4. Sample selection: sites and pottery

4.1. Ceramic Typologies.

4.1.1.Ertebølle vessels.

Figure 4. 1. An Ertebølle pointed-based vessel with everted rim.

Late Mesolithic Ertebølle pottery of the western Baltic is characterised by pointed bases, with concave necks and everted rims (figure 4.1). There is considerable variation to be found in profiles of Ertebølle vessels, with a spectrum from conical to cylindrical (figure 4.2 a and b). It is possible that the conical variety is a western Danish phenomenon (Troels-Smith 2002, Koch Nielsen 1987).

Figure 4. 2. a) An EBK pot with cylindrical profile, and b) an EBK pot with greater curvature and a more conical profile.

By comparison to Early Neolithic Funnel Beakers, there are so few Ertebølle vessels that making typological distinctions beyond an east-west contrast has been difficult, and unproductive to date. It was previously believed that the rare decoration on Ertebølle rims of stabs, lines of double stabs and rhombic patterns might evidence a regional group within 20-25km of Ringkloster (Andersen 1998). As more sites have been excavated, however, the expansion of known decorated Ertebølle sherds has risen to include examples from Timmendorf-Nordmole in northern Germany (Lübke 2003), and Löddesborg in Sweden (Andersen 1998).

4.1.2. Funnel Beaker types.

There is a move towards greater proliferation of vessel styles that fall under the Funnel Beaker label. This goes hand-in-hand with an increase in their number, as pottery features more strongly as a component of megalithic graves rituals, and bog offerings during the Early Neolithic. As well as these container vessels, the repertoire also grows to include flat clay discs of unknown purpose (figure 4.3), whilst the 'blubber lamps' of the Ertebølle (figure 4.4) become obsolete a few centuries into the Early Neolithic. Greater variety has given the opportunity for much finer typological subdivisions than had been possible for Ertebølle wares.

Figure 4. 4. A flat clay disc of the TRB period, with unknown function.

Figure 4. 3. An oval 'blubber' lamp from the EBK period, derived from Tybrind Vig.

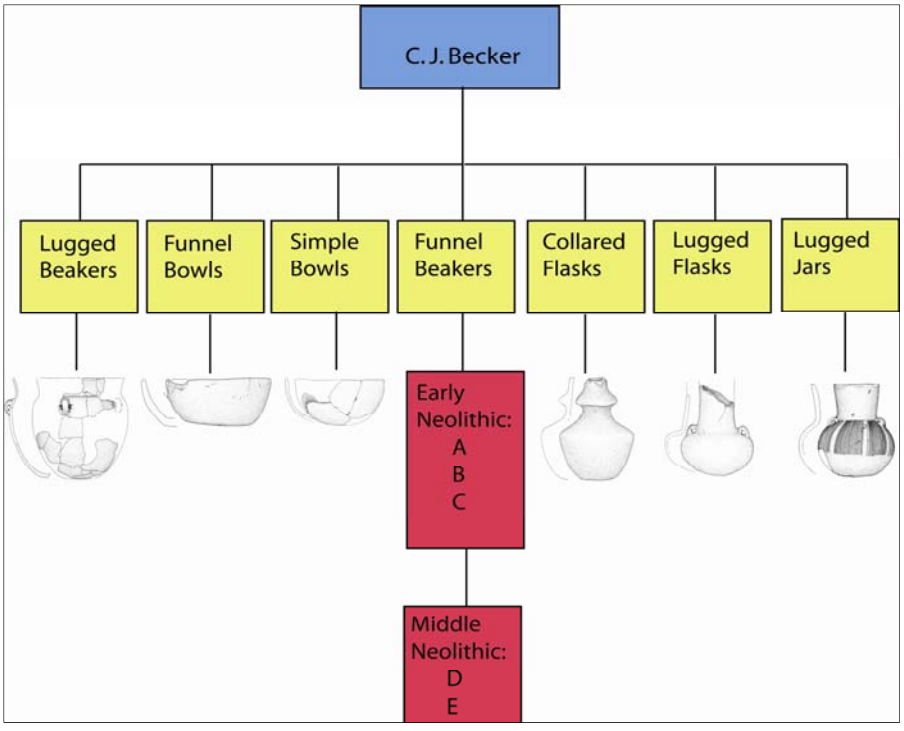


Figure 4. 5. The typological scheme of C. J. Becker which seperates vessel forms with functional discriminations.

C. J. Becker produced some of the first and most influential typological sequences in Denmark, using a scheme that he envisioned working for the whole of the Funnel Beaker influenced region (Becker 2002). Using 152 bog finds of Neolithic vessels he created 7 vessel groups, illustrated in figure 4.5. Of the most common 'funnel beaker' group a further 5 types could be sub-divided, with A-C occupying the Early Neolithic and D-E representing the Middle Neolithic.

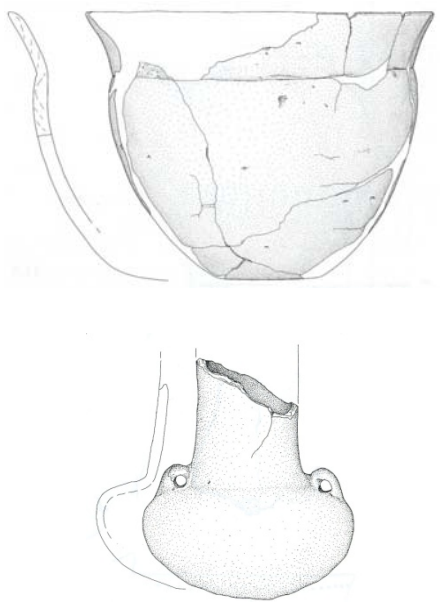


Figure 4. 6. Type A funnel beakers (above) are one of the earliest Neolithic pottery examples in Becker's typological conception, and are associated with more closed forms (below) (Koch 1998, 404 & 437).

Type A are characterised by a smooth profile with a short neck. The base is nearly always flat (figure 4.6). Associated with the funnel beakers of this type are lugged flasks (figure 4.6) and lugged beakers which share the similar features of flat bottom, short neck and sparse ornamentation (Koch 1998). Any decoration that does occur is restricted to a narrow band just below the rim (Becker 2002), and is normally very simple.

By contrast, Type B pots comprise taller vessels with a longer, everted neck. The neck is also clearly accentuated from the belly by the sharpness of the angle at the top of the shoulder. The base is usually flat, with some uneven examples that are slightly more rounded. Typical ornamentation includes incised points in a narrow band below the rim, although a lack of ornamentation is common (Koch 1998). This decorative type, plus the tall neck and base character have similar correlates in the other

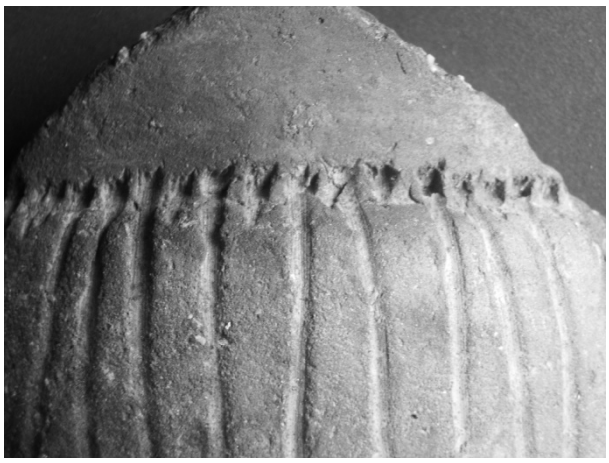
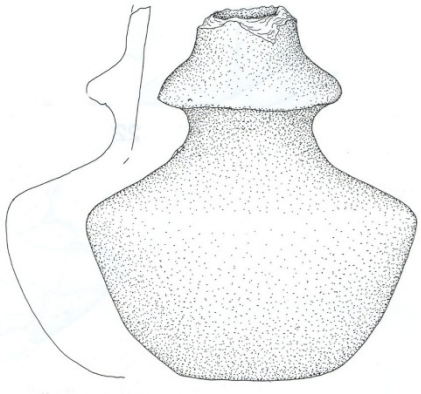


Figure 4. 7. The decorative motif common to the North Jutland Type C Funnel Beakers in Becker's sequence.

groups of vessels, namely lugged beakers, collared flasks, lugged flasks and bowls (Koch 1998).

