

New Evidence of Late Palaeolithic Settlement in East Jutland

by BO MADSEN

This review presents a series of newly discovered late palaeolithic finds from Jutland. Some of the provisional conclusions presented suffer from problems due to the absence of scientific dating, stratigraphy, and representativeness. Interpretations must therefore often be based on indirect evidence, as has been the case with earlier work on the subject. This is so far the state of affairs for this branch of stone age studies throughout Scandinavia. Aspects of the Bromme culture will here be discussed against this background, the starting point being two newly excavated complexes of finds in eastern Jutland.

RESEARCH BACKGROUND

The publication of the settlement Bro I over ten years ago was the first presentation of excavated settlement material of the Bromme culture west of the Great Belt (Andersen 1970: 85–100, 1972: 6–60). Almost at the same time a general review of more recent finds from the Danish late palaeolithic was also published (Becker 1971: 131–139). Since then there has been a marked upsurge in the intensity of research into late palaeolithic settlements. Thanks to the systematic work of in particular one very active researcher, the number of known late glacial settlements in the Zealand area has increased by several times (Fischer 1976: 95–115).

The Jutland peninsula on the other hand has for long been an area from which late palaeolithic finds seemed to be very rare. The material was almost solely single finds. In 1971 C.J. Becker could thus only list one settlement from Jutland, namely that at Fjellerup Mark. This distributional picture is now changing. A vastly increasing quantity of finds is now known both from eastern and southern Jutland (Andersen 1977: 18–27). An ever increasing number of single finds is being recorded, mainly tanged points. In several places the main late

palaeolithic types have occurred together. Finally, four settlements of late palaeolithic date have now been excavated in Jutland. Most noteworthy is the so far unfinished excavation of a settlement at Jels in southern Jutland, with a late Hamburgian inventory, making it the oldest known settlement in Scandinavia (Holm and Rieck this volume).

CLASSIFICATION OF THE MATERIAL

The material to be presented consists exclusively of finds of flint which from their morphology and technique can be referred to the late palaeolithic (Taute 1968). Recording has mainly included flint projectile points, particularly tanged points. The geographical area covered includes mainly the central part of east Jutland, namely the Djursland peninsula, the Randers area and the lower Gudenå River area, in fact the former county of Randers. Archaeologically, this area is administered in two districts, respectively by Djurslands Museum in Grenå and by the Culture Historical Museum in Randers (1).

The appearance of the increased quantity of material is mainly due to a network of good contacts, primarily amateur archaeologists. Systematic surveying by the museums has only been carried out in connection with the excavated settlements. Corresponding well-established contact with amateur archaeologists formed the basis for recording finds in southern Jutland, Fyn and Zealand.

It has proved practical to make a simple classification of the late glacial material according to the quantity and composition of the type-defined artifacts and other tools. Earlier reviews have divided material up into single finds and settlement finds. In this way, findspots with only two late glacial tool types have sometimes been called »settlements« (Clark 1975: 80). It has, un-



Fig. 1. Late glacial settlements, find assemblages, and stray finds (circles) in Randers Amt.

derstandably, been difficult to establish definite criteria for defining the term »settlement«. In this work, a purely practical although subjective division is made, according to the number of artifacts. As most of the material consists of surface finds, the number of finds from any locality is often proportional to the intensity of surface collection, agricultural activity and soil type. It may at a later date be necessary to change this grouping in the face of more information.

In the following, the terms single find, find accumulation, and settlement will be used. Single finds have in several instances been the starting point for locating find accumulations. By find accumulation is understood a surface find with 2 to 4 tools, not accompanied by other characteristically worked flint. It transpires that these find accumulations consist most often of tanged points or fragments thereof. If, for example, the combination tanged point – scraper – burin occurs, it is almost always possible to demonstrate the presence of characteristic flint débitage at the same spot.

The term settlement is used for both surface and excavated finds, where characteristic by-products of flint working appear, such as blade cores, blades, core trimming blades, flakes, microflakes, burin spalls etc. If the find is not from a secure, excavated context, at least one datable artifact must also be found. The term is also

used for sites where more than 4 tools have been found, even if there is no flint débitage. The find of Ommelshoved is a good example, with about 100 tanged points as the total inventory (Holm 1972: 5–15).

SINGLE FINDS

In the publication of the Bromme settlement, single finds were for the first time mentioned of tanged points of late glacial type from Djursland (Mathiassen 1946: 168). In more recent years the number of finds has increased a great deal, so that 16 single finds are now known, these being 15 tanged points and 1 scraper of late glacial type (fig. 1).

Earlier recording:

- | | | |
|-----------------|---------------|-------------------|
| 1. Anholt | NMA 38078 | (Mathiassen 1946) |
| 2. Hemmed. | NMA 39384 | (Mathiassen 1946) |
| 3. Stenvad. | NMA 16300 | (Taute 1968) |
| 4. Fjeldholm. | KHM 5275 | (Mathiassen 1946) |
| 5. Astrup Mark. | KHM (missing) | (Mathiassen 1946) |
| 6. Grenå region | FHM 5424 | |

Recent recording:

- | | |
|------------------|----------------------|
| 7. Porsbakkerne. | KHM j. no. 5/83 |
| 8. Dråby. | Ebeltoft Museum 3645 |

- | | |
|---------------------|-----------------------------------|
| 9. Sostrup. | DJM 1960 |
| 10. Obdrup Mølle. | DJM 1889 |
| 11. Trustrup. | DJM 1883 |
| 12. Løkken. | DJM 1952 |
| 13. Stenvad Kær. | DJM (registered priv. collection) |
| 14. Ramten. | DJM (registered priv. collection) |
| 15. Vænge Sø. | DJM (registered priv. collection) |
| 16. Ellemandsbjerg. | DJM 1956 |

(Abbreviations: NM = National Museum, KHM = Culture Historical Museum, Randers, FHM = Museum of Prehistory, Moesgård, Århus. DJM = Djurslands Museum, Grenå).

The recorded tanged points are all quite heavy, powerful pieces, with a length of over 6 cm. The largest is from Dråby north of Ebeltoft. With regard to morphology, size and weight, this point is comparable to the very large point from Viby on Fyn (Taute 1968, tafel 92). The other single finds fall within the range of variation in size and morphology of the tanged points from the Bromme site including an unusually narrow, regular example from Sostrup near Gjerrild. This corresponds closely to several of the narrow points from Bromme (Mathiassen 1946, fig. 6, no. 1). An unusual scraper type was found at Stenvad Kær. This tool is 5.2 cm long, made on a blade and equipped with a convex scraper edge at its distal end. The edge is made with flat, lamellar retouch. The lateral margins are shaped with a more steep retouch which extends right up to the proximal end. The remains of the striking platform shows clearly that removal was effected by means of the so-called »hard percussion technique« (Madsen 1981: 16–20). The distribution of heavy tanged points of Bromme type in northern Djursland partially corresponds with the distribution of Pitted Ware sites (Rasmussen and Boas 1982: 104–114). In this area, middle neolithic single finds of tanged points of type A 1 might in theory be expected. The question arises whether it is possible to confuse heavier type A 1 points with light tanged points of Bromme type.

Both V. Nordmann (1936) and T. Mathiassen (1946) present finds of heavy tanged points of »Lyngby« type from postglacial settlement deposits. V. Nordmann thus describes »Lyngby points« from an Ertebølle shell midden. In such contexts, tanged point-like blade tools are not uncommon. These appear in the form of blade borers in the earlier part of the Ertebølle Culture (Andersen 1965: 68). Similarly, T. Mathiassen refers to some heavy points from a collection from Hesselø (Mat-

hiassen 1946: 171). Most of the finds from Irisdammen, as it is known, derive from the middle neolithic (Nielsen 1979: 23–48) although the finds are an open accumulation.

Pitted Ware A 1 points differ from Bromme type tanged points first and foremost with regard to technique of production. A 1 types are made on blades removed from bipolar, cylindrical cores by means of the so-called »soft percussion technique«. Bromme tanged points show the diagnostic traits of blades produced by »hard percussion technique« from conical blade cores, the blades all being struck in one direction (Madsen 1981: 16–20). The late glacial tanged points have a series of morphological elements which can be seen on whole examples. An intact, smooth section of striking platform can often be seen, where the point of percussion is clearly visible as a ring-shaped break above a well-developed bulb of percussion. On some points the proximal end is subsequently removed during the making of the tang. The negative scars on the dorsal surface, and the curvature of the blade, show whether these blades are of neolithic type. Neolithic blade points, even heavy A 1 types, are generally smaller and lighter than late glacial ones; their tangs are shorter and lighter in proportion to the blade. Bromme tanged points most commonly have a longer tang, and it is always broad regardless of how short it might be (Taute 1968, tafel 11, 12).

