

# Settlement and Palaeoecology in the Scandinavian Mesolithic

LARS LARSSON

IN PROFESSOR GRAHAME CLARK'S research, which was both thematically and geographically wide-ranging, he showed a special interest in the Scandinavian Mesolithic. With books such as *The Mesolithic Settlement of Northern Europe* from 1936 and *The Earlier Stone Age Settlement of Scandinavia* from 1975, he made research and finds from Scandinavia accessible to archaeologists elsewhere. These books were not just a presentation of the Scandinavian Mesolithic but also contained extensive research findings of his own, demonstrating his thorough familiarity with the material, together with a marvellous capacity for innovative thinking.

These books, like Grahame Clark's investigations in Star Carr (Clark 1954) and further analyses of the results (Clark 1972), were to serve as models for several generations of Mesolithic scholars in northern Europe and an encouragement to extend the forms of analysis. His ability to incorporate new patterns of thought, several generated by Clark himself, into the study of the Mesolithic showed that previously excavated settlement sites contained a constantly accumulating information potential. Clark's global vision (1961) also meant that archaeologists came into contact with new reference interfaces, and he personally helped Scandinavians to link their network of contacts to a larger archaeological community. I would also emphasize his significance as a source of inspiration in contacts with young scholars—a characteristic that I had the privilege of experiencing.

My aim here is to follow up certain themes that Grahame Clark considered to be of particular interest, and also to add data from some current research efforts of relevance to the subject of this article, settlement and palaeoecology in the Scandinavian Mesolithic.

## The Late Palaeolithic–Mesolithic transition

In his research concerning the Scandinavian Stone Age, Grahame Clark devoted special attention to the Late Palaeolithic and its relation to the Mesolithic (1975). New research findings have produced an image of a much more dynamic pattern than previously suspected. I therefore choose this transitional phase as my starting-point.

Detailed studies in the areas of quaternary geology and biology have been carried out over the last two decades in relation to Late Glacial conditions in southern Sweden. This means that we now have a good idea of deglaciation and palaeoecology (Berglund 1979; Berglund & Rapp 1988; Björck *et al.* 1988).

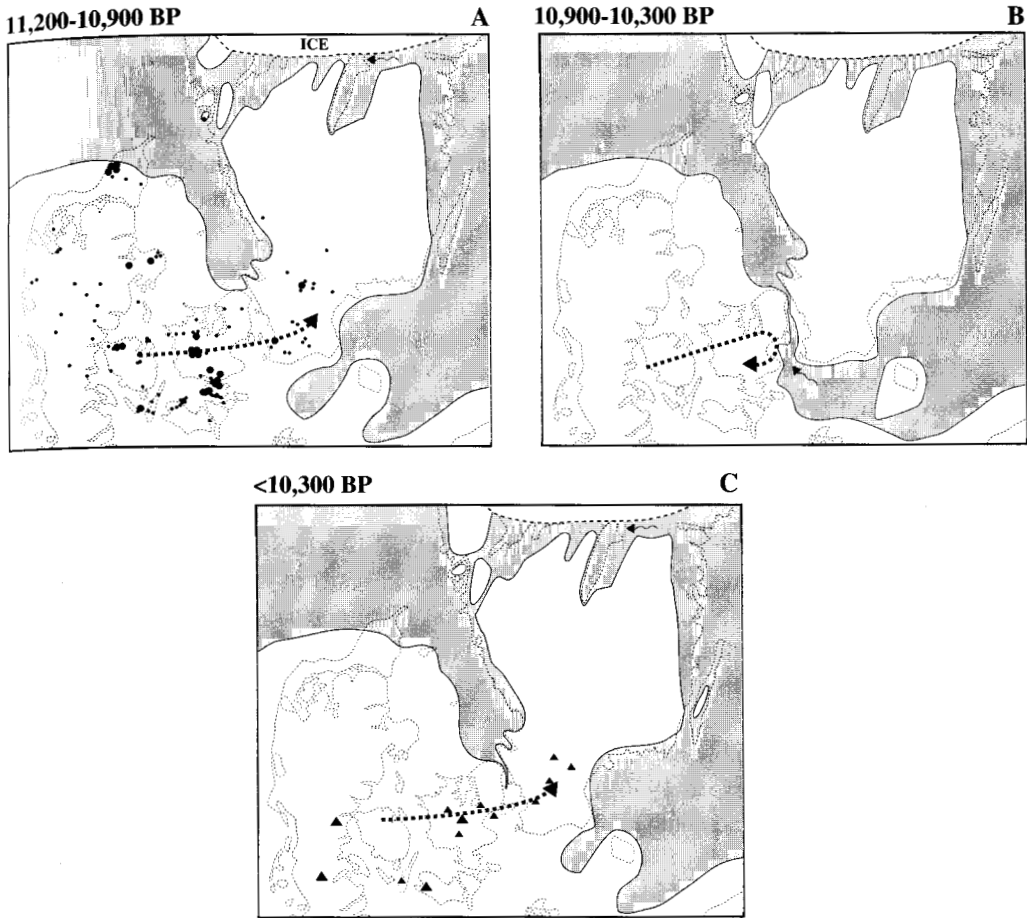
Scania, the southernmost province of Sweden, was the first part of southern Sweden from which the ice disappeared about 13,500 BP (all dates are uncalibrated). The deglaciation process during the Late Glacial can be monitored to Middle Sweden, where the melting of the ice ceased as the temperature fell during the Younger Dryas period (Figure 1). The Swedish west coast became ice-free earlier than the eastern Baltic coast. A certain delay in the melting of the ice occurred in the central area included in the South Swedish Upland, an area of primary rocks at about 300 m above sea level. Very rapid melting occurred mainly during the late Bølling period, at a rate that is estimated at its maximum to be about 50 km per century.

After a temporary advance of the ice sheet during the Younger Dryas there was continued deglaciation. Clay varve chronology suggests that the central part of northern Sweden was deglaciated around 8500 BP and that the whole of northern Sweden was free of ice around 8000 BP (Forsberg 1996).

The data which are actually available to us with regard to our interpretation of the palaeoecological conditions prevailing during the deglaciation phase are disparate. Insect studies give a picture that differs noticeably from the pollen analysis as far as the oldest chronozones are concerned.

Pollen analysis from the south-west of Sweden points to an ice-free Bølling period, with vegetation consisting of steppe tundra with elements of birch and willow (Björck *et al.* 1988; Berglund & Rapp 1988). An increase in temperature is indicated as well as a rapid decrease during the Younger Dryas period. On the other hand, an analysis of the insect fauna in the Late Glacial deposits in Scania indicates that southern Sweden was subject to a noticeable rise in temperature at the end of the Bølling period (Lemdahl 1988). There is evidence of a certain decrease in temperature during the Allerød period and a distinct minimum temperature during the Younger Dryas period, and also of a sharp increase in temperature during the transition to the post-glacial period (Lemdahl 1991).

The earliest settlement of Scandinavia belongs to the Hamburgian cultures with sites in western as well as eastern Denmark (Holm 1996; Petersen & Johansen 1996) and somewhat later in southernmost Sweden (Larsson 1996). The Bromme culture is well represented in south-western Scandinavia (Fischer 1991; Larsson 1991b; 1996; Johansson 1996), as the formation of a land bridge at about 11,200 BP between present-day eastern Denmark



**Figure 1.** Different stages of the relation between land and water during the Late Palaeolithic and Early Mesolithic.

and southernmost Sweden made the movement of migrating animals from continental Europe much easier (Petersen & Johansen 1996) (see Figure 1A).

