

# Settlements of the Hamburgian and Federmesser Cultures at Slotseng, South Jutland

by JØRGEN HOLM

## INTRODUCTION AND FIND HISTORY

This article presents the results obtained to date from the archaeological and geological investigations undertaken in the period 1985–91 at Slotseng, South Jutland, in connection with a group of Late Palaeolithic settlements from the Hamburgian and Federmesser cultures. In 1991, sounding in a nearby kettle hole revealed an apparently complete Late Glacial stratigraphy, a flint implement and well-preserved organic material, including reindeer bones with traces of human working. One bone has been dated by accelerated mass spectrometry (AMS) to  $12520 \pm 190$  b.p.  $C^{14}$  years, *i.e.* the middle of the Bølling period.

In the investigation in 1981–84 of two settlements, Jels

1 and 2 (Holm & Rieck 1983, 1987, 1992), situated on the Jels lakes, South Jutland (fig. 1), it was ascertained for the first time that it is possible to find settlements older than the Bromme Culture, which has already been subjected to intensive investigation for many years (*e.g.* Mathiassen 1946; Andersen 1973; Madsen 1983; Fischer & Nielsen 1987). The Jels settlements derive from the Hamburgian Culture, which was apparently the first to appear in the North European tundra areas after the last glaciation, more precisely at the beginning of the Bølling Period, c. 13000 b.p. in  $C^{14}$  years (Burdukiewicz 1986).

The most northerly Hamburgian sites in Germany are found at Ahrenshöft, Kreis Nordfriesland (Hartz 1987), and it was only to be expected that other Hamburgian sites would appear in South Jutland. This quickly proved to be the case, although in an unexpected manner: during a general examination of the Stone Age material in the store rooms of Haderslev Museum during 1985, it was found that a flint assemblage acquired by the museum as early as 1962 is from the Hamburgian Culture. *I.a.* 1 double Zinken, 2 single Zinken and 1 scraper could be distinguished, besides a score of flakes.<sup>1</sup>

## TOPOGRAPHY AND GEOLOGY

The find locality is the northern edge of the Nørreå valley between the villages of Mølby and Neder Lert in the western part of an extensive hill formation occupying the angle between Nørreå, which flows from the north-east, and its tributary Ørsted Å, which comes from the north-west (fig. 1). This is the extreme western edge of the East Jutland late moraine landscape, formed during the Weichselian glaciation. The stationary ice line is assumed at its maximum extent to have stood around the modern town of Jels – a mere 5 km or so to the west. Wind- and water-deposited sand and gravel seems to predominate in this area, but there are also considerable tracts with boulder clay, especially in the high hills east of the find-area.

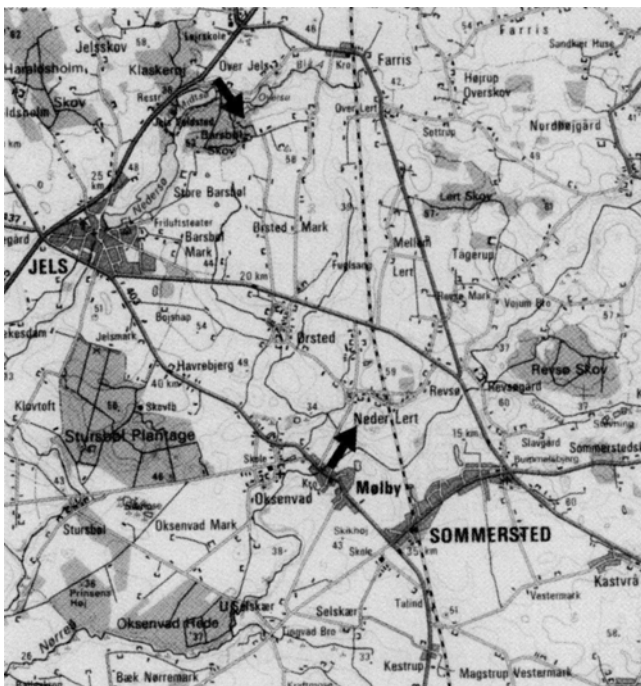


Fig. 1. Section of map sheet 1212 Haderslev (1:100.000). The arrows indicate the settlements of Jels (above) and Slotseng (below). Reproduced by permission of Geodetic Institute (A. 404/85).

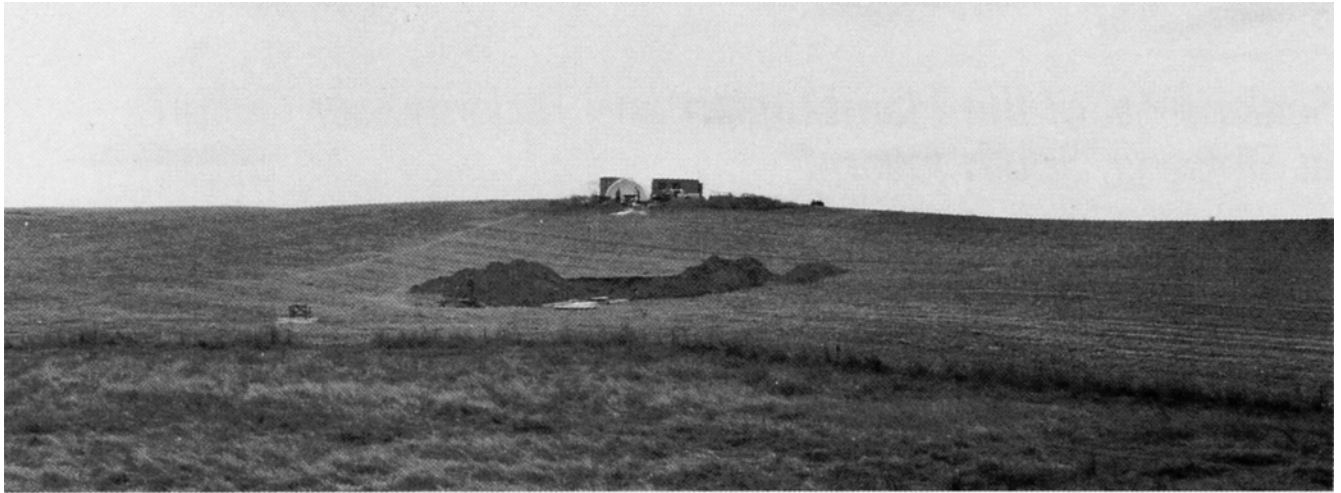


Fig. 2. The Late Palaeolithic settlements lie at the top of the hill – near the tent and the site trailers. At the foot of the hill, sounding is in progress in the kettle hole. In the foreground is a meadow, which in Late Glacial times was presumably a lake. View from the north-west – from the road between Mølby and Neder Lert. Photo: Jørgen Holm.

