BRONZE AGE SETTLEMENT FLINT FROM THE NETHERLANDS: the Cinderella of Lithic Research

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Abstract: In this paper some basic characteristics of Dutch Bronze Age flint assemblages from settlements in the Central Netherlands are discussed, with special reference to raw materials, core-reduction strategies and typo-morphological aspects. Special attention is paid to the use-wear analyses of formal and informal tool-types.
Keywords: Netherlands, Late Neolithic, Bronze Age, settlement flint, raw material, technology, typology, use-wear.

1. Introduction and objectives

In the Netherlands research into the Bronze Age has traditionally been directed at the study of features, structures (Theunissen, 1999), graves (Lohof, 1991) and non-stone finds such as pottery (Lanting, 1973) or bronze (the most recent of a series of seminal articles: Butler & Steegstra, 2000). Apart from flint artefacts from graves, such as daggers, arrowheads, planoconvex knives and other types (Lanting, 1973; Lohof, 1991) little is known about the domestic use of flint, a few exceptions aside (Hristova, 1984). For this lack of research interest several explanations can be put forward. First of all, the importance of flint during the Bronze Age was and is underestimated, because of the implicit assumption that with the advent of metallurgy, flint would have lost its functional value. Secondly, many late Neolithic and Bronze Age sites are located on higher sandy soils where the remains are not stratigraphically separated from older Stone Age material. Lastly, the assemblages can, in general, be characterised as "poor" and consist of small and unattractive artefacts compared to flint from earlier periods. In the past few years this situation has gradually begun to change, mainly as a result of large-scale excavations in the central part of the Netherlands. The construction of a new railway, the Betuweroute, has led to the excavation of several sites dating from the Late Neolithic to well into the Middle Bronze Age (fig. 1). In addition to finds such as pottery, faunal remains, features and house-plans, quantities of flint and other stones have been found on all these sites. The analysis of this flint material has produced a wealth of data concerning the everyday use of flint. Although the taphonomy of the various sites (see below) does not allow a differentiation within the trajectory of the Late Neolithic to the Middle Bronze Age with respect to flint technology and use, the general trends are becoming apparent.

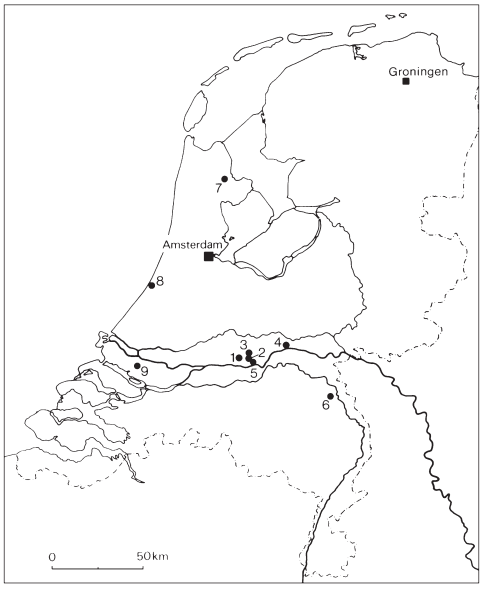

Fig. 1. Location of the sites mentioned in this paper: 1. Eigenblok; 2. De Bogen (including Voetakker); 3. Boog C-Noord; 4. Lienden; 5. Lage Blok; 6. Boxmeer; 7. Twisk; 8. Noordwijk; 9. Hekelingen. The sites 1-5 were excavated as part of the Betuweroute project.

This paper does not intend to provide an exhaustive survey of these results. Rather, the objective of this paper is to outline the technological features, the typo-morphological variability and the use of flint tools, in order to shed some light on the significance of flint for everyday life in the Bronze Age. So far, very little is known about the relationship between metal and stone technology, even though the two technologies existed side by side for several centuries. Understanding

the role of Bronze Age settlement flint is needed before this relationship and the changes that took place through time can be examined.

2. The sample

The sites presented in this article, all studied within the context of the Betuwe-railway construction, include Eigenblok (Jongste, 1996; Bulten, 1997; Jongste & Van Wijngaarden, in press), Boog C-Noord (Jongste & Smits, 1998; Schoneveld & Gehasse, in prep.), De Bogen (Jongste & Smits, 1998; Meijlink & Kranendonk, in prep.), Voetakker (Bulten & Smits, 1998) and Lienden (Sier & Drenth, 1999; Siemons & Sier, 1999; Schoneveld & Kranendonk, in prep.). The dates mentioned below are not ^{14}C-dates from the sites themselves (these will be published in the final reports), but generally accepted dates, in calibrated years BC, for the archaeologically defined periods (mainly after Fokkens, 1998 and Theunissen, 1999).

The site Boog C-Noord can be dated to the Late Neolithic B and the Early Bronze Age (2500-1800 BC) with an emphasis on the Early Bronze Age (*c*. 2000-1800 BC). The site could not be excavated completely, but the lack of clear house-plans combined with a specific flint inventory suggests that it may constitute a special activity area rather than an actual settlement.

The settlement area of De Bogen consists of several spatially separated concentrations of artefacts and features. Site 28-1, sometimes also referred to as Voetakker, is a palimpsest of Late Neolithic to Middle Bronze Age material, but mainly dates to the transition from the Early (*c*. 2000-1800 BC) to the Middle Bronze Age A (*c*. 1800-1500 BC). Several house-plans have been identified and it probably constitutes a continuously occupied settlement site. At sites 29, 30 and 45 occupation took place from the Late Neolithic B (*c*. 2500-2000 BC) into the Middle Bronze Age B (*c*. 1500-1100 BC). The southern part of site 29 was analysed separately from the rest of the site because it consists of a more-or-less isolated concentration of artefacts that may date to a shorter period *i.e.* Late Neolithic/Early Bronze Age. The sites 28-2 and 28-4 date from the Late Neolithic/Early Bronze Age to the Middle Bronze Age (*c*. 2500-1100 BC), while 28-3 must be dated to the Middle Bronze Age (*c*. 1800-1100 BC). House-plans are present at most of the sites. Site 28-4 is comparable to Voetakker in the sense that several partially overlapping house-plans are present.

Both Eigenblok and Lienden consist of several sites but the bulk of the finds belongs to the Middle Bronze Age, more specifically the end of the Middle Bronze Age A (*c*. 1800-1500 BC) or the beginning of the Middle Bronze Age B (*c*. 1500-1100 BC). Material from the Late Neolithic/Early Bronze Age and Early Bronze Age has also been found at both locations but in general these find layers are separated from the later periods. House-plans are present at both Eigenblok and Lienden.

