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Chronology and Distribution of Corded Ware Groups in Saxony-Anhalt

Ralf Schwarz[a]

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 Since the conference proceedings he planned were never published, the text remained unpublished in its original form.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

[a] Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, Landesmuseum für Vorgeschichte, Richard-Wagner-Straße 9 06114 Halle (Saale), Germany; e-mail: RSchwarz@lda.stk.sachsen-anhalt.de; ORCID: 0009-0008-5072-9306

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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:

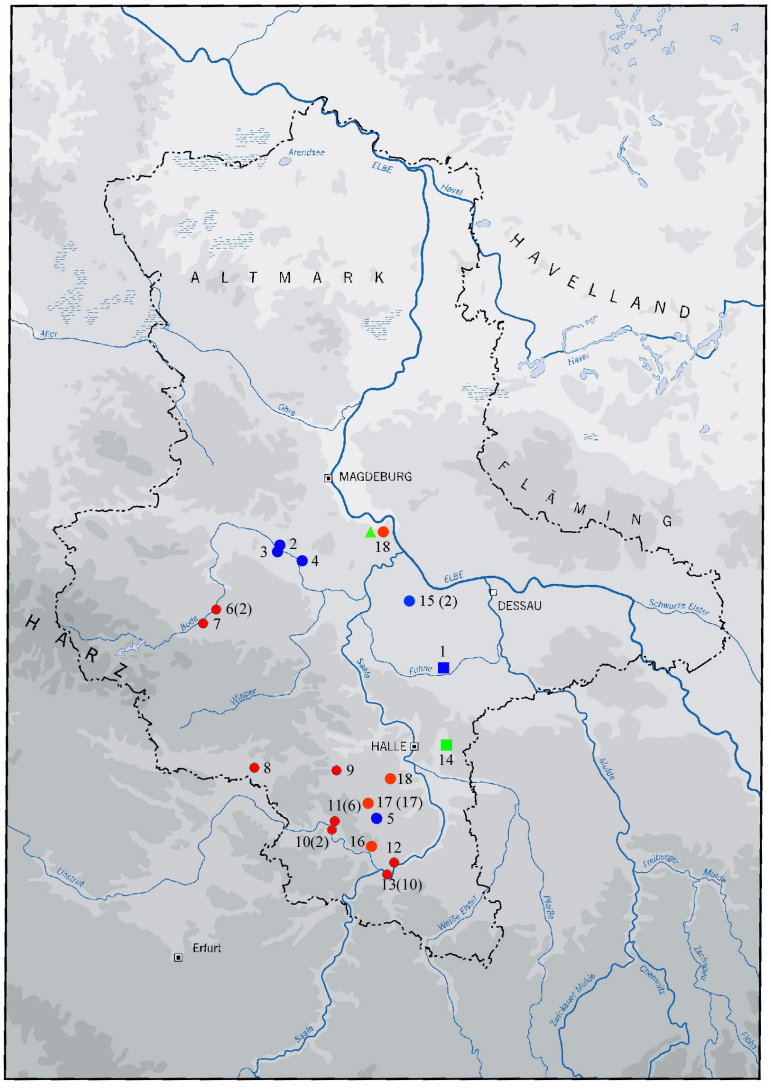

Fig. 1. Locations of sites with radiocarbon-dated finds of the early Corded Ware Culture in Saxony--Anhalt (Stage CWC 1: 2825–2450 BC): 1. Weißandt-Gölzau, 2. Egeln-Nord, 3. Egeln, 4. Unseburg, 5. Mücheln, 6. Quedlinburg, 7. Quedlinburg-Moorberg, 8. Niederröblingen, 9. Esperstedt, 10. Wetzendorf, 11. 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).

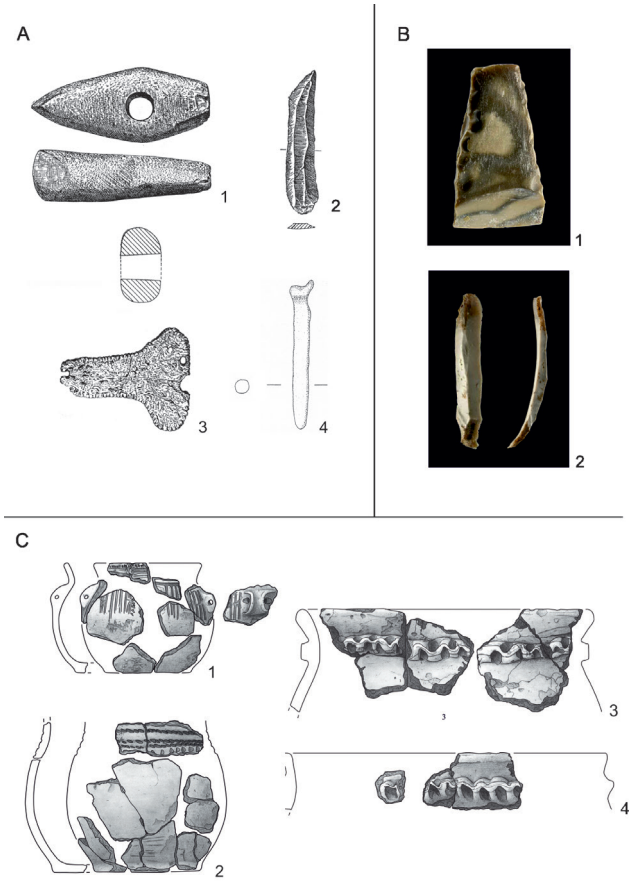

Fig. 2. Materials of the CWC 1a1 stage from radiocarbon-dated graves. A: 1–3 Nohra, grave 6; 4 Karsdorf, grave 95. B: Quedlinburg-Moorberg, grave 704. C: selected ceramic finds from the ritual ditch quadrangle feature 1120 of Pömmelte-Zackmünde. Image credits: Schmidt-Thielbeer 1955; Behnke 2015; Schwarz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

