HANDAXES FROM DENMARK: NEANDERTAL TOOLS OR 'VICIOUS FLINTS'?

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ABSTRACT: Four handaxe-like tools from Denmark (Fænø, Villestrup, Karskov Klint, Skellerup) and their surface modifications are described. In the authors' opinion, only one of these tools probably dates from the Middle Palaeolithic: the Fænø handaxe. The other implements are thought to be preforms of bifacial tools dating from the Neolithic or the Early Bronze Age.

One blade was found in a sand quarry near Seest, Jutland. It must derive from gravelly water-laid deposits, presumably meltwater deposits, because it is slightly rounded. Therefore it too most probably dates from the Middle Palaeolithic.

Several other sites in Denmark have produced flint material ascribed to the Early or Middle Palaeolithic, e.g. Vejstrup Skov and Ejby Klint. We believe that these do not necessarily date from the Palaeolithic. At these and similar localities we may in fact be dealing with *atelier*-sites dating from much later periods: Mesolithic, Neolithic, or Early Bronze Age.

It is argued that for dating any 'primitive-looking' flint artefacts to the Palaeolithic, when found outside a stratigraphic context, features independent of typology should be used. Surface modifications on the flints, if studied in relation to the geological context, may provide such independent arguments.

KEYWORDS: Denmark, Early/Middle Palaeolithic, handaxes, Neolithic, preforms, *atelier*-sites, surface modifications on flint.

1. INTRODUCTION

In Denmark, as in other countries, there has always been a lively interest in possible traces of Early Palaeolithic man, among both professional and amateur archaeologists. Much has been written about the relatively few artefacts in Denmark which have been thought to date from this remote period.

Artefacts from the Early or Middle Palaeolithic, especially if they are stray finds, are difficult to identify with confidence. The reason is that the evolution of flint technology through prehistory was a cumulative process: new tricks were added, but there were no extinctions. Previously developed techniques continued to be used. Therefore, it is dangerous to rely on typology alone. Direct hard percussion always remained in use, for example in the preparatory stages of the production of such advanced tools as axes or daggers. Hard-percussion flakes, Levallois-like flakes, and handaxe-like forms are all known to occur at sites dating from long after the end of the Palaeolithic, especially from the Neolithic and the Early Bronze Age. In the Netherlands and elsewhere, rough-outs of Neolithic axes have repeatedly been interpreted as handaxes (Stapert, 1981).

In Denmark, preforms of bifacial tools such as daggers, spearheads and sickles may resemble Palaeolithic handaxes. Professor Peter Vilhelm Glob (1911-1985) always vigorously opposed any claims of Early/Middle Palaeolithic artefacts in Denmark when these finds could alternatively, and more plausibly, be interpreted as preforms of bifacial tools from the Neolithic or the Early Bronze Age. In the sixties, he fought a noisy battle with Eli Jepsen (whom we shall meet again in section 4). Jepsen had made a big case in the media for the presence of Neandertal people in Denmark, based on what Glob believed to be Neolithic preforms. Glob repeatedly accused Jepsen of seeing archaeological 'flying saucers' (e.g. Glob, October 27th, 1963). Later, Glob engaged in a similar discussion with professor Carl Johan Becker (Becker, 1971; Glob, 1972; see section 4). The title of Glob's 1972 paper, *Farlig flint*, has become a famous expression in Danish archaeology (here translated as 'vicious flint').

However, Glob was not of the opinion that Middle Palaeolithic people could not have lived in Denmark, and he accepted a Middle Palaeolithic dating for the sites at Hollerup and Seest (Glob, October 27th, 1963). Seest is one of the sites investigated by Erik Westerby (see section 8). Westerby visited Eli Jepsen (October 26th, 1963), to have a look at Jepsen's collection of 'Acheulian' handaxes from various sites in Denmark, but was too sceptical to be converted (manuscript by Westerby, kept in the National Museum, Copenhagen).

Artefacts dating from the Mesolithic too may pre-

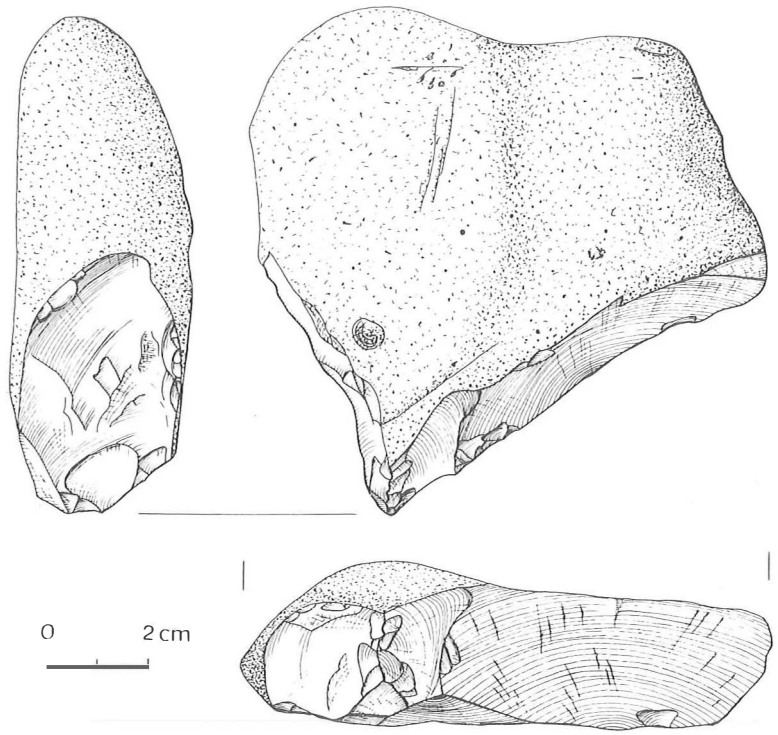

Fig. 1. 'Claudi-kiler' from Gammelholm, Samsø. Drawing Lykke Johansen.

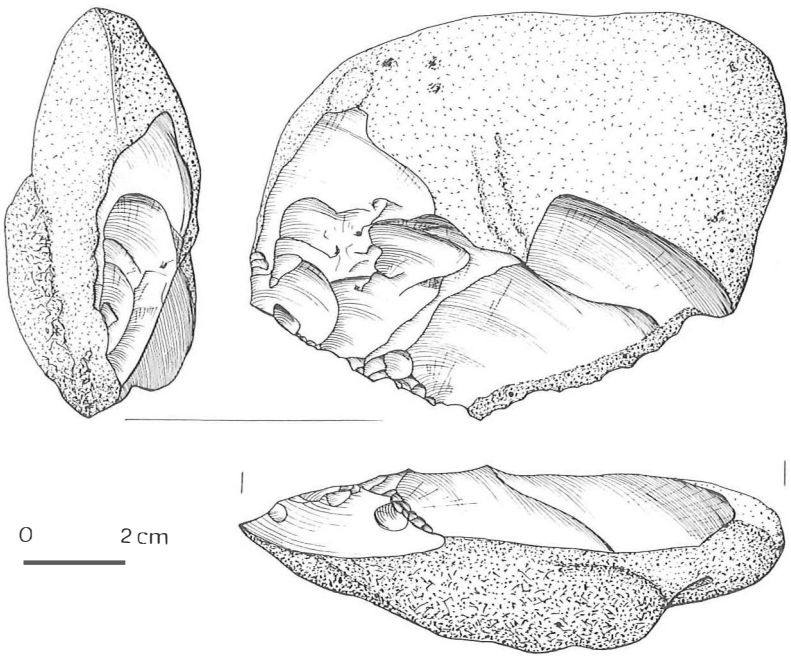

Fig.2. 'Chopper' from Gammelholm, Samsø. Drawing Lykke Johansen.

sent an Early Palaeolithic *habitus*. Therkel Mathiassen (1935) published material from a series of sites in the Stavns Fjord on the island of Samsø. A substantial number of 'primitive-looking' tools were collected here, showing a broad unworked basal part opposite a crudely pointed end ('Claudi-kiler', named after the finder of the first specimens, Mr Claudi-Hansen). Some of these tools looked very much like 'handaxes' to Mathiassen, which made him wonder about their dating. Moreover, some cores from these sites, made on round-

ed flint pebbles, did resemble 'choppers'. Figures 1 and 2 show examples of these implements, from the Gammelholm site in Stavnsfjord on Samsø. In this area there are many shell-middens, mostly dating from the Ertebølle Culture. At these midden-sites, the handaxe-like tools did not occur; they were mostly found at some distance seawards of these sites, often under water. Though these coarse pointed tools did strike Mathiassen as 'Palaeolithic', he admitted that they could not be dated with certainty.

Jørgen Troels-Smith (who, as a student, joined Mathiassen's trip to Samsø) analysed some of the Samsø material. He believed that these tools belonged to the Ertebølle Culture, and were used to cut molluscs, especially oysters, from the sea bottom. Ulrik Møhl-Hansen found a Claudi-kiler (the one illustrated in fig. 1) and a flake axe under water, in front of the Gammelholm site, near an oyster bank (Troels-Smith, 1995).

Inspired by the work of Mathiassen, Ole Højrup (1947) described nine tools of the 'Samsø type', which he collected from the beach, or under water, near Mesolithic sites in the Roskilde fjord area, which mostly belonged to the Kongemose Culture. Therefore he argued that a Pleistocene dating for these tools would be improbable.

Given these and similar problems, artefacts considered to originate from the Early or Middle Palaeolithic should preferably be dated by stratigraphical means. Typology can be misleading. Unfortunately, none of the Danish flint artefacts supposedly dating from these periods was found in a stratigraphical context. So, how can we feel reasonably confident that any of the published 'Early/Middle Palaeolithic' material from Denmark really belongs to that era, and not to much later prehistoric periods? In this paper, we shall approach this problem by studying the surface modifications that can be observed on the artefacts under discussion.

We were prompted to write this paper when the handaxe-like tool from Skellerup (described under 7) was presented to the first author in 1994.

2. GEOLOGICAL BACKGROUND

Except for the southwestern part of Jutland, the whole

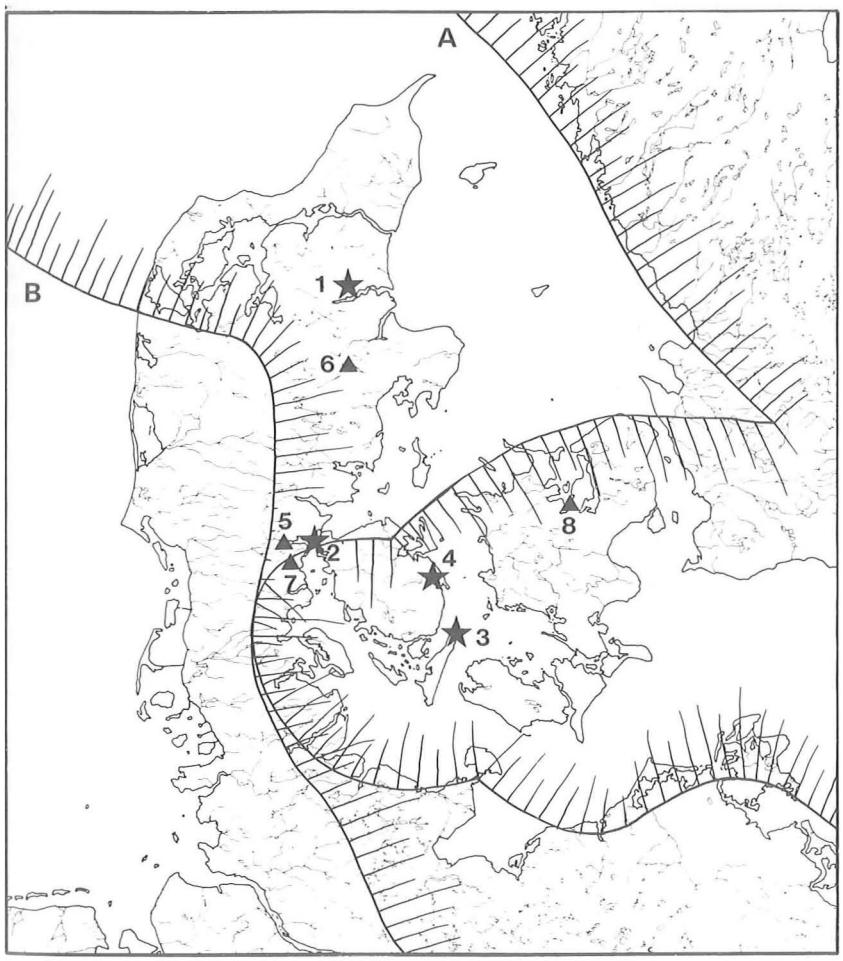

Fig. 3. Map of Denmark, showing the sites discussed in this paper. A. Extent of the ice-sheet during the Lower Pleniglacial of the Weichselian; B. Extent of the ice-sheet during the Upper Pleniglacial of the Weichselian (after Houmark-Nielsen, 1989). Asterisks: handaxe sites; triangles: other sites. Sites: 1. Villestrup; 2. Fænø; 3. Karskov Klint; 4. Skellerup; 5. Seest; 6. Hollerup; 7. Vejstrup Skov; 8. Ejby Klint. Drawing Lykke Johansen.

of Denmark was covered by the Weichselian ice-sheet. Two major glaciations and many smaller ones are known from the last glacial, with the result that the 'young moraine landscape' has a complicated geological history (for overviews of the Late Pleistocene of Denmark, see: Houmark-Nielsen, 1989; Petersen, 1985).

The most important glaciation took place around 20,000 BP, during the period known in the Netherlands as the Upper Pleniglacial. (In Denmark, this is part of the 'Late Weichselian' – which also includes the Late Glacial – (Houmark-Nielsen, 1989: p. 49), or of the 'Late Middle Weichselian' (Petersen, 1985); the two terms are somewhat confusing). In this period, the Weichselian ice-sheet reached its maximum extent (B in fig. 3).

Much earlier, during a period we take to correspond to the Dutch Lower Pleniglacial, eastern Denmark was covered by a Baltic ice-sheet, coming from the east, which just reached the east coast of Jutland (A in fig. 3).

Between these two major glaciations, there was a complex of interstadials and moderately cold stadials (called the Middle Pleniglacial in the Netherlands, c. 60-25,000 BP), during which Denmark must have been ice-free most of the time.

During the last interglacial, the Eemian, most of eastern Denmark was covered by sea (Petersen, 1985: fig. 2). Chances for Palaeolithic habitation of eastern Denmark must have been better in what is known in the Netherlands as the Early Weichselian. During this period, which was a complex of important interstadials (Amersfoort, Brørup, Odderade) and not very cold stadials, at least parts of eastern Denmark must have been dry land (Houmark-Nielsen, 1989: fig. 5).

Summarizing: during the Eemian, settlement was possible in Jutland; eastern Denmark was then covered by sea. During the Early Weichselian, Jutland and at least parts of eastern Denmark were inhabitable.

Theoretically, Denmark could have been inhabited also during the final stages of the Middle Palaeolithic – during the Hengelo Interstadial, one of the interstadials of the Middle Pleniglacial, c. 50-40,000 BP. From this period, several leaf-point industries are known in northern and central Europe, e.g. in Poland, Germany and the Netherlands (e.g. Allsworth-Jones, 1986; Hülle, 1977).

