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AN EXTENDED BROAD SPECTRUM OF PAPERS
PRESENTED TO LEENDERT LOUWE KOOIJMANS

EDITED BY

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JOS P. KLEIJNE, HEDWIG H. PONJEE AND CORIJANNE G. SLAPPENDEL



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The Mesolithic – Neolithic transition in Western Denmark seen from a kitchen midden perspective. A survey

Søren H. Andersen

6.1 INTRODUCTION

Despite many differences in geography, topography and cultural background it is fascinating to observe how similar tracks the development from the Mesolithic to the Neolithic has followed in The Netherlands and Denmark. In Denmark this transition is best shown by the so-called '*køkkenmødding*'.

Therefore, it is with great pleasure and respect that I offer Leendert Louwe Kooijmans this small synthesis on the first farming culture in Jutland.

The Danish '*Køkkenmøddinger*', (coastal shell middens) are one of the best – if not the best – source of information on the introduction of the first farming culture in Denmark. Of special importance within this group of sites are the so-called "stratified shell middens" (Andersen 2000a, 375-376), which contain cultural layers from both the latest phase of the Mesolithic Ertebølle culture (EBK) (c. 5400-3900 cal BC) and the beginning of the Early Neolithic Funnel Beaker culture (TRB) (c. 3900-3300 cal BC). The Early Neolithic is subdivided into EN I (c. 3900-3600 cal BC) and EN II (c. 3600-3300 cal BC).

In regards to the questions concerning the introduction of the oldest farming culture in Scandinavia and in contrast to other types of settlements (e.g. the inland, "bog" sites (Fischer 2004, 350 ff.)) the shell middens offer a series of advantages: Firstly, they are numerous, they have a readily discernible stratigraphy and a fast sedimentation rate with 'sealed' occupation horizons. Secondly, because of the good preservation conditions for organics, they are 'data banks' for environmental studies – especially of the marine biotope; the sediments offer excellent opportunities for ¹⁴C dating based on charcoal, bone and shell. Finally, this type of settlement gives possibilities for pollen analysis of old land surfaces protected below the midden layers.

As the Mesolithic and Neolithic layers are located in the same environment, it is literally possible to describe and 'measure' any changes in the same biotope during the transitional phase – and compare all types of information before and after the transition.

In connection with new excavations in western Denmark, several stratigraphic series of ¹⁴C dates have been performed through the thick midden layers, allowing for comparative studies between stratigraphy, ¹⁴C dating and typology as well

as analysing the Mesolithic – Neolithic transition in much shorter time segments than before (and at most other types of sites; fig. 6.1).

In general, the stratigraphy in the shell middens demonstrates long occupation phases from the younger Kongemose culture (c. 5700-5400 cal BC), though the Ertebølle culture (c. 5400-3900 cal BC) to the end of the Early Neolithic I, the Funnel Beaker culture (c. 3600 cal BC).

Of special interest in this connection is, however, the time span covering the latest Mesolithic and the earliest Neolithic.

6.2 HISTORY OF RESEARCH

During an excavation in the Krabbesholm I shell midden in 1889, it was observed that the cultural layer consisted of two different horizons: a lower one dominated by oysters and an upper layer characterized by cockles, ash and 'burned stones' (potboilers). The deepest layer contained thick-walled and undecorated pottery from pointed-bottomed vessels, while the upper horizon only had thin-walled, nicely decorated sherds (Andersen 2005; fig. 6.2).

Today – in retrospect – we know that this sequence is a nice example of a typical Danish, stratified shell midden with a succession of Late Mesolithic Ertebølle culture (bottom) covered by a horizon of Early Neolithic Funnel Beaker culture (top). In other words, the Krabbesholm I *køkkenmødding* demonstrates a stratigraphic sequence covering the transition from the Mesolithic to the Neolithic in Denmark.

Unfortunately, the insights from this small excavation were not understood at that time, and were not followed by other, supplementary investigations in the Danish shell middens.

Quite the contrary happened. Later, the main emphasis of studies on the introduction of the oldest farming culture in Denmark was concentrated on inland sites in the bog Åmosen on Zealand (Troels-Smith 1953; 1960), while the possibilities for further information from the shell middens were discounted.

