Hunters and farmers in the North – the transformation of pottery traditions and distribution patterns of key artefacts during the Mesolithic and Neolithic transition in southern Scandinavia

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Abstract

There are two distinct ceramic traditions in the Mesolithic (pointed based vessels) and Neolithic (flat based vessels) of southern Scandinavia. Comparisons between the two ceramic traditions document differences in manufacturing techniques, cooking traditions and usage in rituals. The pointed based vessels belong to a hunter-gatherer pottery tradition, which arrived in the Ertebølle culture around 4800 calBC and disappears around 4000 calBC. The flat based vessels are known as Funnel Beakers and belong to the Tragtbæger (TRB) culture, appearing around 4000 calBC together with a new material culture, depositional practices and agrarian subsistence. Pioneering farmers brought these new trends through a leap-frog migration associated with the Michelsberg culture in Central Europe. These arriving farmers interacted with the indigenous population in southern Scandinavia, resulting in a swift transition. Regional boundaries observed in material culture disappeared at the end of the Ertebølle, followed by uniformity during the earliest stages of the Early Neolithic. The same boundaries reappeared again during the later stages of the Early Neolithic, thus supporting the indigenous population's important role in the neolithisation process.

Zusammenfassung

Keywords: Southern Scandinavia, Neolithisation, Late Ertebølle Culture, Early Neolithic, pottery traditions, material culture, distribution patterns

Schlagwörter: Südskandinavien, Neolithisierung, Späte Ertebølle-Kultur, Frühneolithikum, Keramiktraditionen, materielle Kultur, Verbreitungsmuster

Introduction

The abrupt disappearance of the pointed-based vessels during the Late Ertebølle Culture and the emergence of the flat-based vessels during the Funnel Beaker Culture have always played a cardinal role in the discussion of how, why and when the shift from hunter-gatherers to farmers began in southern Scandinavia (Fischer/Kristiansen 2002). The aim of this contribution is to scrutinize the technological similarities and differences between the pointed-based and flat-based ceramics and to investigate the distribution of ceramic material and other key artefacts in order to discuss trends of continuity and changes during the late 5th and early 4th millennium calBC. It is hereby possible to gain a more nuanced understanding of the transitional processes towards an agrarian society on both a regional and a northern European scale.

Main hypothesis

Researchers have argued that the coarse Ertebølle ceramics evolved into the finer Funnel Beaker ceramics based on independent innovation, which occurred without any larger interference from outsiders, thus supporting a gradual adaptation of agriculture between the late 5th and early 4th millennium calBC (Troels-Smith 1954; Jennbert 1984; Koch 1998; Persson 1999; Fischer 2002; Andersen 2008a; 2008b; Craig et al. 2011). In this model the funnel beaker of type 0 could exemplify a transitional pottery between the Ertebølle Culture and Funnel Beaker Culture (Koch 1998). Other scholars have claimed that Funnel Beaker vessels emerged as a consequence of a small-scale leap-frog migration of farmers from Central Europe, thus supporting a cultural change towards an agrarian society from 4000 calBC onwards (Becker 1947; Schwabedissen 1968; 1972; Rowley-Conwy 2011). This hypothesis argues that these pioneering farmers were the prime movers of agrarian ideas. They brought with them a new set of pottery with different sizes and shapes used for new functional purposes, which was quickly adapted as a new trait by the indigenous population. The transition towards an agrarian society could therefore occur at different speed in various regions, thus supporting the possibility of cultural dualism in certain areas, where a gradual integration and assimilation occurred between hunter-gatherers and pioneering farmers (Sørensen/Karg 2012).

It has also been argued that these migrations are not random expansions, but part of a large-scale advance of agrarian societies around 4000 calBC originating in the area of the Michelsberg Culture. The introduction of agriculture and a new agrarian ideology happened at the same time in both Britain and South Scandinavia, thus arguing for clear technological and functional break between the Ertebølle and Funnel Beaker ceramics (Klassen 2004; in press; Klassen et al. 2012). In this model the funnel beakers are originating from Central European agrarian societies, whereas the pointed-based pottery in the Ertebølle Culture is interpreted as having an eastern origin associated with well-established hunter-gatherer societies in the eastern Baltic, Finland and on the Russian plain during the 7th to the 5th millennium calBC (Hallgren 2008; Hartz 2008; Müller 2008; Gronenborn 2009).

The proposed models often focus on the neolithisation process from either a regional or large-scale perspective, thus resulting in an increased or limited focus on the indigenous population or the incoming farmers. Trends of continuity have in many cases been associated with the archaeological material from coastal or lake shore sites, whereas signs of change have been related to inland sites located on easy-workable arable soils (Sørensen/Karg 2012). It is however important to acknowledge that early agrarian societies supplemented their subsistence with hunting, fishing and gathering. Signs of continuity will therefore always be present in the choices of subsistence even in well-established agrarian societies (Skaarup 1973; Koch 2003; Marciniak 2005; Sheridan 2010; Hachem 2011; Hartz/Schmölcke 2013).

At the same time, the ideology changes with the arrival of agrarian societies, as farmers have a different perception of nature and negotiation with nature, thus resulting

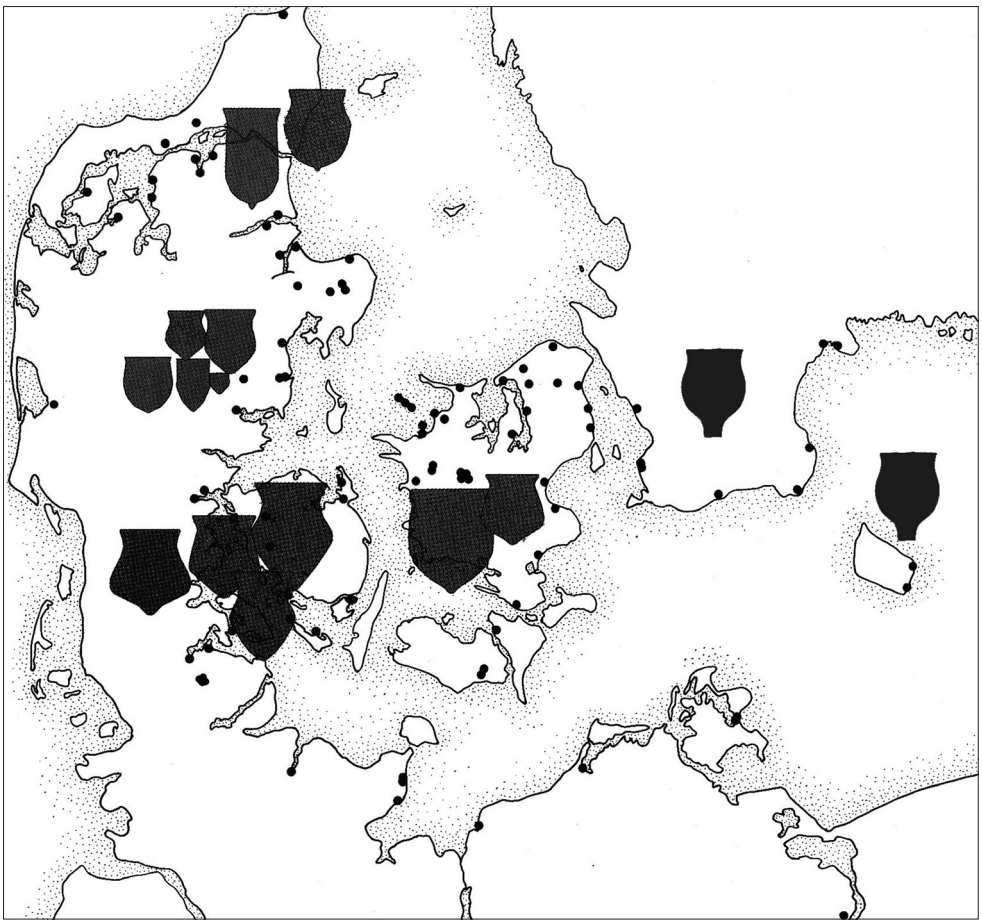


Fig. 1. Distribution of pointed based Ertebølle vessels and their regional variation (after Jennbert 1984; Nielsen 1994b; Petersen 2001; Andersen 2008c).

in a different symbolic behavior and rituals. The ideological aspects could have been the most important faculties in connection with the expansion of agrarian societies. It is therefore important to investigate the symbolic aspects of key artefacts together with their chronology, technology and distribution patterns from the Late Ertebølle Culture and Funnel Beaker Culture in order to gain a more nuanced understanding of this transitional process.

Chronology and typology of ceramic assemblages

The hunter-gatherers of the Late Ertebølle Culture began to produce pointed-based vessels and flat-based blubber lamps approximately between 4800 calBC and 4600 calBC (Mathiassen 1935; Andersen 2008c; Brinch Petersen 2008b; Hartz 2008) (Fig. 1–2). The distribution of Ertebølle ceramics concentrates in southern Scandinavia, northern Germany and Poland. The proposed origin of the pointed-based Ertebølle pottery has shifted from western European "subneolithic groups" to hunter-gatherer groups on the Russian plains (Hulthén 1977; Van Berg 1990; Louwe Kooijmans 1998; Timofeev 1998; Raemaekers 1999; Gronenborn 2009). A connection between the Ertebølle and Swifterbant pottery should however not be totally dismissed, because we have limited knowledge of Late Mesolithic pottery finds from Lower Saxony and the northern parts of the Netherlands (Deichmüller 1969; Schindler 1962; De Roever 2004; Hartz 2008). Around 4000 calBC the characteristic pointed-based pottery disappeared together with the characteristic lamps (Fischer 2002; Meurers-Balke 1983). Continued use of the lamps in the Early Neolithic was formerly only supported by data from sites like Siggeneben-Süd and Åkonge, where it is difficult to separate the stratigraphic layers from the Late Ertebølle and Funnel Beaker Culture. However, a lamp from the Polish site Dąbki 9 was decorated with nail impressions, similar

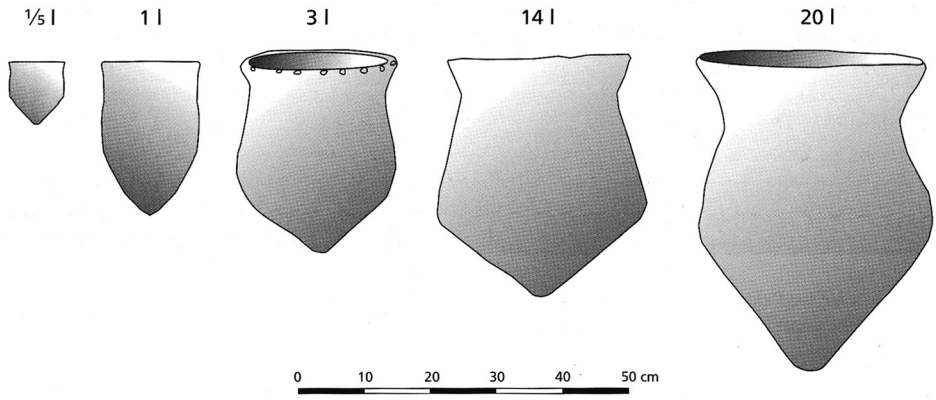


Fig. 2. Various sizes of pointed based Ertebølle vessels (after Andersen *2008c).*

to the ornamentation found on early Funnel Beaker vessels, thus arguing for a continuation of the lamps into the earliest part of the Funnel Beaker culture (Czekaj-Zastawny et al. 2011, 61).

Funnel beakers emerge in southern Scandinavia around 4000 calBC together with flasks, bowls, discs and spoons (Fig. 3). The distribution of the funnel beakers covers most of South Scandinavia including parts of Central Sweden (Hallgren 2008). Traditionally, the earliest types of funnel beakers in southern Scandinavia have been associated with various typological groups, primarily based on the study of rim ornaments and the shape of the vessels (Becker 1947; Nielsen 1984; 1994b; Madsen/Petersen 1984). The earliest groups were associated with either the A-group or the Oxie/Wangels group belonging to the earliest phase of the Early Neolithic dated approximately to 4000–3800 calBC (Becker 1947; Nielsen 1984; 1994b; Larsson 1984; Müller 2008; Hartz 2008). These beakers were characterized by having a short neck and simple rim ornamentations of either nail or stamp impressions. This phase was followed by a B-group and the non megalithic C-group in Becker's typology, which belongs to the later stages of the Early Neolithic dated to approximately 3800–3500 calBC (Fig. 4).

The beakers from the B-group were subdivided into several regional groups based on minor differences in the ornamentation and its placement on the vessels. Volling beakers are concentrated in Jutland, whereas Svaleklint beakers concentrate on Zealand. The difference between them can be observed in the rim ornamentation, which is dominated by stick-stabs and stab-and-drag ornaments on Svaleklint vessels, whereas the Volling vessels are dominated by two-ply cord (Koch 1998, 45). In Scania and Blekinge the beakers are ornamented in Svenstorp/Mossby/Siretorp styles. These styles are as yet vaguely defined and are difficult to separate from one another, as they are all dominated by two-ply cord impressions. The Vrå style concentrates in eastern central Sweden and is characterized by twisted cord impressions, cord stamps, toothed stamps and pit impressions (Bagge/Kjellmark 1939; Larsson 1984; 1992; Hallgren 2008). Other, still unnamed beaker groups with twisted cord impressions and stamps, possibly influenced by Vrå beaker style, have been observed in western parts of Sweden and in southern and southwestern parts of Norway (Hallgren 2008) (Fig. 20). The beakers from southern Norway are characterized by a wall-thickness over 1 cm and tempering inclusions of up to 1 cm in size (Skjølsvold 1977, 336; Nærøy 1987, 118; Olsen 1992; Åstveit 1999; Hallgren 2008; Åhrberg 2011). A rare find of short-necked funnel beakers, found in a shallow pit at Dønski near Oslo, shows similarities with beakers from the B-group in southern Scandinavia. The funnel beakers from Dønski were less than 1 cm thick and contained temper less than 5 mm in size (Demuth/Simonsen 2010). The typological classification as funnel beakers was supported by a radiocarbon date of a piece of charcoal from the pit at Dønski from 3761 to 3521 calBC (T-19326: 4850 ± 50 BP). Beakers from Schleswig-Holstein and on Langeland are associated with the Siggeneben-Süd/Sattrup/Stengade II group, which contains typical vessels belonging to the A and B group (Meurers-Balke/Weninger 1994, 261p).

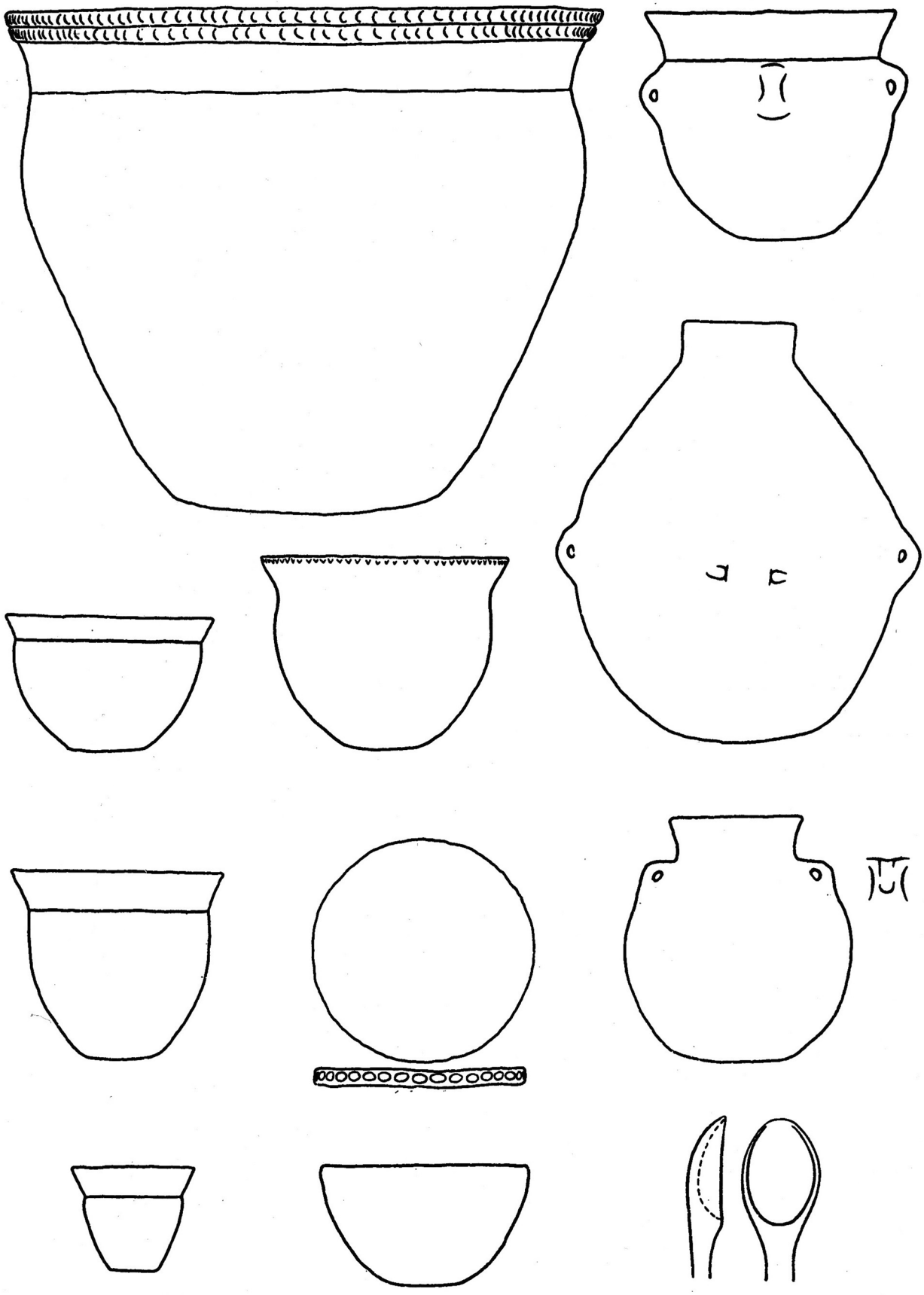


Fig. 3. Funnel beaker vessels, discs and spoons belonging to the A-group (after Nielsen *1994b). Scale 1:4.*

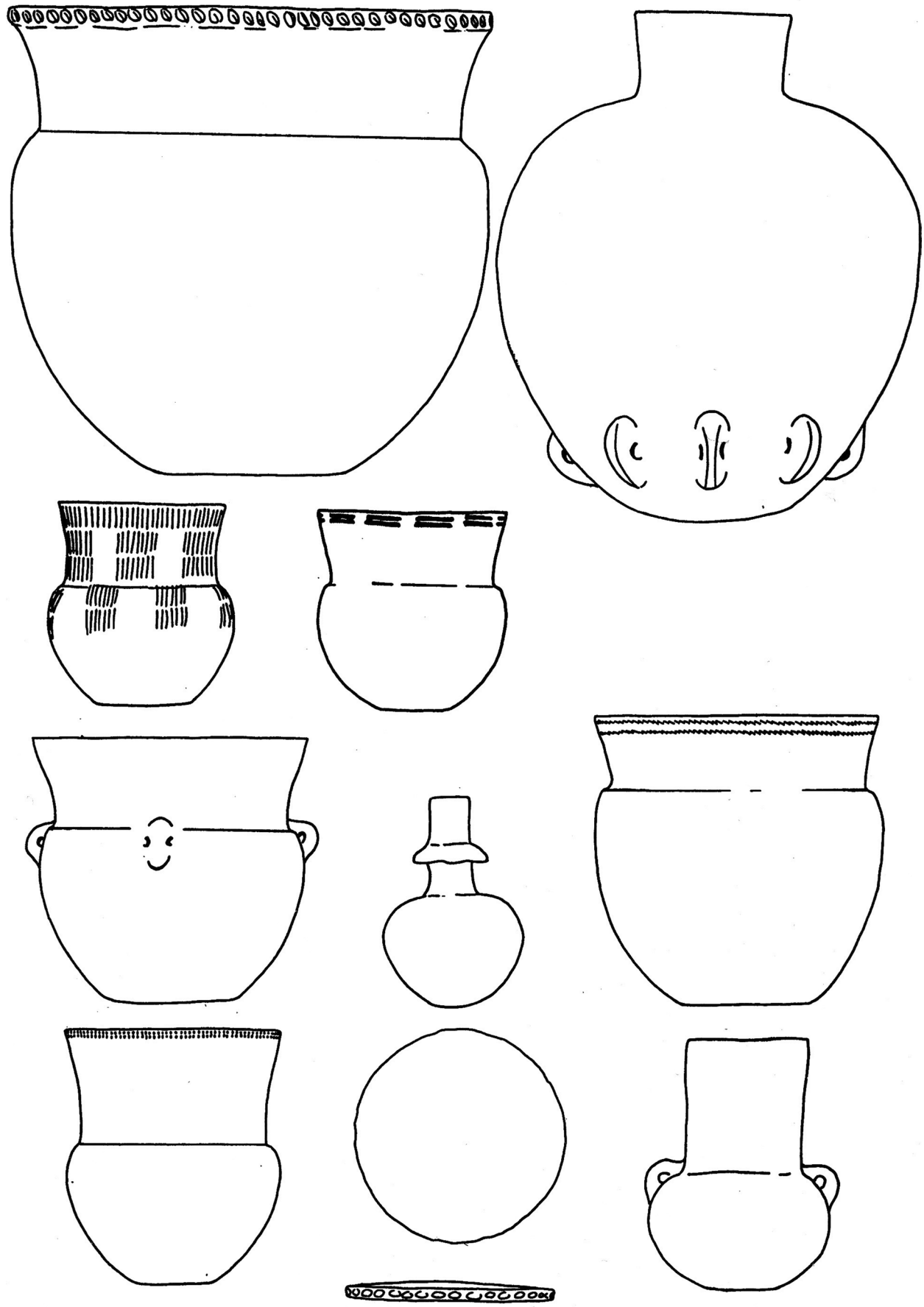


Fig. 4. Funnel beaker assemblage belonging to the B-group (after Nielsen *1994b). Scale 1:4.*

The B-group is followed by the C-group, which has been dated to approximately 3500–3300 calBC and can be regarded as a transitional style pointing towards the Middle Neolithic (Nielsen 1993; Koch 1998). The C-group is characterized by vertical stripes on the belly of the vessels and rim ornaments like whipped cord patterns combined with different types of impressions. The C-group has also been sub-divided into several groups, based on minor differences in the ornaments. The Bellevuegård group is observed in Scania, the Virum group is concentrated in the eastern part of Denmark and the Fuchsberg group in the western part (Ebbesen/ Mahler 1980; Andersen/Madsen 1978, 142, Larsson 1984; Madsen/Petersen 1984).

