FLINT IN FOCUS

Lithic Biographies in the Neolithic and Bronze Age

ANNELOU VAN GIJN

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Symbols used in the figures

Contact material / activity
(in alphabetical order)

BO	bone
BR	striking fire
CE	cereals
DH	dry hide
HA	hafting
HI	hide
HI/MI	hide with mineral additives
JE	jet
MI	mineral
PL	plant
SH	shooting
SIPL	siliceous plants
SIPL/HI	resembling polish from both siliceous plants and hide
ST	stone
UN	unknown
WO	wood
'10'	polish 10
'23'	polish 23
'23' a	polish 23 rough aspect
'23' b	polish 23 smooth aspect
'23' a+b	polish 23 mixed

Motion

↔	longitudinal
↥	transverse / scraping
↧	impact
↷	drilling / boring
◡	hafting

Degree of use

●	heavily developed traces
•	medium developed traces
·	lightly developed traces

Other

x	resin / tar
+	friction gloss

Acknowledgements

This book owes much to many and, as it contains the results of 25 year of research, I am bound to forget to mention some people who have contributed towards its completion. My apologies to those whom I accidentally forgot. I will remember you tomorrow!

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Preface

The present project started as a post-doctoral fellowship, entitled *The meaning of flint for Neolithic and Bronze Age societies in the Netherlands* (NWO, N 78-95, from 1995-2000). The objective was to study the choices past people made with regards to their flint tools through the Neolithic and Bronze Age up until the time that flint was replaced by metal technology. These choices encompassed the selection of raw materials, the actual manufacture and the use to which an object was put. The emphasis lay on the reconstruction of the function of flint objects, by means of use-wear and residue studies. The intention was to examine samples of flint from various contexts, including settlements, burials and special depositions. The project clearly suffered from *hubris*, as it quickly turned out to be very difficult to incorporate representative samples from all these contexts. Examining burial gifts and hoards proved to be far more complicated than I anticipated as many finds were either lost, locked away in storage depots or were in such bad state that detailed functional analysis proved to be impossible. Also, the numbers needed for a representative sample were enormous and way beyond anything that could be done within the time span of the five years of the duration of the project. Last, several large commercial projects came my way, projects that were so interesting that they could not be turned down but definitely slowed down my progress.

The project therefore stranded and it was not until I was invited to spend a year at the Netherlands Institute for Advanced Studies in Wassenaar in 2006-2007 that I was able to face the task of pulling together the enormous amount of data gathered through the 25 years that I had been studying Neolithic and Bronze Age flint assemblages from the present-day Netherlands. This book is largely based on the data from c.25 settlement sites, resulting in c. 45.000 records, out of which more than 3000 implements were subjected to a use-wear study. In addition a total of almost 500 flint objects from burials and special depositions were microscopically examined. Occasional reference will be made to observations made after the beginning of 2008 or before 1984 when the Laboratory of Artefact Studies was founded. To deal with the problem of representativity, I decided to approach this large quantity of data from a different, more thematic angle. I wanted to understand the role of flint in various spheres of past life, from subsistence, to the expression and negotiation of identity, to the dealings with the ancestors. How did flint objects figure in all these different domains of prehistoric life? Flint is often mistakenly seen as something quite mundane and for the most part linked with the daily chores of obtaining food and making various utilitarian objects. However flint is intimately entwined with other spheres of life and lends itself to an interpretative archaeological framework. The concept of the cultural biography of objects opened up a different way of looking at 'flint as things' and to study their meaning for past societies (Appadurai 1986; Kopytoff 1986). I also became increasingly aware of the actual properties of flint objects and how detailed knowledge of use-wear and residue on the flint objects could contribute to our understanding of social processes and past belief systems. The objective of this book therefore is to understand what kind of roles flint objects had in past society and how these roles changed through time.

Geographically I have limited myself to flint from the present-day Netherlands, knowing very well that this is completely arbitrary in terms of prehistoric patterns. In terms of time, the data span the period from c. 5300-600 BC, the period from the earliest Neolithic to the Iron Age. Although this choice of time and place is largely governed by my own particular research history, the region of the Netherlands is actually very relevant for the time period involved. It is an area where 'Mesolithic' traditions, a reliance on natural food resources, persisted for a very long time despite the introduction of agriculture, only to be fully disappearing towards the Middle Bronze Age. It is thus a highly relevant area to study the neolithisation process from a lithic perspective: how is flint used to negotiate this new farmer identity? Moreover, the region of the Netherlands is of old dissected by the delta of Rhine and Meuse, causing the development of cultural areas with different interaction spheres: the area south and east of the rivers and the one north and west of it. This provides an excellent opportunity to examine the role of flint objects in the expression of the relationship between different groups of people.

This book should be seen as work in progress. As we continue to study objects from the past, and take a new look at existing data with a different perspective, it is possible that some of the conclusions in this book may well have to be revised. However, I hope to show that studying the often unattractive Neolithic and Bronze Age flint can be worth the effort. Flint is more than a mundane and utilitarian material. More importantly, I hope to convey the importance of use-wear and residue studies for a better understanding of the cultural biography of objects. The microscopic data on the 'wear and tear' of flint objects will be at the heart of this book. They provide new evidence for the role flint objects played in Neolithic and Bronze Age societies, evidence that was hitherto not available. By incorporating functional evidence about actual use, and combining this with other lines of information, we can search for patterns in the archaeological record, patterns that may give a clearer insight into the meaning that flint tools once had for prehistoric society.

Chapter 1

Introduction

"Social relations have no substantive reality without objects, since otherwise there is nothing through which these relations can be mediated. Moreover, objects are central to repetition and reproduction and it therefore follows that they are the key to the creation of tradition" (Sofaer Derevenski/Sorensen 2002, p.117).

1.1 The scope of the study

Flint sometimes is called 'the steel of the Stone Age' (Weisgerber *et al.* 1980). A great variety of tools were made of flint, tools that were indispensable in subsistence and craft activities. Because of its isotropic nature flint can be flaked into virtually any shape the flintknapper's skills and quality of the raw material allow him to, from a simple cleaving tool of the Lower Palaeolithic to the highly sophisticated Scandinavian flint daggers from the Bronze Age (Whittaker 1994). The cryptocrystalline structure of flint produces extremely sharp edges, indispensable in many basic subsistence tasks like butchering. Very few other raw materials can produce such sharp edges that are moreover very hard: flint has a hardness of between 6 and 7 on Mohs' scale and can therefore also cut hard materials like most stones, bone, wood and shell. These physical properties have made flint a very sought-after material. Hunter-gatherers collected flint in their seasonal rounds, visiting sources that were sometimes located hundreds of kilometres away. Later, flint was exchanged over vast distances, sometimes as nodules, but more frequently as blanks or finished objects, even though perfectly suitable alternative flint sources were often available nearby. Strictly utilitarian explanations for the large-scale movement of flint do not provide a sufficient explanation. Instead, it seems that aesthetic properties of flint like a mottled appearance or a special colour were relevant and meaningful as well as their remote origin (fig. 1.1). It is such physical properties of flint, and the variation therein, that many archaeological researchers sometimes tend to overlook because we consider the appreciation of a pretty colour or lustre too subjective a criterion to base our inferences on. Instead, many lithic specialists rather choose to focus on 'hard evidence' like technology or typology. The results of these analyses are usually conveyed in black and white drawings, so that we have no idea of colour, lustre and texture of the flint (Hurcombe 2007). We thus literally 'loose touch' with the material properties of flint, even though it becomes more and more clear how relevant these are, not just as a determining factor in knapping, but also as a purely sensory experience (Ingold 2007).

Flint is generally seen as a profane and very utilitarian material and many researchers have almost automatic associations between specific tool types and their practical applications: arrowheads are associated with hunting and warfare

Fig. 1.1 Large retouched flake from the Middle Neolithic site Rijswijk A4, located in the wetlands near the present-day town of The Hague. The tool is made of an attractively mottled, fine-grained flint probably originating from the Belgian region of Hesbaye. It displays four zones of use, it has been re-sharpened several times, and forms a good example of a curated implement (scale 1:1).

and flint axes are believed to be used to chop down trees. In fact many of the typological classifications that archaeologists impose on the flint material reflect our preoccupation with subsistence and craft activities in prehistory. The prevailing typological approach, combined with macroscopic observations of what is often called 'use-retouch', as well as simplistic analogical reasoning, have obscured our view of the complexity of the role of flint in technological systems and past society in a wider sense. Flint objects frequently have a far more complex cultural biography than we believed possible.

