jungstein ITE Journal of Neolithic Archaeology

www.j-n-a.org

6 December 2019
doi 10.12766/jna.2019.6

The Dark Ages in the North? A transformative phase at 3000–2750 BCE in the western Baltic: Brodersby-Schönhagen and the Store Valby phenomenon

Jan Piet Brozio, Johannes Müller, Dragana Filipović, Wiebke Kirleis, Ulrich Schmölcke, Jenny Meyer

Abstract

On the Cimbrian peninsula, comprising the continental part of Denmark and part of northern Germany, the period 3100–2800 BCE is characterised by a decline in burial activity and by reforestation in some areas. Following the peak of megalithic construction by the Funnel Beaker societies and preceding new building activities by the Corded Ware societies, this period can be referred as the 'Dark Ages' of the north. Our analysis of this period within the context of a German Research Foundation Collaborative Research Centre (CRC 1266) project resulted in a new perspective on the role of settlement patterns associated with a ceramic type known as Store Valby. In addition to small domestic sites, such as Schönhagen LA 107 (Brodersby), which dominate on the western and southern parts of the Cimbrian peninsula, research has identified giant settlements to the west, from around 2900 BCE, and palisade enclosures to the east. Despite the diversity of regional developments in the western Baltic, we think that the general characterisation of these centuries as an independent phase of socio-environmental transformations can serve as a model for the entire region.

Introduction

Recent archaeological discoveries and palaeo-ecological results have hinted at the special character of socio-environmental interactions in the western Baltic region around 3100–2800 BCE. As part of a research project on transformations in the northern German Neolithic (CRC 1266 C1), the hypothesis was formulated that these centuries should be seen as a transformation phase, clearly separate from the preceding farming communities of the Funnel Beaker Culture (also known as the *Trichterbecherkultur:* TRB) and the later, more pastorally oriented Corded Ware Culture (CWC) phenomenon. Here we present our first results and indicate the extent to which they confirm or reject this hypothesis. We also indicate different triggers for and characteristics of the proposed socio-environmental transformation phenomenon.

Typochronology and transformation

At the beginning of the 3rd millennium BCE, the Corded Ware phenomenon started in large parts of northern and central Europe

Article history:
Received 15 September 2019
Reviewed 8 November 2019
Published 6 December 2019

Keywords: Western Baltic, 3rd millennium BCE, Store Valby phenomenon, domestic sites, settlement patterns, socio-environmental transformations

Cite as: *Jan Piet Brozio, Johannes Müller, Dragana Filipović, Wiebke Kirleis, Ulrich Schmölcke, Jenny Meyer: The Dark Ages in the North? A transformative phase at 3000–2750 BCE in the western Baltic: Brodersby-Schönhagen and the Store Valby phenomenon JNA 21, 2019, 103–146 [doi 10.12766/jna.2019.6]*

Authors' addresses:
Jan Piet Brozio
jpbrozio@ufg.uni-kiel.de

Dragana Filipović
d.filipovic@ufg.uni-kiel.de

Wiebke Kirleis
wiebke.kirleis@ufg.uni-kiel.de

Johannes Müller
johannes.mueller@ufg.uni-kiel.de

Institute of Pre- and Protohistoric Archaeology, Kiel University,
Johanna-Mestorf-Strasse 2–6, 24118 Kiel
Germany

Ulrich Schmölcke
Zentrum für Baltische und Skandinavische Archäologie, Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorf
24837 Schleswig, Germany
ulrich.schmoelcke@schloss-gottorf.de

Acknowledgements
The authors thank Agnes Heitmann and Carsten Reckweg for the revision of the graphics, also Tanja Reiser for the processing of the botanical macro-remains. This study was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation, Projektnummer 2901391021 – SFB1266).

(Buchvaldek/Strahm 1992; Dörfler/Müller 2008; Harrisson/Heyd 2007; Kristiansen et al. 2017). More or less contemporaneously, on the North European Plain and in southern Scandinavia, the Middle Neolithic Funnel Beaker societies ended (Brozio in press; Müller 2019) and the Single Grave Culture (SGC; German: *Einzelgrabkultur*, EGK) societies, a northern regional expression of the CWC phenomenon, became established, albeit in different intensities (Brozio 2019a; Hübner 2005; Müller et al. in press; Schultrich 2018). This socio-cultural transformation related to fundamental changes in social organization and the formation of new ideologies (Brozio et al. 2019b; Kristiansen 1984), reflected e. g. in new burial practices. On the Cimbrian peninsula (comprising the continental part of Denmark and part of northern Germany; also known as Jutland) and on the Danish islands in the western Baltic region, this transformation process from TRB to SGC has been linked to the so-called Store Valby ceramics, traditionally associated with the Nordic Middle Neolithic (MN) V (Becker 1954; Davidsen 1978; Müller et al. 2012). At that same time, Globular Amphora Culture (GA) elements appeared in the southern part of the western Baltic (Woidich 2014).

Store Valby was originally defined by J. Becker (1954) as the last phase of the northern group of TRB societies (Müller et al. 2012). At certain sites, such as the eponymous Store Valby site, Region Zealand, he observed that the pottery differed markedly from the older, Middle Neolithic pottery in surface design and decoration. This resulted in a relative chronological classification at the end of the Middle Neolithic, MN V, which later was dated in absolute terms between ca. 3000 and 2800/2700 BCE (Hübner 2005) and, in eastern Denmark, possibly between ca. 3000 and 2600 BCE (Iversen 2015; 2016). Store Valby is the dominant style of ceramics at most of the sites in the Cimbrian peninsula and on the Danish islands at this time. There are other areas where Store Valby shows local variations, for example on Bornholm (Nielsen/Nielsen 1985; 1986; 1991) and in Scania (Larsson 1982; 1985). Additionally, there are regions where small numbers of Story Valby pots may have been an integral part of Early Single Grave pottery or Globular Amphora pottery, for example in Ostholstein (eastern Holstein) (Brozio 2016). Several bucket-shaped vessels from Mecklenburg-Vorpommern (Ebbesen 1975), to the south, are problematic to classify, as they can be typologically assigned to the Store Valby style but also to the Globular Amphora groups (Beier 1988; Schuldt 1972; Woidich 2014). Within the general distribution area of Store Valby pottery, different regions without Store Valby pottery exist. There is no Store Valby pottery in Djursland, on the north-western part of the Cimbrian peninsula (Sørensen 2012). The southernmost distribution includes Dithmarschen and the Wagric peninsula (Klooß 2008).

Although Becker (1954) argued that Store Valby pottery should be assigned to the TRB ceramic development, from the start his definition raised questions about the socio-cultural relationship of the Store Valby phenomenon with the TRB, which were never satisfactorily answered. New studies on environmental change, the degree of opening up of the land, the quantities of monuments, and economic change have shown a period between ca. 3100 and 2800 BCE without monumental building activity and a decrease in human impact on the environment in northern Germany and the southern part of the Cimbrian peninsula. We therefore argue that it may be more appropriate to view the mosaic of Store Valby patterns as an independent phase of transformation (Brozio et al. 2019b; Feeser et al. 2012).

We hypothesised that such a transformation phase should show different ceramic styles, burial rites and economic systems. From a terminological point of view, testing this hypothesis requires a clear

separation into periods (certain phenomena separated into clearly defined, absolute chronological brackets), phases (certain phenomena separated into clearly defined, absolute chronological brackets that are shorter than those for periods), and material culture (e. g. ceramic styles). Starting from the hypothesis that the settlement behaviour and the economy are the most important criteria for the characterization of communities, our project focussed on the identification and analysis of domestic sites of the 3rd millennium BCE.

One site yielded the most promising features and finds for checking possible domestic structures dating to the period in question, especially with respect to Store Valby. This site, which forms the starting point of this study, is known as Schönhagen LA 107 (Brodersby; hereafter Brodersby-Schönhagen). It is located on the southern part of the Cimbrian peninsula and was excavated in 2017 as part of CRC 1266, "Scales of transformation: Human-environmental interaction in prehistoric and archaic societies".

In general, our objective is to use these local data to outline a historical classification of Store Valby. In doing so, we aim to answer the following question: How does the Store Valby phenomenon relate to other, contemporary phenomena through practices of subsistence, ritual and material culture within the western Baltic Sea region in the 3rd millennium BCE?

The Store Valby domestic site of Brodersby-Schönhagen

Locality

The site of Brodersby-Schönhagen is located in the district of Rendsburg-Eckernförde, Schleswig-Holstein, Germany, on the east side of the southern part of the Cimbrian peninsula, on a much smaller peninsula called Schwansen, ca. 200 metres from the coastal zone of the Baltic Sea. The Schwansen peninsula is delimited in the east by the Baltic Sea and in the west and north by a 42 km long firth, the so-called Schlei (Fig. 1). The geomorphology is the result of flooding

Fig. 1. The domestic site of Brodersby-Schönhagen on the Schwansen peninsula, on the east coast of the Cimbrean peninsula, Schleswig-Holstein, Germany.

of the landscape that had been shaped by glacial ice, caused by post-glacial sea-level rise, which is mainly driven by eustatic global sea level variations and the isostatic land elevation of Scandinavia (Labes 2002; 2005). Steep coastal cliffs alternate here with barrier landscapes, of which the windblown dunes are characteristic (Niedermeyer et al. 2011). The beach walls have partly separated bays from the open sea, resulting in lagoons in which fens could form. The area inland is characterised by sandy-moranic areas with podzols and heavy clay soils (Burbaum 2006). Palaeo-environmental reconstructions of the environment are still missing for the Neolithic, but deducing from neighbouring palynological and sedimentological analyses (Schaller/Kirleis 2018), it seems reasonable to reconstruct a forested landscape with a high potential for pasturing, as well as aquatic resources, both inland and coastal.

Fig. 2. Aerial photo of the site of Brodersby-Schönhagen showing the dense vegetation (Photo: Jan Piet Brozio).

Field work and technical settings

The Brodersby-Schönhagen site was first discovered during test excavations carried out in 2007 by the Schleswig-Holstein State Archaeological Department. Their two trenches yielded flint tools, small pieces of fragmented pottery and bones, as well as several further stone tools, but no features, such as pits or postholes. After several storms in the years that followed, the area was left to regenerate (Fig. 2). By 2017, when the CRC team started work on the site, dense vegetation and fallen trees restricted the technical possibilities, so that large-scale excavations were not possible. Instead, the team excavated six sondage trenches (Fig. 3). The first step was mechanical excavation down to the layers containing the finds. Artefacts were

documented *in situ* photographically, photogrammetrically and by three-dimensional measurements. Plan views and profiles were produced using the same techniques. Contexts were sampled in a random manner for archaeobotanical investigations. In the area of dry soil, samples with a volume of 10 l were taken. In the area of wet soil, samples with a volume of 0.3 l were taken. In total, an area of 118 m^2 was excavated.

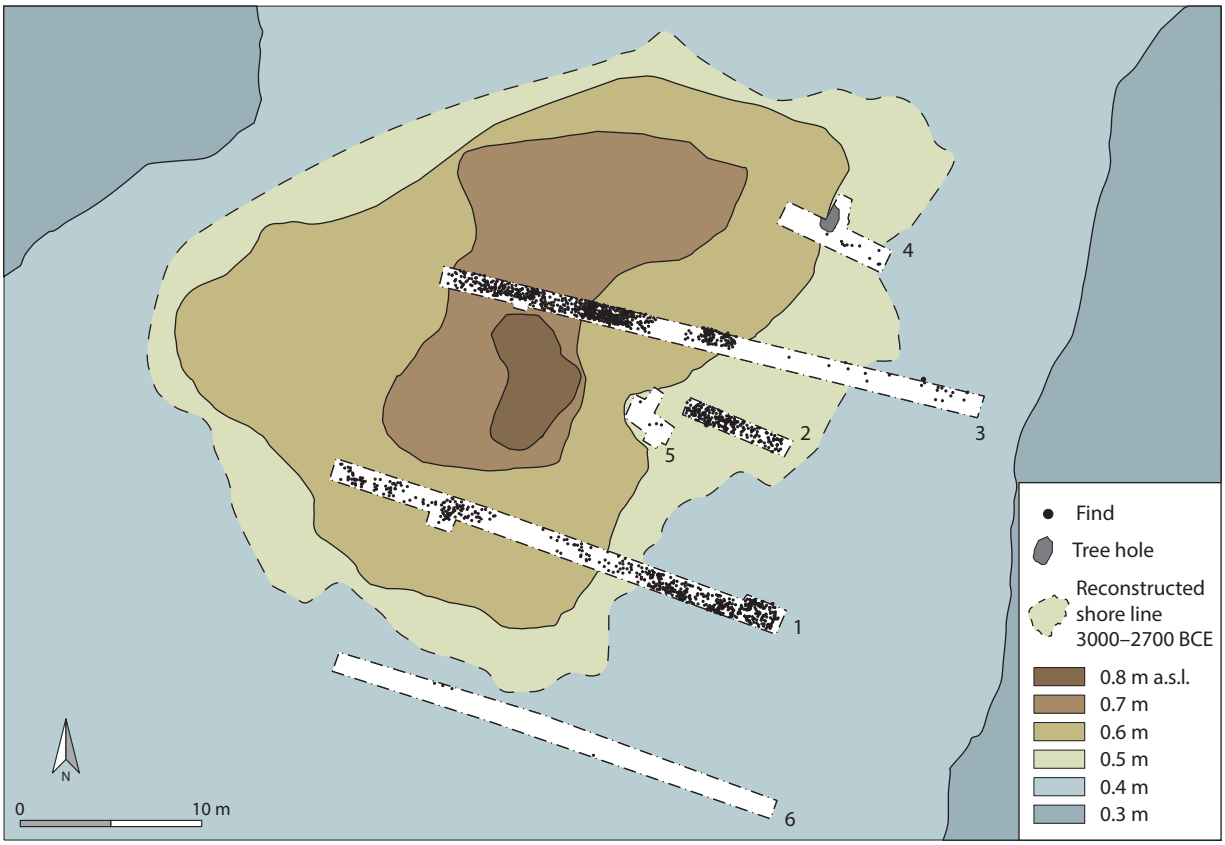


Fig. 3. Excavation sections of Brodersby-Schönhagen. The hill on which the site is situated, which today is only slightly elevated, was an island or peninsula in the 3rd millennium BCE.

Geomorphology and stratigraphy

The site is surrounded by peat and sits on a sandy, flat hill in the centre of this peat. To the northeast, survey work by the CRC team found a former shore zone. This shore zone formed of a marked layer of grey sand interspersed with marine shells (Fig. 4). Above this lies a layer of strongly decomposed peat, up to 60 cm thick, black to dark brown in colour, that could be traced to a depth of -1.85 m a.s.l. The lower borders are clearly visible, whereas the upper transition to the humus horizon is only diffusely recognisable as a border area. South of the shore zone, the wet, natural ground level changes to a fine to medium sand, which is light yellow to greyish in colour due to strong iron oxide precipitation. On the flat hill, the thinness of the topsoil and contact with oxygen induced by the iron oxides have resulted in poor conditions for the distinguishing of features by colour difference and for the preservation of organic remains. On the basis of the artefact distributions, the relief, and the extent of the surrounding wetland, the domestic site is estimated to cover an area of 40 × 35 m, or approx. 750–1,000 m^2, at a height of 0.5 and 0.8 m a.s.l., of a former island. The adjacent mainland is located 50 metres distant from this former island. Therefore, the sea level of the Baltic Sea in this region is estimated to have been between -1.8 and -1.4 m a.s.l. for the period 3000–2000 BCE (Jakobsen 2004; Labes 2005).

Jan Piet Brozio, Johannes Müller, Dragana Filipović, Wiebke Kirleis, Ulrich Schmölcke, Jenny Meyer

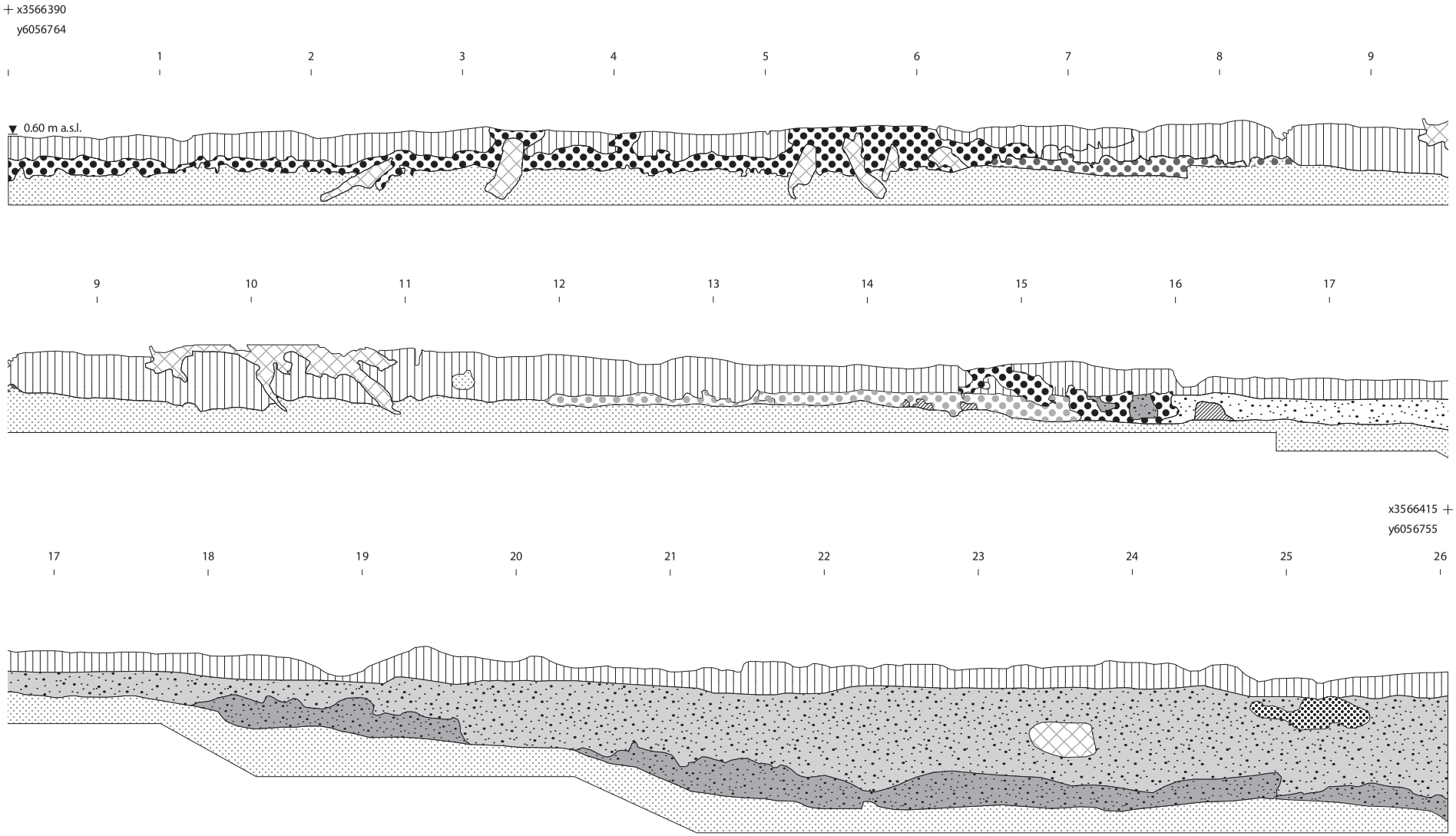


Fig. 4. Section through the hill and the former shoreline of Brodersby-Schönhagen (trench 1, north profile).

Dating

Absolute chronology

In total, twelve ^{14}C-dates are available (Fig. 5). In five cases, the sample material consists of wood charcoal, namely, ash *(Fraxinus)* (n = 2), hazel *(Corylus)* (n = 2), and alder *(Alnus)* (n = 1). In five cases, it consists of charred nut shells, specifically hazel (Tab. 1). In two cases, it consists of animal bone, namely sheep *(Ovis)* and red deer *(Cervidae)*. Five of the samples come from find concentrations, six from the former shore zone, and one from a tree hole yielding a thick-butted flint axe. The samples Poz-98336 and Poz-98284 yielded Bronze Age dates (1256–1122 and 806–772 cal BCE)[1]. The median of the remaining samples indicates that the primary activity at the site was between 2950 and 2740 cal BCE. Two of these samples, which delimit a period between 2390 and 2180 cal BCE (Poz-98286 and Poz-98287), point towards late Younger and/or early Late Neolithic activity at the site (Fig. 6). Therefore, the ^{14}C-dates indicate a site occupation mainly from the mid-2900s to mid-2700s century BCE and later 'visits' during the transition period between the Younger and the Late Neolithic and during the Bronze Age. Due to the Neolithic character of the site, the Bronze Age dates are interpreted as *termini ante quem*. The earlier dates are in line with the typological indication of the artefacts (see below).

