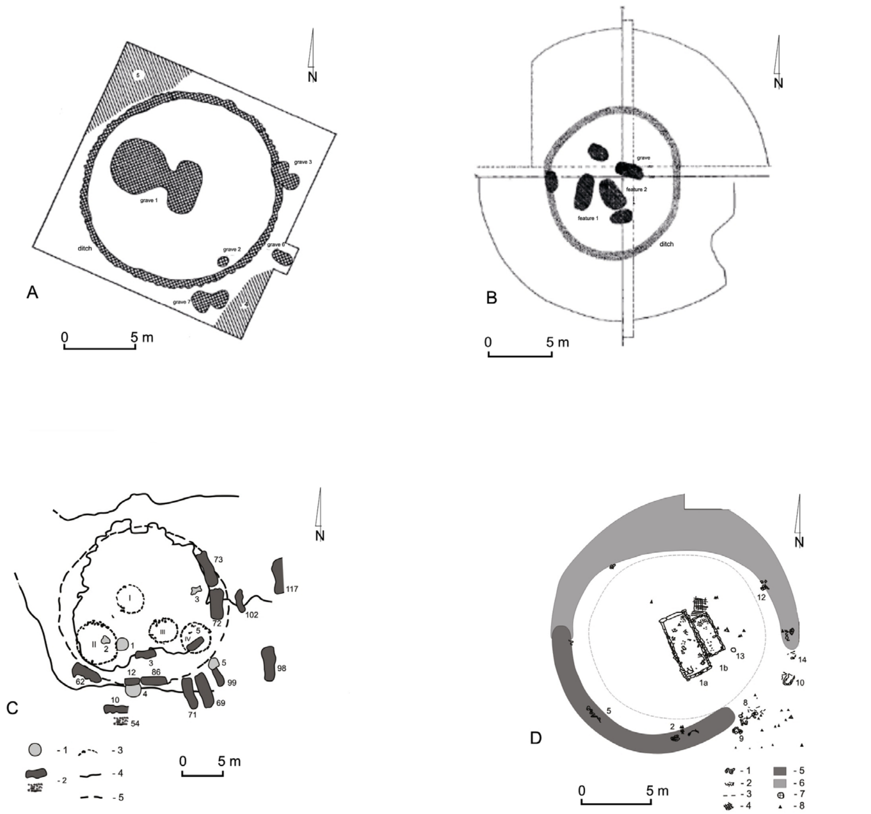

Fig. 3. Structures under the barrows of the Corded Ware culture (A, B) and the Trzciniec Cultural circle (C, D): A – Pałecznica, Lesser Poland Upland. 1 – primary grave; 2, 3, 6, 7 – secondary graves of the Corded Ware culture, 4, 5 – other features. After Włodarczak 2006; B – Średnia, barrow 2, Lesser Poland Upland. After Jarosz 2011; B–C – Żerniki Górne, site 1, Lesser Poland Upland. After Włodarczak 1998; Makarowicz 2010a. 1 – pit; 2 – grave; 3 – stone circle; 4 – present-day limit of the mound; 5 – reconstructed limit of the mound. D – Dacharzów, site 1, Sandomierz Upland. 1 – stones; 2 – human bones; 3 – original barrow limit; 4 – traces of ploughing; 5 – ditch; 6 – site from where earth was dug for the mound; 7 – trace of a post; 8 – pottery and pottery fragments. After Florek and Taras 2003; Makarowicz 2010a.

Trzciniec circle barrows were usually built in a single effortalbeit a long-lasting one – by the whole local community (a lineage?); they were enlarged only sometimes by putting more earth on top, in particular, when a subsequent grave was sunk into the mound (Górski 1996: 208; Makarowicz 2010a: 370f.; 2010b; Makarowicz and Kochkin 2025).

In the mounds and in the space beneath CWC and TCC barrows, many features can be found which together make up a peculiar "sub-barrow landscape" (Fig. 3). Common features consist of graves (including mortuary houses and cenotaphs) and non-grave ones: the relics of funeral feasts and accompanying rituals, leaving behind broken vessels, post-consumption animal bones, charred layers, hearths, fires and various pits. Corded Ware kurgans have also ditches and palisades marking the original mound range and separating the spheres of the sacred and the profane (Czebreszuk and Szmyt 2011: 123f.; Jarosz 2011: 260; Bourgeois 2013). This custom has not been observed in the case of TCC monuments. In turn, Trzciniec circle barrows are occasionally accompanied by complex ritual structures of a non-grave nature (stone and timber ones), deposits of vessels, as well as animal burials frequently keeping the anatomical order (Górski 2008; Makarowicz 2010a: 253–262; Makarowicz *et al.*, 2016; Makarowicz and Kochkin 2025).

CWC graves, generally single ones, were most often located in the centre of a barrow. Rare secondary funeral features were sunk into various mound sections. There was a clear opposition between the primary (central, the most important) burial and secondary ("minor", later) burials (Furholt 2014). Rectangular or oval grave pits with rounded corners were oriented E–W (most frequently) as well as SW–NE or NW–SE. Inside, there were timber protective structures: log ones, planking or coffins (Włodarczak 2022). Sometimes, these features resembled mortuary houses: they consisted of four posts supporting a wooden roofing. Several observations (state of preservation of bones, stratigraphy) indicate that barrows were not built immediately after interring the dead. Graves must have been left open for some time. Usually, prior to the building of the mound, the timber structure was burnt down (Jarosz 2011: 261f.).

TCC funerary features are usually found in various sectors of the barrow (including its centre). Rectangular or oval graves were oriented NW–SE or NE–SW, less often N–S and E–W. Next to simple pits, barrows hid funeral features with burnt timber structures; graves containing stone or stone-timber elements were fewer. Inner containment in grave pits, taking the form of "planking" or coffins, is evidenced by the regular shape of bone "piles" in many collective graves and their relatively identical distance from the walls. TCC barrow cemeteries are known to include the relics of mortuary houses comprising several posts supporting a roof (Makarowicz 2010a; 2019). As in the case of the CWC, such features were often burnt prior to building a mound. Until then, they were accessible, which was quite important because of the dominant practice of collective funerary rituals (successive burying of the dead in the one grave; Makarowicz 2010a: 228–242; Makarowicz *et al.*, 2021).

SPATIAL ARRANGEMENTS AND CONTINUITY OF OCCURRENCE SITES

Barrows built by the communities of both cultural groupings stand out against the landscape, their mounds are visible from a distance even today. In most cases the numbers of these monuments are underestimated, since originally there must have been several times more barrows. Many have been destroyed due, above all, to intensive land cultivation, deforestation and urbanization.

CWC features were built in prominent places, usually on top of hills, on watersheds, along upland edges, and on the higher grounds of meadow terraces (Table 1). These areas were partially deforested, which is attested by palynological indicators, for instance, in the upper Dnister drainage area (Harmata *et al.*, eds 2013; Makarowicz and Kochkin 2025). Barrows form chains consisting of several barrows, often over a dozen or even several dozen mounds differing in size (both in height and diameter) and age (Fig. 4). The distances between them vary from several to several dozen metres (Sulimirski 1968). As a rule, the largest kurgans occupied a central position within a linear-group arrangement (Jarosz 2011: 256f.). Occasionally, "Corded" mounds occur also alone or in pairs (Fig. 5; Makarowicz 2010b: 205–208).

In the western part of TCC, barrows occurred solitarily, sometimes in pairs (relatively close to each other) rarely in threes, often in the vicinity of settlements placed on the same terrain form, but always above them (Fig. 6; Górski 1996). Only in the upper Dnister basin do they form large groups that had linear or linear-group arrangements which followed hill ridges for several hundred metres up to several kilometres (Sulimirski 1968; Makarowicz *et al.*, 2016; 2019). They stood on elevations (on summits or close to them), along watersheds and upland edges or on the higher grounds of meadow terraces. However, they are virtually absent from floodplains. They often consist of over a dozen (up to several dozen) monuments clustered in several groups. In some instances, smaller barrows were built around larger ones; there are also examples of double barrows (Romaniszyn *et al.*, 2021). Their chronology varies (see also: Makarowicz 2010a: 372f.; 2010b; 2011; Makarowicz *et al.*, 2019).

Sometimes the "Trzciniec" barrows were built over the older "Corded Ware" mounds. For instance in Miernów, Barrow I, Lesser Poland Upland, the first activity was the deposition of vessels on the surface of an older monument (Górski 2010). In TCC monuments in Bukivna, on the upper Dnister, vessels were sometimes deposited on the edge of space later covered by the mound (Makarowicz *et al.*, 2013; Makarowicz and Kochkin 2025). Sometimes, TCC graves were sunk into the mounds of older barrows. What else is frequently observed is the introduction

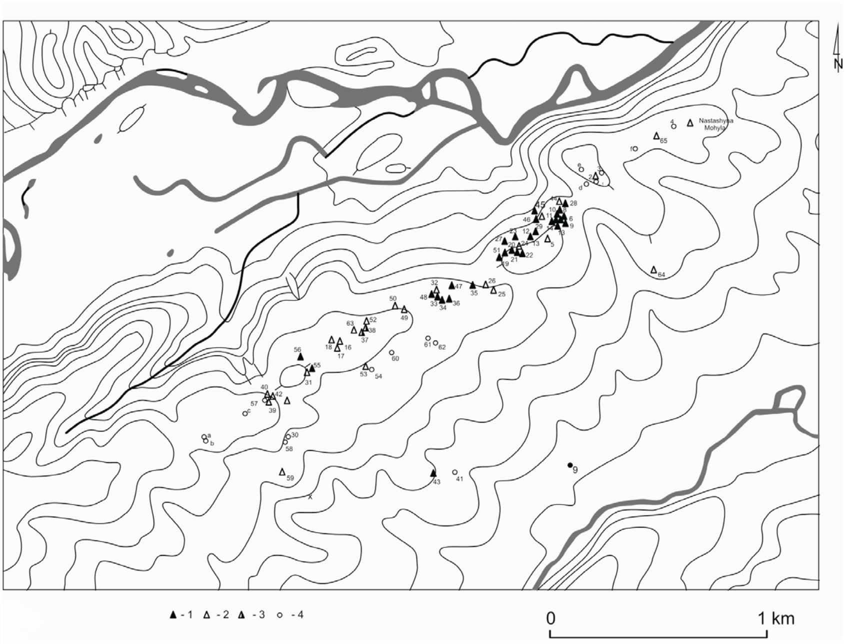

Fig. 4. Relationships between barrows in Komarów, Podolia Upland: 1 – Trzciniec Cultural circle (TCC) barrows; 2 – Corded Ware culture (CWC) barrows; 3 – CWC barrows with secondary TCC burials; 4 – barrows of unknown chronology. After Sulimirski 1968; Makarowicz 2010b.

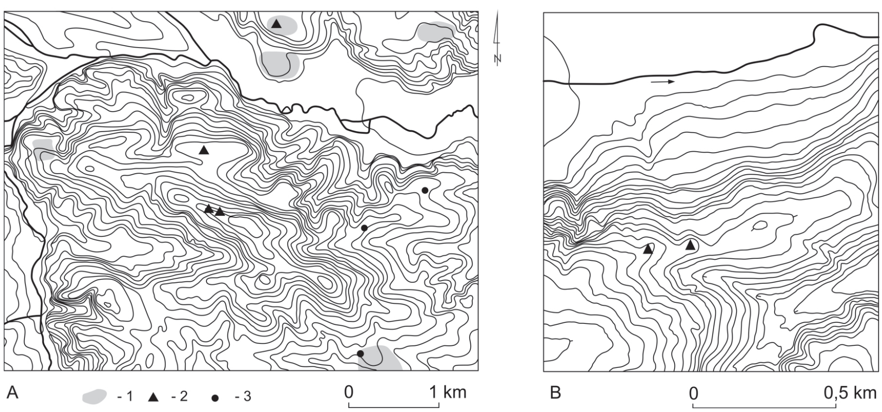

Fig. 5. Arrangements of Corded Ware culture (CWC) barrows. A – Koniusza, Lesser Poland Upland. 1 – TRB settlements; 2 – barrows; 3 – other CWC graves. B – Dobrocice, Sandomierz Upland. After Machnik 1979; Makarowicz 2010b.

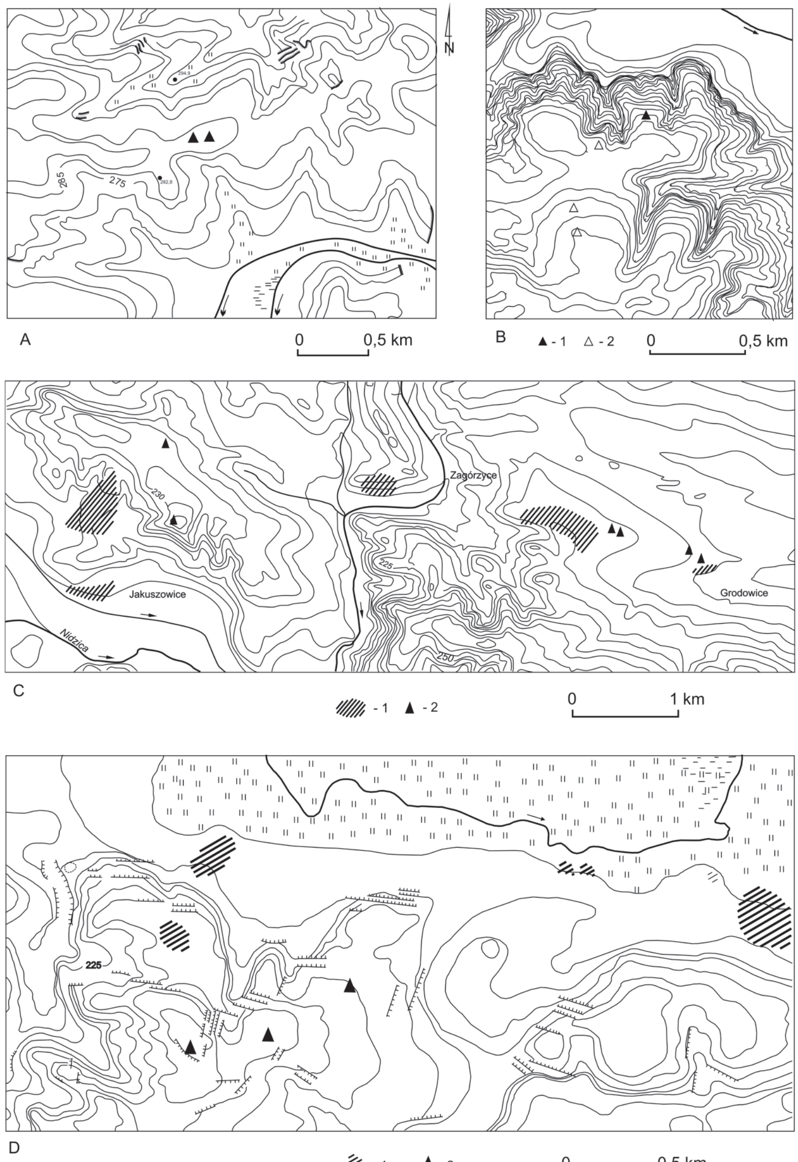

Fig. 6. Arrangements of Trzciniec Cultural circle barrows in Lesser Poland and Sandomierz Uplands. A – Rosiejów; B – Dacharzów, site 1; C – neighbourhood of Jakuszowice, Zagórzyce and Grodowice: 1 – settlement; 2 – barrow; D – neighbourhood of Proszowice: 1 – settlement; 2 – barrow. After Makarowicz 2010b.

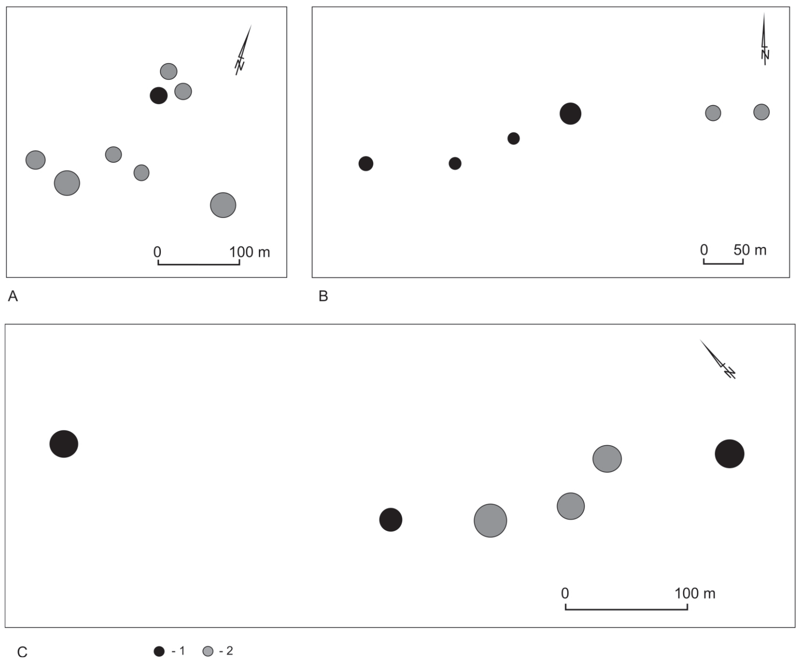

Fig. 7. Relationships between Corded Ware culture (2) and Trzciniec Cultural circle (1) barrows in Podolia Upland A. Kołpiec, B. Krasów, C. Sarniki. After Sulimirski 1968; Makarowicz 2010b.

of TCC monuments in the linear and linear-group arrangements of CWC barrows erected earlier (Fig. 7; Makarowicz 2010b: 204–208, 210). We witness this practice in the TCC eastern province, in particular on the Podilla and Volhyn uplands as well as in the drainage of the upper and middle Dnister (Makarowicz *et al.*, 2016; 2019). It is also encountered in the TCC western province, specifically on the Lesser Poland and Lublin uplands and in Roztocze (e.g., on the hilltops of the Grzęda Sokalska ridge). The same may be true for some barrow cemeteries and single barrows (in most cases, of unknown chronology) recorded on the loess soils of the Sandomierz-Opatów region (Florek 2011). Hence, the rule of continuation of burial places was very clear. TCC barrows were raised in the places which had already been included in the sacred space centuries earlier.

Thus it can be claimed that barrow clusters of both cultures represented a mental map of a sort, that they were a record – written by the community – of individual and collective history and were built over several dozen generations in each of the cultural units under discussion (Ślusarska 2007).

FUNCTIONS/ROLES OF BARROWS

In the literature, one can encounter opinions that barrows had various functions in the social life of both the CWC and TCC (Table 1; e.g., Bourgeois 2013; Arnoldussen and Drenth 2015; Makarowicz *et al.*, 2019). Moreover, their role certainly had more than one dimension. Whereas, in the case of "Corded" societies, the primary function of barrows – as a special type of graves for men, mainly for a single individual, is widely recognized (e.g., Włodarczak 2006; 2022; Furholt 2014), the same is not as obvious in the case of "Trzciniec" populations. TCC barrows often covered collective graves holding the remains of men, women and children (Górski 1996; Makarowicz 2010a). Unquestionably, the main reason behind raising another barrow by CWC communities was the death of a member of the group. It seems that in most cases "Trzciniec" communities too built barrows to bury people under them. However, in both cultures, only a fraction of their populations was buried under barrows. These monuments could become markers only secondarily, owing to their visibility in the landscape and peculiar spatial arrangement, defining the bounds of area of interest of a given community (lineage?), asserting their rights to the area they occupied, and setting the boundaries of the "tamed" universe. Their linear and group-linear arrangement, observed in both cultures, can be taken to be a metaphor of succession or the continuity of generations of lineages/families. The funeral function, as the resting place of the ancestors and progenitors of a lineage or a family, or their outstanding members, corresponded no doubt with their secondary "role", namely, the defining of the settled area and signalling from a distance, through their monumental form, the territorial claims of particular group. For Trzciniec circle communities, a barrow occasionally formed part of a larger ritual complex, having a sacred and sepulchral nature (e.g., Żerniki Górne, Lesser Poland Upland; Kempisty 1978; Włodarczak 1998; Makarowicz 2010a: 221f.).

The occurrence of barrows on the elevations of watersheds or on higher grounds within valley terraces or around strategic communication hubs suggests also their potential connection with long- and short-distance transit routes. Barrows may have marked the places/zones of entrance onto routes or only may have shown directions to those who travelled over long distances (Makarowicz 2009).

For both cultures, kurgans were important elements of a settlement network around which social and ritual life concentrated. Because of the ephemeral nature of settlements and high mobility of CWC communities in east-central Europe, barrows would have served as major reference points in space and the centres of socio-religious life in and around which a group's history and mythology spun. "Trzciniec" barrows, often built next to settlements, at a distance varying from less than a hundred or up to several hundred metres away, were always located on landforms situated higher than neighbouring settlements (Górski 1996; Makarowicz *et al.*, 2019). In the classic phase of the TCC, there appeared long-lasting settlements, developing over many construction phases and occasionally spanning hundreds of years, which stabilised the "Trzciniec" settlement network by creating an additional permanent component of the settled space (Górski 1996; Makarowicz 2010a). Barrows, however, remained important elements of the ritual space, communally built and long used. They were cosmologic and myth-making centres where the present met the past (Ślusarska 2007). Covered with mounds, collective graves were sometimes used for 200–300 years (Makarowicz *et al.*, 2021). As an example may serve a barrow in Polesie on the Bzura River, central Poland, which was used over many generations (Górski *et al.*, 2011: 143f.). Hence, the barrows of both cultures may be considered, in the first place, to have been the physical and visible markers of the metaphysical and invisible presence of ancestors. The visibility of barrow constructions was also used for purposes going beyond funeral functions but generally related to the socio-political aspect of life in a given community.

FUNERARY RITUALS

Both CWC and TCC societies practised unusually complex rites of passage related to the preparation of the burial ground, construction of graves, deposition of the dead and grave goods, building a mound and forming the space above the mound, funeral feasts and accompanying rituals and ceremonies (Table 1).

The "Corded" barrow funerary rituals were dominated by inhumation (Furholt 2014; Włodarczak 2022). As a rule, the dead were interred individually, in the contracted position, mainly on the right side, rarely on the left. Other cases, paired and collective burials, are sporadic. Burials were accorded to adult men; male juveniles and children only rarely were granted this privilege. Sometimes, no burial is recorded in a barrow, which may suggest that it was a "symbolic" mound, a cenotaph or a non-funeral ritual feature. It is also possible of course, that in such cases, due to unfavourable conditions (e.g., high soil acidity) no bones have survived (Jarosz 2011).

Not all the dead were given grave goods; neither are grave goods entirely standardised. They are dominated by vessels (beakers or amphorae) with stone battle-axes, flint axes, blade knives, blades or archer tackle sets being less frequent. Men laid to rest on the left side were not furnished with battle-axes, but were given axes (Włodarczak 2006; Jarosz 2011; Furholt 2014; Szczepanek *et al.*, 2022). It can be said that grave goods given to most men buried in graves covered with barrows were personalised and identified them as warriors (warriors/hunters) or potential warriors – male children and juveniles (Vandkilde 2006).

TCC societies buried their deacesed in barrows uncremated; however, they did practise cremation *in situ* as well. Occasionally, corpses were only partially burnt and dismembered (fragmentary burials), with some bones being placed in the graves of other individuals. The dead were buried individually or collectively in anatomical order or not. A burial in a barrow grave was accorded to individuals of both sexes as well as to children (Makarowicz 2010a: 246f.; Górski 2017).

Only a few individuals were furnished with grave goods. In the case of collective burials, because of the moving of bones of those who died earlier, it is rarely possible to attribute a specific object to a given individual. In such situations, it can be said that grave goods were depersonalised and de-individualised. Possibly, in the case of mass burials, grave goods were rather the "property" of the group ("collective gifts") than a specific deceased individual within the group. In collective barrow graves, virtually the same kinds of objects are recorded as in single sepulchral features (Makarowicz 2010a: 269–276; Górski 2017).

In the "Trzciniec" funerary ritual, the dead were sometimes furnished with objects of a specific type (function), depending on the sex and age of the people buried. Certain categories of grave goods were specific to men: insignia of power (bronze diadems, gold rings and weapons). The last-mentioned category included daggers, battle-axes, axes, javelins, and archery equipment. Grave goods placed in "female" graves were dominated by vessels, bronze hand and leg ornaments (bracelets, armlets, shin ornaments), which often came in pairs (worn on both legs or hands), and dress ornaments (pins). Interestingly enough, some categories of grave goods found in child and juvenile graves are related to their sex (Makarowicz 2010a; Górski 2017).

"TRZCINIEC" SOCIETIES AND THE LANDSCAPE OF BARROWS ON THE EAST-CENTRAL EUROPEAN UPLANDS

A framework for interpreting the adoption of round mounds by "Trzciniec" communities may be established through an examination of how populations of the Trzciniec Cultural Circle in the upper Vistula and upper Dnister basins embraced the tradition of barrow construction. In these upland settings, such groups represented an intrusive element within the local cultural landscape (Kempisty 1978; Górski and Kadrow 1996; Makarowicz 2010a). From the standpoint of archaeological classification, their material culture displays the diagnostic attributes of the classic phase. In their northern homeland, stretching between the lower and middle Vistula, the Neman, and the upper Pripet basins, these communities had not practised barrow construction (Makarowicz 2010b: 208; 2011). However, while migrating southward in successive stages, they may have encountered and observed "Corded" barrows on their route toward the uplands.

Upon their arrival on the Lesser Poland Upland (prior to 1700 BC) and within the upper Dnister basin (shortly after 1800 BC?), the TCC communities could interact solely with local populations of the Mierzanowice culture, who generally did not construct barrows (except for the so-called Gródek-Zdolbytsa group in Volhynia and Podolia; Kadrow and Machnik 1997). Initially, the northern newcomers established their settlements in environmental zones distinct from those inhabited by Mierzanowice groups (Górski and Kadrow 1996). Nonetheless, round earthen mounds were present in those territories, constructed earlier by populations belonging to the "traditionalist" branch of the CWC (Machnik 1979; Kruk and Milisauskas 1999). The latest Corded barrows, dated to the end of the 3rd millennium BC, are known from the upper Dnister drainage area; in the upper Vistula region, this practice had ceased even earlier (Jarosz and Włodarczak 2022; Makarowicz and Kochkin 2025). A few centuries (approximately 300 years) separated the decline of Corded Ware groups from the emergence of early Trzciniec societies in these areas (Jarosz and Włodarczak 2022). Consequently, direct contact between both cultural formations was impossible. The adoption of the "Corded" custom of barrow construction by Trzciniec populations, therefore, occurred without physical interaction, but by imitation through observation of the spatial distribution and form of the older CWC barrows. These "Corded" kurgans would have been highly visible to TCC settlers approaching from the north, as they were typically positioned in prominent landscape locations, particularly on hilltops along watersheds. Palynological and pedological evidence confirms that these terrains were deforested at that time (Harmata *et al.*, 2013; Makarowicz and Kochkin 2025). Hence, in numerous instances, Trzciniec communities consciously reproduced the practices of Corded Ware populations. What played a crucial role in this emulation was the perpetuation of an older tradition of ritual topography, one of using and re-using sacred/funereal places. Although "Corded" mounds primarily served as burial monuments, their spatial layouts suggest that they also functioned as orientation landmarks and territorial markers, with their linear and grouped configurations symbolically expressing the continuity of descent lines and broader community bonds.

The incoming Trzciniec populations may have understood the symbolic significance originally associated with the "Corded" tradition of raising barrows, or alternatively, may have reproduced it more mechanically, re-inscribing their own social and cultural presence into a pre-existing (*in illo tempore*) ritualised landscape.

Numerous barrows scattered across the upland zones, especially in the upper Vistula and upper Dnister catchments, might have evoked for TCC colonists memories of "Corded" mounds known from their northern lowland homeland. The Trzciniec societies could have adopted barrow building as a means of differentiating themselves from Mierzanowice culture populations, who in turn refrained from such practices to emphasise their distance from the conservative "Corded" tradition (Kruk and Milisauskas 1999). Although difficult to verify, the hypothesis of deliberate imitation seems more convincing. By embracing the custom, the Trzciniec groups could have sought to legitimise their occupation of new lands and to visually assert their distinctiveness (their "ethnicity") in contrast to the indigenous inhabitants. Barrows, as tangible and visible monuments, would have expressed this identity while simultaneously serving as burial sites, often containing both individual and collective interments of men, women, and children. The architectural elaboration of some mounds, as well as the presence of rich grave inventories, testifies to the high social status of certain individuals or lineages (Makarowicz *et al.*, 2021). The construction of barrows in linear sequences on deforested watershed elevations also points to communication corridors that probably followed those same ridges (Makarowicz *et al.*, 2019). The mounds merely marked the general routes, paths (rather than formal roads), that consisted of broad landscape zones facilitating, from the early 2nd millennium BC onwards, the movement of people, livestock, goods, and probably wheeled vehicles as well (Makarowicz 2009).

If we accept the assumption that TCC groups, while progressing southward, saw the "Corded" barrows and were aware of their significance, we may imagine their initial astonishment upon encountering landscapes densely populated with such monuments. The few kurgans that they may have known from the northern plains (monumental relics of vaguely remembered predecessors, perhaps even ancestral figures), now appeared in striking abundance within their newly-occupied territories, especially in the upper Dnister region. The Mierzanowice communities, in contrast, showed no particular interest in them. They were egalitarian and territorially organised, residing in large settlements and using communal cemeteries within settlement microregions located in landscape zones distinct from the barrow areas (Górski and Kadrow 1996; Kadrow 2001). On the contrary, anthropological, genetic and funerary data indicate that TCC societies were organised along kinship or lineage lines (Makarowicz 2010a: 293; Chyleński *et al.*, 2023), resembling in this respect the social structures of Corded Ware groups.