From the Nørreå valley there is a direct valley connection to the Jels lakes. If the depression through which the stream Barsbøl Bæk flows is followed to the north-west, the Hamburgian sites Jels 1 and 2 are reached, a stretch of about 5 km as the crow flies.

Just where the modern road between Mølby and Neder Lert crosses the river Ørsted Å in the form of a causeway, the brinks of the valleys lie very close together, a natural funnel in Late Glacial times. The actual find locality lies only about 250 m ENE of this spot – on a sandy plateau rising about 10 m above the surrounding wetlands, which fall gradually to the north-west to form a brink where the settlements lie. Below this is a semicircular depression which to the east cuts into a more elevated landscape, the open western part of which is connected with the valley of Ørsted Å. There must have been a lake of considerable extent here in Late Glacial times (fig. 2 and 3).

The geology and stratigraphy in immediate connection with the settlements may be generally characterized in the following way (fig. 4 and 5). 25–30 cm thick ploughed topsoil and immediately under this 10–40 cm featureless, strongly cryo- and bioturbated fine sand, presumably of aeolian origin and stained dark by eluted humic material. Close to the base of the tilth are possibly the remains of a podzol horizon (Allerød?). Under this again are alternating highly irregular sand, gravel and silt layers, which mainly seem to be of fluvial origin. In a few places, the series reaches right up to the base of the tilth, but layers of aeolian origin seem also to occur – well-sorted sand with

only indistinct layering. These layer series are broached – and thus disturbed – by numerous frost cracks, uprooted trees, root holes and animal burrows that can sometimes be followed down to a depth of over 1 m. These disturbances are as a rule sharply defined in relation to the original geological layers and filled with soft, featureless sand. This sand contains – apparently quite at random, but with diminishing frequency from top to bottom – the flint artefacts. The frost phenomena must have primarily arisen in the Late Dryas.

The aeolian and fluvial layers are judged to be several thousand years older than the settlements and probably derive from the melting of the ice from the main stationary line only a few km to the west near the town of Jels. The stratigraphy greatly resembles that of Jels 1 and 2, and here we have some thermoluminescence datings of aeolian sand of “Older Cover Sand Type” (Kolstrup 1992):  $14700 \pm 1500$  and  $14300 \pm 1500$  B.P. respectively (Huxtable & Mejdahl 1992). It should be borne in mind that TL-datings express calendar or solar years, while the Late Glacial chronology is based on  $C^{14}$  years.

## RECONNAISSANCE AND SOUNDING

In the period 1985–89 reconnaissance has been carried out every spring and autumn in the Slotseng locality, and a considerable material has been collected from the sur-

face. It was notable that the Late Palaeolithic flint could be found over so large an area as  $75 \times 75$  m – but without clear concentrations. In order to cast light on this circumstance, the National Museum, under the direction of the author, carried out a trial excavation in the autumn of 1989.

The sounding strategy at Slotseng was based on a knowledge of the smallest size of known Hamburgian settlements: c.  $5 \times 5$  m. Pits measuring  $50 \times 50$  cm were dug in the area, which covered more than 5000 sq.m., at 5 m intervals. At a few places, down the slope to the north-west, where settlements could hardly be expected, the interval was set to 10 m, however.

A total of 111 holes were dug. Only a shovel was used, but all soil was sieved. Mesh size was 5 mm, and dry weather throughout the excavation period made it possible to dry-sieve. Finds from the tilth and the underlying sand layers were kept apart. No attempt was made to plot the exact position of the flint in the underlying sand, the most important thing in this phase being to discover whether flint was present under the tilth. We had already learned from the investigation of the Jels settlements that geological processes and bioturbation after settlement have caused a considerable dislocation of the flint, so it would be unproductive to perform a detailed three-dimensional plot.

Taking the number of artefacts from the various probes, a density contour map was produced.<sup>2</sup> Three very distinct find concentrations were observed right out on the brink, marked from east to west *a*, *b*, and *c* (fig. 3). A fourth concentration, designated *d*, some way downslope to the north-west, should, with its 16 flakes found in a single probe, also be considered, but hardly represents a proper settlement. The finds are confined to the tilth layer, and comprise only chips. This is probably washed-out or slipped material – and most probably derives from find concentration *b*.

If the density curves for 5–30 chips per probe are examined, a continuous, c. 60 m long by up to 20 m wide, irregular find zone may be discerned roughly parallel to the edge of the slope. Extensive out-ploughing is doubtless mainly responsible for this picture, but there was probably also sporadic traffic along the edge during the settlement period – behaviour which has resulted in a more scattered occurrence of artefacts between the concentrations.

The curves for 15–30 flakes per probe probably give a more accurate picture of the settlement's original extent.

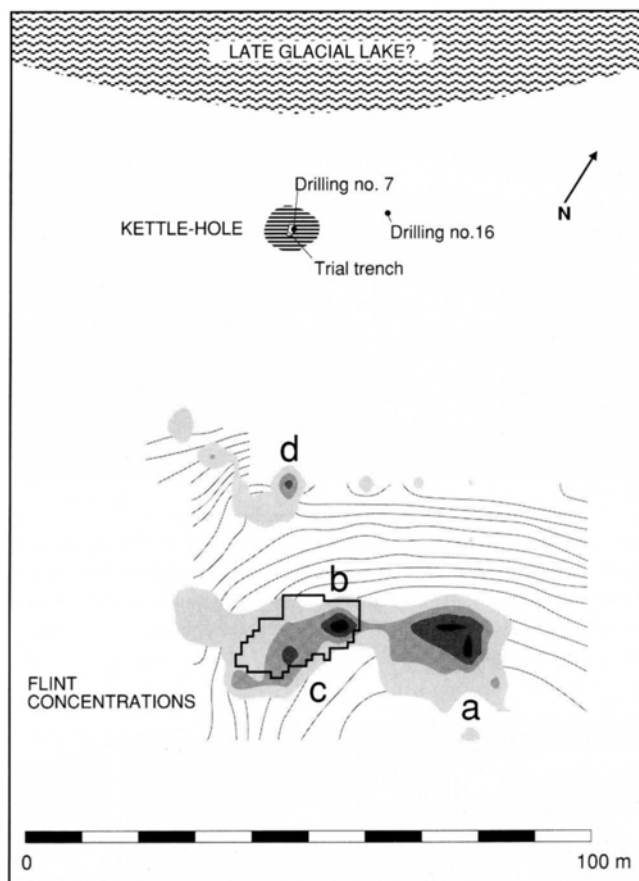


Fig. 3. Flint concentrations *a-d* shown with density curves (rasterized) for flakes and blades at an interval of 5 pieces per  $\frac{1}{4}$  sq.m. *a*: Still uninvestigated, probably from the Hamburgian Culture. *b*: Settlement of the Federmesser Culture. *c*: Settlement of the Hamburgian Culture's Havelte group. *d*: A few small flakes. Also shown are the excavation area for the 1990–91 investigation and the location of the kettle hole, trial trench and drillings no. 7 and 16. Computer graphics: Jørgen Holm.