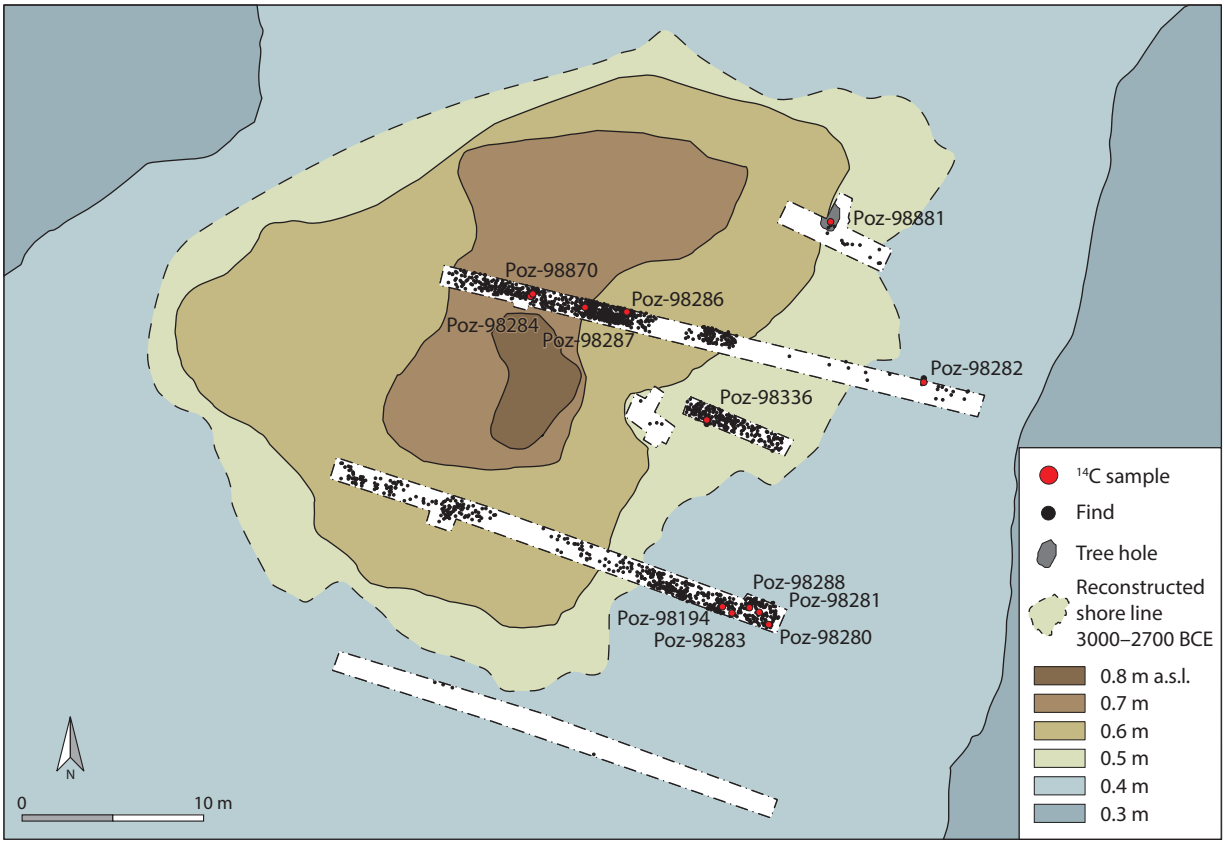


Fig. 5. Location of ^{14}C-samples of Brodersby-Schönhagen.

1 Unless specified differently, the 1 sigma range for the ^{14}C-data is mentioned.

Table 1. ^{14}C-dates from Brodersby-Schönhagen.

Lab. number	Material	Species	Context	^{14}C age (BP)	Range 68,3 %	Range 95,4 %	Median	Comment lab.
Poz-98194	Nutshell	Corylus sp.	Concentration 1 (waste zone in the shore area)	4310 ± 40 BP	3010–2887	3023–2880	-2925	
Poz-98280	Animal bone	Ovis	Concentration 1 (waste zone in the shore area)	4200 ± 40 BP	2889–2701	2900–2639	-2781	1.1%N 5.7%C, 1.1%coll
Poz-98281	Charcoal	Alnus sp.	Concentration 1 (waste zone in the shore area)	4205 ± 35 BP	2889–2705	2900–2673	-2787	
Poz-98283	Charcoal	Corylus sp.	Concentration 1 (waste zone in the shore area)	4280 ± 40 BP	2922–2878	3017–2762	-2901	
Poz-98288	Animal bone	Cervidae	Concentration 1 (waste zone in the shore area)	4320 ± 40 BP	3010–2892	3081–2883	-2941	1.8%N 7%C, 2.5%coll
Poz-98286	Charcoal	Fraxinus sp.	Concentration 2	3765 ± 35 BP	2278–2136	2291–2042	-2180	
Poz-98287	Charcoal	Fraxinus sp.	Concentration 2	3905 ± 35 BP	2466–2346	2479–2287	-2392	
Poz-98336	Nutshell	Corylus sp.	Concentration 3	2965 ± 35 BP	1256–1122	1280–1053	-1178	
Poz-98284	Nutshell	Corylus sp.	Concentration 4	2590 ± 35 BP	806–772	827–571	-789	
Poz-98870	Nutshell	Corylus sp.	Concentration 4	4145 ± 35 BP	2866–2637	2877–2620	-2739	
Poz-98282	Charcoal	Corylus sp.	Shore area, under a grinding stone	4250 ± 35 BP	2911–2780	2921–2701	-2885	
Poz-98881	Nutshell	Corylus sp.	Tree hole	4150 ± 35 BP	2869–2668	2878–2623	-2744	

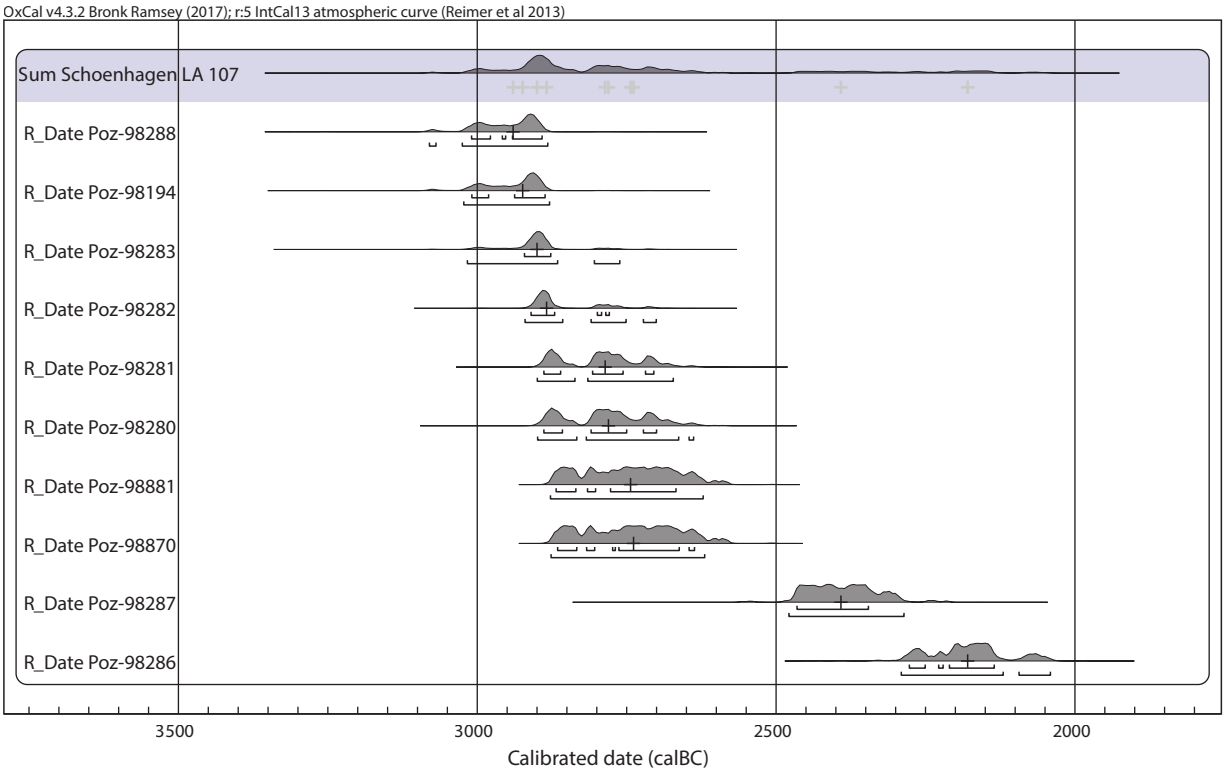


Fig. 6. ^{14}C-dates of Brodersby-Schönhagen.

Typochronology

In general, the Store Valby phenomenon is characterised by its pottery, with its rough surfaces and decorations consisting of rows of imprints (Becker 1954), and by its thick-butted flint axes (Davidsen 1978). The phenomenon is separated from both the Middle

Neolithic TRB and the early Single Grave Culture by these same Store Valby ceramics and Valby axes. Valby-type flint axes are characterised by a relatively square neck, flat flange, and a maximum width at the cutting edge. The polish is mainly on the front and back faces, but in some cases also on the two narrow sides and the neck (Becker 1974; Ebbesen 1975; Nielsen 1979).

The Valby axes from the domestic site of Brodersby-Schönhagen are fragments of thick-butted axes with a polished surface on both wide sides and a relatively square neck. The largest width is at the cutting edge, and the ratio of wide to narrow sides is between 75 % and 100 % (Fig. 7,2). Another axe from the site (Fig. 7,1), an isolated find not from a find concentration, is linked to the Single Grave societies because of its slightly asymmetrical basic form and the careless neck finish (Hübner 2005).

The ceramic vessels have a biconical shape and decoration consisting of horizontal rows of imprints (Fig. 8–9). In the case of two of the vessels, due to the size of the shards and the calculated rim diameters, of 19 cm and 20 cm, a conical vessel type without handles can be identified. According to Davidsen (1978, 97), these two vessel units fall into vessel type A, belly-ridged food vessels. The horizontal rows of imprints on the vessels from Brodersby-Schönhagen are characteristic of Store Valby vessels and similar imprints occur in about 90 % of the vessels from Denmark of this period (Davidsen 1978, 100).

Summary

In conclusion, the site of Brodersby-Schönhagen was initially occupied between ca. 2950 and 2750 cal BCE and again, during a second phase, between ca. 2400 and 2200 cal BCE. The first phase is confirmed typochronologically by Valby-type axes and biconical vessels with belly ridges and with horizontal rows of imprints. This phase is clearly linked to the Store Valby phenomenon. The second phase is chronologically assigned to the SGC, typochronologically supported by an SGC axe.

Features and objects

Features

In general, a blackish layer of humic soils with artefacts forms the main context that could be recorded at Brodersby-Schönhagen. Although no discrete archaeological features, such as pits or postholes, were detected, obviously a consequence of the conservation conditions of the well-drained sandy substrates on the former island or peninsula (see above), several concentrations of flint objects and ceramic shards (Fig. 10) could be documented at spatially separated locations, indicating former activity areas, possibly parts of sunken floors. The concentrations, which were mostly excavated only in part, have excavated sizes between 2.5 to 5.3 m in diameter. Due to the soil conditions, animal bones are only preserved from the waterlogged area of the former coastal zone. Another feature is a tree hole from which a Valby axe was recovered (cf. Fig. 3; Fig. 7,2).

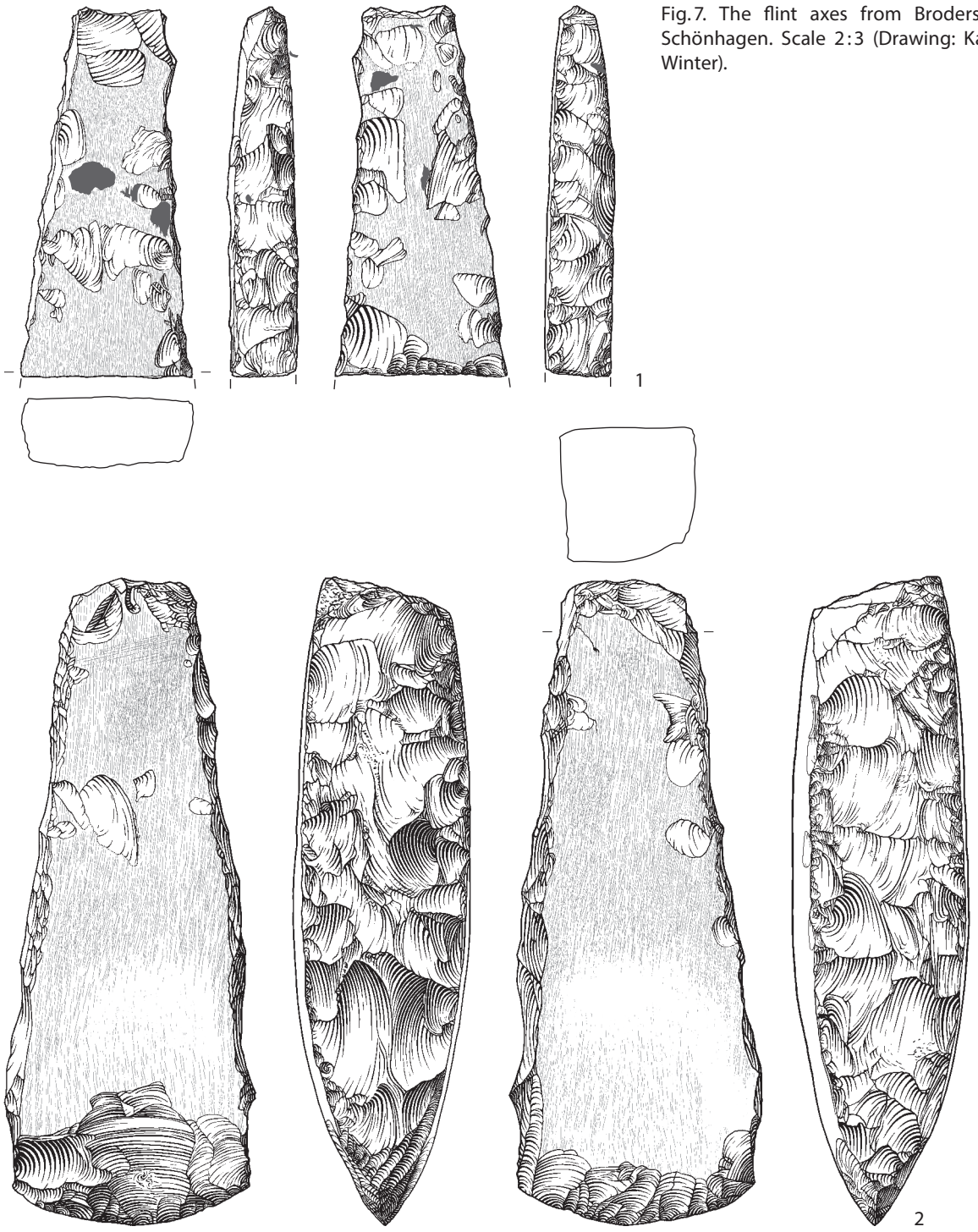


Fig. 7. The flint axes from Brodersby-Schönhagen. Scale 2:3 (Drawing: Karin Winter).

Fig. 8. Selected Store Valby ceramics from Brodersby-Schönhagen. Scale 1:3 (Photo: Anna Sara Jagiolla).

Fig. 9. Selected Store Valby ceramics from Brodersby-Schönhagen. Scale 1:3 (Photo: Anna Sara Jagiolla).

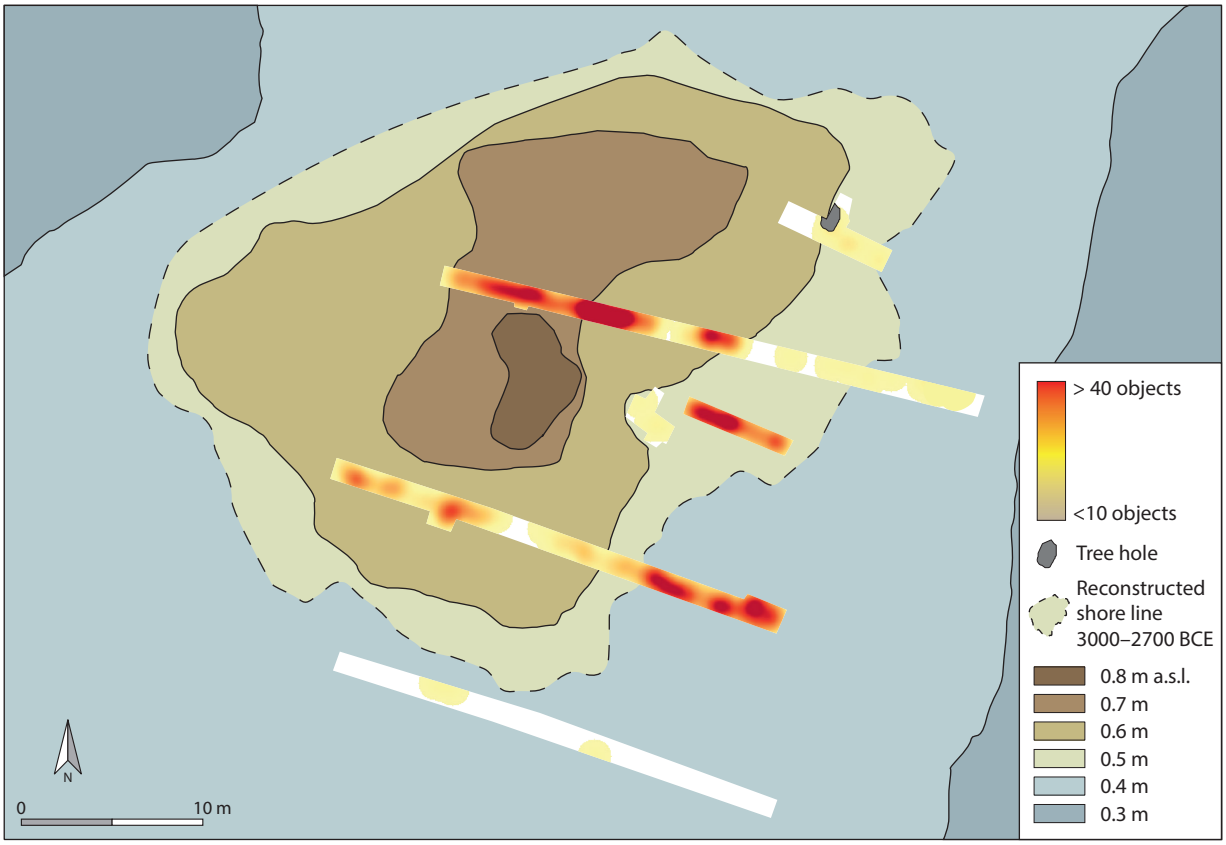


Fig. 10. Sections of Brodersby-Schönhagen showing the density of concentrations of artefacts.

Animal bones, plant macro-remains and the artefact assemblage

In the following, we will present the finds from the small settlement. We will first focus on aspects of the subsistence strategy of the inhabitants, then on craft activities, and, finally, on aspects of storage and consumption.

Animal bones: Husbandry and hunting

The assemblage of animal remains from the site is small (Fig. 11), and, due to the high degree of bone fragmentation, only 64 finds could be identified to the taxonomic level of species; for 88 finds, a species determination was not possible. The fragmentation can be illustrated by the median weight of the zooarchaeological finds, which is only 8.5 g in the identified and only 1.3 g in the non-identified remains. Combined with cut marks and traces of fragmentation, this points to an intensive exploitation of animal carcasses, as is characteristic for the regional Middle Neolithic.

The numeric significance of the assemblage is further limited by the presence of a partial, relatively well-preserved sheep skeleton, including parts of the head, the spine and all four legs, accounting for 46 of the 64 items identified to species. This directly radiocarbon-dated skeleton (Poz-98280) represents a single juvenile individual with a biological age of 7–20 months (based on the state of epiphyseal fusion of phalanx 1, the proximal radius, the distal humerus, and the scapula) and, more specifically, 15–20 months (based on the state of epiphyseal fusion of the metapodial). Apart from some single teeth, all the remains of this sheep are fragmented, and even the most complete limb bones are represented by only half of the bone. It is not clear if this high degree of fragmentation is due to slaughtering and intensive use of the sheep carcass or due to

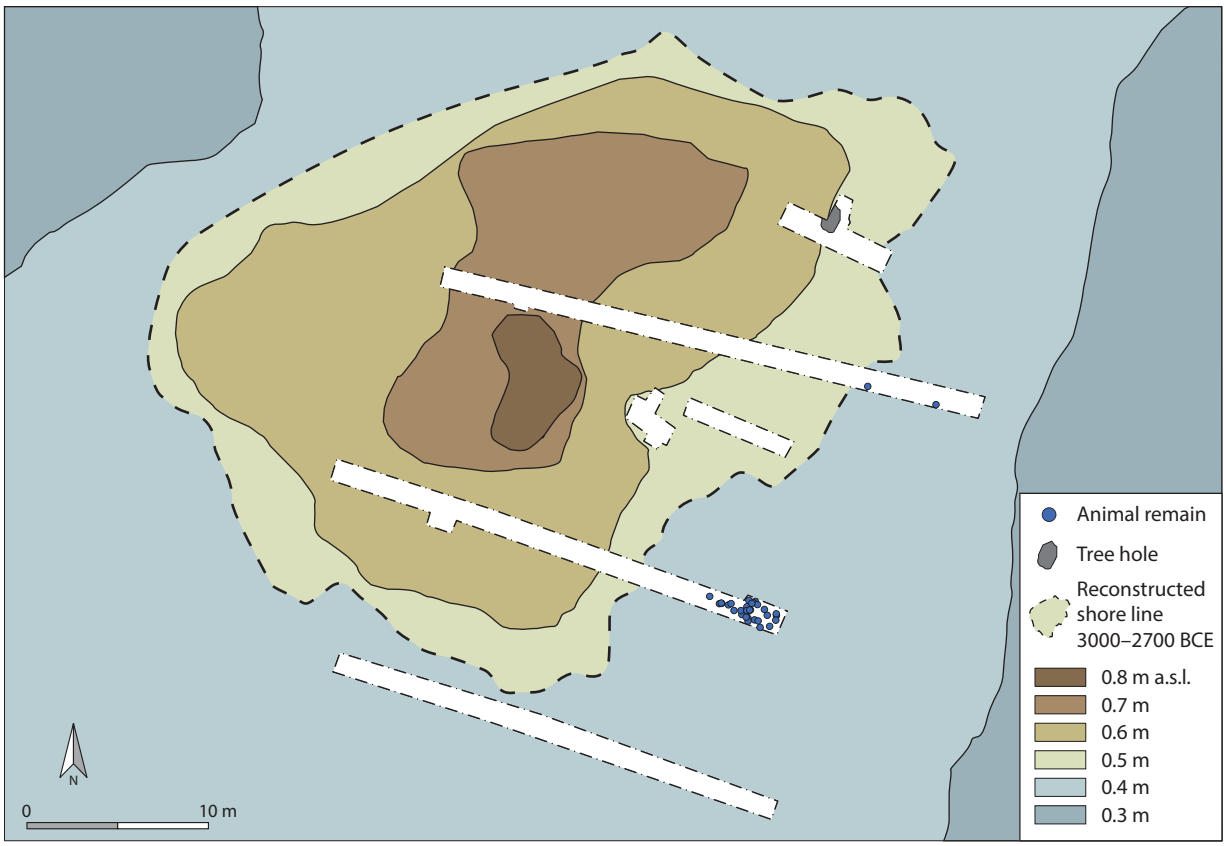


Fig. 11. Sections of Brodersby-Schönhagen showing the locations of animal remains.

taphonomic reasons, because clear marks of cutting and dissection are rare, being visible on only two split limb bones (Tab. 2).

