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Neolithic Battle Axes With Cup Marks

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For many years, scholars consistently dated cup marks – shallow depressions found on both portable and immovable stones – of northern Germany and southern Scandinavia to the Bronze Age. Novel findings trace them back to at least as far as the Late Neolithic period (LN, c. 2350 BC). Recently, portable cup marked stones belonging to a late Funnel Beaker context (c. 2800 BC) have been found. There are even indications of cup marks dating back to the 4th millennium BC. At present, a gap exists in the knowledge of cup marks and non-figurative art in general during the Younger Neolithic (YN) Corded Ware Culture (CWC) (c. 2800–2250 BC). This paper establishes the significance of three related types of secondary treatments of battle axe fragments, namely the addition of (hourglass shaped) unfinished shaft holes, deep pecking holes, and shallow cup marks. The argument put forward is that they were present in small numbers in the 4th millennium BC, becoming increasingly common during the proposed 'gap phase' in the context of CWC societies. The late 3rd millennium is a period of enormous social change. During this period, of the three types of secondary treatment only cup marks persist, while the potential media on which such cup marks are applied diversifies, with them appearing on objects and items other than battle axe fragments. It is proposed that this development is related to the social changes that characterise the onset of the LN. Finally, it is suggested that the LN and Bronze Age cup mark tradition is based on an earlier tradition initially associated with battle axes.

Keywords: Cup marks, battle axes, symbolic drillings, Neolithic, Corded Ware Culture, northern Germany

INTRODUCTION

Introduction to the dating of cup marks

Cup marks are found on both portable and immovable rocks in many prehistoric and historic contexts throughout Europe. Cup marks are generally about 5 cm in diameter and up to 1 cm deep, although they can vary greatly in size, ranging from 1–20 cm in diameter and up to 6 cm deep (Glob 1969, 111; Gosso 2010, 207; Iversen 2019a, 144). Cup marks are present in the early 4th millennium BC of Brittany and the Iberian Peninsula, as well as in the late 4th millennium BC in Great Britain and Ireland (Horn 2015 30; Iversen 2019a, 144). In northern Italy, they can even be traced back to around 5000 BC (Gosso 2010, 208). In Central and Northern Europe, cup marks are mainly believed to exist from the Bronze Age onwards. However, the basis for this assumption is not solid and recent discoveries have shown that a rethink is needed.

In northern Germany and southern Scandinavia, cup marks discussed in the literature are predominantly dated to the Bronze Age (Table 1 summarises and compares different chronologies). This dating is, in particular, derived from cup marks in Sweden and Norway. These occur with centres along Norway's west coast, south-eastern Norway, and Bohuslän, and in Uppland, and are associated with figures such as boats or people with weapons, verifying a Bronze Age date (Horn 2015, 30). This date cannot, however, simply be transferred to Danish and north German cup marks. Bronze Age figurative art associated with cup marks seldom occurs in Denmark and when it does it is more often on the islands in the east than in Jutland in the west (with the exception of Djursland, easternmost Jutland), and more frequently so on the

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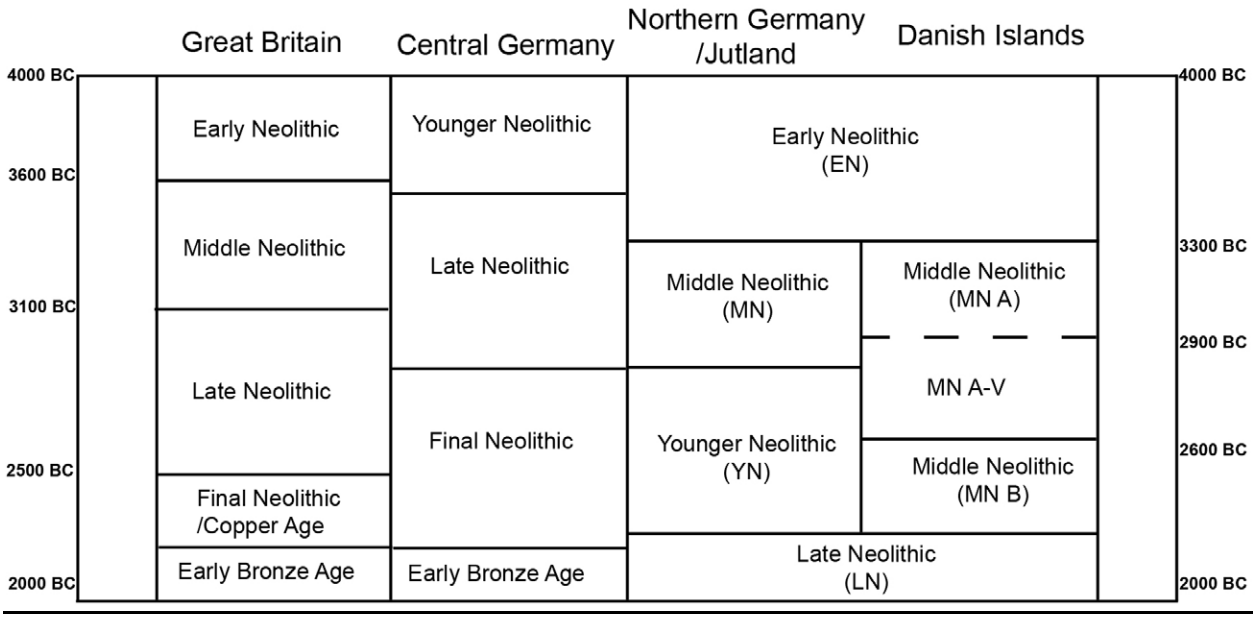
TABLE 1. COMPARISON OF TERMINOLOGIES FROM DIFFERENT REGIONS



island of Bornholm (Felding 2010, 85; Horn 2022, 15). Such images are largely unknown in northern Germany (Horn 2015, 31); here, rocks are only sporadically attributed with symbols other than cup marks, such as the cup marked capstone from Bunsoh that also exhibits engraved rings, hands, and feet (Ickerodt & Kelm 2011). Thus, as one moves further away from the centre, the frequency of occurrence decreases (Felding 2010; Horn 2022, 15).

In Denmark, and potentially in northern Germany as well (although this region has not yet been sufficiently researched), small 'pocket-stones' marked with cup marks (known as *Lommeskålsten*) have been discovered. These stones have 1–11 cup marks (Glob 1969, 128). While Glob attributed these to the Bronze Age, subsequent excavations have revealed that they were already being created during the Late Neolithic (LN; Sørensen 2018, 43). Even though pieces of such an age bear only a single cup mark, this demonstrates that the phenomenon began earlier than previously believed.

However, cup marks are more common on megaliths and free-standing stones in both Denmark and northern Germany. Over 275 megaliths in Denmark are associated with cup marks (Iversen 2019a, 144) but the dating of these to the Bronze Age remains dubious, with closed and dated contexts almost non-existent (Horn 2015, 31; Iversen 2019a, 144–7). The age of the cup marks remains uncertain as the activity of creating them continued (or was revived) until at least the 17th century AD (Horn 2015, 32).

In his extensive analysis of cup marks, Glob (1969) already expressed scepticism as to the restricted Bronze Age dating of those associated with megaliths, pointing to a number of contexts that open up the possibility of a LN date (1969, 119–24; cf. Iversen 2019a, 151). Additionally, Felding (2009, 58) suggests a LN date for several cup marked stones found in burial contexts (cf. Sørensen 2018, 45). Dibbern (2016) confirms this with a cup marked stone from the megalithic grave of Albersdorf-Brutkamp (most likely a capstone belonging to the passage) that dates at least to the early LN (2350–1900 BC; 2016, 103–4).

Iversen (2019a) also identified potential Early Neolithic (EN) and Middle Neolithic (MN) contexts with cup marks. While citing the work of Dibbern (2016), he dates the cup marks back to the construction and primary use phase of the tomb (*c.* 3600–3100 BC; 2019a, 146). Dibbern used stratigraphic observations for his own dating: the layer with the cup marked stone was filled in the early LN, offering a *terminus ante quem* for the cup marks (2016, 97, 103–4). This opens the possibility of an earlier date; however, caution in necessary.

Another late EN context (*c.* 3500 BC) mentioned by Iversen (2019a, 146; cf. Kaul 1987; Iversen *et al.* 2022, 169) is doubtful due to its state of preservation

(a destroyed long dolmen at Onsved Mark, Zealand). This context can neither be verified nor refuted. Iversen's suggestion that cup marks are linked to the spread of megalithism throughout Europe (2019a, 146) is straightforward but not supported by the data. However, even if these examples are not entirely clear-cut, they deliver enough evidence to urge a rethinking of the dating of megalithic structures with cup marked capstones in Denmark and northern Germany.

Recently, Iversen *et al.* published two stones with cup marks, each found in one of two adjacent enclosures on the island of Bornholm, with a *terminus ante quem* of 2900–2700 BC (2022, 163). This confirms the existence of cup marks in this period in Northern Europe (cf. Milstreu & Dodd 2018, 20). However, it is important to note that, during the period 3000–2600 BC, Bornholm is distinct from mainland Denmark and northern Germany. The MN V (late Funnel Beaker Culture – FBC) on Bornholm is characterised by highly decorated pottery and art in the form of sun motifs on clay plates, making it a distinct example of the late FBC in its area of distribution. The sun symbols are even unique within this region (cf. Kaul *et al.* 2016; Nielsen & Nielsen 2020). Additionally, late FBC palisade enclosures, and, later, the Swedish Boat Axe culture (BAC) are present on Bornholm, while both are absent from the mainland (cf. Iversen 2015). Until cup marks dating to the EN or MN are found elsewhere, it must be concluded that they are mainly confined to this island. However, this does not apply to cup marks on battle axes as will be shown in this paper.

Introduction to cup marks on battle axes, and objectives

Cup marks are one of three types of secondary markings of battle axe fragments, along with deep pecking holes and hourglass shaped holes (see below). The cup marks and other secondary treatments present on battle axes addressed in this paper are currently predominantly interpreted as markings for later drillings. Rarely, and only in early studies, have they been regarded as symbolic and partly associated with the wider cup mark phenomenon (Schwantes 1958; Malmer 1962; Röschmann 1963; Roe 1966). Thus, this paper is a new attempt to establish the significance of cup marks on – and secondary uses of – battle axes.

Iversen's paper (2019a) is titled *The appearance, disappearance, and reappearance of non-figurative rock art during the southern Scandinavian Neolithic and Bronze Age*. According to this and other studies, there should be a 'gap phase'; the disappearance of cup marks as non-figurative rock art during the Younger Neolithic (YN; see Table 1 for correlation of dating and nomenclature), thus being associated with Corded Ware (CWC) societies. This notion stems from, and consolidates, simplistic narratives about social changes in the 3rd millennium associated with the emergence of these societies. Even though in a recent paper, Iversen *et al.* (2022) mention cup marks on YN battle axe fragments by citing Schultrich (2018), the notion of a 'gap phase' still needs to be disproved in an in-depth study dedicated to the phenomenon.

To provide a full understanding of cup marks on battle axes it is first necessary to introduce their secondary uses and modes of final deposition. This paper will demonstrate the diversity of secondary treatments of axes and illustrate the various interpretations of this. The present study is based on an investigation of battle axes originating in the YN throughout the northern German state of Schleswig-Holstein (Fig. 1). The focus is placed on single finds, with an emphasis on secondary reworked fragments. Building on recent research (particularly Dibbern 2016; Sørensen 2018; Iversen 2019a; Iversen *et al.* 2022), this study explores the origins of the practice of marking objects and locations with cup marks. The objective of this study is to show that cup marks occur regularly on battle axe fragments related to the so-called Single Grave Culture (SGC), a regional variation of the YN CWC specific to northern Germany and Jutland (cf. Hübner 2005). Based on this, a reconstruction of the origins and original meaning(s) of adding cup marks to objects and places in the Neolithic of Northern Europe is proposed.

This paper has three core goals. First, to (re-) introduce the topic of cup marks on battle axes into the discussion. Secondly, to associate the cup marks on battle axes with the wider cup mark phenomenon, in an attempt to fill the proposed 'gap phase'; and thirdly, to tackle simplistic narratives about social changes in the 3rd millennium BC associated with CWC societies.