Any Middle Palaeolithic tool in eastern Denmark dating from, for example, the Early Weichselian would have been affected by the glaciations during the Lower and Upper Pleniglacial. It might have been transported by the ice-sheet, becoming damaged in the process, or even heavily crushed. Or it could have become embedded in meltwater deposits, which would at least have

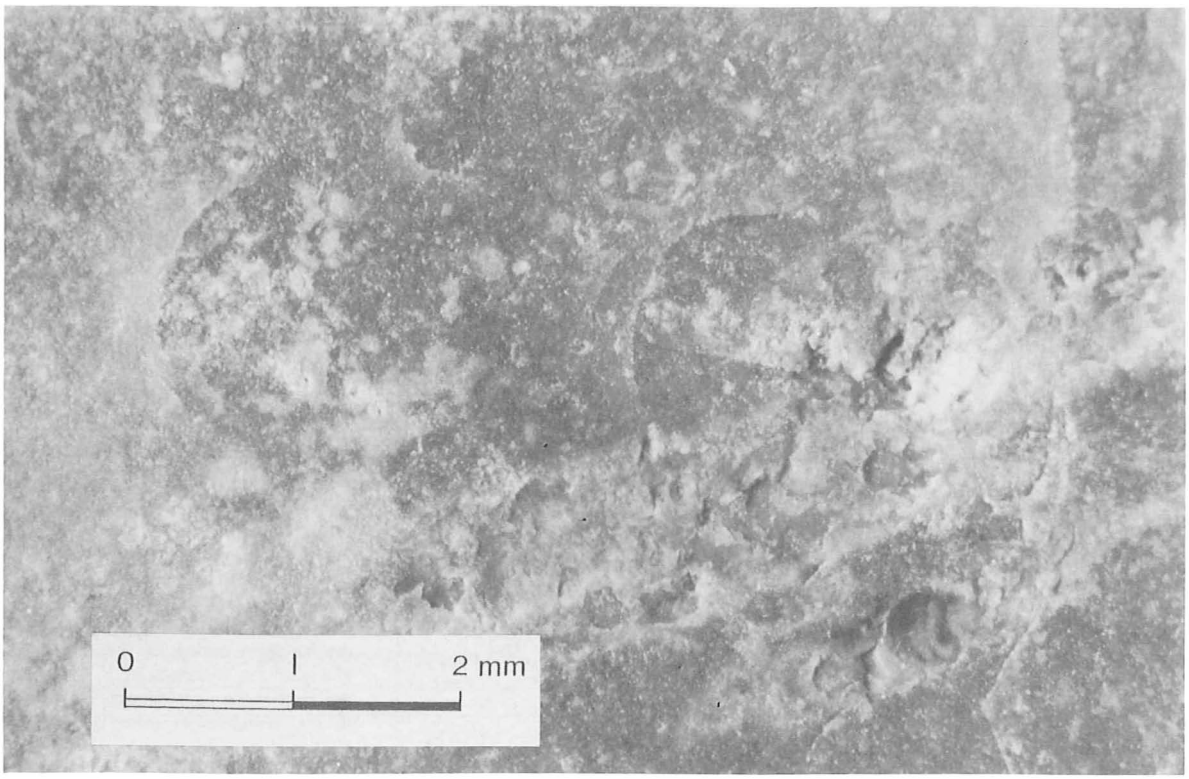

Fig. 4. Very severe scratches on a (natural) flint, collected by the authors on the gravel beach at Møns Klint, 1995. The massive scratching must be the result of glacial transport. Photo: Dick Stapert.

meant some rounding of the implement. On the beach at Møns Klint, we collected a flint pebble (unworked by man) that must have derived from the moraines at the top of the cliff. The flint has a brown patina, and shows abundant scratching (fig. 4), while moreover a lot of large pressure cones are present. The coarse scratches were produced during glacial transport.

An important point to note is that, in eastern Denmark, Middle Palaeolithic artefacts cannot have lain at the surface for thousands of years during the severely cold stadials of the Weichselian, for example during the Upper Pleniglacial. This is in sharp contrast to the 'old moraine landscape', in southwestern Jutland, which remained ice-free during the Weichselian. Southwestern Jutland was covered by ice during the penultimate glacial, the Saalian. This area is therefore, geologically speaking, comparable to the Saalian moraine landscape of the northern Netherlands, which also was never reached by the Weichselian ice-sheets.

Up till now, Early or Middle Palaeolithic artefacts have not been found in the old moraine landscape of southwestern Jutland. Any such artefacts would look very different from artefacts of the same antiquity left behind in the young moraine landscape. In these two areas, Middle Palaeolithic artefacts would have had very different depositional histories, and this would be reflected by their surface modifications.

3. SURFACE MODIFICATIONS ON FLINT ARTEFACTS

It has proved very useful to study in detail the natural surface modifications occurring on problematic flint artefacts. In this way it has been possible to prove that several large collections of 'Middle Palaeolithic handaxes' in the Netherlands in fact were forgeries (Stapert, 1976a; 1976b; 1986).

This game entails linking the observed surface modifications to either geological processes or stratigraphical units, or – even better – both. With some luck, flint artefacts may at least be given a relative dating in this way. In specific geological contexts, this method may prove that an artefact could not possibly date from the Palaeolithic; alternatively, the method may show that an implement can only be Palaeolithic. Of course, in most cases no definite conclusions can be reached. The method is not without pitfalls, but in many cases it is the only one at our disposal.

We are here dealing with a whole series of phenomena of widely varying origin, which should be studied in relation to the geological context of the findspots. Some of these phenomena are more useful than others, because of the more specific information they convey about the depositional history of the artefacts under discussion. Several surface modifications are so common, or take so little time to develop, that they are hardly interesting for the purpose of relative dating, except in quite special circumstances. In most cases, for example, white or brown patinas do not necessarily indicate that flint artefacts are of great antiquity, and the same is true for low gloss (also called 'soil sheen' or 'gloss patina'). More interesting are the modifications resulting from only one, well-understood process, especially if this process can be associated with a specific period, or with a stratigraphical unit in the locality from which the problematic flints derive. Some phenomena will be briefly discussed below.

Artefacts from gravelly water-laid sediments will mostly – but not always – show rounding. This is a result of many collisions with gravel particles. The rounding is created by micro-scale splintering, and the surface of the rounded parts will display many little circular breaks – collision cones. Rounded edges and ridges caused by this process therefore are quite characteristic, when viewed through a stereomicroscope. The rounding is not smooth – as would be the case if the rounding was only the result of chemical dissolution, but 'rough'. Of course, this type of rounding is not only produced in rivers. On gravel beaches, flints can become extremely rounded, and the whole surface may then be densely covered by collision cones.

Transport by moving water in a gravelly sedimentary context may also produce fine scratches on flints. Moreover, small damaged spots caused by splintering will gradually develop over the whole surface – not only on the rounded parts. Moreover, 'retouches' and 'flake scars' will also be produced.

Many different processes can result in scratching. One type of coarse scratch, with a flat bottom, seems to be associated with flints from water-laid gravelly deposits. Such scratches are known, for example, from Early Middle Palaeolithic material from several sites near Rhenen in the central Netherlands (Stapert, 1987; 1991). These flints derive from Middle Pleistocene gravelly sands, deposited by the river Rhine. There are good reasons to believe that this type of very coarse scratch is produced by creeping ice floes during severe winters (Stapert & Zandstra, 1985). There is a correlation between the degree of rolling and the occurrence of these scratches: the more heavily a flint has been rolled, the more scratches it will have, generally speaking. This is easily understood under the above hypothesis, because the longer a flint was in the active riverbed, the greater the chance of its becoming incorporated in an ice floe.

On Middle Palaeolithic artefacts from the old moraine landscape in the northern Netherlands, scratches of a specific type can be observed: fine scratches that are 'segmented' (consisting of many small parts), suggesting that they developed very slowly, 'by fits and starts'. This type of scratch can be associated with soil movements such as cryoturbation, during periods of permafrost. Under such conditions, pressure from stone on stone would gradually build up in the soil, until at last

a tiny movement occurred – resulting in a small part of a slowly lengthening scratch. These segmented scratches go together with little 'pressure cones' in the surface of the flint, and in some cases segmented scratches and pressure cones have been found directly together (Stapert, 1976a). Pressure cones are similar to collision cones, so one needs good arguments to decide whether small cones in flint surfaces are either collision or pressure cones. As stated above, collision cones occur in quantity especially on the rounded ridges of rolled flints. Pressure cones can be observed especially near, but at a slight distance from ridges between flake scars. This can be explained: the ridges acted as barriers to other stones in their route over the flint in question. Cryoturbation may also produce series of oblique pressure cones, which may or may not be associated with scratches.

When pressure cones, and the accompanying scratches, are very coarse (clearly visible to the naked eye), and very abundant, an origin in glacial transport is the most probable explanation. Besides, 'flake scars' and 'retouches' may result from cryoturbation and glacial transport.

Fig. 5. The handaxe recently found near Oldeholtwolde in the northern Netherlands. The implement originates from bouldersand on top of Saalian till. The surface modifications include windgloss and scratches produced by cryoturbation – characteristic features of Middle Palaeolithic artefacts from the old moraine landscape. Photo: University of Groningen.

'Friction gloss' refers to a group of poorly understood phenomena: usually very small patches of very high gloss on the surface of flint (see e.g.: Juel Jensen, 1994: pp. 42-45; Moss, 1983: pp. 81-83 and 221-224; Moss, 1987; Stapert, 1976a; Vaughan, 1985). Under a microscope, the surface within these 'bright spots' appears to be extremely smooth, and may show sub-parallel striping or rippling (Juel Jensen calls the latter phenomenon 'fluting'). There seem to be two main types of friction gloss: 'flat' and 'raised'. The origin of the flat type (in fact the glossy patch is mostly somewhat depressed) is unknown, but in several cases there are reasons to believe that some living organism might be responsible (roots?). Friction gloss of the flat type can occur on flints from virtually all periods and in many sedimentary environments, and therefore is not an indicator of great antiquity.

The raised type of friction gloss occurs especially on ridges between flake scars, or other exposed parts of the surface, and is often of the ripple type. It can be associated with movement under some pressure of stone (or some other hard material) on the flint. Moss (1983) found this type of friction gloss ('polish G') on Late Palaeolithic flints that she considered to be 'curated': carried together with other artefacts in some container for an extended period of time. Hafting is also a possibility (Juel Jensen, 1994; Moss, 1987). Stapert (1976a: p. 37) described a small patch of raised and rippled friction gloss, occurring ventrally on a ridge between flake scars on a Mousterian point, and suggested that it was the result of friction caused by hafting. Patches of raised friction gloss may be produced by cryoturbation, and may also develop in many other situations where movement of stone on stone occurs under some pressure, for example on gravel beaches.

Windgloss is a recurrent phenomenon on Middle Palaeolithic artefacts from the old moraine landscape in the northern Netherlands. Windgloss is a relatively high, but often variable sheen on flint, and is mostly associated with 'small pits' in the surface (Stapert, 1976a). It can clearly be linked to very cold periods, when the landscape was without vegetation. Most ventifacts, as well as severe windgloss on flints, must have originated during the Upper Pleniglacial, the most extreme stadial of the Weichselian. We would expect Middle Palaeolithic artefacts from the southwestern part of Jutland to display windgloss. However, we would not expect windgloss to occur on Middle Palaeolithic artefacts in eastern Denmark. This area was covered by ice during the cold stadials of the Weichselian, so that windgloss simply could not develop on any artefacts that man might have left there during the Early Weichselian.

To summarize, we would expect at least the following surface modifications to be present on Middle Palaeolithic artefacts in the old moraine landscape:

windgloss and phenomena caused by soil movements such as cryoturbation. A handaxe recently found near Oldeholtwolde in the northern Netherlands (fig. 5) exemplifies what may be expected in this region (Stapert, 1995). This implement shows the following surface modifications: white patina, brown patina, windgloss, small pits, scratches, friction gloss, pressure cones, rounding of edges and ridges due to chemical dissolution, and cryoturbation-retouches (for other examples from the northern Netherlands, see: Stapert, 1976b; 1982).

In the young moraine landscape, on the other hand, we would not expect windgloss, but instead coarse scratching caused by glacial transport, or rounding caused by meltwater, or both. As in the old moraine landscape, other types of surface modification may also be present, such as white or brown patinas, gloss patina, and naturally produced 'retouches'.

4. THE HANDAXE FROM VILLESTRUP (Astrup sogn, Hindsted herred, Jutland)

4.1. Find history

The Villestrup handaxe (Nationalmuseet, A 51116, J.nr. 618-71) was found in 1931 by Elly Jensen from Arden, then a 13-year old girl (she later married a Mr Petersen), during the digging-up of potatoes in a field. The tool was given to the local schoolmaster, Michael Christensen of Møldrup school. In 1950, it became part of the collection of the Ålborg Historical Museum. Later, the implement came into the possession of Jørn Bower (Ålborg), a dealer in antiquities. He sold the tool to *consul* Eli Jepsen (of Herning), a well-known collector, who wrote a book in which this handaxe and its history were mentioned (Jepsen, 1973).

The findspot was pointed out to archaeologist Oscar Marseen of the Ålborg Museum, both by the finder and – independently – by her father, in 1972 (Elly Jensen was at that time Marseen's domestic help). It is located about 1 km to the NW of Astrup, at the southern tip of Elsehøj Plantage. The field has been searched many times since then, but nothing of interest has been collected: "Bower and I carefully searched the field, which has not yet been harrowed, in the hope of finding a concentration of flint artefacts. First of all, it has to be said that this is the most sterile field we ever saw. In total, we only found 5 artefacts. We did not make any test pits. In many places we saw ploughed-up gravel and stones" (Marseen, 1972).

The Fænø handaxe (described in section 5) was found in 1957 by Mrs Gine Jacobson from Middelfart. Together with her husband, she had been collecting artefacts from Fænø for many years. Now and then, the above-mentioned Eli Jepsen bought artefacts from them. One of these artefacts was the Fænø handaxe, acquired by Jepsen in 1971. The Jacobsons were not aware of the possible significance of this find.

In 1971, professor Carl Johan Becker visited Eli Jepsen, and inspected his collection. Jepsen believed many of his artefacts to date from the Early or Middle Palaeolithic. Becker singled out only two implements which he believed could indeed be of that age: the handaxes of Villestrup and Fænø. In 1982, Eli Jepsen donated both handaxes to the National Museum in Copenhagen.

The precise findspot of the Fænø handaxe now became an important issue. Eli Jepsen considered Fænø to be such a small island, that a more detailed description of the find location seemed superfluous. When the National Museum asked for more information, he tried to obtain further details from the finder. Unfortunately, the Jacobsons by then had both died.

The handaxes from Villestrup and Fænø were first published by Becker in *Skalk* (Becker, 1971; see also Becker, 1979; 1985). Becker was convinced that these implements were Palaeolithic, though he had some reservations concerning the antiquity of the Fænø handaxe. The late professor François Bordes (of Bordeaux) also examined both handaxes, and agreed that they probably both dated from the Palaeolithic. Bordes ascribed both handaxes to the Acheulian, and on the basis of the flint types he excluded the possibility that these tools could have been imported from France (Becker, 1971).

Although Becker did discuss the possibility, he dismissed the idea of these tools being preforms of bifacial tools dating from the Neolithic or the Early Bronze Age. Glob, who recently had excavated a Late Neolithic flint-workshop at Fornæs, Djursland, did not agree with Becker. He argued that the handaxes from Villestrup and Fænø could be preforms of sickles or daggers (Glob, 1972).

4.2. Description of the tool (figs 6 and 7)

This subtriangular handaxe-like tool, somewhat asymmetrically shaped, is made of fine-grained, homogeneous grey-coloured Senonian flint, containing few Bryozoan fossils. Max. length 13.1 cm, max. width (measured as the short side of a circumscribing rectangle, of which the long side is parallel to the longitudinal axis of the tool) 7.4 cm, max. thickness 3.1 cm, weight 227 g. Side-edges are fairly straight in side-view. The handaxe was made by direct soft percussion. At the base of face 2, a large flake scar (coming from the right) is present, creating the cutting base, somewhat like that on a *tranchet* axe. This scar was used as a striking platform for the removal of several basal thinning flakes on face 1, more or less parallel to the longitudinal axis of the tool. The only technological problem with this piece is the occurrence of several step fractures near the right edge of face 2. However, this would have been only a minor problem for a good flint-knapper.