FIND ACCUMULATIONS AND SETTLEMENTS

At 9 localities within the former Randers county, surface collection has established traces of late glacial settlement. Two of these are now excavated. Of the remaining 7, 4 are categorised as settlements, while the other 3 are find accumulations which have not so far produced finds of associated flint working. The find from Fjellerup Mark (Taute 1968: 95) consists of 4 tanged points, and belongs to the last category. The find was in the National Museum as early as the 1890's, but it has still not proved possible to pinpoint the findspot more closely than a 0.5 km² area, within which one additional late glacial find is now known. Another surface find, which belongs to the Djursland cluster, comes from Ring, south of Auning. The find includes 1 tanged point, 2 blade scrapers, 2 dihedral burins and some typical blades. The tools are typical of the Bromme culture, but

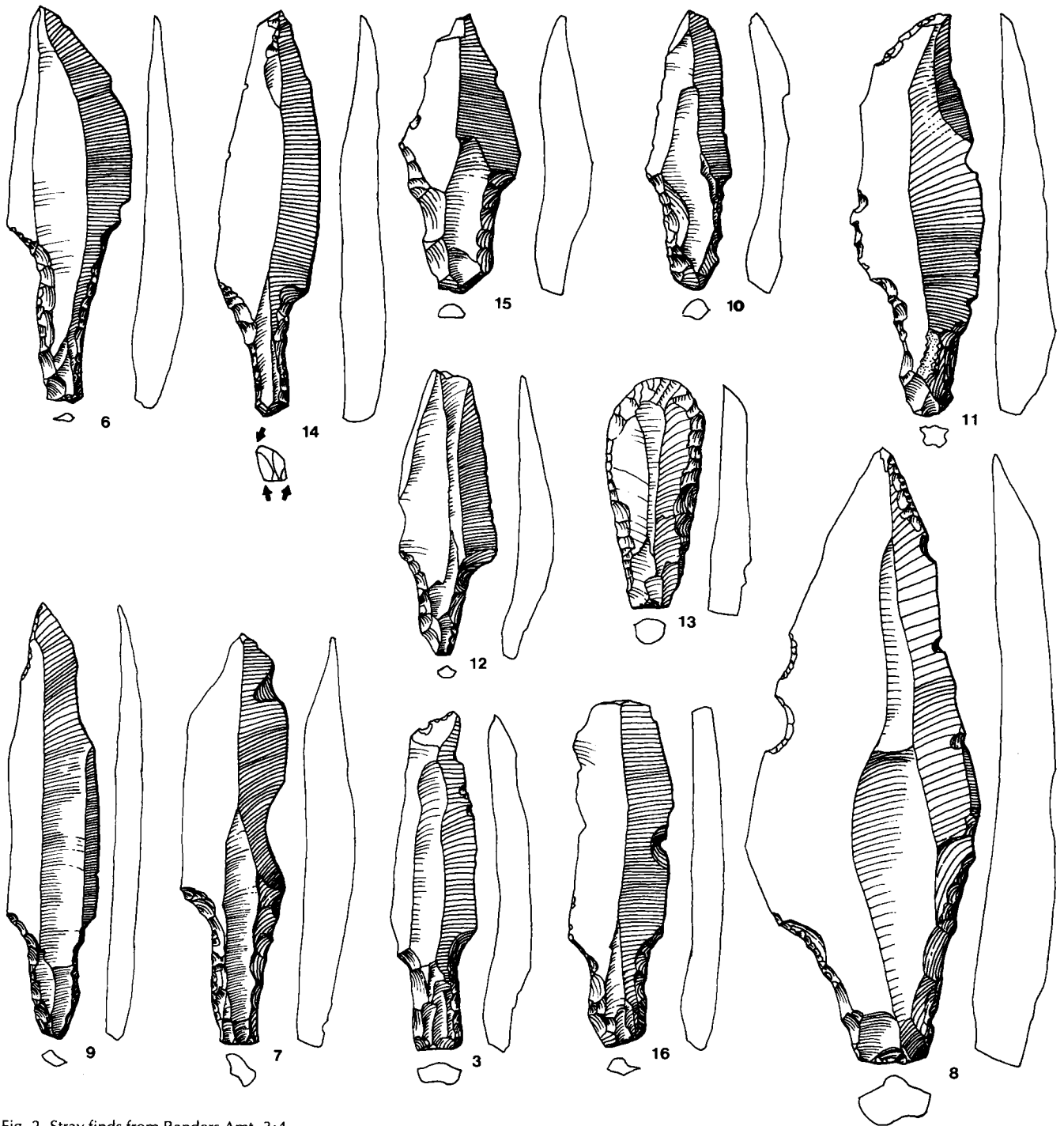


Fig. 2. Stray finds from Randers Amt. 3:4.

were collected from an area with post glacial occupation mainly of neolithic date.

Most notable is the western grouping of late glacial settlements on the Gudenå River immediately north of

Langå. That the area was occupied in the late glacial has long been known. During peat cutting in a bog near Hjorthede west of Langå the palmate part of a reindeer antler was found, which had traces of working. The

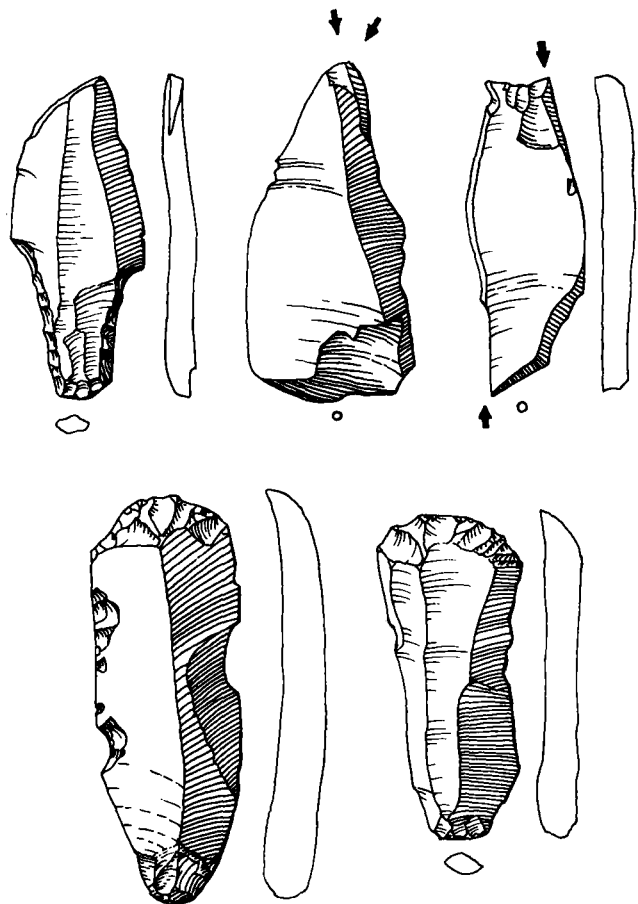


Fig. 3. Selection of surface finds from a settlement at Ring, Randers Amt. 3:4.

antler is pollen dated to the Younger Dryas (Degerbøl and Krog 1959: 17). In the period 1977–1980 4 definite settlements were located near Langå, as well as one site with blades and flint waste. The settlements lie together on a late glacial terrace c. 15 m above the Gudenå River. In the lower areas nearer the river, many settlements of early and late mesolithic date were already known. Despite repeated surveying, it was not previously possible to establish the presence of earlier finds in the area. The first settlement appeared only in connection with draining and deep ploughing, in an area which had earlier been extensively surveyed. Single finds of tanged points are still not known from the area of the lower Gudenå. In addition to this the finds collected from the late glacial settlements at Langå show that the inventory was dominated by scrapers and burins. The following list includes, apart from the local east Jutland

finds, all other finds which have been published or are otherwise accessible from the rest of Jutland (fig. 13). It must be emphasised that the distribution is still very incomplete. Among other things, the number of late glacial settlements known through surface collection in southern Jutland is now increasing greatly (2).

Excavated settlements:

1. Søvind. FHM 2174
2. Løvenholm. KHM 27/74
3. Langå I. KHM 30/77
4. Jels I. Haderslev Museum 1356

Settlements known by surface collection:

5. Hjarup. (Andersen 1977: 18–27)
6. Silkeborg. (Silkeborg Museum no. 2–4/78)
7. Ring. KHM 163/81
8. Langå II. KHM 100/80
9. Langå III. KHM 355/82
10. Langå IV. KHM 356/82

Find accumulations:

11. Fjellerup Mark. NMA 16296–16299
12. Fuglsø Mose. KHM 140/78
13. Fjeldholm. KHM 1/83
14. Refshalegård. (Mathiassen 1937: 150)
15. Hjarnø, submarine find (Fischer 1978) (7).
- 16–19. Jels (2).
20. Aaes (8).