Scholarly literature has not addressed the motivations behind the southward movement of Trzciniec communities. However, the dense concentration of settlement sites in their lowland homeland suggests that demographic pressure in regions of poor soils – between the middle Vistula, upper Pripet, and middle Neman rivers – may have triggered an ecological crisis (Makarowicz 2010b; Górski 2017). The fertile loess and chernozem soils of the uplands thus became highly desirable. Competition for access to these productive lands must have arisen among migrant families and lineages advancing from the north.

For any society settling in a new cultural environment, the preservation of identity – its continuity, distinctiveness, and internal cohesion – is paramount. These elements are typically maintained through rituals and ceremonial acts that reaffirm connections with the ancestors and the past. The building of barrows constitutes precisely such a practice. The adoption of mound construction may have represented a material expression of a new foundation myth, symbolically rooting the newcomers in their unfamiliar surroundings among the territorially organised Mierzanowice communities. The act of barrow building might be interpreted as a kind of foundation sacrifice (Górski 1996). By erecting kurgans in locations previously occupied by Corded Ware barrow clusters, TCC communities could have sought to appropriate the "pre-Mierzanowice" past to legitimise their claims to the land (Makarowicz 2010b). The continuation of "Corded" mound lines may have served as a deliberate statement, signaling to local populations that the newcomers were the heirs (self-proclaimed heirs) of the ancient settlers once inhabiting these lands. In this way, they usurped the right of succession and grounded their legitimacy in tradition, a principle carrying decisive weight in non-literate societies (Weber 2002). The colonisers thus presented themselves as descendants of the renowned Corded ancestors, perhaps even mythical progenitors. As noted earlier, Trzciniec mounds tend to be larger than those of the Corded Ware Culture, not simply due to poorer preservation of the latter. It seems that the Trzciniec builders sought not only to emulate their ancient predecessors but also to surpass them.

CONCLUSIONS

The present study advances a thesis explaining the mechanisms underlying the transcultural and "timeless" influence of Corded Ware barrows within the cultural landscape of the east-central European uplands.

Among both Corded Ware and Trzciniec communities, barrow construction was accompanied by elaborate rites of passage, reflected in the presence of graves and associated subsurface structures – sometimes of considerable complexity – as well as in traces of funerary feasting: hearths, animal bones, and fragmented vessels. Mounds were raised by extended kin groups or lineages in conspicuous positions within the landscape: on or near hilltops and along watersheds, where they were visible from afar, their prominence often enhanced by deforestation. The Trzciniec builders followed earlier spatial patterns, arranging barrows in lines, clusters, or occasionally as solitary or paired monuments.

Barrows within both cultural systems fulfilled multiple roles. They served as burial places of ancestors and simultaneously as territorial markers delineating the oecumene, the domesticated, familiar space, distinguishing it from that of outsiders who did not build such monuments. For Trzciniec migrants arriving from the north, Corded Ware barrows and their spatial organisation provided both an inspiration and a model for imitation. The renewed practice of mound construction among the newcomers, and its use as a means of asserting territorial claims, can thus be interpreted as a remarkable instance of cultural landscape inheritance: a "posthumous heritage" transmitted from Corded Ware communities to their distant successors.

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Site of Corded Ware Culture in Kavske, Sub-Carpathian Region: Change of Interpretation

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The article is devoted to two barrows of the Corded Ware Culture (CWC). Mounds I–II in Kavske in the Sub-Carpathian region (Ukraine), have until now been interpreted as the remains of a settlement of this culture. As a result of the analysis of the source base (archival materials and the museum collection), it was established that the CWC material in these mounds is represented by a small group of artefacts. On this basis, the interpretation of the mounds as the remains of a CWC settlement was refuted, instead, they were defined as burial places of the CWC. The planigraphy of the features and, where possible, movable material, is presented. The vast majority of the finds belong to the Funnel Beaker Culture (FBC), and it is clear that the barrow burial ground was founded on the remains of a FBC settlement (individual Mesolithic artefacts were also discovered). Imports of the Trypillia Culture were distinguished from the complex of FBC ceramic vessels. We date the construction of Barrows I–II of the CWC no earlier than the middle of the 3rd millennium BC and note a strong similarity of the ceramic material to the vessels of the Middle Dnipro Culture.

KEY-WORDS: Mesolithic, Funnel Beaker Culture, Trypillia Culture, Corded Ware Culture, Trzciniec-Komarów Culture, Middle Dnipro Culture, barrow burial ground

INTRODUCTION

The territory of the Northern Sub-Carpathian region (Ukrainian part) and Podillia is a part of the area of distribution of the southeastern group of Corded Ware Culture (CWC). Due to objective reasons, the local state of research on this archaeological culture is disproportionately low compared to the research carried out in the territory of South-Eastern Poland, where over 400 burials have been investigated (Włodarczak

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2022: 379). Therefore, each investigated site is extremely important for the reconstruction of the settlement of this territory at the junction of Central and Eastern Europe. The publication of sources that were unknown or published briefly, as in the case of the CWC "settlement" in Kavske, is therefore extremely important and relevant.

The multilayered site located near the village of Kavske, Stryi district, Lviv region (Ukraine) was discovered in 1956 by an archaeological expedition of the Historical Museum of Lviv, led by Kostyantyn Bernyakovich (Fig. 1). In an area of about 1 km², six mounds were discovered, located in the valley of the Stupnytsia River at a distance of 1.2 km south of the village (Fig. 2). In 1956, K. Bernyakovich excavated two mounds (I–II; Bernyakovich 1957). Four more were explored during the following year (III–VI; Bernyakovich 1958). At the time of the investigations, the mounds were levelled elevations with a diameter of 11–24 m and a height of 0.3–0.86 m. Under them, according to the researcher's observations, a cultural layer 0.3–0.6 m thick was discovered, and at the bedrock level there were negative features that are interpreted as hearth pits. The materials obtained as a result of the research included pottery, stone, and flint items. The author interpreted all the excavated mounds as settlement sites of the CWC (Bernyakovich 1959a: 29–42; Bernyakovich 1959b: 692–698; Svieshnikov 1959: 24). He also noted that in Mound V there was an inserted cremation burial of an adult aged 30–35 (Bernyakovich 1959a: 38).

The scientific community, in general, agreed with the interpretation of the mounds in Kavske as belonging to the CWC (Machnik 1961: 209–218; Svieshnikov 1974: 28–29), though with certain modifications. Based on the analysis of the published ceramic material, it became clear that some of the mounds were barrow burials of the Trzciniec-Komarów culture (mounds IV, V). Two others, as Igor Sveshnikov suggested, could have been barrow sites of the Corded Ware Culture (Svieshnikov 1977–1980: 49). Mounds I–II, however, have been interpreted to this day (Svieshnikov 1974: 28–29; Voitovych 2012: 144–145; 2022: 43–45) as the remains of a temporary settlement of the CWC (Fig. 3).

Tadeusz Sulimirski did not agree with this interpretation of the site. He considers the barrows in Kavske to be typical burial mounds of CWC. He explains the absence of preserved skeletons by the peculiarities of the local soil, where skeletons are often not preserved in burials. The researcher also drew attention to the presence here of material of the Trzciniec-Komarów culture (Sulimirski 1968: 132–133).

The "archaic features" of a part of the published flint collection from K. Bernyakovich's research in Kavske attracted the attention of Leonid Matskevyi, a researcher of the Mesolithic of Ukraine. In June 1987, the archaeologist conducted surveys at the location of the Kavske I site (it was under this number that the site

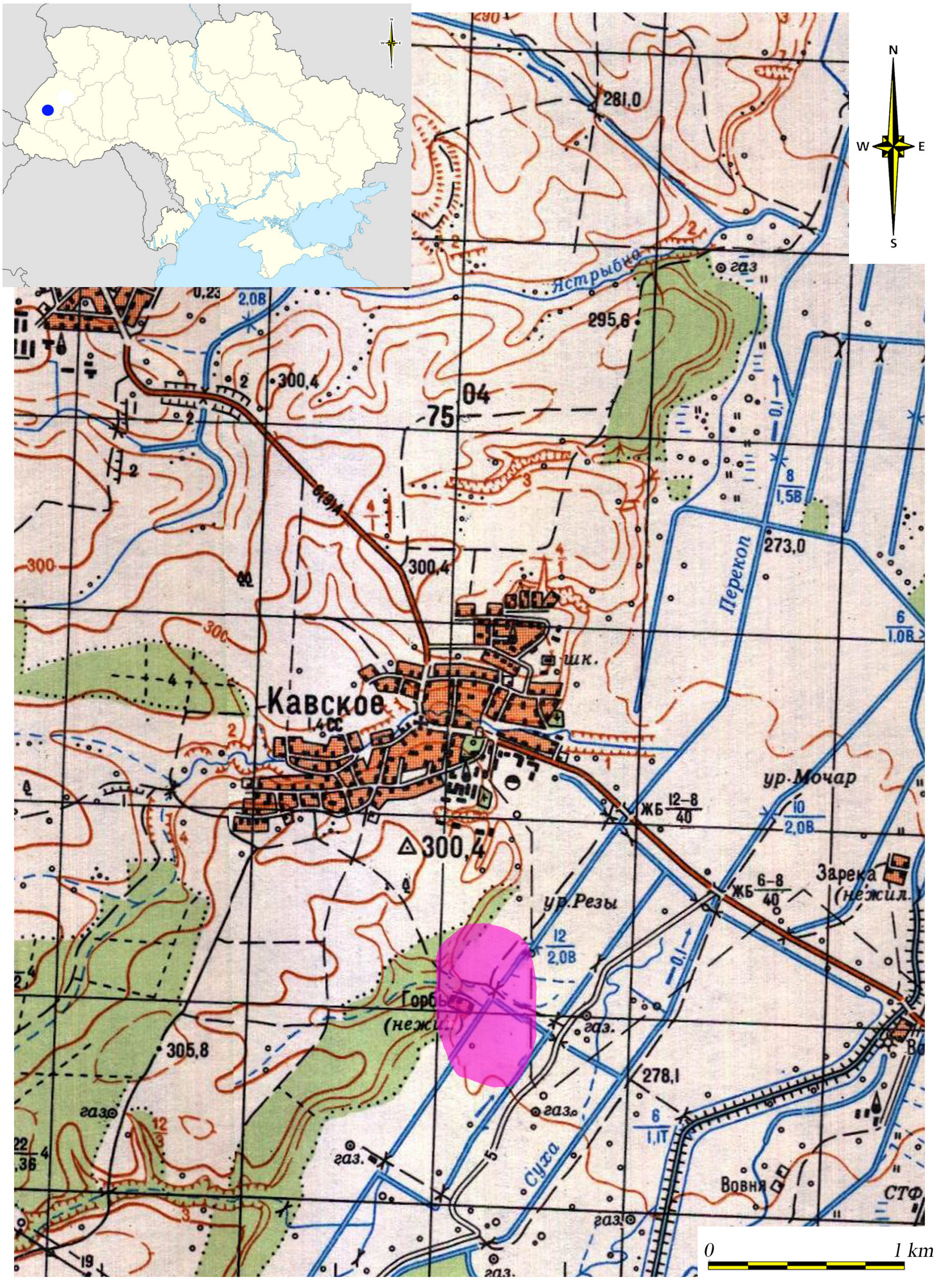

Fig. 1. Localisation of the multilayered site in Kavske in the Sub-Carpathian region. Author: M. Voitovych.

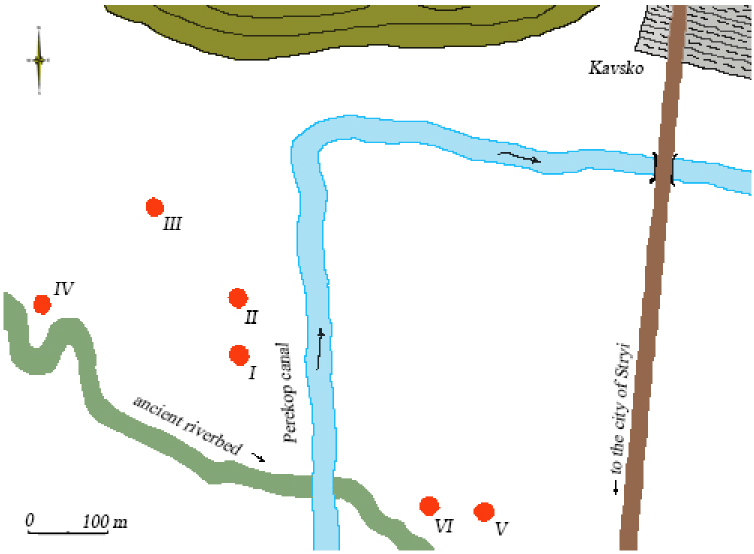

Fig. 2. Plan of the barrow burial ground in Kavske. Archive of the Stryi Regional Studies Museum "Verkhovyna", with additions made by M. Voitovych.

entered the scientific literature). In one of the two survey pits, as well as on the surface of the arable field, flint items and fragments of pottery were discovered (Matskevoi 1988: 22, 57, fig. 26). L. Matskevyi dated all the collected artefacts, including thirty--eight features, to the Eneolithic period (Aleksandrovskyi and Matskevoi 1991: 8; Matskevyi and Kozak 2009: 96). We have examined this collection, which is stored in the reserve collections of the Department of Archaeology of the I. Krypiakevich Institute of Ukrainian Studies of the NAS of Ukraine. The entire collection from the 1987 research is associated with the Funnelbeaker culture. The available ceramic material is in an unsatisfactory state of preservation, represented exclusively by vessel walls. CWC material was found in the collection.

The study of the site continued in 2015, as a result of the implementation of an international project to record the mounds of the Trzciniec-Komarów Culture in the territory of Ukrainian Sub-Carpathian and Podillia regions, led by Przemysław Makarowicz. During the survey research of the site, two strongly levelled mounds (155–156) were discovered in an arable field, which stood out against the surroundings with their dark colour. Two better-preserved mounds (157–158) were discovered in the forest a few hundred metres to the west of these barrows on the territory of the Drohobych Upland. Geomagnetic scanning was conducted on these two mounds. Another barrow was

Fig. 3. The process of researching Barrows I–II in 1956. Scientific archive of the Department of Archaeology of the I. Krypiakevych Institute of Ukrainian Studies of the NAS of Ukraine.

discovered by the expedition participants outside the territory of the site, at a distance of 600 m northwest of Mound 157 (Makarowicz *et al*., 2016: 249–259).

Small-scale research was carried out in 2024 by an archaeological expedition of the Department of Archaeology of the I. Krypiakevych Institute of Ukrainian Studies (KIUS) of the National Academy of Sciences of Ukraine (NASU). This was directed by the author of the article and Yana Yakovyshyna, and the goal of the work was to define the state of preservation of the site. It was established that the cultural layer on part of the site area was severely damaged as a result of many years of ploughing. No CWC material was found here. However, research near Barrow 158 in the inter-mound space indicated the presence of highly fragmented CWC material here.

The ambiguous nature of this site led us to revise the archaeological collection from Kavske, which had been transferred from the Historical Museum of Lviv in the late 1950s for permanent storage in the collections of the "Verkhovyna" Regional Studies Museum (VRSM) in Stryi. Today, the collection from the Kavske I site includes over eight hundred artefacts. It was established that the interpretation of the site as a settlement of the Corded Ware Culture does not correspond to reality. Most of the materials from Mounds I–II, which had previously been interpreted by the scientific community as belonging to CWC, in fact should be assigned to the Funnelbeaker Culture, on a settlement of which barrows of CWC and the Trzciniec-Komarów Culture had been constructed. Also, in addition to the materials of the above-mentioned cultures, a small group of artefacts dating back to the Mesolithic was discovered, which confirmed Leonid Matskevyi's assumption about the presence of this horizon here. There is also material of the Mierzanowice Culture.

The analysis of the source base allows us to reconstruct the stages of settlement of this territory as follows. The first inhabitants appeared here in the Mesolithic period. Later, FBC population founded a settlement from which individual archaeological features and a large amount of movable material were left, which was discovered under all the mounds of the barrows. In subsequent times, CWC population transformed this territory into a sacred place, founding a barrow burial ground and constructing Mounds I–II. The presence of a preserved Mierzanowice Culture ladle in Mound VI indicates that the population of this culture continued the CWC tradition of burying the deceased in mounds of the barrows. Mounds III–V were built by representatives of the Trzciniec-Komarów Culture, which is clearly visible on the basis of the preserved ceramic vessels (Voitovych 2025: 110–115).

We associate with the CWC the construction of Mounds I–II, a detailed analysis of which is the purpose of this study. The situation with the presence of several fragments of ceramic vessels under Mound IV is not yet fully understood by us. Was this barrow constructed by the CWC population, or did some fragments of ceramic vessels of this culture fall there during the construction of the mound by the population of the Trzciniec-Komarów Culture?

METHODOLOGY

When writing the text, a comprehensive approach was used to examine the source base. In addition to studying the collection stored in the VRSM in Stryi, archival materials were processed, consisting of archaeological reports (Scientific Archives of the Institute of Archaeology of the National Academy of Sciences of Ukraine (IAN ASU) and the KIUS NASU, a collection of photographic films from archaeological research held in the KIUS NASU, as well as acts of transfer of finds and correspondence between the Historical Museum of Lviv and VRSM in Stryi. This approach makes it possible to obtain the maximum amount of information from the source base that has been preserved to this day. When studying the artefact collection, only those finds for which it is indicated which mound they come from were taken into account. Part of the collection, due to the lack of such information, is classified as dubious finds. Where possible, the localisation of archaeological features and artefacts has been reproduced, based on the material, with indications of depths and descriptions in field reports. The method of a critical approach to sources has been used for the entire source database.

GEOMORPHOLOGICAL CONDITIONS

Site I at Kavske is located at the junction of two geomorphological regions: the Drohobych Upland and the Upper Dnister Alluvial Lowland. The Drohobych Upland belongs to the zone of structural-erosive uplands with a ridge-hilly relief with an altitude of 300–400 m above sea level (Tsys 1962: 172; Kravchuk 1999: 166). The highest elevations in the upland territory are recorded in the watershed areas of the Carpathian foothills (600–700 m above sea level), and the lowest – at the junction with the Upper Dnister Alluvial Lowland (about 300 m above sea level). The relief of the upland is characterised by strong fragmentation of the terrain. There are combinations of broad swampy valleys and deep riverbeds, with a dense network of smaller valleys and different dry small forms (Łanczont and Hołub 2011: 164–166). In the interfluve of Tysmenytsia and Kolodnytsia-Nezhukhivka rivers, there is a complex of branched ravines. Part of the archaeological sites (northwestern area), where two barrows are preserved, is localised on the eastern ledge of the Drohobych Upland, which rises by about 20 m above the level of the Upper Dnister Alluvial Lowland.

Most of the site is located in the valley of the Stupnytsia River (also known as Sukha River), on its left bank. The length of this river is 17.85 km and flows into the Kolodnytsia River northeast of the village of Kavske (Nazaruk 2018: 552). A significant part of this river is canalised and serves as receiving water for drainage systems, which divide the area of the multilayer site into several parts. The average altitude of this area is 278–279 m above sea level. In physical and geomorphological terms, this area is also the easternmost section of the Upper Dnister Alluvial Lowland subdistrict of the Sambir Basin, which here, in the Kolodnytsia-Nezhukhivka Valley, borders the Zhydachiv Basin. The Sambir Basin is characterised by a thick layer of alluvium (up to 18 m; Pylypovych and Kovalchuk 2017: 51).

BARROWS OF THE CORDED WARE CULTURE

Barrow I. According to K. Bernyakovich, the barrow is somewhat deformed, with a diameter of 17.8 m from north to south and 19.6 m from west to east. Its height relative to the modern surface is 0.86 m. During Bernyakovich's excavation, a control baulk 0.5 m wide had been left in the centre of the barrow, extending from north to south. The stratigraphic layers were recorded as follows: 0–0.36 m layer of light brown soil; 0.36–1 m layer of dark brown, sometimes black soil, the maximum thickness of which occurs in the centre of the mound; 1–1.26 m – the bedrock represented by grey-brown clay. Below this layer are deposits of river pebbles. The dark brown layer represents the mound of the barrow and the ancient soil horizon, about which K. Bernyakovich wrote that it was black in places (Bernyakovich 1957: 6).

Based on the analysis of the plan, combined with the descriptions in the scientific report and location details of the movable material, indicating in most cases the depths, we can reconstruct the planigraphy of the location of the features, in particular, the burial place of the CWC and the movable material (Fig. 4). It is worth noting here that the previously discovered plan of this mound, as well as Mound II, made by I. Sveshnikov and subsequently published by us, is not accurate and in many cases is significantly simplified and does not coincide with the original plan made by K. Bernyakovich (Voitovych 2022: figs 8–9).

In Barrow I, three charcoal accumulations were found at different depths. They had a lens shape in cross section and a thickness of 0.08–0.1 m. Two of them were in the centre of the barrow and one on the periphery. Accumulation № 1 (numbering by the excavator) was located near the centre of the barrow, in its northwestern part at a depth of 0.58 m, pear-shaped in plan with dimensions of 1.48×1.12 m (Bernyakovich 1957: 7). Below, at the bottom of the charcoal layer, at a depth of 0.68 m, a flat axe made of a light cream-coloured siliceous limestone (*opoka*) of trapezoidal shape in plan was found. It is rectangular in cross-section and wedge-shaped in profile (Fig. 4). The surfaces are carefully polished. The butt is rounded, rough. The blade is arcuate with rounded corners. The length of the axe is 9.8 cm, the width of the blade is 5.5 cm, the thickness is 1.63 cm, and the width of the butt is 2.6 cm (Fig. 5:1).

Charcoal accumulation № 2 (Fig. 4) is located 0.3 m south of the centre of the mound, oval in plan with dimensions of 1.14×0.76 m, discovered at a depth

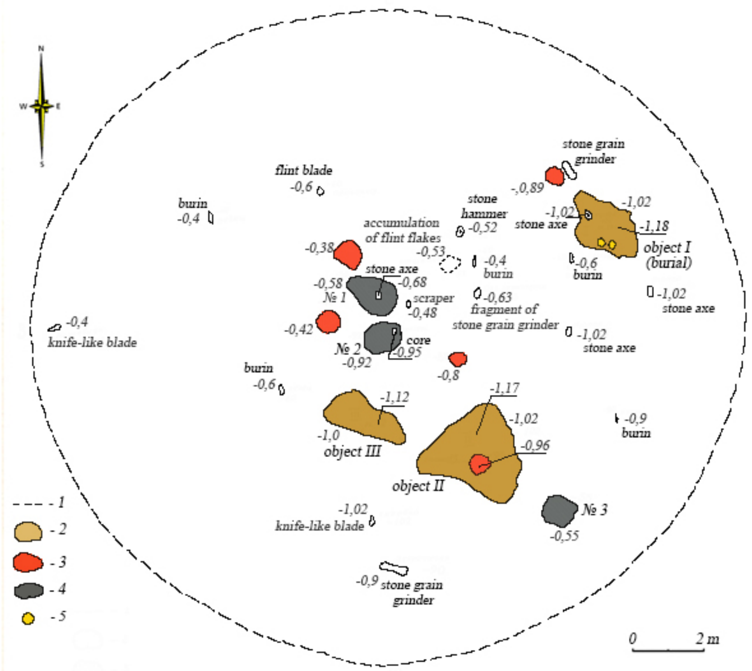

Fig. 4. Plan of Barrow I: 1 – outline of the barrow; 2 – negative features; 3 – accumulation of ceramics; 4 – accumulation of charcoal; 5 – clay vessels. Scientific Archive of the Institute of Archaeology of the NAS of Ukraine, with additions made by M. Voitovych.

of 0.92 m (Bernyakovich 1957: 7). In this layer of charcoal fragments, a strongly worn subprismatic, single-platform core for micro-blades was found, made of grey-mustard quartzite with dimensions of 4.1×4.2×4.6 cm. Flake scars were found on the surface (Fig. 6:4). The knapping technique used to produce this artefact allows us to date it back to the Mesolithic period.

Charcoal accumulation № 3 is located in the northeastern sector of the barrow at a distance of about 7.5 m from the centre of the mound at a depth of 0.55 m. No movable material was found here (Bernyakovich 1957: 7).

K. Bernyakovich provides descriptions of negative features that were recorded at the level of the natural subsoil under the barrow mound, which he interprets as "hearth pits" due to the presence of charcoal in the infill (Bernyakovich 1957: 7).

Feature I (burial of the CWC), located on the periphery of the mound at a distance of 5.76 m to the northeast from the centre of the barrow at a depth

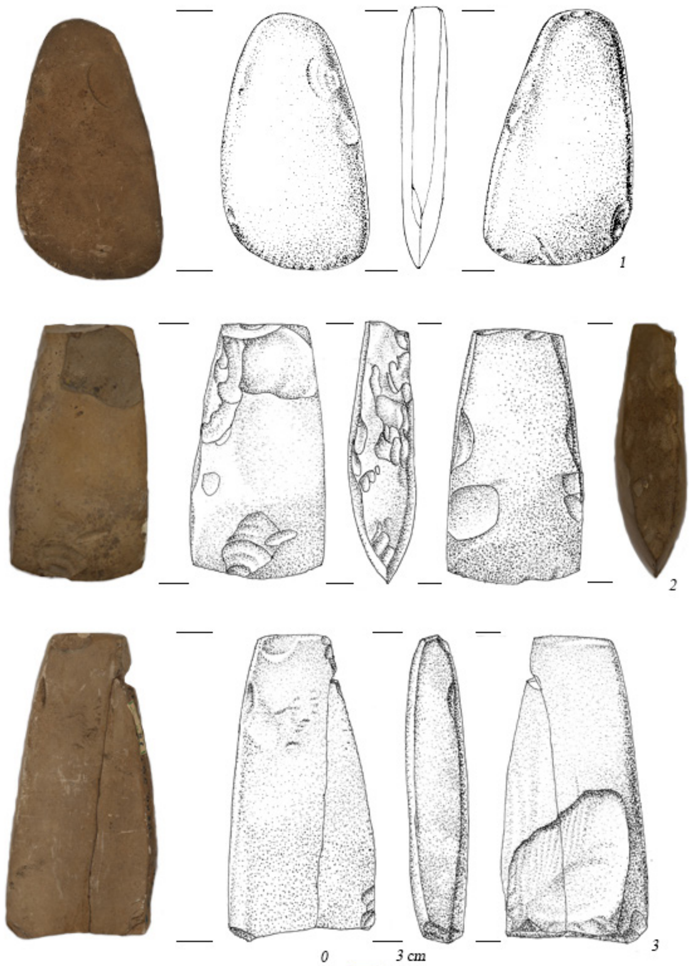

Fig. 5. Axes made of a siliceous limestone (1, 3) and stone (2) of the CWC from Barrow I. Authors: I. Prynada and M. Voitovych.

of 1.02 m, dimensions 1.24×0.75 m and 0.16 m below the level of discovery. Regarding the shape of the feature, there is a mismatch between the description and the available plan. According to the plan, the feature is of a subrectangular shape with uneven contours, extending from the northwest to the southeast (Fig. 4). However, archival materials indicate that “the pit had an almost regular rounded

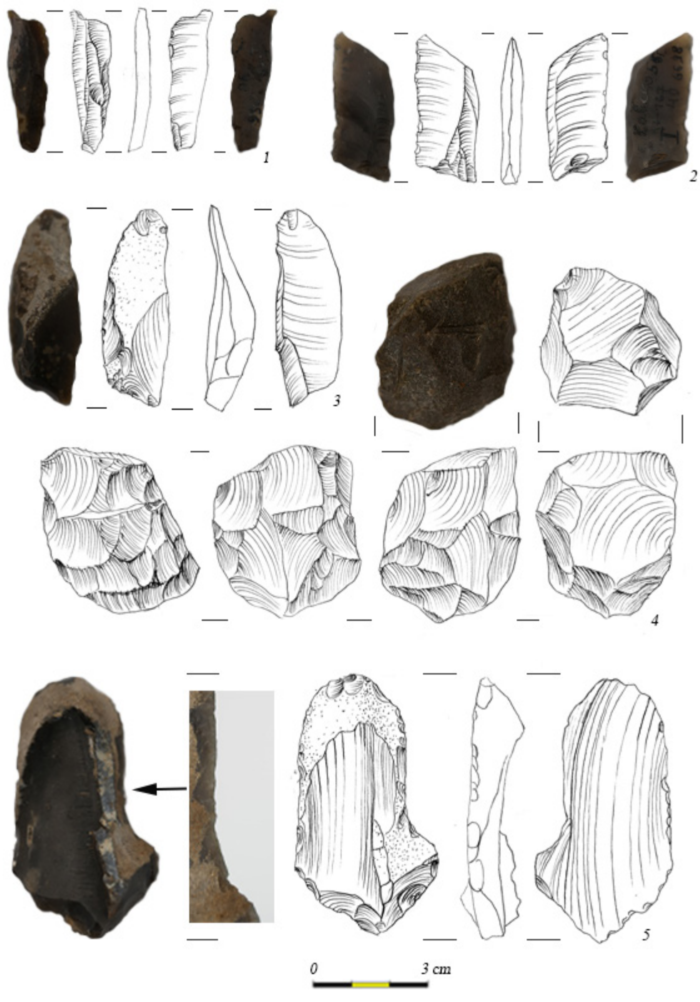

Fig. 6. Flint items from Barrow I. Authors: I. Prynada and M. Voitovych.

shape" (Bernyakovich 1957: 7). The layer of ash and charcoal in the feature was 0.1–0.12 m thick. No skeletal remains from a burial were found in the middle (due to the acidity of the local soils). Two vessels were found near the southern wall, one of which could not be restored, only its bottom remained. In the western one, a drilled stone axe was found (Fig. 7).