Although the faunal sample is small, it provides some information about local hunting and livestock breeding. Obviously, hunting had at least some relevance because even in this restricted assemblage, with red deer and a seagull, both wild game hunting and fowling are attested. Due to the size and individual biological age of the three red deer bones, however, it cannot be excluded that they all derive from one larger adult female. When we disregard the bones of the partial sheep skeleton, the high proportion of pig remains is striking and could point to relatively forested surroundings of the settlement. One skull fragment derives from a piglet about 11 weeks old; the other pig remains come from adults. The only measurable adult pig bone is from an animal clearly smaller than average in comparison to contemporaneous conspecifics in the region, based on the log size index (LSI) (LSI: -0.117; LSI mean value for MN V: -0.071). The only measurable adult sheep bone in the assemblage originates from an animal a bit larger than average in comparison to regional contemporaneous sheep (LSI: -0.039; LSI mean value for MN V: -0.052).[2]

Table 2. Animal taxa identified from Brodersby-Schönhagen.

	NISP	g	g/find
Bos primigenius	1	27	27
Bos primigenius f. taurus	3	47	15.7
Cervus elaphus	3	121	40.3
Ovis/Capra	35	75	2.1
Ovis ammon f. aries	11	60	5.5
Sus scrofa f. domestica	11	93	8.5
indet.	88	116	1.3

Querns and botanical macro-remains: The gathering of plants and processing of cereals

Two recovered querns indicate cereal processing at the site. One is 27.2 cm long and 20.4 cm wide and weighs 3.8 kg (Fig. 12). The other is 13.2 cm long and 8.9 cm wide and weighs 3.0 kg (Fig. 13,2). In addition to providing an archaeological indication for an agricultural subsistence component, the botanical macro-remains represent items that could be associated with cereal processing, with the natural environment, and with gathered plants, such as hazelnuts.

2 The general values for MN V given here are based on our own, unpublished data.

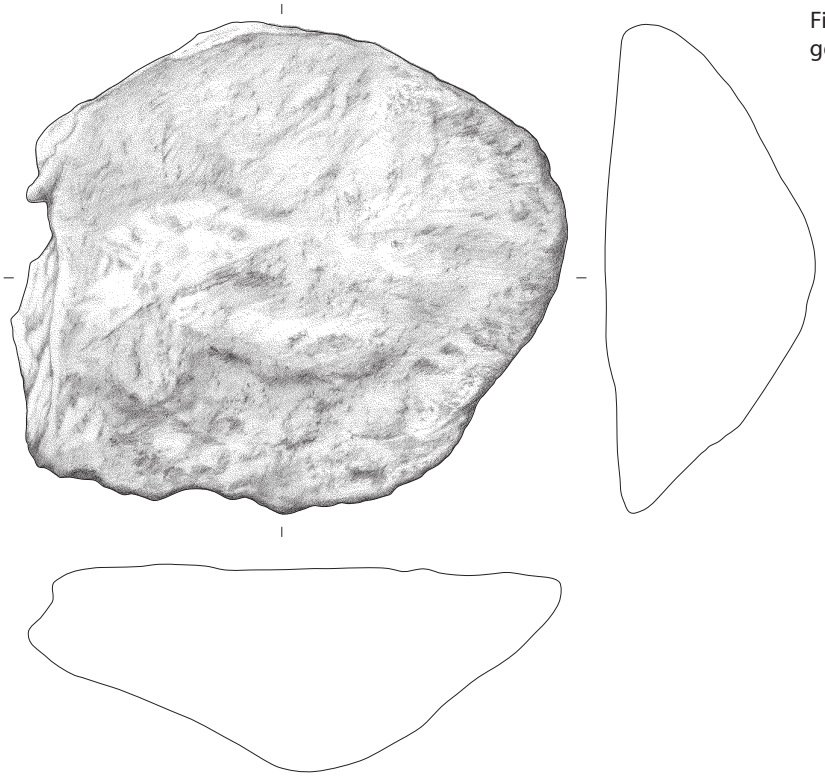
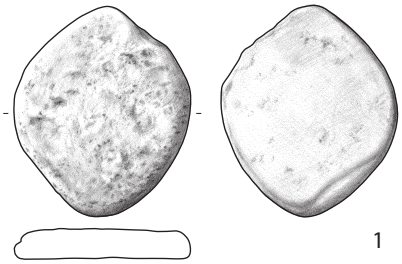
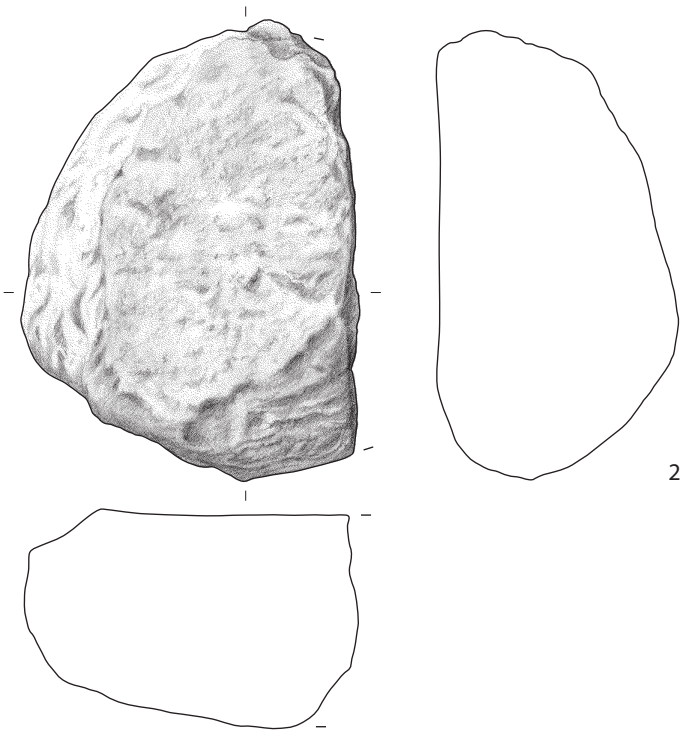


Fig. 12. Quern from Brodersby-Schönhagen. Scale 1 : 3 (Drawing: Susanne Beyer).



1



2

Fig. 13. Grinding stone and quern from Brodersby-Schönhagen. Scale 1 : 3 (Drawing: Susanne Beyer).

Sampling, recovery and analysis

In the course of the excavations at Brodersby-Schönhagen in 2017, archaeobotanical samples were taken from trenches 1–4, in which both dry sandy and wet peaty sediments were encountered. Processing of the samples in the laboratory, sample sorting and identification of the remains was carried out during 2017 and 2018. A total of 15 samples were analysed; five samples, from trenches 2 and 3, were composed of dry sediment; ten samples, derived from wet layers in trenches 1–4, were composed of wet sediment. Sorting was done using a low-power stereomicroscope (10–40 × magnification).

The dry samples were first floated manually using buckets and a 0.3 mm sieve. They yielded mainly pieces of wood charcoal, of which one identified fragment per sample was selected for radiocarbon dating (see Tab. 1). The non-wood remains from these samples consisted only of charred, indeterminate seed fragments and the embryo of a cereal grain.

The wet samples were subsampled down to c. 0.3 ml and then sorted. In some cases, a smaller fraction of the 0.3 ml subsample was sorted for seeds of particular species (e.g. 1/8 of the subsample was sometimes sorted for the numerous seeds of *Urtica dioica*); the number of seeds present in the small fraction was then multiplied to obtain an estimate for the entire 0.3 ml subsample.

The analysed samples contained wood charcoal fragments, the remains of seeds and fruits, and vegetative plant parts, preserved in different states – as charred, subfossil/waterlogged, mineralised and uncharred remains. The mineralised and uncharred remains are almost certainly recent/modern and are, therefore, excluded from consideration here.

Table 3 shows the plant species and finds for each analysed sample. Some of the samples (such as most of those from trench 3) yielded only wood charcoal or wood charcoal and a few non-wood plant remains. Similarly, the samples from trenches 2, 4 and 5 contained wood charcoal and very little seed/fruit remains. Most of the material, both charred and waterlogged, came from the samples taken in trench 1.

The charred assemblage

The charred remains originate from activities and locations that involved fire. All of the crop remains from Brodersby-Schönhagen are charred; they represent burnt residue, either from post-harvest handling of the crop (i. e. processing) or, perhaps, from preparation of the grain for food. They include grains and/or chaff of three different types of wheat and barley. Einkorn *(Triticum monococcum)* is represented by glume bases; emmer *(Triticum dicoccum)* by grain and glume bases; and free-threshing wheat (*Triticum aestivum* s. l.) and barley *(Hordeum vulgare)* by grains. There are also a few cereal grains that were too distorted for precise identification. The wild plants in the charred seed/fruit assemblage are arable weeds that were typically harvested together with the crops; their seeds/fruits were sieved out or removed by hand from the crop grain and discarded. The exception is hazel, from which nuts would have been collected and, after shelling, consumed. The nutshell could have served as kindling or fuel for fire or simply have been discarded in the fire after the kernel had been eaten (e.g. McComb/Simpson 1999). The charred sclerotia of the fungus *Coenococcum geophilum* were probably numerous in the locations where plants were handled and/or charred, and they thus became incorporated in the deposits and the archaeobotanical samples.

Table 3. Botanical macro-remains identified from Brodersby-Schönhagen.

		Trench number	1	1	1	1	2	2	2	2	3	3	3	3	3	4	5
		Find concentration	1	1	1	1	3	3	3		2	4	4	4	2		
		Sample number	**8**	**11**	**12**	**13**	**6**	**10**	**17**	**18**	**1**	**2**	**3**	**4**	**5**	**9**	**7**
		Sediment type	wet	wet	wet	wet	dry	wet	wet	wet	wet	dry	dry	dry	dry	wet	wet
		Sample volume	0.3	0.3	0.3	0.3	10	0.3	0.3	0.3	0.3	10	10	10	10	0.3	0.3
Charred Remains		**plant part**															
Cultivated plants																	
Triticum monococcum	einkorn	glume base				28											4
Triticum dicoccum	emmer	grain		7	2												
Triticum dicoccum	emmer	glume base		6	5	23											
Triticum monococcum/dicoccum	hulled wheat	glume base	1			6											
Triticum aestivum/durum/turgidum	free-threshing wheat	rachis segment		1													
Triticum sp.	wheat	grain		2													
Hordeum vulgare	barley	grain		2	1	1											
Cerealia indet.	cereals	grain	2			1						1				1	
Wild plants																	
Corylus avellana	common hazel	nutshell fragment	1	3		1			1							1	
Chenopodium album	fat-hen	seed	1	1		1											
Coenococcum geophilum	(fungus)	sclerotia	1		6	86		12	227		8					7	5
Galium aparine	bedstraw	seed														1	
Matricaria perforata	scentless mayweed	seed		1													
cf. *Phleum pratense* s.l.	timothy grass	fruit		11		4		1									
Phleum pratense/Poa annua	timothy grass/annual bluegrass	fruit	3														
Poa sp.	bluegrass	fruit		1													
Poaceae	grasses	fruit		7													
Persicaria lapathifolia/maculosa	pale persicaria/lady's thumb	seed				1											
Unidentified																	
indeterminate		seed/fruit				1	1					1	3				
vegetative plant part		fragment				1											
bud		scale				1											

Table 3, continued. Botanical macro-remains identified from Brodersby-Schönhagen.

		Trench number	1	1	1	1	2	2	2	2	3	3	3	3	3	4	5
		Find concentration	1	1	1	1	3	3	3		2	4	4	4	2		
		Sample number	**8**	**11**	**12**	**13**	**6**	**10**	**17**	**18**	**1**	**2**	**3**	**4**	**5**	**9**	**7**
		Sediment type	wet	wet	wet	wet	dry	wet	wet	wet	wet	dry	dry	dry	dry	wet	wet
		Sample volume	0.3	0.3	0.3	0.3	10	0.3	0.3	0.3	0.3	10	10	10	10	0.3	0.3
Charred Remains		**plant part**															
Charcoal	volume (ml)		5	8	5	7	7	2.75	1.3	2.75	0.5	8	14	5	2	0.75	0.7
Alnus sp.	alder						1										
Quercus sp.	oak											1	1				
Fraxinus sp.	ash													1	1		
Waterlogged Remains																	
Wild plants																	
Chenopodium album	fat-hen	seed		272		1											
Chenopodium ficifolium	fig-leaved goosefoot	seed		3													
Chenopodiaceae	goosefoot family	seed			8												
Poa pratensis/trivialis	common/rough meadow-grass	fruit	1			3											
Alnus glutinosa	black alder	seed	1														
Betula pubescens	downy birch	seed				1											
Galeopsis sp.	hempnettle	seed	2														
Juncus gerardii	black needle rush	seed		8													
Ranunculus repens	creeping Buttercup	seed	1														
Rubus idaeus	raspberry	seed	5			2											
Sambucus nigra	black elderberry	seed				1					4						
Stachys palustris	marsh woundwort	seed	2			1											
Urtica dioica	stinging nettle	seed	12	6	1	2			2		472					1	
Unidentified																	
indeterminate		seed/fruit			5												
indeterminate		endosperm	8														
vegetative plant part		fragment			9	45			114								
bud		scale				1											

The Trench 1 samples yielded the largest proportion of the charred material, including crop products (wheat and barley grain) and by-products (glume bases and seeds of arable weeds), as well as wild fruit/nut by-products (hazelnut shell). This assemblage documents plant processing and consumption, perhaps because these activities took place in this location or because the charred remains generated elsewhere were subsequently deposited in this location (e. g. after cleaning out of fireplaces). Sample 13 from Trench 1 contained einkorn remains in the form of glume bases, that is the by-product of crop cleaning. This sample also contained glume bases of emmer, a few seeds of arable weeds and a fragment of hazelnut shell. It seems that this deposit has preserved discarded waste from processing (dehusking and sieving of grain, shelling of nuts) of plants for consumption. The other samples from this trench were composed of a similar spectrum of remains. The presence of both grain and glume bases of emmer in Samples 11 and 12 maybe shows that there were several emmer spikelets in these deposits. Since they are accompanied by seeds of the likely arable weeds (e. g. small-seeded grasses), perhaps the spikelets represent traces of a crop store that awaited further cleaning before use. On the other hand, the presence of free-threshing wheat and barley indicates that residues from different crops and crop-related activities were combined in this deposit. The very low quantity of the remains precludes any firm conclusions. For the same reason, it is impossible to say whether emmer and einkorn could have been grown, harvested and processed together, as is perhaps implied by their co-occurrence in the samples. Nevertheless, the vast predominance of emmer at the sites of this period in this region (cf. Kirleis 2019) and beyond signals that emmer may have been a major wheat type grown, with einkorn as a random admixture.

The water-logged plant remains

A large number of the non-charred/subfossil remains from Brodersby-Schönhagen are in a waterlogged state. They derive from plants that likely grew around the site, namely, trees *(Alnus, Betula)* and wetland species, such as rushes *(Juncus)*, but also some ruderal species *(Stachys, Urtica)* and some that produce edible fruit *(Sambucus nigra, Rubus idaeus)*. They could thus represent accidental inclusions in the assemblage, but they could also come from the consumption of these plants or from their use in some other way. For example, stinging nettle *(Urtica dioica)* could have had several different uses, including as food, medicine, and raw material (cf. Warren 2006). Perhaps the large number of seeds of this species found in a sample from Trench 3 reflects intentional collection of this plant. Similarly, the large quantity of *Chenopodium album* seeds in a sample from Trench 1 perhaps indicates collection of the seeds for their starchy endosperm, which can be consumed; or maybe they remained after the plant was picked for its edible leaves (e. g. Körber-Grohne 1988). It cannot, however, be excluded that these and some other waterlogged seeds from Trench 1 represent cereal processing refuse that was not exposed to fire. For instance, *Chenopodium album* seeds are found in both waterlogged and charred state in the same samples in Trench 1. As was noted above, this trench preserved traces of plant processing and food preparation, and the waterlogged assemblage confirms this observation.

Agriculture and cereal processing

The macro-remains as well as the querns indicate the growing of cereals, especially emmer, and the storage and the processing of cereals on site. The gathering of different plant species, especially hazelnut, indicates the economic value of gathering.

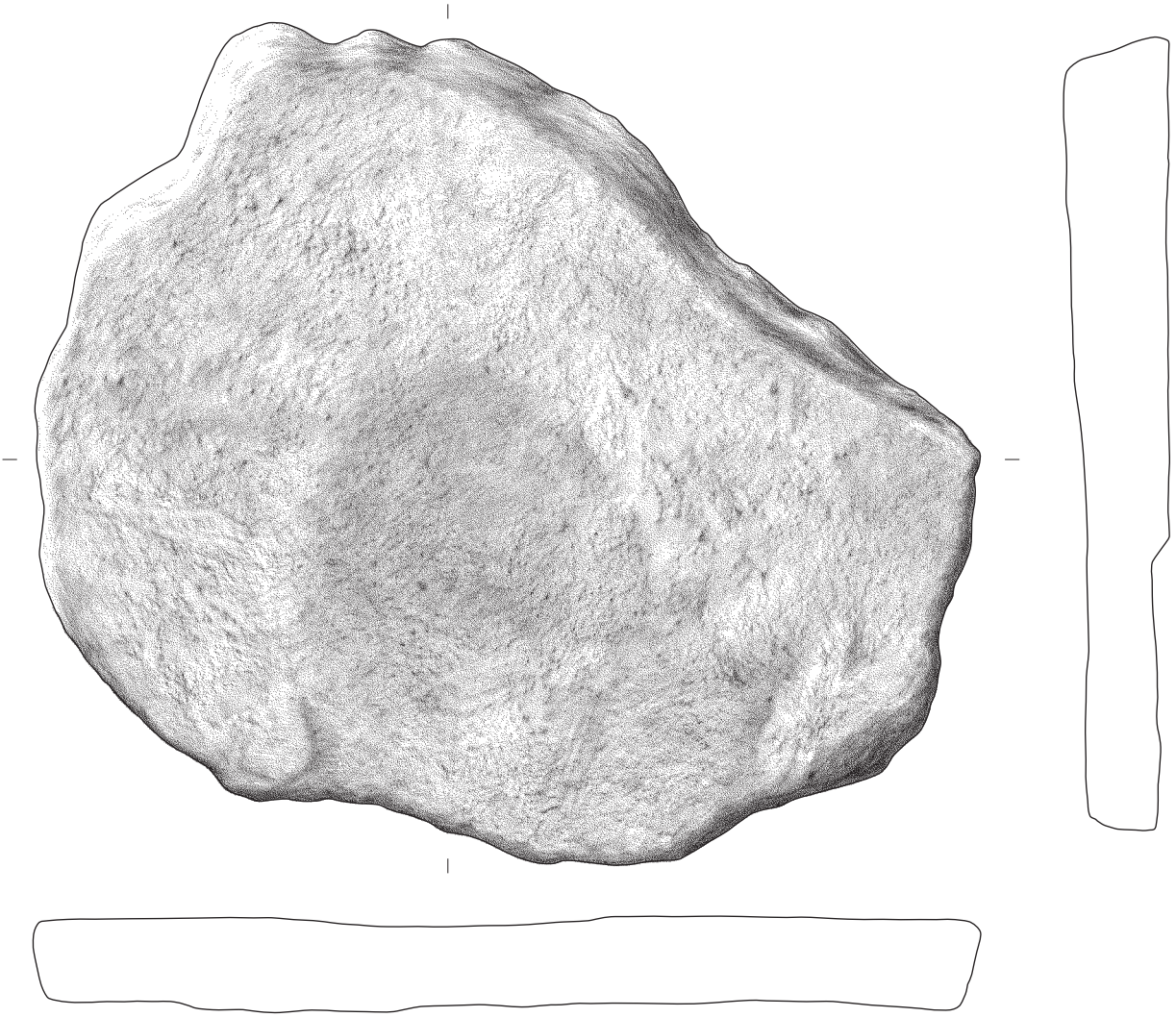


Fig. 14. Quern from Brodersby-Schönhagen. Scale 1 : 4 (Drawing: Susanne Beyer).

