A SITE OF THE HAMBURG TRADITION ON THE WADDEN ISLAND OF TEXEL (PROVINCE OF NORTH-HOLLAND, NETHERLANDS)

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CONTENTS

1. INTRODUCTION

In recent years an extensive settlement research-project has been carried out by the Rijksdienst voor het Oudheidkundig Bodemonderzoek (R.O.B.) near the Beatrixlaan in Den Burg on Texel, involving the investigation of traces dating from the Middle Bronze Age until the Late Middle Ages (Woltering, 1975). In 1974, in the course of this research, a concentration of Upper Palaeolithic flint artefacts was found. On the basis of typological and geological evidence these finds can be placed in a late phase of the Hamburg tradition. They are described here below.

For the realization of this article I wish to thank the following persons: Mr. P.J. Woltering (R.O.B.), for the opportunity to study the material; Mr. H.J. Veenstra (Geologisch Instituut, Groningen) for the determination of the grain size distribution of two sand samples; Mr. J.M. Smit (B.A.I.) for inking my pencil drawings; Mr. F.W.E. Colly (B.A.I.) for the printing of several photos; Mette Bierma and Engelien Rondaan-Veger for typing the manuscript; Sheila van Gelder-Ottway for the translation into English. To all these people I am very grateful.

Fig. 1. Map of the Netherlands, on which the location of the Hamburg site on the island of Texel is indicated.

2. THE SITE, GEOLOGY

The coordinates of the site on the Topographical Map of the Netherlands (1:50,000, no. 9W – Den Helder) are c.: 114.95/563.72. For the situation on a map of the Netherlands see figure 1 (see also the maps in Woltering, 1975; the site lies on the border of his excavation trenches 131 and 136).

In contrast to the other Wadden Islands, the island of Texel has a Pleistocene core that is exposed at the surface. In different places there are outcrops of boulder-clay (the highest is the "Hoge Berg"), that form part of a series of hills in the Northern Netherlands, and that can be regarded as ice-pushed moraines of Saalian age (Ter Wee, 1962; 1973). The "Hoge Berg" reaches a height of about 15 m above N.A.P. (Dutch Ordnance Level). On the flanks around the relatively high boulder-clay regions cover-sands occur, dating from the last part (Late Glacial) of the Weichselian. The site lies about 1 km to the north of the western part of the exposed boulder-clay region of the "Hoge Berg", within the area of cover-sand. It is possible, however, that during the Late Glacial sources of stones and flint (boulder-clay) were present at the surface also closer by, that became covered by cover-sand only after the Upper Palaeolithic occupation. From a map shown by Woltering (1975, fig. 5) it is evident that the site lies on the northwestern slope of a cover-sand ridge, that runs roughly SW-NE. For the entire area that he has excavated (c. 11.5 ha) Woltering has made a reconstruction of the original micro-relief (1975, fig. 7). From this it can be deduced that the site did not lie on the highest part of

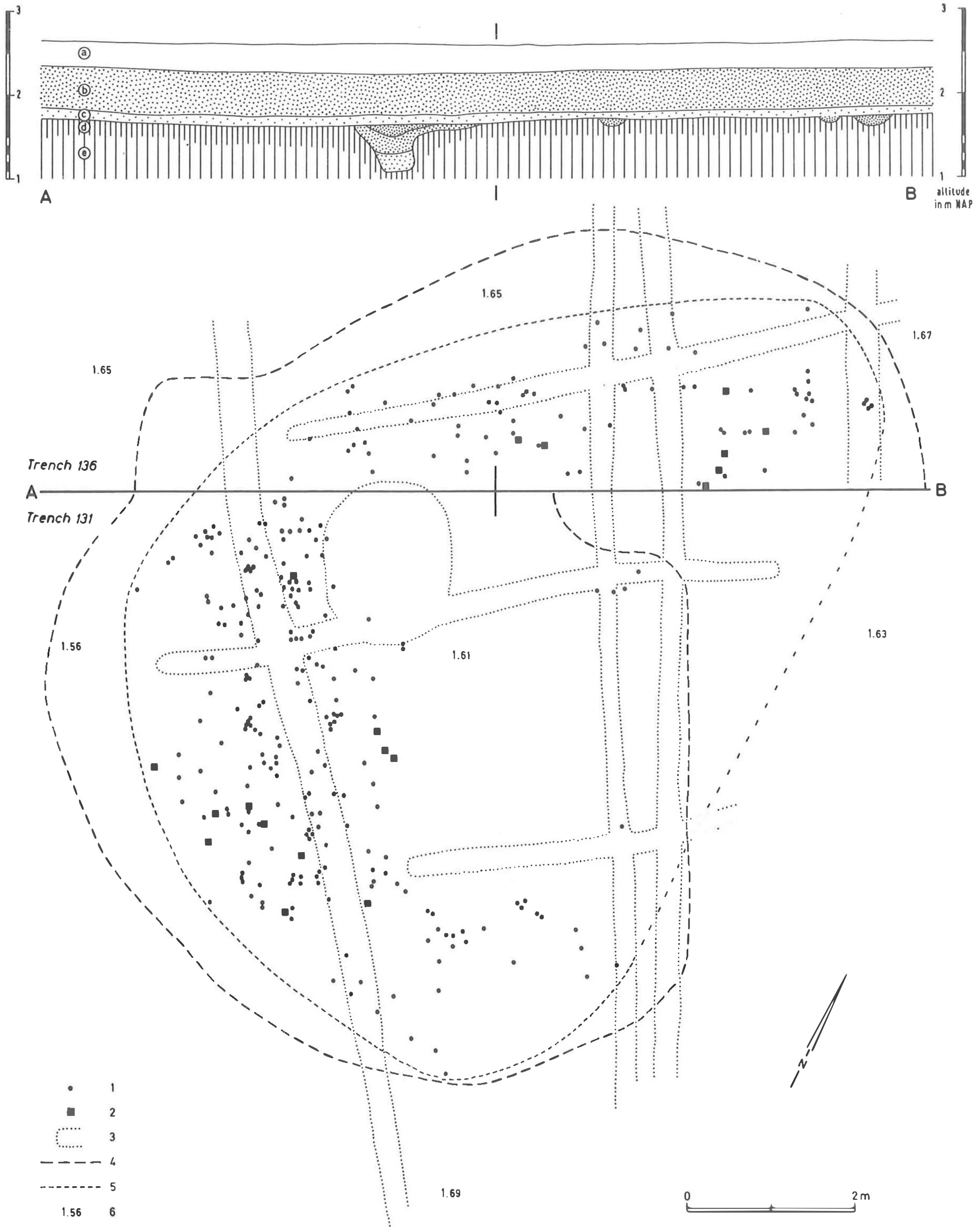


Fig. 2. Excavation plan of the horizontal distribution of the finds, and cross-section through the concentration. – Key: a. modern topsoil; b. *es* layer (Late Middle Ages); c. humous field layer (probably dating from Roman times); d. cover-sand, brownish in colour; e. cover-sand, yellow in colour; 1. flint artefacts; 2. stones; 3. ditches, dating from Roman times; 4. area that was searched for finds; 5. reconstruction of the most probable original shape of the concentration; 6. altitudes in m above N.A.P. (Dutch Ordnance Level). Redrawn by J.M. Smit (B.A.I.) after data provided by P.J. Woltering (R.O.B., Amersfoort).

the cover-sand ridge (c. 3.25 m + N.A.P.) that is situated c. 60 m to the SE of the site, but on a plateau-like projection of the northwestern flank of this ridge, about halfway up the slope.

Within a radius of 10 km around the site (the area necessary for hunters and gatherers to have at their disposal according to Sturdy, 1975) there were several relatively high boulder-clay outcrops, higher and lower cover-sand ridges, and undoubtedly also several smaller valleys and/or small lakes.

At that time the coast must have lain at a distance of 300 to 350 km to the north (see e.g. Veenstra, 1970).

The profile at the site of the flint concentration (fig. 2) can be described as follows (based on data of P.J. Woltering, R.O.B.; the surface lies at c. 2.60 m + N.A.P.):
a. 0–30 cm: modern topsoil, b. 30–80 cm: *es* layer (Late Middle Ages), c. 80–95 cm: humous field layer (probably dating from Roman times); d/e. 95–deeper than 150 cm: cover-sand (Twente Formation; Pleistocene-eolian); towards the top (d) brownish in colour, lower down (e) yellow.

Table 1. Grain size distribution of cover-sand samples 1 and 2.

sieve fractions	*percentages by weight*	
	sample 1	*sample 2*
> 710 mu	0.182	0.610
500 - 710 mu	0.437	1.666
425 - 500 mu	0.639	1.450
355 - 425 mu	1.075	1.964
300 - 355 mu	2.939	4.265
250 - 300 mu	5.814	7.286
212 - 250 mu	8.366	9.468
180 - 212 mu	15.416	16.603
150 - 180 mu	17.907	18.045
125 - 150 mu	17.066	15.108
106 - 125 mu	9.828	7.797
90 - 106 mu	8.847	6.346
63 - 90 mu	9.875	7.024
< 63 mu	1.609	2.369

The flints were present towards the top of the cover-sand, just under the humous field layer (c), and were distributed vertically over c. 5-10 cm, according to the excavators. From the profile description it is evident that the find level (at c. 1.60 m + N.A.P.) lies at the base of a podsol. In the cover-sand iron infiltration traces (brown) were still visible, but one cannot speak of a distinct B-horizon in the find level. The A- und B-horizons of the original podsol have evidently (largely) disappeared as a result of later human activities. We are most probably concerned here with a remnant of the Holocene heath-podsol, that is present almost everywhere in the cover-sand region at the top of the most recently formed cover-sand layer. It is not known for certain whether originally flints also occurred higher in the profile, e.g. in the B-horizon (that has now disappeared). No flints were found when a surface in level c (the humous field layer) was being cleaned. On the basis of this fact it could be proposed that originally the finds did not occur substantially higher in the profile. In that case we could conclude that the flints were left behind before the entire cover-sand layer had been deposited, thus during (though presumably in the last part of) a stadial. From other excavations of Upper Palaeolithic flint concentrations in the cover-sand of the Northern Netherlands it is known, however, that the flints are often scattered vertically considerably more than 10 cm, up to c. 50 cm, as a result of various disturbances caused by burrowing animals and by roots (bioturbation). A vertical distribution of only 10 cm therefore seems improbable, so that in my opinion it must be assumed that originally the finds did indeed occur also higher up in the profile.