To achieve these goals, some material based questions will first be raised, concerning both the frequency of cup marks and other additions on battle

Fig. 1.
The location and borders of the modern federal state of Schleswig-Holstein from where the main data was obtained. There are more than 1200 battle axes from single-find contexts in this region (according to Schultrich 2018)

axes from a diachronological perspective and their physical attributes; ie, their precise positioning and (any) differentiation according to shape.

MATERIALS AND METHODS

One cannot rely on a study of the literature alone to provide a thorough examination of battle axes with

cup marks and other types of secondary treatments. Many battle axes that have turned out to have cup marks were not labelled as such in the literature. Also, only the diameter of such a feature is made clear in illustrations of axes, with the depth only rarely being documented. The basis of this study is formed through an analysis of ~1460 battle axes from modern day Schleswig-Holstein, of which more than 300 pieces were investigated in person by the author of this paper. The methods applied include a typological and typo-chronological appraisal of the battle axes, measurements of the dimensions of the different secondary treatments, and a basic statistical analysis of the number of axe fragments with additions and the development of such additions over time. Moreover, the approach also involves a differentiation between types of secondary shaft hole axes, to distinguish 'functional' from 'non-functional' axe fragments and, furthermore, to distinguish between different methods of secondary marking.

ANALYSIS AND THE *CHAÎNE OPÉRATOIRE*

After presenting an introduction to the main typological trends of battle axes in Central Europe, the *chaîne opératoire* will be detailed, with a focus on the final life-steps of a battle axe; ie, its fragmentation and re-use. Here, an analysis of the fragmentation, re-use, and – associated with this – the different types of secondary treatment, will also be introduced.

Introduction to battle axes: Separation to simple shaft hole axes, chronology, contexts

Battle axes emerge as a distinct type of object in Central Europe *c.* 4000 BC, and flourish until *c.* 2200 BC (Zápotocký 1992), continuing throughout the Bronze and Iron Ages (Schmidt 1993, 68; Frehse 2013, 5; Iversen 2015, 106–8). Battle axes are defined by their shaft holes and their elaborate, rather complex, form. The diverse forms with arcs and edges, as well as the (mostly) blunt cutting edges, distinguish battle axes from shaft hole axes with sharp cutting edges and of a less elaborate design (Hoof 1970, 80; Zápotocký 1992, 154). Simple shaft hole axes could be reworked several times after breaking (Lekberg 2004, 262–5) (Fig. 2), while battle axes were (almost) never reworked to become serviceable pieces again (see below).

Simple shaft hole axes develop in the late YN on the basis of battle axes. In this phase, the shaft holes move near to the butt of the axes and the shapes becomes simpler. However, during the YN III complex forms also continue to be produced (cf. Hübner 2005, 127–33; Schultrich 2023b, 64–6; Fig. 3). In the LN and Older Bronze Age, elaborated battle axes vanish temporarily or permanently in most regions of Northern Germany and Southern Scandinavia and simple shaft hole axes now dominate (Schultrich 2023b, 66; 2018, 114–15; cf. Lekberg 2004).[1] In some regions, complex forms re-appear in the Younger Bronze and Iron Age (Schmidt 1993, 68; Frehse 2013, 5).

For the battle axes of the Neolithic, generally speaking, two typological breaks occur. In the EN, *c.* 4000–3300 BC, hammer axes (Flat hammer axes [F] and Knob hammer axes [K]) existed. During the MN, *c.* 3300–2800 BC, the hammer axes came to be replaced by different forms of double axes (Nordic Double axes [D], Lancet-shaped Double axes [L], Round-butted axes [R], Neck-comb axes (*Nackenkammäxte*) [N]). These, in turn, are replaced at the onset of the YN by different variants of hammer axes (Zápotocký 1992, 2; Klimscha 2016, 86). The reality is more complex than this simple outline (Schultrich 2023a, 288–90), but for the purpose of this paper there is no need to deal with this in detail.

Over the course of time, the contexts to which battle axes are associated change. During the EN, they only occur sporadically in burial contexts. Minor concentrations of burial contexts occur in Denmark and north-eastern Germany, where the battle axes are often (*c.* 33%) fragmented; ie, only one axe-half is present (Zápotocký 1992, appx; Schultrich 2022, 357). This changes during the MN, when a different typology becomes predominant. The proportion of battle axes from burials related to single-find contexts increases significantly. Fragments, in contrast, become increasingly less frequent (albeit with regional variations in this regard[2]). In the YN, when the CWC related SGC emerges, the absolute number of battle axes from all contexts drastically increases (in Sschleswig-Holstein there are ~210 MN (according to Zápotocký 1992) and 1461 YN pieces according to Schultrich 2018). This is especially the case during the earlier phases of the YN, where about 65–70% of all known graves are attributed with a battle axe (Hübner 2005, 605). However, the proportion of burial finds in relation to single finds remains rather constant and, in some regions, even decreases (Schultrich 2022, 357, 461–2, 604; 2023a, 291; cf. Hübner 2005; Ebbesen

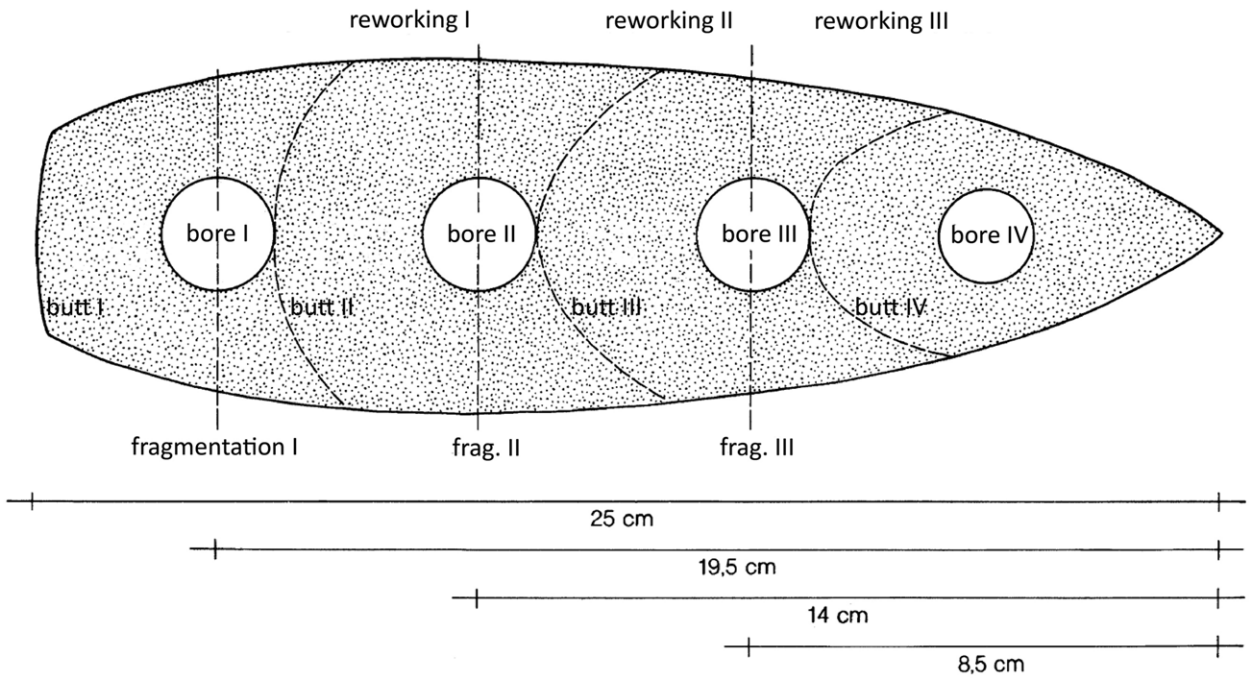


Fig. 2.
Several recycling stages of a simple shaft hole axe from the Swedish LN according to Lekberg (2004). For each stage, the neck was ground to a rounded shape and a proper shaft hole was drilled

2011; Iversen 2015). At present, we know of hardly any fragments from YN burial contexts (Schultrich 2018, 21). Thus, significant changes appear on two occasions: During the MN *c.* 3100 BC, and with the onset of the YN *c.* 2850 BC.

The first steps

No extraordinary skills are required to create a battle axe; however, it is a time-consuming process (Olausson 1997, 130–2). Most estimations derived from an experimental basis are over 50 – and mostly between 80 and 100 – working hours (Zápotocký 1992, 144; Olausson 1997, 130; Wentink 2020, 114). Manufacture requires a solid stone material. Within the material culture of Schleswig-Holstein, the most frequent stone used is diabase (so-called Åsby-Diabase; Schultrich 2018, 164–7; cf. Wentink 2020, 113). This is a stone typical of the glacial moraines of the region. It is robust but relatively easy to process. If necessary, the stone could first be split into smaller pieces, with the selected piece being shaped with a hammerstone, bit by bit, roughly into the desired shape, using a pecking method (Olausson 1997, 132; cf. Wentink 2020, 112–13). If this was successful, ie, no mistakes were made by the manufacturer and no cracking appeared in the stone that rendered it useless, the manufacturer(s) proceeded to the next step.

Many rough-outs of YN battle axes at different stages of production are present in the archaeological record of northern Germany; these are mostly attributed with cup marks or deep drillings (Fig. 3). Generally, the shaft hole, or at least the marking for it, was created after the axe was pecked and ground to the desired form but before the time-intensive polishing was finished. This may well be due to the fact that the finalising of the drilling was a process with a high potential for failure (Zápotocký 1992, 144; Olausson 1997, 130–2; Goldhammer *et al.* 2012, 127–8).

By examining the data closely, we find different forms of rough-outs. Some appear to be very uneven and it may well be that the manufacturers discarded them before investing too much energy in preparing a piece that would likely never be completed. Some rough-outs, however, do not seem uneven (Fig. 3), and are also devoid of cracks or the potential crack zones

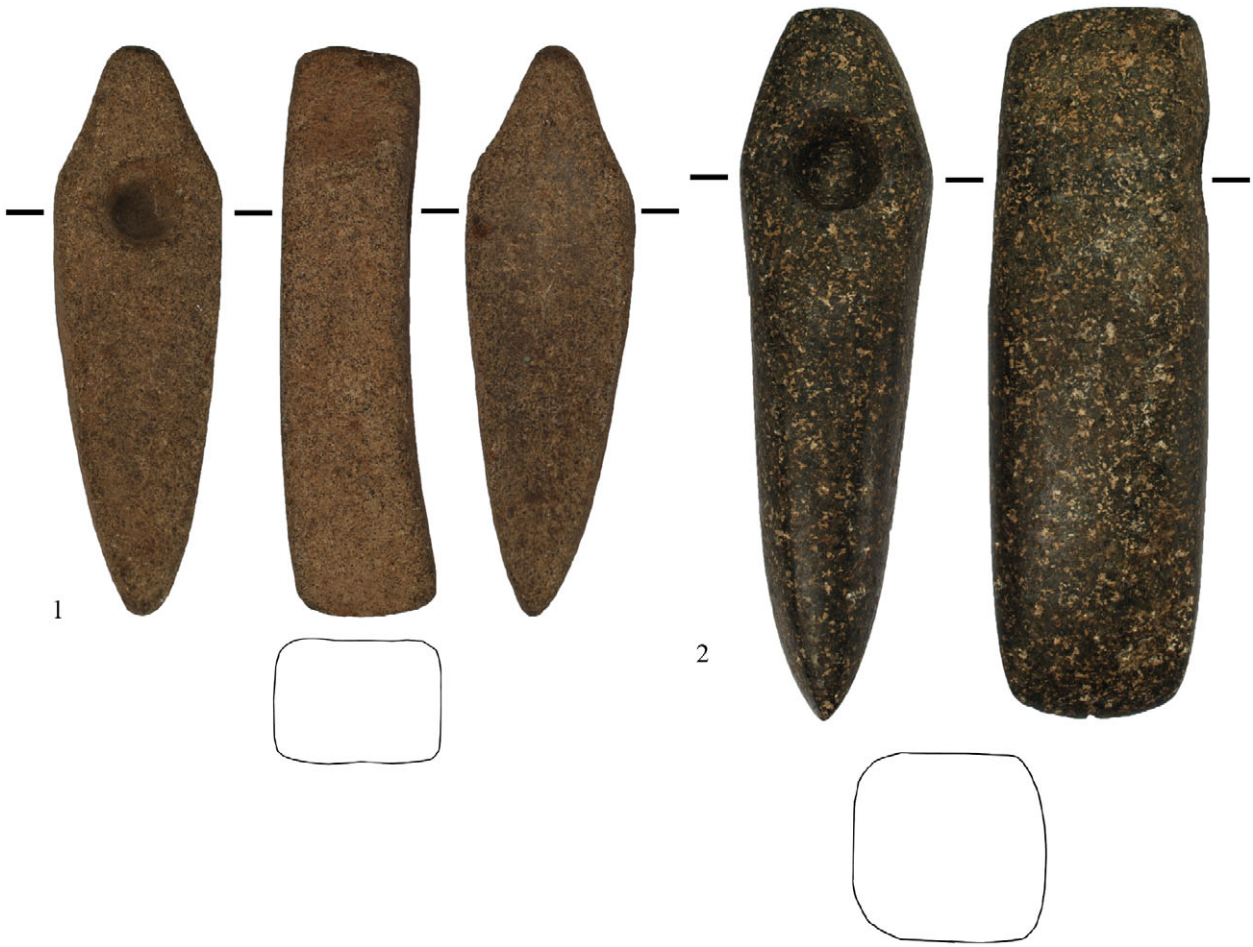


Fig. 3.
Two rough-outs with cup marks, both Schleswig-Holstein, unknown locality (Schultrich 2018, cat. 1647, 1645)

that can occur in such stones. The choice behind leaving such pieces unfinished may well have been down to other reasons.[3]