3. Raw material and technology

All the sites mentioned in paragraph 2 are located in the central part of the Netherlands. This area consists mainly of Holocene fluviatile deposits in which larger stones are virtually absent. Gravel-bearing Pleistocene deposits are present at greater depth, but thick layers of more recent sediments cover them. All lithic raw material must, therefore, have been brought in from outside the river delta. In table 1 the excavated assemblages are subdivided according to different types of raw material. If present, the natural surface of the artefacts clearly indicates an origin in fluviatile deposits, for example the Veghel Formation, which is present in large parts of the Central and Southern Netherlands. Most of the artefacts are made from so-called “terrace-flint” that is composed of relatively small and irregular nodules. The outer surface usually displays signs of rolling (gloss, scratches, abrasion etc) in an active, gravel-bearing riverbed. This also applies to the homogeneous group of “Meuse-eggs”, rounded flint pebbles with a dark-grey to black surface which occur in sediments from the rivers Meuse and Rhine (Arora, 1980). The texture of the flint varies from moderately fine-grained to coarse-grained. The relatively small size of the nodules can be illustrated by examining the average length and width of the nodules. At Boog C-Noord, for

instance, there are fourteen nodules (both terrace-flint and Meuse-eggs) with an average length and width of 3,1 and 2,1 cm respectively (Niekus, Van Gijn & Lammers in prep.) At Lienden (Niekus, Huisman, Van Gijn & Lammers in prep.) the average measurements are 3,0 and 2,3 cm (N=18). Both types can be found upstream, at or near the surface of pleistocene river terraces. The pleistocene fluviatile deposits in the ice-pushed ridges in the Central Netherlands could have been a source of raw material too, since part of the Veghel Formation has become incorporated in the ridges. The distance from the sites to these sources, east and north of the river delta, ranges from approximately 10 to 30 kilometres. All sites have produced low numbers of erratic flint of Baltic origin. This type, with frost fissures, windgloss and scratches, was deposited during the Saale glaciation and can be found in moraine deposits, which are also present in the ice-pushed area to the north and east of the sites. The other "southern" types of flint, Rijckholt (Rademakers, 1998), Rullen (De Warrimont, 1998), Valkenburg (Brounen & Ploegaert, 1992) and light-grey Belgian flint (Cahen, Caspar & Otte, 1986) were clearly of minor importance as a raw material. Although some of these flints may have been brought in from a primary source either as raw material, blanks or as finished products, this does not apply to all of them. Some of these "exotic" artefacts display signs of rolling that point to an origin in a secondary source. It is known that Rijckholt-type flint for example occurs in deposits of the Veghel Formation (Brounen & Ploegaert, 1992) and its presence does not necessarily imply that it was imported from the mines at Rijckholt-St. Geertruid. Another plausible explanation may be that artefacts of these types of flint are "pick-ups" from other sites at the higher sandy soils. This is most certainly the case with Wommersom-quartzite originating in the vicinity of Tienen (Belgium) a raw material that was frequently used during the Middle and Late Mesolithic (Arts, 1989). Finally, mention must be made of a polished axe flake made of a type of flint originating in Helgoland (Beuker, 1988) found at De Bogen (Niekus, Van Gijn, Lammers & Schreurs, in prep.).

The core-reduction strategies used at the sites were clearly influenced by the quality and size of the raw materials. In general the technology can be described as an *ad hoc* strategy aimed at the production of flakes. Most of the tools are made from flakes while regular blades and blade-cores

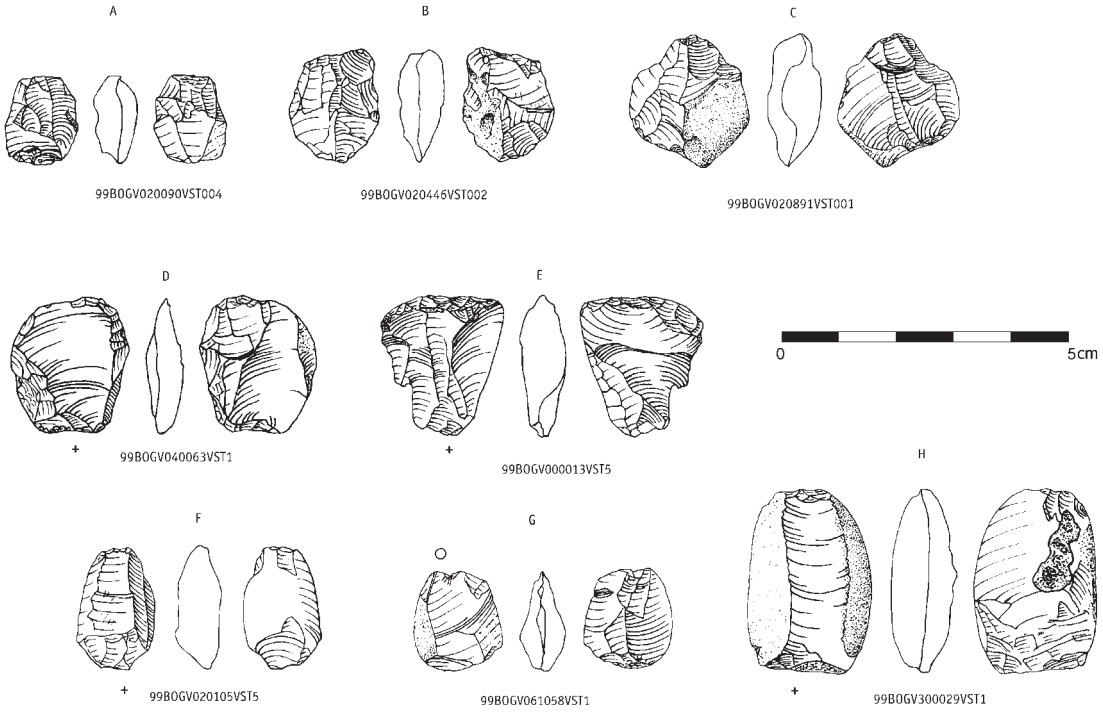

Fig. 2. Bipolar cores (a-c) and bipolar flakes (d-h) from De Bogen. Key to artefact drawings: dense stippling = remains of cortex; stippling and stripes = old frost-split faces; plus sign = position of percussion point; open circle = position of point of percussion where it is no longer present.

