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A bifacial tool of the Neanderthals from Ameland, the Netherlands•

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Abstract

A bifacially worked flint tool has recently been found on the North Sea beach of Ameland, one of the Wadden Islands in the northern Netherlands. It probably dates from the Middle Palaeolithic because its surface modifications include windgloss which in this area originated especially during the Weichselian Late Pleniglacial. The tool was probably first worked by a skilled knapper and subsequently, after a break occurred, by an apprentice. It is suggested that the tool was transported to Ameland from the North Sea bottom in the course of sand replenishment activities. Other artefacts from the Wadden Islands allegedly left by Neanderthals are also briefly discussed.

Keywords: Middle Palaeolithic, Wadden Islands, natural surface modifications, dating, apprentice flintknappers

Introduction

On June 16, 2012, Mrs Margriet Diertens, an artist and part-time employee of the Groninger Museum, went for a walk on the North Sea beach of the Wadden Island of Ameland in the northern Netherlands. Not far from the water line, between kilometre markers 14 and 15, she noted a curious black flint on the sand (Figs 1, 2). Flints with a blackish discolouration ('underwater patina') are quite common: they can be found on beaches of most Wadden Islands in large numbers. A tiny fraction of these flints are special, however, because they in fact constitute artefacts, manufactured by humans (including Neanderthals) during various prehistoric periods. The object from Ameland is a bifacial tool, i.e., a tool with traces of human workmanship on both sides, that is slightly reminiscent of a leafpoint.

One of the reasons why this find is interesting is that it contributes to our knowledge concerning the northern limits of the Neanderthals' range. Therefore, several (allegedly) Middle Palaeolithic artefacts from other Wadden Islands will also be briefly discussed (Fig. 3).

Bert Boekschoten has always been interested in archaeological finds and their geological contexts. Not long ago, he visited the Wadden Island of Vlieland in connection with the many interesting artefacts found on the Vliehors by Mr Idzard Vonk. Some of these artefacts also date from the period of the Neanderthals, the Middle Palaeolithic. Bert also co-authored a paper on these finds (Stapert et al., 2011). With pleasure, we dedicate the present note to him on the occasion of his 80th birthday.

Description of the tool

For a bifacial tool, the specimen is rather small; its length, as preserved, is merely 8.4 cm. It is damaged, however, and originally would have been around 9 cm in length. At the top, there is a large, recent fracture. Elsewhere along the edges smaller damages occur; in the drawing (Fig. 2) recent fractures are left white. The tool has a maximum width of 4.5 cm, its thickness and weight being 1.6 cm and 57.2 grams, respectively. At the recent breaks, it can be seen that the artefact is made of

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Fig. 1. The bifacial tool from the Ameland beach discussed in the present paper (photograph by M.J.L.Th. Niekus).

fine-grained, grey flint with whitish spots, containing a few bryozoan fragments. It is clearly of northern (erratic) origin.

On face B, in addition to flake scars, there are several remnants of old faces that predate human flaking. These remnants, which are indicated in the drawing by a deviating signature, are present in the centre of this face and are in fact old frost-split faces: parts of the outer surface of the raw flint nodule picked up by prehistoric man. Face A is covered completely by flake scars. There are no remnants of older faces. It is possible, therefore, that face A originally was the ventral face of a flake or blade. However, in view of the surface-covering secondary working of this face, it is not possible to ascertain, nor exclude, that this tool was made out of a flake or blade, even though this is a distinct possibility.

This tool is, at least in part, a failed product and, as a result, its typology is not very clear. The working of this implement, as shown by the flake scars, was of very variable quality. The piece seems to present a 'Janus face' in this respect: one side

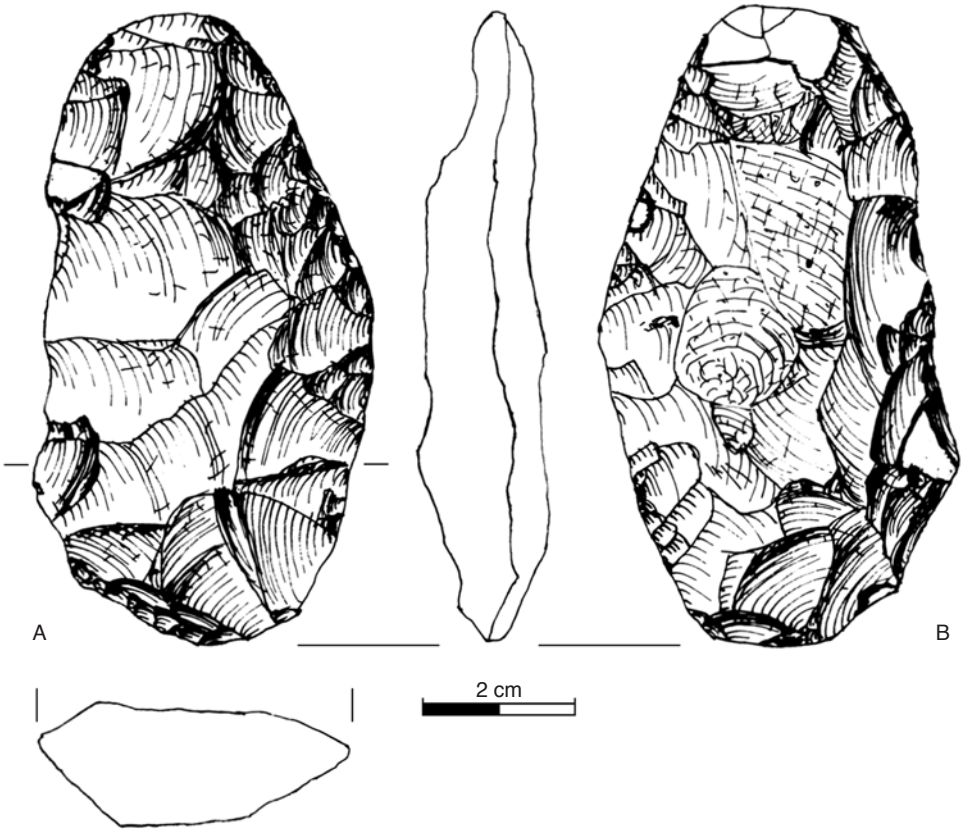

Fig. 2. The bifacial tool from the Ameland beach discussed in the present paper (see Fig. 1). Left white in this drawing is recent damage; the deviating signature signifies old frost-split faces (drawing by L. Johansen).