Lithic objects and grinding stones: Tool processing and the daily tool assemblage

Overall, 6,490 flakes, 123 blades and 42 cores of flint were recorded, as well as 3,271 pieces of flint debris. The raw material consists almost exclusively of Senonien flint (98 %). Danien flint (1 %) and Bryozen flint (1 %) play only minor roles. Due to the precipitation of iron oxide, the flint objects in the top layers of the site have in many cases assumed a yellowish discolouration. The tools include drills, scrapers, a crusher, a fragment of a flint plank, hammer stones, fragments of flint axes, flint chisels, and a heavy, thick-butted flint axe[3].

Among the flakes, those between 4 and 6 cm in length predominate (Arnold 1982), representing 68 %. These are sizes resulting from tool production and reduction (Hartz 1999). However, 92 % of the flint flakes also have none or only 1/3 of the surface covered with the natural outer surface, such as the cortex. It can therefore be assumed that larger tools, such as axes, were produced at the site. If an average of 600–800 g debitage (Krause-Kyora 2007; Steffens 2009; Vemming/Madsen 1983) is applied to the material, a production of approx. 10–13 tools, such as axes, can be extrapolated for the excavated area.

There are also 13 grinding stones, of which 8 only exist as fragments. The largest grinding stone has a length of 55 cm, a width of 44 cm and a weight of 18.6 kg (Fig. 14). These grinding stones indicate a further step in the *chaîne opératoire* of the manufacture of

3 On the Data Exchange Platform of the Johanna-Mestorf-Academy, the catalogue of the finds is available at: https://www.jma.uni-kiel.de.

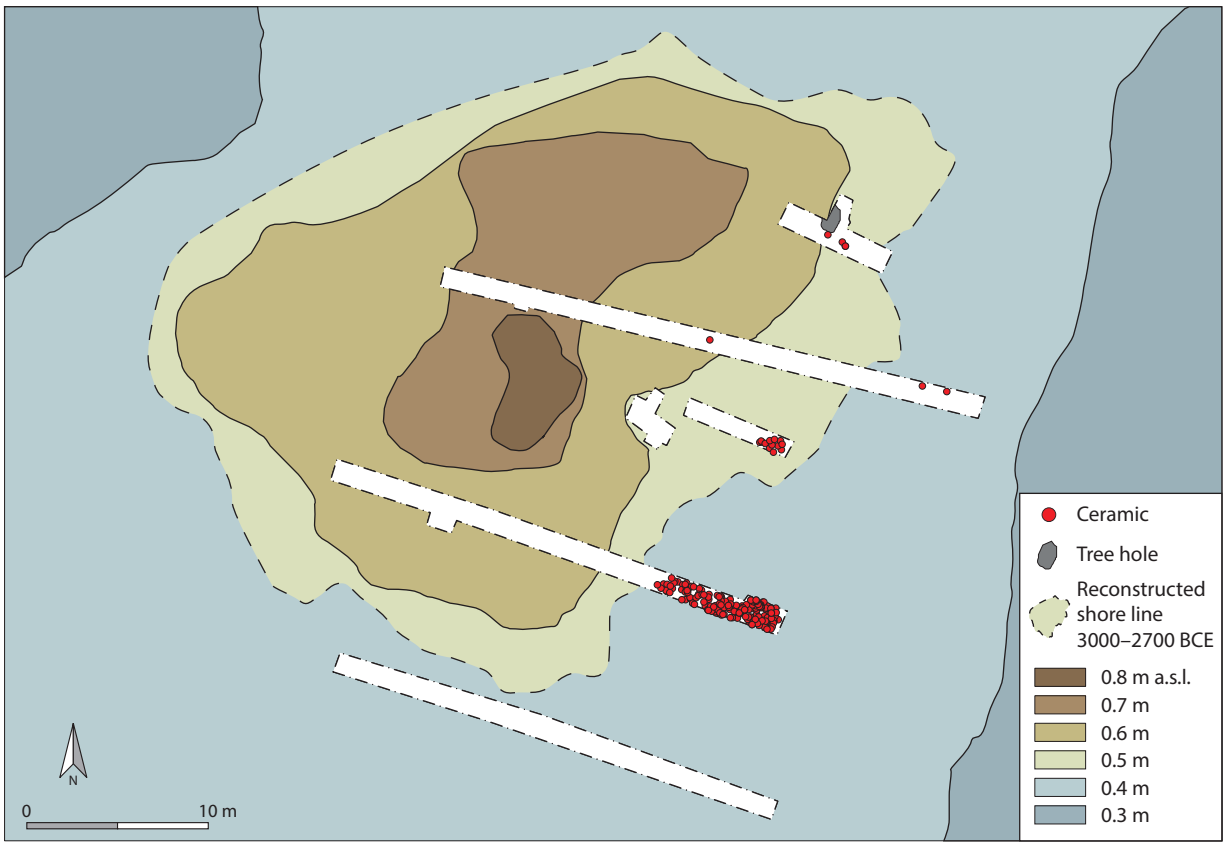


Fig. 15. Sections of Brodersby-Schönhagen showing the locations of ceramics.

polished flint tools, such as axes, on the site. The assemblage indicates the processing of flint tools for daily use as well as the use of artefacts for wood working, animal slaughtering and fur processing, among others.

Ceramics: Cooking, drinking and storage facilities

A total of 454 ceramic fragments, with a total weight of 8.2 kg, was recovered[4]. The size of the fragments studied ranges between 1 cm^2 and 12 cm^2. A total of 402 body fragments, 21 rim fragments and 28 base fragments were recorded. Only 9 of the 454 fragments exhibit decoration. The finds originate mainly from Trench 1, the former shoreline; only a small proportion originate from trenches 2, 3 and 4 (Fig. 15). There is variation in the state of preservation of the fragments. While the majority of the fragments were well preserved, some fragments were in very poor condition. Shards with an area of less than 1 cm^2 were recorded as "smallest fragments". We recorded their combined weight, but did not count them. Sorting and re-fitting resulted in 39 vessel units, of which eleven were represented by more than one shard. In one case, several decorated rim fragments could be joined, constituting about 45 % of the original rim perimeter. The fracture borders of the shards range from relatively sharp (23 %) to slightly eroded (56 %) to strongly rounded (21 %). The temper of the fragments is consistently rectangular. Only granite with white and/or red feldspar with grain sizes between 1.1 mm and 7.3 mm was used as temper. The vessels were fired in a reduced (15 %) or oxidised (85 %) environment. The shard thickness is between 5.0 mm and 19.3 mm, with an average value of 10.6 mm. All vessel bottoms retrieved so far are of flat-bottomed types.

The classification of the fragments into vessel shapes is difficult due to the high degree of fragmentation. Only four vessels could be

4 On the Data Exchange Platform of the Johanna Mestorf Academy, the catalogue of the finds is available at: https://www.jma.uni-kiel.de.

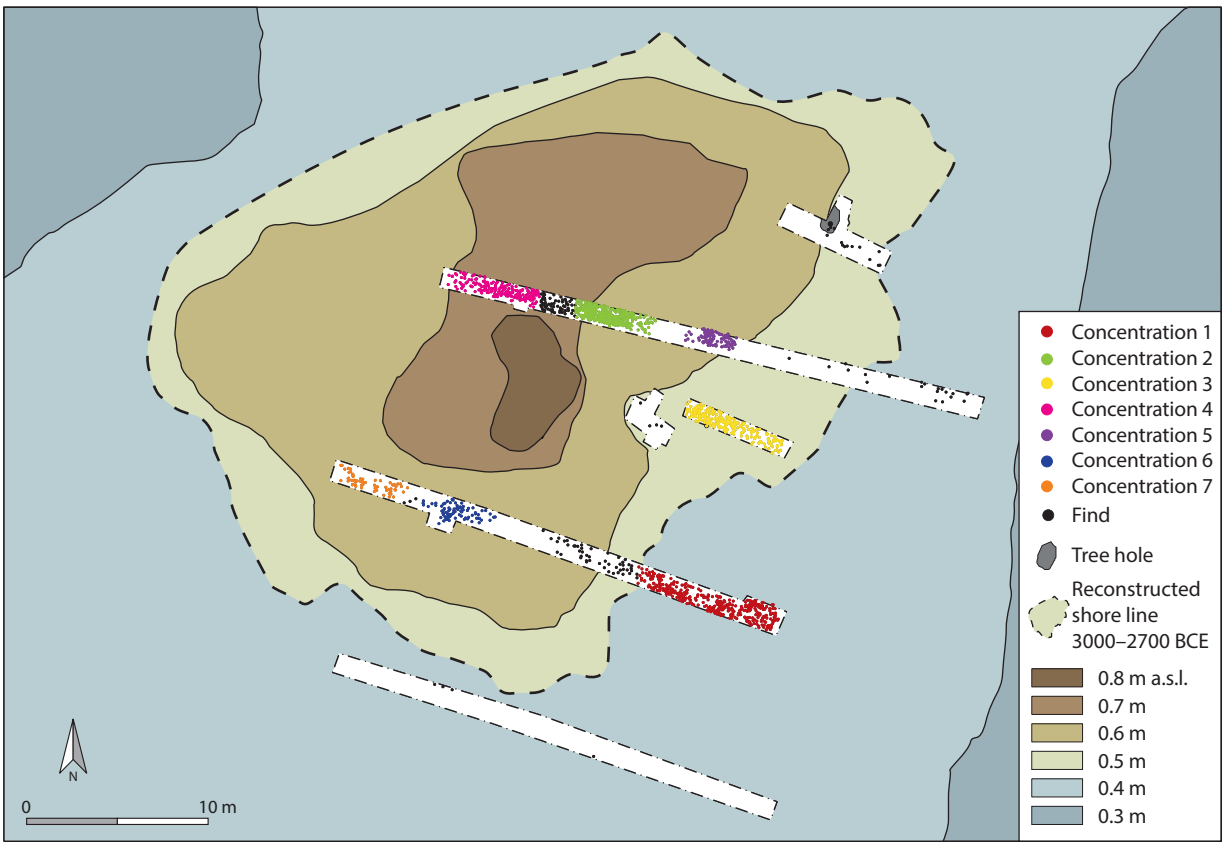


Fig. 16. Sections of Brodersby-Schönhagen showing the locations of the seven concentrations of artefacts.

classified, as conical, rimmed vessels (cf. Fig. 8), and more precisely as two-part conical, rimmed vessels (see above). Three clay discs could be identified, two of which are perforated (cf. Fig. 9,3–4).

Ornamentation, when present, is simple. Only six of the 39 vessel units have decoration, of a series of finger impressions (cf. Fig. 8; 9,2). Charred food crusts on six of the 39 vessels indicate their use as cooking vessels.

Summary: A full domestic site

The animal, plant and artefact assemblages describe resources and activities relating to an agricultural community. In addition to husbandry and cereal processing, gathering and hunting are also indicated; only fishing is not attested. Furthermore, the documented on-site production of different daily tools and the presence of a wide spectrum of tools underlines the cycle of what were probably year-round activities.

The artefact assemblage by find concentration

As already mentioned, different find concentrations were interpreted as activity areas and/or sunken floor levels (cf. Fig. 10). A comparison of the find distributions shows differences between the activities connected to certain artefact distributions (Fig. 16).

Concentration 1

At the transition to the shore zone, 448 stone objects were recovered from an area measuring 9.5 m to 1–1.5 m. These are mainly flakes (n = 261) and debris (n = 147). The remainder are fragments

of grinding stones (Tab. 4). Most of the ceramics and animal bones were recovered from this area (cf. Fig. 10). Concentration 1 also yielded most of the plant remains, and they were found in both charred and waterlogged state. The charred material includes crop products (wheat and barley grain) and by-products (glume bases and seeds of arable weeds), as well as wild fruit/nut by-products (hazelnut shell). The waterlogged remains may indicate collection of some wild plants for consumption (e. g. *Chenopodium album*) or they may simply represent cereal processing refuse that was not exposed to fire. In sum, this assemblage documents plant processing and consumption, which likely took place in the settlement. The discarded plant parts were ultimately deposited in this location. A total of five ^{14}C-dates (Poz-98280, Poz-98281, Poz-98283, Poz-98288, Poz-98194) places the deposit in the period 3000 to 2700 cal BCE and thus in the Store Valby phenomenon, a classification which is also typochronologically confirmed by the ceramics. The concentration is considered a waste zone in the shore area of the Store Valby activity on the island.

Table 4. Lithic artefacts from Concentrations 1–7 at Brodersby-Schönhagen.

Concentration	blade	flake	core	debris	flint blank	scraper	drill	axe	chisel	hammerstone	quern	grindstone
1	22	261	2	147		3			1	5	1	6
2	74	1502	20	926	1	19	1	4	4	10	2	11
3	16	147	3	72		9	1		1			2
4	6	206	2	148				1				
5	2	65		28								
6	4	65	2	34								
7		81	1	30								

Concentration 2

This find concentration was recorded over a length of 4.2 m and a width of 1 m. In total, 2,574 stone artefacts were found, mostly flakes and flint debris relating to intensive flint working. Blades and drills are also present. Axes and chisels are documented as fragments. Indications of the working of flint come from hammer stones and fragments of grinding stones (cf. Tab. 4). In Concentration 2, many waterlogged seeds of stinging nettle were recorded. Since this is a ruderal species, the seeds could represent accidental inclusions in the deposit. However, their high number perhaps points to the intentional collection of this plant. Among the few wood charcoal remains recovered was a fragment of ash wood.

Two ^{14}C-dates on charcoal are available from find Concentration 2 (Poz-98286 and Poz-98287). The two samples, with results of 2466–2346 and 2278–2136 cal BCE, date the activity to the Younger Neolithic and thus to the SGC.

Concentration 3

A further concentration of artefacts was observed over a length of 6 m and a width of 1 m. A total of 251 stone artefacts was dominated by flakes and debris (cf. Tab. 4). In addition, there are 13 small, undecorated fragments of ceramic. Archaeobotanical samples contained very little plant material, which was heavily eroded and thus unidentifiable. Of note is a charred fragment of hazelnut shell. Many charred spores were discovered here, likely belonging to *Coenococcum*

geophilum, which, along with *Calluna vulgaris*, is often taken as signalling sediment erosion or disturbance (e. g. Cubizolle et al. 2013). The spores were probably numerous in the locations where plants were handled and/or charred, and they thus became incorporated in the deposits and related archaeobotanical samples. The small amount of wood charcoal extracted from the samples indicates the use of alder, known to grow in wetland areas. A ^{14}C-date (Poz-98336) of 1256–1122 cal BCE places Concentration 3 in the Bronze Age, period III.

Concentration 4

Concentration 4 was recorded over a length of 5.3 m and a width of 1 m, 2 m northwest of find concentration 1. The two concentrations are separated by a loose find scatter. A total of 363 stone objects were recovered from Concentration 4. These mainly comprise flakes and debris (cf. Tab. 4). Concentration 4 yielded a somewhat larger collection of wood charcoal, in which oak (*Quercus*) and ash were recognised. It also yielded a few highly distorted (probably wild) seed/fruit remains and a fragment of charred cereal grain. ^{14}C-dating on two hazelnut shells returned dates of 2866–2637 (Poz-98870) and 806–772 cal BCE (Poz-98284). The older date coincides with the Store Valby phenomenon, the younger with the Bronze Age, period V.

Concentrations 5–7

Artefact concentration 5 extended over an area of 2.63 × 1 m. It was separated from find concentration 1 by a 2 m wide open space. The 96 objects from Concentration 5 include 65 flakes, 28 items of debris, 2 blades, and 1 undecorated ceramic fragment. Concentration 6, in the southwestern portion of the surveyed area, is 4 m in length and up to 1.5 m in width. It contained 105 flint objects, with 65 flakes, 34 items of debris, 4 blades and 2 core (cf. Tab. 4). Concentration 7, near Concentration 6 and covering an area 4 m long and up to 1 m wide, yielded 112 flint objects, namely, 81 flakes, 30 debris and 1 core. Because there are no typochronologically classified artefacts or ^{14}C-dates from Concentrations 5, 6 and 7, we were unable to perform a detailed chronological classification.

Reconstruction: The Store Valby domestic site of Brodersby-Schönhagen

The model: A small, permanent settlement

In sum, the Store Valby activity at the site of Brodersby-Schönhagen dates mainly between 2950 and 2750 cal BCE. Further activity, of lesser intensity, by SGC groups took place between 2400 and 2200 cal BCE. Although only parts of the site were excavated, large numbers of finds relating to intensive flint working were recorded. These are spatially concentrated and delineate several places of flint tool production at the site and the disposal of related waste in the former coastal zone. Based on the area of the island or peninsula, we argue that the site measured 40 × 35 m, or about 0.1 hectare (Fig. 17). A small group of people worked local flint, used pottery for storage and cooking, and provided part of their livelihood by hunting and local cereal processing. The presence of thick-butted axes (see below) on the northern part of the Schwansen peninsula, within a radius of 10 km around the Brodersby-Schönhagen site, refers to contemporaneous activity of low intensity in the surrounding area (Fig. 18)[5].

5 Coordinates are available for only two of the Valby axes; the other flint axes can only be located to municipality.

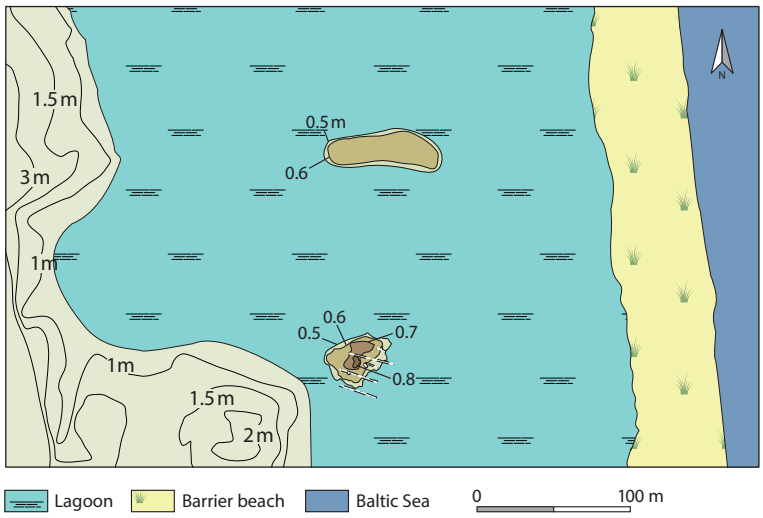
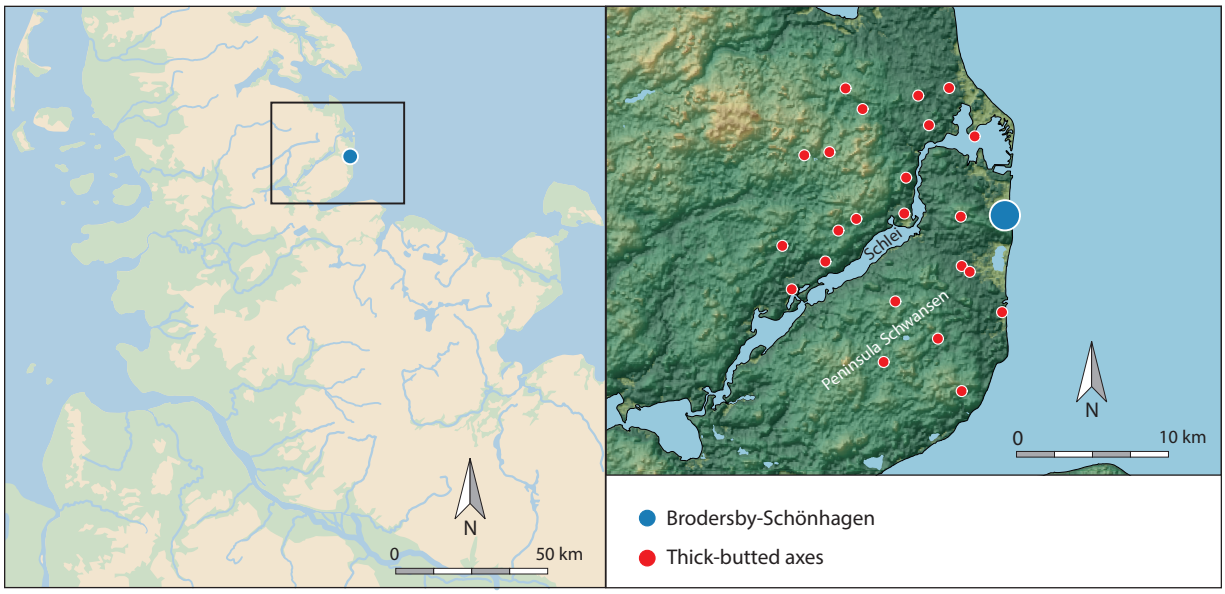


Fig. 17. Reconstruction of the location of the domestic site Brodersby-Schönhagen between 3000–2700 BCE between -1.8 and -1.4 m a.s.l.

In general, we assume that one family group, specialised in flint tool production, lived at the coast, at the site itself. The identification of tools relating to cereal processing and animal husbandry do underline the model of a short, permanent occupation of the site, with activity extending into the surroundings, as documented by the axes. The presence of contemporaneous Single Grave Culture finds and features on the Schwansen peninsula indicates the typological mixture of these complexes. But this mixing does not change the interpretation of the site as relating to the Store Valby phenomenon.

Fig. 18. Sites with Store Valby artefacts in the surrounding area of Brodersby-Schönhagen.