are rare. The blades themselves are more blade-like flakes, which were not systematically produced. There are tow main core-types: unidirectional or single platform cores and multidirectional cores. Two or three core reduction strategies can be discerned, based on characteristics of both flakes and cores: hard hammer percussion, bipolar flaking and possibly percussion with a softer hammer such as an antler billet or other soft materials. In bipolar flaking (Hayden, 1980; Andrefsky, 1998) a nodule is smashed between a hammerstone and a stone anvil. Bipolar flaking is also attested by the presence of anvils, made of rock types other than flint. In this way it is possible to maximise raw materials by producing flakes, even when the nodules are very small or when the cores became too small to be handheld (figs. 2a-c). The technique was also used to "open" rounded nodules, such as Meuse-eggs. Hard hammer percussion and bipolar flaking have been identified on all sites. At this moment it is not clear whether the techniques were used simultaneously or whether hard hammer percussion was used at the initial stages of core-reduction (testing of nodules and cortex removal), with bipolar flaking especially being employed when the cores became too small. The bipolar flakes (figs. 2d-h) are generally characterised by a flat ventral surface, absence of a clear bulb of force and crushed or sheared striking platforms (if present) on opposite ends. Furthermore they are sometimes wedge-shaped in side-view. These characteristics, and especially the signs of crushing, may lead to difficulties when attempting to separate the bipolar products from actually used splintered pieces (see also paragraph 4). Voetakker (site 28-1) is the only site for which there is evidence for systematic use of soft hammer percussion: weakly developed bulbs and ripple marks and small punctiform striking platforms. At the other sites flakes with these characteristics are either absent or rare.

4. Typological variation

The typological variation of the assemblages is presented in table 3. Formal tools include scrapers, (planoconvex) knives, borers/reamers, points, and strike-a-lights. Informal tools such as retouched flakes predominate. It should be stressed, however, that it is not always clear where to draw the line between two types as we define them. For example, the difference between a scraper and a retouched flake is a gradual one. This is not surprising because the users may just have wanted a proper tool for the immediate task, i.e. a convex slightly blunt edge for hide working and not a scraper. This idea is supported by ethnographic observations of native classifications of implements (White, Modjeska & Hipuya, 1977).

Retouched pieces are a very common tool type. The retouch is often rather irregular and seemingly quickly applied, as the need arose. In most cases flakes were used, but occasionally retouched blades and other types of blanks (cores, blocks etc.) were chosen as well.

Scrapers are the most frequently occurring formal tool type at all of the sites. At Boog C-Noord they constitute the largest component of the total number of tools. Generally speaking, they can be characterised as short end scrapers, almost always produced on flakes. In addition there are side scrapers and round scrapers. Probably, scrapers were frequently resharpend, as some of the edges have very obtuse angles and resharpening flakes were found at Boog C-Noord and Eigenblok (Van Gijssel, *et al*., in press). Many of the scrapers were probably hafted; on some tools vague traces of resin can still be observed.

Splintered pieces, which are mostly produced on flakes, are a difficult tool type. They show crushing and splintering in the shape of a buildup of step or hinge fractures. These stacked step and hinge fractures are supposed to be the result of impact. Similar features have experimentally been reproduced by using bipolar reduction and by using a flake as a wedge on hard contact materials such as bone or wood (Hayden, 1980; Van Gijn, pers. observ.). In the assemblages described the stacked fractures have been observed on one or on two sides of the implement.

Knives, in most cases, are of the planoconvex type, a tool often considered to be very typical of Late Neolithic and Early Bronze Age assemblages (Lanting, 1973). The dorsal surface displays invasive retouch, applied by pressure flaking, whereas the ventral surface is usually only retouched

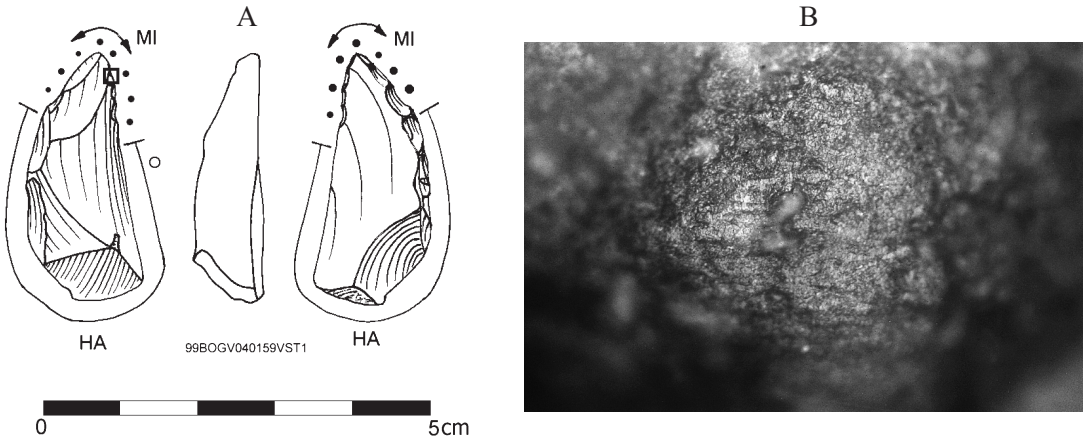

Fig. 3. A tool from De Bogen (site 30) initially classified as a strike-a-light, but actually used as a hafted borer on mineral material; A. the tool with location of use and hafting (the black square indicates the area seen on the photograph); B. heavy rounding and matt polish (200x). Key to use-wear symbols: MI = mineral; HA = hafting.

along the edges. Sometimes more bifacially retouched implements occur. The bulb of percussion is frequently removed by retouch, possibly in order to facilitate hafting.

Points are mostly of the triangularly shaped variety, but barbed and tanged arrowheads also occur. They display relatively fine workmanship, the retouch being regular and invasive, probably as a result of pressure retouch. Triangular points have bases, which may vary from concave to straight. The implements are often very flat, with the bulb of percussion carefully removed by retouching. They do not differ from the arrowheads found in graves.

Borers and reamers were found on all sites, albeit in small numbers. Borers have a bifacially retouched tip, whereas reamers have retouch on only one aspect of their tip. Incidentally, these implements show signs of hafting, for example, the heavily used borer from De Bogen site 30 (fig. 3).