The above-described probe method has proved an excellent method of localizing and delimiting flint concentrations. If fig. 3, showing flake spread and frequency expressed in density curves after sounding, is compared with fig. 6, which shows the final density curves for the fully excavated settlements *b* (Federmesser Culture) and *c* (Hamburgian Culture), a convincing congruence will be found, whereas this method is inadequate if it is desired to identify the involved culture. Implements should be precisely plotted in already during the reconnaissance phase and the small probes supplemented with excavation of larger holes, of 1 sq.m., for example, in the centre of the concentrations, in order to obtain sufficiently characteristic material for this purpose.



Fig. 4. Profile section through the Hamburgian settlement *c* seen from the north. In a 0.5 m wide baulk, the featureless, soft, artefact-bearing sand has been removed with a combination of digging and hosing down. Remaining, in highly irregular relief, are the remains of the harder fluvial layer series, disturbed by frost phenomena and bioturbations. For a more detailed general description, see the main text. Photo: Jørgen Holm.

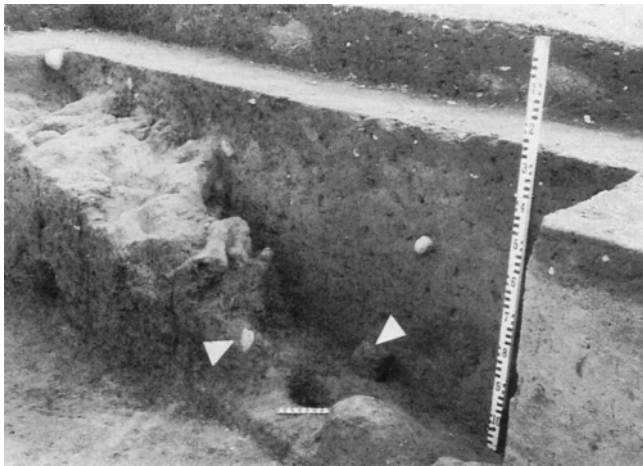


Fig. 5. Part of a profile section through the Hamburgian site (*c*). The cryo- and bioturbated artefact-bearing sand has been removed to a breadth of 0.5 m. Two flint flakes remain at a depth of about 1 m (shown with white triangles). Viewed from the west. Photo: Jørgen Holm.

There is naturally nothing new in digging probes to localize and delimit flint concentrations, but Slotseng has shown that this part of the process may be carried out with relatively few, small holes. The saving in time and money is obvious, and computer-generated graphical presentation is an excellent point of departure for planning subsequent field-work.

The artefact material from both surface collection and

probes suggested the presence of settlements exclusively of the Hamburgian Culture. In addition, there were a couple of stray tanged points of Bromme type. A few backed blades did not raise at this stage any suspicion of Federmesser Culture, but were merely perceived as an integrated and not particularly surprising part of the Hamburgian inventory (a few implements of this kind have also been found at the Jels sites and are known in considerable numbers from certain north German sites, *i.a.* Teltwisch 1 (Tromnau 1975)).

Flint concentration *b* seemed especially promising. Not only were there many artefacts under the tilth, but the presence of a couple of rocks under the tilth in one of the probes raised hopes of proper constructions. This settlement was therefore made the primary target of the investigation in the summer of 1990, which also covered the peripheral parts of concentration *c*, however. The latter was excavated in the course of the summer and autumn of 1991. This campaign also comprised geological probes.<sup>3</sup> In connection with these, a kettle hole was found with well-preserved organic material, including reindeer bones and a flint implement about 70 m north-west of the settlement heap (fig. 3 and 10).

As yet uninvestigated is a very large flint concentration, *a*, which probably covers at least two settlements. The finds from the surface collection and probes mostly suggest Hamburgian Culture.

#### THE EXCAVATION PROPER – METHOD

The topsoil in the two settlements was excavated in squares of 1 sq.m. The soil was sieved, using a 4 mm mesh. Both dry- and wet-sieving were employed, but in the author's experience it is advisable in excavations of this kind always to employ wet-sieving, which is effective in all weathers.

Under the topsoil, which was everywhere 25–30 cm thick, squares of  $\frac{1}{4}$  sq.m. were consistently employed, and all material was wet-sieved. At the Federmesser site, a cross-profile and a surface-oriented excavation method were employed. After the topsoil had been investigated, the underlying sand was scraped clean, and from then on excavated in artificial 10 cm layers – not horizontal, but following the natural slope of the land.

It soon became apparent, however, that the flint had a vertical spread of over 1 m (from the top of the tilth), and it was difficult, not to say impossible, to gain an impres-