Comparison with other sites

Our data suggest a low intensity of habitation relating to the Store Valby phenomenon on the Schwansen peninsula in the 3rd millennium BCE. Therefore, the domestic site of Brodersby-Schönhagen stands in contrast to the older, larger, agglomerated TRB settlements on the southern Cimbrian peninsula, such as Oldenburg-Dannau LA 77 (Brozio 2016) or Büdelsdorf (Hage 2016), each with more than 100 inhabitants and characterised by an intensive use of the landscape, attested through monuments, find deposits and evidence for agriculture (Knitter et al. 2019).

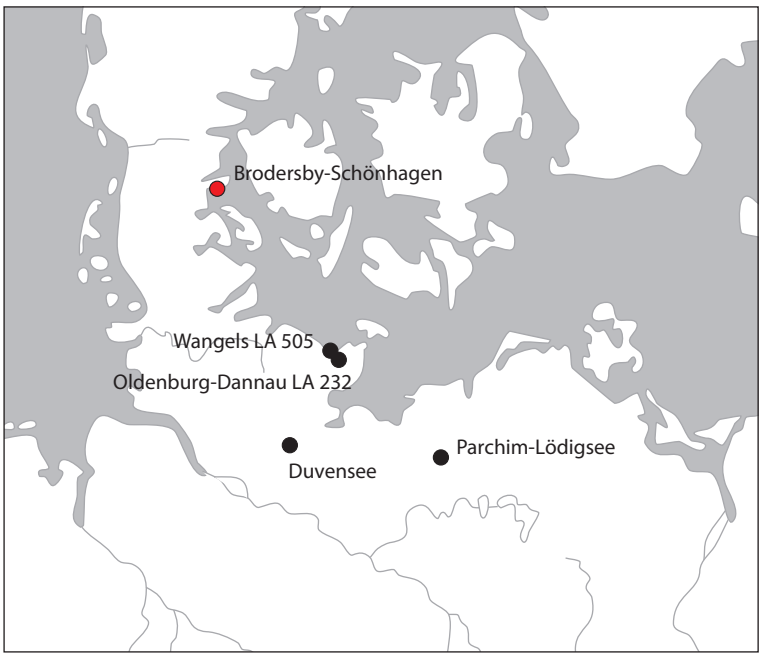


Fig. 19. Excavated domestic sites in the North German Plain from the first part of the 3rd millennium BCE.

There are some similarities with other sites, such as the scattered evidence for activity at Oldenburg-Dannau LA 232 (Brozio et al. 2019a), Wangels LA 505 (Hartz 2005; Klooß 2008), Parchim-Löddigsee (Becker/Benecke 2002) and Duvensee (Brozio et al. accepted) (Fig. 19). These small sites from the period 2900–2500 BCE existed alongside Middle Neolithic V/early SGC houses that might indicate a different aspect of the society in transformation.

The Store Valby phenomenon on the southern Cimbrian peninsula

The ^{14}C-dates available for the chronological classification of the Store Valby phenomenon are subject to various source-critical limitations (Tab. 5). In the majority of cases, only long-lived material, such as charcoal samples, were available, and therefore several samples have standard deviations of up to 100 years (Iversen 2015). In addition, there are ^{14}C-plateau effects between 3100 and 2600 BCE. For a more detailed determination, we carried out a calculation of 34 ^{14}C-dates from the entire Store Valby phenomenon with a standard deviation of not more than 55 years (Fig. 20). The oldest dates used here (AAR-20457, AAR-9105) can only be used to a limited extent due to the plateau effect, but they seem to refer to the onset of the phenomenon around 3000 cal BCE due to their median. This classification is supported by a dendrochronological date of 2983–2962 BCE from the site of Spodsbjerg, on Langeland (Sørensen 1998, 209). The ^{14}C-dates in the following, steep section of the ^{14}C-curve fall around 2950 cal BCE based on the median date. Pinpointing the end of the Store Valby phenomenon is complicated by the wide 1-sigma ranges of the results, in some cases more than 300 years. But it can be estimated at 2600 cal BCE, a time during which the dates concentrate on the Danish islands. On the southern Cimbrian peninsula, based on the ^{14}C-curve, the phenomenon can be dated to between 2950 and 2750 cal BCE (Fig. 21).

Table 5. ^{14}C-dates from contexts relating to the Store Valby phenomenon (after Hartz 2005; Iversen 2015; Klooß 2008).

Sample	Site/feature	County	Sample type	^{14}C age (bp)	Range 68,3 %	Range 95,4 %	Median	Reference
AAR-6583	Helgeshøj (Pit x135)	Copenhagen	Charcoal	4165 ± 50	2876–2677	2889–2589	-2753	Giersing 2004, 19-21
AAR-6951	Helgeshøj (Pit x446)	Copenhagen	Animal teeth (cattle)	4105 ± 40	2851–2580	2871–2501	-2680	Giersing 2004, 22-3
AAR-9099	Aldersro I (Culture layer)	Randers	Plant (hazel)	4190 ±55	2887–2680	2903–2621	-2768	Skousen 2008, 211-2,345
AAR-9104	Aldersro I (Culture layer)	Randers	Charcoal (hazel)	4165 ± 44	2875–2679	2887–2621	-2755	Skousen 2008, 207,345
AAR-9105	Aldersro I (Culture layer)	Randers	Charcoal (hazel)	4391 ± 37	3083–2926	3265–2906	-3003	Skousen 2008, 207, 345
AAR-9108	Aldersro I (Culture layer)	Randers	Charcoal (hazel)	4115 ±55	2859–2581	2878–2499	-2700	Skousen 2008, 211-2, 345
AAR-9158	Damsbo (Pit A 30)	Svendborg	Animal bones, burnt (goat/sheep)	4100 ± 39	2850–2578	2870–2498	-2670	N.H. Andersen 2008, 38-9; AUD 2002, No. 192; Report from AMS ^{14}C Dating Centre, Aarhus University 2004
AAR-9159	Damsbo (Pit A 30)	Svendborg	Charcoal (hazel)	4092 ± 36	2848–2575	2864–2496	-2654	N.H. Andersen 2008, 38-9; AUD 2002, No. 192; Report from AMS ^{14}C Dating Centre, Aarhus University 2004
AAR-9160	Damsbo (Pit A 30)	Svendborg	Plant (emmer wheat)	4058 ± 40	2833–2492	2853–2475	-2595	N.H. Andersen 2008, 38-9; AUD 2002, No. 192; Report from AMS ^{14}C Dating Centre, Aarhus University 2004
AAR-9161	Damsbo (Pit A 30}	Svendborg	Shells (cockle)	4000 ± 43	2571–2473	2832–2351	-2528	N.H. Andersen 2008, 38-9; AUD 2002, No. 192; Report from AMS ^{14}C Dating Centre, Aarhus University 2004
AAR-20455	Lerhøjsager (Pit x191)	Copenhagen	Charcoal (oak)	4218 ± 27	2893–2763	2903–2698	-2801	Report 1314, AMS ^{14}C Dating Centre, Aarhus University 2014
AAR-20456	Lerhøjsager (Pit x191)	Copenhagen	Charcoal (poplar)	4332 ± 26	3010–2901	3017–2897	-2938	Report 1314, AMS ^{14}C Dating Centre, Aarhus University 2014
AAR-20457	Lerhøjsager (Pit x191)	Copenhagen	Charcoal (alder/hazel)	4407 ± 26	3090–2940	3261–2922	-3025	Report 1314, AMS ^{14}C Dating Centre, Aarhus University 2014
K-1572	Vroue Hede I (Stone packing grave II)	Viborg	Charcoal (oak)	4230 ± 100	2923–2632	3096–2495	-2799	Hübner 2005 , part 3, app. 3, find list p. 276; Jørgensen 1977,58-9, 209-12
K-1573	Vroue Hede III (Stone packing grave VII)	Viborg	Charcoal (oak)	4270 ± 100	3077–2679	3324–2576	-2886	Hübner 2005 , part 3, app. 3, find list p. 276; Jørgensen 1977, 134, 210
K-1574	Vroue Hede III (Stone packing grave VII)	Viborg	Charcoal (oak)	4210± 100	2909–2632	3085–2491	-2778	Hübner 2005 , part 3, app. 3, find list p. 276; Jørgensen 1977, 134, 210
K-1725	Søliager (0.6 m thick culture layer IV)	Frederiksborg	Charcoal (oak)	4030 ± 100	2857–2462	2878–2299	-2579	Becker 1947, 87-8; 1951,160-2; Oavidsen 1978, 15, ftg. 2; Skaarup 1973, 59-67,98-104, 116-7.
K-1930	„Vester Årup (All samples from the same pit)“	Ålborg	Shells (cockle)	4290 ± 100	3090–2699	3330–2586	-2919	Davidsen 1975 b, 166; Hübner 2005, part 3, app. 3, find list p. 275

Table 5, continued. ^{14}C-dates from contexts relating to the Store Valby phenomenon (after Hartz 2005; Iversen 2015; Klooß 2008).

Sample	Site/feature	County	Sample type	^{14}C age (bp)	Range 68,3 %	Range 95,4 %	Median	Reference
K-1931	Vester Årup (All samples from the same pit)	Ålborg	Shells	4350 ± 100	3311–2880	3354–2697	-3014	Davidsen 1975 b, 166; Hübner 2005, part 3, app. 3, find list p. 275
K-1932	Vester Årup (All samples from the same pit)	Ålborg	Animal bone (cattle)	4100 ± 100	2866–2500	2908–2351	-2675	Davidsen 1975 b, 166; Hübner 2005, part 3, app. 3, find list p. 276
K-1982	Vester Årup (All samples from the same pit)	Ålborg	Charcoal (poplar, oak, alder)	4450 ± 100	3336–2944	3484–2896	-3145	Davidsen 1975 b, 166; Hübner 2005, part 3, app. 3, find list p. 275
K-1983	Vester Årup (All samples from the same pit)	Ålborg	Animal bones (pig, sheep)	4160 ± 100	2881–2625	3004–2471	-2732	Davidsen 1975b, 166; Hübner 2005, part 3, app. 3, find list p. 276
K-2115	Kornerup (Pit 30)	Copenhagen	Animal bones (cattle, pig, sheep)	4090 ± 100	2864–2495	2903–2350	-2664	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, ftnd list p. 276
K-2269	Lidsø (Pit II, E, 12)	Maribo	Charcoal	4260 ± 100	3016–2678	3321–2504	-2867	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 276
K-2270	Lidsø (Pit II, E, 12)	Maribo	Charcoal	4390 ± 100	3320–2902	3366–2780	-3067	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, ftnd list p. 275; Malmros & Tauber 1977, 81
K-2271	Lidsø (Pit II, E, 12)	Maribo	Charcoal	4210 ± 100	2909–2632	3085–2491	-2778	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 276
K-2272	Lidsø (Pit II, E, 12)	Maribo	Charcoal	4300 ± 100	3093–2704	3332–2624	-2939	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 275
K-2273	Dorthealund (Pit C)	Vejle	Charcoal (poplar)	4110 ± 100	2870–2573	2914–2409	-2686	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 276
K-2275	Dorthealund (Pit C)	Vejle	Charcoal (poplar)	4200 ± 100	2903–2632	3023–2491	-2768	Davidsen 1975b, 174; Hübner 2005, part 3, app. 3, find list p. 276
K-2425	Vroue Hede I (Stone packing grave XV)	Viborg	Charcoal	4180 ± 100	2891–2631	3011–2480	-2750	Hübner 2005 , part 3, app. 3, find list p. 276; Jørgensen 1977, 72-5, 210
K-2429	Dorthealund (Pit C)	Vejle	Charcoal (poplar)	4220 ± 100	2916–2632	3090–2495	-2788	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 277
K-2430	Dorthealund (Pit C)	Vejle	Charcoal (poplar)	4540 ± 100	3491–3091	3519–2928	-3233	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 275
K-2432	Dorthealund (Pit C)	Vejle	Charcoal (poplar)	4550 ± 100	3495–3093	3622–2930	-3245	Davidsen 1975b, 167; Hübner 2005, part 3, app. 3, find list p. 275
K-4073	Spodsbjerg (Log GF)	Svendborg	Wood (oak)	4370 ± 70	3090–2906	3331–2885	-3016	Christensen & Rasmussen 1998, 210-11; Sørensen 1998, 119, table 33; Sørensen & Sech 1998, 35-7, 50, ftg. 9
K-4074	Spodsbjerg (Log FY)	Svendborg	Wood (oak)	4240 ± 60	2917–2698	3011–2629	-2806	Christensen & Rasmussen 1998, 210-11; Sørensen 1998, 119, table 33; Sørensen & Sech 1998, 35-7, 50, ftg. 9
K-6197	Spodsbjerg (Pit BAD)	Svendborg	Hazel nut	4260 ± 115	3023–2666	3330–2499	-2869	Christensen & Rasmussen 1998, 211; Sørensen & Beck 1998, 62-5
Ka-6453 (AAR-2164)	Jorlxøse Mose VIII (Food residue from St. Valby pot)	Holbæk	Food residue from pot	4300 ± 80	3087–2777	3322–2635	-2935	Hübner 2005 , part 3, app. 3, ftnd list p. 275; Rahbek & Ra smussen 1996, 313
KI-4060	Wangels LA 505	Eastern Holstein	Nutshell (hazel)	4150 ± 45	2871–2640	2881–2584	-2742	Klooß 2008, 132, Tab. 1

Table 5, continued. ^{14}C-dates from contexts relating to the Store Valby phenomenon (after Hartz 2005; Iversen 2015; Klooß 2008).

Sample	Site/feature	County	Sample type	^{14}C age (bp)	Range 68,3 %	Range 95,4 %	Median	Reference
KI-4061	Wangels LA 505	Eastern Holstein	Nutshell (hazel)	4150 ± 40	2870–2666	2880–2620	-2743	Klooß 2008, 132, Tab. 1
KI-4125	Wangels LA 505	Eastern Holstein	Charcoal	4070 ± 50	2840–2493	2864–2474	-2623	Klooß 2008, 132, Tab. 1
KI-4126	Wangels LA 505	Eastern Holstein	Charcoal	4180 ± 45	2881–2680	2892–2628	-2766	Klooß 2008, 132, Tab. 1
KI-4181	Wangels LA 505	Eastern Holstein	Pile	4200 ± 35	2887–2704	2897–2671	-2784	Klooß 2008, 132, Tab. 1
KI-4182	Wangels LA 505	Eastern Holstein	Pile	4160 ± 40	2872–2679	2882–2623	-2752	Klooß 2008, 132, Tab. 1
KI-4183	Wangels LA 505	Eastern Holstein	Pile	4150 ± 30	2867–2671	2876–2628	-2745	Klooß 2008, 132, Tab. 1
KI-4184	Wangels LA 505	Eastern Holstein	Pile	4190 ± 40	2886–2697	2895–2635	-2775	Klooß 2008, 132, Tab. 1
KIA-408	Wangels LA 505	Eastern Holstein	Shaft	4100 ± 40	2851–2578	2871–2497	-2671	Klooß 2008, 132, Tab. 1
KIA-6137	Wangels LA 505	Eastern Holstein	Scull	4133 ± 33	2861–2631	2872–2587	-2728	Klooß 2008, 132, Tab. 1
KIA-6426	Wangels LA 505	Eastern Holstein	Scull	4145 ± 35	2866–2637	2877–2620	-2739	Klooß 2008, 132, Tab. 1
Poz-98194	Brodersby-Schönhagen	Peninsula Schwansen	Nutshell (hazel)	4310 ± 40	3010–2887	3023–2880	-2925	–
Poz-98280	Brodersby-Schönhagen	Peninsula Schwansen	Animal bone (sheep)	4200 ± 40	2889–2701	2900–2639	-2781	–
Poz-98281	Brodersby-Schönhagen	Peninsula Schwansen	Charcoal (ash)	4205 ± 35	2889–2705	2900–2673	-2787	–
Poz-98282	Brodersby-Schönhagen	Peninsula Schwansen	Charcoal (hazel)	4250 ± 35	2911–2780	2921–2701	-2885	–
Poz-98283	Brodersby-Schönhagen	Peninsula Schwansen	Charcoal (hazel)	4280 ± 40	2922–2878	3017–2762	-2901	–
Poz-98288	Brodersby-Schönhagen	Peninsula Schwansen	Animal bone (deer)	4320 ± 40	3010–2892	3081–2883	-2941	–
Poz-98870	Brodersby-Schönhagen	Peninsula Schwansen	Nutshell (hazel)	4145 ± 35	2866–2637	2877–2620	-2739	–
Poz-98881	Brodersby-Schönhagen	Peninsula Schwansen	Nutshell (hazel)	4150 ± 35	2869–2668	2878–2623	-2744	–
Ua-45166	Strandsegård II (Pit 3023)	Frederiksborg	Macrofossils	4341 ± 33	3011–2905	3081–2895	-2960	Report from Ångströmlaboratoriet, Uppsala Universitet 2013
Ua-45167	Strandsegård II (Pit 3023)	Frederiksborg	Macrofossils	4257 ± 32	2907–2878	2920–2759	-2890	Report from Ångströmlaboratoriet, Uppsala Universitet 2013

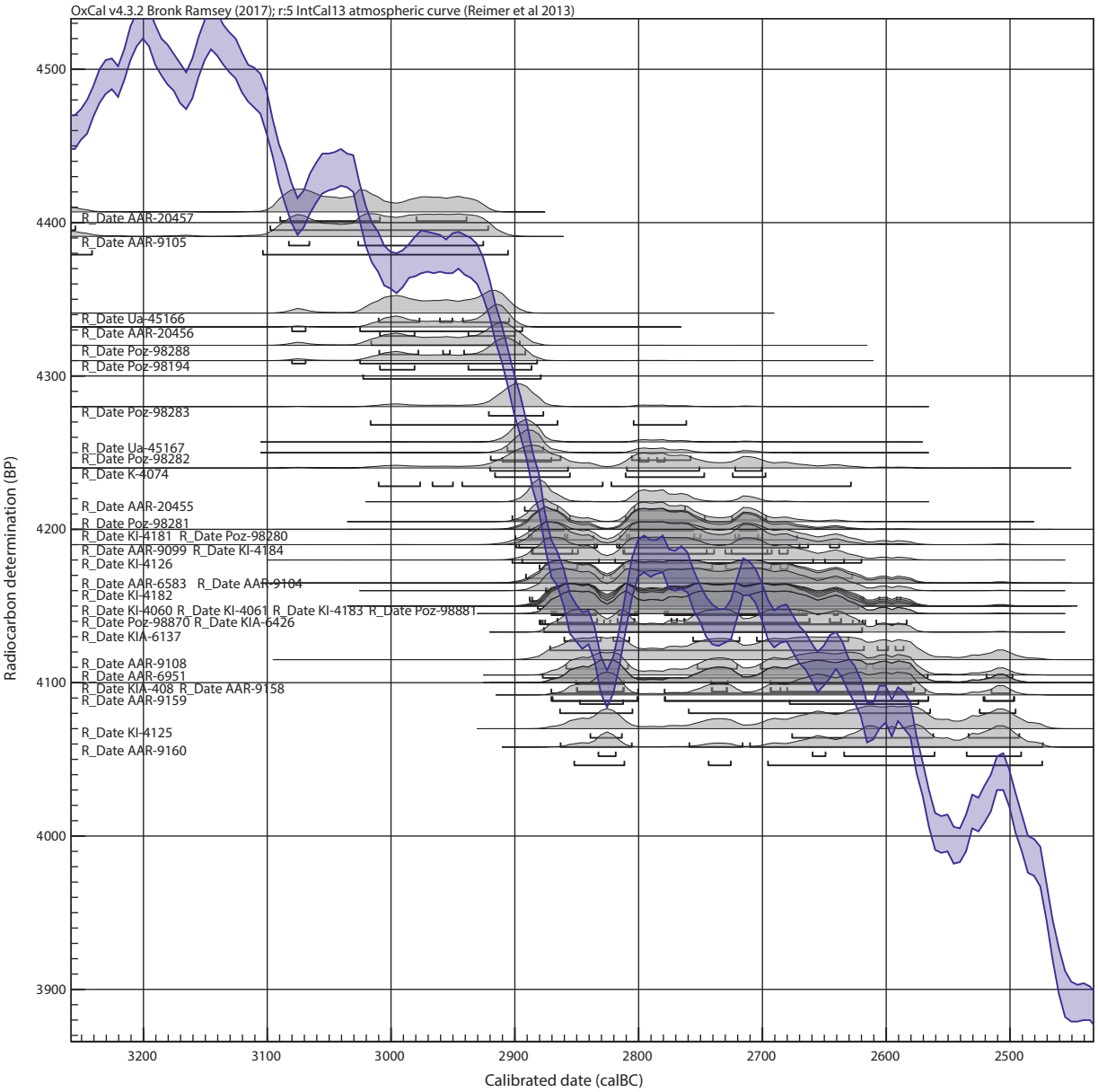


Fig. 20. ^{14}C-dates with a standard deviation of less than 56 years relating to the Store Valby phenomenon.

Ceramics and axes: The ability to use different styles contemporaneously

Because the Store Valby phenomenon begins around 3000 cal BCE, co-existence with the Bundsø/Lindø ceramic style is possible. This region lacks a supra-regional absolute chronology for the Middle Neolithic phasing I–IV (Müller 2019), so that the period terms MN I to V provide only a rough typochronological frame of reference. On the southeastern part of the Cimbrian peninsula, however, a model of ^{14}C-dates associated with ceramics is available. It indicates that MN III/IV ends at 2900 cal BCE (Brozio 2016; 2019b). Globular Amphora vessels, which are known from East Holstein and Mecklenburg-Western Pomerania, as well as Globular Amphora Culture influences, span the period around 3100–2900 BCE, according, for example, to the dates from Wangels LA 69 (Brozio 2016; 2019b). This means that Store Valby pottery may be contemporaneous with both TRB pottery and Globular Amphora pottery.

