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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 Although now partially outdated due to the passage of time, it nonetheless offers a valuable overview of how the Corded Ware complex was perceived and studied in the early 2010s.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

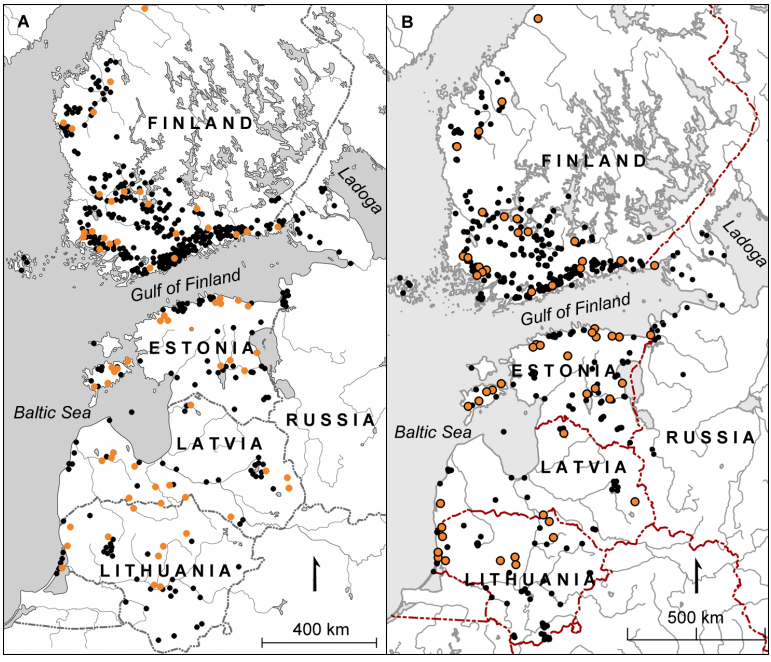

Fig. 1. The distribution of the Corded Ware Culture settlement sites (black dots) and burial sites (orange dots) in the eastern Baltic Sea region; the left map (A) represents the situation in 2011, while the right map (B) shows the present situation. Differences in the distribution of settlement sites 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.,*

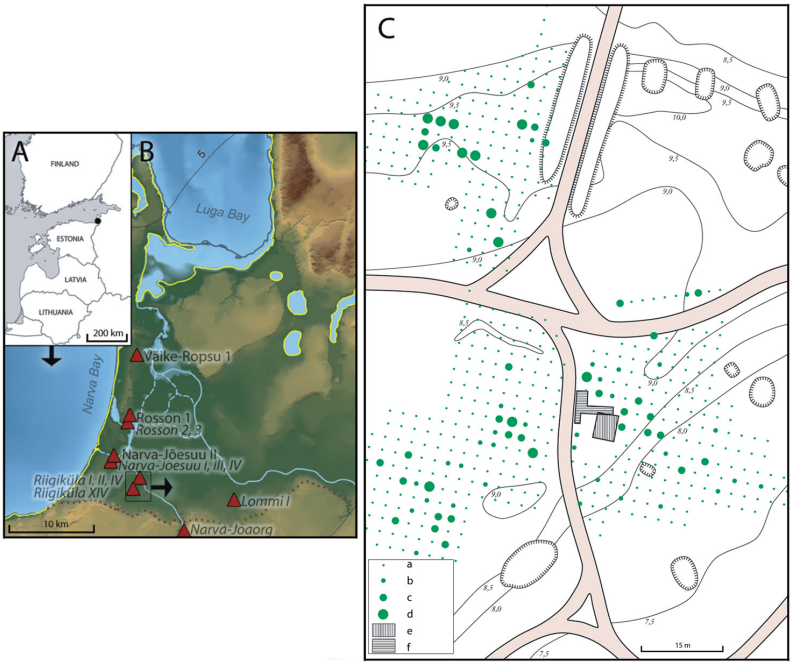

Fig. 2. Riigiküla XIV is an example of an extensive Corded Ware settlement site. Located in north-eastern Estonia (A), it belongs to a cluster of Corded Ware sites found in the early 2000s in the Narva–Luga region (Estonia and Russia; B). The general map (C) indicates: test pits (year 2006) with a – 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