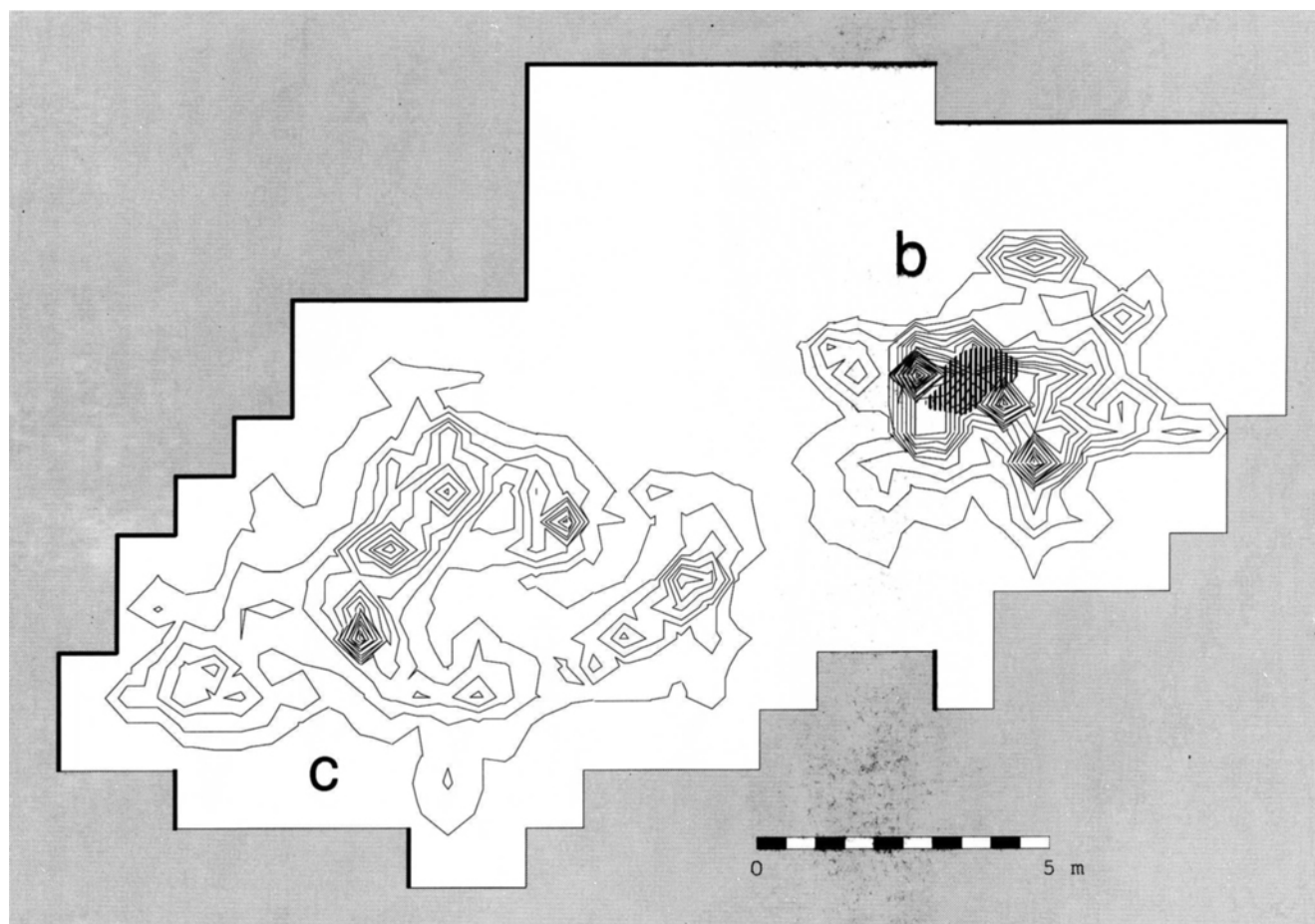


Fig. 6. The Federmesser settlement (b) and the Hamburgian settlement (c). The distribution of flint flakes is shown in density curves at an equidistance of 10 pieces per  $\frac{1}{4}$  m. Vertical hatching: The putative fireplace of the Federmesser site. Computer graphics: Jørgen Holm.

sion of the geology and other factors that had caused this pronounced and apparently random spread of artefacts, which undoubtedly occurred *after* settlement (fig. 4 and 5). In order to obtain a better understanding of these conditions, it was therefore decided in 1991 in connection with the investigation of the Hamburgian site only to excavate in a section-oriented manner, so that the excavator always had a c. 1 m high profile ahead, and advanced in a straight line, 0.5 m at a time. This also afforded an opportunity to establish parallel sections at  $\frac{1}{2}$  m intervals and thus a much better possibility of making stratigraphic observations. On account of the geological and biological disturbances, it was also now considered pointless to excavate in arbitrary 10 cm thick layers. This altered strategy reflects a realization that we were confronted with anything but an *in situ* situation. To excavate in artificial layers – whether of 10 or 5 cm thickness – was under the

circumstances considered to be a waste of time and money. We were now content to excavate and sieve the artefact-bearing sand in one operation and to quickly remove the remains of the intervening mainly fluvialite, completely sterile layer series (fig. 4). We had some success with – experimentally – carrying out the wet-sieving in the excavation itself, *i.e.* with a suitable pressure flushing the soft sand and flint artefacts out of frost cracks, animal burrows, etc., down onto a sieve placed in front of the section.

In connection with the Federmesser settlement, the investigation of the topsoil was started where the soundings had indicated most flint. Excavation was then extended to all sides, until the flint frequency had typically fallen to 20–30 pieces per sq.m. That is to say the topsoil was investigated over a large area, prior to work on the underlying layers.

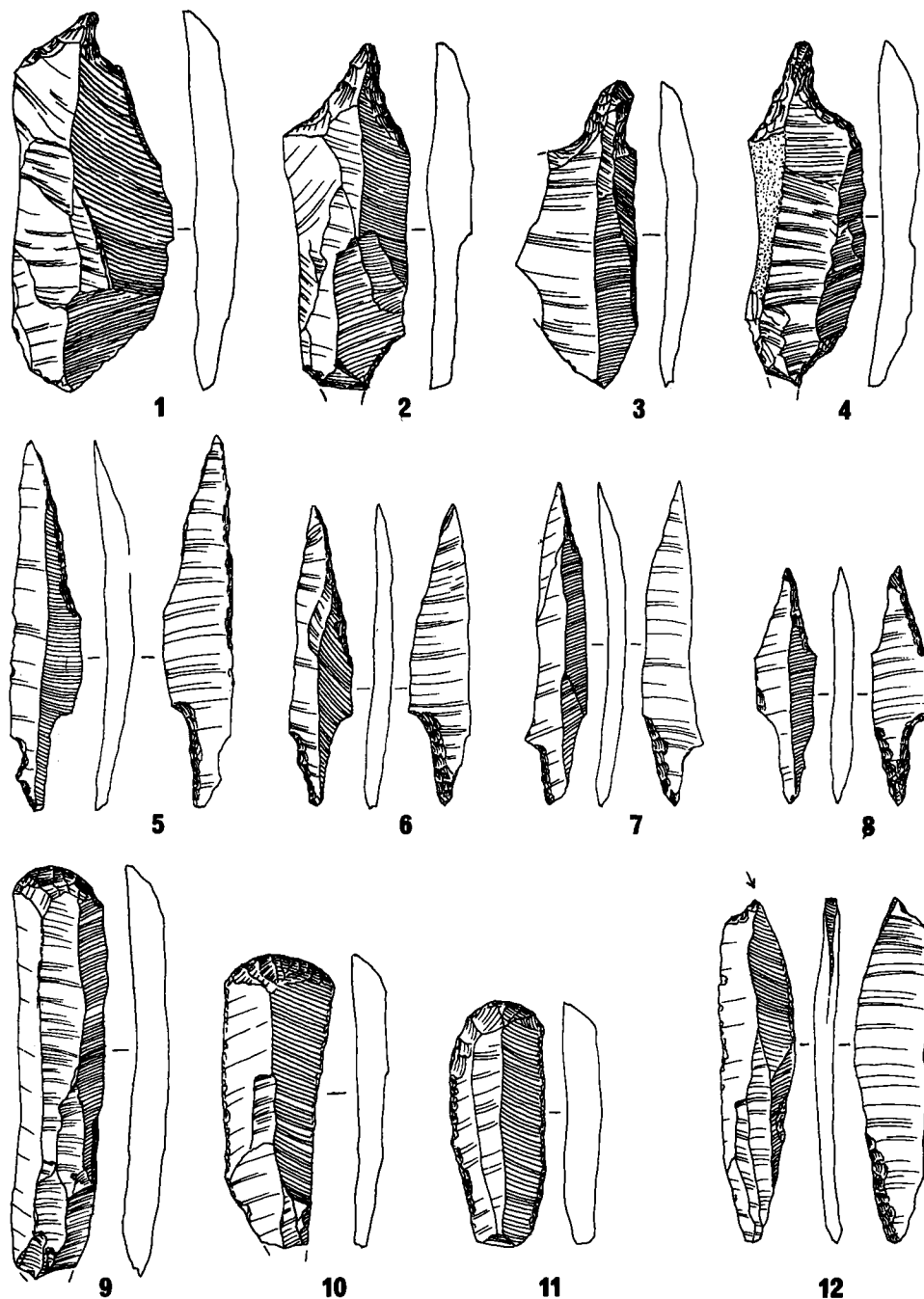


Fig. 7. Flint implements from the Hamburgian site (c). 1–4: Zinken. 5–8: Tanged points (Havelte type). 9–11: Scrapers. 12: Burin. 3:4. Drawing: Jørgen Holm.