This has only been brought home to us with the introduction of use-wear and residue analysis (Ibáñez/González 2003; Juel Jensen 1988; Keeley 1980; Odell 2001; Van Gijn 1990). Use-wear and residue analysis have enabled us to examine in detail the different life stages a flint object passed through. Such studies reveal the hidden choices of past users: not only how the objects were used, but also how they were treated. For example, remains of ochre may indicate that the object received a special treatment related to ceremonial use. Many flint objects have now been studied for traces of wear and residue and much new information has come up regarding the actual behaviour of past peoples. By using a holistic approach towards the study of flint objects, integrating the data on raw material, technology, typology and function, is it possible to assess and compare the biographies of flint objects through time and space. In this way the variety of choices made by past agents becomes clear. Combined with information about the selection of raw materials and the extent to which skills are required to make different objects (Apel/Knutsson 2006; Bamforth/Finlay 2008), such data tell the story of an object's life-history. These stories show that flint is far more than a simple utilitarian object. Some flint implements, also those whose life cycle began in domestic context, were ritualised and objects like large axes may even have been agents in their own right (cf. Olsen 2003).

This book aims at a better understanding of the cultural significance of flint, not from a cultural-historical point of view, evaluating tool types as spatial and chronological markers, but by examining the 'roles' flint played in the past. Were these roles only very practical, related to the daily chores for which a sharp cutting edge was needed, as we would generally expect from this material? Or did flint also have significance in the expression of the past belief systems, embodying and structuring aspects of social identity and symbolising ancestral cosmological notions? Is there evidence for the deployment of flint objects as 'icons' of vast social and ideological networks incorporating and uniting people in widely separated areas? Were flint objects used as mnemonic devices, translating social notions and values in stone, a material that lasts and can thus link past and future generations? Such questions will be addressed in this book, using the Neolithic and Bronze Age of the Lower Rhine Basin in the Netherlands as a case-study. This area is one of those 'borderlands' (Bogucki 2008) of the Neolithic world in which the process of neolithisation took a very long time (Louwe Kooijmans 1993, 1998a, 2007). Pottery is introduced quite quickly after the first appearance of colonist farmers in the south-east, followed shortly by the incorporation of domestic animals in the existing broad-spectrum economy (Louwe Kooijmans 1993). However, it took more than 1000 years before cereal cultivation started in the northern and western Netherlands. This area is therefore a very suitable focus for the study of the processes of interaction between different cultural spheres and how this is reflected in flint technology and use (De Grooth 2008; Van Gijn 2008a; Vanmontfort 2008). Stone, because of its longevity and varied properties, is argued to be a focal material "…..*in the material construction of a new social world…"* (Cooney 2008, p. 206). Flint, due to the added property of being highly portable and thus suitable to function as 'pieces of places' (Fontijn 2002), may well have been such a focal material in the neolithisation process of the lowlands.

1.2 The materiality of flint

This book is not about theory but about empirical observations and what meaning we can attribute to these. I will therefore not dwell in detail on the various theoretical concepts that will be used in this book; these will be introduced in the course of the thematic chapters. Nevertheless a brief introduction of the concept of materiality may be relevant. The concept of materiality is widely discussed in archaeology, sometimes in very obscure terms, and has led to a veritable explosion of books and articles (a.o. Cahen *et al.* 1986; DeMarrais *et al.* 2004; Graves-Brown 2000; Hurcombe 2008; Kingery 1996; Meskell 2005; Tilley 2004; Tilley *et al.* 2006). Although anthropology has long neglected the study of material culture, such studies became prominent in the 1990s, due to the influence of anthropologists like Bourdieu and Godelier. Central to the notion of materiality is the dialectical relationship between people and the material world. Material culture, the house and all the objects people use and live with, are so much part and parcel of daily life, that they structure the behaviour of the people. This implies that even though an object may have a very simple and profane function, the daily practice it is involved in makes it an object imbued with 'the traditional way of doing things'. As such even a simple flint tool is an important mnemonic device, assuring that the technological process, as well as the social and cultural interaction it is embedded in, is carried out 'the right way'. The tool not only reflects tradition, it also ensures its continuing practice.

Several simple flint tools discussed in this book not only embody traditional practice, they may even be ritualised and subjected to special treatment if they are involved in activities that are considered dangerous or highly significant. It is therefore not possible to separate profane from ritual tools because the same tool may be meaningful in both domains (Bradley 2005). Yet ethnographic research also gives ample illustrations of special objects of stone, objects that do not so much circulate in daily practice but that are of special significance, having a biography that diverges from a simple utilitarian one from the moment of their making. The oversized axes in Papua New Guinea are a well-researched example (Hampton 1999; Pétrequin/Pétrequin 2000). Although anorganic objects can also be sacred and imbued with cosmological powers, the very fact that stone is believed to be lasting makes it eminently suitable to embody sacred, ancestral knowledge (Cooney 2008; Scarre 2004a, b). Several objects discussed in this book, like the oversized axes from the Funnelbeaker culture, never had a utilitarian function but were 'born sacred'. At the same time, however, we have to be aware that it is ultimately people that attribute special significance to certain materials or objects, as these meanings are not intrinsically present.

I have already used several times the terms 'biography' or 'life-history', terms I am using interchangeably in this book. Such a biographical approach

> *"seeks to understand the way objects become invested with meaning through the social interaction they are caught up in. These meanings change and are renegotiated throught the life of an object* (Gosden/Marshall 1999, p.170).

By looking at the life-history, that is the selection of raw material, the production, use and final discard, we can obtain data indicative of the social configuration of past societies. The archaeological configurations constitute the material reflection of the actual behaviour of past agents, and that includes their 'flint surroundings'.

In the search for patterns in flint biographies I tend to use a hermeneutic approach. This book encompasses a long time period, from the Early Neolithic to the Early Iron Age, and it is clearly impossible to have statistically representative samples from this entire time-span. New data are appearing all the time and are likely to change the picture. Also, the Netherlands are characterized by two entirely different landscapes, the Holocene wetlands and the Pleistocene uplands, that greatly affect the preservation, visibility and hence retrieval of finds (Van Gijn/Louwe Kooijmans 2005). Hence, I choose for another approach, one that is less quantitative, but which allows another type of 'reading' the data. To quote Hodder:

> *"This emphasis on fitting rather than testing is at the heart of the hermeneutic approach……. Archaeology is an historical science that works not by testing theories against data but by fitting lots of different types of data together as best it can in order to make a coherent story"* (Hodder 2004, p.28).

I am aware this approach can be severely criticized. However, as the chances of ever having a truly representative sample are virtually nil, it is time to 'fit the pieces' as we have them and to put flint in a social perspective.

1.3 The concept of function and 'the use' of use-wear analysis

The focus in this book is on the information obtained through use-wear analysis (fig. 1.2). Flint is often seen as a highly functional material. However, certain flint objects are not strictly 'functional' in the utilitarian sense of the word but instead had a more symbolic 'function' in past society. Therefore a brief evaluation of the concept of function is in order here. Function as a concept is commonly equated with utility. As such it has been relegated to the strictly pragmatic: function has to do with doing things, most importantly performing the necessary tasks for survival. Function is therefore seen as largely a-social. Consequently, little theorizing has been directed at questions concerning function. In many ways this way of thinking is very much a relict of the past. It was long believed that archaeologists could only come to grips with the lowermost step of Hawkes ladder of inference: technology. This simplistic approach towards the past has been rejected for at least a quarter of a century in general archaeology, most notably by the theories of Hodder and other post-processualists. The introduction of the concept of *chaîne opératoire* has made us aware of the social context of technological processes. However, the pragmatic and simplistic view of technology as related to utility and survival has persisted around the concept function.

Fig. 1.2 Focus on flint: the use of the metallographic microscope for studying polish and striations under magnifications of up to 560x.