Between 1970 and 2005, a series of new investigations of stratified middens was performed at several different locations in the West Danish area of Jutland, for example at Norsminde (Andersen 1991). This was the first modern excavation of a stratified shell midden, where the importance and scientific value of this type of settlement in relation to



Figure 6.1 The land-sea configuration of Denmark during the Late Atlantic – Early Subboreal (c. 4000 cal BC). Settlement sites mentioned in the paper are indicated.

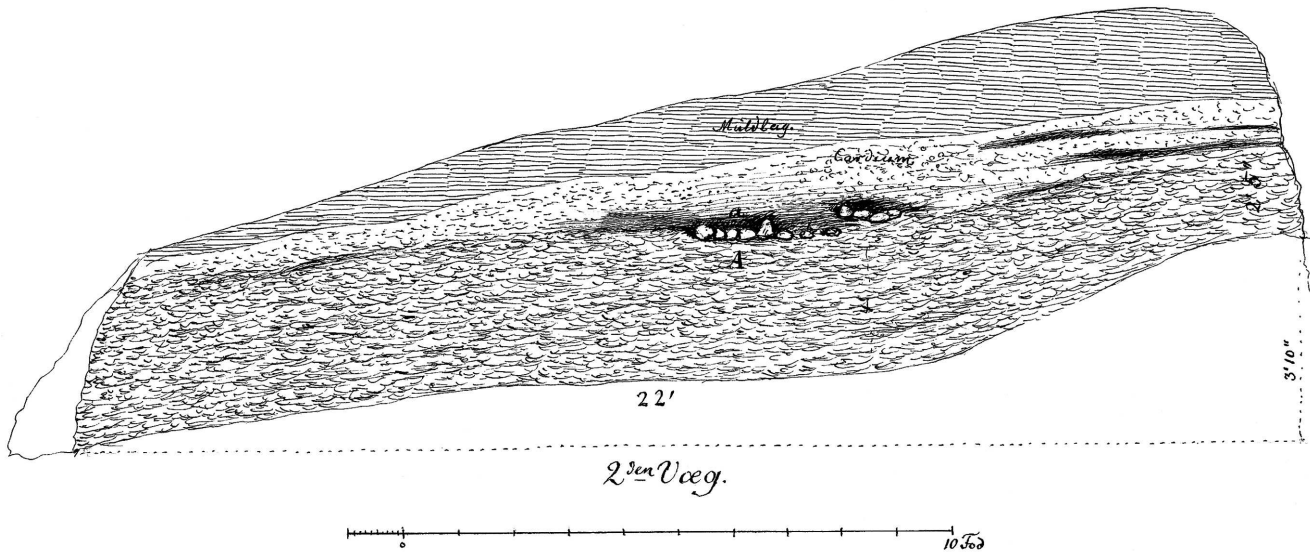


Figure 6.2 Section through the Krabbesholm I shell midden. The bottom layer (A) is the Late Mesolithic Ertebølle horizon dominated by oyster shells. On top of it is the Early Neolithic Funnel Beaker horizon characterised by cockles and thin ash layers and a hearth. The excavation revealed fragments of pointed-bottomed Ertebølle vessels in the bottom horizon and nicely decorated Funnel Beaker ceramics in the cockle-and-ash layer (the position of the Neolithic sherd is indicated by an “a” on the profile).

the oldest Neolithic was first understood (Andersen 1991). The Norsminde site was especially informative, because it contained thick deposits from both the Late Mesolithic (EBK) as well as the Early Neolithic (TRB) and because it had an undisturbed stratigraphy (fig. 6.3).

This investigation was followed by excavations at Bjørnsholm (Andersen 1993), Visborg (Andersen 2000b; 2001; 2002), Krabbesholm I (Andersen 2005) and finally Havnø (Andersen 2008).

6.3 STRATIFIED SHELL MIDDENS

In general the deepest section of the shell layers are of a white-yellowish colour and are dominated by large, unbroken, oyster shells (up to 80 – 90% of the deposits) while the top layers are dark grey/black and are characterized by a dominance of crushed cockles and many thin layers of ash, charcoal and potboilers. However, it should be emphasized that there are also oysters in the upper layers, but in a much smaller percentage than in the lower horizons. This differentiation between midden layers is generally true in all stratified middens, although the composition and relationship between the shell species may vary somewhat.

