A new site of the Mousterian of Acheulian Tradition in the northern Netherlands

Ein neuer Fundplatz des Moustérien in Acheuléen-Tradition in den nördlichen Niederlanden

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Abstract - About four years ago an extensive surface scatter of Middle Palaeolithic artefacts was discovered in an arable field not far from the town of Assen, Province of Drenthe, in the northern Netherlands. The site is located on a slight elevation in the landscape, gently sloping towards a small stream valley, a tributary of the Drentsche Aa valley system. The field is surveyed on a regular basis by a team of professional and amateur archaeologists and students. At the time of writing (spring 2011) the collection from this site comprised some 65 artefacts but in May 2011 some 14 more artefacts, including three handaxes, were found. These new finds are not described in detail in this paper but are briefly discussed in the Postscriptum. The assemblage now consists of 79 artefacts including 12 bifacially worked pieces. The latter include four more or less triangular handaxes, four cordiformes, a tip of a handaxe, a broken preform of what may have been a handaxe, and two small handaxe-like tools. Except for two pieces with some marginal retouch (including an atypical 'side-scraper') other tools are absent. In addition, five cores, four blades (including a Levallois blade) and 56 flakes were also found. Nearly one-third of the artefacts were found within an area measuring c. 50x50 m. Whether the finds are the remains of a single campsite disturbed by geological processes (and ploughing) or in fact represent several sites is at present unknown. The site is the first Neanderthal campsite in the Province of Drenthe and, with the site of Mander in the Province of Overijssel, the largest one in the northern Netherlands. The large number of handaxes is exceptional. Based on the typological characteristics of the handaxes the site is attributed to the Mousterian of Acheulian Tradition (MAT), Type A, with an approximate age of 50 000 to 100 000 years. After some general remarks on Middle Palaeolithic finds from the northern Netherlands, we present the most important finds from the site, i.e. the handaxes and handaxe-like artefacts. Special attention is paid to the quality of flint knapping and the identification of apprentice flint knappers which elaborates on research by the second and fourth author.

Zusammenfassung - *Vor ungefähr vier Jahren wurde eine große Oberflächenstreuung von mittelpaläolithischen Artefakten auf einem Feld unweit der Stadt Assen (Provinz Drenthe, nördliches Niederlande) entdeckt. Der Fundplatz liegt auf einer leichten Anhöhe, welche in Richtung eines kleinen Bachlaufs abfällt, einem Nebenfluß der Drentse Aa. Das Gebiet wird regelmäßig von Archäologen, Amateur-Archäologen und Studenten abgesucht. Bei Erarbeitung des vorliegenden Artikels (Frühling 2011) lagen 65 Artefakte vor, aber im Mai 2011 wurde 14 weitere Stücke gefunden, einschließlich dreier Faustkeile. Diese neuesten Funde sind hier nicht im Detail beschrieben, werden aber kurz im Postscriptum besprochen. Das gesamte Inventar besteht jetzt aus 79 Artefakten, darunter 12 beidseitig bearbeitete Stücke. Unter letztgenannten befinden sich vier annähernd dreieckige Faustkeile, vier herzförmige Faustkeile, die Spitze eines Faustkeils, ein gebrochenes Halbfabrikat, vermutlich von einem Faustkeil, und zwei Faustkeil-ähnliche Werkzeuge. Außer zwei Stücken mit marginalen Retouchierungen (einschließlich eines atypischen Schabers) gibt es keine anderen Werkzeuge. Zusätzlich liegen fünf Kernstücke, vier Klingen (darunter eine Levalloisklinge) und 56 Abschläge vor. Fast ein Drittel der Artefakte wurde innerhalb eines Areals von ca. 50x50 m gefunden. Derzeit ist nicht klar, ob es sich nur um einen Lagerplatz handelt, der durch geologische Prozesse (und Pflügen) gestört ist, oder ob doch mehrere Lagerplätze vorliegen. Der Fundplatz ist der erste Neanderthaler-Fundplatz in der Provinz Drenthe und zusammen mit Mander in der Provinz Overijssel stellt er den größten Fundplatz in den nördlichen Niederlanden dar. Die große Zahl von Faustkeilen ist außergewöhnlich. Aufgrund der typologischen Merkmale der Faustkeile ist der Fundplatz dem Moustérien in Acheuléen-Tradition (MAT), Type A, mit einem Alter zwischen 50 000 und 100 000 Jahren, zuschreiben. Nach einigen allgemeinen Bemerkungen über mittelpaläolithische Funde aus den nordlichen Niederlanden präsentieren wir die wichtigsten Artefakte, das heißt die Faustkeile und Faustkeil-ähnlichen Werkzeuge. Besondere Aufmerksamkeit wird der Qualität der Feuersteinbearbeitung und der Identifizierung von Lehrlingen der Feuersteinbearbeitung geschenkt, was auf die Forschung des zweiten und vierten Autors zurückgeht.*

Keywords - Middle Palaeolithic, Mousterian of Acheulian Tradition (MAT), handaxes, flint knapping apprentices, northern Netherlands, Province of Drenthe, field surveys
Mittelpaläolithikum, Moustérien in Acheuléen-Tradition (MAT), Faustkeile, Flintbearbeitungs-Lehrlinge, nördliche Niederlande, Provinz Drente, Feldbegehungen

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Introduction

Research concerning the Middle Palaeolithic in the northern Netherlands started relatively late compared to other areas in Europe. The first Middle Palaeolithic artefact from this region, the handaxe from Wijnjeterp in the Province of Friesland, was discovered in 1939 but was only recognized and published as a Neanderthal artefact considerably later (Bohmers & Wouters 1954). In the late 1950s and the 1960s a few new finds were discovered such as the handaxes from Anderen and Exloo (Stapert 1976a), but only from the 1970s onwards did the number of finds start to grow slowly. At the find-spot of a handaxe near Drouwen a small excavation was carried out, but no more finds came to light (Stapert 1979). It should be noted that we confine ourselves in this introduction to surface finds dating from after the Saalian glaciation; earlier Middle Palaeolithic finds ('Rhenen Industry' cf. Stapert 1987) and finds from suction-dredging (e.g. Beuker et al. 2007; Johansen et al. 2009; Niekus & Stapert 2005) are not discussed here.

After the discovery in 1979 of a small subtriangular handaxe, made from a flake, at Mander (Province of Overijssel: see 'M' in Fig. 1), its find-spot (a large field) was regularly surveyed by students from Groningen University which resulted in a collection of some 25 artefacts (Stapert 1982a). At that time Mander was by far the largest Middle Palaeolithic surface scatter in the northern Netherlands. Later, more material was collected at the site, especially by Dick Schlüter (of Enschede); at present between 75 and 80 artefacts are known from Mander, including approximately 10 scrapers and a few *disques* (Stapert et al. in prep.).

Another scatter of Middle Palaeolithic artefacts is present in the Corversbos near Hilversum in the Province of North-Holland (see 'C' in Fig. 1) where since the first find in 1969 approximately 40 artefacts have been collected. No handaxes were found at this site; the only tools are three scrapers (Offerman-Heykens et al. 2010).

Although several dozens of other surface sites are known from the northern Netherlands, these are mainly isolated finds or small scatters of no more than a handful of artefacts (see Niekus & Stapert 2005; Beuker et al. 2006). Quite a few of the single finds are handaxes or other tools: artefacts that are relatively easy to recognize even for non-archaeologists. The predominance of handaxes is also reflected in publications on the Middle Palaeolithic in the

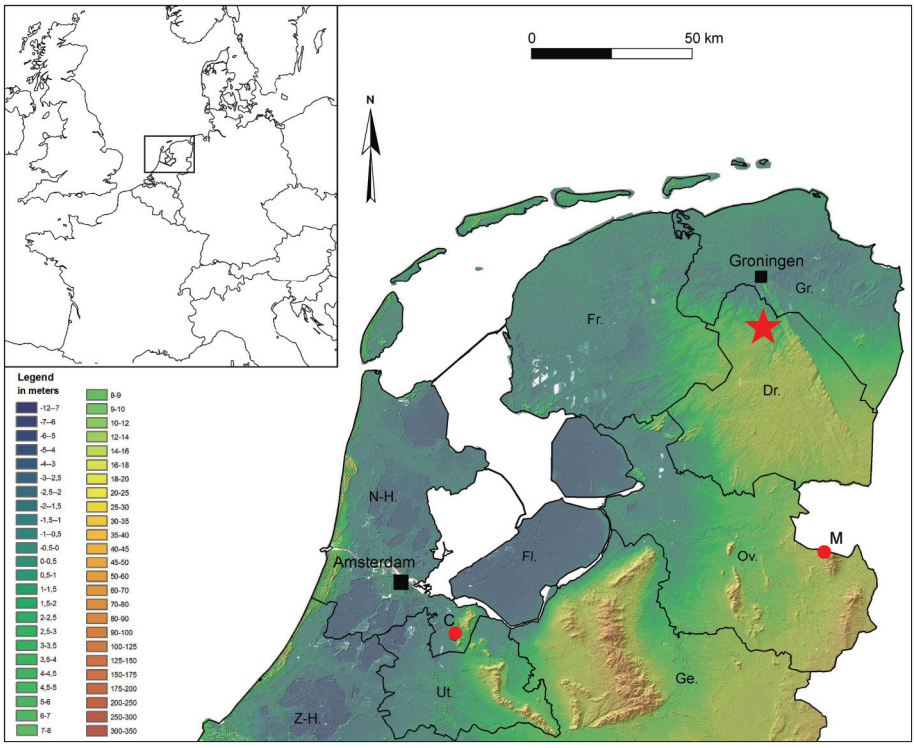

Fig. 1. Map of the northern Netherlands with the approximate location of the Middle Palaeolithic site near Assen (star) and the two other larger surface scatters: M = Mander and C = Corversbos. The provinces are also indicated: Gr. = Groningen, Fr. = Friesland, Dr. = Drenthe, Ov. = Overijssel, Ge. = Gelderland, Fl. = Flevoland, Ut. = Utrecht, N-H. = Noord-Holland and Z-H. = Zuid-Holland. Drawing E. Bolhuis (University of Groningen, Groningen Institute of Archaeology).

Abb. 1. *Karte der nördlichen Niederlande mit der Lage der mittelpaläolithischen Fundstelle bei Assen (Stern) sowie zwei weiteren, großen Oberflächenfundorten: M = Mander und C = Corversbos. Die Provinzen sind auch gekennzeichnet: Gr. = Groningen, Fr. = Friesland, Dr. = Drenthe, Ov. = Overijssel, Ge. = Gelderland, Fl. = Flevoland, Ut. = Utrecht, N-H. = Noord-Holland und Z-H. = Zuid-Holland. Zeichnung E. Bolhuis (Universität Groningen, Groningen Institut für Archäologie).*

northern Netherlands (e.g. Stapert 1979, 1982b, 1985, 1992, 1995; Beuker & Niekus 1994). It is of interest to note here that also several finds of leaf points (Mauern type) are known in this area, including unfinished pieces (Stapert et al. 2007).

The lack of larger Neanderthal campsites, apart from Mander and Corversbos, prompted the Groningen Institute of Archaeology (University of Groningen) and the Drents Museum (Assen) in the beginning of 2007 to start a project entitled 'The Middle Palaeolithic Occupation of the Northern Netherlands'. This project can now be said to be unexpectedly successful, as we hope to show in this paper.

The Middle Palaeolithic Project: systematic field surveys

One of the main goals of the project, described in detail in Niekus et al. (2008), is to locate Middle Palaeolithic sites on the Drenthe boulderclay plateau. This plateau was mainly formed during the Saalian III glacial (c. 170 000-130 000 years ago) and comprises large parts of the Provinces of Drenthe and Friesland as well as small parts of the Provinces of Groningen and Overijssel (see Fig. 1). Despite the fact that a few sites were known, especially in Drenthe, where more than one artefact had been found, for example Balloo, Emmen, Zeijen and Zweeloo (e.g. Beuker & Niekus 1994; Stapert et al. 2007), extensive scatters comparable to the Mander site were non-existent until a few years ago. One of the reasons for this lack is the fact that fields in areas where the bouldersand surfaces – and where Middle Palaeolithic artefacts may be found – are literally strewn with millions of pieces of flint and finding artefacts in this mass is a daunting task. Furthermore, the recognisability of Middle Palaeolithic artefacts is often problematical. Due to severe weathering and secondary frost splitting (see the section on natural surface modifications) artefacts may be difficult to recognize, especially simple flakes and cores.

Apart from compiling an illustrated catalogue of finds from the Drenthe Plateau, which will be published in the coming few years, the project consists of systematic large-scale field surveys of known Middle Palaeolithic sites and of potentially interesting locations near the borders of valleys and lakes. To enhance our chances of success the surveys are carried out by sometimes quite large groups, consisting of students (from Groningen and Leiden Universities), amateur archaeologists and colleagues, with the number of participants varying between 3 and 25 people. Since not all participants are equally experienced with respect to identifying Middle Palaeolithic artefacts, large numbers of flints are collected (often in squares measuring 50x50 m) and checked for the presence of artefacts after the survey. The locations of artefacts that are identified in the field, and also of possible artefacts or 'incerto-facts', are measured in with a GPS. Incerto-facts are pieces which do not have enough diagnostic attributes to decide whether they are artefacts or geo-facts; such pieces (of which there are many) are kept, but not included in our analysis of the assemblage.

Large-scale systematic surveys have also been conducted at other locations in Drenthe and Overijssel; at a few of these sites Middle Palaeolithic artefacts have been found as well (Niekus et al. 2008; Stapert et al. 2008).

The discovery of a new Neanderthal campsite

In March 2007, several months and numerous fruitless surveys after the start of the project, four Middle Palaeolithic artefacts were found in a ploughed field, not far from Assen. This field was chosen as a target for a survey mainly because of the presence of bouldersand at the surface and also in view of the fact that the field is located not far from a stream valley. Furthermore, several Middle Palaeolithic artefacts were already known from the area. During the past years the field has been regularly surveyed and so far (mid April 2011, but see the *Postscriptum*) the site has produced some 65 Middle Palaeolithic artefacts (interim reports: Beuker et al. 2009; Niekus et al. 2008; 2009; 2010).

The composition of this assemblage is extraordinary because it includes no less than nine (fragments of) handaxes or handaxe-like tools. Two of these were probably created by apprentices of flint knapping, i.e. children. Several other bifaces (including two subtriangular forms and a *cordiforme*) were clearly worked by an experienced knapper. These good-quality handaxes were not made at the spot, but imported from elsewhere because they are made of types of flint not represented by waste material. Tools of other types than handaxes are virtually absent, but one blade fragment has some scraper-like retouch combined with ventral thinning, and one flake shows scraper-like retouch-scars. Furthermore, there are three blades or blade fragments and two blade-like flakes. One of these is a Levallois blade, also produced elsewhere and imported to the site. In total, five cores or core fragments have been found, of which one may have been worked by an apprentice. So far, some 44 flakes were collected among which there are quite a few decortication pieces as well as a small number of core-preparation flakes. Two artefacts – a blade fragment (see Fig. 20) and a distal fragment of a flake (Niekus et al. 2008: 6-7) - are burnt, but whether this occurred during the occupation or post-depositionally (e.g. during a forest fire) is unknown.