It is not known exactly in which geological period the cover-sand was deposited in this locality. Within the flint concentration no sand samples were taken, but after the excavation two samples were taken in the immediate vicinity by P.J. Woltering, at my request: *sample 1*, taken about 60 m to the S of the concentration, immediately under the soil disturbed by the excavation, and thus certainly from a slightly greater depth than the level at which the flints were present; *sample 2*, taken c. 50 m to the NE of the concentration just outside the excavation area, most probably from the same level as that of the finds (just below the culture layers, sand with slight iron infiltration), at about 1 m below the surface. Dr. H.J. Veenstra was so kind as to have the grain size distribution of both samples determined. The results are shown in table 1.

Ter Wee (1973) used a classification triangle for sands, in which 3 large fractions can be read off. For the 2 samples from Texel these fractions have the following values (the fraction limits are slightly different as a result of the sieves used, but this has no significant consequences for the purposes of comparison).

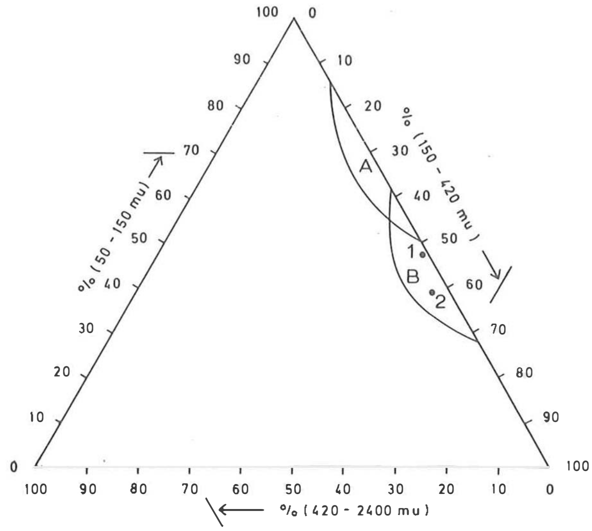


Fig. 3. Classification triangle for sands (after Ter Wee, 1973), in which the grain size distributions of the two samples from Texel are indicated. – Key: A. Older Cover-sand; B. Younger Cover-sand; 1. sample 1; 2. sample 2. Drawing by D. Stapert/ J.M. Smit (B.A.I.).

Table 2. Sieve fractions for the classification triangle (fig. 3).

sieve fractions	*percentages by weight*	
	sample 1	*sample 2*
50 - 150 mu	47.2	38.6
150 - 425 mu	51.5	57.6
> 425 mu	1.3	3.7

Figure 3 shows the classification triangle mentioned above. Indicated are the areas established by Ter Wee (1973) for A Older Cover-sand and B Younger Cover-sand. These areas show an overlap. Both samples from Texel fall in the middle of the area of Younger Cover-sand, outside the overlap. Sample 1 is somewhat finer than sample 2, which can be explained by the fact that the former originates from a somewhat greater depth than the latter. According to Van der Hammen *et al.* (1967) and Ter Wee (1966) Younger Cover-sand was deposited after the Bølling interstadial, and can be divided into Younger Cover-sand I and II. Younger Cover-sand I was deposited during the stadial between the Bølling and Allerød interstadials (Early Dryas), and Younger Cover-sand II in the last stadial of the Weichselian (Late Dryas), after the Allerød interstadial. Younger Cover-sand I is somewhat finer than Younger Cover-sand II, and is furthermore characterized by the presence of thin loamy bands, that increase in number and thickness with increasing depth. In view of the fact that the "layer of Usselo" was not observed, it is most probable that we are here concerned with Younger Cover-sand I. Finds of the Hamburg tradition from after the Allerød interstadial are moreover from an archaeological point of view hardly to be expected.

To conclude, the most probable dating for the finds is as follows: the last part of the (short) stadial between the Bølling and Allerød interstadials (Early Dryas stadial). Naturally it must be pointed out that this dating can by no means be taken as definitive, but only as the most probable on the basis of the insufficient data that are available. It is noteworthy, however, that for at least 2 other sites of the Hamburg tradition in the Northern Netherlands a comparable dating has been established, namely Luttenberg (province of Overijssel, see Lanting & Mook, 1977) and Oldeholtwolde (province of Friesland, see Stapert, in prep.), while for several other Hamburg sites the same dating can be reasonably assumed. The typology of the material from Texel (see under 4) does not contradict this possible dating.

3. THE EXCAVATION, HORIZONTAL DISTRIBUTION OF THE FINDS

The excavation near the Beatrixlaan in Den Burg was carried out in 1967 and 1971-1975, on a terrain that was later built up with houses (see Woltering, 1975, fig. 9). The first flints were found in trench 131 (see Woltering, 1975, fig. 10), on August 7th, 1974.

In trench 131 first the recent topsoil and the *es* layer were removed mechanically. The surface that was thus exposed, surface 1, was localised in the field layer dating from Roman times (c in fig. 2). While this surface was being cleaned with a shovel no flints were noticed. Subsequently excavation proceeded mechanically down to surface 2: in the cover-sand just under the culture layers, i.e. in d in fig. 2 (at c. 1.60 m + N.A.P.). When this surface was being cleaned with a shovel the first flints came to light. Afterwards the whole of the surrounding area was searched intensively (also with trowels). The finds were registered on an excavation plan (with 2 symbols: one for flint, one for other sorts of stone), but not individually numbered. The sand was not sieved.

Part of the ground said to be removed from the area of the flint concentration in trench 131 was sieved; in this way a number of finds were recovered.

In trench 136 mechanical excavation proceeded directly down to surface 2. The area was searched for finds, but the dumped ground from this trench was not sieved.

Table 3. Numbers of finds, encountered in the two excavation trenches (131, 136) and sieved from loose soil.

	flints	*stones*	*total*
trench 136	76	7	83
trench 131	221	12	233
subtotal	297	19	316
sieved from loose soil (trench 131)	150	9	159
total	447	28	475

A total number of 475 finds were collected, of which about two-thirds were found during the cleaning of surface 2 (see table 3). In figure 2 is shown the horizontal distribution of the registered finds. A broken line (4) indicates the area that was searched for finds during the process of cleaning (with shovel and trowel) the surface just below the culture layers. A conspicuous feature is the area without any finds present in the eastern half of trench 131, that does not continue into trench 136. It must be assumed that here the machine removed most of the find-bearing level. The finds obtained by sieving the dumped ground (c. one-third of the total) would have originated mainly from this area. A thin broken line (5) in figure 2 indicates a reconstruction of the most probable original shape of the concentration: an oval of c. 10 x 8 m. The total number of finds recovered (475) is rather small for such a fairly wide concentration. It therefore seems probable that a considerable proportion of the finds are lost to us. This could also be evident from the fact that extremely few examples of the broken blades fit together (see under 4.3.2.1). Several reasons for this could be:

a. As a result of the mechanical excavation an unknown amount of the material was removed.

b. An unknown proportion of the finds could

have ended up in the later culture layers. This could not have been the case with very many finds, as during the cleaning of surface 1 in trench 131 no flints were noticed.
c. No sieving was done.
In view of the fact that the distribution plan shows a large hiatus (c. one-third), and that in addition an unknown (though probably considerable) proportion of finds is lost to us, it is clear that this plan cannot provide much further information. Moreover the finds have not been individually numbered, so it is not possible to study the distribution of specific groups within the material. For the rest, the plan shows no striking phenomena.

4. THE FLINT ARTEFACTS

4.1. General

The finds consist of 447 flint artefacts, in addition to 28 stones (see under 5). The flint used is of good quality. In fact this applies in general for sites of the Hamburg tradition, in contrast to many sites, for example, of the Tjonger (*Federmesser*) tradition. This may be partly connected with the more open vegetation during the Early Dryas stadial (in which many Dutch Hamburg sites can be dated), that made it possible to select good flint. During the Allerød interstadial (in which most of the Tjonger sites can be dated) it must have been much more difficult to collect good flint.

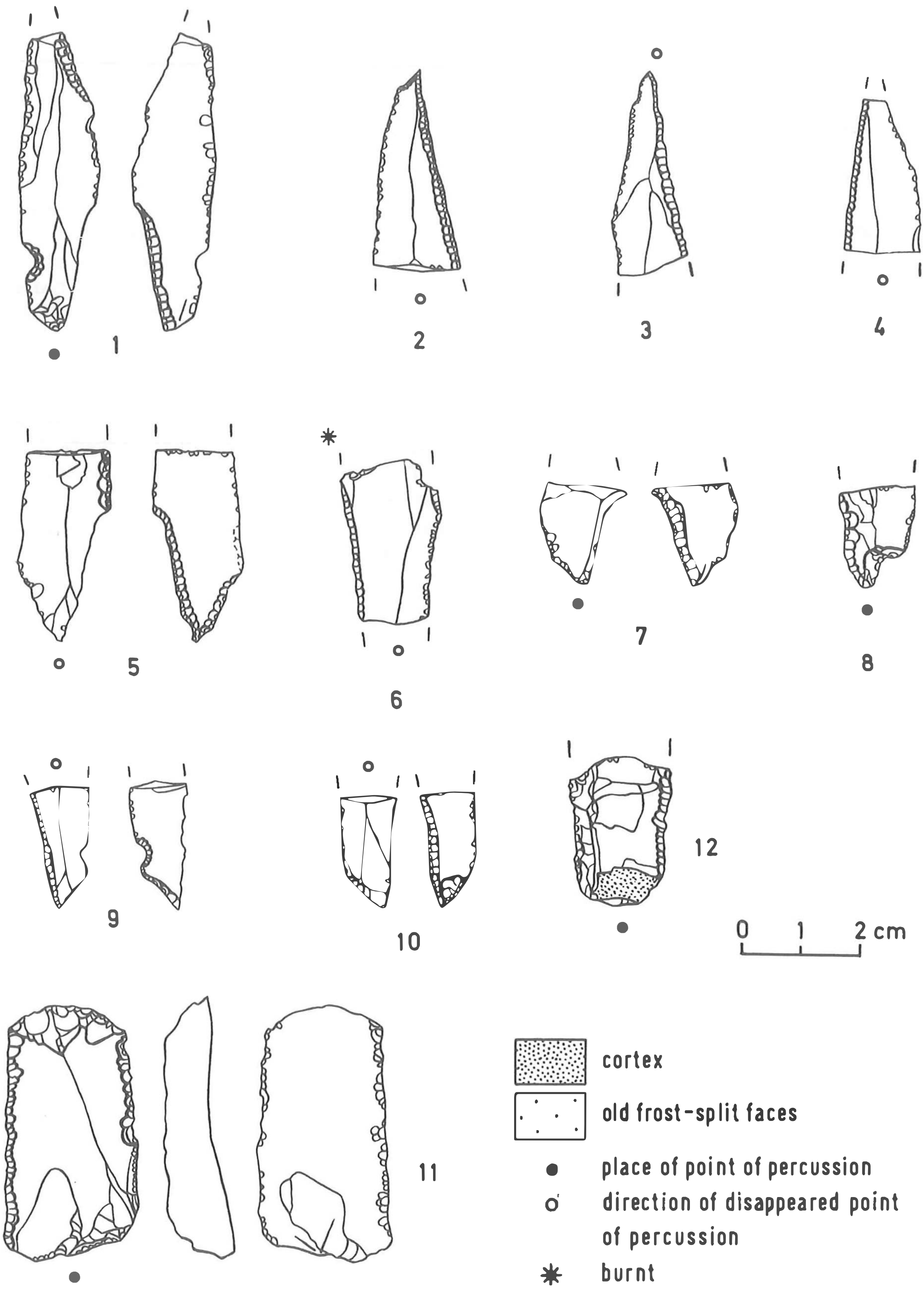
Frequently occurring within the material are grey to brown relatively fine-grained sorts of flint. These consist without exception of northern moraine-flint (including bryozoan flint). The origin of the flint is undoubtedly the nearby situated boulder-clay area of the "Hoge Berg".