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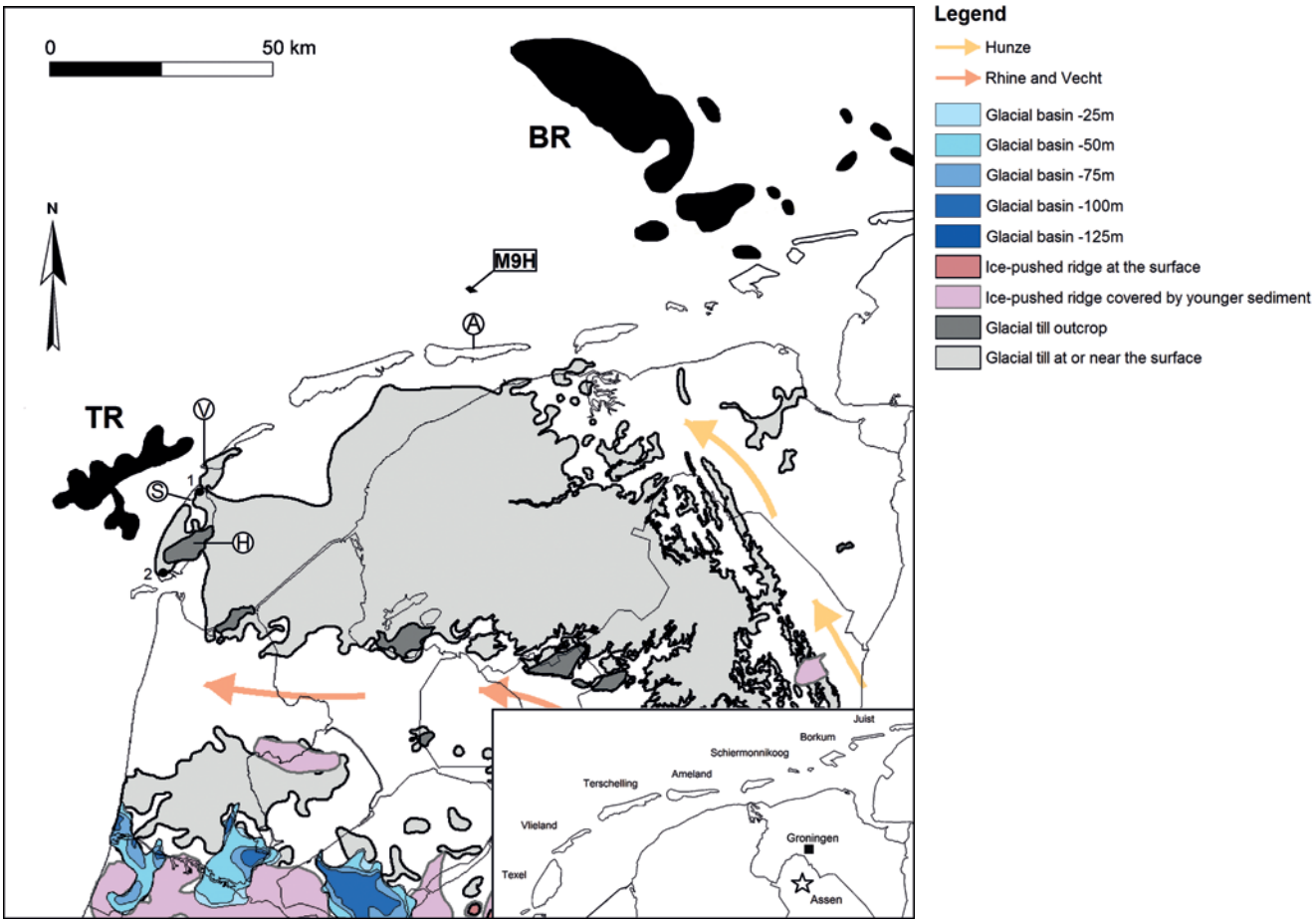

Fig. 3. Simplified geological map of the northern Netherlands showing the majority of the sites mentioned in the text. Indicated in black are localities of the Texel Rough (TR; after Leenaers, 2009, p. 48) and the Borkum Rough (BR; after Veenstra, 1976, p. 22): areas on the sea floor with a lot of moraine gravel of a Saalian date. A: the provenance of the bifacial tool on the Ameland beach; M9H: the probable source area of the Ameland tool; V: the Vliehors area (Vlieland); S: the area of De Slufter (Texel); H: De Hooge Berg (Texel); two of Mr J.J. Waverijn's localities on the Texel coast: 1. Eierland; 2. De Hors. The approximate location of the Middle Palaeolithic site near Assen is marked by a star in the inset showing the Wadden Islands (drawing courtesy of F.S. Busschers, modified by M.J.L.Th. Niekus and L. Johansen).

(the right side of face A) was worked in a much more skilled way than the opposite side. The right side was worked bifacially over the entire length in a careful way. Working angles along this edge are acute (40-50°) and regular. In cross-section, this lateral edge is symmetrical, as seen in handaxes or leafpoints. The working of this side was undoubtedly done with a soft hammer made of bone or antler and was very successful. Nothing went wrong during the shaping of this edge; the manufacturer must have been a skilled flintknapper.

The left side of face A presents a different picture; it has an irregular edge. Here too, the working was bifacial but almost all strokes went wrong. Quite some flakes went too deep into the tool because the flaking angle was inadequate, or the strokes were too hard. Several deep 'steps' or 'hinges' were produced; these are abrupt terminations of flakes that hinder further working. The knapper was unable to remove these irregularities, although this was attempted in several places. Especially the basal part of the tool shows rather many scars of failed strokes. A thicker part is present here, and the lateral edge shows a zigzag shape. All this must have been done by someone who had not yet mastered flintknapping completely, i.e., a learner (e.g., Stapert, 2007; Johansen & Stapert, 2012). In the top part of face A, it can be seen that this apprentice was the second knapper who worked on this piece, because some of his negatives cut across the negatives produced by the skilled knapper. Therefore, it seems that in the first phase of its history this was a tool, maybe a handaxe, produced by a skilled flintknapper. In a second phase, probably after a break had occurred, it was picked up by an unskilled knapper who tried to 'repair' it, and transform it into a small handaxe, or even a leafpoint. This work was largely in vain, as a result of inadequate knapping. In our opinion, this second knapper was most probably an older child; not an absolute beginner, but an advanced pupil of the art of flintknapping.

Because the working of this tool partly failed, with a slightly asymmetrical shape as a result, it is difficult to classify it unambiguously in a typological sense. It resembles a preform of a leafpoint, but we consider it best to describe it more neutrally as a 'small bifacial tool', in order to avoid cultural connotations.