The duration of Store Valby overlaps with later phenomena. In Denmark, where it lasts until 2600 cal BCE (Iversen 2015), it overlaps with the Single Grave Culture (specifically YN 1) phenomenon,

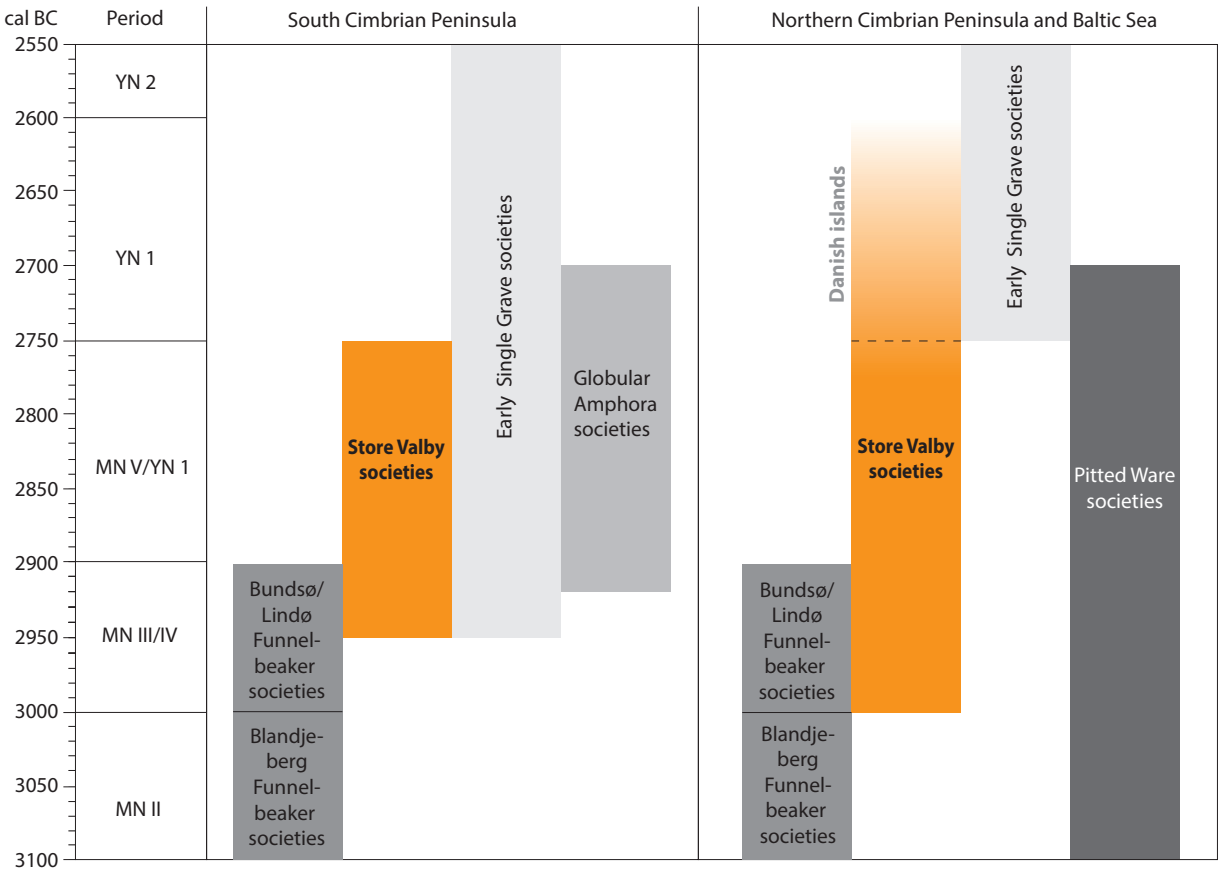


Fig. 21. Chronological classification of the Store Valby phenomenon on the Cimbrian peninsula and the Danish islands.

of 2750–2620 cal BCE. In northern Germany, where we know from Brodersby-Schönhagen that Store Valby lasts only until 2750 cal BCE, it overlaps with the northern German EGK 1, of 2950–2550 cal BCE (Brozio 2019a). Accordingly, we have a period of about 200 years in which the Store Valby ceramics and axes on the southern Cimbrian peninsula overlapped with the SGC ceramic and axe types. As a consequence, in the period 3100–2900 BCE, people could have had access to Bundsø/Lindø, Globular Amphora and Store Valby ceramics. Similarly, in the period 2900–2600 BCE, they could have had access to early Corded Ware ceramics, Globular Amphora and Store Valby pottery.

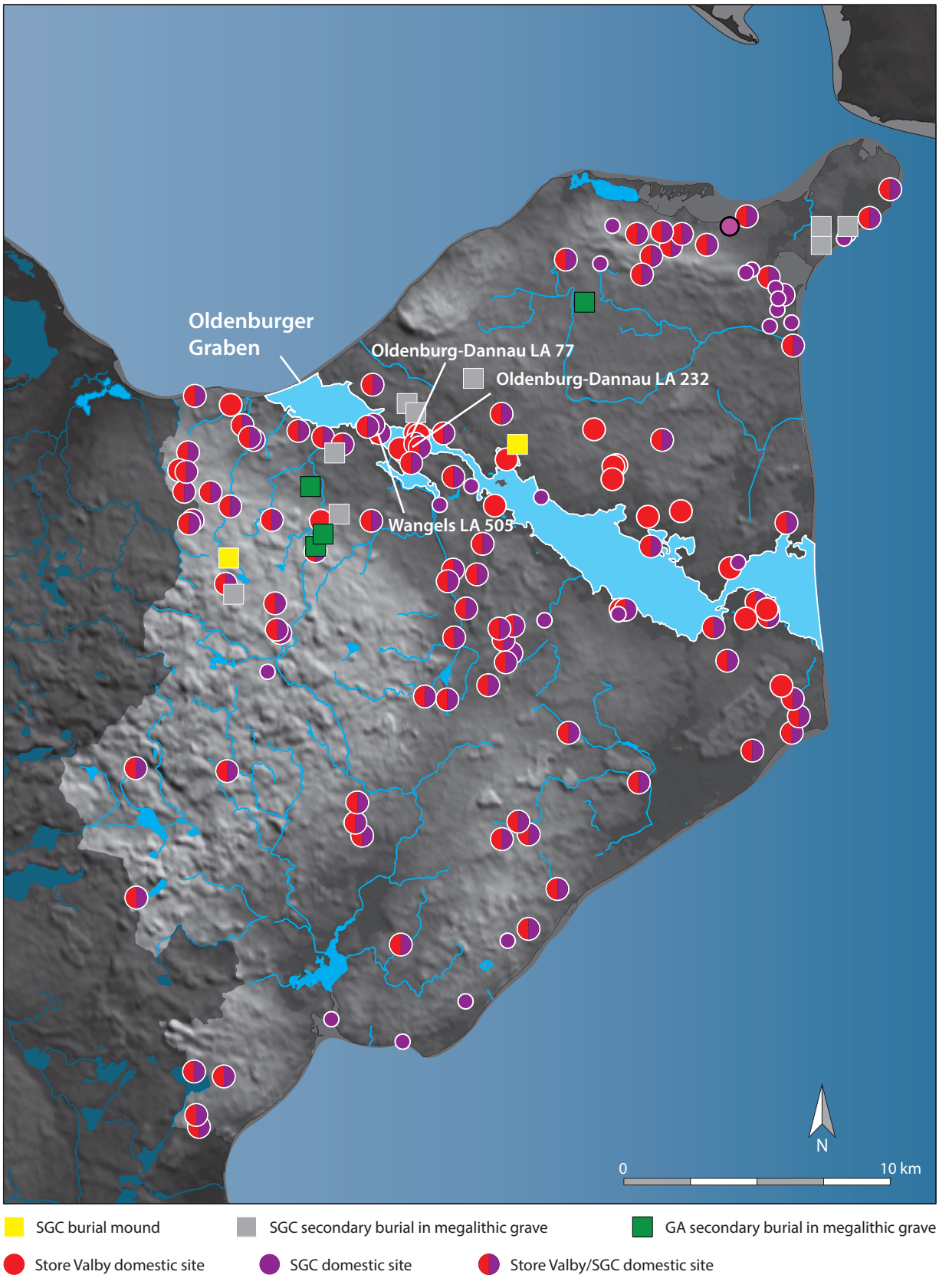
Domestic sites

In contrast to the northern Cimbrian peninsula and the Danish islands in the eastern Baltic Sea (Iversen 2015, Catalogue A 204–205), where we know of altogether more than 70 Store Valby settlement sites, the southern Cimbrian peninsula has only a few known sites. The excavated settlement sites are characterised as smaller settlement forms, with no house plans or other features, such as storage or waste pits.

Beside Brodersby-Schönhagen, with find concentrations that might indicate sunken floors, and a cultural layer, the final phase of Oldenburg-Dannau LA 77 with the latest houses (Brozio 2016; 2019b) might include Store Valby coarse pottery into the assemblage with TRB Lindø/Bundsø vessels. Nearby, at Wangels LA 505, excavations confirmed further activity around 2900 BCE, which is associated with a brackish waste area and a workshop for producing axes – comparable to Brodersby-Schönhagen. At Wangels LA 505, the contexts with Store Valby pottery consist of a cultural layer and three oak posts,

which may have been the part of a house structure (Hartz 2005; Klooß 2008). All in all, within the limited area of the Oldenburger Graben (Jakobsen 2004), domestic activities that are partly associated with Store Valby pottery are reflected in various small areas of activity (Fig. 22).

Fig. 22. Domestic sites and burial places in eastern Holstein in the 3rd millennium BCE. Reconstruction of the morphology of the Oldenburger Graben and the coastline at a sea level of -1 m a.s.l. (after Jakobsen 2004, Fig. 2).



The settlement pattern in the eastern parts of the northern Cimbrian peninsula is comparable, with a few scattered sites on the west coast and in northwestern Jutland. In all of these areas, evidence for larger domestic sites is lacking. Globular Amphora Culture influences are detectable in these western and southern settlement patterns, in the form of the globular amphorae themselves or in the form of animal graves under stone packages (Johannsen/Laursen 2010).

In the more eastern distribution of the Store Valby phenomenon, extensive cultural layers are associated with larger settlements, up to 20–30 hectares, and occupations of longer duration (Iversen 2015; Skaarup 1985) (Tab. 6; Fig. 23). Even if the overall character of the activities is not yet clear, it is obvious that these large sites are restricted to the western Danish isles (Fig. 24). Obviously, these giant settlements or activity areas, which lasted less than 200 years, are separated from the pattern to the west, with its small sites with domestic structures, and from the pattern to the east, where palisade enclosures probably formed the focal point of small farmsteads.

Strikingly, in 82 % of the cases (n = 87), the Store Valby domestic sites in the western Baltic region were not used directly by TRB groups (cf. Tab. 6). On the southern Cimbrian peninsula, these are the coastal domestic site of Brodersby-Schönhagen, the domestic site of Wangels LA 505, with a transition from Store Valby to EGK and prior activity in the Early Neolithic (Hartz 2005; Klooß 2008), and the domestic site of Oldenburg LA 232, with a transition from Store Valby to the SRC groups and with prior activity in MN II (Brozio et al. 2019a). On the northern Cimbrian peninsula, for instance, this is the domestic site of Spodsbjerg, on Langeland, with its Store Valby material culture and prior Late Mesolithic and Early Neolithic activity (Sørensen 1998).

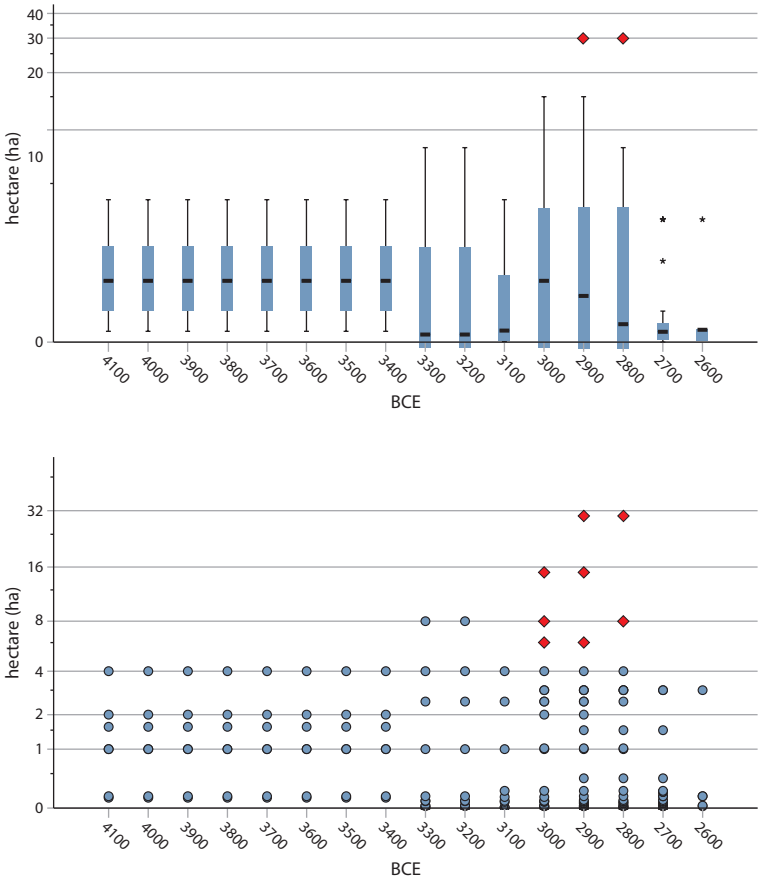


Fig. 23. Domestic areas per century in hectares (logarithmic scaling) in the western Baltic region.

Tab. 6. Store Valby domestic sites in the western Baltic. EN = Early Neolithic, MN = Middle Neolithic, YN = Younger Neolithic (after Brozio 2016; Davidsen 1978; Iversen 2015; Klooß 2008; Skaarup 1985).

Site	Period	Size (hectare)	References
Ålbækdalen	MN I, MN V	–	Davidsen 1978, 159 fig. 77
Aldersro I	MN V	–	Iversen 2005, 180–183 Appendix 2
Allenbjerg N	neolithic	0.35	Skaarup 1985, 53
Alrø	EN, MN V	–	Davidsen 1978, 159 fig. 77
Ålstrup	MN I – II, MN V	–	Davidsen 1978, 159 fig. 77
Bækkelundgård	MN I – III/IV	–	Davidsen 1978, 159 fig. 77
Birkelund	EN, MN I	–	Davidsen 1978, 159 fig. 77
Birkemose Ø	neolithic	1.25	Skaarup 1985, 58
Birkemose V	EN/MN	0.25	Skaarup 1985, 348
Blandebjerg	MN II	0.14	Skaarup 1985, 363
Bodemosemarken, Vemmenæs	neolithic	1.50	Skaarup 1985, 62
Botofte	neolithic	1.50	Skaarup 1985, 36
Bregnemose N	neolithic	5.00	Skaarup 1985, 38
Brodersby-Schönhagen	MN V, YN	0.10	–
Bundsø	MN I – II, MN V	0.09	Davidsen 1978, 159 fig. 77
Bunkehøj	neolithic	0.25	Skaarup 1985, 53
Damsbo	MN V, YN	0.21	Iversen 2005, 180–183 Appendix 2
Ditlevsgårde	neolithic	0.29	Skaarup 1985, 38
Ditmarskgård	neolithic	2.50	Skaarup 1985, 53
Dorthealund	MN III/IV – V	3.00	Davidsen 1978, 159 fig. 77
Doverodde	MN I – III/IV	–	Davidsen 1978, 159 fig. 77
Fakkemose	EN/MN	0.03	Skaarup 1985, 348
Flædemose	MN V	–	Iversen 2005, 204–205 Catalogue A
Forlev Losseplads	MN V	–	Iversen 2005, 204–205 Catalogue A
Frederiksholm Teglværk	MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Fruelundsgård SØ	neolithic	0.25	Skaarup 1985, 63
Gåsemosen	MN V, YN	–	Davidsen 1978, 159 fig. 77
Gedevasegård	MN V	0.42	Iversen 2005, 204–205 Catalogue A
Gerlev	MN II – V	–	Iversen 2005, 204–205 Catalogue A
Glostrupgard	MN I – II	–	Davidsen 1978, 159 fig. 77
Grået (Reerslev)	MN III/IV – V	–	Iversen 2005, 204–205 Catalogue A
Grastenård	neolithic	2.50	Skaarup 1985, 63
Grønnebæk	MN III/IV	–	Davidsen 1978, 159 fig. 77
Gyldenstrand	MN V	–	Iversen 2005, 204–205 Catalogue A
Halmø	EN/MN	2.00	Skaarup 1985, 348
Hammeren	EN, MN I	–	Davidsen 1978, 159 fig. 77
Hanebjerg Mose	neolithic	6.00	Skaarup 1985, 50
Helgeshøj	MN V	3.00	Iversen 2005, 204–205 Catalogue A
Hesselø	EN, MN I, MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Holckenhavn	MN V	–	Davidsen 1978, 159 fig. 77
Hollensminde	MN II – V	0.08	Iversen 2005, 204–205 Catalogue A
Humble Rene	neolithic	0.50	Skaarup 1985, 51
Hvorlis	MN I – II, YN	–	Davidsen 1978, 159 fig. 77
Hyldehoved	neolithic	8.00	Skaarup 1985, 60
Kaastrup	MN V	1.50	Iversen 2005, 204–205 Catalogue A
Kalvø	EN, MN V, YN	–	Davidsen 1978, 159 fig. 77
Klintebakken	EN, MN I – II	–	Davidsen 1978, 159 fig. 77; Skaarup 1985, 363
Klostergårdens Jorder	MN V	–	Iversen 2005, 204–205 Catalogue A

Tab. 6, continued. Store Valby domestic sites in the western Baltic. EN = Early Neolithic, MN = Middle Neolithic, YN = Younger Neolithic (after Brozio 2016; Davidsen 1978; Iversen 2015; Klooß 2008; Skaarup 1985).

Site	Period	Size (hectare)	References
Klostergårdens Jorder etape H	MN V	–	Iversen 2005, 204–205 Catalogue A
Knudsnæs II	neolithic	0.70	Skaarup 1985, 45
Kobberbakken	EN, MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Kong Holms Slot	neolithic	3.75	Skaarup 1985, 38
Kornerup	MN III/IV – V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Koustrup	EN, MN I – II	–	Davidsen 1978, 159 fig. 77
Lerbaks Agre	MN V	–	Iversen 2005, 204–205 Catalogue A
Lerhøjsager	MN V	–	Iversen 2005, 204–205 Catalogue A
Lidsø	MN III/IV – V, YN	3.00	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Lindenborg	MN V	–	Iversen 2005, 204–205 Catalogue A
Lindø	MN I – V	4.00	Davidsen 1978, 159 fig. 77; Skaarup 1985, 365
Lindskov	MN III/IV – V	1.02	Davidsen 1978, 159 fig. 77
Livø	MN I	0.03	Davidsen 1978, 159 fig. 77
Lodbjerg	MN III/IV	–	Davidsen 1978, 159
Lohals	EN/MN	0.01	Skaarup 1985, 348
Lyø I	MN I – II	0.01	Davidsen 1978, 159 fig. 77; Skaarup 1985, 60
Møllebakken	EN/MN	0.75	Skaarup 1985, 56
Mosevangen	MN V	–	Iversen 2005, 204–205 Catalogue A
N. Sandegård	EN, MN I – II	–	Davidsen 1978, 159 fig. 77
Nagelsti	MN I, MN III/IV – V	0.02	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Nevre	neolithic	8.00	Skaarup 1985, 58
Nørhå	MN II – III/IV	–	Davidsen 1978, 159 fig. 77
Nørreholm	MN	2.50	Skaarup 1985, 363
Nykøbingvej	MN V	–	Iversen 2005, 204–205 Catalogue A
Øgårde	EN, MN I	–	Davidsen 1978, 159 fig. 77
Oldenburg LA 232	MN III/IV – YN	0.80	Brozio et al. 2019a
Olsbjerg	EN, MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Ørnekul	EN, MN I, MN V, YN	–	Davidsen 1978, 159 fig. 77
Østergårds Jorder	MN V	–	Iversen 2005, 204–205 Catalogue A
Østre Huse	neolithic	2.00	Skaarup 1985, 29
Øxenbjerg	EN, MN I – II	–	Davidsen 1978, 159 fig. 77
Pellegårds Strandmarker	MN III/IV	2.00	Skaarup 1985, 365
Polleholm	EN	1.60	Skaarup 1985, 348
Prydsgårdens Strandmark	MN III/IV	6.00	Skaarup 1985, 365
Purlund	MN V	–	Iversen 2005, 204–205 Catalogue A
Rævebakken	MN I, MN III/IV – V	8.00	Davidsen 1978, 159 fig. 77
Ragelbjerg, Snerup	MN III/IV – V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Ratgård S	neolithic	4.00	Skaarup 1985, 54
Ringstedmark	MN V	–	Iversen 2005, 204–205 Catalogue A
Rispebjerg	MN I – III/IV	–	Davidsen 1978, 159 fig. 77
Rødkilde	MN V	–	Iversen 2015, 204–205 Catalogue A
Rørso Mose	neolithic	0.35	Skaarup 1985, 46
Ryomgård	EN, MN I	–	Davidsen 1978, 159 fig. 77
Sarup	MN, YN	–	Davidsen 1978, 159 fig. 77
Saxbjerggård	EN/MN	0.50	Skaarup 1985, 348
Selbjerg	MN II, MN V, YN	–	Davidsen 1978, 159 fig. 77
Sigersted I	MN V	0.06	Iversen 2005, 204–205 Catalogue A
Sigersted II	MN V	–	Iversen 2005, 204–205 Catalogue A

Tab. 6, continued. Store Valby domestic sites in the western Baltic. EN = Early Neolithic, MN = Middle Neolithic, YN = Younger Neolithic (after Brozio 2016; Davidsen 1978; Iversen 2015; Klooß 2008; Skaarup 1985).