Analysis indicates that this change in mollusc composition is a reflection of environmental change in the marine biotope (Andersen, 2007, 43-44).

Careful stratigraphic studies in the Norsminde, Bjørnsholm, Visborg and Krabbesholm shell middens all show a characteristic *c.* 2 – 3 cm sandy, grey/black humus horizon with shell fragments and cultural debris, between the lower (oyster dominated) and the upper (cockle dominated) horizons (*e.g.* Bjørnsholm; fig. 6.4). Unfortunately, this layer has not yet been chemically analysed, but its structure and composition shows that it represents a shift in the midden formation and sediment sequence, and most probably represents an open land surface; the cultural remains show that it is not a layer which had been flooded by the sea during a transgression.

At Bjørnsholm this horizon is dated to the time interval 4000-3710 (K-5817) cal BC and 4030-3790 (K-5516) cal BC (Rasmussen 1993) respectively. From Norsminde there are three dates of respectively 3940-3815, 3982-3944 and 4037-3959 cal BC (AAR-5364, AAR-7838 and AAR-7837), and at Visborg the dates gave time intervals of 4340-4080 – 3950-3770 (K-6875 and K-6876) and 4450-4260 – 3960-3800 cal BC. (AAR-7005 and AAR-7004).

At Krabbesholm I, a sample was taken *directly* from the horizon itself, which gave a date of 3970-3800 cal BC (AAR-9786).

All of these results (based on dates of both charcoal and shell) cluster around *c.* 4000-3800 cal BC and are in nice

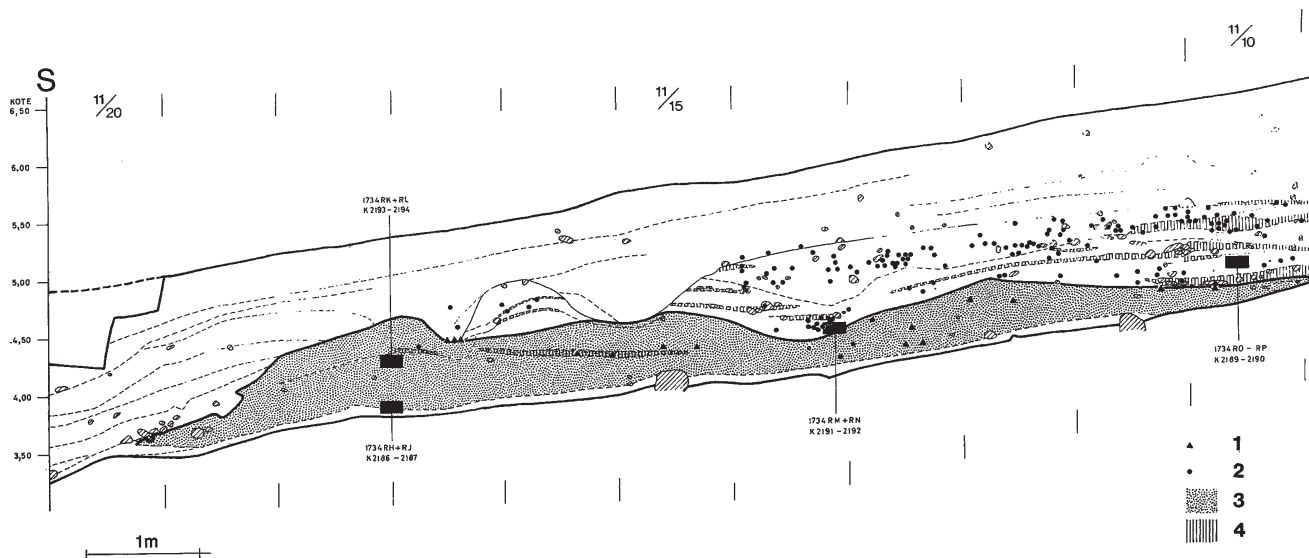


Figure 6.3 Section through the Norsminde shell midden with a plot of all Ertebølle (triangles) and Funnel Beaker sherds (dots) from within the nearest meter. The Ertebølle horizon is shaded, while the Early Neolithic is white.