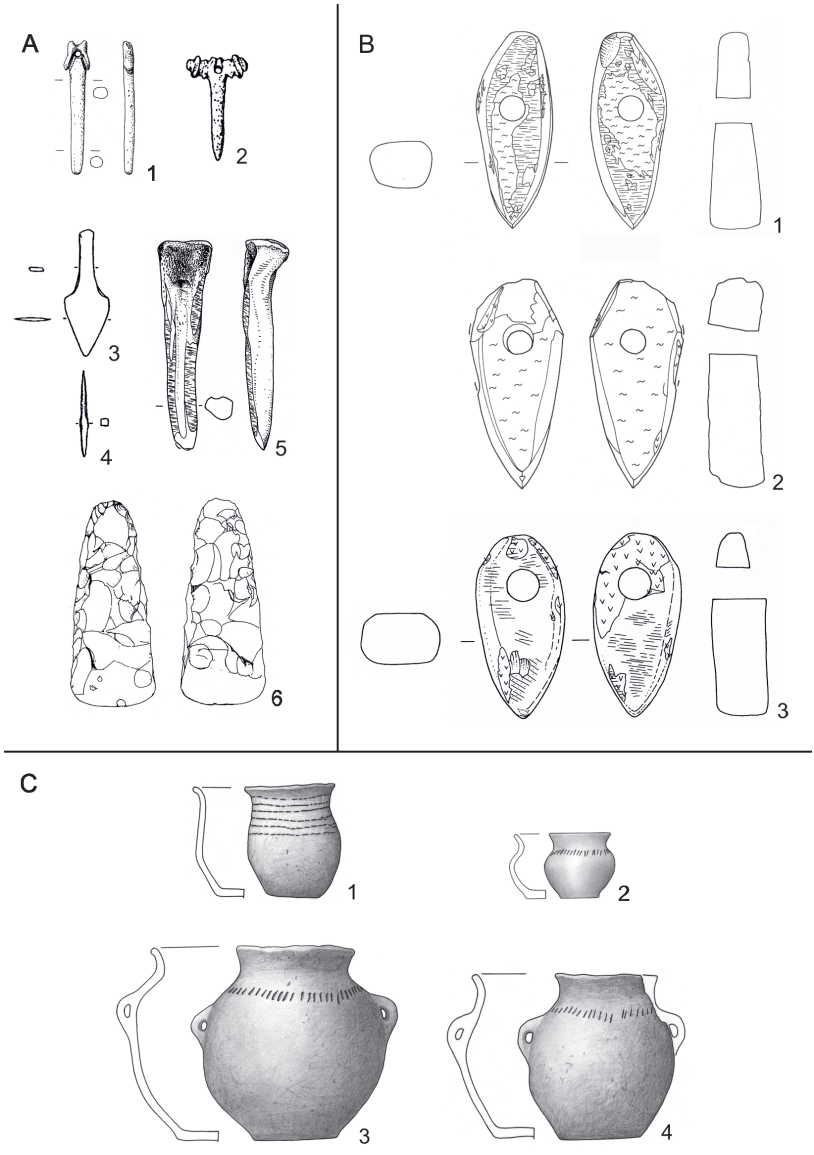

Fig. 3. Materials of stage CWC 1a2 from radiocarbon-dated graves. A: 1, 5–6 Eulau, grave VI/66, 2–4 Egeln-Nord (Bleckendorf); B: 1 Eulau, grave VI/99, 2 Eulau, grave VI/98, 3 Eulau, grave VI/93; C: 1 – Quedlinburg, grave XII/7853, 2 – Egeln-Nord (Bleckendorf), 3, 4 – Karsdorf, grave 22; D: Wetzendorf, 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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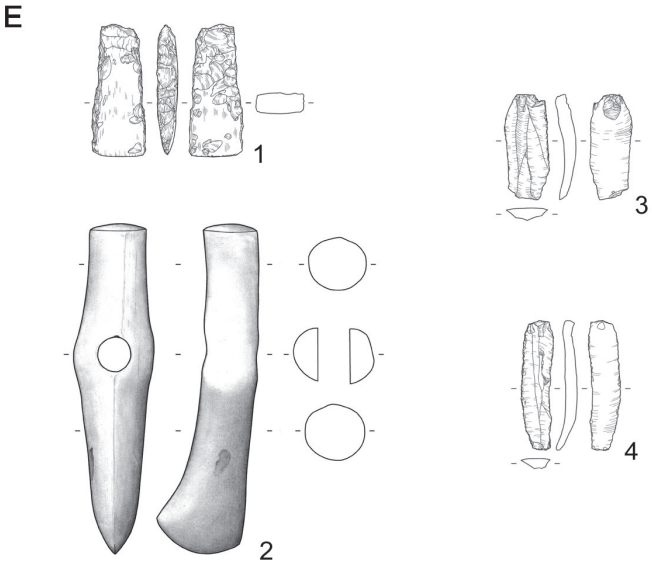
