

Mesolithic Bone and Antler Implements from the North Sea and from the Netherlands

With a contribution by G. Kortenbout van der Sluijs

figs. 1-19; pls. I-VII

ABSTRACT

In the last few years a number of bone and antler artifacts have been dredged up from the North Sea. They are dated to the Late Preboreal – Early Boreal by means of the curve of the relative rise of sea-level. Some of them can be dated to the same period by means of the archaeological parallels at some of the rich northern Early Mesolithic sites, others have no dated counterparts. They all form welcome additional evidence to the Leman and Ower Banks barbed point, found in 1931.

In the Netherlands also new finds of this period were made. Those, found in the western part of the country document the earliest occupation there at a level of about —25 m. o.d. Some older finds have been recently recognized in the museum collections.

The finds, 24 in number, throw some new light on the Early Mesolithic occupation of the North Sea Basin and on the Dutch Mesolithic.

In a geographical situation, well comparable with the Danish Isles during the Maglemose occupation, another distinct group must have centred in the southern North Sea. But during the Boreal the inhabitants were dislodged by the encroaching sea.

The Dutch finds and all other 'Maglemose' bone and antler implements found to the south of the Core Axe Culture area are no proof of an extension of this culture into these regions, but they must represent the bone and antler tool kit of the Early Mesolithic groups already defined there. The typological parallels of the implements in the north-European find assemblages stress the cultural relationships of the northern groups with core axes and the southern groups lacking this type of implement, as is apparent from recent studies of the flint assemblages.

I THE IMPLEMENTS FROM THE BROWN BANK REGION, NORTH SEA¹

INTRODUCTION

Since 1964 many thousands of fossil bones, dredged up by fishermen from the floor of the North Sea, have been collected by the National Museum of Geology and Mineralogy at Leiden. The bones are fished up almost exclusively in the surroundings of the so-called Brown Bank or Brown Ridge. They are brought together in the various Dutch fishing-ports, especially IJmuiden, from where Mr G. Kortenbout van der Sluijs, keeper of the museum, regularly brings them to Leiden. Thanks to his alertness, eight implements or worked bones have so far been recognized, which he generously handed over to the National Museum of Antiquities in the same town. Only one worked bone (no. 6) was acquired by this museum directly from a fisherman.

FIND CIRCUMSTANCES

The Fossil Faunal Remains

Mr Kortenbout van der Sluijs kindly prepared a preliminary report on the fished-up faunal remains. I have added his report to this paper.

By far the greater part of the many thousands of bones can be attributed to animals that lived in the last glacial period, such as mammoth, woolly rhino, reindeer and others. A small number of the bones are of Early Pleistocene age. There is also a small percentage that is either Weichselian or Holocene. In view of the occurrence of

¹ Preliminary notes on the finds: Louwe Kooijmans 1968, 1969; Louwe Kooijmans/Stuart 1969, 17 and pl. 4.

bones of the dog² and the here described Mesolithic implements it is likely that at least a part of this last group belongs to the Early Holocene and in fact represents the faunal remains of Early Mesolithic dwelling places.

A comparison of this list, however, with the faunal lists of the northern Mesolithic sites³, reveals that the roe deer is absent and the red deer is only represented in very small numbers. Since most of the aurochs bones are hardly or not distinguishable from those of the steppe bison, we can only state that the aurochs is present but we cannot tell in which proportion to the other, possibly Holocene, mammals. The absence of the smaller mammals and of birds can be explained by the different ways the bones are collected from an excavation or from the North Sea floor.

The human remains must be considered as undated and may be either Late Glacial, Holocene, or sub-recent, *i.e.* the remains of drowned seamen. It is, however, interesting that human remains also occur at some Danish Maglemose sites, as Sværdborg, Mullerup, Øgaarde, and Vinde-Helsing⁴. From other sites human bones are not mentioned, or their absence is noted, as at Star Carr⁵.

Finally the absence of bones of domesticated animals, other than those recently thrown overboard by ships'

cooks, is an indication that bones from the period beginning with the Ertebølle-Ellerbek Cultures are lacking.

According to the fishermen, nearly all the dredged-up bones come from the surroundings of the Brown Bank, especially from some gullies up to 50 m in depth in the region west of the ridge. Incidentally, bones are also dredged up near the Belgian and the Dutch coast, especially from the deep tidal channels in the province of Zeeland. Although it is often stated that 'mammoth bones' are found at the Dogger Bank, faunal remains from that area are not known to us and Dutch fishermen have never reported finds from there⁶. Although the concentration of finds west of the Brown Bank can be caused partly by the intensive fishing there, we can state with certainty that the area is particularly rich in fossil faunal remains, especially of Weichselian age.

Geology

In the last few years the Quaternary geology of the North Sea area has become relatively well known⁷. Recently Houbolt published a study on the ridges or banks in the southern part of the North Sea. He could distinguish ridges formed by sand accumulation and ridges formed by erosion of older sediments. The isolated Brown

2 The earliest remains of the dog are those found at Star Carr (not yet identified in Clark 1954 (70, 97; Late Preboreal, Degerbøl 1961). Next are those from Mullerup (Sarauw 1903, 195; 1911, 99). The dog occurs at all important Danish Maglemose sites. At Hohen Viecheln no differentiation is made on account of the stratigraphy. There the dog only can be dated to the Late Boreal or earlier. See also Zeuner 1963, 85-8.

3 Star Carr - Clark 1954, 70.

Hohen Viecheln - Schuldt 1961, 43.

Mullerup - Sarauw 1903, 194 f; 1911, 100 f.

Sværdborg - Friis Johansen 1918, 261-3 (1919, 128-33),

Holmegaard - Broholm 1924, 28-30.

Norslund - Andersen/Malmros 1965, 109.

4 At Sværdborg some small fragments of a human skull were found (Friis Johansen 1918, 264). From Mullerup the remains of at least two persons are mentioned: a femur and a phalanx of an adult, the lower jaw of a little child (Sarauw 1903, 198; 1911, 101). Both at Øgaarde and at Vinde Helsing a human ulna was found (Mathiassen 1943, figs. 85, 86 and 98).

5 Clark 1954, 70; 'none of the bones is human' see also Clark 1936, 128 on human skeletal remains.

6 We were informed by Mr Kortzenbout van der Sluijs that on or near the Dogger Bank fossil mammal bones are dredged up very rarely (*cf.* also his contribution at the end of this paper).

But he gave me a small catalogue of the 'Wanderndes Museum Schleswig Holstein' (undated) where we could read: 'Show case VI... From the Dogger Bank we know, besides a number of mammoth teeth also a series of Early Mesolithic finds, dredged-up by fishermen in their nets, together with lumps of peat, from a depth of about 20 m'. These finds are known to neither Dr K. Struve, director of the Schloss Gottorp Museum, Schleswig, nor to Professor H. Schwabedissen and Dr R. Schüttrumpf, University of Köln. I would like to thank them here for the friendly information they gave me on this question. I think the Dogger Bank, being the best known feature of the North Sea, was unconsciously introduced as the find place of all objects derived from the North Sea. But although we must forget the finds mentioned so far, a former occupation of the Dogger Bank, even when separated as an island from the 'North Sea Land', is not at all unlikely and might be proved some day by new finds. Future geological knowledge on the Dogger Bank, whether it is a terminal moraine or the result of isostatic uplift, or both, might also be helpful in understanding whether or not prehistoric occupation could have taken place there. See Veenstra 1965 and Oele 1969 and lit. cited there.

7 Sketchy maps have been published earlier among others by Faber 1947 (pl. xxvii) and Schwabedissen 1951 (*Abb. 1 r.*).

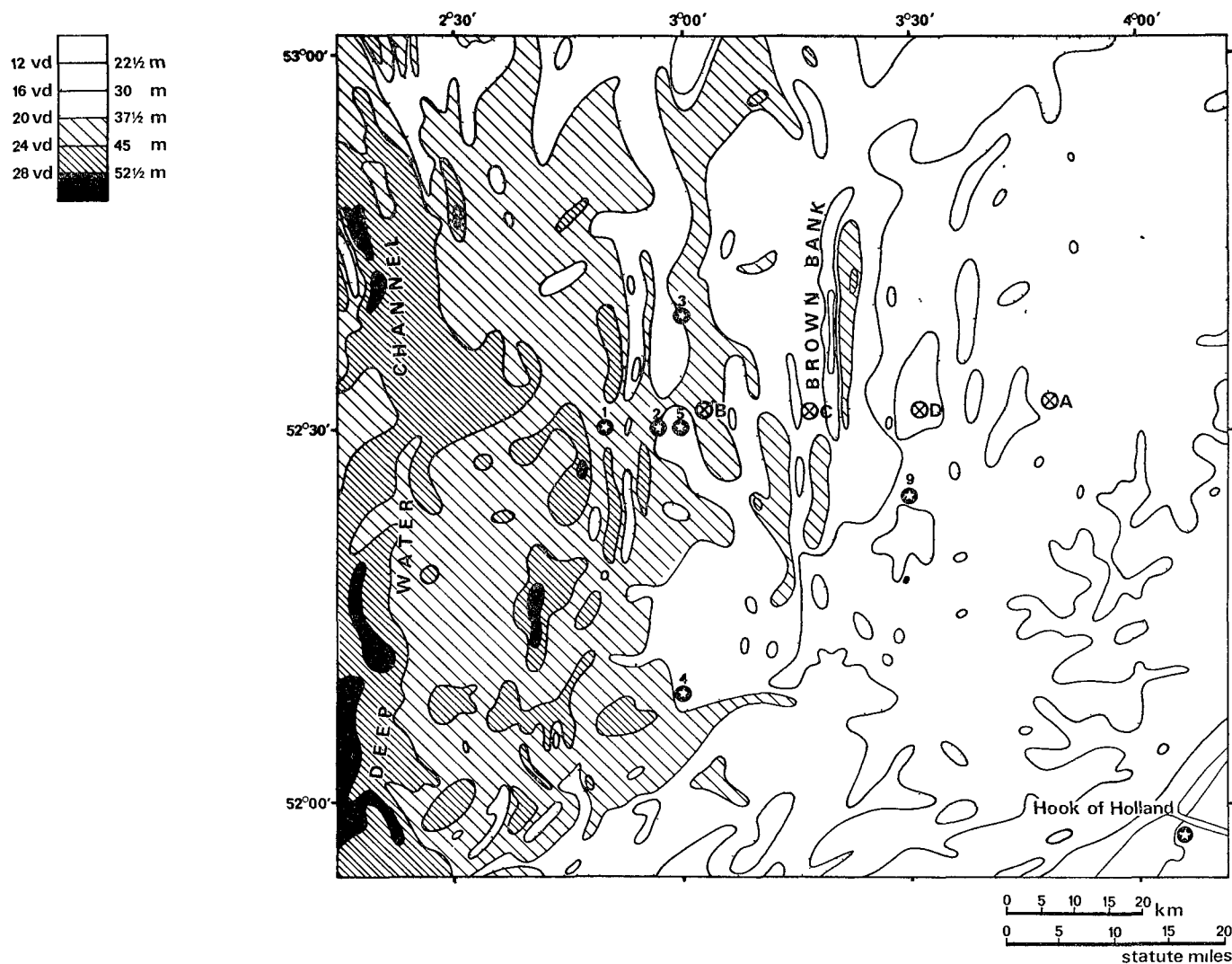


Fig. 1 Contour map of the surroundings of the Brown Bank (after Houbolt 1968) with the position of the fished-up implements and of the pollen samples A–D of Jelgersma 1961. Scale 1: 1million. For the situation see fig. 18

Bank appeared to be such an erosional remnant, since a clay sample from the top of it yielded an autochthonous brackish *Foraminifera* and *Ostracoda* fauna⁸. Houbolt also published a detailed isobathic map⁹.

Oele gave a description of the Quaternary geology and a map of the Dutch part of the southern North Sea¹⁰. The

surroundings of the Brown Bank are characterized by the occurrence of a fresh water clay of Early Weichselian age, the 'Brown Bank Bed'. The clay had been deposited in an extensive freshwater lake, that dried up during the Pleniglacial, when the sea-level was very low. The top of the clay lies at a depth of about 37 m (below Spring Low Water). The clay beds are not covered by the Late Weichselian coversands (the Twente formation). South of 52° 15' N they probably intercalate with the Kreftenheye Formation, the fluvial sands of the Late Glacial Rhine/Meuse river system. As almost everywhere in the

8 Houbolt 1968, esp. 264–5.

9 Houbolt 1968, encl. 1, less detailed maps can be found in Faber 1947 (fig. 109), Jelgersma 1961 (fig. 43).

10 Oele 1971, for the northern part Oele 1969.

southern North Sea, there is a cover of young sea-sand, here of about 6 m.

It is clear that the Weichselian faunal remains occur predominantly if not exclusively in the Brown Bank Clay, were partially washed out of it during the Holocene, and are now lying in and on the surface of the clay, below the young sea-sands. They can only be dredged up from the reported gullies or depressions in this sand, that reach down to the surface of the clay or deeper. The gullies are well visible on the isobathic map (fig. 1), with depths over 38 m and up to 50 m. In the deeper parts also the Late Tertiary sands and clays may be eroded. These Tertiary deposits also reach as high as 37 m in the find area¹¹. All this is perfectly in accordance with the comments of the fishermen and with the report by Kortebout van der Sluijs¹². First, the occurrence of the Villafranchian animals is explained: they must have been dredged up from the deepest points. Second, the statement that many of the bones are often in a bad state of preservation and that they must have been lying at or near the surface for a certain time, prior to the inundation of the North Sea, can be explained very well.

A second particularity of the area is the Brown Bank itself. This long ridge, with a highest point of —16 m (below SLW) is defined by Houbolt as an erosion remnant, while Oele suggested on acceptable reasons that it might be a coastal barrier. If this is true, the date of the ridge forms a *terminus ante quem* for the implements, since the sea must have encroached over the find spots at the time of formation of the ridge. The dating of the Brown Bank, using its height and the sea-level data of Jelgersma includes, however, many sources of error. We can only say that the Brown Bank, if a coastal barrier, must have been formed in the Late Boreal¹³.

The Position of the Implements

Five out of the nine artifacts are to be located fairly precisely: the position is given in degrees longitude

and latitude (table III, p. 35). We must, however, be aware of several sources of error. First, the length of a single drag of the trawl-net can amount up to 10 km. So the given position might have an error of about 10 km in all directions. Second, bones found at different positions may have been easily thrown together in the same case or basket by the fisherman. However, we still plotted the given positions in our map (fig. 1), but rather than relying on these points alone we must consider the whole region where they are found. This district measuring 30 to 70 km agrees well with the fishermen's general statements concerning the bones they fished up (see above). No. 9 was found outside this region. The rough indication '50 miles' for no. 8 seems also a little too small to reach this district and the find spot of no. 6 is known only vaguely. We can only say that they were found near by. The single unlocalized artifact (no. 7) will very probably also have originated from the surroundings of the Brown Bank.

NON-TYPOLOGICAL DATINGS

The Bones Used

It has already been long established that during the Late Palaeolithic the North Sea Basin, then dry as far north as the Dogger Bank, must have been populated. The occupation of this extension of the north European plain need cause no surprise and can be proved for instance by the occurrence of the Aurignacian, Solutrean and Azilian Cultures in the British Isles and of Cheddar and Creswell points on Dutch Tjonger sites¹⁴.

The dredged-up implements are made of bones of either the aurochs or the steppe bison, that must have disappeared in these regions during the Late Glacial. It is not possible to distinguish the two species by their long bones. Since an intensive survey of the literature on the Palaeolithic yielded no parallels to the implements found, contrasting with the Mesolithic parallels described below,

Bank, in spite of a large number of borings made there, some of them as deep as 10 m. He suggests that a landscape of tidal flats once existed behind the coastal barrier. The clay might be an erosion remnant of the deposits in that environment. The form of the Brown Bank suggests a short period for its formation, as was also the case with the Dutch Subboreal barrier system. According to him we may not exclude that high dunes were formed and so the possibility of an earlier (Early Boreal or even Pre-boreal) date.

14 Bohmers 1956, 1960; Schwabedissen 1951.

11 Oele 1971, section on pl. II and pers. comm.

12 The report by Mr Kortebout van der Sluijs is added to this paper (p. 69).

13 These sources of error are, for instance, a possible erosion of the top of the ridge, the possibility of some dune formation on the top, the quality of the moorlog-samples (mostly washed-out lumps) and the uncertain relation between Mean Sea Level and peat growth in the submerging North Sea Basin (see also p. 33). Dr Oele informed me that he had never found the brackish water clay, mentioned by Houbolt from the eastern slope of the Brown

TABLE I. Chronological table of the end of the Palaeolithic, the Mesolithic and the beginning of the Neolithic around the North Sea

Conventional ¹⁴ C dates years BP	North Sea sea-level (to o.d.)	pollen zones	Great Britain	Netherlands	Northern Germany	Denmark	archaeological periods	
5.000	- 5 m	Sub-boreal		TRB	TRB	TRB	Neolithic	5.000
6.000	- 7	Atlantic	Windmill Hill	Swifterbant	Ellerbek	Ertebølle		6.000
7.000	- 10		Lower Halstow	Bandceramic Late Mes. surv. De Lijen-Wartena complex	'Oldesloe'	Vedbeak Bloksbjerg		7.000
8.000	- 20	Boreal	Skipsea Broxbourne	Boreal Mesol.		Kongemose Holmegaard Svaerdborg	Mesolithic	8.000
9.000	- 40		Leman and Ower	Early Mesol. Bank Basal Mesol.	Hohen Viecheln	Mullerup Øgaarde I		9.000
	- 50	Pre-boreal	Brown Star Carr			Klosterlund		
10.000					Pinnberg			10.000
11.000		Younger Dryas		Ahrensburg	Ahrensburg	Lyngby	Palaeolithic	11.000
		Alleröd	Creswell Cheddar	Tjonger	Federmesser	Bromme		

we had to conclude that they are made out of aurochs bones. The implements surprisingly enough did not belong to the overwhelming number of Pleniglacial, but to the insignificant percentage of Holocene bones. Factually no worked Pleniglacial bones have been recognized until

now, so that we must assume that these bones are derived mainly from natural deposits and not from former Late Palaeolithic settlement sites¹⁵.

The general age of the implements is given by the mere fact that they were manufactured out of bones of the

15 In Louwe Kooijmans/Stuart 1969, 13 worked bones of the wild horse are mentioned too and for these a Late Palaeolithic date is suggested. More detailed study revealed, however, that the

traces of 'working' might be accidental forms or the gnawing by wild animals as well.

aurochs. In Denmark aurochs and elk bones are common only in the Boreal Maglemose settlements. They become rare during the Ertebølle Culture and are almost absent during the TRB-Culture. Perhaps this is the result of the changing environment¹⁶. It is significant that the aurochs from Vig is dated to the Preboreal¹⁷. So it need cause no surprise that the parallels to our implements are almost exclusively found in the Preboreal and Boreal find groups, perfectly in accordance with the geological data.

The Barbed Point from Leman and Ower Banks
(table III, no. 10; fig. 2)

The Mesolithic occupation of the 'North Sea Land' is made very plausible merely by the distribution of 'Maglemose' finds all around the southern North Sea (cf. p. 66 and fig. 18). Inhabitation of the Boreal peat landscape was indeed proved by the famous barbed point found in 1931 at Leman and Ower Banks. So the Brown Bank finds do not provide anything new in this respect, but only offer the possibility of further working out a known fact. The point was dredged up in 1931 by the trawler *Colinda* of Lowestoft in a lump of 'moorlog' from a depth of about 36 m, between the Leman and Ower Banks, about 25 miles NE of Cromer, Norfolk. The peat was dated in the Early Boreal by means of pollen analysis. A later ¹⁴C-date of moorlog from the same place and depth gave a date about 8500 B.P.¹⁸ The point has a single series of fine bars and is of the relatively early Kunda type (form 6 after Clark 1936), dated generally in the Early Boreal and the (Late) Preboreal (cf. p. 52). The bars are separated by notches, formed by criss-cross sawing, which seems to be an exclusively English characteristic. The 'decoration' of obliquely running scratches on the stem also occurs only on a number of English points. The scored tang is a characteristic of the (stratigraphical) oldest type E at the Late Preboreal Star Carr. This seems somewhat in contradiction to the date of the Leman and Ower Banks point, but first, the points of type E are much smaller, and second, they are made of red deer antler, which is not at all certain in the case of the Leman and Ower Banks point.

¹⁶ Brøndsted 1960, 83, 127, 218, Cf. also the lit. in note 3.

¹⁷ Brøndsted 1960, 54.

¹⁸ The Leman and Ower Banks point has been the subject of much discussion. Not all papers agree (mostly due to inaccuracy) regarding the material of which the point is made (bone, antler), the year in which it was found (1931, 1932), or the exact position of the find spot.

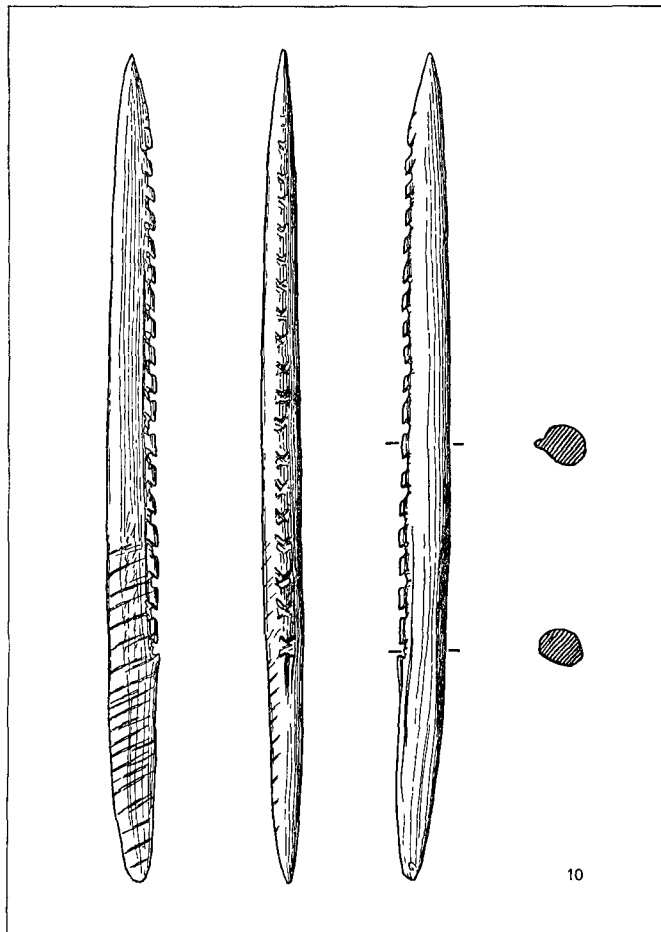


Fig. 2 The barbed point from Leman and Ower Banks (no. 10). After Clark/Godwin 1956. Scale 1:2

The Relation between the Depth and the Date of the Peat Formation

The district where the Brown Bank finds are made comprises a part of the North Sea floor gently sloping from east to west, with in detail an irregular topography of ridges running N-S and of channels. The depth shows a variation from 30 to 52 m at extremes, more generally between about 35 and 45 m. Since the implements must

Antiquity 1932, 218; Burkitt 1932; Clark 1932, App. VII, p. 115; Godwin/Godwin 1933, esp. 42; Clark 1954, 1; Clark/Godwin 1956, esp. 11, 16, 18, pl. II, 8 (not 9!); Clarke 1960, 43; ¹⁴C date: Q 105 8422 ± 170 B.P., Godwin/Willis 1959.