The development from the Late Palaeolithic into the Mesolithic has often been assigned to the start of the Holocene. How does this agree with new investigations?

The introduction of the Younger Dryas at about 10,900 BP was characterized by a sharp fall in temperature. The mean temperature during the summer may have fallen by as much as eight degrees over just a short period, perhaps within the course of a few decades (Lemdahl 1988). The former outflow of water in central Sweden was stopped by an advance of the ice at 10,800 BP (Björck 1996) (see Figure 1B). A new breakthrough of flowing water in Öresund, the sound that today separates Denmark and Sweden, may

have had drastic or, more likely, catastrophic consequences for the fauna. A fall in temperature combined with the opening of the Öresund would probably have caused the total disappearance of the Boreal species which immigrated over the land bridge from present-day Denmark during the Alleröd interstadial. Reindeer and horse populations may have been severely reduced, reflected by the fact that datings of reindeer finds from southernmost Sweden are absent from this period. The ability to maintain continuous settlement east of the Öresund was very probably impaired.

During the latter part in the Younger Dryas, an increase in temperature initiated a withdrawal of the ice, a new outflow of the Baltic in central Sweden, and the formation of a land bridge at about 10,300 BP (see Figure 1C).

The increase in temperature might be linked to the establishment of the Ahrensburg culture in Scandinavia. Datings from northern Germany fall within the range 10,200–9,800 BP (Fischer & Tauber 1986). This coincides closely with the re-establishment of a land bridge in the Öresund.

Radiocarbon dates have shown that in Scania and part of eastern Denmark the reindeer survived into Pre-Boreal times until about 9600 BP (Aaris-Sørensen 1988; Liljegren & Ekström 1996). As a matter of fact, most radiocarbon dates of reindeer relate to a very late part of the Younger Dryas and early Pre-Boreal. That period saw the immigration of bison, wild horse, elk, red deer, wild boar, and aurochs (Liljegren & Ekström 1996). It is likely that a combination of Late Glacial fauna and new arrivals existed during the first half of the Pre-Boreal period. This should have given excellent conditions for human settlement. However, the remains of settlement from this timespan are very limited in southwestern Scandinavia (Larsson 1996; Petersen & Johansen 1996).

In western Sweden and southern Norway the oldest coastal zone is located high above today's shoreline as a result of isostasy. Sites have been excavated which show a development from the Late Palaeolithic to the Mesolithic that has not yet been detected in southernmost Scandinavia (Schmitt 1994; Kindgren 1996). Several settlement sites along the former coast have proved to contain remains from the Ahrensburg culture. The Galta site at Stavanger in south-west Norway shows a typical and rich inventory of finds from this culture (Bang-Andersen 1996; Prøsch-Danielsen & Høgestøl 1995). But the traditions from the Ahrensburg culture extend much further than this. According to  $^{14}\text{C}$  datings, the oldest settlement in northern Norway, 1600 km towards the north-east, took place shortly after the first colonization of southern Norway (Bjerck 1995; Thommessen 1996) (Figure 2). This occurred in areas with a rich marine environment but along a coast from which the land ice still was fully visible. This shows that colonization took place very quickly and shortly after the coast had been freed from land ice. The terrestrial resources were thus not considered interesting.

The Ahrensburgian is the first north European culture from which coastal as well as inland sites are known. This makes it a culture of special interest for detailed study.

The question is whether the rapid colonization was the result of new adaptation to the special coastal conditions in connection with deglaciation (Bjerck 1995), or derived from



**Figure 2.** Sites marking the earliest settlement along the coast of western Scandinavia.

a coastal settlement going back much further in time (Fischer 1996a). We cannot answer this question at the moment, owing to the unfortunate lack of remains of coastal settlement from the Upper Palaeolithic in other parts of western Europe. This is because there have been no deliberate searches in marine environments.

In inland sites of south-west Norway, a mixture of small tanged points, single-edge points, and microliths has been found. Radiocarbon dates cluster between 9600 and 9400 BP for samples from all the encampments (Bang-Andersen 1990). This can probably be taken as the time during which traditions from the Ahrensburg culture were replaced by a material culture corresponding to that of the Early Mesolithic, not only in western Norway but in most of Scandinavia too. In south-west Scandinavia the introduction of a new material culture appears to coincide with the disappearance of the last reindeer. In northern continental Europe a conscious replacement of the material culture can be linked to a change of fauna and flora. In Scandinavia the ecological shift is not as clear as it used to seem, with a much longer succession phase than has previously been claimed.

In Denmark the oldest settlement sites with unequivocal Mesolithic tool-kits are dated around 9400 BP, while the well-known aurochs from Vig, which was perforated by points fitted with microliths, is dated to 9500 BP (Fischer 1996a). The oldest evidence of the bog sites so familiar from the southern Scandinavian Mesolithic is found at Barmosen in southern Zealand, dated to 9300 BP (Johansson 1990; Fischer 1996a).

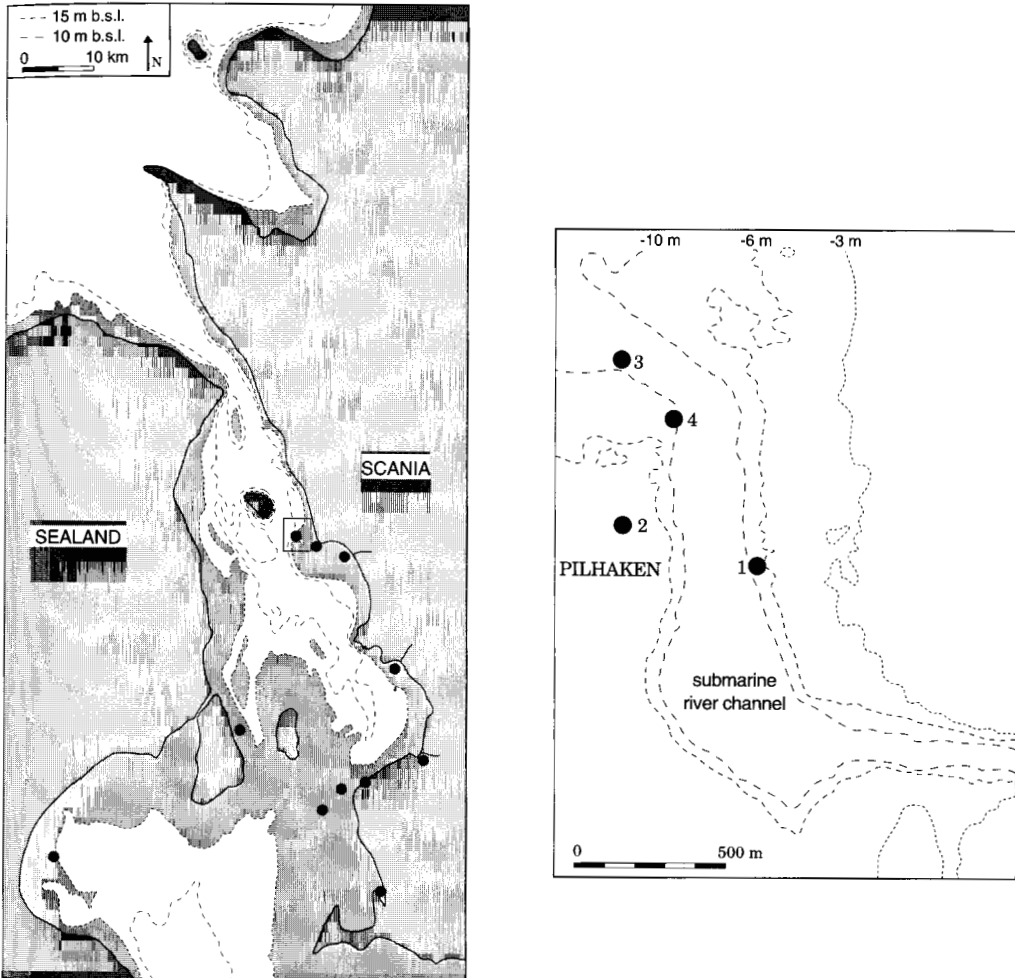
### **Submerged settlement during the Early Mesolithic**

Although the number of Pre-Boreal sites in southernmost Scandinavia has increased in recent years, they are surprisingly few in relation to the Boreal sites. As is evident from the remains from further north in western Sweden, the coast appears to have exerted a great attraction to the settlers, borne out by the large number of sites (Kindgren 1995; Nordqvist 1995). But was the inland as empty as the finds suggest? The lack of finds is probably due to the unrepresentative source material. One explanation may be that precipitation was low and that several lakes had a very low water level. Sites beside the lake shore or on layers where lakes were becoming filled in, may today be covered with later sediment deposited at higher water levels and thus very difficult to detect (Larsson 1993).