The final Type C was further sub-divided by Becker (2002) into 4 regional groups: the North, Jutland group, the South-Danish megalithic group, the Bornholm/ South Sweden group, and the South Danish non-megalithic group. They were mainly distinguished from one another and Type B on ornamental grounds. The North Jutland group comprised some vessels that were heavily decorated all over with stick-stabs, stamps and stab-and-drag incisions, in characteristic belts of vertical and horizontal lines (figure 4.7) (Koch 1998).



Decoration on vessels belonging to the South-Danish megalithic group includes all over decoration with whipped cord, or vertical stripes arranged around the belly. The Bornholm/ South Swedish group is typically decorated in 2-ply and whipped cord. There are few examples of vessels from the non-Megalithic South-Danish Group, but what few there are display all-over decorative motifs working in horizontal belts of alternating circular impressions with small vertical lines dragged through the clay (Koch 1998).

Becker's (2002) classification of the other shapes of vessels was done on the basis of expected use. Flasks and jars have a very narrow neck and aperture, beakers have a slightly wider aperture, and bowls have the widest aperture. The descriptive precursor indicates an additional defining feature. 'Collared' describes a narrow cylindrical neck, sometimes including a disc-shaped extrusion half way up (figure 4.8). 'Lugged' describes the addition of clay handle appliqué, which are variously pierced horizontally or vertically (figure

Figure 4. 8. (Top) A collared flask (Koch 1998, 540), (middle) a lugged vessel, (bottom) a funnel neck.

4.8) Finally, ‘funnel’ indicates the narrowing of the neck in the proximal direction (figure 4.8).

Troels-Smith made some of his own refinements to Becker’s sequence, based on his excavations of Muldbjerg in the Åmose. In his opinion the sequence held, but Type A belonged to the Ertebølle period, and had developed directly out of the Ertebølle style (Troels-Smith 2002). Most of the similarity was held stylistically in the upper two thirds of the profile. From pollen profiles taken during his excavations it was possible to establish that Type B vessels appeared at the point where evidence for the earliest pastures occurs (Troels-Smith 2002). Four of Becker’s Type A can be dated by pollen analysis to contemporary with the elm decline, earlier than the first pastures (*ibid.* 2002). A number of observations were made of cereal grain impressions in the Type A vessels from the Åmose, narrowing down their temporal inception.

Schwabedissen’s contribution was to suggest cultural persuasions that played a role in stylistically shaping the Funnel Beaker vessels. Type B profiles were attributed to a Rössen influence, whilst Type A was attributed to an eastern movement from the Baalberg culture. He also related the presence of novel clay discs to the southern Michelsberg culture where they are also found (Koch 1998).

Sophus Müller (1918) created an entirely new typological scheme, which has never had as great an impact as Becker’s original framework. The combination of features of ornamentation technique, decorative patterning and vessel shape is cumbersome to work with, and leaves some overlap between the six Early Neolithic types. Until recently Becker’s formulations have singularly seen the greatest adherence.

In the process of cataloguing the Danish National Museum’s ‘bog pot’ collections however, Eva Koch has reinvestigated the sequencing of Funnel Beakers and made some important contributions. Her sequencing has been supported by a programme of radiocarbon dating. On this basis she has been able to identify 9 Funnel Beaker types; 4 of them range from the transition up to the beginning of EN II c. 3500 B.C. The later types delve beyond our time frame and will not be further considered here.

4.1.2.1. Type 0.

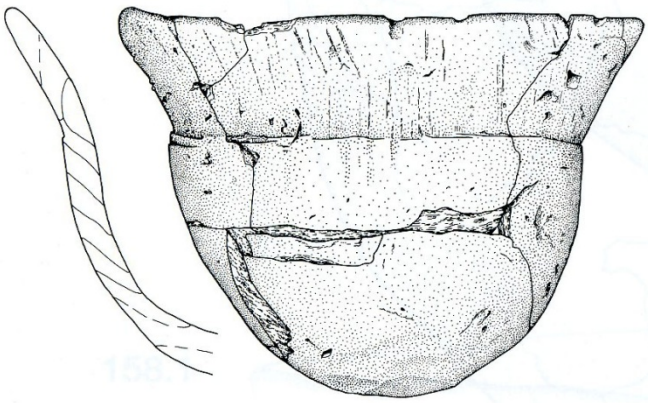


Figure 4. 9. A Type 0 Funnel Beaker with characteristic rounded base. This example is from Kongemosen 3 (Koch 1998, 485).

In profile Type 0 funnel beakers have wide shoulders that are only slightly curved, decreasing the accentuation of the transition to the belly. The belly is curved, and narrows towards the base making the distal part the widest. Often the base is rounded or convex (figure 4.9). There is occasionally simple decoration in a band on the rim, usually impressions with a stamp of some sort, although sometimes they possess an applied list.

Within this group, however, there is quite a degree of variation (Koch 1998), and examples are known that incorporate Ertebølle construction techniques with Funnel Beaker style features (Fischer 2002). In these cases the combination of both Ertebølle and Funnel Beaker features makes them easier to identify as Type 0. Their open V-shaped profile and small base are stylistically similar to Ertebølle vessels, but the usual construction technique is classified as Funnel Beaker. Needless to say these are very early Neolithic vessels, transitional types. Dates of examples from Kongemosen 1, Åkonge, Norseminde, and Bjønsholm place them in the range 4000-3800 B.C. (Koch 1998).

4.1.2.2. *Type I.*

Type I have a short funnel-shaped neck, which becomes slightly marked at the transition to the belly by upward scraping marks, and by the angle at which it attaches. Similar to the Type 0, the widest point of the belly is

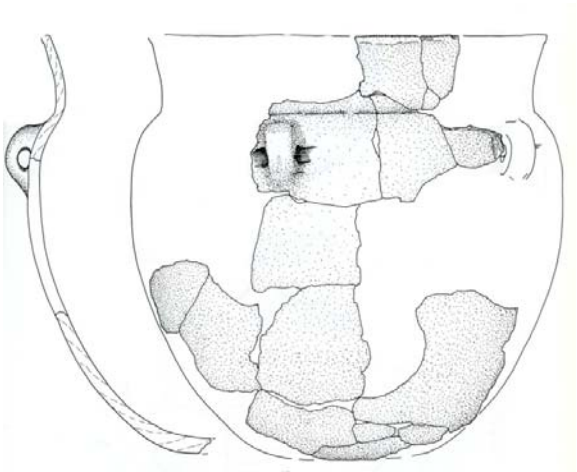


Figure 4. 10. A Type I vessel from Ejby Mose (Koch 1998, 417).

raised above the middle of the vessel and the belly narrows towards the base, creating the V-profile. The curve on the belly isn't as marked as the Type 0's giving the impression that these are more slender vessels. More often the base is flat or has a very slight curve to it (figure 4.10) (Koch 1998).