Strike-a-lights are characterised by the presence of heavily rounded, slightly crushed tips. This crushing is due to the impact from striking pyrite, a rather soft stone that produces long lasting sparks when struck. Most of these tools are made on blades or blade-like flakes (fig. 4). In a few cases it seems that special raw material was selected for their production, differing from the ubiquitous Meuse-eggs and terrace-flint. They have been recognised as a tool type in several Late Palaeolithic traditions (Stapert & Johansen, 1999) and are also known from the Funnel Beaker Culture (De Groot, 1988; Van Gijn, pers. observ.) in the Netherlands. Several were found in late Neolithic Swiss lakeside dwellings (Beugnier & Petrequin, 1997), but until now they have rarely been identified in our region on Late Neolithic and Bronze Age sites. Although artefacts with rounded ends do occur in settlements and graves they have not been examined microscopically, apart from one possible strike-a-light from a Late Neolithic or Early Bronze Age site in the northern part of the Netherlands (Johansen *et al.*, in prep.).

In addition to the above-mentioned tools there are some combination tools, notched, denticulate and truncated pieces, a few burins, polished axe fragments and flint hammerstones (sometimes reused cores). One of the most remarkable finds, from the site Boog C-Noord, is a fragment of a dagger, probably its tip. It displays invasive retouch and is made of a fine-grained flint of unknown origin.

5. Function

Samples of different sizes were selected for the study of traces of wear. Only a very small pilot study was made of the Eigenblok (N=19) and Lienden (N=17) material. Larger samples were studied from Boog C-Noord (N=79) and Voetakker 28-1 (N=45). A total of 23 artefacts were examined from site 30, 33 from site 29, and 20 implements from site 45. A total of 12 artefacts were studied from sites 28-2, 28-3 and 28-4. The samples include both retouched implements and,

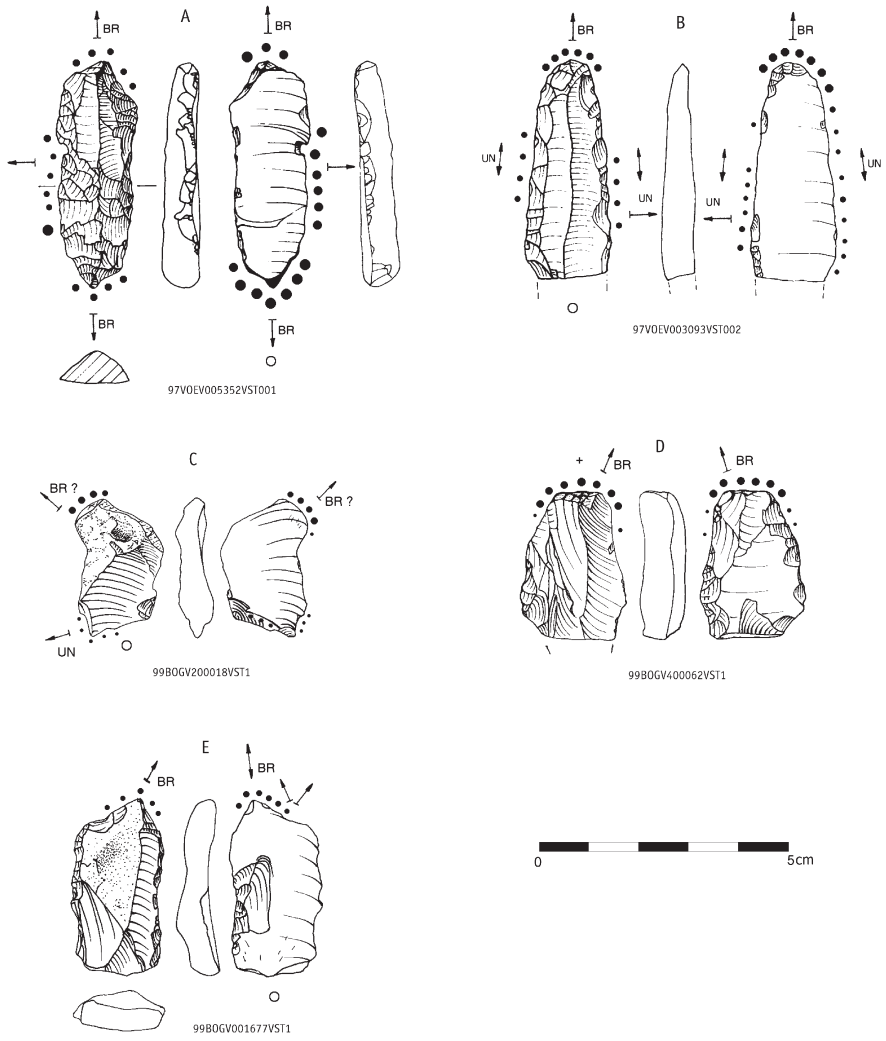

Fig. 4. Strike-a-lights from De Bogen: A. (site 28-1); B. (site 28-1); C. (site 28-2); D. (site 28-4); E. (site 45). Key: BR = briquet (strike-a-light); UN = unspecified.

to a lesser extent, also unretouched artefacts. Stereo-microscopes with both oblique and reflected light and magnifications ranging from 10-160 x were used for examining use retouch and edge rounding. A metallographic incident light microscope, with magnifications up to 1000 x, was used for the examination and interpretation of polish and striations. It is at magnifications between 200-300 x that variations in polish become visible, allowing an interpretation of contact material (see Van Gijn, 1990; Van den Dries & Van Gijn, 1997).

A wide variety of activities is represented by the wear traces on the flint implements. This suggests that the sites reported in this paper are probably settlement sites and not special purpose locations. One possible exception is Boog C-Noord where an unusually large number of hide working implements has been found, suggesting we may be dealing here with a special purpose area, either spatially isolated or part of a "normal" settlement.

Wear traces from working hide are seen on a large number of scrapers and also on some knives. There seems to be some variation in the character of the wear traces, indicating that different stages of hide processing are represented. All of the hide working implements display the typical rounded edge with a band of polish following every indentation of the edge (fig. 5). In most instances it was not possible to specify further the state of the hide during work. However, some scrapers display rounding to an extent never experimentally observed, unless substances were added during the scraping (figs. 6 and 7). This could have been done to facilitate the removal of the subcutaneous fat