In addition to a slight gloss patina that is generally present, brown and sometimes also white patina occur on the flint artefacts.

The flint material can be subdivided as shown in table 4, in which figures are also given concerning the occurrence of fractures and traces of burning. The high percentage of broken blades is conspicuous. An attempt was made to fit broken blades together. This was possible in only 2 cases, i.e. for 4 out of the 146 blade fragments (i.e. 2.7%). This almost certainly means that a large proportion of the original material has not been recovered

Table 4. Flint artefacts.

			broken		*burnt*	
	no.	*% of total*	*no.*	*% per group*	*no.*	*% per group*
blades	173	38.7	145	83.8	8	4.6
flakes	194	43.4	97	50.0	20	10.3
cores	12	2.7	–	–	2	16.7
blocks/nodules	8	1.8	–	–	0	0
splinters (< 1 cm)	33	7.4	–	–	6	18.2
subtotal non-tools	420	94.0	242	–	36	8.6
tools	27	6.0	21	77.8	1	3.7
total	447	100.0	263	–	37	8.3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12
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11
cortex
old frost-split faces
place of point of percussion
direction of disappeared point of percussion
burnt

Table 5. Flint tools.

type	*no.*	*perc.*	*burnt*
shouldered points (mostly broken)	10	37.0	1
convex end scrapers	1	3.7	0
burins	2	7.4	0
borers	2	7.4	0
notched blades	5	18.5	0
(part.) retouched blades	5	18.5	0
(part.) retouched flakes	2	7.4	0
total	27	99.9	1

(see also under 2). Consequently no further attempts were made to fit the flints together. In view of this situation it must also be remembered that the relative numbers of e.g. different types of tools do not necessarily reflect the original proportions.

The numbers of specimens indicated as showing traces of burning must be regarded as minimum figures: it is not always possible to definitely ascertain former contact with fire.

4.2. Tools

The 27 tools (6% of all flints) can be subdivided as shown in table 5. Not included in the category of tools are 4 specimens, that could be described as "core scrapers" or "core burins". These specimens are classified as cores (see under 4.3.3.).

In the following, several remarks are made here and there about traces of use that are visible on some specimens. Here we are concerned with traces that are visible to the naked eye or with a stereomicroscope. The author is no specialist in this field, but is of the opinion that macroscopically observable phenomena should in any case be mentioned.

Fig. 4. Texel, flint tools. 1. shouldered point (tip anciently broken off); 2-10. point fragments; 11. blade end scraper with two retouched sides; 12. proximal blade fragment with one retouched side (possibly fragment of blade end scraper). Drawings by D. Stapert/J.M. Smit (B.A.I.).

4.2.1. *Points and point fragments* (total 10; fig. 4, nos. 1-10)

Of the ten points 9 are fragmentary. Only one specimen (fig. 4, no. 1) is more or less complete, with only a small part of the top broken off – possibly as a result of being used as a projectile (the fracture surface is not recent). This is also possibly indicated by the relatively high degree of splintering along the non-retouched edges. Ventrally some scratches are also visible with the aid of a stereomicroscope, that run more or less parallel to the longitudinal axis of the point (fig. 5). Similar scratches also occur on at least one of the top fragments. Scratches of this kind can also indicate use as a projectile (see e.g. Odell, 1978).

Table 6. Lengths of point fragments.

top fragments	*length*
fig. 4, no. 2	3.3 cm
fig. 4, no. 3	3.4 cm
fig. 4, no. 4	2.6 cm
	(mean = 3.1 cm)

basal fragments	*length*
fig. 4, no. 5	3.2 cm
fig. 4, no. 7	1.7 cm
fig. 4, no. 8	1.7 cm
fig. 4, no. 9	2.0 cm
fig. 4, no. 10	1.8 cm
	(mean = 2.1 cm)

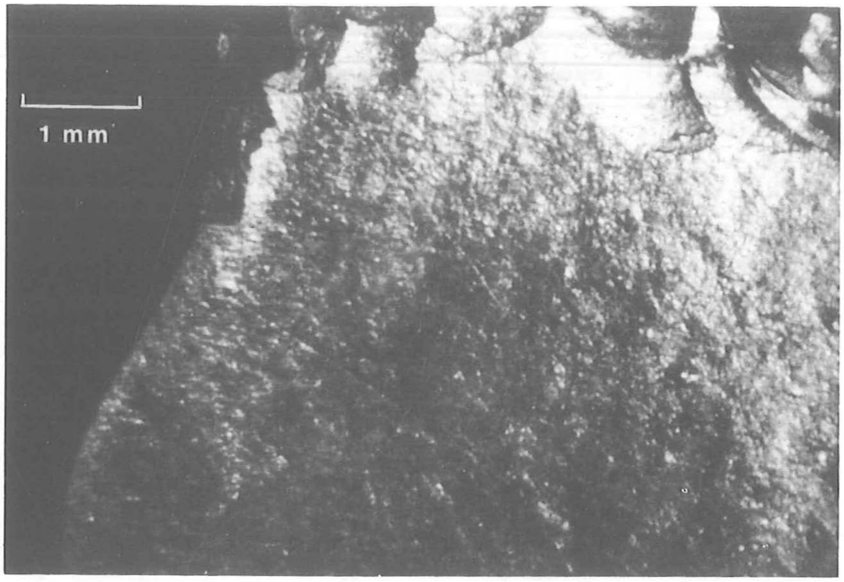

Fig. 5. Some fine scratches on the ventral face of the shouldered point (fig. 4, no. 1) near the fracture (to the left) at the tip of the point. The scratches run more or less parallel to the longitudinal axis of the point. Scale in mm. Photo made with a stereomicroscope by D. Stapert (B.A.I.).

The single complete specimen is a typical shouldered point (*point à cran*), as occurs in the Netherlands mainly within the Hamburg tradition.

The basal notch (shoulder) is retouched ventrally, the apical part dorsally. A conspicuous feature is the small dorsal notch at the base, opposite the (shoulder-) notch. This notch may have served to facilitate shafting of the point. A similar extra notch is also present on one of the basal fragments (fig. 4, no. 9). The original length of the point was c. 5.5 cm.

Of the 9 point fragments one is burnt (fig. 4, no. 6); this fragment is the middle part of a shouldered point.

For the other 8 fragments the lengths are given in table 6. The fractures are not recent.

None of the fragments fits together with any other. The numbers are of course too small to permit any statistically reliable conclusions to be drawn. There is a suggestion however that the fractures mostly occur at a little over 2 cm from the base, so the hypothesis could be proposed that these points were shafted over a distance of c. 2 cm. The two complete basal (shoulder-) notches within the material are 2.1 and 2.3 cm long respectively (fig. 4, nos. 1, 5), which does not contradict this proposition. The average lengths of the top and basal fragments are together 5.2 cm, which could have been approximately the average length of complete points.

It is understandable that basal fragments were left behind at a settlement. They may have been shafted, e.g. on to spears (in the Hamburg levels of Meiendorf and Stellmoor there are no arrows present, in contrast to the Ahrensburg levels), and could then have been replaced by new complete points during the time when the settlement was inhabited. The fact that top fragments were left behind is more difficult to understand, unless one assumes that these were transported to the camp site embedded in the flesh of game that had been killed. It is in any case interesting to note that within the material not a single completely intact point is present, and that basal fragments occur more frequently than top fragments.

It is reasonable to assume that one of the activities at this camp site was replacing broken or damaged points. The relatively high proportion of points among the tools may perhaps indicate that we are concerned here not with a

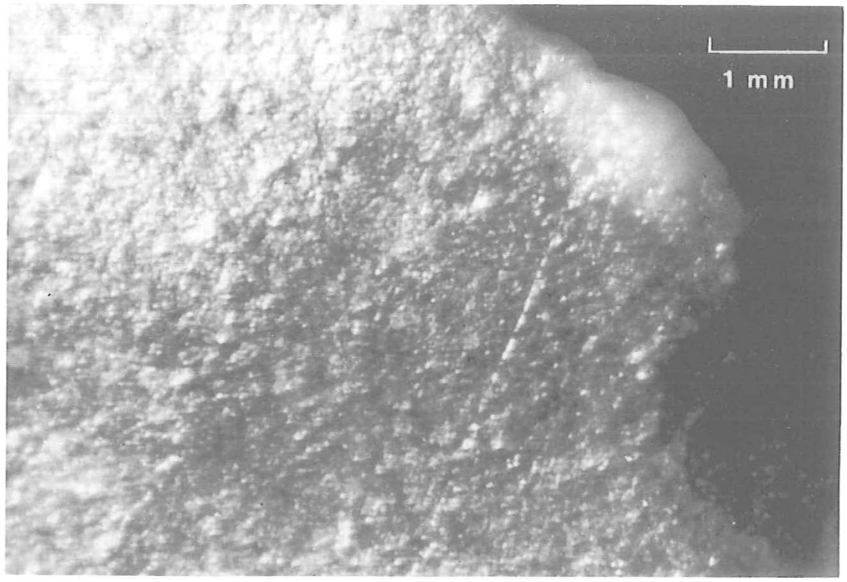

Fig. 6. The ventral face of the blade end scraper (fig. 4, no. 11) near the scraping edge. Visible are the roundedness of the scraper edge, and a scratch that runs c. perpendicular to the scraping edge. Scale in mm. Photo made with a stereomicroscope by D. Stapert (B.A.I.).

"base camp", but with a temporary camp of a group of hunters. Naturally this is all speculation, in view of the fact that we are not familiar with all the material from this site. (Compare however the material from Swalmen: Stapert, 1979).

Among the top fragments a noteworthy feature is the extra retouch on the apex of fig. 4, no. 2, that served to make the tip sharper.