TABLE II. Dated peat samples from the North Sea Basin

no.	depth. in m	reference level	pollen zone (cf. Jelgersma 1961, 71, 78)	¹⁴ C age years B.P.	way sampled	position	references
1	- 47	O.D.	Early Preboreal	—	bored	n.w. of Frisian Isles	Oele 1969, 472, 475
2	- 46	sea-level	Late Preboreal	—	bored	s.e. of Dogger Bank	Behre/Menke 1969
3	- 39	—	Late Preboreal (1b)	(9.300)	dredged	Dogger Bank	Vermeer-Louman 1934; Jelgersma 1961, 73
4	- 37	sea-level	Early Boreal	8422 ± 170 Q 105	dredged	Leman and Ower Banks	cf. note 18
5	- 35	N.A.P.	Late Preboreal (1c)	(9.000)	dredged	near Brown Bank	Jelgersma 1961, 71-3, sample B
6	- 33	N.A.P.	Early Boreal (IIa)	(8.700)	dredged	near Brown Bank	Jelgersma 1961, 71-3, sample C
7	- 28	N.A.P.	Early Boreal (IIa)	(8.500)	dredged	near Dutch Coast	Jelgersma 1961, 71-3, sample D
8	- 26	N.A.P.	Late Boreal (IIb)	(8.400)	dredged	near Dutch coast	Jelgersma 1961, 71-3, sample A
9	- 24.5	N.A.P.	Boreal	—	—	Goeree Light vessel	Oele 1971, 468
10	- 21.5	N.A.P.	—	8170 ± 150 GrN 2274	bored	IJmuiden, Netherlands	Jelgersma, 1961, 30, 43

have been derived from levels between these depths we have a possibility of estimating their age.

As they used to do elsewhere, for instance at Star Carr and generally on the Danish Maglemose sites, the Mesolithic hunter-fishers will have settled in the Brown Bank area on relatively high points (of the Brown Bank Clay) or on small dunes – that occurred possibly locally – during the period when this region had been changed into an extensive swamp as the result of the rising ground water table, caused by the quick rise of sea-level in the Early Holocene¹⁹. So the implements are roughly dated by the period of peat formation: from its beginning till the submergence by the sea.

We listed some data on the age and depth of dredged-up and bored peat samples from the North Sea (table II). The data were plotted in a time-depth diagram in order to construct the curve of the relative rise of sea-level according to Jelgersma.

We must stress that in table II only the relation between the moment of peat formation and the reported depth is

given and not the sea-level at various dates. When constructing the sea-level curve we assumed that peat development started when the sea-level had risen up to a few metres below the point in question. In view of the quick rise of sea-level (2 m per century in the Early Holocene) the point will have been submerged only a few centuries later. So at every place the period of peat formation was short and followed directly by transgression.

The few bored samples are most important, since they are the only data giving an accurate depth. The given depths of the fished-up moorlogs are not very reliable, due to the cover of young sea-sand, near the Brown Bank generally of about 6 m.²⁰ This, however, will be partly compensated for by the fact that the lumps of moorlog were eroded and possibly washed down to a somewhat deeper position. We can only use the dredged-up samples as a rough approximation of the former sea-level.

The most important is the boring from the Dogger Bank (table II no. 2). A thin (5 cm) peat layer, dated to the Late Preboreal, was eroded at the top and covered over

¹⁹ That the peat formation took place subsequently in extensive parts of the North Sea appears from the widespread occurrence of 'moorlog', lumps of peat, often dredged up by the fishermen. See maps in: Vermeer-Louman 1934, fig. 11; Clark 1936, fig. 3; Brøndsted 1960, 9; remarks in other articles: Jelgersma

1961; Oele 1971. According to Oele 1969 no moorlog occurs on the southeastern slope of the Dogger Bank.

²⁰ Cf. Oele 1971. The depths of the samples A, B, C, D of Jelgersma fit very well to the depths of Houbolts map, which gives the sea-bed.

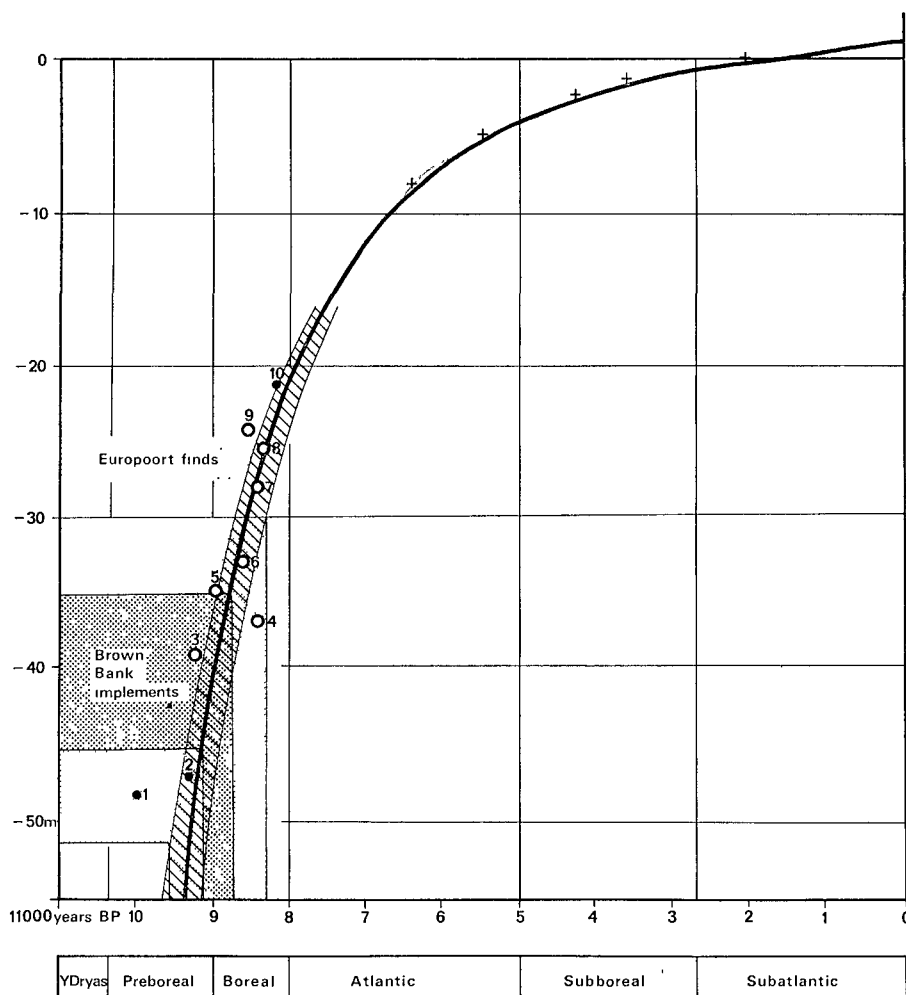


Fig. 3 The curve of the relative rise of sea-level (M.H.W.) and the age of the bone implements from the Brown Bank region. The curve is based on the data in table II (● = bored, ○ =

dredged sample), the data of Jelgersma 1961, and on former M.H.W. levels established at prehistoric sites in the western Netherlands (+), recently brought together by the author

in the Late Boreal with 60 cm of clay and sand. The sea-level must have been a few metres below the —46 m-line when the peat started and must have passed this point at the end of the Preboreal or the very beginning of the Boreal. We must be prepared for uplifting isostatic forces, when using northern samples like this. This evidence from the Dogger Bank fits, however, well with the data from the southern North Sea and is a first indication that these forces were not active there. For construction of a more accurate curve, more data of this quality, preferably supported by ^{14}C -dates are needed.

In view of the restricted reliability of the plotted data, the older part of the curve is shown as a zone, in which an unbroken line gives the most likely approximation of the curve. The younger part of the curve is well established by the work of Jelgersma and by new data acquired from archaeological sites by the author.

The beginning of the peat formation on the Brown Bank Clay probably started relatively early because of the bad drainage conditions on such a clay. This is illustrated by the age of Jelgersma's sample B (no. 5). The collected data give no reason to assume an earlier start. The end

TABLE III. Mesolithic Bone and Antler Implements from the North Sea

no.	Museum & inv. no.	Year found	Position lat. long.	Animal	Bone	Implement
1	RMO U 1968/11-4	1968	52° 30' 2° 50'	aurochs	radius	shaft-hole pick
2	RMO U 1967/10-2	1967	52° 30' 3° 00'	aurochs	metatarsal	socketed axe
3	RMO U 1967/10-1	1967	52° 40' 3° 00'	aurochs	radius	socketed axe
4	RMO U 1969/8-3	1969	52° 10' 2° 51'	aurochs	tibia	axe or adze
5	RMO U 1968/11-1	1968	52° 30' 3° 03'	aurochs	metatarsal	pointed axe
6	RMO U 1968/11-8	1968	surroundings of the Brown Bank	aurochs	metatarsal	cut-off articular end
7	RMO U 1971/3-1	1969	— —	aurochs	metatarsal	picked-off articular end
8	RMO U 1971/3-2	(1970)	c. 50 miles wsw of IJmuiden	aurochs	metacarpal	broken out
9	RMO U 1966/12-2	1966	52° 25' 3° 30'	red deer	antler tine	with perforation
10	Norwich Castle Museum	1931	Leman and Ower Banks 25 miles NE of Cromer	—	antler?	barbed point

of the occupation in the Brown Bank region is defined by the submergence of the —35 m-line or, excluding all possible errors, the —30 m-line. Using the graph in fig. 3 we obtain a *terminus ante quem* to the implements in the middle of the Boreal period. When we assume a relation to a marshy environment, and when we exclude a (Late) Palaeolithic age, and when we consider the widest margins of error in establishing the sea-level curve and in the reported depth, then the age of the implements is restricted to the Late Preboreal and the Early Boreal, 9500-8500 B.P. The time around the Preboreal-Boreal boundary, 9000 B.P., is the most likely.

We must also consider the possibility that the occupation might have taken place on the coastal barrier, which in the course of time moved past the area, or on the Brown Bank itself. This would imply a considerable replacement of the implements, which in view of the fresh appearance of most of them seems unlikely. It would, however, mean a slightly later date.

THE FINDS

General Remarks

Nine worked bones or implements have been found so far; these are reviewed in table III. An equally small number of bones with only very dubious traces of working

is not included in this paper. The bones were all dredged up on different days by different ships²¹. So we have to treat them as isolated finds, since no indication exists at all that they derive from only one place or from a restricted number of sites.

The bones were incrustated to different degrees with recent *Bryozoa*, which indicates that they had already been washed free for varying lengths of time. Consequently no trace of peat for pollen analysis had remained in the bones when they were fished up. The last vestiges of peat will have been washed away when they were dragged in the nets through the water of the North Sea. The colour of the surface is either black or reddish brown, the result of staining by iron rust. The core of the bones is usually pale yellow. The condition is generally good, though varying. There is often some surface slaking, which could be prevented by conservation.

All implements but one are made from aurochs bones: the metapodal (5 ×), the radius (2 ×), or the tibia (1 ×). The forms comprise different types of axes and three metapodals with traces of working.

We must remember that the smaller implements (barbed points!) are absent, because they have slipped too easily through the mesh of the fishing nets. Flint implements (core axes?) are moreover not recognizable as artifacts to layman.

²¹ With the exception of the nos. 2 and 3, which were acquired together from one fisherman. Their very similar state of preservation

makes it not unlikely, that they are derived from the same site.

*Descriptions*²²

No. 1 (fig. 4, pls. I-II)

Shaft-hole pick, made out of the distal part of the right radius of the aurochs. Proximal end removed. Ground and polished to a very smooth and symmetrical point. The tip has been made in the thick and hard bone of the anterior side. Near the distal end an almost cylindrical shaft-hole has been made, not by means of a cylindrical or conical boring apparatus, but by cutting around with a flint instrument, like a sharp flake or a burin. As a result the rim of the shaft-hole is slightly irregular in outline. Since the direction of the shaft is perpendicular to the plane of the cutting edge we must speak of a pointed *adze*. At the point and to lesser extent along one of the sides, traces are visible of working with a sharp pointed instrument, probably a flint burin. The marks resemble to some extent the marks resulting from gnawing by mice. Since these marks occur only on two implements (*cf.* no. 3) and not on other bones and since there are differences in detail from some true gnawing marks of mice known to us²³, we think the interpretation as the result of working is justified. We may conclude that after the removal of the articular end and preceding the grinding of the point, a splinter of the bone, that extended too far at the point, had apparently been removed by cutting with a burin, until the desired form had been attained. On the surface of the bone longitudinal scratches are visible especially beside the shaft-hole: the traces of wear or of cutting that may have been caused when the bone was cleaned before it was worked.

Measurements: l = 30.4 w = 9.0 th = 5.8 cm.

Diameter shaft-hole = 2.7-2.9 cm.

Colour: 5YR - 2/1 (black) with some lighter stains.

²² The maximum dimensions are given: l = length, w = width, th = thickness. The colours are in the code of the *Munsell Soil Color Charts*; they are the colours of the surfaces of the bones. The cores generally have very light colours.

After the manuscript was completed Mr G.D. van der Heide informed me of another worked bone from the Brown Bank region. It is a red deer antler tine, broken off at both ends (l = 20.2, w = 3.2, th = 3.0 cm). A small perforation, diameter 0.9, depth 2.7 cm, has been made in the middle of the preserved part, but it did not completely pierce through the cortex at the other side. The hole has an irregular rim, showing that a burin or a flint knife was used. This type of perforation fits well with the northern Mesolithic material, and better than the perforation of no. 9. The object was fished-up on 17 July 1971 by the present owner, Mr Klaas Post from Urk, near the Brown Bank.

²³ We owe these examples to Mr J.A. Brongers, Amersfoort, and Mr G. Kortenbout van der Sluijs, Leiden.

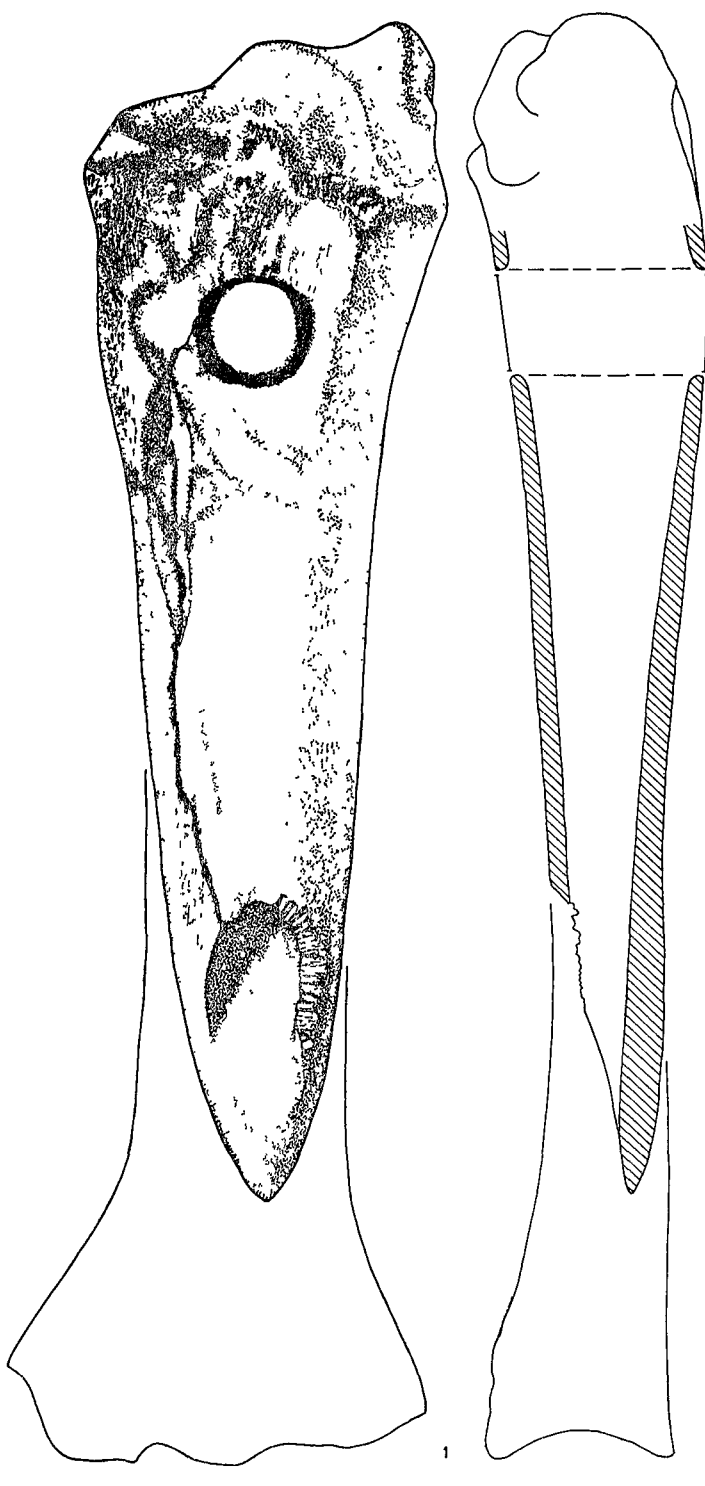


Fig. 4 Brown Bank region, shaft-hole pick (no. 1). Scale 1 2

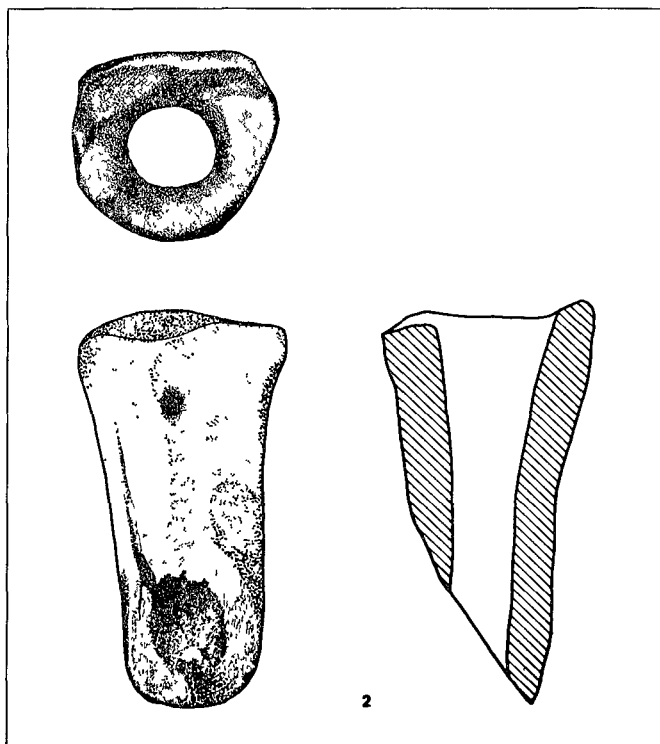


Fig. 5 Brown Bank region, socketed axe (no. 2). Scale 1:2

No. 2 (fig. 5)

Socketed axe, made out of the proximal end of the left metatarsal of the aurochs. The cutting-edge formed by obliquely cutting at one side. Near the edge are also traces of superficial cutting at the surface of the tubular bone. The articular end has been perforated to create a shaft-hole in the marrow-cavity.

Measurements: $l = 10.2$ $w = 5.4$ $th = 4.8$ cm.

Diameter shaft-hole = 2.1-2.3 cm.

Colour: 5YR - 2/1 (black)

No. 3 (fig. 6, pl. III left)

Socketed axe, made out of the proximal end of the left radius of the aurochs. Cut or ground obliquely at one side to an axe with a straight cutting-edge. At the other side a broad and thin flake has been cut off. The greater part of the articular end is missing. It was probably perforated intentionally to create a shaft-hole in the slightly narrowing internal cavity of the bone. Along the whole length of one side a splinter is broken out; this might have been caused accidentally by the strong pressure of a hooked haft, when the axe was used in the same way as suggested

for the Koerhuisbeek adze no. 17 (see p. 54). Along one of the fractures are at least 12 short marks, probably made with a flint burin (*cf.* no. 1), at right angles to this edge. Perhaps they were made as a roughening to give a cord, wrapped around the bone, a better fixation during continued use of the damaged implement. Similar marks ('decoration') occur along cracks in antler sleeves from Sværdborg and Crouy, Somme, and the same function is suggested for these marks²⁴.

Measurements: $l = 17.1$ $w = 9.2$ $th = 4.6$ cm.

Diameter shaft-hole = $3.2 \times 2.5 - 2.6 \times 1.7$ cm.

Colour: 5YR - 2/1 (black)

No. 4 (fig. 6, pl. III right above)

Axe or adze made out of the distal end of the left tibia of the aurochs. No shaft-hole. The cutting-edge formed by cutting from one side. Later grinding (?) and polishing have resulted in a very smooth and shining surface on both sides and in a blunt, rounded cutting-edge. This last fact especially, indicates that the polish was not intentional, but the result of use.

Measurements: $l = 16.0$ $w = 9.1$ $th = 6.0$ cm.

Colour: 2.5YR - 3/4-4/6 (dark reddish brown-red)

No. 5 (fig. 7, pl. III right below)

Pointed axe made out of the distal part of the right metatarsal of the aurochs. Apparently first worked by cutting and flaking off splinters. Subsequently the rough-out had been ground and polished on all sides to an irregular point. On the surface of the bone, especially in the furrow on the frontal side are fine longitudinal scratches, the traces of wear. The articular end has been broken off recently. Since the *spongiosa* is still present, we can conclude there was no shaft-hole in the articular surface, as with the socketed axes.

Measurements: $l = 14.3$ $w = 5.5$ $th = 3.2$ cm.

Colour: 2.5YR - 3/4 (dark reddish brown)

No. 6 (fig. 7, pl. IV below)

Distal articular end of the right metatarsal of the aurochs, incompletely broken off by a deep V-sectioned groove, cut all around the bone, somewhat obliquely to the long axis and about 3.5 mm deep. Probably made with a sharp flint blade or flake. On the posterior side of the bone some sawing marks parallel to the groove. Since no further traces of working are visible, we must consider this artifact as a waste product of bone working.

²⁴ Friis Johansen 1918, 293 and fig. 36 (1919, 167), *cf.* note 107.

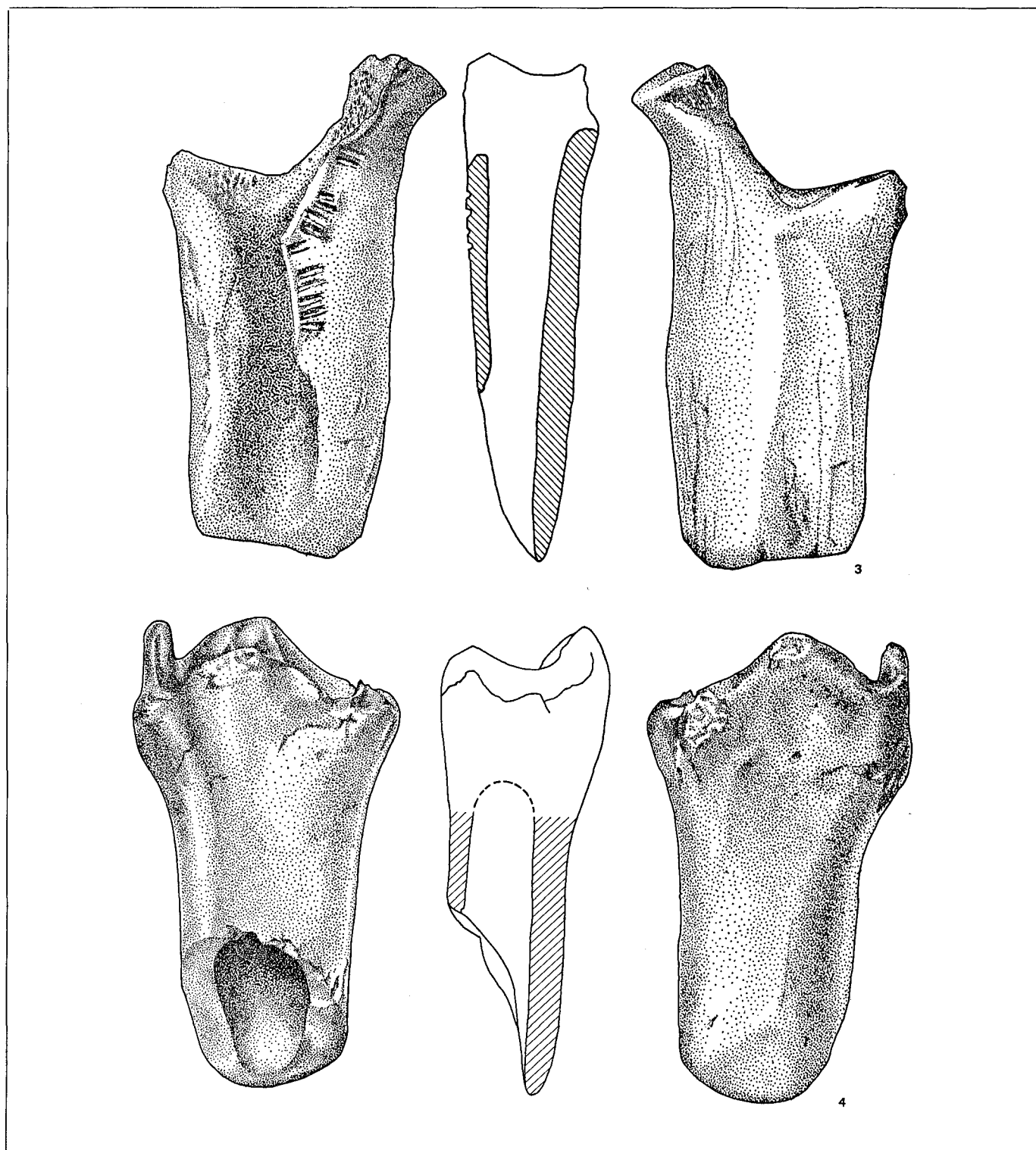


Fig. 6 Brown Bank region (nos. 3 and 4). Scale 1:2

Measurements: $l = 10.5$ $w = 7.6$ $th = 4.2$ cm.