A different procedure was followed at the Hamburgian settlement. Here the tilth was investigated with only a single row of 1 m squares, before excavation of the underlying sand was initiated. It was now only the spread and frequency of flint under the tilth that determined in which

direction and to what point the excavation should extend. Some concrete and relatively consistent criteria were set: when the frequency per  $\frac{1}{4}$ -m square was 10 flakes or less, excavation was stopped. It must be admitted that this is still rather a high frequency, but this delimitation was in

accordance with the maximum spread of tools and – not unimportantly – within the time and money framework of the campaign, to which should be added the pessimistic argument that only part of the material could be recovered anyway, due to the marked horizontal spread of the material in the tilth.

#### THE HAMBURGIAN SITE (c)

The spread of artefacts in the tilth (not illustrated) showed, as expected, a blurred picture. But in the underlying sand (fig. 6), an ellipsoid spread is seen, which to the east runs out in a small tongue. The concentration, which is here delimited by the 10 flakes per  $\frac{1}{4}$  sq.m. contour, measures  $11 \times 8$  m. The vast majority of the flint was found within the main western concentration, however. There is a particularly marked concentration of implements in the most northerly part of this area: 8 implements were found within a single  $\frac{1}{4}$ -m square, for instance.

The following find list is based on a preliminary scrutiny of the material (1.8.1992):

Cores	73
Flakes and blades	8305
Zinken	37
Borers	29
Tanged points	35
Scrapers	42
Burins	22
Combination tools	7
Backed flakes and blades	9
Flakes and blades with terminal retouch	21
Backed points (= Federmesser)	4
Total typed implements	206

In addition there are numerous retouched and notched flakes and blades, truncated Zinken and borer tips, broken-off working edges (including scraper edges), burin spalls, microburins and shouldered fragments. In the border area between concentrations *b* and *c*, a single large hammer-stone of quartzite was found.

About 35% of the material was found in the tilth, the remainder in the underlying sand.

Only about 135 pieces of flint show fire-marks, and they

were also so scattered that it is not possible to indicate a fireplace.

The large numbers of Zinken (fig. 7.1–4), including double Zinken, assign the material unambiguously to the Hamburgian Culture, and the many tanged, not shouldered, points (fig. 7.5–8) allow the identification to be further refined to this culture's hitherto mainly western Havelte group, which is traditionally, but not necessarily correctly, perceived as a late phase. The scrapers (fig. 7.9–11) are as a rule produced from regular blades with parallel edges, which are sometimes retouched. Among the burins (fig. 7.12), dihedral burins predominate.

#### THE FEDERMESSER SITE (b)

The preceding surface collection and probes indicated, as already mentioned, only the presence of settlements of the Hamburgian Culture. It was therefore a total surprise to the excavators that during the proper excavation of flint concentration *b* increasing quantities of small blades with one long edge retouched appeared: Federmesser (fig. 9.1–5) or “backed” points, which now seems to be

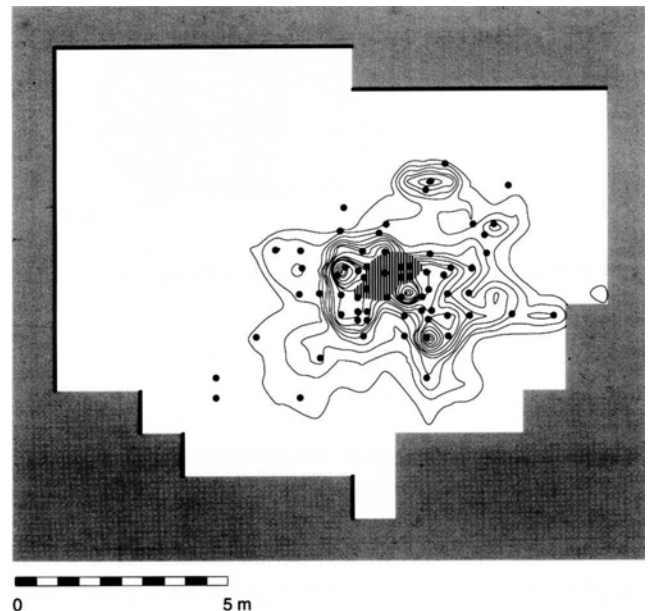


Fig. 8. The Federmesser settlement (b). The spread of Federmesser points is shown with filled circles. In addition, density curves for flakes and the putative fireplace (vertical hatching) are shown. Computer graphics: Jørgen Holm.