Because function is usually associated with practical day-to-day activities, functional analysis of prehistoric tools has consequently been very much directed at questions regarding the type of site (extraction site or base camp) and the duration of occupancy. Obviously these questions are relevant but the link to theoretical concepts is limited to what has been commonly called middle-range theory (Binford 1981). In the minds of most archaeologists function and therefore also use-wear analysis, have very little to do with theory. However, it is one of the merits of the method of use-wear analysis that it has enabled us to look at function in a different way. Use-wear analysis includes both the study of the wear traces on tools (edge removals, edge rounding, polish and striations) and the remnants (residue) of the worked material or other substances the tool came into contact with during its life (Chapter 2). This approach has enabled us to detect flint objects with traces that cannot be related to a 'utilitarian function' but rather seem to be the result of some 'special treatment', related to its

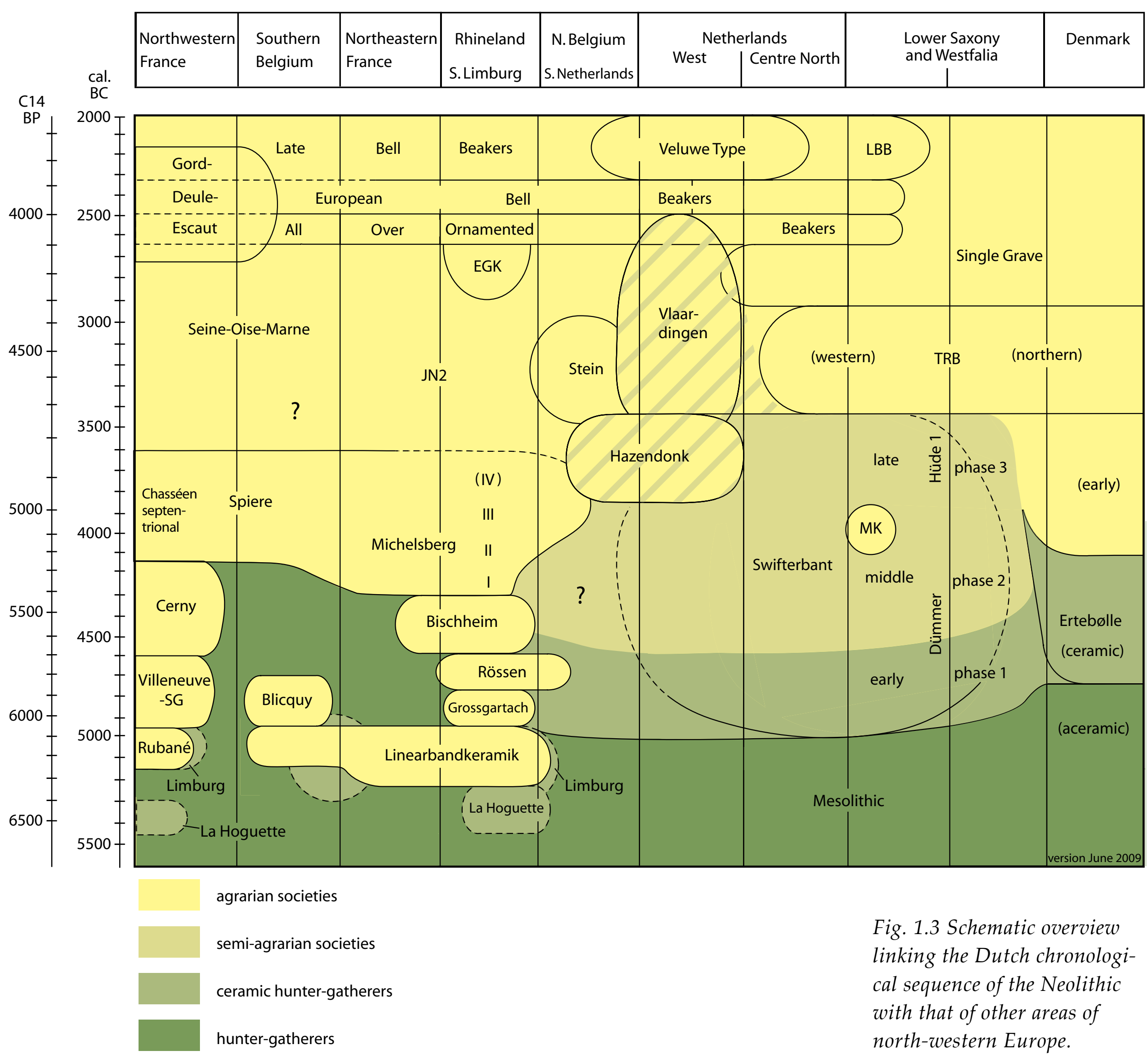

Fig. 1.3 Schematic overview linking the Dutch chronological sequence of the Neolithic with that of other areas of north-western Europe.

symbolic significance. In this book therefore function is not synonymous with subsistence and craft activities, but may also refer to other, more elusive, symbolic 'functions' of flint objects.

1.4 Spatial and chronological framework

For the past 25 years I have examined, often together with students and much of it in a commercial setting, many Late Mesolithic, Neolithic and Bronze Age flint objects from the Netherlands, encompassing a period of almost 5000 years (fig. 1.3). These objects derive from settlements, burials and special depositions. The 'site' database contains c. 45.000 entries, 3130 of which were examined in detail for traces of use (Table 3.1). In total samples from 23 settlement sites are included, as well as c. 500 objects of flint from burial contexts and special depositions (Appendix). The latter are incorporated in a separate 'museum' database. These two datasets form the core of this book. The focus on the territory of the present-day Netherlands has been dictated by my own research history: virtually all the material I studied the past years comes from within this area (fig. 1.4). Chapter 3 gives a detailed overview of the composition of the sample and the motivations behind the selection.

It should be stressed that the dataset is continuously growing as research continues. Recently the flint material from the sites Hellevoetssluis, Hattemerbroek-Hanzelijn and Hattemerbroek-Bedrijventerrein Zuid has been studied. These sites were excavated by Archol, Leiden. Within the context of the NWO project *Ancestral Mounds* (dr. D. Fontijn, prof. dr. C.C. Bakels and the author) complete burial sets are currently being examined by Karsten Wentink, encompassing not only those of flint but also all other artefacts. An important gap in our knowledge, the settlement flint from the Single Grave Culture, is addressed in an Odyssee-project, entitled *Unlocking Noord-Holland's Late Neolithic treasure chest*, financed by NWO (a collaborative project of dr. J.M. Peeters, dr. L. Kubiak-Martens, prof. dr. D.C.M. Raemaekers, dr. J. Zeiler and the author) and carried out by Virginia Garcia Diaz.

1.5 Research objectives

The purpose of this research was twofold: first, to explore the 'roles' of flint in past societies and how these varied in space and time, especially in the context of the neolithisation process, and second to study the decline of flint, that is the gradual replacement of this raw material by metal. Studying the 'roles' of flint entailed a search for patterns in the way flint 'functioned' in different realms of prehistoric life: subsistence, craft, social relations, the expression of identity, the relationship with the ancestors and the maintenance of long-distance exchange networks. Also, do we have any evidence for the ritualisation of flint objects? A key question was how flint may have played a role in negotiating long-term processes of change, such as the gradual conversion to a Neolithic existence, a process that took well over a thousand years in many parts of the Netherlands.

The second main research question addressed the gradual demise of flint technology and how this process evolved. In the course of the Neolithic we see the emergence of two different traditions of flint technology: a domestic pro-

Fig. 1.4 Location of the various settlement sites studied and the regions mentioned in the text. 1 Hardinxveld-Giessendam (Polderweg and De Bruin); 2 Beek - Molensteeg; 3 Elsloo; 4 Geleen-Janskamperveld; 5 Maastricht-Randwijck; 6 Brandwijk - Het Kerkhof; 7 Hazendonk; 8 Swifterbant; 9 Gassel; 10 Rijswijk - Rijksweg A4; 11 Schipluiden - Harnaschpolder; 12 Wateringen 4; 13 Rijswijk - Ypenburg; 14 Barendrecht - Zuidpolder; 15 Hekelingen III; 16 Leidschendam; 17 Groningen - Oostersingel; 18 Slootdorp - Bouwlust; 19 De Bogen; 20 Boog C-Noord; 21 Voetakker; 22 Lienden; 23 Lage Blok; 24 Eigenblok; 25 Oldeboorn. Most of the burials and hoards discussed in the text are located in Drenthe, the Veluwe and West Friesland.

duction of simple tools frequently made of locally available, often inferior, raw material versus the production of special objects, made of import, high-quality flint. The first is found in settlement context, the latter in special contexts such as graves and hoards. This dichotomy has been noted across Europe and the Near East and seems to occur everywhere around the same time, culminating in the Bronze Age and leading to the final demise of flint around the Late Bronze Age or Early to Middle Iron Age (Högberg 2004; Humphrey/Young 2003; Rosen 1996; Young/Humphrey 1999). Various hypothetical explanations have been put forward as to why this dichotomy should occur. The most straightforward explanation is of course the introduction of metal, a material that we consider far superior to flint and which, from our western 'progress-oriented' point of view, should inevitably lead to the demise of flint. Another dominant explanation has been the increasingly sedentary existence of these Neolithic communities. To contribute towards this discussion I will examine the importance of flint in the various domestic tasks in the Late Neolithic and Bronze Age and assess the role of flint in various special contexts in those later periods of prehistory.

These questions can only be addressed by means of a holistic approach. Studying either stylistic attributes or functional data is not enough to shed light on the role of flint tools in past society. Just as a kitchen chair and a royal throne are both used to sit on (thus displaying the same traces of wear), their social and ideational function is entirely different. In the same vein, a flint tool like a strike-a-light can have a direct functional application (to make fire) but, as the burial gift of such an implement at Schipluiden indicates, may also have an ideational connotation (Van Gijn *et al.* 2006). It is therefore important to study lithics in their wider archaeological context.

