

The Earliest Settlement in Southern Sweden

Late Paleolithic Settlement Remains at Finjasjön, in the North of Scania

Lars Larsson

Our knowledge of Late Palaeolithic settlements in Southern Sweden has been increased significantly by investigations which started at the end of the 1980s.

Great interest attaches to the new find locations discovered close to lake Finjasjön in the north of Scania. Two find locations have been investigated at the outlet of the river Almeån from the lake. The Vångamosen bog is a camping place dating from the Bromme Culture. Finds recovered from a sandy hill at Mölleröd indicate brief visits including during the Hamburg Culture. This find location is the first to contain remains from the Hamburg Culture in Sweden.

New studies into the changes which took place in the Öresund area during the ice melting phase point to the existence of a land bridge only for short periods. The outflow of meltwater through the Öresund at other times during the Late Glacial period prevented or obstructed the fauna migration routes. These factors must be taken into account in any comparison of Late Palaeolithic settlement in Southern Sweden with the various cultural complexes which occur in North Germany and in the Danish region.

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For the past thirty years the factual situation relating to Late Palaeolithic settlement in Southern Sweden has been limited to a single excavated site, at Segebro in south-west Scania. It was discovered by chance during excavations on a Mesolithic site in 1960 (Salomonsson 1964). The artefact material and the distribution of the finds agree very closely with the numerous site finds in Denmark which belong to the Bromme Culture (Mathiasen 1946; Andersen 1973; 1988; Fischer 1976; 1990a; Fischer & Mortensen 1978; Madsen 1983). The remains which were found correspond to the features

appropriate to a group of the size of a family. On the basis of new analyses of the eponymous site, Bromme, on Zealand (Fischer & Sonne Nielsen 1987:23ff), the Segebro site probably belongs to an older part of the Bromme Culture, when the majority of tanged points still have the bulb of percussion preserved, in spite of the retouching of the tang.

A small number of individual finds of tanged points from south-west Scania had already been reported (Salomonsson 1961) when details of Segebro were published, although a certain period has elapsed since

what we know about the Late Palaeolithic was the subject of more detailed study.

The project "The Late Palaeolithic Settlement in Southern Sweden" was begun in 1988 with a view to collecting and analyzing data in respect of Late Palaeolithic settlement remains. This included visiting the previously known sites of finds of tanged points for the purpose of establishing whether these marked the position of sites of Late Palaeolithic settlement. New studies of museum collections have also resulted in the identification of a number of tanged points of the Bromme type. Unfortunately, the majority of such find data is of such a general nature that it has not been possible to identify the precise location of the find (Larsson 1984). Contacts with amateur archaeologists have also led to several finds being made. Three tanged points were found at each of two find locations in southern Scania – Annavälla, Slimminge parish and Karlsro, Sövde parish – but only a very limited number of

worked flints was found at each site (Larsson 1986). They are probably the remains of camp sites which were used for a short period.

The new finds of tanged points have contributed to a major extension (Fig. 1) of the distribution of finds of tanged points of the Bromme type, which were previously known only within south-west Scania. One find was made as far north as on the south side of the South Swedish Uplands (Westergren 1979:34). Further finds in northern Scania have confirmed that this find was not an extreme northerly marker of remains associated with humans (Carlie & Götz 1983; 1986).

These new finds also provide an interesting picture of the topography of the find sites. Certain points were found adjacent to the inlets into and the outlets from lakes; this is a site location which is highly typical of Danish finds (Fischer 1976). Others were found at the edge of tunnel valleys or on a raised area in undulating countryside.

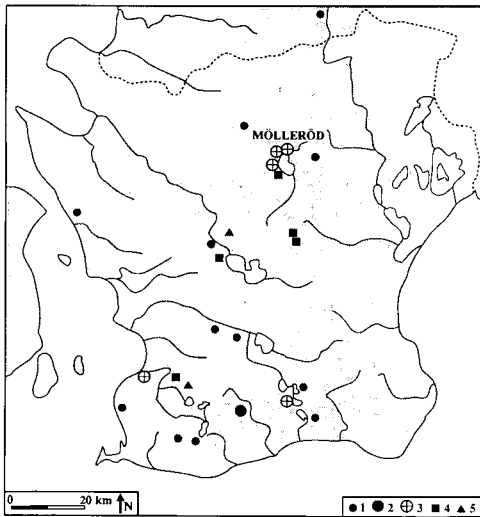


Fig. 1. Late Glacial finds in southernmost Sweden. Legend; 1: single finds of tanged points of the Bromme type, 2: sites with a least three finds of tanged points of the Bromme type, 3: excavated Late Palaeolithic sites, 4: single finds of tanged points of the Ahrensburg type and 5: single finds of implement made of reindeer antler.

LATE PALAEOOLITHIC SETTLEMENT REMAINS CLOSE TO LAKE FINJASJÖN, NORTHERN SCANIA

Of the recently discovered find locations, there can be no doubt that the most interesting finds have been recovered from those close to lake Finjasjön in northern Scania. Interest began to be shown in this area following the discovery of tanged points of the Bromme type in a private collection. Finds of this type of tanged point could be identified from at least two areas. These main areas covered the land on the northern shore of lake Finjasjön to the west of the river Almeån, which is the only outlet from the lake (Fig. 3). The other area, known as Finja kärr (marsh), extended for a distance of about 3 km in a south-westerly direction over part of the western shore of lake Finjasjön. A minor watercourse flows out into the lake at this point. It is possible, both from the topography and from aerial photographs, to

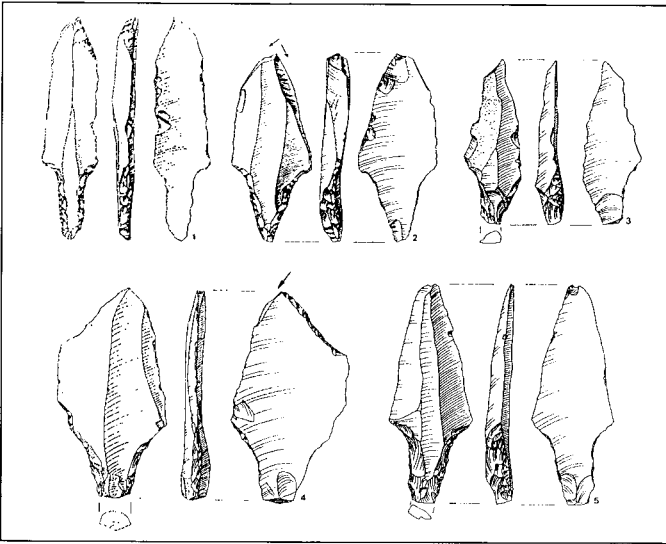


Fig. 2. Tanged points of the Bromme type from Scania. 1-2: Karlsro and 3-5: Annavälla (Larsson 1986).

distinguish a comprehensive delta system in this area consisting of depressions filled with organic material and with low raised sandy areas between them. It was on these raised areas that the finds of implements (Fig. 4: 1-4) and worked flint were recorded. A part of the area was the subject of in-

vestigation during the spring of 1990, when a sparse system of test trenches covered an area of 200x50 metres which included two low raised sandy areas. Only a single find, a surface find of a tanged point of the Bromme type, has been dated to the Late Palaeolithic (Fig. 4: 5). The sparse distribution of worked flint and implements was otherwise found to belong to an Early Mesolithic settlement.