There are quite a lot of rust patches on the tool, probably resulting from ploughing, and several recent

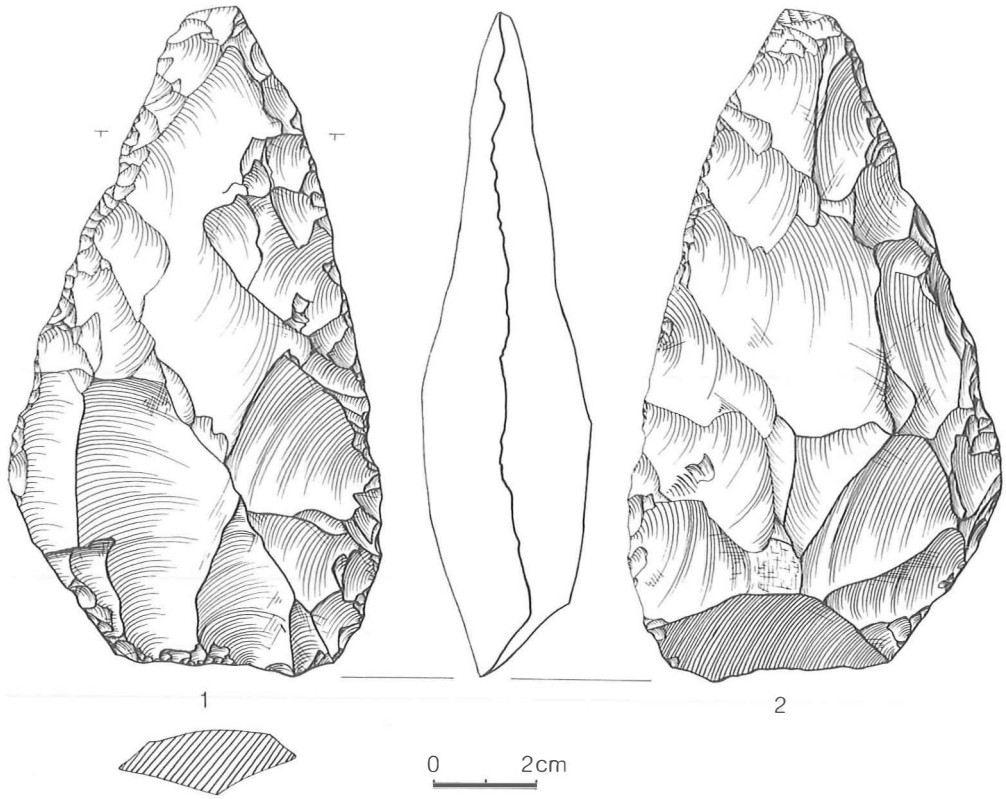

Fig. 6. The handaxe from Villestrup. Drawing Lykke Johansen.

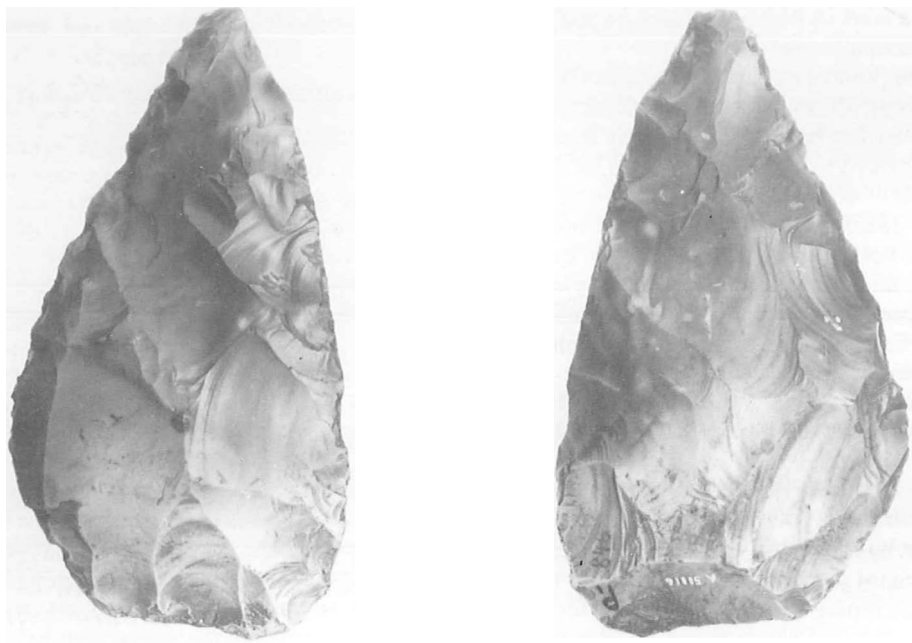

Fig. 7. The handaxe from Villestrup. Photo: Kit Weiss, National Museum, Copenhagen.

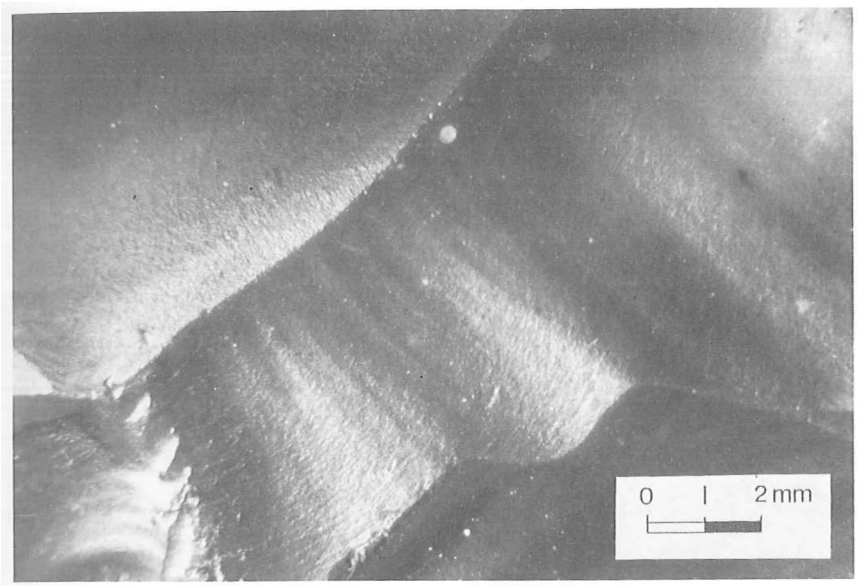

Fig. 8. The handaxe from Villestrup. Area in the top part of face 1, showing the fresh state of the flint surface. Stereomicroscope photo: Dick Stapert.

scratches can also be attributed to ploughing. A low gloss is present. This gloss is not windgloss, however, and there are no 'small pits', which are mostly present in flint surfaces with windgloss (Stapert, 1976a). Most of the surfaces in the top part are quite fresh, and the ridges are sharp (fig. 8). Near the top, on face 1, a few 'bright spots' occur (friction gloss of the 'flat type'). The basal part shows a light white patina (somewhat yellowish on face 2), and the gloss is higher here. Moreover, ridges in the basal part are slightly rounded, most probably due to dissolution processes in the soil rather than fluviatile rolling. No clearly old scratches were observed, nor were any pressure cones. Near the base, on face 2, a remnant of an old face is present – predating the making of the tool. Within this old surface, many old scratches can be observed.

4.3. Discussion

None of the observed surface modifications on the tool from Villestrup indicates a Palaeolithic dating. Gloss patina, white patina, and bright spots of the flat type could all have been produced in the last few thousand years. There are no signs of glacial transport, or of rolling by meltwater; indeed the surface of this tool is relatively fresh. Our conclusion is that this implement probably is a preform of a bifacial tool from the Neolithic or the Early Bronze Age.

5. THE HANDAXE FROM FÆNØ (Middelfart landsogn, Vends herred, Fænø)

5.1. Find history

The find history of this tool (Nationalmuseet, A 51117, J.nr. 617-71) is connected to that of the handaxe-like tool from Villestrup, and is therefore described under 4.1.

5.2. Description of the tool (figs 9 and 10)

This is a more or less *cordiforme*-shaped tool, somewhat asymmetrical. The tool is manufactured of fine-grained Senonian flint. Max. length 11.0 cm, max. width 7.3 cm, max. thickness 2.7 cm, weight 184 g. The max. width and thickness occur at about 4.5 cm from the base, which is a cutting edge. On face 1, a remnant of the cortex is present, greyish-white and weathered. The tool was made by direct soft percussion. A remarkable feature is that the right sides of both face 1 and face 2 are worked more carefully than the left sides, by small flakes from bottom to top. This is reminiscent of what Bosinski (1967) has called *wechselseitig gleichgerichtete Kantenbearbeitung*, a feature considered by him to be typical of bifacial tools of the Micoquien Tradition (dated to the Early Weichselian). One flake-negative in the basal part of face 1 shows a hinge, but this does not appear to have been problematic. On face 2, there is one step fracture, roughly halfway along the right edge. The flint-knapper tried to repair it, but was unsuccessful.

The implement from Fænø is quite heavily patinated. Face 1 is covered by a yellowish mixture of white and light-brown patina; most of face 2 has a thick white patina, in the top part and along the right edge brown patina is also present. Within the brown-coloured zones, especially on face 2, there are roundish patches, up to 1 cm in diameter, of dark-brown, organic residue (algae?).

Many scratches can be observed on this tool. Most of them look old; they appear to be 'embedded' in the thick

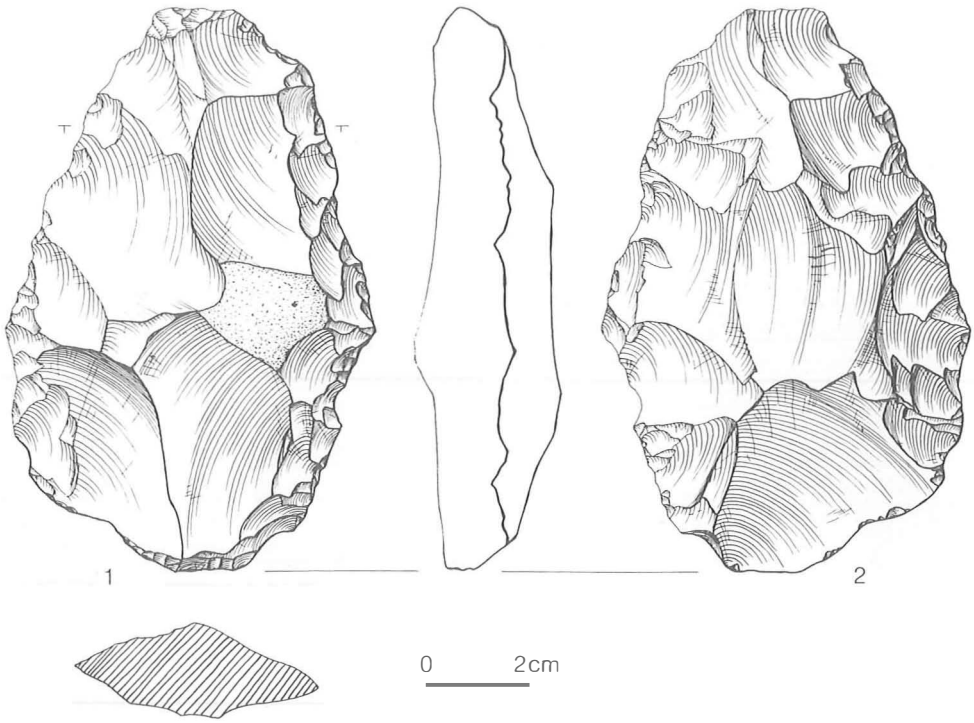

Fig. 9. The handaxe from Fænø. Drawing Lykke Johansen.

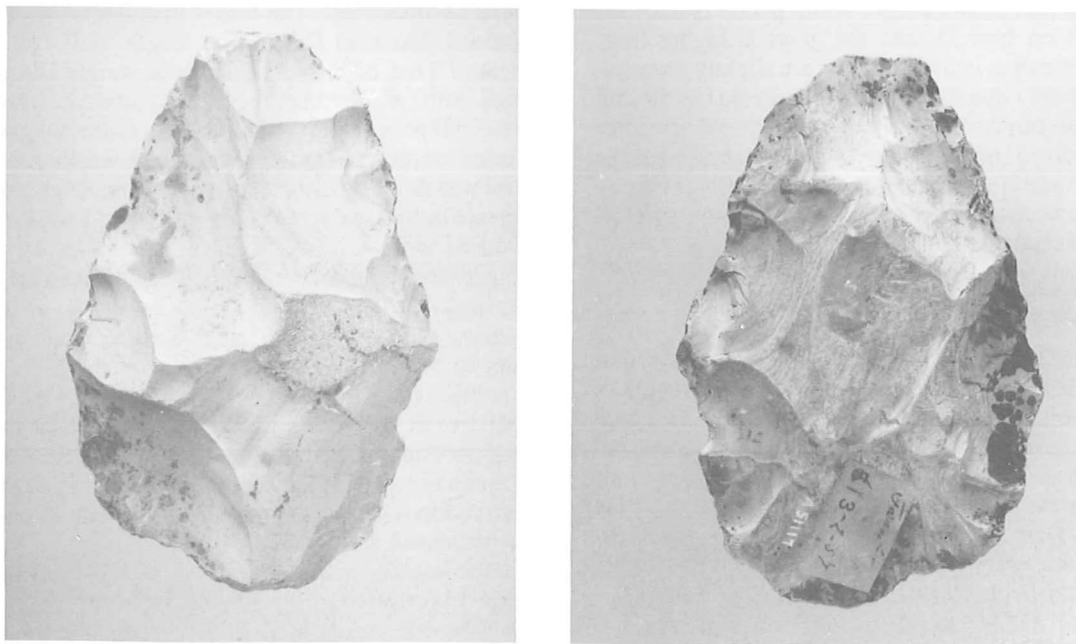

Fig. 10. The handaxe from Fænø. Photo: Kit Weiss, National Museum, Copenhagen.

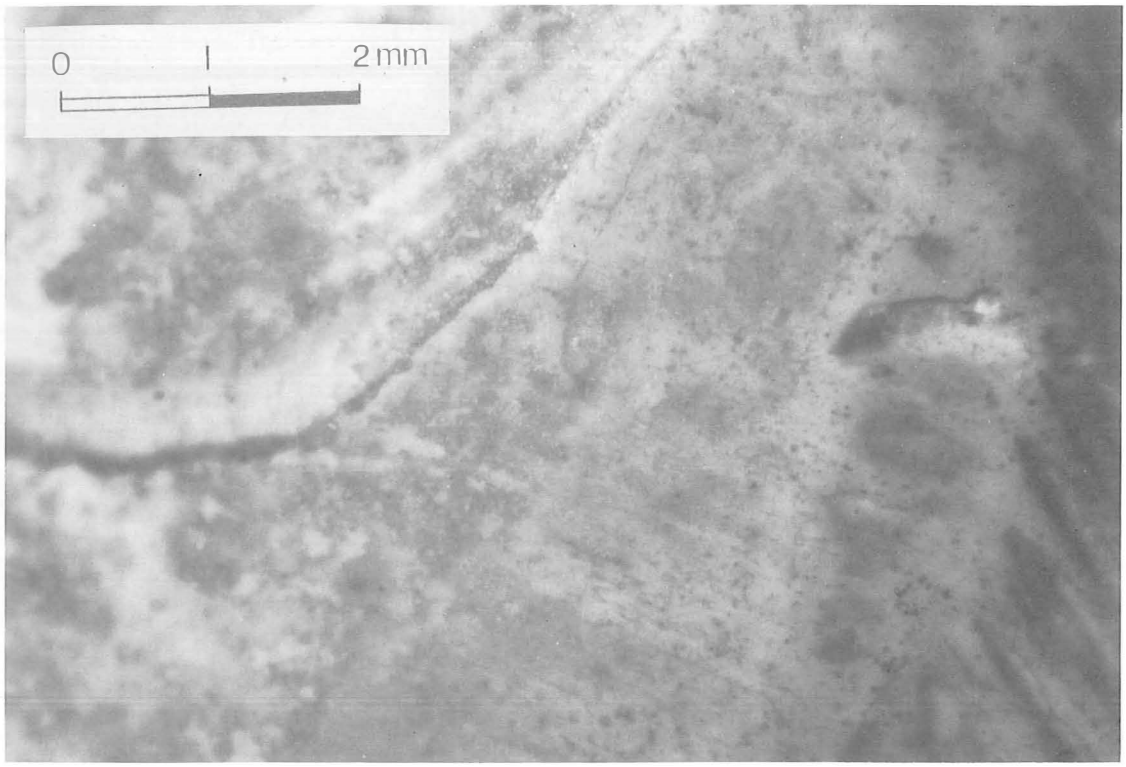

Fig. 11. The handaxe from Fænø. Face 2, at about one third from the top: area with massive subparallel scratching. Stereomicroscope photo: Dick Stapert.