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'Dating' the tool – surface modifications

The present tool was clearly found outside its original geological context (see below) and the only way to approach the question of dating appears to be the study of its natural surface modifications. Typology, i.e., the study of its shape, on its own, without supporting evidence, is risky and in many cases cannot provide reliable answers. Just looking at its shape, the Ameland tool may be of Middle Palaeolithic date, although a more recent age is also possible. Bifacial implements, for example daggers and sickles, were also produced during the Neolithic and Bronze Age periods. Preforms of these tools may resemble Middle Palaeolithic tools such as handaxes or leafpoints. Since the artefact is a somewhat atypical piece, a preform at best, it is not possible to ascribe it to one of these periods based on shape or technology alone. In view of the natural surface modifications present (see below), in our opinion this is most probably a Middle Palaeolithic implement, created by Neanderthals. In this region, the Middle Palaeolithic ended when the Neanderthals died out, around 35,000 years ago, certainly not later than 30,000 ^{14}C years ago. It is important to note that their culture ended before the start of the very cold Weichselian Late Pleniglacial. Neolithic and Bronze Age are cultural periods which markedly postdate the end of the Weichselian. Here we shall attempt to use the surface modifications present on the tool to decide whether it dates from the Middle Palaeolithic or from the Neolithic/Bronze Age. In some cases, such modifications may provide data on the original geological context of artefacts found *ex situ*.

The most conspicuous modification present on the Ameland tool is a blackish discolouration (by infiltration) of the outer layer of the flint, also referred to as 'black patina'. The black material consists of an iron-sulphur compound, which is formed under water in anaerobic circumstances by the actions of sulphate-reducing bacteria (e.g., Stapert, 1981; Stoel, 1991). Occasionally flints turn black through and through. Black patina is a common phenomenon with flints from the North Sea and the Wadden Sea, and it is also well known from finds occurring in river sediments (e.g., Johansen et al., 2009). It is found not only on Palaeolithic flint artefacts, but may occur on artefacts of all prehistoric periods, including the Neolithic and the Bronze Age. Therefore, the presence of black patina on the present tool is of no help as far as dating is concerned.

Both sides also exhibit gloss, but face B has a much more marked gloss than face A. In fact, face A looks quite fresh, except near the right edge. The higher gloss on face B continues here over the edge to face A, where it can be seen over a distance of about half a centimetre, especially in the top part of the tool. It is clear that during the formation of the gloss the piece was lying with face B turned up. A strong variability in the strength of gloss on a single piece, as in this case, is observed quite often with one specific kind of gloss: windgloss, created predominantly mechanically by blowing sand during long periods without vegetation cover (Stapert, 1976), although a chemical component may be present too. Knutsson & Lindé (1990) presented SEM micrographs of traces of impact on quartz by grains of sand in a laboratory experiment simulating aeolian activity. Their work is suggestive in the sense that it supports the idea that windgloss is created predominantly in a mechanical, not a chemical, way: by impacts smoothing down the surface on a micro-scale. They did not mention the creation of 'small pits', however. Small pits were created on flint surfaces in a laboratory experiment simulating aeolian activity by one of us (Stapert, 1976, p. 17).

Long periods without vegetation cover are known to have occurred during the stadial phases of the last glacial. Both the Weichselian Early Pleniglacial (~75-60 ka) and Late Pleniglacial (~26-15 ka) experienced severely cold and dry conditions (see e.g., Huijzer & Vandenberghe, 1998; Kasse et al., 2007). Ventifacts and flints with windgloss have been recorded especially from the latter period, for example from the Beuningen Gravel Bed in Twente (eastern Netherlands), the formation of which took place between ~17-15 ka (Kasse et al., 2007).

Several Middle Palaeolithic artefacts, including a handaxe, with windgloss present on only one of their faces are known from an important site near Assen (see Fig. 3). Most artefacts from this site, where more than 30 handaxes have been collected so far, are covered in windgloss over their entire surface, although even then, some variation in the strength of the gloss may often be noted. These finds derive from bouldersand, a weathering residue of glacial till or boulderclay mixed with other sediments (e.g., coversand) as a result of solifluction, aeolian action, cryoturbation and other processes, that may have formed over a long period of time (see Niekus et al., 2011). The presence of typical windgloss on any artefact in this region makes it very probable that it dates from the Middle Palaeolithic, because it will predate the Weichselian Later Pleniglacial.

A complicating factor is that a strong gloss patina, somewhat similar to windgloss in appearance, can develop under water, also long after the end of the Weichselian. For example, some artefacts which can be placed unambiguously in the Neolithic, collected from the beaches of Vlieland (see below), show quite a high gloss. Also in some of those cases, just as with windgloss, there may be variation in strength of the gloss over the flint. As such, the presence of gloss is not enough to ascribe an artefact to the Middle Palaeolithic with any confidence. However, during our study of the Vlieland material we have noted that the 'small pits' which are typically associated with windgloss (Stapert, 1976) do not seem to be present with 'under-water gloss' seen on quite a few Neolithic artefacts, even though some of these do exhibit quite a high gloss. On the other hand, with the very few finds from Vlieland that are typologically clearly Middle Palaeolithic, including a Levallois core, these small pits co-occur with gloss (see below). Therefore, it is especially the combination of gloss (variable or not) and small pits that characterises windgloss. Windgloss originated on dry land during the coldest phases of the Weichselian. Maybe

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the impact of sandgrains when colliding with flint surfaces under water (by wave action) is in general less strong than on a dry land surface (by wind), so that small pits are not created. Alternatively, the formation of under-water gloss may largely be a chemical phenomenon, in contrast to windgloss (but see also Harding et al., 1987).

Our conclusion is that artefacts showing both gloss and small pits should predate the Weichselian Late Pleniglacial, and therefore most probably can be assigned to the Middle Palaeolithic. The implement from Ameland shows small pits in several places, especially in the basal part of face B. Even within the narrow zone of gloss along the right side of face A some pits are visible. Compared with most Middle Palaeolithic finds from Drenthe, such as those from the site near Assen, however, the pits are relatively small and few. Nevertheless, their presence does constitute the main reason why we date this tool to the Middle Palaeolithic with some confidence.