Versions of Type I with combinations of simple decoration and/or lugs are known (Koch 1998). Reliable dates for vessels of this type include radiocarbon measurements on hazelnuts from Muldbjerg of 3690-3530 B.C., 3780-3650 B.C., and 3790-3650 B.C. (Koch 1998). The overall date range allocated to this group by Koch (1998) is 3800-3500 B.C. on the basis of 10 samples.

4.1.2.3. Type II.

The profiles of Type II funnel beakers exhibit a neck-belly transition that is either not marked at all or is only marked by upward scraping incisions (Koch 1998). The vessels start to appear more barrel-shaped as the widest point drops to their middle section, unlike Type I and II where it is located higher. The base is flat or very slightly curved in instances where the proximal belly transition is gradual (figure 4.11).

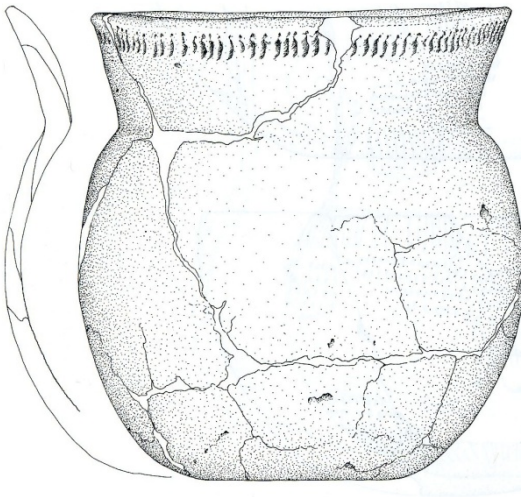


Figure 4. 11. A Type II vessel from Jordløse Mose XVII (Koch 1998, 517).

Type II don't tend to have lugs, the two variants identified by Koch (1998) include those with simple decoration, and those with more complex decoration. Simple decoration consists of a band of incised impressions below the rim. The vessels display more complex decoration if the stamps and impressions on the rim are supplemented by drag-impressions on the neck and belly (Koch 1998). The six radiocarbon measurements for this group give a range 3900-3500 B.C., making them contemporary with Type I, perhaps catching the very last part of the Type 0 range.

4.1.2.4. Type III.

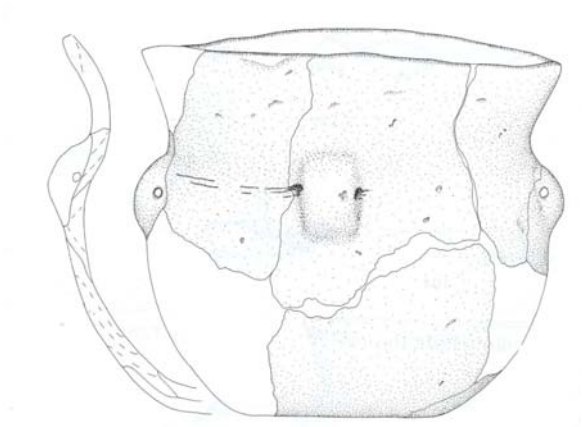


Figure 4. 12. A Type III vessel from Jordløse Mose XVIII (Koch 1998, 518).

The neck of Type III vessels is markedly different from previous examples, being much taller with a much more emphasised curve. The neck-belly transition is similar to the Type II and I; gradual unless marked by upward scratching impressions. Some of these vessels lose their barrel-feature, as the widest point of the belly again retreats upwards to above their middle. For others the middle is maintained as the wide point. The base is again flat, or sometimes slightly curved (Koch 1998) (figure 4.12). The majority of the Type III 'bog pots' are without lugs and either unornamented or with simple ornamentation similar to Type II examples. A smaller number are more complexly ornamented with or without lugs. The decoration consists of alternating bands of horizontal and vertical lines incised over the neck and belly in a rudimentary checkerboard style.

A number of radiocarbon dates have been taken on foodcrusts giving ranges around 3660-3380 B.C., 3790-3640 B.C., and 3710-3550 B.C. (Koch 1998). The possibility of a reservoir effect is present, but the additional dates of 3780-3640 B.C from the Rude long barrow on Jutland support the former ranges (Madsen 1980) and are not from potentially compromised material. At an overall date estimation of 3800-3500 B.C., this puts the Type III vessels in a contemporaneous position with Type II, although perhaps with a slightly later inception (Koch 1998).

4.1.3. Type discrimination based on construction.

One of the most useful outcomes of these later typological refinements has been the formal investigation of temporal differences in construction technique, and the development of this as a dating indicator. There are three main construction

techniques used on Ertebølle and Funnel Beaker pots (figure 4.13); H, N, and U (Koch 1987) with varying degrees of obliqueness.

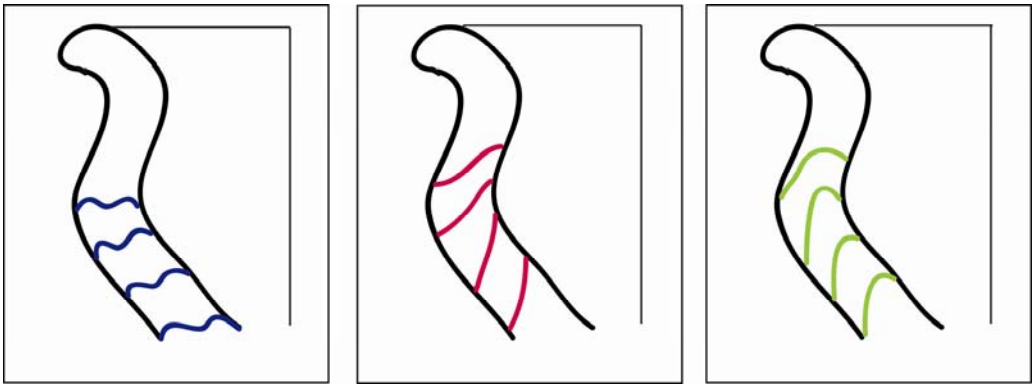


Figure 4. 13. The three construction techniques used to create EBK and TRB ceramics, from left to right, H-construction, N-construction, U-construction.

In N or H-construction the attachment area on the surface of the coils is often scored with fingernails (figure 4.14) to roughen the surface so that the clay adheres into the crevices. The coils in H-construction run less obliquely to the line of the vessel profile than N-construction where the coils are smoothed to a greater angle to secure their attachment. Sherds of H- or N-construction with nail impressions in the fabric, and/or pointed bases, are conclusively from Ertebølle pots. This is also true of sherds that are thicker than 1.3cm, as there is a trend for thinner walls in Funnel Beakers (Koch 1987).

Figure 4. 14. On undisputedly EBK vessels fingernails are visible in the coil surface, aiding the attachment of coils to one another.

At the shoulder of Funnel Beakers there is often a change in the direction of the coil placement (figure 4.15) (Koch 1987), and this is unique to these vessels. It is often the case that the N-construction becomes more oblique, and the vessel walls thinner due to the likely use of the ‘hammer-and-anvil- technique. This is where a smoothed stone or other curved object is placed on the inside of the vessel, and a ‘hammer’ of some sort is tapped against it from the outside to seal the coil contact.