Most of the finds were found scattered over an area measuring approximately 250x250 m, but a denser concentration is present within this area. Nearly one-third of the finds, including three of the handaxes described further below, were collected

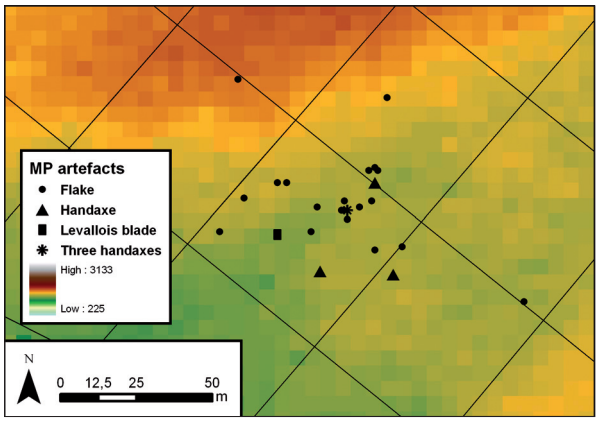

Fig. 2. Distribution map of a part of the site; the location (± 3-4 m) of the artefacts in the field was recorded with a Global Positioning System (GPS). Several 50x50 m squares are indicated. The map (as of June 2011) includes the most recent finds such as the three handaxes briefly described in the Postscriptum. Approximately one-third of all artefacts was found in this area. Drawing T. de Haas (University of Groningen, Groningen Institute of Archaeology).

Abb. 2. *Verteilungsplan eines Teils der Fundstelle; die Lage (± 3-4 m) der Artefakte im Gelände wurde mit einem Global Positioning System (GPS) aufgenommen. Mehrere Quadrate 50x50 m werden angedeutet. Der Plan (Stand Juni 2011) zeigt auch die jüngst gefundenen Artefakte, so auch die drei im Postscriptum beschriebenen Faustkeile. Ungefähr ein Drittel aller Artefakte wurde in diesem Areal gefunden. Zeichnung T. de Haas (Universität Groningen, Groningen Institut für Archäologie).*

from an area measuring c. 2 500 m² (Fig. 2). In the spring of 2010, geological research (corings and test-pits) was carried out by the *Institute for Earth Sciences* (Free University Amsterdam), the results of which will be published elsewhere. One important conclusion is that it is presently unclear whether in-situ finds can be expected below the ploughed topsoil. More detailed geo-archaeological research is planned for the near future.

Natural surface modifications of the flint artefacts

The field not only produced obvious Middle Palaeolithic artefacts but also hundreds of Mesolithic artefacts, a few artefacts from the Late Neolithic/Early Bronze Age and a presumably Late Upper Palaeolithic truncated blade. Middle Palaeolithic and later prehistoric finds can be distinguished from each other on the basis of a difference in their secondary surface modifications. The Middle Palaeolithic artefacts exhibit rather severe weathering phenomena, and, strictly speaking, can only be recognized as such because of that (Stapert 1976b). Later Stone Age artefacts from the field remained largely unpatinated. All pieces classified by us as Middle Palaeolithic artefacts are covered wholly or partly in wind gloss. This is a characteristic modification which probably largely developed during the Upper Pleniglacial of the Weichselian. This gloss is often variable, and in some cases parts of the surface of the flints have largely escaped the formation of wind gloss. Wind gloss is associated with the presence of small flat-bottomed pits in the surface. In addition, all Middle Palaeolithic artefacts show phenomena that can be associated with cryoturbation in a stone-rich matrix such as scratches, small pressure cones and irregular retouches (see also Fig. 19). Slight rounding of ridges and edges is also generally present, not as a result of fluviatile rolling but probably due to slow dissolution processes in the soil. No traces of fluviatile rolling have been observed on the artefacts from this site. Secondary frost splitting is in evidence with quite some artefacts, and in some cases artefacts became severely fragmented as a result (see the section on handaxes for examples). The development of secondary frost cracks probably took place especially during the Upper Pleniglacial (as did the wind gloss). Finally, nearly all Middle Palaeolithic artefacts have a brown patina; some have (also) a slight or moderate white patina.

A similar scale of weathering phenomena can also be seen on Middle Palaeolithic artefacts at many other sites on the boulderclay plateau in Drenthe and neighbouring areas, if located outside valleys or lakes, and also at sites on the slopes of ice-pushed hills, e.g. at Mander (Stapert 1982a) and Corversbos (Offerman-Heykens et al. 2010). Similar combinations of weathering phenomena are known from comparable geological contexts in northern Germany as well, for example at Drelsdorf (Hartz 1986; Hartz et al. in press). Several of the phenomena present on these artefacts point to a long period of periglacial conditions after their abandonment, during which the artefacts were both subject to repeated cryoturbation in a stone-rich soil and exposed to the action of the wind in conditions with no vegetation.

Descriptions of selected finds

In this section we will present and briefly discuss the most important and interesting artefacts from the site. Since all these artefacts show all or most of the phenomena listed in the preceding section, mention of their surface modifications is generally omitted. In the text, an asterisk indicates measurements that are not the original ones because of fragmentation of the artefact.

Handaxes

The relatively large number of handaxes or handaxe-like tools, c. 14% of the total number of artefacts, is exceptional. The predominance of (sub)triangular shapes is rather characteristic of the MAT (*Mousterian of Acheulian Tradition*), especially of its early phase. One of the finest specimens is the nearly triangular handaxe depicted in Figures 3 and 4. It has the following measurements: length 6.8 cm, width 5.8 cm, thickness 1.8 cm; its weight is 65.1 g. A small part is probably missing from the top. In the typology of

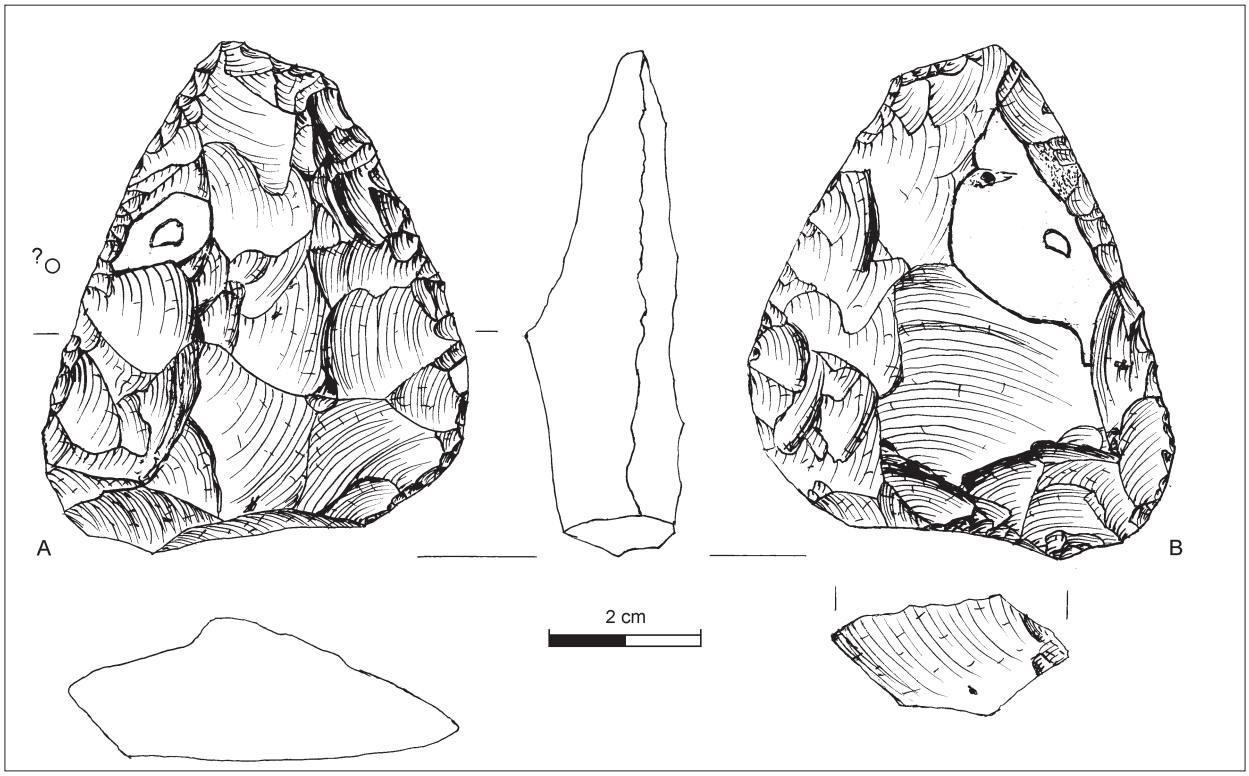

Fig. 3. A nearly complete (sub)triangular handaxe seen from two sides, in side-view and with a view of the base. The cross-section is indicated. A small conchoidal fracture in the surface of the axe, resulting in a hole, is the result of secondary frostsplitting. Key to all drawings: stippled areas = cortex, irregular cross-hatching = old frost-split surfaces, regular stippling = secondary frostsplitting, blank areas = (sub)recent damages. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 3. *Ein fast vollständiger sub-dreieckiger Faustkeil mit Ansichten der beiden Flächen, einer Seitenansicht und mit Aufsicht auf die Basis. Der Querschnitt wird angedeutet. Ein kleiner, durch nachträgliche Frostwirkung verursachter muschelförmiger Bruch in der Oberfläche des Faustkeils hat ein Loch entstehen hinterlassen. Für alle Zeichnungen gilt: Punktierung = Kortex, unregelmäßige Schraffur = alte Frostbrüche, regelmäßige Tüpfel = nachträgliche Frostbeschädigungen, weiße Flächen = rezente Beschädigung. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

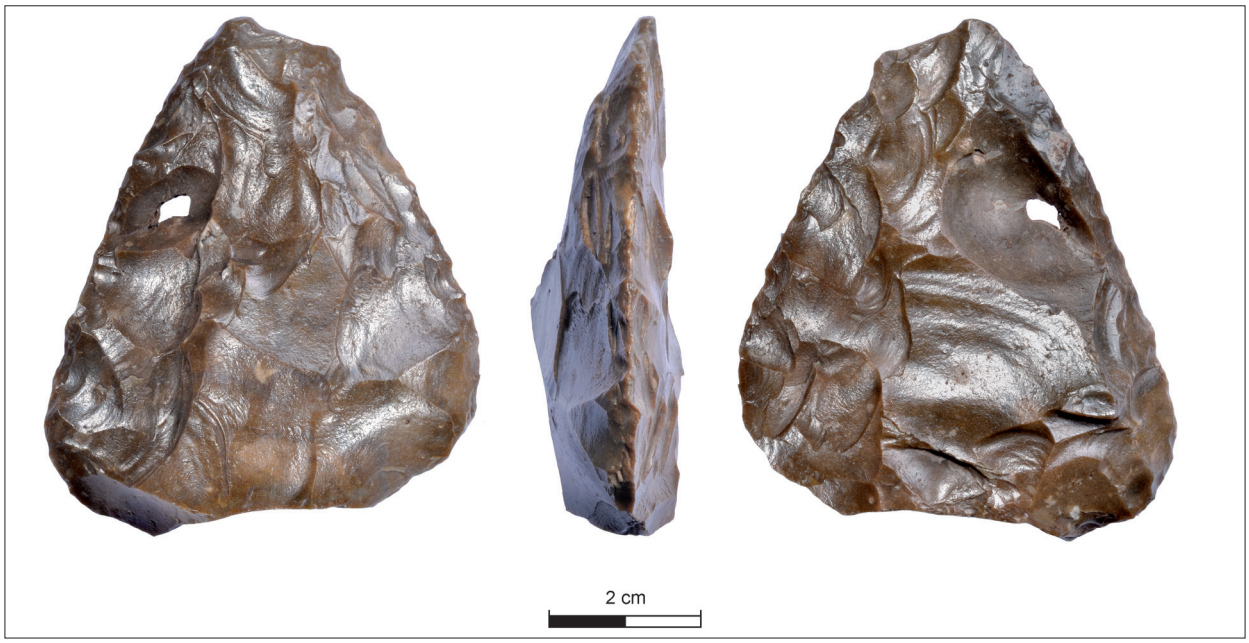

Fig. 4. The handaxe was made of good-quality, brownish flint and was most probably not produced on the site but brought from elsewhere. There are no flakes of this type of flint in the assemblage. Photo: J. R. Beuker (Assen), Scale 1:1.

Abb. 4. *Der Faustkeil ist aus bräunlichem Feuerstein von guter Qualität und wurde sehr wahrscheinlich nicht am Fundort hergestellt, sondern von anderswo importiert. Es gibt keine Abschläge aus diesem Material im Fundinventar. Foto: J. R. Beuker (Assen), Maßstab 1:1.*

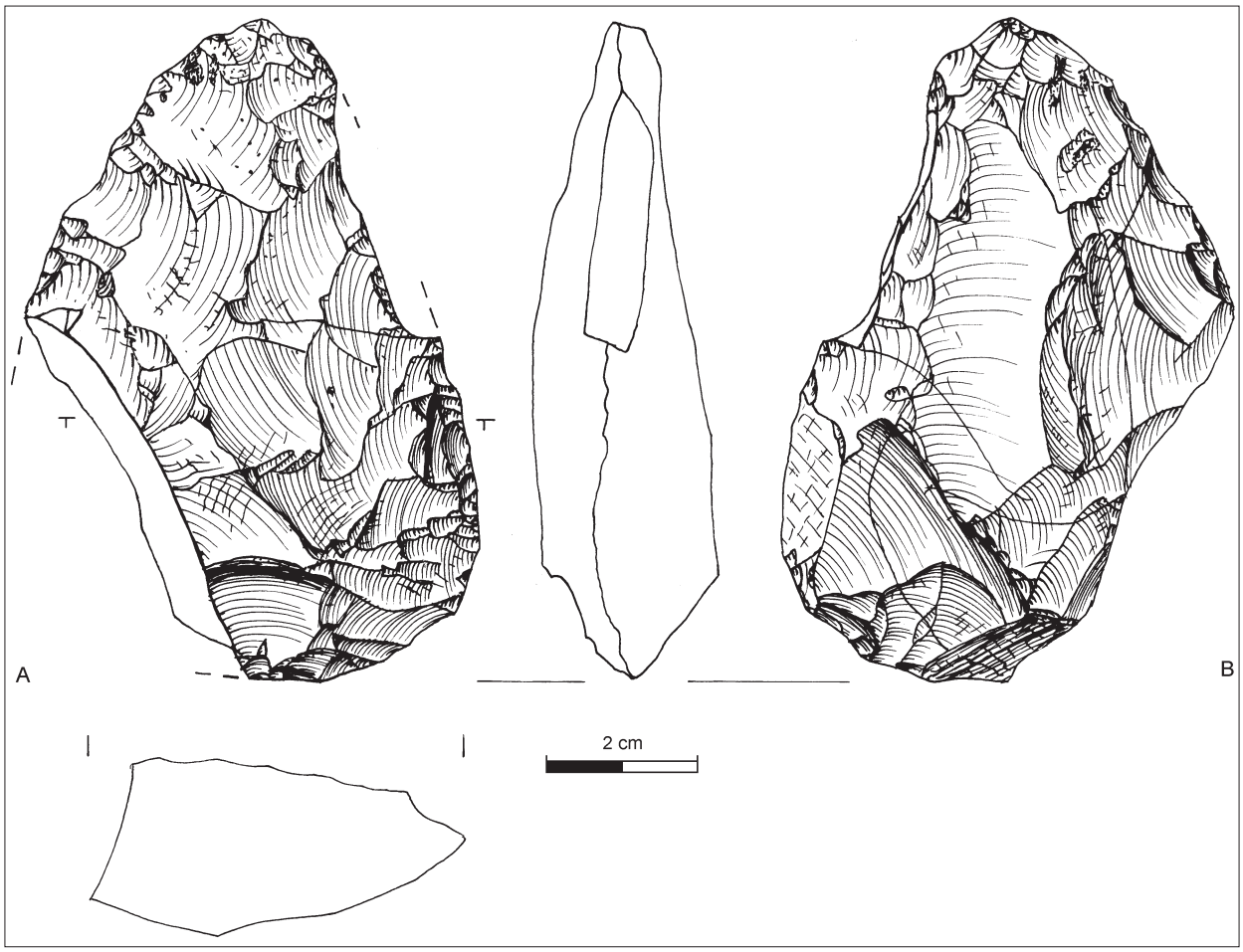

Fig. 5. Large fragment (c. three-quarters) of a triangular handaxe seen from two sides, in side-view and with a cross-section. Several larger frost-cracks (secondary) are indicated in the drawing. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 5. *Großes Fragment (etwa dreiviertel) eines dreieckigen Faustkeils mit Ansichten der beiden Flächen, einer Seitenansicht und dem Querschnitt. Mehrere größere Frostsprünge werden in der Zeichnung dargestellt. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