In the spring of 1991 the archaeological investigation concentrated on a low raised sandy area on part of the northern shore of the lake. This raised area was the southernmost part of an area which had previously been damaged, although the extent of the damage is not clear, by the building of a football pitch. A map dating from 1820 shows the position of the site to have been directly adjacent to the shoreline (Fig. 5) before the level of lake Finjasjön was lowered during the nineteenth century. The depression to the south of the find location was filled with organic material. This was also true of the area to the east of the find location, which represented the south-eastern part of a long and narrow stretch of bog known as the Vångamossen bog which extended in a north-south direction. The

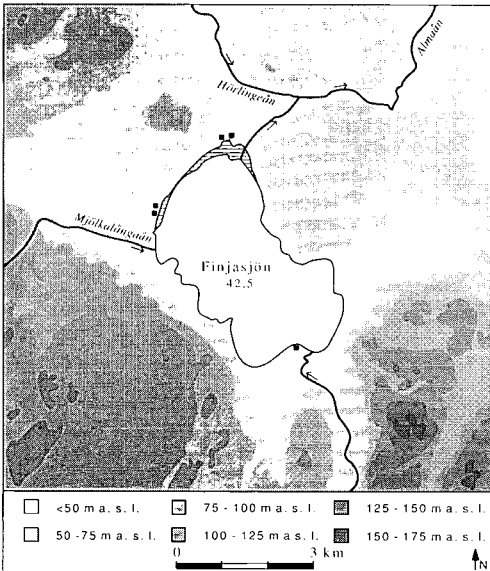


Fig. 3. Lake Finjasjön and its surroundings.

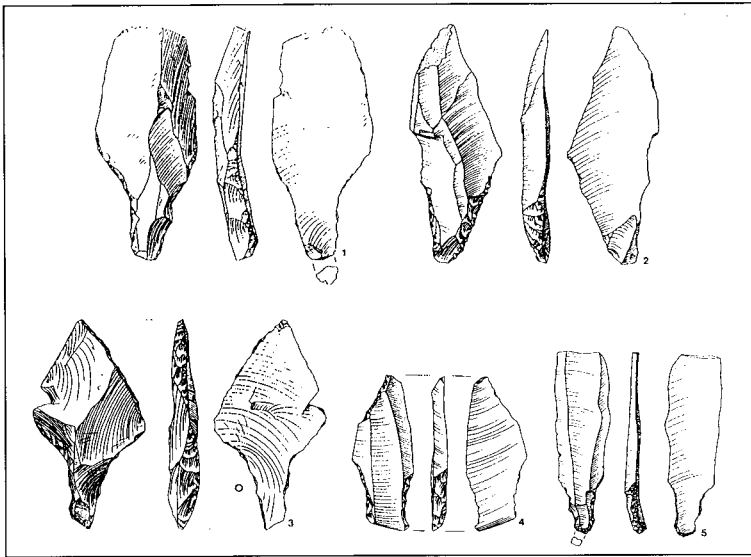


Fig. 4. Tanged points from Finja kärr (marsh).

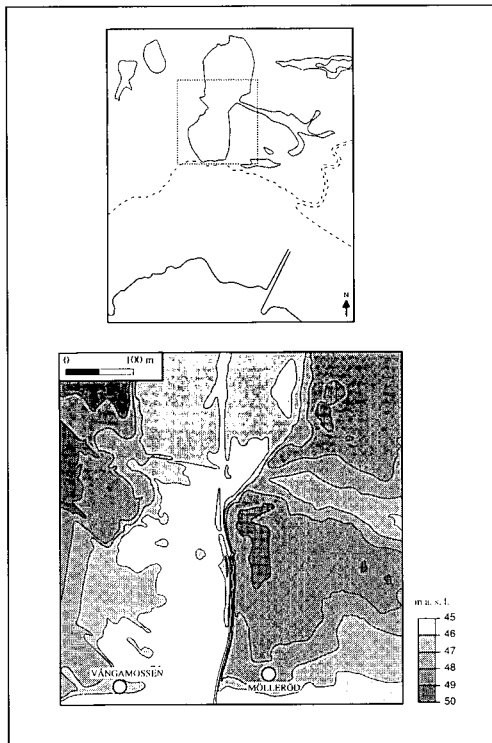


Fig. 5. The northern shoreline of lake Finjasjön, showing the Late Glacial settlements. The broken line marks the shoreline before the level of the lake was lowered during the nineteenth century and the filled areas (above) mark the bogs from the same period.

topographical conditions mean that the site, which is eponymous with the bog, now occupies a slightly marked headland.

Find material belonging to the Bromme Culture was discovered in the course of the archaeological investigation, which included a continuous area of just over 40 square metres. All the objects were found in a stretch of sandy humus which marks the path of the plough. Its considerable depth of 0.3 m can be explained by the fact that wind erosion has built up an unusually thick layer of topsoil. In addition, both Mesolithic and Neolithic artefacts were found in the same layer.

The four fragments of tanged points from the Bromme Culture which had previously been recovered as surface finds were now added to by nine new finds of tanged points (Fig. 6: 1–4). These are fragmentary, with two exceptions, and consist primarily of base parts. Of the scrapers recovered from the site, three exhibit retouching with a shape such that, with a shallow angle between the retouching and the surface of the cleavage face, they can be dated with great probability to the Late Palaeolithic (Fig. 6: 5–7). Certain other objects, including a tool with the combined function of burin/

