

Where did all the farmers come from?

by *Håkan Petersson*

In this article I take up again a discussion in the *Journal of Danish Archaeology*, 1987, concerning the neolithisation of southern Scandinavia. In contrast to most scholars, but in agreement with a few others (Juel Jensen 1994; Price et al 1995), I consider neolithisation to have been a gradual transformation over a long period. I will also argue that it was a process with large regional differences. In this article I make an attempt to present a somewhat different view from that which represents the change as rapid and uniform. I also try to re-introduce the earlier European hypothesis of a slow and geographically varied shift to the neolithic way of life in southern Scandinavia. My opinion is that the change takes place almost simultaneously in western Norway, the Mälars region, western Sweden and Denmark. But the transformation varies from region to region and societies do not change according to unitary, defined cultural systems; rather in accordance with their own unique conditions. My aim is to discuss neolithisation in this light. Similar discussions of the change from the Mesolithic to the Neolithic have recently appeared (Nordqvist 1997; Zvevbeil 1995; 1998; Whittle 1995).

HISTORY

In one way or another, theories of the eighties have considered neolithisation to be a rapid and homogeneous process. It produced new, regional groups of vast extent (Volling, Svaleklint-Svenstorp and Oxie; Svenstorp is another name for Svaleklint in Scania). The Ertebølle culture's relatively homogeneous territories disappeared in favour of new ones "...reflected by the local stylistic groups emerging during the EN" (Nielsen 1987, 242). The inland Ertebølle culture was transformed to the Vollling/Svaleklint stylistic constructions and thereafter the coastal populations of the Ertebølle culture also changed, possibly with some people moving away from the settlement areas (Madsen 1987, 237). Several researchers considered the Oxie group to have been a development out of the coastal populations of the Ertebølle culture, with its origins still visible in the archaeological material. The theories were basically functionalist, even if many of the researchers modified their views (e.g. Madsen 1979; 1982; 1987; 1991). The shape of vessels was considered to be determined by methods of food production and storage, while stylistic and technical details were seen as specific cultural elements (see, for instance, Nielsen 1987, 242). The traditional chronology was overturned by C14 analyses. These also indicated that neolithisation occurred within a short period, and were considered to refute the previously popular migration theories.

The relatively small difference in time between the Erte-

bølle culture and the Funnel Beaker culture strengthened the view of the new local pottery groups as parts of a homogeneous system so that a mixed economy, with both mesolithic and neolithic elements, was impossible. Some archaeologists considered it to be solely the product of economic factors: the population of the Ertebølle culture had "...a modest capacity for the storage of food. The range of pottery types was limited..." (Nielsen 1987, 240). That cultural groups in a phase of transformation could maintain elements from both the Ertebølle and the Funnel Beaker cultures has never been discussed, since this has been considered incompatible with the differences in respect of social organisation that these two economic systems are supposed to involve. This, it was argued, was demonstrated in that the Funnel Beaker culture had a more advanced material culture than the Ertebølle culture (for instance the pottery).

The existence of cultural dualism in the transformation phase has been the subject of discussion in Scandinavian archaeological research for a long time. It has been categorically denied by most scholars in southern Scandinavia since the advent of the processual uniform system theory and the development of the radiocarbon dating method. This position may also be seen as dependent on the opinion that the changeover from the EBK to the TRB was very rapid. Economic variation has, however, been accepted, even if the degree of variation that researchers recognise varies considerably. Fishing and hunting are considered to have been important complements to farming throughout the Early Neolithic. On the other hand the view seems to be that the new economy, i.e. food production, changed society fundamentally, and the population is therefore to be seen as one of farmers (Kristiansen 1988; Larsen 1987; Madsen 1982; 1987; 1990; Madsen & Juel Jensen 1982; Nielsen 1985; 1987; Welinder 1982; Skaarup 1973). In the work of Welinder, the new economy is expressed by the populations of some sites preferring hunting and gathering while others preferred farming. His conclusion is that it is uncertain whether they belong to the same cultural system or consist of different groups but that they all used Funnel Beaker pottery irrespective of their different economic strategies (Welinder 1982, 159).

Discussions concerning cultural dualism, i.e. whether the EBK was replaced by the TRB or if the two cultures existed side by side in the beginning of the Early Neolithic, have taken place since twenties and thirties. The debate was especially intense during the forties and fifties, even if Rydbeck, for instance, argued for this as early as 1938. C. J. Becker argued that the EBK continued to exist throughout the EN. This view was accepted as the TRB was seen as an immigrant culture that could coexist with EBK as long as the resources were not scarce. The geological dating of the EBK in the 30's and 40's supported this hypothesis. In the 50's Troels-Smith argued that the younger part of the EBK had an economy that was partly agrarian, and that it continued to exist in the Early Neolithic side by side with the TRB, an immigrant population whose economy was based on animal husbandry. Troels-Smith's case was based on pollen analyses, and stratigraphical observations of EBK pottery and TRB A-pottery in Aamosen, along with the simultaneity of these two types of pottery and agreement

in technical features on two other sites. Several intermediary forms bridged the extremes in his view. After this, Becker accepted that the investigations in the Aamosen bog had proved that the A-pottery was the oldest. Elements of this pottery type were nevertheless seen as alien features (Becker 1954).

When finds from the EBK were radiocarbon dated, however, support for a cultural dualism in the Early Neolithic disappeared. At the same time during the seventies the idea of the introduction of farming due to migration became less popular, in favour of interpretations involving internal conditions, i.e. that the Funnel Beaker culture was a development out of the Ertebølle culture.