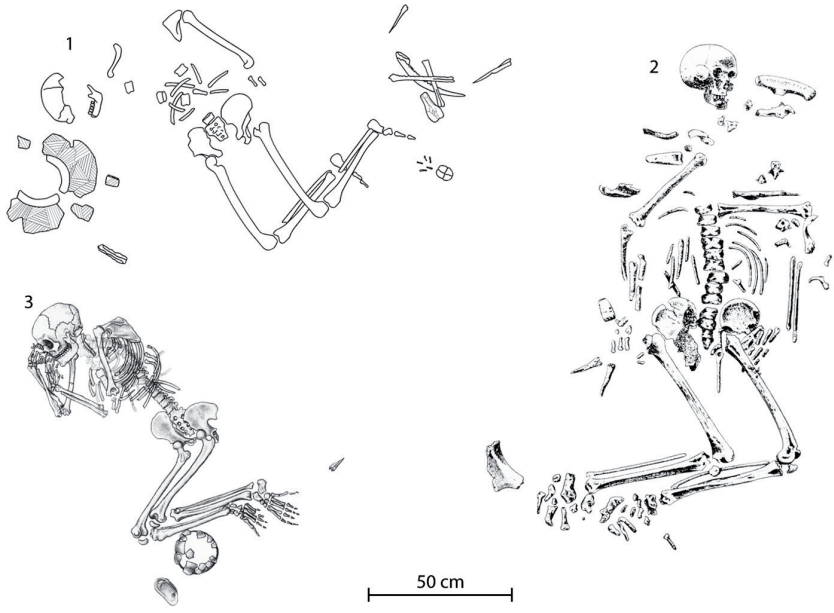

Fig. 3. Corded Ware Culture burials from Selgas in Latvia (1; after Grasis 1996), and from Ardu (2) and Sope (3) in Estonia. After Indreko 1935.

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

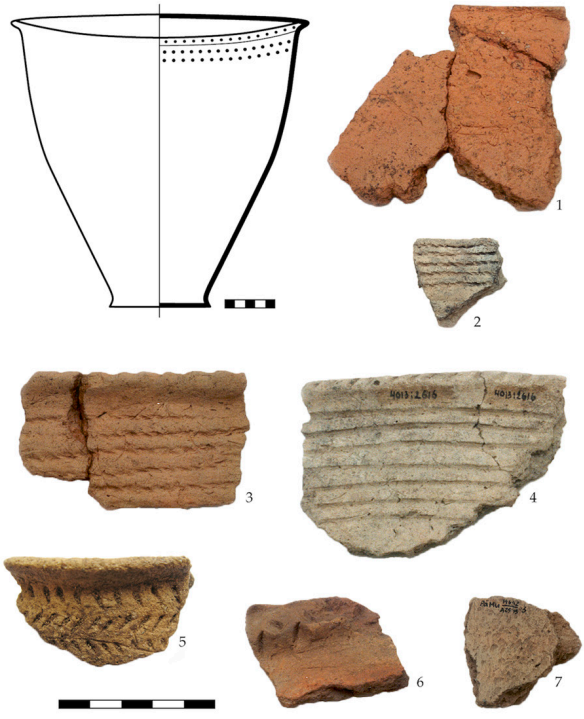

Fig. 5. Reconstruction of a household pottery vessel from the Narva Joaorg site and fragments of Corded Ware pots from the Riigiküla XIV (1, 3), Lemmetsa I (2), Akali (4), Ruhnu Valgi (5), and Valma (6, 7) settlement sites, all in Estonia (Narva Museum, NLM 2181:243 and 672; Pärnu Museum, PäMu 14642/A2515:1, 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