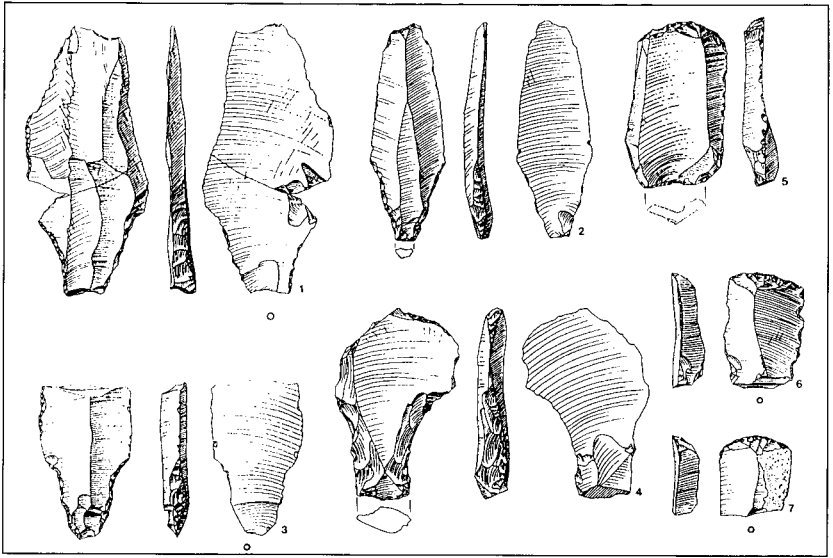


Fig. 6. Finds from the settlement at Vångamossen. 1–4 tanged points and 5–7 scrapers.

borer, exhibit characteristic features of the Bromme Culture.

The quantity of waste material from Vångamossen is limited, which suggests that flint-working did not take place to any great extent here. The finds indicate, rather, that arrows were reshafted here, since the majority of the points are fragmentary. The tanged points are made of both south-west Scanian Senonian flint and Kristianstad flint (Fig. 6:1 and 4). Kristianstad flint of the high quality represented here is found primarily in the area to the north of Kristianstad. Tanged points of the Bromme type made of Kristianstad flint have also been found along the western edge of lake Finjasjön (Fig. 4:1).

To judge from the shape of the tanged points, with remaining parts of the bulb of percussion and the striking platform, the points from Vångamossen probably belong to an early part of the Bromme Culture (Fischer & Sonne Nielsen 1987:23ff).

Surface finds, including a couple of heavy flakes which are characteristic of the flaking technique of the Bromme Culture, have been made less than a hundred metres to the east of the investigated site (Fischer 1990a:41); this points to the presence of a number of remains from the same period in the

immediate vicinity.

Tanged points of the Bromme type have been found in at least three locations close to lake Finjasjön – at Finja kärr (marsh), Vångamossen bog and the neighbouring Mölleröd area (Fig. 3). A find situation which suggests some form of camping place occurs at only a single location, whereas the other find circumstances indicate stays of very short duration. These find locations differ in this respect from Segebro and those in East Denmark, which contain a lot of waste material from the raw material-intensive flint working technique which characterizes the Bromme Culture (Fischer 1990a). Find locations of this kind are known within the Bromme Culture, however. A number of find locations with tanged points, few other implements and small quantities of waste are situated in a well-documented area of Vendsyssel, on North Jutland (Nils-son 1989:72).

A section of shoreline about three kilometres long lies between Finja kärr (marsh) and Vångamossen bog. We are not aware of any other find locations apart from a single site which is rich in worked flints and implements dating from the Mesolithic, situated immediately to the west of Vånga-

mossen bog. This is explained largely by the fact that most of the shore zone consists of grazing land which has still not been the subject of a detailed inventory.

THE MÖLLERÖD SITE

A couple of surface finds from a find location on the other side of the bog, approximately 200 m further to the east (Fig. 5 and 7), were recorded in conjunction with the excavation at Vångamossen. These finds consisted of two so-called *zinken* – small beaked implements probably used for working antler – a characteristic implement of the Hamburg Culture (Fig. 8:3 and 6). The find location, known as Mölleröd, lies in a military training area. The top grassy layer had been damaged by the passage of heavy tracked vehicles, and worked flints had been exposed and recovered. This place has long been known to the local population as a place where many flint objects have been found, since the area was previously used as arable land.

The site location is situated immediately to the east of Vångamossen and includes a

marked sandy hill (Fig. 7). Its maximum height at the present time is about three metres above the level of the surrounding land. Old maps show the southern slope of the sandy hill to have been situated directly adjacent to the sand zone before the level of the lake was lowered. A shoreline running in a south-eastern direction from the sandy hill as far as the outlet of the river Almeån, which lies some 500 m from the sandy hill, can be traced on the old maps (Fig. 5).

The finds of *zinken* led to a further investigation of the site on a smaller scale in the autumn of 1991, and to extended field work during 1992. The archaeological investigation was to comprise two long, narrow trenches running from the southern edge of the raised area and a substantial system of test pits distributed over the entire area of the find location. The trenches which were sunk revealed a stratigraphy of up to two metres' depth in places, comprising layers of gyttja and peat interspersed with layers of sand. It can be appreciated from the complex pattern of layers that variations in the water level and consider-



Fig. 7. The find location Mölleröd at lake Finjasjön viewed from the south-east with wetland in the foreground. Most of the Late Palaeolithic finds were discovered close to the two bushes in the middle of the picture. The hillside leading down to the outermost part of the Vångamossen bog can be seen on the extreme left (se Fig. 5).

able erosion both contributed to the complexity of the stratigraphy.

The sandy hill was used as an encampment over a very long period. The find material comes from an area of several thousand square metres which was used repeatedly as an encampment during significant parts of the Stone Age. Quite a small number of objects which may be regarded as dating from the Late Palaeolithic were recovered in the course of the archaeological investigations. This limited material was subsequently added to by new surface finds. Individual finds point to settlement during the Early Mesolithic, whereas by far the dominant proportion of the material was deposited during the late Kongemose Culture and the Ertebølle Culture. Activities during the Neolithic are also represented by Early Neolithic pottery and two vessels, presumably a sacrificial find on the shoreline of the period, dating from the late Battle Axe Culture.

EARLIEST SETTLEMENT REMAINS FROM MÖLLERÖD

The accumulation of remains from the long period of settlement presents considerable difficulties in identifying the Late Palaeolithic finds. There is only an extremely limited amount of material that possesses characteristics which indicate that they date from the Late Palaeolithic. Account should be taken of the fact that the find material also includes a number of objects which exhibit similarities of form with those reported below.

It is nevertheless necessary to make allowance for a number of sources of error when identifying the material which is believed to be of a Late Palaeolithic nature. When classifying tanged points, certain characteristics exist which are common both to those which belong to the Late Palaeolithic and to those which belong to an early part of the Pitted Ware Culture. With the exception of one blade arrow head of the late

type, however, no finds capable of being related to the typical flint technique for the Pitted Ware Culture were made at this location. Implements which resemble the *zinken* may occur from time to time in the flint material belonging to a Neolithic context, although not in the numbers or with the distinctive form with which we are concerned here.