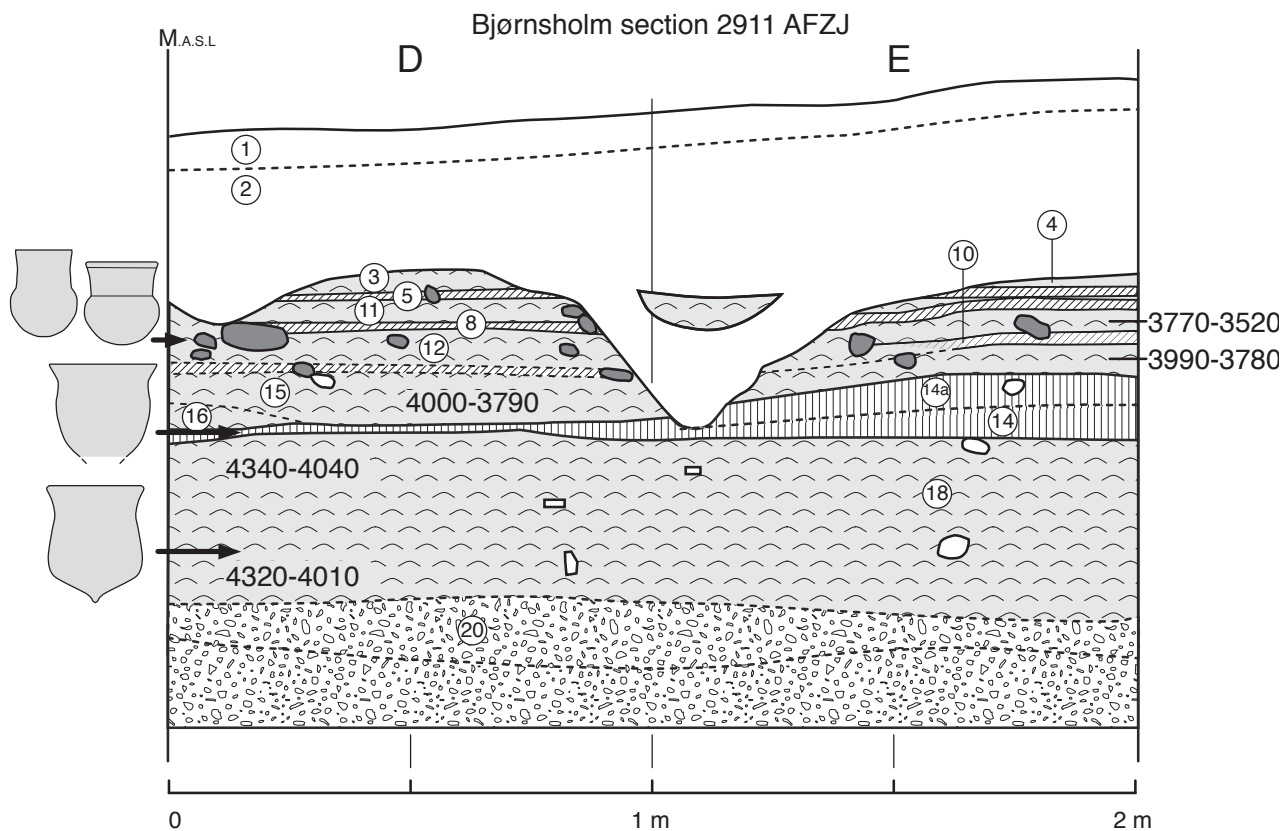


Figure 6.4 Section from the stratified Bjørnsholm shell midden. In between the thick EBK layer (number 18) and the TRB layer (layers nr. 3, 11, 12, 15 and 16) is a thin humus horizon (layer 14) representing the transitional period from the Late Mesolithic to the Early Neolithic on this site. Relevant ^{14}C dating from the profile is indicated as well as typical vessel types (left).

accordance with each other, the stratigraphic observations and the other ^{14}C dated sequences through the cultural deposits. These results also support the information obtained from the midden-stratigraphy, which indicate it was formed in a period of a very limited duration, possibly only *c.* 100 years.