When it comes to drillings, two different kinds are evident; the 'pecking' technique and the 'true drilling' technique. In the Neolithic of northern Germany, most shaft holes were made using a hard tool in combination with water and sand to peck a hole (Zápotocký 1992, 145; Olausson 1997, 130–2; Schultrich 2018, 182; Wentink 2020, 113–5). Before the shaft hole's inner surface became polished, the pecking technique would have led to a cup mark, deep pecking hole, or hourglass shaped hole (in successive order), as frequently evidenced in the material of Sscleswig-Holstein. In other regions, such as central and southern Germany, Switzerland, or the Czech Republic, holes were more often drilled using narrow instruments (Zápotocký 1992, 145; Wolf 1993; Goldhammer *et al.* 2012, 128).[4] If unfinished, such a 'true' drilling technique would lead to a ring-shaped hole (see Fig. 10, below).

The polishing of the axe body can be of varying quality and cover different parts. These differences most likely reflect different functional purposes. Most battle axes of the early YN are almost completely polished, with a high quality finish. Residual evidence of the pecking technique (in the form of small depressions) is only seldomly visible (Schultrich 2018, 172–5, tab. 67). In the later YN and the LN, many simple axes are only polished near the cutting edges while the rest of the body is evidently coarser (Schultrich 2018, 172–5; 2023b, 65).

Use-life

An investigation of the use life of battle axes is a desideratum. Generally, scholars agree that battle axes were not merely mundane wood-working tools as they are too elaborate, mostly have blunt cutting edges, and the shafts are too thin (Zápotocký 1992, 166; cf. Wentink 2020, 123). However, some battle axes exist with cutting edges that are sharp and have proportionately thick shaft holes (cf. Hübner 2005, 90). This is already indicative of some degree of functional diversity. Most scholars regard battle axes as socially valued, prestige, or individual status objects, as they are often present in grave contexts. Such a social value becomes even more evident through the fact that battle axes were depicted on stone slabs and stelae, were also sometimes made of copper, and – more symbolically – clay or amber miniatures are known from a number of contexts (Seregély 2008, 281–2; Kerig 2010; Frieman 2012; Schultrich 2023a, 294). Also, interpretations of the battle axe as a weapon – or at least a symbolic weapon – are prevalent, with such interpretations being heavily intertwined with those of the implements as status objects (Zápotocký 1992, 154–6, cf. Horn 2014, 221). It is undeniable that violent encounters occurred in which weapons of various kinds were used (Varberg 2015, 97; Horn 2021, 56–9). However, actual use as a weapon or any other type of implement has not (yet) been objectively verified and it is likely that battle axes served multiple functions (Hübner 2005, 637).

In principle, only use-wear analysis can help clarify precisely what these axes were used for. However, even such analyses have significant limitations, as axes in burial contexts may well have been made exclusively for this purpose, or resharpened immediately prior to deposition (Hübner 2005, 79–81; Wentink 2020, 119). Hübner (2005) showed through a simple observation of the traces of use-wear, which occur on both the cutting edges and the butts, that huge regional variations in types of use exist. In some areas (as is the case for Schleswig-Holstein), the axes of the YN seem almost unused while, in other areas such as Thisted and Ringkøbing, Jutland, they appear to be heavily worn (Hübner 2005, 80). Also, many axes bear reworked cutting edges. The question of what the battle axes were used for, however, remained unaddressed.

Frieman (2012) undertook a more detailed analysis of the trace marks of the LN knob-butted hammer axes of north-western Europe, determining that both the cutting and butt ends commonly bear trace marks, with the cutting edges bearing evidence of flaking, probably stemming from a percussive use like woodworking. Wentink (2020) made experiments to recreate the trace marks of SGC battle axes from the Netherlands. The best match was obtained by chopping the roots of trees (2020, 120–5).

At present, we cannot judge whether this is the definitive source of such use marks. However, even if it does turn out to be the case, this only provides an explanation for the use of such axes in this specific region and period, due to the limited nature of the study. Generalised statements on the use of (types of) battle axes, which occur across a vast territory spanning from Western to Eastern Europe for a period of more than 2000 years, must be avoided. The above-mentioned comparison by Hübner (2005) exemplifies the potential for huge differences within a relatively small region.

The end of life of battle axes

Coming to the end of the life of the battle axe, our corpus of knowledge becomes much broader. From what is known, we can see that they were commonly deposited either in graves or as single finds; only seldom are they discovered in multi-object hoards or settlement contexts.

Graves, multi-object hoards, and single finds

YN battle axes appear mostly as single finds, followed by finds in graves, hoards, and lastly settlement contexts. Significant changes to the frequencies of occurrences of battle axes in these contexts appear during the late YN.

The context category of *single find* is by far the largest one across all SGC regional groups and even in all CWC regional groups (Schultrich 2022, 444; cf. Iversen 2015; Schultrich 2018; Kolář 2018; Ahola 2020). While some scholars denote them as loose finds or unidentified graves, this interpretation is not supported by the data: The fact is that, across all periods examined here, a number of isolated finds have been found in seas, rivers, bogs, etc., demonstrating that they were deposited intentionally (Sørensen 1997, 228; Iversen 2015, appx G, 212–213; Schultrich 2018, 43–4). Based on this and further arguments (see below), the majority of single finds without a clear or known

context can be regarded as intentionally deposited items (Schultrich 2018, 43–5; Ahola 2020, 121).

In Jutland and Schleswig-Holstein, almost 1500 YN battle axes are recorded from single burial contexts (Hübner 2005, 68). Additionally, around 90 axes in Denmark and around 40 in Schleswig-Holstein have been found in collective graves (Ebbesen 2011, 364; Schultrich 2018, 36). In some cases, they appear to have been freshly made specifically for the burial while, in others, they bear evidence of use (cf. Hübner 2005, 80). Regardless of presence of indicators of use, during the YN battle axes are almost always are complete in the graves, which is reflective of a conscious idea of burying complete axes only (see below).

Settlement contexts with battle axes are generally rare. This, however, might be affected by the overall rarity of early and middle YN settlements (cf. Hübner 2005, 638; Schultrich 2018, 54). At the end of the YN and in the LN, settlements become more frequent, with simple shaft hole axes occasionally being found within them (Sørensen 2018; Borup 2019). These simple axes of the LN are, however, not the same as the rather elaborate battle axes addressed in this paper. Four of the five known battle axes from settlement contexts in Schleswig-Holstein are of a very late YN type (Schultrich 2018, 160 and catalogue). The five pieces together account for just 0.4% of all battle axes from known contexts.

Indications for multi-object hoards with battle axes are incredibly rare during the EN and MN, even if we consider material from across the entire region of the battle axes' distribution (cf. Zápotocký 1992, 164–5). Also, there is no evidence for multi-object hoards containing battle axes in northern Germany and Denmark during the early and middle YN. This changes in the late YN (*c.* 2450/2350 BC), when a few hoards include rather clumsy battle axes or rough-outs (Schultrich 2018, 52; cf. Rech 1979, Taf. 3; Ebbesen 1982, 156). This altered deposition practice corresponds with multiple changes. These include a decreasing importance of battle axes in burials (whereas pottery increases; Hübner 2005, 605; Schultrich 2023b, 69), increase in absolute numbers (Schultrich 2018, 162), and a diversification of the shape and quality (huge differences in the elaboration and, thus, time spent on manufacturing; Schultrich 2018, 176–7; 2023b, 64–6). Also, as mentioned above, most settlement finds are derived from this phase. Moreover, in this phase secondary axes become visible in the archaeological record for the first time (see below). Hereafter, with the onset of the LN battle axes become superseded by the flint dagger as a primary status symbol in burial and hoard contexts (Hübner 2005, 686–90; Vandkilde 2005, 32; cf. Müller & Vandkilde 2020). Thus, the gradual decline/change of the social meaning(s) of the old established symbol of the *battle axe* becomes visible in the archaeological record in the late YN (Schultrich 2018, 178–9; 2023b, 64–7).

Fragments and secondary axes (I)

There are quite a few fragments of axes present in the database, ie, axe-halves (Figs 5 & 6, below). Almost all battle axe fragments in the archaeological record are broken at the shaft hole in the central section, so that both remaining axe-halves possess a part of the former shaft hole (Figs 8–11, below; cf. Zápotocký 1992, 163; Schultrich 2018, 180–4). Occasionally, such axe-halves are to be found in EN and MN burials, indicating that they were not perceived as waste but rather had a certain, possibly symbolic, function. The fact that during the YN (almost) no broken battle axes were placed in burials (Schultrich 2018, 211) shows that in this phase the symbology partially shifted; now it became important to furnish the deceased with proper axes. However, this does not mean that broken axes did not have a certain meaning for YN societies.

To show this, we will examine some possible secondary treatments of the axes. Generally, broken battle axes can be reworked or left 'as is'. If they are to be subjected to secondary reworking, there are two main ways of doing this which lead to different usability – and likely also symbolic – values. One of these is a reworking to create functional secondary axes (Figs 2 and 4), while the other is a more symbolic treatment.

Above, we addressed the morphological and social property changes of battle axes occurring in the late YN. In this phase, for the first time, with the exception of rare earlier findings, functional secondary axes were made from broken battle axes. In the late YN, long and elaborate K1-type axes (typology of Hübner 2005) were reworked to K6 axes (Hübner 2005, 132; Fig. 4). For this, the butt was ground to a roundish form. This caused the former shaft hole to become almost or completely invisible. The object was then given a new shaft hole whose diameter and straightness was similar to those of the original. Thus, it

Fig. 4.
A late YN K6 axe with reworked neck end and high quality secondary shaft hole (photo: Claudia Janke, Schloss Gottorf Schleswig, 2016; after Schultrich 2018, 501)