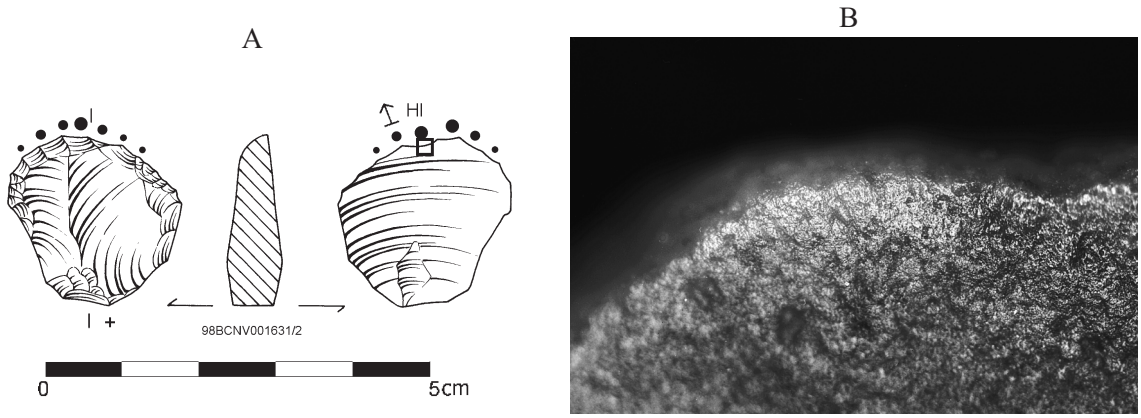

Fig. 5. Scraper from Boog C-Noord with typical hide working traces, but without mineral additives; A. the tool with location of wear (the black square indicates the area seen on the photograph); B. rounded edge with a band of polish following every indentation of the scraper-edge (200x). Key: HI = hide.

during the initial cleaning of the fresh hide or, alternatively, additives could be used during the curing process. For the first, one could think of sand or flour, all substances, which can absorb the moist subcutaneous fat of fur animals. For curing hides different mineral additions are possible, powdered ochre being the best known. Traces of ochre have not been observed on the scrapers, however. Hopefully continued experimentation with various stages and techniques of hide processing may help to explain the observed variation in archaeological hide working traces.

Several implements show traces of having been used as strike-a-lights. All implements interpreted as such have a more-or-less protruding point to strike pyrite. This tip is heavily rounded,

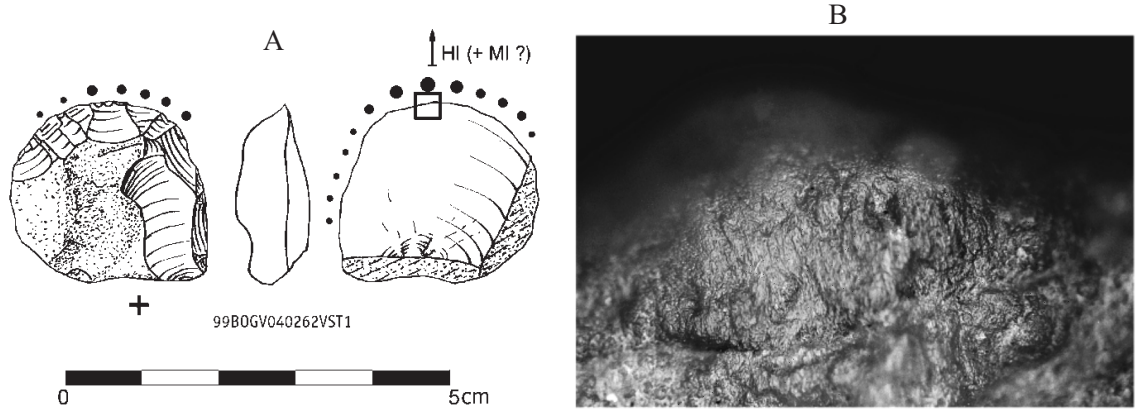

Fig. 6. Scraper from De Bogen (site 30) used to scrape hide with the possible addition of some mineral component: A. the implement with location of the wear traces (the black square indicates the area seen on the photograph); B. detail of the scraper that shows extensive rounding of the scraper-edge (200x). Key: HI = hide; MI ? = possible mineral additive.

displaying a dense concentration of small impact points and a rough, dull, linearly distributed polish (fig. 8). The entire piece is glossy and all the ridges and edges are rounded. This is most probably due to the fact that striking the pyrite creates a fine dust, which will act as an abrasive between the hands and the stone surface. Most of the tools seem to have had a very long use life, considering the observation that some have been used on two sides and that nearly all strike-a-lights display very heavily developed traces of use (fig. 9). They are frequently made on relatively long blades and blade-like flakes, which would facilitate holding the implement. The extent to which the entire tool is worn suggests it was not hafted but rather held in the hand. It was probably carried around for immediate use when the need arose. The strike-a-lights must be con-

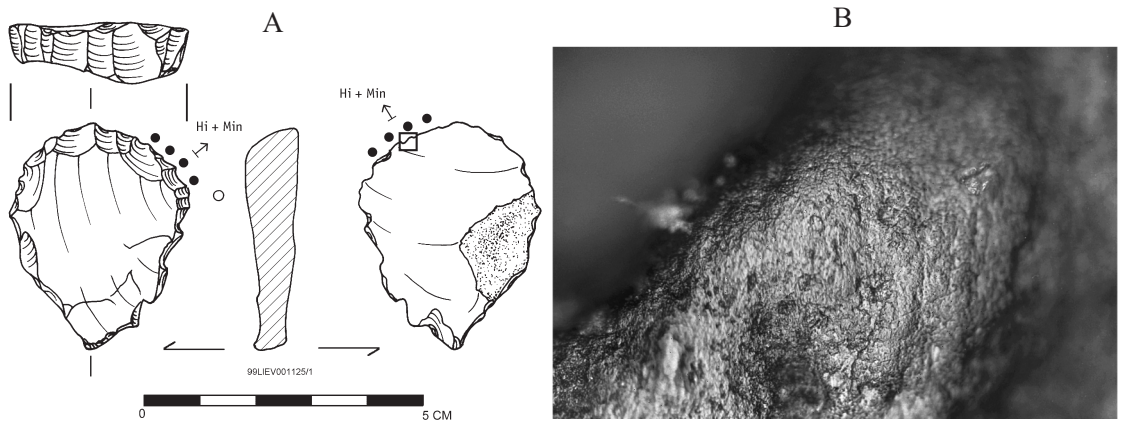

Fig. 7. Scraper from Lienden used to scrape hide with mineral additive; A. the tool with location of wear (the black square indicates the area seen on the photograph); B. detail of the scraper-edge displaying extreme rounding (200x). Key: Hi + Min: hide with mineral additive.