The earliest settlement remains consist of a small number of so-called *zinken* together with a number of tanged points. Of the readily identifiable *zinken*, there are six intact or fragmentary examples (Fig. 8:1–6).

As far as the dating of the current finds is concerned, the only methods which could be applied were those based on a comparative typology. As already stated, the *zinken* is a characteristic form of implement for the Hamburg Culture. According to finds from Løvenholm on East Jutland, certain *zinken*-like implements may occur in the context of tanged points of the Bromme type (Madsen 1983:19).

The fact that two of the *zinken* exhibit retouching of a kind which indicates that they may be interpreted as combination implements is also a common feature of the Hamburg Culture. One of these is a front-retouched point having a form which suggests that this part should be interpreted as a borer (Fig. 8:1). However, the object as a whole has a form which closely resembles that of a tanged point. In the other case, the broken end has retouching from opposite sides (Fig. 8:2). One assumption is that the object was a double *zinken*, although this is a less likely interpretation since diagonally related retouching from the respective broad sides, referred to as 'propeller' retouching, occurs very rarely when forming the point. An interesting aspect concerning the *zinken* from Mölleröd is their shape. In the find material from the Hamburg Culture there is a marked tendency for the borer-like tip to face towards the right. The dominant form in the finds from Mölleröd, on the other hand,

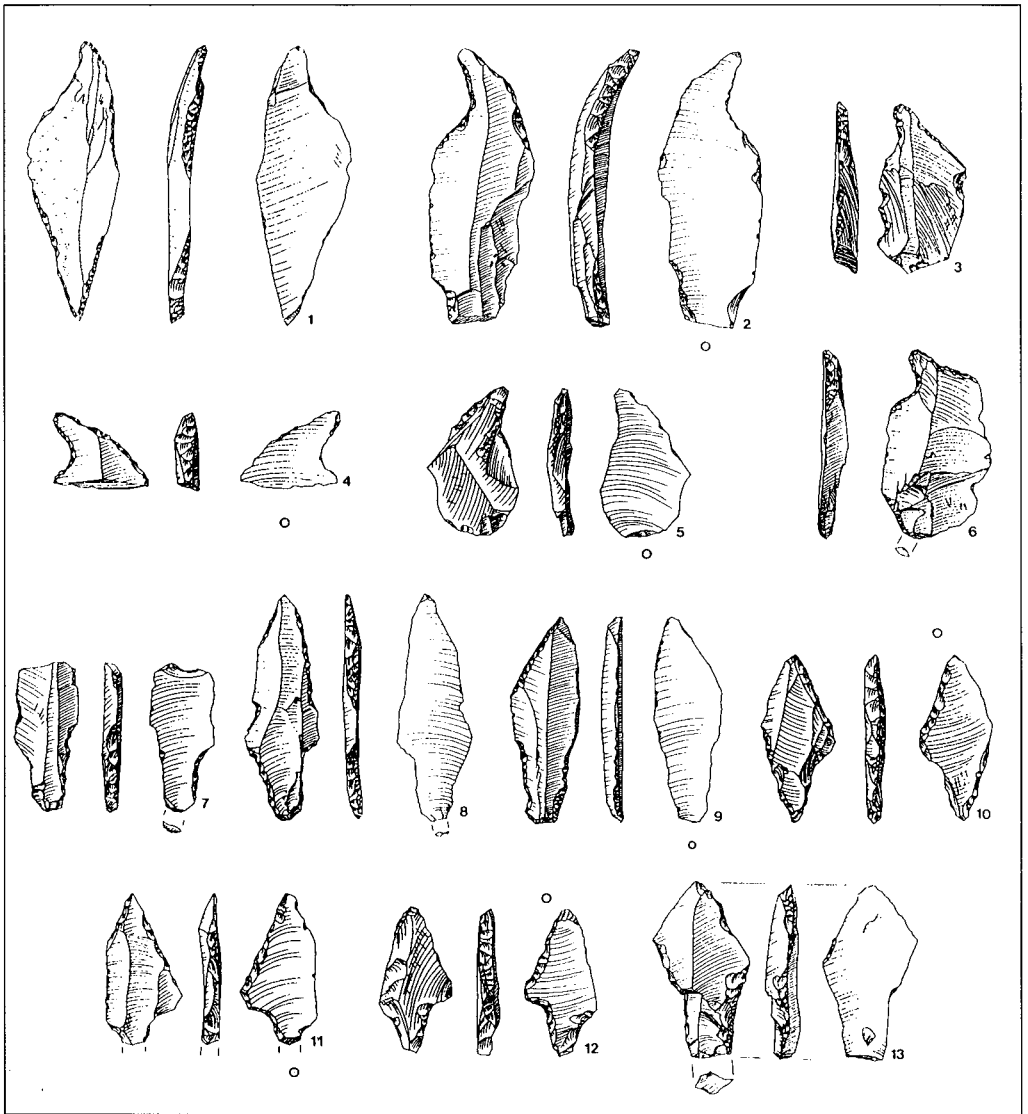


Fig. 8. Finds from Mölleröd. 1-6 zinken and 7-19: tanged points.

has the tip facing towards the left. In addition, the *zinken* at Mölleröd are of generally coarser execution than those from other settlement finds from the Hamburg Culture. These variations may be taken to indicate that they are somewhat younger than those in the majority of the finds from the Hamburg Culture.

Amongst the tanged points which have

been found, there is one base part which, through its 'propeller' retouching and the different length of the retouching on the point, exhibit characteristic features of the points of the Havelte type (Fig. 8:7). Two tanged points can be said to be of the Bromme type; both are of slender form (Fig. 8:8-9). It is not possible, however, fully to exclude an association with the Ahrensburg Culture.

It must also be pointed out that a tanged point with similarities with tanged points of the Ahrensburg type was found at Finja kärr (marsh); like these, the proximal end of the blade is in the tip part (Fig. 4: 4).

The find material also includes a group of tanged points of a special design (Fig. 8: 10–13). These are characterized by the fact that they exhibit tang retouching, but also by further retouching on one side and partial retouching on the other side at an angle with the tang part. In certain cases the tang is formed by 'propeller' retouching.

The small group of points which has been identified as having a special nature exhibits a form which most closely resembles an oblique arrowhead with a tang. Oblique arrowheads have been found at Mölleröd, although these were made from thin blades like those from other Scanian locations (Larsson 1982; 1983). Oblique arrowheads with a tang-like extension can also occur on sites from the Kongemose Culture (Brinch Petersen *et al.* 1977: 153; Larsson 1983: Fig. 17:7), although the form of these differs markedly from the points from Mölleröd with which we are concerned here. Examples of this form have also been recovered as surface finds at Finja kärr (marsh) (Fig. 4: 3). It is not possible to give any clear cultural association for these points. They have similarities with points of the Havelte type, but also with points from the Ahrensburg Culture. The latter culture is represented through a number of finds of tanged points within the Scanian area (Larsson 1991b: Fig. 12.4).