As mentioned above, artefacts with windgloss most probably date from the Middle Palaeolithic.The opposite is not necessarily true. One might pose the question, 'What about artefacts without windgloss in this area? Could not some of them have escaped the formation of windgloss and date from the Middle Palaeolithic too?' That is certainly possible, of course, and such artefacts do exist. The Middeldiep site in the North Sea off the Zeeland coast, more than 100 km south of the southern limit of the Saalian till plateau, is a case in point. Several handaxes from this site do show black patina and gloss, but no windgloss with small pits. Nevertheless, we place them in the Middle Palaeolithic without any hesitation (Johansen et al., 2009; Johansen & Stapert, 2012). The absence of windgloss at the Middeldiep site can be explained by assuming that these artefacts derive from fluvial sediments (e.g., the Kreftenheye Formation) and were not exposed to aeolian activity during the Weichselian Early or Late Pleniglacial. In the case of the Wadden Islands, however, we are dealing with finds from the Saalian Drenthe till plateau. In this area Late Pleistocene Rhine sediments are absent (Busschers et al., 2007), although sediments of smaller (local) rivers do occur (Boxtel Formation: compare Westerhoff et al., 2003; Gunnink et al., 2013). We expect most Middle Palaeolithic finds in this region, similar to those on the till plateau in Friesland and Drenthe, to derive from bouldersand, and to exhibit windgloss. However, it is important to note that localities where Middle Palaeolithic artefacts without windgloss could be present may exist in this region as well, for example from local river sediments, the Eemian record or lakeshore deposits in glacial basins. So far we have no hard evidence for this, but the handaxe from Elahuizen might have come from the last-named type of site (Stapert, 1986).

The Ameland tool is not rounded as a result of rolling, or barely so. In several places on the artefact fine scratches have been observed with the aid of a stereomicroscope, and also a few slightly indistinct cones. In the case of beach finds, these phenomena are not of great interest as far as dating is concerned. One of us (DS) once suggested that the presence of 'segmented scratches', which arose not swiftly but over a long period by fits and starts (Stapert, 1976), may be characteristic of flint deriving from cryoturbated sediments, such as bouldersand. Some flakes found on the beaches of Texel show such scratches and have therefore been considered to be of Middle Palaeolithic age (Stapert, 1983). However, it has subsequently been observed that such scratches can also be produced by the action of creeping icebergs during severe winters, even to this day (Stapert & Zandstra, 1985). Therefore, such scratches cannot be used as an indication of great age, at least not in the case of beach finds.

Our conclusion is that the Ameland implement most probably dates from the Middle Palaeolithic. Even though we believe we have good arguments for this, we still have to be careful with 'dating' any finds from beaches and other places without stratigraphy; this will always be a risky undertaking.

Origin of the tool

It is clear that the tool was not found in its original geological position. It was either washed up on the shore, or transported to the Ameland coast by man. We shall first discuss natural agents to explain its occurrence.

On the bottom of the North Sea occur several areas with gravel concentrations. At least one of these, the Texel Rough ('Texelse stenen'), may be a source of flints, including artefacts, and stones of other kinds on the beaches of the Wadden Islands. In a series of articles, Hemmo Jan Veenstra, one of Bert Boekschoten's geologist colleagues at the former Geologisch Instituut (Universiteit Groningen), who died October 8, 2012, aged 84, described the sediments on the North Sea bottom (e.g., Veenstra, 1969, 1971, 1974, 1976). In his gravel analysis, Veenstra was able to distinguish four types. One of these, Type 3, is characterised by high proportions of flints and granites of Scandinavian origin. The Texel Rough has gravel of Type 3, and is located to the west of the North Sea coasts of Texel and Vlieland at a distance of some 10-50 km. This area, indicated on a map by Veenstra (1971), which was reproduced by Eisma (1980, p. 28), was later shown in a more detailed version (Veenstra, 1976, p. 22). On these maps, the Texel Rough has a diameter of about 40-45 km. More to the east there is a similar gravel-rich area, the Borkum Rough ('Borkumer rif'), mainly about 30-70 km north of Lauwersoog. Veenstra (1974, p. 34) noted about these two areas, 'The gravel is poorly rounded (...), due to the large content of angular flint and granite. The black flint as well as the granite and red feldspar fragments point to a Scandinavian origin. The gravel forms a lag deposit from moraines, for boulder clay crops out at the Texel Rough. This boulder clay belongs to the Penultimate (Saale) Glaciation (...)'. A recent map of the Texel Rough can be found in Leenaers (2009, p. 48); on this map the gravel area starts already at about 5 km from the coasts of both Texel and Vlieland (Fig. 3). The shape of the gravel patch

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on this map suggests that it may in part consist of eroded glacio-tectonic ridges surrounding a small glacial basin.

It is probable that many flints on the North See beaches (in particular on the westernmost Wadden Islands) derive from the Texel Rough, transported by the dominant western sea currents in this area (Eisma, 1980, p. 30). Eisma (1980, p. 29) mentioned that most of the stones washed up on the beaches were flat, not rounded, because flat stones were more easily picked up and transported by the waves. In this respect it is of course of interest that most prehistoric artefacts have a flat shape.

Former glacial basins, having a diversified environment with lakes and hills, will have offered attractive habitation spots and hunting grounds for Palaeolithic people. From the northern Netherlands, relatively numerous Middle Palaeolithic finds are known from such areas, especially from the glacial basins of Gaasterland (e.g., Stapert, 1986; Stapert & Johansen, 2002, 2008) and Steenwijk (e.g., Stapert et al., 2008). Some of these finds, especially leafpoints, can be ascribed to the last phase of the Middle Palaeolithic. This favourable habitation zone, along the southern rim of the Saalian Drenthe till plateau, will have continued into what is now the North Sea and it is only to be expected that Neanderthals will also have inhabited this area.

In the case of the new Ameland find, however, an origin from the Texel Rough seems less probable. The distance is rather large (60-70 km at least), and the tool does not show the severe traces of rolling which one would expect after such a long transport. The Borkum Rough seems to be too far away to be a source as well; moreover, it is situated in the wrong direction in consideration of the dominant sea currents. A local source of flint, on the island itself, which is positioned relatively closely to the till plateau, is not available. In contrast to Texel, there is no outcrop of till at or near the surface on Ameland or in its immediate surroundings. Boulderclay has only been encountered in a few cores, at depths of more than 15-25 m below sea level (Van Staalduinen, 1977, bijlage 2).

Therefore, we have to consider the alternative that this tool arrived on the Ameland beach as a result of recent sand replenishment, an idea formulated by the Groninger Museum curator, Mr Egge Knol, in November 2012. During the last twenty years, and increasingly so, beach replenishment has been an important way of defending the Dutch coast against erosion by the sea. In the case of the Wadden Islands, the sand used for replenishment is mostly dredged up from the sea bottom north of the islands, in places where the water is deeper than 20 m. In general, these sites are about 10-15 km out of the coast; the depth to which sand is dredged is mostly several metres, up to about 6 m, but larger depths are considered. Yet, also much closer to the coasts, sand is dredged up, although on a smaller scale, from waterways that have to be deepened from time to time. The sand that is dredged up from the North Sea bottom and transported to the islands often contains shells and other living or fossil organisms including fossil bones, lumps of peat and also artefacts from various periods, including quite a lot of flint artefacts (for data on sand replenishments reference is made to www.ecomare.nl and www.rws.nl).