Generally there are many spatial overlaps between the Early Neolithic groups based on ornamental trends, which is why other scholars have distinguished the funnel beakers into certain types through standardized measurements of vessel-profiles (Salomonsson 1970). Especially the height of the neck of the vessels was of typological importance (Koch 1998). Short necked beakers (type 0-I) belonged to the A-group. Funnel beakers having a medium neck height (type II and III) could be associated with the B-group, whereas the C-group was related to beakers having longer necks (type IV and V.1) (Koch 1998, 81pp). The proposed typology by Koch was more or less confirmed by radiocarbon dates on the food crusts of different types of vessels, although some dates had to be discarded (Fischer 2002). These dates did not take into account the value of reservoir effect, which could result in radiocarbon dates being several hundred years older depending on local variations (Bowman 1990). The relation between radiocarbon dates and overlaps between ceramic groups from the Early Neolithic can also lead to misinterpretations.

Is the Volling group earlier than the Oxie group?

Recently the Volling group has been re-interpreted as being synchronic or even earlier than the Oxie group (Müller 2008). This interpretation was based on radiocarbon dates of charcoal from features belonging to barrows, clustering to 4000–3800 calBC (Tab. 1). Several of these long barrows contained Volling ceramics as grave goods. If this interpretation is correct, then long barrows came to southern Scandinavia around 4000 calBC together with the first farmers. Volling beakers do have parallels in the Chasséen culture from around 4500 calBC and within the Michelsberg ceramic assemblages since 4200 calBC, thus indicating that these types of vessels could appear in southern Scandinavia from the earliest stage of the Early Neolithic (Müller 2008). However, there are many problems in placing the Volling group before the Oxie group. Firstly, all discussed radiocarbon dates from the long barrows are conventional dates, thus giving a lower time resolution. Secondly, many of these radiocarbon dates may have originated from previous occupations during the Early Neolithic, which have been observed below several of the barrows in question (Madsen 1975; Skaarup 1975; Madsen/ Petersen 1984; Liversage 1981; 1992; Larsson 2002; Rudebeck 2002; Beck 2009). This would suggest that the dates are not to be interpreted as dates for the Volling group at all. Thirdly, the dated charcoal may have originated from large oak trees, which could be 200 to 300 years old, thus giving earlier radiocarbon dates. Fourthly, stratigraphic observations from the Norsminde kitchenmidden have confirmed that Volling ceramics are found in layers above the Oxie ceramics (Andersen 1993, 91). Finally, several new AMS radiocarbon dates of charcoal from pits or cultural layers containing Volling ceramics concentrates between 3800 and 3600 calBC (Skousen 2008; Ravn 2008). All these arguments points towards an introduction of the Volling ceramics and the long barrows around 3800 calBC, which could be part of a secondary impulse from central European agrarian societies.

Radiocarbon dates and ceramics from the Early Neolithic

A recent survey of published radiocarbon dates of either food crusts on funnel beakers or contexts containing Early

Long barrow	Type	Context	Material	Lab.nr.	BP	±	cal BC	References
Barkær	Volling	Cultural layer below a long barrow	Oyster shells	K-2634	5270	75	4321-3961	Liversage 1992, 102ff
Barkær	Volling	Cultural layer below a long barrow	Oyster shells	K-2633	5100	75	4042-3711	Liversage 1992, 102ff
Barkær	Volling	Cultural layer below a long barrow	Clam shells	K-2635	5090	100	4224-3653	Liversage 1992, 102ff
Barkær	Volling	Cultural layer below a long barrow	Clam shells	K-2636	5010	100	4037-3637	Liversage 1992, 102ff
Bjørnsholm	Volling	From lower layer of the long barrow	Charcoal	AAR-802	5050	160	4256-3522	Andersen/Johansen 1992, 38ff
Bjørnsholm	Volling	From lower layer of the long barrow	Charcoal	AAR-968	4975	105	3985-3530	Andersen/Johansen 1992, 38ff
Mosegården II	Volling	From postholes in the ditch	Charcoal	K-3463	5080	90	4046-3660	Madsen/Petersen 1984, 61ff
Rustrup I	Volling	Postholes in ditch A	Charcoal	K-2254	4970	100	3975-3534	Fischer 1975, 29ff
Rustrup I	Volling	From different places in the long barrow	Charcoal	K-2355	4920	100	3959-3519	Fischer 1975, 29ff
Rustrup I	Volling	Postholes in ditch A	Charcoal	K-2253	4910	100	3957-3385	Fischer 1975, 29ff
Mosegården II	Volling	From the northen ditch	Charcoal	K-3464	4890	90	3943-3384	Madsen/Petersen 1984, 61ff
Storgård IV, phase 1	Volling	From the ditch	Charcoal	Ua-441	4825	140	3963-3139	Kristensen 1991, 72ff
Storgård IV, phase 1	Volling	From the ditch	Charcoal	Ua-443	4790	145	3951-3113	Kristensen 1991, 72ff
Storgård IV, phase 1	Volling	From grave G	Charcoal	Ua-442	4710	115	3709-3101	Kristensen 1991, 72ff
Rokær	Volling	From the grave	Charcoal	K-7126	4740	34	3637-3378	Kristensen 2000, 44f
Thorshøj	Volling	Pit next to the grave	Charcoal	K-6672	4720	70	3638-3370	Nilsson 1996, 16ff
Thorshøj	Volling	Ditch	Charcoal	K-6671	4710	70	3637-3367	Nilsson 1996, 16ff
Thorshøj	Volling	From lower layer of the grave	Charcoal	K-6673	4590	75	3627-3034	Nilsson 1996, 16ff
Lindebjerg phase 1	Svaleklint	Ditch	Charcoal	K-1659	5010	100	4037-3637	Liversage 1981, 85ff
Kristineberg, södra	Svenstorp	Facade ditch A163A in long barow 2	Charcoal	LuA-4541	5040	100	4040-3643	Rudebeck 2002, 77ff
Kristineberg, södra	Svenstorp	Filling of the grave A162 in long barrow 1	Charcoal	LuA-4304	5010	110	4044-3537	Rudebeck 2002, 77ff
Kristineberg, södra	Svenstorp	Filling of the grave A157	Charcoal	LuA-4303	4860	110	3942-3373	Rudebeck 2002, 77ff
Jättegraven	Svenstorp	Lower layers of the long barrow	Charcoal	Ua-2788	5220	70	4242-3811	Larsson 2002, 35ff

Tab. 1. Radiocarbon dates from different long barrows in South Scandinavia containing Volling, Svaleklint and Svenstorp vessels.

Neolithic beakers from all over southern Scandinavia has been compiled (Fig. 5, Tab. 2). The dates for short-necked beakers of type 0 cluster to 4000–3800 calBC, whereas the dates for type I concentrate in the period 4000–3600 calBC. The following type II and III were dated 3800–3500 calBC. The results indicated an overlap between the A-group/Oxie style/type 0–I and the B-group/Volling/Svaleklint/Svenstorp styles/type II–III. Perhaps funnel beakers of type I, such as the one found in the male Dragsholm grave, was in use for a longer period of time compared to type 0. However, a careful review of the radiocarbon dates associated with type I funnel beakers reveals that the dates from Muldbjerg and Värby are old conventional dates giving uncertainties of several hundred years. The latest dates from Sigersted are also problematic, as they were some of the first AMS dates, where there could have been problems concerning the cleaning of the samples. If these dates are discarded together with the dates made on food crusts, then the main bulk of radiocarbon dates cluster around 4000 to 3800 calBC. A general overview of the development of the funnel beakers emerges. Detailed typological studies combined with series of radiocarbon dates might be able to develop a more detailed local chronology.

Such a study has been initiated on the early funnel beaker ceramics on Bornholm (Nielsen 2009). Here it was possible to distinguish between funnel beakers of type I, II and III (Fig. 6). The research was based on a series of radiocarbon dates of pits or postholes containing beakers. These results were combined with systematic measurements of the neck height and compared with the diameter of the rim, thus creating a neck index for each type of beakers. Type I was dated 4000–3800 calBC, whereas dates for type II cluster to 3800–3700 calBC and type III dates around 3600 calBC. Based on these overall results I therefore interpret the A-group/Oxie ceramics to be short necked funnels beakers of type 0 and 1 within the typology suggested by Koch (1998) and Nielsen (2009). These short necked funnel beakers can be associated with the first agrarian societies in southern Scandinavia, which rather suddenly appeared all over southern Scandinavia, while the pointed-base pottery disappeared.

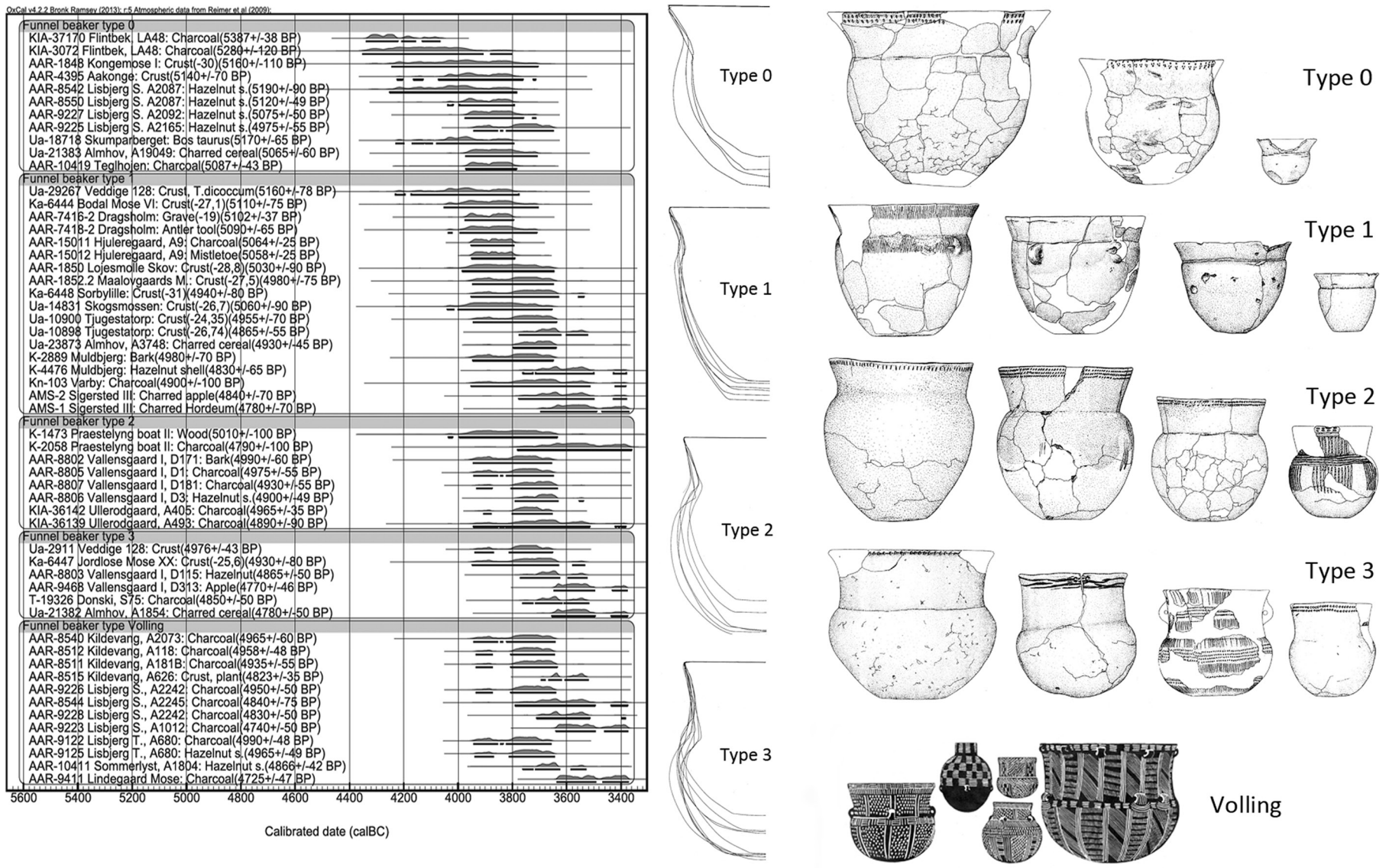


Fig. 5. Radiocarbon dates of various types of funnel beakers (type 0, I, II, III and Volling vessels) in southern Scandinavia (after Koch 1998).

Site	Type	C-14 dated material	$\delta^{13}C$ ‰	Lab.nr.	BP	±	calBC	References
Flintbek LA48	0	Context: Charcoal from pit LA 48		KIA-37170	5387	38	4337-4068	Jansen et al. 2013
Flintbek LA48	0	Context: Charcoal from pit LA 48		KIA-3072	5280	120	4351-3803	Zich 1993, 20
Kongemose I	0	Food crust	-30	AAR-1848	5160	110	4243-3708	Fischer 2002, 358f
Aakonge	0	Food crust with charcoal and plant remains		AAR-4395	5140	70	4225-3716	Fischer 2002, 358f
Lisbjerg Skole	0	Context:Hazelnut shell from pit A2087		AAR-8542	5190	90	4251-3785	Skousen 2008, 125
Lisbjerg Skole	0	Context:Hazelnut shell from pit A2087		AAR-8550	5120	49	4038-3794	Skousen 2008, 125
Lisbjerg Skole	0	Context:Hazelnut shell from pit A2092		AAR-9227	5075	50	3974-3715	Skousen 2008, 125
Lisbjerg Skole	0	Context:Hazelnut shell from pit A2165		AAR-9225	4975	55	3942-3651	Skousen 2008, 125
Skumparberget	0	Context with cattle		Ua-18718	5170	65	4228-3796	Hallgren 2008
Almhov, A19049	0	Context:Charred cereal		Ua-21383	5065	60	3971-3711	Rudebeck 2010, 112f
Teglhøjen	0	Context:charcoal from pit		AAR-10419	5087	43	3971-3786	Skousen 2008, 146
Veddige 128	1	Food crust of T. dicoccum		Ua-29267	5160	78	4230-3777	Johansson et al. 2011
Bodal Mose VI	1	Food crust	-27,1	Ka-6444	5110	75	4051-3706	Fischer 2002, 358f
Dragsholm	1	Grave context with date of human bone	-19,47	AAR-7416-2	5102	37	3973-3797	Price/Gebauer 2005, 123
Dragsholm	1	Grave context with date of antler tool		AAR-7418-2	5090	65	4036-3712	Price/Gebauer 2005, 123
Hjuleregård, A9	1	Context:charcoal hazel		AAR-15011	5064	25	3951-3796	Personal comment Poul Otto Nielsen
Hjuleregård, A9	1	Context:mistletoe		AAR-15012	5058	25	3950-3792	Personal comment Poul Otto Nielsen
Løjesmølle Skov	1	Food crust	-28,8	AAR-1850	5030	90	3984-3648	Fischer 2002, 358f
Måløvgårds Mose	1	Food crust	-27,5	AAR-1852.2	4980	75	3946-3650	Fischer 2002, 358f
Måløvgårds Mose	1	Food crust	-27,9	AAR-1851.1	4950	230	4329-3116	Fischer 2002, 358f
Sørbylille	1	Food crust	-31	Ka-6448	4940	80	3951-3538	Fischer 2002, 358f
Skogsmossen	1	Food crust	-26,7	Ua-14831	5060	90	4039-3656	Hallgren 2008
Tjugestatorp	1	Organic residue on pottery	-24,35	Ua-10900	4955	70	3943-3639	Hallgren 2008
Tjugestatorp	1	Organic residue on pottery	-26,74	Ua-10898	4865	55	3775-3524	Hallgren 2008
Almhov, A3748	1	Context:Charred cereal		Ua-23873	4930	45	3797-3640	Nilsson/Rudebeck 2010, 112f
Muldbjerg	1	Context:bark from *Alnus*		K-2889	4980	70	3945-3651	Fischer 2002, 358f
Muldbjerg	1	Context:burned hazelnutshell		K-4476	4830	65	3761-3380	Fischer 2002, 358f
Värby	1	Context: charcoal from pit		Kn-103	4900	100	3952-3384	Salomonsson 1970, 55ff
Sigersted III	1	Context: charred apple		AMS-2	4840	70	3776-3381	Koch 1998
Sigersted III	1	Context: charred barley		AMS-1	4780	70	3695-3373	Koch 1998
Præstelyng boat II	2	Context: Tilia part of boat		K-1473	5010	100	4037-3637	Fischer 2002, 358f
Præstelyng boat II	2	Context: Charcoal		K-2058	4790	100	3780-3362	Fischer 2002, 358f
Vallensgård I, D171	2	Context: Pomaceae (Bark)		AAR-8802	4990	60	3944-3657	Nielsen 2009, 13
Vallensgård I, D1	2	Context: Charcoal (Alnus sp)		AAR-8805	4975	55	3942-3651	Nielsen 2009, 13
Vallensgård I, D181	2	Context: Charcoal (Alnus sp)		AAR-8807	4930	55	3932-3636	Nielsen 2009, 14
Vallensgård I, D3	2	Context: Burned hazelnut shell (Corylus avellana)		AAR-8806	4900	49	3790-3541	Nielsen 2009, 13f
Ullerødgård	2	Context:charcoal from A405		KIA-36142	4965	35	3905-3655	Esben Aarsleff personal comment
Ullerødgård	2	Context: charred cereal from pit A493		KIA-36139	4890	90	3943-3384	Esben Aarsleff personal comment
Veddige 128	3	Food crust		Ua-2911	4976	43	3938-3654	Johansson et al. 2011
Jordløse Mose XX	3	Food crust	-25,6	Ka-6447	4930	80	3947-3536	Fischer 2002, 358f
Vallensgård I, D115	3	Context: Burned hazelnut shell (Corylus avellana)		AAR-8803	4865	50	3770-3526	Nielsen 2009, 13
Vallensgård I, D313	3	Context: charred apple		AAR-9468	4770	46	3646-3379	Nielsen 2009, 14
Dønski, S75	3	Context:Charcoal		T-19326	4850	50	3761-3521	Demuth/Simonsen 2010
Almhov, A1854	3	Context: charred cereals		Ua-21382	4780	50	3655-3377	Rudebeck 2010, 112f
Kildevang	Volling	Context:charcoal from pit A2073		AAR-8540	4965	60	3942-3644	Skousen 2008, 143
Kildevang	Volling	Context:charcoal from pit A118		AAR-8512	4958	48	3933-3646	Skousen 2008, 169
Kildevang	Volling	Context:charcoal (Fraxinus) from pit A181B, layer K-172		AAR-8511	4935	55	3933-3637	Ravn 2008, 140
Kildevang	Volling	Food remains from vessel in pit A626		AAR-8515	4823	35	3694-3522	Ravn 2008, 145
Lisbjerg Skole	Volling	Context:charcoal (Corylus) from pit A2242		AAR-9226	4950	50	3932-3642	Skousen 2008, 137
Lisbjerg Skole	Volling	Context:charcoal from pit A2245		AAR-8544	4840	75	3790-3378	Skousen 2008, 137
Lisbjerg Skole	Volling	Context:charcoal (Corylus) from pit A2242		AAR-9228	4830	50	3710-3385	Skousen 2008, 137
Lisbjerg Skole	Volling	Context:charcoal (Corylus) from pit A1012		AAR-9223	4740	50	3639-3376	Skousen 2008, 137
Lisbjerg Terp	Volling	Context:charcoal (Corylus avellana) from pit A680		AAR-9122	4990	48	3942-3659	Skousen 2008, 149
Lisbjerg Terp	Volling	Context:hazelnut shell (Corylus avellana) from pit A680		AAR-9125	4965	49	3938-3647	Skousen 2008, 149
Sommerlyst	Volling	Context:hazelnut shell from pit A1804		AAR-10411	4866	42	3761-3531	Skousen 2008, 146
Lindegård Mose	Volling	Charcoal from layer above the TRB pot		AAR-9411	4725	47	3635-3374	Skousen 2008, 151