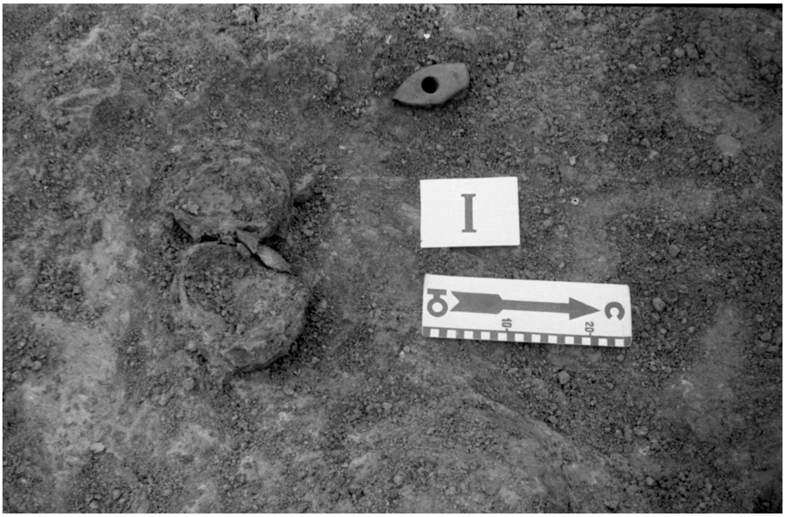

Fig. 7. Burial of the CWC in Barrow I. Scientific Archive of the Department of Archaeology of the I. Krypiakevych Institute of Ukrainian Studies of the NAS of Ukraine.

The axe is made of light grey sandstone, wedge-shaped in plan and rectangular in cross-section with rounded corners. The surface is polished, and the side surfaces are best polished with a shine at the side edges of the blade (Fig. 8:2). The blade is slightly inclined downwards, slightly convex, and damaged in the upper part. The butt is high, oval at the end, and obliquely shaped. The hole is made closer to the blade, with a diameter of 2–2.2 cm. The axe length is 11.8 cm, maximum width is 5.2 cm, maximum height is 3.6 cm, the preserved blade length is 2.7 cm, and the height of the butt is 3.3 cm.

The vessel that contained the axe is squat with an uneven bottom, concave, and damaged in its middle part, a convex body with a concave neck, which turns into a slightly everted rim, the edges of which are rounded (Fig. 8:3). The ceramic fabric is heterogeneous with an admixture of grey chamotte. The firing is good. During the restoration, the surface was covered with brown paint. Originally, the outer surface was grey-brown, polished with small scratches from rubbing. The inner surface is light brown, smoothed, but uneven with traces of rubbing with something like a bundle of straw or grass, the traces of which are clearly visible. The fracture is grey-brown. The outer surface under the rim is ornamented with five horizontal imprints of a weakly twisted cord in which individual fibers can be traced in the impressions. The imprints of the cord are with the top to the left. The diameter

Fig. 8. Stone items (1–2) and ceramics (3–4) of CWC. Authors: I. Prynada and M. Voitovych.

of the rim is 16.5 cm, the height is 8.4 cm, the maximum convexity of the body is 15.9 cm.

The bottom of the handmade vessel is flat and squat, its rounded edges pass at an obtuse angle, probably into a swollen body (Fig. 8:4). The ceramic fabric has an admixture of brick-colour fired clay grog. The structure is heterogeneous and tough. The firing is good. The outer surface is carefully polished, and grey-brown. The inner

Fig. 9. Fragments of pottery from Barrow I. Authors: I. Prynada and M. Voitovych.

surface is creamy-brown, and polished, with traces of finger rubbing (or the formation of the vessel?). The fracture is heterogeneous, grey-brown. The diameter of the bottom is 6.5 cm, and the thickness of the bottom is 1 cm.

Feature II was discovered at a depth of 1.02 m and was located at a distance of 3.12 m southeast of the centre of the barrow. It was subtriangular in plan with

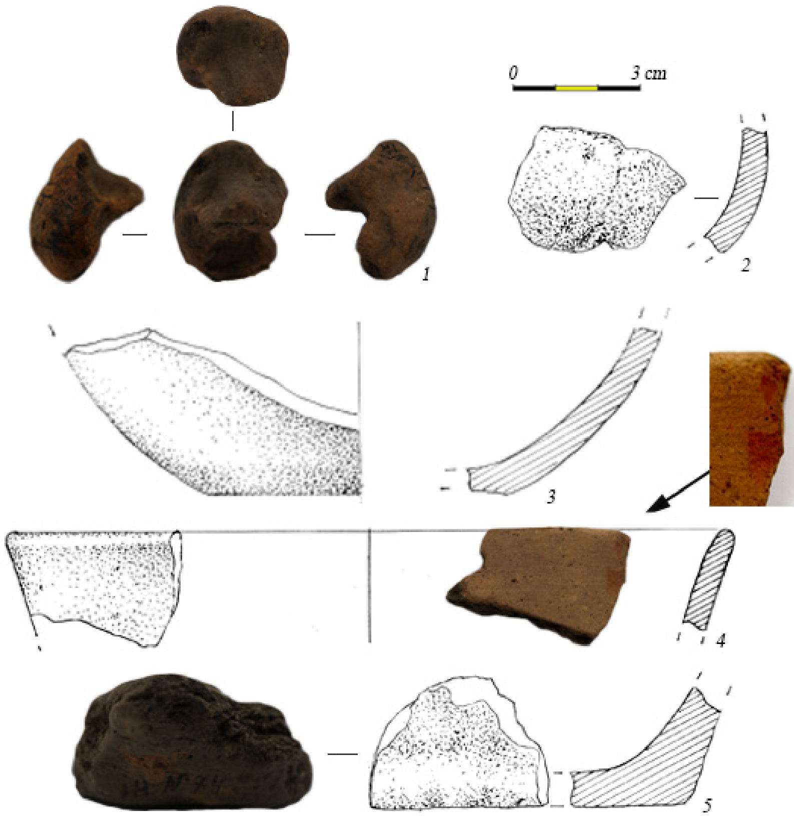

Fig. 10. Fragments of pottery from Barrow I of FBC. Authors: I. Prynada and M. Voitovych.

rounded corners, measuring 2.36×2.92 m and 0.15 m deep. A small accumulation of ceramics was discovered above the feature at a depth of 0.96 m (Fig. 4). It is known that the infill contained charcoal and ash (Bernyakovich 1957: 7).

Feature III was recorded at a depth of 1 m and a distance of about 3 m south of the centre of the barrow, amorphous in shape, extending from northwest to southeast with dimensions of 2.8×0.96 m and a depth of 0.12 m. No movable material was found in the infill, containing charcoal (Bernyakovich 1957: 7).

At different depths under the mound, a significant amount of movable material was collected, consisting of several stone and flint tools and an accumulation of fragments of ceramic vessels found in the mound of the barrow. Four main clusters of ceramic vessels can be distinguished, based on the plan.

The first accumulation was found at a depth of 0.38 m at a distance of 1.92 m northwest of the centre of the barrow. It included 20 small fragments of FBC ceramic vessels with heavily damaged surfaces, represented by vessel bodysherds. Only one find is the rim of a funnel-shaped pot (Fig. 9:7).

The subsequent comparison of the discovered fragments of ceramic vessels with the plan encounters difficulties. According to the description, this cluster is located at a distance of 1.32 m west of the centre of the barrow and at a depth of 0.42 m. However, according to the inscriptions on the finds, none were found at a depth of 0.42 m. The presence of ceramics was confirmed at the following depths: 0.4 m (40 finds), 0.41 m (19 finds), and 0.46 m (40 finds). As for cultural interpretation, the picture here looks as follows. All material from depths of 0.4 m and 0.41 m belongs to the FBC. Among the material discovered at a depth of 0.46 m, three small sherds belong to the CWC and one bodysherd to the Trzciniec-Komarów Culture, all the others to the FBC (Fig. 9:6, 8). The fragments of Corded Ware Culture ceramics belong to one vessel up to 1 cm thick, made of ceramic fabric with an admixture of chamotte (Fig. 9:5). The outer surface is light brown and carefully smoothed, and the inner surface and the fracture are dark grey. There are noticeable traces of scratches from smoothing with a bundle of straw or grass on the inner surface.

It is noteworthy that among the ceramic finds of the FBC from a depth of 0.4 m are the rims of two vessels of different shapes (Fig. 9:1–2), and on one wall a trace of a handle has been preserved (Fig. 9:4). Also present at a depth of 0.4 m were two fragments of fired daub. Among the ceramic fragments that were found at a depth of 0.41 m, a handle, presumably from a ladle in the form of a zoomorphic figure of a ram, made of a ceramic fabric typical of the FBC with an admixture of chamotte (Fig. 10:1), stands out. The surface of the find, like most of the FBC material, is damaged by acidic soils. At the same depth, three walls of the vessels, belonging to the Trypillian culture, were discovered (Fig. 9:3, 9).

A difficult situation arises with the comparison of accumulations of ceramic material from a depth of 0.89 m. No finds from this level were preserved. Only one fragment of the bottom of the FBC vessel was found at a depth of 0.8 m (Fig. 10:3). Instead, a significant collection of pottery fragments was found at a depth of 1.02 m (44 items). It corresponds to the level of the bedrock of this barrow. All of them are small fragments of FBC vessels (Fig. 10:2), most of which are bodysherds from different vessels. Among them is one rim from a funnel-shaped pot and fragments of two bottoms of thick-walled vessels (Fig. 10:5).

Along with ceramics, flint products made exclusively from high-quality deposits of Turonian flint were found at the same levels, from 0.4 to 1.02 m (Fig. 11). However, their preserved proportion among other materials is quite low (24 pieces). Only in

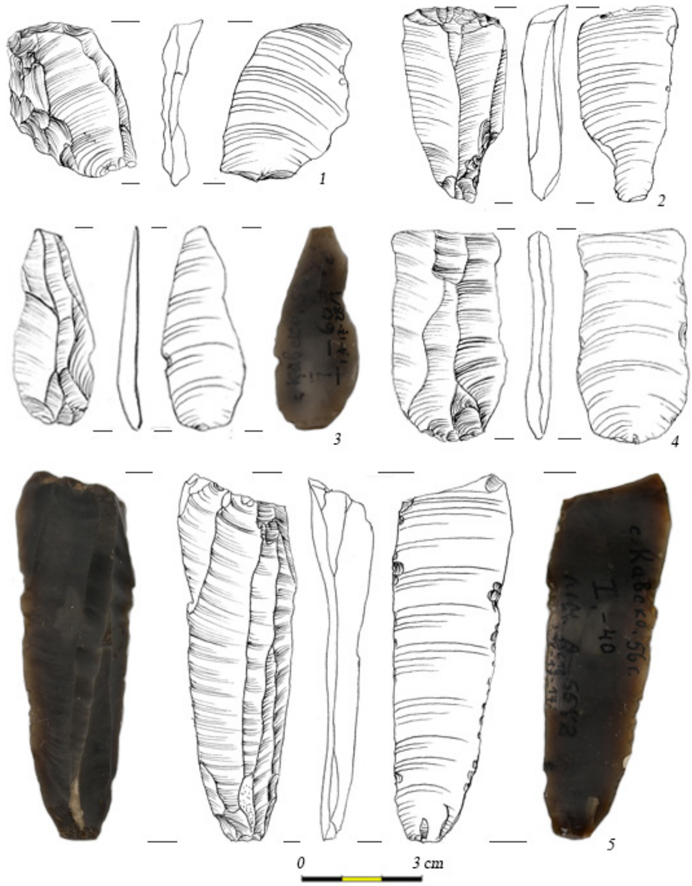

Fig. 11. Flint items from Barrow I. Illustrated by I. Prynada and M. Voitovych.

one case, according to the documentation made by the excavator, was a cluster of flint artefacts found. It includes six flakes, which lay compactly at a depth of 0.53 m at a distance of 1.6 m to the northeast (Bernyakovich 1957: 10). However, no flint item from this depth has been preserved. Among the flint artefacts, there are completed tools, such as burins, knives, and scraper, together with flakes and fragments of blades.

A significant part of the collection of stone tools found outside the features is represented by grain grinders, and flat and drilled axes. The planigraphy of the grain grinders is as follows. One find was discovered 7.5 m to the northeast at a depth of 0.86 m

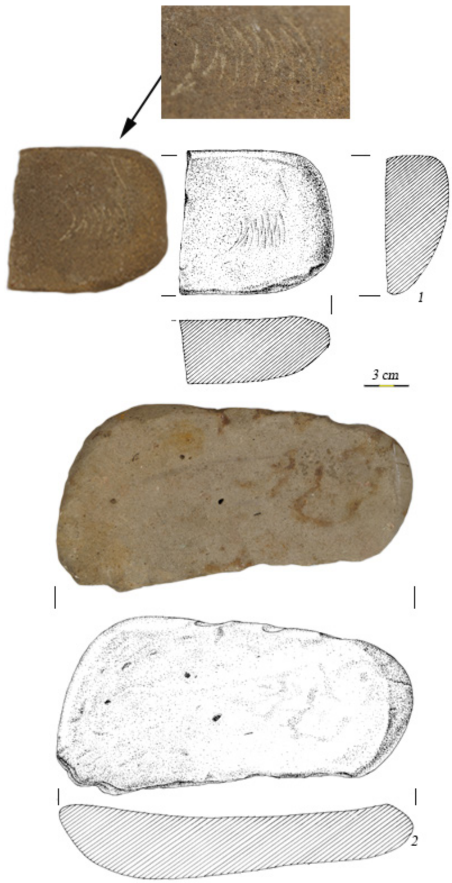

Fig. 12. Stone grain grinders from Barrow I. Authors: I. Prynada and M. Voitovych.

near a cluster of ceramic ware. It was made of a light grey sandstone. The millstone has an elongated shape with rounded edges, measuring 25.8×9.7–10.8×0.35–3.8 cm. The working surface is heavily worn, concave, and flat (Fig. 12:2). The other is also completely preserved, identical to the previous one, measuring 24.2×7.8–12.2×3.3–4.6 cm. The third specimen was found in a fragmented state directly in the barrow's mound at a depth of 0.63 m and a distance of 2.56 m to the northeast from the centre of the barrow. It is made of the same raw material as the previous ones, measuring 10.3×9.6×4.3 cm. On the working surface, there is a recess in the form of a zigzag (Fig. 12:1). It is not clear how these notches were formed. We do not exclude the possibility of damage to the find by a metal tool during the research (it is necessary to determine what tool made the zigzag).

A sandstone hammer was discovered at a distance of 3.24 m to the northeast of the centre of the barrow at a depth of 0.52 m (Fig. 8:1). It was made from a reused axe, as indicated by the profile of the find in the form of a blade inclined downwards, the surface of which was polished carefully. However, the edge is not polished so intensively, it is rough to the touch. The hammer is biconical in plan with rounded edges. The butt is rounded. The hole is made closer to the lower part, with a diameter of 2.25–2.55 cm. The length of the find is 8 cm, the maximum width is 5.83 cm, the height is 5 cm, height in the lower part is 5.6 cm.

At the bedrock level, at a depth of 1.02 m south of the CWC burial and at a distance of about 2.5 m from each other, axes similar in shape and different in raw material were discovered. The first find, discovered at a distance of 1 m from the burial, was made of cream-coloured siliceous limestone (*opoka*; Fig. 5:3). The blade and one of the sides are missing. Based on the preserved part, we conclude that the shape was trapezoidal in plan, and rectangular in cross-section. All sides are polished. The butt is slightly convex. The preserved length is 11.2 cm, preserved width is 2.9–5.4 cm, the thickness is 2.3 cm.

Another find is made of flinty aleurite of grey-cream colour. It is trapezoidal in shape with a slightly rounded blade on which notches can be seen (Fig. 5:2). The corners of the blade are sharp. The object is rectangular in cross-section, with one slightly convex edge. All sides, including the butt, are carefully polished. The length of the find is 9.6 cm, the width of the butt is 3.2 cm, the width of the blade is 4.9 cm, the maximum thickness is 2.6 cm.

Barrow II is located 15.5 m west of Barrow I, measuring 12.8 m from north to south,14.2 m from west to east, and 0.64 m high. The research methodology adopted for its excavation was identical to that of Barrow I (Fig. 13). The upper layer consisted of light brown soil, 0.32 m thick. Below is the mound of the barrow and the level of the ancient surface, which is represented by a layer of dark brown colour, sometimes black (0.32–0.84 m). The bedrock consisted of grey-brown clay 0.24 m thick, which turned into river pebble deposits, which began at a depth of 1.08 m (Bernyakovich 1957: 11–12). The two mounds were connected by a trench, 2 m wide (Fig. 3), in which no movable material was found (Bernyakovich 1957: 17).

A significant amount of movable material was discovered under Mound II, as well as negative features, among which the burial of the CWC stands out.

The burial, which K. Bernyakovich interprets as an “ash spot”, was discovered at a depth of 0.85 m at the level of the natural subsoil, on the periphery of the mound

Fig. 13. Barrow II. Scientific Archive of the Department of Archaeology of the I. Krypiakevych Institute of Ukrainian Studies of the NAS of Ukraine.

in the north-eastern part of the barrow, at a distance of 4.1 m from the centre (Fig. 14). The dimensions of the pit are 0.84×0.48 m and a depth of 4–5 cm. The infill consisted of a charcoal layer and ash. No grave goods were found in the burial pit, however, nearby, 0.3–0.4 m from the edge of the burial, on the northern side, two clay vessels were found, which are shown on the plan as No. 3–4. According to the researcher's descriptions, a flint blade was also found near the burial (Bernyakovich 1957: 12). It transpires from the records that this find was discovered much higher, at a depth of 0.55 m, so it cannot be associated with the grave goods (Fig. 15:4). At the same depth, near the burial, a flint racloir was also found, which was not preserved (Bernyakovich 1957: 13).

An amphora-shaped vessel (№ 3) was discovered at a depth of 0.85 m. It has a well-defined flat and slightly concave bottom, a convex-flattened body, a high, concave neck, and rim slightly inclined outwards (Fig. 16:1). The ceramic fabric is homogeneous and dense with an admixture of brick-colour chamotte. The firing is good. The outer surface is brown with traces of smoothing using something like a bundle of straw or grass. The inner surface is light brown, also with horizontal traces of rubbing with a bundle of straw or grass. The outer surface under the rim is ornamented with four horizontal stripes of imprints of a weakly twisted cord, applied with its top to the left. The diameter of the rim is 7.3 cm, the height is 13.1 cm, the maximum convexity of the body is 13.2 cm, diameter of the bottom is 6.2 cm.

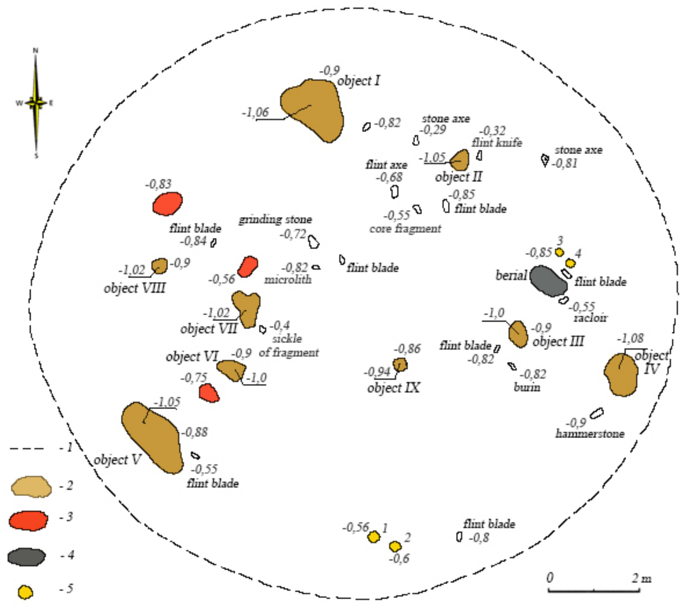

Fig. 14. Plan of Barrow II: 1 – outline of the barrow; 2 – negative features; 3 – accumulation of ceramics; 4 – accumulation of charcoal; 5 – clay vessels. Scientific Archive of the Institute of Archaeology of the National Academy of Sciences of Ukraine, with additions made by M. Voitovych.

A flask-shaped vessel (№ 4) was discovered at a depth of 0.84 m with a flat, well-defined bottom, a strongly convex lower part, and a conical upper part, asymmetrical rim, which on one side is slightly reverted and on the other slightly everted (Fig. 16:2). The ceramic fabric is homogenous and dense with an admixture of chamotte. The firing is good. The surfaces are light cream-coloured and slightly polished. The edges of the rim on one side, which is slightly everted, are ornamented with a horizontal strip of slightly twisted cord. The diameter of the rim is 6.8 cm, the height is 14.5 cm, the maximum convexity of the body is 12.2 cm, and the diameter of the bottom is 5.4 cm.

K. Bernyakovich provides information about the presence of nine negative features where charcoal pieces were found, which he calls “hearth pits”(Fig. 14). The information about them is incomplete. It is indicated that fragments of ceramic vessels were found in some features, but without specifying in which ones. It is also indicated, without additional specifics, that the infill contained charcoal and ash, the thickness of which in the layer was 5–8 cm. The numbering of the features is given by the excavator (Bernyakovich 1957: 12).

Fig. 15. Artefacts made of flint (1, 4–5) and siliceous limestone (2–3) from Barrow II.
Authors: I. Prynada and M. Voitovych.

Feature I was located in the northwestern sector of the barrow at a depth of 0.9 m and a distance of 3.76 m from the centre of the barrow. The shape of the feature was close to triangular with rounded corners, dimensions 1.48×1.12 m, and a depth of 0.16 m.

Feature II was discovered in the northeastern sector of the barrow at a depth of 0.91 m and a distance of 3.92 m from the centre of the barrow, 0.14 m deep. The shape in the plan was close to pear-shaped, with dimensions of 0.51×0.32 m.

Fig. 16. Clay vessels of the CWC from Barrow II. Authors: I. Prynada and M. Voitovych.

Feature III was located in the southeastern sector of the barrow at a depth of 0.9 m and a distance of 3.44 m from the centre of the mound. The shape was oval, with dimensions of 0.61×0.39 m and 0.1 m deep.

Feature IV was discovered on the periphery of the mound in the southeastern sector of the barrow, at a distance of 5.68 m from the centre and a depth of 0.88 m. The shape was oval, with dimensions of 0.92×0.68 m and a depth of 0.2 m.

Feature V was located in the southwestern sector of the barrow at a depth of 0.88 m and a distance of 4.72 m from the centre. The shape of the feature was elongated-oval with dimensions of 1.84×0.4 m and a depth of 0.17 m.

Feature VI was located at a depth of 0.9 m and a distance of 2.64 m southwest of the centre, oval in plan, with dimensions of 0.6×0.44 m and a depth of 0.1 m.

Feature VII was discovered at a distance of 2.24 m west of the centre of the barrow at a depth of 0.88 m. Dimensions of 1.08×0.64 m and a depth of 0.14 m in plan, amorphous in shape.

Feature VIII was oval with a diameter of 0.48 m, discovered at a depth of 0.9 m and a distance of 4.21 m west of the centre of the barrow. The depth of the pit from the discovery level was 0.12 m.

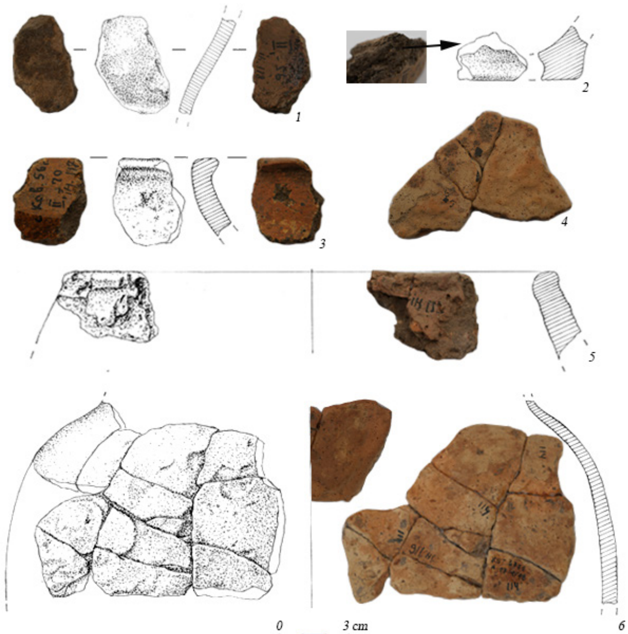

Fig. 17. Fragments of clay vessels from Barrow II. Authors: I. Prynada and M. Voitovych.

Feature IX was located in the southeastern sector of the barrow at a distance of 1.36 m from the centre and a depth of 0.86 m. In plan, it was oval with a diameter of 0.43 m and a depth of 0.08 m (Bernyakovich 1957: 12).

We found small discrepancies in the descriptions of the features in the archival materials and in the plan. In particular, the width of Feature V in the text is indicated as 0.4 m, while according to the illustrative material, it is about 1 m.

Despite the smaller size of Barrow II, a significant amount of movable material was discovered here at different depths, dating from the Mesolithic period to the Bronze Age. A significant part of the material had been incvorporated into the mound during the construction of the barrow. This applies to finds discovered at depths from 0.25 m to 0.8 m (the lower limit is relative since it is not known at what depth the ancient surface level began during the construction of the mound).

According to the plan, three accumulations of movable material were recorded under the mound of the barrow, located at a depth of 0.56 m, 0.75 m, and 0.83 m. The first one was discovered in the northwestern sector at a distance of 2.24 m from the centre. These include small fragments of the lower part of the vessel, in a reasonably good state of preservation. Thanks to the brief description left by the author of the research, we know that the fragments are made of ceramic fabric with an admixture of a significant amount of black grit of coarse-grained sand. Thus, we managed to distinguish these finds from another collection, primarily the FBC, which was discovered at this depth. We know that the bottom of the vessel has a diameter of 6.4 cm, but it is absent among the preserved fragments (Bernyakovich 1957: 15–16). On some fragments, the remains of an intact dark grey surface are visible (Fig. 17:1). The fragments of another vessel were found in this cluster. It differs from the first one in its massive proportions and ceramic fabric, in which, in addition to the grit, there is an admixture of brick-coloured chamotte (Fig. 17:5). We have established that the finds from this cluster belong to the Trzciniec-Komarów Culture.

We encounter difficulties in interpreting the cultural identity of the next cluster since the plan indicates that the material was discovered at a depth of 0.75 m, and among the preserved ones, there are finds that are fixed at a depth of 0.7 m. Eleven of the thirteen units belong to the Trzciniec-Komarów Culture. The other two are FBC. The cluster was discovered at a distance of about 2.5 m south of the previous one. All fragments of the Trzciniec-Komarów Culture belong to one vessel with an admixture of a significant amount of coarse-grained sand and large fractions of black grit. The bottom of the vessel is well-defined and flat (Fig. 17:2), and the rim is slightly everted, thickened, and horizontally cut (Fig. 17:3).

The last accumulation is located in the northwestern sector of the barrow at a distance of 4.52 m from the centre. According to the descriptions made by K. Bernyakovich, it is known that this one included exclusively fragments of brick-coloured ceramics with an identical fracture. The firing is good. In the preserved collection, only one find is recorded at this depth and is represented by a fragment of a vessel base, the diameter of which is extremely problematic to determine. In contrast, three more fragments originating from the same vessel are indicated as having been found at a depth of 0.86 m, and nineteen other examples are indicated only as having been found in this barrow. It was possible to partially recreate the convex body of a rather thick-walled vessel (Fig. 17:6). The surface is severely damaged by aggressive soils, but traces of red paint, which was used to cover the outer surface, are partially preserved. And on one find there are traces of repair in the form of tar residues on the surface (Fig. 17:4). The described finds belong to the CII stage of the Trypillian Culture.

On the periphery of the barrow, in its southern part, two vessels were found together (Nos 1 and 2 on the plan). The first vessel was recorded at a depth of 0.56 m. It is a cup (№ 1) with an uneven bottom concave inward, a convex body with a concave neck, which passes into a slightly everted rim, the edges of which is rounded (Fig. 18:1). The ceramic fabric is dense and homogeneous with an admixture

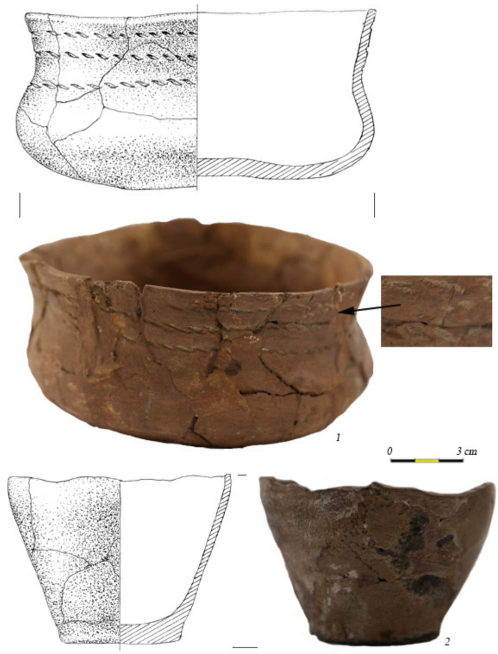

Fig. 18. Clay vessels from Barrow II. Authors: I. Prynada and M. Voitovych.

of brick-coloured chamotte. The firing is good. During the restoration, the surface was covered with brown paint. The original outer surface was light brown and well-smoothed. The inner surface is also light brown, smoothed, but uneven with traces of rubbing with a bundle of straw or grass, the traces of which are visible in the lower part of the body. The fracture is brown. The outer surface under the rim is ornamented with three horizontal imprints of a weakly twisted cord, in which some fibres can be traced in the impressions. The cord is applied with its top to the left. In one place, on the upper imprint, there is a joint at the end of the cord. The diameter of the rim is 14.4 cm, the height is 7.1 cm, the maximum convexity of the body is 14.7 cm.