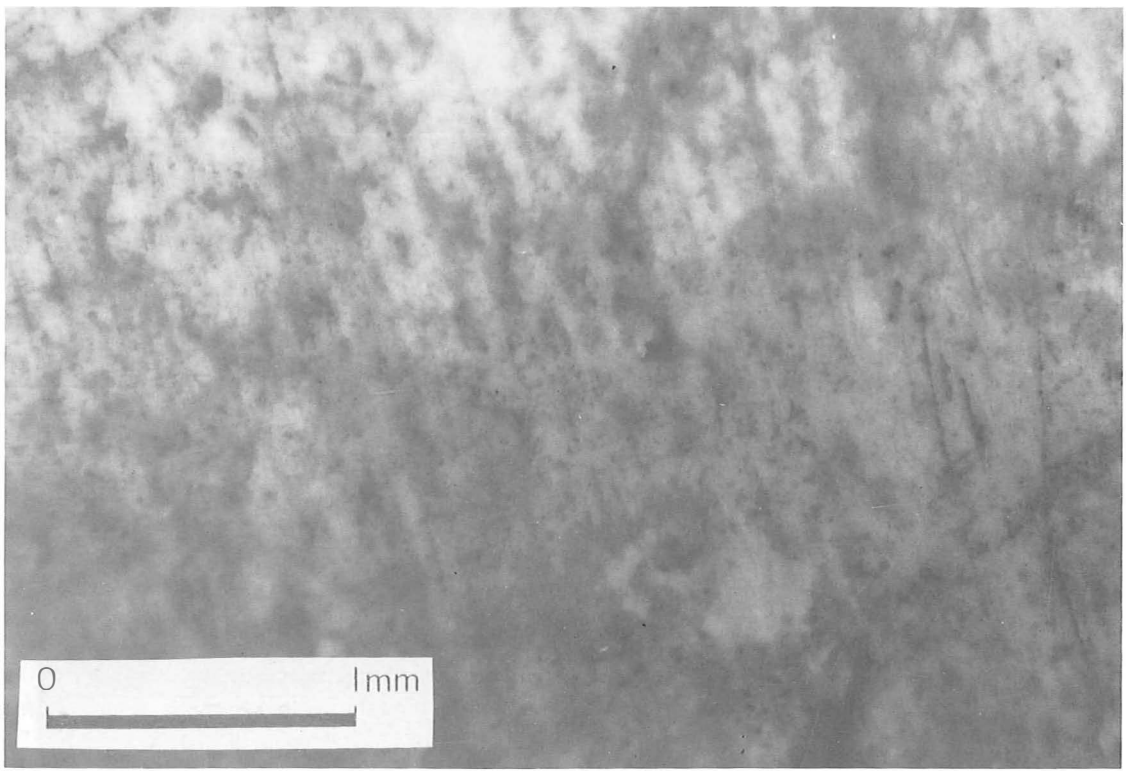

Fig. 12. The handaxe from Fænø. Detail of an area with massive subparallel scratching; face 2. Stereomicroscope photo: Dick Stapert.

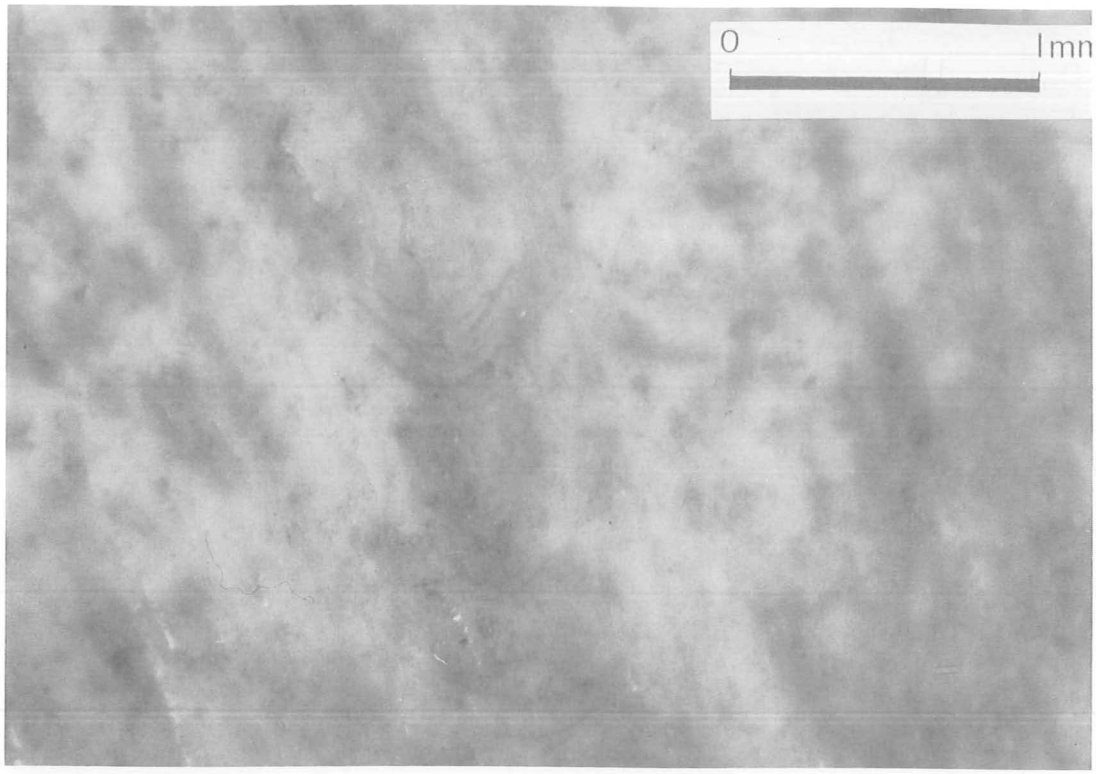

Fig. 13. The handaxe from Fænø. Series of oblique pressure cones in an area with subparallel scratching. Stereomicroscope photo: Dick Stapert.

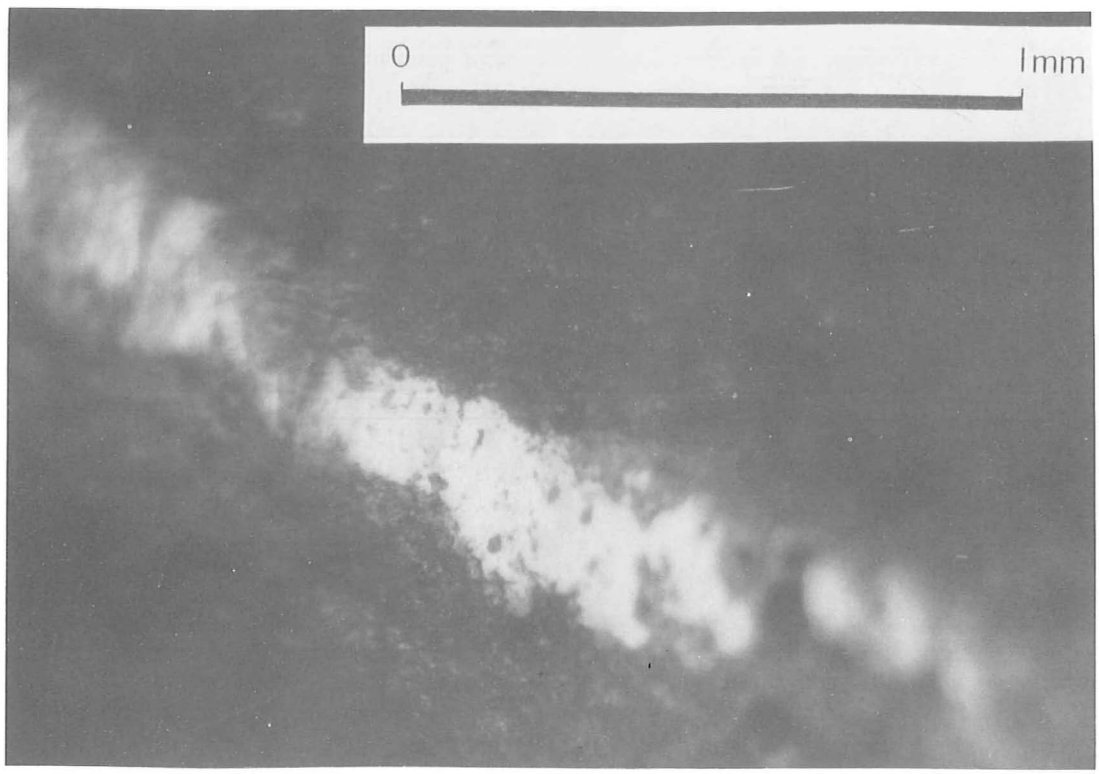

Fig. 14. The handaxe from Fænø. Friction gloss (with striping), on a ridge between flake scars, face 2. Stereomicroscope photo: Dick Stapert.

white patina. In some areas, there is an abundance of scratches in all directions. There are also several places, especially on face 2, where dense bundles of subparallel scratches are present (figs 11 and 12), which are suggestive of scratching produced during glacial transport. Series of oblique pressure cones were observed in several areas, for example near the base on face 1, and at about one third from the top on face 2 (fig. 13). A patch of friction gloss is present on a ridge between flake scars, on face 2 (fig. 14). This friction gloss is of the raised type (see 3), and most probably indicates contact with another stone under some pressure, as do the series of oblique pressure cones mentioned above. The whole surface of this tool displays a fairly high gloss, which is, however, not windgloss (no 'small pits' are present; see 3). Ridges between flake scars are slightly rounded, most probably by chemical dissolution in the soil.

On both faces, especially on face 1, there are rust patches, most probably resulting from ploughing. Several recent scratches can be attributed to ploughing. In view of these rust patches, and the absence of heavy rounding, the handaxe must have come from a field, not from a beach.

5.3. Discussion

Several surface modifications on the Fænø handaxe suggest that it could date from the Palaeolithic. The abundant scratching, and especially the dense bundles of subparallel scratches, suggest that the piece derives from moraine deposits. The series of oblique pressure cones and the patch of raised friction gloss may also have been produced in ground moraine.

Since the tool has suffered from contact with agricultural machinery, one could wonder whether the observed scratches and series of oblique cones might be recent. However, in our experience ploughing does not result in dense bundles of parallel scratches, such as can be observed on the tool from Fænø. Therefore, in our opinion, this implement is most probably a handaxe dating from the Middle Palaeolithic. Typologically, it might be a tool of either the Late Acheulian or the Mousterian of Acheulian Tradition.

6. THE HANDAXE FROM KARSKOV KLINT (Karskov Klint, Snode sogn, Langelands Nørre herred, Langeland)

6.1. Find history

The handaxe of Karskov (Nationalmuseet, A 51111, J.nr. 4621-82) was found in 1973, at the foot of the Karskov cliff (1.5-2 m high). According to the finder, the findspot is located 'a few metres' (10-20 m, according to Grote & Jacobsen, 1982) north of the northern edge of the Karskov forest. The finder is Dr Klaus Palandt (Hannover, Germany), who spent a holiday in Denmark. In 1979, he showed the tool to Dr Klaus Grote of the *Denkmalpflege* in the Göttingen *Landeskreis*. The National Museum in Copenhagen became aware of the handaxe through a publication in the *Archäologisches Korrespondenzblatt* (Grote & Jacobsen, 1982). Subsequently, the National Museum staff approached Dr Grote, because they wished to acquire the handaxe for the Museum's collection. As a result of the negotiations, Dr Palandt presented the handaxe to the Museum, as a gift.

The handaxe was not found in a stratigraphical context, but as a stray find, at the foot of the cliff, on the beach. This is made very clear in a letter by Dr Palandt to Ebbe Lomborg of the National Museum (dated Feb. 27th, 1983): "Der Stein lag unmittelbar am Fusse der etwa 1,5-2 m hohen Abbruchkante. Ich vermute, dass der Stein aus dem Kliff herausgebröckelt ist. Jedenfalls lag der Stein nicht in der Nähe der Wasserkante. Leider kann ich Ihnen also nicht sagen, in welcher Erdschicht sich der Stein befunden hat".

Unfortunately, Grote & Jacobsen (1982: p. 281) explicitly state that the handaxe was found in situ – in the moraine layers exposed in the cliff face: "(...) ist es aber die Einbettung in eine durch das Karskov-Kliff aufgeschlossene weichselzeitliche Grundmoräne, die das mittelpaläolithische Alter der Faustkeils belegt". This incorrect idea is repeated in a report by Jacobsen (n.d.: p. 3): "The finding is of special interest because of its age and the fact that it is not a surface finding, but was situated in a profile". We also encounter this idea in Holm (1986: p. 79): "It was found in till deposited during the latest Weichselian glacier advance".

The geologist Erik Maagaard Jacobsen studied the cliff. In the cliff face, moraine layers of the Late Weichselian are exposed. In the course of his research, Jacobsen discovered a pit dug from the top, that had become exposed in the cliff face as a result of erosion. The pit contained charcoal and fishbones (cod); Jacobsen did not observe any flint artefacts in the pit (Jacobsen, n.d.). Cod remains might date from the Atlantic, but they could also be much younger. The handaxe could theoretically have come from the pit fill, but we consider this to be highly improbable, because the implement is heavily rounded.

Grote & Jacobsen ascribed the handaxe to the Early/Middle Palaeolithic. Their arguments concerned the shape of the artefact, the heavy rounding of the piece, and especially its allegedly being embedded in the moraine layers. They dismissed the possibility of the implement being a preform of a bifacial tool dating from the Neolithic or the Early Bronze Age. Jørgen Skaarup of the Langelands Museum, however, suggested that it might be a preform of, for example, a dagger (in a letter to Grote, dated Nov. 11th, 1982). Grote replied (on Feb. 2nd, 1983) that he did not believe this, his most important argument being the non-cutting base of the tool, an oblique transverse face (see below): "(...)