Among the basal fragments especially the tang-like specimen no. 5 is worthy of note; also no. 9 has been finely finished off with an extra notch opposite the shoulder-notch. Especially these two specimens are suggestive of the possibility that we are concerned here with a typologically late phase of the Hamburg tradition (as postulated by Bohmers, 1947 and Tromnau, 1975), that is supposedly characterized by the presence of tanged points and backed pieces (e.g. *Federmesser*). Within the material there is also one, albeit atypical, backed blade present (fig. 7, no. 8; see under 4.2.6.). The material concerned is however of too small a quantity for a convincing "typological dating". As we have already seen, however (under 2) the scarce geological data are not in contradiction with a "late" dating.

4.2.2. *Blade end scraper* (total no. 1; fig. 4, no. 11)

Only one (complete) blade end scraper is present. The scraping edge has been made distally on a fairly short blade. The scraper angle is c. 45°. The left edge of the blade is retouched completely, the right edge partly; the non-retouched part is naturally blunt. Blade end scrapers with retouched edges are a normal element within the Hamburg tradition and may be indicative of a relation with the Late Magdalenian.

With a stereomicroscope it can be seen that the working edge of the scraper is clearly rounded and glossy (fig. 6). These features indicate use in the processing of skins (see i.a. Keeley, 1980; Broadbent & Knuttson, 1975). Locally ventral scratches also occur close to the scraping edge; usually they make an angle of 30-80° with the scraping edge, but in addition there are a few scratches that run more or less parallel to the scraping edge.

One of the broken retouched blades may be a broken scraper (fig. 4, no. 12), but this is not certain (see under 4.2.6.).

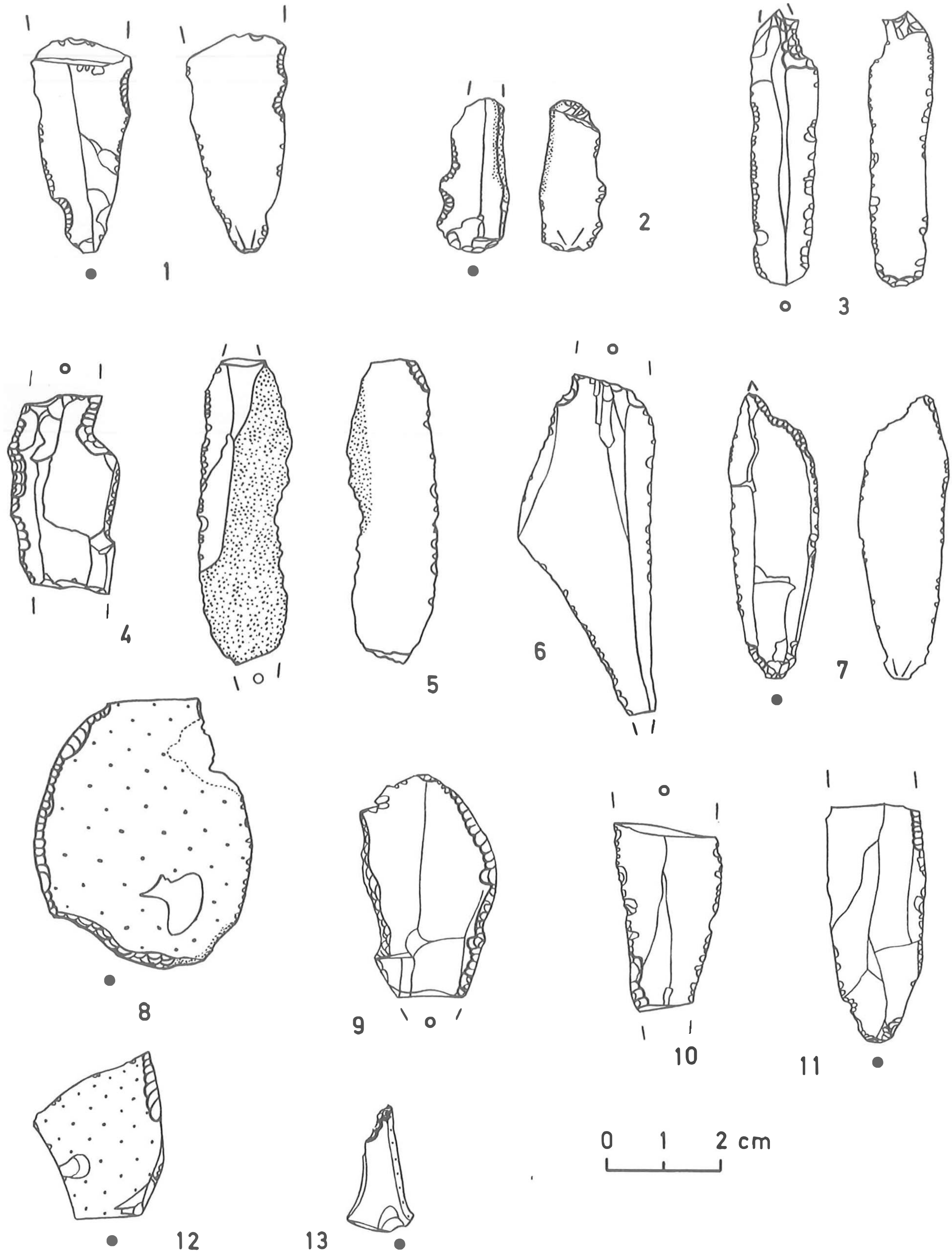
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Table 7. Notched blades: number and position of notches.

	no.	*dorsal*	*ventral*
fig. 7, no. 1	4	2	2
fig. 7, no. 2	2	2	–
fig. 7, no. 3	1	1	–
fig. 7, no. 4	3	3	–
fig. 7, no. 5	1	1	–
total	11	9	2

4.2.3. *Notched blades* (total no. 5; fig. 7, nos. 1-5)

There are 5 blades with notches, that vary considerably in size and shape. Indicated in table 7 is the number of notches present on each specimen, and their position (dorsal or ventral).

All the specimens are broken, and in 2 cases only a medial blade fragment has been preserved. The average number of notches per specimen (2.2) is therefore almost certainly lower than the original number. The width of the notches (only complete cases) varies from 0.5-0.8 cm (average 0.64 cm, N=7). In 4 cases a fracture borders on to a notch, so one gets the impression that these fractures, in any case partly, could have something to do with the existence of the notches (see Dewez, 1970).

In some cases a certain amount of gloss was observed along the edge of the notch, on the surface from where retouch had been applied.

Fig. 7. Texel, flint tools. 1-4,6. notched blades; 7. borer (with inverse retouching; small tip anciently broken off); 13. small "borer" on flake; 5,9-11. (partially) retouched blade fragments; 8,12. retouched flakes. Drawings by D. Stapert/J.M. Smit (B.A.I).

4.2.4. *Borers* (total no. 2; fig. 7, nos. 6,12)

Within the material from Texel, there are no typical asymmetrical borers (*Zinken*) present. Of the two borers present one is a clear example, made from a blade (no. 6), while the other is an atypical specimen made out of a small flake (no. 12).

The first borer consists of a somewhat concave oblique truncation, with ventral retouch along the opposite edge. The very top part of the borer has been broken off (not recently, therefore presumably as a result of use). Near the top end of the borer the edges are somewhat blunted. Near the base of the blade (on the left) a small amount of retouch has been applied, while in addition both edges show ventrally and dorsally quite a lot of fine splintering, that can probably be regarded as the result of use.

The second implement that can be described as a borer is an atypical specimen. It consists of a small flake that has been sharpened into a point, with some additional retouch on the dorsal ridge.

4.2.5. *Burins* (total no. 2; fig. 8, nos. 1,2)

There are 2 burins present within the material: a very small dihedral burin made out of a frost-split fragment (no. 1), and an transverse angle burin made out of a broken core-preparation blade (no. 2). Burins on truncations, that generally occur frequently within find-complexes of the Hamburg tradition, are absent.

In the case of the dihedral burin the negative of a burin spall perpendicular to the longitudinal axis of the specimen has been used as a striking platform for 3 burin spalls parallel to the longitudinal axis (one primary, two secondary). The burin edge is 0.3 cm wide, and the burin angle is almost 90°.

One angle of the burin edge (indicated by a semicircle in fig. 8:1 b) is clearly rounded (abraded), as can be seen already with the naked eye. This roundedness, that can only be the result of intensive use, is not restricted to this angle itself, but is also clearly present over

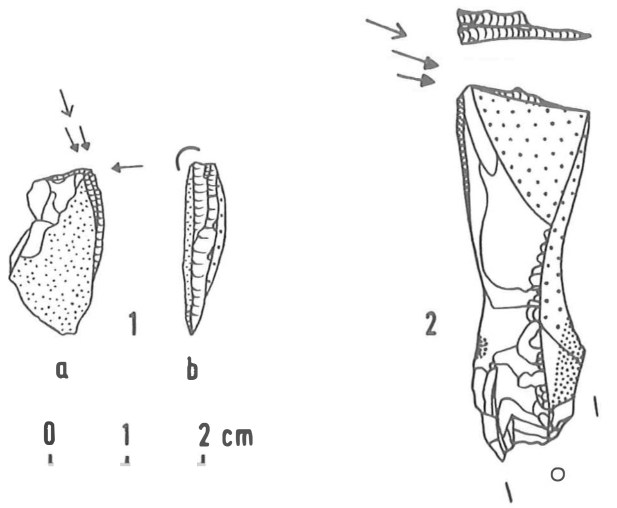


Fig. 8. Texel, burins. 1. small dihedral burin (face not shown is an old frost-fracture); 2. transverse angle burin. Drawings by D. Stapert/J.M. Smit (B.A.I.).

a distance of about 0.3 cm along the top rim (in fig. 8:1 a, to the left), while right next to this edge on the top surface scratches are visible, that run more or less parallel to this edge (fig. 9).

On the burin edge itself the roundedness is visible only over a very short distance, as is also the case along the edge of the burin facet downwards. The other angle of the burin edge (on the right in fig. 8:1 b) shows only minimal roundedness, that is present from the angle again mainly along the rim of the upper surface.

For these distinct traces of use to have originated, especially on the left angle of the burin edge, the tool must most probably have been manipulated in the following way. The implement would have been held in the left hand between thumb, fore- and middle finger, with the upper surface (of fig. 8:1 a) directed downwards, in such a way that the burin edge pointed away from the user (fig. 10). Only one method of use appears possible, namely graving, and then by means of a movement towards the person. Only in this way could the upper edge have become rounded over a fairly long distance, and then to a lesser degree with increasing distance from the angle, and only in this way too could the scratches on the upper surface run parallel to the edge.