From another vessel (№ 2), discovered at a depth of 0.6 m, the lower part of the conical shape with a well-defined flat bottom was preserved (Fig. 18:2). The ceramic fabric is mixed with a significant amount of coarse-grained sand, dense, and homogeneous. The firing is good. The outer surface is smoothed, brown in colour, with grains of sand on the surface and small scratches from horizontal rubbing. The inner surface is brown and uneven with grains of sand. The fracture is dark grey. The diameter of the bottom is 5 cm, and the preserved height is 6.8 cm.

Fig. 19. Fragments of clay vessels (1–6) and flint items (7–14) from Barrow II. Authors: I. Prynada and M. Voitovych.

In the mound of the barrow, ceramic material of FBC was recorded from a depth of 0.56 m. It is severely damaged, only some samples have a polished surface. The fracture is dark grey, the outer surface is mostly brown, and the inner surface is grey (Fig. 19:1). A greater concentration of ceramics of this culture is recorded at a depth

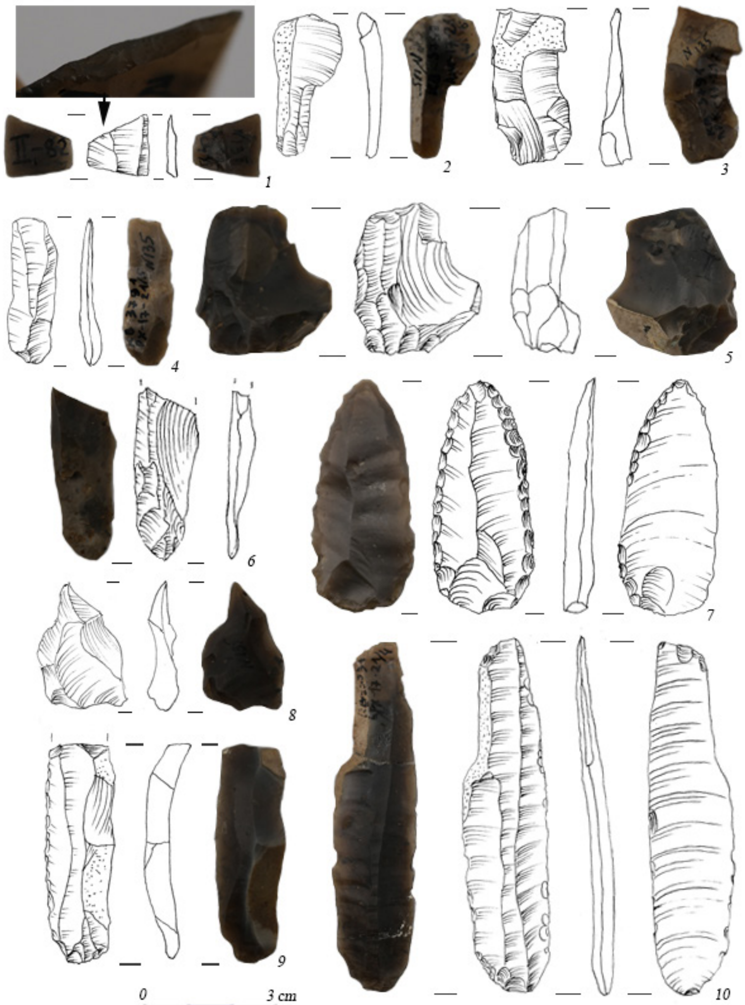

Fig. 20. Flint artefacts from Barrow II. Authors: I. Prynada and M. Voitovych.

of 0.6 m (twenty-nine pieces), but all of them are represented by small fragments of bodysherds (Fig. 19:3–4). The largest collection of FBC vessels was found at a depth of 0.86 m. It is also in a highly fragmented state, but among it, there are some fragments of bases, rims, and handles, which allows us to suggest that among the discovered vessels there are fragments of funnel-shaped pots and amphorae (Fig. 19:2, 5).

Fragments of clay daub were found under the mound of the barrow but in smaller quantities than in Mound I. According to K. Bernyakovich, one find contained an imprint on the clay of a stick with a diameter of 1.8 cm (the find has not been preserved; Bernyakovich 1957: 16).

The collection of flint items was discovered at different depths and left by the local population during the period from the Mesolithic to the Early Bronze Age. The finds occurred from a depth of 0.25 m to 0.85 m, some of them were found in a redeposited state in the mound of the barrow. More than half of the products were recorded in different parts of the mound at a depth of 0.82 m. All discovered artefacts were made from high-quality Turonian raw material.

The collection of finds of the Mesolithic period is small but consists of characteristic finds such as a microlith with a retouched edge (Fig. 20:1) and a fragment of a well-worked narrow-faced single-platform core for removing micro-blades (Fig. 20:5).

Most of the flint artefacts are represented by finds belonging to the FBC, among which blades and their fragments dominate (Fig. 19:7–8, 10–14; 20:2–4). The presented knives are made on blades with retouched edges (Fig. 15:5; 20:9–10). One knife is made on a laurel-shaped blade, triangular in cross-section (Fig. 20:7). The striking platform is facetted. Regular retouching was made on the dorsal surface and partially on the ventral one. Dimensions: 5.22×2.28×0.68 cm. This find is represented in the scientific literature as a dart point (Bernyakovich 1959a: 38). Among other tools, we can distinguish an awl (Fig. 20:8), a burin made on a blade (Fig. 20:6), and a sickle insert. The last one is made on the medial part of a blade, close to a trapezoidal shape. The dorsal surface is parallel, and the working edge of the blade is covered with regular retouching and was polished during usage (Fig. 19:9).

The find of a flint axe, discovered at a depth of 0.68 m and at a distance of 2.6 m northeast of the centre of the mound, is associated with the CWC (Fig. 14). The axe is made of Turonian raw material, striped dark grey and light grey in colour with partial remains of cortex of brown and white colours (Fig. 15:1). It is trapezoidal in plan, with a rounded butt. In profile, it is lenticular in shape with one convex side. The edges of the blade and partially the side crests are carefully ground, and the blade is slightly rounded. The surface of the butt is also ground. On both sides of the object, there are negatives from counterstrikes applied across the axe. The object's length is 8.35 cm, blade width is 3.85 cm, butt width is 1.8 cm, maximum thickness in the centre is 1.5 cm.

Two other axes are also associated with the CWC. The first axe is made of cream--coloured siliceous limestone (*opoka*) in a trapezoidal shape (Fig. 15:3). The surface is carefully polished. The butt is slightly convex, polished. The blade is arcuate with sharp corners. In the cross-section, it is octagonal, in the longitudinal section it is

Fig. 21. Stone artefacts from Barrow II. Authors: I. Prynada and M. Voitovych.

wedge-shaped. The length of the object is 8.5 cm, blade width is 4.55 cm, butt width is 2.9 cm, maximum thickness is 2.35 cm. It was found at a depth of 0.29 m at a distance of 3.84 m northeast of the centre of the barrow.

The second axe is also made of a wedge-shaped siliceous limestone (*opoka*) of grey-milky colour (Fig. 15:2). The find was discovered in the northeastern sector of the barrow at a distance of 5.32 m from the centre and 2.3 m north of the CWC burial. In plan, the butt of the axe is slightly rounded. The blade is flat, with slightly rounded corners. The surface is carefully polished with traces of mechanical damage. The bore is made closer to the blade, with a diameter of 2.2–2.3 cm. The length of the product is 9 cm, the maximum width in the centre is 5 cm, and the length of the blade is 2.4 cm.

The interpretation of two more stone products, represented by a hammerstone and a grinding stone (K. Bernyakovich interprets it as a fragment of a grain grinder) seems problematic. The hammerstone was discovered on the periphery of the mound in the southeastern sector of the barrow at a depth of 0.9 m (Fig. 21:1). It was made on a pear-shaped piece of sandstone, on which traces of use in the form of notches are noticeable. The grinding stone was discovered in the northwestern sector of the barrow, at a distance of 1.64 m from the centre, at a depth of 0.72 m. The find was made on a grey rectangular piece of sandstone, one of its edges is damaged. The working surface has traces of use and is slightly concave (Fig. 21:2).

DISCUSSION

A characteristic feature of the CWC barrows in the territory of the Carpathians is their high-altitude location in the terrain. The tops of terraces were chosen for the construction of barrow burial grounds, less often, their slopes (Svieshnikov 1974: 29; Machnik 1966: 57; Jarosz 2011: 256). Most of the explored barrow burial grounds in the Drohobych Upland, such as Nyzhni Gai (Machnik *et al.*, 2011: 10–27, map 1), Kulchytsi (Machnik *et al.*, 2006: 126–127, fig. 1), Bolekhivtsi (Svieshnikov 1977: 5–6), Zaluzhany (Demetrykewiecz 1897: 124–125) and Bykiv (Czopek *et al.*, 2016: 64–65), are located in such conditions. However, the studied barrows in Kavske were located in somewhat unusual conditions – in a river valley. The presence of CWC barrows in river valleys in the southeastern area of the CWC distribution is a rather rare phenomenon, however, not unique (Machnik 1966: 69; Jarosz 2016: 513). The closest territorial analogies are found in Radelychi (Mohylky). The ruined barrow burial ground there is located on a low sand dune in the wide Dnister valley (Konoplia 1996b: 31). The now defunct burial ground in Velyka Ozymyna, located in the Bystrytsia Valley, is located in similar conditions (Sulimirski 1968: 137; Machnik *et al.*, 2006: 127, fig. 1). There are also examples of the construction of mounds of CWC in river valleys in the Roztocze region, both in Ukraine and in Poland. In particular, a heavily ploughed barrow burial ground in Sukhovolia near Lviv is located in such conditions (Krushelnytska *et al.*, 1982: 24). Near Ulów, there is a somewhat more interesting situation, in addition to the typical localisation of mounds on the tops of terraces, there are barrows constructed in the valley (Niezabitowska-Wiśniewska and Wiśniewski 2022: 217, fig. 2, 14). At Kavske, the barrows were built in the reverse topographic conditions (Makarowicz *et al.*, 2016: 249–251). It should be noted that all of these sites, at least on the territory of Ukraine, are severely damaged or completely destroyed, which suggests that in the past there could have been more barrow burial grounds in such conditions.

Barrow I. Most of the discovered movable material had been incorporated into the mound of the barrow during its construction. This primarily concerns the material discovered at depths of 0.38–0.8 m. Some of the material and archaeological features were found *in situ* at the bedrock level and the level of the ancient surface. Unfortunately, the stratigraphic descriptions made by K. Bernyakovich do not allow us to clarify this issue. Whether the level of the ancient surface is the black soil that was partially discovered under the mound is difficult to answer. It seems that the finds of two stone grain grinders, some flint artefacts, fragments of ceramic vessels, and Feature II, which were discovered at depths of approximately 0.9 m to 1.02 m, were left here during the functioning of the FBC settlement (Fig. 4). The number of archaeological features found at the bedrock level was greater. K. Bernyakovich points out that there were depressions here that were not recorded due to the lack of finds inside and which are not marked on the plan of the barrow, and they were not post holes (Bernyakovich 1957: 7). The excavator had recorded features that contained pieces of charcoal. These features were interpreted as hearth pits, and this interpretation of them entered into the scientific literature (Svieshnikov 1974: 28).

Probably, the population of the FBC contributed to the appearance of Feature III, but there is no information on whether any material was discovered here. A cluster of ceramics above Feature II, at a depth of 0.96 m, was indicated in the plan, but the feature began at a depth of 1.02 m, and a significant amount of fragmented ceramics was discovered at this depth. We have identified certain discrepancies between the descriptions, the plan, and the available movable material.

We also encounter difficulties with answering the question which population left the accumulation of charcoal № 2. Its central localisation under the mound and the depth corresponding to the level of the ancient surface attract attention. Although a Mesolithic core was recorded under this charcoal, it cannot indicate that the hearth should be dated to the Mesolithic period. The question of the cultural attribution of the charcoal accumulations Nos. 1 and 3 is simpler. The latter, which is probably the remains of a hearth, is associated with the CWC. Accumulation № 1 most likely belongs to the inserted burial in the mound of the barrow, as indicated by the parameters (1.48×1.12 m) and the presence of an axe made of siliceous limestone (*opoka*) discovered under it (Fig. 5:1). Presumably, the lower part of the burial pit was not recorded, but only the upper fill, due to the presence of a layer of charcoal here.

In the area of distribution of the CWC in the Forecarpathia, barrows with traces of inserted burials, which are dated back to the late stage of CWC and the early Mierzanowice culture, are often recorded (Jarosz 2010: 281–282; 2018: 147). Therefore, it is not excluded that the so-called Hearth 1 belongs to an inserted burial. We can find examples when inserted burials were carried out in an area close to the centre (Rokytne, Barrow 3; Sulimirski 1968: 145). There are also burials with a flat stone axe among the grave goods (Bykiv, Bigiivka Place, Barrow 2, Burial 1; Czopek *et al.*, 2016: 328). The presence of hearths under the mounds of the CWC barrows is also a well-known practice (Machnik *et al.*, 2008: 212–215; Jarosz *et al.*, 2008: 282–285; Jarosz 2011: 258; Voitovych 2020: 122). In some places, as in our case, more than one was found: two were located in Komariv, Barrow 39 (Sulimirski 1968: 113), two in Bolekhivtsi, Barrow 4 (Svieshnikov 1977: 10–11); and three in Stebnyk, Barrow 1 (Sulimirski 1968: 138).

It is difficult to interpret the presence of individual finds of CWC, in particular axes. We know that a stone hammer was found in the mound at a depth of 0.52 m. However, two other flat axes were found at the same depth as the CWC burial (Feature I) and a distance of 1 m and more than 2 m to the south of it. Whether these two axes are connected with Feature I is a matter of discussion.

Barrow II. The CWC burial is interpreted as a child's, as indicated by the size of the burial pit (Fig. 14). The practice of burying children under CWC barrows is witnessed by some burial mounds in the Carpathian region. In particular, the closest territorial analogies are known from the research conducted by the Ukrainian-Polish archaeological expedition led by J. Machnik in Nyzhni Gai (Machnik *et al.*, 2011).

The presence of the CWC material suggests the presence of at least one more burial under the mound, which was located in its southern part, near the two clay vessels (Fig. 14). Most likely, it was an inserted burial in the mound of an already existing barrow, as indicated by the depth of the discovery of the vessels. We have some comments on one of the vessels found there. Namely, the lower part of the vessel, probably a pot, the ceramic fabric of which is not at all similar to that typical for CWC, but close to that of vessels of the Babyno Culture (Fig. 18:2). We interpret this vessel as an imported product. While such an assumption requires a more detailed study in the future.

It seems interesting that all the separate CWC finds, specifically a flint axe and two axes made of siliceous limestone, were discovered in the northeastern part of the mound in the same area as the CWC burial, although at different depths and a certain distance from each other (Fig. 15:1–3). Whether they are related to the construction of the burial pit is an open question.

Two accumulations of ceramic vessel fragments may mark the places of inserted burials of the Trzciniec-Komarów Culture in the mound (Fig. 14). The absence of bones at the site is due to the specifics of the local soils. However, we can safely conclude that the population of the Trzciniec-Komarów Culture performed certain ritual practices in this barrow, as evidenced by the presence of its material in the mound. An interesting fact is that, except for one vessel wall, which was discovered at a depth of 0.86 m, finds of this culture do not occur below the 0.7 m mark.

Most of the finds under the mound of Barrow II belong to the FBC. This also applies to the artefacts discovered below the 0.8 m mark, except for several items of the CWC. We can assume that negative archaeological features appeared as a result of the existence of a settlement of this culture here. This is be evidenced by the clay daub, which is associated in most cases with the dwellings of this culture. It should be recalled that one of the finds also had the imprints of wooden wattles. The limited source base does not allow us to attribute all of Features I–IX to the FBC, but it can be assumed that a significant part of them was formed as a result of the activity of the FBC population living here.

Movable material. The diversity of the artefacts obtained at the multilayered site in Kavske and the state of research of archaeological cultures, in particular the FBC, originally led to an incorrect interpretation of the site. As we know, I. Sveshnikov, who was just beginning his scientific research in the field of the CWC, took part in the work of the archaeological expedition led by K. Bernyakovich (Fig. 22). Together with Yuri Zakharuk, I. Sveshnikov also provided scientific consultations during the processing of movable material, in particular flint artefacts (Bernyakovich 1959a: 34). Not only was the FBC material not discerned, but a mistake was made in that the small amount of Mesolithic material was not recognised for what it was (in other mounds, several artefacts were also found) and therefore it was not distinguished from other finds. Subsequently, this situation led to the incorrect dating of the site in Kavske and its inclusion by I. Sveshnikov in the circle of sites of the early stage of the CWC. The researcher wrote about this as follows: "The early character of the entire described inventory is indicated not only by the ceramics but also by the presence of such archaic forms as trapezoidal inserts…" (Svieshnikov 1974: 35). Indeed, it was doubts about the attribution of all flint artefacts from Kavske to the CWC that led to the small-scale explorations conducted by L. Matskevyi. However, this time too, not a single find of the Mesolithic age was identified among the obtained flint collection. The researcher continued to interpret the site as Eneolithic (Matskevyi and Kozak 2009: 96). This is despite the fact that in the same topographic conditions and at a close distance from Kavske, there have been several Mesolithic sites recognised in Radelychi, which were explored in the 1980s (Konoplia 1983: 272; 1985: 293–294; 1996a: 18–21; 1999: 3–21).

The poor state of preservation of the ceramics of FBC and the significant fragmentation of the finds became the main reason for the mistake in the cultural interpretation and attribution of the whole assemblage of material to the CWC. As of 1956–1957, the only well-studied FBC settlement was in Mali Hrybovychi in the Lviv region, from where a significant collection of ceramic vessels with a well-preserved surface originates (Smishko and Peleshchyshyn 1962). Research conducted by Yu. Zakharuk in Zymne in the Volhynian region was at an initial stage (Zakharuk 1955: 114–115; 1957: 97–100). Thanks to the study of geographically close sites such as Rudnyky and Trostyanets, we have similar examples where ceramic material is preserved in a similar state (Konoplia and Havinskyi 2013; Havinskyi and Pasterkievich 2017).

Despite the poor state of preservation of the FBC material, several interesting facts were defined. First of all, this is the presence of Trypillian ceramics of the CII stage. This was discovered not only under Mounds I–II (Voitovych 2025: 113–114). One fragment of Trypillian pottery with traces of repair (the presence of tar on the surface) was found. The discovery of this substance on the sites of FBC is not attested for the first time. In particular, it is known thanks to recent research conducted at the site of Vynnyky-Lysivka, where some of the vessels on the surface of which tar is preserved are decorated with it in the form of wide stripes (Havinskyi *et al.*, 2024: 507).

On one fragment of the rim of a funnel-shaped pot, which was found in the mound, there is a vertical stripe of red colour on the outer surface (Fig. 10:4). We assume that this may be an example of imitation of the painted decoration of the Trypillian culture. Such cases are known from some settlements of the FBC, such as Kotoryny and Lezhnytsia (Hawinskyj *et al.*, 2013: foto 12). We treat this find from Kavske with caution until the fact of decoration with paint is confirmed by laboratory analyses. We do not exclude the possibility of the stripe forming naturally, since this area is rich in iron ore deposits.

The settlement in Kavske is part of a group with one of the largest concentrations of FBC sites on the territory of the right bank of the Dnister, covering the interfluve of the Tysmenytsia and Stryi rivers (Havinskyi and Pasterkievich 2016: fig. 2). Among the sites territorially close to Kavske, it is worth mentioning the settlements in Rudnyky, Radelychi, Krynytsia, and Hirske (Artiukh *et al.*, 1977: 262). The discovered ceramic material from Rudnyky, as we can judge on the basis of the latest study of the collection from excavations conducted by A. Havinskyi, is in a similar, unsatisfactory state of preservation (Havinskyi 2024: 79).

The specific ceramic material of the CWC from Kavske and sites such as Kolpets and Kulchytsi led J. Machnik to distinguish a separate group of sites of the Kavsko-Kolpets type of the CWC, since the vessels from there stood out among other ceramic

Fig. 22. Igor Sveshnikov during research of the multilayered site in Kavske in 1957. Scientific Archive of the Department of Archaeology of the I. Krypiakevych Institute of Ukrainian Studies of the NAS of Ukraine.

forms. The similarity of the vessels to the Middle Dnipro culture was noted (Machnik 1979: 61–62). Since the 1990s, several sites have been recorded in South-Eastern Poland, in which vessels of the Middle Dnipro Culture, or imitations of their forms, have been found, which suggests the migration of population groups of the Middle Dnipro Culture to the West (Machnik and Pilch 1997: 146–153; Machnik *et al.*, 2009: 257–261; Machnik 2014: 87–106; Kośko and Włodarczak 2018: 275).

Today, sites of the Kavsko-Kolpets type should be considered as a general phenomenon of the intrusion of the population of the Middle Dnipro Culture to the west. Kateryna Bunyatyan associates this process with a certain pressure from the Catacomb Culture that could have occurred in the second half of the 3rd millennium BC (Buniatian 2008: 10; Buniatian and Samoliuk 2011: 249–256). The appearance of niche sites in various microregions of South-Eastern Poland in which features of the Middle Dnipro Culture were found took place between 2550 and 2450 BC (Jarosz and Włodarczak 2022: 30–31). Therefore, it is worth dating the appearance of burials with features of the Middle Dnipro Culture in the territory of the Upper Dnister region to the same time, and possibly even somewhat earlier. However, this question remains open due to the lack of materials suitable for analysis.

Currently, the main difference between the CWC sites with Middle Dnipro features of the Ukrainian part and the Polish part is that in the territory of the first one, they were all discovered under barrows, while in the territory of Poland, as a rule, in ground burials made in niches (Włodarczak 2022: 390–402). Burials in niches on the territory of the Upper Dnister region are unknown today, although we do not dismiss their existence. A common feature for the CWC barrows in Kavske and burials from the territory of Southeastern Poland is the presence of rather rich grave goods. We know that the majority of barrow burials in the Upper Dnister region are characterised by a low number of materials. A significant part of the burials are without grave goods. Only a few, such as Barrow 7 in Kulchytsi, have rich accompanying material, which includes two or more vessels (Voitovych 2023: fig. 10).

CONCLUSIONS

Thanks to the study of the preserved archaeological collection from the research conducted by K. Bernyakovich in Kavske in 1956–1957, it became clear that the interpretation of the site accepted by the scientific community is mistaken and is caused by the incomplete publication of the collection and the subsequent development of an erroneous chronology of the CWC in the Carpathians with the distinguishing by I. Sveshnikov of the early phase, which was based on the archaic nature of the forms, in particular the flint complex (Svieshnikov 1974: 35). This applies to the inclusion of flint artefacts from the Mesolithic and Eneolithic periods in the assemblage of CWC. A detailed analysis of archival materials and movable materials from Mounds I and II has refuted their interpretation as a CWC settlement on artificial mounds. We have established that the site was repeatedly inhabited in the past from the Mesolithic period and up to the Bronze Age. However, the largest amount of material belongs to the settlement of FBC, over the remains of which the CWC population constructed the first barrows in this area. An interesting discovery was the identification of samples of ceramics of the Trypillian Culture of the CII stage among the FBC pottery, which we interpret as imports. The small amount of CWC material, among other things, refutes the inclusion of the examined site as a settlement of this culture. The discovered CWC material was usually localised compactly, inside the burials or near them. As for the ceramic material itself, it is quite atypical and characteristic of the Middle Dnipro Culture, a population of which, migrating westward in the second half of the 3rd millennium BC, could have brought with them their ceramic forms. It was possible to record the facts of the intervention of the population of the Trzciniec-Komarów Culture in the mounds of the barrows, probably with certain ritual actions.

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Collective Flint Deposits in Graves of the Corded Ware Culture: Examples from the Sandomierz Upland, Lesser Poland

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The subject of this article is to present a special type of collective finds, namely compact deposits of flint artefacts in the graves belonging to the Corded Ware culture, to the Kraków-Sandomierz group. Grave deposits from two cemeteries: Kichary Nowe and Wilczyce, situated in the Sandomierz Upland and located in the Opatówka-river valley serve as an example. The authors propose a new perspective on issues related to the placement of such deposits in human graves, hoping that this will contribute to a broader discussion on the meaning and function of finds of this kind in the socio-cultural context of Late Neolithic communities, with particular emphasis on their role in funeral rites.

KEY-WORDS: Poland, Neolithic, Corded Ware culture, funeral rites, grave deposits, flint artefacts

INTRODUCTION

The subject of analysis and the main topic of this article is the presentation of specific grave goods found in funeral structures of the Corded Ware culture. The term "specific grave goods" should be understood here not as concerning unique or exceptional artefacts, but as applied to elements of grave inventories whose special character results from their context: funeral rituals and gestures. The subject of interest are therefore collective flint deposits consisting of flakes or/and blades, stored in a limited space

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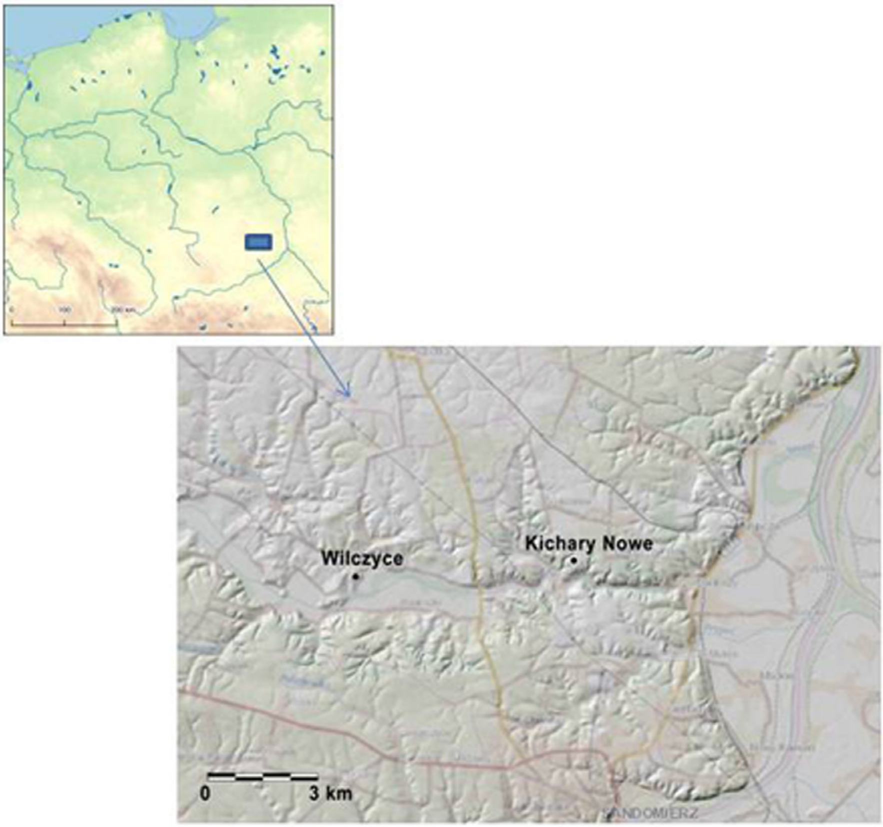

Fig. 1. Location of cemeteries at Kichary Nowe and at Wilczyce in the Sandomierz Upland, Lesser Poland (hypsometric map according to: Geoportal.gov.pl). Preparation: M. Jakubczak (map of Poland) and D. Wyczółkowski (hypsometric map).

inside the burial chamber, which were discovered in two Neolithic cemeteries on the Sandomierz Upland: at Kichary Nowe and at Wilczyce near Sandomierz (Fig. 1).

The authors attempt to reflect on the nature and significance of these deposits, viewing them as an ambiguous and multidimensional phenomenon. The key issue is here to understand the idea of placing such sets in graves among other grave goods which is linked to the perception of flint in spiritual and social terms. The authors hope that their research will contribute to a deeper understanding of the function and role of such deposits in the cultural system of Neolithic communities.

MATERIALS AND CONTEXTS

Flint deposits in grave inventories of the Corded Ware culture are not very common finds, and their presence has only recently become the subject of more detailed analysis (Budziszewski and Tunia 2000; Włodarczak 2004; Budziszewski *et al.*, 2008; Libera 2009; Bienia *et al.*, 2016; Pelisiak 2017; 2019).

The three deposits of this kind analysed in this article come from two burial grounds associated with the Kraków-Sandomierz group of the Corded Ware culture. They are situated in the central-eastern part of the Sandomierz Upland, Lesser Poland, at a distance of several kilometres from each other, on the northern slope of the Opatówka-river valley. In both cases, these are small Corded Ware culture cemeteries belonging to larger funeral complexes (see, e.g., Kowalewska-Marszałek 2007; Kowalewska-Marszałek and Duday 2014; Boroń and Włodarczak 2019).