The finds can thus be summarized as including implements which are typical of the Hamburg Culture and others which only have certain features in common with material from that culture. Finds belonging to the Bromme Culture have also been made. A number of tang-like points cannot be integrated into any known material culture complex.

The objects were found within an area

covering a few thousand square metres. In view of the limited size of sites dating from the Late Palaeolithic, it is possible that one or more site areas were missed when sinking the test pits. Although the two *zinken* and the point of the Havelte type were found within an area of less than 100 square metres (Fig. 5), the location of the finds cannot be interpreted as primary remains of a short stay, since the objects were found in a layer of topsoil covering the extensive stratigraphy which is present in the lower part of the hill. The most plausible explanation for the find location is that one or more original accumulations of remains subsequently became scattered. As can be appreciated from the extensive stratigraphy in the slope leading down towards the former shoreline of lake Finjasjön, the area has been subjected to considerable erosion. Different water levels, as indicated by small indentations along the shoreline, gyttja deposits and other deposits which have been partially washed away, indicate that the area has undergone considerable reshaping through changes in the water level. Higher up the hill, the test pits provide evidence of a number of humus-rich layers which are the result of the repeated covering of the land by sand. Sand drifting in the area may have been considerable, therefore, in the absence of vegetation cover on the land. The eolithic and water-based erosion phenomena may have exposed the area to very considerable changes. It seems probable that the hill had a much more accentuated relief during an early part of the ice melting phase than that which is evident today.

HAMBURG CULTURE IN SOUTH-WEST SCANDINAVIA

Evidence of the Hamburg Culture in south-west Scandinavia has been found at a small number of locations in Denmark, including South Jutland and West Lolland (Fig. 9). Of these, the two camping places at Jels were the first to be confirmed in Scandinavia

(Holm & Rieck 1992). These two site areas have been interpreted as differing chronologically to some extent. Tanged points of the Havelte type occur at both sites, however. A thermoluminescence measurement from Jels 1 gives the value $12,400 \pm 1,600$ BP (Holm & Rieck 1992: 33), although the associated considerable margin of error does not provide us with a reliable chronological starting point.

A camping area containing material very similar to that from Jels was found in the course of the investigation of the Slotseng site, which is situated only 5 km from Jels (Holm & Rieck 1992:60ff.). A kettle hole (dead ice-hole) in the slope below the site yielded antler and bone from reindeer and one object resembling a *zinken*. A C-14 dating of the antler from this layer has given the value $12,500 \pm 190$ BP, which

corresponds to the middle of the Bølling Period (Holm 1993:15). A preliminary pollen analysis also puts the age of the find horizon in the Bølling Period.

Finds from other parts of Denmark are restricted to one other find location, at Brænøre, in the same part of South Jutland as Jels and Slotseng, and to a distinctly raised area in the landscape - Sølbjerg - on the south-western part of Lolland (Vang Petersen & Johansen 1993). The Hamburg Culture is represented at this location primarily by finds of *zinken*. However, an analysis of the flint technology indicates that the production of blades exhibits similarities with that encountered in Magdalenian, and that Sølbjerg accordingly predates Jels (Madsen 1992:125). Apart from features associating them with the Hamburg Culture, Jels, Slotseng and Sølbjerg

also contain more or less comprehensive features from the Federmesser Culture. Remains of later activities dating from the Late Palaeolithic, such as those from the Bromme Culture at Slotseng (Holm & Rieck 1992: 64) and those from the Ahrensburg Culture at Sølbjerg, also occur.

A knife-like implement made of reindeer antler found at Middelgrunden in the Öresund has previously been dated by pollen analysis to the Younger Dryas; this has long been regarded

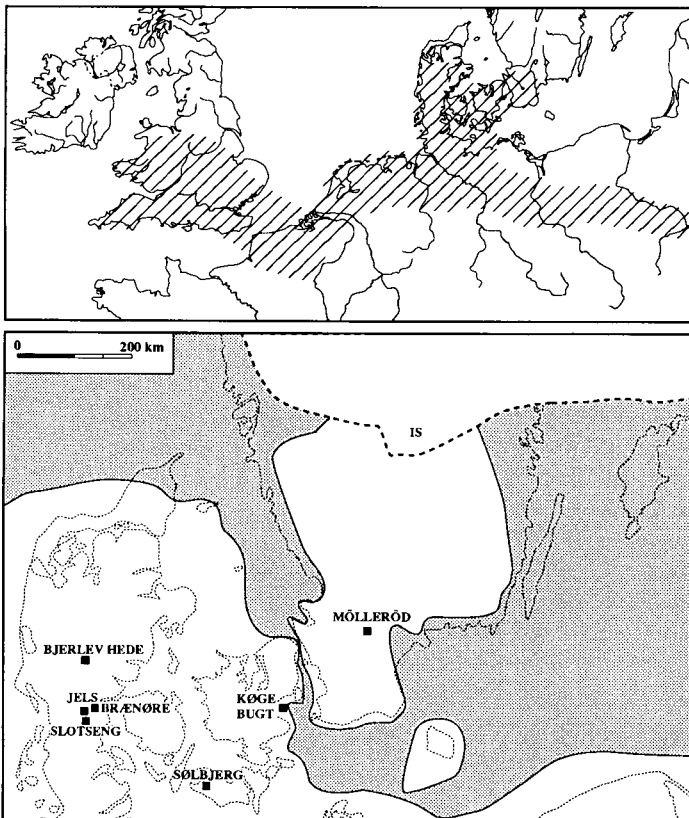


Fig. 9. Distribution of the Hamburg Culture (based upon Bosinski 1987: Abb. 119) and sites from the Hamburg Culture in south-western Scandinavia.

as the oldest remain of human activity in South Scandinavia (Mathiassen 1938). Two C-14 datings have shown the object to be of recent age, however (Holm & Rieck 1992: 65). On the other hand, a fragment of reindeer antler bearing traces of having been worked was found during sand-suction dredging operations in the bay at Køge. This has produced a radiometric dating of around 12,100 BP (Vang Petersen & Johansen 1993).

The chronological relationship for the contexts which contain tanged points of the Havelte type - the so-called Havelte Group - within the Hamburg Culture is extremely problematical. The Havelte Group is regarded in certain cases as belonging to an early part of the Hamburg Culture (Burdukiewicz 1986; Tromnau 1981), although it has also been interpreted as being a late part of that culture (Stapert 1984; 1986; Tromnau 1975). The view that the Havelte Group belongs to a late part of the Hamburg Culture is based on the fact that scrapers of the Wehlen type - scrapers with retouching of both long sides - which are characteristic of the Federmesser Culture, occur at sites which belong to the Havelte Group, and that similarities exist between tanged points of the Havelte type and the Bromme type.