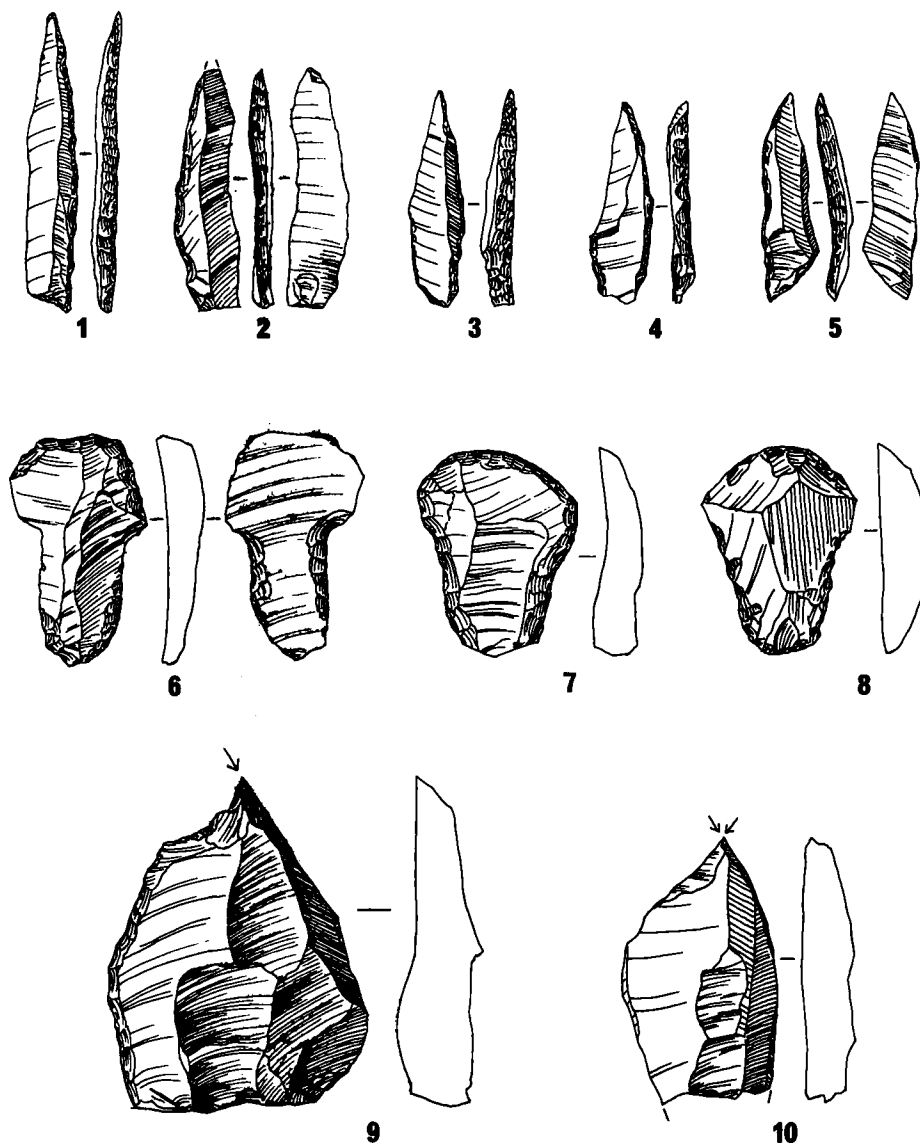


Fig. 9. Flint implements from the Federmesser settlement (b). 1–5: Federmesser points. 6–8: Scrapers (Wehlen type). 9–10: Burins. 3:4. Drawing: Jørgen Holm.

the preferred, more neutral designation of German archaeologists (*Rückenspitze*). It gradually became apparent that we were dealing with a settlement of the Federmesser Culture, especially as none of the Hamburgian Culture's typical implement forms occurred under the topsoil. Also the predominant scraper type – small, sturdy pieces with edge retouch and almost tang-shaped base, the Wehlen type (fig. 9.6–8) (Schwabedissen 1954) – which is known in particular from the older phase of the Federmesser

Culture, and a general superficial evaluation of the basic flint technology, supported and straightened an assignment to the Federmesser Culture. This was the first time a settlement from this culture had been excavated in Denmark.

Under the tilth, the flint swarf was mainly found within an area measuring c. 8 × 6 m, forming an almost stellate concentration with rounded points (fig. 6). In the centre of this figure, a marked concentration of burnt flint was



found, suggesting the presence of a fireplace. Most of the implements were concentrated around this spot, suggesting once again that the fireplace was the centre about which settlement activities occurred. The Federmesser points (fig. 8), in particular, were found around and in the fireplace. A few were located more peripherally in the concentration, and a couple of pieces to the south, in the border area between this and the Hamburgian site. Almost all the scrapers lay inside the 10 flakes per  $\frac{1}{4}$  sq.m. contour, mainly west and east of the fireplace. The occasional burins (fig. 9.9–10) all lay within the 10-flake per  $\frac{1}{4}$ -sq.m. curve in the northern part of the settlement. Under the topsoil, about fifty stones larger than 5 cm were found. They mainly occupied a more peripheral position in the concentration, but so scattered and irregularly that it is impossible to say whether they were part of a structure.

The following list of finds is based on a preliminary examination of the material (1.8.1992).

Cores	110
Flakes and blades	10368
Federmesser	128
Scrapers	112
Burins	22
Borers	4
Flakes and blades with oblique end retouch	19
Flakes and blades with transverse retouch	2
Notched flakes	4
Combination tools	3
Zinken	6 (all from the tilth)
Tanged points (Havelte type)	2 (both from the tilth)
Total typed implements	302

In addition, there were about 250 flakes and blades with various retouching and a considerable quantity of more or less certain burin spalls.

About 50% of the material derives from the topsoil, the remainder from the underlying sand.

## THE KETTLE HOLE

Drilling (no. 7 – fig. 3) at the foot of the hill, c. 70 m north-west of the settlement cluster, produced in August 1991 three bone or antler pieces deriving from an olive-green clay gyttja layer at a depth of c. 4.40 m. Further drilling suggested the presence of a small kettle hole, measuring little more than c.  $10 \times 10$  m. A trial trench measuring 2 sq.m. was dug around the bore-hole, and produced a reindeer antler<sup>4</sup> and a few bones (fig. 10). Clearing of the trench floor produced a Zinken-like implement near the bones and at about the same level (fig. 11).<sup>5</sup> Intrusive groundwater made further excavation impossible, and we had to resort to breaking off that piece of the antler which stuck out of the trench wall. The rest of the bones were abandoned, to await a future investigation.

A preliminary report by Charlie Christensen, of the Environmental Department of the National Museum (Christensen 1991), states that the kettle hole appears to contain a complete Late Glacial and part of a Post-glacial (Holocene) layer series. Bones and flint lay at the top of a c. 60 cm thick layer of clay gyttja. The first evaluation already favoured a dating to the Bølling Period. This has now been fully confirmed by an AMS-dating of the bone/antler pieces obtained from drilling no. 7. The dating has been carried out by the AMS Laboratory, Institute of Physics and Astronomy, University of Aarhus:

AAR #	<sup>14</sup> C age (bp)	$\delta^{13}\text{C}$ (0/00) PDB
AAR-906	12,500±190	-17.98

*I.e.* the dating falls in the middle of the Bølling Period (13000–12000 bp in C<sup>14</sup> years).

## DISCUSSION

The last decade has seen a marked increase in research into the Late Palaeolithic of Denmark. We can now state that practically all the cultures/industries associated with the final phases of the Weichselian glaciation and known from the North European lowlands are also represented in Denmark: the Hamburgian, Federmesser, and Ahrensburgian cultures. In addition we have the Bromme Culture, which seems mainly to be a South Scandinavian phenomenon.

The Hamburgian Culture is represented by a stray

find, the shouldered point (“Kerbspitze”) from Bjerlev Hede between Vejle and Horsens (Becker 1970), the Jels settlements (Holm & Rieck 1992) and Slotseng, and a relatively newly found cluster of settlements at Sølbjerg, south Lolland (Vang Petersen & Johansen 1993, this volume). Jels 2 is with respect both to settlement area (c.  $11 \times 8$  m) and number of implements (c. 700), one of the largest and richest Hamburgian settlements found. Jels 1 and Slotseng c occupy equally large areas, but are far poorer in implements: c. 125 and 200, respectively (for a comparison with German and South Scandinavian Hamburgian, Federmesser, Bromme and Ahrensburgian sites, see Bokelmann 1978).