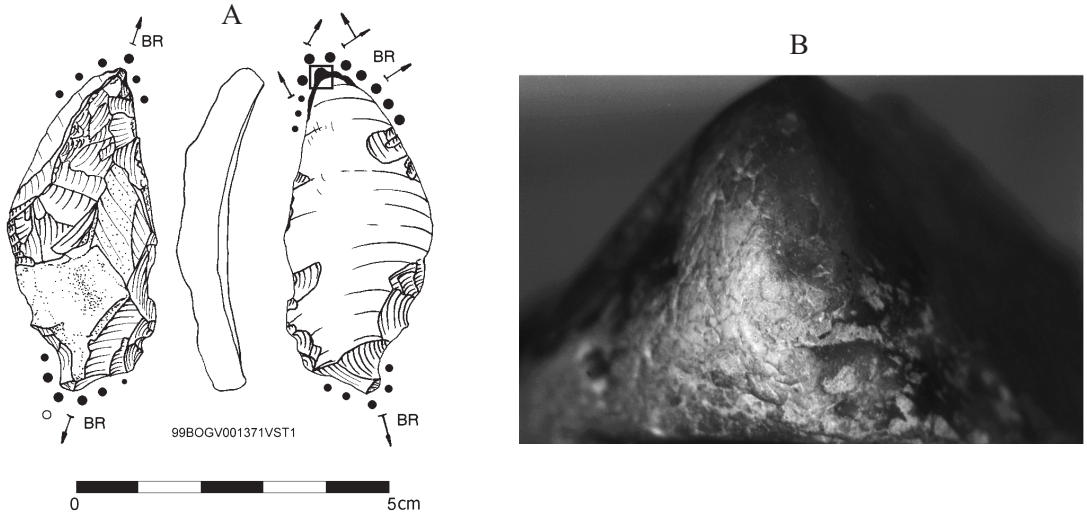

Fig. 8. Strike-a-light from De Bogen (site 45): A. the tool that has been used on two sides (the black square indicates the area seen on the photograph); B. dense concentration of small impact points. Photo taken by stereoscope (40x). Key: BR = briquet (strike-a-light).

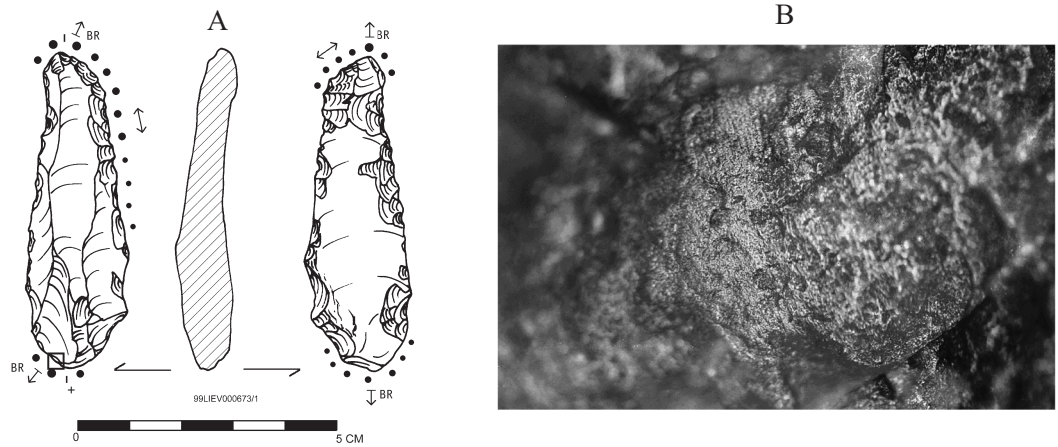

Fig. 9. Strike-a-light from Lienden: A. the tool with the two locations of use (the black square indicates the area seen on the photograph); B. a rough and dull, linearly distributed polish (200x). Key: BR = briquet.

sidered curated implements and may be part of the personal tool-kit kept with the individual. Typologically the tools are not uniform: some were initially classified as reamer or pointed retouched blade and only after the use wear analysis were they identifued as strike-a-lights.

Splintered pieces display traces of use in some cases, but the traces on these tools are not very well developed. Experiments using splintered pieces as wedges on hard contact materials, such as bone or wood, always produce more-or-less extensive polish on both aspects, distributed in a linear fashion. In addition, stacked step and hinge fractures develop, which are very similar to the ones caused by bipolar reduction. The linear traces of polish have only been observed on a small number of the archaeological splintered implements. This could imply that splintered pieces are a result of bipolar reduction and not a specific tool type. Nevertheless, a few splintered pieces (figs. 10a-c) do display traces of use, indicating that the issue is not yet resolved. Most likely both explanations are valid, with some splintered pieces being only the by-product of bipolar flaking, others having obtained their characteristic stacked fractures and incidental polish spots from use.

A few arrowheads have also been found in the various settlements, especially de Bogen site 28-1. Quite a number display impact traces from use as a projectile. The fact they have been found in settlement contexts could indicate that the arrows were retooled here (Keeley, 1982). Although finely shaped arrowheads are generally associated with graves, they frequently occur in settlement context and can be considered part of the personal tool-kits of some individuals. In this respect it is interesting to note that four Late Neolithic/Early Bronze Age arrowheads have been found at Boog C-Noord representing three different point types.

Retouched flakes and, to a lesser extent, blades were frequently used (fig. 10d). Even unretouched artefacts were often used, an observation made before at the Late Neolithic site of Hekelingen III (Van Gijn, 1990). The flint is much better preserved at this site than at the sites described here. This means the chance of finding wear traces from contact with softer material or from brief moments of use was much greater at Hekelingen III (fig. 1, no. 9) than at most of our Bronze Age sites (Van den Dries & Van Gijn, 1997). Considering the probability that many of the informal tools (*eg* as retouched and unretouched flakes) were used only briefly, it is likely that such tools are under-represented in the results.

The dagger fragment from Boog C-Noord displays a very bright, rather flat polish, probably resulting from contact with plant material. The polish is most prominent on the ventral and dorsal ridges and is not confined to the edges of the tool. This same distribution has been noticed on a number of complete daggers of Grand-Pressigny flint from the Netherlands (Van Gijn, in prep.). If these tools were used for cutting plants, most of the polish would have been located on the lateral (functional) edges. Instead they show no evidence of more intensive damage along their edges, which actually seem, apart from the ubiquitous plant polish, to be quite devoid of use wear traces. It is suggested that this configuration of wear is due to recurrent contact with a sheath, made of woven plant material. The extensive development of the wear may be attributed to pulling the dagger frequently in and out of the sheath, causing polish over the entire surface and mostly on the protruding dorsal and ventral ridges. The fact that the edges of the dagger did not display strong wear traces may indicate that the dagger was not used for daily subsistence or craft activities. Instead, the dagger may have had an ideological function, to be displayed publicly at social or ritual gatherings.