Settlement during a somewhat later stage is characterized in southern Scandinavia chiefly by the inland bog sites well known because of the good preservation of organic material (Larsson 1990), as Clark showed very well in his research. At this time large areas of south-west Scandinavia were inundated. The melting of the land ice over northern Scandinavia combined with rapid isostatic uplift resulted in large parts of the present-day southern Baltic becoming under water (Björck 1995).

Especially in Late Boreal times there was a large rise in sea level which brought the surface of the water from a position of more than 20 m below present level to only a few metres below this in just a few centuries (Christensen 1995). To shed light on coastal set-

tlement during this phase, attention may be directed to Öresund. During the Early Mesolithic this sound was a deep and narrow bay of the North Sea (Figure 3). It is evident from the topography of the sea bed that the bay contained a true archipelago. A rapid rise in the water level caused the bay to enlarge, at the same time as islands were submerged. A number of submerged areas with layers of peat and gyttja on the bottom of the Öresund show that this area, before it became a marine bay, contained a number of fresh-water basins, which were gradually transformed into lagoons before finally being inundated (Mörner 1969; Larsson 1978). The area contained several biotopes which made it attractive for settlement.



**Figure 3.** Submerged Late Palaeolithic and Early Mesolithic settlement sites in Öresund, the sound between present-day Denmark and Sweden.

Due to considerable rises in sea level during the Late Boreal and Atlantic, very little evidence of coastal settlement during the Early Post-Glacial in southern Scandinavia remains. It is only during a later part of the Boreal, about 8000 BP, that our knowledge of the southernmost part of Sweden improves. In order to obtain information on coastal settlement forms during the Early Mesolithic, marine archaeological investigations have been carried out on the Swedish side. They were concentrated on what is now a submarine furrow corresponding to the prehistoric course of the river Saxån (Figure 3). Along this river, both surveys and investigations have revealed a number of Late Mesolithic sites close to the present shoreline. From the study of sea charts, it was possible to trace the former course of the river, as well as submarine elevations and depressions. Areas of particular interest in a submarine context were noted. These were sampled, both from on board ship and with the aid of divers. During this phase of our tentative investigations, at least four Early Mesolithic sites were recorded, the depths of which varied between 20 and 6 m below surface level (Larsson 1983; Larsson in print). The best preserved site, Pilhaken 4 (Figure 3), which is partially stratified in peat, is situated at a depth of 7 to 8 m and has been dated to about 8000 BP. The muddy layer could be observed as a horizon in the steeply sloping submarine course of the river. The part nearest the course of the river channel is exposed to continuous erosion. With large-capacity nozzles and the resulting back-suction, small trenches were dug. The stratigraphy consisted of alternate layers of mud and sand. The find material consists of flint artefacts from the Late Maglemose Culture, and bones from roe deer, red deer, and aurochs were found (Larsson in print). The layers of peat were deposited in a comparatively well-protected basin, possibly in a part of the delta that may have included the former mouth of the river Saxån.

Surveys of the sea bed in the southern part of the sound, in the vicinity of the location of the former land bridge between Denmark and Sweden, were carried out in 1992–94 in conjunction with prospecting for the bridge to be built over the Öresund. Flint artefacts were found in a significant number of test pits, pointing to the fact that the area had been occupied (Larsson in print). None of these flints could be confirmed with certainty as *in situ* finds. Most also bore traces of rolling and saltwater patination. Such traces were absent from a small number of flints, however. These finds indicate that undisturbed find-bearing layers had been eroded quite recently, or that they may still exist in particularly well-protected areas. We were unable to identify any such find location, however, during the trial investigation.

The find material includes artefacts from a late part of the Boreal and the earlier part of the Atlantic, that is, a late part of the Maglemose Culture. The finds emerged at a depth of between 9 and 5 m (Fischer 1995). Roots of trees descending into the clay at the base of trial pits to a depth of approximately 6 m have been dated to 7800 BP (Fischer 1996b). The ingression threshold in the Öresund lies just below this level, which indicates that significant quantities of saltwater found their way into the Baltic Basin at that time.

There are several attested examples of inundated coastal settlement. During dredging work to extend the harbours, surveying for sites in the vicinity of the line of the proposed



Öresund Bridge, together with marine archaeological research focused on much younger barriers and unloading places, traces of settlement have been found at a depth of between 5 m and 1 m below present-day sea level (Fischer 1995; Larsson in print).

The results of these investigations provide the basis for an argument that coastal settlement during the Boreal was just as intensive as that which is well documented for the hinterland. The location in the outer parts of the course of a river or in bays points to a position entirely in accordance with the position in which settlements from the Late Mesolithic are found. This indicates that the choice of settlement site was dictated by the same factors as those which governed Late Mesolithic man. Whether these Early Mesolithic settlements were as extensive and of as permanent a character as that attributed to their later variants is a question to which we are still unable to provide a satisfactory answer. The sites investigated have suffered erosion, which has partially or totally disturbed the original find picture.

The fact that organic material is almost entirely absent rules out the possibility of using these find locations to provide an indication of the importance of marine food in the subsistence strategy. In this context, values from analyses of the  $^{13}\text{C}$  content may give some indication of the composition of the diet. A human skull found at a depth of 10 m in the southern part of Öresund, dated to the Late Boreal, showed a  $^{13}\text{C}$  value of  $-14.7\text{‰}$  (Tauber 1989). In this case the dominance of a marine diet is obvious. However,  $^{13}\text{C}$  analyses of human skeletal material from a small Danish cemetery found in the vicinity of a site dating from the Late Maglemose Culture in the Holmegaard Mose bog on Zealand, situated about 30 km inland, show low  $^{13}\text{C}$  values, which means that the inhabitants of the site had no great contact with the coast and marine resources (Tauber 1986). This may be taken as an indication of specific resource structures typical of the coast and inland areas.

New results of  $^{13}\text{C}$  analyses of dog bones from the Late Mesolithic, from Jutland in western Denmark, give further support for this view (Noe-Nygaard 1988). It turns out that dogs from the inland area had low  $^{13}\text{C}$  values, indicating a terrestrial diet, while coastal dogs had high values from a diet of marine sources (Larsson 1991a).

We have to re-examine the frequently used settlement model for the Mesolithic. This includes a social exploitation system where base camps are situated on the coast and the inland area is used only temporarily (Larsson 1978). Perhaps it is the case that both in the latter part of the Early Mesolithic and in the Late Mesolithic there were two separate ethnic groups, one on the coast and one at least 30 km further inland (Larsson 1980).