Colour: 2.5YR - 3/4 (dark reddish brown)

No. 7 (fig. 7, pl. v left)

Distal articular end of the left metatarsal of the aurochs, separated from the long bone in a careful 'nibbling' technique, probably by means of picking with a heavy, pointed flint implement, such as a pointed core axe or a heavy burin.

No traces of the fracture are visible, but the entire surface of the fracture has been picked into a regular form. It might not be a waste product (as no. 6) but an implement or part of it, for example a handle in which a bone or flint axe blade could be inserted. No traces of wear at the interior of the bone give any support to this assumption, however.

Measurements: $l = 10.3$ $w = 7.3$ $th = 3.8$ cm.

Colour: 5YR - 3/2-4 (dark reddish brown)

No. 8 (pl. iv above)

Right metacarpal of the aurochs. At the posterior side the greater part of the bone has been broken away. Since no well-defined traces of working are visible it is not completely certain that the fractures were made artificially. But in the way it is damaged it is in contrast to the other metapodals found. Moreover the bone fits so well in a group of parallels from Mesolithic sites that we included the piece in the series of bones described in this paper.

Measurements: $l = 22.7$ $w = 8.7$ $th = 4.4$ cm.

Colour: 5YR - 3/3 (dark reddish brown) to 10YR - 7/4 (pale yellow)

No. 9 (fig. 8)

Antler tine, probably red deer. Cut and/or broken off perpendicularly at the point of juncture to the beam. At this point a small and almost cylindrical perforation has been made outside the axis of the tine. The perforation shows very sharp edges and very smooth sides.

Measurements: $l = 17.5$ $w = 3.8$ $th = 2.4$ cm.

Colour: 2.5YR - 8/4 (pale yellow)

Discussion

Shaft-hole picks (no. 1)

The shaft-hole pick is a rare but characteristic implement in the northern Core Axe Cultures. Mathiassen gave a general description:

'Picks of tubular bone, with shaft-hole. May be made of the ulna of various animals: aurochs, stag, wild boar; the radius of aurochs, wild boar; the cubitus of bear. Near

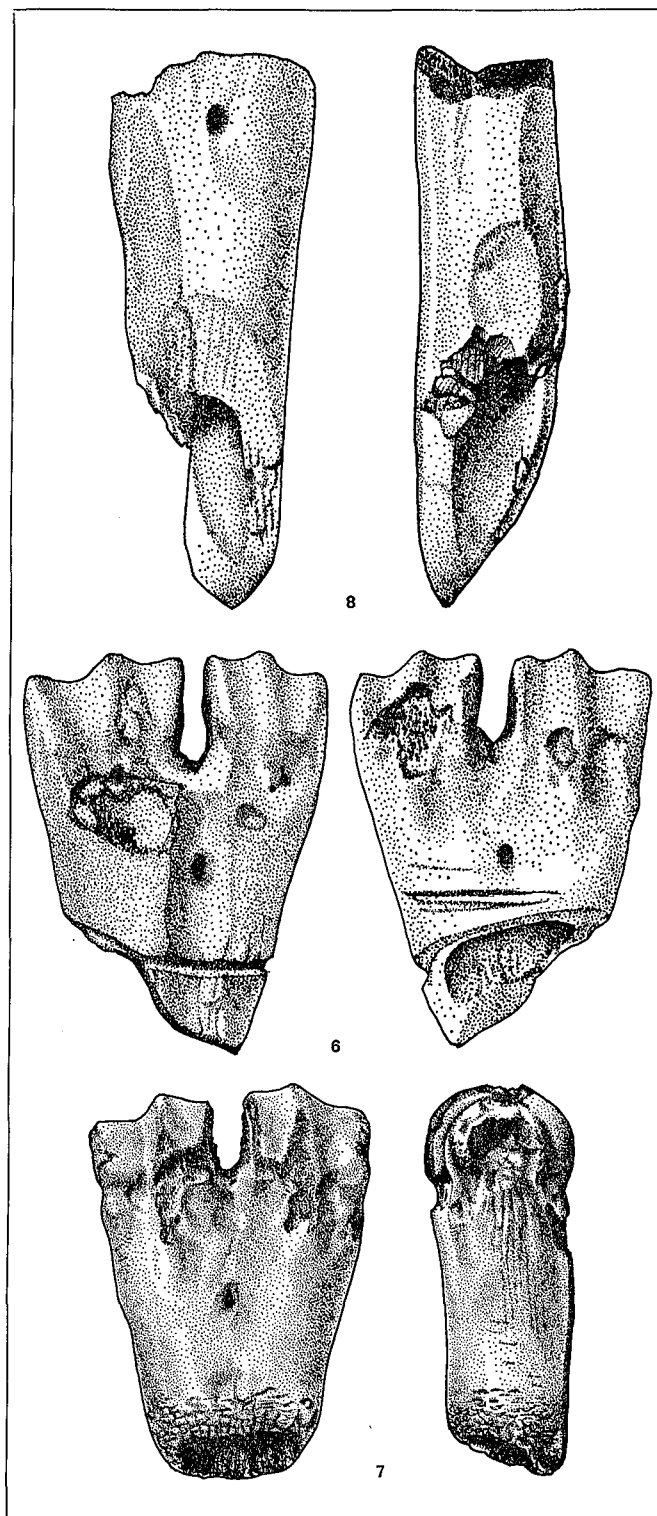


Fig. 7 Brown Bank region (nos. 5, 6 and 7). Scale 1:2

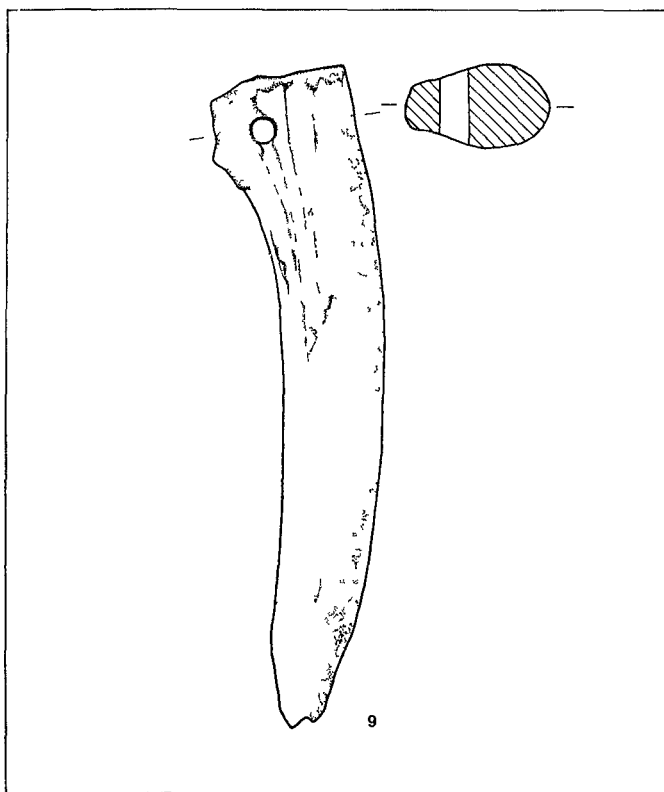


Fig. 8 Brown Bank region, antler tine (no. 9). Scale 1:2

the articular end is a shaft hole drilled through and the other end is sharpened to a point. The entire surface is scraped smooth and often ornamented with incised patterns. Length 11–32 cm. Presumably as a pointed axe mounted at right angles to a haft. Found in the Maglemose sites of Mullerup, Sværdborg, Øgaarde and Skellingsted Bro, as well as stray finds in Zealand and Jutland²⁵. The type is extremely rare in the Late Boreal Maglemose sites; only one specimen, made of the radius of a wild boar, from Sværdborg²⁶ can be named. At the relatively early site of Mullerup²⁷ one or perhaps two fragments,

25 Mathiassen 1948, nos. 133–5. We think by ‘drilled’ merely ‘perforated’ is meant in this sentence, because apparently no rotating boring apparatus was used. We prefer to use ‘adze’ instead of ‘axe’ because the plane of the cutting edge is not parallel but perpendicular to the haft.

26 Sarauw 1903, 275–7. Also in Clark 1936, fig. 62,6 and 7. 27 Broholm 1924, 123, fig. 55. Also Mathiassen 1948, no. 135 but illustrated as no. 134. Length about 12 cm.

28 Mathiassen 1943, figs. 35,2, 35,8 and 40,1.

29 Mathiassen 1943, 59. In view of their form and slenderness

both made out of the radius of an elk, can be mentioned. All three show decoration.

At Øgaarde more than one specimen was found²⁸. The most typical is a 17 cm-long fragment, the upper part of a decorated shaft-hole pick, well polished and made of an aurochs radius. The epiphysis has disappeared and the point is broken off. The shaft-hole has a diameter of 2.6 cm with a somewhat irregular rim. A second fragment is the 22 cm-long lower part of such a pick, broken through the shaft-hole and made of the ulna of a bear. The surface shows fine scoring, as decoration. A third specimen is also represented by a lower part, broken through the shaft-hole. It is made of an unidentified long bone, decorated and only 12.6 cm in length. In total 11 ‘Spidsvaaben af Ben’ are mentioned, but in this number also the antler implements have been included²⁹. It is important that at Øgaarde two occupation phases have been distinguished, the second dated Late Boreal. Since from the lower layer only 4 barbed points of Kunda-type, against 60 of Mullerup type and 6 slotted with flint insets are reported, the first phase cannot be dated much earlier than Mullerup and so must belong to the Early Boreal³⁰. Most of the bone and antler objects (600 out of 736) and especially the ‘Spidsvaaben af Ben’ (9 out of 11) belong also to the first phase.

No other shaft-hole picks in Denmark are dated since they are all more or less isolated finds.

The most typical form (made of big aurochs bones) was known to Mathiassen³¹ as isolated finds only: five specimens in north and middle Zealand and in east Jutland. We found very good parallels to our shaft-hole pick in the decorated axes of Ryom Aa in Djursland and Ringstedt Aa³², both made out of the distal part of an aurochs radius and both about 30 cm long.

From south Sweden a specimen is known to us from Lyby Moor, Skåne³³, decorated with ‘typical Maglemose motifs’, dated by pollen analysis to the Early Boreal. The 30 cm-long shaft-hole pick has been made out of the ulna of an aurochs.

In the German Democratic Republic the type is known at

the antler ‘Spidsvaaben’ must have had a somewhat different function.

30 Mathiassen 1943, 148–53 and fig. 93 suggests a Preboreal date. As to the barbed points see p. 43 f. of this paper.

31 Mathiassen 1948, nos. 133–5. But one specimen at Øgaarde was made out of an aurochs bone.

32 Ryom Aa: Brøndsted 1934, 145–7; Brøndsted 1960, 81 and 79, fig. a; Ringstedt Aa: Sophus Müller 1918, fig. 1.

33 Malmer/Magnusson 1955, dated in pollen zone VIII, Early Ancylos or Early Boreal (98–104).

Hohen Viecheln and in four isolated finds in Mecklenburg and Brandenburg³⁴. The 33.5 cm-long specimen of Kessin, Kr. Alentrepow, has been made out of the distal part of an aurochs radius and also shows all minor characteristics of the type. The shaft-hole axis makes an angle of about 80° to the axis of the adze itself, the shaft-hole (diam. about 3.2 cm) shows an irregular outline with cutting marks along the edge. The surface is well polished, but not decorated, showing traces of wear in the form of longitudinal scratches, especially at the point. It is the best counterpart of the Brown Bank pick.

At Hohen Viecheln³⁵ two complete specimens were found. Both are made out of an aurochs radius, 28.5 and 32 cm long, well polished and decorated with 'typical Maglemose motifs'. Both axes and the 10 cm-long cutting-edge of a third specimen are attributed to the 'Younger Settlement', while they are lacking in the older. The exact dating of both settlements, however, gave rise to some discussion even in the published monograph. Reviewing all archaeological and palaeobotanical evidence, we think it is very difficult to make a clear distinction between the two settlements. The best that can be said is that the finds belong to a period covering the end of the Preboreal and the Early Boreal, while the finds from the younger deposits might be lying in secondary position³⁶.

On the other side of the North Sea, the about 22 cm-long upper part of such a pick, made of the distal end of an aurochs ('ox') radius, was found in the Thames³⁷. The lower part of the axe is decorated with heavily incised chevrons, one of the 'Maglemose' motifs. It cannot be determined whether the bone was cut to a point or hollowed out to insert a flint axe blade. The first possibility seems most likely. The shaft-hole has a diameter of about

2.9 cm and shows the common, somewhat irregular form with cutting marks along the rim.

Near the 'pile-dwelling' at West-Furze, Ulrome, Holderness, Yorkshire³⁸, but not necessarily associated with it, a group of eight perforated axes had been found, all of them without the points and made out of aurochs bones (7 × distal part radius (!), 1 × scapula). The shaft-hole diameter is rather small: 1.2–2.3 cm. For typological reasons an (Early) Boreal date seems the most plausible. Since three find places of barbed points are known in the same district, the date is not at all unlikely.

Briefly we will point out the possible origin of the type of implement under discussion. We think it is a further development of the elk antler shaft-hole adzes, discussed at another place in this paper (p. 56 f.), themselves the successors of the reindeer antler axes of Lyngby type. The elk antler adzes ('mattock heads') at Star Carr comprise different subtypes. Of special interest is the subtype, where the working-edge or point is cut in the bone of the adhering pedicel³⁹. The toolmaker profited from the hard bone for the working end and from the softer antler for making the shaft-hole. This might be the first step to similar adzes made entirely out of bone, *i.e.* the picks discussed here. In view of the rarity and the short period of use of the bone shaft-hole picks, this change was probably not successful. The red deer antler adzes and axes proved to be a greater success. The adze from Aschbroeken (p. 59) is in our opinion such a 'translation' in red deer antler, resembling the aurochs radius shaft-hole picks in many respects.

Summarizing we can state that the shaft-hole pick fits very well with a small number of picks of the same type, generally made out of the distal part of an aurochs radius, about 30 cm long with a shaft-hole of about 3.0

suggest that these might be objects which have sunk down from the level of concentration, but the palaeobotanists point out a human occupation level in the lower part of the gyttja. Moreover the lithological boundaries are not chronological boundaries, which is proved by the occurrence of fragments of one of the picks in both the upper two layers. The material of the Younger Settlement might also include redeposited material of the older phase. In this paper the whole complex has been regarded as of a Late Preboreal – Early Boreal age. The occurrence of a considerable number of uniserially barbed points at the higher levels also points to a date contemporaneous or even slightly earlier than Mullerup and the early phase of Øgaard.

37 Smith 1933–4.

38 Smith 1911. The 'pile-dwelling' is dated to the Late Bronze Age. Roman finds occurred in the immediate vicinity. The dimensions of the bones indicate that they are aurochs bones.

39 Clark 1954, 157 f., nos. EM 1, 2 and 4.

34 Gramsch 1971.

35 Schuldt 1961: preliminary reports in: *Bodendenkmalpflege in Mecklenburg, Jahrbücher* 1955, 1956, 1957. For the axes: 1961, 126–7 and *Taf.* 51, 52 and 115.

36 Schuldt 1961, esp. 36, 89, 126, 147.

At Hohen Viecheln three successive layers are distinguished: a lower sand with washed wood remains (undated), a detritus gyttja (End Preboreal – Early Boreal), and an upper sedge and brushwood peat (Late Boreal – Early Atlantic). The material of the 'Older Settlement' is confined to the deepest layer and must certainly be of Preboreal age. The preponderance of uniserially finely barbed points (form 6) and the occurrence of two stag frontlets, worked to masks (with dated parallels only at Late Preboreal Star Carr) confirm such a date. The material of the 'Younger Settlement' was found in the upper two layers, mainly concentrated in the transition zone of both. A relatively small number of finds came from the gyttja itself. The excavators

cm diameter, which had been cut out with a burin or a flint flake. The picks are all well polished and mostly decorated. We can date the type to the Early Boreal on account of the finds at Øgaarde, Mullerup, Lyby Moor, and (less reliable) Hohen Viecheln and the absence of the type at Star Carr and the Danish Maglemose sites. Since all pieces show a blunt or adze-like point, we consider the very sharp point of the Brown Bank axe a remarkable characteristic. The burin cutting-marks are also unique, while the lack of decoration is exceptional.

Socketed axes (nos. 2 and 3)

The bone socketed axe is more common than the shaft-hole pick, although in absolute sense still a rare implement. It was found, however, at all important Danish Maglemose sites. The axes are generally made out of the proximal parts of aurochs metatarsals, by cutting obliquely from one side. The length varies between 11 and 20 cm⁴⁰. Three specimens from Mullerup⁴¹ are all made of aurochs bones. At Øgaarde⁴² six complete specimens, varying in length between 14 and 19 cm, and 4 fragments were found. From Holmegaard⁴³ two specimens, both made of aurochs metacarpals, 16.8 and 20.5 cm long, are mentioned. From Sværdborg Friis Johansen⁴⁴ named 3 specimens, two made of an elk metatarsal (11 and 16 cm) and one of an aurochs radius (24 cm, diameter shaft-hole 2.5 cm). Broholm⁴⁵ added 7 new pieces: 4 made of an aurochs metacarpal (? , 13.0, 16.8, and 19.5 cm), one of an aurochs radius (16.5 cm, diameter shaft-hole 2.2 cm), one of an elk metatarsal and a rough out (25.5 cm) of an aurochs metatarsal. At Hohen Viecheln⁴⁶ two socketed axes were found, both made of aurochs metatarsals, 19.1 and 16.1 cm long, and both attributed to the 'Younger Settlement'.

In the small hoard from Brenningmose⁴⁷ a socketed axe occurred together with a shaft-hole axe and a shaft-hole adze, both made of red deer antler, and an elk antler fragment with adhering pedicel, probably the raw

material for the fabrication of a perforated adze. The socketed axe is made of an aurochs metatarsal and measures about 20 cm.

Outside Denmark the type is found as far as Esthonia and Poland⁴⁸. The only bone socketed axes known to us from the countries around the southern North Sea are the axes from Wichelen⁴⁹ and from Koerhuisbeek near Deventer, described below (p. 53). Made of an exactly similar piece of bone, it is the sole exact parallel to our axe no. 3. Is this subtype perhaps restricted to the North Sea region? At Sværdborg only two other socketed axes made from a radius were found, but in both cases the distal end was used.

All finds prove a Boreal age for the bone socketed axe, Early as well as Late Boreal. The absence at Star Carr suggests that this type of axe was not yet in use during the Preboreal.

Post-Boreal finds are, however, known. At Rude 2, Satrup Moor⁵⁰, one 13 cm-long specimen was found, made of the distal end of a tibia, and belonging to the Oldesloe Culture. In the TRB-settlement of Bundsø⁵¹ a number of these axes, but made of the metatarsals of the domestic ox, were found, about 12 cm long. At the Michelsberg earth works of Heilbronn-Neckergartach, Schwaben, socketed bone axes, made of the shoulder-blades of domestic cattle were in use in Middle Neolithic times⁵².

Summarizing we find that our axe no. 2 fits in well with Maglemose-series and that, in spite of the younger finds, a Boreal date can hardly be disputed. With its length of only 10.2 cm it is, however, the shortest known. Our axe no. 3 is less typical. As when discussing the shaft-hole picks we can conclude that both pieces show some minor characteristics of their own.

Other axes (nos. 4 and 5)

However remarkable it may seem, we did not find any parallels to the simple bone axe (adze), no. 4. The

40 Clark 1936, 112; Mathiassen 1948, no. 129.

The distribution covers the regions of the Maglemose as well as the Gudenaa Cultures (for instance Revelmose, dated Boreal, Mathiassen 1937, pl. 1; Brøndsted 1960, fig. at 96).

41 Sarauw 1903, 221 and fig. 18; aurochs metatarsal.

42 Mathiassen 1943, 82, fig. 38, 1 and 2. On 59, however, 7 + 6 = 12! pieces, see also note 30 for the dating of Øgaarde. On p. 82 the use as ice picks is suggested. As it seems they are made predominantly out of aurochs metatarsals.

43 Broholm 1924, 59-60 and figs. 20, 21.

44 Friis Johansen 1918, 308 (1919, 185).

45 Broholm 1924, 111 and fig. 48.

46 Schuldt 1961, 125 and *Taf.* 50, 113, 114.

47 Mathiassen 1959, 22 and fig. 23.

48 Cf. Mathiassen 1948, no. 129; Indreko 1948, *Abb.* 51, 1; Clark 1936, 112.

49 Hasse 1934, 70, pl. 1, 3. A 19 cm long socketed axe made of the proximal end of an aurochs metatarsal.

50 Schwabedissen 1957, 7. Length about 13 cm; shaft-hole (diameter 2.5 cm) with sharp edges.

51 Mathiassen 1939, 26 and fig. 12.

52 Koch 1971, 56 and *Abb.* 3.

type does not occur at any of the well-known Mesolithic sites named above. We could not find parallels in settlements of the Ertebølle Culture or the Early and Middle Neolithic either. The polished surface of the axe, the smooth form and the blunt edge are proof of an intensive use, which must have been rubbing against a relatively soft material. So it is not possible to call the axe a half-finished socketed axe or shaft-hole adze. Moreover, the tibia is never mentioned as a bone used for the fabrication of these axes.

The above remarks concerning the axe no. 4 are also valid for the fragmentary pointed axe no. 5. It seems that the pointed form is only secondary, made after a part of the cutting-edge was broken off. In view of the place of the fracture at the end it is impossible that a shaft-hole was originally present, while the polishing and the marks of wear make clear that it is certainly a finished product. The metatarsal was moreover never used for a shaft-hole pick.

Our conclusion must be that we have no archaeological evidence for the dating of the two axes.

Worked metapodals (nos. 6, 7 and 8)

Cut or broken-off distal ends of metapodals are frequent at Maglemose sites⁵³. Metapodal ends of the aurochs are, however, a special characteristic of Star Carr. The distal ends of the metapodals were removed there by cutting a deep V-sectioned groove and breaking along the line of weakness. Nine examples of such detached ends have been recovered. The break was rarely perfect and in one extreme instance it coincided with no more than half an inch of the groove. The groove itself was formed 'very laboriously by working sharp-edged flakes back and forth with a saw-like motion'⁵⁴. It is clear that these are waste products of the fabrication of the so-called skin working tools, a speciality of Star Carr. Metapodals of other animals were not used: the (barbed) points were almost exclusively made of antler.