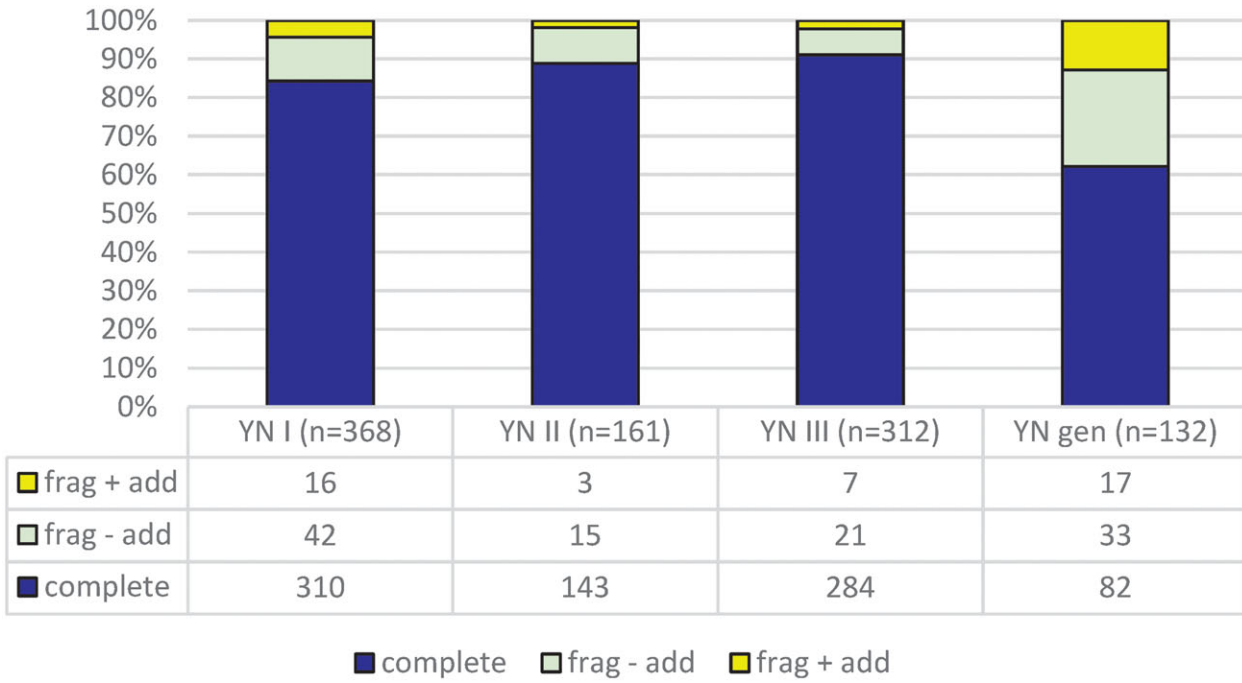
became similarly useful (Lekberg 2004, 262–5). After the late YN, morphologically simpler LN and Bronze Age 'working axes' were regularly treated in this way. In particular, thousands of ground stone shaft hole axes have been recorded in the LN of eastern central Sweden, which have been reworked on more than one occasion. Such axes started their lives being rather long, becoming shorter and shorter with each reworking (Lekberg 2004, 262–5; Fig. 2). Such a treatment cannot, however, be reconstructed for battle axes during most of the Neolithic.

Fragments and secondary axes (II): unfinished drillings and cup marks

Another form of secondary battle axe exists, where those performing the reworking did not intend to create proper and 'useful' (in the sense of use in the same manner as the primary object) axes. To show their significance, we first have to consider some aspects concerning YN axe-halves.

In the YN material of today's Schleswig-Holstein, more than 1400 battle axes have been recorded, of which more than 1200 are isolated finds (Schultrich 2018, 160–1; see Fig. 1, above). Dependent on the respective sub-region,[5] between 12% and 31% (~ average 19%) of the battle axes in the record are axe-halves (Fig. 5). In neighbouring regions, we see similar proportions; in north-eastern Germany 12% (Jacobs 1991, 20), in northern Saxony-Anhalt 27% (Beran 1990, 40), and in Sweden 25% (Malmer 1962, 669; 1975, 101).

Interestingly, in Schleswig-Holstein there are about double as many cutting edges (n=100) preserved as there are butts (n=45; Fig. 6). This pattern does not reflect different chances for finding, as both sides of YN battle axes are of relatively similar shape to one



	YN I (n=368)	YN II (n=161)	YN III (n=312)	YN gen (n=132)
frag + add	16	3	7	17
frag - add	42	15	21	33
complete	310	143	284	82

Fig. 5.
The number of battle axes from the YN gen (= general, ie those that could not be specified chronologically) and YN I–III of three sub-regions of Schleswig-Holstein, and the number and percentage (Y axis to the left) of axe halves and axe halves with additions (frag + add) in the form of cup marks, deep drillings, or hourglass shaped holes. The percentage of fragments from the YN gen is higher as it is impossible to more precisely determine the type of many fragments

another (Schultrich 2018, 181). The same pattern (346 cutting edges and 151 butts) is evident in the material of the BAC in Sweden, as noted by Malmer (1962, 666–71). This pattern is also observed in north-eastern Germany and northern Saxony-Anhalt (Schultrich 2018, 180–4; cf. Beran 1990; Jacobs 1991). Accordingly, in these areas there was probably some kind of structural difference of how/where people deposited cutting edges and butts respectively (already Malmer 1962; 1975). This probably conscious pattern further contributes to the notion of considering single finds as intentionally deposited objects.

The potential for a conscious decision having underlain deposition patterns becomes even more evident when we compare this pattern to the material of other CWC regions. In regions such as the western Alpine area or central Germany, the ratio of cutting edges to butts is much more balanced (Fig. 7). When we accept that single finds are consciously deposited artefacts, as becomes evident from a few isolated finds from seas, bogs, and rivers (Schultrich 2018, 43–5), it becomes apparent that we are facing regionally differentiated nuances of a symbolic treatment of the two battle axe parts.

The potential symbology becomes even more apparent when we regard secondarily reshaped fragments. In Schleswig-Holstein, in three sub-regions investigated more closely, during the YN *c.* 28% (YNI: 27.5%, YNII: 16.7%, YNIII: 25%, YN gen: 34%) of all fragments bear evidence of secondary reworking (Fig. 5). In contrast to the 'proper' secondary axes addressed above, here we mean that the axe-halves were subjected to the first steps of the drilling of new holes but that this process was not completed. These are shallow cup marks (<1 cm) on one or both sides of the axe (Fig. 8, 2, 4–5; Fig. 9, 6–9), or deeper drillings (>1 cm) on one or both sides (Fig. 8.1). Sometimes the drillings from both sides meet each other in the middle of the axe but, in these cases, the novel shaft hole is much smaller than the original one and is mostly hourglass shaped (Fig. 8, 3; Fig. 9, 3–5). Thus, the secondary drillings are not of a similar degree of utility to the primary ones. Moreover, the broken sides of cutting edge fragments

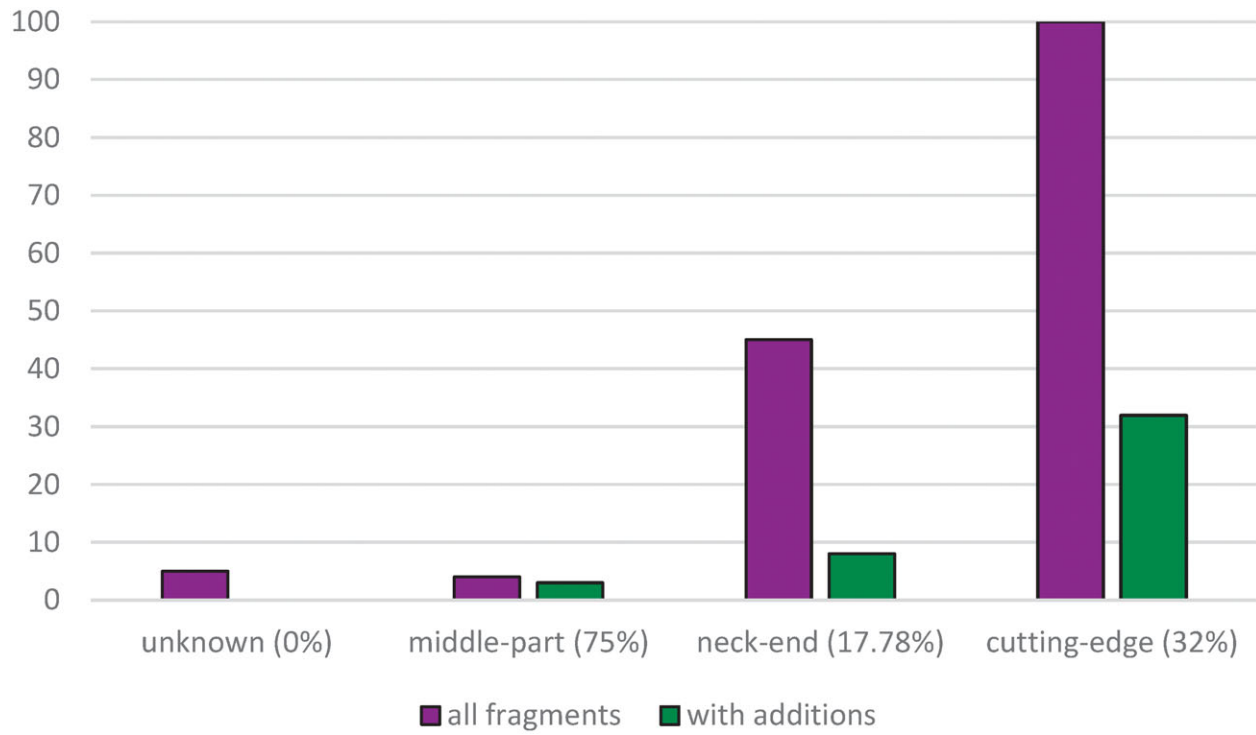


Fig. 6.
The number (Y axis to the left) of preserved axe halves in the record of Schleswig-Holstein and the number and percentage of axe halves with additions in the form of cup marks, deep drillings, or hourglass shaped holes

with such additions were never reground to proper butts, as described above for the K6, LN, and Bronze Age axes (Figs 2 and 4). This furthermore indicates a different secondary function.

The high frequency of early, middle and late YN broken axes attributed with such additions (Fig. 5) demonstrates that this is a well-established phenomenon throughout the entire phase in northern Germany. Table 2 shows that cup marks dominate the three modes of secondar drilling during all stages of the YN. A tendency toward a decrease in the variability is evident, ending with cup marks eventually becoming the only form. However, the database for Table 2 is too small to make statistically significant chronological observations.

In older literature on the archaeological material of northern Germany, a variety of explanations for these additions can be found, ranging from the mundane to the ritual (on the problem of distinction, see below; Schwantes 1958; Loewe 1959; Röschmann 1963; Paulsen 1996). One could argue that cup marks are indicative of later (unfinished) drillings. This idea is influenced by battle axe rough-outs whose begun drillings indeed can be regarded as to be finished (but see below). However, in the material of Schleswig-Holstein there is no evidence of broken battle axes of the early[6] and middle YN that were reworked into proper axes.

This changes, however, in the late YN (see above). Moreover, ~18% of all butts from the YN bear evidence of cup marks (Fig. 6; Fig. 9, 10–12). Secondary axes made from butts are non-existent in the late YN, LN, and Bronze Age. This means, in these cases, the cup marks cannot have been intended as markings for later drillings. Additionally, a number of battle axe fragments exist with cup marks not perfectly centred, or even laterally positioned (Pieper 1940, 270–6; Schultrich 2018, Tab. 17,4; 42,3). Thus, such axe fragments with added cup marks may never have been intended to become proper secondary axes. On the basis of this, the additions may well have borne a symbolic function (see below).

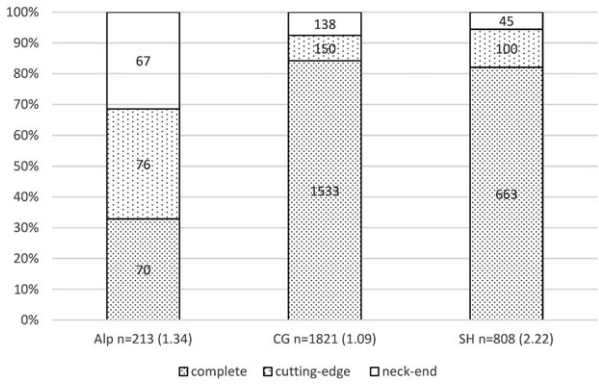


Fig. 7.
The number of battle axes according their preservation in three different regions (Schultrich 2022, 361). The ratio of cutting edges and neck ends is given in brackets. Alp: circum-Alpine CW-groups; CG: central German CW-groups, SH: Schleswig-Holstein, SGC. The high proportion of broken axes in the Alpine region is related to the specific depositional practices in Western Switzerland. Here, a depositional strategy occurs that is unique to CW societies as the axes are primarily derived from settlement contexts (cf. Wolf 1993)

SPATIALLY AND TEMPORALLY BROADER PERSPECTIVES ON CUP MARKED BATTLE AXES

Battle axes with secondary additions are neither temporally nor spatially restricted to northern Germany but occur throughout many CWC regions and also pre- and post-date CWC horizons.