Since the theoretical resurgence of the 70's a Scandinavian form of processual system theory, influenced, *inter alia*, by traditional empirical diffusion and migration theories, has dominated archaeological research. The famous population model of Esther Boserup, where population pressure is the cause of all technological development, has frequently been used to interpret archaeological evidence. The more nuanced version of the theory later presented has never been taken into consideration (Boserup 1965; 1981a; 1981b).

Altogether this created a view that the structural changes were simultaneous all over Scandinavia. In accordance with processual theory they were the result of two competing technologies and external pressure, such as ecological changes and population pressure (see, for instance, Larsson 1984; 1987; 1992; Madsen 1982; 1987; Nielsen 1987; 1993). Other scholars considered these arguments to be unlikely, but that did not affect the praxis of interpretation (see, for instance, Jennbert 1985; Persson 1980; 1981). Estimates showed that population pressure alone could hardly have caused development towards a neolithic society (Persson 1981). At the same time some scholars argued that the population could never have reached its highest theoretical level. Logical estimates and anthropological research also rejected any essential connection between population pressure and the development of food production (Persson 1980; 1981).

The later works of Torsten Madsen and those of Kristina Jennbert represent one section of the research establishment which has reflected upon the critique of post-processualism. They both consider the shape of vessels to be symbolic, and to constitute people's perception of the world. An understanding of the relationship between changes in material culture and changes in social structure is therefore essential (Jennbert 1984; 1985; Madsen 1987; 1995). Madsen does not abandon systems theory or the idea of rapid cultural change in his social categorisation of the Early Neolithic, but he considers social factors to be of crucial importance in the process of change. However, he dismisses the theory that the earliest phase of the TRB constituted one single cultural group in southern Scandinavia (Madsen 1987; 1991, 490), a view with which I fully agree and which is supported by radiocarbon dating (see, for instance, Persson 1998). There is also a group of archaeologists who claim, supported by anthropological studies and analyses of economic change, that there are not necessarily any marked differences between the EBK and the earliest part of the Neolithic in respect of social structure, economic strategies, land use and material culture (Jennbert 1985; Persson

1987b, 52ff). Other presentations may also imply this (Andersen S. H. 1993a, 1991; Andersen & Johansen 1987; Fischer 1993; Larsson 1987). Modern theories thus seem to consider the transformation from Mesolithic to Neolithic to have been less dramatic (Ahlfont et al 1995; Bonsall et al 1997; Fisher 1993; Juul Jensen 1994; Olsen 1992; and others).

However, most researchers seem to stick to the idea that neolithisation saw a rapid introduction of farming to southern Scandinavia. This view is largely based on stratigraphical observations in shell middens (Andersen S. H. 1991; 1993), and on a general idea of how certain archaeological phenomena should be interpreted.

MIXED CULTURAL LAYERS AND PREHISTORIC CULTURAL SYSTEMS

Rapid neolithisation is said to be proved by the sharp stratigraphy of the shell middens (Anderssen S. H. 1991; 1993a). This, in turn, is based on the basic view of archaeology, under which the archaeological cultures EBK and TRB have been regarded as objective and truly existing groupings, reflected in two separate and observable systems of material culture. These represent separate societies, which are *a priori* discernible from each other. Cultural layers containing pottery from both the Ertebølle culture and the Early Neolithic have therefore been interpreted as mixed, irrespective of whether any arguments for a mixture such as geological factors have been presented. It is also due to archaeological methods, which have led the discussion to focus on accumulated, sealed settlement layers. So far only the stratified shell middens, in which it is claimed that EBK and TRB appear in separate layers, have been considered to fulfil these conditions. However, mixed and sealed accumulated layers are found at some settlements, such as Åkonge and Siggeneben Süd (Fischer 1993; Meurers-Balke 1983). It is therefore logical to presume that more open accumulated settlement finds may represent remains of settlements where culturally definitive material of both the EBK and the TRB was contemporary. Accordingly, I suggest that the idea that the two cultures represent two different societies has guided archaeological research to consider all stratigraphical settlement layers to be mixed until the contrary is proven. The result is that sites with material from both the early phase of the TRB and the late phase of the EBK cannot be regarded as undisturbed although the two are usually impossible to separate stratigraphically. That archaeological cultures such as the EBK and TRB are simplified constructions, fulfilling our need for a visible and understandable structure of prehistoric development, is not discussed. We construct archaeological cultures and decide to which culture the archaeological material belongs. But there seem to be some archaeologists who believe this construction to be a reflection of the actual course of events in the past. It is more likely, however, that our archaeological cultures are a considerable simplification of the actual way of life in that past. I argue that these constructions have been produced without allowing for the possibility of complexity and heterogeneity in societal development. In our concept of homogeneous systems and a defined cultural categorisation of the archaeological material there is no room for "cultural overlaps" and therefore no possibility that in periods