In Denmark the bodkins and (barbed) points were made out of the extremity bones of large mammals, usually the metapodals⁵⁵ of deer species, in the same technique as antler was worked at Star Carr. It is remarkable, however, that no sharp incisions were made around the bone, but that generally a broad transversal notch or circular groove was hewn out, probably with a heavy burin, flint pick, or core axe. This is also true for HohenViecheln⁵⁶. The articular end was struck off after the longitudinal incisions were made in the diaphyses, as appears from some articular ends and bones with half-finished working⁵⁷. The struck-off articular ends were only rarely used; neither the 9 pieces (aurochs) of Star Carr nor the 38 pieces (deer sp.) at Hohen Viecheln show traces of use. In Denmark this is generally the case too: at Mullerup⁵⁸, for example, 25 articular ends of the red deer, 18 of elk and 3 of aurochs were found. Those of the red deer were all 'cut off', of the elk 'broken off', and of the aurochs 'worked', which in our opinion means that no traces of use were visible. On the other hand at Sværdborg⁵⁹, 4 ends of aurochs metapodals were used as smoothers ('Glattere'). At Holmegaard⁶⁰ only one 'Glattere' of an elk metapodal was found. Other uses of the aurochs metapodals comprise the manufacture of socketed axes and of clubs (Benkølle)⁶¹. So in Denmark the aurochs metapodals were not neglected, but their use differed definitely from that in Star Carr.

The circumcision of metapodals is not restricted to the Mesolithic. As an example we can mention the articular end found in the Vlaardingen Culture settlement at Voor-schoten⁶². At Hekelingen⁶³, also a settlement of the Vlaardingen Culture, red deer antler was worked in the same way.

Our articular end no. 6 shows all the characteristics of the specimens of Star Carr, which seem to be absent from the Boreal Danish sites. Consequently a date in the Late Preboreal seems to be the most probable. As to no. 7, the technique is not found at Star Carr but it does occur the

53 Mathiassen 1948, no. 177.

54 Clark 1954, 161, pls. xvii and xviii.

55 Mathiassen 1948, no. 177 speaks about 'metatarsals'. It seems better to use the more general word 'metapodals', since in our opinion, a clear distinction is not always made between metacarpal and metatarsal.

56 Schuldt 1961, 110, *Taf.* 111b, c, d.

57 Sarauw 1903, figs. 25, 26 (Mullerup).

Friis Johansen 1918 and 1919, fig. 70 (Sværdborg).

Schuldt 1961, *Taf.* 111, cat. no. 1000 (Hohen Viecheln).

58 Sarauw 1911, 100.

59 Friis Johansen 1918, 338, fig. 69 (1919, 213).

Cf. also Schuldt 1961, 110 (note).

60 Broholm 1924, 75 and fig. 30.

61 Sarauw 1903, 224 and fig. 19 (2 specimens found); Friis Johansen 1918, 310 (1919, 186) and fig. 48.

62 Groenman-van Waateringe *et al.* 1968, 118 and fig. 9, bottom right, from layer 10 (= Early Vlaardingen).

63 Modderman 1953, pl. 1, *afb.* 2; not made of reindeer antler as mentioned in the text (p. 9).

more to the east of the North Sea. Aurochs metapodals are, however, hardly used there, nor are 'handgrips' of this type known⁶⁴. So it is not possible to give an accurate date to this artifact. Finally we illustrate the broken-out aurochs metacarpal, although we are not completely sure whether it was broken by man or by natural causes. Real traces of working, clearly visible on some of the published parallels⁶⁵ are not present on our specimen. Yet we thought it useful, because of the relation to the artifacts presented here and of the resemblance to the parallels, to illustrate this metacarpal.

Antler tines (no. 9)

Detached tines of red deer antler are common at all important Early Mesolithic sites around the North Sea, but they were found also at later sites, *i.e.* in the kitchen-middens of the Ertebølle Culture. The tines are unworked, sharpened or cut obliquely at the point and then perhaps used as 'rubbing sticks'⁶⁶. Sometimes the point is blunted for the use as a flint-flaker (percussion stick)⁶⁷. Large perforations (shaft-holes) may occur and promote the antler tines to small picks ('Spidsvaaben'), which (when made out of the main beam of the antler) can measure up to 80 cm in length. They are often decorated and found on Maglemose as well as Ertebølle sites⁶⁸.

Small perforations, as on our specimen are not known to us from such tines, but they occur on a series of other objects, showing that the technique at least was known. The perforations have been made in different techniques: roughly cut out, conical and sometimes also cylindrical. A perfect perforation as on our tine, however, seems to be an exception⁶⁹.

In spite of the data named above, in our opinion, we

must regard this antler tine as undated, but we cannot completely exclude an Early Mesolithic date. Since it is reported to have been found farther to the east, where the depth is about 30 m, it might be slightly younger than the other implements. A later date would imply that it is an object lost by ships, for example the part of fishing gear.

Working techniques (pls. I–V)

The relatively small number of Mesolithic implements from the Brown Bank region demonstrates a remarkable variation of working techniques:

1 A technique named by Clark⁷⁰ 'nibbling' or 'gnawing'. With a flint burin a large number of short, parallel grooves were cut close to one another. It occurs most distinctly on our no. 1 near the point but also at the side of the same piece, and on no. 3.

2 The cutting of sharp, V-sectioned grooves, probably made with a flint flake or blade or with a burin. On no. 6.

3 A technique named by Schuldt⁷¹ 'anpicken', to translate as 'picking'. Not a sharp groove but a broad notch originated in this way. On no. 7.

4 The superficial cutting of the bone as a preparative working, probably done with a big flake or perhaps with an axe. On nos. 2 and 3.

5 Flaking; breaking away flakes of the bone by means of beating or pressing. On no. 5.

6 Grinding. Especially at the working-ends of the axes, as on nos. 1, 4 and 5. Intentional polishing could not be attested.

When we compare this list with the comments on bone and antler working techniques at Star Carr⁷², Hohen Viecheln⁷³, and the Kunda district⁷⁴, it appears that the whole range of techniques of the Northern Core Axe

64 Grips of another type, made of the long part of the bone, were made by the Maglemosians, for instance at Øgaarde (Mathiassen 1943, 59) and at Undløse Bro (*ibid.* 124, fig. 65). Cf. also the 'priemartiges Gerät' at Hohen Viecheln, Schuldt 1961, Taf. 69d, 139b.

65 Cf. note 57.

66 In general: Mathiassen 1948, no. 189.

Holmegaard: Broholm 1924, fig. 19.

Sværdborg: Broholm 1924, fig. 47; Friis Johansen 1918, fig. 44.

Øgaarde: Mathiassen 1943, fig. 38,4 and 5.

Hohen Viecheln: Schuldt 1961, Taf. 138.

Star Carr: Clark 1954, 136 and figs. 65, 66.

Ertebølle Culture: Brøndsted 1960, 121 no. 0.

See also Brøndsted 1960, figs. 67f, 71b, 101b.

67 In general: Mathiassen 1948, no. 190. For example at Øgaarde (Mathiassen 1943, figs. 38,6 and 39,4. But also Ellerbek: Schwantes 1958, Abb. 72.

68 Mathiassen 1948, nos. 136–140.

Øgaarde – Mathiassen 1943, fig. 38,3.

Holmegaard – Broholm 1924, fig. 23.

Sværdborg – Broholm 1924, fig. 52.

69 See Mathiassen 1948, *passim*.

In teeth: Mathiassen 1943, fig. 43; Schuldt 1961, Taf. 68 (conical) Sarauw 1903, fig. 42. In 'Schwirrgeräte': Brøndsted 1960, fig. 101e; cf. also Late Palaeolithic Stellmoor, Schwantes 1958, Abb. 34. In bone: Schuldt 1961, Taf. 68 (cylindrical), Sarauw 1903, fig. 38, 34 (fish hook). In amber: Brøndsted 1960, 88 (cylindrical and conical), Clark 1954, pl. xx (also in haematite). Ertebølle Culture: Brøndsted 1960, fig. 121b, k.

70 Clark 1954, 136, 157, 190 and pl. xvi.

71 Schuldt 1961, 150.

72 Clark 1954, 115–9, 136, 157, 161; see also 181–5 for cultural relations of the techniques and Clark 1956, 12–5 for a summary.

73 Schuldt 1961, 15, 110, 149 f. and Taf. 73b (gnawing).

Cultures was employed in the Brown Bank region. The techniques at the Danish sites have been studied in less detail, but we can state (mainly on account of the illustrations) that in general the same methods of bone and antler working were known there⁷⁵. Despite this overall agreement there are, apart from the typological differences named above, also technological dissimilarities between the Brown Bank finds and those from the other regions. First, the high preference for aurochs bones (see p. 30) and the complete lack of worked antler. Further, the elsewhere most common 'groove-and-splinter' technique on either antler (Preboreal, Star Carr)⁷⁶ or deer metapodals (Preboreal-Boreal, Hohen Viecheln⁷⁷; Boreal, Danish sites) is not represented with certainty. Perhaps in the North Sea Basin the metapodals of the aurochs were used.

Traces of wear and some ideas about the use of the axes

If well-preserved, the axes demonstrate clear traces of wear: longitudinal scratches at the point (nos. 1 and 5) or a high polish (no. 4). The axes nos. 2 and 3 are in a too bad condition for details such as these to be distinguished. The high polish might be well the result of rubbing against a soft material, for instance the hides in leather-working. We suggest the same use as some cut-off articular ends of metapodals found on the Danish Maglemose sites (the 'Glattere', see p. 43).

The longitudinal scratches on bone axes seem to be fairly common, but are only visible on well-preserved specimens and mentioned only when a detailed description is given (*e.g.* the shaft-hole pick from Kessin). They might indicate that we are concerned with digging implements, especially when the scratches are concentrated at the working-ends. But longitudinal scratches might also originate when stripping the flesh from the bone, as was suggested for the scratches on the upper part of no. 1 (pl. 1 right).

We collected some remarks on the use of both types of bone axes and of bone and antler axes in general. At Ulrome the occurrence of at least eight broken specimens of the rare shaft-hole pick points to a strictly localized activity of a special character, with a great chance of breaking the axes. Smith suggests that they were used 'possibly to cut out the burnt interior of tree trunks in

order to make canoes'⁷⁸. We consider this to be quite plausible. Schuldt⁷⁹ argues that the fact that both pointed shaft-hole adzes at Hohen Viecheln were forcibly broken in the settlement, makes it unlikely that they were used for hunting. He thought both these and the socketed axes to be unsuited for grubbing up roots either. Clark says of bone and antler axes⁸⁰ that it seems hardly reasonable to assume that they were used for working wood, in view of their physical characteristics. As to the elk antler adzes at Star Carr (well-comparable with the bone shaft-hole picks, see p. 41) he suggests that they were used as mattocks for grubbing up roots, making holes for traps or similar purposes. About the later T-shaped red deer antler axes there is some evidence that they were used for chopping off meat from carcasses⁸¹.

These partly contradictory quotations make clear that any interpretation of the use of the axes is speculative. We must reckon on the one hand with functional differences of different types or with the use of a certain type of axe for different kinds of work, and on the other hand with typological and technological evolution of an implement with a certain function. Perhaps a systematic and careful study of the traces of wear and of the way of manufacture might shed some light on this problem.

2. THE IMPLEMENTS FROM THE NETHERLANDS

INTRODUCTION

During recent years a number of well-defined Mesolithic bone and antler artifacts were found in the Netherlands. Together with some older finds they form a distinctive element in the Dutch (Early) Mesolithic not yet recognized fully until now. The artifacts listed in Table IV are described and discussed here. No attempt is made, however, to be complete in this modest list. Some implements may still be hidden in the museum store-rooms or in private collections. Moreover all red deer antler axes and adzes are left out of consideration, in view of the serious difficulties of dating them. This would imply a basic study on the typology, working techniques *etc.*

74 Indreko 1948, esp. 136-40.

75 'Gnawing': Sværdborg, Friis Johansen 1918, 1919, fig. 63. Transversal cutting (for beads): *ibid.* fig. 60. Transversal notches: see note 55. Longitudinal cutting in the groove and splinter technique: see note 57. Heavy picking: Sværdborg, Broholm 1924, fig. 45; Sarauw 1903, fig. 16.

76 Clark 1954, 115 f., 136 f., pl. VII-IX, fig. 79.

77 Schuldt 1961, 110 and 149 f.

78 Smith 1911, 599.

79 Schuldt 1961, 127, 147-8.

80 Clark 1952, 224.

81 Clark 1954, 157; Clark 1952, 224.

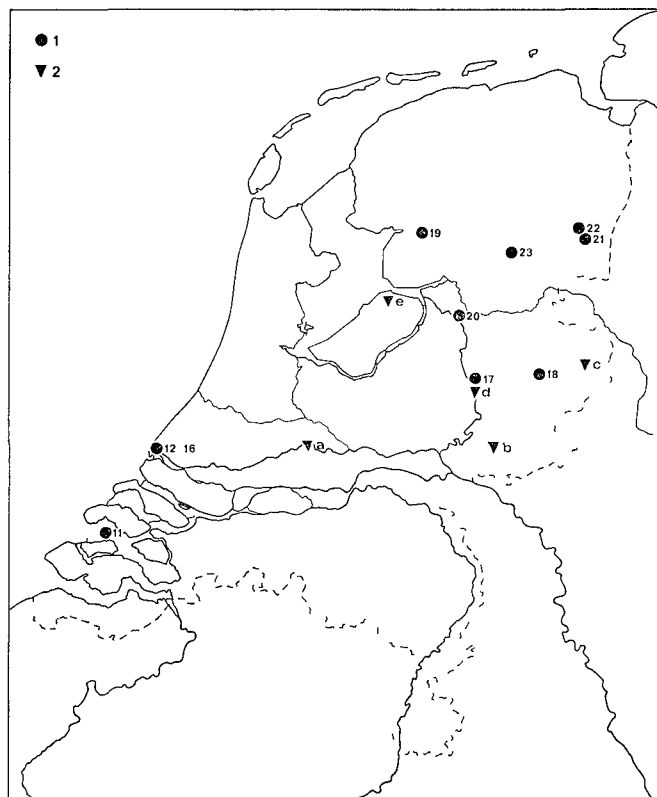


Fig. 9 Findspots of the discussed Mesolithic implements (1) and the named Tévéc-skulls (2) from the Netherlands: a: Vianen, b: Hummelo, c: Hengelo, d: Koerhuisbeek, e: Swifterbant

Fig. 10 Colijnsplaat, worked red deer antler (no. 11). Scale 1:2

of all finds. We feel we should make an exception for the adze from Aschbroeken, that certainly must be dated before the Ertebølle – Ellerbek phase⁸².

COLIJNSPLAAT (figs. 10–11, pls. v right and vi left)

Description

No. 11

The artifact is the base of a naturally cast right antler of a red deer. The first tine has been broken off roughly and the beam shows the marks of working in the 'groove-and-splinter' technique. We see the lower ends of six V-sectioned grooves and in between them the scars of five splinters that are released from the beam. At two points transversal cutting marks, as a preparation in breaking out the splinters, are visible. At the base of one broad splinter, the preparative work also comprised superficial chiseling with a burin in a longitudinal direction (pl. v right), well comparable to the 'gnawing' technique mentioned above on the pointed shaft-hole axe from the Brown Bank. The rose is secondarily damaged.

Measurements: l = 13.8 h = 8.8 th = 6.0 cm.

Colour: 10 YR – 7/4 (very pale brown) – 10YR – 2/2 (very dark brown)

Find Circumstances

On the 14th of April 1970 the remains of a Roman temple, consecrated to the goddess Nehalennia were discovered by Mr K.J. Bout, a fisherman from Tholen. The consequent fishing and diving operations by the National Museum of

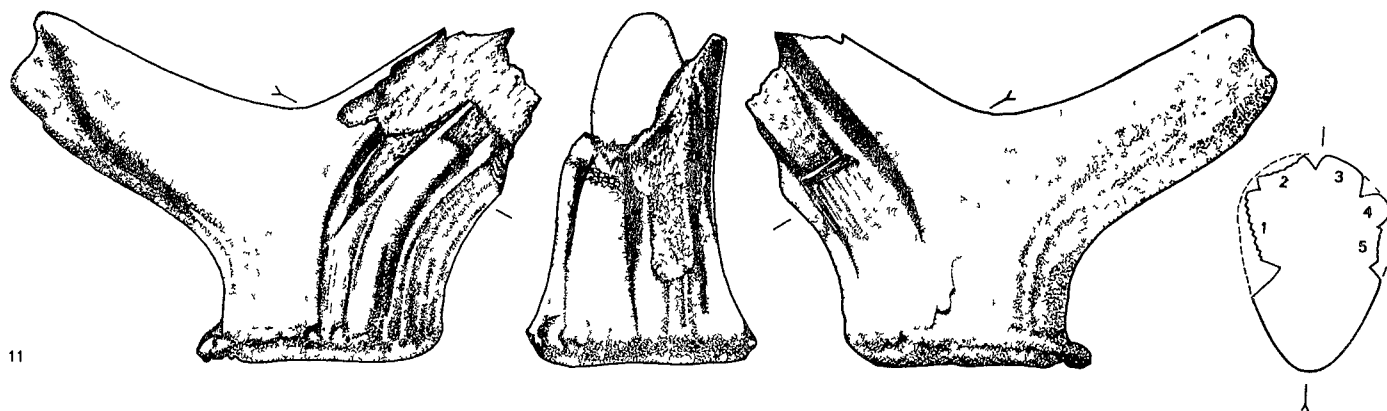


TABLE IV. Mesolithic Bone and Antler Implements from the Netherlands*

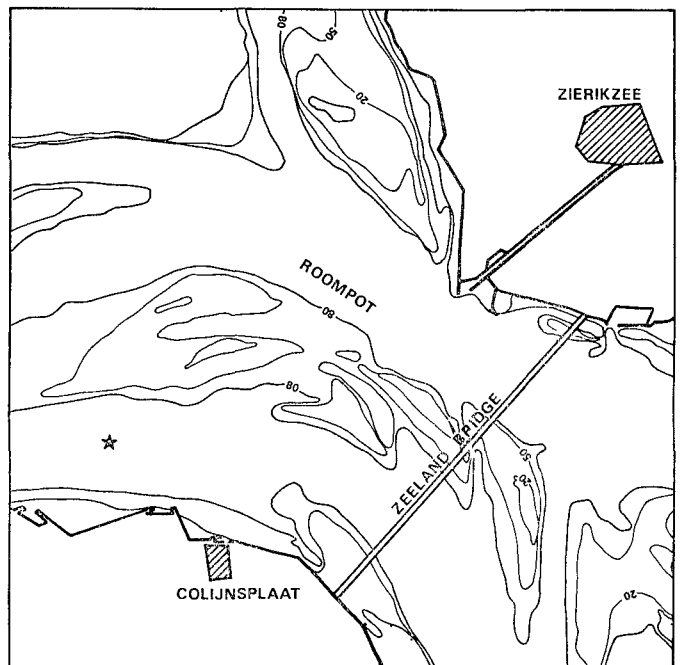
no.	Museum & inv. no.	Year found	Find place	Animal	Bone	Implement
11	RMO 1971/12-2	1970-'71	Colijnsplaat	red deer	antler	groove-and-splinter technique
12	priv. coll.	1971	Europoort	—	bone	barbed point
13	priv. coll.	1971	Europoort	wild boar	tusk	chisel
14	priv. coll.	1972	Europoort	—	bone	barbed point (fragment)
15	priv. coll.	1971	Europoort	red deer	antler	worked in various techniques
16	priv. coll.	1972	Europoort	—	bone	worked
17	Zwolle no. 5544E	1968	Koerhuisbeek	aurochs	radius	socketed axe
18	Zwolle no. 98	before 1909	Hericker Berg?	elk	antler	shaft-hole adze
19	Schokland (North East Polder) Z 1957/5-35	—	Kuinre	elk	antler	shaft-hole adze
20	Schokland (North East Polder)	1961-'62	Spoolde	elk	antler	shaft-hole adze (fragment)
21	Emmen no. C14	before 1935	Emmererfscheiden- veen	—	?	barbed point
22	Emmen no. B4	before 1935	Aschbroeken	red deer	antler	pointed shaft-hole adze
23	Assen 1955/VIII-2	1955	Pesse	pine wood	—	dug-out canoe

* The nos. 16a and 16b are not included; the Pesse canoe is added to the list.

Antiquities resulted in a 'catch' of about 30 tons of stone, for the greater part altar stones, about 80 of them more or less complete⁸³. The minor finds (roof tiles, pottery, fossil bones) include a few pieces of worked antler. One is an axe, made out of the base of an antler beam, with an oblong shaft-hole and a badly damaged cutting-edge. A similar axe was found at the type site of the Vlaardingen Culture, a Late Neolithic age seems the most likely⁸⁴. Four others are merely the cut and broken-off parts of bases of antler beams, that typologically cannot be dated accurately. The sixth piece is, however, presented here, since it must be dated to the (Early) Mesolithic.

At Colijnsplaat the Roman material lies at -24 to -27 m NAP on a subaquatic platform formed of a resistant Early Pleistocene clay. Most of the fishing was done at this depth, but incidentally somewhat deeper (to -32 m) in channels cutting the platform. On the platform Early Pleistocene, Weichselian, and Holocene faunal remains⁸⁵ lay intermingled at the same level as the Roman finds,

Fig. 11 Colijnsplaat, position of the fished-up worked antler no. 11 (star). Depth in dm. Scale 1:100,000



82 Cf. p. 61 f. of this paper.

83 Stuart 1971 and lit. cited there.

84 Van Regteren Altena *et al.* 1962, fig. 9. Similar shaft-holes do not occur at the Maglemose implements.

85 Identified by Mr G. Kortenbout van der Sluijs.

which means that all are lying in secondary position, as was the piece of antler under discussion. We can only say that originally it must have been situated at a level higher than -32 m and very probably higher than -27 m NAP.

We know from a bored section 4 km to the east of the find spot at the place of the present-day Zeeland bridge, that the top of the Weichselian lies between -16 and -27 m NAP. Below the island of Schouwen the Lower Peat (*viz.* the not-eroded top of the Late Glacial deposits) is found between -21 m in the west and -10 m in the east of the island. At the lowest points it is dated to the Preboreal, at about -15 m in the Boreal and at the highest points to the beginning of the Atlantic. The sea invaded the region in the beginning of the Atlantic⁸⁶. We can only conclude that the find circumstances of the worked antler and the geology of the district permit no closer dating than Preboreal or Boreal.

Discussion

In the Late Glacial the red deer did not live in North-western Europe, with the exception perhaps of the Allerød period, when some penetrated so far to the north. So we safely can date the artifact to the Holocene. As said above the working of red deer antler in the groove-and-splinter technique is dated to the Late Preboreal at Star Carr. Clark⁸⁷ suggested that this might be a characteristic for this period and that in the Boreal the techniques changed to (red deer) metapodals. The differences between Star Carr and the Boreal Danish sites are more likely to be chronological than regional, since some bone points were found in Great Britain and grooved antler beams in Denmark and Schleswig-Holstein. New evidence revealed, however, that the problem is somewhat more complex than the simple relation Preboreal = antler, Boreal = bone. At Hohen Viecheln the points were made out of bone⁸⁸ and the groove-and-splinter technique was practiced on antler beams as late as the Atlantic at Heidmoor in Schleswig-Holstein⁸⁹.

86 Van Rummelen 1970, 49-51.

87 Clark 1954, 181-7; Clark/Godwin 1956, esp. 13.

88 Schuldt 1961, 110.

89 Schwabedissen 1958, 35 and *Abb. 10*. Found at a settlement site with occupation of the Ellerbek-Ertebølle Culture, in the Middle and in the Late Neolithic.

From the Ellerbek settlement at Rosenhof (Eastern Holstein) Schwabedissen (1972, 5) reported that the working of bone was based on the groove and splinter technique, but it seems that this was not the case in the working of antler.