Bordes (1961) this tool can be classified as a subtriangular handaxe. Though this cannot be demonstrated with certainty, it was probably made out of a flake. One of the arguments is that, in side-view, face B is somewhat curved in a way similar to the ventral face of a flake. Moreover, a small part of the ventral face has probably been preserved in the middle of face B, at about 2 cm above its base, but it is not possible to be sure of that. If the tool was indeed made from a flake, its point of percussion was located near the middle of the left side of face B as indicated in the drawing. Nothing remains of the striking platform remnant. Removing the bulb completely has not been an easy affair because at least four flake scars from the left edge ended in light steps or hinges. These were not major obstacles, however, and as a whole the knapping of this handaxe was done very well. Both sides have functional edges over the whole length, with edge-angles of 50-60°. The base is not a cutting edge, but consists of an almost transverse face with a thickness of c. 1.5 cm. This face is formed by a flake negative coming from face A, and was used as a striking platform for shaping face A. One larger and several small flakes were removed from here. The constellation of this transverse face and the flake scars coming from it suggest that the handaxe was made out of a Levallois flake that went wrong in the sense that one of the core edges was detached with the flake. In this scenario some of the negatives on face A may have originated during core preparation prior to the manufacture of the handaxe. Apart from a few light steps, the knapping of this handaxe went very well, and the end product is a fairly symmetrical and rather thin, more or less triangular handaxe with functional edges. Knapping was undoubtedly by soft percussion. The flint is of good quality and fine-grained. Apart from the usual surface modifications (wind gloss, brown patina and traces of cryoturbation), parts of the handaxe broke off, on both faces, because of secondary frost splitting, as a result of which a hole was created. This handaxe must have been imported to the site as there are no flakes of this material in the assemblage. Transport of handaxes is a well-known phenomenon. In the case of Pech-de-l'Azé I, some two-thirds of the handaxes had been imported, sometimes over

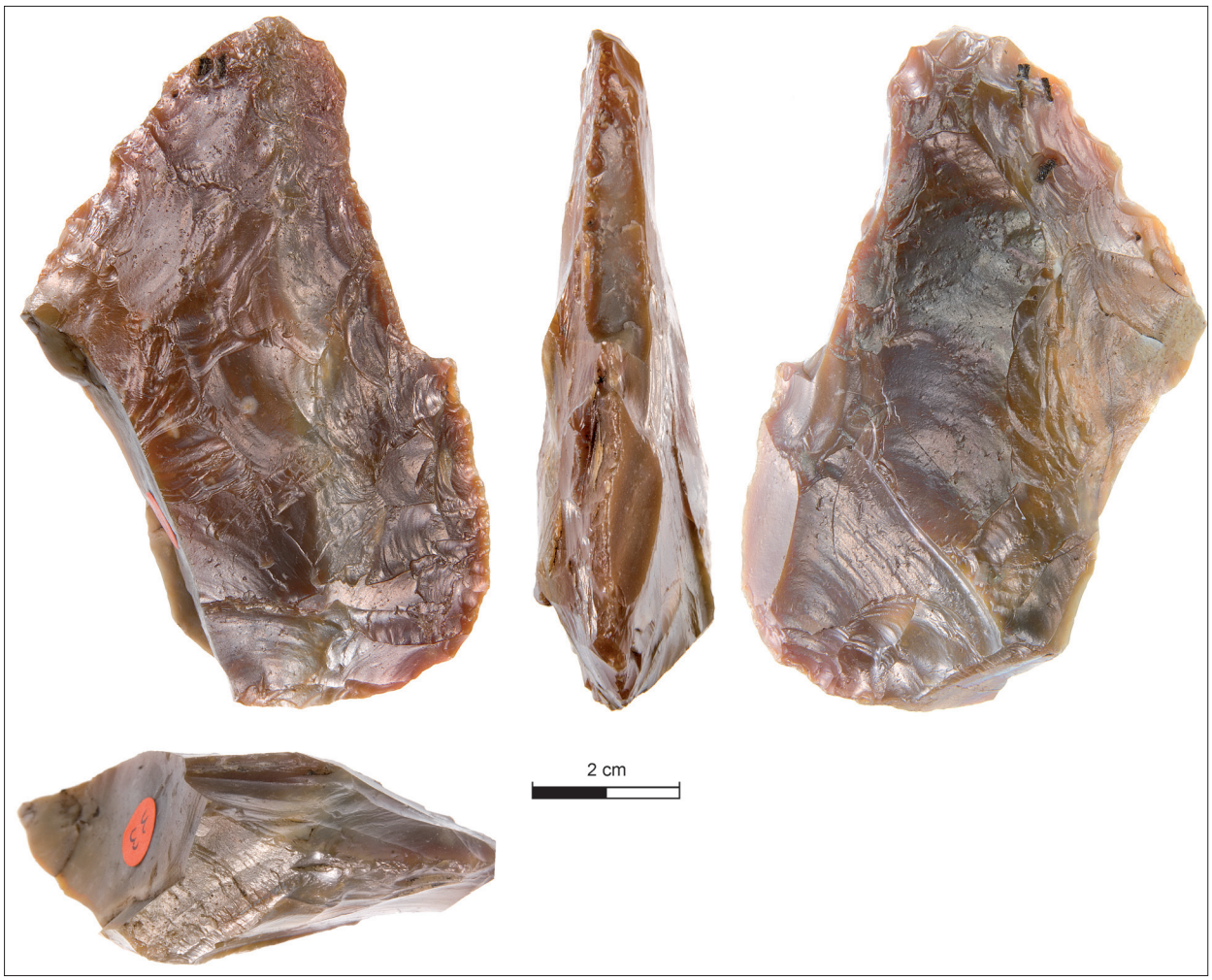

Fig. 6. The handaxe-fragment seen from different sides including a view of the largely unworked base. The windgloss with small pits, which is so characteristic for Middle Palaeolithic finds from bouldersand, is clearly visible, especially near the top of the artefact. Photo: F. de Vries (ToonBeeld, Stiens), Scale 1:1.

Abb. 6. *Das Faustkeilfragment in verschiedenen Ansichten, darunter die weitgehend unbearbeitete Basis. Die Windpolitur, die für mittelpaläolithische Funde aus dem Geschiebesand so typisch ist, lässt sich unschwer erkennen, vor allem nahe der Spitze des Artefakts. Foto: F. de Vries (ToonBeeld, Stiens), Maßstab 1:1.*

distances greater than 40 km (Soressi 2004: 356-357). Neanderthals must have been in the habit of always carrying one or more handaxes during travel.

Figure 5 shows a large fragment of a triangular handaxe. Because of fragmentation due to secondary frost splitting, only the maximum length can still be measured: 8.9 cm. The thickness, possibly not the original, is 2.3 cm; the remaining weight* is 98 g. Several pieces broke off by frost splitting. The surface of the break on the right (face A) is not recent: it is covered in wind gloss and therefore originated already during the Weichselian. It does not have brown patina, however, implying that this modification is even older than the wind gloss. The other break is much more recent: wind gloss and patina are lacking (Fig. 6). In the handaxe, several frost cracks can be seen. These cracks must also be secondary because the flaking was not affected by them. Despite the breaks, it is clear that the handaxe was of the (sub)triangular type. Face A is worked totally: there are no remnants of old faces. On face B, however, two remnants of old frost-split faces have been preserved, on the left and at the base. The one at the base could not be removed by the knapper, with the result that the base is only partly a cutting edge. For the rest the shaping of this tool was successful, even though a few flake scars end in shallow step fractures. The flake scars are flat and without prominent bulb impressions, so the handaxe must have been worked by soft percussion. A long flake negative running in the main axis on face B is remarkable.

The largest handaxe from the site (Fig. 7) has a length of 10.4 cm, a width of 8.5 cm and is 3.0 cm thick. It weighs 231.1 g. This tool was made of rather low-quality bryozoan flint. It has coarse parts with natural holes, of which the largest is almost 1 cm in diameter; a fossil is also present in the flint, as well as remnants of cortex and old frost-split faces. Several frost cracks which run through the flint were already present when it was knapped, and made the working

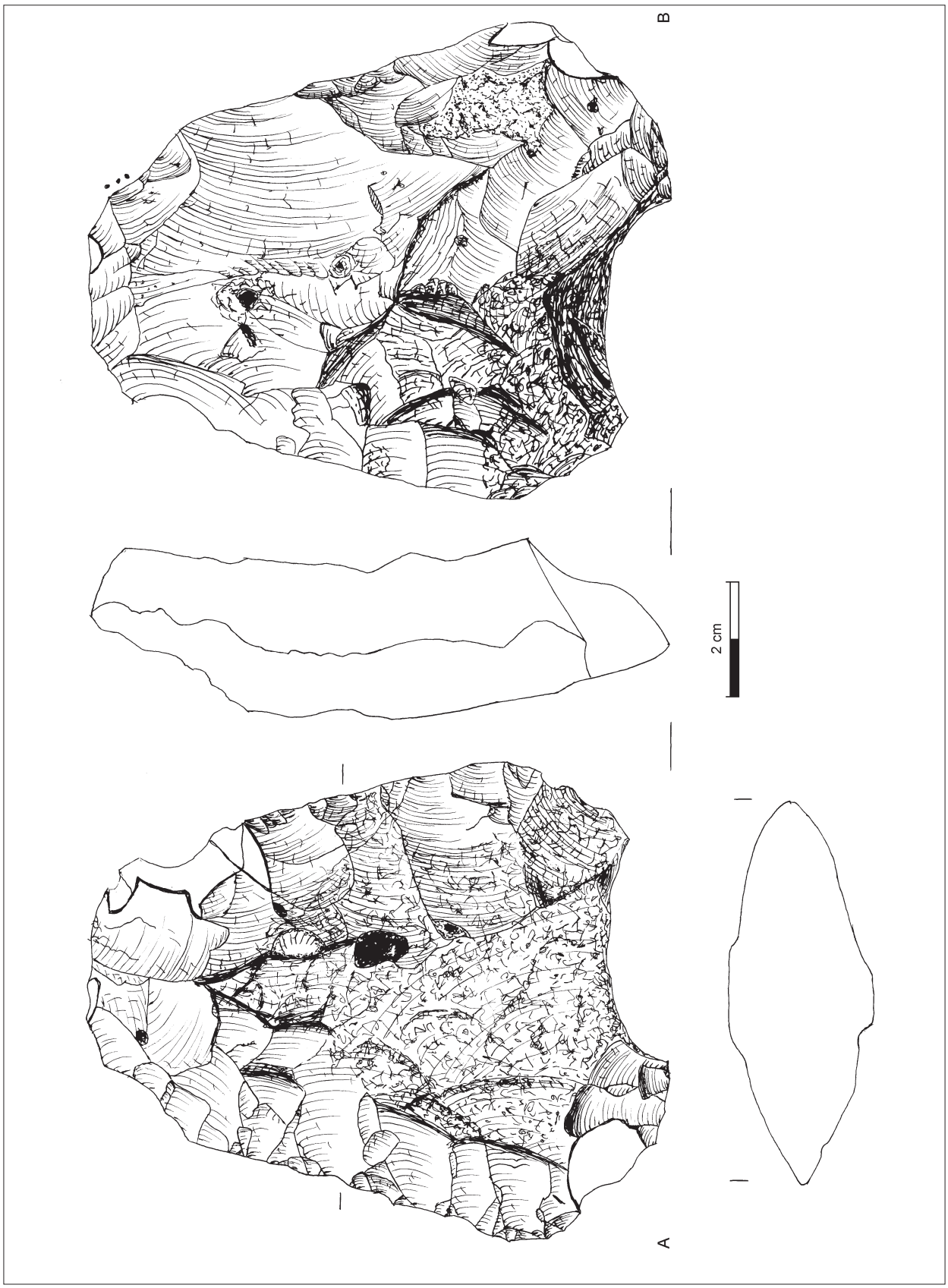

Fig. 7. A nearly triangular handaxe seen from two sides, in side-view and with a cross-section. The rounding near the tip is indicated by three dots. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 7. *Fast dreieckiger Faustkeil mit Ansichten der beiden Flächen, einer Seitenansicht und dem Querschnitt. Die Rundung nahe der Spitze ist durch drei Punkte gekennzeichnet. Zeichnung: L. Johansen (Haren), Scale 1:1.*

Fig. 8. This handaxe was found in a heap of stones at the edge of the field and as a result it is slightly damaged. On these recent damages it can be seen that the flint was originally light-grey; the brown patination is very common with the Middle Palaeolithic artefacts from this site. A large coarse-grained inclusion and a fossil fragment are present which hampered the knapping. Photo: J. R. Beuker (Assen), Scale 1:1.

Abb. 8. *Dieser Faustkeil wurde von einem, am Rande des Ackers liegenden Steinhaufen geborgen und trägt als Folge leichte Beschädigungen. Diese lassen erkennen, daß der Feuerstein ursprünglich eine hellgraue Farbe hatte; die braune Patinierung kommt bei den mittelpaläolithischen Artefakten dieser Fundstelle sehr häufig vor. Eine großer grobkörnige Einschluß sowie ein Fossilfragment beeinträchtigten die Bearbeitung des Stückes. Foto: J. R. Beuker (Assen), Maßstab 1:1.*

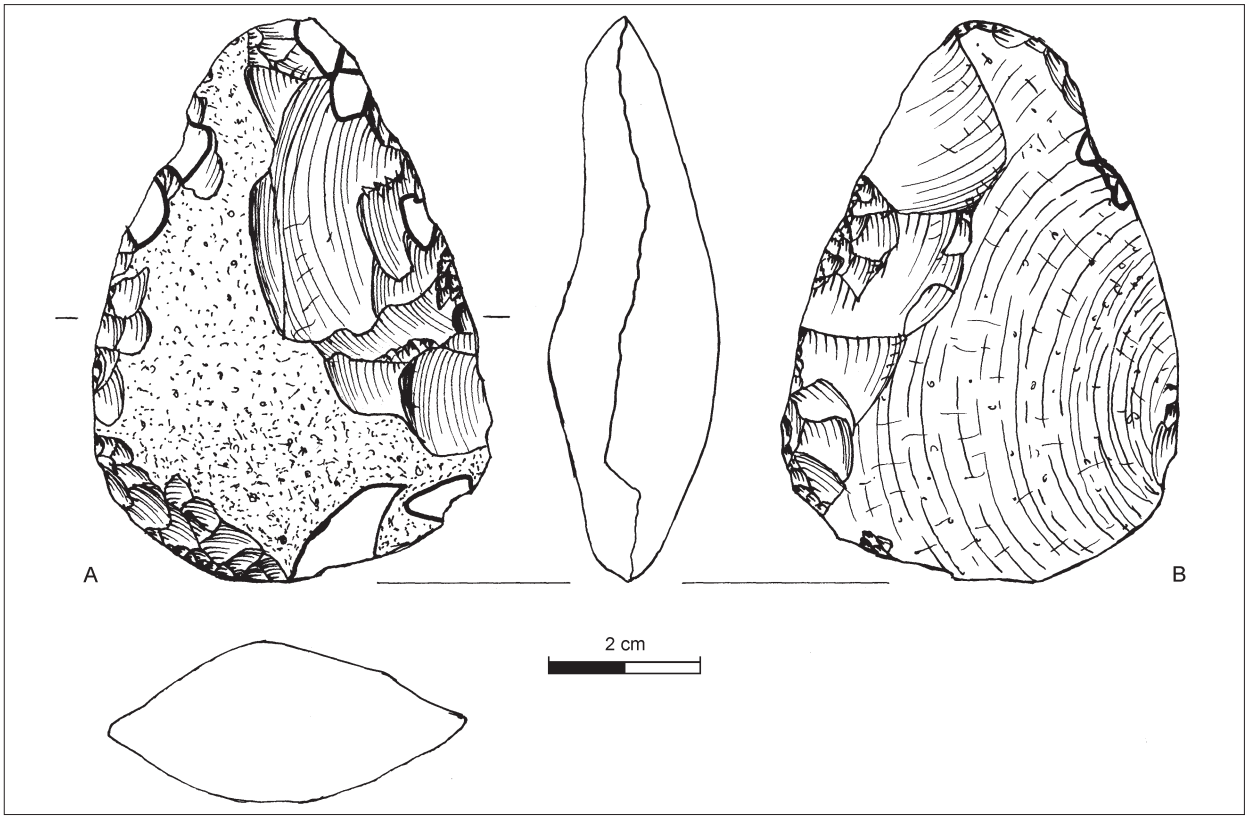

Fig. 9. *Biface partiel* or *Halbkeil* seen from two sides, in side-view and with a cross-section. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 9. *Biface partiel oder Halbkeil mit Ansichten der beiden Flächen, einer Seitenansicht und dem Querschnitt. Zeichnung: L. Johansen (Haren). Maßstab 1:1.*

Fig. 10. The handaxe was made from a flake-like frost-split piece of flint. Photo: F. de Vries (ToonBeeld, Stiens), Scale 1:1.