The Federmesser Culture was until 1990 known only from a series of surface finds, stray Federmesser (Andersen 1977; Madsen 1982; Fischer 1990), and scrapers of Wehlen type and a single, secure settlement on Rundebakke, Knudshoved Odde, South Zealand (Petersen 1974). In addition there is a flint workshop, consisting exclusively of cores, blades, and flakes at Egtved, South Jutland. This is assigned on its basic flint technology to the Federmesser Culture (Fischer 1990). But the presence of this culture in Denmark has now been established by excavation at Slotseng b, which – in comparison with foreign finds (Bokelmann 1978) – appears atypically large and rich.

The Ahrensburgian Culture, which has hitherto only been glimpsed in more or less uncertain single finds – tanged points, antler striking-weapons, and large-barbed harpoons with spatulate base (Becker 1971; Skaarup 1974; Taute 1968; Andersen 1974) – is now represented by a securely attributed excavated settlement at Sølbjerg, where, as mentioned above, settlements of the Hamburgian Culture have also been attested (Vang Petersen & Johansen 1993, this volume).

This significant increase in the Danish Late Palaeolithic material has, as we have often seen before, its background in a combination of determined search and good fortune. Not least amateur archaeologists have made an enthusiastic contribution. In addition, when one Late Palaeolithic settlement has been found, closer scrutiny will often reveal more in the immediate vicinity. Jels, Slotseng, and – in particular – Sølbjerg are good examples. It is also interesting to see that several cultures from more or less different periods are sometimes represented at the same locality: at Slotseng Hamburgian, Federmesser, and Bromme cultures and at Sølbjerg an even longer sequence from the Hamburgian to the Ahrens-

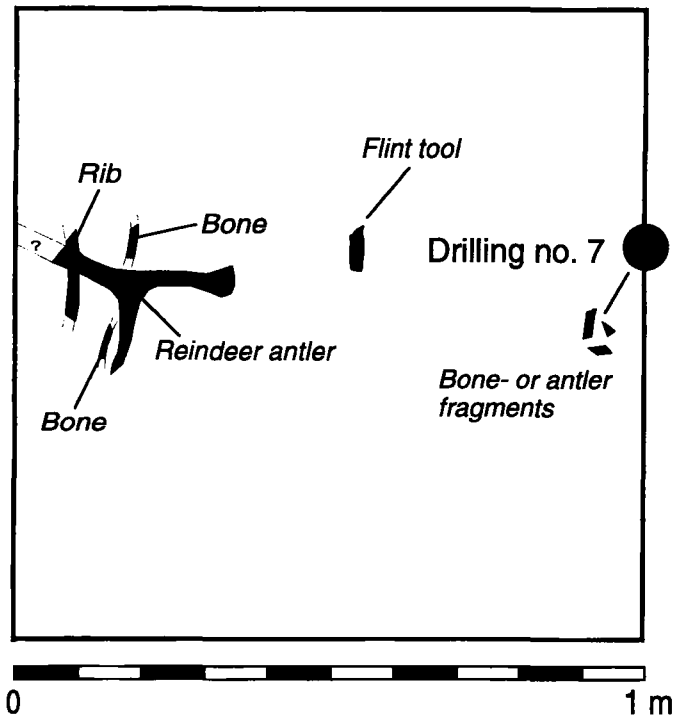


Fig. 10. The trial trench in the kettle hole with finds of reindeer bones and flint implement (it is possible to give only the approximate position of the latter). The artefacts were found 4.20–4.40 m below the surface. The eastern profile cuts drilling no. 7, which yielded the first bone/antler pieces. Computer graphics: Jørgen Holm.

burgian. This is hardly a coincidence. The reason should probably be sought in a roughly similar way of life, hunting strategy and demands on raw material resources. A particularly noticeable common feature is a penchant for placing the sites at topographical funnels, e.g. valley constrictions where the reindeer could easily pass on their seasonal migrations along fixed routes.

In Denmark, we often see that the sites occupy an elevated position in the landscape with an extensive view to all sides. One interpretation is obvious: observation posts (an extreme North German pendant is Schalkholz, where settlements from both the Hamburgian and Federmesser cultures have been made at the top of a 40 m high hill (Tromnau 1974; Bokelmann 1978)). It would, however, be hasty to draw the conclusion that the Late Palaeolithic sites necessarily occupy elevated positions in the landscape. An obvious source of error should be pointed out here: low-lying sites are far more likely to have been covered with metre-thick soil deposits. Such sites will naturally not reveal themselves on the surface, even less with normal trial excavation.

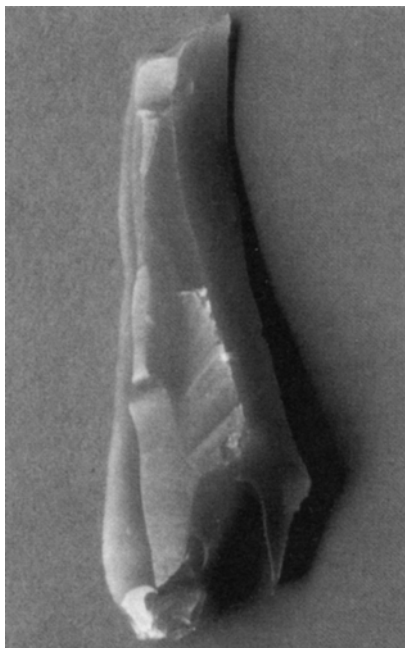


Fig. 11. The completely fresh, Zinken-like implement from the kettle hole. The piece shows wear-marks after work with bone or antler. 1:1. Photo: Jørgen Holm.

Also the location of the Jels sites in immediate association with springs is a striking example of a settlement-locating factor. And these sites are situated not merely in the vicinity of an obvious funnel, the valley constriction between Jels Oversø and Midtsø, but both west and east of them are deep, V-shaped erosion gullies that may very well have been used in connection with battue. Such erosion gullies were also ideal places for collecting raw flint.

If we look at southern and South Jutland, a striking tendency is seen for Late Palaeolithic finds to collect around the Jutland ridge, the watershed – or put differently: the host road (*hærvej*) stretch. This applies to a large number of single finds and to, for example, the settlements in Hjarup Mose (from Federmesser, Bromme and Ahrensburgian cultures – Andersen 1977) and at Jels and Slotseng. This is interpreted to mean that there was here a favoured N–S oriented migration route, where animals and men had to cross only a minimum of rivers and swamps (for a further discussion of the migration route problem, see Vang Petersen & Johansen 1993, this volume).