1.6 Structure of the book

The book is organized thematically around the various 'roles' flint can play in past societies. First, however, two chapters address the less exciting aspects of methodology and representativity. Chapter 2 provides an outline of the methodology used in this study, emphasizing the biographical approach towards objects. Although this book does not intend to be a textbook for how to research the life-history of flint objects, it was felt necessary to expound to some extent on the methods used, highlighting the limits of inference of the various ways of studying flint objects. Chapter 3 gives an overview of the dataset that lies at the basis of this book and explores the inferential limits of the study. In chapter 4 the role of flint in food procurement and processing is explored. Chapter 5 does the same for craft activities such as ornament making, hide processing and so forth. Obviously, these two chapters mostly make use of the data deriving from settlement sites. The role of flint tools in the expression of identity is addressed in chapter 6. This is based on persistent choices of tool manufacture and use in settlement flint, indicating long-term traditions that are reflective of social identity. However, information on flint burial gifts is evaluated as well, in order to assess what story the flint objects in graves tell us about the identity of the deceased or about the society he or she is part of. Both approaches are combined in this chapter because issues of identity are operative at different levels of society. In chapter 7 I examine the ritualisation of flint and the role it may have played in embodying and conveying aspects of the world view or cosmology of past societies. Chapter 8 deals with the gradual replacement of flint by metal, examining the role of flint in domestic tasks and its continued ideological significance in special contexts. Chapter 9 attempts to attribute meaning to the changing roles of flint through time: from a rather homogeneous technology in the Early Neolithic towards the development of different technologies side by side, each referring to and structuring different realms of past society in the course of the Late Neolithic and Bronze Age.

Chapter 2

The biography of flint tools: methods of study

2.1 Introduction

The emphasis of this book is on the biography of flint tools and the role these tools played at various stages of their life-history in structuring the lives of their makers and users (fig. 2.1). The methodologies chosen are intended to reveal this life-history: from the selection of raw materials (the conception of the object), to the production (birth of the object), to exchange and actual use (the socialization process), to the phase of deposition, being destroyed, lost or discarded and finally the moment the object ends up in the ground, that is to say, the 'death' of the object (Tilley 1996).

Fig. 2.1 Hoard of Nieuw-Dordrecht, dated to the early Single Grave culture. None of the objects display traces of use.

In this book the emphasis will lie on the results of the use-wear and residue analysis, as such data provide information about the actual *use* of the objects. It is these actual wear traces and residue that are generally not visible to the average researcher of flint artefacts. Because of the highly specialized nature of use-wear and residue studies, flint assemblages are rarely studied from this perspective. However, such data enable us to understand the, usually unconscious, choices made by prehistoric agents because they reflect what actually happened to the flint tools between their production and the moment they end up in the ground. In this way we can obtain an 'inside' view of technology.

The first phase of a flint tool's biography - its 'conception' - requires determining the source of the raw material it is made of. This is severely hampered by the fact that we still do not have a complete picture of the range of potential sources available to the prehistoric flint-knappers in our region (Weisgerber *et al.* 1980). The location of the sources of many types of raw materials is not known and we have to be content with general designations of the area of origin (like 'southern Belgium'). Some types of flint are very difficult to distinguish from one another. For example, petrographic analysis has shown that flint from Spiennes is virtually indistinguishable from the various other types of flint that derive from the same Lanaye chalk deposits, such as Rijckholt (Kars *et al.* 1990). Another problem is that there are enormous variations in the appearance of the flint within one source depending on the layer it originates from. Rijckholt flint ranges from a very coarse-grained, quite homogeneous light-grey, almost chert-like flint, through medium-grained mottled varieties, to fine-grained, almost pitch black nodules with very few inclusions. Clearly the complexity of these issues requires specialist research (Burnez-Lanotte 2003; De Grooth 2008; Gronenborn 2003; Zimmermann 1991) that is beyond the scope of this book. Nevertheless, an attempt was made to source all artefacts studied, relying on the reference collection of the National Museum of Antiquities in Leiden, set up by Verhart and others.

The 'birth' of a flint implement can be investigated by technological analysis. In this study, this encompassed a general examination of the reduction strategies (bipolar, blade or flake technology; hard or soft hammer percussion and so forth), inferred from features such as thickness of the bulb of percussion, presence of impact scars, amount and location of the cortex and a study of the cores. However, these features were not studied as systematically as, for example, in Peeters' analysis of the Mienakker material (Peeters 2001a) or De Grooth's analysis of LBK flint technology (De Grooth 2003). Because our emphasis is more on the actual *use-life* of the objects, this book does not pretend to provide an exhaustive study of the technological properties of the flint assemblages of the Neolithic and Bronze Age. The same applies to another aspect of the production of flint implements: the stylistic information conveyed by the modifications applied to the blanks. This book does not aim to provide a detailed typological study.

It is the actual use-life of the object that lies at the basis of this study. Here use-wear and residue analysis constitute the main source of data and the methods and techniques of this approach will be extensively discussed in this chapter. Although in the past this approach has been seen as a *panacea* to solve many of the questions regarding material culture, it will be shown that limitations of this method have important consequences for the sort of questions we can ask. Finally, the 'death' of the object will be studied by examining the wider archaeological context, the associations with other objects and the spatial distribution of the implements. In the following section, I will discuss the various research methodologies and techniques that underpin this study.

2.2 The 'conception' of the tool: determining the raw material

2.2.1 Introduction

The choice of raw material for the production of a tool is significant not only from a functional point of view, but also from a social and ideological perspective. There is a distinct difference whether a tool was made from high quality exotic flint, or whether an inferior local source was used.

The region of the Netherlands is not rich in high quality flint. Much of the present-day Netherlands was buried under cover sands and extensive Holocene deposits of clay and peat, covering much of the original Pleistocene landscape. This makes it very difficult to reconstruct the locations where flint could have been obtained in the past. For example, the western edge of the province of Brabant consists of sand deposits, which currently form low cliffs that descend steeply into the basin of Zeeland. It is possible that here small rolled nodules of flint from Miocene beach deposits were available in the past. The fact that the

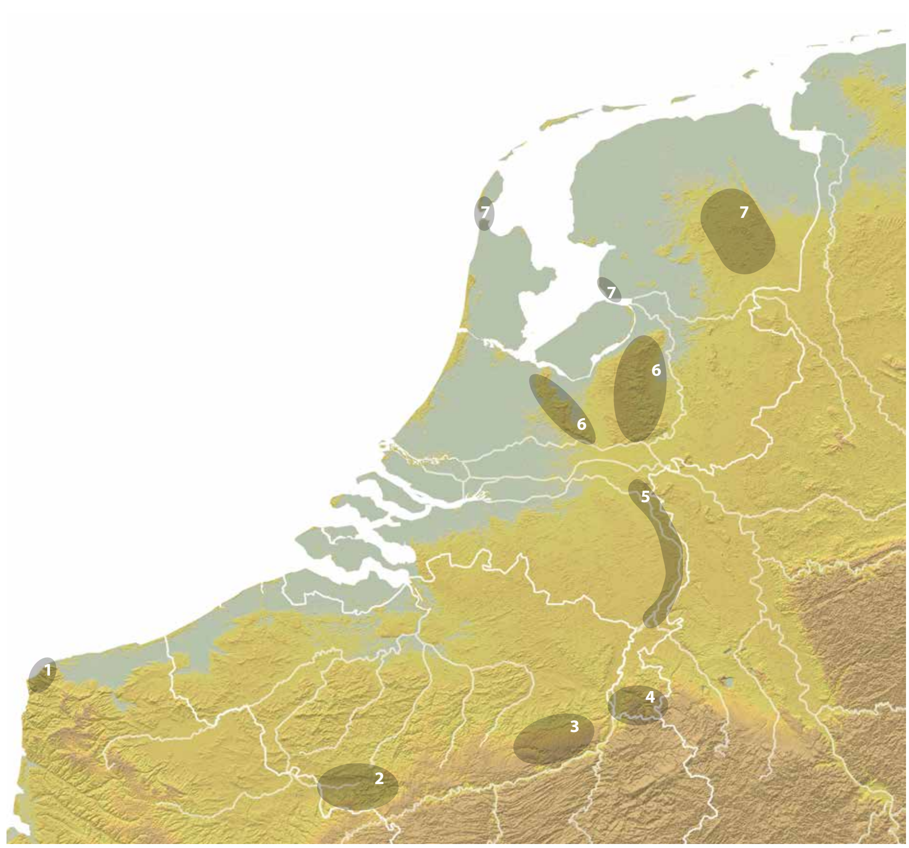

Fig 2.2 Location of the different flint sources from which material is present in Dutch sites.
Legend: 1. Cap Blanc Nez; 2. Hainault; 3. Hesbaye; 4. Rijckholt-type flint; 5. terrace flint; 6. moraine flint from the Veluwe and Utrechtse Heuvelrug; 7. moraine flint in loam deposits.