THE LØVENHOLM SETTLEMENT

The site is situated in a high area of bogs, about 30 m above sea level. The area, which today is heavily wooded, is sandy, and cobbles and larger stones are scarce; several waterfilled kettle holes are in the immediate vicinity. The settlement was discovered during the surveying of a peat-litter harrowed area. This harrowing had removed most of the secondary peat formation which originally covered the settlement. Geological conditions indicate that the settlement is of late glacial age, although scientific dates do not yet exist for the settlement horizon or the secondary peat. Conditions of deposition, with a considerable vertical spread of flint items, are regarded as the results of permafrost phenomena. Microwear analysis of the surfaces of the

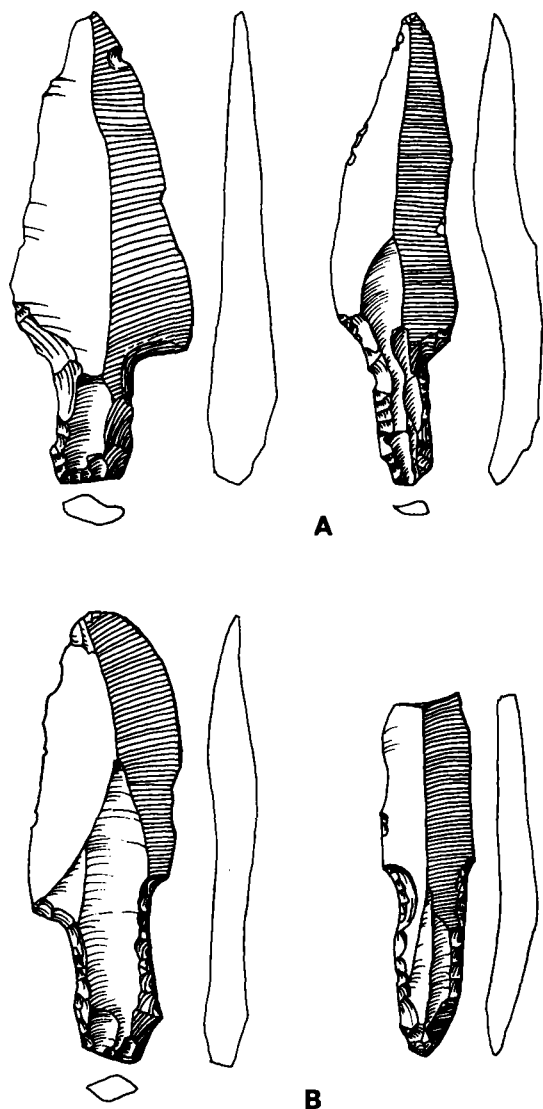


Fig. 4. Tanged points collected from the surface. A, Fjeldholm. B, Fuglsø Mose. 3:4.

flints show the characteristic polish caused by freezing and melting.

Two separate areas of worked flint, measuring 6×8 and 3×2 m² respectively, were uncovered within the excavated area which amounted to a total of 130 m² (fig. 8). Find area I, the larger of the two, produced all the tools and most of the other pieces of worked flint on the site, 465 pieces of worked flint in all. A concentration of burnt flint marked a possible hearth. Find area II produced no typical flint tools, only a few pieces of flakes and cores, 28 in all. Two hammerstones were also found, as were many small fragments of frost-shattered

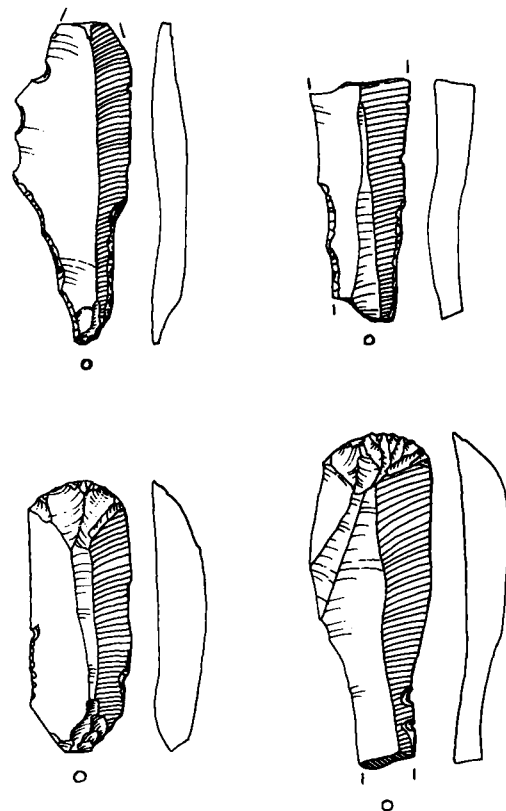


Fig. 5. Selected tools from the Langå II settlement. Surface finds. 3:4.

flint nodules. The contemporaneity of the two find areas is shown by the fact that pieces from area II can be joined to pieces from area I.

The Finds

Twenty four tanged points dominate the inventory, and display considerable size variation (fig. 6). They include both typical, large and heavy tanged points, and smaller, lighter pieces of similar size to points of Ahrensburg type. Length varies from 8 to under 4 cm, breadth from 2.6 cm for the heaviest to 1.3 for the lightest. Technically they are all similar, with the tang shaped from the ventral side. Several pieces have oblique retouch at the point. The tang retouch must be described as steep and rather rough, although in a couple of cases, where the blade was already of the desired breadth, only very limited modification of the proximal end is seen. On two of the tanged points, retouch here is less than 2 mm high. All points have relatively broad tangs. Most are wider than 1 cm. This is partially re-

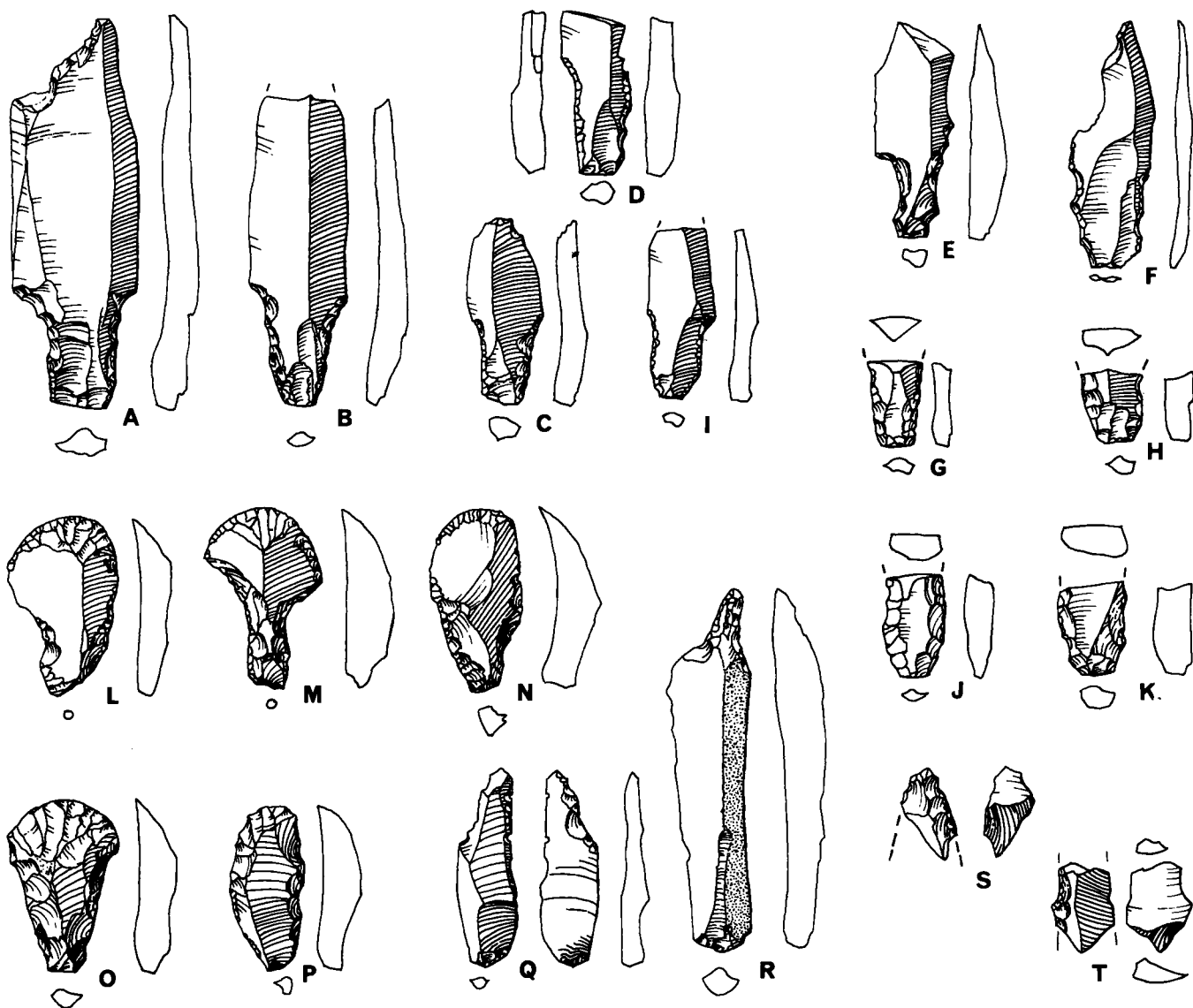


Fig. 6. Flint tools from the Løvenholm settlement. 3:4.

sponsible for giving them their powerful feel. About half the points have typical macroscopic traces resulting from the penetration of meat or bone (Barton and Bergman 1982: 237–248). Several points are also broken across between blade and tang in a way suggestive of hunting damage. In 6 cases, only the tang itself is present.

The find includes 16 scrapers (fig. 6), all being end scrapers with convex edge, produced on blades or oblong flakes. They can be divided into four groups: 1) Blade scrapers with edge on the distal end, and no

further retouch. 2) Double scrapers with or without partial edge trimming. 3) Scrapers with double edge trimming to form a thick, pointed tang at the proximal end. (Only two of the 8 scrapers in this category could from a morphological point of view be made from broken tangged points). 4) Scrapers with parallel, double edge trimming.