Abb. 10. *Der Faustkeil wurde aus einer abschlag-ähnlichen Frostscherbe bearbeitet. Foto: F. de Vries (ToonBeeld, Stiens), Maßstab 1:1.*

of this piece rather difficult. Quite a few flake scars end with steps at these cracks. The handaxe has a more or less triangular shape, with straight edges both at left and at right. The base is largely unworked and consists of an almost transverse old face with a thickness of at most 2.5 cm. Despite the frost cracks and the resulting steps, both sides of the handaxe are well made and functional, having edge-angles of 55-60°. Knapping was probably by soft percussion. One might wonder why an experienced knapper should have selected such a poor-quality nodule (Fig. 8). Maybe there was not a lot of intact flint material available on or near the site, at least none over 10 cm in length. At any rate, there are no clear indications, such as stacked step fractures, that the piece was worked by an apprentice. Originally, the handaxe must have had a more or less pointed tip that broke off, possibly during use. After the break occurred, its surface was retouched in order to create a striking platform, forming an angle of about 70° with face B. From this platform several flakes were then removed from face B. This largely went wrong due to the presence of frost cracks. These attempts at 'repairing' the tip were then abandoned. Near the top, but not on the platform created after the break occurred, somewhat heavier rounding can be seen on the right side (of face A), which gives the impression of having been caused by use. It seems that this rounded zone was truncated by the break, and it is thus possible that the break occurred during the use which produced the rounding. With a stereomicroscope, some fine scratches can be seen within the rounded part, running more or less parallel to the longitudinal axis. We cannot know whether the rounding was also present on the left side near the tip, because of recent damage to that area (see Figs. 7 & 8).

The handaxe in Figure 9 can be described as a *biface partiel*. Its maximum length is 7.4 cm, its width 5.2 cm, and its thickness 2.2 cm. Its weight is 75.6 g. In the typology of Bordes (1961), *bifaces partiels* are made of flakes of which the ventral face was only partially retouched. This handaxe is made out of a flat frost-split piece of flint instead of a flake, but otherwise shows the characteristics of this type. Face B largely consists of an old frost-split face, slightly convex like the ventral face of a flake (Fig. 10). This handaxe is a well-made tool with functional edges on both sides, having edge-angles of 60-65°. The right edge of face A is worked bifacially over its whole length, with well-controlled flaking that was done by soft percussion. The flat negatives reach to about the centre of the tool. Some slight hinges occur but these were not obstructive at all; in fact, the knapping created a fairly straight cutting edge over a length of c. 6 cm. The cross-section is symmetrical and biconvex, as expected in the case of handaxes; therefore this is not a bifacial scraper. On face A, some light retouch at the base and at left served to create a more or less symmetrical contour shape, which can be described as *cordiforme*. Also the left edge of face A is a functional cutting edge over its whole length. In our opinion, therefore, this is a finished tool. The decision to make a *biface partiel* of this type may be considered as a (successful) adaptation to the raw material available in this region. In the bouldersand, hardly any large and intact nodules of flint can be found, but frost-split pieces of flint are present in abundance. With minimal effort, a frost-split piece was transformed into a functional handaxe with the required *cordiforme* outline. Other examples in the northern Netherlands of *bifaces partiels* made out of frost-split pieces of flint are known from the surroundings of Smilde (Stapert 1992) and from Lonneker near Enschede (Stapert et al. 2005).

Another *cordiforme* (cf. the measurements by Bordes 1961) has a maximum length of 9.1 cm; its width is 6.5 cm and its thickness 2.9 cm. It weighs 166 g (Fig. 11). The handaxe was worked in an adequate way even though the quality of the selected flint nodule was not optimal. Especially the tip end has been knapped carefully. Several frost cracks were already present when knapping started and these influenced its final shape. These cracks also resulted in more steps and hinges than would have occurred if a good-quality piece of flint had been used. On face A, a remnant of the cortex is present, and both faces show parts of old frost-split faces. In the basal part a number of large natural pressure cones are present - probably created during glacial transport of the nodule (see also De Vries 2009) - which could not be removed. Because of this, the flint knapper was largely unsuccessful in shaping the base as a cutting edge, although this was attempted. The handaxe is therefore not a totally finished product, largely due to the poor quality of the nodule. The knapper does not seem to have been very experienced, but succeeded in producing a more or less triangular-shaped handaxe with functional edges, especially near the tip where edge angles are around 60°.

A small bifacial tool can be described as a 'mini-handaxe' (Fig. 12). Maximum length 5.7 cm, width 4.4 cm, thickness 1.4 cm; weight 31.8 g. This tool was made on a hard-percussion flake. The striking platform was not prepared; its remnant (1.8 x 0.4 cm) consists of an old frost-split face. The striking angle is c. 115°. There is a prominent bulb of percussion of which about half is preserved. Along the right edge of the ventral face a series of flake scars is present, the purpose of which was to remove the bulb. This was only partially successful, however. On the dorsal face too a protruding area is present near the base, making this a relatively thick part of the tool even though the knapper tried to thin it. Roughly in the middle of the right edge of the ventral face a series of steps (see Fig. 13) was created as a result of repeated, unsuccessful flaking attempts, leaving stacked steps (Shelley 1990). Dorsally, remnants of old surfaces are present in the thick basal area. These are mostly old frost-split

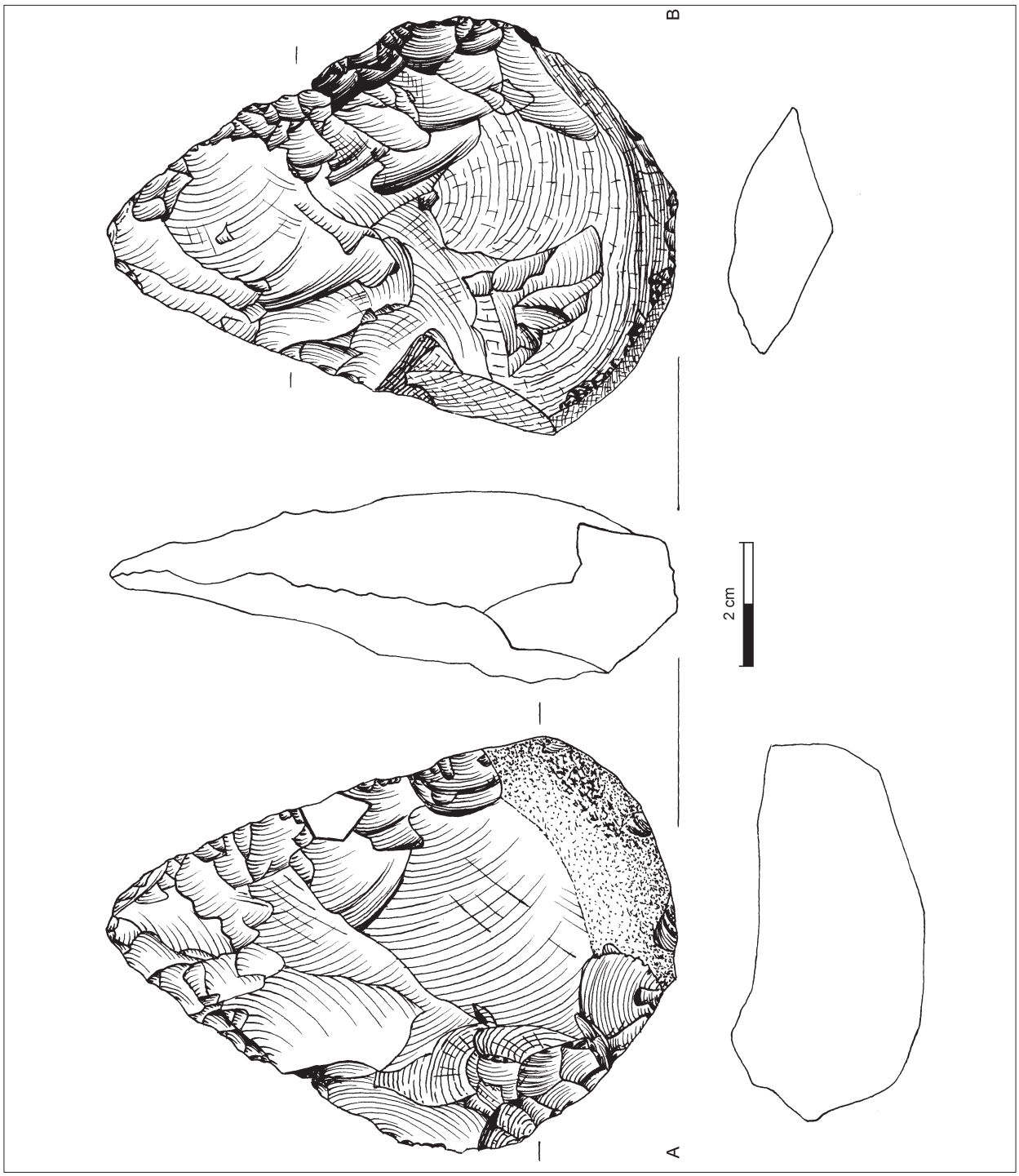

Fig. 11. Handaxe (biface cordiforme) seen from two sides, in side-view and with two cross-sections. The intention of the flintknapper was to make a (sub)triangular handaxe but this failed because of the poor-quality flint. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 11. *Faustkeil (biface cordiforme) mit Ansichten der beiden Flächen, einer Seitenansicht und zwei Querschnitten. Der Steinschläger beabsichtigte die Herstellung eines (sub)dreieckigen Faustkeils, was wegen der schlechten Qualität des Feuersteins mißlang. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

surfaces, but there is also a small remnant of cortex. Several larger negatives, coming from the tip and dating from before the striking of the flake, end in hinges. Hence this was a coarse and thick flake to start with, which nevertheless was transformed into a tool. Since both edges were retouched dorsally, the tool could be described as either a Mousterian point or a converging double side-scraper following the typology of Bordes (1961). Given the attempts to remove the bulb, it especially resembles a *pointe moustérienne à bulbe enlevé*, rather than a *racloir convergent*. However, this classification is problematic. The retouching was partly bifacial and not completely successful; especially along the left edge dorsally, several retouch flakes ended in steps, and ventrally even in stacked steps as noted above. Alternatively,

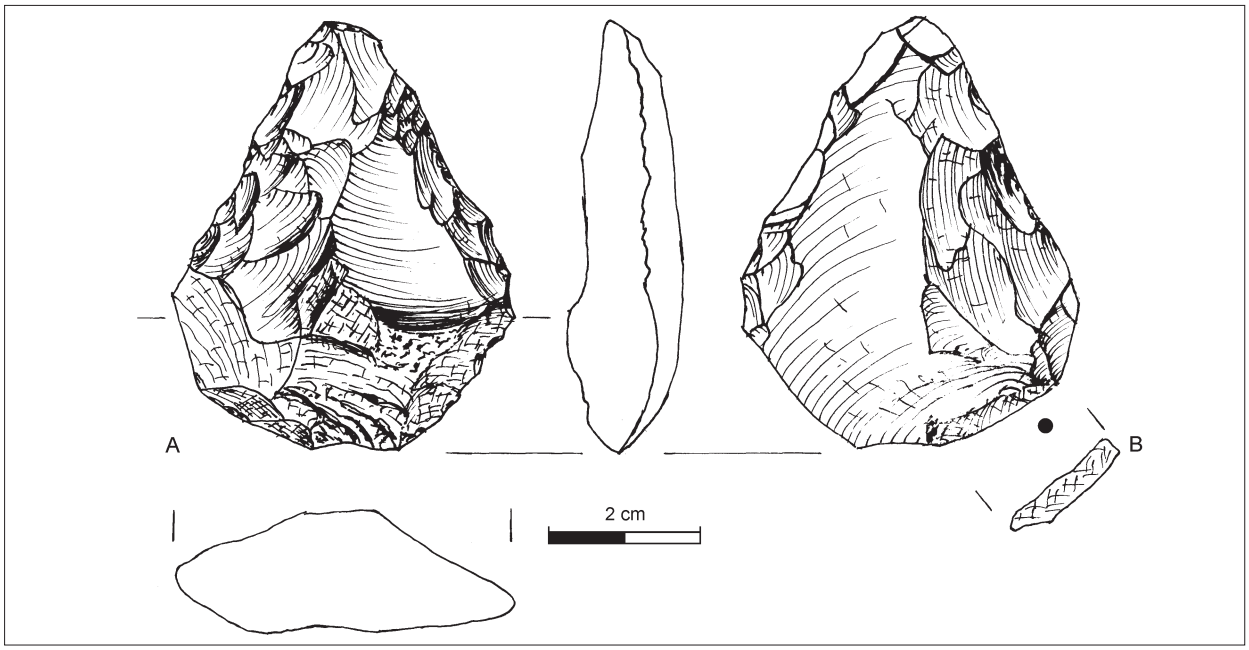

Fig. 12. Small bifacial tool (mini handaxe or Mousterian point) made out of a flake, seen from two sides, in side-view and with a cross-section. The position of the point of percussion is indicated by a closed circle. This piece was probably worked by an inexperienced knapper. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 12. *Kleines, aus einem Abschlag bifaziell bearbeitetes Werkzeug („Mini-Faustkeil" oder Moustier-Spitze), mit Ansichten der beiden Flächen, einer Seitenansicht und dem Querschnitt. Die Schlagfläche des Abschlags wird durch den schwarzen Punkt gekennzeichnet. Das Stück wurde wahrscheinlich von einem unerfahrenen Steinschläger bearbeitet. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

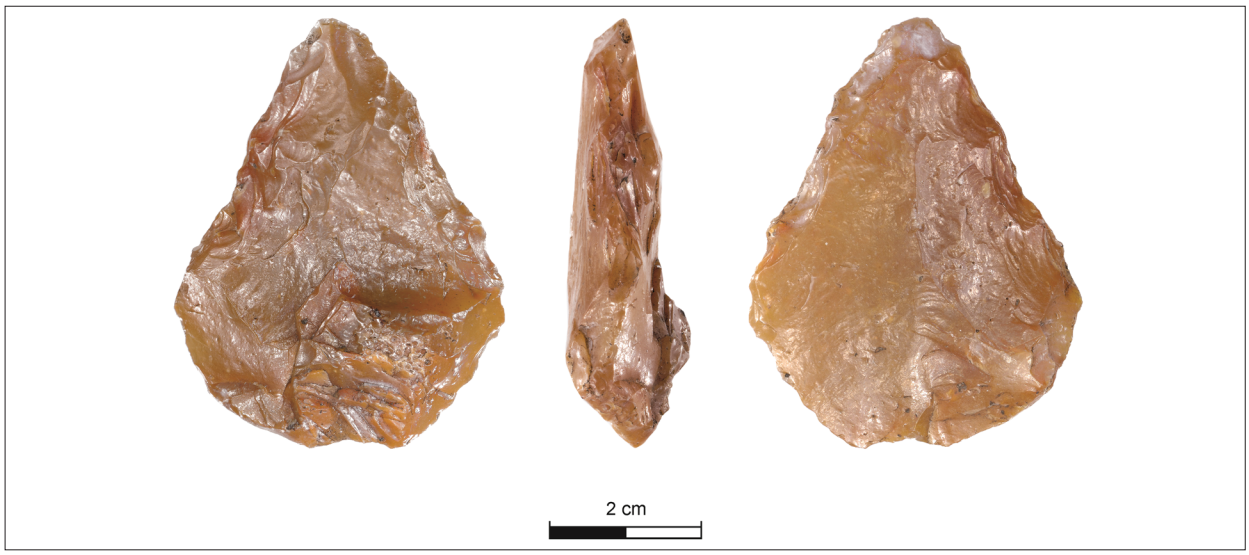

Fig. 13. It can be seen that quite a lot of steps were produced during the knapping of this tool. Photo: F. de Vries (ToonBeeld, Stiens), Scale 1:1.