Neolithic inhabitants of the area around the present-day city of Antwerp had access to the same type of raw material as the inhabitants of the Rhine/Meuse delta further north suggests that extensive flint deposits were once present in this region. We also do not know how far north the Cap Blanc Nez flint from the Pas de Calais area was carried by the tidal streams of the Channel. Rolled nodules of this material may have been transported north as far as the basin of Zeeuws-Vlaanderen (P. Crombé, pers. comm.).

Most of the so-called local flint was secondarily transported. The flint sources in the northern half of the Netherlands consist of material of Scandinavian and northern German origin that was carried south by the Saalian glaciers (fig. 2.2). In the southern half of the country, with the exception of southern Limburg, rolled flint nodules of various origins can be found, commonly referred to as 'Meuse' flint. These were transported north by the rivers and could have collected in terrace deposits of the Meuse as well as in gravel deposits along the river banks. In the middle of the Netherlands, in the area of the big rivers, people had access to both types of material. They could collect moraine flint in the ice-pushed ridges of the Utrechtse Heuvelrug and the Veluwe, as well as 'Meuse-flint' in the fluviatile sediments of the Urk deposit.

Only in the very far south of the Netherlands, in southern Limburg, is it possible to find flint in primary context. Here the Upper Cretaceous deposits contain different types of flint such as Rijckholt, Banholt and Simpelveld. Of old this flint was collected from eluvial deposits, but during the later phases of the Michelsberg culture it was also mined, as is testified by the spectacular excavations of the flint mines of Rijckholt (De Grooth 1998, 2005; Rademakers 1998).

2.2.2 Flint sources within the territory of the Netherlands

2.2.2.1 Moraine flint

The landscape in the north-eastern, eastern and central areas of the present-day Netherlands was shaped during the Saalian, when glaciers pushed all the way down to where the large rivers currently flow, resulting in the ice-pushed ridges of the southern Veluwe and the Utrechtse Heuvelrug. The glaciers brought with them flint and other types of stones, like granites, from Scandinavia and northern Germany, deposited in boulder clay. The boulder clay deposits vary greatly in terms of their flint contents. Outcrops can be found on Texel, Wieringen, Urk, on the so-called Fries-Drents Plateau and occasionally in the provinces of Gelderland and Overijssel (fig. 2.2). The original Scandinavian sources of flint are difficult to determine, in contrast to the origin of the granites and other hard stone types in the boulder clay which can generally be traced (Zandstra 1988). The variation in the moraine flint is substantial, ranging from highly translucent, fine-grained flint, commonly referred to as Senonian flint in Scandinavia, to very coarse-grained material of a rather homogeneous grey colour that is called Danian flint in the north (Högberg/Olausson 2007). Some of the northern flint contains fossils of bryozoa. Generally the flint nodules in the boulder clay are small and, because they were transported by glaciers, they often display pressure cones, signs of crushing, scratching, frost fractures and numerous internal cracks. Much of this flint would have lain exposed on the surface, so the material often displays severe gloss and colour patination. Such phenomena are especially severe because of the periglacial climatic circumstances at the end of the last glacial period, the Weichselian (Stapert 1976).

2.2.2.2 Upper Cretaceous flint

In the far south, near Maastricht, we find the chalk deposits of Upper Cretaceous age (De Grooth in press; Felder 1998) (fig. 2.2). These deposits extend from Aachen in Germany, to Heerlen and Maastricht in the Netherlands, to Liège and Tongeren in Belgium. On the other side of the Meuse these deposits extend from the Hesbaye area all the way to the southern part of Hainault in Belgium. In this Cretaceous flint zone, several flint mines have been documented such as Rijckholt (Rademakers 1998) and Spiennes (Collet *et al.* 2006). Two formations, the formation of Gulpen and Maastricht, contain flint nodules. These two formations form the source of many of the flint types used in Neolithic times. Some of these flint types were not only collected in eluvial deposits but were also extensively mined. The most important flint-rich deposits in these two formations will, therefore, be described in more detail.

The lowermost deposit of the Gulpen Formation is the chalk of Zeven Wegen in which a glass-like black flint is found, called Zeven Wegen flint (Felder/Bosch 2000). This flint is rare on Dutch prehistoric sites and the nodules are relatively small (10-20 cm in diameter). The most important flint-containing deposit in the Gulpen Formation is the Lanaye chalks. The Lanaye layer extends over a huge area, from southern Belgium to the area around Maastricht, and consists of a 15-18 m thick deposit of fine chalk with numerous layers of grey to black flint nodules (Felder/Felder 1998). In the eastern part of the Lanaye deposit we find Simpelveld, Orsbach and Lousberg flint. These flint types are matt and relatively coarse-grained. They are more homogenous in colour and display smaller and fewer lightly coloured inclusions than Rijckholt-type of flint. Lousberg flint is found close to Aachen and occurs in plates of about 8 cm thick. The most characteristic feature of this type of flint is the fact that the original grey colour of the outer zones of these plates often has changed to a reddish-brown or chocolate colour, caused by iron infiltration (Warrimont/Groenendijk 1993). The Lousberg source was also mined (Weiner 1984). Both Lousberg and Valkenburg flint (see below) were extensively used for the production of axes, as their coarse-grained structure made them relatively tough and shock-absorbent in comparison to the finer-grained varieties of flint. Simpelveld flint is also found as flat plates but no actual exploitation point is known yet for this material (Arora/Franzen 1987; Felder 1998). Orsbach flint was not intensively used in Neolithic times and will not be further discussed here.

Farther west we find Rullen, Banholt/Mheer, and of course Rijckholt flint. Rullen flint has a characteristic light-yellow colour, probably the result of a secondary iron infiltration in the eluvial and slope deposit context in which this type of flint is often found (Warrimont/Groenendijk 1993) (fig.2.3.a), but is not always easily distinguished from Rijckholt flint. This pertains even more to Banholt/Mheer flint, which is slightly coarser and of a grey colour but therefore quite difficult to distinguish from the coarser Rijckholt varieties, certainly if no cortex is present.