KICHARY NOWE SITE 2

Site 2 (AZP: 99-74/18) at Kichary Nowe (current name of this village is Nowe Kichary, Dwikozy commune, Sandomierz district, Świętokrzyskie voivodeship) is located on a prominent loess promontory on the left edge of the Opatówka river valley. Archaeological excavations conducted there in 1987–2020 revealed remains of a Neolithic and Early Bronze Age necropolis. Five graves belonging to the Kraków-Sandomierz group of the Corded Ware culture were unearthed there (see e.g., Kowalewska-Marszałek 2007; Kowalewska-Marszałek and Duday 2014) except for human burials related to the Funnel Beaker culture (Duday and Kowalewska-Marszałek 2003; Kowalewska-Marszałek *et al.*, 2006) and to the Mierzanowice culture as well. Two graves of the Corded Ware culture (No. 26 and No. 29) contained collective flint deposits.

Both are graves of a niche-construction, each of them contained individual inhumation as the primary type of deposit (Kowalewska-Marszałek and Duday, in print). The deceased were buried in a contracted position, on their right side; both were adults (*adultus* in Grave no. 29; *juvenis/adultus* in Grave No. 26; see Pyżuk 2006), presumably males (the poor state of preservation of the skeletal remains does not allow to determine their sex for certain). This diagnosis seems to be confirmed by both the details of the arrangement of the dead and the nature of the grave goods (Table 1; see also Włodarczak 2006: 59).

Both graves in question should be described as "very rich" (Kadrow and Machnikowie 1992: 66; Włodarczak 2006: 143); Grave No. 29 is even to be placed among

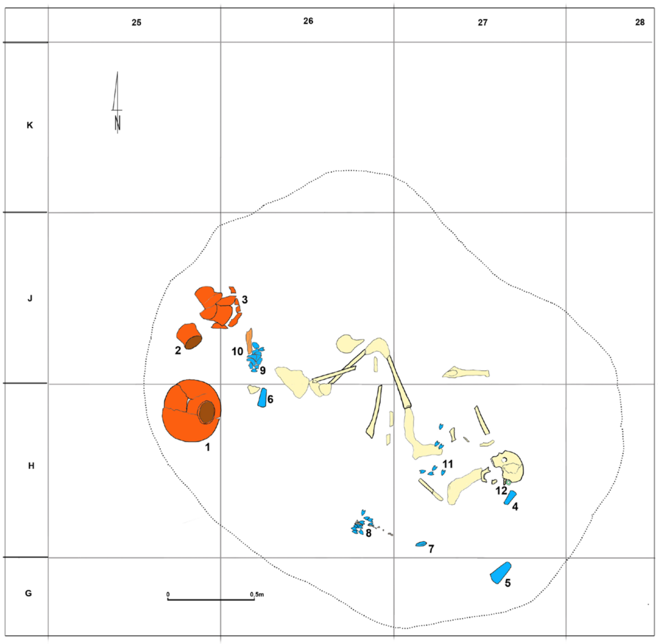

Fig. 2. Kichary Nowe, Site 2, Grave no. 26. Layout of burial and location of grave goods: 1–3 – vessels, 4 – stone battle-axe, 5–6 – polished flint axes, 7 – flint blade tool, 8 – concentration of flint arrowheads, 9 – collective deposit of flint specimens, 10 – tools of animal bone and of boar tusk, 11 – arrowheads dispersed in the region of thorax, 12 – spiral copper ornament. Drawing: E. Gumińska, after original field documentation by M. Krakowiak.

the "richest" graves of the Kraków-Sandomierz group of the Corded Ware culture in Lesser Poland (e.g., Polańska 2016: 317) due to the nature of its inventory.

KICHARY NOWE, GRAVE NO. 26

A burial of a young adult *(iuvenis/adultus*), presumably male (Pyżuk 2006), lying on his right side, along the SE–NW axis, head to SE (Fig. 2). The deposit of flint material was situated in the western part of the niche, between the feet of the deceased on the one side and a set of three ceramic vessels on the other one (Fig. 2:9). It was found at the bottom of the burial chamber, at the same level as the skeletal remains.

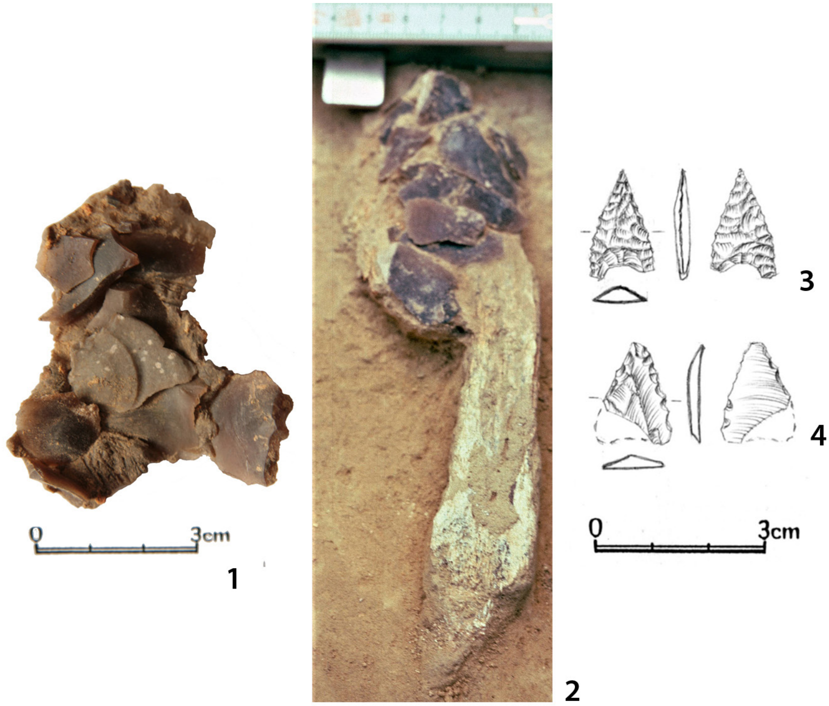

Fig. 3. Kichary Nowe, Site 2, Grave no. 26. Collective deposit of flint specimens: 1 – part of the assemblage, view from inside; 2 – flint specimens and tool of animal bone during the excavations; 3 – an arrowhead, and 4 – fragment of an arrowhead from this deposit. Photo: H. Kowalewska-Marszałek (1–2); Drawing: E. Gumińska (3–4).

One of two flint axes (the smaller one) was located nearby (Fig. 2:6). Other grave goods were placed mainly on the SW and SE edges of the niche: a small copper spiral ornament (Fig. 2:12) was situated directly by the skull of the deceased, near his left temporal lobe, a battle axe (Fig. 2:4) was behind the skull as well as another flint axe (Fig. 2:5), a retouched blade tool (Fig. 2:7) and an assemblage of flint arrowheads (probably remains of a quiver; Fig. 2:8) were placed behind the back of the deceased, and single arrowheads (Fig. 2:11) were dispersed in his chest area (Kowalewska-Marszałek 2025).

The collective deposit of flint material (Fig. 3:1, 2): consisted of 18 specimens preserved in whole or in fragments that formed three compact layers lying closely on top of each other (inv. I J26: 326–327; 353–359; 361–370). There were also about 108 very fine pieces of flint: micro-waste particles, mainly microscopic chips (inv. I J26: 329–351; 351A; 359) which formed two small concentrations at the upper level of the whole set.

One small flint arrowhead (inv. I J26-325; Fig. 3:3) and a fragment of another one, maybe a semi-finished product (inv. I J26-328; Fig. 3:4) were also included, as well as two tools made of animal bone: one of them, presumably a chisel (inv. I J26-260; Fig. 3:2) was made of a split long bone (its poor state of preservation makes it impossible to identify the species), the other one was a fragment of a split boar's tusk (inv. I J26-252).

The deposit cluster, small and very compact, was approximately oval in shape (with its longitudinal axis N–S). It covered an area of approximately 9 x 5.5 cm (or about 15.5 x 8 cm if bone objects are included) at its upper level, and slightly less (approximately 7 x 5 cm) at the lowest one; its thickness was about 2–3 cm. All larger flint specimens were located on one side of the bone "chisel", while the smallest pieces formed two separate, very compact concentrations on the northern edge of this area, located on both sides of the aforementioned tool.

The high uniformity of the raw material is noteworthy in the set: almost all specimens (except for one) were made of chocolate flint, most of them of the same variety of it. Flakes and fragments of flakes clearly dominate (14 specimens); one splintered flake was also included: that is also the only piece made of the different kind of raw material, of the Świeciechów-type flint (Fig. 3:1; Table 2). The standardisation of the size is noticeable in this collection (Table 3): the length of the specimens ranges from 8.8 to 27.6–30.0 mm (average 20.6 mm), the width from 10.7 to 27.7 mm (average 17.8 mm); these are also specimens of small thickness: 1.4–3.8 mm (average 2.6 mm).

KICHARY NOWE, GRAVE NO. 29

A burial of an adult with a fairly strong body structure, presumably male, at the age of 20–30 (Pyżuk 2006). He was lying on his right side along the S–N axis, head towards S, the face directed to E, with legs strongly drawn up (Fig. 4).

As previously, the flint deposit was located at the bottom of the burial chamber, at the level of skeletal remains (Fig. 4:14). It was situated in the northern part of the niche, to the N of the lower limbs of the deceased and near two ceramic vessels (Fig. 5:A). Other elements of the grave inventory (Table 1) were also two polished flint axes (placed behind the deceased's head); four retouched blade tools and a set of flint arrowheads (probably in a quiver) were located behind the deceased's back, as were two copper tool tips, presumably retouchers (one of them stuck among the arrowheads). The necklace of copper wire (Fig. 4:1) was situated at the height of the deceased's cervical vertebrae,

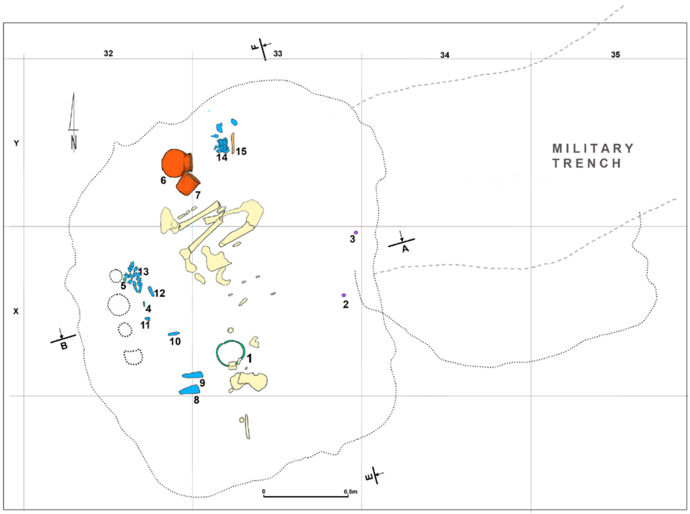

Fig. 4. Kichary Nowe, Site 2, Grave No. 29. Layout of burial and location of grave goods. 1 – copper necklace; 2–3 – gold spiral ornaments, 4 – larger tool tip of copper, 5 – small tool tip, probably of copper, 6–7 – vessels, 8–9 – polished flint axes, 10–12 – tools of flint blades, 13 – assemblage of flint arrowheads (probably remains of a quiver), 14 – collective deposit of flint specimens, 15 – tool of animal bone. Drawing: E. Gumińska, after original field documentation by M. Krakowiak.

and two spiral ornaments of golden wire were found in the eastern edge of the burial chamber, some distance from the human remains: one of them (Fig. 4:2) to the E of the deceased's head, the other (Fig. 4:3) to the E of his pelvis (Kowalewska-Marszałek 2025).

Because of the nature of grave goods and the number of elements, Grave No. 29 stands out not only from all graves at Kichary Nowe but it is also among the "richest" graves belonging to the Kraków-Sandomierz group of the Corded War culture in the Lesser Poland (see above).

The flint deposit consisted of 27 specimens, mainly blades preserved in whole or in part (Fig. 5:B; Table 2) and forming, as before, a multi-layered structure with four layers of flint pieces lying closely on top of each other. Four specimens remained a little outside this most compact arrangement but they were situated at a very short distance from it. This set also included one bone tool of the chisel type made from a split shaft of a long animal bone – the identification of the species was not possible in this case either (Fig. 5:A).

This deposit was rather triangular in shape; its minimum dimensions were 6.5–8.0 x 8.5–9.0 cm, approximately 20 x 16 cm when taking into account the bone

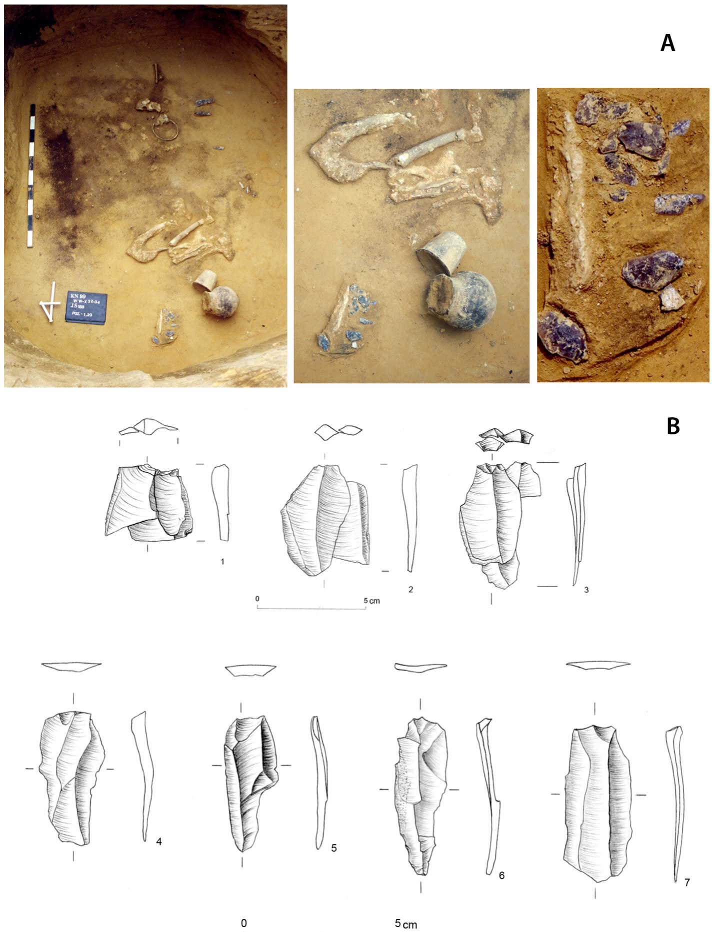

Fig. 5. Kichary Nowe, Site 2, Grave No. 29. A – location of the deposit inside the burial chamber (close-up); B – selected flint artefacts from this deposit: 1–3 – refitted blocs (according to T. Boroń); 4–7 – blades. Photo: H. Kowalewska-Marszałek (A). Drawing: D. Wach (B).

tool and four flint specimens from the edge; its thickness was approximately 2–3 cm. Unlike the previous, in this case almost all flint specimens (except one) were located on only one side of the bone tool (to the W of it; Fig. 5:A).

The uniformity of the raw material is even more evident in this case: only chocolate flints, of dark and very dark varieties, were used. The set is dominated by blades and their fragments, mainly proximal parts, there are also few splintered pieces. Flakes are much less numerous (Table 2). The edges of specimens often bear traces of use (visible macroscopically). Metric differences between these two deposits are noticeable: the pieces from Grave No. 29 are generally slightly larger and more massive (Table 3).

The detailed analysis of refitting allowed distinguishing in this deposit at least three refitted blocks: one of them consisting of three elements and the other two – of two elements each (Fig. 5B:1–3). Flakes and blades or fragments thereof were concerned, all of them are non-cortical and unidirectional. They have a flat cross-section, and their distal parts are slightly bent, while the butts are dihedral and concave. Based on these refitting blocks, it was observed that the striking platform of the core was renewed and its flaking surface was rather wide.

The deposits from both graves formed small but very compact, multi-layered clusters, consisting of a group of flint specimens and single tool made of animal bone; they were uniform in terms of raw material and not very diverse as to their size. Both deposits were similarly located within the burial chamber: in the zone of the deceased's lower limbs, below the knees (Grave No. 29) or slightly below the feet (Grave No. 26), which seems to be their typical location (e.g., Włodarczak 2006: 73).

The compact nature of deposits suggests that they were placed in tight containers or packages (wraps) made of organic materials. The uniformity of the raw material seems to indicate a deliberate selection of a specific type of flint – in these cases, the chocolate one. On the other hand, the presence of three (at least) refitting blocks in Grave No. 29 suggests that the selections of the components of these assemblages may have been related to the local flint production processes, perhaps the acquisition of blanks, maybe intended for further processing (see below).

WILCZYCE SITE 10

Site

Site 10 at Wilczyce (Wilczyce commune, Sandomierz district, Świętokrzyskie voivodeship) is situated on the plateau on the northern, southeast-facing slope of the Opatówka-river valley (Fig. 1 and Fig. 6). It is located above 40 m from the modern valley floor and about 200 m above sea level.

History

The site was discovered in 1994 during a ground survey carried out within the framework of the Archaeological Picture of Poland (AZP) research project by an expedition

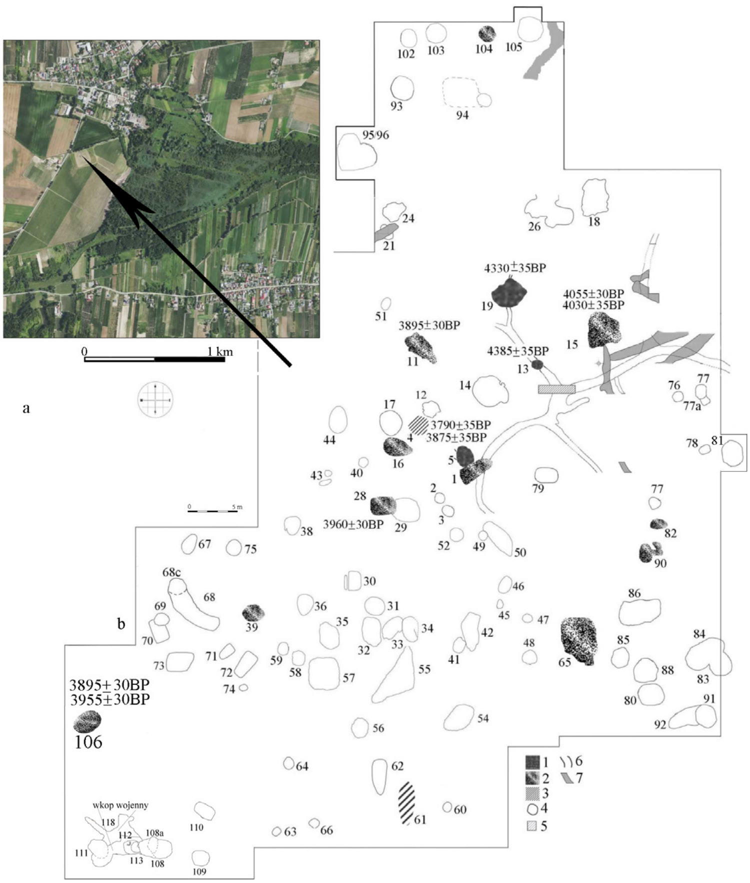

Fig. 6. Wilczyce Site. 10: a – location of Site 10 at Wilczyce, b – archaeological features discovered at Wilczyce during excavations (state in 2022): 1 – Globular Amphorae culture; 2 – Corded Ware culture; 3 – Bronze Age features; 4 – other features; 5 – preserved baulk of cut; 6 – ice wedge; 7 – military trench from the First World War. Preparation: T. Boroń.

headed by Hanna Kowalewska-Marszałek from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences (Kowalewska-Marszałek and Włodarczak 2002).

The first stage of investigation at the site was related to the settlement of the Magdalenian culture and lasted until 2010. Unique and spectacular discoveries concerning art, everyday life and funeral rituals have been presented many times in renowned journals as well as in books (Fiedorczuk and Schild 2002; Fiedorczuk *et al.*, 2007; Irish *et al.*, 2008, Boroń 2010; Boroń *et al.*, 2012; Schild 2014).

The second stage of research focuses on Neolithic settlement and on the Early and Middle Bronze Age.

To date, 167 features have been explored (Fig. 6). Based on ^{14}C dates and analysis of ceramic materials, several phases of settlement associated with the Middle and Late Neolithic (Lublin-Volhynian culture, Globular Amphora culture, Złota culture, Corded Ware culture) and with the Early and Middle Bronze Age (Mierzanowice culture and Trzciniec culture) have been identified.

One aspect that is very clearly and legibly outlined at the site is related to funeral rites, manifested by the presence of human and animal burials. The exceptional character of the settlement by Neolithic and Bronze Age communities is reflected in the unusual nature of the grave structures and the "richness" of the grave goods. In addition to burials, settlement pits and industrial structures, known as combustion features, have also been discovered there.

The material sources obtained so far are remnants of various forms of settlement, which makes this site unique in the settlement landscape of Neolithic and Bronze Age communities, not only in Poland but also in Central Europe. These discoveries have been published in many foreign journals (Boroń 2017; 2020; Boroń and Winiarska-Kabacińska 2021). One of them is presented in this article.

BURIAL FEATURE

Location

A burial feature (No. 106) was unearthed during the excavation season in 2022. It is located in the SW part of the investigated area, outside the area of the other features (burials as well as settlement pits) belonging to the Corded Ware culture (Fig. 6). It was a grave of niche construction.

Grave construction

At the level of distinction, this feature, measuring 200 cm by 170 cm, manifested itself in the form of an irregular outline filled with dark earth (Fig. 7:1). Its size increased during exploration, reaching dimensions of 300 cm by 300 cm at the bottom. The depth of the grave filling was 115 cm. The entrance to the niche was located at its eastern edge. The burial chamber was later destroyed as a result of the collapse of the vault, which probably occurred quite quickly, as no

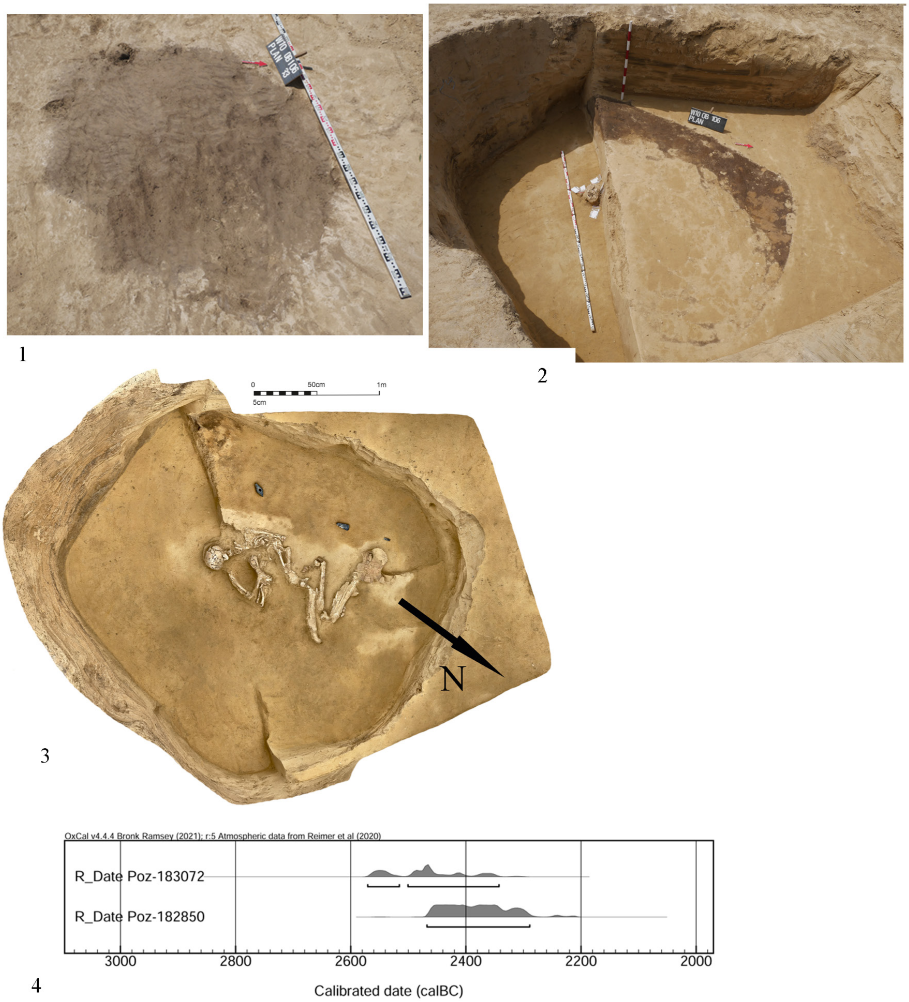

Fig. 7. Wilczyce, Site 10. Feature 106: 1 – level of distinction; 2 – layout of the feature; 3 – burial chamber (scanned); 4 – calibration diagram. Scanning: M. Chrzanowski. Photo: T. Boroń.

dark earth runoff from the surface was noted at the level of the human remains. Figure 7:2 illustrates the collapse of the vault. This event undoubtedly affected the condition and state of preservation of the skeleton and the fragmentation of the ceramic vessels.

Chronology
Two ^{14}C dates were obtained from a bone sample from the skeleton: 3895±30 BP (Poz-182850); 3955±30 BP (Poz-183072; Fig. 7:4).

Grave arrangement
The central part of the niche was occupied by a human burial. The skeleton remained in an anatomical position. The deceased was laid on his right side, facing east, with his arms bent at the elbows and raised towards his face, and with his legs drawn up (Fig. 7:3).

The grave goods were located in three areas: at the head and under it (a deposit of small flakes and chips, metal ornaments, Fig. 8:1–2), behind the back of the deceased (a stone axe, five arrowheads, a flint axe, a copper awl, and flint blades and flakes), and at the feet (ceramic vessels – an amphora and a beaker, as well as a flint chisel, Fig. 8:3).

Characteristic of grave goods
Metal specimens
– An awl with a square cross-section, which becomes round near the tip (Fig. 9:3). The head of the specimen is slightly rounded. Dimensions: length – 64 mm, width – 3.8 mm, thickness – 4 mm. Weight: 6 g.
– Spiral ornament made of metal wire. Heavily corroded. Dimensions: outer diameter – 17 mm, inner diameter – 10,5 mm, width – 7.8 mm. Weight: less than 1 g.

Ceramic vessels
Two vessels were unearthed: a complete, undamaged amphora (Fig. 8:3) and a damaged, broken beaker. The amphora was not destroyed because it was located outside the area where the vault collapsed.

Stone implements
1. The axe has an elongated, boat-shaped form and a regular symmetrical outline (Fig. 9:2). The hole is located in the widest part of the specimen, almost halfway along its length. The head is round and slightly raised above the upper surface. Dimensions: length – 127.5 mm, maximum width – 53.7 mm, thickness – 30 mm, hole diameter – 30 mm. Weight: 311 g. Raw material: not specified.

Bifacial forms
1. A symmetrical four-sided chisel with a slightly curved blade and a quadrangular cross-section (Fig. 9:4). All surfaces of the preserved fragment of the chisel

Fig. 8. Wilczyce, Site 10. Feature 106: 1 – collective flint deposit under the skull of the deceased; 2 – metal ornament (close-up); 3 – amphora. Photo: T. Boroń.

are polished. Dimensions: length – 62.8 mm, width – 19.6 mm, thickness – 14.4 mm. Weight: 31 g. Raw material: striped flint.

2. Flint axe with a symmetrical outline and a slightly convex, polished cutting edge (Fig. 9:1). The cross-section is trapezoidal in the middle and lenticular near the cutting edge. Surfaces: the lower and upper surfaces are formed with flat strikes from both edges, while the slightly sloping side surfaces are formed with strikes from

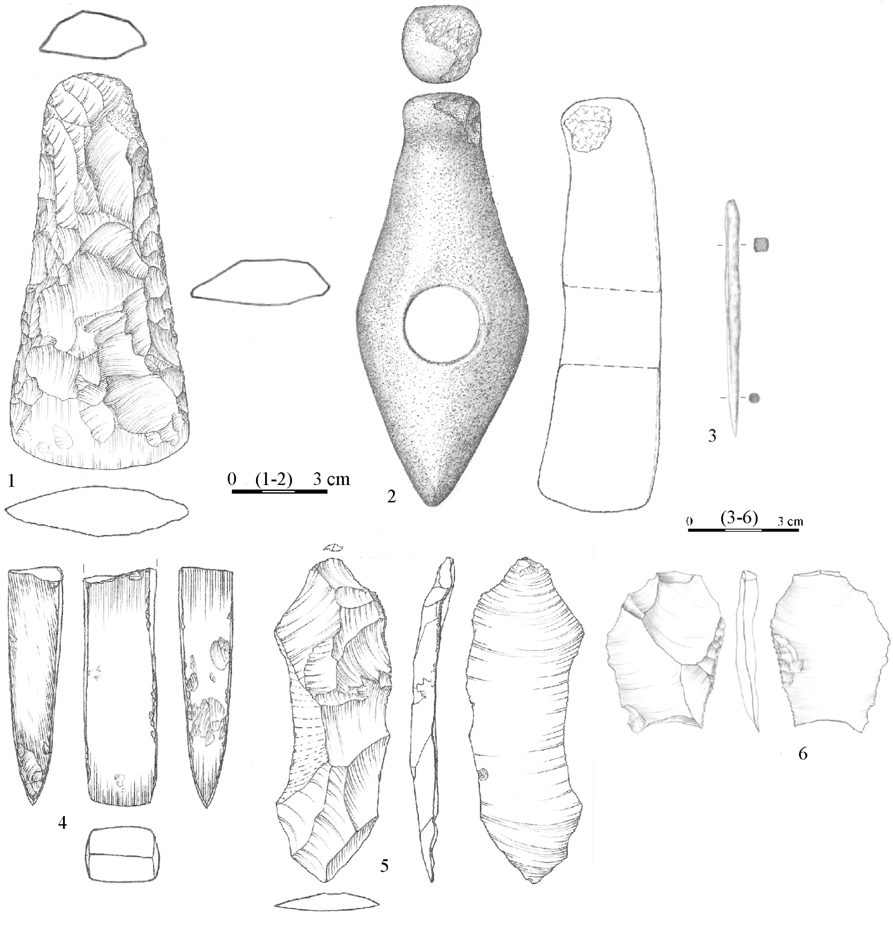

Fig. 9. Wilczyce, Site 10. Feature 106: 1 – flint axe; 2 – stone battle-axe; 3 – copper pin; 4 – chisel; 5 – retouched blade; 6 – retouched flake. Drawing: E. Gumińska, A. Pałasz, D. Wach.

below. The butt is rounded and profiled. Dimensions: length – 122.5 mm, width of cutting edge 55.2 mm; width of butt – 26.7 mm, thickness – 15.3 mm. Weight: 135 g. Raw material: Ożarów-type flint.