The scrapers are small, only 3.5 to 6 cm in length. 3 showed a relatively steep scraping edge. Most of them are, however, shaped with unusually fine and regular flat and lamellar retouch. There are two edge fragments

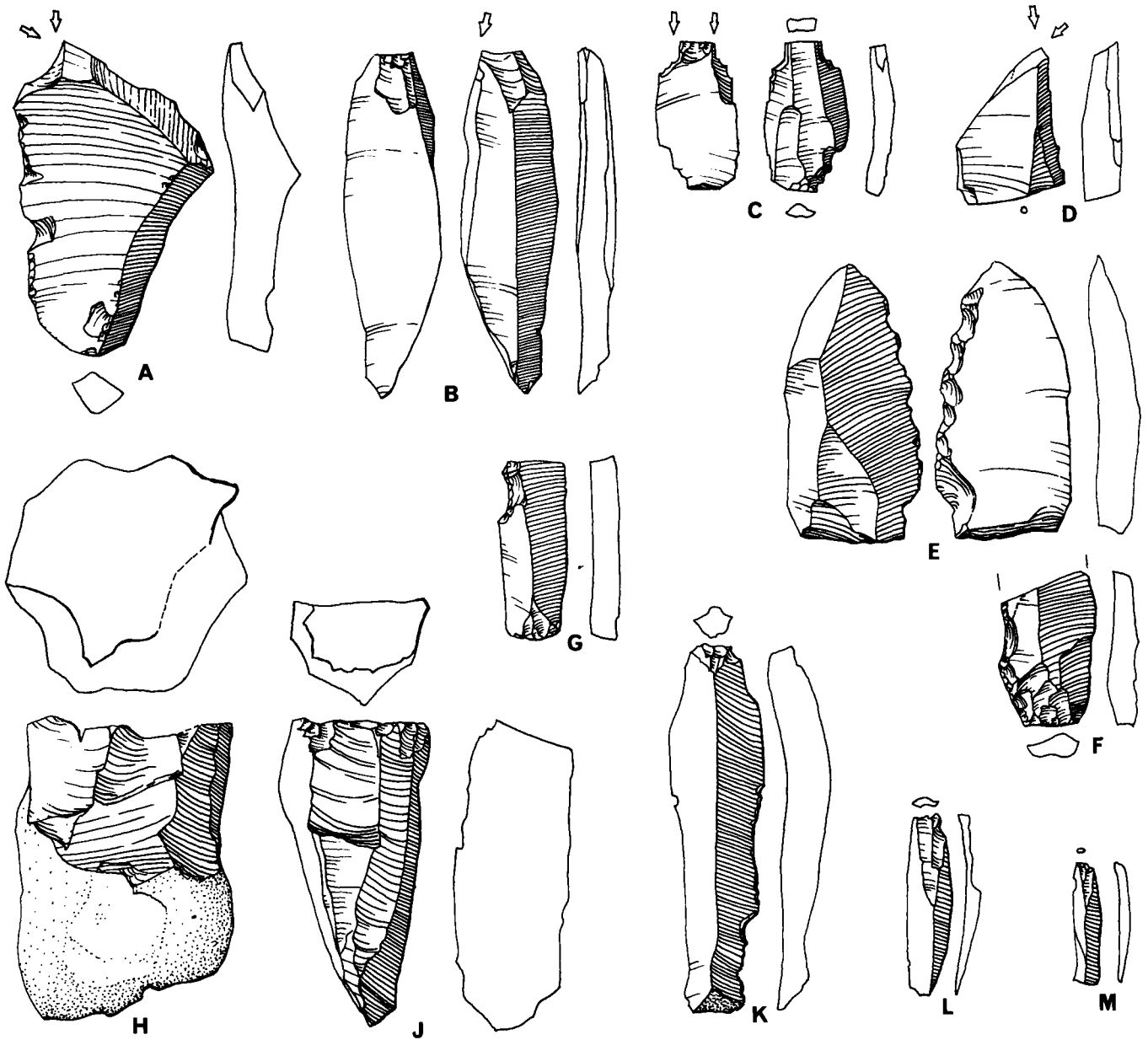


Fig. 7. Flint tools and various artefacts from the Løvenholm settlement. 3:4.

suggesting a »nosed« edge (Tixier 1980: 85), and a blade scraper (fig. 9, A) which is double edged, and where the oblique, rather steep edge (fully preserved at the proximal end) has a hint of a shoulder. The tool can best be described as a »kratzer« (Rust 1958, Taf. 53,5).

There are 7 burins (fig. 7). 2 are dihedral, one being a typical double blow burin. Two made on broken pieces are unusually small, being respectively 2 and 3 cm

long. The longer is made on a blade, where the burin blow is made from the distal end »sur un talon« (Tixier 1980: 77), and runs along one side (fig. 7, B). 9 burin spalls were recovered, all with remnants of a smooth striking platform.

The tools also include 3 borers, from 7.5 to 3.5 cm long (fig. 6, Q, R). The longest has a shape characteristic of the so-called »zinken«. Another corresponds in

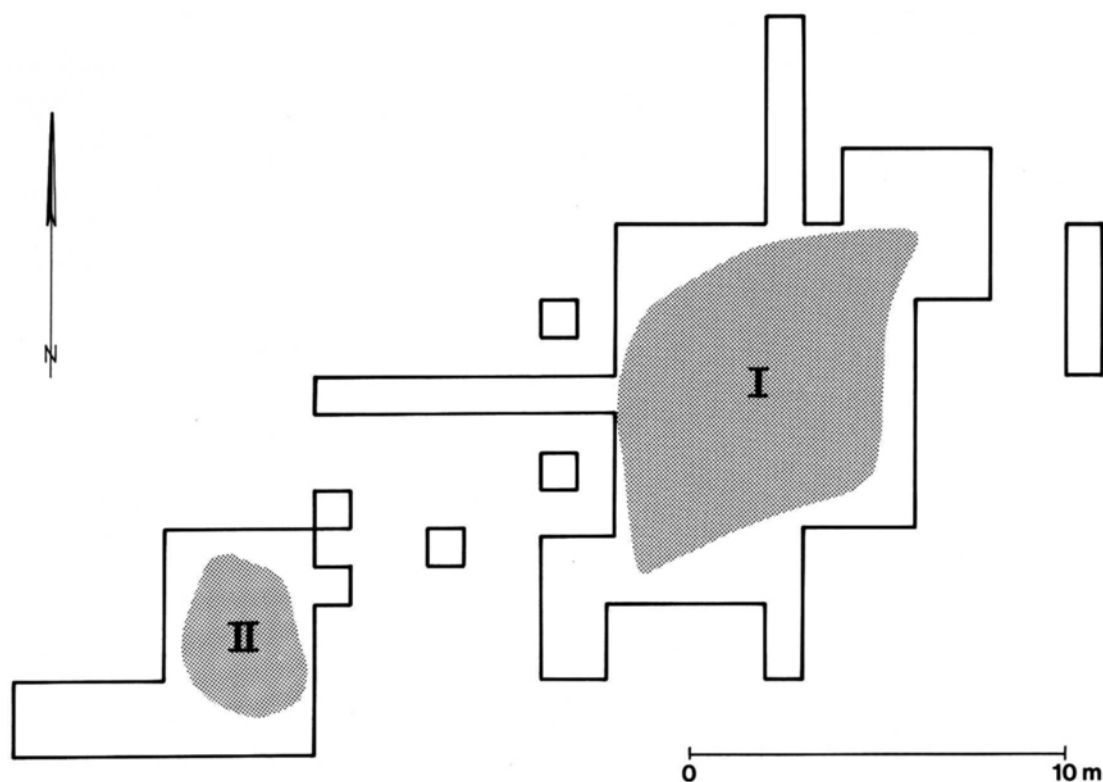


Fig. 8. The distribution of worked flint at the Løvenholm settlement.

shape and size to an example from Bromme (Mathiasen 1946, fig. 9).

The rest of the inventory consists of 3 blades with trimming along the long edge (fig. 7, E, F). One has denticulate retouch. Another has retouch that can best be described as wavy (Rust 1958: 33). Besides these, several blade fragments with partial retouch were found, including 5 notched pieces.

Two pieces have a particular shape (fig. 6, S, T). Both are flakes removed from the sharp end of a worked point. The point is formed by flaking from the ventral surface. The retouched side then formed the striking platform for the removal of the flakes in question, which were detached by means of so-called lateral transverse flaking (Tixier 1980: 67). There is a superficial similarity between the byproduct of the so-called microburin technique and these »pseudo-microburins«. The latter are merely removed from the outermost part of a blade retouched to form a point. This could happen if a borer or »zinken« was used with a seesaw or wrenching motion. Either these are broken during use, or the technique is some kind of sharpening.

Evaluation

The Løvenholm inventory is characterised by many small, lightweight tools. Consumption of flint was limited, blade and flake cores being used to the very end. Blade production is shown by the presence of 37 unretouched blades and fragments of 70 more. The starting point was conical, monopolar cores (fig. 7, H, J). Judging from size and cortex type, these are produced from the very rare, locally available ice transported flint. The quality of the utilised flint can be said to be relatively good; it is homogeneous, and as far as the tools are concerned, translucent. Some cores and flakes show, however, that attempts were made to work frost shattered and inferior flint.

Many of the flakes, blades and cores, and a few of the tools could be joined together. The analysis (cf. Cahen et. al. 1980: 209–259) is not yet complete, but one main conclusion is that some of the big tools were brought to the site from elsewhere. Examples are found among the tanged points, burins and unworked blades. None of the burin spalls fit onto any of the burins, and so

could belong to burins produced on the site but not left there. They could have been taken along to the next campsite as replacements for the worn out burins left at Løvenholm. It has already been mentioned that two of the scrapers could be on old tanged points, reworked into a new form and function. This intensive use of flint is also shown by the fact that many of the scrapers' edges show signs of having been sharpened (Håland 1979: 85–94).