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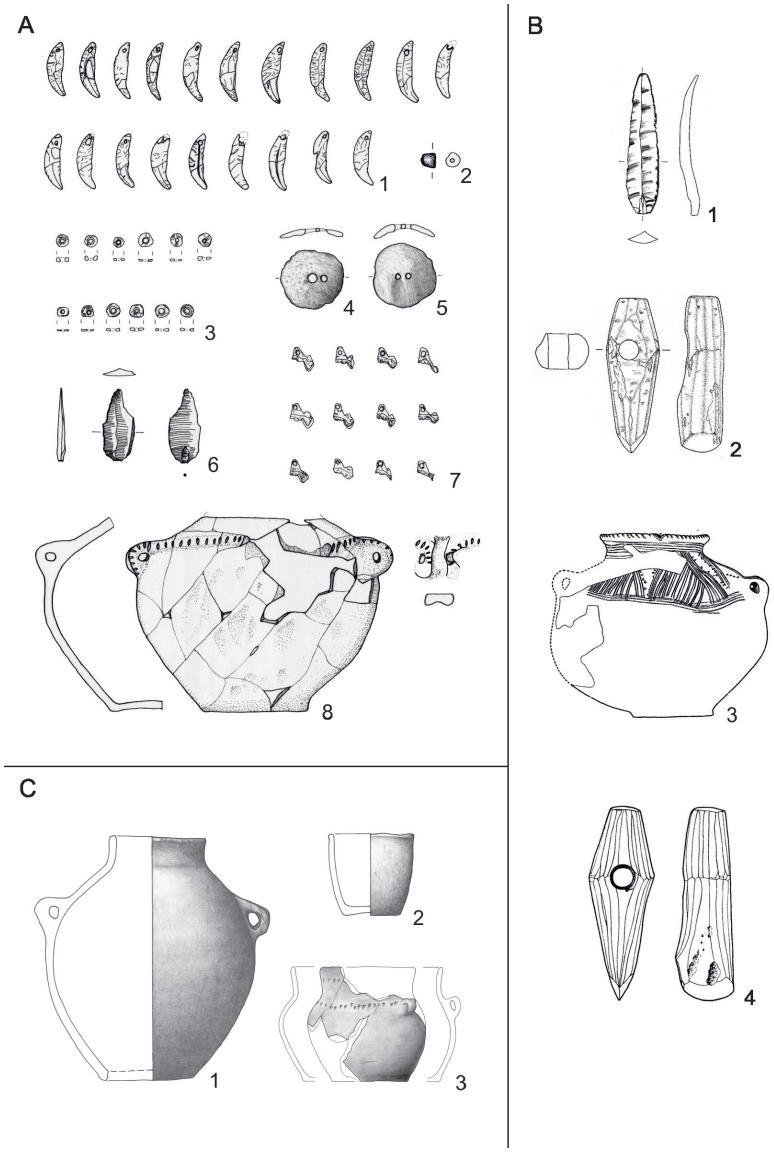
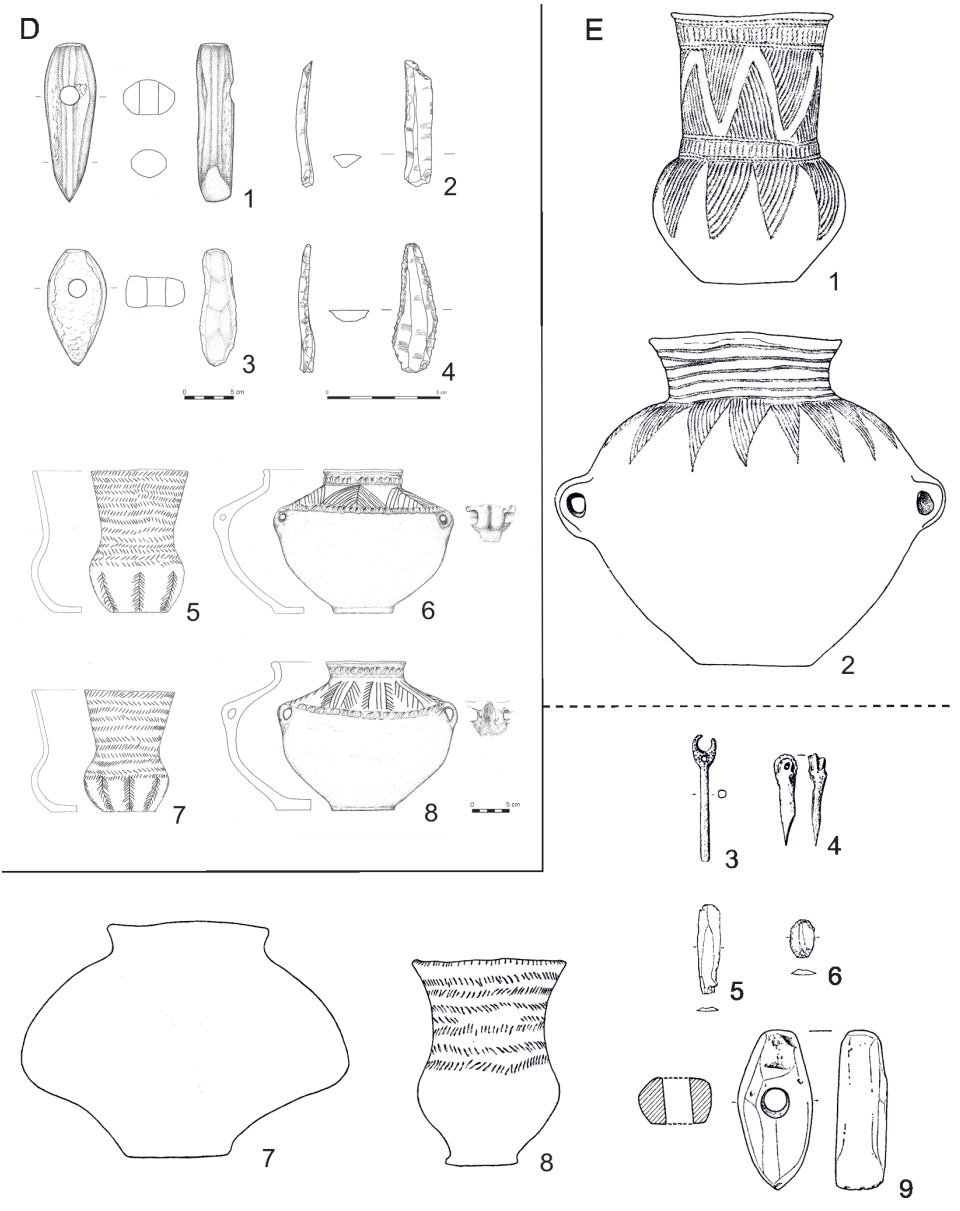


Fig. 4. Materials of stage CWC 1b from radiocarbon-dated graves. A: Esperstedt, grave 4179. B: 1, 2 – Niederröblingen, grave 3925; 3, 4 – Milzau. C: Karsdorf, grave 294. D: Niederröblingen, finding 3448. E: Materials of stages CWC 1b and 2 in two graves in a stratigraphic position one above the other: 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.