Site	Period	Size (hectare)	References
Sigersted III	MN II – V	0.23	Iversen 2005, 204–205 Catalogue A
Skarø N	neolithic	2.50	Skaarup 1985,61
Skarrild III	MN III/IV – V, YN	0.02	Davidsen 1978, 159 fig. 77
Skarrild IV	MN I, MN V	–	Davidsen 1978, 159 fig. 77
Sletø	MN V	30.00	Skaarup 1985, 367
Sølager	EN, MN I, MN V	0.01	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Søsum (Pudebjerggård)	MN V	–	Iversen 2005, 204–205 Catalogue A
Spodsbjerg	EN, MN V	–	Skaarup 1985, 367
Spotofte	EN/MN	0.80	Skaarup 1985, 348
Sprogø (Vestbjerget)	MN V	–	Iversen 2005, 204–205 Catalogue A
St. Bogø	MN III/IV	2.50	Skaarup 1985, 365
Stendis	MN I, MN V	–	Davidsen 1978, 159 fig. 77
Stenfeldtlille	YN	–	Iversen 2005, 204–205 Catalogue A
Stengade I	EN, MN V, YN	0.15	Davidsen 1978, 159 fig. 77; Skaarup 1985, 348
Stengade II	EN	0.13	Skaarup 1985, 348
Stensballesund	MN I – II	–	Davidsen 1978, 159 fig. 77
Store Valby	EN, MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Store Heddinge	MN V	–	Iversen 2005, 204–205 Catalogue A
Størup	EN, MN I	–	Davidsen 1978, 159 fig. 77
Strandagergård	EN	4.00	Skaarup 1985, 348
Strandhavegårds Strandmark	neolithic	1.00	Skaarup 1985, 35
Strandholm	MN III/IV – V	–	Iversen 2005, 204–205 Catalogue A
Strandsegård	MN V	–	Iversen 2005, 204–205 Catalogue A
Strynø N	neolithic	0.15	Skaarup 1985, 62
Stubhavekrogen	MN I – II	0.09	Skaarup 1985, 51
Svaleklint	EN, MN I, YN	0.15	Davidsen 1978, 159 fig. 77
Svanemøllevej	MN V	–	Iversen 2005, 204–205 Catalogue A
Syltholm	MN V	–	Iversen 2005, 204–205 Catalogue A
Tårup	EN, MN I	–	Davidsen 1978, 159 fig. 77
Thorsmarkgård	EN, MN I – II, MN V	–	Davidsen 1978, 159 fig. 77
Tise Bakker	MN V, YN	–	Davidsen 1978, 159 fig. 77
Tøvelsø	MN V	30.00	Skaarup 1985, 367
Tøvelsø	MN III/IV	15.00	Skaarup 1985, 365
Tranderup Dal	neolithic	2.00	Skaarup 1985, 58
Trelleborg	EN, MN II – V, YN	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
„Trillen“	MN I, MN V	–	Davidsen 1978, 159 fig. 77
Troldbjerg	MN I, MN V	–	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Troldebjerg	MN I, MN V	–	Davidsen 1978, 159 fig. 77; Skaarup 1985, 363
Troldhøj	EN, MN I – II	–	Davidsen 1978, 159 fig. 77
Udbyhøj	EN, MN I – II	–	Davidsen 1978, 159 fig. 77
V. Egesborg	MN III/IV – V, YN	0.03	Davidsen 1978, 159 fig. 77; Iversen 2005, 204–205 Catalogue A
Vallensbæk Tofter	MN V	–	Iversen 2005, 204–205 Catalogue A
Vatermose	MN I	0.50	Skaarup 1985, 50
Veddinge	EN, MN I – III/IV	–	Davidsen 1978, 159 fig. 77
Vester Årup	MN V	–	Davidsen 1978, 141 fig. 71
Vigersdalgård 2	MN V	–	Iversen 2005, 204–205 Catalogue A
Voldbæk	EN, MN I, MN V, YN	–	Davidsen 1978, 159 fig. 77
Wangels LA 505	EN, MN V, YN	0.20	Hartz 2005; Klooß 2008

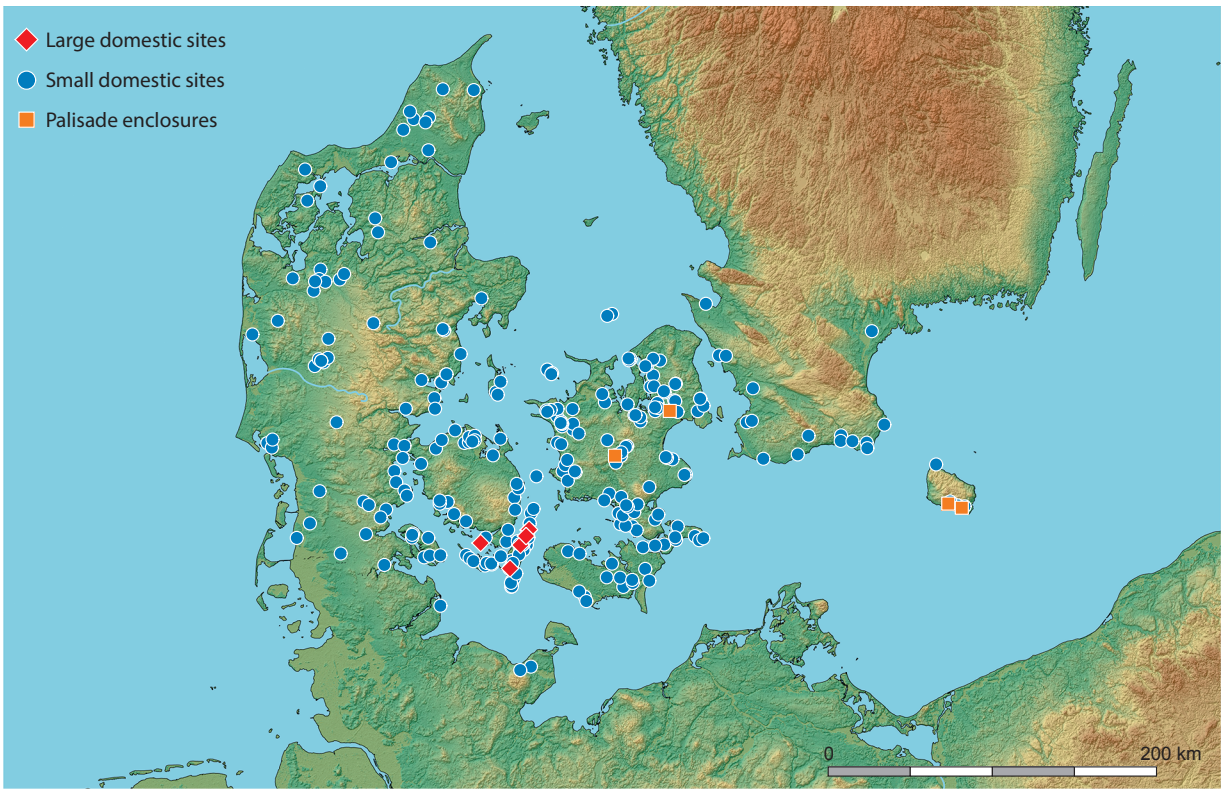


Fig. 24. Store Valby sites in southern Scandinavia and the North German Plain (based on Davidsen 1978; Ebbesen 2008; 2011; Iversen 2015; Larsson 1985; Nielsen 1997).

Specialisation and continuation

In addition to being reflected in settlement sites recorded through excavations, the Store Valby phenomenon on the southern Cimbrian peninsula is mainly represented by the Valby axe type. In eastern Holstein, for example, 67 sites can be allocated to MN V on the basis of their thick-butted axes (Breske 2017). Especially in these coastal areas, intensive flint working took place, a phenomenon which is analogous to earlier Neolithic phases. For example, the flint artefacts at Brodersby-Schönhagen and the MN I–II/V domestic site Oldenburg Dannau LA 77 (3270 and 2920 cal BCE) in Eastern Holstein (Brozio 2016; 2019b) are dominated by flint flakes with lengths of 6–9 cm and little or no cortex surfaces, which are associated with the production of flint tools, such as axes. This same flint production method is also reflected in the design of the types that are produced. Yet the differentiation and typochronology of the thick-butted axes of the Middle Neolithic Bundsø, Lindø and MN V Store Valby types, which are frequently discussed in the literature (Ebbesen 2006; Hinz 2014; Hoika 1987; Malmer 1962; Nielsen 1977), indicate that the Lindø and Valby types differ only in the ratio of wide to narrow sides.

One of the diagnostic characteristics of the Store Valby phenomenon are vessels with rough surfaces and simply designed decoration (Becker 1954; Davidsen 1978). On the southern Cimbrian peninsula, there are only minor differences between the ceramics of the Middle Neolithic phase I–II/IV and those of the Store Valby phenomenon. These include minor differences in surface treatment, the amount of temper and the size of clay particles. The proportion of rough to smooth exterior surface in the Store Valby vessels from Brodersby-Schönhagen is the reverse of that in the MN I–MN III/IV vessels from the domestic site of Oldenburg-Dannau LA 77 (Fig. 25).

The shape of Store Valby ceramic vessels is assumed to have developed typologically – especially the cups, vessels and bowls – from the MN I–MN III/IV repertoire of settlement goods (Becker 1954, 64;

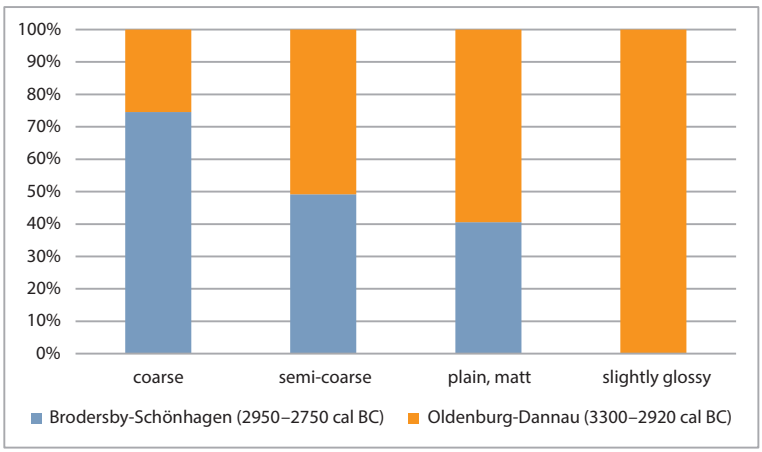


Fig. 25. Pottery from the Oldenburg-Dannau LA 77 site and Brodersby-Schönhagen.

Langenheim 1935). However, the specific vessel design and decorations seen in ceramics from MN I–MN III/IV graves were not used (Lorenz 2018, 128–133). Furthermore, within the Store Valby phenomenon no explicit burial pottery in terms of form or decoration was designed, but, instead, "storage" vessels from domestic contexts were deposited in graves. Store Valby pottery is characterised by a reduction in the diversity of forms (Ebbesen 1975, 17 Fig. 2b; Saev 2015), a small number of pattern types, and a small number of combinations of ornamental elements within the pattern types. For example, carved line patterns, a formative element in MN I–MN III/V, were not used within the Store Valby phenomenon (Becker 1954, 64; Davidsen 1978).

Burials

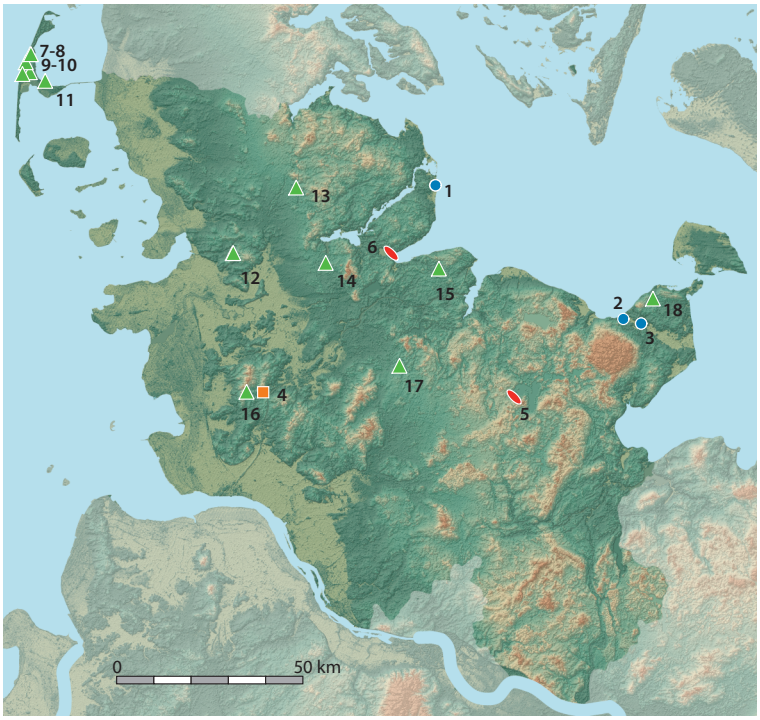
Store Valby burials on the southern Cimbrian peninsula appear in two forms (Fig. 26). In some cases, secondary depositions are entered in megalithic tombs. From a total of twelve megalithic tombs, secondary depositions of the Store Valby phenomenon are known (Davidsen 1972; Lorenz 2018). In other cases, individuals are buried in single flat graves. The one at Dersau contained a thick-butted axe and a flint blade (Clausen 1985; Kossian 2005). Stone package graves, interpreted as wagon burials and known from north-western Jutland (Johannsen/Laursen 2010), do not appear in the southern Cimbrian peninsula.

Enclosures

The enclosure of Dieksknöll (cf. Fig. 26) yielded a beaker fragment that was assigned to the Store Valby phenomenon between 2880–2640 BCE (Fig. 27). At this site, the Store Valby phase is associated with several re-cutting and backfilling events (Dibbern 2016).

Subsistence

Emmer and barley continue, as they had in the Middle Neolithic, to dominate the plant-based subsistence, with only a small proportion of the spectrum consisting of wheat and einkorn (Kirleis/Fischer 2014). Unknown before, however, is poppy, identified in small quantities at the site of Wangels LA 505, in Eastern Holstein (Kirleis et al. 2012; Kroll 2001). The proportions among the domestic animals (cattle, pig, sheep and goat) also correspond to the Middle Neolithic



Secondary burials in megalithic tombs
Single flat grave
Domestic site
Enclosure
Large domestic sites

1. BrodersbySchönhagen
2. Wangels LA 505
3. Oldenburg-Dannau LA 232
4. Dieksknöll
5. Dersau
6. Eckernförde-Wilhelmstal
7. Kampen, Steingrab 2
8. Kampen, Riesenbett 107
9. Wenninstedt, Steingrab 12
10. Wenninstedt, Steingrab 91
11. Keitum
12. Schwesing
13. Süderschmedeby
14. Hahnenkrug
15. Birkenmoor
16. Bunsoh
17. Eisendorf
18. Kembs

Fig. 26. Store Valby activity on the Cimbrean peninsula, Schleswig-Holstein, Germany (based on Davidsen 1978).

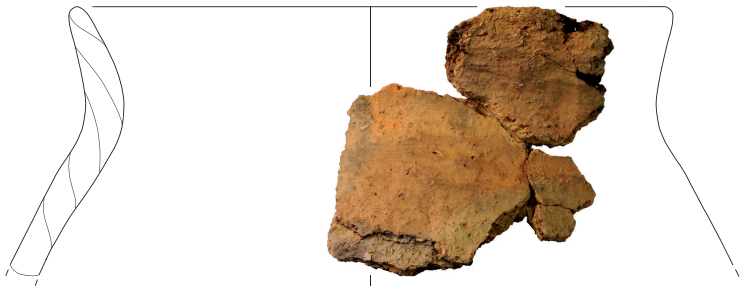


Fig. 27. A beaker fragment from a trench in the enclosure of Dieksknöll assigned to the Store Valby phenomenon, dated 2880–2640 BCE. Scale: 1:3.

pattern (Benecke 1994), with a clear dominance of cattle (Schmölcke 2001). However, Store Valby sites show a higher proportion of wild animals (Steffens 2005).

The Store Valby phenomenon in the context of the 3rd millennium BCE

Store Valby as a pottery style and Valby axes as a typologically significant axe type are formally integrated into a period in which different pottery styles, different settlement systems, and different burial rites existed contemporaneously. In the period 3100–2900 BCE, Store Valby, Globular Amphora and Lindø/Bundsø (TRB) co-exist, and in the period 2900–2600 BCE, Store Valby, Globular Amphora and early Single Grave Culture pottery co-exist. From a terminological point of view, we advocate labelling the first period MN/YN 1 and the second period MN/YN 2. Using these labels highlights the difference in the roles and typological background of the material culture of the Store Valby phenomenon compared with the developed TRB and the early SGC.

We identify the following continuities and discontinuities for the southernmost extent of the Store Valby phenomenon, based on the domestic site of Brodersby-Schönhagen and the Store Valby phenomenon on the southern Cimbrian peninsula:

Continuity

- The method of production of flint tools and the types of tools produced, such as, for example, axes and chisels, remain the same compared to previous periods, an observation that also applies to the EGK.
- Store Valby burials take place in megalithic graves and in individual flat graves. Burials of the EGK take place mainly in burial mounds and only rarely, as secondary burials, in megalithic tombs (Schultrich 2018).
- The subsistence economy remains constant. The use of domestic animals dominates over the hunting of wild animals. Naked barley and emmer are the main crops.

Discontinuity

- In design and intensity, the ornamentation of the ceramics contrasts strongly with the vessels of the MN I–IV and early SGC societies.
- No specific ceramics were created for ritual activities, unlike in MN I–IV. In SGC societies, the S-shaped beaker is dominant in burials, but it is also present in domestic sites.
- In many cases, the domestic sites were founded where there were no direct settlement activities during MN I–IV.

In summary, we observe, on the one hand, a continuity in subsistence farming and the use of tools, and, on the other hand, a discontinuity in the area of pottery, burials and the location of domestic sites.

The appearance of Store Valby pottery around 3000 BCE followed a period that, from 3600 BCE onward, had been characterised by a process of monumentalisation and simultaneous opening up of the landscape, and that, by 3200 BCE, saw demographic changes that, by between 3100 and 3000 BCE, resulted in regional agglomerations, for example in eastern Holstein. Overall, during this period ceramics play an increasingly secondary role as a supra-regional signalling system, whereas from 3100 BCE onward, weapons gain in importance (Müller 2011). Expression of identity through jewellery, such as amber, is, in contrast, practically irrelevant (Ebbesen 1995; Woltermann 2012). A progressing land clearance can be observed in increasing *Plantago lanceolata* values and a continuing open landscape on the southern Cimbrian peninsula (Feeser et al. 2012). From 3100 to 2900 BCE, a process of increasing fragmentation in the southern area of the Northern Funnel Beaker Group took place – a phase of dissolution, social disintegration and imbalance, a phase which at the same time continued the centuries-old TRB symbolism (Brozio in press).

The Store Valby phenomenon, of the period 3000–2750 (2600) cal BCE, therefore is part of the mosaic of socio-cultural changes in the Cimbrian peninsula and southern Scandinavia. In this period, we observe the decline of the TRB societies and associated forms of social organisation, which were based on the concept of monumentality (Brozio et al. 2019b; Müller 2019). We see not only an intentional, symbolic rejection of these social forms of organization by the Store Valby phenomenon, but also the rise of a new phenomenon. Starting in 3100 BCE, the Globular Amphora phenomenon, with its own coarse ware, axe and adze types, as well as cattle burials, spreads from southeast to northern Jutland (Johannsen/Laursen 2010; Woi-

dich 2014). At the same time, the phenomenon of the SGC develops, spatially in different intensities, with its own forms of social organization and its own symbols, such as emphases on a second monumental boom or perhaps on the role of warriors (Brozio 2019a; Hübner 2005; Schultrich 2018).

Although it is critical to deduce profound cultural changes from individual characteristics (Burmeister 2014), it must be noted that with Store Valby we encompass a phenomenon that explicitly distinguishes itself from the TRB north III/V groups through a new signalling system in the ceramics and through the founding of new domestic sites. We observe a process of separation that we connect with a transformation process in which new group formations took place, whose effort was directed at building up a new, visible identity (Zeeb-Lanz 2006, 90).

Consequently, we argue that the local Middle Neolithic V, known as Store Valby, between 3000 and 2750 (or in some places 2600) BCE, can no longer be associated with the phenomenon of the northern TRB group, but is to be understood, instead, as a phenomenon of its own, within the transformation process that took place in the western Baltic region at the beginning of the 3rd millennium BCE.