Abb. 13. *Während der Bearbeitung des Gerätes entstanden sehr viele Stufenretuschen. Foto: F. de Vries (ToonBeeld, Stiens), Maßstab 1:1.*

the tool may be described as a small *biface partiel*. According to Bordes, these are mostly made of flakes, with incomplete working of the ventral face. In terms of its outline, the piece would then fall into the category of *bifaces cordiformes*. All in all, this implement has an unclear typology, and cannot be classified unambiguously. For a handaxe it is rather small, with a length of less than 6 cm. The relatively thick basal part argues against classification as a Mousterian point. Ventral thinning to facilitate hafting is not uncommon on Mousterian points. In this case, however, removing the bulb was not achieved, and this piece cannot have been a functional point. Moreover, the retouching was done in an incompetent way leaving a number of steps and stacked steps. Though the work was somewhat hampered by an old frost crack in the flint, this fails to explain the inexpert knapping. Therefore, our conclusion is that this is most probably the product of an apprentice in flint knapping - not a beginner but an advanced learner.

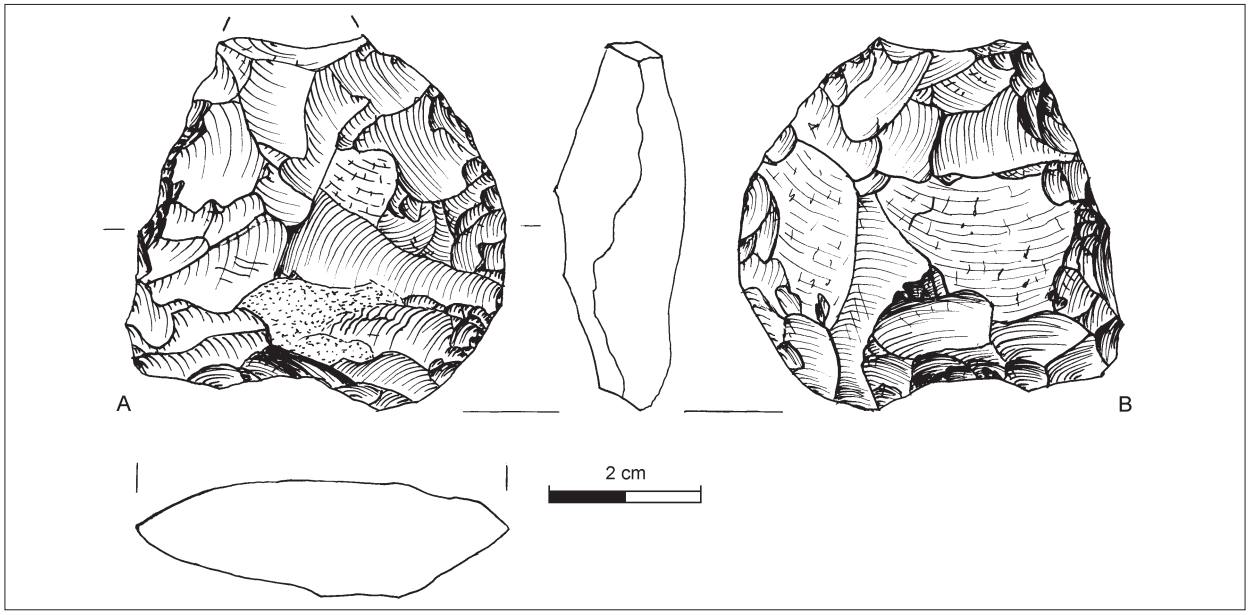

Fig. 14. Small handaxe-like tool seen from two sides, in side-view and with a cross-section. The artefact was made from a thin, slab-like piece of flint and was probably worked by an inexperienced knapper. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 14. *Kleines, faustkeilähnliches Werkzeug, mit Ansichten der beiden Flächen, einer Seitenansicht und dem Querschnitt. Das Artefakt wurde aus einem dünnen, plattenartigen Stück Feuerstein hergestellt und wurde wahrscheinlich von einem unerfahrenen Steinschläger bearbeitet. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

Another possible example of an apprentice's workpiece is the small handaxe-like tool in Figure 14. Length 4.9 cm, width 5.0 cm, thickness 1.6 cm. Its weight is 42.9 g. From the top of this artefact a small part is missing, probably about 0.5 cm. The original length can be estimated as c. 5.5 cm. The surface of the break is not (sub)recent, and therefore the break could be contemporary with the production of the tool. It is made of good-quality, fine-grained flint. On face A there is a small part of an old frost split face, in addition to cortex. On face B, two larger areas of old faces are present. Since remnants of old faces occur on both faces, the tool cannot have been made out of a flake. It was made of a slab-like piece of flint created by frost-splitting, with an original thickness of not much more than about 2 cm. This is a small bifacial tool

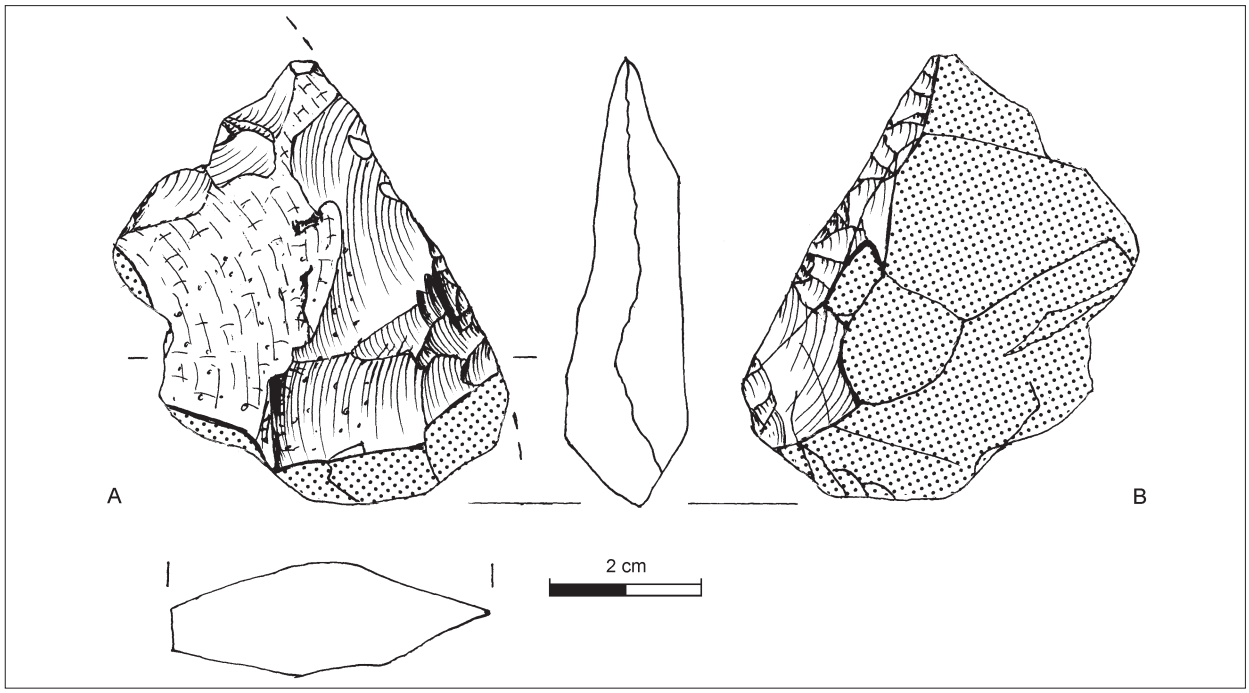

Fig. 15. Small fragment of a handaxe broken as a result of repeated secondary frost-splitting. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 15. *Kleines, durch wiederholten, nachträglichen Frostbruch entstandenes Fragment eines Faustkeils. Zeichnung: L. Johansen (Haren). Maßstab 1:1.*

with a somewhat unclear typology. One of the lateral edges is straight in outline, the other convex. It seems clear that the aim was to make a more-or-less triangular handaxe with a cutting base. However, the knapper did not succeed very well. There are several negatives of unsuccessful flake removals, on both faces: irregularly shaped, too steep or stopping too early. Especially near the base there are a series of small and steep retouch scars, partly ending in steps. The concave shape of the base is in fact the result of inadequate knapping. Also along the left-hand side of face A, the working of the piece went very wrong. By repeated hitting of the same spot, where knapping could not be successful, a series of superimposed stacked steps was created. Quite a few steps occur elsewhere too on this small handaxe-like tool. Both lateral edges are shaped irregularly when seen in side-view, and the creation of good working angles along the edges largely failed. The signs of inexpert knapping, and especially the occurrence of stacked steps, indicate that the piece was probably knapped by an apprentice, not a novice but an advanced learner.

A small fragment of a handaxe is shown in Figure 15. The piece has the following measurements: maximum length* 5.9 cm, width* 4.2 cm, thickness* 1.5 cm; weight* 34.6 g. Because of repeated secondary frost-splitting, the handaxe was probably reduced to a handful of pieces, of which this fragment is the only one found so far. Even in this fragment, a large number of frost cracks is present. On the best preserved face, a remnant of an old frost-split face can also be seen. Only one bifacial side with a length of about 5 cm is preserved on the fragment. This edge has a symmetrical cross-section with edge-angles of around 60°. The shaping of the bifacial edge was successful and must have been done by an experienced knapper, most probably by soft percussion. Based on the fact that the preserved side runs straight, not curved, we suppose this is a fragment of a more or less triangular handaxe. The tool was made of good-quality fine-grained bryozoan flint. It may be noted that the secondary frost breaks do show wind gloss; therefore, the fragmentation already took place during the Weichselian.

On-site production of bifacial tools is attested by the presence of a possible broken preform of a handaxe (Fig. 16): maximum length* 9.2 cm, width* 6.0 cm, thickness* 2.1 cm; weight* 117.9 g. Although

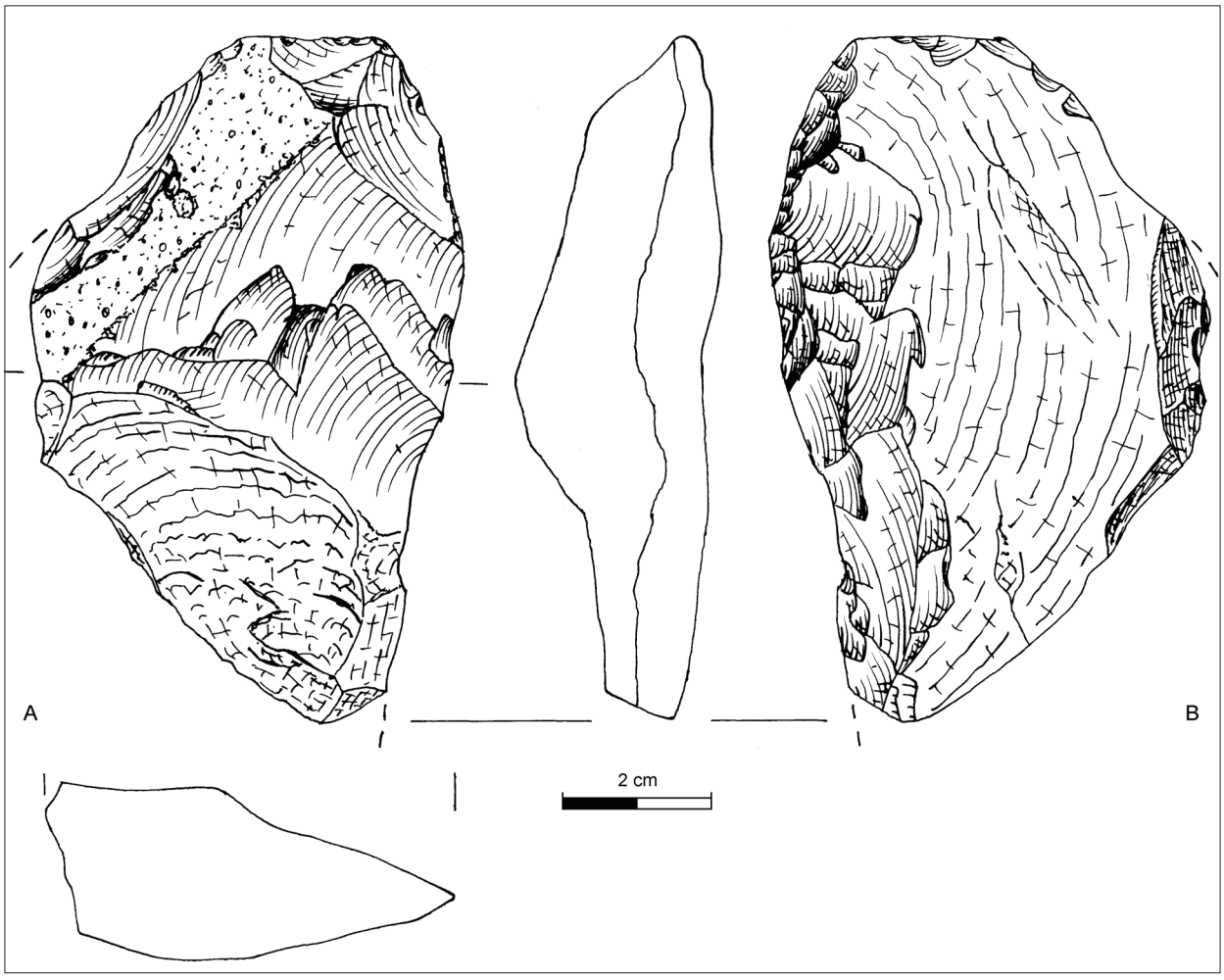

Fig. 16. Broken preform of a bifacial tool, probably a handaxe. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 16. *Gebrochene Vorarbeit für ein bifazielles Gerät, wahrscheinlich einen Faustkeil. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