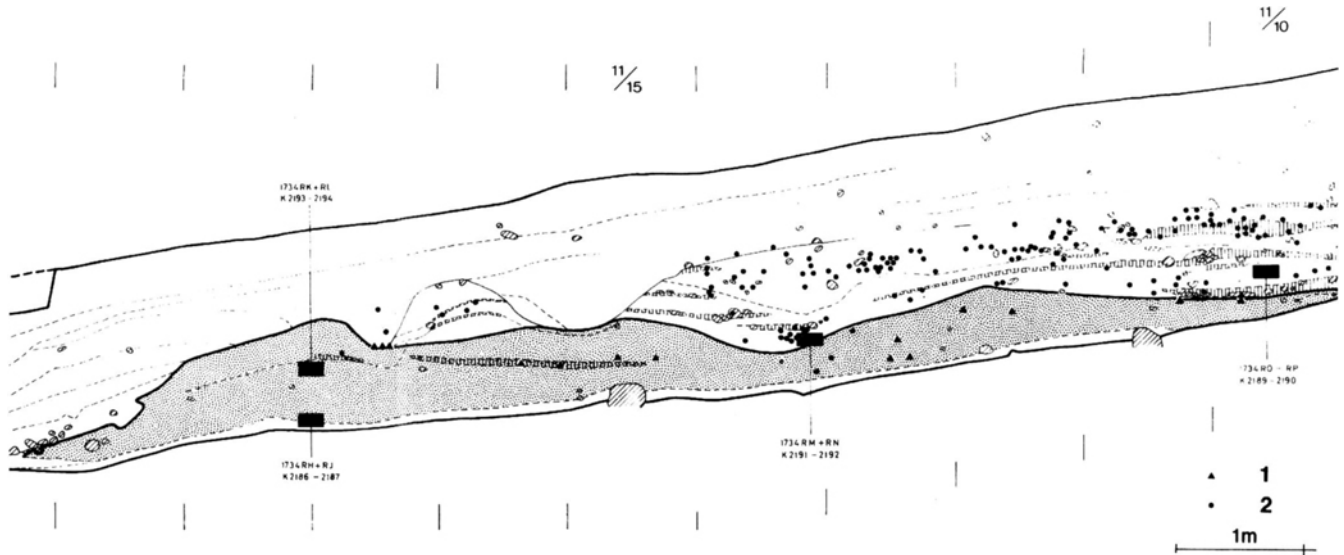


Fig. 1. Section from Norsminde midden. 1. EBK sherds; 2. TRB sherds (from Andersen 1991, 24, fig. 11).

of change the material may be a composition of two different “cultures”. Such assumptions are controlled by the fact that archaeological research sees the marked change in pottery as a basis for defining culture, while the flint material, which indicates continuity, is explained functionally. There are on the whole no archaeologists who support the idea of different regional patterns of change where the contextual relationship of different material categories varies between different regions. The background to these circumstances is probably to be found in the paradigm of the 1970’s and 80’s, which was led by a belief in general laws and that change in the archaeological material reflected change in functional needs. A marked break in social organisation was considered a cultural change resulting from changed economic strategies, technological innovations and other external factors such as ecological ones.

It is plausible that one single social group produced and used both TRB and EBK pottery. This scenario is supported by ethnographic examples, where hunter-gatherer groups have intensive contacts with farming populations (e.g. Nicholaisen in Kristiansen 1988; Turnbull 1993). Under previous theories the two types of pottery have been taken to represent two completely different social systems. As I see it, however, different social groups used the same type of flint artefact and consequently may also have used the same type of pottery. But if this period of overlap is quite short, we will not be able to identify this short episode in the archaeological material.

Sites with cultural overlapping have been described as “mixed”, even when there is no stratigraphical evidence. Methodological principles or ideas about various transformation processes might explain this. The conclusion is possible, but not necessarily the only possible scenario. Everyone agrees that at stratified sites one should always observe the stratigraphy, but some archaeologists do not seem to agree that a presenta-

tion of mixed sites ought to contain observations of transformation processes. My opinion is that in no other way can a mixture be established, although such sites are probably represented in the archaeological material as well. The term “mixed cultural layers” is often used where no discernible stratigraphy has been observed. Often there have been no observations of any transformation processes. The material is simply assumed to be mixed, since the artefacts cannot be stratigraphically separated.

The conclusion must be that a layer containing artefacts from different cultural systems, which are entirely our construction, can be original, although this can seldom be proved. It is also quite probable that societies during a period of change continue their old habits side by side with the innovations. Sealed settlement sites with both mesolithic and neolithic material have been observed at, for instance, Siggeneben Süd and Åkonge in Aamosen (Fischer 1993; Meurers-Balke 1983). However, as has been claimed by Persson, both cultures are mainly defined by their pottery, and the C14-analyses that have been undertaken indicate that there was a cultural overlap between them (Persson 1998, 162).

EXAMINATION OF THE STRATIGRAPHY OF THE SHELL MIDDENS

The perception of neolithisation derives mainly from C14-analyses of shell middens in Jutland. The transition from a mesolithic to a neolithic way of life is seen as an extremely rapid process in archaeological terms. Some archaeologists claim that it only lasted for c. 50 years. This conclusion is based on The sequence of datings associated with the materials in the middens (S. H Andersen 1993a, 74ff.). Only a few scholars have suggested a different view (Juel Jensen 1994; Jennbert 1984; 1985; Persson 1979; 1987a, 113f; 1987b; 1998). There