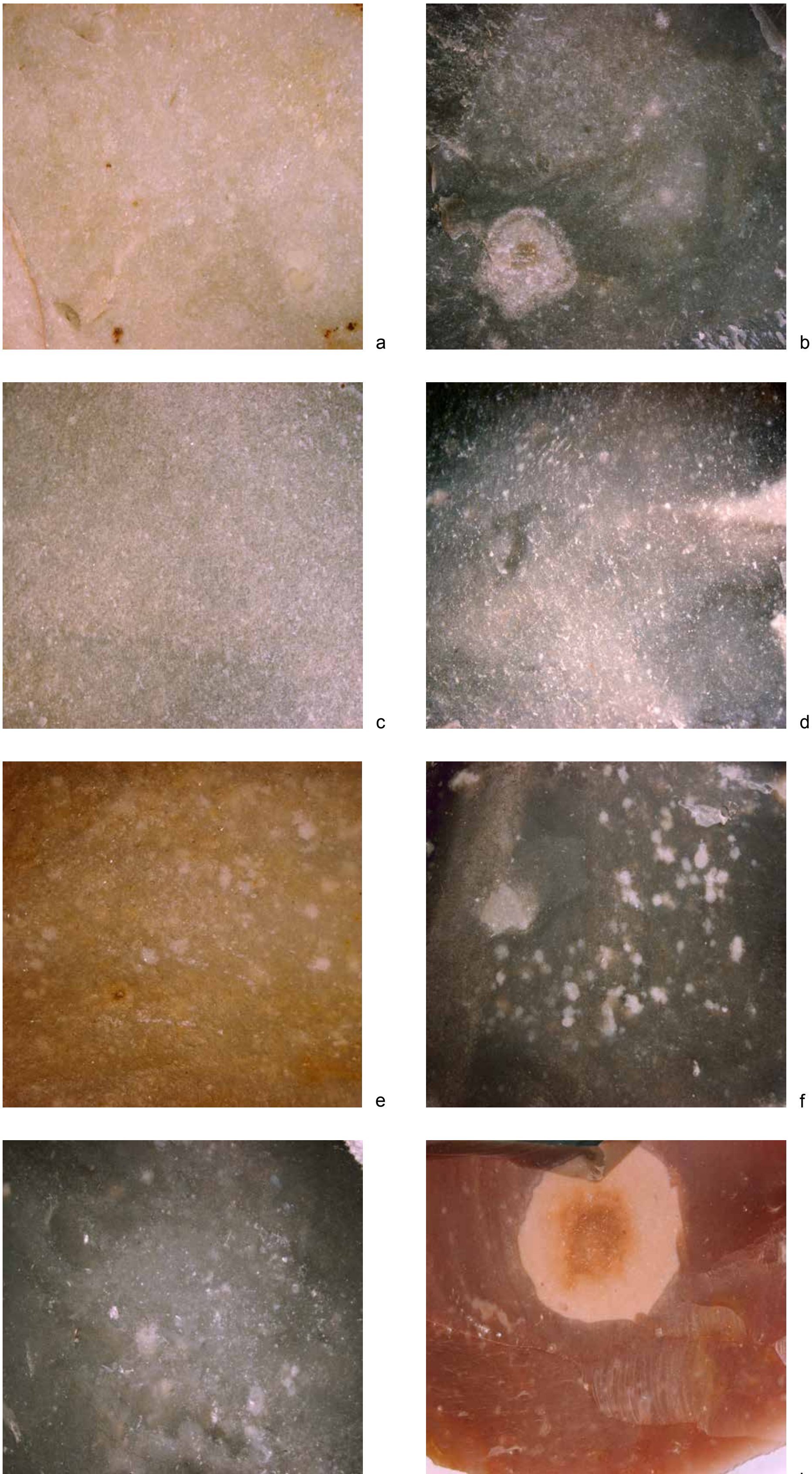

Fig. 2.3 Different flint types: a. Rullen; b. Rijckholt; c. Valkenburg; d. Spiennes; e. Grand-Pressigny; f. Cap Blanc Nez; g. Stevns Klint; h. Helgoland (taken with a stereomicroscope at approx. 2,5x magnif.).

Rijckholt flint was extremely important and has been found from the northern Netherlands to southern Germany. It was used on a massive scale throughout the Neolithic and even into the Bronze and Iron Age, as its presence in Bronze and Iron Age sites from the nearby Aldenhovener Platte shows (De Grooth 1991). In Palaeolithic, Mesolithic and Early Neolithic periods there was ample good-quality Rijckholt flint available from eluvial deposits. This type of flint was systematically mined during the later Michelsberg culture: the first evidence dates from between 3940 and 3750 BC, but mining may have continued during the subsequent period of the Stein-group (De Grooth 1998, 2005). This means that the mines were in use for at least 500 years, maybe even as long as 1300 years (De Grooth 2005). It is generally assumed that the mining of flint started because the eluvial deposits had largely been depleted and were no longer able to provide material of the size and quality necessary to produce axes. However the fact that mining started all over Europe, from Poland to the British Isles, at pretty much the same time, indicates that social processes were at work and that flint mining was an inextricable part of the organization of societies at that time (Chapter 7).

Rijckholt flint has a mottled appearance with colours varying from light-grey to almost black (fig. 2.3b). It occurs in nodules of varying size and shape, depending on the strata within the Lanaye chalks that it derives from. It usually is fine-grained and displays lighter colour inclusions of varying sizes and sometimes even of varying grain-size. The lighter inclusions are coarser-grained; the blacker the colour the finer the grain-size. Tiny white specks are frequently visible and seem to be the hallmark of Rijckholt flint. However, often it is almost impossible to distinguish Rijckholt flint from the mined flint in southern Belgium like Spiennes (De Grooth 1998). Also, in the light of the difficulties in distinguishing between Banholt, Simpelveld, Rullen and Rijckholt flint, Felder suggested referring to all these Cretaceous flints as deriving from the Chalks of Lanaye and Lixhe (Felder/Felder 1998). The coarser varieties of Rijckholt were less intensively used and are basically of inferior quality; they are rarely found far-away from their source and can usually be quite easily distinguished. The flint of Eben Emael also derives from the Gulpen Formation, from the uppermost layers of the Lanaye chalks. This flint was a by-product of the chalk extraction activities at the spot and has been exploited until very recently, both as building material and to coat the grinding tumblers used in the porcelline industry (M.E.T. De Grooth pers. comm.).

The Gulpen Formation is overlain by the Maastricht Formation. Valkenburg flint derives from this deposit (fig. 2.3c). The very coarse-grained Valkenburg-type of flint is typically homogeneously coloured, ranging from cream to light-bluish grey, with a matt, completely opaque appearance and a very coarse-grained texture (Brounen/Ploegaert 1992; Marichal 1983). This makes it relatively shock resistant and hence suitable for axe production. It was not only collected in eluvial form, but it was also mined for the production of axes in the Michelsberg period and especially during the time of the later Stein-group (Brounen/Ploegaert 1992).

2.2.2.3 'Terrace flint', 'Meuse eggs' and 'sea flint'

Various secondary deposits of rolled flint can be found, especially along the major rivers. We can differentiate between what is commonly called 'terrace flint' and the rolled pebbles that are usually called 'Meuse eggs'. Last there is the even less well-defined category of very dark coloured flint that is referred to as 'sea flint'. Terrace flint is frequently found in the Meuse terraces and also occasionally in the main terraces of the Rhine in the Niederrheinische Bucht (Arora 1980, p. 249) (fig. 2.2). These nodules of terrace flint, at least partially originating from eluvial Cretaceous sources in the Limburg area, can be found in the Formation of Urk. They are extensively rolled, particularly when found at greater distances from their source. Sometimes terrace flint is slightly angular in shape and not so much nodular in form. It has a very hard, smooth and shiny weathered surface made up of a multitude of fine cracks. Terrace flint has been used widely and is of relatively good quality.

The Meuse eggs look exactly like their name suggests: egg-shaped and -sized rolled nodules. They have a matt, hard outer surface, in fact consisting of numerous impact cones from rolling in the surf. The original cortex is not present anymore. The colour varies from yellow, reddish to brown but is usually a mottled mixture of the two. The primary source of these nodules lies in Miocene layers in southern Limburg.

In addition to these yellow/brown mottled Meuse eggs, there are also small, rolled nodules of black flint. Again the weathered surface is hard, matt and covered with impact cones. The fine-grained flint inside is quite homogeneous and without any inclusions. Although the colour is for the most part black, occasionally grey areas are present. This black flint has in the past not always been separated from the category of the Meuse eggs. The origin of this type of flint is unknown, but it may be that it originates from the area of the Pas de Calais because if it has no weathered outer surface the material is frequently almost indistinguishable from the material of Cap Blanc Nez.

2.2.3 Imported flint from Belgium and France

2.2.3.1 Southern flint sources: Belgium and France

The present-day territory of Belgium was an important source of flint and other stone types to the communities living south of the big rivers. Already in the Mesolithic Wommersom quartzite was used over a wide area (Gendel 1982), including the Rhine/Meuse delta as testified by its presence in the Late Mesolithic site of Hardinxveld-Polderweg (Van Gijn *et al.* 2001a). Belgian flint is rarely found in the provinces of Drenthe or Friesland, with the exception of an occasional axe in TRB context (Bakker 2006). The Upper Cretaceous chalk deposits, of which Rijckholt is a part, also extend far into Belgium (fig.2.2). In Belgium there are several important sources of flint from which material was transported to the Lower Rhine Basin. First of all there is the Hainault basin, the area where the river Scheldt originates. The most notable flint types there are Spiennes and Obourg, both located just east of the present town of Mons. The material from Spiennes, which was also mined at about the same time as the flint mine of Rijckholt, is virtually indistinguishable from the latter (fig.

2.3.d). It has a slight granularity, a dark-grey colour with white specks, sometimes also some mottled areas of different shades of lighter grey, usually coarser-grained intrusions, very much like the pattern of Rijckholt flint. The mining complex at Petit Spiennes has been extensively investigated (Collet 2004; Collet *et al.* 2006, 2008). In nearby Obourg an almost glassy, very black flint of a waxy texture has been found with a characteristic reddish translucency close to the cutting edge. Occasionally Obourg material has a grey colour (M.E.T. De Grooth pers. comm.). It is sometimes difficult to distinguish from Zeven Wegen flint in archaeological context.

The Hesbaye, near Liège, also harbours some very rich flint sources. This is the source of the so-called light-grey Belgian flint, a fine-grained, waxy, mottled flint in various shades of very light-grey. These colour shades are irregularly distributed and of varying sizes. Hesbaye is probably the source of some of the variants of heavily mottled fine-grained grey flint such as what the typical Vlaardingen or Buren-axes were made of (Bakker 2006; De Grooth 1991). It is also the location of several flint mines such as Jandrain-Jandrenouille (Hubert 1974). However, some of the Hesbaye flints are much darker (Allard 2005) and there is considerable variability even within the individual source areas. Avennes, for example, produces an extremely mottled fine-grained flint but also a much coarser variety: the two are very different and show that different strata within the same general location contain nodules of different texture, grain-size and quality. The fine-grained, mottled light-grey Hesbaye flints are a regular occurrence at, for example, Hazendonk sites.