If we turn our attention to the cultural remains from the midden sequences, this layer corresponds with a typological change in the material culture, of which the most marked is found in the ceramics, where we see a shift from thick-walled, undecorated and pointed-bottomed vessels to new types of thin-walled, round-bottomed beakers with a wide range of decorative motifs. Additionally, the quantity of pottery in the 'oyster layers' is much less than in the 'cockle layers', while the amount of flint artefacts and flint debris is clearly much higher in these 'oyster layers'

From the Norsminde, Bjørnsholm and Krabbesholm middens we have found vessels of typologically transitional forms between Ertebølle- and Funnel Beaker ceramics within this transitional horizon (fig. 6.4).

In flint technology there is also an abrupt change in style from a production based on blades in the lower horizon, to a production characterized by flakes in the upper layers (Stafford 1999). Next to that, a change occurred from flake and core axes to the first appearance of polished flint axes in the TRB. However, it is essential to underline that despite these changes in style and technique, basically it is the same flint types which continue.

Finally we have a few finds of domesticated animals (sheep/goat) and charred grains (wheat/barley) from the beginning of the upper, cockle dominated horizons onwards.

Taken together, the ^{14}C dating, next to the vertical (stratigraphic) distribution of characteristic types (especially pottery) and the first appearance of domesticates and cereals, demonstrate that this is a 'transitional horizon' from the Late Mesolithic Ertebølle culture to the Early Neolithic Funnel Beaker culture, and that it took place *c.* 3900-3800 cal BC on the coastal settlements in the Western part of Denmark.

The observations indicate that there was no break in the occupation – quite the contrary – all investigations indicate settlement continuity on the coastal sites.

This "transitional horizon" is not recorded in all stratified shell middens, a fact which can be explained either by its thinness or as a function of a horizontal shift in focus of habitation during longer periods of occupation. If we are dealing with an excavation of limited extent, it is more a matter of accident if the investigation cuts through such a transitional sequence or not. Besides, a short period of occupation will only result in a thin cultural horizon of restricted area and of slight archaeological visibility.

These problems are nicely illustrated in the totally excavated Norsminde midden, where the transitional layer was recorded in some areas and not in others.

The occurrence of a transitional layer is therefore most probably a general aspect in all these shell middens. Also on sites where such a horizon has not been recorded, the series of ^{14}C dates support the impression of continued occupation from the Mesolithic to the Neolithic (*e.g.* at the classical site of Ertebølle (Andersen/Johansen 1987, 50 – 51, 60; figures 16 and 17)).

The stratigraphy and the sedimentation of cultural debris and marine molluscs combined with the dated sequences shows a continued activity on the coastal sites from the Late Ertebølle and into the beginning of the Early Funnel Beaker (*c.* 3900-3600 cal BC), and if we compare the thickness of the layers with the ^{14}C dates, it is obvious that the sedimentation rate in the Early Neolithic was just as fast or faster than in the EBK.

Later on, from *c.* 3600 cal BC, the sequence of cultural horizons on the majority of coastal sites comes to a stop.

From the following period, the Early Neolithic II (*c.* 3600-3300 cal BC), we only have scattered and sporadic traces of site use on the 'Køkkenmøddinger', and the investigations clearly show that the coastal activities in by far the most cases either stopped or decreased significantly after that time. Therefore, this date seems to mark a fundamental change or restructuring of the Early Neolithic settlement pattern along the coastline.

Coastal occupation was resumed at the transition from the Middle Neolithic A (Funnel Beaker culture) to B (Pitted Ware culture and Single Grave culture) *c.* 2800 cal BC.

That stratified coastal settlements with long occupational sequences are the norm rather than the exception, has recently been demonstrated by investigations of all Stone Age settlements in the fossilized Bjørnsholm Fjord in Northwestern Jutland (Andersen, 2001, 34); here *c.* 50% of all coastal sites belonged to this type of settlement – a number which probably originally was even higher, because the upper (Neolithic) layers have been in most danger of younger disturbances (ploughing).

In summary, the investigations show coastal occupation from *c.* 5700 to *c.* 3600 cal BC, after which the sequence of cultural horizons declined, or came to a general stop (fig. 6.4).