are two sites of extraordinary importance in these circumstances: the shell middens at Bjørnsholm by Limfjorden and Norsminde south of Århus. A strict examination of the observed stratigraphical change at Norsminde shows that it was mainly due to a change of climate, from oysters to cardium shells (see fig. 1). According to S. H. Andersen, the stratigraphical change is the result of the human use of resources. This is probably a correct conclusion, but at the same time the economic change at Norsminde is taken to be accompanied by an archaeological cultural change, since the mesolithic and the neolithic pottery are claimed to be confined to the lower and upper layers of the kitchen midden respectively (Andersen 1991, 24, fig 11). This conclusion is logical since it is based on the dominant processual theory, according to which cultural change is a change of systems, created by external influences, such as ecological factors. But there are objections to this presentation of cultural change. If the small segment of the published section of Norsminde is examined (see fig. 1) one can see that a third (4/13) of the pottery material presented in the mesolithic layer of the profile is in fact Early-neolithic. But the contextual relationship is missing in the publication. There is therefore no information on the distribution of the material in the profile. How wide is the area in front of the profile from which the pottery originates? If this area were a metre wide, for instance, the discrepancies in the relative artefact levels might have been substantial. On the other hand it is claimed that the archaeological change is associated with a stratigraphical change from oysters to cardium shells. These possibilities seem therefore to have been taken into consideration when the archaeological material was projected into the profile. But if the area outside the profile, from which the projected material originates, had undulating layers, the material could have been projected into the wrong layer of the profile. This would imply that a totally misleading profile has been constructed. The solution would in this case have been to select a smaller area or an area with less difference in level for the projection. But one has to assume that the excavator did not document in a misleading way and that the published part of the profile is representative. Unfortunately there is no such stratigraphical presentation of Bjørnsholm. Furthermore, a detailed presentation of the entire material from both sites, with all sections fully presented, is wanting. It is noteworthy that a geological correspondence between EBK and TRB is discernible in the shell midden at Kolind (Mathiassen et al. 1942, 37), though the presentation of the evidence in this case is primitive.

The view of a rapid neolithisation at both Norsminde and Bjørnsholm is based on C14-analyses. All these analyses except one were extracted from oyster and cardium shells and there was no C14-analysis of artefactual material. This implies that the material analysed does not necessarily connect the ecological stratigraphy with the archaeological material. The fact that the neolithic material was found partly in the mesolithic oyster layer might of course be due to natural formation processes. But these are not discussed and there can therefore hardly have been any observations of such natural formation processes. Nonetheless, the profile from Norsminde cannot be used as a proof of a rapid neolithisation. A detailed discus-

sion of how the neolithic pottery got in the "mesolithic" layers is lacking. Consequently, the archaeological material from the EBK and TRB in the transitional area between the layers could originate from the same period or settlement phase and the changeover from oyster to cardium shells might simply be the result of a change in climate. This view is supported by the fact that the transition to cardium shells at Bjørnsholm actually takes place before the cultural change (Andersen 1991, 74). Thus there are no necessarily functional or economic conditions for cultural change. The available resources affect the economy, but the economy is also a result of the needs and beliefs of the society.

If neolithisation was a rapid process at some sites, it does not automatically follow that all sites in that region underwent the same process at the same time. The radiocarbon dating of Norsminde in comparison with Bjørnsholm allows for a difference in time of 200 years, at a carbon 14 probability of 10-90%. Similar transition phases of 200-250 years are possible when dealing with radiocarbon dates on TRB material in east central Sweden.

The exact time delay in the transition at Bjørnsholm is hard to calculate since the transition from oysters to cardium shells precedes the cultural change in archaeological artefacts, and, as has previously been discussed, it is not the archaeological material that has been dated, but the ecological change. However, the so-called rapid transformation in southern Scandinavia can be said to take place 200 years later at Norsminde, which is situated 110 km south of Bjørnsholm. This is an argument against the view of systems theory, of a large-scale, rapid and homogeneous transformation from EBK to TRB all over Scandinavia. According to this view neolithisation is an influence coming from the south and there should be no difference in time between the introduction of farming at the two sites. There had been contacts with the European Continent already in the late Mesolithic and it is thus hardly likely that the difference in time is due to social isolation of certain groups.

In Aamosen, Sjølland, Fischer has examined several settlement sites, all with sealed layers situated in bogs. The earliest is dated to 4000 BC and contains finds exclusively from the EBK, while sites that are later than these contain material from both the EBK and TRB. Then there is a younger group of sites, dated to approximately 3750 BC, which only contain TRB material. At all sites the flint shows marked continuity with the technology of the EBK. Bones from domesticated animals appear only at the youngest sites. At one site, Å-konge, the stratigraphy was divided into two sequences. The lower layers contained EBK pottery together with smaller amounts of Oxie-group pottery and bones from domesticated animals. The upper layer contained pottery from the EN and large amounts of bone from domestic animals. The excavations showed that the settlements had been used at the transition from the Mesolithic to the Neolithic, and radiocarbon dating indicates a gradual transformation (Fischer 1993; Persson 1997, 381).

Siggeneben Süd is another site with sealed accumulated layers. This has also been an object of discussion in respect of "mixed cultures" (Meurers-Balke 1983). A vessel that was found

at Bjørnsholm at the borderline between EBK and TRB deposits reveals the possibility of a morphologically intermediate form (S H Andersen 1993a, 86). Another intermediate form with a mesolithic morphology and neolithic ornamentation, has been found at Kotedalen, Norway (Olsen 1992). Koch Nielsen has also encountered an intermediate form, which she calls type 0 (Koch 1998). It is thus plausible that material from the EBK and the TRB can appear together in intact layers, irrespective of whether these can be stratigraphically determined to be sealed accumulations or not. The argument for the division of the archaeological material in stratified shell middens can also be criticised.

There is consequently no substantial proof that neolithisation was a rapid, homogeneous process. The archaeological material indicates that there was an intermediate phase before the development of a "homogeneous" neolithic culture. There is no proof that the so-called mixed settlement layers are really disturbed. The process may therefore have been slow, with a cultural transformation phase. It is also noteworthy that the nature of economic changes is considerably more long-term and is not necessarily connected to what we interpret as social and cultural markers.

Sites with observed stratigraphy may indicate a general stratigraphical difference between the EBK and the TRB. But this is hardly possible without a diffuse intermediate phase, and even if it were, no such single observation can be regarded as indicative of a general phenomenon. Such a diffuse phase is present in the profile of Norsminde, which has always been said to be the strongest indication of a marked break at the beginning of the EN. I therefore argue that the archaeological facts that we possess cannot be understood as reflecting incommensurable social systems in the way that the EBK and TRB have been regarded. Furthermore, many sites, e.g. the shell middens, show that the change of economic strategies was limited. In several cases there was only a small change in hunting and gathering strategies.