Microwear analysis

The flint tools from Løvenholm have been examined for traces of microwear (4). The examination (Madsen 1982a: 11) showed that most surfaces of the flint tools have secondary polishing. In only a few cases is definitely identifiable microwear present. A tanged scraper with flat, lamellar retouch shows wear from scraping on dry skin. A so-called blade scraper with steep retouch (the above-mentioned »kratzer«) has wear along its long edge from cutting siliceous plants – it was presumably used for cutting grasses. In both cases the tools have been in contact with materials which leave the strongest traces of wear (fig. 9).

THE LANGÅ I SETTLEMENT

The site is located at the foot of an east facing slope, 15 m above sea level. The excavated site is the southernmost of a group of 4 known late glacial settlements. The first finds were made following draining and deep ploughing (5). Since then intensive collection has been undertaken on the site. The archaeological investigation was carried out to save the threatened settlements.

The excavation confirmed that much of the settlement layer remained in existence. Before cultivation began, the findspot was a wet area in which water often stood. The settlement layer had been protected by a 10–15 cm thick layer of waterborn clay, and above that various peat formations. Under the clay lay finegrained late glacial sand, in the upper part of which lay the finds.

No scientific dating of the site has yet been carried out. A provisional evaluation of a single sample from the overlying clay suggests that postglacial pollen is absent. In the finds horizon, it was noted that some of the objects had been moved by what was interpreted as permafrost action.

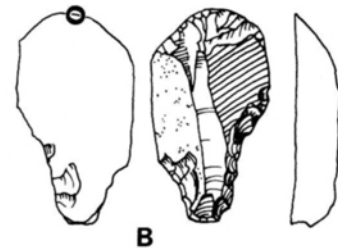
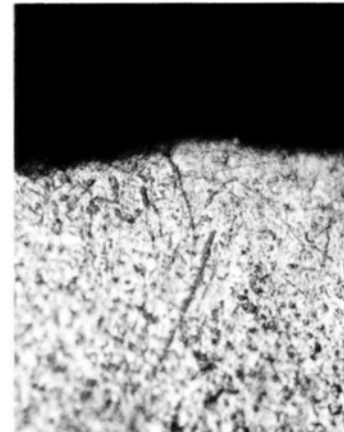
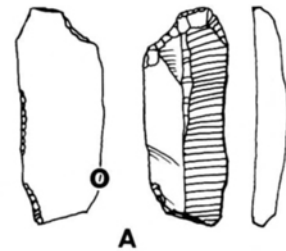
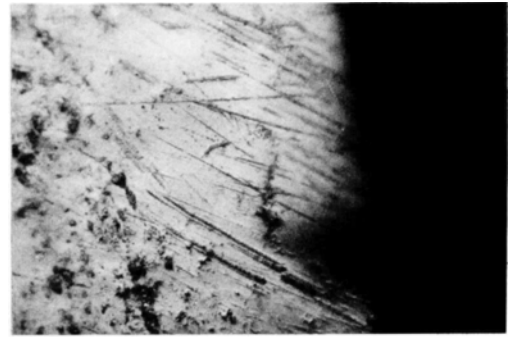


Fig. 9. Micro-wear on flint tools from the Løvenholm settlement. A, scraper on blade, or *Kratzer*, used for cutting plant fibres. B, scraper used on dry hides. Drawings 3:4. Microphotography: Peter Rasmussen. Magnification c. 240 x.

Thanks to the damp conditions, it was possible to recover faunal remains for the first time in Jutland, although these were scarce, consisting of a few whole teeth, and some fragments of bone or antler. This material has not yet been identified.

160 m² were excavated. In this area on oval concentration of finds was uncovered, oriented NW–SE and measuring about 8 × 5 m (fig. 12). In the centre of this was a small (0.3–0.4 m across) deeply dug fireplace, clearly marked by an area discoloured by sooty, washed out charcoal. 2 distinct flint working areas were recognised within the finds concentration, marked by many microflakes and a few scale-like slivers from bulbs of percussion. The 2 areas were particularly visible because of their concentrations of blade cores, core trimming blades and many heavy overpassed blades. In the southeastern area a hammerstone of porous sandstone was also found. Even during advanced preparation it could be seen that many of the flints could be rejoined, so that little horizontal disturbance had taken place.

The Finds:

2100 pieces of worked flint come from Langå I. There are 40 tools, 1 hammerstone and some blades with retouch acquired during use. 850 worked flints come from the surface collections and from the lower part of the ploughsoil, including 13 tools. These show virtually no plough damage, and occurred in a remarkably concentrated area, all within 5–6 m. The find is treated as a unit, and will be described as such in the following.

The largest tool group is the scrapers (fig. 10, F, L). All 18 have convex edges, which are generally made with flat, lamellar retouch. The blade scrapers, totaling 10, are made on long, regular blades; the longest scraper measures 9.9 cm. The sizes of 2 flake scrapers (5.5 × 4.5 cm and 6.5 × 4 cm) are similar to those of neolithic flake scrapers, and in accordance with the scrapers from the lower level at Bromme (Mathiassen 1946: 145). The other flake scrapers are small, down to 3.5 cm in length, with edge proportions similar to those of the blade scrapers.

The 14 burins are typical, heavy pieces with broad burin edges. They can be divided into 4 groups according to method of production: 1) Doubleblow burins, including 7 dihedral and 2 angled burins. 2) Burin blow on retouch, 2 examples. 3) With transverse burin blow, 2 examples. 4) Burin blows on breaks, 1 example. Three

burins are produced on blades, the rest on oval flakes. 17 burin spalls were recovered, and several of these can be joined with particular burins.

The material includes 1 typical tanged point (fig. 10, D), which was found in the ploughsoil. This is a heavy piece with a length of 7.1 cm and a breadth of 3 cm. Another piece was found during surface collecting, being a pointed blade with very slight proximal modification (as Andersen 1972 fig. 69). From the bottom of the ploughsoil, just at the northwest edge of the finds concentration, a lanceolate point was recovered. The tool was produced on a macroblade, is thick and broad, and shaped with heavy retouch at the points. It is 3.6 cm long, 1.4 cm broad and 0.4 cm thick (fig. 12).

The remaining lithic items comprise 412 blades, 168 blade fragments and 15 blade cores (fig. 11, A–B). Besides these, there are also the characteristic waste products associated with blade production: 13 platform rejuvenation flakes and 19 heavy, overpassed blades (Andersen 1972: 25). The blade cores are dominated by 12 examples of the conical form with a single striking platform. The rest are subcylindrical with two platforms. The blade material can be divided into three groups: 1) large, heavy blades, often running down the whole side of the core from platform to distal end, with large remnants of the striking platform. In cross section they are thick, polygonal and lumpy or triangular. Length is up to 15 cm. 2) Narrow, often barely curved blades, often tending to hinge fracture at the distal end, and often, because of the core shape, naturally pointed. Length from 4 to 12 cm. 3) Microblades. These are closely associated with the area where flint working took place. There are about 150 microblades at Langå I.

Several flint nodules up to 20 cm in diameter were found, which still had their primary cortex. Several of the flakes weighed up to 500 g, and derived from »opening« or »quartering« (Clarke 1935) such nodules.

Evaluation

In summary, the find is characterised by few, but powerful and relatively large tools. Flint working is completely dominated by blade production, to the extent that the flake: blade ratio is 5:1. The utilised flint is not only of good quality but also demonstrably local in origin. The immediate environs of the site have much icetransported flint, within a couple of hundred metres of the settlement.