The edges of the negatives of the vertical burin spalls (in fig. 8:1 b) do not appear to have any distinct traces of use; only in two places

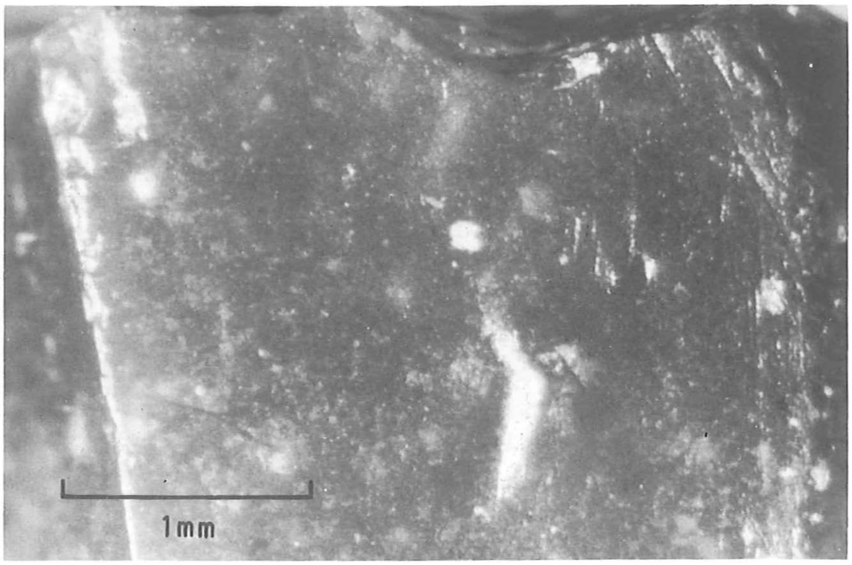


Fig. 9. Top surface of the dihedral burin just near the burin edge (at the top). The ridge on the right is heavily abraded, and scratches are visible on the top surface that run approximately parallel to this ridge. Scale in mm. Photo made with a stereomicroscope by D. Stapert (B.A.I.).

is slight splintering visible (on the right), but no roundedness or scratches can be seen. It is interesting that it can be shown that the probable function of this tool was graving with an angle of the burin edge (the traditionally assumed function of burins, see e.g. Rust, 1937), and not scraping with the edges of the burin facets (Bordes, 1965). Nevertheless the latter function is not improbable in some cases, e.g. some burins from the Late Ahrensburgian site of Gramsbergen (Stapert, 1979), where regular and distinct splintering occurs along the edges of the burin facets.

The second burin shows the negatives of 3 burin spalls (2 primary, 1 secondary), perpendicular to the longitudinal axis of the blade, struck off from a transverse rim (formed by cortex). The burin edge is c. 0.4 cm wide, the burin angle measures c. 85°. No distinct traces of use could be observed on this implement.

Within the material from Texel there are no clear burin spalls present.

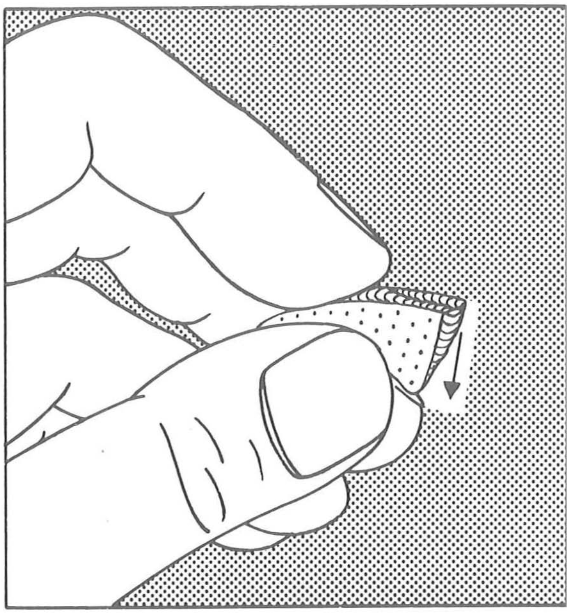


Fig. 10. Reconstruction of the most probable way of using the dihedral burin: graving while the implement is held in the left hand, with a movement towards the person. Drawing by D. Stapert/J.M. Smit (B.A.I.).

4.2.6. *(Partially) retouched blades* (total no. 5; fig. 4, no. 12; fig. 7, nos. 8-10,13)

The only tool from Texel that could with some difficulty be called a backed blade (no. 8) is a fairly wide core-preparation blade, that is broken (distal fragment), and of which one edge is completely retouched. The other edge is not sharp, however, but consists of preparation negatives that are more or less transversely oriented, from which it is evident that this specimen is atypical.

In fig. 4, no. 12, a proximal fragment of a core-preparation blade is illustrated, of which the right edge is retouched; the left edge is not sharp, but consists of an almost transversely oriented face. It is very well possible that we are here concerned with a broken scraper. (With the blade end scrapers of the Hamburg tradition the sides are often retouched).

The three other specimens are larger blade fragments (two medial, one proximal) with partial retouching of one of the edges. Apart from the retouching these specimens show fine splintering along the non-retouched edges, both ventrally and dorsally, that could be the result of use.

4.2.7. *Retouched flakes* (total no. 2; fig. 7,11)

In both cases we are concerned with flakes that consist dorsally of (old) frost-split faces. The larger flake (no. 7) shows in addition features indicative of core-preparation, and is completely retouched along one convex edge. The other edge is sharp, so the specimen could have been used as a knife (some fine splintering is visible along the edge).

The smaller flake shows partial retouching along one edge, that ends distally in a point. The other edge is not sharp, but consists of a transversely oriented face. Fine splintering near the point suggests that this is the "working edge" of the tool, although the specimen cannot be described typologically as a borer, for example.

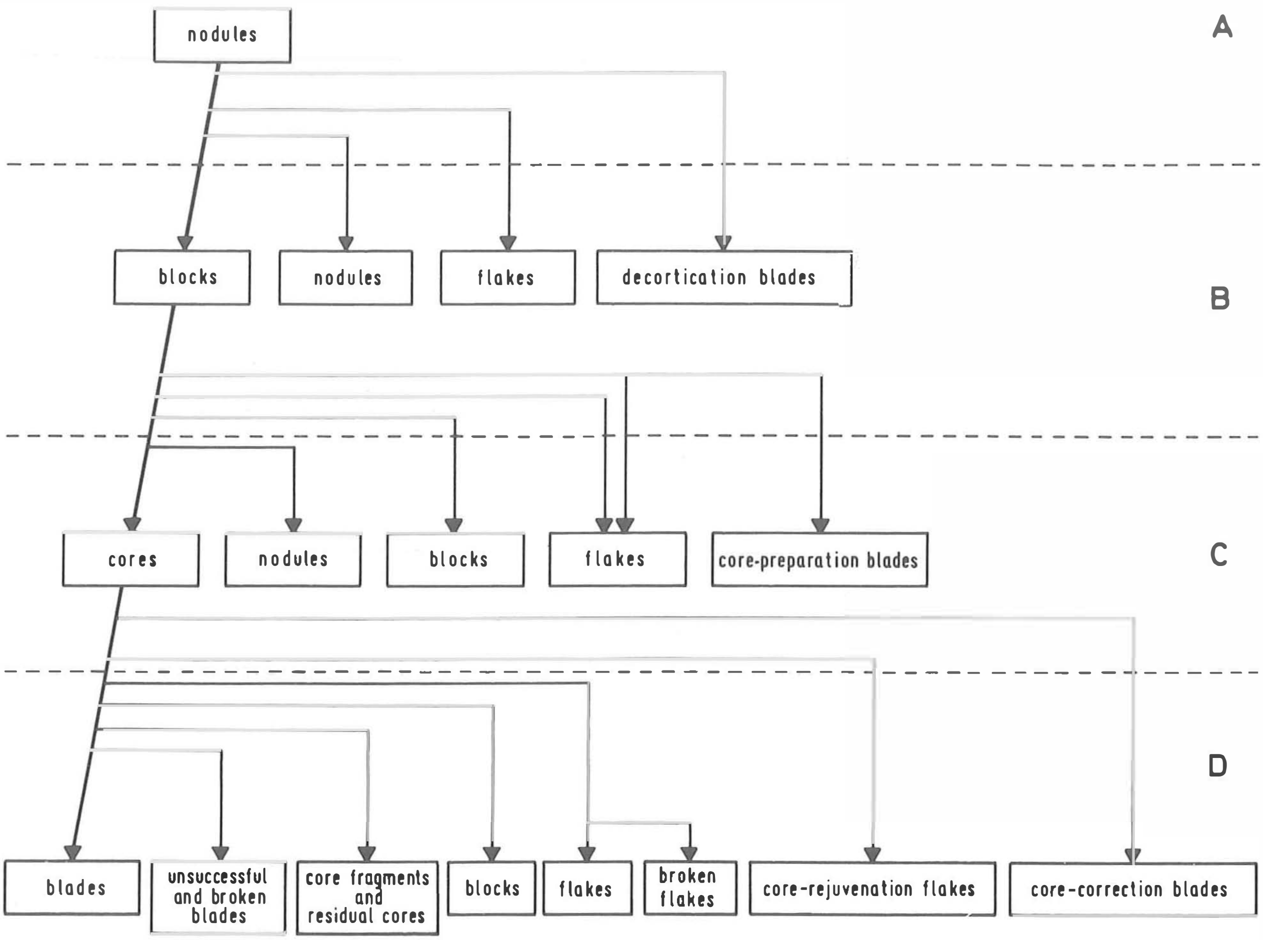


Fig. 11. Scheme illustrating the Upper Palaeolithic blade technology. A. selection of raw material; B. first testing and quartering of the nodules; C. core-preparation; D. blade production. Indicated are the products that result at each stage in the working. Drawing by D. Stapert/J.M. Smit (B.A.I.).

4.3. The artefacts other than tools

4.3.1. *General*

There is a total number of 420 flint artefacts that have not been modified further. For the numbers of several main categories within this material see table 4.

The flint material of Texel is clearly the product of a technology for the manufacture of blades, as is generally the case with Upper Palaeolithic sites. The blocks, flakes and splinters can be regarded for the most part as the waste products of this technology. The process is shown schematically in figure 11. The Upper Palaeolithic blade technology has already been described extensively in the literature (also experimentally), so it is not necessary to go into the subject in any detail here (see i.a. Bordes & Crabtree, 1969; Crabtree, 1972; Newcomer, 1975; Tixier, 1972).

The scheme is intended to indicate the different stages in the process, and the products that result at each stage.