Is it likely then that people produced vessels using two different technologies, related to different pottery types, for more than a century? The pottery of the EBK is characterised by thick wares in H- or U-technique. Later the ware gets thinner and the N-technique is also used. The TRB pottery has thinner wares and is made in the N-technique. It is likely that the differences in technology are due to functional factors. The H-technique is suitable for a thick ware, while the N-technique is better for thin ware. Both EBK and TRB pottery have parallel Continental forms. But the N-technique is also used for thin EBK pottery, which shows that the choice of technology is not socially determined (Hulthén 1977, 205ff).

"The manufacture of Early Neolithic Funnel Beakers compared with a late phase of Ertebølle pottery methods is, for instance, one example of a continued development of pottery craft. The same applies to Middle Neolithic TRB pottery compared with Early Neolithic pottery." (Hulthén 1977, 205)

Furthermore, many small pottery sherds are classified as belonging to the EBK or TRB just by their thickness. There might thus be a large source of error because of the difficulties of definition. But even if the choice of technology and shape was not due to functional factors it is still plausible that

the population stuck to the technique they were used to for producing a certain type of vessel, while concurrently using another technology for new types of pottery. That different types of vessels were produced during a same period is possible because of the functional reasons for technological differences. As has already been noted, there are also indications of intermediate forms of pottery.

One should not forget that neolithisation concerns more than just the production of pottery, even though this is of crucial importance in this discussion since it has been seen as socially constituted. My hypothesis is therefore that neolithisation was an extended process, both in terms of groups and in the relations between groups in a region, but that the phenomenon appeared at roughly the same time all over Scandinavia (cf. C14-datings; Persson 1998, 82f, 222ff). This will form the basis for the further discussion, where I shall argue for the plausibility of such a development at the transition from the Mesolithic to the Neolithic in southern Scandinavia.

ECONOMIC STRATEGIES

The hypothesis of a richly varied economy in the late Mesolithic and early Neolithic has recently become increasingly popular. It implies a more gradual and varied transformation to the Neolithic. But the archaeological material from this period is scarce and it is therefore hard to come to any conclusion concerning the economy. There is evidence of farming from the EN, but it can hardly have been crucial to the economy.

Analyses of sickles indicate very limited use from the EN to MNA I, and show that only flint blades were used (Juel Jensen 1994, 129ff.; pers. comm.). The spikes could, however, have been harvested by hand, so there is a chance that farming was more extensive than the evidence indicates. The material from a vessel at Bjørnsholm together with dated grains, e.g. from Mossby, are the most important indications of farming in EN I. But the sample from Bjørnsholm does not indicate farming until c. 3800 BC, i.e. approximately 150 years after the introduction of the Neolithic. In east central Sweden there are direct indications (bone material) of farming dated to 500 years later than the transition to TRB (Andersen Th. 1992; Persson 1998, 104).

"...the evidence for bare-soil plant communities is certainly sparse, compared to other vegetation types such as secondary woodland and pasture." (Juel Jensen 1994, 151)

This applies to both Sweden and Denmark. There is a certain difference in the Swedish evidence for the human effect on woodland in the Målar region and southern Sweden, even though the development is not linear but shows great regional variation (Ahlfont et al 1995; Andersen 1993a). There is a possibility of pasture existing in Skåne already before the elm decline, which would in that case also be true of Sjælland. But the pollen evidence supporting this hypothesis is weak. Grains exist in Sweden from as early as the final phase of the EBK, but the indications from the pollen analyses are weak. Criticism of the methods of sampling and dating, which is general to all Neolithic pollen analyses, can certainly in this case cause

doubt whether the results are correct (Ahlfont et al 1995; Jenbert 1984; Göransson 1991; 1994; 1995). The pollen material from the Neolithic has been interpreted as indicating slash and burn agriculture (e.g. Th. Andersen 1992; 1993a; 1993b), while the same phenomenon from the Mesolithic has been interpreted as different types of burning. Clearance by burning is, in ethnographic terms, a kind of forest management. Burning causes a favourable sprout forest, but can also be used to manage certain types of forest. Recent investigations from Denmark show extensive manipulation of the woodland during the EBK to achieve a greater growth of willow. Evidence shows that willow was used for extensive fishing traps (Christensen 1997, 147ff; Petersen 1997, 124ff). In terms of C13 isotopes there is marked break between the Mesolithic and the Neolithic, but this may be misleading due to the reservoir effect. Samples from Dragsholm, Ertebølle, Vængesø and Norsminde have been dated to the Late Mesolithic and have a lower C13 content than those from an earlier phase of the Mesolithic, but the reservoir effect on marine material is not known. If we reckon with a reservoir effect, Late-mesolithic samples close by the shores might be from the Early Neolithic. This would give us a transition phase from the Mesolithic to the Neolithic of approximately 500 years. This is supported by the burials from Dragsholm where the two burials seem to be constructed together, but the radiocarbon dates separate them by approximately 500 years. This discrepancy is what one would expect when taking the reservoir effect into account. But there are very often remains of land mammals in the mesolithic graves as well. On the other hand, compared with material from central Västergötland, the skeletons from southern Scandinavia show that many individuals may have had a partly marine diet, irrespective of whether they lived at coastal or inland settlements. At the same time the decrease in the C13 content cannot be dated more closely than to the period between 4000-3500 BC (Persson 1997; 1998, 55ff, 93). Another problem is that one cannot determine whether a high C13 content is the result of a diet consisting of products from the natural flora and terrestrial animals or from domesticated animals and plants. This implies, if the decrease of the C13 content is correctly dated, despite the reservoir effect, that it might be the result of changed hunting and gathering strategies, without any farming going on.