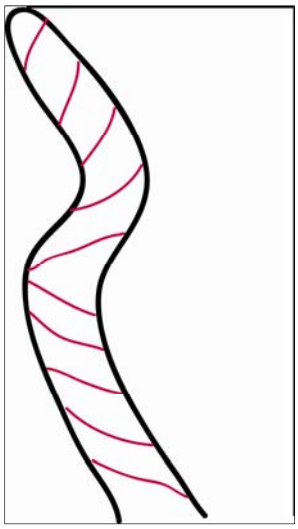


Figure 4. 15. On undisputedly TRB vessels there is a change in the direction of the coil at the shoulder.

Sherds of N-construction where coil application changes, and/or where there are scratch marks from the modelling of the surface are from funnel beakers. This is also true of sherds with flat or rounded bases (Koch1987). This leaves a group of unclassifiable sherds; undecorated rim or belly sherds in N-construction, without nail impressions on the coil surface and with a thickness under 1.3cm (Koch 1987). However, the possibility of being able to distinguish between Ertebølle and Funnel Beaker vessels from incomplete parts of vessels opens up sampling potential for a much wider number of sites.

4.2. The significance of sites selected for study.

The sites chosen for analysis range from stratified coastal shell middens such as those on Jutland, inland shell middens, coastal and inland settlements, and some ceramic bog deposits with ritual associations. Most of the sites under investigation fall across the transition to agriculture, and possess both Ertebølle and Funnel Beaker pottery styles, and these were preferentially selected for. A smaller number of the sites belong exclusively to either the Late Mesolithic or Early Neolithic. Where possible, clusters of sites that displayed different settlement activities were investigated within a landscape so that it was possible to explore the roles of pottery and foods across a range of contexts.

The sites were excavated by a number of institutions, and the ceramic sample material is kindly provided by them. For the purposes of site cross-comparison it is important to understand such criteria as the diversity of excavation strategies, the variety of artefacts within and across sites, the temporal range of the sites, auxiliary artefact or environmental analyses and dating programmes. Understanding the value of foods in the context of pottery relies on appreciating what contextual information is available and capitalising on that.

4.2.1. Neustadt.

Number of sherds analysed:	***72***
Number of interior samples (i):	***65***
Number of exterior samples (e):	***5***
Number of interior surface deposits (f):	***33***
Number of exterior surface deposits (s):	***7***

Neustadt was excavated under the direction of Sönke Hartz between 2000 and 2006. The post-excavation analysis and publication of this site is ongoing, and so at the time of writing background information was partially incomplete. The responsibility for writing up the substantial pottery and animal bone assemblages rested with Aikaterini Glykou for her doctoral thesis, so full scale access to complete raw data in lieu of her publication was not possible. Extensive stylistic information on those sherds that were sampled is available however, as well as some data on contextual aspects of the site assemblage. Neustadt is an underwater settlement spanning the Late Mesolithic to Early Neolithic which occurs in the centuries around 4100 cal B. C. in this region of northern Germany. Around 100m² has been excavated of the refuse area, that was situated offshore (figure 4.16). The actual settlement has been eroded by the action of sea level rise and fall. There exists stratigraphy at the site, but the reliability of the contexts is open for debate as there is no stratigraphic difference between Ertebølle and Funnel Beaker vessels.

The recovered artefactual material is substantial: c. 80,000 artefacts in total; 13, 000 mammal bones, 10,000 fish bones and 7, 000 pottery sherds (Glykou 2010). Over 60% of the pottery assemblage is dominated by sherds of pointed-based vessels, whilst less than 10% are Funnel Beakers (Glykou 2010), pottery cuisine seems to have been an important contributor to overall consumption. Tool and ceramic production took place at the site itself, although a minority of the pottery sherds display Michelsberg-stylistic features.

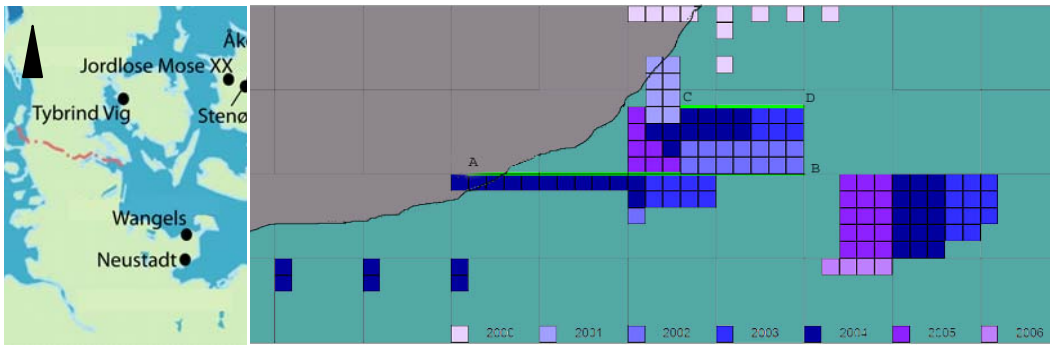


Figure 4. 15. A location map of Neustadt in Schleswig-Holstein, northern Germany, with a plan of the excavated portions of the site.

Thirty-two species of animal are represented at the site, which represents a predominantly hunter-fisher economy. 61.9% of the animal bone assemblage is terrestrial mammal, and of that a 35% majority is red deer (*Cervus elaphus*), followed by 20% wild boar (*Sus scrofa*), with equal respective proportions of domestic dog (*Canis lupus* f. *familiaris*) and roe deer (*Capreolus capreolus*) at 10% (Glykou 2010). 37.5% of the animal bone assemblage was sea mammals, dominated by seal species at 63.7%, suggesting that this was an important seal hunting station (Glykou 2010).

Apart from the domestic dog, only three bones of domesticated cattle were discovered during the course of excavation, confirmed by aDNA analysis. Two of these were radiocarbon dated to 4046 cal BC and 3800 cal BC. This makes the Neustadt cattle some of the oldest for northern Germany (Glykou *pers. comm.*), and is a significant reason for its incorporation into the dataset.

4.2.2. Wangels.

Number of sherds analysed:	***16***
Number of interior samples (i):	***16***
Number of exterior samples (e):	***4***
Number of interior surface deposits (f):	***4***
Number of exterior surface deposits (s):	***2***

Wangels is a midden and minor settlement excavated from 1996-99 (Grohmann *in press*). The settlement evidence consists of a hearth area (Hartz *pers comm.*), but the majority of the find area is made up of midden material. Wangels is located in the northern German region of Schleswig-Holstein on what was a former island. A now dry coastal ingress from the south of the peninsula created a south-easterly fjord in which the Wangels island was midway along (figure 4.17).