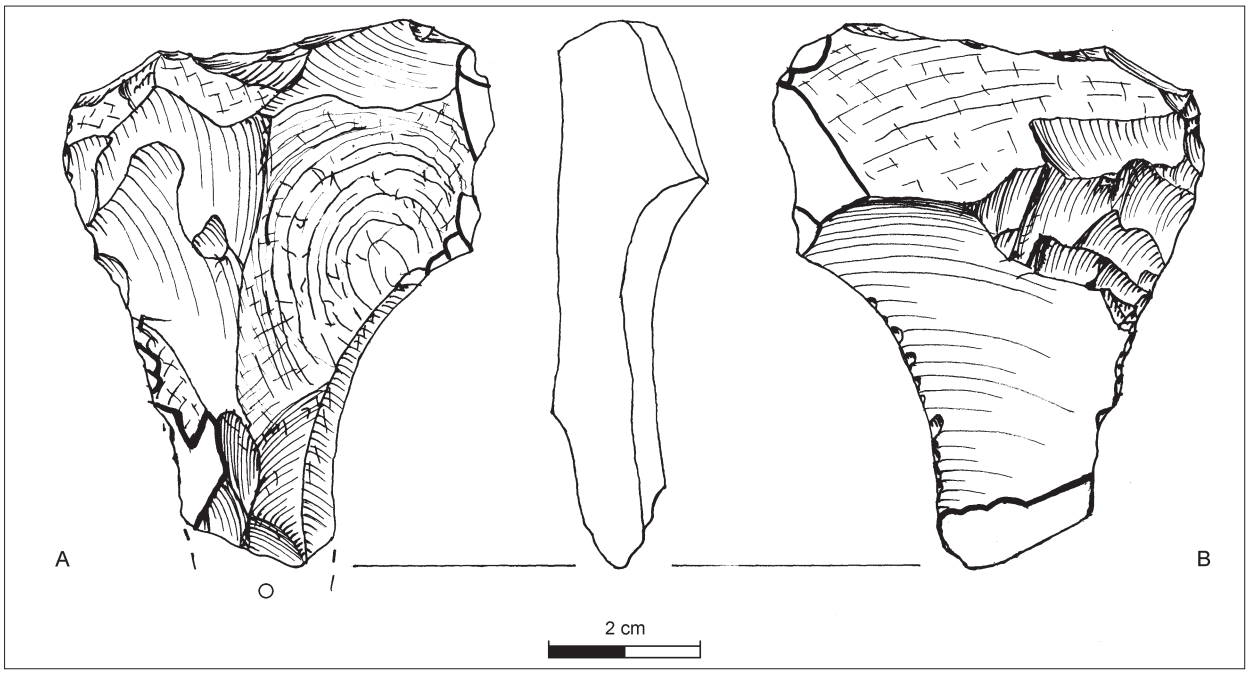

Fig. 17. Atypical side-scraper: a distal fragment of a plunging blade with ventral thinning and some scraper retouch. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 17. *Atypischer Schaber: distales Fragment einer Klinge mit Kernfuß, etwas ventrale Verdünnung sowie Kantenretusche. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

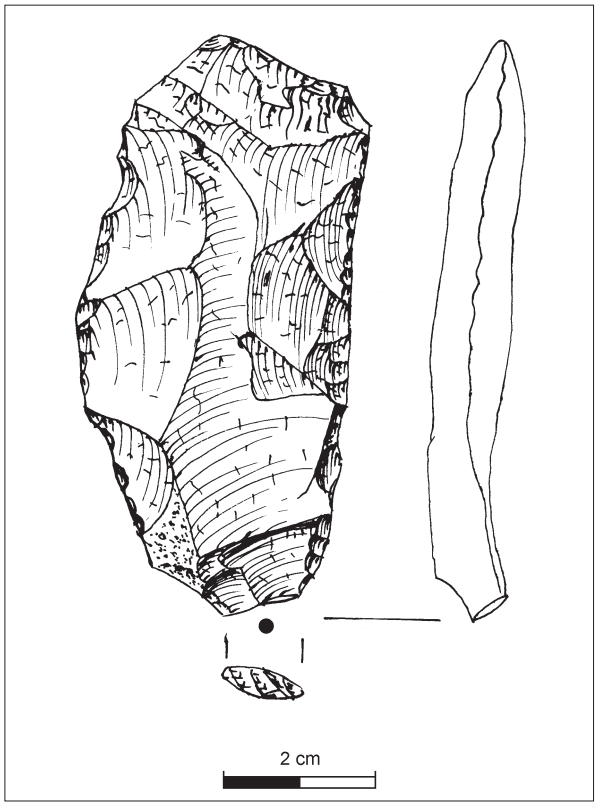

Fig. 18. Levallois-blade. This blade is the only artefact clearly produced by the Levallois technique and was most probably made elsewhere. Drawing: L. Johansen (Haren). Scale 1:1.

Abb. 18. *Levallois-Klinge. Diese Klinge ist das einzige deutlich mit der Levallois-Technik bearbeitetes Artefakt und wurde sehr wahrscheinlich woanders hergestellt. Zeichnung: L. Johansen (Haren). Maßstab 1:1.*

this is only a fragment, it can be seen that the intention probably was to make a handaxe, but the piece broke during manufacture. The break possibly resulted from an internal frost crack. The tool is made of medium-quality bryozoan flint with coarser areas. One side of the tool was worked bifacially over a length of about 7 cm. The cross-section of this edge is symmetrical as is normal with handaxes. The flake scars are well-shaped and quite flat, so most probably soft percussion was applied. Edge angles of the bifacial side-edge vary from 55-60°. The opposite edge shows some retouch but is largely unshaped; the retouch probably had to serve as a striking platform for working one of the faces. A large remnant of the cortex is preserved, and also several parts of old frost-split faces on both faces. Therefore, the tool was made out of a nodule, not a flake. It documents another attempt to create a handaxe out of a frost-split piece, similar to the handaxe in Figures 9 and 10. The piece was worked by a reasonably experienced knapper, as far as this can be judged from a fragment.

Summarizing, it can be concluded that the handaxes at this site are relatively small. Of the seven specimens of which we can measure or reliably estimate the length, the mean length is only 7.7 cm (standard deviation 1.8); the range is c. 5.5 - 10.4 cm. The rather small average length is partly due to the circumstance that the two specimens interpreted as work-pieces by flint knapping apprentices are quite small - i.e. the smallest of the whole assemblage: c. 5.5 and 5.7 cm respectively. Omitting these two specimens, the mean length of the remaining five handaxes is 8.5 cm. The

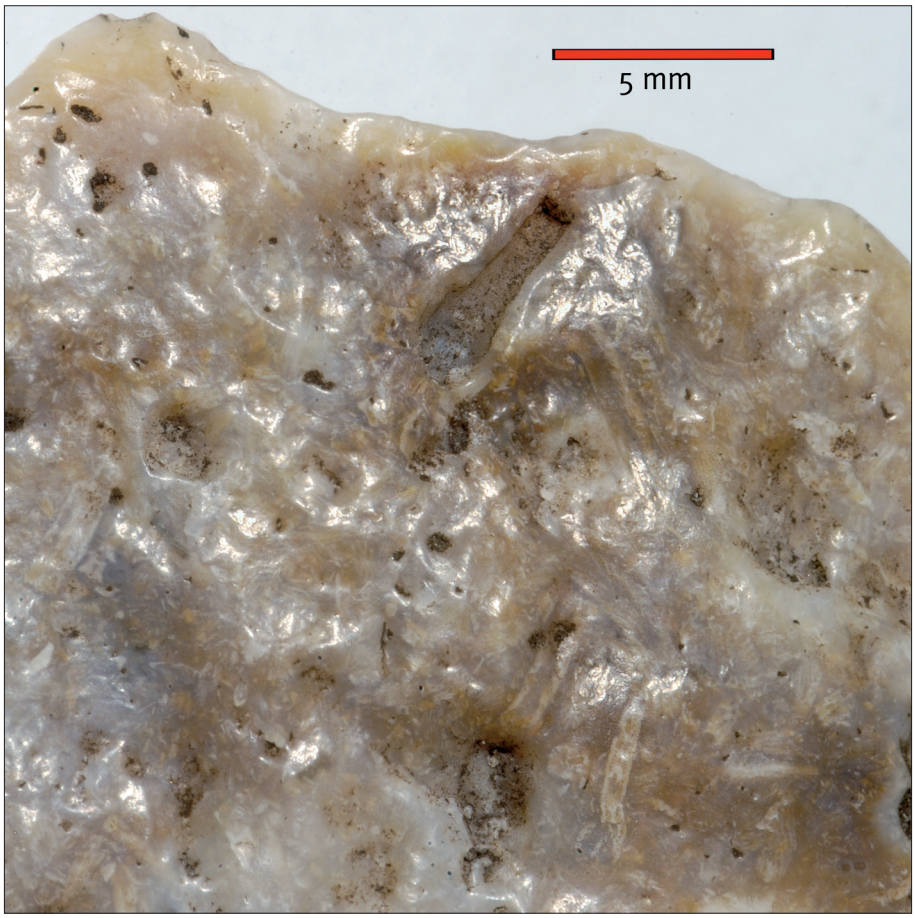

Fig. 19. Detail of the Levallois blade showing the heavily weathered surface with windgloss and small pits. Photo: F. de Vries (ToonBeeld, Stiens), Scale 1:1.

Abb. 19. *Die Detailansicht der Levallois-Klinge zeigt die schwer verwitterte Oberfläche mit Windpolitur und kleinen Grübchen. Foto: F. de Vries (ToonBeeld, Stiens), Maßstab 1:1.*

weight of the six more or less complete specimens ranges from 31.8 - 231.1 g; average weight: 102.1 g (standard deviation 79.0). Of course, the two small handaxes probably made by apprentices are the lightest: 31.8 and 42.9 g.. Omitting these two, the average weight of the remaining four handaxes is 134.5 g.

Retouched pieces

Only two retouched artefacts have been found: a modified flake and a fragment of a blade-like flake. The first piece is a large decortication flake (length 6.2 cm) showing two retouch scars on one side, near the base; because the flake also shows heavy cryoturbation retouch, this is not enough to describe the piece as a certain 'tool'. The second piece (Fig. 17) is a distal fragment of a plunging blade with a remaining length of 7.4 cm; the break is recent. It resulted from an attempt to regularize the ventral face by invasive flaking; this was only partly achieved because several of these flakes ended in steps. Dorsally, a few coarse retouch scars are present. The tool may be described as an atypical and slightly concave 'side-scraper' with ventral thinning made of a blade fragment.

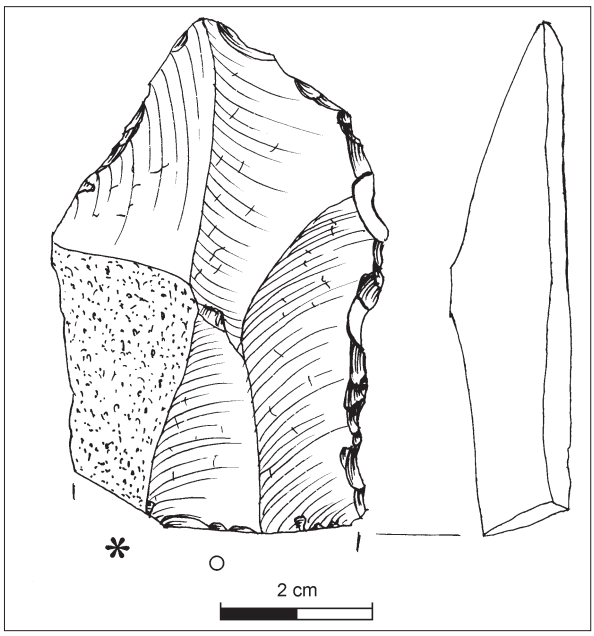

Fig. 20. Distal fragment of a large (non-Levallois) blade. The artefact is burned. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 20. *Distales Fragment einer großen (nicht Levallois-) Klinge. Das Artefakt ist verbrannt. Zeichnung: L. Johansen (Haren), Maßstab 1:1. .*

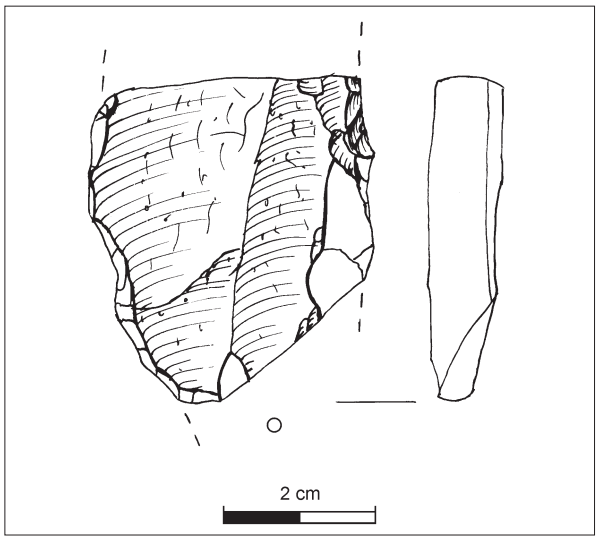

Fig. 21. Medial fragment of a large blade. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 21. *Mediales Fragment einer großen Klinge. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

Blades and blade-like flakes

The presence of some five rather large blades (mostly fragmented) or blade-like flakes, including the retouched piece described in the preceding section, is striking. Only one clear Levallois blade, showing the characteristic core preparation, is present (Fig. 18). The blade (length 7.6 cm, width 3.6 cm, thickness 0.9 cm; weight 26.6 g) is made of reasonably fine-grained, bryozoan flint. The striking platform remnant is small, possibly facetted, and the percussion bulb is rather flat; the blade was possibly obtained by soft percussion. A small remnant of cortex has been preserved on the dorsal face, close to the proximal end. One longer negative is visible, maybe from a first blade that turned out to be too thin. A whole series of flake negatives is present at both sides resulting from preparing the core. This blade was struck from a Levallois core for blades (*Strunkförmiger Kern* cf. Bosinski 1967). It was most probably not produced on the site but imported – just like several handaxes. There are no flakes of this material in the assemblage. The blade is heavily weathered (Fig. 19). Ventrally, a small piece splintered off, probably because of secondary frost splitting.

A distal fragment of a large blade is shown in Figure 20. The remaining length* is 6.9 cm, width 4.4 cm, thickness 1.5 cm; weight* 46.5 g. The artefact is burnt (as indicated by the asterisk in the drawing), which may have caused its fragmentation; the break surface looks old (patinated). Dorsally, a remnant of the heavily weathered cortex is present. In addition, four flake scars are present of which two have the same striking direction as the blade. There are no clear indications of preparation in the Levallois style. The many small retouch scars along the side are most probably caused by cryoturbation.