3. Triangular arrowhead with a flat-convex cross-section. The retouched base concavity is semicircular, as are the tops of the wings. The specimen was formed by semi-sharp edge bifacial retouch. Dimensions: length – 19.0 mm, width

14.5 mm, thickness – 2.5 mm. Weight: less than 1 g. Raw material: chocolate flint.
4. A slightly asymmetrical triangular arrowhead with an arched base and a flat-convex cross-section. The surfaces are bifacially retouched with a trough-like retouch. Dimensions: length – 14.5 mm, width – 11.5 mm, thickness – 1.7 mm. Weight: less than 1 g. Raw material: chocolate flint.
5. A small and slim, triangular arrowhead with an asymmetrical arched base and lenticular in cross-section. The surfaces are shaped by surface retouching, while the edges – with flat and trough-like retouch. The wings with sharp ends. Dimensions: length – 17 mm, width – 10.4 mm, thickness – 2.3 mm. Weight: less than 1 g. Raw material: chocolate flint.
6. A triangular arrowhead with slightly convex edges and a flat-convex cross-section. The point formed in the proximal part of the flake. The lower surface at the base of the specimen is worked using the scaled retouch, while the side edges are formed with trough-like retouch on the dorsal face and a flat retouch on the ventral face. Dimensions: length – 15.4 mm, width – 11 mm, thickness – 2.2 mm. Weight: less than 1 g. Raw material: chocolate flint.
7. A triangular arrowhead symmetrical in shape and of a concave base. Its cross-section is lenticular, and its point was formed in the apical part of the flake. The dorsal face with surface retouch while the ventral face with edge retouch only. Dimensions: length – 15.5 mm, width – 11 mm, thickness – 2.7 mm. Weight: less than 1 g. Raw material: chocolate flint.

Other tools
1. Non-cortical blade with multidirectional scars on the dorsal face (Fig. 9:5). The butt is small and of double-scar. A fine, probably functional retouch is visible in the proximal part of the blade, on a short section of the edge. Dimensions: length – 87 mm, width 30.7 mm, thickness – 5.3 mm. Weight: 17 g. Raw material: dark chocolate flint.
2. Flake with a trough-like retouch on one edge (Fig. 9:6). The retouch is regular and continuous, covering almost the entire length of the edge. The butt is dihedral. Dimensions: length – 44.8 mm, width – 31 mm, thickness – 4.4 mm. Weight: 7 g. Raw material: dark chocolate flint.
3. Flake with fine regular retouch on one edge. Dimensions: length – 32.3 mm, width – 34.4 mm, thickness – 4.9 mm. Weight: 7 g. Raw material: dark chocolate flint.

Blades
1. Non-cortical blade with a partly natural surface (Fig. 10:1). The butt is smooth, and the bulb is small and convex, but clearly distinct from the rest of the surface.

Dimensions: length – 58.4 mm, width – 22 mm, thickness – 4 mm. Weight: 5 g. Raw material: dark chocolate flint.

2. A blade with a dihedral, faceted butt and a large, broad bulb, and with multidirectional scars (Fig. 10:2). Dimensions: length – 46.7 mm, width – 28 mm, thickness – 5.5 mm. Weight: 8 g. Raw material: dark chocolate flint.
3. Non-cortical blade, very flat and thin, with multidirectional scars. The butt is large, with single scar. Dimensions: length 44.8 mm, width 24.5 mm, thickness 2.2 mm. Weight: 3 g. Raw material: Ożarów-type of flint.

Flakes

1. A rather large non-cortical flake with a flat and thin cross-section, with a series of scars as in centripetal preparation (Fig. 10:3). Dimensions: length – 50 mm, width – 40 mm, thickness – 5.4 mm. Weight: 10 g. Raw material: dark chocolate flint.
2. A bi-directional, non-cortical flake. Dimensions: length – 44 mm, width 27.2 mm, thickness – 3.7 mm. Weight: 5 g. Raw material: dark chocolate flint.
3. Unidirectional, non-cortical flake. The butt is smooth and elongated, and the profile of the flake is flat and thin. Dimensions: length – 36 mm, width 27.3 mm, thickness – 3.5 mm. Weight: 4 g. Raw material: dark chocolate flint.
4. Small non-cortical flake with unidirectional scars. Dimensions: length 23.3 mm, width 15 mm, thickness 2.2 mm. Weight: less than 1 g. Raw material: dark chocolate flint.

Flint deposit under the skull of the deceased

The assemblage consists of 65 flakes and 198 chips and small debris. Apart from two flakes presumably made of Volhynian cretaceous flint (Fig. 10:12), all other specimens are made of light chocolate flint (Fig. 10:4–11; 13–18). The flakes are rather small in dimensions: the largest one measures 34 by 28 mm, while the vast majority do not exceed 25 mm in size. The collection includes cortical and non-cortical flakes. Weight of the collection: 85 g.

Bone artefacts

Only one artefact with a severely damaged surface. It is made of external bone tissue. Dimensions: length 90 mm, width 16 mm, thickness 7 mm. Weight: 8 g.

DISCUSSION

Flint deposits in graves belonging to the Corded Ware culture are sometimes considered to be sets of semi-products or materials for the production of arrowheads – this

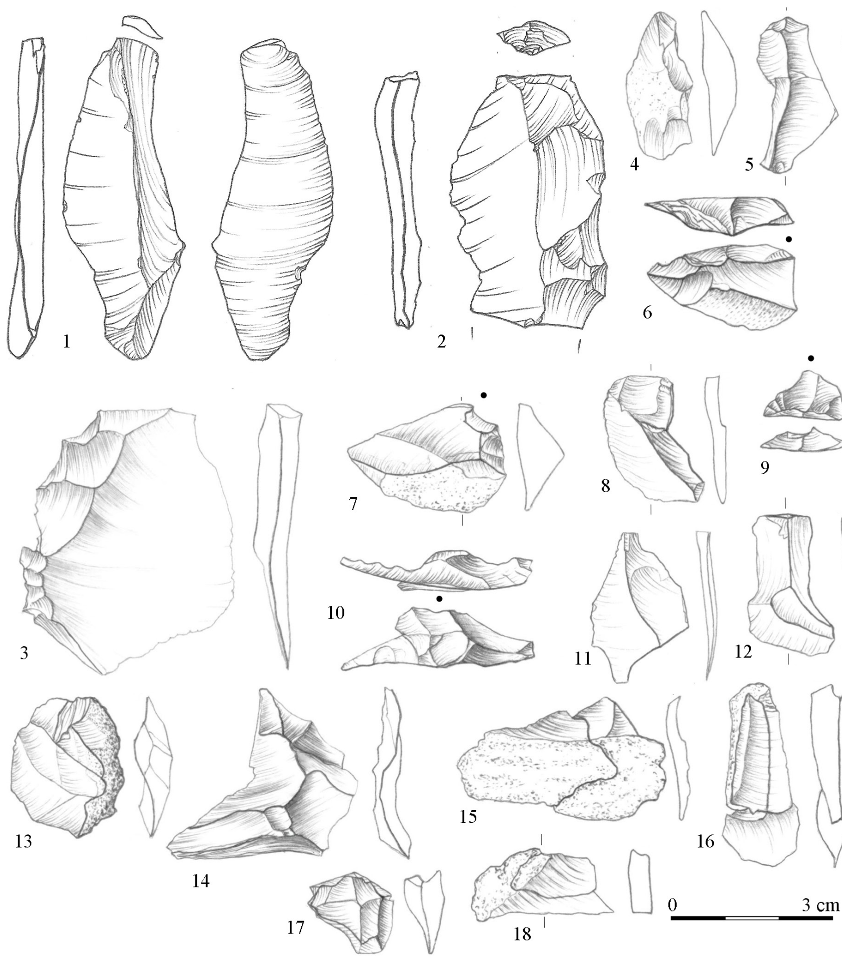

Fig. 10. Wilczyce, Site 10. Feature 106: 1 – blade; 2 – blade; 3 – flake; 4–18 – flakes from the collective deposit under the skull of deceased. Drawing: A. Pałasz, D. Wach.

is, for example, the interpretation of the assemblage from Grave 110 in Mirocin, Przeworsk district, Site no. 24 (Pelisiak 2019: 177), referring to earlier analyses of the inventory from the grave at Koniusza, Proszowice district (Budziszewski and Tunia 2000: 130).

However, it seems that such an interpretation would be difficult to accept in the case of the analysed sets from Kichary Nowe and from Wilczyce as well. Especially the deposit from Grave No. 26 at Kichary is concerning, due to the parameters of specimens that are lower to those from Mirocin. They also do not fully correspond to the size of the finished arrowheads found in Grave No. 26: their average length is 20.6 mm, which is almost equal to the average length of the arrowheads (20.2 mm), and the average thickness of the arrowheads is even slightly greater than that of the specimens from this set, amounting to approximately 3 mm (from 2.1 to 4.55 mm). Therefore, only the width of the arrowheads (13.4 mm) would correspond to the dimensions of pieces from the deposit. The situation is slightly different in the case of the assemblage from Grave No. 29, where the parameters of the flint specimens are generally higher, but even in this case their thickness seems generally too small. However, it cannot be ruled out that only some of the specimens in these sets could be considered as potential material for the production of arrowheads (Borkowski 1987: 156–160; see also Fig. 11).

However, an argument in favour of linking the Kichary Nowe deposits with the production of arrowheads may be the fact that one semi-finished piece and one finished arrowhead (2.5 mm thick) were found together with the other specimens from the deposit from Grave No. 26 (Fig. 2:4, 5). Such interpretation may also be supported by the presence of a tool made from a split boar‘s tusk together with flint pieces in the same "container". Tools of this kind were used, among other things, for working flint (Włodarczak 2006: 38). This type of use has recently been confirmed by traseological studies concerning tools from a grave at Świerszczów, Hrubieszów district, however belonging to the Malice culture (Zakościelna and Osipowicz 2024: 345).

The presence (in Grave No. 26) of numerous, very small flint fragments, microscopic chips and debris that should undoubtedly be considered as micro-waste should also be noted: these are, perhaps, waste from the production of arrowheads. Their concentrations on the border of the "proper" assemblage, but definitely together with it, seems also indicate some connections with the arrowheads production. Unlike other flint materials, they could not have had any utilitarian significance, so their presence in the grave deposit must have been due to other (non-functional) reasons.

In the case of the deposit from Wilczyce, however, the morphological and technical characteristics of the flakes, such as dihedral butts, flat cross-sections of non--cortical specimens, multidirectional scars and the presence of so-called overpassed flakes in the collection, indicate that they were obtained during the production of a tetrahedral axe (Fig. 10:6, 9, 10, 14). In view of the fact that the collection also includes cortical and partly cortical forms, it should be considered as waste products from all phases of axe production. Of course, this is not a complete assemblage of flakes, as it lacks, for example, large pieces over 3 cm from the initial stage of axe production (Boroń 2017; 2018). Two flakes of Volhynian cretaceous flint are not related to axe production.

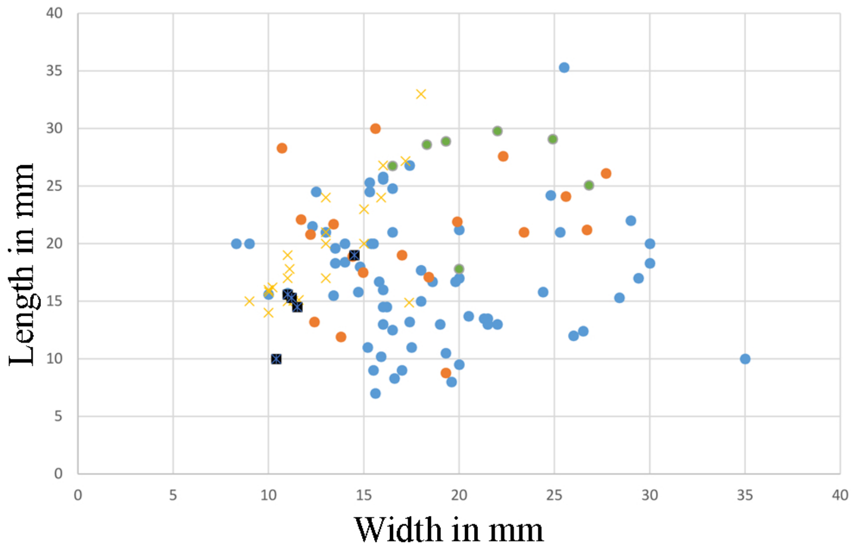

Fig. 11. Flakes and arrowheads from collective deposits at Kichary Nowe, Site 2, and at Wilczyce, Site 10: relation of the length and width of the specimens: red points – flakes of Kichary Nowe, Grave No. 26; green points – flakes of Kichary Nowe, Grave No. 29; blue points – flakes of Wilczyce; yellow X – arrowheads of Kichary Nowe; black squares – arrowheads of Wilczyce. Preparation: T. Boroń.

The issues related to the production and use of tetrahedral axes, as well as the formation of a specific group of waste, have been raised many times in both Polish and foreign literature (Balcer and Kowalski 1978; Arnold 1981; Olausson 1983; 1997; Kopacz and Pelisiak 1988; Borkowski and Migal 1996; Sałaciński and Migal 1997; Mitura 2007).

The nature of finds from flint deposits in question – the presence of very small, even microscopic pieces – and their high spatial density indicate the possibility of their deposition (at least some of them) in the form of a "package". Rather than a "bag" made of organic material it could have been a tightly rolled piece of textile or leather, for example, which could have served previously as a kind of pad used during flint working and, at the same time, during the preparation of the funeral deposit.

All three sets analysed here have many features in common:

1. Funeral context: these deposits were found with human burials and are undoubtedly elements of grave inventories, along with other grave goods, which were very numerous in all graves in question: both graves from Kichary Nowe and that from Wilczyce were also high on the "wealth" scale.

2. The compact nature of all sets is evident: each of the flint assemblages occupied a very small area, limited to a few dozen square centimetres.
3. The uniformity of the raw material is clearly visible in all cases, the main or exclusive source was chocolate flint. Other types of flint were present at most in the form of single "inclusions": Świeciechów flint – only one specimen at Kichary Nowe (Grave No. 26), Volhynian Cretaceous flint – in the assemblage from Wilczyce. There is also a clear internal uniformity within the sets: each of them is dominated by one variety of chocolate flint, with only a small proportion of other variants.
4. A large part of specimens in each assemblage are pieces of a "post-production" nature, related to flint processing: blade production, axe manufacturing and production of arrowheads. However, this is rather waste material: a significant part of these sets consist of small (Kichary Nowe, Grave No. 26) or even very small flakes (Wilczyce), not particularly suitable for further use as semi-raw material. In two assemblages, there are also very small micro-waste pieces (Kichary Nowe, Grave No. 26, Wilczyce) which are completely useless in this respect.

Several differences are also noteworthy concerning the analysed deposits:

1. The sets differ in terms of the number of specimens: the deposit from Wilczyce contained 65 flakes and 198 chips and small debris, while the assemblage from the Grave No. 26 at Kichary Nowe included 18 flakes and 108 micro-waste chips and debris. The smallest one was the assemblage from the Grave No. 29 at Kichary containing 27 specimens.
2. The structure of each assemblage was different: two of them consist exclusively (Wilczyce) or almost exclusively (Kichary Nowe, Grave No. 26) of flakes and micro-debris; in the third one, blades, mostly in fragments, predominate among which at least three refitted blocks have been detected.
3. Deposits differ also in terms of metric data (Fig. 11).
4. Despite the general uniformity of the raw material and the use of chocolate flint as the basic one, the deposits differ in terms of the varieties of this type of flint: light chocolate flint was used at Wilczyce, and dark or very dark in both sets from Kichary Nowe.
5. The location of the deposits within the burial chamber was different: they were found near the lower limbs of the deceased in both graves from Kichary Nowe, while that from Wilczyce was placed under the deceased's head.

As in other cemeteries of the Corded Ware culture in the Sandomierz Upland (at Mierzanowice, Złota-Grodzisko II, Żuków), the sets in question were found in the graves of the deceased laid on their right side, which are often also distinguished by the presence of numerous flint arrowheads (Włodarczak 2006: 74).

Suggestions or assumptions about the intentionality of flakes obtaining during ceremonial procedures have already been considered in earlier publications

(Budziszewski *et al.*, 2008: 53; Bienia *et al.*, 2016) but due to the lack of clear arguments they have not been articulated explicitly.

Undoubtedly, quite specific and reliable evidence of the possibility of obtaining flakes during funeral rituals is provided by the analysis of the deposit from Wilczyce. Considering this possibility, we may ask the question: when and where was the axe produced and how was the collection of flakes deposited in the grave in question? The answer to the first question is based on further research and the application of the flint refitting method.

Six blocks of two- and three-elements each were refitted, which most likely indicates that the axe was made at the site in Wilczyce or in a short distance from it. Another important element is the method of storing the waste products. Undoubtedly, the flint knapper had to work on the concretion in a previously chosen and prepared place, using a mat or a sheet of leather. The waste was then dumped, possibly into a tight container, and the whole deposit was placed in a grave. However, the most suitable flakes, suitable for making arrowheads or other tools, were previously removed from this collection. The presence of small, 1–2 mm chips in the remaining part of flint material indicates such sequence of events. It is therefore a deliberate relocation of part of the flakes, associated with their transfer from the primary original location (i.e. place of axe production) and putting them into secondary context – a grave (Schiffer 1972; 1987; Morrow 1996: 355).

CONCLUSIONS

1. The analysed flint assemblages were undoubtedly burial deposits, intentionally placed in graves along with other grave goods.
2. The sets in question were "composed" of elements prepared *ad hoc*, as evidenced by the refitting blocs and the presence of numerous very small pieces. They utilised the effects of local flint processing: the possible production of arrowheads (Kichary Nowe, Grave No. 26) and of axes (Wilczyce), as well as the production of blades (Kichary Nowe, Grave No. 29).
3. The selection of specimens for deposition in graves was not always focused on their further "production" usefulness, although it cannot be ruled out that several flakes, and especially blade fragments, could still be used to make, for example, arrowheads. However, most of the specimens in the analysed deposits were post-production waste, completely useless from economic point of view. It would therefore be mainly a kind of "negative selection", although undoubtedly deliberate and targeted. It was also Piotr Włodarczak who pointed to a similar way of selecting materials when

discussing the deposit from Grave 3 at Zielona, Proszowice district (Włodarczak 2004: 335).

4. The current division of flint materials from grave inventories into two groups: semi--raw materials "used as tools" and that "for tool production" (Włodarczak 2006: 32) should be supplemented with a third category: "flint production waste", selected or not, but undoubtedly deliberately deposited.

Therefore, graves associated with the Corded Ware culture contained not only functional things (vessels, tools, personal ornaments, and, partly, flint blank material), but also "useless" flint waste, which, however, was clearly important to the communities of that time, as indicated by the repetitiveness of this phenomenon. This was probably related to some aspects of the funeral ritual, which are difficult to specify at present: perhaps it was the chocolate raw material that was important? Or perhaps the fact that the deposit was prepared on the spot just before the deceased was laid to rest in the grave was important?

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OBITUARY

Somnambulant women,
left behind, move
through emptied kitchens
imagining our slow triumph
towards the mounds.
Seamus Heaney, *Funeral Rites*[1]

In memoriam
Wojciech Piotrowski (1952–2024) – researcher of Biskupin and "wet archaeology" from Poland

Wojciech Piotrowski was born on 25 October 1952 in Warsaw, in the first decade after World War II, when the city was recovering from the ruins. From 1955, he lived with his parents in Zielona Góra (until 1945, the German town of Grünberg), near Poland's new western border. There, he began his primary school education. He read extensively from his school years onwards. Archaeology was popular at the time, and

1 From *North*. First published in Faber Paperbacks 1975 by Faber and Faber Limited, London – Boston. Reprinted nine times. Reset 1992.

Fig. 1. Wojtek Piotrowski's ID card as a final-year student at Primary School No. 46 in Łódź, Teacher Training College Practice Schools [Szkoły Ćwiczeń Studium Nauczycielskiego]. Photograph courtesy of D. Piotrowska.

historical themes relating to the Middle Ages were common in novels and in belles-lettres more generally. The year 1966 marked the 1000th anniversary of the baptism of the Polish prince Mieszko I. For the Roman Catholic Church, which then played an important role in the country, it was the millennial anniversary of Christianity in Poland, and for the political authorities controlled by the Soviet Union, which did not see eye to eye with the Church, it was the millennial anniversary of the state. With the creation of the new Polish People's Republic (PRL – officially since 1952, the "dictatorship of the proletariat"), the country saw a return to the borders of the times of Mieszko I and his son, King Bolesław Chrobry "the Brave" of the Piast dynasty (who reigned from 992 to 1025). In scientific programmes related to the preparations for the celebration of the state anniversary, numerous archaeological studies of early medieval sites of the early state were financed. Many reports on the excavations were published for a mass audience, and numerous radio programmes were broadcast, later followed by television programmes popularising the archaeology of strongholds and early towns, churches, battlefields and cemeteries. The celebrations culminated in 1966, but the subject remained present in the country's public life for the next decade. It served to integrate the state within its new borders and post-war Polish society with the authoritarian regime, which remained stable until 1989 thanks to the support of the Soviet Union and Soviet troops stationed in the People's Republic of Poland (see Gieysztor 1979; Kieniewicz 1979; Lech 1997–1998: 57–105; Davis 2014: 324–325, 1049, 1101–1008, 1236 and 1316).

Wojtek Piotrowski then finished primary school and began attending a comprehensive secondary school in Łódź, in central Poland (Fig. 1). Łódź is the second most populous city in the country. In his final year of secondary school, his family moved to Warsaw. Here, Wojtek graduated from the Stefan Batory High School (named after the 16th-century King of Poland), which is well known in Poland. From October 1970, he studied at the Department of Prehistoric and Early Medieval Archaeology at the University of Warsaw. In the summer of 1971, he was sent on an excavation internship to Tarławki, Węgorzewo district, in north-eastern Poland (the region of the Great Masurian Lakes). Dr J. Okulicz and Ms. E. Gąssowska, MA, were researching

Fig. 2. Tumiany, Olsztyn district, site 2 "Rybaczówka". Excavations in July 1974. Wojtek Piotrowski explores kneeling in the middle of an archaeological excavation. Photograph courtesy of T. Baranowski.

a defensive settlement of the West Baltic Barrow culture from the La Tène period. The site was located in a forest. Danuta Kowalczyk (later Piotrowska, Wojtek's wife since 1978), also did her internship there. During his studies, the Institute of Archaeology was established at the University of Warsaw.

In the summer of 1974, Wojtek was in his fourth year of studies. He was again sent to the Masurian Lake District for his summer internship. In the village of Tumiany near Olsztyn, the production part of a settlement from the 5th–7th centuries AD was identified (Fig. 2). The work was supervised by doc. dr Krzysztof Dąbrowski (1931–1979) and his assistant T. Baranowski on behalf of the Team for Research on the Ethnogenesis of Slavs in North-Eastern Poland. It was a unit operating at the Institute of Material Culture History of the Polish Academy of Sciences (today the Institute of Archaeology and Ethnology of the Polish Academy of Sciences). Wojtek met his future director there, as K. Dąbrowski soon took over the position of director of the State Archaeological Museum in Warsaw (PMA) after the death of Prof. Zdzisław A. Rajewski (1907–1974) in the middle of the year. The new director employed Danuta Kowalczyk at the museum (December 1, 1974), who had

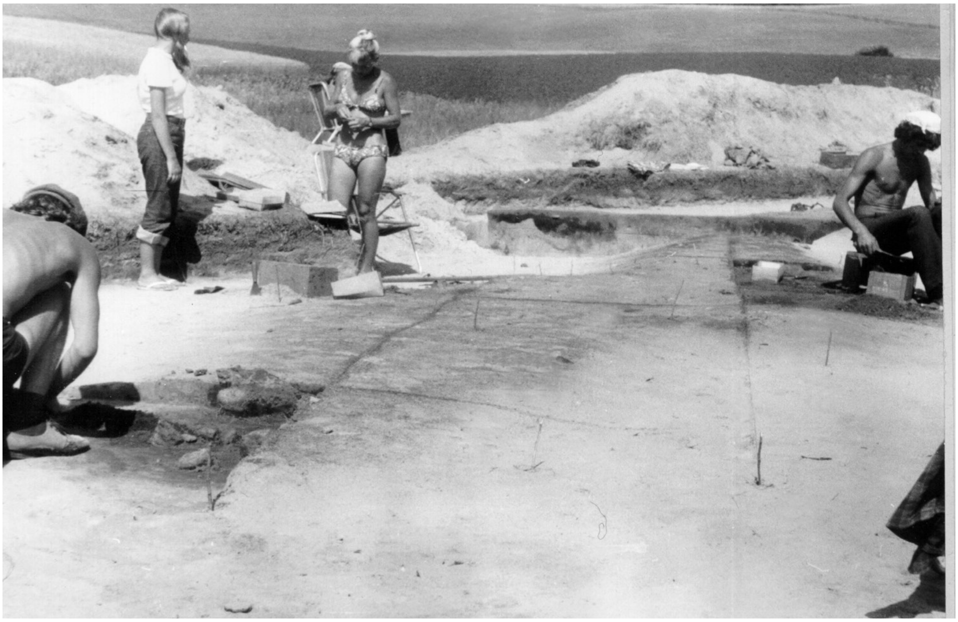


Fig. 3. Tumiany, Olsztyn district, site 2 "Rybaczówka". July 1974. Danuta Kowalczyk records a small find in the middle of an archaeological excavation. Photograph courtesy of T. Baranowski.

previously participated in his most important excavations in Kalisz and Tumiany (Fig. 3).

In 1976, Wojtek presented his master's thesis entitled "Przęśliki z łupku owruckiego w Polsce na tle handlu polsko-ruskiego w okresie od X do XIII wieku" ["Spindle whorls from the Ovruch slate in Poland in the context of Polish-Ruthenian trade in the period from the 10th to the 13th century"], prepared under the supervision of doc. dr Jerzy Gąssowski (1926–2021).

In the same year, he was employed at the PMA. In July 1976, he and D. Kowalczyk went on holiday to visit friends in Yugoslavia (Fig. 4). At the museum, he initially worked with Danuta in the Scientific, Educational, and Exhibition Department. Both, along with Mitkova-Szubert, participated in preparing the Polish presentation of the renowned exhibition "Treasures of the Thracians. Culture and Art of the Thracians in Bulgarian Lands", which was exhibited in prestigious museums in Moscow, Leningrad, Paris, Vienna, and London. Thanks to the efforts of K. Dąbrowski, the exhibition was brought to Poland. It was on display at the PMA from 7 September to 15 November 1976. "Treasures of the Thracians" was a cultural showcase of a country with a rich prehistory, prepared under the patronage of the highest state authorities of the People's Republic of Bulgaria. On the Polish side, the exhibition was held under the patronage of Prof. Henryk Jabłoński, historian and Chairman of the Council of State of the Polish People's Republic. Danuta was one of the exhibition curators, while Wojtek actively participated in the preparatory work. The magnificent gold artefacts from the tombs of Thracian rulers and aristocrats displayed in the showcases attracted crowds of visitors from all over the country to the PMA. During the 67 days of the exhibition, it was seen by 40,000 visitors. It was accompanied by a Thracian symposium (Romanowska 1977a; 1977b; Modrzewska 1978: 116; Piotrowska 2002–2003: 28). At that time, the opening ceremonies at the PMA were attended by representatives of the highest state authorities, sometimes including the influential Minister of Foreign Affairs of the Polish People's Republic, members of the diplomatic corps and the Warsaw establishment. H. Jabłoński was given a tour of the exhibition by the director of the PMA together with D. Kowalczyk. Later, with Wojtek's participation, the exhibition "Charlemagne's Residence in Ingelheim on the Rhine" was mounted.

In 1978, Danuta Piotrowska moved to the PMA branch in Biskupin, while Wojtek remained in the Education Department. In July 1978, he was sent on a month-long scholarship to Finland, and then with his wife to the Malkoto-Kale excavation site in Bulgaria. They also studied Site 17a in Biskupin together (Modrzewska 1979b: 237 and 239).