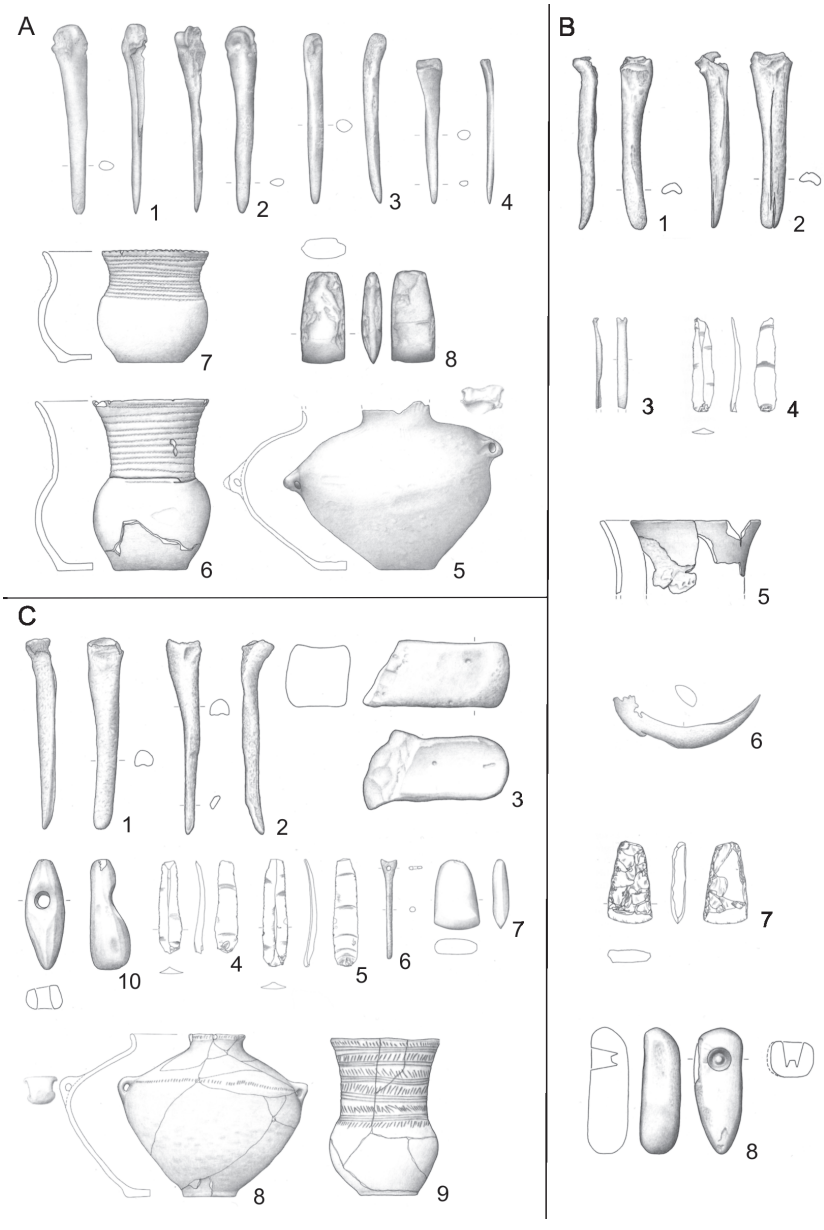

Fig. 5. Materials of stage CWC 1b from radiocarbon-dated graves. A: Bad Lauchstädt, grave 70044. B: Oechlitz, grave 25493. C: Oechlitz, grave 25569. D: Oechlitz, grave 25576. E: Reichardtswerben, "Auf dem Haine". Image credits: Fröhlich and Wüstemann 2017; Matthias 1982.

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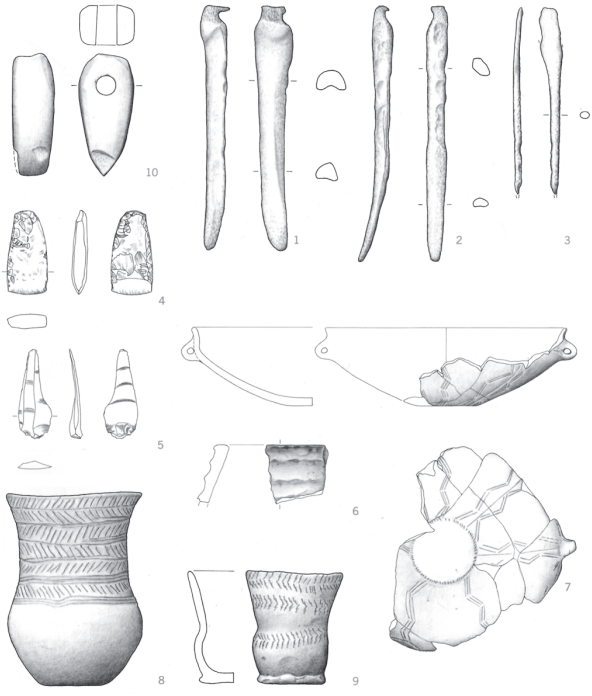

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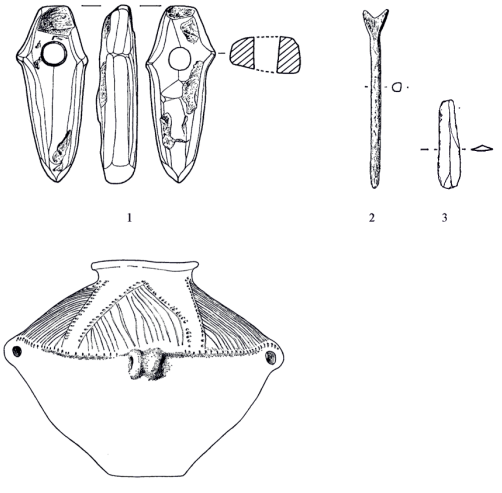

5. Oechlitz, Grave 20787: 3898±18 BP (MAMS-18137): 2458–2347 BC (Fröhlich and Becker 2015).
6. ForstLeina, Grave 33/3: 3890±40 BP (KN-I.319): 2458–2307 BC (Furholt 2003: MES 20).
7. Erfurt-Gispersleben: 3890±40 BP (KIA-2689): 2458–2307 BC (Furholt 2003: MES 18).
8. Oechlitz, Grave 25645.4: 3886±23 BP (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).

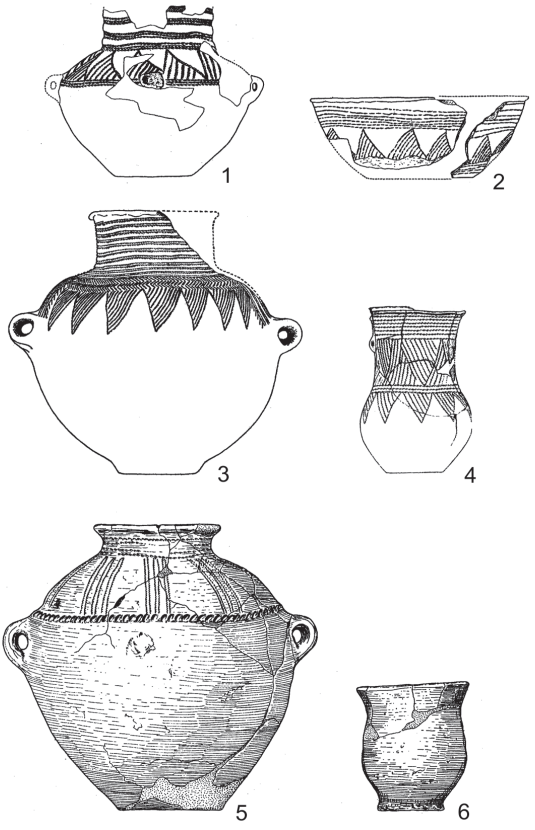

Fig. 6. Forms of stage CWC 2 from radiocarbon-dated grave finds. 1–2 – Hausneindorf, Grave 1; 3 – Braunsdorf, Grave 12; 4 – Forst Leina, Grave 33/3; 5–6 – Erfurt-Gispersleben. Image credits: Furholt 2003.

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.