Figure 21 is a medial fragment of a large blade. The proximal break is old (patinated), the other break is secondary, possibly caused by frost splitting. Dorsally,

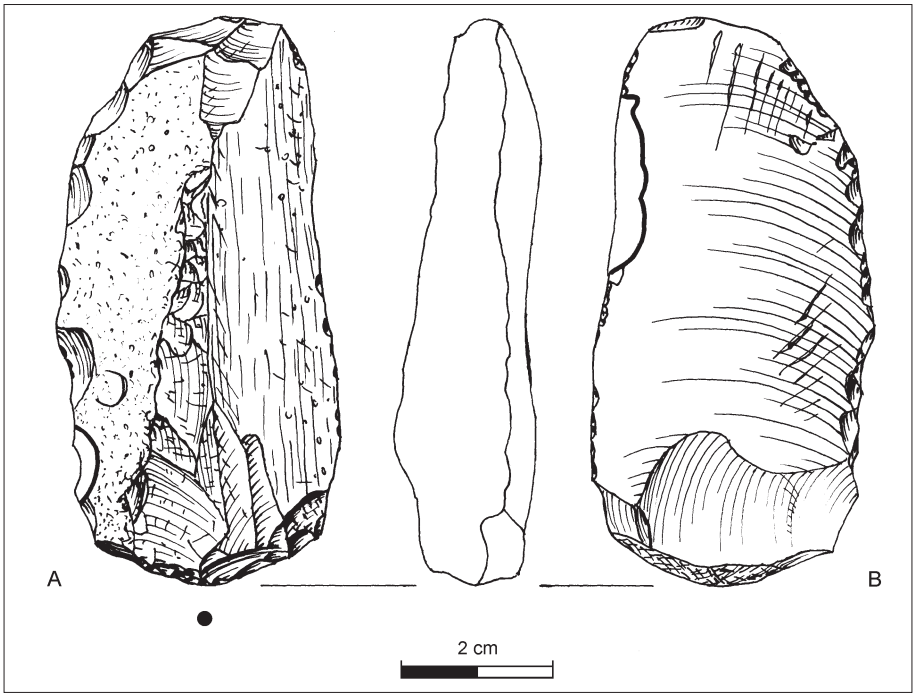

Fig. 22. Blade-like flake. The dorsal side consists completely of old faces. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 22. *Klingen-ähnlicher Abschlag. Die Dorsalfläche besteht ganz aus alten (natürlichen) Oberflächen. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

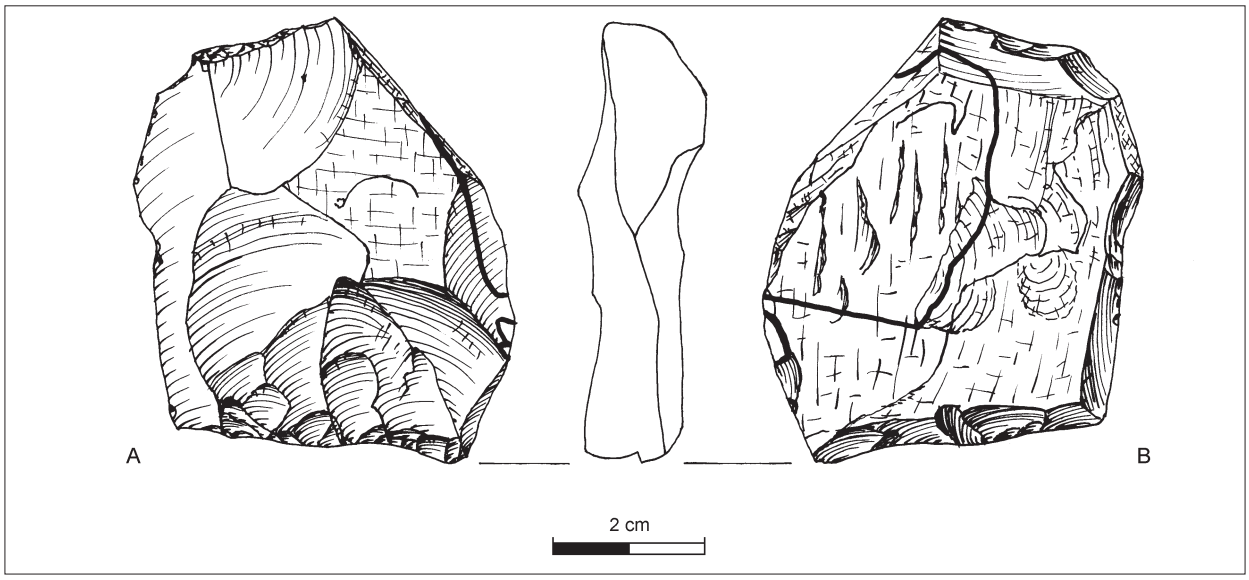

Fig. 23. Thin and flat core, possibly worked by an inexperienced knapper. Drawing L. Johansen (Haren). Scale 1:1.

Abb. 23. *Dünner und flacher Kern, möglicherweise von einem unerfahrenen Steinschläger bearbeitet. Zeichnung L. Johansen (Haren). Maßstab 1:1.*

three negatives with the same striking direction as the blade are present. No traces of preparation are visible, so it cannot be established whether or not this is a Levallois blade. The measurements of this fragment are: remaining length* 4.3 cm, width 3.7 cm, thickness 0.9 cm; weight* 17 g.

An example of a decortication piece is a 7.5 cm long blade-like flake (Fig. 22). The dorsal face of this artefact, which was probably produced by hard percussion, consists almost entirely of old faces. The artefact has a width and thickness of respectively 3.6 and 1.7 cm. It weighs 51.4 g.

Furthermore, several flake fragments are present that may in fact be fragments of blades.

Cores

Five cores or core fragments are present. Among these there are no clear Levallois cores. One of the cores may have been worked by an inexperienced knapper, and the same possibility exists for one or two of the other pieces.

The core in Figure 23 is a rather thin and flat core. Its maximum length is 5.9 cm and its maximum thickness 1.3 cm; its weight is 39.4 g. Face A shows a series of negatives flake scars, but also has a remnant of an old frost-split surface. Most flake scars come from the base, only one has a different striking direction. This is therefore not a Levallois core, even

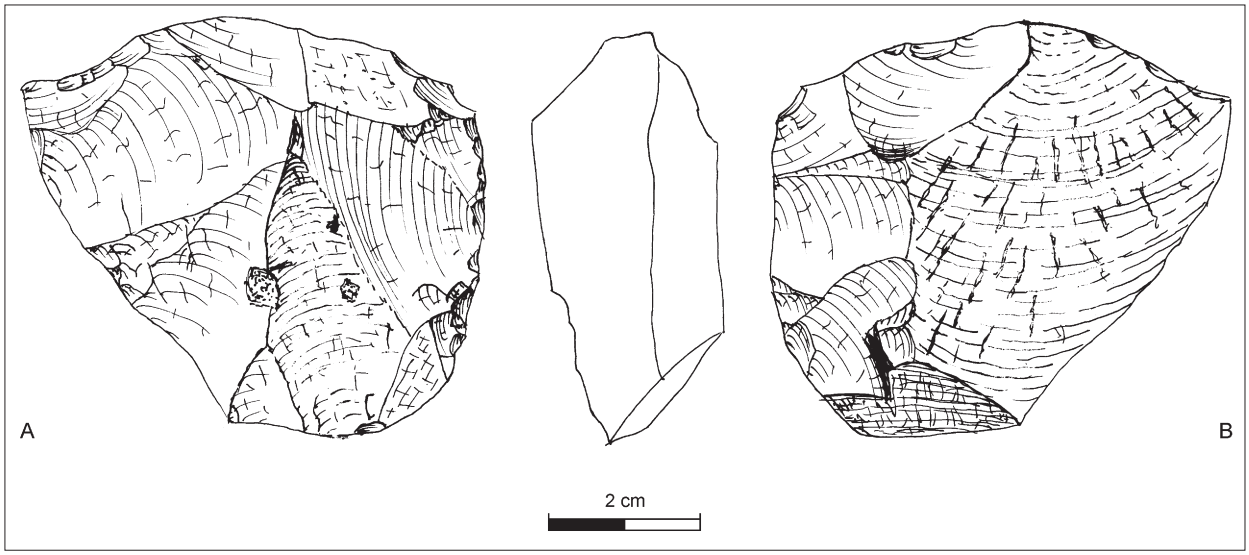

Fig. 24. ‚ad hoc' core, somewhat discoid in shape. Drawing: L. Johansen (Haren), Scale 1:1.

Abb. 24. *‚Ad hoc' Kern, in der Form etwas diskoid. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

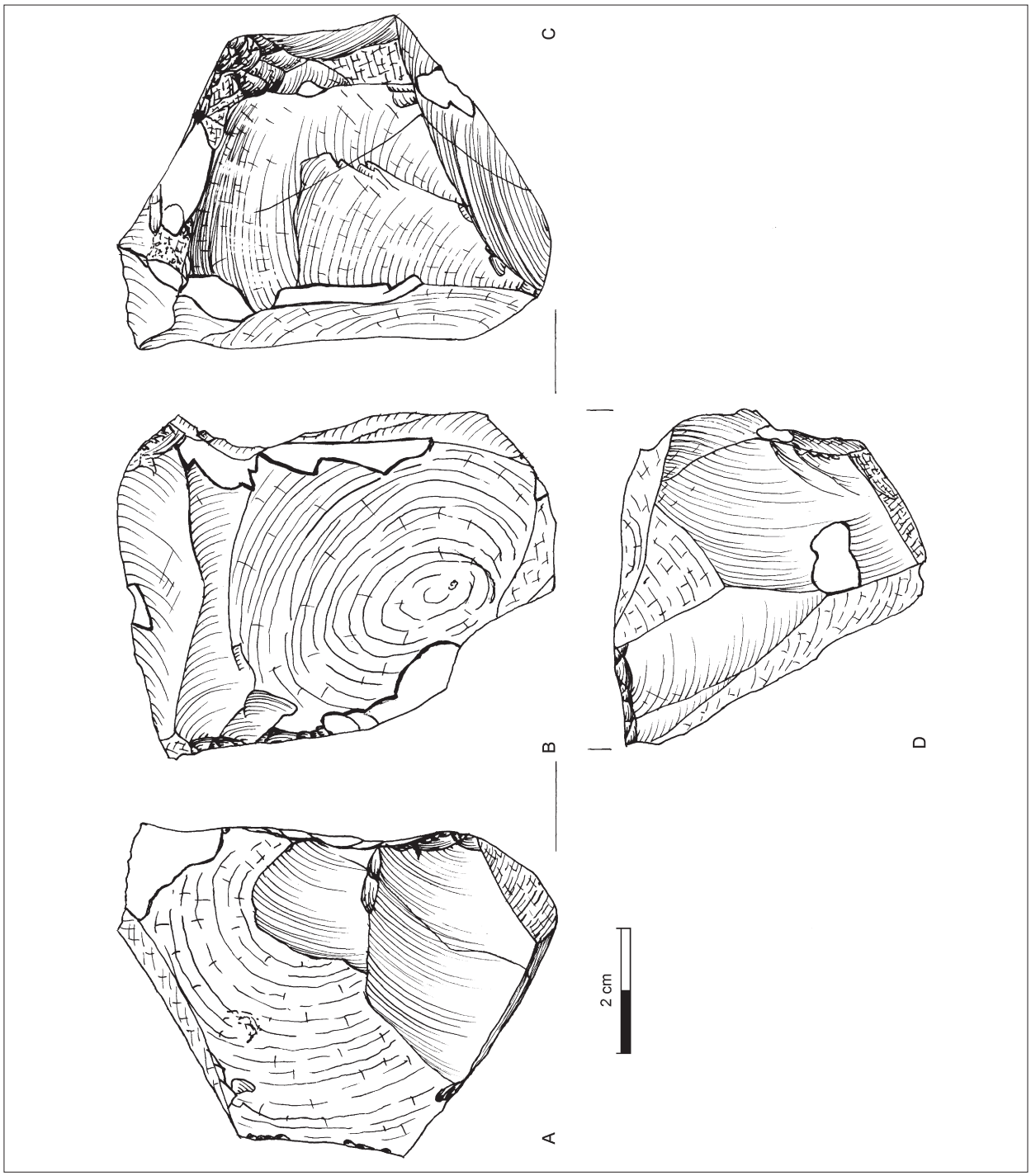

Fig. 25. Another ‚ad hoc' core. Drawing: L. Johansen (Haren), Scale 1:1.
Abb. 25. *Ein weiterer ‚ad hoc' Kern. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

though that may have been the knapper's intention. Face B largely consists of old frost-split surfaces, but along three sides striking platforms were created for the flaking of face A. Angles between face A and these striking platforms are mostly around 60 or 70°. No large and well-shaped flakes came from this core: the largest negative has a maximum length of only 3.3 cm. The core is very thin; in its present state its thickness is no more than 6 or 7 mm in several places. It is hardly possible to strike off any more flakes from this core. It is curious that this piece of flint should have been selected as a core in the first place, because its thickness cannot have been much more than about 1 cm to begin with. These features, and the fact that several flakes ended in hinges, suggest that this core was not selected and worked by an experienced knapper, but by an apprentice practising his knapping skills. The selected nodule was not really suitable for use as a core, and the motor skills needed in knapping were still insufficient as shown by quite a few flakes that

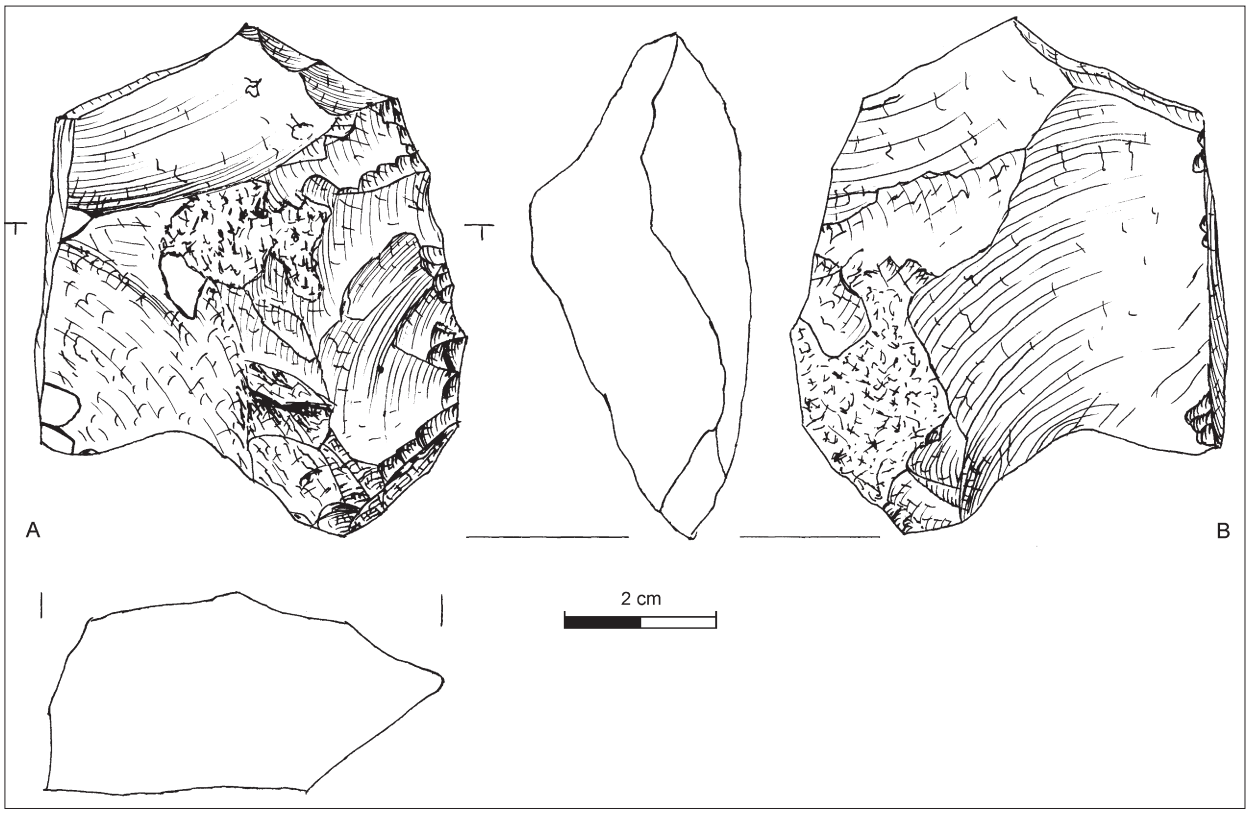

Fig. 26. Fragment of an irregularly shaped core. Drawing: L. Johansen (Haren), Scale 1:1.
Abb. 26. *Fragment eines unregelmäßigen Kerns. Zeichnung: L. Johansen (Haren), Maßstab 1:1.*

ended in hinges. It must have been an advanced learner, not a beginner, because usable striking platforms were created for working the upper face of the core. In our opinion, this core and the two small handaxe-like tools discussed in the section on handaxes may all have been produced by the same young knapper.