Tab. 2. Radiocarbon dates of food crusts and contexts containing funnel beakers from the Early Neolithic in southern Scandinavia.

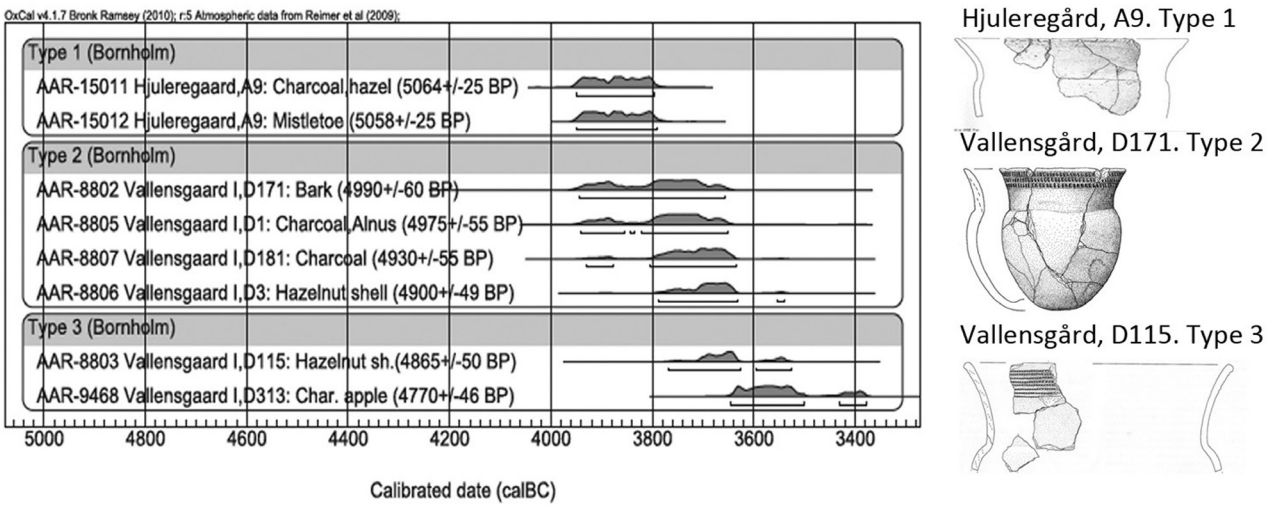


Fig. 6. Radiocarbon dates of archaeological contexts containing funnel beakers of type I, II and III from Bornholm (after Nielsen 2009).

Stratigraphy and developing trends

The disappearance of the Late Ertebølle pottery has often been interpreted as an abrupt change, but very little is known about the development of the pointed-base vessels from 4800 to 4000 calBC and the transition towards the production of funnel beakers (Brinch Petersen 2008b). In many cases it has been impossible to observe any development of the Ertebølle pottery, because many of the sites are intermixed (Jennbert 1984; Koch 1998; Hartz 2008). In contrast, the Ertebølle site Ringkloster does contain some stratigraphic information of the pottery found in the depositional layers (Andersen 1998). Sherds from the lower layers were predominately H-built and had an average thickness of 1.2 cm, whereas the upper layers predominantly contained N-built sherds and had a thickness around 1 cm. Furthermore some smaller pointed-base cups were found in the upper layers, thus indicating a larger variety of vessels sizes in the latest part of the Ertebølle culture. Additionally, some narrow, rounded bases, described as a "transitional type" between Ertebølle and Funnel Beaker vessels have been found in thin transitional horizons dated to around 4000 calBC at Ertebølle, Bjørnsholm, Krabbesholm and Ringkloster (Andersen 1993; 2008c).

Another possible transitional vessel has been proposed for type 0 in Koch's typology (1998). Nevertheless, it is important to acknowledge that neither Ertebølle nor funnel beaker vessels have been found together in the same layers on any kitchenmidden sites containing a well-defined stratigraphy (Andersen 2008c). Some coastal and lake shore sites do contain layers with both funnel beakers and Ertebølle vessels. However, all these sites have been characterized as having an unclear or intermixed stratigraphy caused by water transgressions or the dynamic sedimentations in bogs (Bagge/Kjellmark 1939; Becker 1939; Mathiassen et al. 1942; Schindler 1955; Schwabedissen 1972; 1979; Meurers-Balke 1983; Jennbert 1984; Noe-Nygaard 1995; Hartz 1999; Fischer 2002; Lübke 2004; Hirsch et al. 2007; Glykou 2008; Terberger et al. 2009). How should we interpret these observations? Are we dealing with ongoing improvements of the Ertebølle ceramic technology, with no relation to the development of funnel beaker vessels, or a gradual change towards the emergence of funnel beakers? In order to discuss these questions it is necessary to investigate the technological, functional and symbolic characteristics of the pointed-base vessels and the flat-based funnel beakers.

Function and Technology

The pointed-base vessels are characterized by having an S-curved or cylindrical profile and containing no handles or knobs, whereas the flat-based beakers are associated with a greater variety of forms and shapes, which

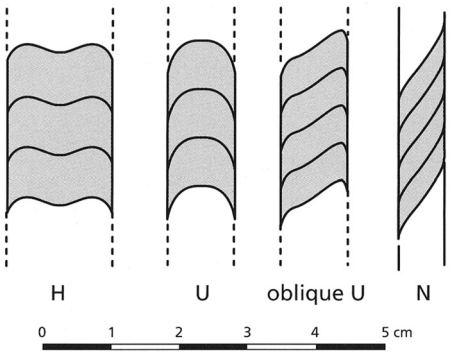


Fig. 7. Different coiling techniques observed on Ertebølle vessels and funnel beakers (after Hulthén 1977; Koch 1987; Andersen 2008c).

besides beakers also includes bowls and flasks (Figs 1–3). Other new forms like clay spoons and discs have also been observed in the earliest part of the Early Neolithic and occur commonly in central European agrarian societies at the transition between the 5th and 4th millennium (Klassen 2004). Especially the clay discs have been interpreted as baking plates (*Backteller*) for making flat bread, thus connecting them with an agrarian subsistence (Lüning 1967; Davidsen 1974). This interpretation is further supported by the straw-tempering found in the clay discs from St. Valby and Lisbjerg Skole (Becker 1954; Skousen 2008). However, the clay discs do not show any significant traces of soot, thus questioning their function as baking plates. Nevertheless, experiments have shown that the clay discs might have been placed near the fire place, where the radiant heat from the fire baked the flat bread without getting any soot on the discs (Lüning 1967). Previously the clay discs have been interpreted as lids, but the diameters of the discs are ranging from 15 to 20 cm, and they are therefore showing less variation compared to the rim-diameter on the funnel beakers. The rim-diameter of the funnel beakers varies from smaller (5–6 cm) and medium (10–15 cm) to larger (15–20 cm) vessels, thus supporting the interpretation of discs being used as baking plates (Davidsen 1974).

Pointed-base vessels have similar sizes based on their rim-diameter, but preliminary studies have shown that larger pots were preferred during the Ertebølle Culture. In contrast, the Funnel Beaker Culture favoured the medium-sized beakers (Koch 1987). Whether these differences reflect what was cooked in the pots is still unknown, although both Ertebølle vessels and funnel beakers have been used as cooking pots. Recent lipid studies of funnel beaker vessels show a continuation of the processing of marine and freshwater resources during the Early Neolithic (Craig et al. 2011). This analysis thus seems to indicate that life continued as before. It should be reminded that the selected funnel beakers in this study came from either coastal or lake shore sites, where the potential for engaging with agrarian activities are relatively low. Future studies of this kind could benefit from integrating funnel beaker vessels from sites located on easily arable soils, where the potential for finding changes in the subsistence is better. This hypothesis is supported by recently published lipid analyses from selected funnel beakers from the inland oriented site of Skogsmossen in Västmanland. Cooking of milk was discovered together with traces of plant, aquatic and terrestrial resources (Isaksson/Hallgren 2012). These results have been interpreted as the introduction of dairy products from domestic animals (cow, sheep or goat) during the Early Neolithic. However, isotopic values of milk fat seem to overlap with deer fatty acids, which make it hard to distinguish if milk actually was being cooked in these vessels (Evershed et al. 2002; Craig et al. 2005).

The base of the vessels

One of the major differences between the Ertebølle and funnel beaker vessels is associated with the shape of the base. Hunter-gatherer societies seem to prefer pointed-base vessels, because experiments have shown, that they can withstand being moved a lot without breaking, thus corresponding to a more mobile lifestyle (Helton-Croll 2010). However, experimental studies with larger Ertebølle vessels indicate a higher fragmentation rate, because of their considerable weight, their thickness of more than 1 cm and coarse tempering, thus arguing that the larger vessels have been used as stationary cooking pots (Inger Hildebrandt personal comment). Generally, a close connection between past mobility and change of ceramics has been investigated through ethnographic studies of the Protohistoric period (1450–1700 AD) in south-western USA. These

studies confirm that the transition from pointed-base to flat-based vessels occurs synchronic with the transition towards a more sedentary mobility pattern together with changes in subsistence and cooking methods (Linton 1944; Mills 1984). The pointed-base vessels can be put directly in the fire, thus indicating a different heating and perhaps cooking method compared to the funnel beaker vessels. One of the aims of the Ertebølle cooking method could be the desire to shorten the boiling time by placing the vessel directly in the fire. This observation is supported by the location of the food crusts on the lower half of the pots on pointed-base vessels from the Ertebølle Culture (Koch 1987). Furthermore, investigations of the Ertebølle vessels show that the base had been exposed to temperatures of up to 800°C (Hulthén 1977). This strategy would result in a low variability of vessels, where only a few preferred shapes and sizes would be used, which is a characteristic feature of Ertebølle ceramics (Andersen 2008c) (Fig. 2).

The funnel beakers have not been standing directly in the fire, but near the fireplace or in embers of a fire, as food crusts are located on the upper half of these vessels. These observations indicate a more prolonged boiling time and simmering of food, thus indicating that a different cooking method is to be associated with the Early Neolithic. The fact that vessels with narrow rounded bases are found in Late Ertebølle layers dated to approximately 4000 calBC argues for a gradual adaptation of new cooking methods and funnel beakers by the indigenous population (Koch 1987). However, the narrow rounded bases of these vessels have been made with the same technology as the pointed bases. The vessels with narrow rounded bases could therefore represent local Ertebølle hunter-gatherer attempts to copy the shape of the funnel beakers, but without grasping the exact technology behind the making of funnel beakers (Andersen 2008c). The base of the funnel beakers is made out of two discs, with clay coils in between them (Fig. 9). In certain cases the direction of the clay coils on the funnel beakers changes either at the midpoint or at the transition to the neck (Fig. 9), which is a trait not observed on any pointed-base vessels (Fig. 8). All these traits enable the pottery maker to gain a better control of standardizing the shape of the vessel, which makes it possible to produce a wider range of various vessels as flasks, jars, jugs and bowls. The Ertebølle vessels seem to have been built-up either in the lap of the potter or around a wooden basket, thus resulting in rather variable and sometimes awkward shapes of the vessels (Tranekjer 2013; Hildebrandt personal comment). The pointed-base vessels began by shaping a lump of clay into a cone. Then some clay coils were laid on top of the cone and pressed onto the underlying one often by using ones fingertips, resulting in either an H-built or U-built ware (Figs 7 and 8A). The funnel beakers must have been standing on a movable surface, when they were being made. The surface could have been made out of braided plant materials, as it is not unusual to find impressions of chaff or grass leaves on base sherds (Koch 1998).

The typical H-technique is observed on many pointed-based vessels, but not any funnel beakers, thus indicating an important technological difference between the two types of vessels. Nevertheless, the N-technique has been observed on some Ertebølle vessels, which could be interpreted

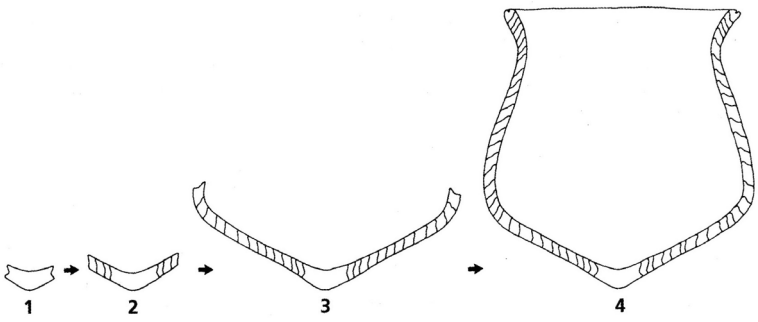


Fig. 8. Fabrication stages of pointed-based Ertebølle vessels (after Koch 1987).

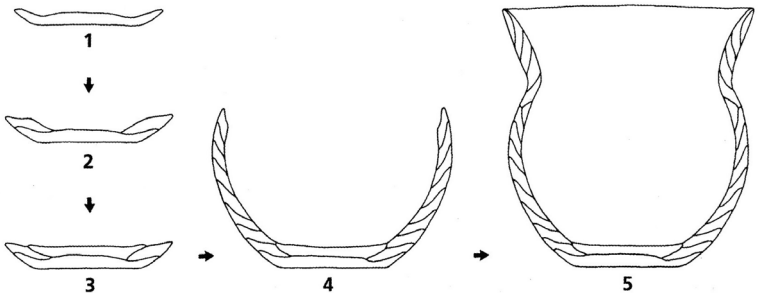


Fig. 9. Fabrication stages of funnel beaker vessels (after Koch 1987).

Fig. 10. Two funnel beaker sherds from pit A 2087 on Lisbjerg Skole dated 4000–3800 calBC. The sherds show different tempering material of either fine sand or smaller pieces of granite.

as a gradual technological change towards the making of funnel beakers. However, the N-technique is often seen on certain sloping parts of the Ertebølle vessels. Furthermore, the clay coils of N-built Ertebølle vessels show finger impressions, which are unknown on N-built funnel beaker vessels (Koch 1998; Tranekjer 2013). The N-technique on Ertebølle vessels therefore seems to represent a practical solution and improvement in pottery techniques.

Other technological aspects have shown considerable overlaps. These aspects are the tempering size and material, the wall-thickness and the vessel sizes (Hulthén 1977; Koch 1987; 1998). Nevertheless the funnel beakers tend to be thinner and contain a more regular and higher tempering density. This allowed the beakers to withstand thermal shock better, thus prolonging their usage. Moreover some funnel beakers from Early Neolithic sites are showing tempering grains of only fine sand, which makes it easier to make thin-walled beakers and detailed ornaments without breaking the vessels (Nielsen 1984; Koch 2004; Skousen 2008) (Fig. 10). Early Neolithic funnel beakers are characterized by having a simple ornamentation just below or upon the rim, which could suggest that some vessels also had a symbolic usage (Koch 1998). One of the major differences between the vessels from the Ertebølle culture and the Funnel Beaker culture is to be formed within their symbolic meaning within the two societies.

Domestic and symbolic usage

Currently there are only a few sites connecting the Ertebølle vessels to a symbolic usage (Koch 1998; Asingh 2000). One of the more convincing finds comes from the lake shore site of Maglelyng XL, where two Ertebølle vessels were found upright leaning against a pole, thus arguing for an offering. But the unique character of this find does not point towards a standardized tradition of depositing ceramics in wetland areas during the Ertebølle culture. The emergence of the smaller pointed-base vessels during the later parts of the Ertebølle Culture has also been interpreted as the introduction of a kind of ceremonial drinking pots, similar to the smaller funnel beakers (Fischer 2002). Yet again this interpretation is based on a very limited number of sites (Andersen 2008c). Other rare finds of Ertebølle vessels have various types of ornamentations (fish net pattern, series of small dots or small shallow marks), which indicate that these pots may have had symbolic meaning. But if this symbolic meaning was significant within Ertebølle society, then one would expect a greater number of ornamented vessels, as is characteristic of funnel beaker ceramics (Koch 1998).