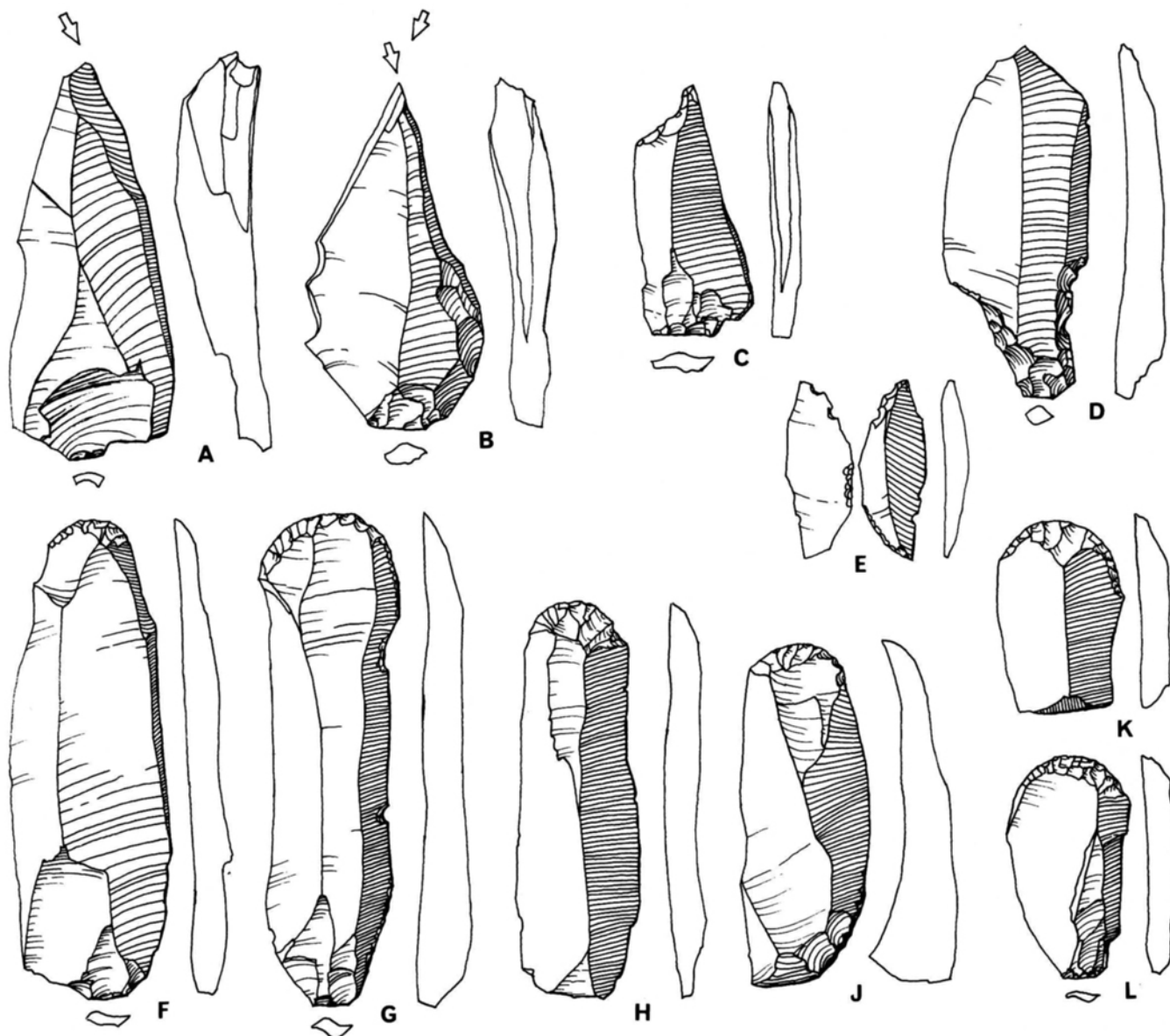


Fig. 10. Flint tools from the Langå I settlement. 3:4.

FLINT TECHNOLOGY AND THE SUPPLY OF RAW MATERIAL

Tools of the Bromme culture are made on blades or blade-like flakes (length 1.5–2 times the width). The blade cores are either conical with one striking platform, or subcylindrical with striking platforms at both ends. The cores have a rear side from which no blades have been removed, and a »front« covered in negative

blade scars. On the edge between the striking platform and the scarred front there are most commonly traces of heavy trimming. The striking platform consists of a flat flaked surface. The method involving the production of a carinated blade was not employed. The only tendency in this direction was the use of partial, monofacial trimming at the distal end. The first stage in the blade producing process was the establishment of a proper striking platform, from which the first 3 or 4 blades or

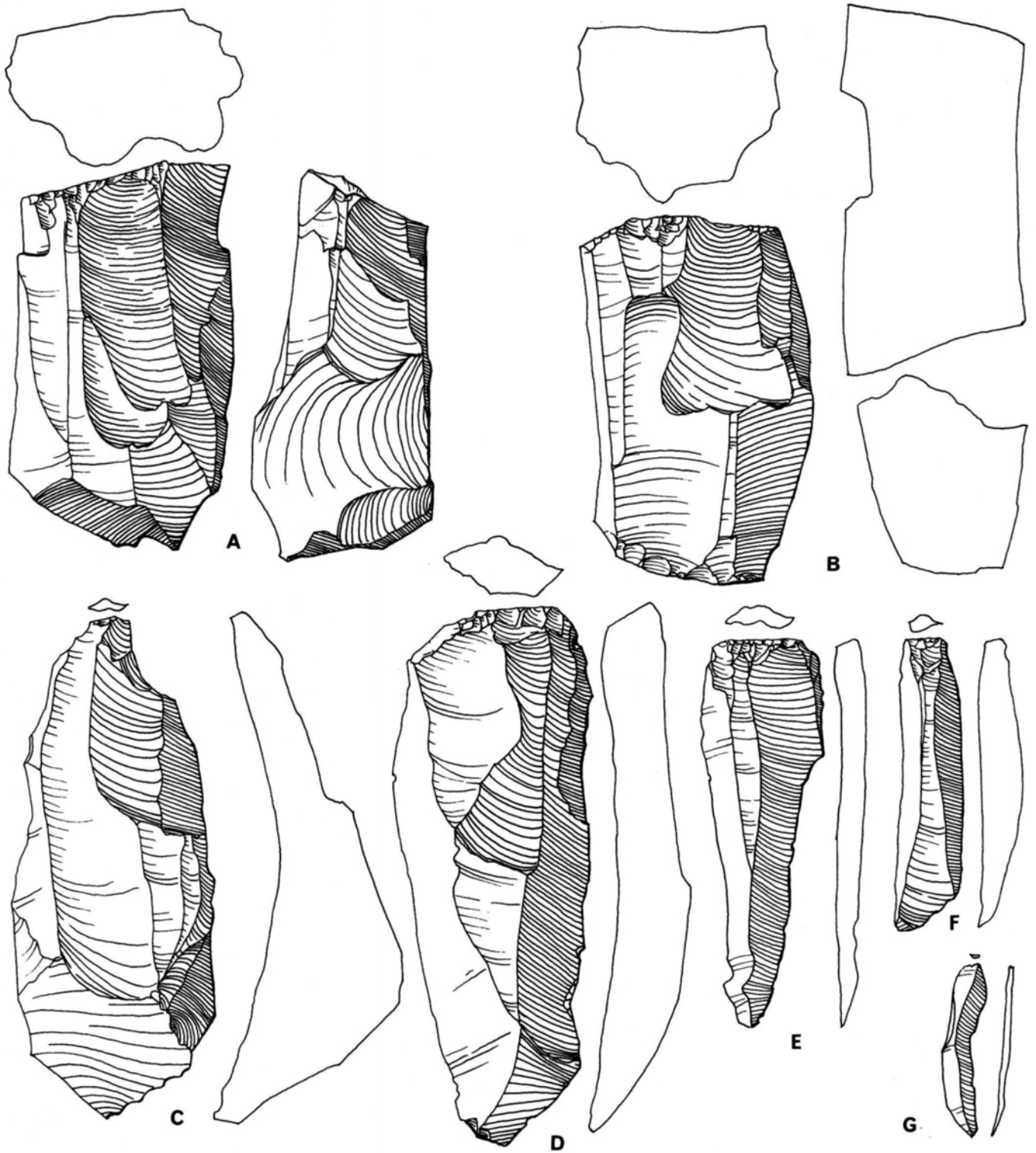


Fig. 11. Flint artefacts from the Langå I settlement. 3:4.

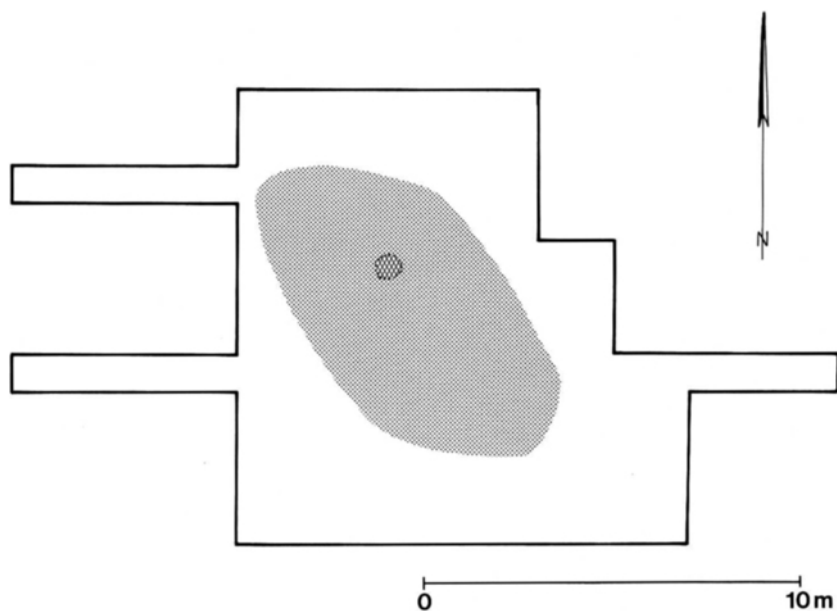


Fig. 12. The distribution of worked flint at the Langå I settlement.

blade-like flakes were struck. This operation produced the facets necessary for the production of further blades. These large removals often take off up to half the weight of the core. Trimming of the angle of the blade core before each blade was struck produced microblades and microwaste. Experimental replication of the flint technique of the Bromme culture (Madsen 1981) showed that the striking of blades and flakes was carried out with hammerstones in the size range 300–800 g. Not only is the morphology of the blades and cores evidence of a »hard percussion technique«, but certain evidence is also found at knapping sites like Langå I, with the common occurrence of flakes with »accident sret« and blades with »languette«-like breaks (Tixier 1980: 103, 108). T. Mathiassen (1946: 144) noted at an early stage that edge working of the Bromme scrapers differed from that known from mesolithic and neolithic types. Langå I scrapers are typical of the Bromme type. They have a very regular, convex edge, on which the retouch is flat and lamellar. It is typical of most of them that the angle of the scraper edge is below 60° (Andersen 1972: 28). Even the large flake scrapers can easily be distinguished from e.g. early neolithic scrapers, on the basis of the negative scars on the scraper edge alone. On scrapers of Bromme type these are always clearly bounded with a clear parallel/converging tendency, and the edges themselves are

sharp. This edge morphology is a typical product of the »soft percussion technique«.