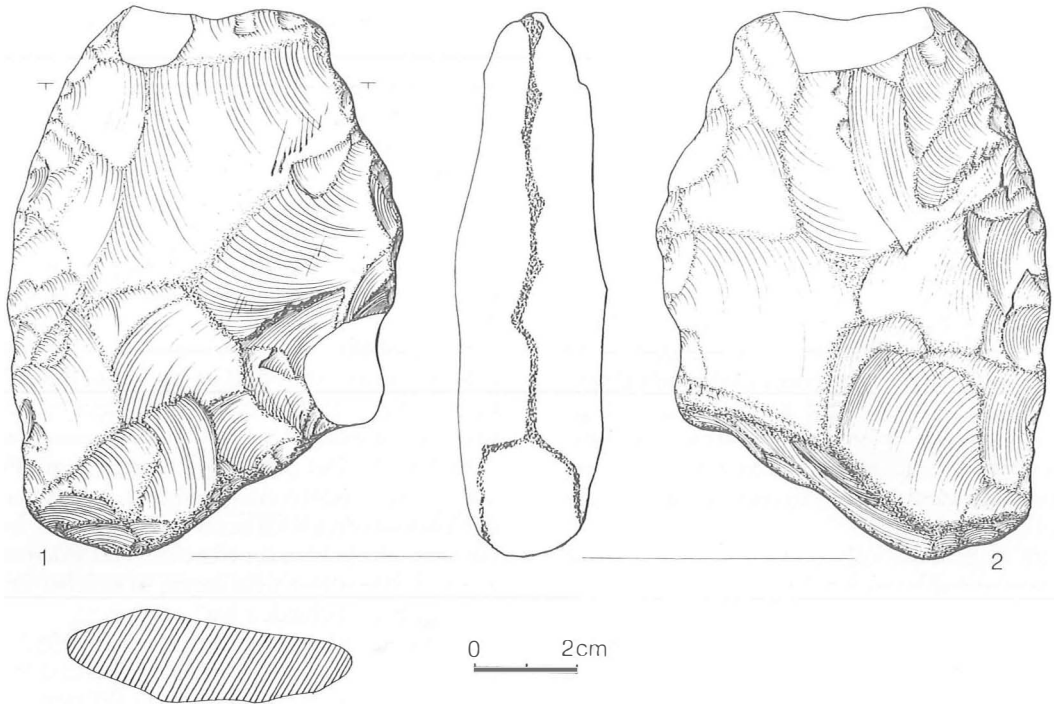

Fig. 15. The handaxe from Karskov Klint. Drawing Lykke Johansen.

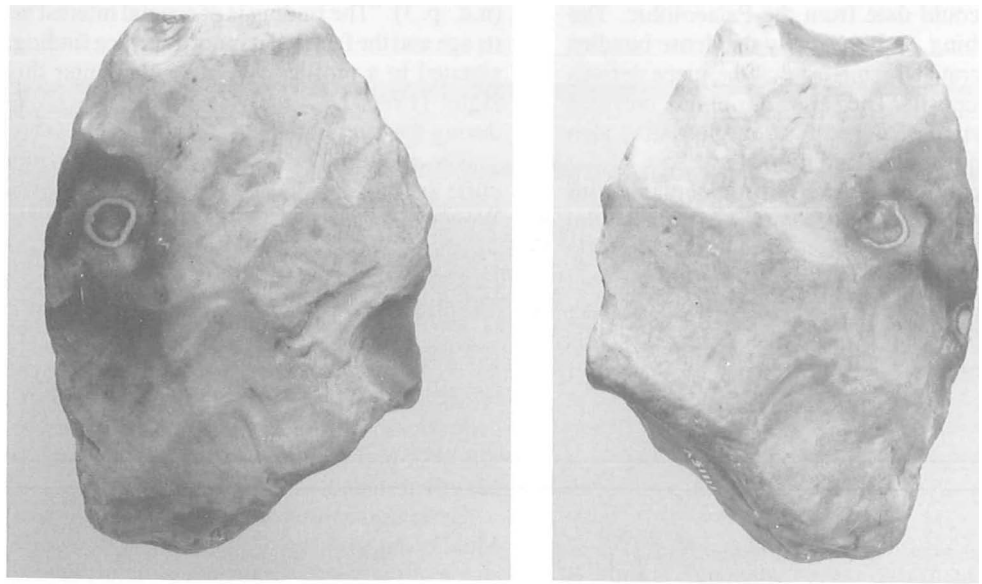

Fig. 16. The handaxe from Karskov Klint. Photo: Kit Weiss, National Museum, Copenhagen.

ein Charakteristikum für viele jungacheulzeitliche Faustkeile".

6.2. Description of the tool (figs 15 and 16)

This tool is fragmentary; both from the top and the right side of face 1, parts have been broken off in sub-recent times. Max. length 10.8 cm, max. width 7.9 cm, max. thickness 3.1 cm, weight 300 g. This implement is made of fine-grained Senonian flint. The tool is made by direct soft percussion. It has an oblique non-cutting base, consisting of a transverse face, a flake scar, 2.3 cm

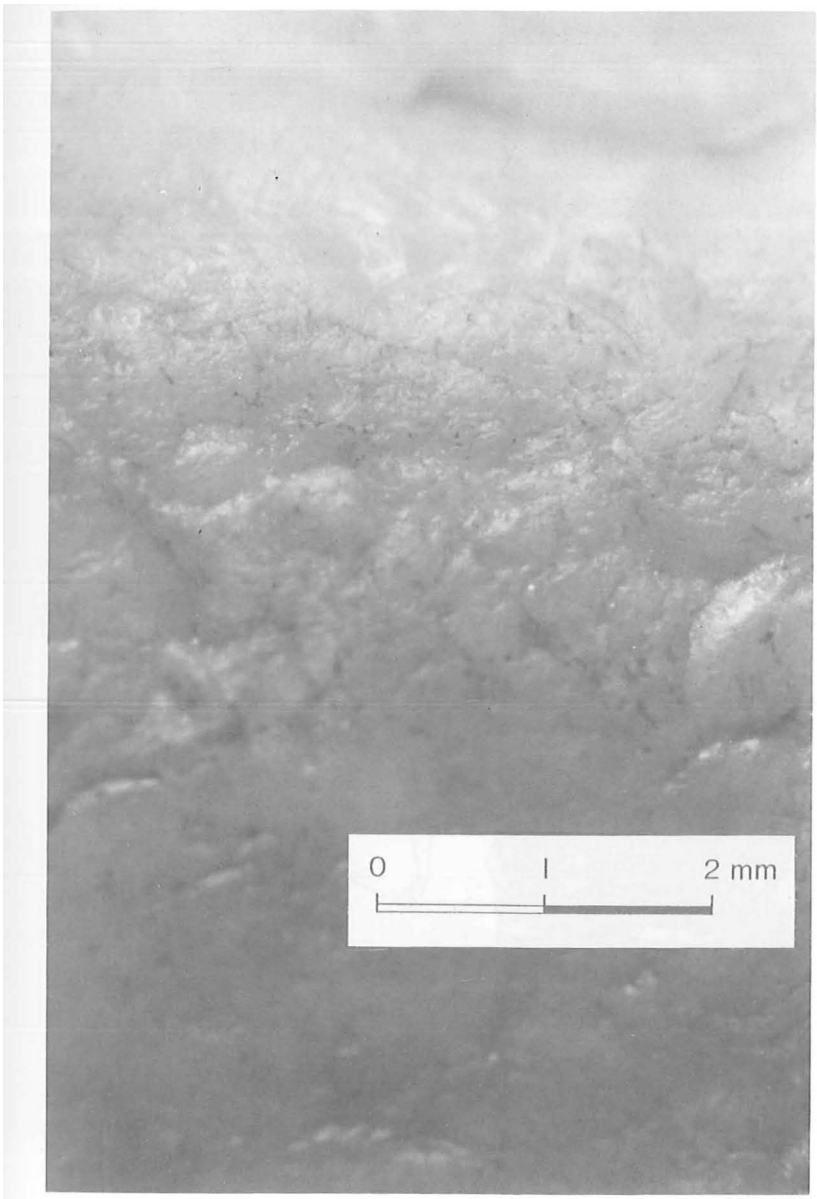

Fig. 17. The handaxe from Karskov Klint. Ridge between flake scars on face 1. The ridge is severely rounded as a result of splintering. Stereomicroscope photo: Dick Stapert.

wide. Using this face as a platform, several thinning flakes were removed from face 1. Some slight technical problems were caused by a hinge fracture on face 2, and a step fracture near the middle of the right side of face 1, but in both cases further working of the piece still was possible.

The tool is heavily rounded owing to surf action. Edges and ridges are much affected, and show a lot of splintering and small collision cones (fig. 17). Collision cones occur over the whole surface of the handaxe. Several fine scratches can be associated with the rounding process, and the same goes for the occurrence of many small damaged spots on the surface of the tool. The original colour of the flint is grey, as can be ascertained from several recently damaged areas. It has a rather thick white patina, with yellowish spots in parts.

In a few places, bundles of very coarse scratches occur (fig. 18). These are very similar to coarse scratches occurring on artefacts from the Middle Palaeolithic near Rhenen in the central Netherlands (see under 3); these scratches are interpreted as the result of creeping ice floes. Since the Karskov tool was found on the beach, this is likely to be the explanation in this case as well.

On face 2, some stripes of friction gloss are present (fig. 19). These probably are the result of contact with another stone, under some pressure. Both strong surf action and creeping ice floes might be responsible for the friction gloss.

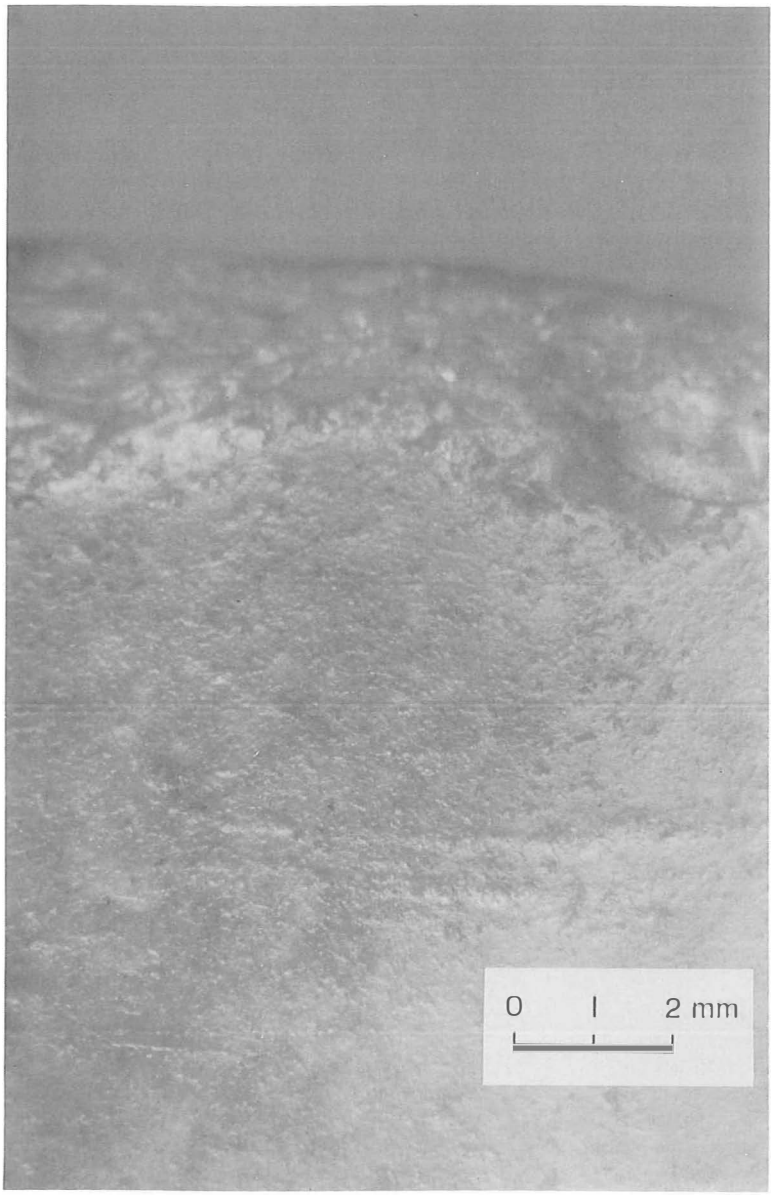

Fig. 18. The handaxe from Karskov Klint. Bundle of broad, flat-bottomed scratches, lower part of face 2. Stereomicroscope photo: Dick Stapert.

6.3. Discussion

None of surface modifications on the tool from Karskov Klint necessarily indicates a dating in the Palaeolithic. Heavy rounding, white patina, scratches and friction gloss could all have been produced during the last few thousand years. In view of the information presented by the finder, the implement could have been left on the beach by prehistoric man. Therefore, it is our opinion that the tool of Karskov could very well be a preform of a bifacial tool dating from the Neolithic or the Early Bronze Age.

In June 1995, we visited Karskov Klint. On the beach, near the findspot indicated by Palandt, but also up to several hundred metres to the left and right of it, we collected about twenty flakes, some of which were elongated (but no real blades). Almost all flakes are certainly hard percussion flakes; one or two could be soft percussion flakes. Most of these artefacts have a thick white patina, and are heavily rolled, just like the handaxe. Some display a brown patina, or a mixture of white and brown patina. Some flakes are only lightly patinated and slightly rounded.

In the near vicinity of the handaxe-site indicated by Palandt, in the cliff face, we found a core; it was situated in the ploughed topsoil on top of the moraine layers. It is a residual core, showing at least four flake negatives (fig. 20). The flint surface is fresh: no rounding, no white patina. Before leaving, we walked the field on top of the cliff, for only five minutes (because it was planted

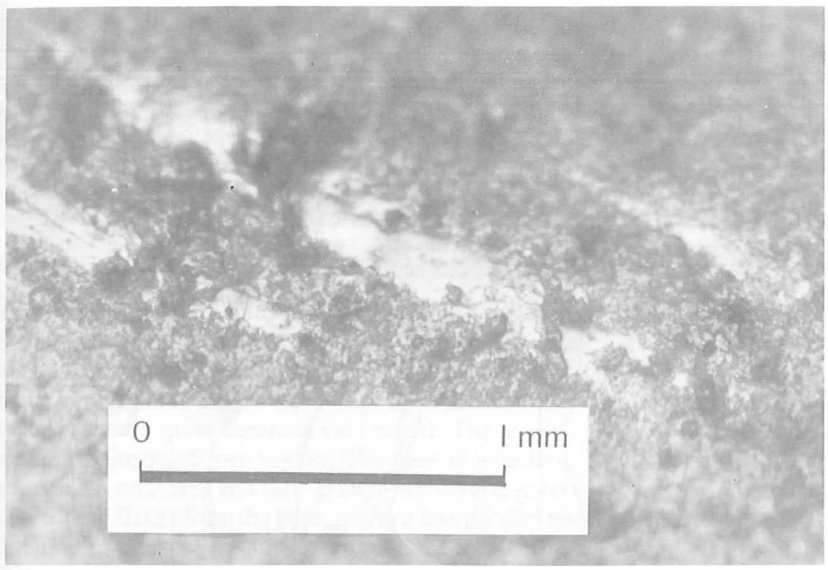

Fig. 19. The handaxe from Karskov Klint. Group of bright spots: friction gloss with striping, to the left of the middle of face 2. Stereomicroscope photo: Dick Stapert.

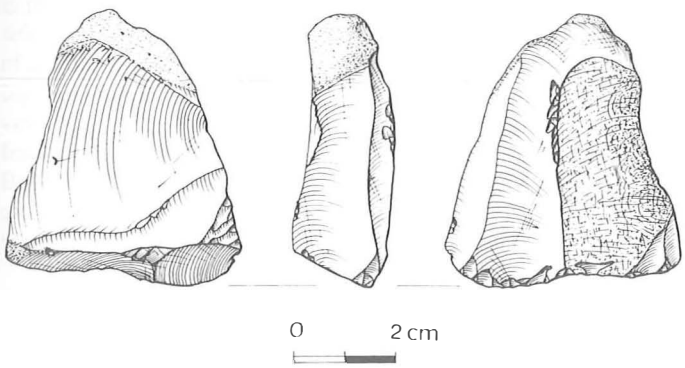

Fig. 20. Karskov Klint. Core found in the topsoil of the cliff face near the findspot of the handaxe. The core is unpatinated and not rolled. Drawing Lykke Johansen.

with wheat). We found a handful of artefacts, all flakes, not rounded, and either unpatinated or showing a light brown patina. There are no tools in our little collection, so we cannot closely date these artefacts. However, this material is certainly Holocene in age – Mesolithic, Neolithic and/or Early Bronze Age.