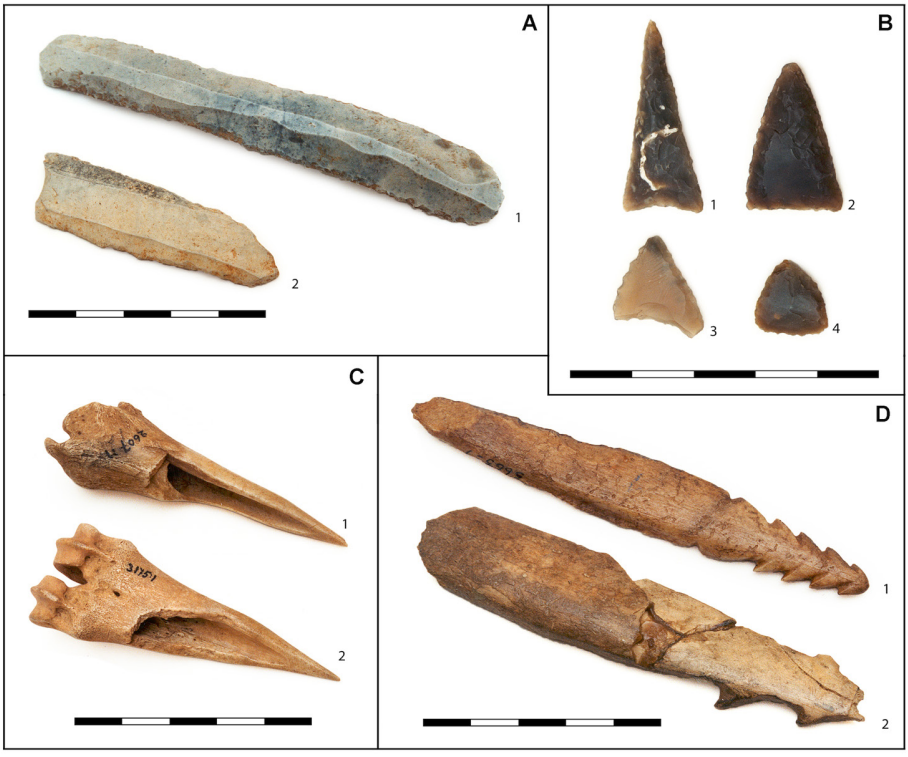

Fig. 7. A – Flint blade knives from the Kunila (1) and Ardu (2) burials in central and northern Estonia, respectively (Institute of History, Tallinn University, AI 3989:12 and AI 2745:3); B – triangular and heart-shaped flint arrowheads from the Tamula I settlement site in south-eastern Estonia (Institute 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 Iča 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.

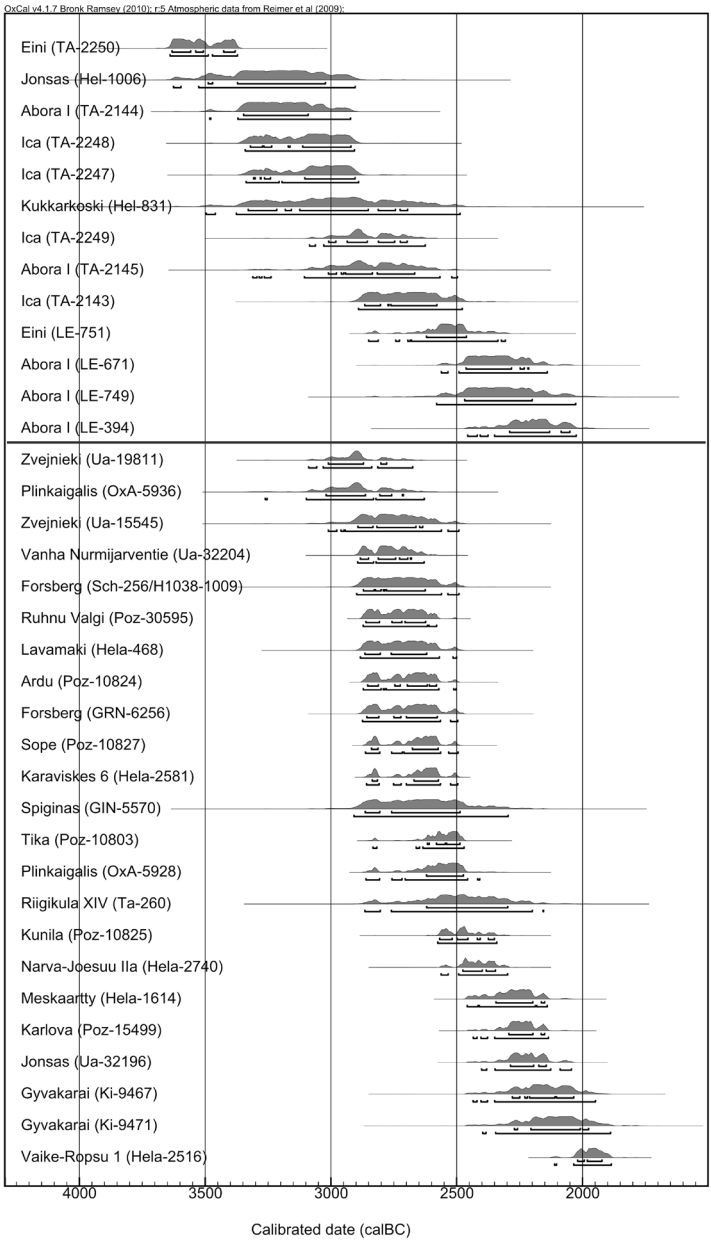

Fig. 9. Published radiocarbon dates associated with the Corded Ware Culture in the eastern Baltic Sea area (as of late 2011); the dates above the solid line are controversial and cannot be regarded as reliable.

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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