Most of the Løvenholm scrapers show the extremely fine application of lamellar retouch, with long, parallel negative scars. Almost no signs of edge damage are visible. The scraper edges are remarkably small, about the size of a thumbnail. Scar morphology on these scrapers is typical of flat flaking undertaken with the pressure technique with an antler or bone flaker (6).

Langå I is a settlement where blade production has clearly been of superior importance. The proportion of blades and blade tools to flakes was, as mentioned above, 1:5. In other words, the so-called »lamellar index« (Bordes 1970: 322) is about 20%, which is very high compared to Løvenholm, Bromme (layer A) and Bro I, where 8–10% of the material is blades. Løvenholm's flint objects have a diminutive feel. The amount of waste products are in themselves sufficient evidence of intensive use of flint. The settlement is located in a fairly high region, and local supplies of flint are very scanty. There is plenty on the north coast of Djursland, about 25 km northeast at Gjerrild and Fornæs, but this only became accessible in postglacial time due to erosion by the Litorina Sea. The Langå I find is distinguished by its content of many regular, unworked macroblades, which together with the flint nodules on site reflect the local abundance of flint. The settlement is in an

area subjected to considerable glacial activity in the late Weichsel. In the late and post glacial period the area was cut by large watercourses. Erosion by these along many sloping hillsides must have exposed the local deposits of moraine deposited flint.

ARTIFACT ASSOCIATION AND TYPE VARIATION AT LØVENHOLM AND LANGÅ I

Compared with other late glacial finds, the newly discovered settlements have modest amounts of worked flint. Langå I is the same size as Segebro (Taute 1968: 154). Løvenholm is rather different, being proportionally one of the richest in tools of the tanged point groups. About 10% of the total inventory consists of characteristic tools. Exactly the opposite is the case at Trollesgave I, which contained under 1% tools. In size, Løvenholm is paralleled by the Ahrensburg settlement of Borneck-Nord (Taute 1968: 82), which contained about 600 worked flints, of which about 5% were tools. A Federmesser site by Schalkholz (Dithmarschen) exposes a similar amount of tools and artifacts (Bokelmann 1978: 36).

Løvenholm and Langå I are linked by some common features such as similar blade and flake technique, and the appearance of some identical tool types. The predominant tool at Løvenholm is the tanged point, of a type which has hitherto been regarded as a type artifact of the Bromme Culture. The scrapers and burins at Langå I are of classic form, and correspond to those from several Bromme culture settlements which have many scrapers and burins but few points.

The things which distinguish Løvenholm from Langå I and the other traditional finds must be conditioned partly by different activities and variable access to raw materials, and partly by chronological factors. Low availability of raw material influences the degree of utilisation of the blade cores, the size of the tools, and the degree of modification and reworking of the tools. Lack of raw material may have been a crucial influence on the decision to resharpen scrapers and re-use tanged points. As far as Løvenholm is concerned, this intensive tool use at least reflects practices in which the collection of raw material and production of blades were given a low priority. The find gives an episodic impression, the main activities having been connected with hunting and in particular with its products. For example, projectile points must have been changed on the site,

because of the many fragments of points, which were presumably brought to the settlement still attached to their shafts. Butchering of animals can be inferred from the presence of a number of points with impact damage; these might have been lodged in joints of meat brought from a nearby kill site. The many scrapers, of which only one has microwear, and that from dry skin, may have been used on fresh skins; this would produce such faint wear traces that they might have been removed by the secondary »solifluction polishing«. The few burins, borers and other retouched pieces represent ancillary activities, for which other parts of the Bromme culture's basic tool kit was used.

SETTLEMENT PATTERN

From the Løvenholm area, a number of large bogs extend northeast towards the northern coast of Djursland; these are Gjesing Mose, Fuglsø Mose and Stenvad Mose (mose = bog). It is believed that these bogs in the late glacial period formed a virtually interconnecting system of lakes. The area is bounded to the west by the Gudenå valley, and to the southeast by the Kolindsund fiord. Most of the finds described here, namely 2 settlements, 3 find accumulations and 6 single finds, derive from this area.

Despite the fact that the finds, like those on Zealand, group along small rivers and lakes, the sites are still »inland« and relatively high-lying (by Danish standards), and some distance from the major rivers.

The Langå settlement group are the first true terrace sites known. They are placed so that they have an excellent view, and are near a T-shaped river confluence (Gudenå and Lilleå rivers); their location is reminiscent of French late Magdalenian sites (Schmider 1982: 260). Further up the Gudenå near Silkeborg is another find-spot with a nearly identical location (fig. 13,6).

This picture is however provisional; it presumably reflects both real patterns in the prehistoric data (clustering of late glacial finds), and also the tendency of amateur archaeologists to collect flints near their own homes and in places which have already produced finds. Djursland is a good example of this.

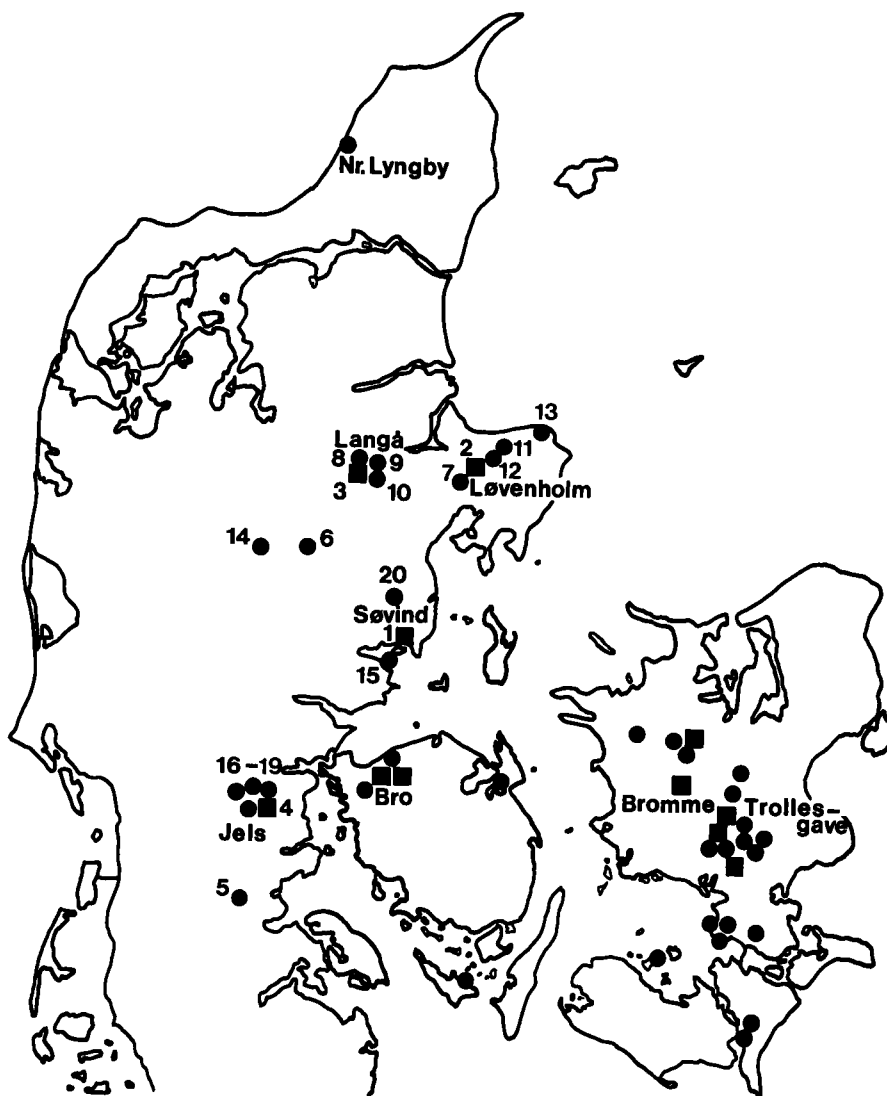


Fig. 13. Late glacial settlement finds from Denmark. Square signatures indicate excavated sites.

DISCUSSION

With the publication of the settlement of Bro I, distinguished by its very detailed description of the lithic inventory, the Bordes-type statistical and typological methodology arrived on the scene. The internal chronology of the Bromme culture was analysed by means of the statistical treatment of three settlement finds: Bromme, Bro I and Segebro (Andersen 1972: 49). Internal variation in the frequencies of scrapers and burins were said to be chronologically determined variables. The proportion of dihedral burins to those of other

types was also viewed as chronologically significant. This has most recently been discussed by A. Fischer (1978: 33), who has gone a step further with a technological-typological seriation of different types of tanged points. As the descriptions of Langå I and Løvenholm hopefully indicate, considerable variations in the assemblage composition and size can occur between certain Bromme culture sites. Certain technological and typological factors imply that this variation is chronologically determined, while others suggest that it is determined by different activities being carried out. The large increase in the number of settlements now per-

mits synchronic studies to be applied to a greater extent. Availability of raw material, for example, would be expected to vary between settlements. The type combination from different settlements must reflect different activities, and cannot only be chronologically determined.

Using ethnoarchaeological observations as a basis (Binford 1978: 330–361), it still seems reasonable to speak of general patterns, which reflect structures and strategies in the settlement pattern of the late glacial North European Plain – an approach already adopted by D.A. Sturdy (1975: 55).