Since 1979 an enormous amount of sand dredged up from the North Sea bottom has been dumped on and near the beaches of Ameland: in total nearly 25,000,000 m^3, according to data provided by Mr T. Overdiep of Rijkswaterstaat (Department of Waterways and Public Works) to Mr E. Knol (pers. comm., December 2012). During the past few years, and especially in 2011, nearly 9,000,000 m^3 of sand have been dumped, mostly in the central part of the northern coast of Ameland (between kilometre markers 11 and 20), the surroundings of the locality at which the implement was found. Nowhere in the Netherlands has so much beach replenishment been applied in such a short period of time (about 1.5 years), and Rijkswaterstaat had to obtain special permission for this. According to Mr S. de Jong at Rijkswaterstaat (pers. comm. to M. Niekus, December 2012), the sand was dredged up at a spot measuring ca 2.28 km^2 (area M9H) about 13 km out of the coast of Ameland (see Fig. 3).

It seems probable that the artefact found on the Ameland beach in 2012 was transported here not long before, during these large-scale sand replenishment activities. This would also help explain the absence of conspicuous traces of rolling on the artefact. The sand-extraction location does not seem to be connected to a glacial basin since there are no gravel patches indicated in this area in Veenstra's maps (see above). However, Mr T. Overdiep (pers. comm. to E. Knol, December 2012) did mention that lumps of peat were occasionally dredged up here. The original site may be comparable to the sites known on the Drenthe plateau, e.g. the one near Assen; in most cases such sites are located near river banks.

On Texel beaches much sand replenishment has also been carried out, for example quite extensively and repeatedly on those south and north of De Slufter. In 2011 alone, along the Texel coast some 5,800,000 m^3 of sand were deposited. Flints found in recent years on Texel beaches therefore do not necessarily derive from the Texel Rough. The first, small-scale, sand replenishment on the Texel coast occurred in 1979, but only since about 1990 this kind of coastal defence has been carried out in a systematic way.

The situation at Vlieland is similar. Between 1991 and 2006, some 3,000,000 m^3 of sand were transported to and dumped on or near the coast of Vlieland. The finds by Idzard Vonk on the Vliehors, briefly described below, were made mainly during the 1960s and 1970s, prior to the start of the beach replenishment operations by Rijkswaterstaat. Therefore, most of these artefacts probably derived from the Texel Rough.

Along the coast of the Netherlands, more and more sand replenishment has been applied in recent years. In the period 1990-2000, every year on average 7,000,000 m^3 of sand were dumped on or near the coast; between 2000 and 2010 this almost doubled to ca 12,000,000 m^3, and at present some 20,000,000 m^3 of sand are transported from various locations on the North Sea bottom to the coast of the Netherlands each year.

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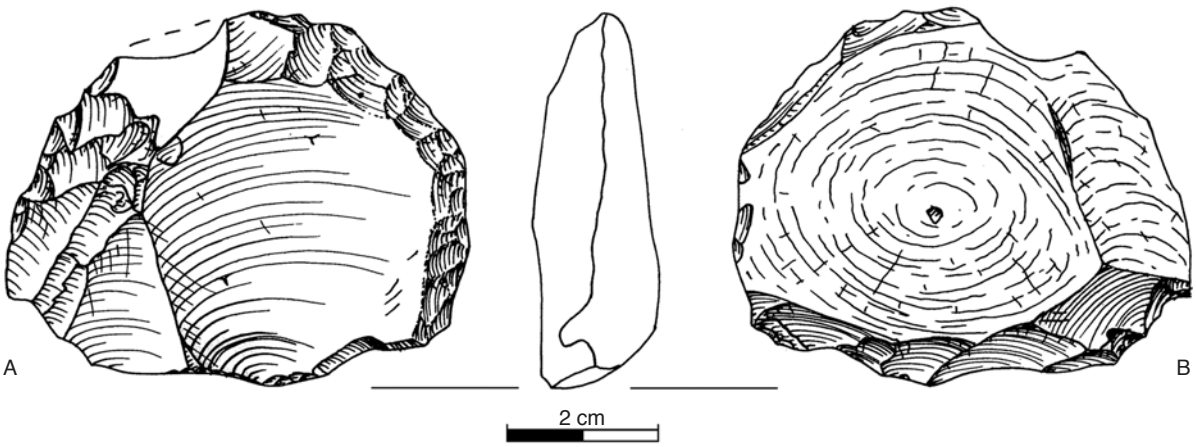

Fig. 4. The Levallois core from Vlieland (drawing by L. Johansen).

Our conclusion is that the Ameland find most probably comes from the bottom of the North Sea, some 13 km north of Ameland. It is of interest to note here that Middle Palaeolithic finds also occur elsewhere in the North Sea. In the Southern Bight, clearly to the south of the Saalian ice limit, several rich localities of the later phases of the Middle Palaeolithic are known. At the Zeeland ridges (Middeldiep) off the southwest coast of the Netherlands, spectacular finds have come to light in recent years, including a fragment of a Neanderthal skull (Hublin et al., 2009) and many flint artefacts including more than ten handaxes (Verhart, 2001; Glimmerveen et al., 2004; Mol et al., 2008). Also at Great Yarmouth, not far from the coast of Great Britain, many handaxes have been dredged up from the sea floor; for a recent overview of the geological context of finds from the Southern Bight of the North Sea, reference is made to Hijma et al. (2012).

Other Middle Palaeolithic finds from the Wadden Islands

Vlieland

Mr Idzard Vonk (Koudum) collected several hundreds of Stone Age artefacts on the beaches of Vlieland, especially on the Vliehors at the western end of the island, during the 1960s and 1970s. Musch & Wouters (1979) described numerous artefacts from this collection; the most spectacular piece being a handaxe (Musch & Wouters, 1979, p. 21, numbered V.36.IV, the 'V' standing for Vonk). However, this handaxe was not collected by Mr Vonk, who has no idea where it came from (pers. comm. to D. Stapert, 2011). We think that it possibly came from abroad (France?). Many artefacts in the Vonk Collection, placed by Musch & Wouters (1979) in the Old or Middle Palaeolithic, in our opinion date from much later periods, especially the Neolithic or Bronze Age. The same goes for several dozens of artefacts found by Mr O. de Graaf (Hoogkerk) during the late 1970s and 1980s. An impressive Neolithic find by Mr I. Vonk is a polished axe made of granulitic gneiss, with a length of almost 18 cm (see Stapert et al., 2011, fig. 1). Recently, a Late Palaeolithic flint point (shouldered point or tanged point of Havelte type) of the Hamburgian-tradition was found on the beach near the Vliehors (pers. comm. E. Knol to M. Niekus, March 2013).