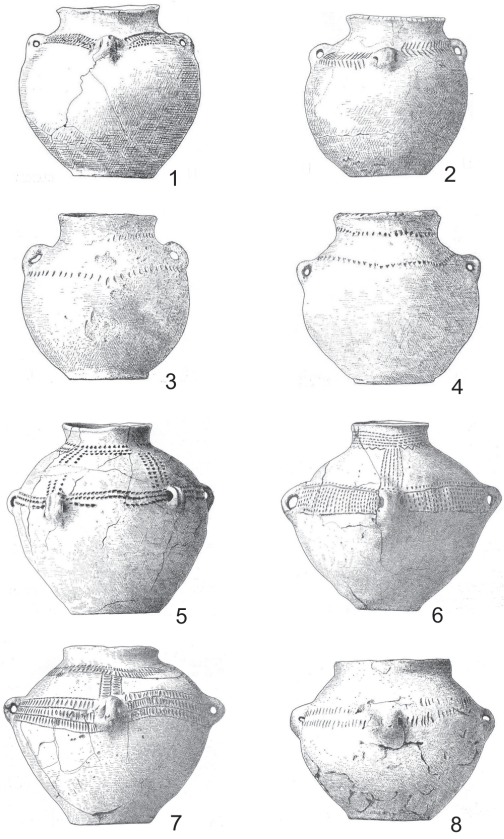

Fig. 7. Chronological sequence of the amphorae of the Saale Estuary Group. 1–3 – shoulder-handle amphoras from stage CWC 1a; 4 – shoulder-handle amphoras from stage 1a2; 5–6 – belly-handle amphoras from stage CWC 2; 7–8 – belly-handle amphoras with rudimentary necks from stage CWC 3. Locations: 1. Schwarz, 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

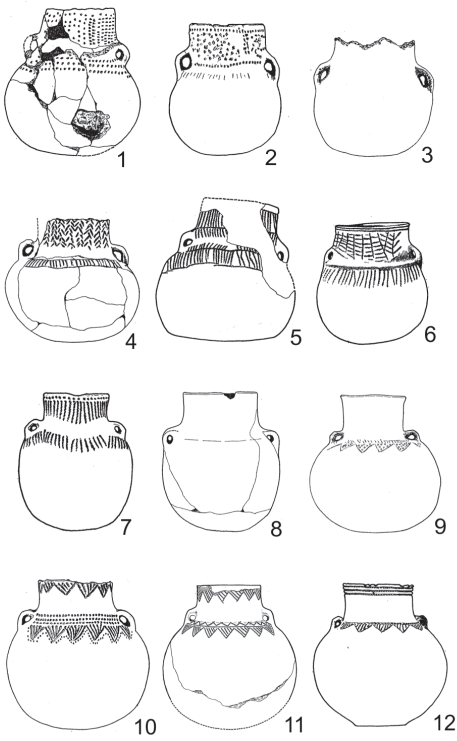

Fig. 8. Late globular amphorae of stage GAC 3: 1 – Wölpke, OT Badeleben; 2 – Diebzig; 3 – Groß Quenstedt; 4 – Deesdorf; 5 – Weißandt-Gälzau; 6 – Hillersleben, OT Paxförde; 7 – Bertkow, OT Plätz; 8 – Barby; 9 – Mittelhausen; 10 – Barby; 11 – Quenstedt; 12 – Meseberg. Image credits: Beier 1988.

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

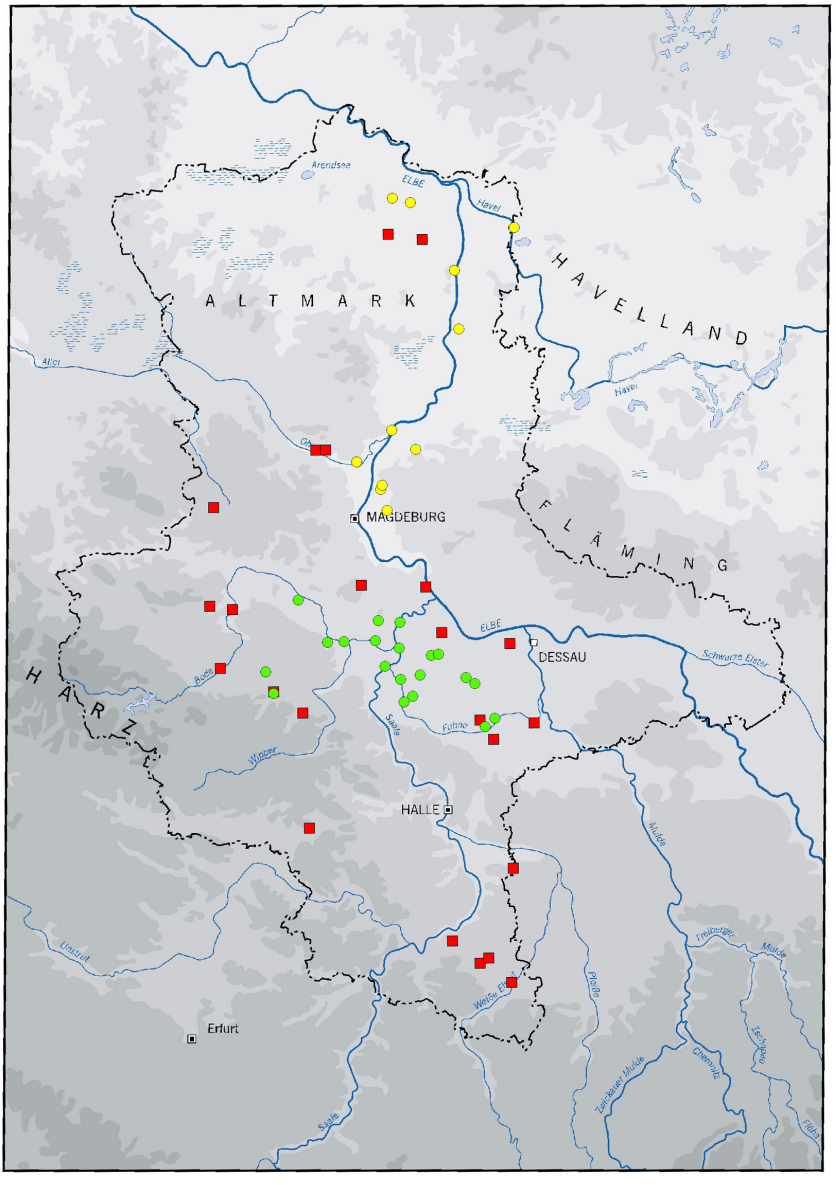

Fig. 9. Distribution of grave finds from the late Globular Amphora Culture (stage GAC 3: red), the CWC 1 stage of the Saale Estuary Group (green), and the early stage of the Schönfeld Culture (Fischbeck Group according to Wetzel 1978: yellow).

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.