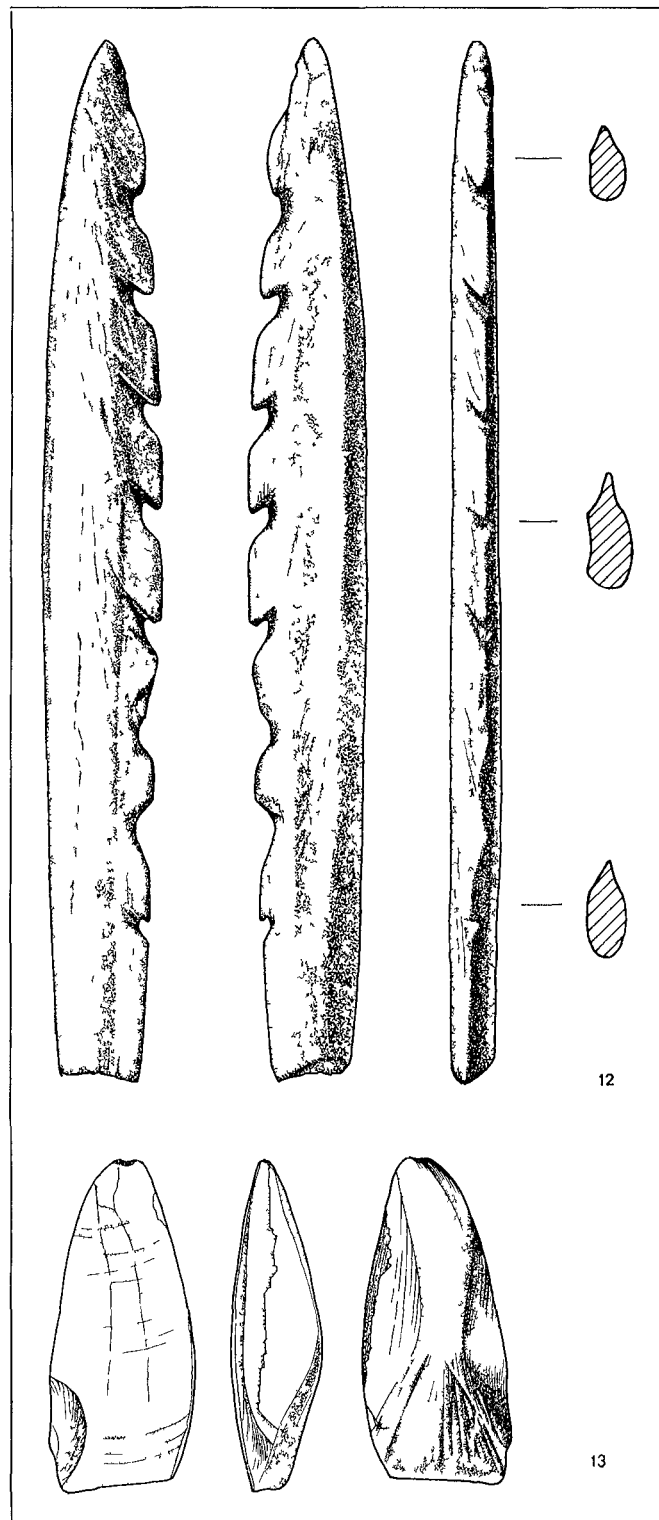


Fig. 12a Europoort, site 1 (nos. 12-13). Scale 1:1

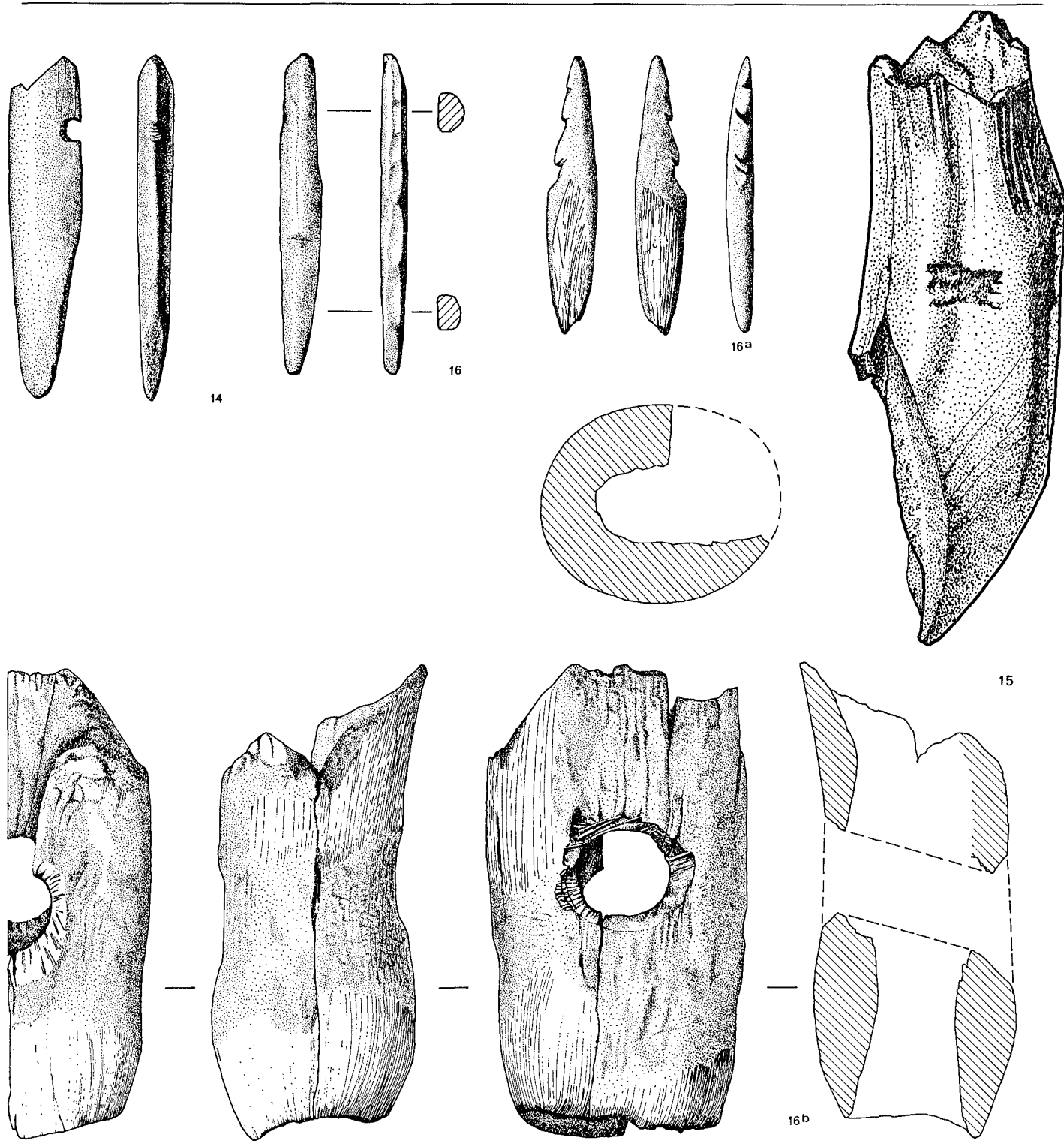


Fig. 12b Europoort, site 2 (nos 14-16b). Scale 1:1

The worked antler from Colijnsplaat is in contrast to the barbed point, made of bone, found at nearby Europoort. Since as far as we know either antler or bone was used predominantly in one settlement⁹⁰, we must assume a different age. A Preboreal date of the antler and an Early Boreal date for the Europoort barbed point seems to us the most likely.

In technical respect the worked antler is similar to the waste of antler working, found at Star Carr⁹¹. At that site the longitudinal grooves have a V-section and were made by burins or graters, as experiments proved. From one beam some 5 or 6 splinters could have been removed. The scars of the work on releasing the splinters are rarely visible, but in four instances the marks of scraping to make the antler thinner (as at the Colijnsplaat specimen pl. v) could be recognized. Transverse sawing occurred only once. Generally only the scars of the broken-out splinter were visible. We may call the Colijnsplaat specimen really very instructive in technical respects.

EUROPOORT (figs. 12-13)

When this article was already in print, some interesting new finds were made at Europoort. Thanks to the friendly cooperation of the editors it was possible to insert the description and drawings of these finds: nos. 16a and 16b. Discussion of the finds would, however, have required drastic changes in and adjustment of the text; consequently, the finds are not enlarged upon in this paper.

Descriptions

Site 1

No. 12

Straight and rather broad barbed point made out of bone, probably a metapodal, one side showing the exterior, the other side the interior of the bone. The bold, slightly recurved barbs are formed by eight oblique incisions, directed perpendicularly to the axis of the implement, when looking on the barbs, and arranged regularly from the extreme point till the end. Only the short tang has no barbs and the end of it has been broken off recently. The surface of the bone shows many fine cracks, the result of weathering. The surface is ground, but it cannot be determined whether it was polished too.

Measurements: $l = 13.5$ $w = 1.5$ $th = 0.7$ cm.

Colour: 10YR - 5/4 (yellowish brown) - 10YR - 4/2 (dark grayish brown), with 2.5YR - N3/0 (very dark gray) stains.

⁹⁰ At Star Carr 187 out of 191 barbed points were made of antler, but only 2 of bone (nos. 83, 175) and two of either bone or antler. In Denmark antler barbed points are rare. A few speci-

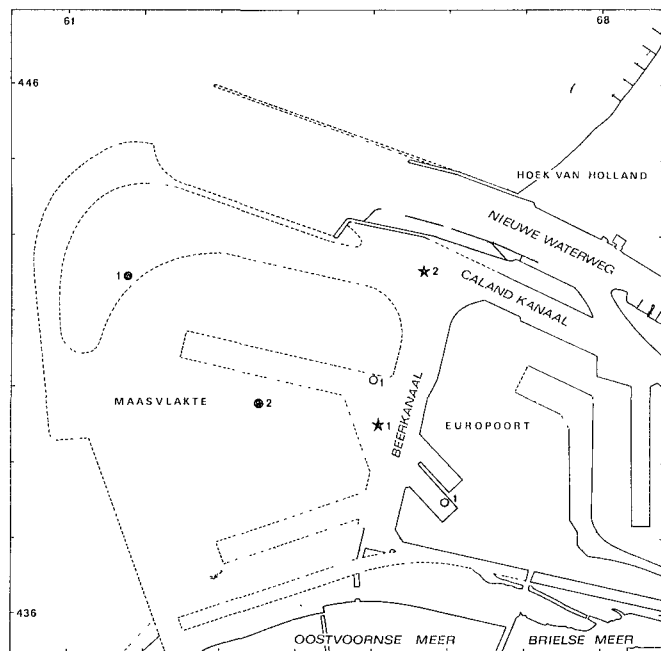


Fig. 13 Europoort, site 1 and 2 (dots) and the positions of the sand-dredgers yielding the sand with which the sites were built up (stars). The open circles give the positions of the two other dredgers operating when site 1 was formed. Scale 1:100,000. Topography according to the most recent map 1:25,000 (1966) of the Topographical Service, Delft

No. 13

Basal part of a lower canine tooth of a wild boar, worked chisel-fashion. Cut obliquely on the inner side, the cutting edge formed in the enamel of the outer side. Rather deep longitudinal grooves on the worked surface must be the result of use.

Measurements: $l = 4.3$ $w = 1.9$ $th = 1.2$ cm.

Colour: 7.5YR - 4/4 (dark brown) with a white enamel.

Site 2

No. 14

Fragment, the tang and one barb of a uniserially barbed point, made of bone. The barb is somewhat recurved as result of the way of cutting the incision.

Measurements: $l = 6.0$ $w = 2.1$ $th = 0.6$ cm.

Colour: 5Y - 7/1 (light gray), the other side 2.5Y - N3/0 (very dark gray).

were found at Sværdborg, Holmegaard, Øgaarde; Mathiassen 1948, no. 173.

⁹¹ See note 81.

No. 15

Worked piece of antler. Part of the beam, of which a tine is removed by careful cutting. One end broken off and partly damaged recently. The other end shows superficial cutting marks in a longitudinal direction, probably made with a burin. At one side a shallow depression, picked out with a heavy implement.

Measurements: $l = 11.0$ $w = 3.5$ $th = 2.7$ cm.

Colour: 7.5YR-4/4 ((dark)brown) - 7.5YR-N4/0 (dark gray), but more bluish.

No. 16

Small bone splinter with marks of cutting along the two sides.

Measurements: $l = 5.7$ $w = 0.7$ $th = 0.5$ cm.

Colour: 10YR-2/2 (very dark brown), other side: 2.5Y-N6/0 ((light)gray), but more bluish.

No. 16a

Very small barbed point, made of bone or antler, with three recurved barbs in the upper part. The lower half is formed by superficial cutting, the marks being clearly visible. The upper half is ground⁹².

Measurements: $l = 4.8$ $w = 0.9$ $th = 0.5$ cm.

Colour: 5Y-7/1 (light gray), other side 10YR 3/3 (dark brown).

No. 16b

Small perforated sleeve with oval section, made from the main beam of a red deer antler. Preserved in three fragments, forming about 2/3 of the implement. The end, where the axe originally was inserted, has been worked by superficially cutting all around, making the sleeve thinner toward the extremity. This end and the upper part of the sleeve, where well preserved, show a smooth and shining surface, but in the zone of the shaft-hole the sleeve is slightly less wide and the surface is somewhat rough. We think this wear is the result of a lashing, which must originally have fixed the shaft into the sleeve. The shaft-hole has been made by means of rough

cutting, of which the traces are clearly visible at one side, and by means of chiselling with a burin, of which the traces can be seen at the fragmentary other side. Perhaps the chiselling was merely the finishing touch to the shaft-hole. The axis of the perforation makes an angle of about 72° to the axis of the sleeve, so that the axe was mounted with a sharp angle to the shaft^{92a}.

Measurements: $l = 8.2$ $w = 4.6$ $th = 3.2$ cm.

Diameter shaft-hole: 1.5/1.6 cm, 2.1/2.4 cm at the rim. Colour: 10YR-4/2 (dark grayish brown) to very white with 7.5YR-7/0 (light gray) stains.

Find circumstances

On 16 October 1971, when surveying the extensive artificial sand plain of Europoort called 'Maasvlakte', and looking for dredged up fossils, Mr A.J. de Vries from Oostvoorne, found the barbed point (no. 12) lying on the surface. The next day Mr O.M. Hombroek, also from Oostvoorne, found the tusk chisel near by. The other finds were made by the De Vries family and Mr Hombroek at the second site, about 2 km to the southeast of the first one, on 4 March (nos. 14-16), 17 July (no. 16^b) and 19 August 1972 (no. 16^a). The Maasvlakte is an artificial sand plain formed by sand dredged up from the Caland Kanaal, Beer Kanaal and Oostvoornse Meer by the Public Works Department of Rotterdam and the Dutch *Rijkswaterstaat*. Since every month the state of the works was mapped, with the position of the dredgers and the pipe-lines, it was possible to determine the exact provenance of the sand at the find places, and hence of the finds themselves⁹³. The bluish white colour of one side of most pieces is the result of the sunshine during the months they were lying on the sand and so is not an indication that they came from the same deposit.

At site 1 and its immediate surroundings the terrain is formed by redeposited sand, rich in gravel, dredged up in the Europoort region itself. It appeared that the terrain was formed about the beginning of March 1971 and that at that time sand was dredged at three sites,

92 This barbed point is indeed very small and is in fact the smallest known to us. But it is of a type that occurs at most of the Danish Boreal sites. Mathiassen 1948 no. 170, Sarauw 1903, 280, Friis Johanssen 1919, 197, Broholm 1924, 67, 127. Our specimen has much in common with the slightly longer (6.5 cm) point of Sværdborg (Friis Johansen 1919, fig. 58), the smallest point found there.

92a The sleeve also has very modest dimensions. The length of this type varies between 10 and 25 cm in Denmark, 15-20 cm being the normal length. Mathiassen 1948, no. 121, Sarauw

1903, 125, Friis Johansen 1919, 165 (10 spec., 11-11.5 cm), Broholm 1924, 24 (6 spec., 9-11 cm), 105 (5 spec. 10-13.5 cm). The shaft-hole diameter varies between 1.8-3.3 cm. The rough technique used in making the shaft-hole is very characteristic for the Boreal implements (cf. p. 64).

93 We would like to thank the Department of Public Works, municipality of Rotterdam, for putting the results of the boring 42 B/17 at our disposal, and especially Mr A.W. Witter for his help and information.

all situated in the 'Beer Kanaal'. But according to the borings made by the department of public works, municipality of Rotterdam, before dredging, the gravelly sand could have been derived from only one site. Sand was dredged there from a depth between —22 and —42 m. At this site the broad sequence of the deposits was as follows:

Depth below NAP

+ 6	– 17	m	clayey fine sand with some clay layers
17	– 18	m	clayey peat, clay
18	– 25.40	m	clayey fine sand
25.40	– 26.50	m	peat and gravel, some clay and sand; disturbed samples
26.50	– 27.40	m	gravelly sand
27.40	– 31	m	clayey fine sand
31	– 34	m	gravelly coarse sand

The terrain at site 2 was formed in July 1969. The sand was dredged up exclusively at the juncture point of the Beer Kanaal and Caland Kanaal and was transported by pipe-lines to this site. In the environment of the dredger's position the top of the gravelly Pleistocene deposits lay between —23 and —20 m. It was covered with a 1–3 m clay layer, itself covered by the Atlantic tidal flat deposits. In a boring near this point the (peaty) clay was situated between —21.25 and —22.00 m NAP. Gullies belonging to the Atlantic deposits had eroded the older layers. One such tidal channel could be recognized near this point, running SW-NE below the Maasvlakte. The sequence at both sites is very characteristic for the Europoort district, as was revealed by the geological investigations⁹⁴.

The palaeo-geographical position of the district is in the centre of the Late Glacial valley of the braided river system formed by the combined Rhine and Meuse. The top of the Late Glacial deposits, when not eroded, lies here between —22 and —25 m NAP⁹⁵. The Holocene sequence starts with a peaty clay and peat, present also in the borings named above, which are dated to the Preboreal and the Boreal. The relatively early start of peat formation might have been caused by the situation in the river valley and does not need to be related to a former sea-level. The sea invaded this region during the end of the Boreal or in the beginning of the Atlantic. The barbed point and the other Mesolithic finds must be related to the peaty deposits at —26 to —21 m NAP.

⁹⁴ We are much indebted to the Netherlands Geological Survey for the information given, especially the most important data of the unpublished internal report no. 452 of the palaeobotanical department. The following account is mainly based on this information.

⁹⁵ Cf. Hageman 1962, fig. 4. To the south of the Late Glacial

This gives, however, no closer date than Preboreal and Boreal. In addition to the Mesolithic remains, more sites were discovered with finds from other periods. Two sites yielded a modest number of Late Iron Age sherds, with rich decoration of fingertip impressions. At two other places Roman pottery (about A.D. 50–3rd century) and at one site mediaeval pottery (Badorf, Pingsdorf, Paffrath, and later wares) was found. Two prehistoric sherds, tempered with broken quartz and decorated with a two- or three-toothed stick, are not easy to date. They might be domestic beaker ware. Much flint was collected from the sand, but only three pieces are human products: two small flakes, and a flake with flat retouche along one side, which is best fitted into the late Neolithic and Early Bronze Age material in the Netherlands. At all sites, including the Mesolithic ones, a modest number of unworked bones was found. But these bones cannot be used to gain insight the animals hunted by Mesolithic people, since during the investigations all finds were thrown together. Moreover, the number of the bones is too small and their quality too poor.

Discussion

Barbed points of form 6

In an attempt to identify the point within Clark's typology, we came to the conclusion (based mainly on negative evidence) that it must be named a point of Kunda type, form 6⁹⁶. The barbs are, however, unusually broad in proportion to its length. The tang-fragment no. 13 can also be ascribed to the form 6 and has equally broad and slightly recurved barbs, although somewhat different in detail. The broad barbs are not an uncommon feature of the barbed points around the southern North Sea, especially of some Belgian and French points⁹⁷, while the form is absent at the Baltic sites, as for instance at Hohen Viecheln. The point no. 12 is a relatively broad one. The original shape of the bone is rarely so clearly visible in this type. The length is about the average length of the points of form 6. At Hohen Viecheln the points measure 12–26 cm, but dimensions of 12–15 cm are most common. At Star Carr the long antler splinters permitted a length up to 40 cm,

Valley the Late Glacial surface lies at —18 to —22 m NAP. See also the contour map of the surface of the Pleistocene in Pons/Bennema 1958.

⁹⁶ Clark 1936, 117, fig. 41,6.

⁹⁷ Table v nos. 21, 22, 27, 30.

but two points were usually made out of one splinter: 2/3 of the points measure 12.5–25 cm, but the points type D and E, which fit our specimen best generally are short.

Type 6 must be considered as one of the oldest in view of its widespread distribution, some dated finds, and the absence in the Late Boreal Danish sites such as Holmegaard and Sværdborg. At Mullerup (1 ×) and Øgaarde (4 ×) this type was found beside a large number points of the (later) Mullerup type⁹⁸. At Hohen Viecheln⁹⁹ the uniserially barbed points (Clark's forms 2, 3, 4, and 6) dominated in the 'Older Settlement' and occurred in minor quantities in the 'Younger Settlement'. The Duvensee¹⁰⁰ settlement (Early Boreal) yielded only a few points, all of type 2 (with small notches instead of barbs). The form 6 point of Lemman and Ower Banks is dated to the Early Boreal¹⁰¹. At Late Preboreal Star Carr the (antler!) points related to the forms 2, 3, 4, and 6, were dominant while type E (finely barbed, with scored tang, shorter than 15 cm) occurred lower in the vertical distribution than the type A (long, with only a few, relatively coarse barbs). In general one can speak there of a development from finely barbed to more coarsely barbed points¹⁰².

A dating of both Europoort barbed points to the Preboreal or the Early Boreal thus seems the most likely. In detail the point no. 12 shows some originality.

Animal teeth knives and chisels

In the Maglemose settlements animal teeth were used for personal adornment and for making some implements. The canines of animals of prey particularly were perforated and worn in strings¹⁰³.

Out of the big tusks of the lower jaw of the wild boar knives and chisel blades were made. Knives, 10–18 cm long, are the most common and occur regularly at all important Maglemose settlements: Mullerup (1 ×), Holmegaard (10 ×), Sværdborg (8 + 1), Øgaarde (4 ×)¹⁰⁴. The type was still in use in Ertebølle times and had moreover a much wider distribution than the Danish Isles alone. Boar tusk chisels, as the one described above from Europoort, are less common. At Mullerup one 8.8 cm-

long specimen was found, at Holmegaard one 6.5 cm-long specimen, and at Sværdborg 5 pieces, partially fragmentary and varying in length between 5.2 and 8.5 cm¹⁰⁵. Once the frontal enamel of a beaver incisor was worked into a chisel. At Sværdborg also a partly broken antler sleeve with shaft-hole was found¹⁰⁶; in the interior the basal part of such a chisel was still in place, proving that this type of chisel was used in the same way as those of bone and flint. A similar specimen is the perforated antler sleeve found at Crouy, in the valley of the Somme¹⁰⁷. It has a wild boar tusk chisel still in place. A crack in the sleeve is accentuated by a row of short incisions, just as on another sleeve from Sværdborg. It is suggested that the function of these incisions was to affix a lashing, as was suggested for the implement no. 3 from the Brown Bank. On the Maglemose knives longitudinal scratches are mentioned but not especially so on the chisels, like the one from Europoort has¹⁰⁸. Such knives or chisels were not found at either Star Carr or at Hohen Viecheln. At Star Carr only two teeth are perforated¹⁰⁹. At Hohen Viecheln a wild bear tusk was worked to a point (perhaps we may call it a knife), some canines were perforated and beaver incisors were used chisel-fashion¹¹⁰. We can summarize that the wild boar tusk chisel fits in well with an Early Mesolithic context, and particularly with the Danish sites. But the find at Crouy proves a much wider distribution of this implement. A Boreal and especially a Late Boreal date is most likely.

KOERHUISBEEK (fig. 14; pl. VI right)

Description

No. 17

Very well-preserved socketed axe, slightly fossilized, made out of the proximal end of the left radius of the aurochs. Cut obliquely on one side to an axe with a straight cutting-edge. On the articular surface a perfectly round shaft-hole with somewhat rounded edges. On the worked oblique surface, groups consisting of many roughly parallel

98 Clark 1936, 128–31; Mathiassen 1943, 59.

99 Schuldt 1961, esp. 86 f.

100 Schwabedissen 1949, *Abb.* 7a and 7b; also Schwantes 1958, *Abb.* 58; Clark 1936, fig. 44, 1.

101 See p. 32 and note 18.

102 Clark 1954, 10, figs. 6 and 123 f.

103 Clark 1936, 110; Mathiassen 1943, 91 (Øgaarde).

104 Mathiassen 1948, no. 187; Sarauw 1903, 233; Broholm 1924, 77; Friis Johansen 1918, 341 (1919, 219); Broholm 1924, 132 f.; Mathiassen 1943, 59.