Table 8. Blades and blade fragments.

	total no.	*not broken*	*proximal fragm.*	*medial fragm.*	*distal fragm.*	*burnt*
normal blades	141	18	44	35	44	7
decortication blades	14	5	2	4	3	1
core-preparation blades	14	3	3	1	7	0
core-correction blades	1	1	0	0	0	0
plunging blades	3	1	0	0	2	0
total	173	28 (= 16.2 %)	49	40	56	8

4.3.2. *Blades and blade fragments* (total no. 173)

The blades can be subdivided as indicated in table 8.

4.3.2.1. *Normal blades* (total no. 141)

Only 18 normal blades are complete (of which 1 has been in contact with fire). Good long blades do not occur particularly frequently. The mean length is only 3.77 cm (S.D. 1.02), the mean width (measured in the middle) is 1.38 cm (S.D. 0.35), and the mean maximum thickness is 0.45 cm (S.D. 0.18). All complete normal blades show to a greater or lesser extent some fine splintering along the edges, that can be regarded as traces of use. Of the 123 blade fragments only two pairs fit together (medial/distal and proximal/distal) so it is clear that a large proportion of the material has not been recovered (see also under 3).

The blade fragments are divided into proximal (fragments with percussion bulb), medial (fragments bounded by 2 fractures) and distal. The numbers and several average measurements of the blade fragments are in table 9 (as a rule the burnt specimens were excluded when measurements were taken).

There are a number of conceivable ways in which blades could break, such as:
a. when being struck off from the core, b. as

Table 9. Numbers and average measurements of the blade fragments.

	no.	*mean length*	*S.D.*	*mean width*	*S.D.*	*mean thickness*	*S.D.*
proximal	44	2.50	0.90	1.19	0.31	0.38	0.15
medial	35	2.67	0.82	1.32	0.37	0.39	0.12
distal	44	3.24	0.88	1.18	0.35	0.41	0.17

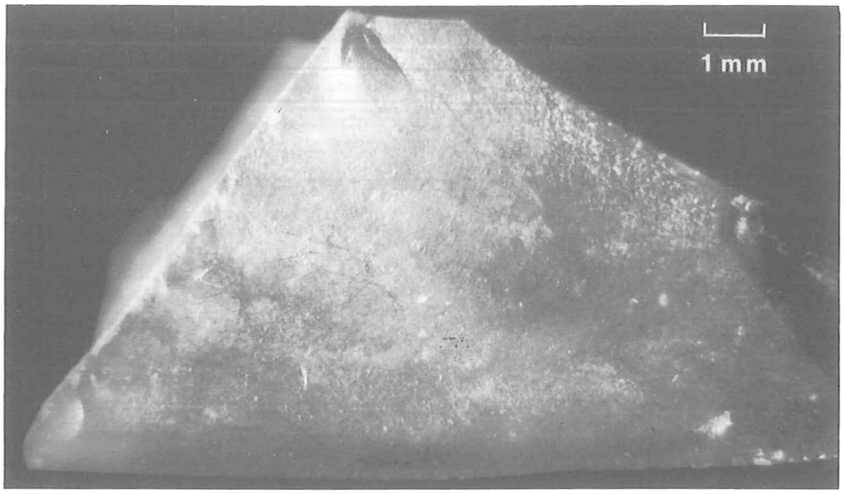


Fig. 12. The fracture surface of a proximal blade fragment. Dorsally a small percussion cone is visible, presumably caused by a blow with a hammer stone on a dorsal ridge of the blade. Scale in mm. Photo taken with a stereomicroscope by D. Stapert (B.A.I.).

a result of use, c. by being trodden underfoot, d. as a result of (secondary) frost-splitting, e. intentionally.

Secondary frost-splitting can with certainty be assumed to be one of the causes of fracture; this would then have occurred mainly during the Late Dryas period (the last 1000 years of the Weichselian), as is evident, for example, from the excavation results of the Hamburg site Oldeholtwolde (Stapert, in prep.).

A number of fractures within the blade material from Texel are strongly suggestive, however, of having originated intentionally. These fractures show a more or less distinct small percussion cone (fig. 12), and often also a "lip" opposite to it. These fractures mostly appear to have been created by a blow with a hammer stone on a dorsal ridge. In some cases fine splintering is visible near one of the fracture angles, so one gets the impression that the fracture was made with the aim of subsequently making use of the sharp but usually also strong fracture angles as "working edges" (possibly in a fashion analogous to the way in which burins were used).

There are also a number of cases in which a dorsal ridge is markedly damaged, sometimes over a distance of more than 1 cm, close to a fracture. In these cases the fractures may also be connected with a method of use (unknown to us) as a result of which the damaged ridges originated.

Assuming that a number of fractures originated intentionally (with the aim of using the fracture angles produced in this way), it does not seem illogical to expect that the lengths of the proximal and distal blade fragments thus produced do not show a normal distribution, but rather a bimodal one. It would have been attempted to keep the length of a blade fragment as long as possible in order to facilitate the manipulation of the "tool". In the frequency diagrams (fig. 13), in which numbers per length class of 0.5 cm are indicated, this expectation appears to be confirmed: the distributions of the proximal and distal fragments are more or less bimodal.

Also worthy of note is the fact that the proximal fragments are distinctly smaller than the distal ones. A hypothesis could be that for the production of the fractures there was a preference for a spot close to the proximal end of the blade, perhaps because the thickest part of the blade is usually present there, so that the fracture edges created will also be more massive.

We are concerned here with such small numbers, however, while moreover the other possible ways mentioned in which fractures formed cannot be excluded, that the hypotheses

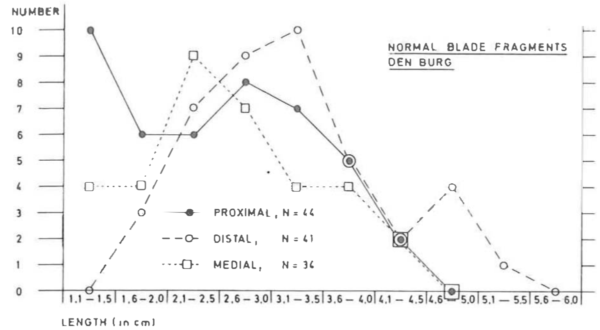


Fig. 13. Frequency diagrams of the lengths of the normal blade fragments, measured in classes of 0.5 cm. Drawing by D. Stapert/J.M. Smit (B.A.I.).

mentioned cannot be satisfactorily tested. The occurrence of intentional fractures seems to me to be certain, however, in view of the presence of a number of distinct percussion cones.

Finally it can be said that most of the blade fragments also show distinct splintering along the edges (edge damage), that can be explained as traces of use.

4.3.2.2. *Decortication blades* (total no. 14)

Decortication blades are blades of which the dorsal face consists for more than 3/4 of old faces (cortex and/or frost-split faces). Of these blades only about half show distinct splintering along the edges. There are 5 complete specimens (mean length 4.34 cm), 2 proximal, 4 medial and 3 distal fragments (mean length 3.82 cm). The mean width of all specimens is 1.38 cm (S.D. 0.52), the mean thickness 0.60 cm (S.D. 0.30).

4.3.2.3. *Core-preparation blades* (total no. 14)

Core-preparation blades are the first blades that are struck off from the core, in addition to the decortication blades. They are characterized by the occurrence of dorsal preparation, that may be one- or two-sided. This preparation served to make an initial straight ridge over the whole length of the core, that can "lead" the blade during the process of splitting it off from the core (see Crabtree, 1972). Only three specimens are complete (lengths 3.8, 3.7 and 2.8 cm). In addition there are 3 proximal, 1 medial and 7 distal fragments. The average length of the broken pieces is 3.85 cm. This is more than the length of the complete normal blades; the same applies for the (broken) decortication blades. This is understandable, because these two types of blades originate at the beginning of the process shown in figure 11. Later the blades become gradually shorter, partly because the striking platform has to be renewed now and then. The mean width of all specimens is 1.21 cm (S.D. 0.37), the mean thickness 0.71 cm (S.D. 0.29). Core-preparation blades are thus generally longer, thicker and narrower than normal blades. For some tool-types, for which a relatively greater thickness is of importance, these properties make them more suitable than normal blades. Thus (at other sites) scrapers are often made out of core-preparation blades, as are *Zinken* too.

4.3.2.4. *Core-correction blades, and plunging blades* (total no. resp. 1,3)

Core-correction blades are usually thick blades, that were generally struck off for the purpose of removing the scar of a previous, unsuccessful blade. Here we are mainly concerned with blades with a "step fracture" or "hinge fracture" distally, that left behind a deep negative c. halfway across the core, as a result of which further normal exploitation of the core became impossible. This could be corrected by striking off a thick blade by means of a hammer stone, preferably from a striking platform situated opposite, so that the unwanted negative was removed at one stroke. One typical example is present, that is unbroken. The length is 5.7 cm, the width 2.1 cm and the thickness 1.1 cm.

In addition there are 3 so-called plunging blades, also known as *lames outre-passés* (see

Tixier, 1963). These are blades, of which the ventral face turned inwards when the blade was being struck off the core, so that sometimes a considerable part of the core (opposite the striking platform used) was removed. Often the distal part of such blades consists of part of an opposite striking platform. It is clear that the cores concerned generally became unusable as a result.

There are three distinct examples, of which 1 is complete (length 6.0 cm, width 2.1 cm, thickness 1.5 cm) and 2 distal fragments (lengths 5.0 and 4.4 cm, widths 2.2 and 1.6 cm, thicknesses 1.8 and 1.1 cm).

Both the core-correction blade as well as the three plunging blades appear to have been used nevertheless, in view of the presence of fine splintering along the edges.

4.3.3. *Cores and core fragments* (total no. 12)

Within the material from Texel 12 cores or core fragments are present. As already mentioned under 4.2., these include 4 specimens that are sometimes described in the literature as "core scrapers" or "core burins"; these specimens are classified here however as cores, and are described under 4.3.3.2. The other 8 specimens are described under 4.3.3.1.

4.3.3.1. *"Normal" cores*

Out of the 8 specimens one is burnt. This core has one distinct striking platform. Two cores are fragmentary; while being used they fractured along (already existing) internal frost-cracks. Both these cores have one distinct striking platform.

Of the remaining 5 cores two appear to be pretty well "used up" (residual cores). One of these has 2 opposite striking platforms, the other one. Three cores are not used up – only a few blades have been removed from them, and still more blades could be struck off. Two have one distinct striking platform, the third has 2 striking platforms that are opposite each other.

The mean length of these 8 cores (measured in the striking direction of the blade negatives that are present) is 5.9 cm.