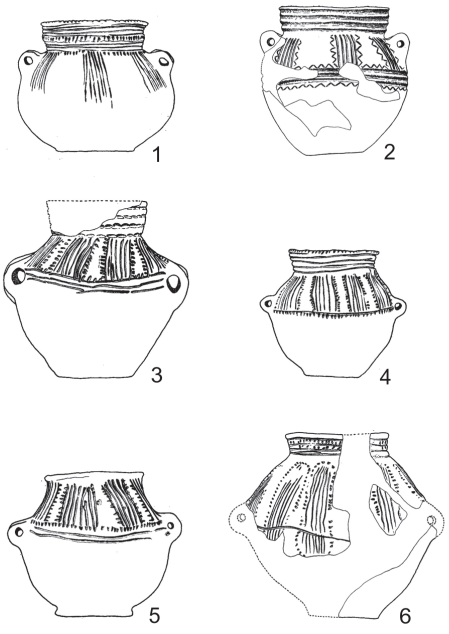

Fig. 10. Chronology of amphorae from the North Harz Group. 1–2 – Shoulder-handled amphoras from stage CWC 1: 1 Egeln, 2: Emersleben; 3–6 – Belly-handled amphoras from stage CWC 2: 3 Schneidlingen, 4: Westerhausen, 5: Tarthun, 6: Schwanebeck. Image credits: Matthias 1968.

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

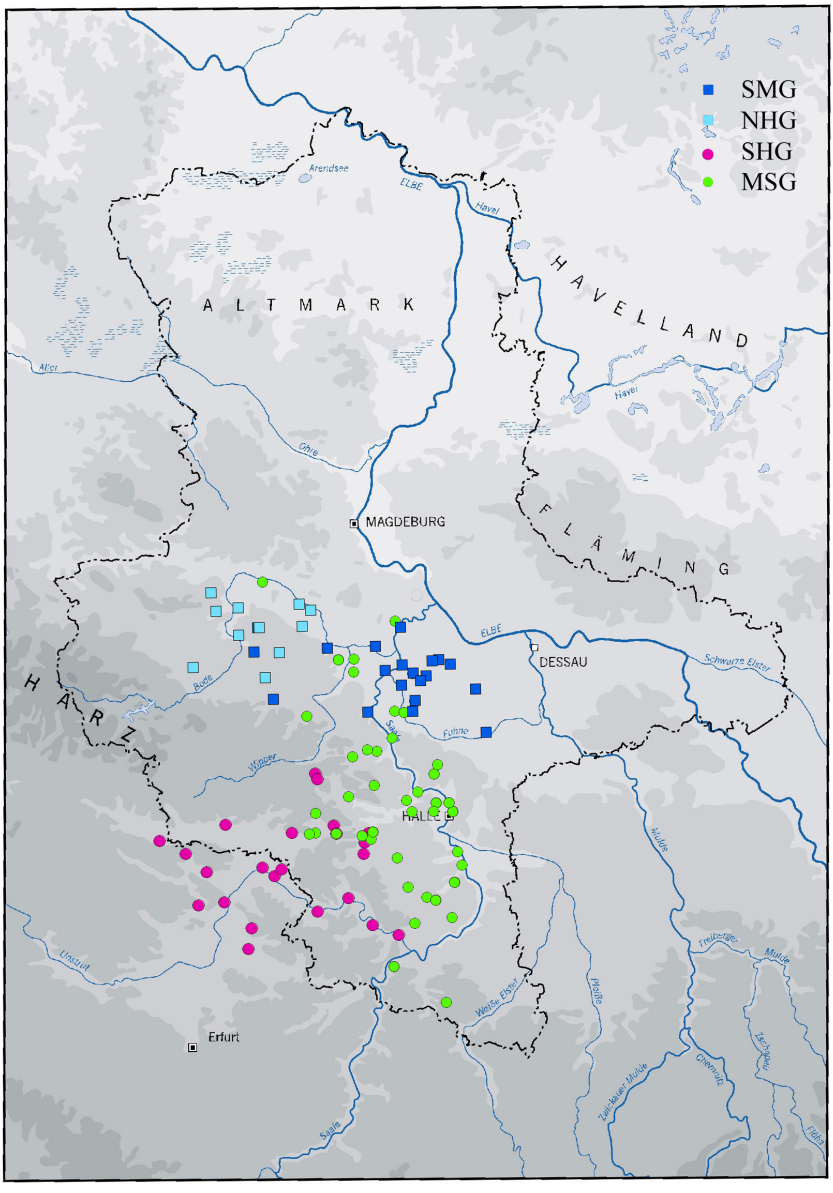

Fig. 11. Distribution of the four regional groups of the Middle German Corded Ware Culture in Saxony-Anhalt: dark blue: Saale Estuary Group (SEG), light blue: North Harz Group (NHG), red: South Harz Group (SHG), green: Middle Saale Group (MSG).

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).