Throughout the British Isles, battle axes appear in the context of the middle part of the Bell Beaker phase and continue to be present during the Early Bronze Age (Roy 2020, 241). Roe (1966, 214) noted that 16% of all battle axe fragments bear cup marks (12 out of 74 fragments). Even though the British battle axe phenomenon starts much later compared to that of the continent, it is probably connected to a similar symbology (see below). The ratio of single finds to grave finds (21%) (Roy 2020, 256), which is very similar to Central Europe (Schultrich 2018, 161; 2022, 444), further demonstrates similarities in the symbology and likely also a common origin, or rather a CWC contribution to the Bell Beaker phenomenon in Britain (cf. Case 2001, 369–74).[7]

In the areas where the 'true drilling' technique (see above) dominates (for this paper, only the material of central Germany has been reviewed), a few axe fragments possess ring-shaped drillings and sometimes also cup marks (Fig. 10). Interestingly, a few complete axes here also possess drilling marks (Fig. 10, 2). It is probably for this reason that Loewe (1959) terms them *Fehlbohrung* (failed drillings). However, these are located far from the central area of the axes and are therefore more plausibly additions as opposed to failed attempts.

The central German pieces – and especially the fragments with additions – moreover indicate that *how* (whether by the pecking or drilling technique) the symbolic drilling was made was of minor importance, with the act of drilling – or the (unfinished) drilling itself – bearing the greatest significance.

To unfold the temporal dimension, battle axes from the EN and MN of northern Germany and Denmark were assessed using tables from Zápotocký (1992). These tables do not represent all battle axes of his catalogue, in which he does not address cup marks, and accordingly the data is limited and potentially gives a rather conservative impression. However, these tables show a few axe-halves with cup marks or hourglass shaped drillings (Table 3; Fig. 11). While studying material in the archive of the Archaeological Museum Schloss Gottorf in Schleswig, the author of this paper came across several other MN axe fragments (ie, type R and D axes) with such additions by chance (Fig. 11, 9–10). According to this, the actual number of fragments with additions may well be much higher than indicated by Zápotocký's tables and on Table 3. Beside the evidence from Schleswig-Holstein and Denmark, his tables show that cup-marked battle axe fragments also occur in other regions; in Bohemia, Moravia, and Central and Southern Germany on EN- and MN flat hammer-axes, knob-butted hammer-axes, and round-butted axes (Zápotocký 1992, tab. 2.7, 5.13, 8.16, 10.3, 36.2, 36.9, 72.3, 81.9, 82.10, 82.13). However, during the (later) MN, this form of treatment appears to be somewhat less intensive in those southern regions, as no lancet-shaped battle axes were found with cup marks (see Table 3).

The occurrence of EN, MN, and YN broken axes with such additions demonstrates that this is a well-established phenomenon during the entire Neolithic in northern Germany, Denmark, and probably also beyond. It also contributes to the discussion of whether there is a cultural break in the early 3rd millennium BC in Central Europe, linked to the emergence of the CWC complex (see below).

During the EN and MN of northern Germany and Denmark, several other present phenomena are helpful in achieving a better understanding of the

Fig. 8.
Symbolic shaft holes on YN battle axes. 1–3: cutting-edges, 4–5: butts. 1: Deep drilling; 2, 4 & 5: Cup marks; 3: Hourglass shaped small shaft hole (after Schultrich 2018, 501–5 and catalogue). 1: Lohbarbek (cat. 1513); 2: Tensbüttel (cat. 147); 3: Idstedt (cat. 1210); 4: Itzehoe (cat. 1499); 5: Husby (cat. 1206) (photos: Claudia Janke, Schloss Gottorf Schleswig, 2016)

cup mark phenomenon related to battle axe fragments. From this period, a few ground stone axes are preserved that possess small holes. Ebbesen (Ebbesen & Crabb 1984, 125) interprets these as being functional, related to the hafting of the axe upon the shaft. Klassen (2014), in contrast, regards the holes as being symbolic because they are often unfinished and also because they are not a necessary addition for the hafting, as shown by many axes without such holes (2014, 205). These holes may well, however, continue a tradition of earlier Jadeite axes, which spread from the Western Alps throughout Western Europe in the 5th millennium BC (*ibid*., 211; cf. Pétrequin *et al*. 2013). Whatever their origin and function, they testify to the addition of holes to artefacts other than battle axes in the FN and MN.

Cup marks, however, are not associated with anything other than battle axes until the LN, provided we choose to neglect the unique find from Bornholm (see above), and instead only consider evidence from archaeologically secure contexts (Sørensen 2018, 45). Even if Iversen (2019a) is correct, and some cup marks

TABLE 2. THE NUMBER OF FRAGMENTS WITH THE THREE DIFFERENT METHODS OF SYMBOLIC DRILLING BASED ON MATERIAL FROM SCHLESWIG-HOLSTEIN THAT COULD BE PHYSICALLY EXAMINED, DURING THE STAGES YN I–III

Period	*Drilling complete (hourglass)*	*Drilling begun*	*Cup mark*
YN unspecific	4	2	9
YN I	3	2	8
YN II	1	2	0
YN III	0	0	7
All	8	6	24

To differentiate between cup marks and drilling holes a depth of ~1 cm was used as demarcation. The number of additions differs from Fig. 4 because some axes could only be investigated by means of illustrations, which are not well-suited to this type of analysis.

on megaliths were created during the EN or MN, during the YN cup marks are obviously restricted to battle axes. Hereafter, in the LN changes related to a diversification of the potential media bearing cup marks appear. Now they could be added to other artefacts and to locations (Dibbern 2016; Sørensen 2018).

However, there is evidence to date this diversification back to the late YN. We have already seen that in this phase a variety of social behaviours connected to battle axes change: they now appear in multi-object hoards, they now can be reworked to proper secondary axes, there is now a huge difference in quality. Figure 12 shows a wedge axe from Schleswig-Holstein with a cup mark. Another example comes from a burial in Denmark (Hübner 2005, cat. 1406). Generally, wedge axes date to the middle and late YN (Hübner 2005, 448–52). Thus, they may also possibly testify to the beginning of attributing cup marks to items other than battle axes, starting in the late YN. However, more evidence is required to prove this idea in the future.

In this regard, the potential development shown on Table 2 must be highlighted. While the cup mark phenomenon loses its strict association with battle axes in the YN III, it can also be inferred that the variety among secondary drillings shrinks to cup marks only. Thus, the potential diversification of media goes hand-in-hand with the limitation to shallow cup marks.

Interim conclusions

The late YN (2450–2250 BC) is a crucial period in terms of practises related to battle axes: They now appear in settlements and multi-object hoards, the diversity in quality increases, and simple shaft hole axes develop. This morphological development will eventually lead to the LN and Bronze Age simple shaft hole axes, which are frequent in parts of Sweden, Jutland, and northern Germany. As mentioned above, these simple shaft hole axes could be reworked several times into functional axes (Fig. 2). To make a new axe from the old, the front end with the cutting edge was always used (to the right on Fig. 2). Here, a new shaft hole was drilled and the new butt (the former broken edge) was reground to a new round(ish) butt (Fig. 4). To distinguish a proper, functional secondary axe from a battle axe fragment with secondary attributes, three things are required: 1. A shaft hole near the butt; 2. A secondary shaft hole that has similar physical attributes to the primary one; ie, being more-or-less straight and of a similar size; and. 3. A reworked butt.

Battle axe fragments of the early and middle YN lack these three characteristics (Figs 8 and 9). Thus, these fragments were never intended to become secondary axes with an identical functionality as the primary ones. A few EN and MN battle axe fragments, a few pieces from central German CWC contexts, and many fragments from the YN of northern Germany possess secondary drillings (or additions) that are different to those of simple shaft hole axes. For the matter of analysis, three different drilling stages have been defined, which are indicative of a sequential process. These are shallow cup marks (<1 cm), deep drillings (>1 cm), and hourglass shaped holes, with each representing a progression of the previous stage. While early and middle YN battle axe fragments bear all three stages of additions, later fragments lack the final two stages, with cup marks alone being present.

These additions are distinct and not simply abandoned reperforations. This has been established because there are (almost) no pieces that are evidently

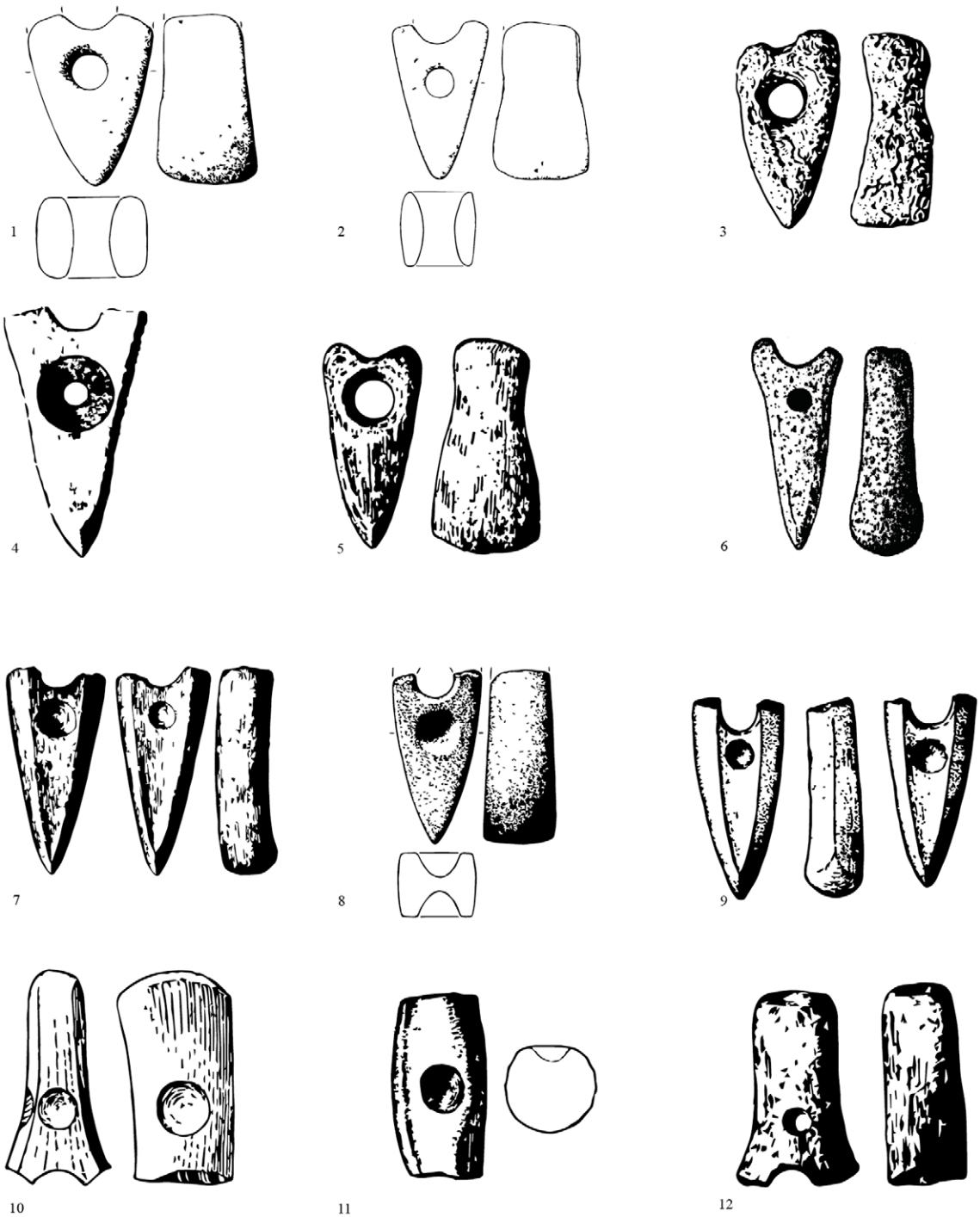


Fig. 9.
YN axe fragments with secondary drilling holes or cup marks. 1–9: cutting edges; 10, 12: butts; 11: middle fragment (after Schultrich 2018 (500–3 and catalogue). 1: Satrup (cat. 1306); 2: Idstedt (cat. 1210); 3: Hrzgt. Lauenburg O.Fo (cat. 255; 4: Flensburg-Weiche (cat. 172.2); 5: Reinfeld (cat. 1593); 6: Jesrbek (cat. 1575); 7: Köthel (cat. 221); 8: Drage (cat. 1149a); 9: Pinneberg (cat. 762); 10: Rantrum (cat. 383); 11: Pinneberg (cat. 763); 12: Reinfeld (cat. 1592)

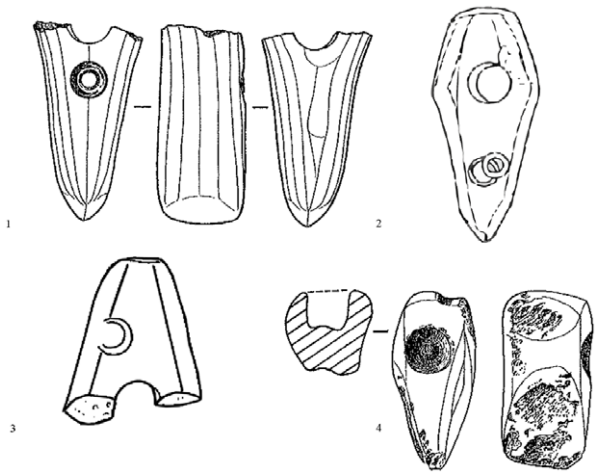


Fig. 10.
Secondary, unfinished drillings on battle axes from Central Germany. 1: Bad Langensalza (Matthias 1987, Tab. 29.4); 2: Camburg, Jena (Loewe 1959, Tab. 110.7); 3: Graischen, Eisenberg (Loewe 1959, Tab. 111.9); 4: Würchwitz (Mathias 1987, Tab. 114.12)

properly finished secondary battle axes, ie, with reground butts and proper shaft holes. Furthermore, a number of butts with such additions are present in the archaeological record (Fig. 6; Fig. 9, 10–12). Even in later times, when proper secondary axes were produced, butts were never used for this purpose. Therefore, there must be a different explanation.