Ornamental patterns have also been observed on Ertebølle artefacts of bone, antler and amber (Andersen 2008c). The ornamented artefacts within the Late Ertebølle Culture have all been found in common 'depositional layers', which beside flint flakes and tools also contain ceramics, antler axes, amber beads and stray finds of human bones (Brinch Petersen 2001). Some of these layers might contain intentionally deposited artefacts. However, it is currently very difficult to separate the intentionally deposited artefacts from normal settlement garbage (Sørensen 2012). Some artefacts probably had a symbolic meaning within the Ertebølle society, but the

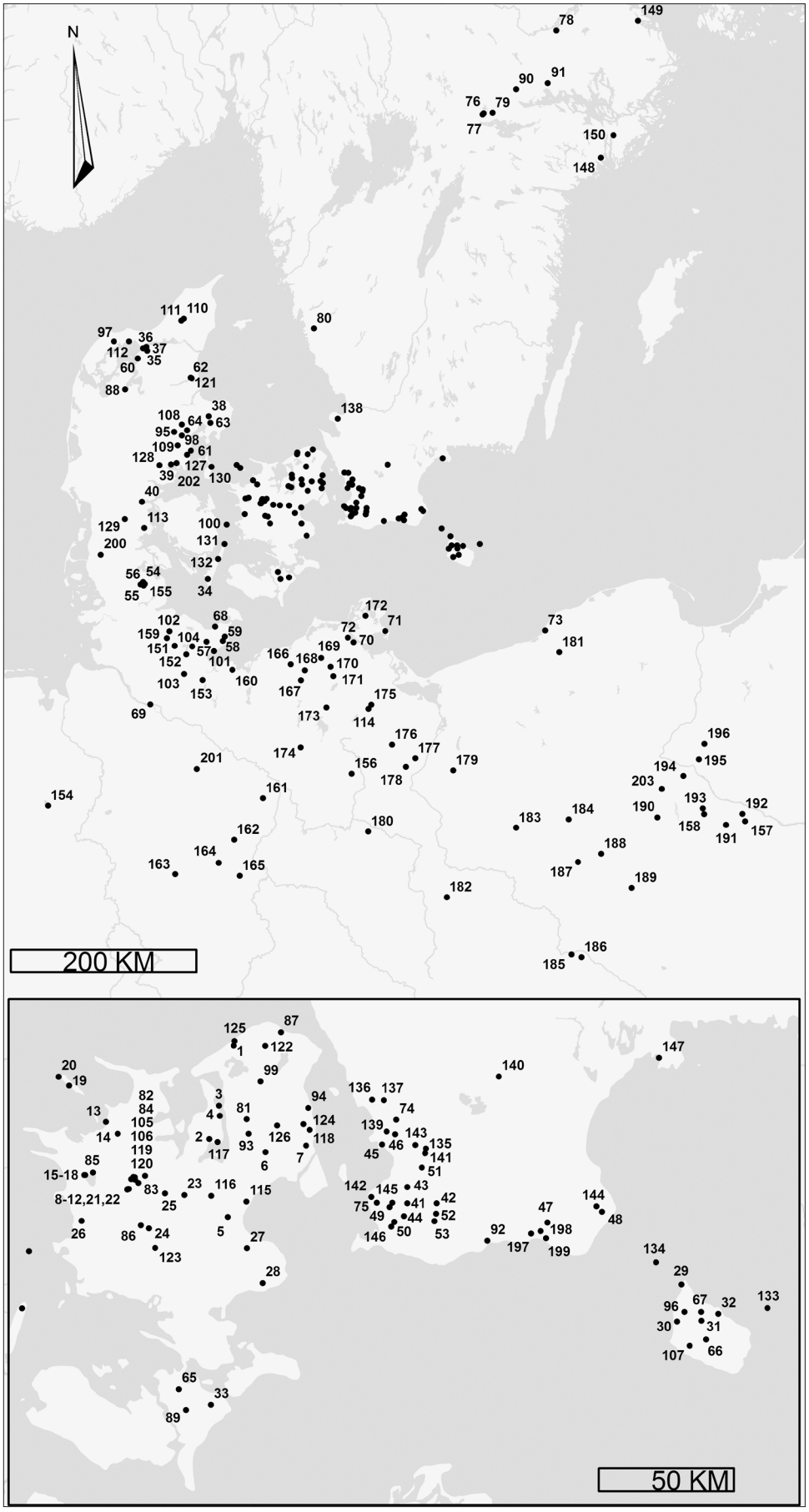
pointed-base vessels points more towards a general domestic usage. The emergence of funnel beakers around 4000 calBC can be associated with the emergence of a new and more formalized symbolic tradition of depositing ceramics and unused pointed-butted flint axes in wetland areas (Koch 1998; Hallgren 2008; Sørensen 2012) (Fig. 11; Tab. 3). The changes in ceremonial practices have been associated with offerings, which might have been part of a cycle of social gatherings within agrarian societies. Funnel beakers are also found in burials exemplified by the Dragsholm man (Brinch Petersen 1974; 2008a; Price et al. 2007). The changed ceremonial practices around 4000 calBC also resulted in new depositional practices on dry land, where whole funnel beakers have been found in pits near or inside possible house structures (Nielsen 2009). Furthermore some large ceramic assemblages of funnel beakers, bowls and flasks including discs and spoons have been found in larger pits. The ceramic assemblages from these sites belong to the A-group. The introduction of beakers resulted in new methods of storing food or liquids or other practical or symbolic ways of deposing ones garbage from 4000 calBC onwards (Mathiassen 1940; Becker 1954; Salomonsson 1970; Andersen 1977; Larsson 1984; Nielsen 1984; Skousen 2008; Rudebeck 2010). Generally, the depositions of ceramic assemblages in pits represent a new behaviour connected primarily with Early Neolithic sites located on easily arable soils. The pits contained various types of vessels including discs and spoons. Similar ceramic assemblages have been found in pits from earlier Neolithic sites in Western Europe. It is to be debated whether the content of the pits can be interpreted as an intentional deposition connected to large offerings related to various social events. Generally it is difficult to separate normal garbage from ritual depositions within these pits, especially if destruction of artefacts is a part of the symbolic behaviour (Andersen 2000; Andersson 2003).

The Early Neolithic site of Almhov in Scania is one of the most important inland-oriented sites located on easily worked arable soil, at which several large pits were excavated (Rudebeck 2010). The pits contained bones of domesticated animals, charred cereals, quern stones, short-necked funnel beakers, clay discs and a high concentration of pointed-butted axes, thus connecting them to an agrarian economy. Studies of the faunal remains show that certain parts of the animals were deposited in the pits, in particular the skulls of various domesticated animals. Many of the pits were placed next to one another, and produced similar diagnostic artefacts from the Early Neolithic, which is why they have been interpreted as being paired pits. A few of the presumed paired pits at Almhov contained a considerable amount of bones from wild species (primarily red deer), whilst most were dominated by bones of domesticated animals (primarily cattle). These patterns could either be the result of different refuse management for wild and domesticated fauna, or represent intentional depositions connected with new symbolic behaviour (Rudebeck 2010; Macheridis 2011). Perhaps these paired pits from Almhov, together with the repeated depositional practices, represent the earliest evidence of social gathering places associated with seasonal feasts, which were used by the first generations of pioneering farmers in South Scandinavia (Rudebeck 2010).

Many funnel beakers have also been found on kitchen midden sites, which contain very few pits. These sites represent continuity from the Ertebølle Culture in terms of site use and depositional practices. However, the material culture (funnel beakers and lithics dominated by flaking tools) from the Early Neolithic layers on these kitchen midden sites can be associated with Neolithic traits. These kitchen midden sites of the earliest phase of the Early Neolithic might represent a swift acquisition of Neolithic habits and material culture by the local Ertebølle population, but perhaps without integrating any new symbolic behaviour in their depositional practice.

Origin of the Funnel Beaker culture

It has previous been suggested that the funnel beaker of type 0 could exemplify a transitional vessel between the Ertebølle culture and Funnel Beaker culture, thus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indicating an independent evolvement of the funnel beakers (Koch 1998). It has to be reminded that type 0 vessels have parallels in the early stages of the Michelsberg culture dated to 4400–4000 calBC, which suggests that the type came to southern Scandinavia through direct or indirect contacts with agrarian groups around 4000 calBC (Lüning 1967). The new practice of ceramics pit depositons points towards direct contact between pioneering farmers and people from the Michelsberg culture (Biel et al. 1998; Jeunesse 2011) (Fig. 12). This interpretation is supported by finds of type 0 funnel beakers, discs and spoons in a pit from the site Flintbek LA 48, which is one of a few inland sites located on easily arable soils in Schleswig-Holstein (Fig. 5). The ceramic material from Flintbek has parallels with vessels from the Michelsberg culture (phase II–III), which could be the place of origin for these pioneering farmers in Schleswig-Holstein (Lüning 1967; Schwabedissen 1979; Laux 1986; Zich 1993; Höhn 1998; Klassen 2004; Jansen et al. 2013). Radiocarbon dates of charcoal from the pit on Flintbek LA 48 are approximately 200 years earlier than the first beakers in southern Scandinavia, thus supporting an early impulse of pioneering farmers in Schleswig-Holstein (Fig. 5). This early impulse also includes domestic animals, which therefore also arrived around 100 years earlier in Schleswig-Holstein than in southern Scandinavia (Hartz et al. 2007; Sørensen/Karg 2012).

Fig. 11. Map of southern Scandinavia, northern Germany and northern Poland with sites with short-necked funnel beakers of type 0 and I. 1. Tisvilde Bymose, 2. Manderup Søgård, 3. Roskilde Fjord, 4. Svaleklint, 5. Ejby Mose, 6. Målevgård, 7. Bloksbjerg, 8. Præstelyngen, 9. Tømmerup II, 10. Øgårde I/II, 11. Bodals Mose, 12. Magleø, 13. Dragsholm, 14. Svinninge Vejle, 15. Jordløse Mose X, 16. Jordløse Mose XIII, 17. Jordløse Mose XIV, 18. Sandhuse Mose C, 19. Olsbjerg, 20. Ragelbjerg, 21. Maglelyng, 22. Muldbjerg, 23. Hørsø Mose, 24. Sigersted III, 25. Høed, 26. Store Valby, 27. Himlingeøje, 28. Havnelev 1922, 29. Hammeren, 30. Simblegård, 31. Borgen, 32. Gudhjem Syd, 33. Åstrup, 34. Dagsmose, 35. Aggersund, 36. Vadgård, 37. Tolstrup/Bakkegård, 38. Kolind, 39. Nørrestrand, 40. Kolding Fjord, 41. Värby V22, 42. Hässleberga 24:1, 43. Önsvalla, 44. Skabersjö, 45. Löddesborg, 46. Håkanstorp 3, 47. Frederiksberg 21, 48. Simrishamn, 49. Oxie 7, 50. V. Kärrstorp 7:2, 51. St. Råby, 52. Sturup 1:88, 53. Sturup 1:107, 54. Bistoft LA 11, 55. Rüder LA 2, 56. Satrup-Pöttmoor LA 70, 57. Klenzau, 58. Rosenhof LA 58, 59. Siggeneben-Süd LA 12/24, 60. Bjørnsholm, 61. Norsminde, 62. Visborg, 63. Barkær, 64. Lisbjerg Skole, 65. Erantisvej, 66. Vallensgård I, 67. Ålykken, 68. Wangels, 69. Hamburg-Boberg 15/20, 70. Hansestadt Stralsund, 71. Baabe, 72. Parow-Sportboothafen 4, 73. Dąbki 9, 74. Dagstorp SU21, 75. Almhov, 76. Skumparberget, 77. Tjugestatorp, 78. Kallmossen, 79. Skogsmossen, 80. Veddige, 81. Sperrestrup Mose, 82. Øgårde 8/11, 83. Åkonge, 84. Øgårde 19, 85. Jordløse Mose XXXII, 86. Garbølle Mose, 87. Rødkildegård, 88. Krabbesholm, 89. Oustrup Præstegårdsmose, 90. Häggsta II, 91. Fågelbacken, 92. Mossby, 93. Magleholm, 94. Maglemosegård, 95. Åbenrågården, 96. Marevadgård, 97. Oddershedegård III, 98. Helenelyst, 99. Rønnevang, 100. Fasanvej, 101. Neustadt LA 156, 102. Flintbek LA 48, 103. Bebensee LA 76, 104. Klein Meinsdorf, 105. Løjesmølle Skov, 106. Sørbylille II, 107. Hjuleregård, 108. Teglhøjen, 109. Stilling Trehøje I, 110. Vangdrup, 111. Kornumgaard, 112. Øsløs, 113. Lønt, 114. Brunn 17, 115. Karlstrup Mose, 116. Lavringe Mose, 117. Lollikhuse, 118. Christiansholm Mose, 119. Øgårde 23/30, 120. Verup Mose V, 121. Havnø, 122. Svendestykket, 123. Glumsø-Gelstad, 124. Granåsen, 125. Vieholmgård I, 126. Kollekolle, 127. Rude Skov, 128. Grønbjerggård, 129. Slevad, 130. Eskholm, 131. Nygård, 132. Klintebakke, 133. Baltic Sea A, 134. Baltic Sea C, 135. Brünnshög, 136. Råga Hörstad, 137. N. Möinge, 138. Ö. Grevie 41:1, 139. Håkantorp, 140. Vätteryd, 141. Östra Torn 29:1, 142. Skjutbanorna 1A, 143. Vällkärra, 144. Järrestad, 145. Kristineberg, 146. Döserygg, 147. Siretorp, 148. Trössla norra, 149. Anneberg, 150. Smällan, 151. Nettelsee, 152. Schlamersdorf LA 5, 153. Lübeck-Genin, 154. Hüde 1, 155. Südensee-Damm LA 1, 156. Schönermark, 157. Sarnowo, 158. Redecz Krukowy 20, 159. Meimersdorf, 160. Tarnewitz, 161. Tangermünde, 162. Haldensleben, 163. Burgdorf, 164. Schöningen, 165. Hundisburg, 166. Bernitt, 167. Liessow, 168. Böhlendorf, 169. Niendorf, 170. Gross Methling, 171. Dargun, 172. Moritzhagen, 173. Moltzow, 174. Sadenbeck, 175. Neuenkirchen, 176. Prenzlau, 177. Pinnow, 178. Niederlandin, 179. Kosin, 180. Berlin-Britz, 181. Gozd, 182. Witaszkowo, 183. Kotowo, 184. Sobota, 185. Gorzyce, 186. Wrocław-Pracze, 187. Smigiel, 188. Lekno, 189. Wdowin, 190. Strzelce, 191. Swietoslaw, 192. Czamaninek, 193. Nowiny, 194. Sadłużek, 195. Lipnica, 196. Płużnice, 197. Karlshem, 198. L. Köpinge 7:3, 199. Kabusa, 200. Tønder, 201. Walmstorf 10, 202. Søvind Mark, 203. Łącko woj.

Nr.	Name	Site type	Context	EBK	Beaker	Bowl	Flask	Disc	Spoon	Tulip b.	References
1	Tisvilde Bymose	Lake shore	Bog, deposition		x		x				Nielsen 1984, 119; Koch 1998, 406, pl. 8: 15.1-3
2	Manderup Søgård	Coastal	Kitchenmidden/grave?		x	x	x				Becker 1947, 127f; Koch 1998, 406
3	Roskilde Fjord	Coastal	Kitchenmidden		x						Nielsen 1984, 113; Koch 1998, 409
4	Svaleklint	Coastal	Site	x	x						Skaarup 1973, 121ff
5	Ejby Mose	Lake shore	Bog, deposition				x				Ebbesen/Mahler 1980, fig. 13:2; Koch 1998, 417, pl. 19: 40
6	Målevgård	Lake shore	Bog, deposition		x		x				Becker 1947 nr. 24
7	Bloksbjerg	Coastal	Site	x	x						Westerby 1920, fig. 6
8	Præstelyngen	Lake shore	Beaker found on dugout canoe	x	x						Nielsen 1984, 113; Tauber 1971, 135
9	Tømmerup II	Lake shore	Bog, deposition		x				x		Becker 1947 nr. 35; Koch 1998, 323
10	Øgårde I & II	Lake shore	Site, bog, deposition		x						Mathiassen 1943, 131; Troels-Smith 1953; Koch 1998, 440ff
11	Bodals Mose	Lake shore	Site, bog, deposition		x						Becker 1947 nr. 41
12	Magleø	Lake shore	Site, bog, deposition		x	x					Nielsen 1984, 119
13	Dragsholm	Coastal	Grave in kitchenmidden		x						Brinch Petersen 1974; Price et al. 2009
14	Svinninge Vejle	Coastal	Kitchenmidden		x						Becker 1947 nr. 46; Koch 1998, 437
15	Jordløse Mose X	Lake shore	Bog, deposition		x						Becker 1947 nr. 64
16	Jordløse Mose XIII	Lake shore	Site, bog, deposition		x						Becker 1947 nr. 67
17	Jordløse Mose XIV	Lake shore	Bog, deposition		x						Becker 1947 nr. 68
18	Sandhuse Mose C	Lake shore	Site, bog, deposition		x						Mathiassen 1943, 116f
19	Olsbjerg, Sejerø	Coastal	Kitchenmidden	x	x		x				Liversage 1973, 89f
20	Ragelbjerg, Sejerø	Coastal	Site	x	x						Nielsen 1984, 119
21	Maglelyng	Lake shore	Site, bog, deposition		x		x				Nielsen 1984, 119
22	Muldbjerg	Lake shore	Site		x	x	x				Troels-Smith 1953; 1982; Skaarup 1973, 118f
23	Hørsø Mose	Lake shore	Bog, deposition				x				Ebbesen/Mahler 1980, fig. 16
24	Sigersted III	Inland site	Site, pit		x	x	x	x	x		Nielsen 1984, 119
25	Høed	Lake shore	Bog, deposition				x				Becker 1947 nr. 84
26	Store Valby	Inland site	Site, pit		x	x	x	x			Becker 1954
27	Himlingeøje	Inland site	Site, pit		x			x			Davidsen 1974, fig. 2:1 & 7-9
28	Havnelev 1922	Inland site	Site, pit		x	x	x	x			Mathiassen 1940, fig. 5:1
29	Hammeren	Coastal	Site, pits		x						Becker 1947, 161ff
30	Simblegård	Inland site	Site		x						Ebbesen 1974
31	Borgen	Inland site	Site		x						Nielsen 1984, 119
32	Gudhjem Syd	Coastal	Site		x						Nielsen 1984, 119
33	Åstrup	Lake shore	Bog, deposition		x						Becker 1947 nr. 99
34	Dagsmose	Lake shore	Bog, deposition		x						Becker 1947 nr. 122
35	Aggersund	Coastal	Kitchenmidden	x	x						Nielsen 1984, 119
36	Vadgård	Inland site	Site, pits		x						Nielsen 1984, 120
37	Tolstrup/Bakkegården	Inland site	Site below a long barrow		x	x		x			Madsen 1975, 126ff
38	Kolind	Coastal	Kitchenmidden	x	x						Mathiassen et al. 1942, 37ff
39	Nørrestrand	Coastal	Site	x	x						Nielsen 1984, 120
40	Kolding Fjord	Coastal	Site	x	x						Mathiassen et al. 1942, 60f
41	Värby V22	Inland site	Site, pits								Salomonsson 1970, 61ff
42	Hässleberga 24:1	Inland site	Site, pit		x			x			Larsson 1984, 52ff
43	Önsvalla	Inland site	Site, pit		x	x					Larsson 1984, 143ff
44	Skabersjö	Inland site	Site, pit		x						Larsson 1984, 71ff
45	Löddesborg	Coastal	Site	x	x						Jennbert 1984, fig. 49:2-6
46	Håkanstorp 3	Inland site	Site/grave?		x						Petré/Strömberg 1958, 82
47	Frederiksberg 21	Inland site	Site		x						Becker 1947, 180
48	Simrishamn omegn	Lake shore	Bog, deposition		x						Althin 1946, fig. 3
49	Oxie 7	Inland site	Site, pit		x			x			Forssander 1938; Becker 1947, 177ff; Larsson 1984, 60ff
50	V. Kärrstorp 7:2	Inland site	Site, pit		x	x	x	x			Larsson 1984, 130ff

Tab. 3. Compiled data of sites from southern Scandinavia, northern Germany and northern Poland, with short-necked funnel beakers, discs and spoons.