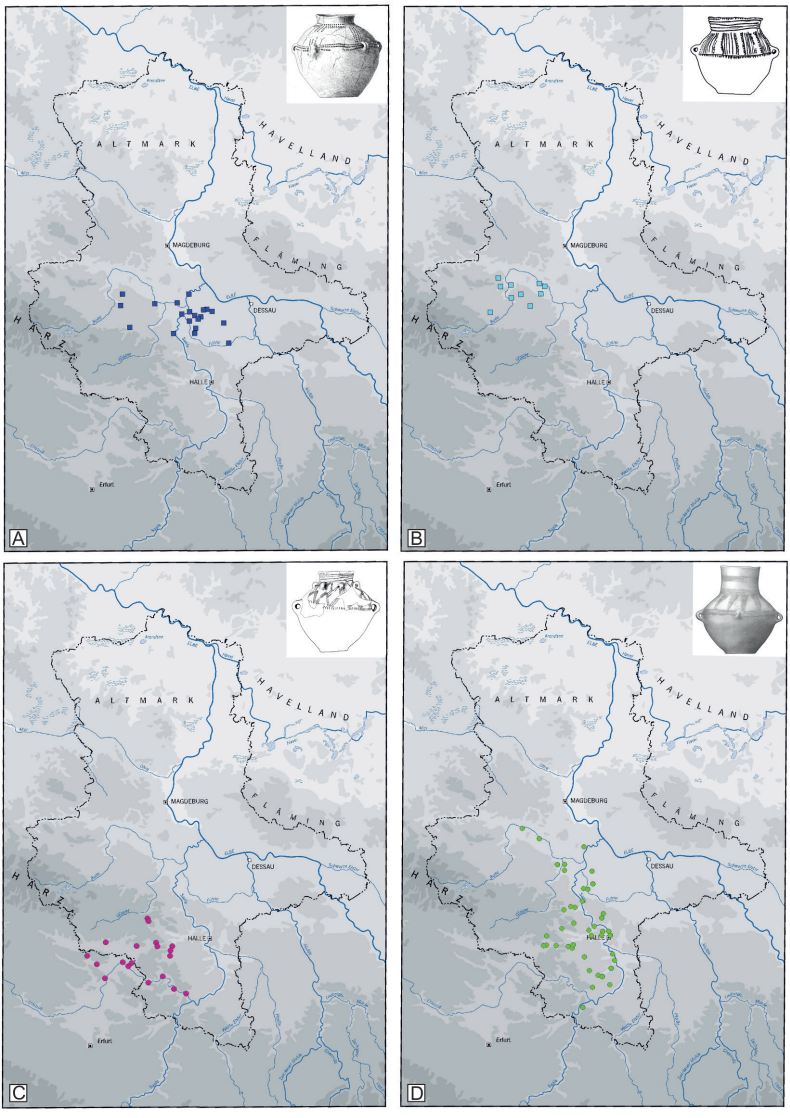

Fig. 12. A – Distribution of the Saale Estuary Group based on the East Harz amphorae (stages CWC 1–2). Image credits: Lucas 1965: pl. 11: 1; B – Distribution of the North Harz Group based on the North Harz amphorae and North Harz beakers (stages CWC 1–2). Image credits: Matthias 1968: pl. 46: 14; C – 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

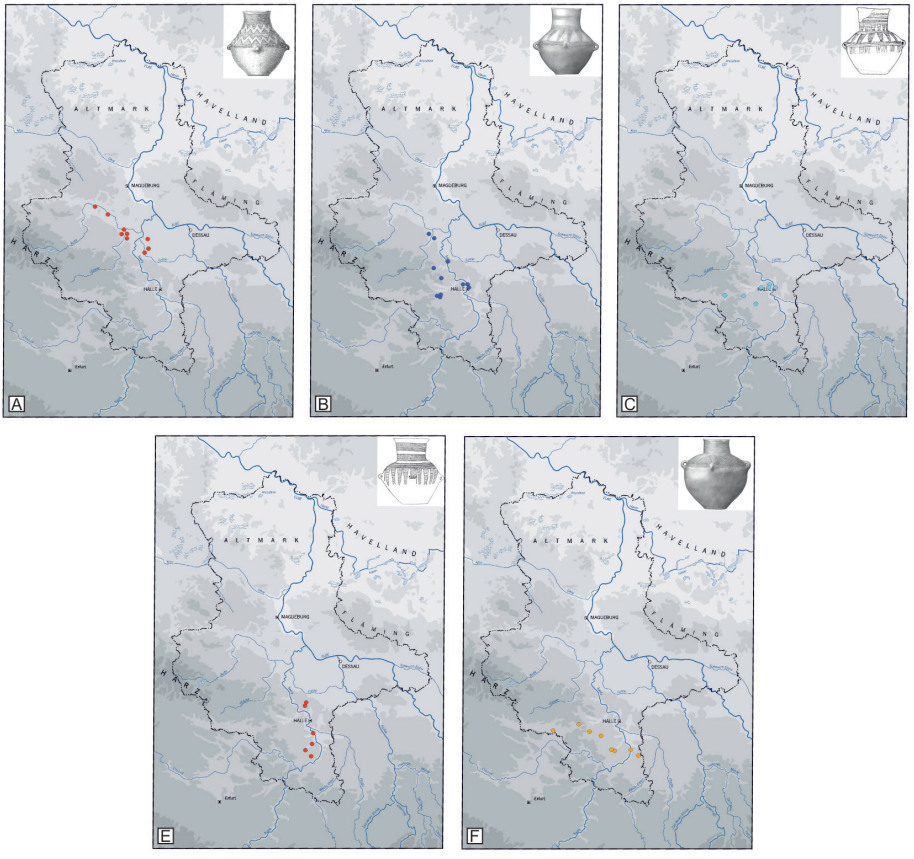

Fig. 13. A – Distribution of the northern local group of the Mittelsaale Group based on the Weddegast-type amphorae with patterns of zigzag bands cut out of areas of circumferential furrowed or incised lines (stage CWC 2). Image credits: Lucas 1965: pl. 26: 2; B – Distribution of the middle local group 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 [...].

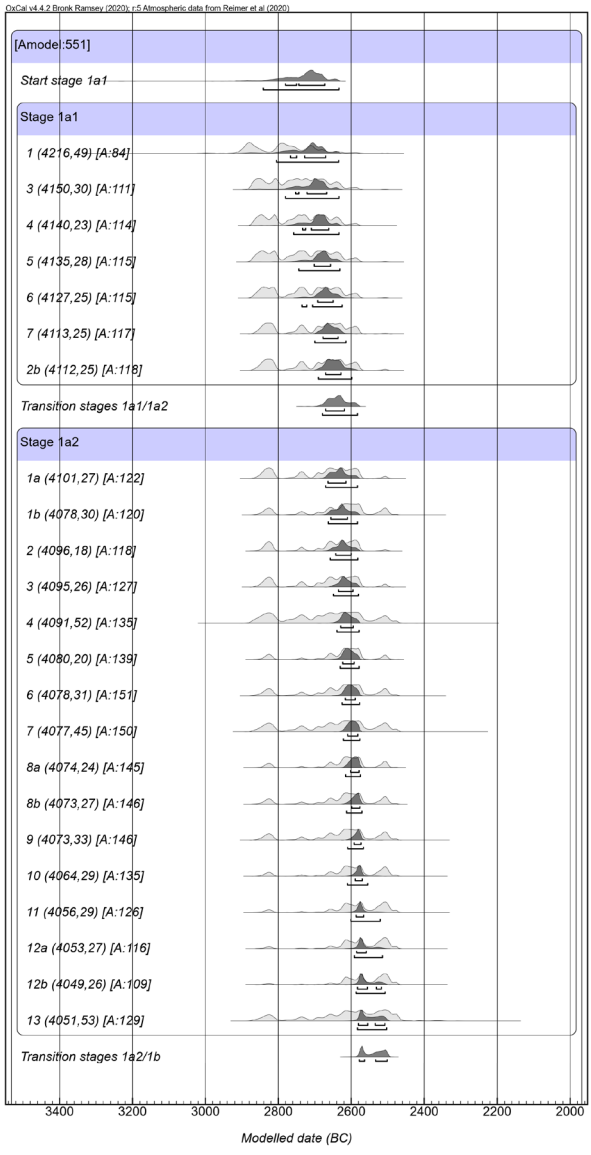

Fig. 14a. The graphic displays the results of a Bayesian model of the radiocarbon-dated graves using OxCal 4.4 (Bronk Ramsey 2020) and the IntCal20 Northern Hemisphere radiocarbon age calibration curve (Reimer *et al.*, 2020). The numbers correlate with those of the graves in the text. The BP ages and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