A number of C-14 datings have been performed for sites belonging to the so-called Meiendorf-Poggenwisch Group with tanged points of the *kerbspitz* type; most of these fall within the range 12,500 - 12,100 BP (Fischer & Tauber 1986:11). The radiometric dating from Slotseng may be taken to indicate that the Havelte Group is the oldest. It has not been satisfactorily demonstrated, on the other hand, that the finds in the kettle hole actually originate from the investigated site belonging to the Hamburg Culture (Holm 1992:62). Surface finds which may indicate the existence of further settlement remains have been made on the slope above the kettle hole. We must now await further investigations at this location.

GEOGRAPHICAL LOCATION OF THE MÖLLERÖD SITE

The location of the Mölleröd site can be regarded as strategic in a local perspective. The low and sparse vegetation afforded a good view from the sandy hill out over the outlet from the lake and the area to the north of it, and over large parts of the shores of the lake. The area around lake Finjasjön exhibits a very often marked relief, since it includes a number of fault zones with steep slopes and rock outcrops (Fig. 3). There are pronounced slopes with large-blocked moraine both to the north-west and to the north-east of lake Finjasjön. Even more pronounced is the slope on the two fault sections which run up from the south as far as the southern part of the lake. In an Arctic or Sub-Arctic landscape the migratory paths of the reindeer presumably followed the low-lying and comparatively easily negotiated valleys. The nature of the terrain thus facilitate the hunting of reindeer by driving the animals so that the herds had to cross the narrow sections of the shore or were forced down into the lake or the watercourses in the vicinity of the settlement, where they could be killed in large numbers.

The existing watercourse is formed by the outlet of the river Almeån from lake Finjasjön. The area of water-logged land situated immediately to the west of Mölleröd, the Vångamossen bog, has a form which may be taken to indicate that the site occupied a different position in relation to the watercourses than that which exists at present (Fig. 5). Augerings have shown that the Vångamossen bog is probably a ravine of up to seven metres in depth running in a north-south direction. With the exception of quite small areas covered with drifting sand, it is possible to follow the water-logged land on old maps as far as the river Hörlingeån, some 2 km to the north (Fig. 3). It is possible that the course of the river during the Late Glacial Period was

quite different, and that it discharged into lake Finjasjön at a point directly adjacent to Mölleröd. Old maps also show the presence of water-logged land both to the north and to the east of the find location (Fig. 5), which means that it was surrounded to all intents and purposes by water, with the exception of a narrow area towards the north-east.

The interval covered by the Hamburg Culture, i.e. the Bølling interstadial, the Older Dryas and possibly also the earliest part of the Allerød interstadial, has previously been regarded as a cold period during which the temperature increased successively (Iversen 1973: 30 ff.). Insect analyses, however, show that the summer temperature was significantly higher at that time than during any other part of the Late Glacial Period, with a mean summer temperature of between 15° and 18° (Lem-dahl 1988b; Kolstrup 1992). The land ice also melted rapidly at a rate which may have reached as much as 5 km per century (Berglund & Rapp 1988; Björck *et al.* 1988). In about 12,500 BP, at the time of the earliest datings of the Hamburg Culture, the ice front was situated in the southern part of the South Swedish Uplands, but was situated in the northern part some five hundred years later (Fig. 9). At the time of the earliest settlement on Mölleröd, the ice may have been as close as ca. 50 km to the north. The vegetation in the far south of Sweden changed during the Hamburg Culture from a steppe tundra to include increased park tundra features.

The sites around lake Finjasjön was probably a part of a system of settlement which, in addition to considerable land masses, also included the coastal region. The ice-dammed lake which was the Baltic could be reached via the river Almeån and its continuation into the river Helgeån. Due to later land rebound and the damming of the ice lake the shore line might have been as close as 20 km. In view of the dearth of

fauna during the early part of the ice melting phase, it is more likely that, in order to reach a sea rich in species, people would travel westwards to that part of the North Sea which bordered on present-day north-west Scania. The watershed between the catchment areas of the river Rönneån and the river Helgeån lies only a few kilometres to the west of lake Finjasjön. The distance from lake Finjasjön to the shore of the North Sea at the time was about 80 km.

LATE GLACIAL DEVELOPMENT OF THE ÖRESUND AND ITS CONSEQUENCES FOR SETTLEMENT

The material from Mölleröd discussed here contains objects which are characteristic not only of the Hamburg Culture, but also of the Bromme Culture and perhaps the Ahrensburg Culture, and a number of tanged points with an unclear cultural association. According to the Danish pattern, the occurrence of remains of a number of Late Palaeolithic techno-complexes within a limited area appears to be the rule rather than the exception. The question, therefore, is one of how to interpret the relationship of these objects to Late Palaeolithic developments.

The new investigations of the highly complex circumstances of the Öresund region, which include rises in sea level, land elevation, the production of meltwater and erosion, are of special significance to any assessment of the cultural relationships between the Mölleröd finds. The southern Öresund was previously held to be a land bridge during the Late Glacial Period, as a consequence of which uninterrupted contacts were assumed to have existed between large parts of south-west Scandinavia. The results of new geological investigations point to the existence of a much more complex relationship between land and water (Björck & Digerfeldt 1991; Björck 1994, information provided personally by Svante

Björck) (Fig. 10).

The situation up to about 12,000 BP is unclear. Evidence of a mammoth dated to between $13,360 \pm 95$ and $13,000 \pm 120$ BP (Berglund *et al.* 1976) suggests that land animals may have been able to migrate into southernmost Sweden, and that the vegetation had developed to such an extent that it was able to provide adequate feeding for large herds of animals (Larsson 1991a; 1991b) (Fig. 10:A). A rise in the level of the bottom of the Öresund combined with heavy melting of the ice caused the outflow to become a fierce flow of water before 12,000 BP (Fig. 10:B). This situation changed drastically at the time of the breakthrough at Billingen in Västergötland in about 11,200 BP, when the level of the ice-dammed lake dropped by about 10 m in a short time. Parts of the Öresund dried up initially at that time, although this situation continued only until about 10,900 BP (Fig. 10:C). A reduction in temperature caused the land ice to advance, closing off the outlet at Billingen, when a new outlet was formed via the Öresund (Fig. 10:D). An outlet at Billingen was formed once more in about 10,300 BP, when the land ice began to withdraw again, and a second land bridge was created with the Danish region (Fig. 10:E).