### **Late Mesolithic—graves in the society**

The Late Atlantic transgressions and their effect in southern Scandinavia on remains of settlement above the present-day sea level have been well known for a long time, not least as a result of Grahame Clark's publications. The shell middens in western Denmark have

been a noted phenomenon for more than 150 years. However, new, goal-directed investigations have shown that they contain a great deal of previously unrecognized information about, for example, duration of use, resource utilization, and settlement structure (Andersen & Johansen 1987; Enghoff 1987; Brock & Bourget 1991; Andersen 1993; 1995). Several examples show that one must be very attentive in dealing with relations between settlement patterns and palaeoecological factors. The choice of settlement site may be influenced by conditions that cannot be related to the immediate environment of the site. For instance, a predominant proportion of the fishing reflected in the shell midden at Ertebølle was done in freshwater in the inland, not in the nearby marine environment.

Our knowledge of Late Mesolithic coastal settlement has been further expanded thanks to the results obtained from marine archaeological investigations of coastal sites in southwest Denmark which have been submerged as a result of later isostatic subsidence (Andersen 1987; Skaarup 1995). The exceptional preservation conditions here have given us a deeper knowledge of the material culture, exemplified in organic material.



**Figure 4.** Grave from the Late Mesolithic cemetery Skateholm II, in southernmost Sweden.

Cemeteries in eastern Denmark, Bøgebakken (Albrethsen & Petersen 1977), and southernmost Sweden, on three sites at Skateholm (Larsson 1984) (Figure 4), are a Late Mesolithic phenomenon whose implications for research into the transition to the Neolithic have been emphasized by several archaeologists (Chapman 1981; Price 1985; Price & Petersen 1987). It should be pointed out, however, that Clark already stressed the significant role of the graves in Mesolithic society for the study of the same phenomenon (Clark 1980).

The number of attested cemeteries has increased in recent years, which shows that they were common in the Late Mesolithic (Figure 5). One or more graves have been found at other sites at the mouth of the lagoon at Vedbæk in eastern Zealand, on which Bøgebakken is situated; examples of these include a couple of previously known graves at Vedbæk Boldbaner (Mathiassen 1946) or at Gøngehusvej, which have been investigated in more recent years (Petersen 1990; Petersen *et al.* 1993). These show that the cremation burial practice predominated in the oldest cemeteries which can be dated to the period 7000–6000 BP (Petersen 1990). A mass grave containing eight people at Støby Egede (Petersen 1988) on the east coast of Denmark completes our picture of Mesolithic burial practices. The interred were divided up by sex into two groups of the same size, which had been deposited at opposite ends of the grave.

Individual graves, or groups comprising a small number of graves, have also been found in the shell middens in east Jutland (Rasmussen 1990). Recent years have seen investigations of several graves in a shell midden at Nederst in east Jutland (Petersen 1988; 1989).

The Danish material is quite extensive if one adds previously known graves such as Korsør Nor on the west coast of Zealand (Hansen *et al.* 1972) and Blokbjerg (Westerby 1927) and new finds at Nivaagård on the east coast (Nielsen & Petersen 1993) and at the submarine sites of Tybrind Vig (Andersen 1987) and Møllegabet II on Funen (Grøn & Skaarup 1993). Individual graves occur in Sweden, such as Uleberg on the west coast (Wigforss 1968) and Stora Bjärs and Lummelunda on the island of Gotland (Arwidsson 1949; 1979; Larsson 1982). Only in the latter case, dated to around 7000 BC, can the three people identified be regarded as having been buried in a cemetery of any size. Investigations in conjunction with the individual grave finds, in both Denmark and Sweden, were far too limited to permit a reliable conclusion to be reached as to whether the graves were isolated or were included in actual cemeteries.

In parts of southern Scandinavian about two-thirds of the landscape disappeared beneath the water during the Late Boreal and the Early Atlantic period. This should not be regarded as ecologically critical for the hunter-gatherer societies. New, abundant fishing environments are formed just as quickly as old ones disappear. The social aspect ought to be far more interesting to study. These changes were so drastic that their effects must have been clearly identifiable in the landscape. Being forced to change one's physical map from one generation to the next probably also had consequences for the mental map. Fishing on a shallow bank on which previous generations were known to have lived must have produced a significant effect on the conceptual world. Stresses were thus of both a physical and a mental nature.



**Figure 5.** Sites with cemeteries or indications of cemeteries in the Mesolithic of Scandinavia.

The territorial perspective which we so often associate with stress symptoms between groups of people may also have had another dimension. The conceptual world in the Mesolithic no doubt contained various oppositions, with a clear dualism between the tame and the wild being an important element (Hodder 1990). In most examples of Neolithization in continental Europe, change takes place in mainland environments and involves relatively small alterations to the environment. The greatest changes that take place are thus the consequence of human activity. In southern Scandinavia, on the other hand, the greatest environmental changes take place in the natural environment. Perhaps we are dealing with a form of territorial marking here, which may be aimed less obviously against other societies and more against the changeability of nature which threatens the social and mental situation of mankind. Could it be that the establishment of cemeteries quite simply represents an attempt to halt changing nature—an attempt to bring about a *status quo*? Greater consideration must be given in future analyses to the mental relationship between the people and the environment, in order to fully appreciate the Late Mesolithic coastal societies.

### A northern perspective

Findings concerning the southern Scandinavian Mesolithic have by tradition been more widely known than the results of investigations from further north. In his book *The Earlier Stone Age Settlement of Scandinavia* (1975) Grahame Clark helped to rectify this imbalance. In recent years, knowledge of the Mesolithic in northernmost Scandinavia has increased significantly (Nygaard 1989; Woodman 1993; Olsen 1994; Forsberg 1996; Hesjedal *et al.* 1996).

In northern Sweden this is due to increased archaeological activity combined with extensive surveys (Forsberg 1996; Halén 1994). A better understanding of isostatic uplift has also contributed to the surer identification of Mesolithic coastal levels, which today can lie more than 100 km from the present-day coast.