It is likely that the Slotseng sites should be perceived as a part of the hunting technique that has facetiously been

called the “head-’em-off-at-the-pass” strategy (Bokelmann 1979), mass slaughter of reindeer at certain times of the year – like the model Klaus Bokelmann has presented in a reevaluation of Alfred Rust’s finds from the Ahrensburg valley, *i.a.* Meiendorf and Stellmoor (Bokelmann 1991). The settlements at Slotseng are close to a funnel, they are high up with a view for miles around, and below them is a kettle hole with reindeer bones. And just north of this, everything seems to show that there was a lake into which the hunters can have driven the reindeer. Moreover, numerous projectiles (tanged points and Federmesser) have been found at both the Hamburgian site (c) and the Federmesser site (b), including some with use-damage.

There is nevertheless reason to warn against drawing too hasty conclusions. It is tempting to perceive the reindeer bones and the flint implement found in the kettle hole in relation to the settlements above it, but the distance is, as already mentioned, no less than c. 70 m, and there is no certainty that there was chronological and cultural contact. The flint implement most closely resembles a Zinken, but is insufficiently characteristic to be placed in the Hamburgian Culture. If we look at the C<sup>14</sup> date,  $12520 \pm 190$  b.p. *i.e.* the middle of the Bølling Period, we can confidently rule out the Federmesser Culture, which does not appear before the Bølling-Older Dryas transition (Bokelmann *et al.* 1983; Houtsma *et al.* 1984). The dating does, however, fit a relatively early phase of the Hamburgian Culture and is close to those of Poggenwisch (the Polish site Olbrachcice 8 is slightly older (Burdukiewicz 1986) and Meiendorf slightly younger (Fischer & Tauber 1986)). But here we run into the next problem: we assign Slotseng c – especially on the basis of the projectiles’ special shape (tanged rather than shouldered points) – to the Havelte group, which is traditionally perceived as a late phase within the Hamburgian Culture (Bohmers 1947; Tromnau 1975, 1981; Stapert 1984, 1985), an evaluation which seems to find support in the thermoluminescence dating,  $12400 \pm 1600$  b.p. that has been obtained on the basis of burnt flint from Jels 1 (Huxtable & Mejdahl 1992), which is also assigned to the Havelte group. Once more it is necessary to point out that thermoluminescence datings (calendar years) and uncalibrated C<sup>14</sup> dates are not immediately comparable: ice core datings from Greenland (Hammer *et al.* 1986), more recent varve chronology from Sweden (Strömberg 1985) and U/Th dating of Barbados corals (Bard *et al.* 1990) indicate fairly consistently that about 1000 years should

be added to C<sup>14</sup> dates in the Late Glacial period to obtain calendar or “solar years”. If we as a working hypothesis accept this conversion factor, 1000 years then has to be subtracted from the Jels 1 dating to fit the Late Glacial zone division based on conventional C<sup>14</sup> dates. *I.e.* Jels 1 should fall at about the middle of the Allerød Period (c. 11400 b.p. in C<sup>14</sup> years). This dating appears to be too late – and it raises numerous problems, for if we accept it we have to accept at the same time that the latest phase of the Hamburgian Culture is coeval with the Federmesser Culture and even approaches the datings we have for the Bromme Culture (Trollesgave c. 11100 b.p. in C<sup>14</sup> years – (Fischer & Tauber 1986)).

If it should prove that with the dating of the organic material in the Slotseng kettle hole we have simultaneously obtained a dating of the Hamburgian *c* site on the slope above it, this would naturally have drastic consequences for the perception of the Havelte group as a late phase within the Hamburgian Culture. It is more likely at the early end of the culture, and we must look for another explanation of the typological differences in the implements in relation to the Poggenwisch-Meiendorf groups. Are the differences for example regionally, ethnically or functionally determined? We should furthermore also ask ourselves whether these differences are also so large as to warrant the maintenance of this group division.

Perhaps the answer lies in the still uninvestigated flint concentration *a*, which will perhaps prove to belong to a different aspect of the Hamburgian Culture. Finally, there is the possibility, which can certainly not be ruled out, that in the immediate vicinity of the kettle hole – deeply buried – there is a site in its own right, a settlement or special site (kill site or butchery site). A slender indication is perhaps the flint chip which appeared in connection with drilling no. 16 (fig. 3) about 15 m north-east of the kettle hole – from a depth of c. 2.70 m.

Some of these questions will hopefully be answered in connection with future excavations that will comprise excavation of concentration *a*, the kettle hole and probes in the lacustrine deposits to the north.<sup>6</sup>

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## NOTES

1. It is apparent from Haderslev Museum's records that the finds were registered 1.10.1962, and that one of the museum's former staff members, the late Peter Lepik, collected the material in the spring of 1962 in connection with probes at the rampart site Slotsbjerg, a few km south-east of Jels. The finding-place was marked on the map, but despite intensive reconnaissance, carried out on the site by the author from the spring of 1985 on, it has not been possible to trace any settlement, only to ascertain that within a fairly large area there are flint artefacts with mainly a Late Palaeolithic appearance, but which are not so typologically distinct as to enable definitive attribution to the Hamburgian Culture. On the other hand, the author and a local amateur archaeologist, farmer H. C. Petersen, Neder Lert, succeeded in finding, about 125 m north of the place Lepik had marked, typical objects of the Hamburgian Culture. This situation naturally raises a serious problem, but there can hardly be any doubt that the original map reference is incorrect. It seems likely that Lepik did not mark the finding-place until about six months after reconnaissance, and from memory, at the point when the flint material was registered for the first time.
2. The tedious work of interpolation was carried out on an Apple Macintosh computer using the spreadsheet programme “Claris Resolve”, which performed the necessary computation in a matter of seconds. The density curves for flakes (including blades) were drawn using the same programme's “Contours” module.
3. Jette Lorentzen, Geological Institute, Aarhus University, participated for two months of the 1991 campaign. As part of an assignment – and as support for the archaeological work – it was her job to record and analyse the soil sections of the Hamburgian site and to carry out more general studies of the local and regional geology with a view to landscape reconstruction. The latter aspect was *i.a.* elucidated with drillings in the surrounding wetlands. This was done with a simple manually driven auger with a diameter of 7 cm.
4. A preliminary investigation of the large piece of reindeer antler recovered from the trial trench has been carried out by Kim Aaris-Sørensen, the Zoological Museum, University of Copenhagen. Cut-marks near the burr show with all clearness that it has been in human hands, and preserved remains of the skull rule out that this is a naturally shed antler.
5. The quite fresh, c. 7 cm long Zinken-like implement found in the area between the reindeer antler and drilling no. 7 (the exact position could not be determined) has been examined for wear-marks by Helle Juel Jensen, Institute of Prehistoric Archaeology, University of Aarhus. It appears that the implement has been used to work bone or antler. The wear-marks, which are relatively weak, are mainly concentrated right out at the tip. Some transverse striations near the base of the implement are interpreted at present as hafting-marks.
6. The investigations hitherto have been supported by Dronning Margrethe II's Arkæologiske Fond, Brødrene Hartmanns Fond, Lodbergs Legat, Sydbank, Carlsen-Langes Legatstiftelse, and the Danish Research Council for the Humanities.

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