The postulated development for the Öresund had considerable consequences on the fauna and also on contacts between the Late Palaeolithic communities in South Scandinavia. Unrestricted access to the present-day Danish region only existed between 11,200 BP and 10,900 BP, and after 10,300 BP. The meltwater flowed out through the Öresund Basin at a more or less rapid rate during the intervening periods; this made contacts difficult, or even impossible from time to time.

The flow of water would have been heavy during the late part of Bølling and an early part of the Allerød interstadial, because of the heavy melting of the ice, and

during the Younger Dryas, mainly because of the land elevation in the north. The annual migration of herding animals such as the reindeer across the Öresund may simply not have taken place during certain of these periods of heavy outflow in the Öresund. The reindeer is a good swimmer, although the question is whether it would venture to cross such a broad and fast-flowing expanse of water by swimming or walking on the ice on a regular basis.

According to the theory which attracts most support, the reindeer probably remained in the south of Sweden during the winter months (Study 1975; Bokelmann 1979). A certain degree of doubt may nevertheless be expressed as to whether the same migration patterns existed during the whole of the Late Glacial Period with its marked changes in climate.

Radiometric datings of reindeer finds indicate that a population already existed in southernmost Sweden in around 11,700 BP (Liljegren & Lagerås 1993:20 f.), which suggests that a vigorous population had established itself by no later than about 12,000 BP, when parts of South Sweden were isolated (Björck *et al.* 1993). The absence of earlier datings of reindeer may be explained by the fact that most of the finds come from smaller lakes or ponds which were the result of melting dead ice. The dead ice only began to melt away during the Allerød interstadial, as it did so creating the conditions enabling parts of the reindeer to be deposited in an environment with good conditions of preservation.

To judge from the datings from Denmark and North Germany, the Hamburg Culture appears to have existed during a period which at least corresponded to the interval 12,500–12,100 BP. The Federmesser Culture occurs in about 12,000 BP and may have existed during an earlier part of the Younger Dryas (Bokelmann *et al.* 1983; Fischer 1990b; 1991). The only radiometric dating of the Bromme Culture gives the value

11,100 ± 85 BP (Fischer 1977). This originates from the Trollesgave site, the inventory of which has been interpreted as belonging to a late stage of the Bromme Culture

(Fischer & Tauber 1986:12).

Aspects of the Federmesser Culture are encountered in both West Denmark and East Denmark, although it is only in the former

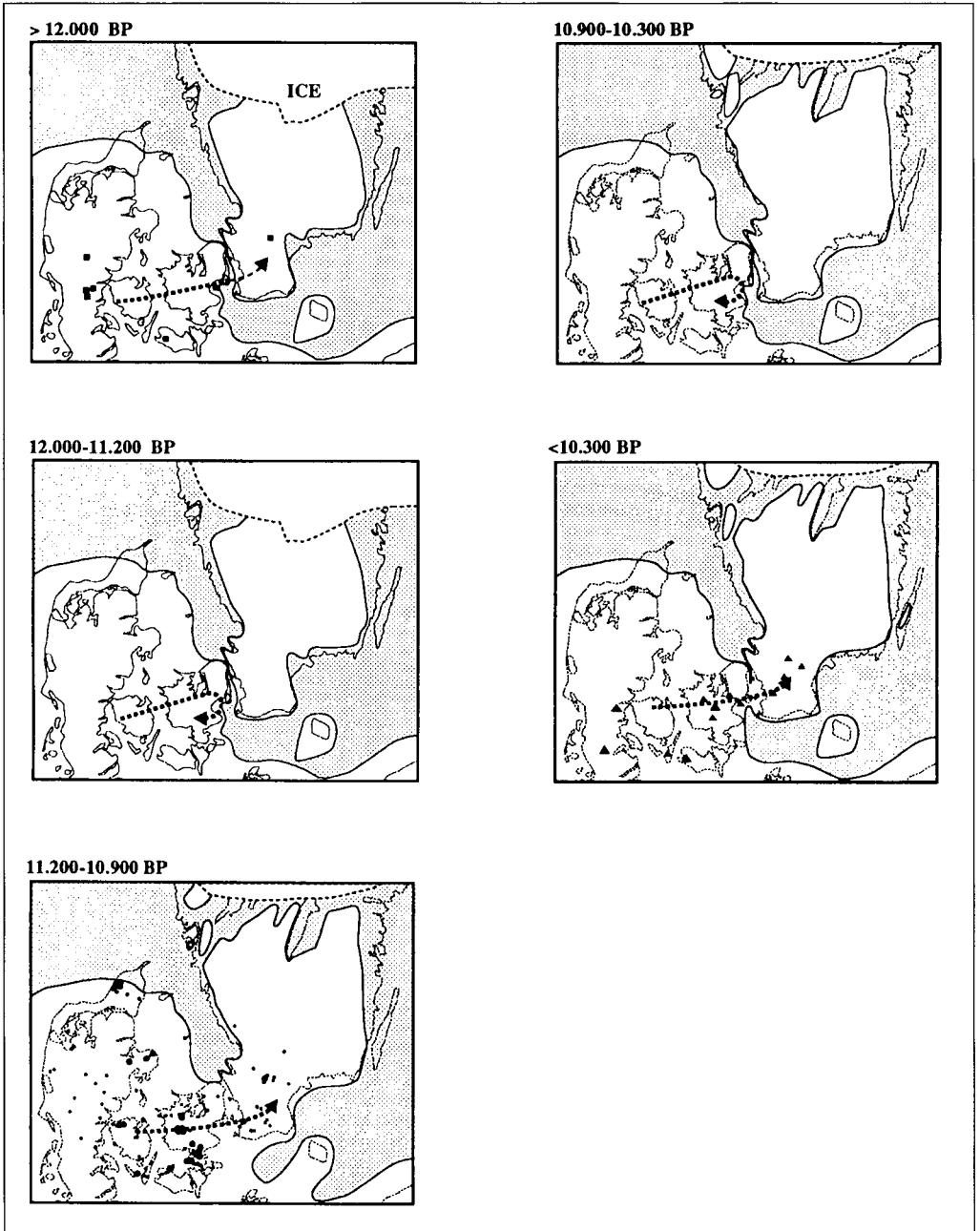


Fig. 10. Tentative representation of the land/water relationship during the Late Glacial Period.

area that evidence of sites which truly belong to the Federmesser Culture can be found (Fischer 1990b; 1991: Fig. 11:3; Holm 1992). A techno-complex belonging to the Federmesser Culture occurs at other locations as a feature of material which can be attributed to the Bromme Culture. The relationship between the Hamburg Culture, the Federmesser Culture and the Bromme Culture is still largely unclear, however. The Federmesser Culture has been interpreted as a culture which arose during the Late Hamburg Culture as a result of impulses from the Late Magdalenian (Holm & Rieck 1992: 66). The Bromme Culture may have arisen from an earlier Federmesser Culture (Fischer 1991:11).