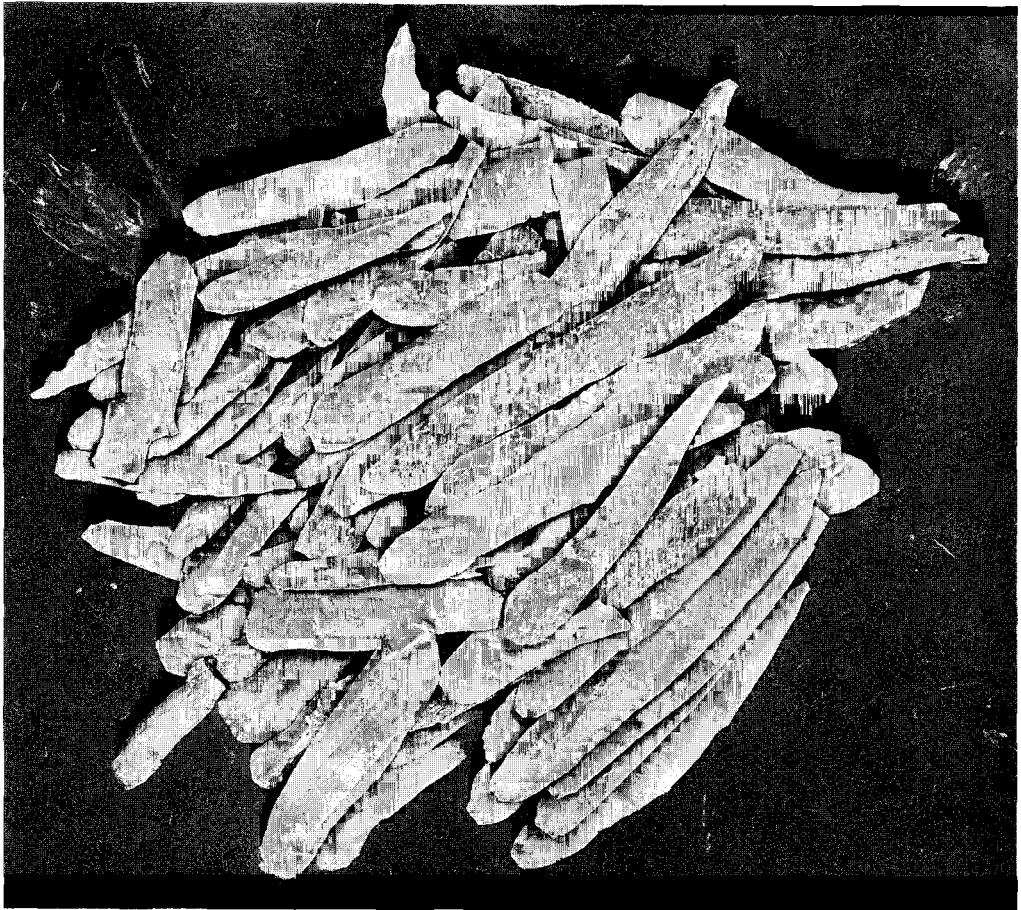
Several distinct house structures have been excavated at sites in northern Scandinavia. They consist of sunken house foundations surrounded by a rim with dug-up soil and waste. In northern Sweden house foundations with a length of 11 m have been excavated, yielding evidence of complex heating systems with smoke ducts under the floor (Loeffler & Westfal 1985). Accumulations of house remains with village-like structure have also been observed (Halén 1994).

At roughly the same time as the art of ceramic fabrication reached southern Scandinavia and resulted in the so-called Ertebølle pottery, ceramics appeared in northern Sweden through the spread of combed ware with rich decoration from Finland and north-west Russia. In recent years, graves, in a few cases in cemetery-like assemblages beside settlement sites belonging to the Late Mesolithic, have also been documented in northernmost Sweden (Halén 1994; 1995) (Figure 5). In certain cases they are furnished with a marking in the form of stone paving above ground. In a grave from Manjäröv in north-east

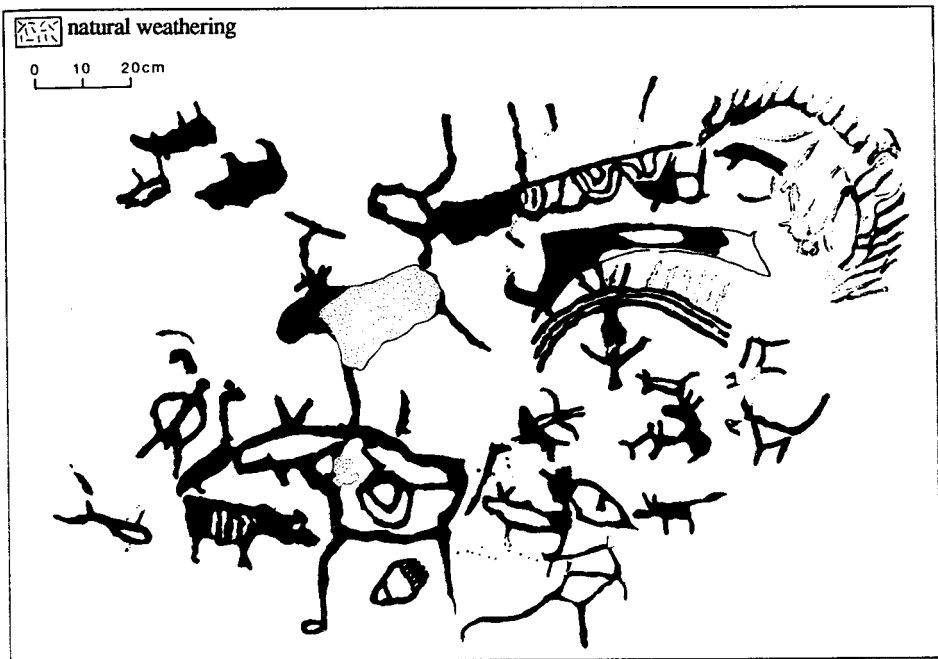
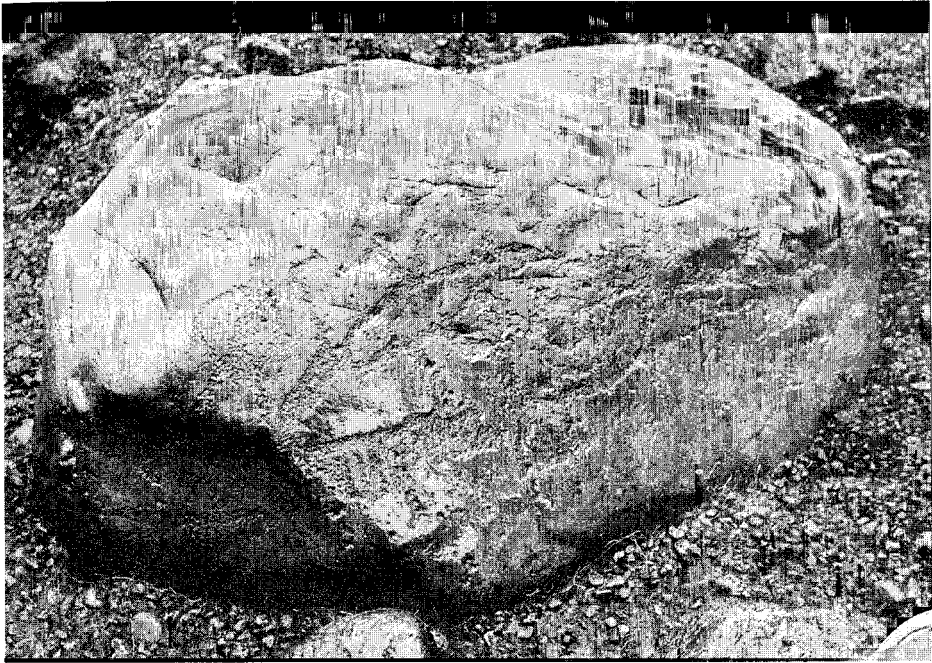
Norrland there were two burials in the same pit, strewn with rich quantities of red ochre (Liedgren 1993). The grave is dated to 6000 BP. This form of grave is linked to similar phenomena at several places in Finland (Edgren 1993) (Figure 5). The northern Scandinavian Mesolithic is quickly on its way to becoming at least as rich in information as the Mesolithic further south.

### **On the margin**

In the study of the Mesolithic, our perspective on society and environment has been broadened by creative efforts in both theory and method. In some cases, new points of view can



**Figure 6.** A flake deposit from Rönneholm moor, southernmost Sweden.



**Figure 7.** (Above) Stone with rock carvings and (below) an example of the illustrations from stones found between sunken house foundations at Slettnes, northern Norway. (Source: Hesjedal *et al.* 1996.)

be obtained by choosing new ways to excavate a settlement site. The importance of excavating on the periphery of the site will be illustrated by two interesting finds, one from the south and one from the north. In the central part of Scania, Sweden's southernmost province, excavations were conducted in summer 1997, occasioned by peat-cutting within the central part of a 12 km<sup>2</sup> area of the Ageröd and Rönneholm bog (Larsson 1978). In Early Atlantic times, around 7500 BP, there was a small island here which was used temporarily as a camp. Several small accumulations of flint material—the chemical composition of the peat does not allow the preservation of bone but wood does survive—have been attested. We are dealing with short-term visits which resulted in hearths with traces of activity around them. In one case the spread of flint clearly marks the limit of a hut structure which is moreover attested by means of surviving posts. On the periphery of the flint concentrations there are special accumulations of large, worked flint cores—often combined with a couple of knapping stones. In one case an assemblage of blades was dug up. There was a total of 106 blades, of which the longest is 16 cm (Figure 6). The blades can be refitted onto four cores and it is evident that the blades were placed beside each other in the cluster as they were struck. Was it the intention to use the blades later, or are they an offering to higher powers?