TABLE 3. THE NUMBER OF ALL TYPES OF EN AND MN BATTLE AXES FLAT HAMMER AXE (F); KNOB-BUTTED HAMMER-AXE (K); ROUND-BUTTED AXE (R); DOUBLE-AXE D); NECK-COMB AXE (N); AND THE NUMBER OF FRAGMENTS, DEPOSITIONS, & FRAGMENTS WITH ADDITIONS FROM SCHLESWIG-HOLSTEIN AND DENMARK

Denmark/Schleswig-Holstein	*F*	*K*	*R*	*D*	*N*	*L*
No. complete	54	68	113	150	26	21
No. fragmented	39	35	28	58	4	54
No. deposited	10	5	10	6	1	15
N. additions	2	7	1	4	0	0

Based on Zápotocký's (1992) tables. Additionally, for comparison, the MN double-axe variant lancet shaped axe (L) from central & southern Germany, Austria, and Switzerland (Schultrich 2022) is included. Note that the actual number of fragments with additions could be much higher, as indicated by chance observations made when analysing the later axes for this study.

DISCUSSION

Cup marks: symbolic shaft holes?

In our modern, European and functionalist way of thinking, the distinction between profane and ritual is associated with either rational or irrational actions. Thus, the cup marks and early stage drillings considered here ought to be irrational in nature, since they can hardly be explained rationally according to today's standards. However, we cannot pre-suppose this way of thinking for prehistoric communities. We should accept that their behaviour is subject to different rationalities than those imaginable in the present (cf. Fontijn 2002; Wentink 2006; Ballmer 2010; Brück & Fontijn 2013). It is probable that people did not distinguish between the two realms and that ritual actions may have served a specific purpose that we cannot comprehend.

In older literature, one will find different ideas on how to explain cup marks and other early stages of drillings. As cup marks occur on rough-outs, many scholars are inclined to also classify broken pieces with cup marks as rough-outs for secondary axes. Loewe (1959, 66) refers to the unfinished drillings as drilling errors (*Fehlbohrung*), as they sometimes occur on complete battle axes of central Germany (Fig. 10). Paulsen (1996, 89) considers cup marks to be an expression of a recycled product for training. However, two observations already stressed speak against these notions: First, rough-outs with cup marks may well have also had a symbolic function. Second, there are no fragments with finished secondary drillings and reground butts present in the archaeological record until the late YN.

More cautiously, Roe (1966) states that 'the explanation remains obscure, but it is clear that it was considered worthwhile to carry out a complete or partial secondary perforation on broken battle-axes that would appear useless to the uninformed, and that in some way this enhanced their value' (Roe 1966, 215). Malmer interprets the Swedish YN material in a similar manner (1962, 662–71). Other early scholars dealing with cup marks – both on fragments and on rough-outs – wrote of a 'sun cult' (Schwantes 1958; Röschmann 1963, 83–6). Paulsen refers to yet other scholars who speak of a symbolic item of a more daily rite; a 'pocket altar' (*Taschenaltar*) (cf. Paulsen 1996, 89). This idea is interesting, as it opens the possibility for a 'middle way' between a strictly mundane or strictly ritual interpretation. For the cup marked

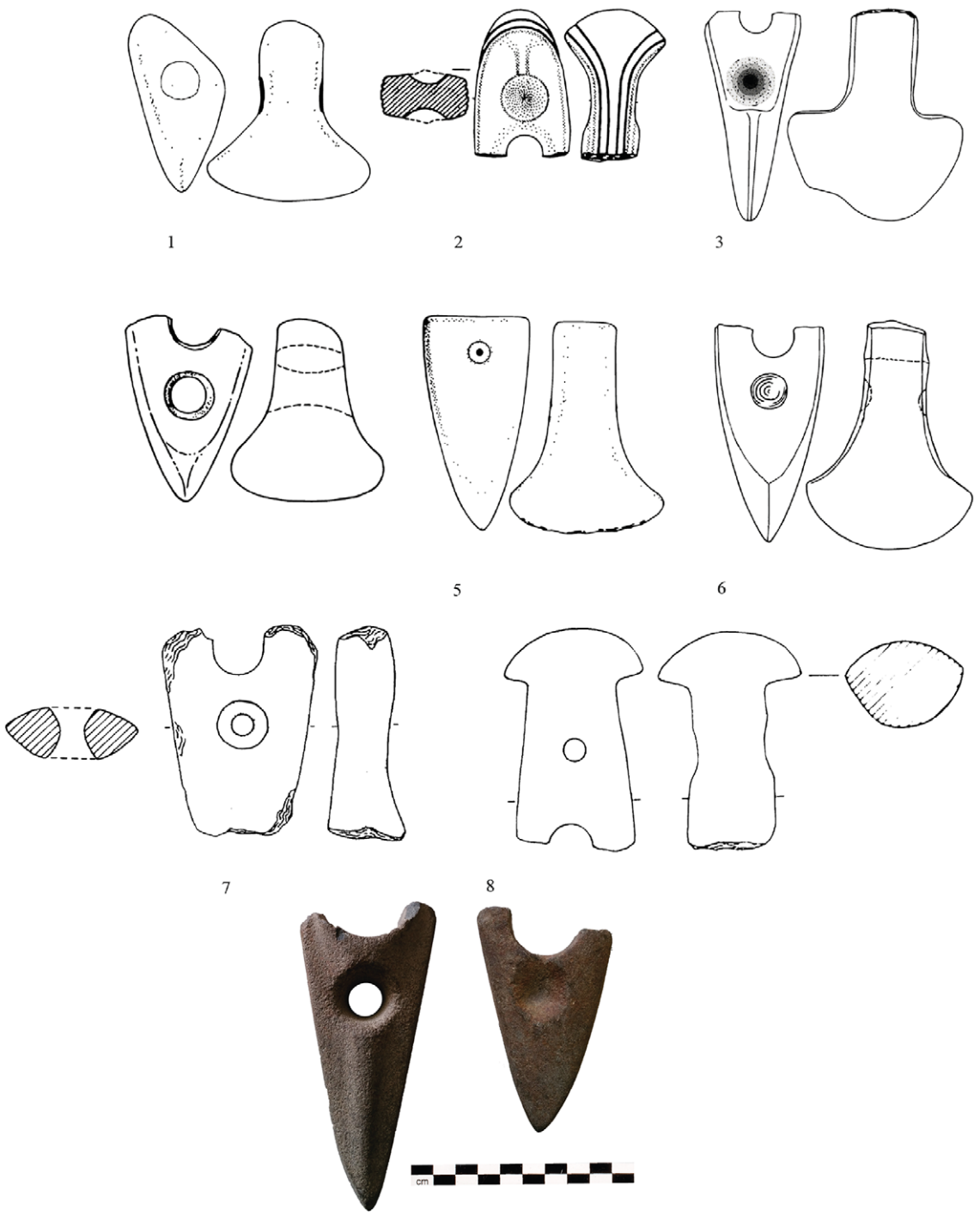


Fig. 11.
FN and MN battle axe fragments with cup marks (1–3, 5–6, 8, 10) or secondary, small and hourglass shaped drillings (4, 7, 9). 1–8 from Zápotockýs (1992) tables and from Schleswig-Holstein (SH) or Denmark (DK), without scale. 1: Viöl, SH; 2: Immenstedt SH; 3: Eckernförde, SH; 4: Frestedt, SH; 5: Aukamp-Seedorf, SH; 6: Rendsburg, SH; 7: Jellinge, DK; 8: Allesø, DK; 9: Unknown locality; 10: Brodersby, SH (Schultrich 2018, 504; photos: author)

stones from LN settlement contexts, Sørensen asks if 'the cup-marks could have been a simple symbolic representation of rock art embedded in an everyday tool as a link to the ritual sphere?' (2018, 45). Müller (2008) links the miniature clay battle axes from Wattendorf-Motzenstein (cf. Seregély 2008) to a more profane symbolic world (Müller 2008, 397). Thus, it may be the case that the addition of cup marks and other unfinished drillings to battle axe fragments was a conscious action with a certain meaning in a more everyday symbolic realm. To access any possible meaning, we need to consider the entire phenomenon of battle axes.

The wider meaning of battle axe deposition and cup marks

Battle axes were most commonly deposited as single finds and cup marked battle axe fragments are almost exclusively single finds. The battle axe itself possibly had a high symbolic value either for the burial ritual itself or for both the ritual and the lifetime of the deceased, marking them as a special person, whether as an adult, free person, warrior, etc. To cite Bradley (2005), special artefacts in prehistoric societies may have been attributed with souls, characters, and names. Thus, depositing artefacts in the landscape instead of the grave may well have also had a certain meaning. When we think of depositions in terms of their structuring of the landscape, the deposition of individual battle axes could have served the same purpose: structuring, or in-taking, claiming it for yourself or your group (cf. Varberg 2015).

Horn (2014, 201) recognised that the blades of Neolithic (Chalcolithic) and Bronze Age halberds were often detached from the shaft before deposition. He moreover states that, alongside other reasons, depositing weapons can serve as an 'execution' of an object perceived as a burden (cf. Freud 1999).[8] After an act of violence, the victorious party possesses a malicious object that has caused damage or even killed, which must be destroyed in order to ward off evil spirits (Horn 2014, 216–9). As the deliberate destruction and deposition of weapons and other artefacts associated with conflict is attested from the Bronze and Iron Ages (eg, Blankenfeldt & Carnap-Bornheim 2017), we can propose that this behaviour was also present in Neolithic societies.

Even if we do not accept the interpretation of the 'killing' of artefacts, this idea at least raises the possibility that battle axes were deposited after having performed some kind of service. This could be one possible explanation for the high frequency of battle axes from single find contexts; they were all deposited after having fulfilled a function. It may be the case that the battle axes had already been destroyed, or, alternatively, they were rendered useless specifically for the purpose of deposition.

Uselessness does not only encompass broken stones that we can reconstruct archaeologically. The mere act of burying makes an implement inaccessible and thus unusable (Horn 2014, 216–9). Also breaking – or breaking off – the shaft would render a weapon unusable but, due to the poor degree of preservation of wooden shafts,[9] we cannot reconstruct whether and how often this happened. An interesting observation in this regard comes from Scania. In the megalithic tomb of Gillhög, one complete-but-fragmented YN battle axe was found associated with destroyed flint axes. These have been interpreted as deliberate offerings as opposed to secondary burial gifts (Olausson 2014, 272). Such contexts are lacking in the YN of northern Germany but this example shows that battle axes and fragments (or the act of destruction) could have borne a certain meaning. Before that, during the MN (3300–2800 BC), broken battle axes are often found in megaliths in Schleswig-Holstein (Zápotocký 1992, 163; Schultrich 2022, 357). Just as fragments in general may have had some significance, so too may single finds of fragments. And as shown above (Figs 6 & 7), cutting edges and butts were obviously deposited differently, thus having different 'meanings'.