105 Mathiassen 1948, no. 132; Sarauw 1903, 236; Broholm 1924, 78; Friis Johansen 1918, 341 (1919, 219).

106 Friis Johansen 1918, 294 (1919, 168).

107 Table v, no. 18 and Friis Johansen 1918, 292–4 (1919, 167), quoting Picard in: *Mémoires de la Société Royale d'émulation d'Abbeville*, 1836–7, 238 f. and *Planche* 1, 6, not available to us.

108 Sarauw 1903, 233; Broholm 1914, 77.

109 Clark 1954, 166, pl. xx.

110 Schuldt 1961, 141–2, *Taf.* 66–8 and 140.

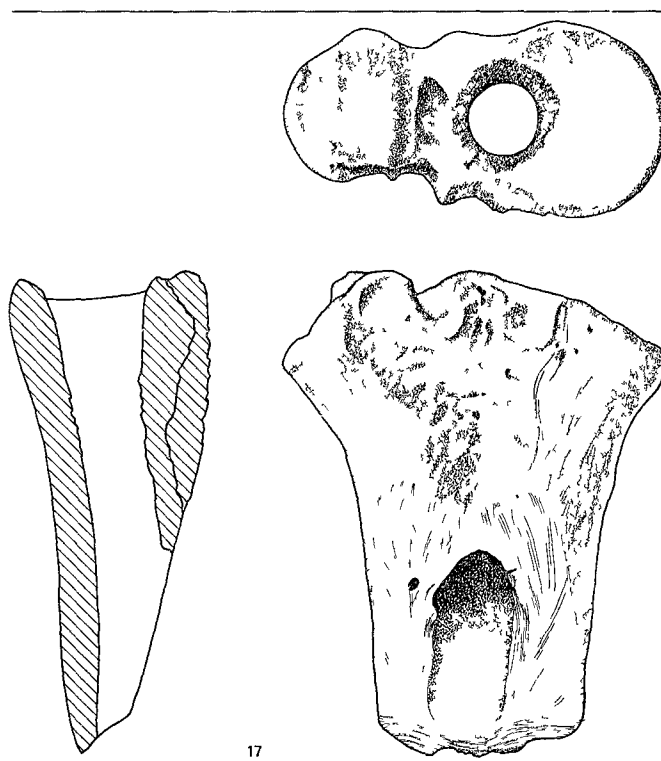


Fig. 14 Koerhuisbeek, bone socketed adze (no. 17). Scale 1:2

scratches are visible and some well-preserved cutting marks. At the other side of the axe no scratches occur at all. The working edge is damaged (partly recently). Along the edge there is a broad facet which is probably the result of resharpening. The lack of scratches and a modest polish must be the result of subsequent use. We concluded that the scratches are traces of working, and not the marks of wear. They resemble to some extent those on the antler fragments of Europoort and Colijnsplaat, but are less regular in appearance. They might have been made by working with a coarse grinding-stone or with a flint scraper.

Measurements: l = 14.2 w = 10.8 th = 5.4 cm.

Diameter shaft-hole = 2.0–2.1 cm.

Colour: 7.5YR – 3/2 (dark brown).

*Find circumstances*¹¹¹

The axe was found in the autumn of 1968 by Mr W. Hekkert of Deventer, in a sandpit dug during the con-

struction of the National Route E-8, situated near the mouth of the rivulet 'Koerhuisbeek' near Deventer. A number of antler implements were also found in the same pit: four axes, three of them made out of the base and one out of the crown end of a red deer antler beam. Further a T-shaped axe and some worked pieces of antler. The implements are not necessarily of the same age as the socketed axe discussed here.

Discussion

The comment on the axe itself can be short. We refer to the discussion of the socketed axes from the Brown Bank region (p. 42). It is of special interest in that the manufacture of the shaft-hole (especially the sharp edges) to some extent resembles the Oldesloe axe from Rude. So we must consider both a Boreal (*cf.* the Brown Bank no. 3) and an Atlantic date possible.

The wear at the edge tells us that the implement was used adze-fashion and on a rather soft material, like wood or hides (as we suggested for no. 5). The breaking of the large splinter out of the quite similar axe no. 3 from the Brown Bank is consistent with such a use.

The find place needs some further comment. Mr J. Butter of Deventer investigated another large sandpit in 1936–37 about 400 m to the east¹¹². He found two human skulls at a depth of 7.5–8 m (about –2 m NAP) in a sand deposit resting immediately on a Late Glacial gravel, containing the bones of mammoth, woolly rhino, giant deer, and reindeer. From the same level red deer and wild boar are also reported, so the human skulls (at any rate) must be Post Glacial. The sand is sealed off by a thin gravel layer from which a third skull (C1) has been retrieved. This gravel is covered by a very irregular complex of sandy sediments, from which thousands of animal bones (cow, horse, red deer *etc.*) were collected. They must be for the greater part of historical date. A few antler implements found in other parts of the complex tell us, however, that part of the complex is much older. In any case these artifacts give a *terminus ante quem* for the skulls: they must be dated to the Neolithic or earlier. Although a Boreal age is named in the literature this can not be proved in our opinion.

A number of anthropological studies agree that at least one of the skulls is of the 'Téviec' type¹¹³, which in itself does not give very much dating information, since relevant

¹¹¹ According to the inventory of the Zwolle Museum and the find report by Verlinde 1970.

¹¹² Butter 1940, 1955. The geological situation in both pits will be roughly the same.

¹¹³ Vallois 1943; Huizinga 1959; see also p. 68.

finds of human skeletal remains are very scarce in the Netherlands and restricted to the Beaker period and after. We might, however, say that an Early Neolithic or Mesolithic date is the most probable¹¹⁴. Some fluorine tests revealed that the skull C1, found at a higher level and not of the Tévéc type, must be considerably younger¹¹⁵. We can conclude that some connection might exist between the two lower skulls and the implement discussed here, since all three are dated independently to the same, albeit long, period.

'HERICKER BERG' (fig. 15, pl. VII above left)

Description

No. 18

Shaft-hole adze made out of elk antler. Well preserved but with a crack in the cutting end, due to drying out. The working edge formed in the beam by cutting obliquely at one side. Perfectly straight and round shaft-hole with sharp edges made obliquely through the antler beam, but perpendicular to the named cut surface. It is, however, not made using a rotating boring apparatus but carefully cut in this form. Due to the friction of the haft, the shaft-hole shows a high polish at two points (indicated with arrows in fig. 15, cf. pl. VII), while at the opposite points the cutting marks are well preserved and only slightly worn. A large part of the antler blade forms a regular oblong blade around the shaft-hole. Not many traces of working or wear are visible. We could only discern some slight cutting marks, a modest polish and fine longitudinal scratches at the cut surface. The blade-shaped end was not used, as a spade for instance, as the form might suggest. At one side the imprint of a former label is visible.

Measurements: l = 19.0 w = 9.2 th = 3.8 cm.

Diameter shaft-hole = 2.6/2.8 cm at the rims, 2.5 at the narrowest point.

Colour: 10YR - 4/1.5 (dark gray - dark grayish brown) - 10YR - 7/3 (very pale brown).

Find circumstances

The adze is mentioned as early as 1909 by Mr G.J. ter Kuile¹¹⁶: 'We must name also the 'battle axe', no. 62 in

the inventory of the Zwolle Museum, in my opinion a kind of spade with conical aperture, manufactured out of bone, 19 cm long and with the greatest width 9 cm, and found here on the Hericker Berg'. The axe is still in the Provinciaal Overijsels Museum at Zwolle, but it is now catalogued as no. 98. The Hericker Berg (Herick Hill) is situated between Goor and Markelo, to the north-east of Lochem. The reported find spot gives rise to some suspicion, since the circumstances for preservation of organic material are generally bad on ice-pushed ridges (as the Hericker Berg), and since bone and antler implements are nearly always found in the lower parts of the landscape such as brooks and river valleys, or on moors. Locally, however, in ice-pushed ridges clay does occur, which might have given the right preservation conditions.

Discussion

We refer to the discussion of the Kuinre adze no. 19.

KUINRE (fig. 15, pl. VII below)

Description

No. 19

Shaft-hole adze made out of elk antler, well-preserved, but slightly cracked as the result of drying. The working edge is formed in the beam by cutting from both sides. Marks of superficial cutting are visible from the working end extending upward beyond the shaft-hole. A modest polish and longitudinal scratches on only one of the worked surfaces are marks of usage. Perfectly round shaft-hole with sharp edges, made almost perpendicularly through the antler beam. It is made by careful cutting. Slight marks of this are visible, but most of the interior of the shaft-hole shows a high polish due to the friction of the haft. A large part of the antler blade forms an oblong projection at the opposite side of the shaft-hole. This end does not show any traces of being worked or used.

Measurements: l = 21.5 w = 8.7 th = 3.5 cm.

Diameter shaft-hole = 2.6/2.8-3.0/3.0, minim. 2.3/2.5.

Colour: 2.5Y - 6/2 (light brownish gray) - 10YR - 8/3 (very pale brown)

¹¹⁴ Cf. note 113; also Butter 1940, 1955.

¹¹⁶ Ter Kuile 1909, 24. We owe this reference to the inventory charts of the Zwolle Museum, compiled by Mr P.J. Woltering, Amersfoort.

¹¹⁴ In the Netherlands some skulls of the Tévéc type were found in the cemetery (c. 5500 B.P.) of the Early Neolithic settlement(s) at Swifterbant. At Tévéc itself the graves are dated to the Mesolithic.

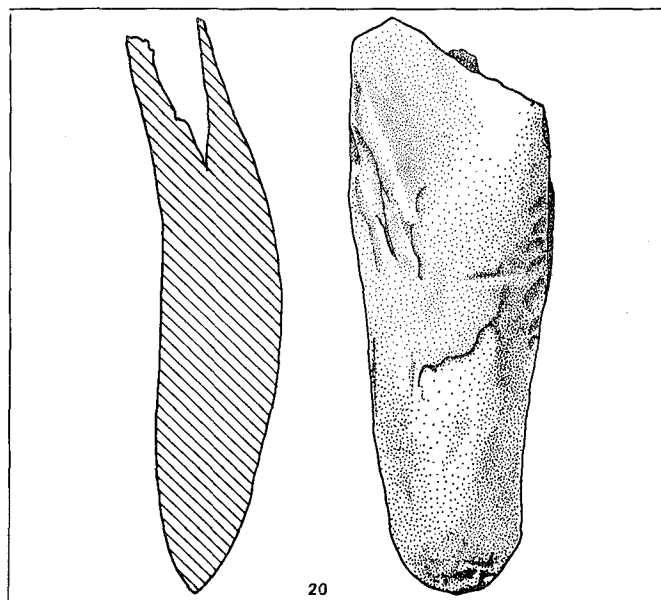
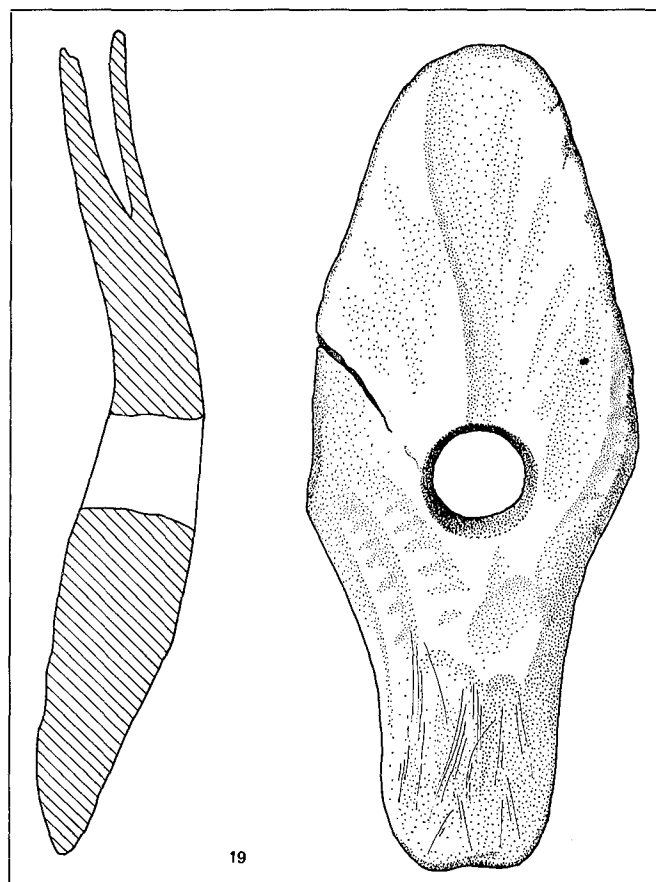
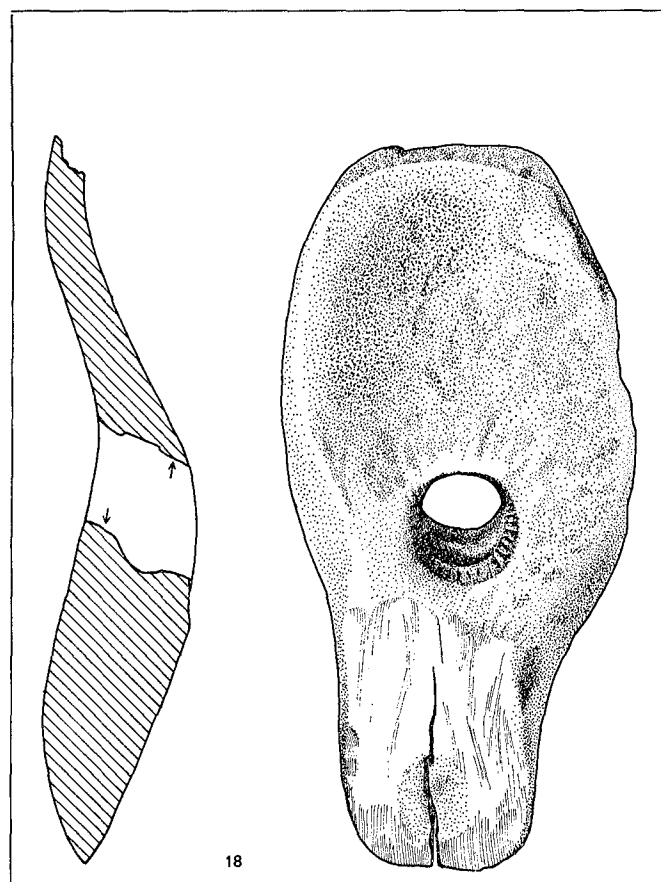


Fig. 15 Elk antler adzes from Herickerberg (no. 18), Kuinre (no. 19), and Spoolde (fragment, no. 20). Scale 1:2

Find circumstances¹¹⁷

Found at Kuinre, south of the village in the valley of the Linde brook, during digging works for the foundations of a new building. Acquired by the Schokland Museum in 1957 from the late town clerk of Kuinre.

Discussion

Elk antler adzes are considered by Clark to be the direct successors to the Lyngby axes/adzes of the Late Dryas period and as one of the adaptations to the new environment and materials, that became available¹¹⁸. As such, they are the oldest Mesolithic heavy implements. They are found as isolated finds in the entire distribution area of the northern Core Axe Cultures from Esthonia to Great Britain¹¹⁹.

¹¹⁷ We were informed by Mr G.D. van der Heide about the find circumstances and the acquisition of the adze by the Schokland Museum.

¹¹⁸ Clark 1954, 187-9.

¹¹⁹ Mathiassen 1948, no. 118; Indreko 1948, 162-72, *Abb.* 45-50; Brøgger 1938.

It is surprising that they are absent from all the rich Danish sites, with the exception of a single rough out (?) at Sværdborg¹²⁰. At Hohen Viecheln they are also absent. This sets a major problem as to dating the implements, though at Star Carr, the only exception, they are dated to the Late Preboreal. The series of six implements found there shows a considerable variety: they are adzes, axes, or pointed implements, with the working end made either from the beam of the antler, or from the adhering pedicel¹²¹.

At Star Carr the adzes measure 28–20 cm in length and the shaft-holes are always made in an oblique direction to the long axis of the implement. In Denmark the adzes are much smaller (12–20 cm) and there the shaft-holes are also nearly always oblique¹²².

There are some differences, possibly rather important, in the way the shaft-hole is made. At Star Carr this was always done by means of heavy cutting, resulting in a somewhat irregular shaft-hole with rounded edges. The adze from Gøgmose, illustrated by Mathiassen as the type specimen, and most of the adzes from the Kunda district have a more carefully made shaft-hole. Because of the lack of dated specimens we cannot decide whether this is a chronological or merely a synchronic-technological difference.

Both the Dutch adzes fit very well into the named series of implements. In length they are just in between the specimens from Star Carr and the Danish implements. The shaft-hole diameters are the same as at Star Carr, but they are made more carefully and most closely resemble the specimen from Gøgmose and the majority of adzes from the Kunda district. The angle of the shaft-hole of the Kuinre adze appears to be exceptional, while the oblique shaft-hole of the Hericker Berg adze is according to the rule. The differing methods of the formation of the cutting-edge on the two adzes do not seem to be very significant. Both types occur at Star Carr. The superficial cutting marks, as on the Kuinre adze, are found for instance on the named Gøgmose adze and on a very long adze from Nauden, recently published by Deichmüller¹²³. Finally the Hericker Berg adze resembles the specimen EM 5 from Star Carr in many respects. The long, oblong blade-like end, a characteristic of both adzes, might be a typically Dutch feature. This will be confirmed or contradicted by future finds.

The date of the adzes is most probably (Late) Preboreal; the dating is based on the finds of Star Carr and the assumption that the absence from the Danish Boreal sites has a chronological significance. But since a hollow-edged specimen was found at the settlement Hüde I, Dümmersee, dated to the Late Atlantic¹²⁴, we must be cautious and not exclude a later date.

SPOOLDE (fig. 15)

Description

No. 20

Elk antler fragment, very probably the cutting-edge of a shaft-hole adze. In a very bad state of preservation. No traces of working or wear are visible except for some cutting at one side, though this is dubious. The identification is based on the shape.

Measurements: l = 14.9 w = 5.1 th = 3.1 cm.

Colour: 10YR - 5/3 (brown)

*Find circumstances*¹²⁵

Found during extensive digging works during the construction of a canal and sluices in 1961–1962 at Spoolde near Zwolle. It is one of an astonishingly large number of antler objects: about 320 pieces, most of them worked, and including about 50 shaft-hole implements. The latter are axes and sleeves. Adzes are missing completely, so that a Mesolithic age can be excluded (*cf.* p. 60 f.).

In a subsequent excavation at a distance of about 150 m, a small creek filled with Subboreal and Subatlantic peat was found. At the bottom some pointed posts were discovered and Late Neolithic pottery (Bell Beaker and Barbed Wire Beaker) was found nearby. An association with the antler implements, however, cannot be proved nor excluded. The state of preservation of the antler implements is generally very good and quite different from the fragment described here, so there is no need to assume a relationship. In view of the size of the works and of the fact that an (Early Neolithic) T-shaped axe was also found, this view is perfectly acceptable.

Discussion

We refer to the discussion of the Kuinre adze no. 19.

¹²⁰ Friis Johansen 1918, 299 and fig. 41 (1919, 174).

¹²¹ Clark 1954, 157–60, fig. 69, pl. XIII–XIV.

¹²² Clark 1954, 157–8; Mathiassen 1948, no. 118.

¹²³ Deichmüller 1966.

¹²⁴ Deichmüller 1963, *Taf.* 1,3.

¹²⁵ A preliminary report on the Spoolde finds is published by Mr G.D. van der Heide (1962). Comment on the geology can be found in Hamming/Knibbe/Maarleveld 1965.

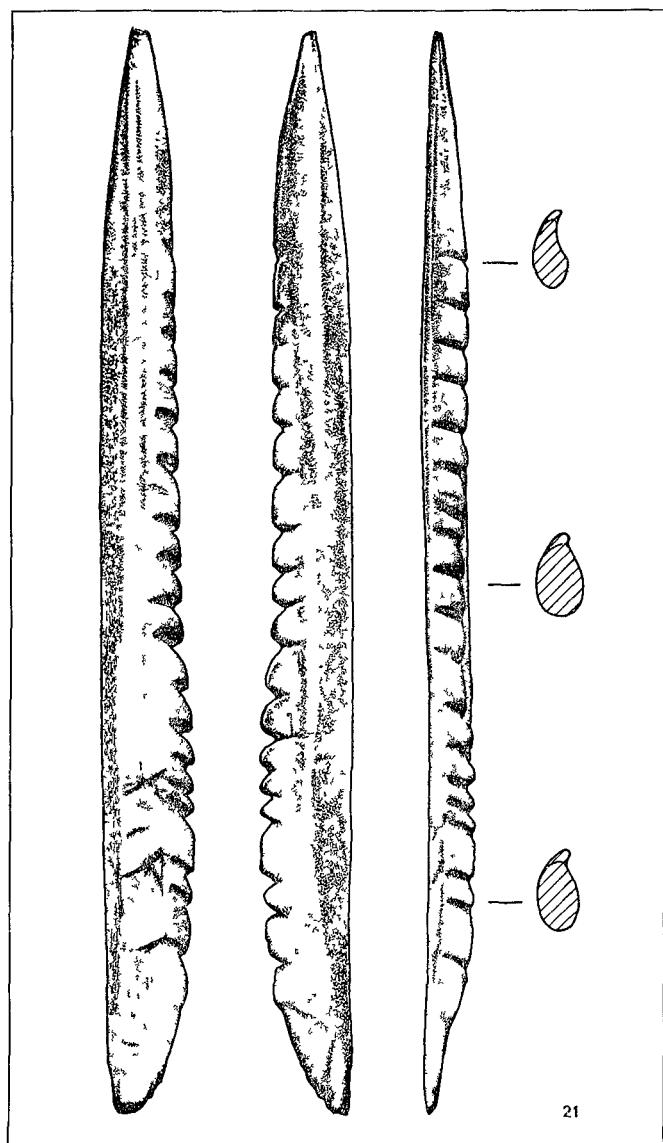


Fig. 16 Emmereifseidenveen, barbed point (no. 21). Scale 1:1

EMMERERFSCHIEDENVEEN (fig. 16)

Description

No. 21

Barbed point with a straight form and a row of fine barbs along one side, with the exception of the tip. The fine barbs are formed by means of 18 small incisions, probably made with a sharp flint blade or flake or perhaps a burin¹²⁶; viewed from above, the incisions are directed somewhat obliquely with respect to the long axis of the im-

plement (fig. 16 right). The barbs and the incisions are arranged very regularly from the point, until about half-way, where there is a sudden change to less deep incisions and a more irregular arrangement. The cross-section is comma-shaped, with the barbs at the thinnest part. The extreme tip of the point has been broken off.

The surface is smooth and has a glossy polish, which might be intentional, a kind of patina, or even the work of the finder. The polish covers the whole surface evenly, including the end, which is cut or broken obliquely on one side. If the polish is intentional we could say the barbed point is a complete one, if the polish is natural or recent we must reckon with the possibility that the end has been broken off. At the end of one side the surface shows some oblique scratches, which in view of their roughness can hardly be a kind of decoration. We think these are due to damage; we cannot exclude damage at the time of discovery. It is difficult to make out whether the point is made out of antler or bone. Some longitudinal shallow grooves are reminiscent of an antler surface, but the very straight form, when compared with the gently curved antler points from Star Carr, favour bone. The shortest points from Star Carr are, however, just as straight. The most likely material seems to be antler, but this cannot be determined with any certainty¹²⁷.

Measurements: l = 14.2 w = 1.2 th = 0.63 cm.

Colour: 5 - 10YR - 2/2 (dark reddish brown - very dark brown).

The find place

Since 1937 at least the barbed point has been preserved in the Chamber of Antiquities 'De Hondsrug' at Emmen¹²⁸.