The northern example comes from Slettnes, a long-term settlement site on an island in northernmost Norway (Hesjedal *et al.* 1996). Here too there are sunken house foundations from the Late Mesolithic, of the kind previously mentioned from northern Sweden. To obtain a better insight into the relations between different house foundations, not only these were excavated but also the area between them. This yielded five large rocks with extensive carvings which were covered with littoral gravel from a later transgression (Figure 7). Although the place was in an archipelago setting, the carved motifs, which can be dated around 8500 BP, contain only examples of forest animals. These finds show what an enlargement of the excavated area may reveal, and also that out here on an island in the archipelago, with a rich marine fauna, people ate fish but thought about elk and bear.

## References

- AARIS-SØRENSEN, K. 1988. *Danmarks forhistoriske Dyreverden. Fra Istid til Vikingetid*. København: Gyldendal.
- ALBRETHSEN, S.E. & PETERSEN, E.B. 1977. Excavation of a Mesolithic cemetery at Vedbæk, Denmark. *Acta Archaeologica* 47, 1–28.
- ANDERSEN, S.H. 1987. Tybrind Vig: a submerged Ertebølle settlement in Denmark. In J.M. Coles & A. J. Lawson (eds), *European Wetlands in Prehistory*, 253–80. Oxford: Clarendon Press.
- ANDERSEN, S.H. 1993. Bjørnsholm. A stratified Køkkenmødding on the Central Limfjord, North Jutland. *Journal of Danish Archaeology* 10 (1991), 59–96.
- ANDERSEN, S. H. 1995. Coastal adaptation and marine exploitation in Late Mesolithic Denmark—with special emphasis on the Limfjord region. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 41–66. Oxford: Oxbow Monograph 53.



- ANDERSEN, S.H. & JOHANSEN, E. 1987. Ertebølle revisited. *Journal of Danish Archaeology* 5 (1986), 31–61.
- ARWIDSSON, G. 1949. Stenåldersfynden från Kams i Lummelunda. *Gotländskt Arkiv* XX, 147–67.
- ARWIDSSON, G. 1979. Stenåldersmannen från Stora Bjärs i Stenkyrka. *Arkeologi på Gotland*, 17–23. Visby: Gotlandica 14.
- BANG-ANDERSEN, S. 1990. The Myrvatn Group, a Preboreal find-complex in Southwest Norway. In P.M. Vermeersch & P. Van Peer (eds), *Contributions to the Mesolithic in Europe. Papers presented at the Fourth International Symposium 'The Mesolithic in Europe', Leuven 1990*, 215–26. Leuven: Studia Praehistorica Belgica 5.
- BANG-ANDERSEN, S. 1996. The colonization of Southwest Norway. An ecological approach. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 220–34. Lund: Acta Archaeologica Lundensia 8:24.
- BERGLUND, B. 1979. The deglaciation of southern Sweden 13,500–10,000 B.P. *Boreas* 8, 89–118.
- BERGLUND, B. & RAPP, A. 1988. Geomorphology, climate and vegetation in NW Scania, Sweden, during the Late Weichselian. *Geographia Polonica* 55, 13–35.
- BJERCK, H.B. 1995. The North Sea and the pioneer settlement of Norway. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below sea level*, 131–44. Oxford: Oxbow Monograph 53.
- BJÖRCK, S. 1995. Late Weichselian to early Holocene development of the Baltic Sea—with implications for coastal settlement in the southern Baltic region. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 23–34. Oxford: Oxbow Monograph 53.
- BJÖRCK, S. 1996. Late Weichselian/Early Preboreal development of the Öresund Strait; a key area for northerly mammal migration. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 123–34. Lund: Acta Archaeologica Lundensia 8:24.
- BJÖRCK, S., BERGLUND, B. & DIGERFELDT, G. 1988. New aspects on the deglaciation chronology of South Sweden. *Geographia Polonica* 55, 37–49.
- BROCK, V. & BOURGET, E. 1991. Analyses of shell increment and microgrowth band formation to establish seasonality of Mesolithic shellfish collection. *Journal of Danish Archaeology* 8, 7–12.
- CHAPMAN, R. 1981. The emergence of formal disposal areas and the 'problem' of the megalithic tombs in prehistoric Europe. In R. Chapman, R. Kinnes & K. Randsborg (eds), *The Archaeology of Death*, 71–81. Cambridge: Cambridge University Press.
- CHRISTENSEN, C. 1995. The littorina transgressions in Denmark. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 15–22. Oxford: Oxbow Monograph 53.
- CLARK, J.G.D. 1936. *The Mesolithic Settlement of Northern Europe*. Cambridge: Cambridge University Press.
- CLARK, J.G.D. 1952. *Prehistoric Europe: The Economic Basis*. London: Methuen.
- CLARK, J.G.D. 1954. *Excavations at Star Carr. An early Mesolithic Site at Seamar near Scarborough, Yorkshire*. Cambridge: Cambridge University Press.
- CLARK, J.G.D. 1961. *World Prehistory: An Outline*. Cambridge: Cambridge University Press.
- CLARK, J.G.D. 1972. *Star Carr: a Case Study in Bioarchaeology*. Reading, Mass.: Addison-Wesley Modular Publications. Module 10.
- CLARK, J.G.D. 1975. *The Earlier Stone Age Settlement of Scandinavia*. Cambridge: Cambridge University Press.
- CLARK, J.G.D. 1980. *Mesolithic Prelude. The Palaeolithic–Neolithic Transition in the Old World*. Edinburgh: Edinburgh University Press.
- EDGREN, T. 1993. Den förhistoriska tiden. In *Finlands historia. Del 1*, 11–270. Ekenäs.