Nr.	Name	Site type	Context	EBK	Beaker	Bowl	Flask	Disc	Spoon	Tulip b.	References
51	St. Råby	Inland site	Site, pit		x						Wyszomirski 1974; Larsson 1984, 170
52	Sturup 1:88	Inland site	Site, pit		x	x					Larsson 1984, 97ff
53	Sturup 1:107	Inland site	Site, pit		x						Larsson 1984, 101ff
54	Bistoft LA 11	Lake shore	Site	x	x						Johansson 1979, Pl. 16:2, 17:5, 18:1
55	Rüder LA 2	Lake shore	Bog, deposition	x	x						Piggott 1955, Pl. VI; Schwabedissen 1958
56	Satrup-Pöttmoor LA 70	Inland site	Bog		x						Schwabedissen 1967, Abb. 9:a
57	Klenzau	Inland site	Site, pit, deposition?		x		x				Becker 1947, 210, fig. 43:11
58	Rosenhof LA 58	Coastal	Site	x	x	x	x				Schwabedissen 1972, 1979; Hartz 1999; 2008
59	Siggeneben-Süd LA 12	Coastal	Site	x	x	x	x	x			Meurers-Balke 1983
59	Siggeneben-Ost LA 24	Coastal	Site		x						Hartz 2008
60	Bjørnsholm	Coastal	Kitchenmidden	x	x	x					Andersen 1993, 87, fig. 87
61	Norsminde	Coastal	Kitchenmidden	x	x	x		x			Andersen 1991, 35, fig. 21
62	Visborg	Coastal	Kitchenmidden		x	x					Andersen 2001; 2002
63	Barkær	Inland site	Site below a long barrow		x	x		x			Liversage 1992, 38
64	Lisbjerg Skole, A2087, A2092, A2165	Inland site	Site, pits		x	x	x	x	x		Skousen 2008, 126ff
65	Erantisvej	Inland site	Site, pits		x						Staal 2005
66	Vallensgård I	Inland site	Site, pits		x	x					Nielsen 2009, 11
67	Ålykken	Inland site	Site, pits		x						Unpublished, Poul Otto Nielsen personal comment
68	Wangels	Coastal	Site	x	x	x	x	x			Hartz 1999, 30; Hartz et al. 2007, 585: fig. 13:1
69	Hamburg-Boberg 15 & 20	Coastal	Site, pits	x	x	x	x				Schindler 1955; 1960; 1961; 1962; Laux 1986; Klassen 2004, 83; Terberger et al. 2009, 275
70	Hansestadt Stralsund	Coastal	Site		x						Kaute et al. 2004, 236, fig. 14
71	Baabe	Coastal	Site	x	x						Hirsch et al. 2007, 28
72	Parow-Sportboothafen 4	Coastal	Site	x	x						Terberger/Seiler 2004, 160, fig. 4
73	Dabki 9	Coastal	Site, bog, deposition	x	x						Terberger et al. 2009, 276: fig. 8:5
74	Dagstorp SU21	Inland site	Site		x	x		x			Lagergren-Olsson 2003, 184, fig. 5
75	Almhov	Inland site	Site, pits		x	x		x			Rudebeck 2010, 156ff
76	Skumparberget	Inland site	Site, pits		x	x	x	x			Hallgren 2008, 170, fig. 8:30
77	Tjugestatorp	Inland site	Site, pits		x	x					Hallgren 2008, 163, fig. 8:24
78	Kallmossen	Inland site	Site, pits		x	x		x			Hallgren 2008, 163, fig. 8:24
79	Skogsmossen	Inland site	Site, pits, bog, deposition		x	x	x	x			Hallgren 2008, 163, fig. 8:24
80	Veddige	Lake shore	Bog, deposition		x						Johansson et al. 2011, 43ff
81	Sperrestrup Mose	Lake shore	Bog, deposition		x						Koch 1998, 81, pl. 18:39.1
82	Øgårde 8, 11	Lake shore	Site, bog, deposition		x						Koch 1998, 81, pl. 53:96.9; pl. 47:93.2
83	Åkonge	Lake shore	Site, bog, deposition		x						Koch 1998, 82, pl. 87:154
84	Øgårde 19	Lake shore	Bog, deposition							x	Koch 1998, 81, pl. 57:104
85	Jordløse Mose XXXII	Lake shore	Site, bog, deposition		x						Koch 1998, 81, pl. 130:205.1
86	Garbølle Mose	Lake shore	Bog, deposition			x					Koch 1998, 81, pl. 134:212
87	Rødkildegård	Lake shore	Bog, deposition		x						Koch 1998, 262, pl. 6:14
88	Krabbesholm	Coastal	Kitchenmidden	x	x						Andersen 2005, 162
89	Oustrup Præstegårdsmose	Lake shore	Bog, deposition		x						Koch 1998, 393, pl. 150:243
90	Häggsta II	Coastal	Site		x						Unpublished, Fredrik Hallgren personal comment
91	Fågelbacken	Coastal	Site		x		x	x			Hallgren 2008
92	Mossby	Inland site	Site, pits		x			x			Larsson 1992, 73
93	Magleholm	Coastal	Site		x						Brinch Petersen 1985, 3
94	Maglemosegård	Coastal	Site		x						Juel 2004, 43ff
95	Åbenrågården	Inland site	Site, pits		x						Andersen 1986, 84
96	Marevadgård	Inland site	Site		x						Nielsen 1994a, 50
97	Oddershedegård III	Inland site	Site, pits		x			x			Haack Olsen 2003, 71
98	Helenelyst	Inland site	Site, pits		x						Skriver 2003, 108
99	Rønnevang	Inland site	Site, pit		x	x		x			Aarsleff/Kramer 2004, 2
100	Fasanvej	Coastal	Site		x						Nielsen 1997, 242
101	Neustadt LA 156	Coastal	Site	x	x	x	x				Glykou 2008, Hartz 2008

Tab. 3. Continuation.

Nr.	Name	Site type	Context	EBK	Beaker	Bowl	Flask	Disc	Spoon	Tulip b.	References
102	Flintbek LA 48	Inland site	Site, pits		x	x			x		Zich 1993; Mischka 2011
103	Bebensee LA 76	Lake shore	Site	x	x						Hoika 1993
104	Klein Meinsdorf	Lake shore	Site	x	x						Graf 2003; Hartz 2008, 266
105	Løjesmølle Skov	Lake shore	Bog, deposition		x						Koch 1998; 327; Fischer 2002, 358f
106	Sørbylille II	Lake shore	Bog, deposition		x						Koch 1998, 378, pl. 138: 218; Fischer 2002, 358f
107	Hjuleregård, Bornholm	Inland site	Site		x	x					Unpublished, Poul Otto Nielsen personal comment
108	Teglhøjen	Inland site	Site, pits		x						Skousen 2008, 146
109	Stilling Trehøje I, pit FZ	Inland	Site, pit		x			x			Andersen 1977, 208
110	Vangdrup, Brønderslev	Inland site	Site, stray find		x						Unpublished, Personal comment Per Lysdahl, survey rapport 586/65
111	Kornumgaard, Brønderslev	Inland site	Site, stray find		x						Unpublished, Personal comment Jens Henrik Bech, survey rapport 586/65
112	Øsløs, Thisted, A22598	Coastal	Kitchenmidden		x						Unpublished, Personal comment Jens Henrik Bech
113	Lønt	Inland site	Site below a long barrow		x						Unpublished, Personal comment A. B. Gebauer
114	Brunn 17	Inland site	Site, pits		x	x	x	x	x	x	Vogt 2009
115	Karlstrup Mose	Coastal	Site/bog		x						Unpublished, S. A. Sørensen personal comment
116	Lavringe Mose	Coastal	Site/bog		x						Unpublished, S. A. Sørensen personal comment
117	Lollikhuse	Coastal	Kitchenmidden	x	x						Sørensen 2005
118	Christiansholm Mose	Lake shore	Site, bog, deposition		x	x			x		Koch 1998, 420, pl. 22–23
119	Øgårde 23, 30	Lake shore	Bog, deposition			x					Koch 1998, 456, pl. 58: 108; 462, pl. 64: 115
120	Verup Mose V	Lake shore	Bog, deposition		x						Koch 1998, 332, pl. 79: 143.1
121	Havnø	Coastal	Kitchenmidden	x	x						Andersen 2008a
122	Svendestykket, GIM 3511	Inland site	Site, pit		x						Grønnegaard 2003
123	Glumsø-Gelstad	Inland site	Site, pits		x			x			Bendtsen 2010
124	Granåsen	Inland site	Site, pit		x						Jønsson 1988
125	Vieholmgård I	Inland site	Site, pit		x				x		Pedersen 1990; Madsen 2009
126	Kollekolle, Værløse	Inland site	Site, pits		x						Andersen 2009
127	Rude Skov, Horsens (OOM 19)	Inland site	Site		x						Unpublished, Torsten Madsen personal comment
128	Grønbjerggård,Horsens (HOM 836)	Inland site	Site		x						Unpublished, Torsten Madsen personal comment
129	Slevad	Inland site	Site, pit		x			x			Klaus Hirsch personal comment
130	Eskholm, Tranebjerg	Coastal	Kitchenmidden		x						Unpublished, Karsten Davidsen personal comment
131	Nygård, Hou, Langeland	Inland site	Site		x			x			Skaarup 1985, 30, nr. 6
132	Klintebakke, Tranekær	Inland site	Site, pits		x						Skaarup 1985, 37, nr. 27
133	Baltic Sea A	Underwater	Sea				x				Nielsen/Nielsen 1990, 55: fig. 1 & 2
134	Baltic Sea C	Underwater	Sea				x				Nielsen/Nielsen 1990, 55: fig. 1 & 2
135	Brünnshög/Råbylund	Inland site	Site, pit		x						Lagergren 2008; Ericson/Lagergren 2009, 16ff
136	Råga Hörstad	Inland site	Site, pit		x	x					Petré/Strømberg 1958, 52ff
137	N. Möinge	Inland site	Site, pit		x			x			Petré/Strømberg 1958, 75; Petersson 1975
138	Ö. Grevie 41:1	Inland site	Site		x						Nagmér 1980, 6ff
139	Håkantorp	Inland site	Grave?				x				Petré/Strømberg 1958, 76: fig. 23
140	Vätteryd	Inland site	Site		x			x			Petré/Strømberg 1958, 79: fig. 26
141	Östra Torn 29:1	Inland site	Site, pit		x						Ericson/Hellerström 2011
142	Skjutbanorna 1A	Coastal	Site	x	x						Jonsson 2005
143	Vällkärra	Inland site	Site		x						Stilborg 2002, 61
144	Järrestad	Inland site	Site		x						Stilborg 2002, 61
145	Kristineberg	Inland site	Site		x						Stilborg 2002, 61
146	Döserygg	Inland site	Site, pit		x						Andersson/Wallebom 2010, 119
147	Siretorp	Coastal	Site		x						Bagge/Kjellmark 1939, pl. 68:9, 11, 12
148	Trössla norra	Coastal	Site				x				Hallgren 2008, 173
149	Anneberg	Coastal	Site		x						Hallgren 2008, 150
150	Smällan	Inland site	Site		x						Hallgren 2008, 150
151	Nettelsee	Lake shore	Single find		x						Unpublished, Sönke Hartz personal comment

Tab. 3. Continuation.

Nr.	Name	Site type	Context	EBK	Beaker	Bowl	Flask	Disc	Spoon	Tulip b.	References
152	Schlamersdorf LA 5	Lake shore	Deposition		x						Hartz 1997
153	Lübeck-Genin	Inland site	Site, pits		x	x	x				Hartz this vol.
154	Hüde 1	Lake shore	Site, pits		x	x	x				Kampffmeyer 1991
155	Südensee-Damm LA 1	Inland site	Bog		x						Hartz 2008
156	Schönermark	Inland site	Site, pits		x	x	x	x	x		Kirsch 1993, Abb. 50–56
157	Sarnowo	Inland site	Site below long barrow		x	x		x			Gabalowna 1970, 77; Wiklak 1982, 72
158	Redecz Krukowy 20	Inland site	Site, pits		x	x	x	x	x		Wstępne 2012, 216
159	Meimersdorf	Inland site	Site		x						Lichardus 1976, 295
160	Tarnewitz	Inland site	Site		x						Lichardus 1976, 295
161	Tangermünde	Inland site	Site		x						Lichardus 1976, 295
162	Haldensleben	Inland site	Site		x						Lichardus 1976, 295
163	Burgdorf	Inland site	Site		x						Lichardus 1976, 295
164	Schöningen	Inland site	Site		x						Lichardus 1976, 295
165	Hundisburg	Inland site	Site		x						Lichardus 1976, 295
166	Bernitt	Inland site	Site		x						Lichardus 1976, 295
167	Liessow	Inland site	Site		x						Lichardus 1976, 295
168	Böhlendorf	Inland site	Site		x						Lichardus 1976, 295
169	Niendorf	Inland site	Site		x						Lichardus 1976, 295
170	Gross Methling	Inland site	Site		x						Lichardus 1976, 295
171	Dargun	Inland site	Site		x						Lichardus 1976, 295
172	Moritzhagen	Inland site	Site		x						Lichardus 1976, 295
173	Moltzow	Inland site	Site		x						Lichardus 1976, 295
174	Sadenbeck	Inland site	Site		x						Lichardus 1976, 295
175	Neuenkirchen	Inland site	Site		x						Lichardus 1976, 295
176	Prenzlau	Inland site	Site		x						Lichardus 1976, 295
177	Pinnow	Inland site	Site		x						Lichardus 1976, 295
178	Niederlandin	Inland site	Site		x						Lichardus 1976, 295
179	Kosin	Inland site	Site		x			x			Lichardus 1976, 295
180	Berlin-Britz	Inland site	Site		x			x			Lichardus 1976, 295
181	Gozd	Inland site	Site		x						Lichardus 1976, 295
182	Witaszkowo	Inland site	Site		x						Lichardus 1976, 295
183	Kotowo	Inland site	Site		x						Lichardus 1976, 295
184	Sobota	Inland site	Site		x						Lichardus 1976, 295
185	Gorzyce	Inland site	Site		x						Lichardus 1976, 295
186	Wrocław-Pracze	Inland site	Site		x						Lichardus 1976, 295
187	Smigiel	Inland site	Site		x						Lichardus 1976, 295
188	Lekno	Inland site	Site		x						Lichardus 1976, 295
189	Wdowin	Inland site	Site		x						Lichardus 1976, 295
190	Strzelce	Inland site	Site		x						Lichardus 1976, 295
191	Swietoslaw	Inland site	Site		x						Lichardus 1976, 295
192	Czamaninek	Inland site	Site		x						Lichardus 1976, 295
193	Nowiny	Inland site	Site		x						Lichardus 1976, 295
194	Sadłużek	Inland site	Site		x						Lichardus 1976, 295
195	Lipnica	Inland site	Site		x						Lichardus 1976, 295
196	Płużnice	Inland site	Site		x						Lichardus 1976, 295
197	Karlshem	Inland site	Site, pits		X						Larsson 1992, 63
198	L. Köpinge 7:3	Inland site	Site, pits		X						Larsson 1992, 48
199	Kabusa Ivb	Inland site	Site, pits		X			X			Larsson 1992, 36
200	Tønder	Inland site	Stray find		x						Jørgensen 2000, 68
201	Walmstorf 10	Inland site	Site, pits		x		x	x			Richter 2002, 89ff. taf. 4:4, taf. 38, 44, 45
202	Søvind Mark	Inland site	Stray find		x						Klassen 2004, 162
203	Łącko, woj.	Inland site	Site, pits		x						Domańska/Kośko 1983

Tab. 3. Continuation.

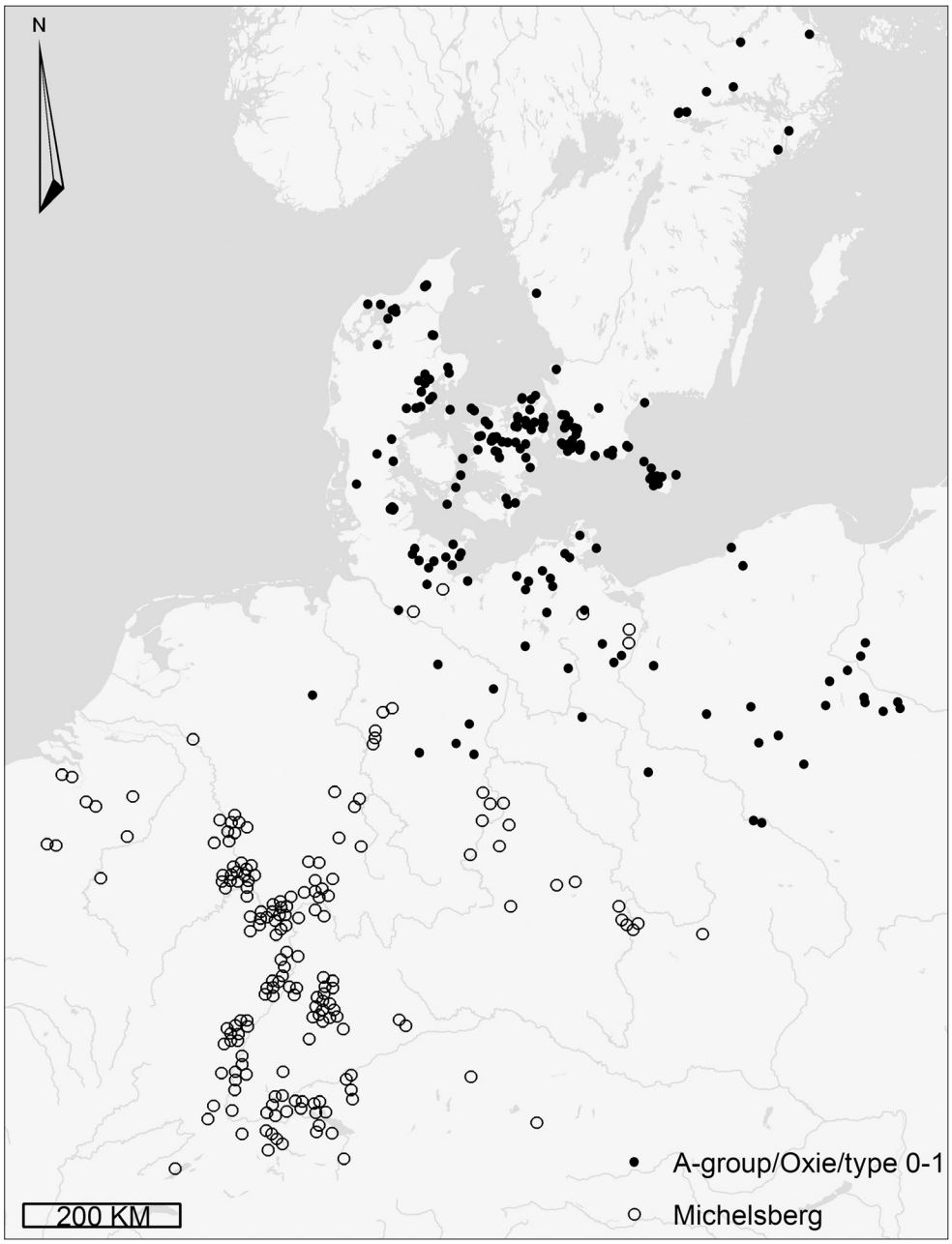

Fig. 12. Map of Michelsberg sites in central Europe and sites with short-necked funnel beakers in southern Scandinavia, northern Germany and northern Poland (after Lüning *1967).*

Similarities to the Michelsberg culture phase III/IV can also be observed in the tulip-shaped beakers from Brunn 17 in Mecklenburg-Vorpommern (Vogt 2009) (Fig. 13). On the Danish islands, only one tulip-shaped beaker has been found at Øgaarde 19 in Åmosen. This indicates either limited contact or a regional rejection of this type of vessels (Koch 1998) (Fig. 14). Typical Michelsberg culture ceramic elements have also been reported from the Early Neolithic site of Lisbjerg Skole in eastern Jutland. The site contained several pits, which have been dated to 4000–3800 calBC. A clay disc from pit A 2087 had impressions of a rush mat, similarto those on clay discs from the Michelsberg site of Rübeland-Baumannshöhle in the Harz mountains (Klassen 2004; Skousen 2008). Pit A2247 from Lisbjerg Skole also contained a pointed-butted flint axe, which has been interpreted as an imitation of a jade axe (Klassen in press). Pointed-butted axes of diabas and flint with a length of over 25 cm have been interpreted as local imitations of various types of jade axes (Klassen 2004; Sørensen 2012). Even the jade axes themselves have been found as stray finds in southern Scandinavia (Klassen et al. 2012). The exotic jade