According to our research, the Vonk Collection includes at least four artefacts of a Middle Palaeolithic date. They are illustrated and briefly described here (see also Stapert et al., 2011). A characteristic Middle Palaeolithic find is a Levallois core with a maximum diameter of about 6 cm; its weight is 51.6 g (Figs 4, 5). This prepared flake core was probably transformed into a side-scraper after its exhaustion as a core. Both sides are covered in windgloss with small pits (see Fig. 5). The second find is a fragment of a bifacial tool (Fig. 6), with a maximum diameter of 5.5 cm; its weight is 56.3 g. This tool is not made of a flake but of a natural frost-split piece. Bifacial working is only visible over a distance of about 2.5 cm. Because there is a natural back opposite the bifacial side edge, this tool resembles a 'Keilmesser' as known in the Micoquian tradition, but as this is only a fragment it is difficult to classify. Again, among other surface modifications, clear windgloss is present. Finally, there are two rather plump flakes (Fig. 7) with windgloss, one of about 5 cm,

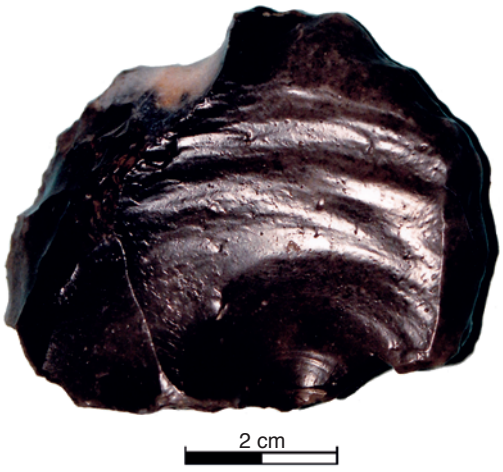

Fig. 5. The Levallois core from Vlieland (see Fig. 4). In this photograph windgloss with small pits is visible (photograph D. Stapert).

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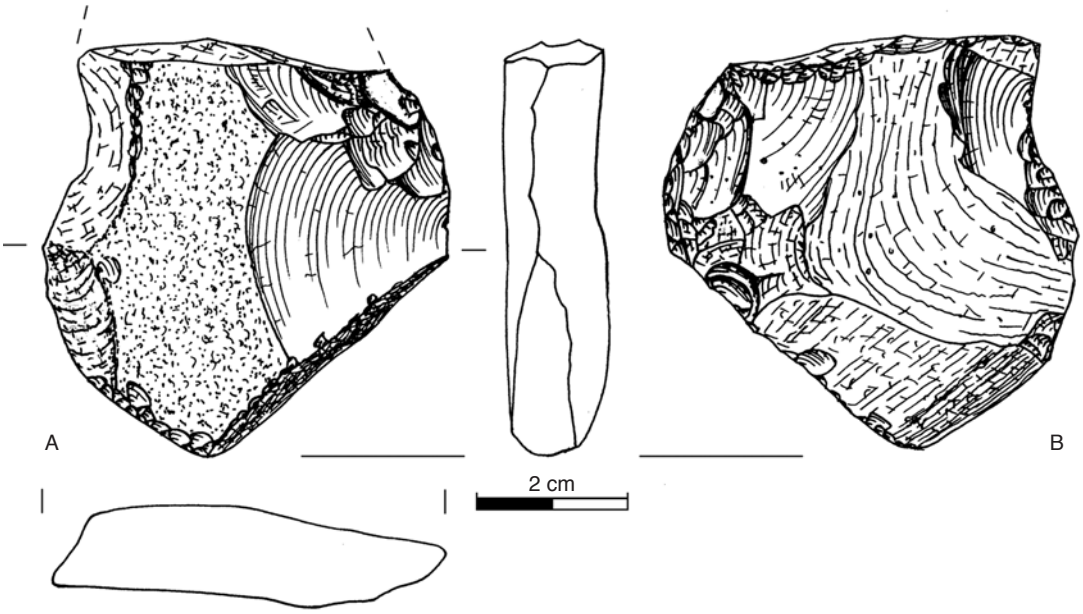

Fig. 6. Fragment of a bifacial tool from Vlieland (drawing by L. Johansen).

the other 5.8 cm. Both are flakes produced by direct hard percussion. Apart from windgloss with small pits, one flake shows black and brown patina, the other white patina. Both flakes exhibit traces of rolling.

Texel

Texel is the only Wadden Island with a Pleistocene core with till cropping out at De Hooge Berg, southeast of Den Burg, among other places. Finds have been reported from both the interior of the island and from the coast. Over the years, Mr G.J. van Noort (Den Burg) has published several allegedly Middle Palaeolithic sites, mostly situated on De Hooge Berg (Van Noort, 1983, 1985, 2002/2003, 2010). The finds from one of the sites on De Hooge Berg were studied at NIOZ (Texel) by Mr P.J. Woltering of the former Rijksdienst voor het Oudheidkundig Bodemonderzoek (Cultural Heritage Agency of the Netherlands) and one of us (DS), shortly after Van Noort's 1983 paper on the finds from De Hooge Berg was published. Our conclusion was that the assemblage consisted of pseudo-artefacts, created by natural processes, not by man.

Several years later, the Van Noort Collection, now also including finds published by Van Noort in 1985, was restudied by the professional archaeologists, Messrs F. de Vries, C. Lagerwerf, H. Kars and S. Jager. With the exception of a single possibly Middle Palaeolithic flake from De Hooge Berg, no certain artefacts with windgloss were identified (pers. comm. F. de Vries to M. Niekus, December 2012). However, a typologically distinct Middle Palaeolithic artefact, a side-scraper manufactured from flint of Meuse type, was also present in the collection. As observed by Messrs De Vries and Lagerwerf (see Van Noort, 1991, p. 11), this artefact resembled finds belonging to the Early Middle Palaeolithic 'Rhenen Industry' (e.g., Stapert, 1987) and