During the past few thousand years, flint artefacts have of course been eroded from the fields on top of the cliff, and ended up on the beach. After arriving on the beach, most of these flint artefacts will soon acquire a white patina, and rounded edges. The longer they lie on the beach, the more severe these modifications will be. Some artefacts found on the beach had evidently ended up there only recently, being rolled and patinated only lightly. On the other hand, some of the flakes collected on the beach were more heavily rolled and patinated than the handaxe-like tool. On the beach of Karskov we may expect two categories of artefact to be present: artefacts deriving from settlements on top of the cliff, and artefacts resulting from testing and preparing flint nodules on the beach, possibly left behind by the same people.

7. THE HANDAXE FROM SKELLERUP (Skellerup sogn, Skovby herred, Fyn)

7.1. Find history

This tool (numbered '4299' by the finder; the tool is donated to the National Museum in Copenhagen) was found by Helge Kierkegaard (Viby, Zealand), between 1960 and 1965. He was a boy then, and did not systematically record findspots. From 1965 on, however, he numbered his finds, which were collected at four localities on Funen. The handaxe must have come from one of these. In 1995, Kierkegaard inspected his collection at our request, looking for any clues that might help to 'rediscover' the handaxe-site. He concluded that three of his findspots could be excluded, because the artefacts from these sites have a different patina than the handaxe, while the artefacts from the fourth are similar in that respect.

On the basis of this information, the handaxe can 'with 95% certainty' be regarded as deriving from the area between Hjulby and Skellerup in the eastern part of

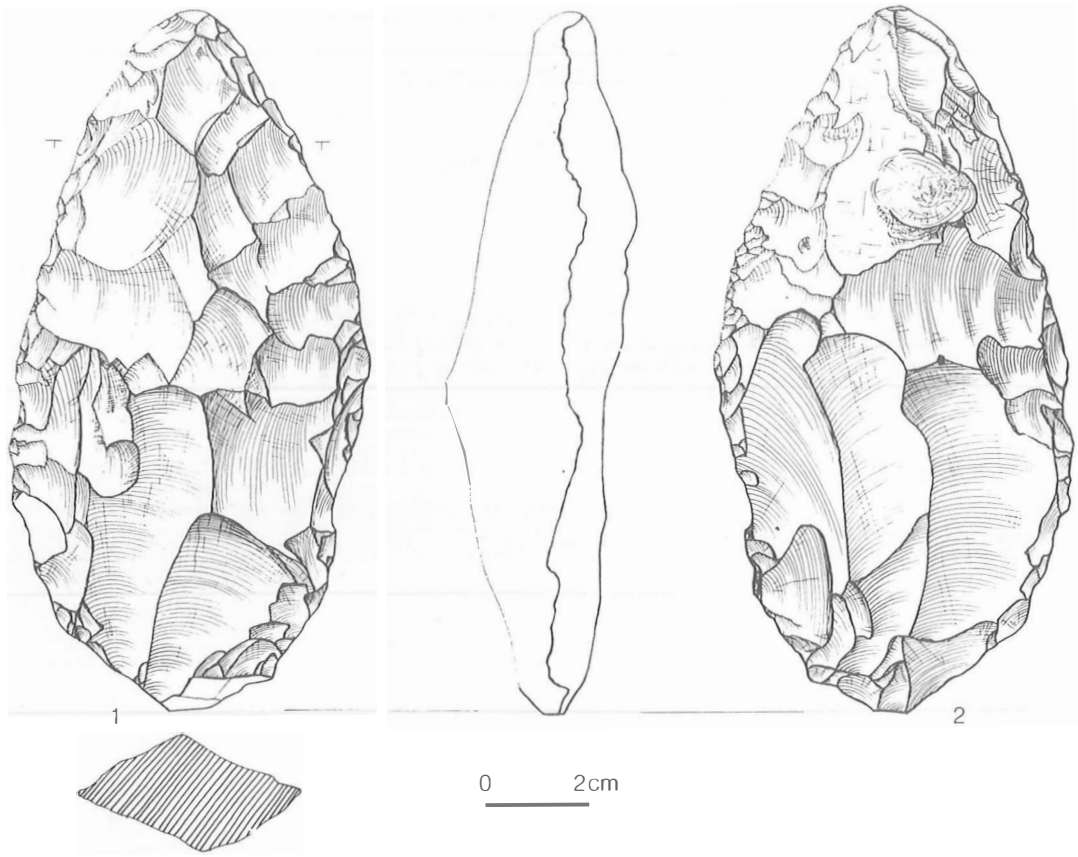

Fig. 21. The handaxe from Skellerup. Drawing Lykke Johansen.

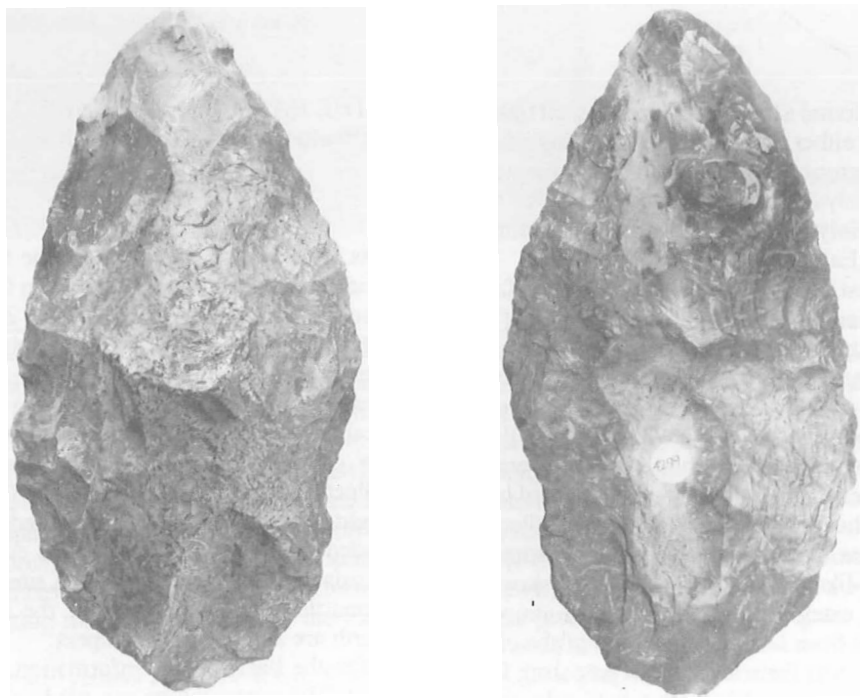

Fig. 22. The handaxe from Skellerup. Photo: Kit Weiss, National Museum, Copenhagen.

Funen. Kierkegaard collected many artefacts from the fields to the north of the small brook running between the two villages. On both sides of the brook there are gently rolling hills, and especially the slopes down to the brook are locally rich in artefacts. Among the finds from this area is a series of unambiguous Neolithic tools.

7.2. Description of the tool (figs 21 and 22)

This is an elongated handaxe-like tool with a pointed oval shape. Max. length 13.7 cm, max. width 7.2 cm, max. thickness 3.2 cm, weight 260 g. The implement is made of Senonian flint, full of Bryozoan fossils (this type of flint is quite common on Funen). The tool is made by direct soft percussion. The base is a cutting edge. Both on face 1 and face 2, there are several scars of thinning flakes from the base, more or less parallel to the longitudinal axis, which resulted in the top part of the tool being thicker than the basal part, the opposite of what is normally observed on Palaeolithic handaxes. It is remarkable that this piece of flint should have been selected by a prehistoric flint-knapper for the production of a bifacial tool, because of a large cone fracture in the top part of face 2, which must have been visible from the very beginning. Perhaps the knapper believed that the fracture was not very deep, so that he could remove it. But he did not succeed, because the fracture is in fact quite deep, and this probably is the reason why this tool was not worked further.

The tool displays a low gloss patina, but as a whole the surface looks relatively fresh. Brown patina is present on both faces. The original colour of the flint is a pale grey, as can be seen at several recently damaged spots. There are rust patches from contact with iron machinery, probably through ploughing, and several recent scratches can also be attributed to ploughing. No clearly old scratches were observed. Edges and ridges between flake scars are not clearly rounded.

7.3. Discussion

None of the surface modifications on this tool indicates a dating in the Palaeolithic. Gloss patina and brown patina could have been formed during the Holocene. We consider it to be a preform of a bifacial tool dating from the Neolithic or the Early Bronze Age. It should be stated here that the finder never believed that the tool should date from the Palaeolithic.

8. THE BLADE FROM SEEST
(Oluf Jensen's gravel quarry, Seest sogn, Anst herred, Jutland)

8.1. Find history

Erik Westerby (1901-1981) was a police officer, High Court barrister, and a famous Danish amateur archaeologist. His best-known achievement is the discovery of the Bromme site, in 1944.

Westerby was very much interested in the quarries near Seest. In these pits, bones of giant deer, red deer, fallow deer, bison, beaver, forest rhino, and molars of either the forest elephant or a primitive form of mammoth were found (kept in the Zoological Museum, Copenhagen). Westerby hoped that these quarries might also provide clues concerning Palaeolithic man, and during many years carefully studied the quarries. His abundant notes, sketches and photographs relating to his research are kept in the National Museum, Copenhagen, and these contain a wealth of information about the layers exposed in the many sand and gravel quarries near Seest. In 1957 he received the Worsaae Medal for his geological and archaeological work in the quarries.

Westerby asked the workmen to collect any flint implements that might come to light, especially those that might turn up in the older layers exposed in the pits. The blade from Seest (Nationalmuseet, A 51589, J.nr. 4700-82; Erik Westerby numbered it 759:2) derives from one of these pits, Oluf Jensen's quarry. It was found in 1954 by one of the workmen in this quarry, Børge Svendson, when it fell from a sifting machine into a wheelbarrow. Sediment residues on the blade were examined by an unidentified French expert, who concluded that the blade could not have derived from the uppermost layers (topsoil) in the quarry, but that it could have been embedded originally in Weichselian meltwater deposits (Andersen, 1957).

In the files left by Westerby, several photographs of the quarry walls are present, with transparent overlays describing the exposed layers; we have reproduced one photo, taken by Westerby in 1957 (fig. 23). His notes were used to make a schematic drawing of this section (fig. 24). Westerby also made many sketches of quarry sections. Most of the exposed layers evidently are gravelly meltwater deposits. Locally, however, thin layers or lenses of loamy fine sand or sandy clay are intercalated. In some drawings by Westerby three such fine-grained layers are indicated, in other sketches one or two. In some cases Westerby remarked that these fine-grained layers are dark-coloured.

Andersen mentions that Westerby possessed six other artefacts, supposedly flakes, from Seest. In the paper by Nielsen (1985), apart from the blade, four flake-like flints are illustrated in a photograph (his fig. 12; at least two of these appear to be rounded). In the inventory files of the National Museum, mention is made of the following pieces from Seest: "1 blade, 1 flake (natural?), 10 flakes/pieces of flint, on which it is written that they were found in Olaf Jensen's gravel pit". The first author was able to study these pieces. Apart from the blade (see below), no definite artefacts are present.

Unfortunately, the blade was found out of stratigraphical context. Nielsen (1985) cited a text by Wes-

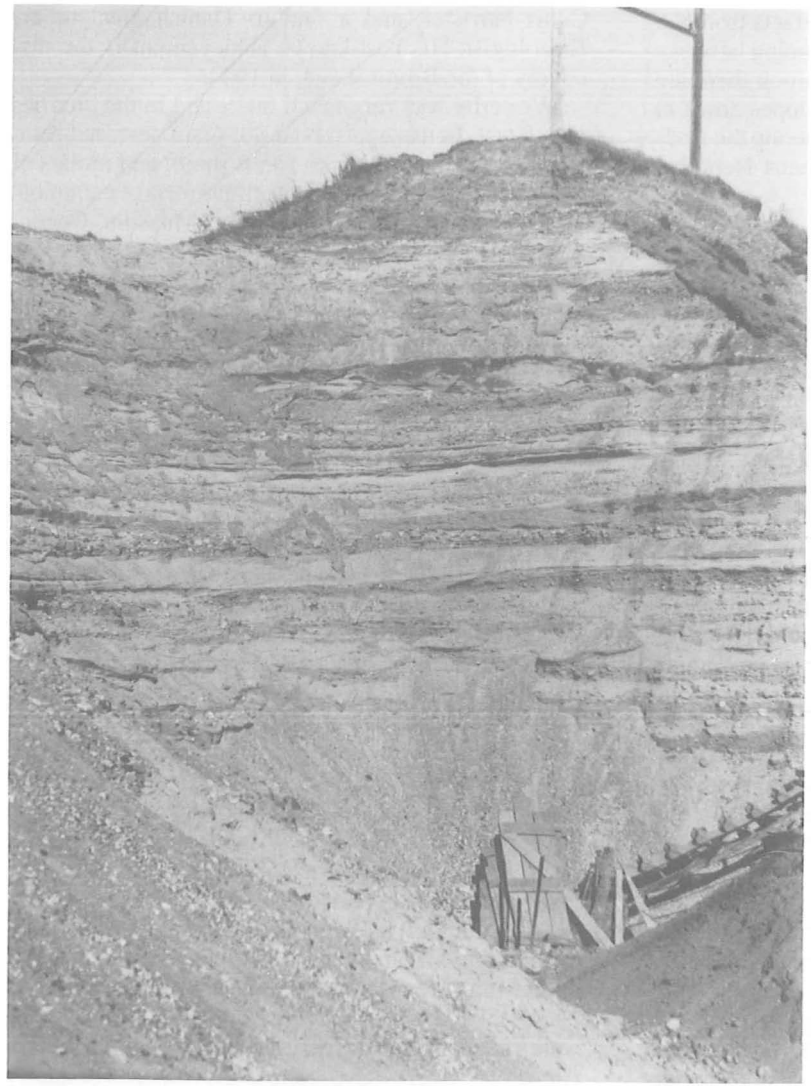

Fig. 23. Photo of one of the quarry walls in Oluf Jensen's gravel pit near Seest, taken by Erik Westerby in 1957. This is one of several photos in Westerby's notebooks, kept in the National Museum, Copenhagen. The height of the section is between 15 and 18 m. Reproduction by the National Museum, Copenhagen.

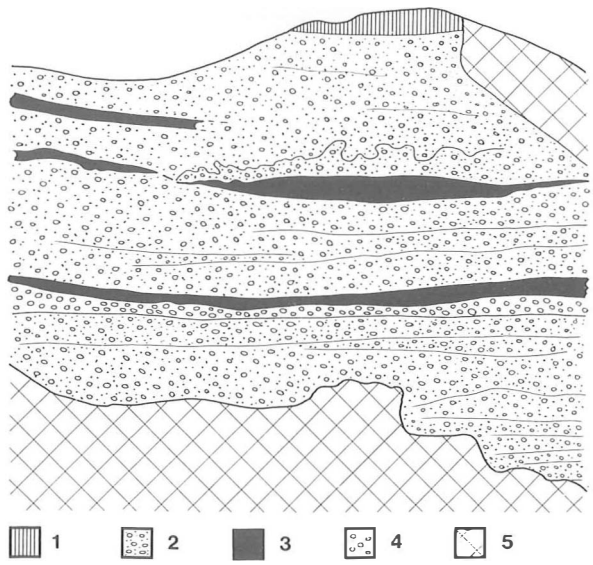

Fig. 24.' Schematic drawing of the section shown in fig. 23, based on the descriptions by Westerby on a transparent overlay. Key: 1. topsoil, 2. gravelly sands, 3. fine-grained layers (loam or clay), 4. gravel (immediately beneath the lowest clay layer), 5. disturbed. Note the cryoturbated deposits in the top part. Drawing Lykke Johansen.

terby (kept in the National Museum): "Once or twice a year, a blade or flake is found in the quarry, worked by Stone Age man. There was always the problem that these pieces were found either in the loose soil at the foot of the quarry walls, or collected by the quarry workmen when sorting the stones, and I have not yet had the improbable luck of finding an artefact in an undisturbed gravel layer. At least for the majority of the finds, however, indications are that the artefacts derive from the gravelly layers, and not from the topsoil; sand matrix still attached to some of the artefacts is similar to the sand in the gravelly layers". Westerby also offered the opinion that the artefacts dated from the Eemian, and were subsequently redeposited by Weichselian meltwater, thus ending up in the gravelly deposits described earlier.