There are bones from possibly domesticated animals of the EN, but they are few and there are other possible explanations than indigenous domestication (Mathiassen 1940, 17; Nielsen 1985; Persson 1998, 45ff). Sites dated to the earlier parts of the Neolithic with bone material show a marked dominance of wild species and all these sites are situated close to the shore (Persson 1998, 76). There are, however, important sites where bones of domesticates dominate, but which have not yet been dated. It is noteworthy that Havnelev and Sigersted, for instance, which have now been dated (Koch 1998) are not very early (4840 (K-3629) and 4780-4600 bp (Koch 1998: 87; NMI j.nr. 2103/77) respectively). Some of the earliest dated neolithic bone material comes from Gotland: sheep (5070 bp – Ua-4952), cattle (4935 bp – Ua-3248) and pig (4800 bp – Ua-3247). On Gotland there was no big terrestrial game so there is no doubt that these bones originate from domesticat-

ed animals (Jonsson 1986; 1988; Lindqvist 1997, 369ff). Recent radiocarbon dating of animal bones has revealed that bone material that previously was dated to the EBK is considerably younger (Jonsson pers. comm.). It has long been well known that grains and grain imprints on pottery can be dated to the earliest phase of the Neolithic. From Bornholm there are two dated grains, one from Vasegård (5250 bp – AAR-2438) and one from Limensgård (5000 bp – OxA-2895), which might indicate the existence of grain before, as well as after, the beginning of the EN.

The archaeological evidence of the EN is very scarce and indicates a varied economy, with a small element of farming activity at the transformation from the EBK to the TRB. S. H. Andersen has noted an economic continuity in the shell middens and this supports the idea that farming was a complementary activity, of secondary importance to a hunting and gathering population at the beginning of EN.

DID IT START IN THE MESOLITHIC?

There are indications that a more varied economic strategy also existed at the end of the Mesolithic. Pollen analyses and paleobotanical examinations, together with archaeological artefacts from all over Europe and Scandinavia, have been interpreted as the products of a slash and burn economy with forest management, with so-called plant husbandry taking place in pre-neolithic contexts (see the discussion in Zvelebil 1994). This created favourable conditions for big game, which made hunting easier, although it is of course impossible to prove this scenario. Clearances of this kind would also have created advantageous conditions for hazel, which seems to have been highly desired in the late Mesolithic because of its nuts, and it is a fact that hazel nuts formed a large part of the diet in this period. Thus, the clearances might indicate that wild plants were of greater importance than has previously been supposed. The lack of fine-meshed nets for water sieving at most excavations might explain why plant remains are not often discovered (Göransson 1994; 1995; Persson 1980; 1987a; Zvelebil 1994).

It is in this mesolithic context that the earliest pottery appears, and this applies both to Scandinavia and to northern Europe in general (Persson 1998, 183). Several archaeologists today also claim that the tools made from bone and antler had a another function than was previously argued for. It is suggested, for example, that the T-shaped antler adze was used for processing the soil rather than woodworking. However, the results of studies of these adzes are contradictory. There are studies that show them to be suitable for woodworking (Jensen 1991), while other studies show them to be badly balanced for cutting wood (Smith 1989; for a further discussion see e.g. Chapman 1989; Zvelebil 1994). There are also ethnographic studies of soil processing among gathering populations which use wild plants (Harris & Hillman 1989).

The reports on neolithisation in Iron Gates indicate that "mesolithic" hunting and gathering populations lived side by side with "neolithic cultures", with a highly differentiated economy, but with fishing as the main resource. At one site possible grains from cultivated plants have been encountered in

both mesolithic and neolithic contexts. Isotopic analyses from mesolithic skeletons (Lepenski Vir) indicate a change in economic strategy in the Mesolithic, from freshwater fishing as the main resource to an increasing use of terrestrial hunting. An alternative view is that there was increasing exchange with the farming populations in the area or even an introduction of farming to these "mesolithic cultures" (Bonsall et al. 1997, 78)

Excavations in central Europe have revealed that the empirical data that we define as mesolithic and neolithic respectively seem to appear in both mesolithic and neolithic times (Bonsall et al. 1997; Budja 1996; Zvelebil 1994). These indications thus appear both in central European and Scandinavian material. But what impact do these indications of farming have on the hypothesis of a distinct change in social organisation in southern Scandinavia during the EN compared to the EBK?

SEDENTARY HUNTER-GATHERERS AND A RECONSTRUCTION OF NEOLITHISATION

Theories of a sedentary "neolithic" settlement structure in the late Mesolithic and at the transition to the Neolithic in Scandinavia were put forward by several scholars during the 80's (Jennbert 1984; Paludan-Müller 1978; Persson 1980, 137; 1981; Wigforss 1983). A slow process of neolithisation could, by this theory, be due to the development of a more sedentary pattern and an appropriate social structure. Socially adapted and conservative groups thus made the introduction of farming a slow process, or adopted only a few elements that were commensurable with their cultural system, values or ideas. The existence of advanced and socially complex hunting and gathering populations is supported by ethnographic examples (e.g. Hayden 1994). There is also archaeological material to support this, such as neolithic hunting stations in Norway (Olsen 1992; for further examples see the discussion about late mesolithic plant breeding in Zvelebil 1994; 1998 and Göransson 1994; 1995, and the discussion of late mesolithic forest management and fishing constructions in Christensen 1997 and Petersen 1997). Osteological analyses indicate the risks of interpreting the lack of bone material from a certain season as being a result of seasonal settlement. Naturally, our indicators of different seasons, which make up a minimal part of the total bone material, are unevenly distributed in different times of the year. Mature individuals can be hunted throughout the year and some species can be stored from good years to bad years. The evidence from Skateholm reveals that that site was probably occupied throughout the year (Jonsson 1988, 85). The differences between coastal and inland settlements in respect of C13 levels, together with the previous argument for a permanent or semi-sedentary settlement, is further underlined by stylistic variations in the archaeological material (Andersen 1998, 48ff; Noe-Nygaard 1983; 1988; Persson 1998, 92f; Vang Petersen 1984).