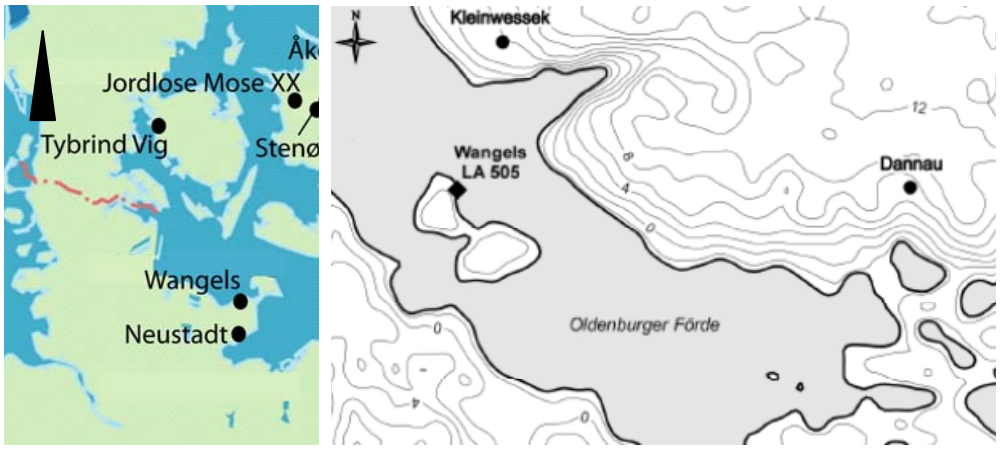


Figure 4. 17. Location of Wangels at the national and regional scale. The site is located on a former island in the middle of a now dry fjord. The regional map is taken from Grohmann 2004, 26.

The 1996 campaign opened a small series of excavation areas, from Schnitt 1-6 which located the former land surface in relation to the water's-edge (Hartz 1997/8). The area to the north-east was opened up in 1997 to capitalise on the well-preserved midden material including bone, antler, flint and ceramic artefacts. Excavation continued until 1999 with a further two areas being opened to the south of the 1997 trenches (Hartz 1997/8).

A series of pollen cores were taken during the 1997 campaign (Hartz 1997/8), and are currently being analysed at Kiel University (Hartz *pers. comm.*). In addition to these pollen analyses which are useful for dating as well as environmental commentary, a radiocarbon dating strategy was adopted. This has yielded a series of dates that document a chronology of site use and artefact discard.

Wangels was inhabited in both the Late Mesolithic Ertebølle and the Early Neolithic Funnel Beaker periods. Ertebølle material is represented by six pieces of T-antler axes, one of which is AMS dated to 4210-4076 BC (Hartz *et al.* 2002). A wiedaer slate axe, which has a provenance in eastern and central Germany, was found. The

only datable parallel is from nearby Schlamersdorf, from an Ertebølle context (Hartz *et al.* 2002). Other Late Mesolithic stone artefacts include truncated blades, slim blade scrapers, toothed blades and specialised core axes (Lübke 2003). The earliest Mesolithic use of the site dates to 4400 BC (Lübke 2003). Around 48,000 flint artefacts are represented at Wangels (Hartz 1997/8).

The pottery was analysed at the Universität zu Köln by Ines Maria Grohmann. The pointed-based Ertebølle vessels date from 4300-4100 BC and mark the earliest phase of the Ertebølle period in Schleswig-Holstein. The dates could be influenced by the marine reservoir effect which would mean the vessels could be around two-hundred years older (Hartz *et al* 2002). There are around 10 fragments of oval 'blubber' lamps. The group AMS dates to 4400/4200 BC (Hartz *et al.* 2002), and are stratigraphically associated with the pointed-based vessels, supporting a view that the sediments are undisturbed.

The transitional pottery styles at Wangels include two vessel rims that have a down-turned 'arcade' rim (Hartz *et al.* 2002, Hartz *pers. comm.)* This is an exterior lip of clay formed by smoothing extra clay down the exterior of the vessel from the rim edge. The technique is a clear indication of influence from the Michelsburg culture to the south, and the Stroke Ornament Pottery groups in the middle-Elbe-Saale region (Hartz *et al.* 2002).

Six decorated funnel beakers at Wangels date to around 4100-3800 BC (Hartz *et al.* 2002). There are a greater variety of Early Neolithic styles visible at Wangels from the first indication of funnel beaker use. These include slender and broad bowls, flask-shaped vessels, discs and lugged amphorae. The latest date of a funnel beaker is 3898-3742 BC from a foodcrust. This suggests that occupation of the site was for a maximum of around six to eight centuries. Considering the possible influence of marine reservoir the occupation could be as short as around three to four-centuries, possibly less.

The earliest dates of funnel beakers coincide with the introduction of domesticated animals, and may actually be slightly later. About 50% of the total mammal bones are from domesticated species (Hartz *et al.* 2002), which is a massive proportion considering the paucity of their representation at contemporaneous sites like Neustadt. Sixty of these bones are from sheep/goat and a series of dates are available

from three of them: 4207-4077 BC, 4228-4080 BC, or just before and/or on the change in pottery styles, and 3931-3815 BC (Hartz *et al.* 2002) just after the style change.

There are few fish bones, only a small number of pleuronectids (flounder family). This resonates with the absence of harpoons and a minimal presence of leister prongs (Hartz 1997/8). Reliance on the sea as a source of food seems evident, although there is a <5% representation of sea mammals in the assemblage of non-domestic species (Hartz *et al.* 2002). Of the non-domesticated terrestrial species wild cow (*Bos primigenius*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and wild pig (*Sus scrofa*) predominate (Heinrich 1997/8). There are minor inclusions of wild horse (*Equus ferus*), brown bear (*Ursus arctos*), otter (Lutra lutra), and pine marten (*Martes spec.*) in the assemblage (Heinrich 1997/8).

As far as evidence of plant material is concerned wheat macrofossils were frequent in the dwelling area, and cereal pollen reached about 40%. A charred emmer grain and some other cereal-type grains preserved on a funnel beaker sherd show that there is evidence of crop processing at Wangels, but the extent is unclear.

4.2.3. Tybrind Vig.

Number of sherds analysed:	***19***
Number of interior samples (i):	***19***
Number of exterior samples (e):	***0***
Number of interior surface deposits (f):	***24***
Number of exterior surface deposits (s):	***0***

Tybrind Vig was excavated over a ten season period from 1978-88, and was one of the first extensive underwater excavations of a prehistoric settlement (Malm 1995). The site is on the south-western end of a peninsula in western Fyn (figure 4.18). The ancient coastline is now submerged around 9m below sea level, but previously formed an archipelago extension of the mainland (Andersen 1987), and the site of Tybrind Vig is situated near the northern end of this extension (figure 4.18). The Stone Age site is a combination of dryland settlement area and inshore refuse dump. The dump accumulated as series of horizontal stages suggesting that habitation was a repeat process.

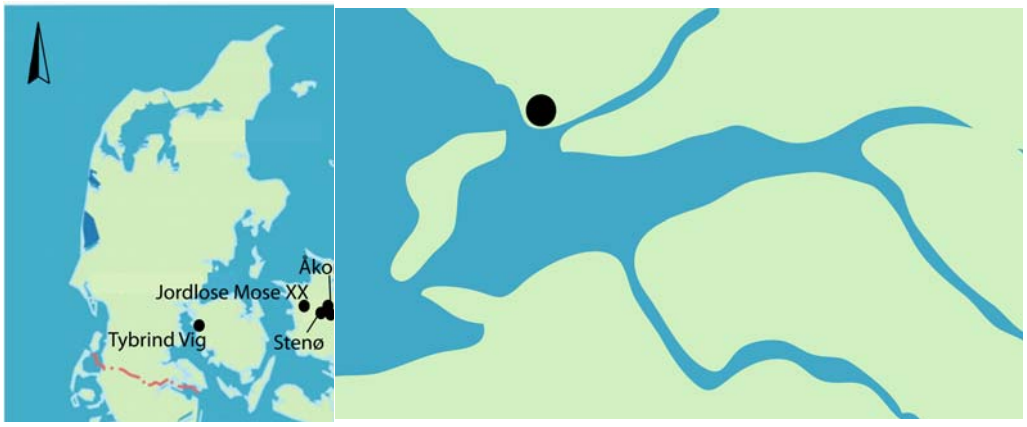


Figure 4. 18. A map of the location of Tybrind Vig in Denmark, and at the outlet of a river at the regional scale.