A group of finds, called the Bromme culture by archaeologists, now includes over 50 settlements in Denmark alone (7). This is a considerable concentration within a geographically limited area, which is reflected by the scatter of Bromme-Segebro group finds in Schleswig-Holstein, southern Jutland, eastern Jutland, Fyn, Zealand and Scania. This area also has many finds of cast antler, particularly of younger dryas date (Degerbøl and Krog 1959). The Zealand concentration can perhaps be seen as an expression of the importance of the area as a corridor for migrating animals leading towards the periglacial zone of central Scandinavia (Sturdy 1975: 70).

Different settlement inventories seem now to be visible in the finds. If a model was to be put forward on this basis, it would have to include various settlement types carrying out different activities: 1) Base camps, represented by large settlements, possibly with evidence of repeated settlement, where a combination of most of the artifact types would be expected, but particularly those connected with permanent activities – for example burin types connected with bone and antler working. 2) »Quarry« sites. These would have a high lamellar index and many waste products resulting from blade production, and few tools. 3) Hunting stands, sites with indirect evidence of hunting: many tanged points with impact damage, tang fragments, many scrapers. Few other tools, and those mainly of »light duty« types. 4) Kill sites, with large numbers of tanged points, and also blades (knives). No, or very limited, traces of an accompanying flint industry.

The establishment of 4 settlement types is best taken as support for what G. Clark described as »optimistic archaeology« (Clark 1975: 5). We must of course expect that our view of what constitutes an activity indicator will be somewhat blurred. First and foremost, not

enough is known about the actual use to which late glacial tools were put. There is still a dichotomy between the need for an archaeological type classification (whether it is used for normative or statistical typology), and the need to understand the function of the artifacts, their degree of use, and their modification. The problems involved can be fully appreciated by studying the present day hunter-gatherers who still use stone tools to a certain extent (Gould et al. 1971: 149–169). The tools called burins by archaeologists may rather be the expression of a particular mode of manufacture than of a particular function. One example from the Løvenholm settlement is the archaeologically-termed scraper, which on the basis of microwear study can be shown to have been used for cutting plants!

Some sites are used more than others (preferred sites), and some were used as transit camps. In the former case, it is difficult to distinguish phases of occupation and activity areas by archaeological means. This is due both to the field methods in use and to the nature of the prehistoric remains. It must be realised that occupation of the preferred sites could have had different functions at different times of the year. For example, it might be that transit sites could be on the same spot as a base camp. Evidence of the different activities would appear mixed to archaeologists, unless ideal conditions of stratigraphy existed. Behaviour of late glacial hunters is unlikely to have been as rigid as archaeologists could wish. Despite this, the existing material does admit to some classification. Bromme and Stoksbjergbro I must primarily be base camps. Trollesgave I, Søvind and Langå I are regarded as sites where manufacturing activities played the most important part. Løvenholm is viewed as a hunting stand. The unique find from Ommeles Hoved I would follow J. Holm in regarding as a kill site.

CHRONOLOGY

Langå I shows close agreement with another lateglacial find from Jutland, namely Søvind near Horsens Fiord (8). Søvind, like Langå I, has many scrapers and burins, lacks tanged points, has about 30–35 flint tools and a high lamellar index as evidence that intensive flint working took place (»quarry« site activity). The same burin types occurs as at Langå I, the latter having, however, a large number of dihedral burins. Both sites have

many scrapers, both on blades and on oblong flakes. Both sites produced a blade scraper with the edge at the proximal end. In the find from Søvind occurs i.a. a curved blade with lateral retouch of a form which is known from a number of the Ahrensburg sites. The combination in the Langå find of a tanged point of Bromme type and an asymmetrical, lanceolate point is also known from the typologically early sites at Ahrensburg (Tromnau 1975). In traditional terms, both sites »have later characteristics« (Fischer 1978).

A very provisional evaluation of the accessible finds does lead to the recognition of older and younger traits in the Bromme culture. In particular, the finds of Løvenholm and Jels have established contact back to the pre-Allerød single finds, and not least to the Hamburgian Culture (9). Løvenholm plays a key part in the discussion of Brommean chronology and origins.

The little hunting stand displays a mixture of traits characteristic of the Bromme culture and of older elements known from the Hamburgian. This culture has long been known via several single finds, such as the Refshalegård find, the Hvejsel point (Becker 1970) and most recently by the scraper from Stenvad Kjær on Djursland. Of similar age are worked reindeer antlers from Allerød and Middelgrunden (Degerbøl and Krog 1959: 9).

Among the Løvenholm scrapers are some that correspond in every detail with those from Jels (9), namely the type with flat, lamellar, pressure flaked edge and tang-like retouch along the sides. In Northern Germany this type has long been known within the so-called »Wehlener-federmesser gruppe« (Schwabedissen 1954). These scrapers appear here alongside examples with older traits such as »Gravette types«. Scrapers of Wehlen type are generally larger and heavier than those so far known from Denmark. In two surface collections from Brunsmark southeast of Hamburg, tanged scrapers of Wehlen type occur together with zinken and burins of Hamburgian type, with tanged points of Bromme type and with dorsally trimmed blades of Federmesser type (Trölsch 1976: 5–42). It would not be advisable to talk of »Federmesser influence« in Denmark on the basis of the Løvenholm find. The so-called Federmesser complex is in strong need of revision. The datings of the excavated finds rests mainly on typology, together with ambiguous geological factors. Schwabedissen (1954) concludes that a dating to both Allerød and younger dryas is likely. The latest, very secure,

dates for the Tjongerian are, however, surprisingly late (Cahen et al. 1979: 662). There have long been good grounds to believe that dorsally trimmed flakes of Federmesser type have a wide chronological and geographical spread (Paddayya 1971: 257–70). As for blade scrapers with convex end retouch, this might be a case of a technological stereotype, where a technological need results in the development of a basic type which has no fine chronological value. The Federmesser complex should perhaps be regarded as a »quasi-culture« in the same way as the so-called »Gudenå culture« of Jutland (Mathiassen 1937).

The Løvenholm borers similarly find their closest parallels in the many »zinken« types in the Jels inventory. In this connection it is interesting to note that the so-called »pseudo-microburins« from Løvenholm are a detail which also occur at Jels. The flint technologies are generally similar, both being based upon a combination of »hard percussion« within the blade producing technique and pressure flaking on the scraper edges. The tools from both settlements are lighter than typical Bromme types. Due to the many typical tanged points the Løvenholm find must nevertheless be classified as Bromme culture. All the tanged points are furthermore of the type that A. Fischer seriates at an early point in the Bromme culture (1978: 32). In this connection it is notable that several are relatively small and light, a characteristic that was earlier (Taute 1968: 247) regarded as a chronologically late trait. It is probably more important to do as A. Fischer has done, and analyse details of shape and production technique of these points.

The Hamburgian points of Havelte type (Tromnau 1975: 40), known from Jels (Holm 1982) are technologically and typologically very close to the narrower versions of Bromme tanged points. They underline the close connections seen between the oldest Bromme and late Hamburgian in Jutland.

PERSPECTIVES FOR THE FUTURE

In Denmark the new evidence of late glacial settlement in Jutland has not only supplemented the already greater amount known from Zealand, but hopefully has also shown the way to a new understanding of the Bromme culture. The settlement material shows clear variations between settlements of the inland late glacial hunters. We still do not know what took place on the

coasts. Many unsolved questions remain regarding settlement pattern and economy. We look forward eagerly to the appearance of the first settlement with preserved faunal material.

It is still difficult to disentangle the chronological situation between the late glacial and post glacial cultures. The solution is probably not to be found in the excavation of a single settlement find. Discussion to date really consists of no more than suggestions based indirectly on the German chronology, despite the fact that it is based on settlements outside the core area of the Bromme Culture. It is necessary to understand the full range of variation in the local material before the hunt starts for »missing links« (Fischer 1982: 99).

There is a perspective for research strategy in the fact that the oldest settlements in Denmark are quite amenable to archaeological research. This is thanks to their limited size, and to a settlement pattern which put settlements in places that were rarely occupied later. The excavations at Langå I go together with the recently published excavations at Bonderup (Fischer 1982: 98) to emphasise the great value that lies in allowing rescue excavations to include palaeolithic settlement sites.

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NOTES

¹ The author did the collecting on behalf of the Culture Historical Museum, Randers.

² Personal communication from Fl. Rieck and J. Holm, Haderslev Museum.

³ Investigated in 1980 and 1981 by the author on behalf of the Culture Historical Museum, Randers (J. no. 27/74, Gjesing parish, Sønderhald region).

⁴ Thanks are due to Peter Rasmussen, of the Department of Natural Sciences at the National Museum, for undertaking the examination of the finds.

⁵ Investigated by the author in 1982 on behalf of the Culture Historical Museum, Randers (J. no. 30/77, Langå parish, Middelsom region). Most of the material collected from the surface is still in a private collection. In the first published description the total artifactual material was incorrectly stated to be 3000.

⁶ The scrapers were examined by Jacques Pelegrin CNRS, Paris.

⁷ Anders Fischer of the Ancient Monuments Protection Department is thanked for freely allowing the author to use his maps of late glacial settlement in eastern Denmark. They will shortly be published (Fischer n.d.).

⁸ Søvind was excavated by S.H. Andersen, Institute of Prehistory, Moesgård, to whom thanks are due for permission to examine this and other finds in the collection at Moesgård.

⁹ The author is grateful to the excavators of Jels, J. Holm and Fl. Rieck, for valuable assistance on two fronts: for displaying the material from the 1981–1982 campaigns at Jels, and for discussing the implications of the Løvenholm find.

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