If we turn our attention inland in the same regions where we have the shell middens, the very small number of Funnel Beaker settlements from the first phase of the Early Neolithic (Early Neolithic I), is striking. Despite intensive campaigns of reconnaissance, we only have a very few inland sites, which are contemporary with the coastal middens (*e.g.* Mosegården (Madsen/Petersen 1984)) and we know of only *one* inland site with a comparable long occupational series covering the Mesolithic – Neolithic transition, which is Ringkloster (Andersen 1975; 1998). Also, the Early Neolithic inland sites are clearly smaller in area than the contemporary coastal sites, and at the same time all the inland sites are located by

water (along river valleys or lake shores), environments more suited for hunting, fishing and gathering than farming.

In conclusion, one can say that our present information indicates that it most probably was on the coastal settlements of Jutland, that the Ertebølle – Funnel Beaker transition actually took place – an observation which fits nicely with the distribution of the Ertebølle network along the Danish coastline. The spread of new elements, technical, economical and ideological, must have followed this coastal-oriented network.

6.4 LOCATIONAL STABILITY, SETTLEMENT STABILITY, OCCUPATIONAL CONTINUITY

A precondition for settlement stability in coastal regions is stability in the marine resources of these sites. From this follows, that we must assume that the basic economic elements must have been the same in Late EBK as in Early TRB.

All faunal and botanical evidence from the modern excavations demonstrates that the subsistence in the Late Mesolithic Ertebølle was based on fishing, hunting and gathering. In no case have traces of domesticates, excepting the dog, been recorded.

The zoological investigations from the Early Neolithic I horizons in these middens show, that we have the same species of mammals, birds and fishes (Andersen 1991; Bratlund 1993; Enghoff 1991), but also (albeit rarely) new types of domesticates. Sheep/goat, cow and pig appear, as well as sporadic traces of wheat, barley and other cereals.

This information supports the opinion that the basic subsistence was the same in the Late Mesolithic as in Early Neolithic I (Andersen 1991, 39 – 40; Bratlund 1993, 97 – 104). The economy of the Early Neolithic continued in ‘the Mesolithic way’ of life and was based on a mixture of hunting, gathering, fishing, with some additional livestock rearing and cultivation of cereals (Andersen/Johansen 1992, 91). The increased number of potboilers in the Early Neolithic demonstrates a change in settlement activities, and an intensification and change in food processing in contrast to the Late Mesolithic; taken at its face value it most probably reflects an intensified reliance on cooking of the food.

Rather than showing any signs of a marked economic change from the Late Mesolithic, the Early Neolithic settlements seem to have continued the Mesolithic way of economy: the basic elements in the whole subsistence pattern were (still) hunting, fishing and collecting, with the addition of a few potentially important domesticated elements (“extended broad spectrum economies”; Louwe Kooijmans, 1993, 131; Bratlund 1993, 104).

On all coastal sites from Jutland, the number of ‘Neolithic elements’ in the economy in EN I are so few, that they could not have played any significant role in the subsistence.

Series of ¹⁴C dates of domesticated animals from the stratified shell midden sites seem to indicate that the number of species and total amount of individual animals increases in the earlier part of the Neolithic (*e.g.* at Visborg; Andersen, 2001; 2002).

In conclusion, the subsistence evidence on the oldest Neolithic settlements demonstrates a mixed and broad economic basis, and a reasonable characterisation for this population is therefore fisher – farmers.

6.5 SOCIAL, RITUAL STABILITY

The locations which were the largest coastal settlements in the Late Mesolithic also continued to be the most important in the Early Neolithic I – not only as habitation sites, but also in a social and ritual context as illustrated by burials on Early Neolithic settlements (*e.g.* Bjørnsholm; Andersen/Johansen 1992). Prestigious artefact types occur, such as the stone skeuomorphs of a Central European copper axe (Andersen/Johansen 1992, fig. 10, 43-44) and a Central European shaft-hole axe from the Åle shell midden (Andersen 1995, fig. 25, 62).

Sites with a combination, in Neolithic levels, of a large settlement area and a rich grave, like the site of Bjørnsholm (Andersen/Johansen 1992; Andersen 1993), indicate that such coastal sites must have been essential and have had a high economic and social importance for the population and the society as a whole in the Early Neolithic.