During the 80's and 90's revisionist anthropological theory has claimed that modern hunter-gatherers have fundamentally changed their "original" lifestyle as a result of contacts with modern civilisation, and that they have often been forced to move from their area of origin (see e.g. Burch 1994; Burch &

Ellanna 1994; Headland & Reid 1989; Kent 1992; Wilmsen & Denbow 1990). In spite of this crisis in anthropological research in respect of potential ethnographic analogies, the latter might still be useful in the construction of a plausible hypothesis. Such studies show, for instance, that there is no necessary isolation between hunter-gatherers and farming populations, as we often assume in our archaeologically constructed cultures. It is also noteworthy that there are no rules for how the relationship is formed: the farmers may be more dependent upon the hunter-gatherers than vice versa, and the hunter-gatherers may be more complex than the farmers (e.g. Burch 1994; Hayden 1994; Headland & Reid 1989; Turnbull 1993).

Norwegian research implies a stable and relatively sedentary hunting-gathering society from the Mesolithic, with a settlement structure that reminds us of the EN in southern Scandinavia. This structure continues into Neolithic times, and the Norwegian changeover from the Mesolithic to the Neolithic is marked by changes in artefacts and stone technology. Pottery appears at 4800-5000 bp and shows, as has previously been noted, various influences. There are sherds with ornamentation reminiscent of the TRB while the morphology is typical of the mesolithic. A marked economic change also took place at the transition to the EN, from heavy terrestrial dependency with the hunting of big game to an almost total dependency on sea fishing (Olsen 1992, 128 ff, tab 17). This Norwegian example reveals that changes in economy and material culture are not always accompanied by changes in social organisation. In Norway the hunting-gathering populations seem to have kept to their way of life, in spite of contacts with a farming population, for several hundred years (Olsen 1992, 231ff). Some archaeologists claim that a stable social organisation was established as early as late Mesolithic times among these hunter-gatherers, who knew of farming as a result of their contacts but who, economically defined, remained "mesolithic" (Bergsvik in Olsen 1992; Olsen 1992, 93, 141, 232ff). There is thus a possibility of higher complexity in mesolithic society than has previously been assumed, of a kind which is normally connected with the EN (Andersen 1991; 1993a; Bonsall et al 1997, 58, 75; Olsen 1992; Persson 1987a; Paludan-Müller 1978; Zvelebil 1994).

SOCIAL AND IDEOLOGICAL FACTORS BEHIND THE INTRODUCTION OF FARMING?

Social and ideological factors provide plausible explanations of a regionally varied economy in southern Scandinavia. This would imply a regionally more varied social organisation and thus also more varied modes for the change to take place than the homogeneous view held in the research of today (Ebbesen & Mahler 1980; Larsson 1984; 1987; 1992; Madsen 1987; 1991; Nielsen 1985). The results of archaeological research indicate that social and ideological change may take place irrespective of, or with only slight changes in, the economy.

Our paucity of information on the EN cultures in respect of the economic factors of that period makes it difficult to try to discern the relationship between economic strategies and social differentiation, symbolically manifested in the decora-

tion of the pottery. The mesolithic lifestyle was not abandoned at the beginning of the EN in southern Scandinavia, but was supplemented by new strategies to a minor degree. The essential question is whether the impact of these new strategies on social organisation, settlement structure, relations of production and so on was in proportion with their relatively minor significance in the economy as a whole.

Cultivation may have been of importance in the creation of social status and for the manifestation of the relations of power in society. Bread and beer may have functioned as social capital and in ritual activities. We find, for instance, collections of grains at some causewayed enclosures, which may indicate that grains were deliberately brought there for some particular reason. The quantity of flint sickles present is also notably high at these sites (Juel Jensen 1994, 151, 203ff). It is also tempting to suggest that pigs were of ritual importance in the Neolithic. This is supported by osteological analyses and Neolithic finds from Gotland (Jonsson 1986; 1988). The same may also apply to cattle in the MN, while in Sweden finds of cattle are concentrated in areas with megaliths (Ahlfort et al. 1995, 166). The role of domesticated animals such as cattle and pigs as symbols of status or important elements in ritual activities, feasting, the perception of the world etc., are well documented by anthropologists among primitive farmers or pastoral groups (Dwyer 1990; Evans-Pritchard 1940; Keesing 1981, 335ff; Rappaport 1984).

Stylistic variations in the archaeological material in Europe are probably due to social and ideological factors rather than to time differences and differences of economic nature. I attach secondary importance to external factors and population pressure as causes of change. Instead I argue that change was created in a kind of successive, evolving interplay between societal actions in terms of "trial and error" and the constant transformation of the social regulations and ideological structures of power in the society. This process probably took place at a regional scale, even though changes may take place simultaneously on a wider scale. The development was probably based on previous experiences within the local community and should be seen in relation to local or regional conditions.