Westerby wrote two articles in the *Jyllands-Posten* ('Kronik'; 2 & 9 January, 1956. Westerby's original typescript is kept in the National Museum, Copenhagen). Both articles bear the title: *Nyt fra min Grusgrav*: 'News from my gravel quarry', which if nothing else shows his attachment to this site. His own drawing of the blade was published in the 'Kronik' of 9 January. In the article he writes that, apart from the blade, three flakes from the quarry were then part of his collection. He did not feel very sure about these, because they were found in gravel heaps, and could therefore derive from the topsoil. However, as he goes on to say, in the case of the blade an origin in the topsoil is excluded because of the find circumstances, even though it was not found in situ. Westerby believed that the blade came from the youngest meltwater gravels in the quarry, because the yellowish patina it displays is very common in those layers.

8.2. Description of the blade (figs 25 and 26)

This is a fairly regular blade, with two dorsal ridges. Max. length 8.7 cm, max. width 3.5 cm (not original, because part of the left edge was broken off in recent times), max. thickness 0.9 cm, weight 24 g. There is a prominent bulb of percussion, and a little bulbar scar. The blade was probably produced by direct hard percussion, but it is difficult to be sure of this, because the striking platform remnant shows negatives coming from the ventral face, probably due to splintering during manufacture. Technically speaking, the blade could have been struck from a Levallois core, but this cannot be proved.

The blade displays a light-brown/yellowish patina. The original colour of the flint is pale grey, as can be seen at several recently damaged spots. The blade is manufactured from Senonian flint of good quality; it contains some Bryozoan fossils. A light gloss is present. Ridges and edges are slightly rounded, very much like those on flints which have been in an active riverbed for some time. Under the stereomicroscope it can be seen that this rounding was caused by collisions with gravel particles (see under 3), so that an origin in gravel-bearing water-laid deposits seems very probable (fig. 27). Many small retouches along the edges may be explained in the same way. A bundle of scratches was observed near a dorsal ridge (fig. 28). These scratches have a flat bottom, and presumably could have been caused by creeping ice floes, though they are rather fine. However, in this case we have to be careful, because they occur near a spot with rust patches, caused by some iron implement. Though the scratches look old, we cannot entirely exclude the possibility that they are recent. Nevertheless, they look different from some

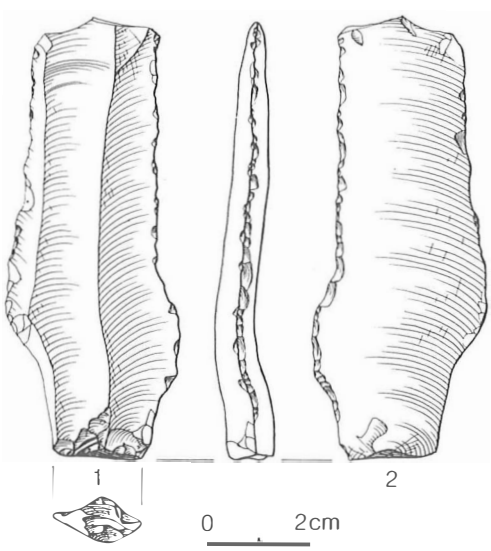

Fig. 25. The blade from Oluf Jensen's gravel quarry near Seest. Drawing Lykke Johansen.

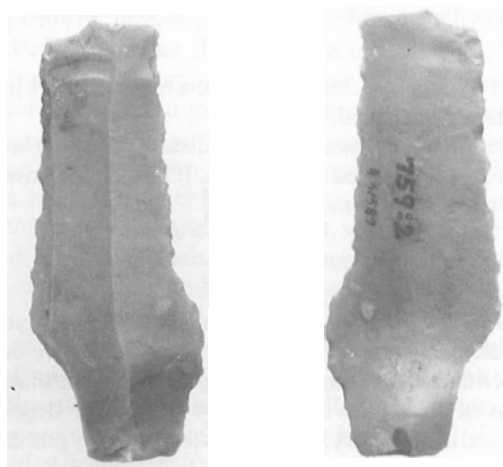

Fig. 26. The blade from Oluf Jensen's gravel quarry near Seest. Photo: Kit Weiss, National Museum, Copenhagen.

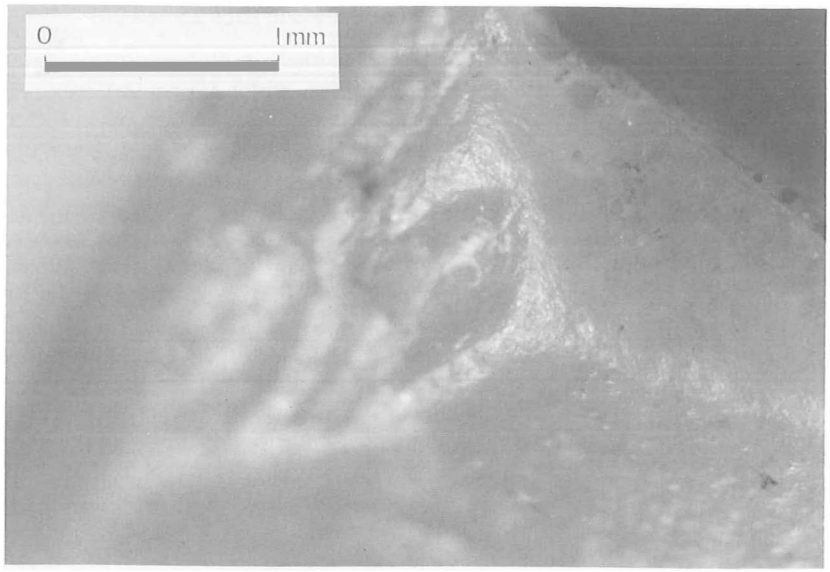

Fig. 27. The blade from Seest. Rounded ridges between flake scars, near the base of the dorsal face. Stereomicroscope photo: Dick Stapert.

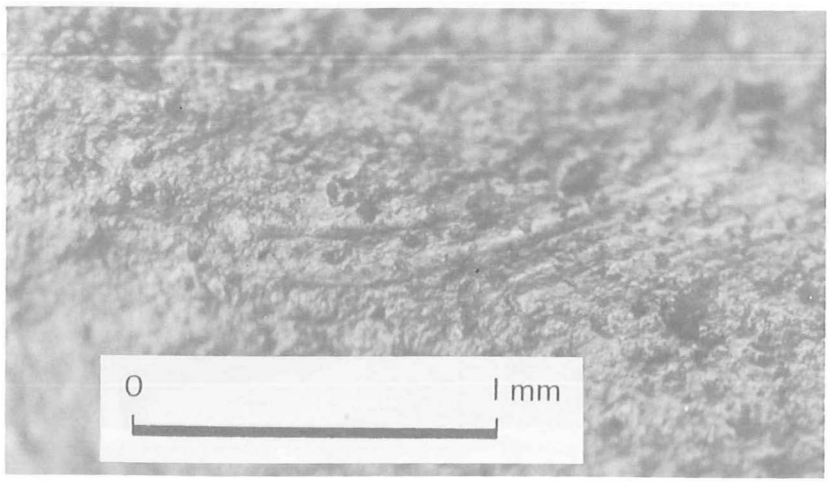

Fig. 28. The blade from Seest. Bundle of scratches, near a ridge between flake scars, middle of the dorsal face. Stereomicroscope photo: Dick Stapert.

clearly recent fine scratches near the rust patches, which are more superficial.

On the dorsal face, near the distal end, some sediment is still attached to the blade. It consists of brown-coloured loam or fine sand.

8.3. Discussion

The rounding of edges and ridges points to an origin in gravelly water-laid deposits. Therefore, we are convinced that Erik Westerby was right in believing that the blade derives from the gravelly meltwater deposits exposed in the quarry. This means that it is very probably Middle Palaeolithic in age. It is not possible to date the artefact more precisely, but since at least the upper meltwater deposits date from the Weichselian, both the Eemian and the Early Glacial of the Weichselian are realistic options. In principle, however, an older dating is not impossible. Similar regular blades are known from sites such as Markkleeberg in eastern Germany (Mania & Baumann, 1981) and Rhenen in the Netherlands (Stapert, 1987). Both sites can probably be dated to an interglacial predating the Eemian though postdating the classic Holsteinian.

9. HOLLERUP (JUTLAND)

One of the best-known sites presenting (inferred) evidence for human presence in Denmark before the last Ice Age, is Hollerup. The zoologist Ulrik Møhl-Hansen described bones of roe deer found in the Hollerup quarry near Randers in northern Jutland (Møhl-Hansen, 1954). They derive from several individuals,

and at least one skeleton is fairly complete. The Hollerup bones were collected in 1897 and 1925 by the geologist N. Hartz. They derive from a layer which is dated by stratigraphy to the Eemian (Aaris-Sørensen, 1988). When going through all fossil finds of roe deer from Denmark, Møhl-Hansen came across the Hollerup bones, and concluded that these were fractured by Palaeolithic man. He did not find any cutmarks on the bones, however, nor any indications of the use of fire. The evidence consisted of traces that led Møhl-Hansen to believe that the bones were fractured intentionally – presumably to release the marrow. Stone artefacts are not reported from the Hollerup locality.

To our minds, it would be very desirable to conduct fieldwork at the Hollerup site. The present state of the evidence, fractured animal bones but no stone artefacts, is most unsatisfactory. Taphonomical studies have shown that many mechanisms might result in bone-fracturing, and that it is not always easy to demonstrate human agency (e.g. Binford, 1981; Brain, 1981). Therefore, it would be good to have an archaeological context in this case. Binford (1978; 1981) describes the process of bone-fracturing for marrow extraction, as practised by the Nunamiut Eskimos. Extracting marrow is likely to have been done at an encampment (see also Grønnow, 1985). Typically, this work results in many bone splinters. The Nunamiut mostly crack the bones near a fireplace.

10. VEJSTRUP SKOV (JUTLAND)

At the site of Vejstrup Skov near Christiansfeld in southern Jutland, an excavation was carried out in 1971-1972, by Søren H. Andersen of the University of Aarhus. At this locality, near the stream in a deep erosion valley, the brothers Niels and Åge Boysen had previously collected a large number of "(...) extremely primitive-looking flint artefacts: flakes, choppers/cores – but no handaxes – which appeared to be very much like the types and techniques of the Clactonian industry" (Holm, 1986: p. 77). The excavation is said to have produced some finds in situ, in sand, beneath about 8 m of Weichselian tills (Holm, 1986: p. 77). Holm is inclined to date the material in the Holsteinian.

According to the excavator, however, the excavation finds derive not from a primary stratigraphical context. The excavated artefacts derive from slope deposits; therefore, they lack sound stratigraphical dating (S.H. Andersen, pers. comm. 1995).

Though a Palaeolithic dating certainly cannot be excluded, this information leaves open the possibility that we are dealing with an *atelier*-site (or several such sites) dating from much later periods of the Stone Age, or the Early Bronze Age. At such localities, the archaeological residue could easily create an 'extremely primitive" impression, because especially waste from testing and preparing flint nodules would have been left behind. Søren H. Andersen kindly informed us that the large collections of Vejstrup Skov consist only of hard percussion flakes and crude cores; no well-defined tool forms are present. The weathering of the artefacts is varied. Some flints have little or no surface modification, while others are strongly patinated (both white and brown patinas occur).

Thorough technological studies of the material, and especially an investigation of the surface modifications present on the artefacts, are needed before anything can be concluded about the antiquity of this material.

11. EJBY KLINT (ZEALAND)

Erik Madsen (1963) described many flint artefacts that he collected on the gravel beach of Ejby Klint (northern Zealand). Most of his finds are said to have been found 'close together', on the beach north of the *Fiskerhuse*. In the cliff face, moraine layers are exposed, and – roughly in the middle – a marine deposit dating from the Eemian (Holm, 1986). Holm states that "(...) about one thousand primitive flint artefacts, crude flakes and cores (...)" were collected here (Holm, 1986: p. 77).

Madsen described his material as containing very crude bifacial tools, large flake tools and core-like pieces, made by hard percussion. He compares his finds to both the Clactonian and the 'Altonian'. This last name refers to material published by Rust (1962), which nowadays is considered by most Stone Age researchers to consist of pseudo-artefacts. In his paper, Madsen is rather hesitant concerning the dating, because the finds all derive from a secondary context – the beach. One of his arguments for a Palaeolithic dating is that in this area he could not find any artefacts clearly dating from the Mesolithic or Neolithic.

The present authors visited the site in June, 1995. We searched the beach from Ejby Havn to the mouth of the Ejby Å. The beach gravel is very rich in flints, and there are plenty of 'incerto-facts' – pieces for which it cannot be decided whether they are man-made or not. The environment is very iron-rich, and many stones are coloured brown. In most cases, however, the brown patina is not deep, but very superficial. Near the mouth of the Ejby Å, brown patinas are much rarer, and we more often encounter flints with white patina.