This all brings us to the potential meaning of cup marks themselves: If a YN battle axe became obsolete because it broke during use or was intentionally broken, and thus not deposited in a grave context, it could be equipped with a secondary, non-proper, shaft hole. There is only one YN (single) burial in the area under study (from Flensburg-Weiche) known to have two battle axes associated with it: an unbroken one and a broken piece with a secondary, small, hourglass shaped drilling (Fig. 9.4) (Struve 1955, cat. 126a, Tab. 5.8–9; Schultrich 2018, cat. 172). It could be the case that the broken piece was the original possession of the deceased, especially when we accept the interpretation of grave goods as being personal items (however, see the critique above). Following this idea this might indicate that, after an axe broke, the person acquired a new axe but also retained (part of) the

former one. The meaning of the former axe was transformed by adding an unfinished or *pars pro toto* drilling, to demonstrate its ideal value. While this novel meaning is primarily linked to depositions in non-burial contexts, in this one instance the person retained the former axe.

Iversen *et al*. (2022) cite a study by Thomas (2016), who connects the cup marks at the Neolithic burial site of Ness of Brodgar, Orkney, to phases of architectonical transformations. Iversen *et al*. interpret the cup marks from the enclosures on Bornholm in a similar manner (2022, 165). This train-of-thought could also account for the cup marked capstone from Albersdorf-Brutkamp – a megalith that was deliberately destroyed, perhaps at the same time as the cup marks were made (cf. Dibbern 2016). Such interpretations conform to the one presented in this paper: battle axe fragments that were attributed with cup marks fulfilled a specific function connected to the afterlife of the classic use-stage; thus, a transformation of the life and meaning of the artefact.

The cradle of cup marks and the diversification of use

Iversen (2019a) has posited that cup marks as a form of non-figurative art appeared in the EN/MN, disappeared during the YN, and re-appeared in the LN of Denmark and northern Germany. The few early contexts with cup marks from Denmark and northern Germany he mentions – the late EN Onsved megalith (cf. Kaul 1987) and the possible EN/MN cup marks from Albersdorf (cf. Dibbern 2016; Iversen *et al*. 2022, 169) – however, are not entirely certain. One clear context dates to the very end of the MN, however, this is located on the island of Bornholm. Taking this as reference for the entire area of discussion is not adequate, as Bornholm and northern Germany differ in many respects, as outlined above. However, as a caveat to this, clear contexts that verify a Bronze Age date for cup marked capstones are not present in northern Germany either. At present, the few contexts Iversen cites strongly indicate that we have to rethink the established view. And this argument is strengthened with the analysis of battle axes in this paper. Here it has been shown that the concept of cup marks was indeed known during the Neolithic, at least on battle axe fragments. This makes Iversen's assumption that cup marks were placed on megaliths during the Neolithic more plausible.

Iversen also argues that during the YN no pictorial art or art-like forms were present and, thus, no cup marks were present (2019a, 150). However, battle axes of the YN possess cup marks and other additions, which we can classify together as symbolic shaft holes. According to this, on the one hand we can verify his ideas regarding early cup marks, while on the other we can also fill the gap he proposes.

As EN, MN, and LN battle axe fragments also possess cup marks and other additions, we can reconstruct a common thread, with the YN specimens connecting the early and late battle axe fragments with cup marks. There are even more common threads connected to battle axes. In many CWC contexts throughout Central and Northern Europe, different forms of symbolic battle axes occur: miniature pieces of hard stone or models of battle axes (mostly likewise miniature in form) made of clay, amber, or soft stone (Hübner 2005, 161, 354; Seregély 2008, 281–2; Larsson 2017, 48). Such symbolic battle axes are not unique to the YN CWC; rather, they continue a tradition from times past (cf. Zápotocký 1992, 161–2). And, later on, in the LN, we still find a few battle axe models made of amber (Schwantes 1958, 359; Vandkilde 2014, 70; Woltermann 2016, 130). Thus, the symbology related to the battle axe idea is continuously present throughout the periods covered by this paper, with there being no hiatus during the YN CWC.

Leaving the cup marked capstones of megaliths aside, it is still unclear precisely *when* cup marks departed from their strict relationship with battle axe fragments and began to be added to portable stones. One could argue that the evidence of the MN V cup marks from Bornholm already testifies to a diversification of the cup mark phenomenon (cf. Iversen *et al*. 2022). However, after the filling events of the two enclosures, no cup marks other than on battle axes are known for a period of several centuries (Iversen *et al*. 2022, 169).

All evidence to date points to the late YN being the crucial phase for the cup mark phenomenon. In the late YN, ie, during the transition to the LN, many changes are evident. A material culture associated with the Bell Beaker horizon appears (Kleijne *et al*. 2020), followed by the re-introduction of metal artefacts (Vandkilde 2017; Brozio *et al*. 2023). Also, changes in climate and probably associated changes in settlement structures and architecture, as well as plant cultivation, appear (Kleijne *et al*. 2020). Moreover, the

transition is marked by battle axes finally losing their function as primary status objects, with flint daggers taking their place (Hübner 2005, 686–90; Schultrich 2023b, 68–70).

In this phase, for the first time in regions other than Bornholm, cup marks lose their strict battle axe association and evidently (albeit rarely) transition to other objects (Figs 12 & 13). At the same time, the former diversity evidenced among secondary drillings shrinks, becoming exclusively limited to cup marks. It may well be the case that, in relation to all the other changes that characterise the transition to the LN, a different perception of cup marks developed, allowing them to lose their strict association with battle axes.

Fig. 12.
YN wedge axe from Malente, Schleswig-Holstein (cf. Schultrich 2018, cat. 606, Tab. 31.5; photo: Claudia Janke, Schloss Gottorf Schleswig, 2016)

The meaning of traditions in the 4th and 3rd millennium BC

By saying cup marks and figurative art disappeared during the YN, Iversen (2019a) reproduces a common narrative that we have faced in recent literature: the notion that everything changes with the emergence of the CWC. This notion, however, stems from a simple reading of complex genetic and archaeological data. This paper is an opportunity to tackle this narrative from a local, material-based perspective.

To put it simply: pioneering studies on ancient DNA (as Allentoft *et al.* 2015; Haak *et al.* 2015) have shown that the 3rd millennium BC was a phase of highly dynamic population movements. They linked this to the spread of the CWC and the demise of the respective pre-existing societies (Kristiansen *et al.* 2017). The genetic observations returned simplistic ideas on archaeological cultures being monothetic blocks and coherent groups of people to the fore (for a critique, see Furholt 2019; 2021; Frieman & Hofmann 2019;

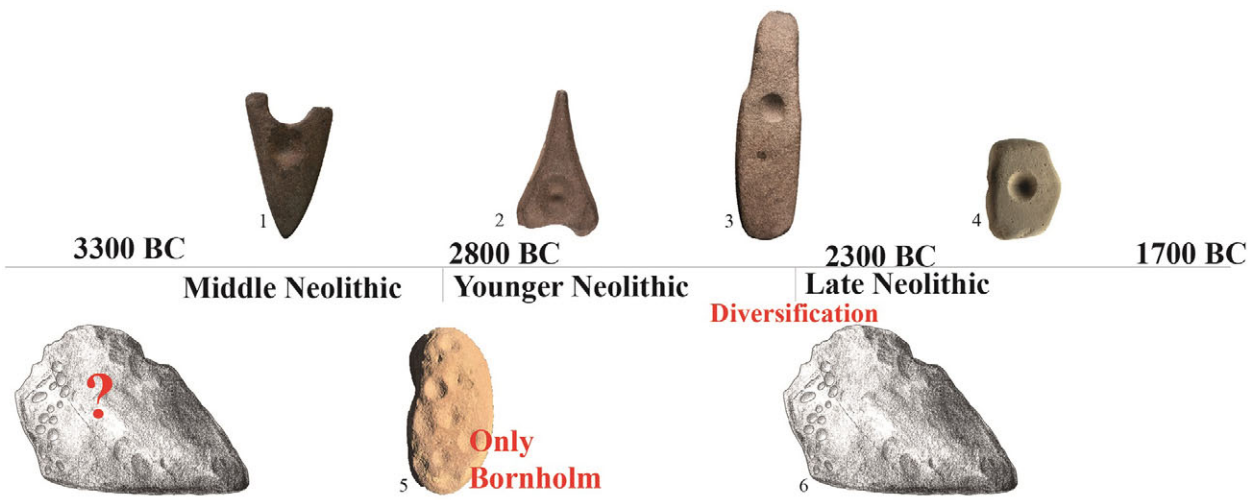


Fig. 13.
Timescale with the different media for cup marks. The line indicates the frequency of battle axe fragments with cup marks and other additions (from Tables 2 & 3). 1: MN axe, Brodersby (photo: author, 2015; cf. Schultrich 2018, 504); 2: YN axe, Itzehoe (Photo: Claudia Janke, Schloss Gottorf Schleswig, 2016; cf. Schultrich 2018, cat. 1499); 3: YN wedge axe from Malente (photo: Claudia Janke, Schloss Gottorf Schleswig, 2016; cf. Schultrich 2018, cat. 606, Tab. 31.5); 4: LN cup marked stone, Østbirk (Borup 2019, 105; cf. Sørensen 2018, 44); 5: MN cup marked stone, Vasagård East (Iversen *et al.* 2022, 165); 6: Cup marked capstone, Albersdorf (Dibbern 2016, 98)

Johannsen *et al.* 2017). The current state of knowledge is that we do not know how fast the processes happened, nor which mechanisms were at play, especially in regions such as northern Germany where we lack bone preservation (Furholt 2019, 120–1; Schultrich 2023a, 281–2). For the region of today's Bohemia, recent studies indicate that the initial CWC formation processes were much more complex and different to what was expected (Papac *et al.* 2021). Additionally, we know that migrations and a high degree of mobility are not phenomena restricted to the 3rd millennium and limited to CWC societies but, rather, that they also occur earlier and are associated with many archaeological complexes (Nielsen & Johannsen 2023; Dunne *et al.* 2023; Schultrich 2023b).

The simple scenarios still fail to provide explanations for the regionally different traditions passed down from the preceding archaeological cultures to the regional CWC societies. Even though CWC emerges as a common denominator across many regions, the novel practices introduced by it are always set against the backdrop of a continuation of local traditions (Beckermann 2015; Schultrich 2018; Kroon *et al.* 2019; Iversen 2019b; Furholt 2019; Kolář 2020).

Acknowledging that the symbolic secondary treatment of battle axe fragments is a tradition passed down from the societies of the 4th to those of the 3rd millennium, has consequences for the recent discussions on the Central European Neolithic. One could argue that this tradition is connected to battle axes in all places in which they occur and, thus, migrants could have brought it with them when they moved. However, from the perspective of northern Germany, many traditions exist, some of them even being unique to the region. Just a few examples: Land use (and its regional variations) remained – on the basis of pollen analyses in seas and bogs in the western and the eastern parts of the region respectively – stable at the transition to the YN (Feeser & Furholt 2014; Schultrich 2018, 68–74; 2023a, 283). Megaliths were re-used in parts of the region (today's districts of Dithmarschen and Steinburg) at the beginning of the CWC period (Schultrich 2018, 36; 2023a, 285). The causewayed enclosure of Albersdorf-Dieksknöll was established in the 38th century BC, re-used several times during the MN, and also during the YN up until the 25th century (Dibbern 2016). This is an exceptional finding for that region, where enclosures were mostly abandoned in the late 4th or very early 3rd millennium and thus centuries before the advent of YN CWC societies (Schultrich 2018, 62–4; 2023a, 285–6; cf. Grünewald 2022).

Taking all this evidence together shows that, at least in this part of the CWC 'sphere', the degree or speed of the potential turnovers was probably rather low, with the local FBC groups being highly involved in the early CWC formation process, ie, they probably passed down the symbolical treatment of broken battle axes – a highly valued object in both phases.