126 Similar sharp cuttings as the result of working with a sharp flint flake or blade are also explained by Schuldt (1961) and Clark (1954).

127 Mr Kortenbout van der Sluijs examined the barbed point carefully and agreed that we cannot name the material with certainty. In earlier publications both bone (lit. as note 129) and antler (Van Giffen 1947, 508; De Laet 1958, 51; De Laet/Glasbergen 1959, 36) are named as the raw material.

128 The 'Oudheidkamer de Hondsrug' was founded after a lecture by Professor A.E. van Giffen given on 10 March 1932. The inauguration ceremony took place 11 May 1935. Shortly afterwards Mr H.T. Buiskool, keeper of the museum, compiled a small catalogue and guide to the collection.

The catalogue had three undated impressions: about 1937, 1943, 1947. The barbed point is mentioned already in the first impression as no. C14(!), but it is strangely not mentioned in the inventory card system of the museum, although even loans have their cards.

Some confusion has always existed as to the exact find-spot. The first catalogue of the Emmen museum, the oldest label in the show-case, and the description of a wooden copy, made in 1951 on behalf of the Provincial Museum at Assen, all gave 'Emmererscheidenveen' (about 5 km N.E. of Emmen) as provenance. But the list of acquisitions in the annual report of the museum introduced an inaccuracy: it listed 'found in a bog near Klazinaveen, municipality of Emmen'¹²⁹. This find spot (about 5 km S.E. of Emmen) reached the current literature¹³⁰ but must be considered as incorrect. It is moreover not even certain that the barbed point was found 'in a bog', although this is highly probable.

The barbed point must have been found before 1937, the year when it was mentioned for the first time, but how many years before cannot be determined. It may have been found shortly before 1937, but it may also have derived from an old private collection. It is not a well-known find, however, neither at that time, nor at present. Van Giffen did not mention it in 1934 in his survey of the pre-history of Drenthe, nor was it known to Clark in 1936¹³¹. Since the Emmen Museum only collects finds from the immediate surroundings of Emmen, we do not see any reason to doubt the find spot given or to think that it was imported recently from the Baltic regions¹³².

At any rate it is not at all surprising that the bogs in the environs of Emmen, especially those to the east of this town, have supplied some Mesolithic bone/antler implements (*cf.* also no. 22), since peat formation started there as early as the Allerød and was continued in Preboreal, Boreal and Atlantic times, as was revealed by pollen diagrams from these bogs¹³³.

Discussion

Unlike the Europoort barbed point, the point from Emmererscheidenveen fits very well into Clark's form 6. So it can easily be dated to the Preboreal or Early Boreal¹³⁴. Quite similar points, (with similar dimensions) are characteristic for the Hohen Viecheln settlement, especially the

material attributed to the Older Settlement; the type with 'einseitigen Kerben', including a group with a length of 10–14 cm and often a similar short tang. Other points of the same type are longer and have a barbless tang¹³⁵. These are the best parallels if we assume that the Emmen point originally had a tang, now broken off. Looking at Star Carr we obtain a similar result. The point fits best into type D, of the same length and with no or only a very short tang. Made of antler, the type is more slender than the Emmen point. Second best is type E, also short but with the characteristic scored tang¹³⁶. The Leman and Ower Banks point, dated Early Boreal, belongs to this type.

Some features require comment. First, the sudden change in the arrangement of the barbs from regular to irregular about halfway along the point. This is not at all common¹³⁷. Perhaps the barbs at the end were of minor importance and merely made for a better attachment to a rope or to a pole. Second, the oblique direction of the notches between the barbs. Notches made perpendicular to the axis are by far the most common, but most of the English specimens (outside Star Carr) show a marked regional deviation: notches were made by 'criss-cross sawing', in two series of oblique cuttings¹³⁸. In general we consider that the Emmen barbed point fits in very well with the Baltic points and does not show so much individuality as the one from Europoort.

DE ASCHBROEKEN (fig. 17, pl. VII above right)

Description

No. 22

Well-preserved shaft-hole pick or adze, made out of the base of a naturally cast red deer antler, left beam. The first tine cut off. Round shaft-hole near the base with oblique rims, made by cutting with a burin or a flint knife. Pointed and convex working end, roughly perpendicular to the axis of the shaft-hole. The point and the surface up to the shaft-hole are very smooth, probably

129 The wooden copy in Assen has no. 1931/1–4. *Cf.* the Annual report over 1951 in *NDV* 71, 1953, 13 no. 1. The label was written, however, by the present keeper Mr Snijders, as he told me, and so it cannot be used as source of primary information.

130 *Cf.* note 127.

131 Van Giffen 1943, Clark 1936.

132 As was thought for instance for the Yorkshire points. See Clark/Godwin 1956; Armstrong 1922, 1923a, b.

133 Van Zeist 1955a, b.

134 See the discussion of the Europoort barbed point at p. 52 f.

135 Schuldt 1961, 125, *Taf.* 42–43, 101–103 (with a short tang); Schuldt 1961, *Taf.* 44a, b = 105c, 106c, (longer, with barbless tang).

136 Clark 1954, type D: fig. 54, type E: fig. 55.

137 Clark 1954, fig. 58, one specimen, probably an unfinished one; Clark/Godwin 1956, no. 5 from Skipsea is well comparable.

138 Clark/Godwin 1956.

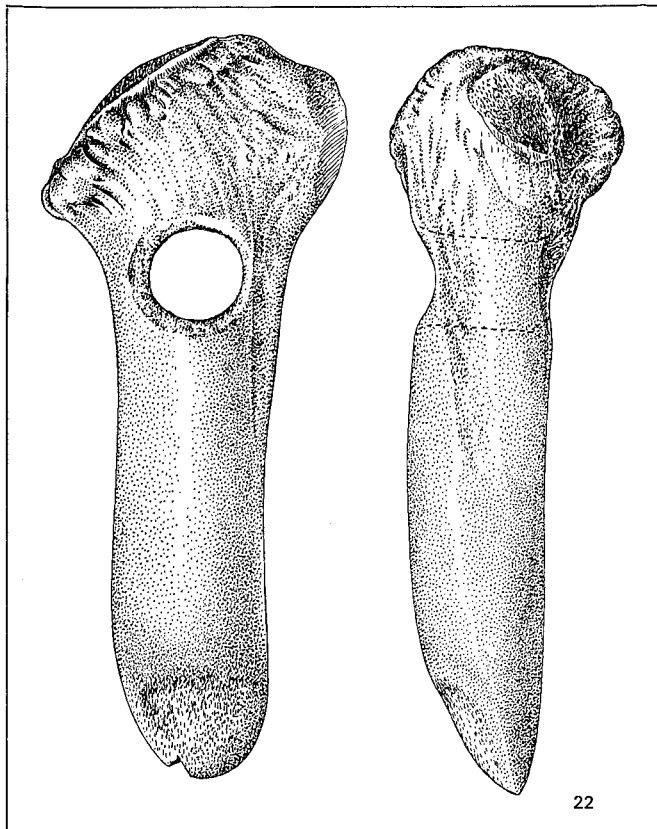


Fig. 17 Aschbroeken, red deer antler shaft-hole adze (no. 22). Scale 1:2

as result of grinding and polishing. The point shows some faceting at the sides. No scratches are visible.

Measurements: l = 19.7 w = 8.1 th = 6.1 cm.

Diameter shaft-hole = 2.3 at the narrowest point; 3.2 cm at the rim.

Colour: 10YR - 5/3 (brown) - 10YR - 3/2 (dark grayish brown)

The find place

The adze has been preserved in the Chamber of Antiquities at Emmen¹³⁹, inv. no. EP 13-1934, 'found at De Asschebroeken near Weerdinge'. The adze was a loan by the keeper (himself in the possession of a modest collection) to the museum when it was founded. So the des-

cription of the find spot should thus be fairly reliable and the adze must have been found before 1934. The 'De Asschebroeken' is a moor situated a few kms to the north of the Emmererfscheidenveen moor, where the barbed point no. 21 is said to have been found. The adze was published by Elzinga together with the other antler implements from Drente¹⁴⁰.

Discussion

There are a number of reasons why this adze has been included in the series of Mesolithic tools. The red deer antler adze is a rare type in the Netherlands. Red deer antler implements are almost exclusively axes. In the rich find at Spoolde, for instance, adzes are completely lacking¹⁴¹. In fact the Aschbroeken specimen is the only one known to us at the moment, but since we did not make a systematic survey of all red deer antler tools others might exist. The form and technique of the shaft-hole of this adze are different from the axes. These have sharp edges and a smooth inner surface of the perforation, reflecting a different way of manufacture. The rough type of shaft-hole is common to all adzes mentioned below. At Star Carr only one perforated red deer antler tool was found: a fragmentary 'hammer', showing a shaft-hole rim, with cutting marks quite similar to those on the Aschbroeken adze¹⁴². The lack of heavy implements made of red deer antler there is a remarkable fact. At Hohen Viecheln 11 specimens are mentioned; all are adzes¹⁴³. At the Danish Boreal sites the axes are very rare¹⁴⁴. The implements are either adzes or sleeves for insets. At Mullerup 5 adzes (2 complete) were found, apparently no axes, and 6 sleeves¹⁴⁵. From Sværdborg Friis Johansen¹⁴⁶ mentioned 52 perforated red deer antler implements: 19 sleeves, 24 with cutting edges, 15 of them more or less complete - all adzes. From the same site Broholm¹⁴⁷ mentioned 12 sleeves, 33 with cutting edges, 25 of them more or less complete, including only one axe; the others are apparently adzes. At Holmegaard¹⁴⁸ the total is 23, including 6 sleeves, 4 adzes and 2 axes. The other implements are rough outs or fragmentary. At Øgaarde¹⁴⁹ 10 adzes, 5 axes, and 2 sleeves were found. Mathiassen stated that the short and thick adze (l = 12-20 cm) is the main form at the Maglemose Culture sites. But the adze appears also

¹³⁹ Cf. note 128.

¹⁴⁰ Elzinga 1962, 214, no. 10, fig. 8, pl. 4.

¹⁴¹ Cf. note 125.

¹⁴² Clark 1954, 158, pl. xiv, no. EH.

¹⁴³ Schuldt 1961, 134-5, Taf. 128-9.

¹⁴⁴ Clark 1936, 112; Mathiassen 1948, nos. 121-128.

¹⁴⁵ Sarauw 1903, 212, 215.

¹⁴⁶ Friis Johansen 1918, 289 f. (1919, 163 f.).

¹⁴⁷ Broholm 1924, 48 f.

¹⁴⁸ Broholm 1924, 101 f.

¹⁴⁹ Mathiassen 1943, 59.

to dominate in the Early Coastal and the Early Ertebølle Cultures and occurs incidentally in the later phase as well¹⁵⁰.

In its general appearance the adze closely resembles the aurochs radius shaft-hole pick. As was the case on p. 41 we can term it a 'translation' of this type of implement into red deer antler, which is also an argument for a Boreal age. We assume that it is the next stage in the development of the antler/bone shaft-hole implement. It will have been followed up by a gradual change to axes, while sleeves were very popular during the whole period (Boreal-Atlantic). The introduction of the T-shaped axe (the 'Tüllengeweihaxt') in the Late Atlantic marks the end of this development.

Summarizing we can say that a Preboreal date is not very likely, a Boreal or Early Atlantic date is very probable, and that a later date is only a possibility of minor importance.

3. EVALUATION

A COMPARISON OF THE DUTCH AND THE NORTH SEA FINDS AS GROUPS

In general the discussed implements from the Netherlands appeared to be dated relatively early, *i.e.* to the Preboreal and the (Early) Boreal or the phase of Star Carr and Hohen Viecheln. The scarcity of later (esp. Atlantic) material might be caused mainly by the neglect of the red deer antler implements. We suspect some of the isolated red deer antler implements, dredged up from the rivers, to be of this date.

The early dating of the group as a whole gives reason to compare the Dutch finds with those from the Brown Bank region. The rather large diversity of the Dutch group can only be partly explained by the different ways in which the objects were collected, and can account for the absence of small objects from the North Sea. The differences might be the result of the small number of implements

(which seems unlikely to us) or might reflect a regional difference. In fact the Koerhuisbeek adze (no. 17) and the axe no. 3 form the only links between both groups. Since both groups have their counterparts in the whole range of northern Mesolithic sites, we think the most important cause of the differences is that the Brown Bank finds cover only a short part (the Preboreal-Boreal transition) of the period, covered by the Dutch finds.

The assortment of working techniques in both groups is, roughly speaking, the same. As with the Brown Bank finds the Dutch implements show a remarkable diversity in the way they are worked. We listed for the heavy implements: deep cutting (nos. 11, 15), superficial cutting (nos. 17, 19), superficial chiselling (resembling 'gnawing'; nos. 11, 15?), picking (no. 15), grinding (nos. 17, 18?, 22), and for the way the shaft-holes were cut (nos. 18, 19, 22).

DATING PROBLEMS

Many problems were dealt with when we tried to date the implements of both groups. In the first place we must mention the very small number of well-dated reference sites that yielded enough material to attribute a meaning also to the absence of certain types of implements. These sites are restricted to the Preboreal and Boreal: Star Carr, Hohen Viecheln, Øgaarde, Mullerup, Sværdborg, Holmegaard. In the Atlantic we must work with much smaller assemblages, as Satrup and Norslund¹⁵¹. Of many groups, as Klosterlund, Pinnberg, Gudena, the English Boreal Mesolithic, the organic remains are unknown or very scarce. On the fringes and outside the Core Axe Cultures bone and antler implements are hardly known, as for instance in Sweden and Norway¹⁵², and in Northern France. To the Azilien belong harpoon-heads of an entirely different type. For the Tardenoisien, Barrière names only a few implements¹⁵³. But one of them is a small and fragmentary shaft-hole pick, split lengthwise and made of the radius of a red deer. It might have some relation to the northern shaft-hole picks. The antler sleeve from Crouy might be another link¹⁵⁴.

¹⁵⁰ Mathiassen 1948, nos. 121-128; Troels Smith 1966. Clark's statement (1936, 112) that 'the adze form is so rare in period III that it can be used with a high degree of probability as a type fossil for period II' must be somewhat revised. The adze becomes scarce only at the end of period III (the Atlantic). As to the length of the adzes: at Sværdborg they measure 12-26 and 13-24 cm (Broholm 1924, 101; Friis Johansen 1918, 290), at Holmegaard 11-18 cm (Broholm 1924, 50), at Hohen Viecheln 16-33 cm (Schuldt 1961, 134).

¹⁵¹ Andersen/Malmros 1965; Schwabedissen 1957-8.

¹⁵² Gjessing 1945, 206 and fig. 54; Brøgger 1938; Stenberger 1964a, 36-46; Stenberger 1964b, 33-5; Althin 1954 only illustrated some bone and antler implements from Ageröd 1. The 'pick of the left tibia of an aurochs' seems to us however to be an ordinary broken-off end.

¹⁵³ Barrière 1954, esp. 51, from Cuzaal de Gramat. Cf. the shaft-hole adze from Skellingsted Bro, made of a stag ulna and the shaft-hole pick from Sværdborg, made of the radius of a wild boar.

¹⁵⁴ Cf. note 107.

In the second place we must take into account that the reference sites, lying far from each other, might show regional variations in details, although the wide distribution of most types suggests that the general composition of the assemblages in a certain period will be the same in the whole distribution area. Other sources of difference might be a varying subsistence economy of the sites and, more prozaic, even the way of excavation. We have tried to take these factors into account in the preceding pages. In short, this means that the presence of a certain tool in a certain period is much easier to prove than its absence.

CULTURAL ALLOCATION

The next problem after dating is the cultural allocation: the organic remains are known predominantly from wet and low regions, an area roughly coinciding with the occurrence of core axes in the flint inventory of the settlements, or the Core Axe Cultures. This is one of the reasons why these cultures were defined as a particular group, contrasting to the poorer finds in the sandy regions: the flint assemblages of 'western tradition', lacking core axes¹⁵⁵. It is realized now that the extraordinarily rich sites like those in Zeeland distorted the model of the Mesolithic. New studies for instance reveal the occurrence of the 'broad blade' flint assemblages, related to Star Carr, but lacking the core axes, on the eastern slopes of the Pennines, probably the summer camps of people living in dwelling places like Star Carr during the winter¹⁵⁶. Maglemose assemblages are now also established in Jutland¹⁵⁷, while the Gudenaa Culture seems to be a complex of mixed assemblages. The definition of 'Maglemose' in wider sense by the distribution of Core Axes, the preference for a marshy environment, and a rich bone and antler industry must be too restricted and determined to a large extent by the conditions for preservation.

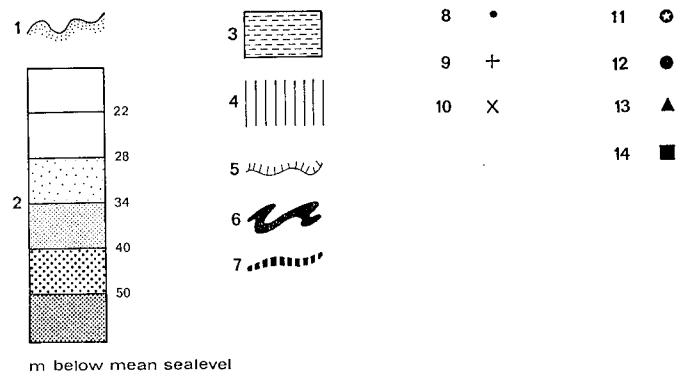
New insight into this question is supplied by the recent work of Dr R.R. Newell of Groningen¹⁵⁸. I am much indebted to him for his information in this respect. Newell distinguishes a scarcely represented 'Basal' and a similarly scarce 'Early Mesolithic' in the Preboreal and Early Boreal with a distribution that covers the Netherlands and its surroundings uniformly, as was the case with the preceding Ahrensburg Culture. Apart from the absence

¹⁵⁵ Cf. De Laet 1958, 51; De Laet/Glasbergen 1959, 36; Waterbolk 1962, 233; Schwabedissen 1944, esp. the map at Taf. 131; Bohmers 1956, 1960; Clark 1932, map 1; Clark 1955, map on 13; Clark 1936, fig. 65.

¹⁵⁶ Radley/Mellars 1964; Clark 1954, foreword in 2nd imp. 1971.

Legends fig. 18

- 1 50 m contour line, generalized
- 2 depth below M.H.W., after Houbolt 1968
- 3 regions of extensive Holocene sedimentation
- 4 Late Glacial valley of Rhine-Meuse
- 5 limit of Brown Bank Clay after Oele 1971
- 6 accumulative banks, after Houbolt 1968
- 7 erosional banks, after Houbolt 1968
- 8 moorlog after Clark 1936
- 9 moorlog after Vermeer-Louman 1934
- 10 moorlog after Oele 1971
- 11 dated settlement
- 12 barbed point(s)
- 13 settlement, yielding the flint only
- 14 various finds



of core axes these Early Mesolithic groups show a remarkable resemblance to the north European flint assemblages. The presence of the complete tool kit for bone and antler working (burins, borers, scrapers) is proof that bone and antler were worked. According to Newell, in the present state of research there is no room to assume the existence in this period of a second tradition of people using core axes in the Netherlands, besides the groups already distinguished. It is most reasonable to conclude that the bone and antler implements described in this paper belong to these well-defined groups; this affirms the close relationship to the northern Mesolithic. This is the more easy to accept since Clark¹⁵⁹ has already pointed out that the bone and antler working techniques of the northern Mesolithic must be derived from the preceding Ahrens-

¹⁵⁷ Ruth/Blankholm/Andersen 1967.

¹⁵⁸ Newell 1970a, b, with reference to his unpublished Ph.D. dissertation.

¹⁵⁹ Clark 1954, 181-5.

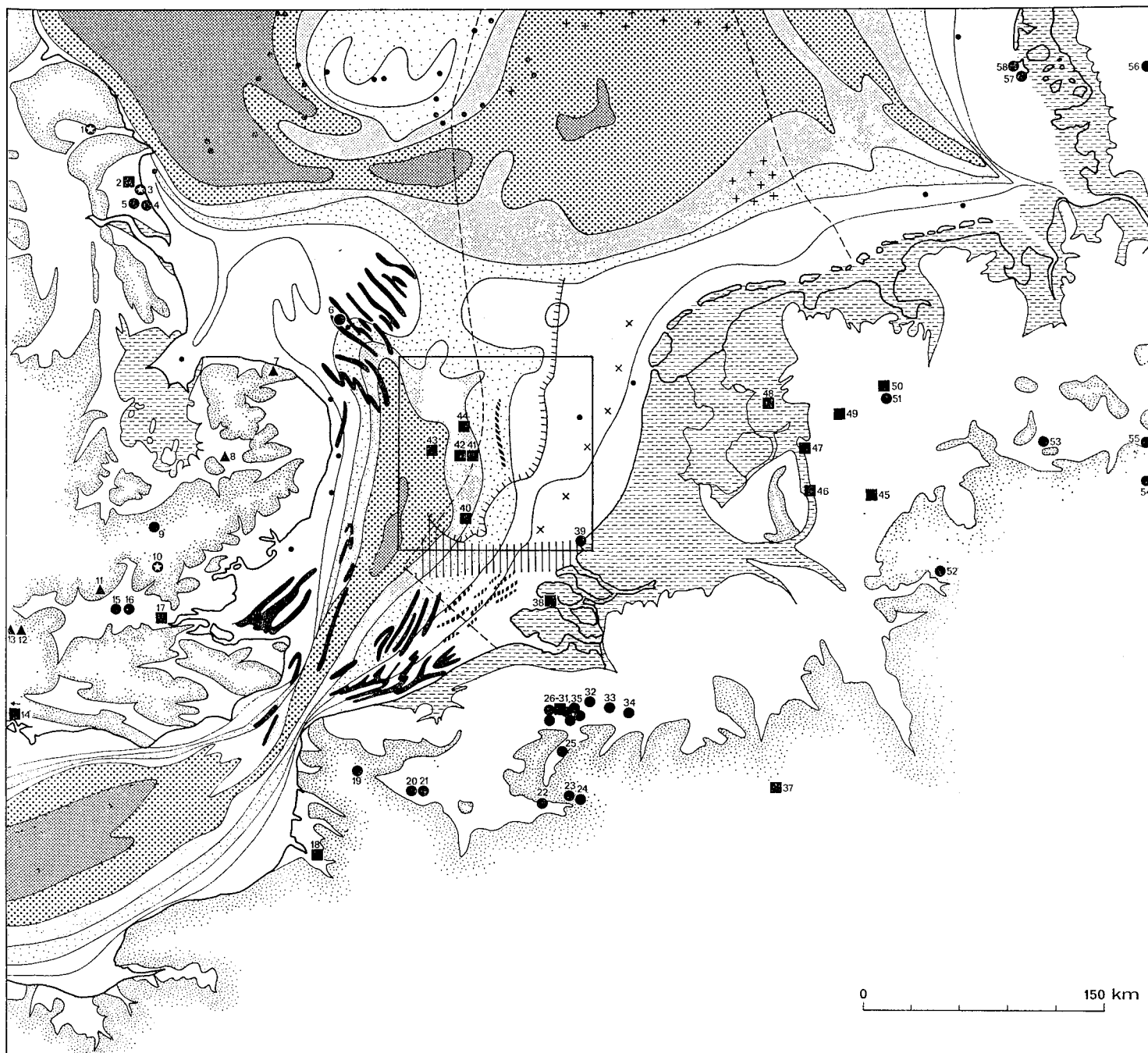


Fig. 18 The southern part of the North Sea and its surroundings, illustrating some features of importance in the study of the fished-up implements. The big square encloses the area of fig. 1