In 1980, after the death of Director K. Dąbrowski, Wojtek participated in the preparation of the exhibition "Vikings" from the Statens Historiska Museum in Stockholm. In just over a month, it was seen by about 6000 visitors. Warsaw was the second place to exhibit "The Vikings" after Leningrad. From the PMA, the exhibition travelled to Sofia, Havana, Mexico City and Washington. Wojtek then participated in the preparation of the exhibition "Archaeology of Lower Austria in the 1st millennium AD" and worked on the organisation of a large exhibition by the PMA with the somewhat strange title "Eisen und Archäologie: Eisenerzbergbau und Verhüttungvor 2000 Jahren in der VR Polen" [Iron and Archaeology: Iron Ore Mining and Smelting 2000 Years Ago in the People's Republic of Poland] for museums in Bochum and Munich in the Federal Republic of Germany. It was a historic success. The PMA report for 1978 states that 200,000 people visited it in Bochum and 300,000 in Munich. To quote the document further: "No Polish archaeological exhibition has ever enjoyed such attendance figures". However, this raises the question of the reliability of the attendance data (Bero 1979; Bielenin 1979; Modrzewska 1979b: 234; Krzeczkowska 1981; Piotrowski 1981).

K. Dąbrowski returned with renewed vigour to the tradition of promoting the Biskupin reserve in Warsaw's international diplomatic circles. He felt very much at home among diplomats. The 1970s created a favourable atmosphere for such undertakings,

Fig. 4. Škofja Loka, Yugoslavia. July 1976. Danuta Kowalczyk and Wojciech Piotrowski on vacation, visiting one of the oldest towns in Slovenia. Photograph courtesy of D. Piotrowska

and the new director was able to take advantage of it. He had close relations with the Ministry of Foreign Affairs (MFA) and decision-makers in the Ministry of Culture and Art. After the stagnation of the last years of Prof. Z. Rajewski's directorship, Dąbrowski breathed new life into the rusty Museum (cf., e.g., Radziwił 1977: 100–101). There was a widespread belief that managing the PMA was a stepping stone toward a future career in the MFA. He eagerly involved young employees, who were more dynamic and available than the older staff, in duties related to the PMA's operations. Among them were Danuta and Wojtek. They both participated in the preparation of the exhibition "Biskupin – Polish Pompeii" initiated by Dąbrowski. The idea was obvious. Biskupin is the only archaeological site in Poland known worldwide (see Clark 1952: 155, 160 and 314; Bławatska 1964: 175–176; Alimen 1965: fig. 108; Bray and Trump 1972: 38 and 137; Milisauskas 1978: 284–288; 2011: 8; Alexander 1980: 226; Midgley 1992: 27; Cunliffe 1994: 352; Harding 1994: 332, 334; 2000: 257–260; 2011: 336, 338; Piotrowska 1994; 1997–1998; 2008: 14–15; Bahn 1996a: 108–109; 1996b: 219–221; Matsui 2000: 56–58; Marciniak 2001; Jameson 2002: 117–118; Schöbel 2004: 228; Sherratt 2004: 273; Trigger 2007: 249; Wells 2011: 408 and 426).

In 1965, Grahame Clark wrote in the first edition of *World Prehistory: an outline*:

> "The wealth of personal armament and above all the widespread prevalence of military defences in the form both of hill-forts and marsh-fortresses like Biskupin in Poland leave one in no doubt that the period was one of warlike activity, but how far the diffusion of Hallstatt types was due to mere fashion, how far to raids by warriors and how far to anything like folk-movements are problems which need to be considered on their merits in particular cases." (1965: 170).

Twelve years later, in *World Prehistory in New Perspective*, Clark (1977: 191) did not forget to mention Biskupin. He briefly summarised the issue raised earlier:

> "Timber fortresses of the kind erected in marshes like Biskupin in Poland offer further evidence of violence."

The exhibition "Biskupin – Polish Pompeii" was prepared at the PMA on the sidelines of major exhibitions. It was intended for shipment to the Socialist Federal Republic of Yugoslavia. In the Museum's 1976 report, it was classified as a "school and archaeology popularisation" exhibition. Without an official opening, it was shown for ten days at the PMA before being shipped. As the history lesson about Biskupin, as a site allegedly inhabited by "our proto-Slavic ancestors", was included in school curricula, it was visited by nearly 7000 visitors in that short time, mainly school classes from Warsaw and the surrounding area. It was a great success (Modrzewska 1978: 116–118). After this episode, the exhibition was transported to Yugoslavia. It opened at the National Museum in Belgrade and was then exhibited in Skopje and at the City Museum in Ljubljana (Węgrzynowicz 1977; Modrzewska 1978: 121). After returning to the PMA, the exhibition "Biskupin – Polish Pompeii" travelled around the country, included in the 1977 report in the category of "national travelling exhibitions". In 1977, during 176 exhibition days, it was seen by over 21,000 people in two western Polish voivodeships (Modrzewska 1979a: 102–103); it was then shown in other museums. From February 1979, the exhibition was in Algeria, in 1984 in West Berlin, in museums in the Federal Republic of Germany,[2] and in other European cities. It was well received and aroused interest. Wojtek participated in its assembly and disassembly as well as in the opening ceremonies, sometimes as the official representative of the PMA; he was

2 Museumsdorf Düppel (West Berlin), Schleswig-Holsteinisches Landesmuseum für Vor- und Frühgeschichte (Schleswig), Helms-Museum / Hamburgisches Museum für Vor- und Frühgeschichte (Hamburg), Niederrheinisches Museum (Duisburg), Museum der Stadt (Regensburg), Westfälisches Museum fürArchäologie (Münster).

Fig. 5. Museumdorf Düppel in West Berlin published a booklet devoted to this exhibition.

sometimes accompanied by Danuta (see Lech 2004: 53–54). Museumdorf Düppel in West Berlin published a booklet devoted to this exhibition, consisting of six short articles (Fig. 5). The longest is Wojtek's article on the history of research at Biskupin (Goldmann 1985; Piotrowski 1985). The authors of the other articles are: J. Jaskanis, then the new director of the PMA, W. Zajączkowski – head of the PMA Branch in Biskupin, A. Harding, P. Reynolds, and K. Goldmann. The booklet concludes with a list of 181 objects presented at the exhibition.

In 1981, Wojtek joined the PMA branch in Biskupin (Fig. 6) as a researcher and museologist specialising in the archaeology of the Biskupin Lake peninsula and its surroundings (Nowaczyk 2024). At that time, Polish researchers of Lusatian culture began to believe that the fortified settlement on the Biskupin Lake peninsula was older than its first researchers, Professors J. Kostrzewski (1885–1969) and Z. Rajewski, had assumed.

At the beginning of 1979, the fourth volume of *Prahistoria ziem polskich* [The Prehistory of the Polish Lands], edited by Jan Dąbrowski and Z. Rajewski, was published in Poland. The volume covers the period from the Middle Bronze Age to the Middle La Tène period (the time of the Lusatian culture). The book was written by eight authors.[3] The section on the defensive settlement in Biskupin was written over several years by the late Prof. A. Gardawski (1917–1974). His text was still highly regarded and, after some additions, was published (Dąbrowski and Rajewski 1979: 9). It reflected the views of most specialists in Poland in the late 1970s on the prehistoric fortified settlement and the Lusatian culture, including its chronology. The stronghold on the Biskupin Lake peninsula was still dated to the Hallstatt D period. The Biskupin region was considered the best-known archaeological region in Poland. I emphasise this state of knowledge because in the same year, a book by J. M. Coles and A. F. Harding (1979) *The Bronze Age in Europe* was published in London. The authors make partial use of Polish literature on the subject. In their summary of the analysis of radiocarbon dating from Europe, they state:

3 The authors of the volume are: Z. Bukowski, J. Dąbrowski, A. Gardawski, B. Gediga, L. J. Łuka, Ł. Okulicz, T. Węgrzynowicz and Z. Woźniak (1979).

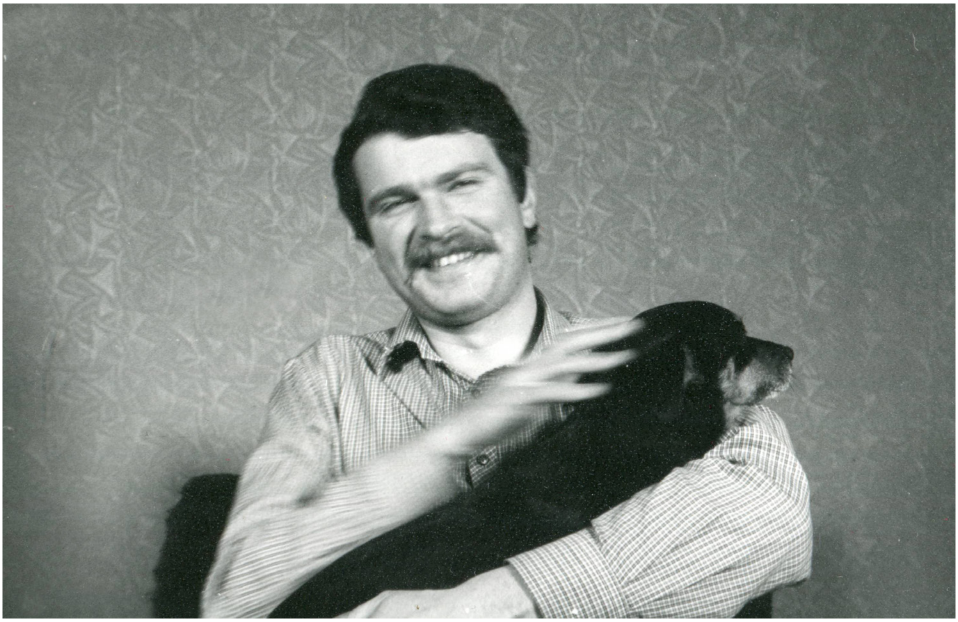


Fig. 6. Rossoszyca, Sieradz district. Christmas 1981 at Danuta's family home (martial law in Poland). Wojtek with her beloved dog. Photograph courtesy of D. Piotrowska.

> "Of some interest are the dates from Biskupin, almost the only sequence we have; it is clear that the material they refer to cannot be much, if any, later than the true Bronze Age in central Poland." (Coles and Harding 1979: 380).

The British authors were right. Both scholars, members of the British Academy, referred to the Lusatian culture settlement at Biskupin on several occasions. In 2000, A. F. Harding published a comprehensive book, *European Societies in the Bronze Age*, with numerous references to the settlement at Biskupin.

Wojtek initially focused on the early medieval period in Biskupin and the surrounding area from 1978, leading or participating in excavations at various sites, sometimes with Danuta. Over the years, his interests expanded to cover the entire archaeology of this mesoregion. Together with his colleagues from the Museum in Biskupin, he also conducted surface surveys of a large area around Lake Biskupin as part of the central Archaeological Survey of Poland programme. In the early 1980s, he travelled to Austria several times to participate in excavations. He participated in research on the ditched enclosure *zweifache Kreisgrabenanlage*– otherwise known as

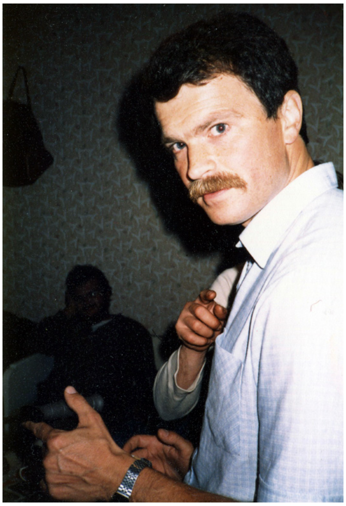


Fig. 7. Kamegg, Austria, August 1985. Wojtek participating in excavations led by Dr. Gerhard Trnka from the University of Vienna. Photograph courtesy of D. Piotrowska.

Rondelle in Kamegg on the Kamp River, near Horn (see Neugebauer-Maresch 1999: 82–87). The work was supervised by Dr Grehard Trnka from the University of Vienna (Figs 7 and 8). Wojtek became friends with Gerhard and remained in contact with him. They exchanged e-mails at least until the end of 2023.

Wojtek also became interested in the production of tar and wood pitch in the early Middle Ages (in connection with experimental archaeology at a late stage). In his book *Kultura prapolska* [The proto-Polish culture], published in 1947, Professor J. Kostrzewski (1947: 291–292) had also discussed the production and use of charcoal, tar and pitch. He emphasised that archaeological finds in Poland confirm their production "only for the late Middle Ages". Four years later, evidence of the production of wood tar and birch bark tar in the early Middle Ages was discovered during excavations in Biskupin. The work was carried out in 1951 as part of an Archaeological Training Camp organised by the PMA for students after their first year of studying Material Culture History. This new field of study was introduced in Poland to replace prehistory, following the USSR's model, as part of the higher education reform during the Stalinist period (1949–1955). In Biskupin, experimental archaeology methods were successfully used in the reconstruction of the early medieval process of producing tar and wood pitch (Kostrzewski 1947: 310; 1962: 264–266; Szafrański 1950a; 1950b: 129–131; Hensel 1952: 114–115, 119, 135; 1965: 226; Rajewski 1970; Lech 1997–1998: 78–82 and 85–91; 2022: 565–569; Piotrowska 1997–1998: 270–274; 2021: 66–75 and 82).

In the early days of his work at the PMA, Wojtek participated in establishing and implementing cooperation between the Museum in Biskupin and Museumsdorf Düppel open air museum in West Berlin reconstructing an early medieval village and showing daily life there. This cooperation was beneficial for the development of both institutions in the fields of experimental archaeology, exhibitions, reconstruction and popularisation. The Archaeological Museum in Biskupin, under the direction of W. Zajączkowski, specialised in prehistoric reconstructions. These attract most visitors to Biskupin. The museum director, who demanded high-quality work, had at his disposal an *ad hoc* work brigade of local villagers who could replace roofs made

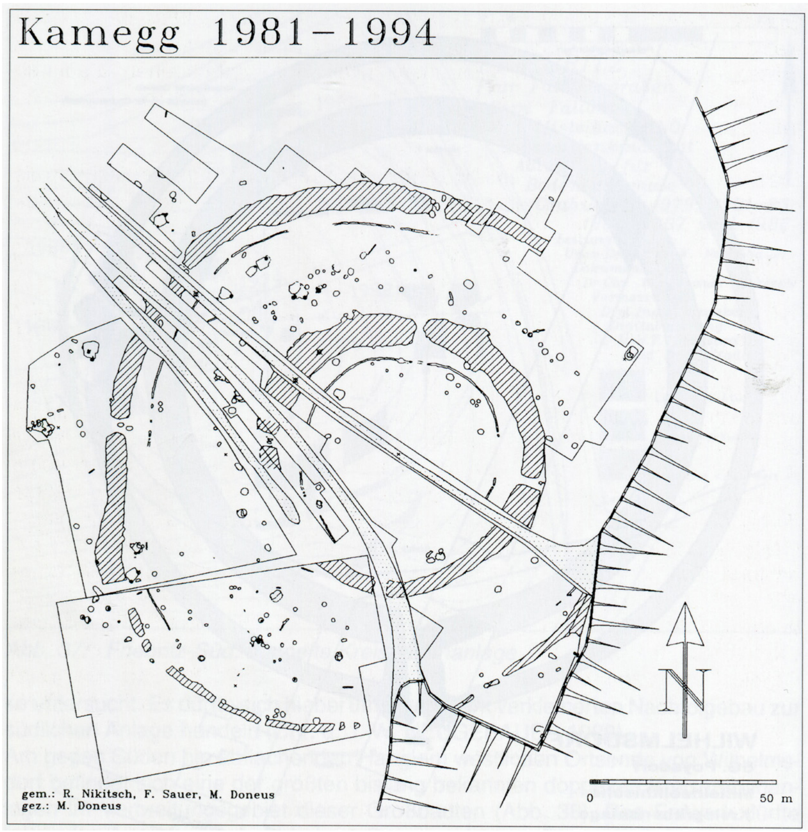


Fig. 8. Kamegg, Austria. Ditched enclosure, also known as Rondelle, on the Kamp River, near Horn. Archaeological features according to *Jungsteinzeit im Osten Österreichs*, St. Pölten–Vienna 1999: 86.

of reeds cut in winter when they began to leak, and erect solid reconstructions. In the vicinity of Biskupin, the local people still remembered how to do this, while in the West, this had long been forgotten. In addition, the lakes around Biskupin provided good quality reed material for this purpose, which was no longer available in Western Europe. It was a good business opportunity for the Biskupin museum and the participating farmers–craftsmen from Biskupin. It was exploited. For some time, the Biskupin brigade also served interested open-air museums in Western Europe. Museum audiences from various countries and European cultures benefited from it. Alongside the manager and later the director of the Museum, Wojtek played an important role in organising this work. This sometimes resulted in interesting trips

Fig. 9. New Grange, Ireland. Wojciech Piotrowski at a boulder with reliefs placed in the frame of a monumental megalithic tomb. After J. Lech (2000: photo VII).

abroad, e.g., to Ireland (Fig. 9). During these contacts with the Museumsdorf Düppel in West Berlin, the idea of an international symposium on the prehistoric production and use of tar and wood pitch was born. It took place in Biskupin on 1–4 July 1993, organised by W. Piotrowski on behalf of the Polish institution and Andreas Kurzweil on behalf of the Berlin museum. It was attended by 120 people from thirteen European countries and the USA, with a large number of researchers from Poland. The 344–page publication of the presentations at this meeting and accompanying articles, entitled, is one of the most carefully edited archaeological books published in Poland after 1989 (Brzeziński and Piotrowski 1997).

In the early 1980s, the PMA established cooperation with British museums. In the spring of 1984, the exhibition "Biskupin, Poland's Iron Age Lake Village" was sent to the British Museum. To inaugurate the exhibition, the London museum organised a symposium entitled "Biskupin and Its Age". Between 1984 and 1985, the Polish exhibition was also displayed in several other English museums. The contacts established led to the PMA hosting the exhibition "Hadrian's Wall" in 1988. On this occasion, it turned out that the British Museum (BM) had a collection of so-called Germanic Antiquities (*Germanische Alterthümer)*, purchased in 1868 from the collection

Fig. 10. London, British Museum, 1992. Grażyna Orlińska and Wojciech Piotrowski at work in the Department of Prehistoric and Romano-British Antiquities. Photograph courtesy of G. Orlińska (PMA).

of Gustav F. Klemm (1802–1867) after his death. Klemm is considered a precursor of anthropology, understood as a broad scientific discipline (as in the USA). For the history of British cultural anthropology, his influence on Edward B. Tylor (1832–1917), considered its "father", is important, especially on the ethnographic understanding of culture and some other concepts (cf., Lowie 1937: 11–16 and 70–71; Trigger 1978a: 75–76). His classic work (Klemm 1843–1852) was referred to by Franz Boas (1858–1942), an American anthropologist of German origin who made a great contribution to the development of this field of research in the USA (Boas 1911/1965: 138 and 248; 1932/1966: 243; Trigger 1978b: 68–69). Klemm was also referred to by A. L. Kroeber (1876–1960), a leading figure in American anthropology, and his prematurely deceased student Ph. Bagby (1918–1958), who followed in his master's footsteps by undertaking research at the intersection of cultural history and anthropology (Bagby 1963: 18, 74–75 – first edition 1958).

The British Museum was interested in having the Klemm collection catalogued by a team of PMA employees. The team was led by Grażyna Orlińska, MA (Figs 10 and 11). The team travelled to London in 1992, 1993 and 1994. Mrs Orlińska recalls W. Piotrowski's participation as follows:

Fig. 11. Grażyna Orlińska, Wojciech Piotrowski, and Wojciech Krajewski (illustrator, killed in 1993 in an avalanche in the Altai Mountains), after work, while relaxing in a London pub. Photograph courtesy of G. Orlińska (State Archaeological Museum, Warsaw).

> "During these trips, we had very specific tasks. Wojtek was an excellent translator and mediator in our contacts with the English. He was always calm and smiling, tirelessly photocopying the letters, manuscripts and books purchased along with the artefacts, as well as 19th-century German works that were unavailable in Poland, which he tracked down in the museum library. (...) After work and on weekends, we usually spent time together. Wojtek was like a rock, great to talk to, joke with, travel with, and explore with."

The Klemm collection was published in London by British Museum Press (Orlińska 2001).

In the early 1990s, Dr T. Ważny used dendrochronology to determine that the Biskupin stronghold was built by the Lusatian culture community using the site between 747 and 722 BCE. Most of the trees were felled in the winter of 738/737 BCE (Ważny 1993). Wojtek considered this dating to be:

> "…the good starting point to create a whole absolute dendrochronological scale for the Biskupin settlement" (Piotrowski 1995a: 93. See also: Ważny *et al.*, 1994: 10).

Well-known Kraków archaeologists, Professors P. Kaczanowski and J. K. Kozłowski from the Jagiellonian University, referred to the new dating:

> "Recently published results of dendrochronological research indicate a different, much earlier date for the establishment of this settlement: the 730s BC, and more precisely, the winter of 738–737 BC. BC. Confirmation of these findings would be one of the greatest sensations in research on the beginnings of the Iron Age in Central Europe and would necessitate a general revision of views on the dating of the final stages of the development of the Lusatian culture, as well as a verification of hypotheses concerning the origins of Biskupin-type settlements." (Kozłowski and Kaczanowski 1998: 180).

In 1994, President Lech Wałęsa granted the excavations in Biskupin the status of a Polish Historical Monument. This was followed by the *Europa Nostra* award for the Museum.

At the same time, an idea was born that would influence the popularisation of archaeology in Poland in the following years. Here is how Wojtek Piotrowski (1995: 48–50) described its birth:

> "...Dr Aleksander Bursche, deputy director of the Institute of Archaeology at the University of Warsaw, while reflecting on the state of popularisation of archaeology in Poland, recalled his impressions from one of the festivals in Germany. A meeting with Wiesław Zajączkowski, MA, director of the Museum in Biskupin, gave shape to the whole idea. Biskupin was chosen as the most suitable place to implement such a project."

The Museum in Biskupin, together with the Institute of Archaeology at the University of Warsaw, organised an archaeological festival lasting over a week, dynamic, colourful, brimming with ideas, on a scale unprecedented in Poland. The project aimed to revive:

> "...ancient craft techniques through events taking place every day throughout the area, engaging visitors in playful fun, stimulating..... personal participation, learning through jokes and humour, but in order to convey accurately and evocatively certain forgotten truths, which are presented in such a concise and dry – and therefore off-putting – manner in history textbooks.
>
> Every day, fashion shows were held on the crown of the reconstructed defensive rampart of the Biskupin stronghold – from the Stone Age to the Middle Ages and the Renaissance. Girls and boys dressed in leather, coarse linen, but also in satin, silk and lace gave an overview of styles and tastes from different civilisations." (Piotrowski 1995b: 56).

Fig. 12. Biskupin, Żnin district. Archaeological Museum. A set of photographs featuring Wojtek Piotrowski showing the reconstruction of the tar and wood tar production cycle at the Archaeological Festival in 2011. Photographs courtesy of D. Piotrowska.

From the very first festival, Wojtek, together with his changing assistants – colleagues employed at the Museum – perfected the skill of dry distillation of wood, producing wood tar and wood pitch in front of the audience. The 1995 Biskupin Festival proved to be a great success. Over the course of nine days, nearly 40,000 spectators visited the Biskupin Lake peninsula, and in the following years, Poland was flooded with similar events of various sizes, none of which, however, could match the imagination, scale and success of the Biskupin festivals. Since then, they have become a permanent fixture in the Museum's Biskupin calendar of events (Fig. 12).

Dr Szymon Nowaczyk (2024), who was assigned to Wojtek in 1999 as a tanner's assistant, recalls this collaboration as follows:

> "To this day, I remember the incredible aura of this place, where the popularisation of archaeology was inextricably intertwined with the festive atmosphere characteristic of the backstage of the festivals at that time. This was primarily thanks to Mr Wojtek, who, like no other, was able to combine the high substantive level of his demonstrations with extraordinary kindness in his contacts with both tourists and colleagues."

Fig. 13. Archaeological Museum in Biskupin. Poster for the permanent exhibition "Dawn of History at Lake Biskupin", opened in 1999. Photo: J. Lech.

No wonder that Wojtek was highly valued by organisers throughout Poland and abroad as a demonstrator of forgotten crafts at similar festivals. He was invited to tar-making demonstrations more often than he was able to accept, despite his best intentions. He grew fond of these demonstrations.

In 1999, Wojtek prepared a section devoted to the Middle Ages for a new exhibition in Biskupin, entitled "The Dawn of History on Lake Biskupin", prepared under the direction of his wife, Danuta Piotrowska, the author of the script (Figs 13 and 14). The new concept of the exhibition developed at that time still forms the basis of the permanent presentation of prehistory and the Middle Ages at the Archaeological Museum in Biskupin.

In 2000, as a result of the country's local government reform, Director Jan Jaskanis, on behalf of the PMA, handed over the Biskupin Branch to the office of the

Fig. 14. Archaeological Museum in Biskupin. The permanent exhibition opened in 1999. Knights against the background of an early medieval stronghold. An attempt at visualisation. Oil painting on canvas (80 x 150 cm), painted by artist Michał Adamczyk based on instructions from W. Piotrowski. Photo: J. Lech.

Marshal of the Kuyavian-Pomeranian Voivodeship. Although Wojtek lived with his family in Warsaw, he took up the position of scientific secretary at the now independent Archaeological Museum in Biskupin. He held this position until his retirement in 2018. He contributed to advancing knowledge of the early Middle Ages in Biskupin by popularising its archaeology in the northern hemisphere of our globe, from Japan in the east (Figs 15 and 16) to Canada in the west (cf., Piotrowski 1998; 2000), and by organising and exemplifying the Museum's functioning. It attracts the highest visitor attendance among Polish archaeological museums.

As part of his duties at the Museum, Wojtek co-organised numerous conferences and scientific symposia held at the reserve, thanks to the infrastructure developed by W. Zajączkowski, director of the facility since 2000, which was excellently managed (e.g., Piotrowska and Piotrowski 2009). Most of them were held on the initiative and with the organisational cooperation of Prof. B. Gediga (1933–2022) from the Wrocław Branch of the Polish Academy of Sciences, the chairman of the Museum Council. After the conferences, Wojtek devoted a lot of work to preparing for publication, with a changing team, subsequent volumes of the series "Biskupińskie Prace Archeologiczne" [Biskupin Archaeological Papers] with texts by participants from Poland and abroad. They were published by the Museum in cooperation with other

Polish institutions. Wojtek's good knowledge of English and German was very useful in this work. The last volume of the series, in which Wojtek participated, is No. 13 and is entitled *Inspiracje i funkcje sztuki pradziejowej i wczesnośredniowiecznej* [Inspirationen und Funktion der Ur- und Frühgeschichtlichen Kunst]. He finished editing his part in 2018, after his retirement. The book has 584 pages.

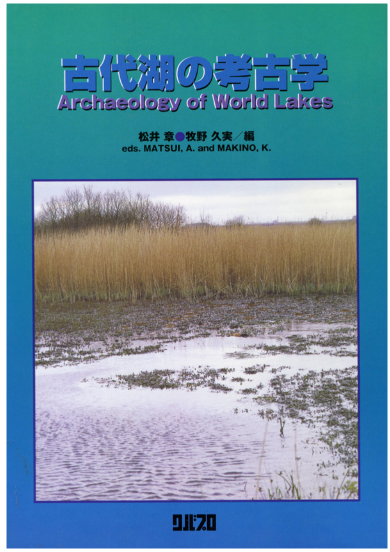
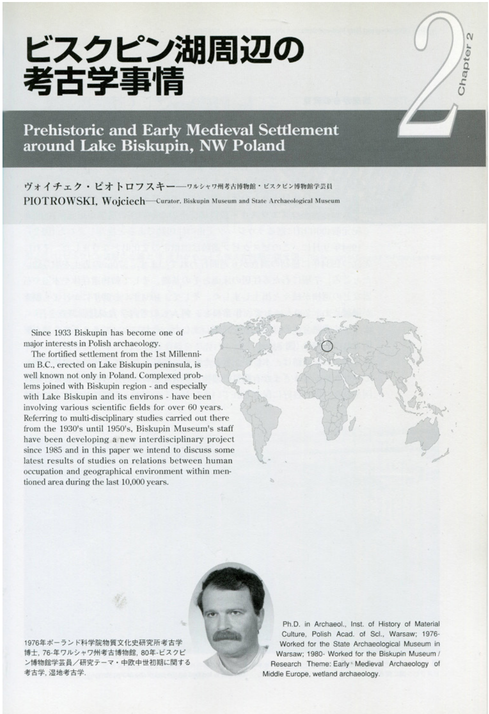


Fig. 15. Cover of the book by A. Matsui and K. Makino (eds), *Archaeology of World Lakes*, 191 pp. + 9, Tokyo 2000. Published by Kuba Pro. Co., Ltd. (in Japanese, with abstracts and short notes about the authors in English). ISBN 4-906347-06-1 and C1022.

Wojtek's scientific expertise and interests covered the entire archaeology of the Biskupin Lake mesoregion, the surrounding areas and the Pałuki region. In addition to scientific issues, Wojtek devoted a lot of energy to popularising this wonderful site in Poland and around the world. At the same time, he was the first and only Polish archaeologist to speak and write about Biskupin in the broad, global context of "wetland archaeology" (e.g., Piotrowski 1992; 1998; cf., Niewiarowski *et al.*, 1992; Piotrowska and Piotrowski 2021). For example, his lecture "Biskupin and Wet Archaeology" began with Swiss research from the early second half of the 19th century, using the works and illustrations of F. Keller (1800–1881), a researcher of aquatic settlements in Swiss lakes, and extensively referring to W. G. Wood-Martin (1886) and the painting "Idyll" by A. Bachelin (cf., Boyd-Dawkins 1880: 291–294 and 353–354; Lord Avebury 1900: 166–192; Sklenář 1983: 74; Trigger 2007: 134). To familiarise his listeners with the specific nature of wetland landscapes, he used photographs from his own collection. He had collected them over many years of travelling around the world. In this field, he owed a great deal to his long-standing collaboration with the aforementioned Prof. John M. Coles, elected Fellow of the British Academy (1978), a scholar of international renown (Piotrowska and Piotrowski 2021). Wojtek and Danuta were friends with J. Coles and his wife Bryony (Fig. 17). John considered Wojtek to be the main representative of "wet archaeology" in Poland. He was invited to important conferences organised around the world within the WARP circle. John and Bryony's knowledge also served the archaeology of Biskupin (see Piotrowska and Piotrowski 2021).