According to the tanged point typology, the site material from the Bromme Culture in Scania extends both to an earlier phase, for example Segebro, Annavälla (Fig. 2:3-5) and Vångamossen, and to a later phase, such as the Karlsro find location with three finds of tanged points (Larsson 1986) (Fig. 2:1-2). In line with the development of the Öresund, the existence of the Bromme Culture is believed to correspond relatively closely to a phase with a land bridge which existed from about 11,300 to 10,900 BP.

The following stage, the Younger Dryas, is characterized by a steep fall in temperature. The mean temperature during the summer may have fallen by as much as 8 degrees over only a short period (Lemdahl 1988a: 325). This, combined with a break-through of flowing water in the Öresund, may have had drastic or, more likely, catastrophic consequences for the fauna. If a fauna corresponding to that of Denmark, with elk, red deer and beaver (Aaris-Sørensen 1988), existed in southernmost Sweden during the Allerød interstadial, a fall in temperature combined with the opening of the Öresund would probably have caused the total disappearance of these Boreal species. The reindeer population may have been exterminated or severely reduced, which can

be appreciated from the fact that datings of reindeer finds are absent from this period. The ability to maintain continuous settlement east of the Öresund was very probably impaired or even rendered impossible.

Reindeer migrated back into the Öresund region only once a land bridge had been reestablished; this theory is also reinforced by a number of datings. Those datings which we have relating to the Ahrensburg Culture, all from Stellmoor in North Germany, fall within the range 10,200-9,800 BP (Fischer & Tauber 1986). This coincides closely with the reestablishment of a land bridge in the Öresund.

SETTLEMENT DURING THE LATE GLACIAL PERIOD

A reindeer population and, probably, populations of other animals which were well adapted to an Arctic environment, i.e. animals such as the wolf and the wolverine, became established in southernmost Sweden before 12,000 BP (Fig. 10: A). After that date, the development of a meltwater outlet with a strong outflow into the Öresund caused an interruption or a significant reduction in the relationship of these animal populations with the Continental animal world (Fig. 10:B). The restrictions on mobility which applied to the reindeer population need not have been as marked for the humans who were to utilize the Late Glacial landscape in South Sweden.

The finds from Mölleröd, with their obvious influence by the Hamburg Culture and on the basis of datings for that culture, have an age of 12,000 BP or might be somewhat younger. During the period for which the Hamburg Culture was in existence, major movements of reindeer herds possibly involving Danish and/or Continental areas may have occurred. This may be one of the reasons why the material culture exhibited such great similarities over such a large area extending from Holland in the

west to Poland in the east, and from North France in the south to South Scandinavia in the north (Burdukiewicz 1987) (Fig. 9).

The isolation or restricted mobility of the reindeer population which may have occurred during a late part of the Hamburg Culture resulted in geographically restricted seasonal migrations by those who utilized the reindeer population which existed in the area of present-day Sweden. The fact that the area of interest of economic significance was reduced does not necessarily mean that the social sphere was subject to the same clear restriction. What it may have meant, however, is that contacts with Continental communities were reduced.

The ice-free area in South Sweden was able to provide food for a large population of reindeer. An abundance of fish, together with the possibility of catching seals and whales on the West Coast, probably represented an important means of support, if not the most important. Very few species were represented in the ice-dammed lake within the present Baltic Basin, on the other hand. At the time when South Sweden was cut off from the Continent in about 12,000 BP (Fig. 10:B), the land area was probably of the order of 30,000 square kilometres, which was a sufficiently large area to accommodate a vigorous population. If we base our estimate on the population calculations which are available for reindeer-hunting Eskimo populations, the available area probably provided food for a population of at least 400 individuals, estimated on the basis of the lowest population density values (Newell *et al.* 1990:40). This was probably sufficient to provide the basis for a self-sufficient population unit.

If South Sweden was permanently inhabited, the population may have had contacts with groups within the Danish area. However, this does not rule out the possibility that the material culture developed in a partially or even very different way than that

within the Danish area. The circumstances for the introduction of the Federmesser Culture were thus much poorer than for the introduction of the Hamburg Culture. The fact that permanent settlement occurred in South Sweden during the first half of the twelfth millennium BP does not necessarily mean that it can be identified from the characteristics which exist in the Federmesser Culture, for example, or in the earliest part of the Bromme Culture.

The necessary conditions for migration into South Sweden by the new animal species which can be identified with the forms of hunting of the Bromme Culture only come into existence again with the establishment of a land bridge during a late part of the thirteenth millennium (Fig. 10:C). The Boreal species may have become acclimatized in the far south, whereas the Arctic species remained in large parts of South Sweden. The form which the Bromme Culture takes in South Sweden does not appear to differ noticeably from that in Denmark. Further to the north, however, the aspects of the material culture may have varied to a greater or lesser degree as an expression of the ecological zoning which existed there.

Large parts, or perhaps even the whole of Scandinavia were depopulated as a result of the radical deterioration in the climate during the earlier part of the Younger Dryas (Fig. 10:D). South Sweden was only repopulated again when a new land bridge was established (Fig. 10:E).

We should keep an open mind in future studies, so that we do not base our approach too slavishly on the cultural aspects and the flint working technique which are characterized by Danish and North German finds (Hartz 1987: Fig. 9). A world of forms local to South Sweden, which also accommodated deviations in flint technique, cannot be excluded during certain parts of the Late Palaeolithic. A reservation of this kind makes our studies noticeably more

difficult, although it is hoped that it may also spur us on to make new research efforts. If this proves to be the case, the best conditions for new research efforts are likely to be found on the West Coast of Sweden.

ACKNOWLEDGEMENT

I wish to extend my sincere thanks to Ingvar Jönsson in Hässleholm. He has made a most valuable contribution in tracing the Late Palaeolithic settlement around lake Finjasjön. I also offer my thanks to Fil. lic. Lennart Carlie for his contribution to the project, in particular the fact that it

was he who drew attention to the settlement remains in the Finja area. Arne Sjöström was a valued colleague during the excavations at Mölleröd, as were Henrik Phil, Hans Gurstad Nilsson and a large number of archaeological students. The project work was financed by the Erik Philip Sörensen Fund for Genetic and Humanistic Research and by the Swedish Council for Research in the Humanities and Social Sciences.

Translation by Roger J. Littleboy / Drawings by Eva Koch

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