4.3.3.2. *"Core scrapers" and "core burins"* (total no. 4; fig. 14, nos. 1-2; fig. 15, nos. 1-2)

This is a problematical category, that is sometimes included with the "tools". Negatives of "burin blows" on cores or core fragments can be regarded however as the scars of unsuccessful blades (e.g. blades that stopped too soon). "Retouching" along the edges of cores can often better be interpreted as preparation retouch, for example of striking platforms or, more often, for making an initial straight ridge on the core, to facilitate striking off the first blades (core-preparation blades). Such core-preparation blades do indeed occur within the material from Texel (see under 4.3.2.3.), so it is clear that this technique was applied here for the preparation of cores. The "core scrapers" and "core burins" are therefore included by some in the same category as cores, as is done here too. A solution to this problem could only be provided by an investigation as to the presence or absence of traces of use on any supposed "working edges" on cores.

Within the material from Texel 4 such specimens are present. They are discussed here separately, and illustrated (the specimens are illustrated in the same way as the tools).

The specimen in fig. 14, no. 1, can very well be regarded as a core with 2 striking platforms opposite each other; it is made out of a flat frost-split piece. Remnants of core-preparation are present along both long edges. One reason for possibly regarding this specimen as a "core burin" is the fact that there are a number of very small blade negatives present. But as stated above these could very well represent unsuccessful blades, and in my opinion this is most probably the case.

The second specimen (fig. 14, no. 2) is comparable with the previous one. Here too it is more likely that we are concerned with core-preparation rather than with scraper retouch, and with negatives of unsuccessful blades rather than with negatives of burin spalls. The core has one distinct striking platform.

In the case of the third specimen (fig. 15, no. 1) the "scraper retouch" can best be regarded as "reduction": removal of the little edges that stick out between the proximal extremities of the blade negatives. Similarly the negative of the "burin blow" can best be regarded as the result of a blade that turned out to be too short. The specimen can well be interpreted as a broken core, which probably fractured as a consequence of the presence of an internal frost-crack that was already present. It is not clear whether there was originally a second striking platform present.

The fourth specimen (fig. 15, no. 2) also shows "scraper retouch", that in my opinion can better be regarded as core-preparation. This core has one distinct striking platform.

The length of the 3 non-fragmentary cores are 6.5, 4.7 and 5.3 cm, respectively. Clear use traces were not observed, but only a stereomicroscope was used so this cannot be taken as definite proof for the non-tool character of these pieces.

4.3.4. *Flakes, splinters, nodules and blocks*

The remaining flint artefacts consist of 194 flakes or flake fragments, 33 splinters (smaller than 1 cm), 4 nodules and 4 blocks.

Among the flakes there are also specimens that are unsuccessful blades, but that cannot be included in the category of blades because they are too short or too irregular in shape. Moreover among the flake fragments a number of blade fragments will also be present that will not be recognizable as such on account of their being too fragmentary.

Among the splinters there are no distinct broken-off fragments of tools (such as borer tips, etc.).

Nodules are pieces of flint that have only natural surfaces (cortex, frost-split faces) on their exterior. These may be pieces of flint that were brought to the site with the aim of using them as cores, without this having happened. The limited size of the 4 specimens from Texel argues against this however (max. lengths 5.8, 5.2, 6.0 and 3.0 cm – mean 5.0 cm; widths 3.5, 2.4, 4.4 and 1.2 cm – mean 2.9 cm). For three of the four specimens another possibility is conceivable, i.e. that when a piece of flint, for intended use as a core, was first tested and prepared, it fell apart along internal frost cracks that were already present. For the fourth (very small) specimen this is not possible, because the frost-split faces are all old (with wind gloss).

Blocks are pieces of flint with external surfaces that are natural for the most part, but that also show traces of working by man (without there being any distinct percussion bulbs). One of the 4 specimens (max. length 6.1 cm, width 2.3 cm) probably originated as the result of the splitting of a core along internal frost cracks; the other three are small (1.5-3 cm) fragments.

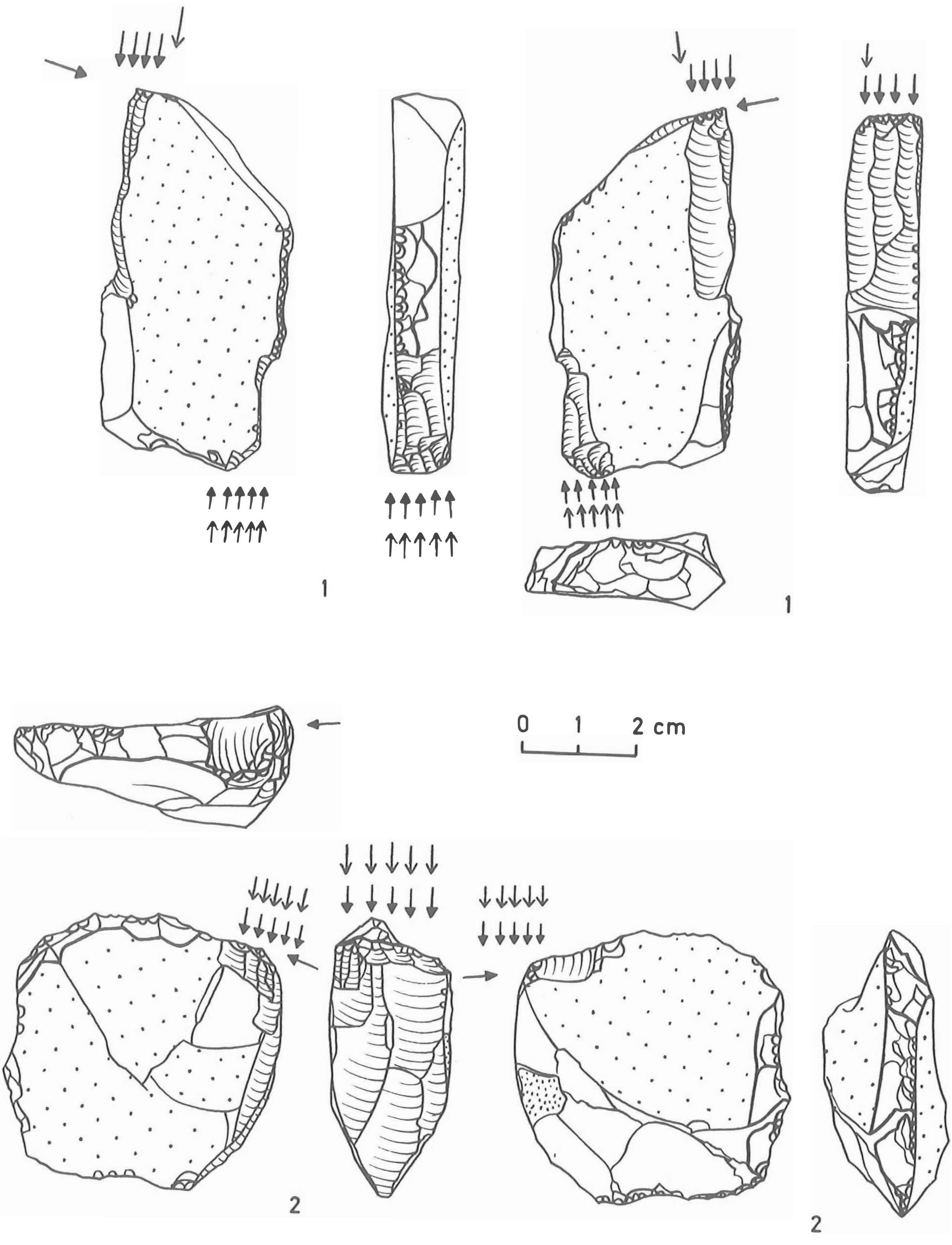
5. THE STONES

A total number of 28 stones were recovered during the excavation near the Beatrixlaan; 19 of these are indicated on the excavation plan (fig. 2). On this drawing no clear pattern is visible in the horizontal distribution of these stones.

The stones are generally rather small, the largest having a maximum length of 8.8 cm, while the smallest measures maximally 2.4 cm.

We are concerned here with angular lumps of rock, that without exception give the impression of having split off larger pieces. In table 10 the stones are roughly subdivided according to rock type, and a few measurements are given (the width is measured perpendicularly to the line of maximum length, and the thickness perpendicular to the plane in which length and width are measured).

Stones are found at many Upper Palaeolithic sites, in the Netherlands especially those belonging to the Hamburg tradition. As for the possibility of a "tent-ring", as had been postulated for some sites in other coun-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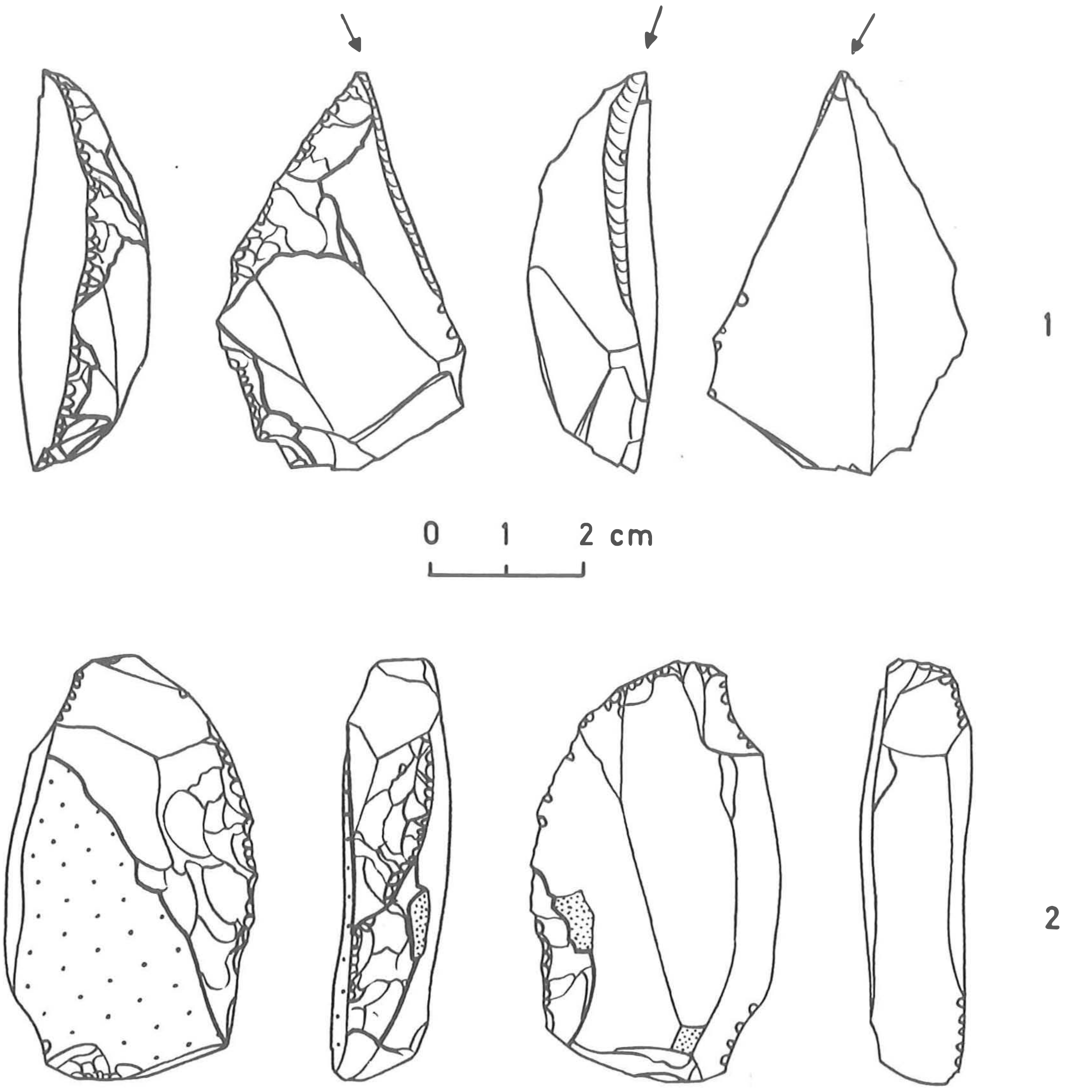

Fig. 15. Texel, "core tools". 1,2. cores with core-preparation retouch ("scraper retouch"), no. 1 also showing a scar of a small narrow blade ("burin spall"). Drawings by D.Stapert/J.M.Smit (B.A.I.).

tries, here there is no evidence of this as far as can be seen on the excavation plan, while moreover most of the stones appear to be too small for such a function.