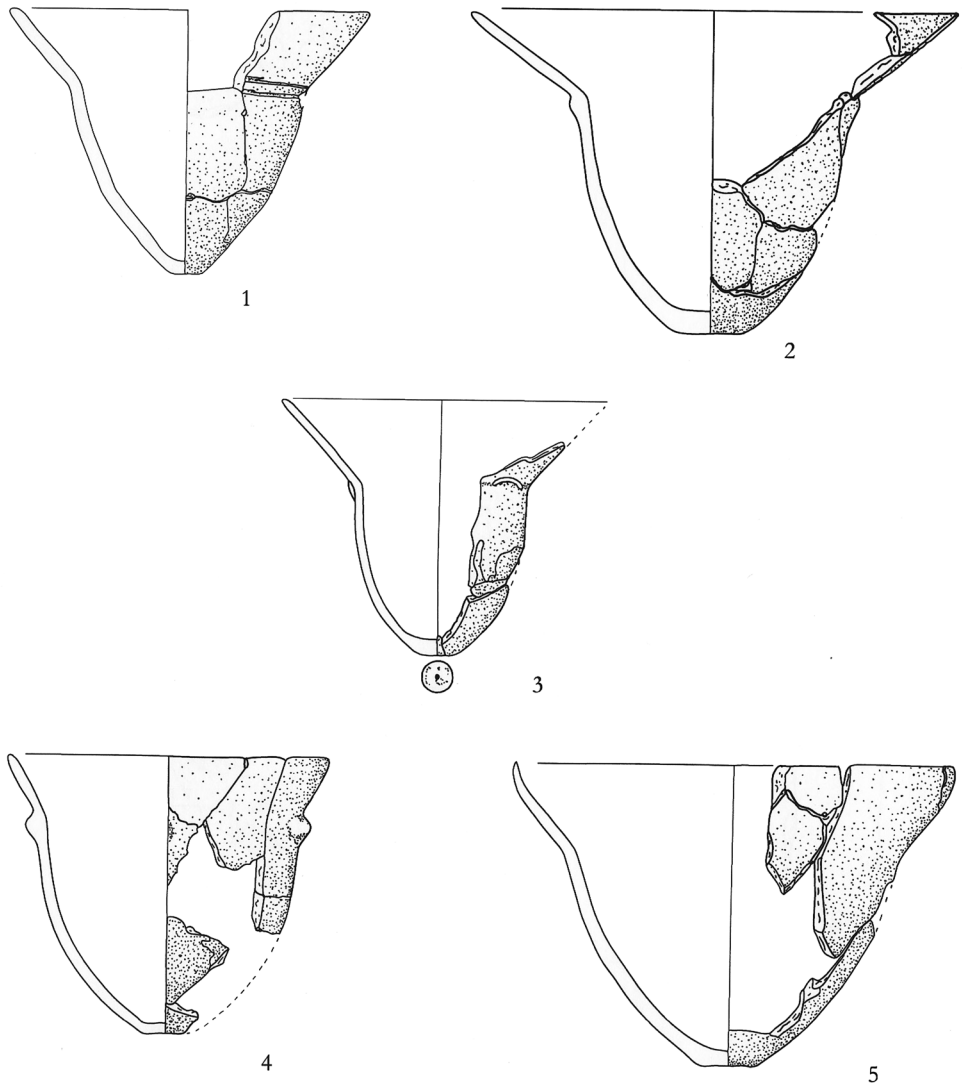

Fig. 13. Tulip-shaped funnel beakers from Brunn 17 in Mecklenburg-Vorpommern (after Vogt *2009). Scale 1:4.*

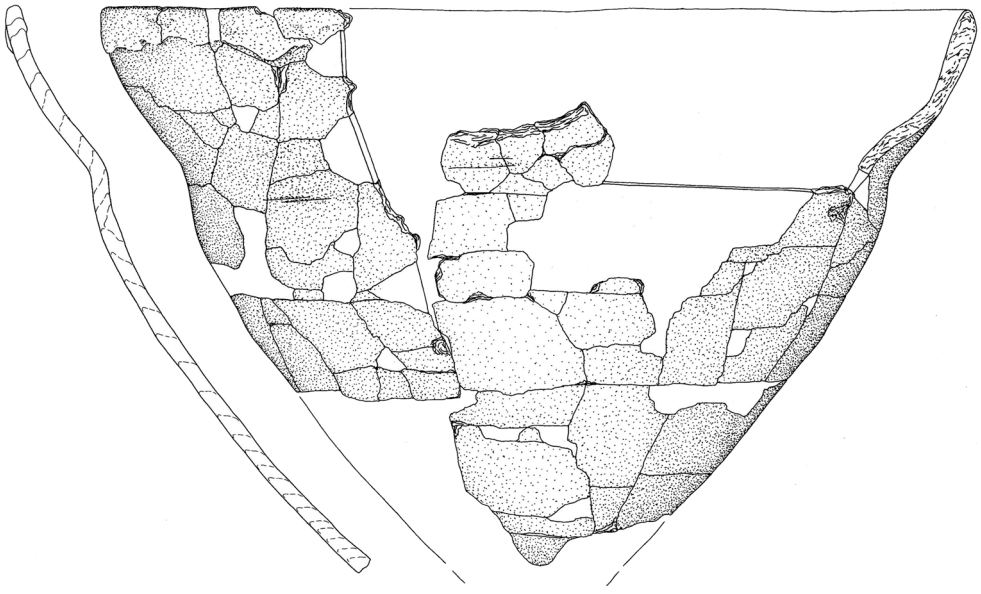

Fig. 14. A tulip-shaped beaker from Øgårde 19 on Zealand (after Koch *1998). Scale 1:4.*

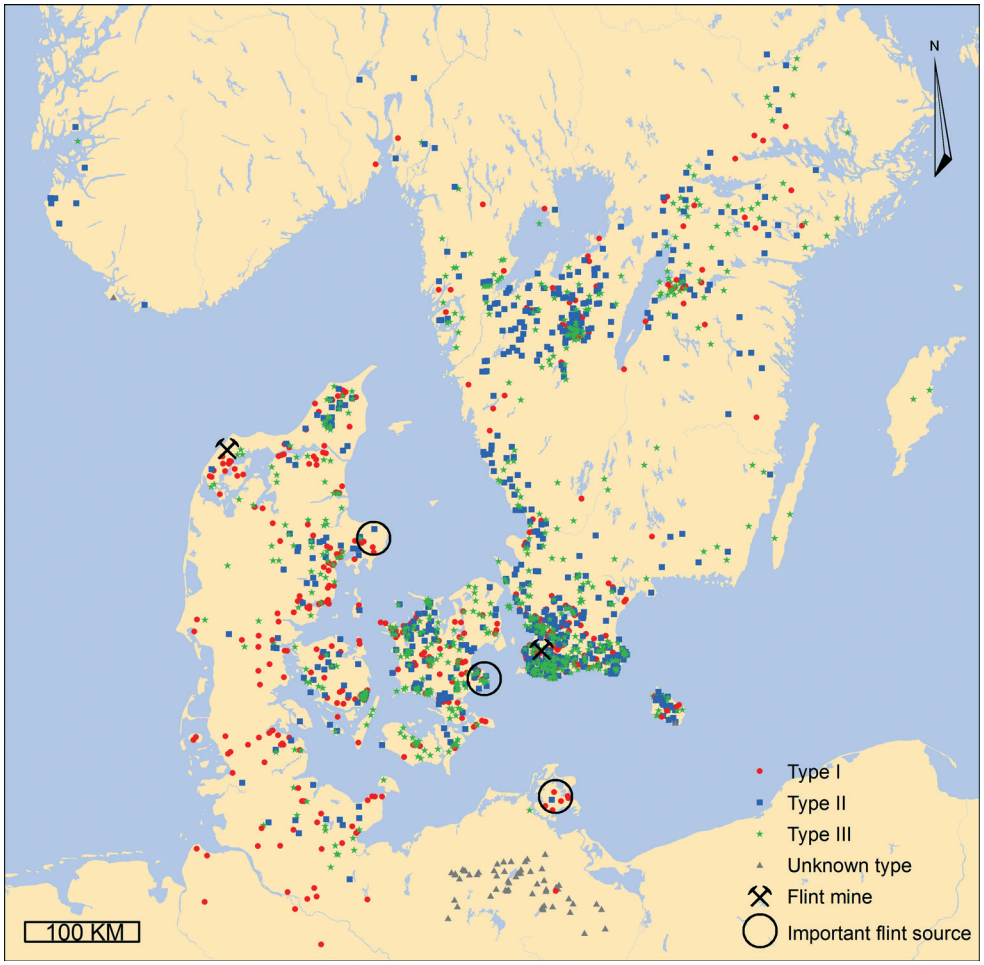

Fig. 15. Distribution of pointed-butted flint axes, flint mines and important flint sources in southern Scandinavia and northern Germany (partly after Østmo 1986; Hernek 1988; Blomqvist 1990; Brauer 1999; Hallgren 2008; Hirsch et al. 2007; Nielsen 2009; Vogt 2009; Sørensen 2012).

axes have been interpreted as mediators of the agrarian ideology, which connected different Neolithic societies across Europe (Pétrequin et al. 2012; Sørensen 2013).The pointed-butted flint axes can be characterized as being imitations of jade axes, which also suggests an extensive contact with the Michelsberg culture.

Radiocarbon dates of the various contexts with pointed-butted flint axes in southern Scandinavia concentrate from 4000 to 3600 calBC. The pointed-butted flint axes have been regarded as being partly synchronic with thin-butted axes of type I–IV. While the dated contexts of the thin-butted axes cluster to 3700–3300 calBC, there exists some overlap between these axe types (Sørensen 2012). However, axe hoards have shown that pointed-butted axes of type 1 have not been found together with any thin-butted axes, thus suggesting that pointed and thin-butted axes are not used at the same time (Nielsen 1977; Karsten 1994). A large production site of the pointed-butted flint axes (including preforms) was located close to or in the flint mines at Hov in northern Jutland, Stevns on eastern Zealand and Sallerup in Scania (Becker 1980; 1993; Olausson et al. 1980; Rudebeck 1998) (Fig. 15). The further manufacture of pointed-butted axes has been observed on the site of Almhov, which is located near the flint mines at Sallerup, Scania (Rudebeck 2010). Large assemblages of several hundred kilos of flakes from the various manufacturing stages were found in the many pits at Almhov. Up to 40 pointed butted axes were found at the site, making it the largest assemblage of this kind in southern Scandinavia. The production scale suggests a systematic manufacturing process, where many axes were intended for further distribution to neighbouring regions poor in flint resources (Fig. 15). Radiocarbon dates of charcoal and animal remains found in the mineshafts at Hov in Northern Jutland and Södra Sallerup in Scania suggest systematic flint mining activities from

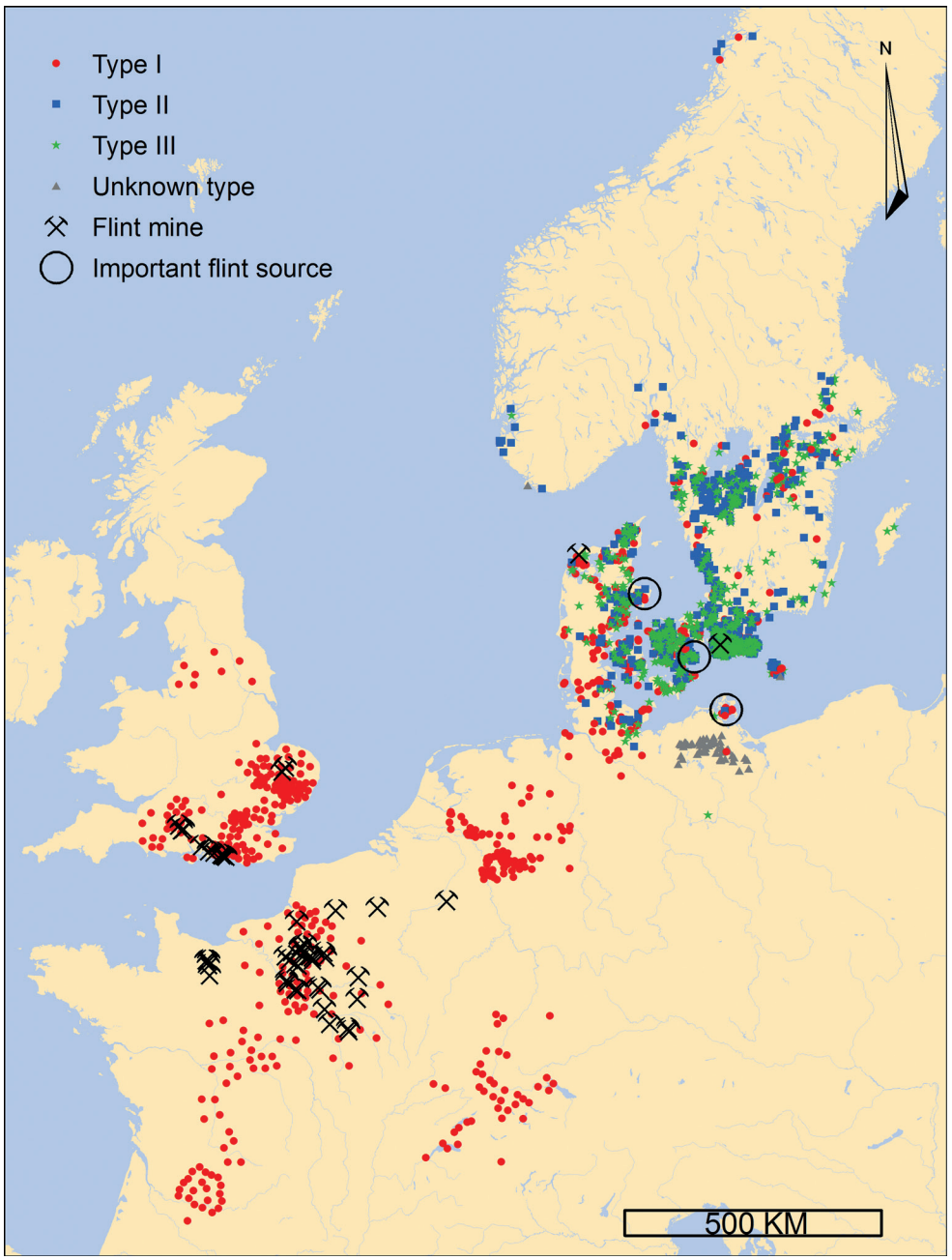

Fig. 16. Distribution of pointed-butted flint axes, flint mines and important flint sources in western Europe (after Åberg *1912;* Brandt *1967;* Schut *1991;* Bostyn/Lanchon *1992;* Barber et al. *1999;* Brauer *1999;* Collet et al. *2004: 151ff;* Pétrequin et al. *2010;* De Grooth et al. *2011, 77pp;* Giligny et al. *2012, 1167;* Sørensen *2012).*

4000 calBC onwards (Sørensen 2012). These southern Scandinavian mines are almost synchronic with other flint mines in Central Europe and Britain, where a similar pattern occurs with high concentrations of pointed-butted axes near the flint mines (Bostyn/Lanchon 1992; Barber et al. 1999; Collet et al. 2004: 151ff; De Grooth et al. 2011: 77ff; Giligny et al. 2012: 1167; Sørensen 2012). Deep mining after flint is a characteristic feature of the Central European Michelsberg culture (4400–3500 calBC) and it is possible, that this technical knowhow was introduced to both Britain and southern Scandinavia by migrating farmers from Central Europe (Fig. 16). All these observations indicate that the origin of the Funnel Beaker culture should be connected to the expansion of pioneering groups, which derived from or had close social relations with people from the Michelsberg culture.

Previously it was proposed that the Funnel Beaker culture derived from the Polish Plain. This hypothesis was based on the many sites containing typical funnel beaker ceramics, especially in the Kujavia region (Becker 1947; Lichardus

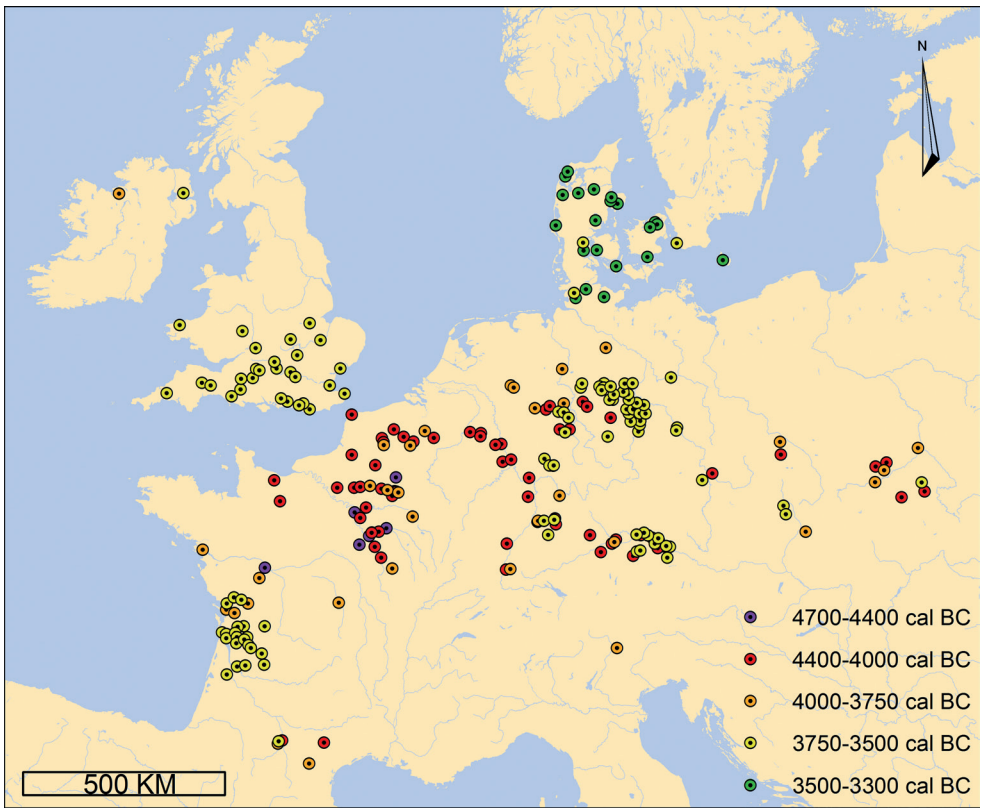

Fig. 17. Distribution of causewayed enclosures in central Europe (after Andersen 1997; Jeunesse 1998; Nielsen 2004; Raetzel-Fabian 2009; Geschwinde/ Raetzel-Fabian 2009; Klatt 2009; Cooney et al. 2011; Whittle et al. 2011; Lützau Pedersen/Witte 2012; Andersson/Wallebom 2013; Andresen 2013; Klassen in press; personal communication P. Østergård Sørensen, Roskilde Museum and C. Casati, Folkemuseet Hillerød).