TABLE V. Archaeological sites, indicated on the map of fig. 18

no.	site	finds
1	Star Carr	Late Preboreal settlement site.
2	Ulrome	8 shaft-hole picks (frag.) ($7 \times$ aurochs radius, $1 \times$ scapula)
3	Skipsea	bone barbed point form 6 and flint, core axes, from below End Boreal peat.
4	Brandesburton	6 barbed points (4 frag.), all bone and form 6.
5	Hornsea	a bone (?) and antler barbed point form 6; 2 different sites.
6	Leman and Ower Banks	Early Boreal barbed point, form 6.
7	Kelling	settlement site, flint, core axes.
8	Thetford	settlement site.
9	Royston	bone barbed point, frag., form 6.
10	Broxbourne	settlement site, flint, core axes, sealed below Boreal peat.
11	Uxbridge	settlement site, flint, tranchet (no core) axes.
12	Newbury	settlement site, flint, core axes.
13	Thatcham	settlement site, flint, core axes.
14	Romsey	chevron decorated antler tine.
15	Wandsworth	bone barbed point form 3.
16	Battersea	bone barbed point, frag., form 6.
17	Thames	chevron decorated shaft-hole pick, aurochs radius.
18	Crouy	decorated antler sleeve with inserted boar tusk chisel.
19	Isbergues	bone barbed point form 6.
20	Béthune	bone barbed point form 6.
21	Béthune	antler point with bold barbs, frag., form 6.
22	Pommerœul	barbed point form 6.
23	Maisières	barbed point form 6 (frag.) and core axe from the same peat layer.
24	Obourg	slotted point with flint insets.
25	Ninove	bone barbed point form 6.
26	Heusden	barbed point form 6 (frag.).
27	Melle	2 barbed points form 6, antler and bone.
28	Wichelen	socketed axe, aurochs metatarsal; 2 barbed points (frag.) one of them form 6.
29	Schoonaerde	barbed point form 6.
30	Zele	4 barbed points, one form 6 with bold barbs, the others with 4-5 barbs.
31	Appels	barbed point(s).
32	Hamme	barbed point(s).
32	Willebroek	barbed point(s).
34	Mechelen	barbed point(s).
35	Wichelen/Schoonaerde	two barbed points, one of them resembling form 6, with 4 barbs.
36	north of Brussels	barbed point form 6 (small fragment).
37	Remouchamps	decorated piece of bone on a Tardenoisian site.
38	Colijnsplaat	worked red deer antler.
39	Europoort	bone barbed point form 6 (one frag.) and other implements.
40	Brown Bank no. 4	bone axe, aurochs tibia.
41	Brown Bank no. 5	pointed axe, aurochs metatarsal.
42	Brown Bank no. 2	socketed axe, aurochs metatarsal.
43	Brown Bank no. 1	shaft-hole pick, aurochs radius.
44	Brown Bank no. 3	socketed axe, aurochs radius.
45	Hericker Berg	elk antler adze.
46	Koerhuisbeek	socketed axe, aurochs radius.
47	Spoolde	elk antler adze, fragment.
48	Kuinre	elk antler adze.
49	Pesse	dug-out canoe, pine wood.
50	Aschbroeken	red deer antler shaft-hole pick.
51	Emmererfscheidenveen	barbed point form 6.
52	Lippe	barbed point with 3 barbs.
53	Dümmersee	bone barbed point with 5 bold barbs.
54	Döhren	bone barbed point form 6.
55	Wendhausen	bone barbed point form 6.
56	Brodersby	bone barbed point form 9.
57	Föhr	bone barbed point form 6.
58	Amrum	bone barbed point form 6.

references

- Clark 1954, 1956.
 Smith 1911.
 Armstrong 1922, 1923a, b; Godwin H./M.E. 1933; Clark 1936, 236 & fig. 42; Clark/Godwin 1956.
 Clark/Godwin 1956.
 Armstrong 1922, 1923b; Godwin H./M.E. 1933; Clark 1936, 236 & fig. 42; Clark/Godwin 1956.
Cf. this paper note 18.
 Clark 1932, 54 f.; Clark 1936, 236.
 Clarke 1960, 43, 45.
 Clark 1936, 236 & fig. 42; Clark/Godwin 1956.
 Warren *et al.* 1934; Clark 1936, 236.
 Clark 1932, 67; Clark 1936, 237.
 Clark 1936, 236.
 Clark 1932, 65; Clark 1936, 236.
 Smith 1934 (pl.); Clark 1936, 236, 249.
 Clark 1936, 237 & fig. 42; Jessup 1970, 36 & pl. 8.
 Clark 1936, 236 & fig. 42; Jessup 1970, 36 & pl. 8.
 Smith 1934 (pl.); Clark 1936, 237, 249.
 Clark 1936, 237, 248; *cf.* this paper note 107.
 Breuil 1926, 310; Clark 1936, 237; Doize 1952, 119.
 De Mortillet 1903, no. 477; Breuil 1926, 310; Clark 1936, 237 & fig. 42; Doize 1952, 119.
 Breuil 1926, 310 & fig. 2; Clark 1936, 237 & fig. 42; Doize 1952, 119.
 Doize 1952, 118; De Laet 1958, 52.
 De Munck 1889, fig. 2; Doize 1952, 118; De Laet 1958, 52.
 Breuil 1926, 310; Clark 1936, 231; Doize 1952, 119; De Laet 1958, 52.
 De Loë 1891, 559 & pl. 13; De Loë 1928, 223; Clark 1936, 231; Doize 1952, 118 & fig. 2; De Laet 1958, 52.
 Maertens 1922, fig. 30; Doize 1952, 117; De Laet 1958, 52.
 De Loë 1931, fig. 2; Doize 1952, 116; De Laet 1958, 52.
 Hasse 1924, figs. 1 & 2; Hasse 1934, 70 & fig. 3 (socketed axe); Clark 1936, 231 & fig. 42.
 De Loë 1931, fig. 2; De Laet 1958, 52.
 De Laet 1958, 52 & pl. 8.
 De Laet 1958, 52.
 De Laet 1958, 52.
 De Laet 1958, 52.
 De Laet 1958, 52.
 Hamal-Nandrin/Servais 1928, fig. 1; Hasse 1934, 8; (De Laet 1958, 52).
 Breuil 1926, 310 & fig. 1; Clark 1936, 231 & fig. 42; Doize 1952, 118.
 Clark 1936, 249 & fig. 57; Doize 1952, 119 and lit. cited there.
 this paper no. 11
 this paper nos. 12-16.
 this paper no. 4.
 this paper no. 5.
 this paper no. 2.
 this paper no. 1.
 this paper no. 3.
 this paper no. 18.
 this paper no. 17.
 this paper no. 20.
 this paper no. 19.
 Van Zeist 1957; De Laet 1958, 55 & pl. 7.
 Elzinga 1962; this paper no. 22.
 this paper no. 21.
 Brandt 1940.
 Clark 1936, 238; Jacob-Friesen 1959, *Abb.* 43.
 Clark 1936, 238; Schwabedissen 1944, *Taf.* 135.
 Clark 1936, 240; Jacob-Friesen 1959, *Abb.* 45.
 Schwantes 1934, *Abb.* 116, 4; Clark 1936, 238.
 Clark 1936, 239; Bantelmann 1949, *Abb.* 1a-c.
 Clark 1936, 237.

The material of the barbed points (bone or antler) is given after the publications. In most cases the determinations are not reliable.

Instead of the reference to De Laet 1958, 52 one may also read De Laet/Glasbergen 1959, 37 and pl. 4.

No. 36 is not plotted on the map.

burg Culture¹⁶⁰. It is this culture which forms the *substratum* of the Mesolithic in the Netherlands.

Bearing the foregoing in mind we mapped and listed the finds around the North Sea that are traditionally attributed to the 'Maglemose Culture', *i.e.* flint assemblages with core axes and a series of antler bone implements, mainly with barbed points (table v, map at fig. 18). The organic finds are concentrated in the coastal regions (East Yorkshire) and in the wide valleys of the rivers Thames and Scheldt. All of them are found well below the 200 m limit of Clark¹⁶¹. The flint assemblages containing core axes are, however, not restricted to low lying regions and are only found on the British Isles. If there was a link with the western Baltic region, it must have passed north of the Netherlands and northern Germany along the coastline in the partly submerged North Sea Basin. To the south the Core Axe Cultures are surrounded by a fringe of bone and antler implements, most of them dredged up and unassociated with other objects, accidentally preserved, while at the dwelling places all organic remains are perished. The typological similarity of the organic implements to the northern finds emphasize (as we put forward for the Dutch finds) a relationship with the indigenous cultures and the Core Axe province.

GEOGRAPHICAL CHANGES IN THE NORTH SEA BASIN DURING THE EARLY MESOLITHIC

The gradual submergence of the North Sea Basin must have been a major factor in the development of the Mesolithic cultures in Northwestern Europe.

At the maximum of the Late Glacial, the sea attained a level of at least —100 m. From the late Preboreal (*c.* 9,300 B.P.) to the beginning of the Atlantic (*c.* 8000 B.P.) the sea-level rose from about —50 m to about —20 m NAP, or at a rate of about 2 m per century (see table I, fig. 3), which resulted in considerable geographical changes¹⁶². In

the beginning of this period the North Sea Basin formed one unbroken lowland, intersected only by the main river courses: Elbe and Weser, IJssel, Rhine, and Meuse, Scheldt, and Thames. During the Preboreal the coastline shifted quickly to the south, and at a sea-level of about —40 m the Dogger Bank was separated from the mainland by the encroaching sea in the present Outer Silver Pit. In the present Deep Water Channel an initially narrow, but quickly widening, north-south oriented inland-sea came into existence at that time. This sea might already have had a connection with the Channel, but it is also possible that the deep channel there is the result of scouring by the currents in later times. In both cases the inland-sea will have been a fresh water sea, since most of the named rivers flowed into it. At the beginning of the Boreal, about 9000 B.P. (sea-level at *c.* —40 m) only a narrow land bridge east of the Humber estuary connected the British Isles with Scandinavia. A short time later the land bridge was flooded and at the end of the Boreal the North Sea had almost reached its present extent.

The geographical situation during the Early Boreal was very similar to that in the Danish islands at that time, where a land bridge, intersected by some narrow water connections, also existed, separating the Kattegat and the Baltic Sea¹⁶³. There, however, due to the isostatic uplift, this situation was preserved until the present day.

In spite of the above statements about the circumstances of preservation influencing the cultural pattern, we think on and around the Danish islands there was a marked centre of occupation, which is proved by the number of sites. We can imagine (as Schwabedissen¹⁶⁴ cautiously does) that in a similar landscape and geographical situation a comparable cultural centre was situated around the inland sea of the Deep Water Channel and on the land bridge north of it, reflected by the recently dredged-up implements. The minor traits of typological individuality, subordinate to the over-all resemblance to the other

160 Rust 1943. Groove and splinter: *Taf.* 50, 51, 66, 70, 83 *etc.*; picking (notches): *Taf.* 49; (perforations): *Taf.* 52, 53, 54; Lyngby axes: *Taf.* 56.

161 Clark 1936; The literature on the Belgian finds is not easily accessible. A survey is given by Doize 1952 (also in: *Annalen van de Federatie van de Kringen voor Geschiedenis en Oudheidkunde van België*, 35e Congres 1953, 71–81).

162 Earlier illustrated by Jelgersma 1961, fig. 46; Schwabedissen 1951, *Abb.* 1. When the present day contour map is used in constructing the former coast line patterns the possible deformations of the North Sea Basin as a result of the tectonic subsidence, the isostatic movements and erosion are neglected. We think that thereby no big source of error is introduced. Tectonic

subsidence in the western Netherlands, for instance, is very small and of only minor importance: about 3 cm per century or 5% of the relative rise in sea-level in the last 10,000 years. Erosion was not of much importance during the very quick rise of the sea level in the Early Holocene. The isostatic movements (either uplifting due to the disappearance of an ice load or downwarping due to a new water load) which might be different in different parts of the North Sea are, however, not easy to estimate. For these problems see Jelgersma 1961, 14 f., 75.

163 Brøndsted 1960, fig. at p. 56.

164 Schwabedissen 1951, 71–2; see also the remarks of Clark 1936, 87; Waterbolk 1962, 233; Roe 1970, 99.

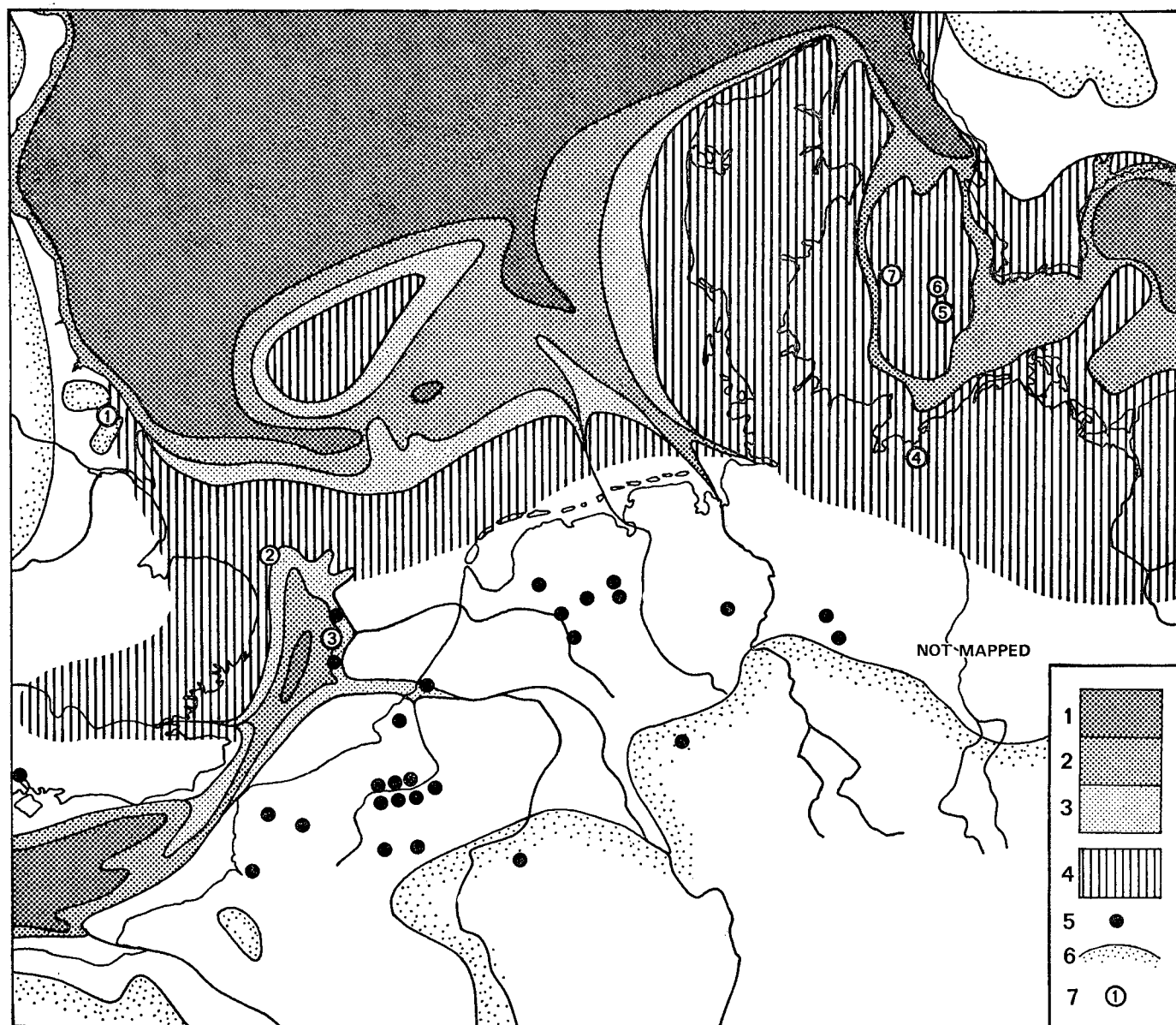


Fig. 19 Generalized picture of the geographical changes in the North Sea and the western Baltic during the Early Holocene

- 1 Middle Preboreal Sea, about 9500 B.P. Sea-level at -50 m in the North Sea, the Yoldia Sea in the Baltic
- 1 + 2 End Preboreal Sea, about 9000 B.P. Sea-level at -40 m in the North Sea, Lake Ancylus in the Baltic
- 1 + 2 + 3 Early Boreal Sea, about 8700 B.P. Sea-level at -34 m in the North Sea, Lake Ancylus in the Baltic

- 4 Presumed extent of the cultures, using Core Axes, in the Early Boreal, shortly before Great Britain became an island
- 5 'Maglemose' bone and antler implements outside the Core Axe Cultures
- 6 200 m contour line
- 7 Most important reference sites: 1: Star Carr, 2: Leman and Ower Banks, 3: Brown Bank, 4: Hohen Viecheln, 5: Sværdborg, 6: Holmegaard, 7: Mullerup

Early Mesolithic tools, noted in the preceding pages for the implements, might be an indication of some minor differences between the group of the southeastern North Sea Basin and other groups, especially the Danish Maglemose Culture.

THE DUTCH LATE MESOLITHIC

In the Netherlands there is a marked increase in the number of sites during the Late Boreal and Early Atlantic¹⁶⁵. Two groups, a 'Northwest Kreis' and a 'Rhine Basin Kreis' are distinguished, mainly on account of the occurrence of 'Wommersom Quartzite' as raw material and the manufacture of blade points, both occurring in the southern group. The boundary lies approximately along the river Rhine. In the beginning of the Atlantic the first core and flake axes are introduced in the Netherlands. They are part of the 'De Leien-Wartena complex', concentrated in the northern Netherlands and along the river Meuse in Limburg. The complex is alien to the Netherlands and must reflect an immigration. In view of the geographical changes described above, the North Sea Basin seems to be a very likely area of origin. It is tempting to see these immigrants as the descendants of the inhabitants of the fens on the North Sea floor, driven upstream by the encroaching sea, which reached the present coastal regions at that time. Although other factors may play a role too, the marked increase in Mesolithic sites after the Early Boreal might be connected with the same changes. The implements of bone and antler have not yet been discovered by us in any great quantities. In view of the ratio to the dwelling sites this is remarkable. As stated above we think that they are among the large number of red deer antler implements dredged up from the rivers.

MESOLITHIC HUMAN REMAINS

A second group of finds deserves comment: the skulls of Tévéc type, named when discussing the Koerhuisbeek adze. At present Dr D.P. Erdbrink is making a study of all such skulls found in the Netherlands; they

number about 50, most of them from the deposits of the rivers Meuse, Rhine, and IJssel¹⁶⁶. Skulls of the same types (three types are now distinguished) are known from the Scheldt and Thames Valleys as well. For this reason Erdbrink named them the 'River Valley People'.

Only a few of the skulls are dated to some extent by associated finds, as for instance the skull Hummelo 1¹⁶⁷, found together with similar antler implements as those giving a *terminus ante quem* to the Koerhuisbeek skulls. The finds at Bunde in the Meuse Valley have been the subject of some discussion; their dating does not seem to be without problems¹⁶⁸. At Swifterbant at least two skulls in the Early Neolithic cemeteries (c. 5500 B.P.) were of the Tévéc type¹⁶⁹. Together with the Early Neolithic occupation, established during the last years in different parts of the Dutch Holocene sedimentation area and with the distribution of the De Leien-Wartena complex, the Early Mesolithic finds described in this paper (and especially the Koerhuisbeek adze) form a general indication that the skulls might belong to a long period, covering the entire Mesolithic and also the Early Neolithic.

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165 We are indebted to Dr Newell for the following account of the Late Boreal and Atlantic Mesolithic in the Netherlands.

166 We would like to thank Dr Erdbrink for the information he gave us on the study he is carrying out together with Dr J. Tacoma. It must be mentioned here for the sake of clearness that Dr Erdbrink proposes a Late Palaeolithic age for some of the skulls. The author must unfortunately disagree on this point. Literature on the most important finds: Vallois 1943;

Huizinga 1958, 1959; Butter 1940, 1950, 1955, 1959; Van Bork-Feltkamp 1957, 1964. A recent review is given by Mrs Constandse-Westermann 1968, 160-4.

167 Huizinga 1959; Erdbrink pers. comm.

168 Erdbrink 1964, 1968; Clason 1968.

169 Information regarding the Swifterbant skulls was provided by Professor van der Waals.

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APPENDIX

BONES OF MAMMALS FROM THE BROWN BANK AREA (NORTH SEA)

by G. Kortenbout van der Sluijs

Since 1964 a large number of bones, dredged by fishermen from the North Sea, have been acquired by the National Museum of Geology and Mineralogy at Leiden. Most of these were obtained in collaboration with the Central Fisheries Laboratory at IJmuiden, especially with the kind help of Mr C. van Delft. The Netherlands Institute for Sea Research formerly at Den Helder, now on the island of Texel, Mr W.F.A. Guilonard of Dordrecht, Mr J.P. Jacobs of Breskens, and others also supplied many bones from the North Sea. To all of these and to the crews of the vessels, who collected the bones, the author is most indebted for their generous help.

Nearly all of these finds are from the neighbourhood of the Brown Bank, but not from the Brown Bank itself. Bones dredged near the Belgian or Dutch coast or from other places in the North Sea are met with only incidentally. Although the Dogger Bank has often been cited as rich in mammoth bones, no finds from this area have been received. According to the fishermen, bones do not occur on or near the Dogger Bank.

The sea-bed in the Brown Bank area consists of Eemian deposits, only a few metres thick and underlain by Early Pleistocene deposits. The latter occur as outcrops in some

places farther south. The banks and ridges on top of the Eemian deposits probably originated as dunes in Weichselian times. Only the Brown Bank has a different structure.

Many of the bones are in a bad state of preservation. This is not because they were lying on the sea-floor, for bones, dredged near the Dutch coast and the estuaries of the river Scheldt are better conserved. This decay has probably been caused by the fact that the bones had been lying on or near the surface for a long time prior to the inundation by the North Sea.

The bones from the Brown Bank area belong to several distinct faunas. The dating of the bones is therefore a rather difficult matter.

First: the fauna of dark, heavily fossilized bones like those of the 'Black Bone Fauna' of the Scheldt estuaries and the bones of the East Anglian crags. These bones are of an Early Pleistocene, Villafranchian age and are characterized by *Mammuthus (Archidiskodon) meridionalis* (Nesti).

Second: the fauna of Late Pleistocene, Weichselian age. Most bones belong to this fauna, which is characterized by mammoth, woolly rhino *etc.*

Third: the fauna dated by the bone implements as Early Holocene. It is very difficult to distinguish these bones from those of the second fauna, because their state of conservation is much the same.

Forth: the group formed of mammals which may belong to one of both foregoing faunas, dated either to the Weichselian or to the Holocene.

Finally: the fauna consisting of bones of marine mammals, which lived after inundation by the North Sea. The following mammals have been recognized so far:

A Villafranchian fauna:

an elephant, *Mammuthus (Archidiskodon) meridionalis* (Nesti)
a rhino, *Dicerorhinus etruscus* (Falc.)
a horse, *Equus cf. robustus* Pomel.

B Weichselian fauna:

cave lion, *Panthera spelaea* (Goldf.)
cave hyena, *Crocuta crocuta spelaea* (Goldf.)
cave bear, *Ursus spelaeus* Rosenm. et Heinr.
mammoth, *Mammuthus (Mammuthus) primigenius* (Blum.)
woolly rhino, *Coelodonta antiquitatis* (Blum.)
horse, *Equus caballus* L.
reindeer, *Rangifer tarandus* (L.)
giant deer, *Megaceros giganteus* (Blum.)
steppe bison, *Bison priscus* Boj.
musk ox, *Ovibos moschatus* (Zimm.)

C Early Holocene fauna:
man, *Homo sapiens* L.
dog, *Canis familiaris* L.
aurochs, *Bos primigenius* Boj.

D Mammals belonging either to the Weichselian or to the Early Holocene:
man, *Homo sapiens* L.
brown bear, *Ursus arctos* L.
wolf, *Canis lupus* L.
otter, *Lutra lutra* (L.)
beaver, *Castor fiber* L.

wild boar, *Sus scrofa* L.
red deer, *Cervus elaphus* L.
elk, *Alces alces* (L.)
aurochs, *Bos primigenius* Boj.

E Marine mammals:
several whales, amongst which:
bottle-nosed dolphin, *Tursiops truncatus* (Mont.)
white whale, *Delphinapterus leuceas* (Pallas)
walrus, *Odobenus rosmarus* (L.)
harbour seal, *Phoca vitulina* (L.)
hooded seal, *Cystophora cristata* (Erxl.)

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