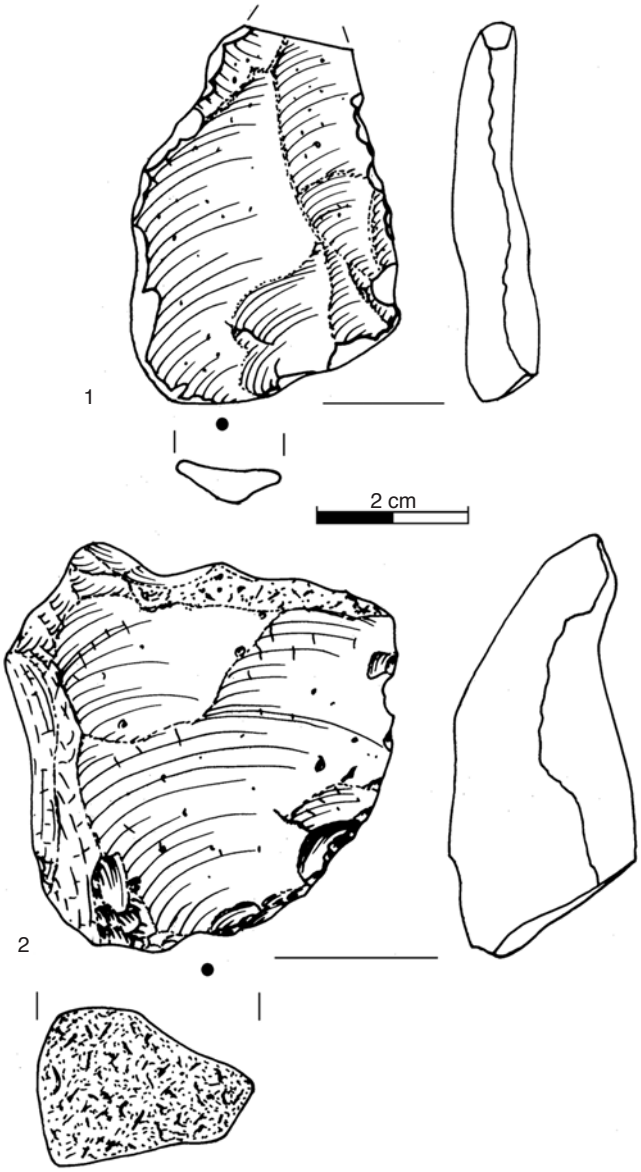

Fig. 7. Two flakes with windgloss from Vlieland (drawing by L. Johansen).

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we therefore seriously doubt that this artefact originated from Texel. In this connection, remarks made above on the handaxe that was incorrectly assumed to have come from Vlieland by Musch & Wouters (1979) may be of importance.

Van Noort (1995/1996) briefly described more than twenty finds said to have come from sand dumped on the beach in the northwestern part of Texel during the course of the first sand replenishment in 1979. Most of these finds are suspected by us to be pseudo-artefacts (or at best incerto-facts), based on assessment of the drawings provided. However, at least one of the finds made by Mr J.J. Waverijn (Den Burg), also published by Van Noort (1995/1996, fig. 3, no. 1), makes a distinct Middle Palaeolithic impression. Based on the published drawings and photographs sent to us by Mr Waverijn (see also www.waverijn.info), this is a retouched Levallois-like flake with a facetted striking platform (Figs 8, 9). As far as can be judged from the photographs, the dorsal face of the flake shows windgloss with small pits, which testifies to a Middle Palaeolithic age. According to Mr Waverijn (pers. comm. to M. Niekus, December 2012), the flake was found around 1985, most probably in an area known as Eierland, between kilometre markers 28 and 32 (lighthouse), on the northeastern end of the island (Fig. 3: no. 1). Therefore, this flake is likely to derive from sand replenishments which were carried out in the area in 1979 and 1985 (Van Gosliga, 2004, table 2.1).

Other flint artefacts, a scraper on a core-like piece and two flakes, all with black patina, were found by Mr Waverijn between 2005 and 2008 in the area around kilometre marker 8 on the southwestern coast of Texel, an area known as De Hors (Fig. 3: no. 2). At least two of these, the scraper (Fig. 10) and a Levallois-like flake (Fig. 11), most probably date from the Middle Palaeolithic as well. However, it is difficult to ascertain whether or not these artefacts possess windgloss based solely on photographs, and a further study of the finds of Mr Waverijn is planned. The southwestern part of the North Sea coast of Texel, situated to the west of the till outcrop near Den Hoorn, is well known for the occurrence of many black flints, including artefacts, bones and other archaeological material (pers. comm. Messrs P.J. Woltering and J.J. Waverijn to M. Niekus, December 2012). Around kilometre marker 8 there have been no sand replenishments (Van Gosliga, 2004, table 2.1) and it is likely that most of these flint artefacts derive from the Texel Rough.

Although we have not personally studied the finds published by Mr G.J. van Noort during the 1990s and later, judging from the drawings and descriptions of the finds we again seriously doubt the alleged Middle Palaeolithic age of most of these flints. In our views, it is more likely that we are here dealing with a mixture of pseudo-artefacts and artefacts from later prehistoric periods, for example the Mesolithic, Neolithic or Bronze Age (see e.g. scrapers and flakes cores depicted in Van Noort, 2002/2003, 2010).

Mrs Jonny Offerman (Kortenhoef) and Mr R. van Zweden (Amsterdam) collected many artefacts from the beaches at and around De Slufter, especially during the 1970s. There are no artefacts with a clear Middle Palaeolithic typology; most of the finds consist of flakes. Some of these show rather coarse scratches (see photographs in Stapert, 1983), and one or two of them are covered in gloss resembling windgloss. A renewed study of this collection is planned. Other collectors, among them Mr F. de Vries (Stiens), have also found flakes in the Slufter area which have rather high gloss, but according to Mr De Vries none of his finds display windgloss and they can therefore not be attributed to the Middle Palaeolithic with certainty (pers. comm. to M. Niekus, December 2012). Unfortunately, whether the post-1979 finds (when the first sand replenishments occurred on Texel) were washed up on the shore from the Texel Rough or were dumped on the beach during sand replenishment activities is impossible to state.

Fig. 8. The retouched Levallois-like flake from Texel (photograph by J.J. Waverijn).

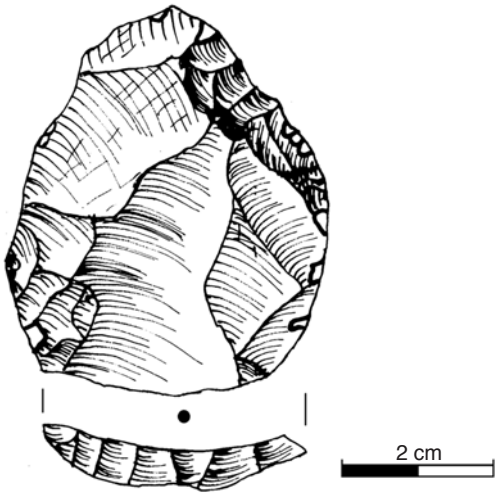

Fig. 9. The retouched Levallois-like flake from Texel (drawing by L. Johansen).