Unlike the multi-period shell middens of northern Jutland, occupation at Tybrind Vig does not appear to have been *on* the refuse dump but on the dryland area beside it. The landmass has undergone eustatic depression by 2-3m, and since the site is 3m underwater this would suggest that the refuse layer was always or at least quickly a well-preserved submerged deposit. Finds occur in the marine layers in a zone c.100m long by 10-15m wide running parallel to the shoreline (Andersen 1987).Tybrind Vig is also dissimilar to many of the Jutland shell middens in being only occupied in the Ertebølle period (Andersen 1987, Malm 1995).

The refuse area of the site is stratified, and at least two clear phases of activity can be observed in the profiles. The lower early Mesolithic phase is a-ceramic and artefact assemblages are characterised by high numbers of flint tools, bone and antler artefacts in a gyttja layer. In these early Ertebølle layers were found the remains of several human burials. A complete burial of a young woman and child was preserved in addition to the partial remains of at least 2-3 other persons (Dahl 2004).

Late Ertebølle gyttja layers also contain large amounts of flint, bone and antler artefacts but with the addition of ceramics and distinctly large quantities of wooden artefacts (Andersen 1987). Two lamps were found along with at least fifteen pointed-bottomed vessels (Andersen and Malmros 1984). The majority of the artefactual material comes from the refuse layer. The dryland settlement 10m to the north (Malm 1995), was badly eroded by marine transgressions. Only stones, gravel and limited artefacts were found lying directly on the natural morainic clay (Malm 1995).

All finds were recorded with 3-dimensional coordinates, or less exactly within 10cm thick layers covering 1/4m². A high degree of recovery was possible because the suction machinery deposited all removed sediment on land, so if artefacts were not spotted during excavation they were sorted and retained secondarily. This allowed the representative recovery of small artefacts like fish bones, and plant macrofossils.

These fish remains predominate in the Late Ertebølle phase which dates from 4500-4200 cal BC (Andersen *pers. comm.)*, as does the evidence of marine hunting strategies. These include plant fibre nets, 10-20 red deer bone fish hooks, leister prongs for spear fishing, basket fish traps, and fish weirs. A scatter of big stones and wooden stakes extend from the shore out into the water. This has been interpreted as the remains of fish fences used in the trapping of fish (Andersen 1987). Next to these fences several leister prongs for spearing fish were found (*ibid.*).

Whilst zooarchaeological analysis of the bone artefacts has been carried out there is limited published information to specify the proportions of different animals represented from different phases of the site. What we do know is that fish remains increase in the Late Ertebølle, as do the remains of fur-bearing animals like pine marten (*Martes martes* L.), wildcat (*Felis silvestris* Schreber), fox (*Vulpes vulpes* L.), otter (*Lutra lutra* L.), and polecat (*Mustela putorius putorius* L.) (Andersen 1987). It seems these were indeed used for their pelts, as their bone remains are clustered which is unlikely if they were consumed.

Whilst we don't have details of the relative use of different animals, we can say that red deer (*Cervus elaphus* L.), wild pig (*Sus scrofa* L.), and roe deer (*Capreolus capreolus* L.) were frequently hunted (Andersen 1987), presumably throughout the entire Ertebølle period. Aurochs are only represented by a small number of bones (Andersen 1987). Seal (*Phocinae* sp.), killer whale (*Orcinus orca* L.), white-beaked dolphin (*Lagenorhynchus albirostris* Gray), dolphin (*Stenella* sp.) and large whale (*Cetacea* sp.) represent those marine mammals that were hunted (Andersen 1987).

Samples of pollen, seed, sediment and wood were taken from Tybrind Vig (Malm 1995), and these were analysed at the University of Aarhus (Andersen 1987). Jens Ømbøll's results suggest that the surrounding area was covered by oak forest with some lime, elm and pine. Hazel, elder and birch occur in higher concentrations near the shoreline (Andersen 1987). A detailed species list of the pollen and seed remains

is not available to compare the proportions of plants that were important throughout the site's history, and this limits the analysis that can be made of the role of pottery in broader a-ceramic foodways in Late Ertebølle Tybrind Vig. Macrofossils collected during excavation point to the foraging of hazelnuts and acorns throughout the Ertebølle period (Andersen 1987). Oysters, mussels, clams and periwinkles are abundant foraged items too (*ibid.*).

Finally, the means by which offshore fishing and sea mammal hunting was possible is evident at Tybrind Vig with the discovery of three dugout canoes. Stratigraphically they occur in the Late Ertebølle phase. All were made of straight trunks of lime (*Tilia* sp.) (Andersen 1987), that had been hollowed using stone tools. The largest canoe had a fireplace at one end, evidenced by a burnt area of clay c. 60x35cm (Malm 1995). In addition nearly ten pieces of decorated paddles were retrieved (Andersen 1987).

4.2.4. Åkonge.

Number of sherds analysed:	***20***
Number of interior samples (i):	***20***
Number of exterior samples (e):	***0***
Number of interior surface deposits (f):	***13***
Number of exterior surface deposits (s):	***3***

The central region of Zealand is a present day wetland and former lake, around which a number of important Late Ertebølle and early Funnel Beaker settlements have been discovered (figure 4.19). One of the most important for the information on the earliest domesticates and the process of 'Neolithisation' in this area is Åkonge. The site is a lakeshore habitation spanning the period of the first introductions of cattle to Zealand. Two domesticated cattle bones were found during excavation; one from an adult and one from a juvenile (Fischer 2002). Both are AMS dated to c. 3960 BC, the oldest direct date for domesticates from Denmark-Scania (Fischer 2002). The small size of the beasts has been used to suggest they may have been imported, as they are morphological unrelated to aurochs (*Bos primigenius*). There is no evidence for cereal agriculture at the site from the same period, although pollen analyses and floral remains are unpublished (Fischer *pers comm*).

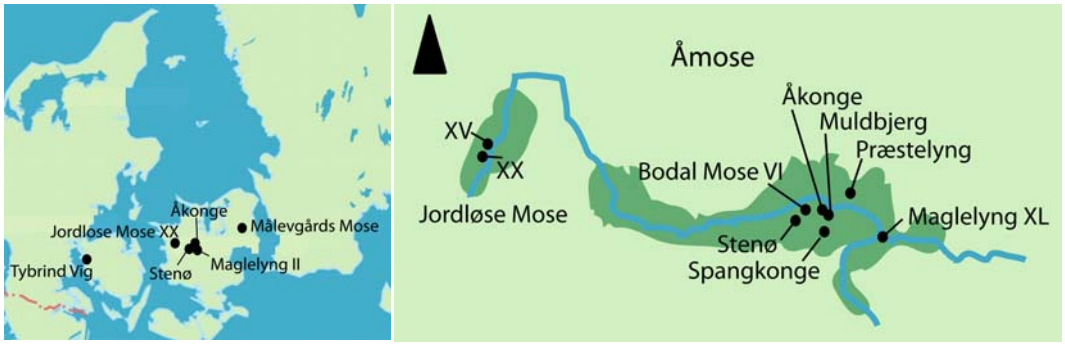


Figure 4. 19. A location map of Åkonge in the wetland landscape of the Åmose.