"...neolithisation of Denmark was a slow process, which began in the EBK with the introduction of certain non-subsistence related technologies, and was ended in MN AII, with the appearance of a manipulating full Neolithic economy...that the duration of this economic and ideological restructuring was more than 1000 years." (Juel Jensen 1994, 173 – my translation)

This implies that the introduction of new economic strategies is a determinative factor in social change. I argue that social and ideological changes in the societal structure of power were considerably more complex, and that in the period of transformation the "neolithic" economic elements probably constituted a small part of the process of change as a whole. But they may have caused marked social changes and started a slow economic development towards another way of life in a conservative society.

Continuity from the end of the EBK to the beginning of EN is, in the light of the foregoing discussion, a possible solution. My aim has been to show that economic, social and technological changes can take place independently of one another, as was the case in Kotedalen, and in a way that our constructions of cultural groups (EBK and TRB) does not take into consideration. Instead of establishing imaginary homogeneous archaeological cultures we should spend our time studying change in the light of how human behaviour changes.

My view is that neolithisation meant a gradual change of the social mode of production: i.e. the mutual relationship between people, their relations to their tasks and their relation to the system of legitimisation of power. In the EN the societal change led to what has often been interpreted as increased ritual activity - at first in connection with long mounds and later also in connection with megalithic graves and causewayed enclosures. The introduction of new economic strategies can be viewed as a part of the legitimisation of power, through political control of new factors of prestige. Even though these new elements were primarily symbols of prestige they had probably also some significance for the economy. They might also have been a vital part of social or ritual feasting in connection with the reproduction of social bonds, alliances, obligations and so on (see e.g. Dwyer 1990; Mauss 1990; Rappaport 1984).

It is tempting to see the ritual activity which is held to increase within the course of the EN as a result of the social, ritual and legitimising nature of the new economic strategies. This ritual activity is held to diminish or change nature at about the same time as the indications of cultivation and stock breeding become so evident that one may assume that these elements had become a general, basic part of the economy. This indicates a more fundamental change in relation to the TRB in southern Scandinavia during MN I/II than the almost invisible transition at the end of EN II and the beginning of MN I. The archaeological material indicates that the Neolithic can be divided into three parts: TRB I (5080-4710 bp), with earthen graves, long mounds and continuity from the Mesolithic, but also new elements and strategies; TRB II (4750-4450 bp), characterised by megalithic graves and a marked increase in ritual activity; TRB III (4450-4190 bp), when the building of megaliths ceases and ritual activities decrease or completely change character, when neolithic strategies become a basic part of the economy and the size of settlement sites increases.

History is not an objective subject; it is a product of our time. Has the time come to revise our view of the Neolithic? The view of the EBK and TRB as two incompatible cultural systems was a result of the theories of the 70's and 80's: a mixture of functionalism, neo-evolutionism and processualism. The function of social institutions as well as social actions is, according to this view, to keep the society in a state of *equilibrium*. Archaeological cultures have therefore been analysed as large-scale, homogeneous systems. The human being is seen as an anonymous and passive part, which only responds to external factors, not as an active factor in societal change. The interpretations of neolithisation have mainly been based on rational reasoning in terms of "cost and benefit". This kind of discussion is almost exclusively based on the economic aspects

of society, which are taken to be the product of external factors that are seen as the primary cause of cultural change. When societies get into a temporary phase of *disequilibrium* and the cost of maintaining the *status quo* exceeds the cost of reorganising society, a change of society as a whole takes place. Thus, rapid societal reorganisation has been assumed at every change of archaeological period, with a constant effort to restore *equilibrium*. Studies of the history of archaeological thought both by archaeologists and by historians of science (Kjørup 1996; Young 1973) provide quite similar views, although many archaeologists may not agree with this.

The transformation from the Mesolithic to the Neolithic, which was principally seen as an economic change with the introduction of farming, and which has been described as a "black box" phenomenon by Madsen, can now be seen as a gradual process. My hypothesis is that this process started in the later phase of the EBK, with the introduction of pottery and forest management, as well as plant husbandry, and that there was a gradual development into Neolithic times.

Thus, the earliest phase of the Neolithic comprises the introduction of farming: "the black box" which, according to Madsen, is to be seen as a process where we can see what goes in and what comes out, but not how it happened. The economically defined transformation from the Mesolithic to the Neolithic is rather a diffuse issue in the archaeological literature. The question is how marked and how fast the transformation was, with the change of material culture and use of artefacts. And how did it influence the social and ideological change? Are changes in material culture a safe indication of such a change? As has been argued by Zvebil (1998, 23), there seems to be a certain continuity between the late Mesolithic and the early Neolithic.

I argue that the development was a slow process, to a large extent not in accordance with our construction of different periods. Social and ideological change nonetheless took place. The transformation was the result of the social and ideological constructions of the population rather than new economic impulses. *The homogeneous economy* all over Scandinavia is noteworthy, and a characteristic of the Late Mesolithic as well as in the Early Neolithic. My answer to the questions stated above is that "neolithic" elements may have caused a change of social organisation and the organisation for power in the mode of production (i.e. the relations between individuals and their access to the means of production). Currently, the TRB period as an ideological change may have implied a changed mode of production. But what was produced seems not to have undergone a marked change until later, in the Middle Neolithic.

The transition to the TRB is thus primarily to be seen as the result of social and ideological factors, which include the introduction of new economic strategies (see also Price et al. 1995; Tilley 1996). In these circumstances it is hard to separate cause from effect, but there was probably a dialectical relationship between the two. In my opinion, new economic strategies indicate that the legitimating structures for power were undergoing slow, but radical change. This change was probably considerably regionally varied, developing both divergently and gradually.

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