Around 2700 BC we find the first imports of French flint in sites of the later Single Grave culture. The most well-known French flint is the beautiful honey-coloured material from Grand-Pressigny (Van der Waals 1991) (fig. 2.3e). This source is located south of the present-day town of Tours about 800 km from the burial mounds in which we occasionally find the long retouched blades that are generally referred to as daggers. As we find no production waste of this flint-type, it is likely that objects were transported north in finished form. They were struck from cores, called *livres de beurre*, that were carefully prepared. The skill with which these cores were prepared and the extreme length of the blades, 25-35 cm, suggest that they were made by people with specialist skills (Pélegrin 2006).

Another French flint source is Romigny-Léhry, located about 20 km south-west of the present-day city of Reims in northern France. No thorough investigation of this source has been conducted yet and it has been proposed to refer to this material with the more general term ‘French tertiary flint’ for the time being (Delcourt-Vlaeminck 1998 cited in (Drenth/Beuker 2000). This tertiary French flint is often banded with colours ranging from dark brown to almost white. Some of the colours fall within the colour range of Grand-Pressigny flint, causing some of this tertiary flint to be wrongly identified as Grand-Pressigny. Polman found that the import of this tertiary flint (he refers to it as Romigny-Léhry) into the Netherlands first took place during the Michelsberg period (seen at the site of Maastricht-Vogelzang) (Brounen 1995) and again during the Single Grave culture (Polman 1993). In the latter period, finished daggers of

Romigny-Léhry flint were imported, made on long blades that were similar in size, and probably in production techniques as well, to those made of the better-known Grand-Pressigny flint.

A last source of French flint that needs to be mentioned is that of Cap Blanc Nez in the Pas de Calais area of north-western France (fig. 2.3f). In the chalk cliffs, bands of flint nodules have been exposed by the sea. The flint is fine-grained, often of a homogeneous black colour with occasional dark-grey inclusions. The cortex is white and chalky but at the foot of the cliffs many rolled flint nodules with a hard weathered cortex can be found (L.B.M.Verhart, pers. comm.). It is a matter of debate how far and to what size nodules could be transported in a northerly direction by the tidal streams running through the Channel. For example at Schipluiden, near The Hague, flint nodules were collected that bear a very close resemblance to the Cap Blanc Nez material (Van Gijn *et al.* 2006).

2.2.3.2 Northern flint sources: Scandinavia and northern Germany

The area of the Netherlands north of the main rivers displays a different picture. North of the line Coevorden-Urk-Texel flint nodules can be found in the substrate of boulder clay deposits. South of this line it concerns smaller fragments of such moraine flint. All of this flint is of northern origin and it is, therefore, not always easy to differentiate it from northern imports: nodule size, post-depositional modifications and general knapping quality are the distinguishing features. Some of the northern material concerns bryozoan flint.

Imported flint in the north-eastern Netherlands for the most part originates from northern Germany or southern Scandinavia and concerns fine-grained, smooth and glassy Senonian material (Högberg/Olausson 2007), such as found at Stevns Klint (fig. 2.3g). Imports of the more coarse-grained, light-grey Danian material are absent. These imports can range from unmodified nodules to finished products like the large spectacular ceremonial axes from the TRB period (Chapter 7). It is not entirely clear when flint was first brought from Schleswig Holstein and southern Denmark, but we are certain that from c. 3400 BC, at the start of the Funnelbeaker culture, such imports occurred. The nodules of the Een deposition and, more importantly, the axe prefab of red Helgoland flint, unequivocally point to a northern source (Beuker 1986) (fig. 2.3h, 7.2). The last northern imports concern the Late Bronze Age and Early Iron Age sickles of Senonian flint (Chapter 8).

Apart from the characteristic red Helgoland flint, the exact source of these northern imports is still unclear because the high-quality flint along the coast of Schleswig Holstein is in secondary position, transported during the Weichselian glaciation from the primary deposits in northern Denmark (Beuker 2005). This means that the sources in Denmark and Schleswig Holstein are of the same type of flint, also because these Danish flint nodules were transported by the glaciers over a relatively short distance, only a couple of hundred kilometres, and a relatively short time ago (the Weichselian). The nodules have therefore largely preserved their original size and structure. Beuker however argues that not only the famous red variety of Helgoland, but also the grey mottled material from this location can be distinguished from the rest of the northern flint. He asserts that Helgoland may actually have been an important source of the flint transported to the north of the Netherlands during this period (Beuker 1986). Although Helgoland was already an island by the time of the Neolithic, the possibility of transport by water along the shallow shores of the Waddenzee may even be considered.

2.2.4 The choice and procurement of raw material: social implications

The choice of raw material for the production of a flint implement can be considered as part of the conception of the tool. Whether the producer of an object chose a locally available flint type or an exotic material has implications from a social point of view. Generally, knowledge about where to find suitable flint to make implements for daily utilitarian tasks likely was available to everyone: it concerned locations where material could be collected relatively easily and knowledge about these sources was transferred from generation to generation. However, the sources of some raw materials were remote or difficult to access. In these latter cases it was the hardship associated with the procurement of the raw material and the history the objects acquired on their journeys that attributed them with a special significance as compared to those of local origin (Bradley 2000; Bradley/Edmonds 1993). Often these exotic raw materials were highly distinctive in terms of their properties (a beautiful colour, a mottled appearance) and could serve in a way as 'pieces of places' (Fontijn 2002), associated with far-away, maybe mythical places not accessible to just anyone (Bradley/Edmonds 1993; Parker Pearson 2008; Parker Pearson *et al.* 2006; Scarre 2004b) (fig. 2.4). This may also apply to mined flint, the procurement of which occurs in relatively inaccessible places out of sight of those not involved in the process. The appearance of flint mines across Europe at roughly the same period may be indicative of the special significance attributed to mined flint (Wheeler 2008). Flint objects made of these exotic, hard to come by materials, may embody knowledge and power that can reflect on their owners or users. These objects may have been deemed particularly appropriate for tasks not belonging to the daily routines such as initiation ceremonies, burial rites or for celebrating special events like the harvest or a good hunt (see Chapter 7).

In order to obtain exotic raw materials past agents must have either fetched the material themselves, or been a part of an exchange or trade network. In both instances they would have come into contact with people outside of the routine sphere of day-to-day social interaction. Obtaining stone, therefore, played a very important role in maintaining long-distance relationships, especially where agricultural subsistence led to a more settled existence and reduced mobility. Especially in the case of the Netherlands where no or little high-quality flint was available nearby, flint was often imported. Importing flint can be explained from the perspective of a shortage of high-quality local materials but we will see in the course of this book that the practice also had social implications. For example, importing large unwieldy axes that were completely impractical for cutting trees (they would immediately snap upon impact) had no immediate utilitarian reason, but was driven by social and ideological motives.

Fig. 2.4 Daggers of Grand-Pressigny flint illustrating the high level of skill with which these objects were made (scale 2:3).

The 'value' that was attributed to the imported material can be inferred from the way such objects were used or treated. We have examples of flint axes that were recurrently wrapped and unwrapped, presumably on special occasions (Wentink 2006; Wentink/Van Gijn 2008) (Chapter 7). Other tools, such as sickles, had been coloured with ochre or had been burnt at some time in their existence before deposition (Chapters 4 and 7). Such behaviour suggests that these exotic objects must have held a special importance for the recipients. The identification of the sources of the selected raw materials is therefore a very important means of reconstructing not only the interaction sphere of prehistoric societies, but also for a better understanding of past ideologies.

Another issue related to imported flint is that of the means of transport: who fetched or carried this material and in what state was the material transported (Louwe Kooijmans/Verhart 2007)? The latter question can be addressed by studying the debitage: the presence of production waste of a specific raw material, such as cores, decortication flakes, core preparation or core rejuvenation pieces, indicates that the object was not imported in finished state. Where no such material is found, we can assume that this material was not locally knapped. If we do find production waste, the exotic raw material was likely imported as nodules or sometimes maybe as prepared cores or blanks and subsequently flaked locally.

The first question, by whome and by what means was the material transported, is almost impossible to answer.Even though we can see the end-result of long-distance contacts in the form of exotic flint, establishing the actual manner in which these foreign flints travelled across a distance of sometimes hundreds of kilometres, is much more difficult. It is possible that prehistoric groups or segments thereof ('task groups'), journeyed to other regions in order to establish and maintain long-distance social contacts. In the course of these travels and interactions, raw materials could also have been obtained. This embedded procurement, as it can be called, has been documented for various ethnographically known societies (Burton 1984; McBryde 1997; McBryde/Harrison 1981). In these cases, there is hardly ever a utilitarian reason for obtaining stones from a distance of hundreds of miles, as equivalent material can frequently be found nearby. For example, the greenstone found in the Mount William quarries in south-eastern Australia travelled far and wide, including areas that already had almost identical stone types at their disposal (McBryde 1984). There is therefore no obvious utilitarian reason for the procurement of Mount William greenstone. Instead these stones must have had an important social and even symbolic role, simultaneously embodying ideological values and enabling valuable long-distance social contacts. These contacts are considered by some to have been a form of 'life insurance' in times of hardship or calamities. Although this is a form of direct procurement, the social ramifications of these imports are very important (Chapter 6 and 7). The history of the travel and the friends met on the way, are embodied in the objects made of this foreign stone.