In fact the most abundant plant remains discovered during excavation were hazelnut shells (*Corylus avellana*) (Fischer 1984), which were found in concentrations associated with other refuse materials such as animal bone deposited in the shallow water at the edge of the lake. Concentrations of these hazelnuts extended over several metres of the site, and are found only a few metres north of an area of bark 'flooring', or mats composed of linearly arranged wooden beams associated with the bark (figure 4.20). These working floors are found south of the refuse dump, on dryland (Fischer 1984).

Figure 4. 20. A plan of the bark floor at Akonge, found in proximity to abundant hazelnut shells on the dryland settlement.

The pottery assemblage from Åkonge also provides interesting evidence for the processes involved in changes in ceramics. There is a mixture of both EBK style vessels and TRB styles, but also two examples of a 'hybrid' form. These intermediate varieties possess EBK construction techniques, being thick-walled in H-construction, but they do not have pointed-bases. AMS dates from sooty exterior deposits and charcoal fabric inclusions place both c. 3980 and c. 3970 BC, during the centuries of the transition. Although the domesticated animal bone evidence from the same period may suggest importation, these hybrid vessels point to a local adaptation to Funnel Beaker styles.

Other pottery includes a fragment of an EBK lamp, as well as decorated rim sherds in a possible Type I or Type II style, incised with simple stab marks in a line around the rim. A series of 11 dates on the surface deposits and inclusions in the fabric of the pots places the occupation of the site between relatively narrow age ranges indicating a short occupation phase; 4250-3800 BC, but with the vast majority falling c. 3950 BC (Fischer 2002). Whilst pottery information from Åkonge is relatively abundant and preliminary typological analyses of the assemblage were made in advance of sample selection, the floral and faunal context of non-ceramic cuisine is not available. However, the centrality of this site in discussions of the earliest domesticates to the region makes it an important contributor to the present study.

4.2.5. Stenø.

Number of sherds analysed:	***17***
Number of interior samples (i):	***11***
Number of exterior samples (e):	***3***
Number of interior surface deposits (f):	***15***
Number of exterior surface deposits (s):	***5***

Stenø is a settlement located at the edge of the former lake in the Åmosen (figure 4.19). The site is still in the process of being excavated, but sampling sherds from here could be carried out in advance of any conservation treatments. The site is a dump of organic material and artefacts. Originally the habitation area was located on peat adjacent to the lake, with the midden dump in shallow waters at the lake edge. Unlike the nearby sites of Åkonge, Muldbjerg, Præstelyng and Storelyng VI there is only a thin organic sediment between the culture layer and the mineral subsoil. This is partly because drainage schemes in this region have caused the peat to shrink and dehydrate, in combination with modern cultivation practices.

The result is that the cultural layer in the northern part of the site excavated to date is truncated in places. The southern area represents a more sealed context. By numerical quantity the most common finds are mammal bones, pottery, worked flint, charcoal, uncharred plant remains, fish remains and mollusc shells. Although specialist analyses of the artefacts and environmental samples are ongoing, it is clear

from abundant macrofossils of shells that hazelnuts (*Corylus avellana*) are an important contributor to the plant assemblage, similar to the situation at Åkonge.

Ceramic analysis carried out by the author in advance of sample selection suggests that this is a settlement inhabited on the cusp of the transition from Late Mesolithic-Early Neolithic. The assemblage is composed of fragmentary sherds, which must in part be attributable to damage caused by modern cultivation practices. There are three instances of rounded-based forms consistent with Type 0 'hybrid' examples found nearby such as 'Peter's Pot' at Åkonge, which would place the site c. 3950 BC by association, relatively contemporary with Åkonge. Apart from these, the only sherd recognisable to a specific type is a possible funnel bowl. There is one thin-walled vessel with a decorated rim, incised with a simple row of stab marks around the edge, and also one fragment from an Ertebølle lamp.

4.2.6. The Bog Pots.

4.2.6.1. Målevgårds Mose.

Number of sherds analysed: ***1***
Number of interior samples (i): ***1***
Number of exterior samples (e): ***1***
Number of interior surface deposits (f): ***1***
Number of exterior surface deposits (s): ***0***

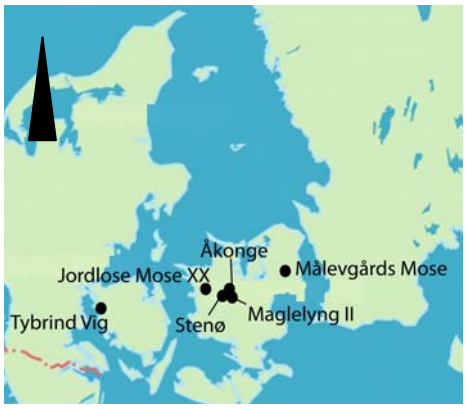


Figure 4. 21. The location of the site of Målvegårds Mose in northern Zealand.

Two vessels were found at a small lake formed by a stream called Jonstrup Å on the Danish island of Zealand (figure 4.21). Both are Type I; one is an ornamented slender lugged beaker, the other is an ornamented funnel bowl. They were discovered apart in a small bog implying they were deposited separately, and arrived at the Danish National Museum in 1942 and 1944 respectively (Koch 1998).

Although there are no other finds from this bog site, the landscape in which these pots were found is brimming with relevant

prehistoric archaeology. About 400m to the south of the find-site at Målvegårds Mose is a megalithic tomb. This long barrow has two stone cists, oriented N-S, and the remains of a kerbstone circle (Koch 1998). It is about 47m long. A second megalithic tomb oriented E-W is 13.93m long and is about 1km east of Målvegårds Mose. It too has a kerbstone, and originally had a portal dolmen chamber of stone (Koch 1998). Long barrows of this kind date from approximately 3800-3500 BC, and portal dolmens date to slightly later at 3500-3200BC (www.natmus.dk).

4.2.6.2. Maglelyng 2.

Number of sherds analysed: ***2***
Number of interior samples (i): ***1***
Number of exterior samples (e): ***0***
Number of interior surface deposits (f): ***2***
Number of exterior surface deposits (s): ***0***

Two vessels were found by peat-cutters 4-5m apart, about 1m down in the peat (Koch 1998). Maglelyng 2 is in the Åmosen region of Zealand (figure 4.19). The first vessel is a Type II, medium-sized funnel beaker with decoration in stick-stabs below the rim. It was found deposited at one end of a split piece of alder wood, and on the other end were the bones of a pike (Koch 1998). Close by was discovered a greenstone axe, also deposited in the bog (Koch 1998). The second vessel is an early lugged jar with four lugs and ornamentation (Koch 1998). No settlement evidence or other prehistoric sites are recorded nearby.

4.2.6.3. Jordløse Mose XX.

Number of sherds analysed: ***4***
Number of interior samples (i): ***4***
Number of exterior samples (e): ***1***
Number of interior surface deposits (f): ***4***
Number of exterior surface deposits (s): ***3***

Eight vessels were found about 60m east of the find site of Jordløse Mose XVIII in the Holbæk district of Zealand (Koch 1998) (figure 4.19). The vessels were clustered in groups: four Type II and Type III vessels were together about 1-2m apart. A few metres to the northeast a broad lugged Type II beaker lay with a Late Ertebølle style

blade-scraper (Koch 1998). Even further to the north-east another three vessels of Type II and Type III lay close together (Koch 1998).