Early Neolithic coastal settlements such as Norsminde, Bjørnsholm, Visborg, Krabbesholm and Havnø have hitherto been classified in the Danish archaeological literature as short term, seasonal “catching sites” in contrast to a group of “residential farming sites” (Madsen 1982, 203-205; Skaarup 1982, 39-42). A distinction very often purely based on the topographic positioning in the landscape, as by far the greatest number of these inland sites are without or with very few faunal remains (*e.g.* Mosegården (Madsen/Petersen 1984)). Quite the contrary is true; these sites are situated along the coasts, in the coastal region and in a few instances inland in river valleys and along lake shores.

The new investigations clearly show a strong difference both in number and settlement area between the coastal middens and the (lack of) inland sites with a pure ‘Neolithic’ economy at the beginning of the Neolithic. The new information on settlement patterns at the Mesolithic – Neolithic transition, demonstrates coastal stability and a very high degree of economic continuity. Furthermore, it shows that these coastal sites must represent settlements essential for the social and economic structure of the society. It seems reasonable, therefore, to argue that the above mentioned distinction between “catching sites” and “residential farming sites” is artificial and that we only have *one* type of Early Neolithic I settlement. This type of settlement is mainly

based along the coasts and in a few cases inland along river valleys and lake shores, environments also well suited for hunting, fishing and gathering.

These sites are *the typical* West Danish, Early Neolithic I settlements based on a mixed economy.

6.6 CONCLUSIONS

There is a high degree of locational stability at coastal settlements in the Late Mesolithic EBK and Early Neolithic TRB cultures. This settlement stability continues from the Late Mesolithic Ertebølle and during the first 300 – 400 years of the Early Neolithic (Early Neolithic I) after which it ends *c.* 3600 cal BC; there are very few coastal sites with cultural debris from the following EN II. As in the Late Ertebølle period, the majority of people during the Early Neolithic Funnel Beaker I period, were living on the coastlines.

The transition from Mesolithic to Neolithic took place *c.* 3900-3800 cal BC over the whole of the Western part of Denmark. The large EBK sites continued as being the largest also in the EN I, and these sites also continued having an important ritual and social role in the Early Neolithic I as well. These Early Neolithic I coastal settlements are not seasonal hunting and fishing sites as claimed earlier, rather they are *the* settlements proper.

There is also continuity in the basic elements of the subsistence from the Mesolithic to the Neolithic. The Early Neolithic I was basically still Mesolithic with only a few Neolithic additions and could best be described as 'fisher – farmers'.

At the beginning of the Neolithic we can observe a series of cultural transformations of which some happened very quickly, while others were more gradual. The previous assumption that the introduction of a farming way of life was an abrupt and fast change defining the beginning of the Neolithic, needs modification. The changes within the material culture were numerous and happened within a short time span, while the introduction of the 'Neolithic' way of life was a much more gradual and prolonged process, which took *c.* 300 – 400 years, i.e. the Early Neolithic I was a phase where subsistence basically was a mixture of hunting – gathering with some minimal assistance from farming.

The Early Neolithic I is therefore to be considered as a period of adoption of 'Neolithic' elements from a pure Mesolithic Ertebølle subsistence to a full 'Neolithic' in the Early Neolithic II, *c.* 3600 cal BC, the time from which the settlement pattern and economy *do* seem to have changed towards an inland orientation, and a division into "residential farming sites" and "catching sites".

This process corresponds well with the model of an availability phase (until *c.* 4000/3900 cal BC), an adaptation phase (until *c.* 3600 cal BC) and a consolidation phase (after *c.* 3600 cal BC) (Zvelebil, 1998). This model has also, been

successfully applied to the Dutch Neolithic by Louwe Kooijmans (for instance in Louwe Kooijmans, 1993, 135).

Acknowledgements

My friendship with Leendert goes back 30-35 years when I was invited to Leiden to give a lecture on the new information on the introduction of the first farming culture in Denmark. This meeting was followed by a visit of Leendert and his students at the Norsminde 'køkkenmødding' with its thick Mesolithic-Neolithic shell layers, and I think it was the first time that Leendert literally saw the Mesolithic-Neolithic transition in an archaeological sequence. I don't know if it was the impression from this visit or not, but during the following years he has shown a continued scientific interest in this essential issue.

I also take this occasion as a good possibility to thank him for many years of hospitality and interesting scientific as well as general discussions on issues of mutual interest.

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