At the Hamburg site of Oldeholtwolde a large hearth was excavated, that was "paved" with stones (consisting e.g. of quartzites and granites), under which charcoal was present (Stapert, in prep.). These stones were generally flat, with an average thickness of about 2 cm. Although the average thickness of the stones from Texel is also about 2 cm, it cannot be said that we are certainly concerned here too with the remains of a hearth. In the first place, in the case of Texel flat stones occur far less consistently than is the case at Olde-

Fig. 14. Texel, "core tools". 1,2. cores made of flat frost-split pieces of flint. Core-preparation retouch and short scars of unsuccessful blades give the impression of the pieces being "core scrapers/burins". Drawings by D. Stapert/J.M. Smit (B.A.I.).

Table 10. Stones.

	max. length (cm)	width (cm)	thickness (cm)	weight (gr)
quartzite-like sandstone	6.7	5.8	0.8	44.7
	3.2	1.8	0.5	4.5
very coarse sandstone	5.8	3.2	1.6	44.9
	5.2	2.8	1.1	18.1
	3.8	2.3	1.6	11.2
	4.7	1.9	0.9	8.3
	2.7	1.7	0.7	2.5
rose-red granite	8.1	7.1	4.7	236.4
	8.8	7.8	2.6	136.5
	5.3	4.3	3.7	96.6
	5.8	4.7	2.8	85.2
	5.9	4.2	3.7	68.5
	5.9	4.4	2.5	57.0
	5.2	4.2	2.8	47.3
	3.6	2.8	1.5	12.1
	3.1	1.9	1.8	9.7
	3.6	2.5	1.1	8.4
white granite	5.3	5.1	2.4	61.4
	6.0	4.0	2.8	60.2
	6.0	4.3	2.9	59.4
	5.8	5.3	1.6	46.7
	4.5	4.5	1.7	32.5
	4.0	3.4	1.7	23.4
	4.7	2.8	1.4	19.7
	2.9	2.8	1.7	11.9
	4.0	2.1	1.4	8.8
	2.8	2.1	1.3	6.6
	2.4	1.9	0.9	4.6
			total weight	1227.1
mean	4.9	3.6	1.9	43.8

holtwolde. What is more important is that on the stones from Texel no distinct black coloration (carbonization) is visible, as occurs on the hearth-stones from Oldeholtwolde. Moreover the stones from Texel were not found in any concentration, as can be seen from the excavation plan. Nor was any charcoal found during the excavation. A few stones do appear to have some vague red coloration, however, while in addition some fracture surfaces could have originated as a result of heat. Therefore the possibility that there was a hearth at this site cannot be completely excluded, but the evidence is too slight for any positive conclusion to be drawn.

None of the stones shows in addition any clear traces of use, e.g. hammer stones, polishing stones, etc.

6. A FEW REMARKS CONCERNING THE DISTRIBUTION AND DATING OF THE HAMBURG TRADITION

The site on Texel is the most westerly one within the entire known distribution area of the Hamburg tradition (see e.g. *Karte 2* in: Tromnau, 1975). It is situated more than 50 km to the west of the dense concentration of sites on the sandy soils of the provinces of Drenthe and Friesland. (A few years ago a site was also discovered in the extreme SW of Friesland: Elzinga, 1972).

The location of the site indicates that in any case part of the North Sea (at that time for the most part dry land – the Late Glacial coastline would then have lain as far north as the northern tip of Denmark), to the west and north of Texel, must have formed part of the region that was occupied by the Hamburgian hunters.

As far as the west is concerned, it is still not yet clear to what extent there was any relation between the Hamburg tradition and some sites of the English "Late Upper Palaeolithic" (for an excellent recent survey see Campbell, 1977). Tool types such as shouldered points and *Zinken*, that are regarded as "indicator fossils" of the Hamburg tradition (actually incorrectly as a rule), occur in a number of English sites. Typical examples of both tool types are present for example within the material from the site of Gough's Cave (Campbell, 1977, vol. II, figs. 119-126), in addition to such tools as Creswell and Cheddar points, and also *Federmesser*. Notably shouldered points with a ventrally retouched shoulder (e.g. Campbell, 1977, vol. II, fig. 122,7) are strongly reminiscent of Hamburgian points. Also the notched blades that are present, long end scrapers, oblique truncations and truncation burins could well fit into the Hamburgian. In the Netherlands and Germany *Federmesser* (Tjonger points) and tanged points are found at late Hamburgian sites, but the Creswell and Cheddar points that are present in Gough's Cave would naturally constitute a problem if one were to ascribe this site to the Hamburg tradition. But, as Campbell also mentions, it is very well possible that the large collection of artefacts from Gough's Cave represents a number of traditions. In Robin Hood's Cave too shouldered points have been found, also during the excavation by Campbell (1977, vol. II, figs. 152-153). It is even possible that shouldered points form the only type of point for one stratigraphical level (Campbell, 1977, vol. I, p. 174), but here we are concerned with very small numbers.

The open-air site of Hengistbury Head has also yielded typical, albeit rather large, shouldered points as well as tanged points, also of considerable size (Mace, 1959; Campbell, 1977 – for drawings see vol. II, figs. 157-165). The most typical shouldered and tanged points occur within the material excavated by Mace (site C1), and that from site A, while within the collection recovered by Campbell (site C2) especially Creswell points are conspicuous. Distinct *Zinken* are not present however.

The brief references made above to the English material serve to support the idea that it is not impossible that the Hamburg tradition is also represented in England, or in any case is related to a number of sites of the Late Upper Palaeolithic of Campbell. For further discussion on this problem it is important that the Dutch "Creswellian" sites be published (especially Zeijen, Siegerswoude II and Neer II), and in fact work is currently in progress with this aim in view. The impression that we get at the moment however is that these certainly do not appear to be less closely related to Hamburgian material than most of the Tjonger find complexes. In my opinion therefore it is not completely correct simply to classify the (Dutch) Creswellian together with the *Federmesser* tradition *s. l.* as proposed by Paddayya (1971), to my way of thinking this group of sites can better be considered separately, at least for the meantime.

As for the north: Texel is not the northernmost Hamburg site. If we disregard the isolated shouldered point, found near Ljerlev in Jutland, Denmark (Becker, 1970), the most northerly known site (according to Tromnau, 1975) is that at Ahrenshöft in Schleswig-Holstein (G.F.R., see Hinz, 1954). This could indicate that a strip of about 100 km to the north of the Dutch Wadden Islands belonged to the region of the Hamburg tradition. In that case the region frequented by the Hamburgian hunters would clearly not have extended as far as the coastline of that period. Moreover, even if that was indeed the case, we must assume that the sites in the Northern Netherlands lay too far from the coast to enable us to suppose that the people who used them (for a certain part of the year) travelled as far as the coast (in another part of the year). The distance (300-350 km) appears to be too great for this. The extent of the annual seasonal migration of most (sub-) recent hunters/gatherers is usually less than 100 km, and seldom more than 200 km (see also the discussion in Campbell, 1977, vol. I, p. 32 and vol. II, maps 5-8). For the meantime we must therefore assume that the Hamburgian hunters had an economy that was not coast-bound, and that they thus spent the whole year living inland.

Although Texel cannot serve as the best evidence, there are nevertheless also geological indications at this site of a dating *after* the Bølling interstadial (see under 2.). For a number of other Hamburgian sites such a dating appears to be certain, for example Oldeholtwolde and Luttenberg. At Oldeholtwolde the Hamburg finds were present in Younger Cover-sand I, that according to the geologists (e.g. Ter Wee, 1966) was deposited during the stadial between the Bølling and Allerød interstadials, a few decimetres below the "layer of Usselo" (Late Allerød soil) that has formed at the top of this cover-sand layer. Oldeholtwolde can therefore be dated to relatively shortly before the beginning of the Allerød interstadial. The finds from this site include tanged points and *Federmesser*, which corresponds to the expectation of both Bohmers (1947) as well as Tromnau (1975) for "Late" Hamburg sites. Moreover it is clear that the finds were left behind while the (eolian) sand was still being deposited, thus during a cold (stadial) period. In my opinion most of the Dutch Hamburg sites, including Texel, are to be dated in this stadial. This is later than is generally assumed (Bokelmann, 1979, dates the Hamburg tradition in Northern Germany, for example, completely in the Bøllling interstadial).

Therefore there most probably does not exist a "gap" in time between the appearance of the Hamburg tradition and that of the Tjonger (*Federmesser*) tradition.

7. SUMMARY

In this article is described the material from a small site of the Hamburg tradition on the Wadden island of Texel, in the extreme northwest of the Netherlands. The finds were present in a layer of cover-sand, and can be dated with some degree of certainty in the stadial between the Bøllling and Allerød interstadials (Early Dryas). The material that was found includes, in addition to 28 mostly smaller stones, 447 flint artefacts. Among these are 27 specimens that can be described as "tools" (6%). What is remarkable here is the relatively large proportion of points (10: in all cases broken or damaged). For the other tools see table 5. The material recovered from this site is certainly only a part of what was once present: an unknown but probably considerable proportion of the original material has been lost to us. As appears from the excavation (carried out by the R.O.B., Amersfoort), the concentration was situated in an area measuring approximately 10 x 8 metres.

8. REFERENCES

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