Samples were taken from two of the vessels from the first cluster of pots. The first is an undecorated Type II broad lugged beaker. A small amount of charcoal was found around in association with this findspot. The second is a medium Type III unornamented funnel beaker. A series of pollen samples were taken beside the vessels, but these have yet to be analysed (Koch 1998).

4.3. Summary of the sampling strategy: sites, sherds and processes.

Details of the pot and the sample were recorded in a central database including information on the site, context, associated dates, construction technique, type of pot, period of use, sample characteristics, and the area of the pot the sample was taken from. Interior surface deposits were given a pot/sample identifier code ending in _F, whilst exterior surface deposit codes ended in_S. The drilled fabric samples were likewise identifiable with and _E for exterior and _I for interior.

The sites chosen for analysis represent both inland lakeside settlements, coastal settlements, across a range of contexts from ritual depositions to more mundane situations of vessel use and discard. In almost all cases it was not possible to locate an individual sherd within distributions of other artefacts, to suggest a specific spatial context of deposition or use. Exceptions to this are the bog pots, which although excavated in the late 19th-early 20th centuries during peat-cutting, are described in enough detail to account for the designed structuring of the deposits. In all other cases sites were preferred with complementary floral and faunal macrofossil evidence, to suggest the relative importance of non-pottery cuisine to pottery cuisine.

Several criteria were taken into consideration in the selection of samples for analysis. Vessels from the centuries around 4100-3900 BC were focused on because during this period the most dramatic shift is seen from pointed-based to flat-based funnel beaker forms, as well as being the period that sees the first faunal evidence for the introduction of domesticates. Ceramics with associated radiocarbon dates (and carbon isotope value) were preferentially selected, especially if the radiocarbon date was taken on an organic inclusion in the vessel paste, rather than the foodcrust. There are relatively few dated ceramics, so the majority were selected according to their stratigraphic position and typological features, which are less directly dateable.

A representative range of both Ertebølle and Funnel Beaker forms were chosen. Although the presence of foodcrust on the surface was dependent on preservation and the original uses of the vessel, a flexible target of 2:1 sherds to foodcrust sample number was aimed at for each site.

Certain typological criteria more securely separate Ertebølle from Funnel Beaker vessels. At the sites of Åkonge and Stenø where the assemblage is quite fragmentary and ceramic analysis was carried out before sample selection, a combination of features was necessary to periodise the sherds. Although sherds >1.3cm thick are considered securely EBK, poined-based vessel walls can also be <1.3cm thick, usually if they derive from smaller vessels. In these instances sherds showing the characteristic EBK single direction of coiling at the shoulder, or fingernails in the upper coil surface were preferentially sampled. This allowed for the incorporation of smaller EBK ceramics which otherwise would have to be excluded, biasing size-based patterning in the data. Base sherds, shoulders and rims were used where available because they allow the most secure typological assignation. A range of TRB vessel types were incorporated in order to represent any specialised uses of certain pot forms.

The sampling strategy is designed to represent the processes of evaluating food across the transition to agriculture. As a result flexibility was written into the approach to selection, and feedback from the ongoing production of results was incorporated into subsequent selections. For example, the preliminary analysis of the Åkonge sherds for bulk isotope values suggested a possible milk content which correlated with sherds that displayed a distinctive ‘white-grey’ foodcrust. This information was utilised to ensure an inclusion of this type of foodcrust from nearby Stenø, and other sites. Impartiality is retained to a point since it is impossible to *predict* the results, but this allowed for an element of design in the dataset design, and meant that some limited control could be exerted over how extensively certain processes were represented.

This strategy is founded on the premise that practice is *a* penetration point at the experiential scale into the processes of evaluating food that we are interested in. Practice is the engagement of individuals and groups in repeated behaviours, mediated and facilitated by materiality. As such, we can use general models that

detail transformations of food from production through consumption and discard, to break down the series of value-generating activities into parts that can be targeted for sampling (Isaksson 2010). One such model is the 'food culture model' (figure 4.22), that describes the sort of transforms one can expect from cuisine.

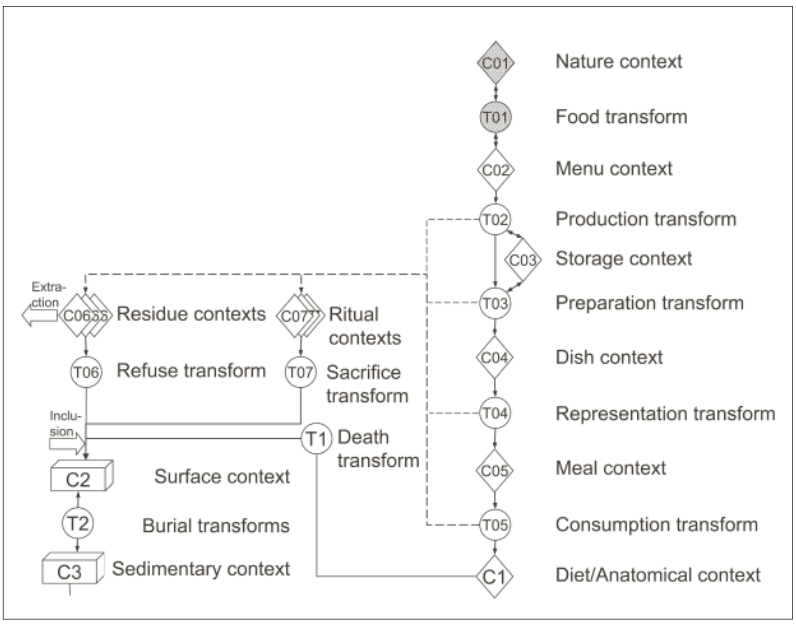


Figure 4. 22. The 'food culture model' of transforms that food undergoes from its production to the recovery by archaeologists (Isaksson 2010).

When considering cuisine as the (re)generation of food values, each node is of interest for representation, since the evaluation of food is not limited to one sphere of practice. However, there are certain nodes on the model that it is more difficult for us to represent, and others where the resolution necessary to describe them must be interpreted from the data collectively rather than represented directly through individual samples. For example, the dish context (CO4) is the mixture of foods that were prepared for consumption together. Pottery residues are a palimpsest of dishes, and it is only possible using the sampling technique of drilling pottery to disclose the ingredients of the palimpsest. The dish context is a matter for interpretation, and could be more appropriately envisaged as a tradition of use, or tradition of mixing if it happens in multiple instances.

It is important to retain an ongoing rationale of feedback in the model; it is both a tool for envisaging food processes that need to be represented, but also an interpretive framework since evaluation is inherent to the practices outlined. In many instances the contexts from which pottery residues were sampled are palimpsests

from which collectively production (TO2), storage (CO3), preparation (TO3), representation (TO4), and consumption (TO5) transforms are blended. As a result, sampling requires the incorporation of pre-drilling site-based context clues to the processes, as well as ongoing results of the actual processes themselves to disaggregate this palimpsest of activities. It is also important to note that the pottery itself is a smaller scale of context that retains interpretable information regarding the transformations that the foods were put through from production to consumption. Pottery cuisine has specific potentialities in relation to different food types, and processing using ceramic technology offers quite precise benefits in the context of different foods. Therefore, acknowledging an embedded relationship between foods and their mode of transformation is relinquishes useful information that can be fed back into the ongoing sample selection procedure.