We found two 'sites'. The first, which must be the site described by Madsen, is a 'concentration' of flakes and cores, occurring between about 200 and 300 m north of Ejby Havn. Apart from several incerto-facts, our collection comprises three cores and nine flakes. The largest artefact is a core about 17 cm in length (fig. 29). It was manufactured from a rolled flint cobble, and there are series of flake scars on both faces, clearly resulting from direct hard percussion. It could represent an attempt at making a preform of a bifacial tool from the Neolithic or Early Bronze Age, but it was abandoned quite soon because 'bad angles' had developed along

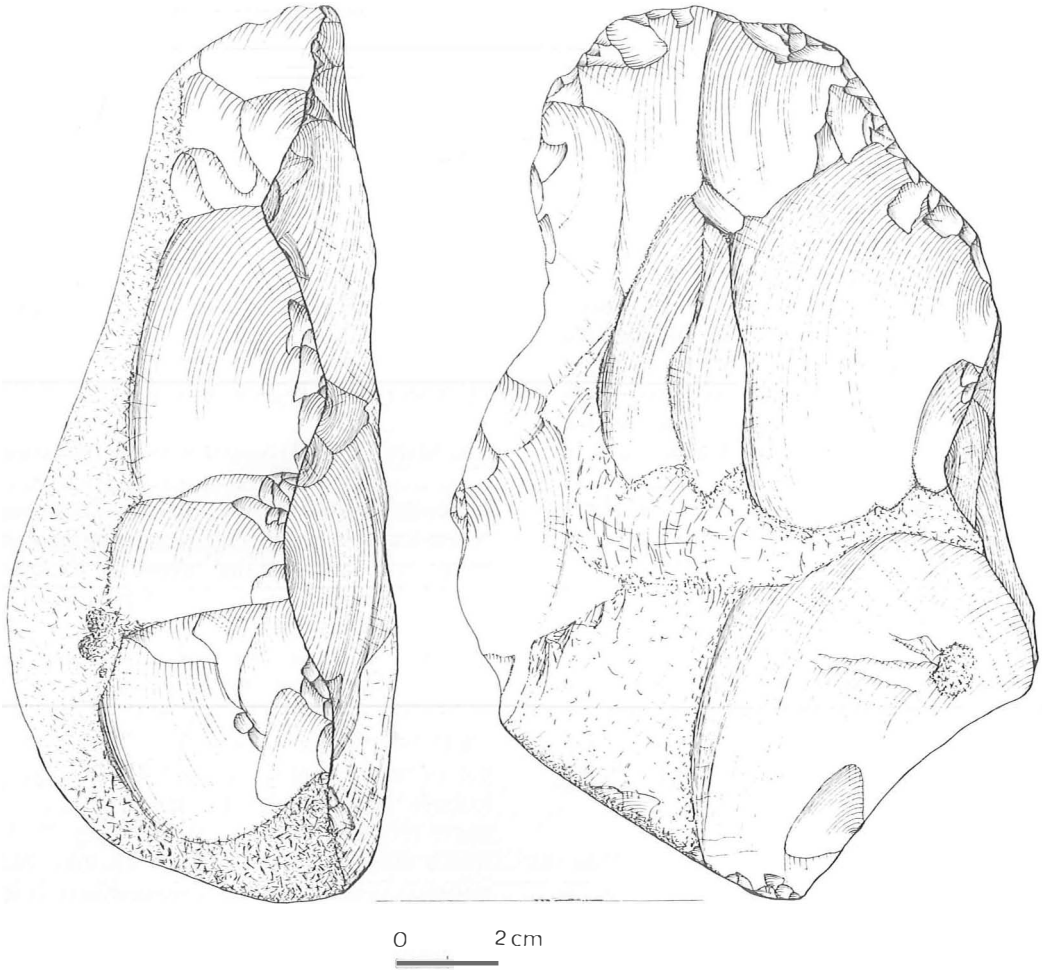

Fig. 29. Ejby Klint, gravel beach, a few hundred metres north of Ejby Havn. Large core. Drawing Lykke Johansen.

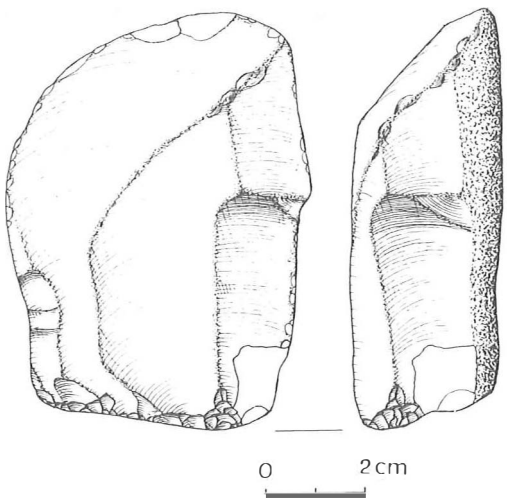

Fig. 30. Ejby Klint, gravel beach, a few hundred metres north of Ejby Havn. Core with several negatives of blade-like flakes. Drawing Lykke Johansen.

one of the edges, which made further working more or less impossible. Another core produced at least two blade-like flakes; it was worked by direct hard percussion (fig. 30); it could date from the Ertebølle Culture. One or two flakes could be described as 'wing-shaped' (fig. 31); such flakes might result from the production of Neolithic axes with a rectangular cross-section.

The surface modifications present on our artefacts are variable. Some artefacts have a strong brown patina and are heavily rolled. Other artefacts are hardly patinated, or only slightly white-patinated. Several flakes are relatively fresh, and hardly rolled.

The second 'site' we found, not mentioned by Madsen, is the beach on either side of the mouth of the Ejby Å. Here we collected three cores or core-like pieces, two flakes, two blades and one blade fragment (fig. 32). Most of these artefacts are lightly white-patinated, and not heavily rolled. We are of the opinion that this latter site most probably dates from either the Mesolithic or the Neolithic. It is quite likely that people lived near the

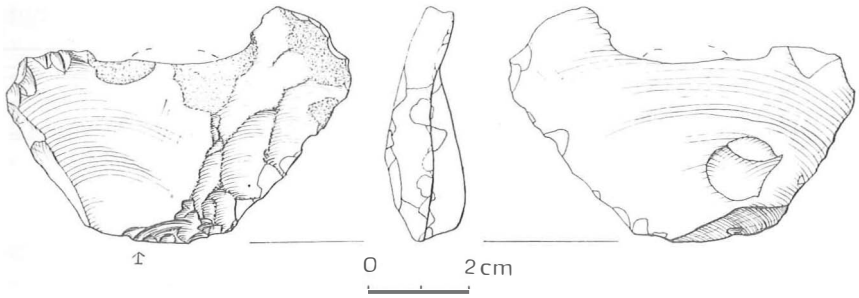

Fig. 31. Ejby Klint, gravel beach, a few hundred metres north of Ejby Havn. 'Wing-shaped' hard percussion flake. Drawing Lykke Johansen.

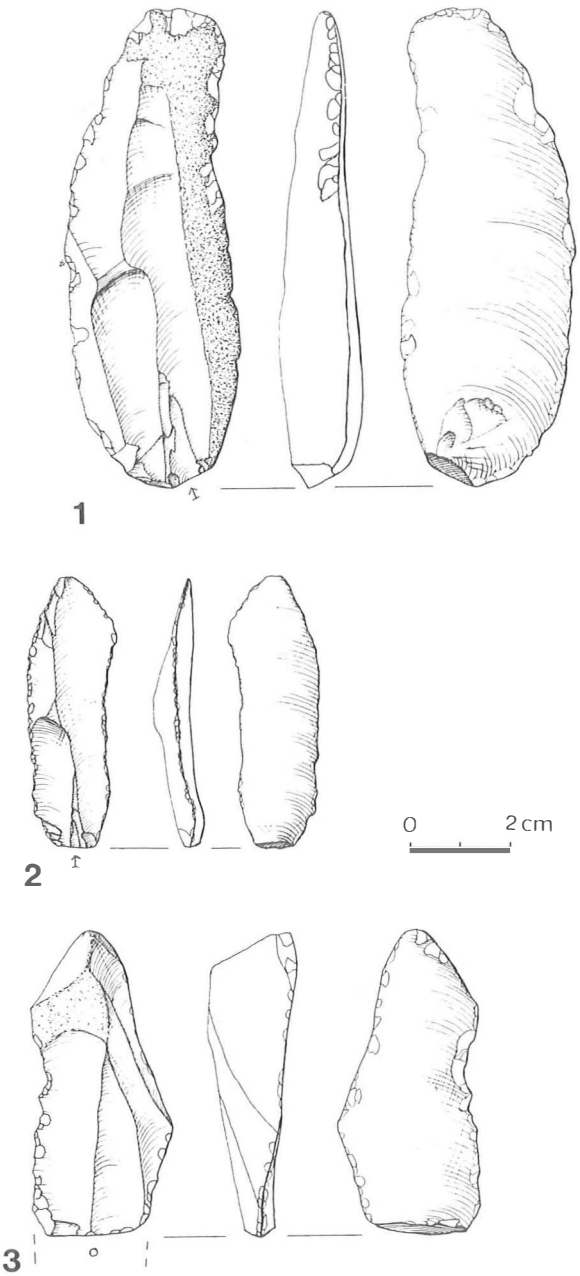

Fig. 32. Ejby Klint, gravel beach near the mouth of the Ejby Å. Two blades (1, 2) and one blade fragment (3). Drawing Lykke Johansen.

river mouth, because it is a favourable location for settlement.

The flakes and cores occurring on the beach near Ejby Havn might be residues of testing and preparing flint nodules on the beach. There are no compelling reasons to believe that these artefacts date from the Palaeolithic. For example, none of our finds shows very coarse scratching (as may be present on flints deriving from moraine deposits); we observed only fine scratches, which could easily have been produced by the surf.

12. DISCUSSION

The problem that 'handaxe-like' tools might date from much later periods than the Palaeolithic was recognized many years ago (e.g. Montelius, 1919). Typology is simply not good enough for confidently cataloguing artefacts as Palaeolithic, when these have been found without a stratigraphical context. The problem is that if one cannot exclude the possibility that a tool is Palaeolithic, this does not necessarily make it a Palaeolithic tool. Because of the inherent weakness of the typological approach, one needs extra arguments for such an ascription, independent of typology. The study of surface modifications that can be observed on the artefacts may, at least in some cases, provide such extra arguments.

In this paper four handaxe-like tools are described. In our opinion, there are reasons to believe that one of these, the Fænø handaxe, might indeed be Palaeolithic. The extra argument in this case is the presence of dense bundles of parallel scratches. Assuming that the handaxe was not found on a beach, we cannot explain this modification if the piece should date from the Holocene. For example, ploughing is not known to result in this kind of modification. For considering the tool as Palaeolithic, we have to assume that it does not come from a beach, because it is at least theoretically possible that such parallel scratching was produced by creeping ice floes along the coast, during the Holocene. The tool is not clearly rolled, however, so that a provenance on a beach seems unlikely; moreover, it shows traces of contact with agricultural machinery. An origin on a beach is all the more improbable because of the positive

correlation that exists between coarse scratching and rounding in such situations, as noted under 3. The reason why we have to be cautious is that we do not know anything more detailed about the findspot than that it is on Fænø.

One of the 'handaxe-like' tools described in this paper, from Langeland, was found on a beach. It made a great impact, because in the publication by Grote & Jacobsen (1982) it was said to have been collected in situ, from moraine deposits. The finder, however, declared that he found it on the beach, not in the moraine deposits.

Given this information, the modifications that can be observed on the tool do not force us to date it to the time when Palaeolithic implements were produced. In other words, even if this tool should really date from the Pleistocene, we would not be able to prove this antiquity. From what we can observe, an origin in for instance the Neolithic is not excluded. The fact that on top of the cliff there is a rich findspot of the Mesolithic, Neolithic and/or Early Bronze Age makes a post-Pleistocene dating of the handaxe more likely.

In the cases of Villestrup and Skellerup, a Pleistocene dating is even more improbable, because the surface modifications on these tools are much less severe than would be expected on Palaeolithic tools from near the surface (fields) in the young moraine landscape.

Above, in discussing the tool from Langeland, we argued that in the case of beach finds it will generally be very difficult to prove that they cannot possibly be younger than the Pleistocene. We would need to observe, for example, unambiguous traces of glacial transport – proving an origin in moraine deposits. However, not every flint in moraines shows such traces. Moreover, heavy scratching could also have been produced by creeping ice floes during the Holocene. This is the reason why we will probably never know whether there are any Palaeolithic artefacts among the flints from the gravel beach near Ejby. The same is true for many other beach finds in Denmark, for example those from Emmerlev (southern Jutland) and Asnæs (western Zealand) (both sites are mentioned – without Palaeolithic pretensions – by Becker (1979)).

It is of interest to note that similar problems exist in other regions of Europe. From the beach near Wimereux in northwestern France (north of Boulogne), thousands of artefacts have been collected that were ascribed to the Early Palaeolithic ('Clactonian': e.g. Bourdier, 1976; Tuffreau, 1978). This material largely consists of crude cores ('choppers', 'chopping tools') and hard percussion flakes. At this findspot, no artefacts have been collected in situ from Pleistocene deposits. The present authors have observed that on top of the dunes, close to the beach, rich Neolithic sites are present. At these sites we found cores, flakes, blades and tools. Among the tools are a transverse arrow-head, a resharpening flake from a polished axe, and a blade retouched on both sides. These artefacts were evidently manufactured from flint cores deriving from the beach, because many among them preserve remnants of old faces that are rounded and patinated in the same way as the flints (either natural or worked by man) occurring on the beach. The idea that the artefacts occurring on the beach are waste from testing and preparing cores during the Neolithic therefore is a realistic option. Ascribing these artefacts to the Early Palaeolithic would require arguments independent of typology. Such arguments have not been presented. The existence of an Early Palaeolithic site at Wimereux has therefore not been demonstrated beyond reasonable doubt.

The situation in the case of Vejstrup Skov and similar sites (artefact collections from the bottom of deep valleys) is somewhat different. At Vejstrup Skov, artefacts have not been found in a clear stratigraphical context. The excavation produced only artefacts deriving from slope deposits (comparable to 'colluvium' deposits in loess areas), and these deposits may well be of Holocene age (S.H. Andersen, pers. comm., 1995). Therefore, we would again need strong arguments, independent of typology, for dating these finds as Pleistocene.

The advantage over beach sites is that here are better opportunities for proving a Pleistocene age by studying the surface modifications on the artefacts. For example, traces clearly resulting from soil movements such as cryoturbation ('segmented scratches' associated with pressure cones, see section 3), or heavy parallel scratching as a result of glacial transport, could provide such arguments, because at Vejstrup Skov creeping ice floes can be practically excluded as scratching agents.

If these finds should belong to the Early/Middle Palaeolithic, the river must have washed them out of Pleistocene, non-moraine deposits, occurring stratigraphically below the moraines. This is because there were so many finds close together, which we would not expect in moraine or meltwater deposits. Of course, this implies that the artefacts should show signs of this erosion; we would expect at least part of the material to be clearly rounded. At Vejstrup Skov, this is indeed the case. However, if the artefacts were produced along the stream in the valley during the Neolithic, we would also expect rounding, because we are dealing here with a gravelly river bed. Therefore, as in the case of beach finds, rounding does not constitute an argument for classification as Palaeolithic.

At Vejstrup Skov, convincing non-typological arguments for the existence of an Early Palaeolithic site up till now have not been presented. This does not mean that these artefacts cannot be Palaeolithic. However, as long as careful studies of the surface modifications on these artefacts, in relation to the local geological context, have not been published, we are essentially left in the dark. As noted above, in such situations it has to be proved that the artefacts cannot possibly be post-

Palaeolithic. We believe that at the Vejstrup Skov site we may well be dealing with Neolithic or Early Bronze Age *atelier*-sites.

A site similar to Vejstrup Skov, Vejstrup Ådal, near the eastern coast of Funen, is mentioned by Holm (1986).

At Seest, we are dealing with sand and gravel quarries. The blade from Oluf Jensen's gravel pit is an unambiguous artefact, and it was rounded by moving water in a gravelly sedimentary context – which could be the gravelly meltwater layers exposed in the quarry. There are some scratches on the blade, and it is patinated similarly to the natural flints occurring in the meltwater deposits. Some sediment matrix is still attached to it: loamy fine sand, coloured brown. So here we have some extra arguments, and it should be concluded that this blade is most probably a Middle Palaeolithic artefact. Mention has been made in several publications of some ten other artefacts from this quarry, presumably flakes or flake-like pieces. Westerby himself did not feel sure about these pieces, however. According to the first author, these pieces are probably not man-made (this opinion is shared by Peter Vang Petersen of the National Museum: pers. comm. 1995).

Even if several of the other finds at Seest were definite Middle Palaeolithic flakes, the number of artefacts from the quarry would be very small, considering that a keen archaeologist such as Westerby visited the quarry very often. Therefore, we seem to be dealing with a very 'poor' site, if we compare Seest with e.g. the sites at Rhenen and Markkleeberg, where many thousands of Middle Palaeolithic artefacts, deriving from coarse river deposits, have been collected. There probably was no 'base camp' near Seest. The blade of Seest might represent a 'low density site', like those at Lehringen (Thieme & Veil, 1985) and Gröbern (Mania et al., 1990). These were kill and butchering sites (dating from the Eemian), where not more than some 25 or 30 flakes were left behind.

Our conclusion is that of the several thousands of Danish flints ascribed to the Early or Middle Palaeolithic, so far only two can indeed be argued probably to belong to that period: a handaxe and a blade. It's a start.

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