- ENGHOFF, I.B. 1987. Freshwater fishing from a sea-coast settlement—the Ertebølle *locus classicus* revisited. *Journal of Danish Archaeology* 5 (1986), 62–76.
- FISCHER, A. 1991. Pioneers in deglaciated landscapes: The expansion and adaptation of Late Palaeolithic societies in Southern Scandinavia. In N. Barton, A.J. Roberts & D.E. Roe (eds), *The Late Glacial in North-West Europe: Human Adaptation and Environmental Change at the End of the Pleistocene*, 100–21. London: CBA Research Report 77.
- FISCHER, A. 1995. An entrance to the Mesolithic world below the ocean. Status of ten years' work on the Danish sea floor. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 371–84. Oxford: Oxbow Monograph 53.
- FISCHER, A. 1996a. At the border of human habitat. The Late Palaeolithic and Early Mesolithic in Scandinavia. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 157–76. Lund: Acta Archaeologica Lundensia 8:24.
- FISCHER, A. 1996b. Rødder og stubbe af havsoplugte træer. *Marinarkæologiske rekognosceringer efter fredede vrage og fortidsminder i højbrotracéet* 41–43. København: Miljø- og Energiministeriet, Skov- og Naturstyrelsen.
- FISCHER, A. & TAUBER, H. 1986. New C-14 datings of the Late Palaeolithic cultures from Northwestern Europe. *Journal of Danish Archaeology* 5, 7–13.
- FORSBERG, L. 1996. The earliest settlement of Northern Sweden—problems and perspectives. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 241–50. Lund: Acta Archaeologica Lundensia 8:24.
- GRØN, O. & SKAARUP, J. 1993. Møllegabet II—a submerged Mesolithic site and a 'boat burial' from Ærø. *Journal of Danish Archaeology* 10 (1991), 38–50.
- HALÉN, O. 1994. *Sedentariness during the Stone Age of Northern Sweden. In the light of the Alträsket site, c.5000 B.C., and the Comb Ware site Lillberget, c.3900 B.C. Source Critical Problems of Representativity in Archaeology*. Lund: Acta Archaeologica Lundensia. 4:20.
- HALÉN, O. 1995. Alträsket—a Mesolithic coastal site in the northernmost Sweden, 25 km inland, and 100 m above the present sea. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 229–39. Oxford: Oxbow Monograph 53.
- HANSEN, U.L., VAGN NIELSEN, O. & ALEXANDERSEN, V. 1972. A Mesolithic grave from Melby in Zealand, Danmark. *Acta Archaeologica* XLIII, 239–49.
- HESJEDAL, A., DAMM, C., OLSEN, B. & STORLI, I. 1996. *Arkeologi på Slettnes. Dokumentasjon av 11.000 års bosetning*. Tromsø: Tromsø Museums Skrifter XXVI.
- HODDER, I. 1990. *The Domestication of Europe. Structure and Contingency in Neolithic Societies*. Oxford: Basil Blackwell.
- HOLM, J. 1996. The earliest settlement of Denmark. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 43–59. Lund: Acta Archaeologica Lundensia 8:24.
- JOHANSSON, A.D. 1990. *Baremose-gruppen. Skiveokser i tidligmesolitiske fundkomplekser*. Århus.
- JOHANSSON, A.D. 1996. A base camp and kill sites from the Bromme Culture on South Zealand, Denmark. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 89–97. Lund: Acta Archaeologica Lundensia 8:24.
- KINDGREN, H. 1995. Hensbacka-Hogen-Hornborgasjön: Early Mesolithic coastal and inland settlements in western Sweden. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 171–84. Oxford: Oxbow Monograph 53.
- KINDGREN, H. 1996. Reindeer or seals? Some Late Palaeolithic sites in central Bohuslän. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 191–205. Lund: Acta Archaeologica Lundensia 8:24.

- LARSSON, L. 1978. *Ageröd I:B—Ageröd I:D. A Study of Early Atlantic Settlement in Scania*. Lund: Acta Archaeologica Lundensia 4:12.
- LARSSON, L. 1980. Aspects of the Kongemose Culture of Southern Sweden. *Papers of the Archaeological Institute of Lund* 3 (1979–1980), 5–22.
- LARSSON, L. 1982. De äldsta gutarna. *Gotländskt Arkiv* 54, 7–14.
- LARSSON, L. 1983. Mesolithic settlement on the sea floor in the Strait of Öresund. In P.M. Masters & N.C. Flemming (eds), *Quaternary Coastlines and Marine Archaeology*, 283–301. New York: Academic Press.
- LARSSON, L. 1984. The Skateholm Project. A Late Mesolithic settlement and cemetery complex at a south Swedish bay. *Papers of the Archaeological Institute University of Lund* 1983–1984, 5–38.
- LARSSON, L. 1990. The Mesolithic of Southern Scandinavia. *Journal of World Prehistory* 4:3, 257–309.
- LARSSON, L. 1991a. Coastal adaptation in the Early and Middle Holocene of Southern Scandinavia. *Journal of Korean Ancient Historical Society Hanguk Sanggosa Hakbo* 8, 93–118.
- LARSSON, L. 1991b. The Late Palaeolithic in southern Sweden: investigation in a marginal region. In N. Barton, A.J. Roberts & D.A. Roe (eds), *The Late Glacial in North-West Europe: Human Adaptation and Environmental Change at the End of the Pleistocene*, 122–7. Oxford: CBA Research Report no. 77.
- LARSSON, L. 1993. Review of Johansson, A. D. Barmosegruppen. Præboreale bopladsfund i Sydsjælland. *Journal of Danish Archaeology* 10 (1991), 215–17.
- LARSSON, L. 1996. The colonization of South Sweden during the Deglaciation. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 141–55. Lund: Acta Archaeologica Lundensia 8:24.
- LARSSON, L. 1998. Submarine settlement remains on the bottom of the Öresund Strait, Southern Scandinavia. *Epipaléolithique et Mésolithique en Europe. Paléoenvironnement, peuplements et systèmes culturels*. Grenoble. In print.
- LEMDAHL, G. 1988. *Palaeoclimatic and Palaeoecological Studies based upon Subfossil Insects from Late Weichselian Sediments in Southern Sweden*. Lund: Lundqua Thesis 22.
- LEMDAHL, G. 1991. A rapid climatic change at the end of the Younger Dryas in south Sweden—palaeoclimatic and palaeoenvironmental reconstructions based on fossil insect assemblages. *Palaeogeography, Palaeoclimatology, Palaeoecology* 83, 313–31.
- LIEDGREN, L. 1993. Rödockragnarvar från stenåldern. *Populär Arkeologi* 1993:2, 28–9.
- LILJEGREN, R. & EKSTRÖM, J. 1996. The terrestrial Late Glacial fauna in South Sweden. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 135–9. Lund: Acta Archaeologica Lundensia 8:24.
- LOEFFLER, D. & WESTFAL, U. 1985. A well-preserved Stone Age dwelling site. Preliminary presentation of the investigation at Vuollerim, Lapland, Sweden. *Archaeology and Environment* 4, 425–34.
- MATHIASSEN, T. 1946. En boplads fra ældre stenalder ved Vedbæk Boldbaner. *Søllerødbogen* 1946, 19–35.
- MÖRNER, N.-A. 1969. *The Late Quaternary History of the Kattegatt Sea and the Swedish West Coast. Deglaciation, Shorelevel Displacement, Chronology, Isostasy and Eustasy*. Stockholm: Sveriges Geologiska Undersökning Ser. C. Nr 640.
- NIELSEN, E.K. & PETERSEN, E.B. 1993. Grave, mennesker og hunde. In S. Hvass & B. Storgaard (eds), *Da klinger i muld ... 25 års arkæologi i Danmark*, 76–81. Aarhus: Konglige Nordiske Oldskriftselskabet.
- NOE-NYGAARD, N. 1988. 13 C values of dog bones reveal the nature of changes in Man's food resources at the Mesolithic–Neolithic transition, Denmark. *Isotope Geoscience* 73, 87–96.
- NORDQVIST, B. 1995. The Mesolithic settlement of the west coast of Sweden—with special emphasis on chronology and topography of coastal settlements. In A. Fischer (ed.), *Man and Sea in the*