ビスクピン湖周辺の考古学事情

2 Chapter 2

Prehistoric and Early Medieval Settlement around Lake Biskupin, NW Poland

ヴォイチェク・ピオトロフスキー——ワルシャワ州考古博物館・ビスクピン博物館学芸員
PIOTROWSKI, Wojciech—Curator, Biskupin Museum and State Archaeological Museum

Since 1933 Biskupin has become one of major interests in Polish archaeology.
The fortified settlement from the 1st Millennium B.C., erected on Lake Biskupin peninsula, is well known not only in Poland. Complexed problems joined with Biskupin region - and especially with Lake Biskupin and its environs - have been involving various scientific fields for over 60 years. Referring to multi-disciplinary studies carried out there from the 1930's until 1950's, Biskupin Museum's staff have been developing a new interdisciplinary project since 1985 and in this paper we intend to discuss some latest results of studies on relations between human occupation and geographical environment within mentioned area during the last 10,000 years.

1976年ポーランド科学院物質文化史研究所考古学博士, 76-年ワルシャワ州考古博物館, 80年-ビスクピン博物館学芸員／研究テーマ・中欧中世初期に関する考古学, 湿地考古学.

Ph.D. in Archaeol., Inst. of History of Material Culture, Polish Acad. of Scl., Warsaw; 1976- Worked for the State Archaeological Museum in Warsaw; 1980- Worked for the Biskupin Museum / Research Theme: Early Medieval Archaeology of Middle Europe, wetland archaeology.

Fig. 16. Title page of the article by Wojciech Piotrowski, "Prehistoric and Early Medieval Settlement around Lake Biskupin, NW Poland", published in Japanese in the book by A. Matsui and K. Makino (eds), *Archaeology of World Lakes*, 47–56, Tokyo 2000 (see Fig. 15).

In his professional life, Wojciech Piotrowski worked with complete dedication to the archaeological site of Biskupin. In recognition of these achievements, on May 21, 2015, in Toruń, on International Museum Day, he received the Kuyavian-Pomeranian Voivodeship Award from Piotr Całbecki, Marshal of the Kuyavian-Pomeranian Voivodeship, in Toruń, with thanks for fulfilling the mission of the museum in Biskupin in a creative, reliable and competent manner (Fig. 18).

Wojtek's professional and personal qualities were recognised by the Archives of the Polish Academy of Sciences, located in Warsaw, in the Stanisław Staszic Palace. After retiring in 2018, he was employed there on a part-time basis for the rest of his life, helping to expand the valuable collections, preparing and delivering occasional lectures. At the same time, he was active in social organisations. He played a key role in establishing the Walenty Szwajcer Society in Biskupin (named after the local teacher who had helped archaeologists since 1933) and served as its president for many years. He gave lectures on various topics at the Public Library of the Capital City of Warsaw and on tar and pitch for students of the Warsaw University of Life Sciences (agricultural university), in response to invitations from Dr Hubert Lachowicz, a professor at this important Polish university.

The last major work in which Wojtek participated was the preparation, together with Danuta (Fig. 19), of the index for the book *Prehistoric Flint Mines in Europe* (Piotrowska and Piotrowski 2023). He undertook this task with his characteristic optimism and willingness to help. The highly acclaimed cover of this book was designed by Tymoteusz Piotrowski, the son of Danuta and Wojtek. We were delighted to see the work published in November 2023. I remain grateful to them for their friendly help

Fig. 17. Biskupin, 25 May 2007. Professor John M. Coles and Wojciech Piotrowski at the Archaeological Museum after the conclusion of the International Symposium "The history of archaeology and archaeological thought in the 20th century", dedicated to Professor Grahame Clark (see Piotrowska and Piotrowski 2009). Photo: D. Piotrowska.

and cooperation, together with Prof. Françoise Bostyn from the Université Paris 1 and Dr Dagmara H. Werra from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences in Warsaw.

Despite his serious illness, Wojtek remained one of the leading representatives of the Polish-Swiss Society and the Rapperswil Society until his death. He was also a second lieutenant in the Polish Army reserves.

Wojciech Piotrowski's extensive knowledge and charming personal culture, his full commitment to the tasks he undertook, his good knowledge of three European congress languages in addition to Polish, and his dedication to his work meant that he played an important role in the development of the Archaeological Museum in Biskupin (Fig. 20). He was an excellent chair of meetings and moderator of discussions. For forty years, Wojtek made a great contribution to the Museum's international cooperation, both in Europe and beyond our continent (Fig. 21). He effectively popularised the achievements of "wet archaeology" in Poland and Polish achievements in this field worldwide (see Selected Bibliography).

The excavations on the Biskupin Lake peninsula, which began in 1934 under the direction of Prof. J. Kostrzewski, were published in three consecutive reports. They covered

Fig. 18. Toruń, May 21, 2015, International Museum Day. Wojciech Piotrowski receives an award from Mr. Piotr Całbecki, Marshal of the Kuyavian-Pomeranian Voivodeship. Photograph courtesy of D. Piotrowska

Fig. 19. Warsaw, October 11, 2007, Institute of Archaeology and Ethnology of the Polish Academy of Sciences. Danuta Piotrowska and Wojciech Piotrowski during an evening social gathering of participants in a symposium devoted to archaeological journals. Photo: F. M. Stępniowski

research from 1934–1939 and 1946–1948 (Kostrzewski *et al.*, 1936; Kostrzewski 1938; 1950). In 1949, Dr Z. A. Rajewski, a student and assistant to Prof. J. Kostrzewski in Biskupin, took over the management and responsibility for all the work, initially as part of the Management of Research on the Origins of the Polish State committee, and from 1950 as director of the State Archaeological Museum in Warsaw. Z. A. Rajewski and the staff of the PMA published works devoted to excavations in Biskupin and the vicinity of Lake Biskupin, but never in the form of broad, interdisciplinary presentations of the results developed by J. Kostrzewski (e.g., Szafrański 1950a; 1956; 1959a; 1959b, 1960; Rajewski 1956; 1959; Balcer 1961; 1963; Szafrańscy 1961).

After a long break, the Archaeological Museum in Biskupin resumed publication of the "Biskupin Reports" when W. Piotrowski was its Scientific Secretary. Wojtek was also the co-editor of two subsequent volumes (Nowaczyk *et al.*, 2015; Kopiasz *et al.*, 2017).

Fig. 20. Biskupin. View of a fragment of the reconstructed defensive settlement of the Lusatian culture community on the peninsula of Lake Biskupin. Photo: A. Zalewska

Wojciech Piotrowski died in Warsaw on Friday, 13 December 2024. We said goodbye to him on 3 January at the Funeral Home at the Powązki Military Cemetery in Warsaw. The ceremony was attended by numerous archaeologists from all over Poland. In accordance with his wishes, the next day we placed Wojtek's urn in his grandparents' grave at the St. Zygmunt Cemetery in Słomczyn, near Konstancin-Jeziorna, south of Warsaw, along the Vistula River.

In reference to an age-old custom, Mr Wojciech Śmielecki, a guide on the "Piast Trail" and cultural activist from Gniezno, the "first capital of Poland" located near Biskupin, ordered a mass dedicated to Wojtek's memory for Sunday, 2 March 2025. It was celebrated in Gniezno, solemnly, at noon, in the bright, sunlit and electrically-lit Gothic cathedral, the famous sanctuary of St. Wojciech in Poland (bishop; lived *c*. 956–997). The church stands on a hill, which until 966 was a place of Slavic pagan worship and the stronghold of the rulers of Greater Poland, and later of all of Poland. A monumental statue of Mieszko's son, King Bolesław Chrobry, was erected a hundred years ago in front of the cathedral, on the southern slope of the hill. In the spring of 2025, a thousand years had passed since the coronation of the powerful monarch. He did a lot to establish the cult of Bishop Wojciech of Prague, the capital of the Bohemia, in the Roman Catholic Church. The Mass

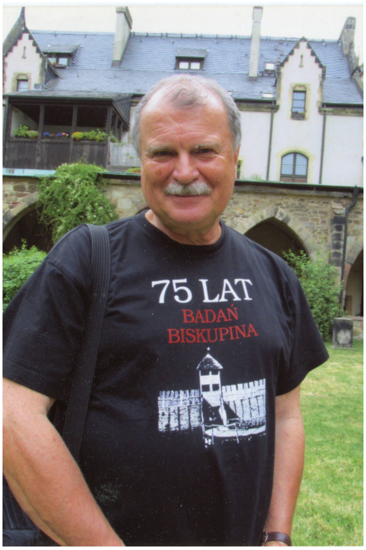


Fig. 21. June 2015. Wojciech Piotrowski (1952–2024). Photo: D. Piotrowska.

on 2 March completed the farewell to Wojciech Piotrowski, a distinguished archaeologist, researcher of Biskupin, expert and specialist in the field of "wet archaeology", and above all, a good man, kind to people and the world.

8 October – 28 November 2025, Warsaw

ACKNOWLEDGMENTS

I am immensely grateful to Mrs Danuta Piotrowska and Mrs Grażyna Orlińska for their invaluable information and photographs. They significantly aided in the preparation of this memoir. I would also like to thank Prof. Dr. Tadeusz Baranowski, Prof. Dr. Anna Zalewska, and Dr. Franciszek M. Stępniowski for providing the photographs.

Jacek Lech

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W. Piotrowski and A. Grossman (eds), Symposium *The History of Archaeology and Archaeological Thought in the 20th Century*. Dedicated to Grahame Clark on the Centenary of his Birth and on the 50th anniversary of the Polish edition of *Prehistoric Europe*. Conference materials, Biskupin 23–25/26 May 2007. Biskupin 2007, Archaeological Museum in Biskupin. ISBN 83-915490-6-2

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CONFERENCES

The International Symposium: 12th International Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times: "Excavating in the Land of the Devil: Past and Current Research on Prehistoric Flint Mines", Worthing (West Sussex), 6–8 May 2025

Reported by Aleksandra Wołk[a]

On 6–8 May 2025 took place the 12th International Conference of the UISPP Commission on Flint Mining in Pre- and Protohistoric Times titled "Excavating in the Land of the Devil: Past and Current Research on Prehistoric Flint Mines" (see Werra ed. 2025). It was organised by the Institute of Archaeology and Ethnology of the Polish Academy of Sciences (IAE PAN), Worthing Museum and Art Gallery, English Heritage, and the UISPP Commission on Flint Mining in Pre- and Protohistoric Times. The conference was hosted jointly by Worthing Museum and Art Gallery (West Sussex) and English Heritage Grime's Graves and the Grime's Graves Visitors Centre (Norfolk, East of England). The symposium was organised at the initiative of Dagmara H. Werra (IAE PAN), Jon Bączkowski (University of Southampton), and Anne Teather (Past Participate / Bournemouth University).

The UISPP Commission on Flint Mining in Pre- and Protohistoric Times was established on the foundations laid by participants of the flint symposiums organised between 1969 and 1999 by the "Prehistoric Flint Mines Working Group" of the Dutch Geological Society. The "Working Group" carried out excavations at the Rijckholt mine between 1964 and 1972, and later at the Neolithic pits at Grime's Graves and Harrow Hill. Through these efforts, they played a crucial role in developing research on prehistoric flint mining in Europe, notably by organising eight International Flint Symposiums between 1969 and 1999.

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Fig. 1. Dagmara H. Werra (in the middle), Anne Teather (on the right), and Jon Bączkowski (on the left) collectively inaugurating the conference. Photo: M. Jakubczak.

At the beginning of the 21st century, after the "Working Group" had ceased its activities, its members supported the creation of a UISPP Commission dedicated to prehistoric flint mining. Researchers involved in discussions concerning this proposal included former participants of the Flint Symposia, such as Françoise Bostyn, Marjorie de Grooth, Jacek Lech, the late Alan Saville, Andreas Zimmermann, and others. During the XVth UISPP Congress in September 2006, the Commission was officially established. The first conference organised by the newly formed Commission was held in Paris on 3–4 September 2007 (Bostyn *et al.*, 2023: 7–9).

The conference was inaugurated collectively by Dagmara H. Werra, Anne Teather, and Jon Bączkowski. The opening session of the 2025 conference, led by Anne Teather, was dedicated to the history of the Neolithic research in West Sussex. The session was opened with a presentation by James Sainsbury, entitled "John Pull and Worthing's Stone Age Revolution". The speaker introduced the audience to the life and work of the charismatic amateur archaeologist who discovered the flint mining complex at Blackpatch. A permanent display dedicated to his person is located in Worthing Museum, and Worthing Archaeological Society hosts the annual John Pull Memorial Lecture.

The second speaker was Joep Orbons, whose presentation, "1982 Excavation, Harrow Hill", took the form of a personal recollection. He reflected on his experiences as

Fig. 2. Participants standing over remains of an extraction shaft at Cissbury Hill. Photo: E. La O Kirchner.

a teenager accompanying his father during the excavations of the Harrow Hill flint mine. His father, a member of the aforementioned "Working Group", took part in the project when the British Museum commissioned the Dutch team led by Peter Josef (Sjeuf) Felder (1928-2009; Lech 2009). The work and daily life on site were documented by Orbons' father through photography and captured on 8mm film camera by one of the team members.

The final presentation of the first session was a paper titled "A Re-assessment of Prehistoric Flint Extraction in Britain and Ireland" by David Field and Peter Topping. The paper was divided into two parts. Part 1, "Origins", delivered by David Field, presented new data concerning Mesolithic extraction sites, alongside recently obtained radiocarbon dates from major flint mines, which collectively suggest an earlier beginning for the Neolithic flint mining in Britain than previously recognised.

Following the break, Françoise Bostyn assumed the chair for the second session of the conference. Peter Topping then delivered "Part 2" of the paper, presenting a re-examination of flint mines from the Mesolithic/Neolithic transition through the Middle Bronze Age. He highlighted both continuity and change in the use of the flint mines presented. The highlight of the talk was the emphasis on the social and ritual meaning of flint mining sites. Topping pointed out the social-cultural meanings of the phased

Fig. 3. Excursion to Cissbury Hill. Photo: E. La O Kirchner.

filling of the shaft, the presence of flint deposits, animal bone, and human skeletons in the mining shafts, and the graffiti in the underground portion of the mines.

In the next presentation, Jennifer Wexler and Dickon Whitewood, presented "Grime's Graves: the 'Digging Deeper' Project and Re-assembling the Grime's Graves Archaeological Assemblage: Future Scope and Possibilities". This covered the outcomes of English Heritage's "Digging Deeper" project, undertaken to enhance the public presentation of this exceptional site. Recent developments included the construction of a new building over Pit 1, the installation of updated interpretation panels highlighting key landscape features, and the creation of new walking and family-friendly trails, as well as refreshed interpretation within the Visitor Centre. In addition, the speakers introduced a new initiative aimed at reassembling the Grime's Graves artefact collections, currently dispersed across several museums. The project focuses primarily on faunal and skeletal material, which will be studied using advanced analytical techniques, including ancient DNA (aDNA), isotope analysis, and new dating methods.

The third paper, presented by Marie-José Schreurs: "Starting from Scratch, but a Great Experience... Consolidation of the Rijckholt-Sint Geertruid Flint Mines (2021–2022)" outlined the process and results of the consolidation of the Rijckholt mine, where several

Fig. 4. Marie-Jose Schreurs presenting the surface find at Cissbury Hill. Photo: D. H. Werra.

structures had partially collapsed and required urgent maintenance. The consolidation works were supervised by the Cultural Heritage Agency of the Netherlands.

The session ended with a second paper by Joep Orbons: "Rijckholt Flint Mine Restoration 2019–2023". This provided further details on the maintenance carried out at the site. The Rijckholt mine has been managed by a volunteer foundation for nearly ten years. The area accessible to visitors has been considerably expanded, with an additional 30 metres of tunnels opened. A new visitors' centre has also been constructed to enhance public understanding of the site's archaeology and geology.

After the discussion and the break, the third session followed, led by Piotr Włodarczak. The first speaker, Françoise Bostyn, delivered a presentation entitled "Old and New Research on the Flint Mine of Jablines (Seine-et-Marne, France): Rethinking the Organisation of the Exploitation and the Use of Flint in the Lower Marne Valley". The paper discussed recent fieldwork that has provided fresh insights into the mining features of the site, as well as new perspectives on the spatial organisation of flint extraction and distribution within the lower Marne valley.

The second presentation, "Methodological Reflection on the Detection, Excavation and Study of Flint Mines, Based on Neolithic Examples from Normandy", was prepared by François Charraud, Emmanuel Ghesquière, and Cyril Marcigny.

Fig. 5. Thomas Guichet standing inside remains of a shaft at the Grime's Graves mine. Photo: D. H. Werra.

François Charraud, on behalf of the authors, outlined recent methodological advances in the detection, excavation, and study of flint mines in Normandy, where mining sites have been investigated since the mid-19th century. They discussed strategies for site prospection, methods for recording extraction techniques, and approaches to characterising the depositology and petrography of exploited flints.

The next paper, "Poręba Dzierżna, Site 24 – The Prehistoric Mine of Chocolate Flint in the Udorka Valley (Kraków-Częstochowa Upland, Southern Poland): Results of Previous Research, Significance and Prospects", was prepared by Magdalena Sudoł-Procyk, Magdalena Malak, Dagmara H. Werra, Hubert Binnebesel, and Maciej T. Krajcarz. It was presented by Magdalena Sudoł-Procyk who summarised recent research on the discovery and systematic excavation of the "chocolate flint" mine at Poręba Dzierżna, highlighting its distinctive mining features, extraction methods, and the chronology of prehistoric activity. The discovery of multiple "chocolate flint" deposits at this site, together with nearby finds, demonstrates that the Udorka Valley was a source of raw material of at least local importance, redefining previous understandings of the distribution and use of "chocolate flint" in southern Poland. The authors also outlined ongoing research aimed at assessing the wider spatial and cultural importance of the Udorka Valley "chocolate flint" deposits.

Fig. 6. Inside the Grime's Graves mine. Tomasz Oberc and Philip C. LaPorta. Photo: D. H. Werra.

The final paper of the third session, "Picks as a Proxy for Flint Mining? Analysis of Flint Picks and Mining-Related Artefacts from Soke Hill, Hampshire, England", was delivered by Emmanuel La O Kirchner. The study highlighted a substantial Late Neolithic assemblage, suggesting intense localised flint extraction and demonstrating the potential of artefacts as proxies for identifying prehistoric mining sites.

Following the discussion and a break, the proceedings of the fourth session commenced under the chairmanship of Peter Topping. It was opened by a paper by Dagmara H. Werra, Artur Jedynak and Rafał Siuda titled "Underground Art – Graffiti in the Prehistoric Striped Flint Mine in Krzemionki. State of Knowledge and a Little More". Dagmara H. Werra presented the history of the discovery of several dozen rock drawings found in the mine, which are very difficult to interpret.

Then Jean Philippe Collin gave a presentation on "The Making and Purpose of Large Blades in Neolithic Middle Belgium. Insights from Orp and Ottenburg". The speaker highlighted technological parallels between Orp, Spiennes, and Rijckholt-Sint-Geertruid, suggesting a shared expertise within a wider supply network across the Michelsberg area.

The third presentation: "Much Ado About Nothing? New Elements About Pressure Blade Making at Spiennes (Belgium)", was delivered by Thomas Guichet. The

Fig. 7. Sara Mandera and Hubert Binnebesel in one of the corridors at Grime's Graves. Photo: M. Jakubczak.

author presented experimental research aimed at identifying diagnostic criteria for the use of the pressure lever technique in blade production at the Spiennes mines. He discussed the technological and socio-economic implications of this technique, noting the absence of clear functional differences between pressure- and indirect percussion-made blades and raising questions about the reasons for its adoption and possible inter-site connections.

Piotr Włodarczak presented the last paper of the day: "The Ideology of Wandering to Flint in the Funeral Rituals of Final Eneolithic Communities in Western Lesser Poland". The speaker examined a distinctive group of richly furnished adult male burials dating to the Final Eneolithic in south-eastern Poland, whose grave goods, mainly tools for extracting and processing flint, reflect both earthly journeys and the symbolic voyage to the afterlife. The presentation emphasised the ideological and social significance of journeys undertaken to distant flint sources, which appear to have served as important indicators of status alongside hunting and warfare.

The fifth session, opening the second day of proceedings on Wednesday, was led by Jean-Philippe Colin. It started with a paper by Margaret C. Brewer-LaPorta,

Fig. 8. Polish representation at the Avebury Circle. From left to right: Magdalena Sudoł-Procyk, Michał Jakubczak, Dagmara H. Werra, Aleksandra Wołk, Piotr Włodarczak, Sara Mandera, Tomasz Oberc, Hubert Binnebesel and Janusz Budziszewski. Photo: M. Jakubczak.

Philip C. LaPorta, Scott A. Minchak and Saverio A LaPorta: "The Tectonic Style and Setting and its Interregional Scale of Pre-Contact Quarry Development: An Application of the District Concept". Philip C. LaPorta presented the geological characteristics of the eastern Appalachian region. The study demonstrated how large-scale tectonic structures defined outcrop distribution. The research carried out by the Centre for the Investigation of Native and Ancient Quarries suggests that later industrial mining districts directly evolved from pre-Contact quarrying traditions.

The next presentation, "Chert Landscapes: Geoarchaeology, Prehistoric Exploitation, and Historical Use in Sant Martí de Tous (NE Iberian Peninsula)", was delivered by Bruno Gómez de Soler. The speaker discussed the progress of an ongoing geoarchaeological project investigating the chert outcrops of the Sant Genís Formation in north-eastern Spain, with the aim of assessing their variability, abundance, and patterns of prehistoric and historical exploitation. Among the sites discussed were La Guinardera, interpreted as a prehistoric chert workshop; La Guinardera Nord, a 18th–19th-century gunflint production site;

Fig. 9. Approaching Stonehenge. Photo: D. H. Werra.

and Cal Sitjo, which preserves a stratigraphic sequence from the Mesolithic to the Middle Neolithic.

The final paper of the session, "Exploitation and Distribution of Jurassic G Chert in the Regional Range among Funnel Beaker and Baden Cultures' Settlements of Western Lesser Poland", was prepared by Tomasz Oberc and Jakub M. Niebylski. Tomasz Oberc presented the results of an ongoing project from Site 1 in Bronocice, which aims to characterise the Jurassic G variety chert through sampling and comparison of material from natural outcrops and archaeological contexts. The study seeks to clarify the chronological horizons of its use, identify potential prehistoric extraction sites, and investigate the organisation of labour involved in the extraction and transport of this raw material between source areas and settlement zones.

The sixth session, chaired by Dagmara H. Werra, started with a presentation by Hubert Binnebesel, a doctoral student from the Institute of Archaeology of the Nicolaus Copernicus University in Toruń. His paper, "What Happened to the Flint Workshops from the Udorka Valley and Where Are They? Project of Geoarchaeological Research at the Mining Site in Poręba Dzierżna (Site 24, Lesser Poland Voivodeship,

Fig. 10. Inside Stonehenge. Photo: D. H. Werra.

Poland)", presented preliminary results from the ongoing geoarchaeological investigation of a multiphase "chocolate flint" mine dated to the Mesolithic and Neolithic. Through analysing the spatial distribution of artefacts, the study seeks to determine the original positions of workshop materials that were probably displaced by prehistoric alluvial processes. The presentation outlined the applied methodology, initial interpretations from two field seasons, and directions for further research.

The second paper, "Tracing the Provenance of 'Chocolate Flint' Raw Material – Petrographic and Geochemical Methods to Discriminate Between Two Source Regions", was authored by Sara Mandera, Michael Brandl, Magdalena Sudoł-Procyk, Christoph A. Hauzenberger, Dagmara H. Werra, Katarzyna Kerneder-Gubała, and Maciej T. Krajcarz. Sara Mandera presented results of applied petrographic (macroscopic and microscopic) and geochemical (Laser Ablation ICP-MS) analyses to distinguish "chocolate flint" from the Holy Cross Mountains and the Kraków-Częstochowa Upland. By combining these methods, they aimed to establish reliable provenance criteria and apply them to artefacts from various archaeological sites in Poland, providing insights into the distribution and circulation of this raw material in prehistoric societies.

The final presentation, "Survey of Flint Mine Remains in Agrarian Areas: Case Study of the 'Bednarzu' 'Chocolate Flint' Mine in Kotlarka (Central Poland)", was prepared by Janusz Budziszewski, Michał Jakubczak, Dawid Jagłowski, Jakub Karczewski, and Aleksandra Wołk. The authors discussed the challenges of studying prehistoric flint mines, whose surface relief is often completely damaged by modern agriculture. They presented a comprehensive, non-invasive research approach developed for the Bednarzu site, combining LiDAR, UAV and satellite imagery, geophysical methods (especially GPR), precise documentation of artefacts by GPS localisation, and spatial analysis in a GIS environment, providing a model for surveying flint mining remains of a similar state of preservation.

After lunch, before the poster session, the UISPP Commission meeting was held, chaired by Françoise Bostyn. The session opened with information regarding the forthcoming Continental UISPP Inter-Congress Asia, to be held in Salatiga, Sangiran, Yogyakarta (Indonesia), from 27 October to 6 November 2025. Details were also provided about the XXI UISPP World Congress, scheduled to take place in Poznań, Poland, from 31 August to 4 September 2026. The Commission discussed its ongoing publication activities and set out proposals for the next Commission meeting. It will be held in the Netherlands, the Rijckholt flint mine, and hosted by Joep Orbons. During the meeting, elections were held for the new board of our committee. Dagmara H. Werra (Institute of Archaeology and Ethnology, Polish Academy of Sciences, Poland) was elected as the new president, with Francoise Bostyn (Université Paris 1 Panthéon-Sorbonne, France) as vice-president. Jean-Philippe Collin (Université Libre de Bruxelles, Belgium) was elected committee secretary, while Jon Bączkowski (University of Southampton, UK) and Joep Orbons (ArcheoPro, the Netherlands) were elected as board members.

A poster session was held, chaired by Jon Bączkowski. The first two posters focused on similar topics and were authored by the same American researchers: Philip C. LaPorta, Margaret C. Brewer-LaPorta, Scott A. Minchak and Saverio A. LaPorta. Their first poster presented "The Regional Scale of Pre-Contact Quarries: Stratigraphic and Sedimentary Facies Relationships"; immediately followed by one covering "The Chain of Operation Across Three Tectonic Provinces: Quarry and Mine Instrument Types; Half Products and Products". The authors of the posters were represented by Philip C. LaPorta. Then Helena Wehren, on behalf of co-authors Anna Kienholz and Jehanne Affolter, presented a poster entitled "Found in Sursee-Zellmoos (Switzerland), but from Where Did It Come?" Helena Wehren presented recent results from excavations at Sursee-Zellmoos, a prehistoric pile-dwelling settlement and part of the UNESCO World Heritage Prehistoric Pile-Dwellings around the Alps. The presentation has developed into a discussion of different approaches and possibilities for identifying the provenance of the intriguing siliceous artefacts. The final poster was "Picks as a Proxy for Flint Mining? Analysis of Flint Picks and Mining-Related Artefacts from Soke Hill, Hampshire, England", presented by Emmanuel La O Kirchner, which was a continuation of the author's presentation from the first day.

After the poster session, a flint material workshop and a film screening took place. James Sainsbury presented artefacts from the Worthing Museum collection. Participants of the conference could also watch a film recorded by a member of the Harrow Hill expedition and edited by Joep Orbons, depicting daily life during the 1982 excavations.

The second day of the conference ended with a trip to Cissbury Hill, which is located within a large Iron Age Hillfort near Worthing. James Sainsbury guided participants through the complex, showed them the excavated shafts and introduced them to the history of research.

On the third day, participants travelled by coach to the Late Neolithic Grime's Graves flint mine, which included access to the newly opened Visitor Centre and a guided tour of the underground mine remains led by English Heritage staff Jennifer Wexler and Dickon Whitewood.

After the three-day conference, participants had the opportunity to join an additional excursion to Neolithic Wessex. The full-day trip took them through the Avebury landscape, with its famous henge, followed by Silbury Hill and the West Kennet Long Barrow, guided by Anne Teather and Jon Bączkowski. The group also explored Woodhenge and observed Durrington Walls from a distance. The day ended at Stonehenge, where participants were able to walk inside the monument.

The conference was held in a warm and welcoming atmosphere, which made everyone feel comfortable and at ease. Jessica Butt handled the technical aspects, ensuring smooth presentations and audio quality throughout. The intimate and engaging meeting in Worthing was attended by thirty participants, including academics, postgraduate and undergraduate students, and museum staff from nine countries: Belgium, France, Germany, the Netherlands, Poland, Spain, Switzerland, the United Kingdom, and the United States. This held particular significance for me, as a young student just starting my career. Having the chance to meet scholars from several countries in such a friendly atmosphere was a great introduction to the world of flint mining research. In addition, the unique opportunity to visit so many important and iconic British archaeological sites within such a short period of time was an invaluable experience, and I am deeply grateful to the organisers and all those involved in making it possible. The materials from the symposium will be published in the next volume of the journal *Archaeologia Polona*.

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