To summarize, use wear analysis has shown that flint tools were used for a great variety of domestic activities. Arrowheads showed traces of use and their presence in settlement context may be related to retooling activities. The strike-a-lights are noteworthy; all are heavily used implements which have clearly been curated and may also have formed part of personal tool-kits. Many unretouched artefacts show traces of use, yet always on an edge clearly suitable for such use (fig. 10e-f). Evidently it was not so important to have a standardised tool type. The selection of tools was not *ad hoc*, but based on clear ideas of what constituted a suitable edge with respect to the task at hand.

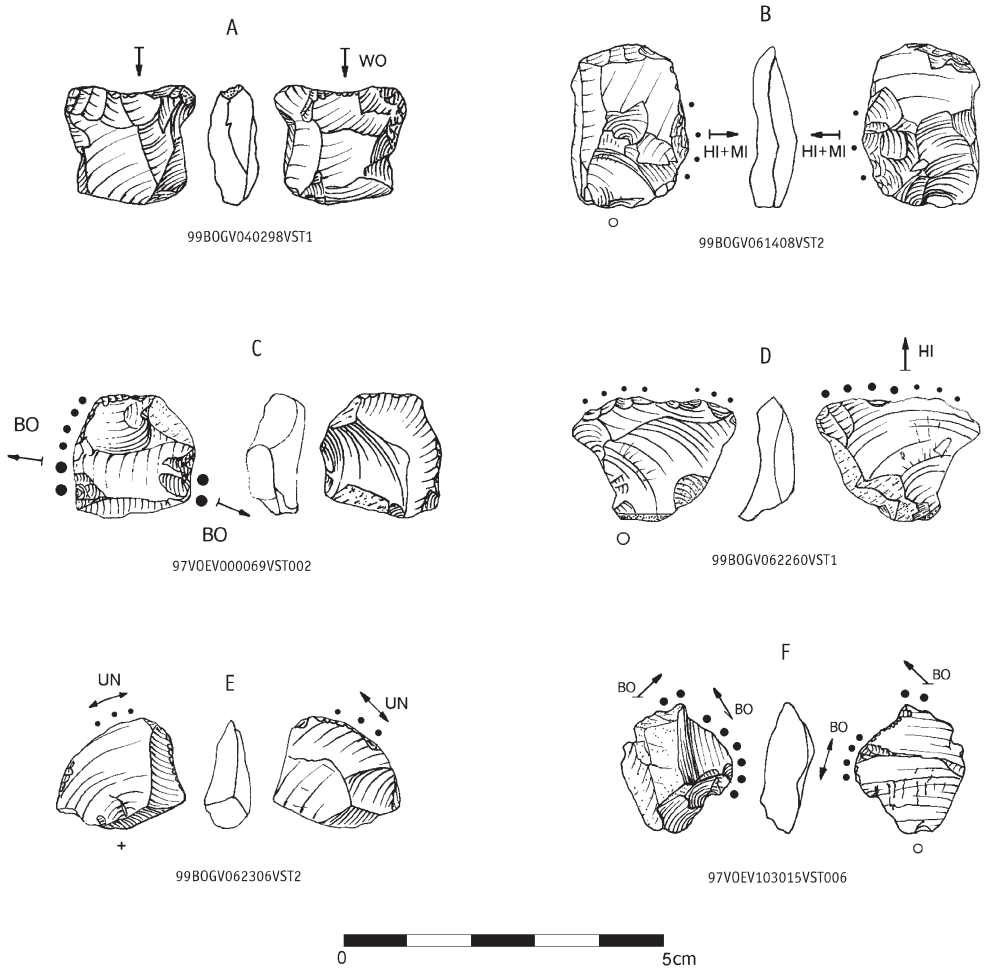

Fig. 10. Retouched and unretouched flakes and splintered pieces with traces of use from De Bogen: A. splintered piece used as a wedge on wood (site 30); B. splintered piece used to scrape hide with mineral additives (site 29); C. splintered piece used as a wedge on bone (site 28-1); D. retouched flake used to scrape hide (site 30); E. retouched flake used to cut unknown material (site 30); F. unretouched flake used on bone (site 28-1). Key to use-wear symbols: WO = wood; BO = bone; HI = hide; HI + MI= hide with mineral additive; UN = unspecified.

6. Conclusion

The artefact assemblages described in this article have produced a valuable set of data concerning the utilisation of flint in Bronze Age settlements in the Central Netherlands. During the Bronze Age, flint continued to play an important role in daily life, even though most of the raw material is small and of poor quality. The choice of these raw materials and the reduction strategies employed were clearly influenced by functional requirements. Consequently, most of the retouched artefacts are relatively small and simple when compared to earlier periods. At first sight the technology and use seem to be unpremeditated, but on closer examination the flint assemblages are nevertheless very standardised, displaying similar technological choices and way of use. A use wear study of the Late Neolithic flint from Hekelingen III for example indicates that here, too, a large number of unretouched artefacts showed traces of use. The technology is also directed at obtaining useful edges rather than at the manufacture of standardised tool types (Van Gijn, 1990). Other Dutch sites that are more-or-less similar in their technological and typo-morphological aspects are the Early Bronze Age site of Noordwijk (Peeters, in: Van Heeringen *et al*., 1998 with further references) and the Middle Bronze Age sites of Twisk (Hristova, 1984) and Boxmeer (Deeben, in: Hiddink, 2000) (see fig. 1, nos. 6-8). This trend is not unique to the Netherlands but can be observed in other areas as well, in both the Bronze Age and Iron Age (Arora, 1985, 1986; Bolus, 1999; Cahen, 1976).

An important question is why flint from Bronze Age settlements displays so few signs of careful workmanship, as compared to the implements from burials that attained a technological achievement not seen before. From the Neolithic onwards there seems to have been an inverse relationship between the efforts invested in the production of domestic flint as compared to flint grave goods, including the import of Scandinavian-type daggers as finished products (Beuker & Drenth, 1999). This process, which becomes more pronounced in the Late Neolithic period, continues well into the Middle and Late Bronze Age.

One possible explanation may have been that flint may lend itself less easily to the transmittance of stylistic messages of cultural identity than pottery and metal. This cannot be entirely true, because of the very fact that the grave goods from flint were invested highly with stylistic features. Moreover, the different types of arrowheads are often considered to be ideal mediums for displaying identity (Wiessner, 1983).