- Mesolithic. Coastal settlement above and below present sea level*, 185–96. Oxford: Oxbow Monograph 53.
- NYGAARD, S.E. 1989. The Stone Age of Northern Scandinavia: a review. *Journal of World Prehistory* 1989:3, 71–116.
- OLSEN, B. 1994. *Bosetning og samfunn i Finnmarks forhistorie*. Oslo: Universitetsforlaget.
- PETERSEN, E.B. 1988. Ein mesolithisches Grab mit acht Personen von Strøby Egede, Seeland. *Archäologisches Korrespondenzblatt* 18, Heft. 2, 121–5.
- PETERSEN, E.B. 1989. Late Palaeolithic and Mesolithic. *Arkæologiske udgravninger i Danmark 1988*, 73–5. København: Det Arkæologiske Nævn.
- PETERSEN, E.B. 1990. Nye graver fra Jægerstenalderen. Strøby Egede og Vedbæk. *Nationalmuseets Arbejdsmark*, 19–33.
- PETERSEN, E.B., ALEXANDERSEN, V. & MEIKLEJOHN, C. 1993. Vedbæk, graven midt i byen. *Nationalmuseets Arbejdsmark* 1993, 61–9.
- PETERSEN, P.V. & JOHANSEN, L. 1996. Tracking Late Glacial reindeer hunters in eastern Denmark. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 75–88. Lund: Acta Archaeologica Lundensia 8:24.
- PRICE, D.T. 1985. Affluent foragers of Mesolithic Southern Scandinavia. In D.T. Price & J.A. Brown (eds), *Prehistoric Hunter-Gatherers. The Emergence of Cultural Complexity*, 341–63. New York: Academic Press.
- PRICE, D.T. & PETERSEN, E.B. 1987. Prehistoric coastal settlement in Mesolithic Denmark. *Scientific American* 112–21.
- PRØSCH-DANIELSEN, L. & HØGESTØL, M. 1995. A coastal Ahrensburgian site found at Galta, Rennesøy, Southwest Norway. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 123–30. Oxford: Oxbow Monograph 53.
- RASMUSSEN, G.H. 1990. Okkergrave fra ældre stenalder på Djursland. *Kuml* 1988–89, 31–41.
- SCHMITT, L. 1994. The Hensbacka: A subsistence strategy of continental hunter-gatherers, or an adaptation at the Pleistocene-Holocene boundary? *Oxford Journal of Archaeology* 13:3, 245–63.
- SKAARUP, J. 1995. Hunting the hunters and fishers of the Mesolithic—twenty years of research on the sea floor south of Funen, Denmark. In A. Fischer (ed.), *Man and Sea in the Mesolithic. Coastal settlement above and below present sea level*, 397–401. Oxford: Oxbow Monograph 53.
- TAUBER, H. 1986. Analysis of stable isotopes in prehistoric populations. In B. Herrmann (ed.), *Innovative Trends in der prähistorischen Anthropologie*, 31–8. Göttingen: Mitteilungen der Berliner Gesellschaft für Anthropologie Ethnologie und Urgeschichte, Band 7.
- TAUBER, H. 1989. Danish radiocarbon datings of archaeological samples 1988. *Arkæologiske udgravninger i Danmark 1988*, 212–28.
- THOMMESSEN, T. 1996. The early settlement of Northern Norway. In L. Larsson (ed.), *The Earliest Settlement of Scandinavia and its Relationship with Neighbouring Areas*, 235–40. Lund: Acta Archaeologica Lundensia 8:24.
- WESTERBY, E. 1927. *Stenaldersbopladsen ved Klampenborg. Nogle Bidrag til Studiet af den Mesolitiske Periode*. København.
- WIGFORSS, J. 1968. Gamla vänner daterade. *Fyndmeddelanden* 1968, 1–4.
- WOODMAN, P. 1993. The Komsa Culture. A re-examination of its position in the Stone Age of Finnmark. *Acta Archaeologica* 63, 1992, 57–76.

ential theoretical models proposed by American anthropologist Julian Steward and others as the new cultural ecology. Clark was a pioneer in the teaching of world prehistory. He trained a whole generation of Cambridge graduates whom he encouraged to work in distant parts of the world. Some of them eventually moved to the United States, bringing his anthropological and ecological approach with them. Grahame Clark's most influential book was *World Prehistory* (1961), which provided the first synthesis that incorporated both New and Old World archaeology into a single global whole. This work, over three editions, provided the conceptual basis for the much more sophisticated world archaeology of today and the inspiration for important comparative studies of early civilizations.

C.F.W. HIGHAM

### **Recent Advances in the Prehistory of South-east Asia**

Prehistoric archaeology in south-east Asia has often lagged behind that of other regions because of its terrain, languages, and politics. Yet the record of human diversity and achievement in colonization, subsistence, and metallurgy is now exceptionally well-documented through a series of multidisciplinary projects. The paper presents an overview of recent field studies and notes the encouragement given by Grahame Clark to south-east Asian archaeology.

LARS LARSSON

### **Settlement and Palaeoecology in the Scandinavian Mesolithic**

Professor Grahame Clark devoted special interest to the Scandinavian Mesolithic, and his research in the area was to serve as a model for several generations of Mesolithic scholars in northern Europe and an encouragement to extend the forms of analysis. The aim of this paper is to follow up certain themes that Grahame Clark considered to be of particular interest, and also to add information from some current research efforts.

As regards the transition Late Palaeolithic–Mesolithic, important new investigations have given us a better knowledge of the deglaciation phase and have also shown that the Ahrensburg culture had a previously unrecognized spread along the west coast of Scandinavia, and it is in connection with this that we can trace the material change to a typical Mesolithic context.

Investigations in marine archaeology in recent years have given us some, albeit fragmentary, knowledge of submerged coastal settlement in southern Scandinavia in the Early Mesolithic. Work on the bottom of Öresund, the sound between present-day eastern Denmark and southern Sweden, shows how extensive this coastal settlement was. The results mean that we must reconsider earlier models of the relation between coastal and inland settlement.

The shell middens of south-western Scandinavia have been well known for a long time, not least as a result of Grahame Clark's publications. Renewed studies show, however, that there is still a great deal of new information to be derived from these features. The cemeteries of the Late Mesolithic in southern Scandinavia are a late observed phenomenon whose implications for research have been emphasized. There is a constant growth in factual material showing that an association between settlement sites and graves was common in the Late Mesolithic. A proposed function for the graves in an environmental perception of the Late Mesolithic conceptual world is presented. Greater consideration must be given in future analyses to the mental relationship between the people and the environment, in order to fully appreciate the Late Mesolithic coastal societies.

In recent years, knowledge of the Mesolithic in northernmost Scandinavia has increased significantly. In northern Sweden this is due to increased archaeological activity combined with extensive surveys. The art of ceramic fabrication appeared at roughly the same time in northern Sweden as in southern Scandinavia. In recent years graves, in a few cases in cemetery-like assemblages beside settlement sites belonging to the Late Mesolithic, have also been documented in northernmost Sweden.

In the study of the Mesolithic, our perspective on society and environment has been broadened by creative efforts in both theory and method. In some cases, new points of view can be obtained by choosing new ways to excavate a settlement site. A few examples of this are presented.

LEENDERT P. LOUWE KOOIJMANS

### ***Shippea Hill and after: Wetlands in North European Prehistory and the Case of the Donken***

Wetlands are like gold mines for our knowledge of the past and this is particularly so for north European prehistory. They have so many qualities: organic perishable materials are preserved and patterns are undisturbed in 'time capsules', while stratigraphy on all scales gives us a high time resolution. The contrast in all these aspects to upland sites invokes contrasts in our views of upland and wetland people. One can, however, question whether prehistoric people saw these same contrasts. We observe in this paper that most wetlands were used for 'cultic' deposition, and for traffic and settlement as well. The Dutch delta wetlands even seem to have been a preferred agricultural land in later prehistory. We should not transfer the historic or our own (negative) wetland appreciation to prehistoric communities and we realize that prehistoric people settled themselves there by free choice. So wetland data, if cautiously used, can be considered as representative of former subsistence and organization.

The second part of this paper is a case study. An overview is given of a research programme for which Grahame Clark was the inspiration in his Fenland work of the early 1930s. Outcropping dune tops in the Rhine delta deposits offer us a unique and rich dataset