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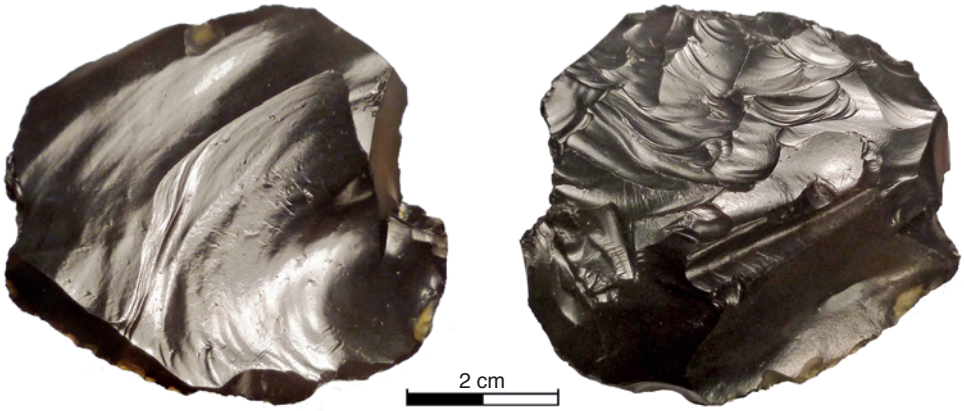

Fig. 10. Scraper on a core-like piece from Texel (photograph by J.J. Waverijn).

Terschelling and Schiermonnikoog

Several artefacts, all of which we have studied, were collected from the beaches of Terschelling by Mr E. Ameling (Stedum) during the late 1970s, but none of these can be placed in the Middle Palaeolithic due to the lack of windgloss or typological characteristics. A few artefacts from Schiermonnikoog, including a blade, found by Mr O. de Graaf (Hoogkerk) around 2000, most probably also date from later prehistoric periods.

Baltrum (Germany)

Approximately ten artefacts are known from the German Wadden Island of Baltrum (not shown in Fig. 3), which is situated approximately 40 km to the east of the island of Borkum. These finds were made over several years by Mrs E. Szeklinski on the beach at the eastern part (Osterhook) of the island. According to H. Thieme and J. Eckert (Bärenfänger & Schwarz, 1999), the finds possibly date from the Middle Palaeolithic. It concerns flakes, blade-like flakes and a few scrapers. One of the flakes has a facetted striking platform, possibly a sharpening flake for a bifacial tool (handaxe?). According to H. Streif of the Niedersächsisches Landesamt für Bodenforschung (cited in Bärenfänger & Schwarz, 1999, p. 264), 'Die Artefakte müssen aufgrund ihrer Beschaffenheit aus den pleistozänen Schichten bzw. von deren Oberfläche (in Tiefenlagen zwischen NN –10 bis –20 m) stammen und durch die in der Accumer Ee (Seegat zwischen Baltrum und Langeoog) wirksamen Tideströmungen aufgenommen und auf den Strand transportiert worden sein'. Most of the artefacts are black or light grey and possess gloss but whether this is windgloss or not is unknown to us since we have not studied these pieces ourselves.

Some conclusions

The bifacial implement found on the Ameland beach probably dates from the Middle Palaeolithic in view of the presence of gloss with small pits, i.e., windgloss. This gloss is variable and occurs especially on one of the faces. Apart from gloss this tool shows 'black patina', created during its stay under water. This object may originally have been a handaxe, produced by a skilled flintknapper. Possibly the tool became fragmented at some stage and was subsequently picked up by an apprentice flintknapper (probably an older child), who used it as a practice piece. His idea was probably to shape it into a small handaxe or a leafpoint. However, this attempt largely failed through lack of skill, and

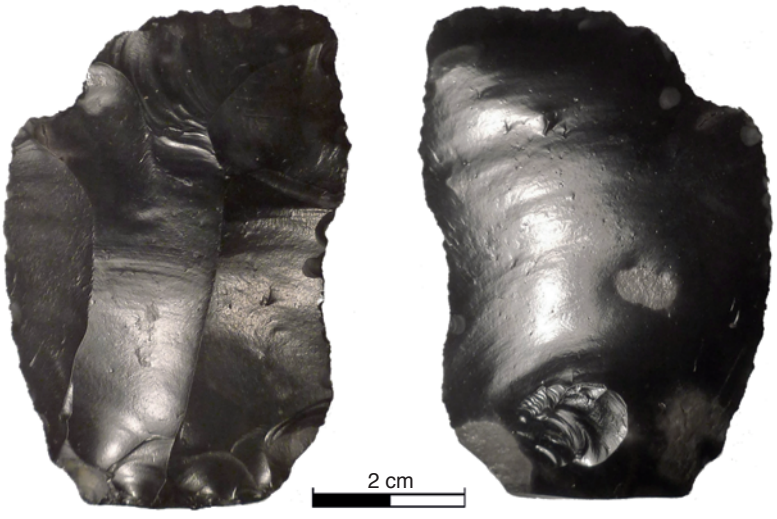

Fig. 11. Levallois-like flake from Texel (photograph by J.J. Waverijn).

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as a result the tool shows a strange asymmetry: one side is worked very well into a regular working edge, but the opposite side is irregularly shaped because of inadequate knapping.

Workpieces that were used by two knappers subsequently: first a skilled knapper and then an apprentice, are known from several Upper Palaeolithic sites. Examples are the Magdalenian sites at Etiolles (Pigeot, 1987; Olive, 1988), the Hamburgian site at Oldeholtwolde (Johansen & Stapert, 2004) and the Creswellian site at Zeijen (Van de Lagemaat et al., 2011; Van de Lagemaat, 2012). Of course, such pieces are also to be expected in earlier periods, but these have been described only sporadically. However, from the Middle Palaeolithic site in the Corversbos, near Hilversum, a blade core is known that most probably shows this type of knapping sequence (Offerman-Heykens et al., 2010; Johansen & Stapert, 2012). As far as we are aware, the implement from Ameland is the first bifacial tool from the Middle Palaeolithic in the Netherlands for which such a sequence during its shaping process has been suggested (but see also Johansen & Stapert, 2012, p. 59, for one of the handaxes from Middeldiep).

The piece was probably transported to Ameland from the North Sea bottom some 13 km north of the island during the course of sand replenishment activities. This is the northernmost find of a Middle Palaeolithic artefact from the Netherlands known to us, and it shows that during at least one of the later phases of their existence Neanderthals were able to live in quite northerly regions. Furthermore, this find indicates that the northern part of the North Sea, which has hitherto received little attention from Palaeolithic archaeologists, may prove to be an important source of information on Neanderthal occupation of northwest Europe. Some other Middle Palaeolithic artefacts are known from Vlieland and Texel; in our opinion, all these finds postdate the Saalian glaciation, i.e. are of Eemian or Weichselian (~120-35 ka) age. There are no indications for older finds.

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