The second core (Fig. 24) has the following measurements: length 6.7 cm, width 5.3 cm, thickness 2.3 cm; weight 65.9 g. Flake negatives are present on both faces of the core and although they come from several directions, it is not a Levallois core. It may be described as an ‚*ad hoc'* core: some flakes were simply struck from this nodule where suitable striking platforms occurred.

Another ‚*ad hoc'* core shows four or five negatives (Fig. 25). There are no traces of any system or preparation at all. The piece has a maximum length of 7.8 cm and weighs 194 g.

The fourth piece, with a weight of 95.5 g, is a fragment (possibly because of secondary frost splitting) of an irregularly shaped core (Fig. 26). The measurements are: maximum length* 6.7 cm, width* 6.6 cm and thickness* 2.7 cm.

The last piece is also a fragment, showing breaks resulting from repeated secondary frost splitting.

Flakes

There are 44 flakes in the present assemblage. One of them is burnt. Most flakes are rather coarse, and produced by hard percussion. Some thin flakes, produced by soft percussion, are also present. There are no clear examples of Levallois flakes. It is possible that a few flake fragments are in fact fragments of blades. Quite a few flakes are fragmented, often by secondary frost splitting. The maximum length of the complete flakes ranges from 3.0 to 7.7 cm and their weight from 4.2 to 82.3 g.

Additional remarks on the handaxes

So far some 65 artefacts have been collected at this site. This may not seem a large number, but in the northern half of the Netherlands this is the largest site known, apart from Mander, and it is the only site with more than one handaxe. In fact, more handaxes have been found at this location than at all other sites in the entire Province of Drenthe together. The rather extreme focus on handaxes - about 14% of all artefacts - sets the site apart. Another site with many handaxes (n=56) in the Northern European Plain is Ochtmissen near Lüneburg in Germany (Thieme & Richter 1994), dating from the Late Acheulian; it is interpreted as a 'hunting camp'. Typologically, the handaxe assemblage from the Drenthe site consists mainly of *bifaces cordiformes* and *(sub)triangulaires*. Especially the triangular forms are striking and well-made, and it seems clear that these were transported to the site. At least one of these handaxes was probably made on a flake.

More or less triangular handaxes, especially if made on flakes, are guide fossils of the MAT (type A) (e.g. Bordes 1961, 1968). Traditionally, triangular handaxes were dated to the Early Glacial of the Weichselian, i.e. to the period before the onset of the Lower Pleniglacial. This was based particularly on stratigraphical observations in loess contexts in northern France (e.g. Bordes 1954). For example, the *triangulaires* and *cordiformes* from Bihorel (Série II), Saint-Just-en-Chaussée and Tillet (*Série 'café au lait'*) occurred at the base of the '*loess récent*' which is generally assumed to have been deposited during the Lower Pleniglacial. However, recent dates for MAT sites in southern France fall after the Lower Pleniglacial, between 60 000 and 40 000 years ago (see especially Soressi 2002, 2004). The level with handaxes at Pech-de-l'Azé for example produced dates around 50 000 BP. Could it be that the 'triangular phase' in the north (northern France, Belgium, the Netherlands) was terminated by the onset of the Lower Pleniglacial, and that its bearers then moved to more southern regions in response? Some researchers (e.g. Hublin & Roebroeks 2009) suggest that the periodical abandonment of northern environments was not the result of 'ebb and flow' movements of Neanderthal groups but was caused by local extinctions and subsequent recolonisation by new groups. Soressi (2002) does not exclude the possibility that in the north a phase of the MAT type A existed earlier than that in the Dordogne. At the moment, we have no possibilities to decide whether our site in Drenthe dates from before or from after the Lower Pleniglacial. The triangular handaxes from the Drenthe site are however quite similar to handaxes from Pech-de-l'Azé, many of which are also quite small. It is of interest to cite Bordes (1961: 78) in this connection: "*Les bifaces triangulaires plats ne semblent pas avoir eu une longue vie comme type, au moins quand ils sont de grande taille. Ils apparaissent sans doute vers l'extrême fin de l'Acheuléen supérieur et disparaissent avec le Moustérien de tradition acheuléenne moyen. De plus petite taille, ils perdurent jusqu'à la fin de ce Moustérien.*" In other words, the occurrence of large triangular forms would be more characteristic of an older phase of the MAT, and small ones especially for later phases. At our site, small specimens occur and therefore a late dating (Middle Pleniglacial), as at Pech-de-l'Azé, could be suggested. However, at some sites in northern France, small handaxes do occur alongside larger specimens (e.g. at Saint-Just-en-Chaussée). Moreover, as noted above, the raw material that was available in the northern Netherlands hardly lent itself for the production of large tools. The overall small size of the handaxes at our site may therefore have been an adaptation to the local raw material. In order to clarify this dating issue more geological work is planned at the site.

At least two of the handaxes had breaks at the tip. The break at the tip of the small handaxe in Figure 14 is old and may date from Middle Palaeolithic times; if so, it might be a result of use. It has been observed in quite a few cases that the relatively thin tips of handaxes were broken off. In the northern Netherlands, examples are the handaxes of Drouwen (Stapert 1979) and Oldeholtwolde (Stapert 1995). A broken-off handaxe tip (without the handaxe itself) from the Belvédère quarry near Maastricht is illustrated by Roebroeks (1988: fig. 123 no 3). One explanation is that such breaks occurred when handaxes were used for heavy butchery work, a function documented for Acheulian handaxes (e.g. Keeley 1980). However, though some Mousterian handaxes may have served the same purpose, they seem to have been used more frequently in woodworking (e.g. Anderson-Gerfaud 1990; Soressi & Hays 2003). Of course, breaks could also occur during woodworking, and during many other activities as well. In any case, this small handaxe seems hardly suitable for butchery.

In the case of the handaxe in Figures 7 and 8, the break may have occurred during an activity that caused some rounding of the tip that can still be seen just outside the broken area (see also the *Postscriptum* for another handaxe from the site with rounding at the tip). An attempt was made to repair the handaxe after the break occurred, without much success. Local rounding of the tip end is also shown very clearly by the triangular handaxe of Anderen (Stapert 1976a: 53-54, 1996: 12). An obvious explanation would be that handaxes with rounded tips were (*inter alia*) used for digging into the soil, for example for unearthing bulbs or roots, or for digging pitfalls or grave pits. Unfortunately, both this handaxe and the one from Anderen are quite heavily weathered and covered in wind gloss, so that a microscopic use wear analysis is hindered. At the moment, graduate student ms. Linda Kiers of Groningen University is studying a collection of several hundreds of handaxes (both Acheulian and Mousterian) from the surroundings of Grand Pressigny in France, collected by Idzard Vonk (of Koudum). This work is in progress, but it has been established that several dozen do show clear rounding of their tips, in some cases on both sides and in others on only one. It is hoped that this analysis, coupled with experiments, will shed more light on the origin of the rounding. It is of interest that in publications on use wear analyses of handaxes, rounding due to possible use in digging is rarely if ever mentioned (e.g: Anderson-Gerfaud 1990; Binneman & Beaumont 1992; Keeley 1980; Lass 1988; Mitchell 1995; Soressi & Hays 2003). However, handaxes are certainly suitable for digging purposes, at least according to Louis Leakey (1950: 73): "*They [handaxes] excelled as digging tools, and Dr. Leakey had himself dug an adequate game-pit with such tools in two days. Hand-axes can also be used for digging up edible roots, using the points, the body of the tool giving the necessary weight.*"

It is of interest that there are two small handaxe-like tools at this site showing more or less the same marks of inexperienced knapping indicated by

the high proportion of steps and hinges, and the occurrence of stacked steps (see i.a. Shelley 1990; Nichols & Allstadt 1978). Such clumsy little tools probably reflect the activities of children practicing their knapping skills (for more possible examples in the Netherlands, see: Stapert 2007; Johansen & Stapert in press). Both tools were quite possibly made by the same person, because they show about the same low degree of skill. This knapper was certainly not a beginner, however, but an advanced learner. Apart from these two handaxe-like tools, a thin core may also have been worked by this or another youngster. Traces of inadequate knapping are often interpreted as reflecting the low quality of locally available material. The raw material available to the occupants of the site near Assen was certainly of mediocre quality. However, even when allowing for this complication, it can still be seen that a marked difference existed in the level of skill shown by the two small and more or less failed handaxes and the other, larger and well-made handaxes from the site. It is interesting to note that at Ochtmissen such apprentice work-pieces may also be present. Most of the Ochtmissen handaxes were worked in a masterly way, but not all: "*Als Einzelstück ist ein grob zugerichtetes, massives cleaverartiges Stück zu nennen*" (Thieme & Richter 1994: 124). It is to be expected that at many Middle Palaeolithic sites such pieces will be observed once they are consciously looked for.

Concluding remarks

This text should be considered as a progress report. The site is of great interest in several respects, both archaeologically and geologically, and more research is needed and planned for the years to come. In a general sense, the site is also important because it is located close to the northern border of the distribution area of the Neanderthals. It is not the northernmost site in the Netherlands, however. Recently, it became clear that several Middle Palaeolithic artefacts, including a Levallois core, have been collected from the beach of the Wadden Island of Vlieland, washed up from the sea (collection of Idzard Vonk, Koudum). It is, however, the northernmost site of which we have more than a handful of artefacts, and the site is special because of its rather extreme focus on handaxes, which is unparalleled in the Netherlands.

Postscriptum (June 2011)

After the above text was completed, more artefacts have been collected on the site, including three handaxes or handaxe fragments (all found on the same day!) which we would like to describe briefly.

A complete handaxe is shown in Figure 27. Its length is 8.6 cm, width 6.7 cm, thickness 1.8 cm; its weight is 93 g. This handaxe can be classified as a

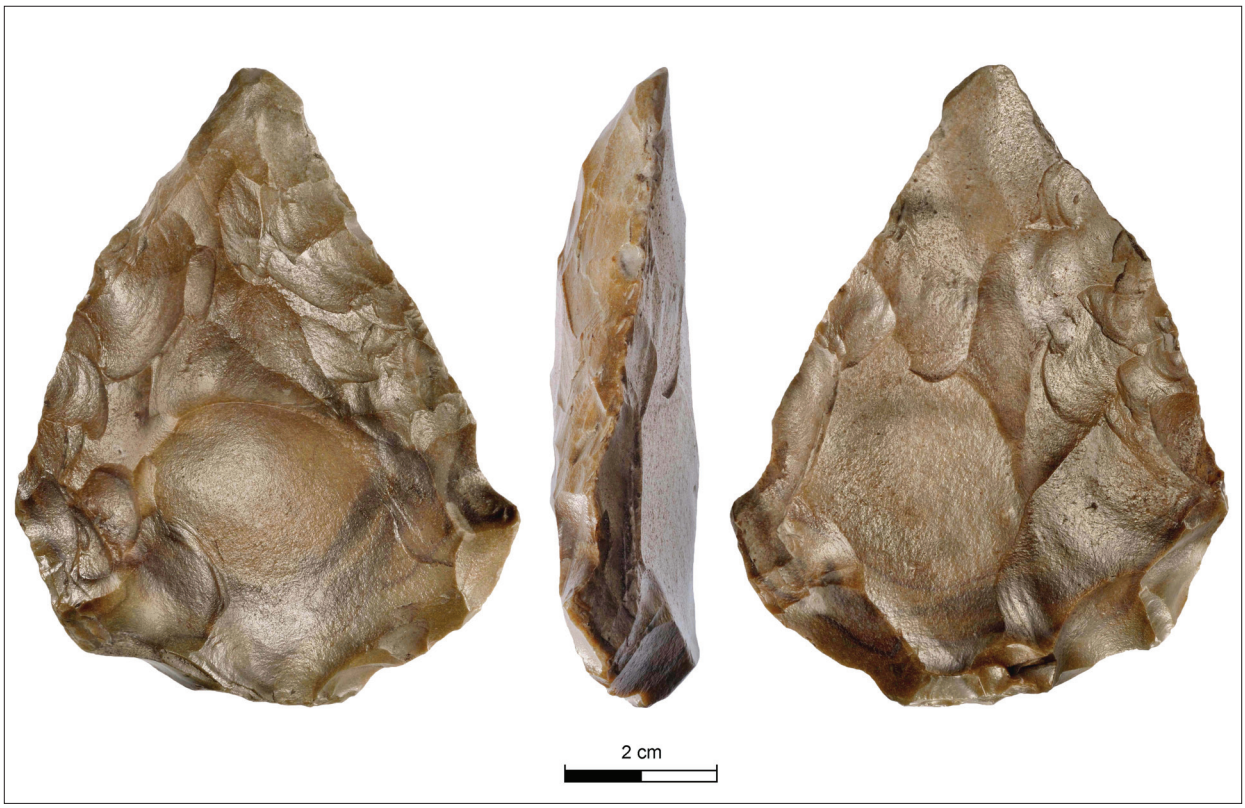

Fig. 27. A complete handaxe (biface cordiforme) seen from two sides and in side-view. Photo: J. R. Beuker (Assen), Scale 1:1.

Abb. 27. *Vollständiger Faustkeil (biface cordiforme) , mit Ansichten der beiden Flächen und einer Seitenansicht. Foto: J. R. Beuker (Assen), Maßstab 1:1.*

Fig. 28. A large fragment of a handaxe, most probably a cordiforme (left) and the tip of a handaxe (right). The photograph was taken in the field, not long after the artefacts were found. Photo: M. J. L. T. Niekus (Groningen), Scale 1:1.

Abb. 28. *Großes Fragment eines (sehr wahrscheinlich cordiforme) Faustkeils (links) und die Spitze eines Faustkeils (rechts). Das Bild wurde im Gelände aufgenommen, kurz nach der Entdeckung der Artefakte. Foto: M. J. L. T. Niekus (Groningen), Maßstab 1:1.*

biface cordiforme though it has some characteristics of triangular handaxes, e.g. more or less straight (not convex) sides. The handaxe was made out of a flat frost-split nodule (it has remnants of old frost-split faces on both faces), and was undoubtedly shaped by soft percussion. The base is not a cutting edge, but largely a transverse face (c. 1.2 cm in thickness), consisting partly of cortex. One of the sides shows steep retouch near the top, probably from repairing a break that had occurred there.

A handaxe fragment with a remaining length of 8.7 cm is shown in Figure 28 (left). Recent breaks have taken away the base of the handaxe. Typologically, this is most probably a *cordiforme* handaxe, because the side-edges are somewhat convex. The tool is well-worked by soft percussion, and has usable side-edges with working angles mostly around 50-60 degrees, at least in the top part. The maker attempted to remove a thicker area in the basal part, but was unsuccessful. The handaxe was probably not made out of a flake, but of a flat nodule created by frostsplitting. The top part of the handaxe, especially along one of its sides over 2-3 cm, is more heavily rounded than the rest of its surface, probably as a result of use (just as one of the other handaxes described in the main text). Digging into the soil seems to be an option; unfortunately, use-wear analysis is precluded by the heavy secondary surface modifications.

A broken-off tip of a handaxe is illustrated in Figure 28 (right). Its length is 2.2 cm, and its weight is c. 6 g. The fragment shows clear bifacial working, probably by soft percussion; it has a symmetrical biconvex cross-section. The break surface shows the same types of natural surface modifications as the two faces, in the same degree, and could therefore have originated either during manufacture (end-shock), or as a result of use. The last possibility seems the most probable, also given the results of some experiments by one of us (L.J.) showing that this kind of break, more or less transverse and with a small lip at one of its ends, can arise during work in which heavy pressure from one of the faces occurred.

In total, we now have 79 artefacts from the site, of which no less than 12 are handaxes or handaxe-like tools (15%). The other artefacts are classified as: 1 blade fragment with some scraper retouche and ventral thinning, 1 possibly retouched flake, 5 cores (non-Levallois), 1 Levallois blade, 3 fragments of rather large blades, and 56 flakes, two of which are probable handaxe flakes.

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