CONCLUSION

This paper established the significance of Neolithic battle axe fragments with three specific additions: cup-arks, deep drillings, and unfinished drillings. These additions were not intended to prepare a properly useful secondary axe, as is well testified in the case of simple shaft hole axes of the LN and Bronze Age (<23/2250 BC). The differences lie in the fact that the additions were never finished, the butts were never reground, and a number of butt fragments have been found bearing cup marks and other additions. Butts, even in later times with proper secondary (simple) axes, never formed the basis for secondary axes. It is likely that these secondary treatments reflect a conscious action and an intention to create a different meaning for the axe halves. This paper proposes that such secondary drillings be termed symbolic – or *pars pro toto* – shaft holes.

Especially important among the three additions are the cup marks. Five conclusions in relation to the appearance and dating of cup marks can be made:

1. Cup marks are present on battle axe fragments.
2. Cup marks were present during the Early and Middle Neolithic (*c.* 4000–2800 BC) in Denmark and northern Germany.
3. Cup marks were present during the Younger Neolithic (2800–2250 BC) in even larger numbers than before.
4. In the late YN (starting *c.* 2450 BC), two of the three additions seem to vanish, with cup marks being the only form to endure.
5. When we exclude the findings from Bornholm, the first artefacts other than battle axes to have borne cup marks do not date to or pre-date the late YN.

Together, these five findings demonstrate a common thread spanning from the Early Neolithic to the

Bronze Age societies of northern Germany (and partly Denmark). They furthermore show that the custom of adding cup marks to objects other than battle axes, which is a significant action and symbol of the LN and Bronze Age, begins in the late YN.

The first secure evidence of cup marks on megaliths appears with the LN. As the evidence for EN and MN cup marked capstones of megaliths is still not entirely clear, we have to conclude that the cup mark phenomenon originated as a symbolic shaft hole on battle axe fragments, from which it was passed down to other media and locations, presumably in the late YN. However, even if EN and MN contexts were to be confirmed, this would not decrease the significance of the battle axe fragments, as there is an apparent lack of cup marks on objects other than battle axes during the YN. Thus, if during the EN and MN cup marks were placed on locations, this practise had presumably been forgotten, later being re-invented in the late YN (Fig. 13).

As presented in this paper, the late YN (and the LN) was a crucial phase regarding the social meaning of battle axes; many changes are evident in this horizon (Bell Beakers, re-introduction of metal items, settlement changes, and plant cultivation, see above). As presented above, in the late YN a general diversification of the use of battle axes (multi-object hoards, settlements, proper secondary axes, diversification morphology) also appears. At the same time, the former diversity evidenced among secondary drillings decreases, becoming limited to cup marks (Table 2).

In this phase, for the first time in regions other than Bornholm, cup marks lose their strict association with battle axes and make a transition to other objects (albeit rarely) (Figs 12 & 13). It may well be the case that, in relation to all the above-mentioned changes that characterise the transition to the LN, a different perception of cup marks developed, allowing them to lose their strict association with battle axes.

In a phase of transformation, people might have felt the need to structure their world and to give places and actions meaning. Above, we termed the cup marks on axes 'symbolic shaft holes'. With such additions, the former meaning of the battle axe was altered: perhaps it was honoured by giving it a *pars pro toto* shaft hole in a phase of (artefact based) transformation; however, a proper shaft hole was reserved for proper battle axes only.

The term 'symbolic shaft hole' cannot be applied to the later cup marks on stones other than battle axes. However, the idea of attributing items and places with a certain meaning is sustained (cf. Thomas 2016; Dibbern 2016; Iversen *et al.* 2022). In a phase of tremendous social transformation during the late 3rd millennium BC, the custom of attributing valued objects with cup marks had now become applied to other artefacts and places. The later significant LN and Bronze Age cup marks thus might stem from an old tradition, one that was initially associated with battle axes.

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NOTES

[1]Complex shaped battle axes continue to exist on the Danish Islands (Iversen 2015, 106–8).

[2]In Schleswig-Holstein ~24% of the LN double-axes (D-axes) are fragmented according to Zápotocký (1992, appx). In Denmark and north-eastern Germany, however, this figure stands at 0–7% only (cf. Schultrich 2022, 357).

[3]Rough-outs of simple shaft hole axes do occur in LN and Early Bronze Age grave contexts, and also hoard-like contexts, in Sscleswig-Holstein, Denmark, and central Sweden (Aner & Kersten 1978, Tab. 27; 1979, Tab. 7; Siemann 2003, 89; Lekberg 2004, 265–71; Aner *et al.* 2005, 117–8, fig. 114; Schultrich 2018, cat. 1147, 1238, 1239, 1384). Also during the EN and MN, a small number of rough-outs were deposited in graves or hoard-like contexts (Zápotocký 1992, 151). A number of rough-outs were also deposited as single finds in hoard-like contexts in the YN (Schultrich 2018, appx). Thus, it may well be the case that rough-outs could, in fact, have borne a symbolic function.

[4]Zápotocký (1992) sees a gradual decline in the drilling technique in favour of the pecking technique during the EN and MN (1992, 145–6). However, his observation is biased, as the later axes in his catalogue are dominated by material from northern Germany and Denmark, where pecking predominates. He did not include the L-axes from Switzerland, Austria, or central and southern Germany in his analysis (Schultrich 2022, 229). Malmer (1962) sees a gradual increase in the drilling technique in the BAC during the YN (1962, 609). The same cannot be said to be observed for the SGC of Schleswig-Holstein: Here the pecking technique dominates throughout the entire YN (Goldhammer *et al.* 2012, 135; Schultrich 2018, 182; 2022, 229).

[5]Precise data was obtained from three regions of Schleswig-Holstein's north-east, south-east, and south-west, within the modern boundaries of the districts: 1. Schleswig-Flensburg and Flensburg, 2. Ostholstein, and 3. Dithmarschen, Steinburg, and Pinneberg.

[6]Hübner (2005, 83) mentions the presence of reworked early YN A-axes (three pieces from Denmark only), which could not be verified among the material of Schelswig-Holstein. However, even if a few such axes were proven to exist, that would not diminish the significance of the fragments with additions.

[7]This fits with the observation of Olalde *et al.* (2018) that the individuals associated with Bell Beaker material are most closely genetically linked to individuals of Oostwoud, Netherlands.

[8]This may well be the case, because philosophers of different periods have emphasised the notion that 'it is the person who kills and not the object' being a revolutionary idea. This suggests that a different view may well have prevailed during prehistoric times (Horn 2011, 60; 2014, 218).

[9]Remains of wooden shafts are preserved in a number of depositions (eg, Groß Sarau: Schultrich 2018, cat. 207, Tab. 64; Oldenburg: Brozio 2016, 71–2, both in Schleswig-Holstein). Thus, wooden shafts may well indeed have formed part of the depositions.

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RÉSUMÉ

Haches de combat néolithiques avec cupules, par Sebastian Schultrich

Depuis de nombreuses années, les chercheurs ont invariablement daté les cupules – faibles dépressions gravées sur des roches portables et fixes – du nord de l'Allemagne et du sud de la Scandinavie à l'âge du Bronze. De nouvelles découvertes les font remonter au moins au Néolithique final (NF, *c.* 2350 av. J.-C.). Un objet mobilier en pierre marqué de cupules, issu d'un contexte de la fin de la culture des gobelets à entonnoir (*c.* 2800 av. J.-C.), a été récemment découvert. Il existe même des indices de cupules datant du 4ème millénaire AEC. Il y a actuellement des lacunes dans nos connaissances sur les cupules, et sur l'art non-figuratif en général, durant la culture de la céramique cordée (CRC) du Néolithique Récent (NR) (*c.* 2800–2250 av. J.-C.). Cet article montre l'importance de trois formes apparentées de traitements secondaires de fragments de haches de combat, à savoir l'ajout de perforations (en sablier) non terminées, de profondes marques de percussion, et de cupules peu profondes. L'argument que nous avançons est que ces traitements étaient présents en faible nombre durant le 4ème millénaire av. J.-C., puis sont devenus de plus en plus fréquents lors de la phase que nous proposons d'appeler «phase de vide» dans le contexte des sociétés CRC. La fin du 3ème millénaire est marquée par d'énormes changements sociaux. Durant cette période, des trois types de traitements secondaires seules les cupules se perpétuent, tandis que les supports sur lesquels ces cupules sont exécutées se diversifient, affectant des objets autres que des fragments de haches de combat. Nous avançons l'idée que cette évolution était liée aux

changements sociaux qui caractérisent le début du NF. Enfin, nous suggérons que la tradition des cupules du NF et de l'âge du Bronze est basée sur une tradition précédente, initialement associée aux haches de combat.

ZUSAMMENFASSUNG

Neolithische Streitäxte mit „Schälchen", von Sebastian Schultrich

Viele Jahre lang wurden „Schälchen" – näpfchenartige flache Vertiefungen auf beweglichen und unbeweglichen Steinen – aus Norddeutschland und Südskandinavien konsequent in die Bronzezeit datiert. Neuere Funde führen sie mindestens bis in das Spätneolithikum (ca. 2350 v. Chr.) zurück. Kürzlich wurden portable Steine mit Schälchen gefunden, die zu einem Kontext der späten Trichterbecherzeit (ca. 2800 v. Chr.) gehören. Es gibt sogar Hinweise auf Schälchen, die auf das 4. Jahrtausend v. Chr. zurückgehen. Gegenwärtig klafft eine Lücke in unserer Kenntnis von Schälchen und nicht-figurativer Kunst im Allgemeinen während der Schnurkeramikkultur des jüngeren Neolithikums (ca. 2800–2250 v. Chr.). In diesem Beitrag wird die Bedeutung von drei verwandten Arten sekundärer Bearbeitungen von Streitaxtfragmenten herausgearbeitet, nämlich das Hinzufügen von (sanduhrförmigen) unvollendeten Schaftlöchern, tiefen Picklöchern und flachen Schälchen. Es wird argumentiert, dass sie im 4. Jahrtausend v. Chr. in geringer Zahl vorhanden waren und während der vorgeschlagenen „Lückenphase" im Kontext der schnurkeramischen Gesellschaften zunehmend üblich wurden. Das späte 3. Jahrtausend ist eine Periode enormen sozialen Wandels. In diesem Zeitraum bleiben von den drei Arten der sekundären Bearbeitung nur die Schälchen bestehen, während sich die möglichen Medien, auf denen solche Vertiefungen angebracht werden, diversifizieren und sie auch auf anderen Gegenständen und Objekten als Streitaxtfragmenten erscheinen. Vermutlich hängt diese Entwicklung mit den sozialen Veränderungen zusammen, die den Beginn des Spätneolithikums kennzeichnen. Schließlich wird vorgeschlagen, dass die Schälchen-Tradition des Spätneolithikums und der Bronzezeit auf einer älteren Tradition beruht, die ursprünglich mit Streitäxten assoziiert war.

RESUMEN

Hachas de batalla neolíticas con cazoletas, por Sebastian Schultrich

Durante muchos años, los investigadores han datado de forma sistemática en la Edad del Bronce las cazoletas – depresiones profundas encontradas tanto en piedras móviles como fijas – del norte de Alemania y el sur de Escandinavia. retrotraen, al menos, hasta el Neolítico final (LN, *c.* 2350 BC). Recientemente, se han documentado cazoletas en elementos de piedra móviles en contextos del Campaniforme final (*c.* 2800 BC). Existen incluso evidencias de estas cazoletas datadas en el IV milenio BC. En la actualidad, existe un vacío de conocimiento en relación con estas cazoletas y el arte no figurativo durante la Cultura de la Cerámica Cordada (CWC) del Neolítico reciente (*c.* 2800–2250 BC). Este artículo establece la importancia de los tres tipos de tratamientos secundarios relacionados con los fragmentos de hacha, a saber, la adición de agujeros de eje sin terminar (en forma bicónica), agujeros de piqueteado profundo y cazoletas profundas. El argumento esgrimido es que estaban presentes en pequeñas cantidades en el IV milenio BC, volviéndose cada vez más comunes durante la 'fase de vacío' en el contexto de las sociedades CWC. El final del III milenio es un período de cambios sociales trascendentales. Durante este período, de los tres tipos de tratamiento secundario solo persisten las cazoletas, mientras los soportes sobre los que se aplican se diversifican, apareciendo en otros objetos e ítems diferentes a los fragmentos de hacha. Se propone que este desarrollo está relacionado con los cambios sociales que caracterizan el inicio del Neolítico final. Por último, se sugiere que la tradición de cazoletas del Neolítico final y la Edad del Bronce se basa en una tradición anterior inicialmente asociada con las hachas de batalla.