1976; Midgley 1992; Persson 1999). This interpretation was supported by one radiocarbon date (GrN-5035, 5570 ± 60 BP), deriving from a charcoal found in a pit with short-necked funnel beakers, located below a long barrow on the site Sarnowo (Gabałówna 1970; Wiklak 1982). However, several new radiocarbon dates on charcoal from pits containing funnel beakers, jars, flasks, discs and spoons from the site Redecz Krukowy 20 now cluster to 4000–3800 calBC (Wstępne 2012, 216). These results support the argument of a large-scale synchronic introduction of funnel beakers from Michelsberg societies in many parts of northern Europe (Höhn 2002; Klassen 2004; Sheridan 2010). The first impulses in the creation of the Funnel Beaker culture appear to have originated from Central European Neolithic societies, but there are also influences from the eastern parts of Central Europe in the shape polygonal battle axes, copper artefacts and import of highly decorated pottery at Dąbki originating from the Bodrogkersztür culture (Zápotocký 1992; Klassen 2000; Hallgren 2008; Czekaj-Zastawny et al. 2011; Sørensen 2012). Generally the Funnel Beaker culture can be characterized as a crucible receiving a wide spread of impulses from various Neolithic societies in Europe. In this context regional preferences could emerge through style drifts (Klassen 2004; Sheridan 2010). Some of these regional preferences could result in the lack of tulip-shaped beakers in southern Scandinavia and the absence of pointed-butted flint axes east of the river Oder (Koch 1998; Sørensen 2012).

Reasons for the expansion of the Michelsberg culture

That the impulses from the Michelsberg culture had such an important impact in northern Europe might be explained by the expansion of interconnected immigrating groups. This hypothesis is supported by concentrations of causewayed enclosures dated to the period 4200–3500 calBC in Lower Saxony and Sachsen-Anhalt. They resemble the architectural trends (oval shaped structures with frequent ditches or dykes) of earlier enclosures from the Michelsberg culture (Andersen 1997; Geschwinde/ Raetzel-Fabian 2009; Klassen in press)

(Fig. 17). The reason why the Michelsberg culture expanded is still debated and several suggestions involving population pressure, conflicts or climate changes have been proposed (Gronenborn 2007; Shennan 2009). It is clear that a reorganization of social gatherings within the core area of the Michelsberg culture probably resulted in major building activities of causewayed enclosures in the period 4400–4000 calBC, promoting a further expansion towards new territories in central Germany (Lüning 1967). Some causewayed enclosures could have served as fortified refuges in times of conflict, based on their location in landscape and the considerable size of the ditches (Andersen 1997; Gronenborn 2010). Signs of conflict and violence are found in the Michelsberg culture, as some human skeletons found in pits on settlements or in ditches of the enclosures are showing signs of head fractures (Wahl/Höhn 1988; Nickel 1997; Christensen 2004). Increasing territorial demands in certain regions could have resulted in a higher degree of conflicts and building of enclosures, which could have led some groups of people to migrate further north. However, if pioneering farmers migrated from central parts of Germany to southern Scandinavia, then it is strange that no enclosures have been dated to around 4000 calBC in this region.

Maybe the population of these pioneering farmers was to wide spread and social gatherings may have materialized in more simple constructions during the earliest parts of the Early Neolithic, like the pair pits on the Almhov site? These simple constructions could be hiding within the complex stratigraphy of the regular causewayed enclosures or below long barrows, thus pushing the social gatherings back to the beginning of the 4th millennium (Madsen 2009; Klassen in press). The first regular causewayed enclosures were built some centuries later in southern Scandinavia, when a more centralized social organization of the agrarian societies had emerged around 3500 calBC (Andersen 1997; Geschwinde/Raetzel-Fabian 2009). However, radiocarbon dates from ditches should be treated with caution, as they could be dating later recuts or refills and not the earliest phases of the structure. Recently a causewayed enclosure at Starup in southern Jutland and Döserygg in Scania was dated to 3800–3500 calBC, thus being the earliest dated enclosures in southern Scandinavia (Lützau Pedersen/Witte 2012; Andersson/Wallebom 2013; Klassen in press). The first pioneering farmers probably consisted of a very limited number of people, where the main objective was to clear the forest for agrarian activities. Marking territories was probably not necessary until several centuries later, when long barrows from 3800 calBC onwards were constructed on top of former Early Neolithic sites from the A-group (Madsen 1975; Skaarup 1975; Madsen/Petersen 1984; Liversage 1981; 1992; Rudebeck 2002). The impulses from the Michelsberg/Baalberg cultures seem to continue with the introduction of different burial structures such as long barrows from c. 3800 calBC and megaliths from c. 3500 calBC in southern Scandinavia (Midgley 1992; Kaul 1998; Rassmann 2011; Rzepecki 2011; Ebbesen 2011). The emergence of the Funnel Beaker culture is therefore closely related to the Michelsberg culture. These pioneering groups of farmers probably established themselves in smaller colonies, where they interacted with the indigenous populations. Currently the archaeological evidences points towards a process of leap-frog, punctuated or sporadic immigration, which could be responsible for the expansion of agrarian societies into southern Scandinavia (Madsen 1987; Klassen 2004; Rowley-Conwy 2011). Leap-frog colonization is described as pioneering groups of humans, that settle in targeted areas, thus forming smaller colonies among the indigenous populations, which is followed by a phase of integration (Zilhão 1993; Moore 2001). Nevertheless, other combinations of movement and contact such as folk migration, demic diffusion, elite dominance, infiltration or frontier mobility could also be responsible for the expansion of the agrarian societies (Zvelebil 1998). The indigenous population plays an active role in the creation of social networks and alliances with the pioneering farmers, which could be revealed by some distribution patterns of key artefacts from the period 4400–3500 calBC.

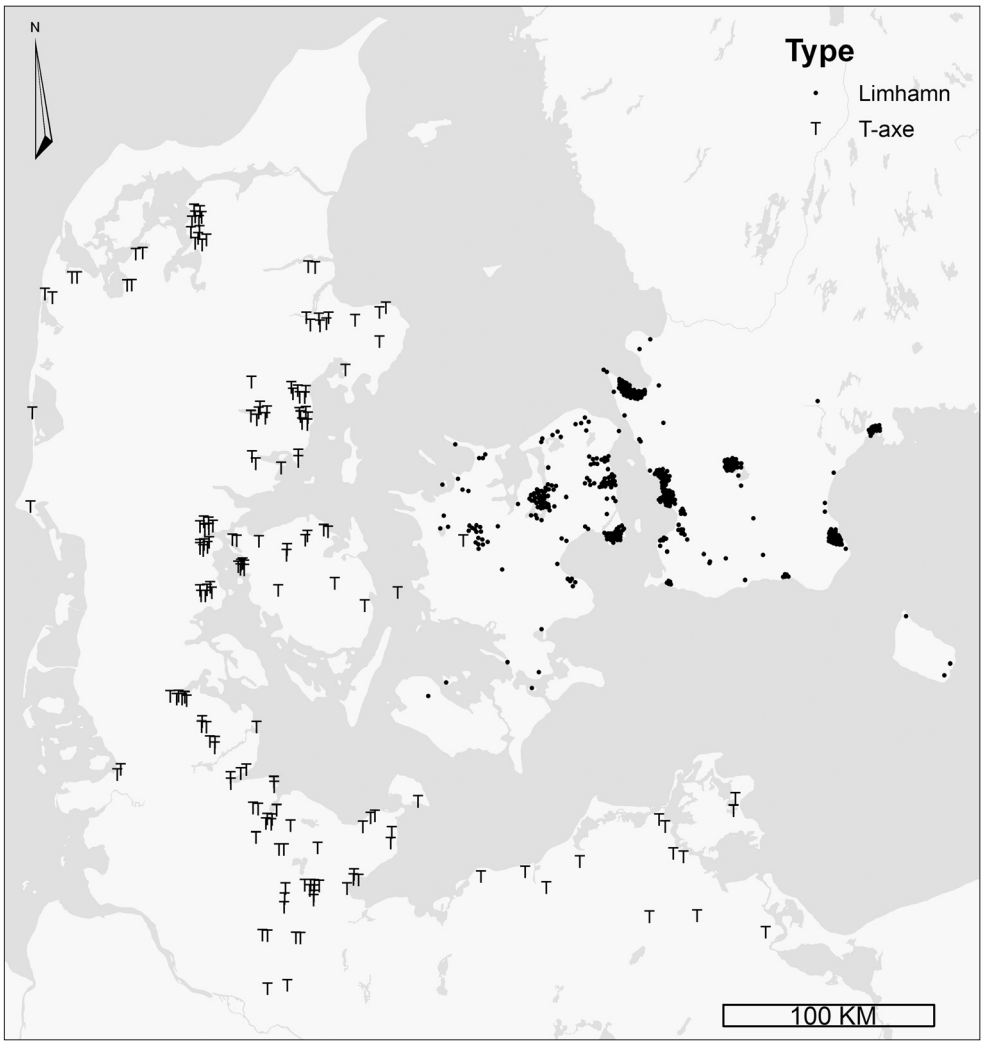

Fig. 18. Distribution of T-shaped antler axes and Limhamn greenstone axes in southern Scandinavia (after Petersen 1984; Andersen 1998; Nicolaisen 2009; personal communication S. Hartz).

Distribution patterns of ceramics and other key artefacts

Regional style differences within the ceramic material of the Ertebølle culture have been observed in the shaping of the base (Hulthén 1977) (Fig. 1). A tap-formed to oval shaped nob has been observed on the Ertebølle vessels in Scania and on Bornholm, whereas a more pointed base shaping has been documented on Zealand, Funen, Jutland, Schleswig-Holstein and northern Poland (Prangsgård 1992; Hartz 2008; Kabaciński/Terberger 2008). Other regional variations within the Ertebølle culture have been proposed by measuring the thickness, investigating the manufacturing techniques and shapes of the vessels (Andersen 2008c). The eastern and north-eastern part of Denmark and Scania is dominated by thick sherds made in the H-built technique, and cylindrical and S-shaped vessels both occur. The west and south-western parts of Denmark are dominated by thinner sherds made in the U-built technique and by S-shaped vessels. These results are supported by previous studies of T-shaped antler axes, bone rings and bone combs being concentrated in Jutland and Schleswig-Holstein, whereas Limhamn greenstone axes and curved harpoons are found on Zealand and in Scania (Fig. 18). Even regional groups on Zealand have been suggested being based on differences within the flake axe assemblages (Petersen 1984).

The difference between Jutland, Zealand and Scania is clearly connected to the fact that these regions are separated by larger straits at Storebælt and Øresund

serving as natural borders in the prehistory. The fact that Zealand became an island during the continuous Boreal and Atlantic transgressions created differences in the faunal assemblage, which explains the lack of bone rings made of aurochs scapulae and T-shaped antler axes on Zealand. The aurochs became extinct after the Boreal phase and the red deer became so reduced in their size that their antlers were unsuitable for making antler axes. The T-shaped antler axes and the bone rings from Jutland are clearly continental impulses, thus showing that the hunter-gatherers in the Ertebølle culture were either directly or indirectly linked to societies in Central Europe. The wide distribution of perforated shoe-last-axes also confirms the continental connections with agrarian societies (Klassen 2004). Provenance studies of the shoe-last axes of amphibolite were firstly believed to have originated from unknown quarries in the Balkan or the West Carpathian area, but current research has found outcrops located in the Czech Republic or the Slovakian Republic (Schwarz-Mackensen/Schneider 1983; 1986; Illásová/Hovorka 1995; Raemaekers et al. 2010; Bernardini et al. 2013). The symbolic meaning behind the shoe-last axes as important markers of status appears to have been lost in the Ertebølle culture, as many of the axes have been found in normal garbage layers. Many shoe-last axes were also showing heavy traces of use, and it seems as if they only served as practical tools in the Ertebølle societies. Personal preferences among hunter-gatherers probably played an important role in defining what could be regarded as objects of status, which could be the reason why a few shoe-last axes are found in fine condition and in only one case are found in a hoard (Lomborg 1962; Fischer 2002; Klassen 2004). But if the shoe-last axes were important symbolic markers, then one would expect local imitations made of local raw materials to emerge, but this did not happen (Sørensen 2012). It is therefore more likely that these hunter-gatherers were part of an indirect exchange system, which had limited contact with agrarian societies, thus explaining the lack of agrarian activities in the Ertebølle culture (Sørensen/Karg 2012).

The emergence of a more unified material culture

The regional differences within the Ertebølle culture appear to have disappeared or developed into a more unified Funnel Beaker culture, which during the earliest stages has been influenced by impulses from the Michelsberg culture. This argument is supported by the distribution of pointed-butted flint axes and short-necked funnel beakers, bowl, flasks and clay discs, which are showing similarities across most of the northern European plain (Lichardus 1976; Nielsen 1984; Midgley 1992; Hallgren 2008; Hartz 2008; Wstępne 2012; Raemaekers et al. 2012). The introduction of an agrarian-based subsistence and a new material culture was probably caused by a leap-frog migration of smaller groups of pioneering farmers, which could have been interlinked with the Michelsberg culture (Anthony 1990; Moore 2001; Klassen 2004; Rowley-Conwy 2011; Sørensen/Karg 2012). Sites like Hüde I, Schönermark, Lübeck-Genin, Brunn 17 and Flintbek LA 48 have all, based on their ceramic assemblages, been associated with the Michelsberg culture (Fig. 11; Tab. 3).

These sites could exemplify pioneering groups of farmers, who settled within the border zone of the Ertebølle culture and interacted with hunter-gatherer groups located in the coastal zone (Hartz 2008). However, the distribution of pointed-butted axes in Schleswig-Holstein is showing a widely spread inland habitation, which could have resulted in more random social relations between pioneering farmers and hunter-gatherers (Fig. 16). But the distribution of pointed-butted axes and short necked funnel beakers has shown a clear concentration in Binnenland located in Mecklenburg-Vorpommeren, which could have served as places of origin for pioneering farmers migrating into regions like Scania (see below; Brauer 1999; Moore 2001; Vogt 2009; Fig. 15). Here the transportation of animals, people and material culture by boats were of cardinal importance. People may have sailed along the coastlines and larger creeks into southern Scandinavia, thus spreading new ideas and technology and maintaining contact with the motherland (Rowley-

Conwy 2011). One representative of these prime movers of agrarian technology and ideology is the Dragsholm man, who was buried in a kitchen midden and equipped as a warrior (Brinch Petersen 2008a). Transportations by boats could be one of the reasons behind the similarities in material culture within the Funnel Beaker culture. Furthermore it could optimize the social relations between agrarian societies, thus explaining the swift spread of Funnel Beaker culture all the way up to central parts of Sweden and southern parts of Norway (Østmo 1986; Hallgren 2008; Glørstad 2012). Even sea faring trips across open waters have occurred, as agrarian societies appear on the islands of Bornholm and Gotland around 4000 calBC (Lindqvist/Possnert 1997; Casati/Sørensen 2006; Nielsen 2009). Finds of imported flint axes on Bornholm and domestic animals on Gotland bear witness of seagoing travels, which succeeded. However, finds of three Early Neolithic lugged vessels, found in deeper waters near the coast of Bornholm could indicate, that some ventures went wrong (Nielsen/Nielsen 1990).

Most of the short-necked funnel beakers have been found on coastal or lake shore sites in southern Scandinavia. They have always been found in layers located in a stratigraphic position above Ertebølle layers (Andersen 2008c) (Fig. 11; Tab. 3). The continued habitation near the coastal and lake shore sites indicates a high degree of place continuity, although domestic animals occur on the sites. Signs of change can be observed around 4000 calBC with the emergence of a new type of inland site, located on easily arable soils. The artefact assemblages from these sites have often been found in pits, thus pointing towards new depositional practices with parallels to the agrarian societies in central Europe (Lüning 1967; Biel et al. 1998; Kirsch 1993; Klassen 2004; Jeunesse 2011).The archaeological visibility of these inland sites is relatively low, as they are both difficult to find and badly preserved. They often consist of smaller cultural layers and some shallow pits located just below the subsoil, which makes them vulnerable for modern disturbances. These inland sites are clearly underrepresented in the archaeological record compared to the easy detectable coastal and lake shore sites. The potential of finding a large number of inland sites is illustrated by the distribution of pointed butted axes (Fig. 15). These axes concentrated not only near the flint mines, but also in areas further inland, which contained very few Ertebølle/Late Mesolithic finds. The quality and visibility of our archaeological data is unevenly spread, but some regions like Scania and Bornholm do show hoards of pointed butted axes, concentrations of pointed-butted axes and short-necked funnel beakers located on easily arable inland sites (Larsson 1984; Hernek 1988; Karsten 1994; Hadevik 2009; Rudebeck 2010; Sørensen 2012).

Continuity and changes

The Early Neolithic period in Southern Scandinavia demonstrates the ermergence of an agrarian way of life supplemented by some hunting and fishing which was practiced on inland oriented sites. At the same time, hunting and fishing activities supplemented by some herding of domesticated animals took place on coastal and lake shore sites (Sørensen/Karg 2012). Are we dealing with farmers moving between the coastal and inland zone or with a cultural dualism? The few domesticated animals at the coastal and lake shore sites could be interpreted as initial herding activities by communities that still live as hunter/gatherer/fishers. However, if hunter-gatherers had started to keep domesticated animals all year round, they would have needed to collect huge amounts of winter fodder, thus changing their economic strategy and their way of life. The complexity of agricultural technologies, especially regarding crop cultivation, requires long-term experience in order to succeed (Steensberg 1979; Lüning 2000; Ehrmann et al. 2009; Schier 2009). If these hunter-gatherers wanted to succeed as farmers, they had to integrate with agrarian societies. The sudden appearance of a new material culture (short necked funnel beakers, clay discs, pointed butted axes and polygonal battle axes), could suggest that agriculture was introduced by smaller groups of pioneering

farmers from Central Europe. The impact of these pioneering farmers within the archaeological record is dependent on the local hunter-gatherers' ability and desire to integrate with the incoming farmers, making the neolithization process different from region to region (Sørensen 2012).

An example of a swift transition towards agrarian subsistence and ideology

Scania is a region where the transition towards an agrarian way of life was a rapid one. The hypothesis is supported by the many dates of cereals being ascribed to the earliest parts of the Early Neolithic I (4000–3800 calBC). Systematic crop cultivation and subsequently the change towards a more open landscape is also observed from 4000 calBC in many pollen diagrams in Scania (Engelmark/Viklund 1990; Engelmark 1992; Regnell 1998; Regnell/Sjögren 2006; Lagerås 2008). Furthermore, a new procurement method through the extraction of flint by mining has been observed in Sallerup from around 4000 calBC (Sørensen 2012). The systematic extraction of flint nodules having a high quality was used to produce pointed butted axes (Fig. 15). The axes were used to clear the forest and they play a key role in creating a more open landscape. The distribution of these axes reveals an inland distribution, thus demonstrating a swift change towards a more inland orientated settlement pattern (Olausson et al. 1980; Hernek 1988).

An example of a slow transition towards an agrarian subsistence

The transitional process may also have involved a time of cultural dualism consisting of indigenous hunter-gatherers and incoming farmers, who exchanged material culture with each other, but the interaction did not necesarrily result into any greater change towards an agrarian subsistence. Such a scenario has been proposed in connection with the investigations of the kitchen middens in northern Jutland containing layers from the Late Ertebølle and the Early Funnel Beaker cultures (Andersen 2008b; Enghoff 2011). Andersen favours a slow transition, based on the coastal orientation of many funnel beaker sites and the absence of large inland sites in northern Jutland. Furthermore, in his excavations of the Early Neolithic kitchen middens in northern Jutland (Norsminde, Bjørnsholm, Visborg, Krabbesholm and Havnø) Andersen has not found any evidence of large-scale cultivation or animal husbandry. The lack of clay discs and spoons on many of the early Neolithic coastal or lake shore sites in general seems to support a slow transition. Nontheless, the limited agrarian activities on the coastal and lake shore sites have led to researchers arguing that these were short-term seasonal catching sites, with the actual agrarian settlement sites located further inland (Skaarup 1973; Nielsen 1984). However, Andersen states that the distinction between coastal and inland sites is artificial. He interprets the majority of Early Neolithic sites as oriented towards the coast and in a few cases along streams and lakes, where the main activity was foraging. Andersen describes these people as fisher-farmers, but acknowledges that the changes in material culture were rapid, whilst the introduction of the agrarian way of life was a long process.