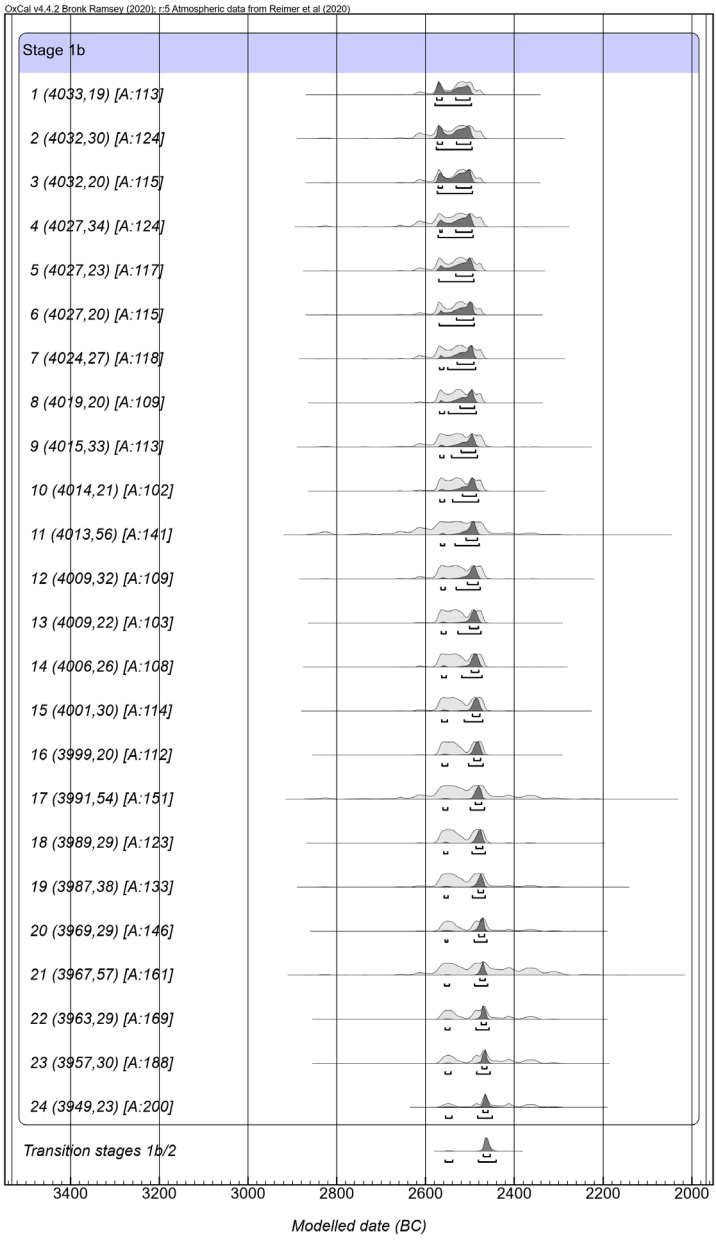

Fig. 14b. The graphic displays the results of a Bayesian model… (continued).

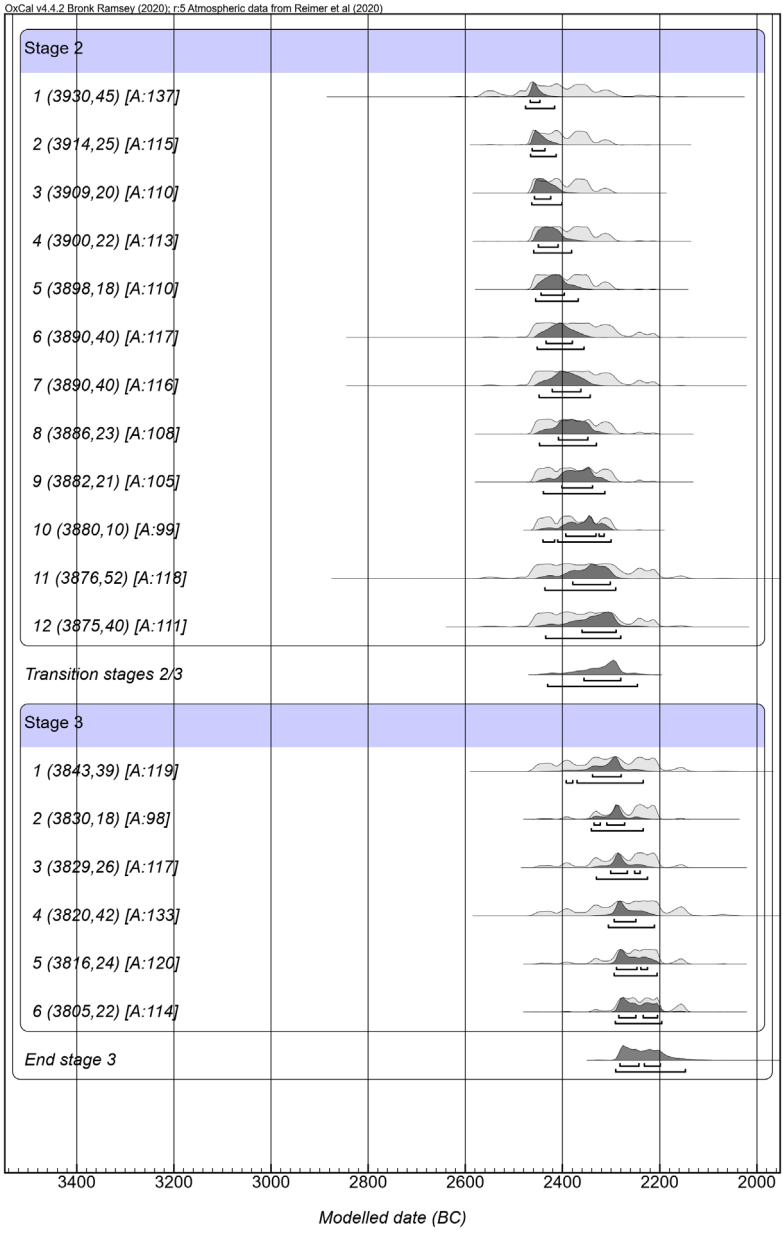

Fig. 14c. The graphic displays the results of a Bayesian model… (continued).

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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