Another possible explanation for the relative lack of sophistication in the flint assemblages from the settlements may be that, as more metal tools became readily available, fewer activities were carried out with lithic artefacts. Less effort was therefore put into the manufacture of stone tools. An examination of British tool-types from the Late Neolithic to the Late Bronze Age indicates a progressive decrease through time in the number of types (Ford *et al*., 1984; Ford, 1987). The four types most commonly present in the Late Bronze Age of Britain are scrapers, awls, "rods" (often used as strike-a-lights), and knives (Ford *et al*., 1984: p. 166). In the sites presented here, this may be the case as well, but due to the lack of chronological control, this cannot be verified. The tendency towards a decrease in typological variation continues well into the Iron Age, as can be illustrated by the Middle Iron Age settlement of Lage Blok (fig. 1, no. 5) (Milojkovic & Smits, in prep.). During the excavation 81 pieces of flint were found, including only four scrapers and nine retouched pieces (Niekus, Huisman & Van Gijn, in prep.). Comparable observations have been made on Iron Age flint in Germany (Bolus, 1999) and Belgium (Cahen, 1976).

Yet another explanation for the lack of careful workmanship may be that in permanent agricultural settlements, there is no special need to have a fully prepared tool-kit for different subsistence tasks. There is no mobile prey to be caught in a split second, for which one needs a perfectly balanced arrow. In other words, if one did not have a perfect tool-kit, one did not risk loosing vital resources. Therefore, the majority of settlement flint looses its technological and morphological specificity. It is produced as the need arose and used for the most part in a rather expedient fashion. It may even be suggested that it became a woman's task (Gero, 1991) associated with domestic activities.

This last explanation for the lack of many standardized tool-types from Bronze Age settlement context seems to be quite a convincing one. Clearly, technological expertise in flintknapping was still available to the communities, as testified by the presence of beautifully made daggers, arrowheads and planoconvex knives (Lanting, 1973; Lohof, 1991) and to a lesser extent also in settlements. These implements clearly formed part of the personal tool-kit used during an individual's life, and were buried with that person after death. The virtual absence of complete daggers in settlement context (to our knowledge it only concerns fragments) may be due to their use in ritual and social context, instead of practical daily applications. As opposed to the arrowheads, which do show traces of having been used as projectiles and ended up in settlement assemblages due to retooling activities, the daggers display no regular wear traces, but seem to have been drawn in and out of a protective sheath. This was probably done for display during social gatherings.

The dichotomy between the flint assemblages from settlement and grave contexts may therefore not be as strong as it seems. A selection from the tool-kit used during life remained with the deceased: in making this selection, the improvised component used for domestic activities was largely left out. At the same time that great technological expertise was invested in certain tool-types which were kept by the individual during his/her lifetime and accompanied the individual after death, the flint technology used in domestic contexts was made and used on an impromtu basis more often. Gradually metal tools took over various functional applications and a sedentary life made the preparation of specialized tool-kits superfluous.

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Table 1. Lithic raw material contents of Late Neolithic and Bronze Age sites in the Central Netherlands.

	Bogen 28-1	Dogen 28-2/3/4	Bogen 30	Bogen 29-South	Bogen 29-North	Bogen 45	Eigenblok	Boog C-Noord	Lienden	Total
Terrace	504	30		212	215	140	128	655	66	2195
Baltic	10	1	12	3	10	4	2	12	1	55
Meuse-eggs	22	2	2	1	2	1	2	12	10	54
Rijckholt-type	4	0	0	0	0	0	2	2	0	8
Light-gray Belgian	3	0	0	0	0	0	2	0	0	5
Valkenburg	0	0	0	0	0	0	0	3	0	3
Wommersom-quartzite	2	0	0	0	0	0	0	1	0	3
Rullen	0	0	0	0	0	0	1	0	0	1
Helgoland	0	0	0	0	0	1	0	0	0	1
Total	**1312**	**67**	**621**	**443**	**475**	**510**	**400**	**1432**	**259**	**5519**

Table 2. Artefact composition of Late Neolithic and Bronze Age sites in the Central Netherlands.

	Bogen 28-1	Bogen 28-2/3/4	Bogen 30	Bogen 29-South	Bogen 29-North	Bogen 45	Eigenblok	Boog C-Noord	Lienden	Total
Flakes and spalls	637	30	410	289	271	358	252	877	76	3200
Blades	18	1	6	3	7	2	3	12	2	54
Prep./rejuv. pieces	10	1	12	10	14	9	4	27	5	92
Cores	94	3	37	23	27	13	20	62	31	310
Blocks	238	8	51	50	43	56	42	185	77	750
Nodules (manuports)	41	2	5	4	11	2	15	14	26	120
Potlids	38	2	26	10	19	22	12	30	21	180
Subtotal	*1076*	*47*	*547*	*389*	*392*	*462*	*348*	*1207*	*238*	*4706*
"Tools"	***236***	***20***	***74***	***54***	***83***	***48***	***52***	***225***	***21***	***813***
Total	**1312**	**67**	**621**	**443**	**475**	**510**	**400**	**1432**	**259**	**5519**

Table 3. Subdivision of tool types of Late Neolithic and Bronze Age sites in the Central Netherlands. NB: some strike-a-lights have been typologically classified as reamer of knive and therefore do not figure in this table.

	Bogen 28-1	Bogen 28-2/3/4	Bogen 30	Bogen 29-South	Bogen 29-North	Bogen 45	Eigenblok	Boog C-Noord	Lienden	Total
Retouched pieces	66	3	28	22	32	19	16	95	8	289
Scrapers	74	6	23	19	36	13	19	64	2	256
Splintered pieces	47	1	4	2	2	2	7	19	0	84
Knives	10	1	4	4	6	3	0	10	1	37
Points	13	1	5	2	3	3	2	5	2	36
Borers/reamers	9	3	2	4	1	3	2	9	1	34
Truncated/notched pieces	5	0	0	1	2	2	0	11	2	23
Axefragments	8	2	5	0	1	1	0	4	1	22
Strike-a-lights	0	1	1	0	0	2	0	0	1	5
Hammerstones	0	1	0	0	0	0	3	1	2	7
Combination tools	3	0	2	0	0	0	0	0	1	6
Miscellaneous tools	1	1	0	0	0	0	0	1	0	3
Toolfragments	0	0	0	0	0	0	3	6	0	9
Total	**236**	**20**	**74**	**54**	**83**	**48**	**52**	**225**	**21**	**813**