Alternatively, it could be argued that the coastal sites were inhabited by commuting farmers during the early EN I and that the real agrarian inland was located in some distance from the coast. The commuting theory could be tested by investigating the seasonal indicators present at the coastal kitchen midden sites from the Early Neolithic, which should reflect short durations. But unfortunately no such seasonal data is currently available from the Early Neolithic kitchen middens. However, the occupation layers in the kitchen middens show the same thickness for the Late Ertebølle and Early Funnel Beaker cultures, which challenge the idea of commuting farmers (Andersen 2008b). If there were agrarian inland sites located along the Limfjord, these would be revealed by the distribution of pointed-butted flint axes. But the inland zone around the Limfjord has not produced many pointed-butted axes, thus indicating that the main sites were in fact located along the coast. It is first in the later part of the Early Neolithic around 3600 calBC that the coastal sites are abandoned and a

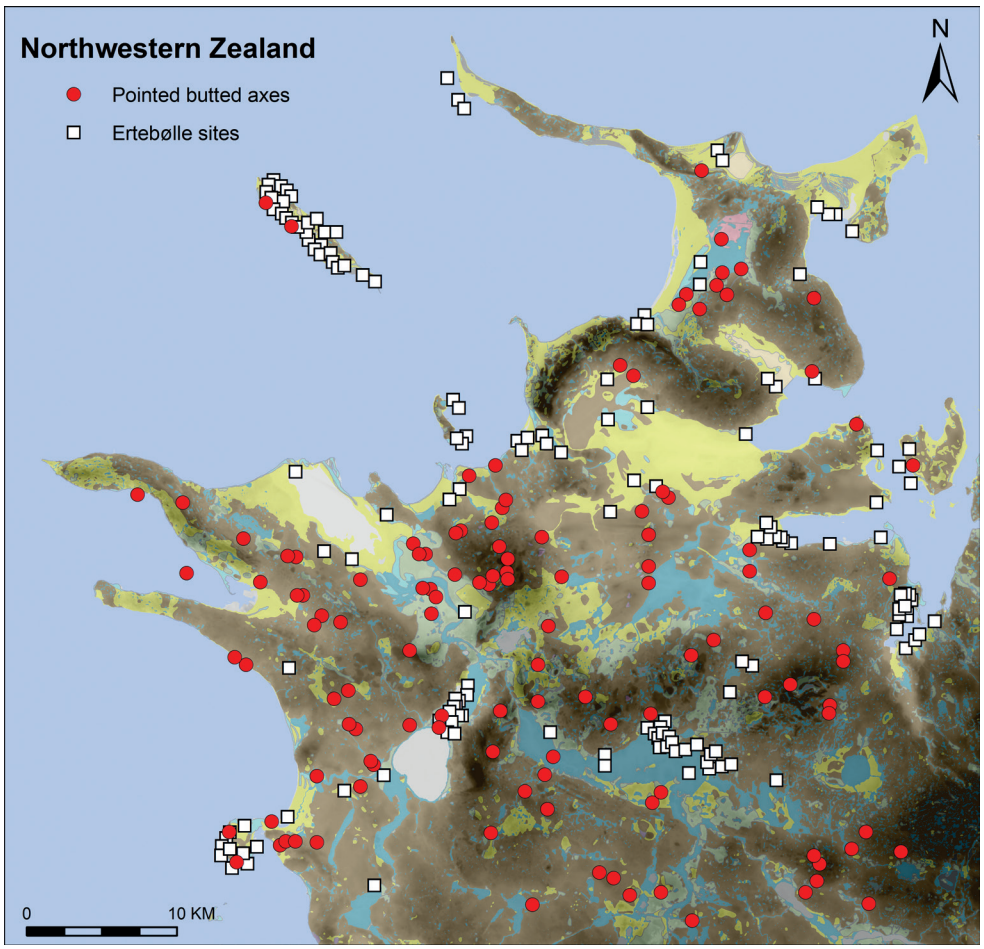

Fig. 19. Distribution of Ertebølle sites and possible Early Neolithic sites, based on pointed-butted axes of type 1 and 2 in northwestern Zealand (after Mathiassen 1959; Price/Gebauer 2005).

larger number of inland sites is observed. Currently these observations point more towards a continuity of a hunter-gatherer habitation during the earliest stages of the Early Neolithic rather than supporting the theory of commuting farmers.

An example of commuting farmers

An alternative to the theory of cultural dualism could be a situation, where farmers were commuting between the inland and lake shore zone, thus resulting in different activities. Such a situation might be found in the Åmose basin, where the Early Neolithic hunting/gathering/fishing sites were located near the lake shore. These sites were seasonally occupied during the summer months,similar to the earlier Ertebølle lake shore sites. Sites with more potential for cultivation, marked by the finds of pointed-butted axes, were located on higher grounds around the Åmose Lake (Fig. 19). The faunal material from the Early Neolithic lake shore sites are dominated by red and roe deer and a few domestic animals, thus suggesting hunting and herding activities during the warmer parts of the year (Noe-Nygaard 1995; Gotfredsen 1998; Fischer 2002). The hunting activity in the Åmose basin is a continuation of behaviour going back to the Ertebølle culture, where people through generations have exploited the same hunting grounds during the same time of the year. The emergence of a group of commuting farmers in North-West Zealand during the early EN I could suggest that the transition towards an agrarian society and the integration of the local hunter-gatherers was a swift process in this region. Particular important for suggesting a swift transition in this region is connected to the Dragsholm man (Brinch Petersen 1974). He may represent an example of a "Big man" who had the competences and ability to disseminate information about agrarian practices. The fact that he was

buried as a warrior at a coastal site could indicate that he and other pioneering farmers were engaged in agrarian practices together with the indigenous population in this region. He and his fellow farmers could thus be interpreted as the primary carriers of agrarian practices and ideology, who laid the foundations for an agrarian society in north-western Zealand. Generally several explanations of how the neolithisation process occured in different regions would be depended on several factors depending on the landscape and personal relations between the indigenous population and the incoming farmers.

The minor differences in material culture

Despite a possible phase of cultural dualism, material culture shows strong similarities across several regions in southern Scandinavia until 3800–3500 calBC, when minor differences appear. In the period 3800–3500 calBC most coastal sites were abandoned and a more dense concentration of inland sites emerges together with specialized hunting and fishing sites in the coastal and lake shore zones (Skaarup 1973; Koch 2003; Andersen 2008b). It seems that the indigenous population all became farmers and moved to the easily arable inland sites, but supplemented their subsistence with hunting and fishing activities. The former differences in material culture within the Ertebølle culture reappear during the later part of the Early Neolithic, thus respecting once again the natural borders in southern Scandinavia (Figs 1, 11, 15, 18). The minor differences can be observed in the emergence of different ornamental styles on the funnels beakers. Volling is concentrated in Jutland, Svaleklint on Zealand, Svenstorp-Mossby-Siretorp style in Scania and Blekinge (Madsen/Petersen 1984; Larsson 1984). Further south the Siggeneben-Süd-Sattrup-Stengade II concentrates on Langeland and in Schleswig-Holstein (Klassen 2004). On Bornholm beakers have been classified based on vessel shapes (Nielsen 2009). Further north the Vrå style concentrates in eastern central Sweden, while still unnamed ornamental styles dominated by twisted-cord impressions can be observed in western Sweden and southern parts of Norway (Skjølsvold 1977; Nærøy 1987; Olsen 1992; Åstveit 1999; Hallgren 2008; Åhrberg 2011; Sjögren 2012) (Fig. 20). These borders within the ceramic styles in southern Scandinavia are further supported by the distribution of hoards containing thin-butted axes. Type I, II and III are observed on Zealand and Scania, whereas type IV mainly concentrates in Jutland (Nielsen 1977) (Fig. 21).

Concluding remarks

The emergence of pointed-base vessels is part of a hunter-gatherer pottery tradition, which first appeared around 4800 calBC during the Ertebølle culture in southern Scandinavia. Around 4000 calBC the pointed-base vessels disappear and funnel beakers emerge together with the first agrarian societies in southern Scandinavia. Different typologies of the funnel beakers have been suggested, based on measurements and ornamental styles. Especially the typology suggested by Eva Koch has been verified in other more regional studies. The neck of the beakers tends to become longer during the Early Neolithic. The A-group (Oxie/type 0–I) is characterized by short-necked beakers. The B-group (type II and III) contains beakers with a medium height and many local ornamental styles, whereas the C-group (type IV and V) is characterized by beakers with longer necks and vertical lines on the belly of the vessels. The radiocarbon dates of contexts containing short-necked funnel beakers (type 0–I) or food crusts of them mostly date to 4000–3800 calBC, whereas beakers with necks with a medium-height neck (type II–III) cluster in the period 3800–3600 calBC. Dates for beakers with a longer neck (type IV–V) concentrate in the period 3600–3300 calBC. Comparisons between the pointed-base vessels and funnel beakers in terms of technology and use clearly indicate different manufacturing and cooking traditions. More importantly the pointed-base vessels have only been used for domestic purposes, whereas the funnel beakers also have been used in rituals. A wide range of funnel beaker vessels including bowls, flasks and accessories like clay discs and spoons were also observed in southern

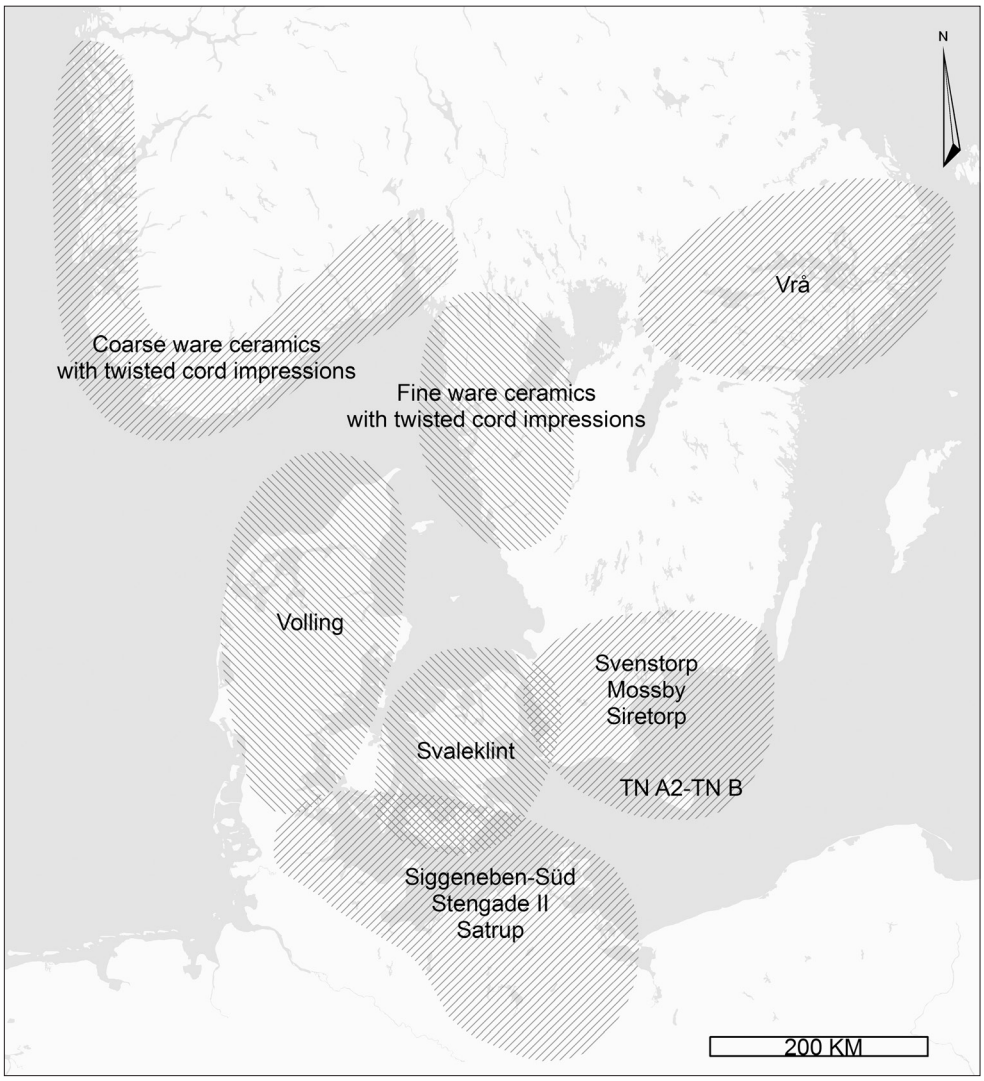

Fig. 20. Distribution of regional ceramic groups during the later part of EN 1 (after Skaarup 1975; Madsen/Petersen 1984; Larsson 1984; Klassen 2004; Hallgren 2008; Nielsen 2009).

Scandinavia around 4000 calBC. All these ceramic types have often been found in pits on inland oriented sites located on easily arable soil. The depositional practice of ceramic assemblages in pits is a phenomenon observed in neighbouring agrarian societies, thus indicating external influences. Funnel beakers also appear in cultural layers on coastal and lake shore sites. Generally the ceramic assemblages from the A-group/ Oxie/type 0–I show similarities to the Michelsberg culture. Southern Scandinavia is not the only region, which seems to be under the influence of the Michelsberg culture, as similar short-necked funnel beakers have been found in many parts of northern Europe around 4000 calBC.

Another influence from the Michelsberg culture can be seen in the arrival of pointed-butted flint axes in northern Europe, southern Scandinavia and Britain around 4000 calBC. In southern Scandinavia the pointed butted axes concentrate in the flint mine areas, which have been established around 4000 calBC, making them synchronic with the mines in the Michelsberg culture. Deep mining after flint is a characteristic phenomenon in the Michelsberg culture and this technical knowhow was introduced to southern Scandinavia by pioneering groups of farmers. These pioneering farmers were probably interlinked with the Michelsberg culture and can be characterized as the prime movers behind the introduction of the agrarian way of life in southern Scandinavia. The reason behind the large-scale expansion of the Michelsberg culture is unsolved, but building of many causewayed enclosures could be interpreted as a sign of internal social instability and reorganization of territories,

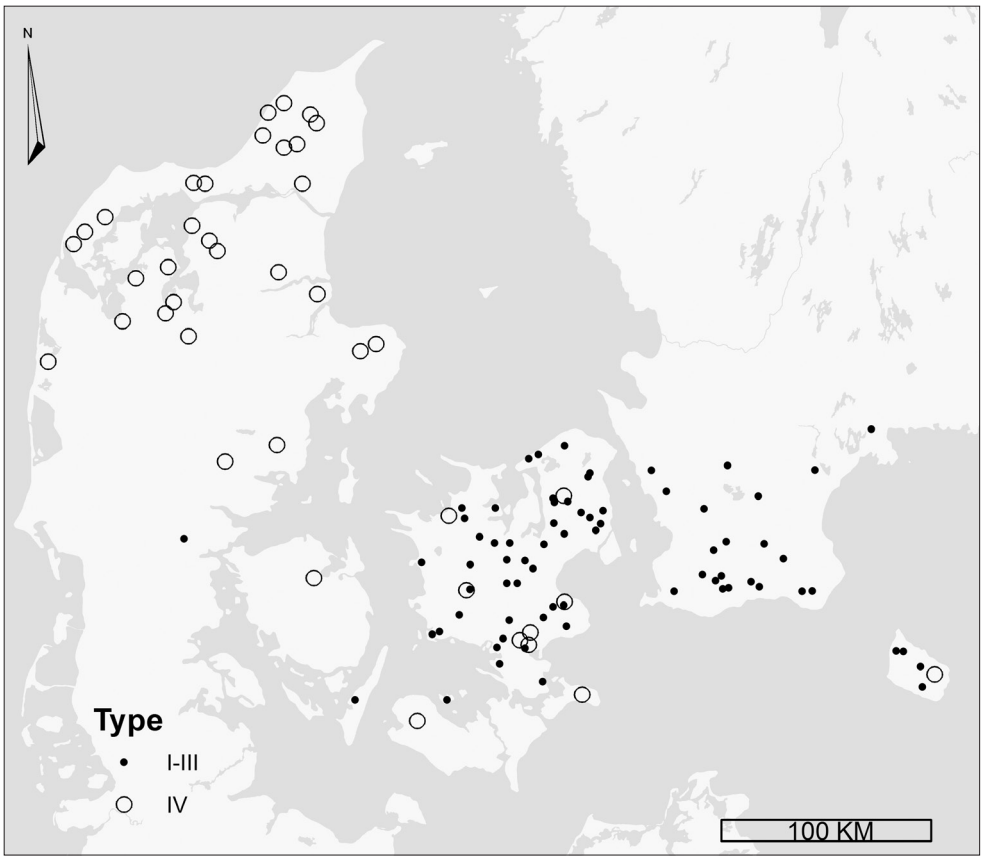

Fig. 21. Distribution of thin-butted axe hoards of type I–III and IV in southern Scandinavia (after Nielsen 1977).

thus resulting in several migrations of pioneers seeking new lands. These pioneering groups probably established themselves in smaller colonies, where they interacted with the indigenous populations, thus supporting a leap-frog colonization as a mode of mobility and contact. Leap-frog colonization is characterized by a small group of people, who settles in specific areas and forms minor colonies among the indigenous populations, which is followed by integration between the two populations. However, we should not rule out other combinations of movement and contacts such as folk migration, demic diffusion, elite dominance, infiltration or frontier mobility.

Pioneering farmers could have established colonies in regions like Scania were the transitional process towards establishing an agrarian society seems to have gone very swiftly, while in other regions the transition was slower, resulting in a possible intermediate phase of cultural dualism. Evidence of cultural dualism can be observed in the absence of clay discs, quern stones and evidence for grain processing on coastal and lake shore sites: all elementsconnected with the handling of crops. Crop cultivation is by far the most difficult endeavour to begin with, which could be one of the reasons why newly turned fisher-farmers did not want to start with a failure. It is easier to keep domestic animals, which have been observed on many Early Neolithic coastal and lake shore sites. However, the coastal and lake shore sites could also be interpreted as specialized hunting and fishing camps used by commuting farmers. If this were the case, one would then expect some differences to appear between the normal Ertebølle sites and the possible specialized hunting camps from the Early Neolithic in terms of site function and seasonality. Because the coastal sites from the Early Neolithic do not appear to be different from the Ertebølle habitation judging from the accumulation of sediments, faunal assemblages and seasonal use, thus pointing more towards a period of cultural dualism, which could have lasted for a couple of centuries in regions like North Jutland. However, it is also clear that a Neolithic material culture can be observed on the coastal and lake shore sites around

4000 calBC, thus arguing that many of these former hunter-gatherer sites were inhabited by commuting farmers as argued in the case of North-West Zealand. Both explanations are possible, thus showing the complexity of this transitional process.

Generally, the introduction of agrarian practices in South Scandinavia during the earlist part of the EN I (4000–3800 calBC) marks the dissaperance of regional differences in the material culture. However, these regional variations reappeares already during the later part of the EN I (3800–3500 calBC), thus argueing that the indigenous populations did play an active role in the transitions towards an agrarian society especially when taking over Neolithic habits and ideology. Structural distribution patterns of material culture support this hypothesis, as old regional boundaries between the southern Scandinavian islands and mainland disappear with the Ertebølle culture. During the earliest part of the Early Neolithic a stage of uniformity appears in the material culture, which is followed by a reappearing of these earlier boundaries during the later stages of the Early Neolithic.

The expansion of the agrarian societies during the early parts of the Funnel Beaker culture stopped in central parts of Sweden and southern Norway. Indigenous populations further north were probably too wide spread to obtain regular social contacts, which is essential in an agrarian society. Moreover, the harsh climate with shorter seasons in these regions could have made it difficult to experiment with agrarian activities.

The transition towards an agrarian society can be characterized as a complex and continuous process of interaction between the indigenous population and incoming farmers, which varies from region to region. Future studies should therefore concentrate on both large-scale and regional diachronic investigations in order to gain a more nuanced and detailed knowledge of the mechanisms behind these agrarian expansions.

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