Future questions

Our focus on the changes during the transformation phase from the Middle Neolithic to the Younger Neolithic initially directed us to the southern Cimbrian peninsula. Beyond this regional development, we recognise three different supra-regional trends or reactions to changes, the causes of which cannot yet be clearly identified (cf. Fig. 24). First, in the west and south, there are areas with small settlements, comparable to Brodersby-Schönhagen, but with partly different cultural influences, e. g. the western Globular Amphora phenomenon. Second, in a small area of the complex western Baltic island and coastal landscape, there are large settlements whose exact character has yet to be investigated. Are these significant population agglomerations that would have been extremely unusual in chronological terms (cf. Fig. 23)? Or are these sites related to other activities that were spread out over several hectares? Third, partly separated farther east, there are small regions with palisades enclosures, which may represent yet another kind of communication structure.

References

Arnold 1982: V. Arnold, Ein aus Schlagabfällen rekonstruierbarer Flintdolch vom Tegelbarg, Gemeinde Quern, Kreis Schleswig-Flensburg. Offa 38, 1981, 153–160.

Becker 1954: C.J. Becker, Die mittel-neolithischen Kulturen in Skandinavien. Acta Archaeologica Ludensia 25, 1954, 49–150.

Becker 1974: C.J. Becker, Studien zu den neolithischen Flintbeilen. Methodische Probleme – Neue Formen und Varianten der dicknackigen Beile innerhalb der Trichterbecherkultur – Chronologische Probleme. Acta Archaeologica Ludensia 44, 1973, 125–186.

Becker/Benecke 2002: D. Becker/ N. Benecke (eds.), Die neolithische Inselsiedlung am Löddigsee bei Parchim: Archäologische und archäozoologische Untersuchungen. Beiträge zur Ur- und Frühgeschichte Mecklenburg-Vorpommerns 40 (Lübstorf 2002)

Beier 1988: H.J. Beier, Die Kugelamphoren-Kultur im Mittelelbe-Saale-Gebiet und in der Altmark (Berlin 1988).

Benecke 1994: N. Benecke, Archäozoologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südskandinavien von den Anfängen bis zum ausgehenden Mittelalter (Berlin 1994).

Breske 2017: B.J. Breske, Untersuchungen zu neolithischen Beilen in Schleswig-Holstein. (Unpublished MA thesis, Kiel).

Brozio 2016: J.P. Brozio, Megalithanlagen und Siedlungsmuster im trichterbecherzeitlichen Ostholstein. Frühe Monumentalität und soziale Differenzierung 9 (Bonn 2016).

Brozio 2019 a: J.P. Brozio, Zur absoluten Chronologie der Einzelgrabkultur in Norddeutschland und Nordjütland. Germania 96, 2018, 45–92.

Brozio 2019 b: J.P. Brozio, Megalithic and settlement patterns of Funnel Beaker times in Eastern Holstein, Germany. In: J. Müller/ M. Hinz/ M. Wunderlich (eds.), Megaliths – Societies – Landscapes. Early monumentality and social differentiation in Neolithic Europe. Frühe Monumentalität und soziale Differenzierung 18 (Bonn 2019) 487–506.

Brozio et al. 2019 a: J.P. Brozio/ D. Filipovic/ U. Schmölcke/ W. Kirleis/ J. Müller, Mittel- bis jungneolithische Siedlungshinterlassenschaften zwischen 3300–2600 v. Chr. – Der Fundplatz Oldenburg LA 232 im Oldenburger Graben, Ostholstein. Praehistorische Zeitschrift 93/2, 185–224.

Brozio et al. accepted: J.P. Brozio/ J. Hellmann/ D. Filipovic/ U. Schmölcke/ W. Kirleis/ J. Müller, Der Wohnplatz 15 (Labenz LA 11): Ein Fundplatz aus dem 3. vorchristlichen Jahrtausend im Duvenseer Moor. Offa 73, accepted.

Brozio et al. 2019 b: J.P. Brozio/ J. Müller/ M. Furholt/ W. Kirleis/ S. Dreibrodt/ I. Feeser/ W. Dörfler/ M. Weinelt/ H. Raese/ A. Bock, Monuments and economies – What drove their variability in the Middle Holocene Neolithic? The Holocene 29, 2019, 1–14. doi: 10.1177%2F0959683619857227.

Brozio in press: J.P. Brozio, From hierarchies in balance to social imbalance – transformation processes in the later Funnel Beaker north societies in the western Baltic Sea region (3100–2900 BCE). In: A. B. Gebauer/ L. Sørensen/ A. Teather/ R. de Valera (eds.), Monumentalizing life in Europe. Narratives of change and continuity (Oxford in press).

Buchvaldek/Strahm 1992: M. Buchvaldek/ C. Strahm, Schlußbetrachtung. Die kontinentaleuropäischen Gruppen der Kultur mit Schnurkeramik. In: M. Buchvaldek/ C.vStrahm (eds.), Die kontinentaleuropäischen Gruppen der Kultur mit Schnurkeramik. Praehistorica 19, 1992, 349–356.

Burbaum 2006: B. Burbaum, Die Böden Schleswig-Holsteins: Entstehung, Verbreitung, Nutzung, Eigenschaften und Gefährdung (Flintbek 2006).

Burmeister 2014: S. Burmeister, Kulturwandel. In: D. Mölders/ S. Wolfram (eds.), Schlüsselbegriffe der prähistorischen Archäologie. Tübinger Archäologische Taschenbücher 11 (Münster 2014) 151–160.

Clausen 1985: I. Clausen, Neolithische Fundplätze am Großen Plöner See. Offa 42, 1985, 113–186.

Cubizolle et al.2013: H. Cubizolle/ J.-N.vHaas/ W. Bielowski/ B. Dietre/ J. Argant/ C. Latour-Argant/ C. Chatelard/ S. Porteret/ J.-P. Lefèvre, Palaeopaludification, environmental change and human impact during the Mid and Late Holocene in Western Europe: the example of the La Prenarde-Pifoy mire in the French Massif Central. Quaternaire 24, 2013, 419–442.

Davidsen 1972: K. Davidsen, Valbykeramik und Kugelamphorenkultur. Zur Verbreitung zweier mittelneolitischer Keramikgruppen in Schleswig-Holstein und den Nachbargebieten. Offa 29, 1972, 133–137.

Davidsen 1978: K. Davidsen, The final TRB Culture in Denmark: A settlement study. Arkæologiske Studier 5 (København 1978).

Dibber 2016: H. Dibbern, Das trichterbecherzeitliche Westholstein. Eine Studie zur neolithischen Entwicklung von Landschaft und Gesellschaft. Frühe Monumentalität und soziale Differenzierung 8 (Bonn 2016).

Dörfler/Müller 2008: W. Dörfler/ J. Müller (eds.), Umwelt – Wirtschaft – Siedlungen im dritten vorchristlichen Jahrtausend Mitteleuropas und Südskandinaviens: Internationale Tagung Kiel 4.–6. November 2005 (Neumünster 2008).

Ebbesen 1975: K. Ebbesen, Die jüngere Trichterbecherkultur auf den dänischen Inseln (København 1975).

Ebbesen 1995: K. Ebbesen, Die nordischen Bernsteinhorte der Trichterbecherkultur. Praehistorische Zeitschrift 70, 1995, 32–89.

Ebbesen 2006: K. Ebbesen, The Battle Axe period. Stridøksetid (København 2006).

Ebbesen 2008: K. Ebbesen, Danmarks megalitgrave 2 (København 2008).

Ebbesen 2011: K. Ebbesen, Danmarks megalitgrave 1 (København 2011).

Feeser et al. 2012: I. Feeser/ W. Dörfler/ F-R. Averdieck/ J. Wiethold, New insight into regional and local land-use and vegetation patterns in eastern

Schleswig-Holstein during the Neolithic. In: M. Hinz/J. Müller (eds.), Siedlung, Grabenwerk, Großsteingrab: Studien zu Gesellschaft, Wirtschaft und Umwelt der Trichterbechergruppen im nördlichen Mitteleuropa 2 (Bonn 2012) 159–190.

Hage 2016: F. Hage, Büdelsdorf/Borgstedt: Eine trichterbecherzeitliche Kleinregion. Frühe Monumentalität und soziale Differenzierung 11 (Bonn 2016).

Harrisson/Heyd 2007: R. Harrisson/ V. Heyd, The transformation of Europe in the third millennium BC: The examples of 'Le Petit-Chasseur I + III' (Sion, Valais, Switzerland). Praehistorische Zeitschrift 82/2, 2007, 129–214.

Hartz 1999: S. Hartz, Die Steinartefakte des endmesolithischen Fundplatzes Grube-Rosenhof: Studien an Flintinventaren aus der Zeit der Neolithisierung in Schleswig-Holstein und Südskandinavien (Neumünster 1999).

Hartz 2005: S. Hartz, Fundgrube Oldenburger Graben. Mittelneolithische Siedlungsreste aus Wangels (LA 505) in Ostholstein. Archäologische Nachrichten aus Schleswig-Holstein 13, 2005, 37–64.

Hinz 2014: M. Hinz, Neolithische Siedlungsstrukturen im südöstlichen Schleswig-Holstein: Dynamik in Landschaft und Besiedlung. Frühe Monumentalität und soziale Differenzierung 3 (Bonn 2014).

Hoika 1987: J. Hoika, Das Mittelneolithikum zur Zeit der Trichterbecherkultur in Nordostholstein. Untersuchungen zu Archäologie und Landschaftsgeschichte (Neumünster 1987).

Hübner 2005: E. Hübner, Jungneolithische Gräber auf der Jütländischen Halbinsel. Typologische und chronologische Studien zur Einzelgrabkultur (København 2005).

Iversen 2015: R. Iversen, The transformation of Neolithic societies. Jutland Archaeological Society Publications 88 (Højbjerg 2015).

Iversen 2016: R. Iversen, Was there ever a Single Grave Culture in east Denmark? Traditions and transformations in the 3rd millennium BC. In: M. Furholt/ R. Großmann/ M. Szmyt (eds.), Transitional landscape? Human development in landscapes (Bonn 2016) 159–170.

Jakobsen 2004: O. Jakobsen, Die Grube-Wesseker Niederung (Oldenburger Graben, Ostholstein) (Unpublished PhD dissertation, Kiel).

Johannsen/Laursen 2010: N. Johannsen/ S. Laursen, Routes and wheeled transport in late 4th–early 3rd millennium funerary customs of the Jutland peninsula: Regional evidence and European context. Praehistorische Zeitschrift 85/1, 1994, 15–58.

Kirleis 2019: W. Kirleis, Atlas of Neolithic plant remains from northern central Europe (Groningen 2019).

Kirleis et al. 2012: W. Kirleis/ S. Klooß/ H. Kroll/ J. Müller, Crop growing and gathering in the northern German Neolithic: A review supplemented by new results. Vegetation History and Archaeobotany 21, 2012, 221–242.

Kirleis/Fischer 2014: W. Kirleis/ E. Fischer, Neolithic cultivation of tetraploid free threshing wheat in Denmark and northern Germany: Implications for crop diversity and societal dynamics of the Funnel Beaker Culture. Vegetation History and Archaeobotany 23, 2014, 81–96.

Klooß 2008: R. Klooß, Ein Fundplatz des Überganges vom Mittelneolithikum A zum Mittelneolithikum Wangels B aus Wangels LA 505, Kreis Ostholstein. Ein Vorbericht. In: Dörfler/Müller 2008, 127–134.

Knitter et al. 2019: D. Knitter/ J.P. Brozio/ W. Dörfler/ R. Duttmann/ I. Feeser/ W. Hamer/ W. Kirleis/ J. Müller/ O. Nakoinz, Transforming landscapes: Modeling land-use patterns of environmental borderlands. The Holocene 22/2, 2019, 1–15. doi: 10.1177/0959683619857233.

Körber-Grohne 1988: U. Körber-Grohne, Nutzpflanzen in Deutschland (Stuttgart 1988).

Kossian 2005: R. Kossian, Nichtmegalithische Grabanlagen der Trichterbecherkultur in Deutschland und den Niederlanden (Halle [Saale] 2005).

Krause-Kyora 2007: B. Krause-Kyora, Ein Trümmerhaufen: Lithische Aspekte aus der neolithischen Siedlung Hemmingstedt LA 2 (Unpublished MA thesis, Kiel).

Kristiansen 1984: K. Kristiansen, Ideology and material culture: An archaeological perspective. In: M. Spriggs (ed.), Marxist perspectives in archaeology. New directions in archaeology (Cambridge 1984) 72–100.

Kristiansen et al. 2017: K. Kristiansen/ M.E. Allentoft/ K.M. Frei/ R. Iversen/ N.N. Johannsen/ G. Kroonen/ Ł Pospieszny/ T.D. Price/ S. Rasmussen/ K.-G. Sjögren/ M. Sikora/ E. Willerslev, Re-theorising mobility and the formation

of culture and language among the Corded Ware Culture in Europe. Antiquity 91/356, 2017, 334–347.

Kroll 2001: H. Kroll, Der Mohn, die Trichterbecherkultur und das südwestliche Ostseegebiet: Zu den Pflanzenfunden aus der mittelneolithischen Fundschicht von Wangels, Kr. Ostholstein. In: R. Kelm (ed.), Zurück zur Steinzeitlandschaft. Archäobiologische und ökologische Forschung zur jungsteinzeitlichen Kulturlandschaft und ihrer Nutzung in Nordwestdeutschland. Albersdorfer Forschungen zur Archäologie und Umweltgeschichte 2 (Heide 2001) 70–76.

Labes 2002: S. Labes, Meeresspiegelschwankungen an der südwestlichen Ostseeküste während der letzten 8000 Jahre. Ein Überblick über archäologische und geologische Untersuchungsergebnisse (Unpublished diploma thesis, Kiel).

Labes 2005: S. Labes, Der nacheiszeitliche Meeresspiegelanstieg der Ostsee im Bereich der Schlei. Offa 59/60, 2002/2003, 223–227.

Langenheim 1935: K. Langenheim, Die Tonwaren der Riesensteingräber in Schleswig-Holstein (Neumünster 1935).

Larsson 1982: L. Larsson, A causewayed enclosure and a site with Valby pottery at Stävie, western Scania. Meddelanden från Lunds universitets historiska museum 1981–1982, 1982, 65–107.

Larsson 1985: L. Larsson, A settlement from the Early and Late Funnel Beaker Culture in southern Scania, Sweden. Acta Archaeologica 54, 1983, 3–44.

Lorenz 2018: L. Lorenz, Kommunikationsstrukturen mittelneolithischer Gesellschaften im nordmitteleuropäischen Tiefland (Bonn 2018).

Malmer 1962: M.P. Malmer, Jungneolithische Studien (København 1962).

McComb/Simpson 1999: A.M.G. McComb/ D. Simpson, The wild bunch: Exploitation of the hazel in prehistoric Ireland. Ulster Journal of Archaeology 58, 1999, 1–16.

Müller 2011: J. Müller, Ritual cooperation and ritual collectivity: The social structure of the middle and younger Funnel Beaker North Group (3500–2800 BC). In: M. Furholt (ed.), Megaliths and identities: Early monuments in Neolithic societies from the Atlantic to the Baltic. 3rd European Megalithic Studies Group meeting 13th–15th of May 2010 at Kiel University (Bonn 2011) 273–284.

Müller 2019: J. Müller, Boom and bust, hierarchy and balance: From landscape to social meaning – Megaliths and societies in northern central Europe. In: J. Müller/ M. Hinz/ M. Wunderlich (eds.), Megaliths – Societies – Landscapes. Early monumentality and social differentiation in Neolithic Europe. Frühe Monumentalität und soziale Differenzierung 18 (Bonn 2019) 29–74.

Müller et al. 2012: J. Müller/ J.P. Brozio/ D. Demnick/ H. Dibbern/ B. Fritsch/ M. Furholt/ F. Hage/ M. Hinz/ L. Lorenz/ D. Mischka/ C. Rinne, Periodisierung der Trichterbecher-Gesellschaften. Ein Arbeitsentwurf. In: M. Hinz/ J. Müller (eds.), Siedlung, Grabenwerk, Großsteingrab: Studien zu Gesellschaft, Wirtschaft und Umwelt der Trichterbechergruppen im nördlichen Mitteleuropa 2 (Bonn 2012) 29–34.

Müller et al. in press: J. Müller/ J.P. Brozio/ W. Dörfler/ W. Kirleis, Narratives of third millennium transformations: New biographies of Neolithic societies, landscapes and monuments. In: A.B. Gebauer/ L. Sørensen/ A. Teather/ R. de Valera (eds.), Monumentalizing life in Europe. Narratives of change and continuity (Oxford in press).

Niedermeyer et al. 2011: R.-O. Niedermeyer/ R. Lampe/ W. Janke/ K. Schwarzer/ K. Duphorn/ H. Kliewe/ F. Werner, Die deutsche Ostseeküste (Stuttgart 2011).

Nielsen 1977: P.O. Nielsen, Die Flintbeile der frühen Trichterbecherkultur in Dänemark. Acta Archaeologica Ludensia 48, 1977, 61–139.

Nielsen 1979: P.O. Nielsen, De tyknakkede flintøkser kronologi. Aarbøger 1977, 5–71.

Nielsen 1997: P.O. Nielsen, Keeping Battle-Axe People away from the Door. Neolithic House-Sites at Limensgårf and Grødbgår, Bornholm. In: D. Król (ed.), The built environment of coast areas during the Stone Age. A symposium at the centenary of archaeological excavations at Rzucewo, Rzucewo-Gdańsk, 4–9 october 1994 (Gdańsk 1997).

Nielsen/Nielsen 1985: F.O. Nielsen/ P.O. Nielsen, Middle and Late Neolithic Houses at Limensgård, Bornholm: A preliminary report. Journal of Danish Archaeology 4, 1985, 101–114.

Nielsen/Nielsen 1986: F.O. Nielsen/ P.O. Nielsen, En boplads med hustomter fra mellem- og senneolitikum ved Limensgård, Bornholm. In: C. Adamsen/ K. Ebbesen (eds.), Stridsøksetid i Sydskandinavien: Beretning fra et symposium 28.–30.10.1985 i Vejle (København 1986) 175–193.

Nielsen/Nielsen 1991: F.O. Nielsen/ P.O. Nielsen, En boplads med hustomter fra mellem- og senneolitikum ved Limensgård, Bornholm. In: K. Jennbert/ M. Strömberg (eds.), Regions and reflections: In honour of Märta Strömberg (Lund 1991) 175–193.

Saev 2015: I. Saev, Gefäßkeramik: Funktion, Form, Habitus (Bonn 2015).

Schaller/Kirleis 2018: L. Schaller/ W. Kirleis, Die subfossil-feuchten Großreste aus dem spätneolithischen Fundplatz Quern-Neukirchen LA 28 (Tegelbarg), Kreis Schleswig-Flensburg. Offa 71/72, 2014/2015, 221–228.

Schmölcke 2001: U. Schmölcke, Wangels MN V – erste Auswertung der Tierknochenfunde von einem ungewöhnlichen Fundplatz der Trichterbecherkultur in Ostholstein. Beiträge zur Archäozoologie und Prähistorischen Anthropologie 3, 2001, 44–49.

Schuldt 1972: E. Schuldt, Steinzeitliche Keramik aus Mecklenburg (Schwerin 1972).

Schultrich 2018: S. Schultrich, Das Jungneolithikum in Schleswig-Holstein. Scales of Transformation 1 (Leiden 2018).

Skaarup 1985: J. Skaarup (ed.), Yngre stenalder på erne syd for Fyn (Rudkøbing 1985).

Sørensen 1998: H.H. Sørensen, Spodsbjerg: En yngre stenalders boplads på Langeland = A younger Stone Age settlement on Langeland. Meddelelser fra Langelands Museum (Rudkøbing 1998).

Sørensen 2012: H.H. Sørensen, Emergence of the Single Grave Culture. Journal of Danish Archaeology 11/1, 2012, 150–157.

Steffens 2005: J. Steffens, Die Bedeutung der Jagd in der Trichterbecherkultur. Journal of Neolithic Archaeology 7, 2005, 1–12.

Steffens 2009: J. Steffens, Die neolithischen Fundplätze von Rastorf, Kreis Plön. Eine Fallstudie zur Trichterbecherkultur im nördlichen Mitteleuropa am Beispiel eines Siedlungsraumes (Bonn 2009).

Vemming/Madsen 1983: P. Vemming/ B. Madsen, Flint axe manufacture in the Neolithic. An experimental Investigation of a flint axe manufacture site at Hastrup Vænget, east Zealand. Journal of Danish Archaeology 2, 1983, 43–59.

Warren 2006: P. Warren, 101 Uses for stinging nettles (Totness 2006).

Woidich 2014: M. Woidich, Die Westliche Kugelamphorenkultur: Untersuchungen zu ihrer raum-zeitlichen Differenzierung kulturellen und anthropologischen Identität. Topoi 24 (Berlin 2014).

Woltermann 2012: G. Woltermann, Die prähistorischen Bernsteinartefakte aus Deutschland vom Paläolithikum bis zur Bronzezeit. Universitätsforschungen zur prähistorischen Archäologie 290 (Bonn 2016).

Zeeb-Lanz 2006: A. Zeeb-Lanz, Überlegungen zu Sozialaspekten keramischer Gruppen: Beispiele aus dem Neolithikum Südwestdeutschlands. In: S. Burmeister/ N. Müller-Scheeßel (eds.), Soziale Gruppen – kulturelle Grenzen: Die Interpretation sozialer Identitäten in der prähistorischen Archäologie. Tübinger Archäologische Taschenbücher 5 (Münster 2006) 81–102.

Imprint

ISSN 2197–649X

Layout draft: Holger Dieterich, Ines Reese
Technical edition: Agnes Heitmann
Language revision: Suzanne Needs