A very different way of obtaining material from far-away places was by means of what is called 'down-the-line exchange': objects pass from one social group to the next, whereby there is, at any one time, only exchange between neighbouring groups. This would result in a very different attitude to exotic objects. De Grooth, studying the flint mines of Rijckholt and the distribution of this type of flint, has proposed a detailed scheme concerning which 'products' she would expect to find at different distances from the flint mine (De Grooth 1991). De Grooth assumes a material to gradually diminish in importance the further it is found away from its source. This was also the case in the so-called axe trade that took place in the British Isles during the Neolithic (Bradley/Edmonds 1993). However, there is also the possibility that objects acquired more and more significance as they moved further away from their source of origin. This may, for example, have been the case with the Rössener *Breitkeile* that are found across much of northern Europe in the Early Neolithic (Verhart 2000) or the Alpine jadeite axes present as far way as Scotland (Pétrequin *et al.* 2008).

Yet another way exotic objects could have travelled across long distances is with individual travellers. If their contacts were structured and part of the social fabric, this may have resulted in recognizable archaeological patterns. One particular type of traveller may have been the skilled craftsman. This is an explanation favoured by some researchers to explain the production and distribution of the long blades of Grand-Pressigny flint (Pélegrin 2006). The traveller could also have been a trader, in which case the import of foreign flints would have been a regular occurrence, presumably resulting in a larger quantity of exotic material. From this perspective, finding a collection of similar artefacts would be interpreted as a tradesman's hoard that was accidentally lost or left behind.

2.3 The 'birth' of the tool: technological and typo-morphological analysis

2.3.1 Technological properties

The way flint nodules are shaped into usable tools comprises a series of steps, usually referred to as the reduction sequence. It is important to realize that flint knapping is a subtractive process and that each time a flake is removed the knapper has to make a decision as to where to direct the next blow, from which direction and how much force was exerted (Whittaker 1994). At the same time he or she has to be continuously aware of the intended end product, so anticipation and planning are important aspects of flint knapping procedures. It is also essential to be aware of the possibilities and limitations imposed by the shape and the quality of the raw material. However, within these limitations on the one hand and the intended product on the other, there are still many choices available which are, in turn, influenced by cultural traditions and preferences. This range of choices is central to the concept of the *chaîne opératoire*, a concept that originated from the work of Leroi-Gourhan and has for some twenty years been highly influential in stone tool studies (Edmonds 2001; Schlanger 1994).

These choices relate to various stages of the production of tools. The selection of raw material has been discussed above and, of course, to some extent will determine the knapping techniques used and also the size and *finesse* of the end-product. However, it is also important to examine the choice of production technique and the level of standardization (fig. 2.5). This will to a large extent be determined by the choice of the end-product required: a dagger made on a large blade requires a much higher level of technical skill than a retouched flake. First of all, making blades requires extensive planning and preparation

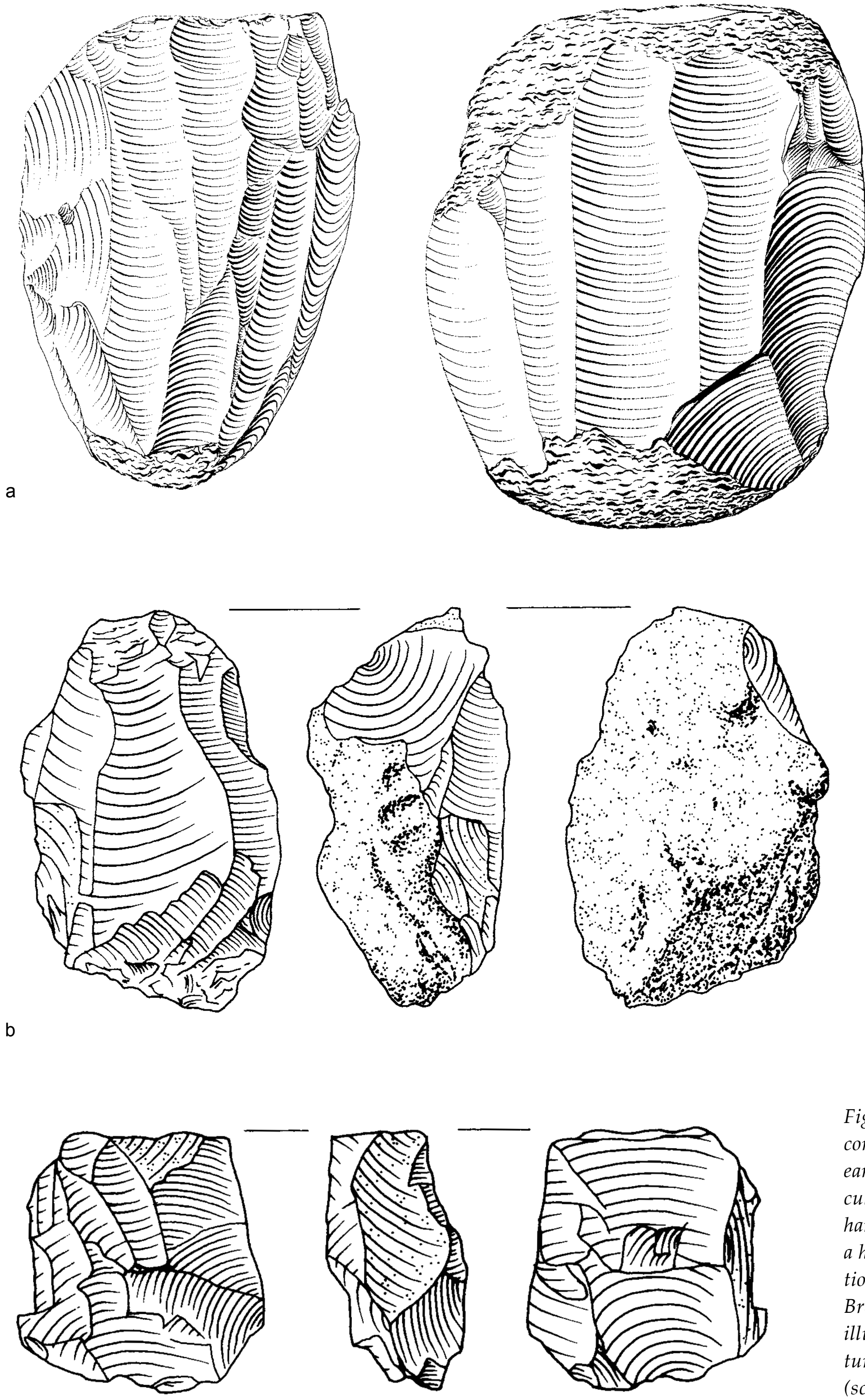

Fig. 2.5 Different type of cores: a. two blade cores of the early Neolithic Bandkeramik culture, secondarily used as hammer stone, exemplifying a highly standardized reduction sequence; cores from the Bronze Age site of Tiel-Medel, illustrating a more opportunistic reduction technique (scale 1:1).

of the core before actual production can start. Mistakes are easily made during the process of core preparation and irregularities in the raw material and any knapping mistakes must be dealt with. These techniques were embedded in the knapping tradition, but were also, to some extent, adapted by the idiosyncratic styles of individual knappers. After the basic blades were made, the blanks as we call them, were then further retouched to produce a variety of tools. It is important to note the constancy and extent of this retouching because this is indicative both of the skills of the knapper and the time invested in the object. If aesthetic aspects are of no importance and functionality is the main motivation for making the tool, then we frequently find that little time, effort and skill was invested in its production: inferior raw material was used and the nodule was reduced by, for example, the bipolar technique, a technique that produces straight edges in a short time and without much effort.

Certain technological attributes deemed relevant with respect to aesthetics and the time and skills invested, were recorded systematically in our research. These included the kind and amount of cortex and the evidence for hafting. Other technological attributes such as the type of percussion (hard, soft, or bipolar), the regularity of the object and the quality of the retouch were only studied on samples of the tools or were noted in an impressionistic manner.

2.3.2 Typo-morphology

Typology is essential to standard archaeological practice: we all know our relative dating sequences based on the style of a series of tools deemed characteristic for a specific period or archaeological culture. Style is thus believed to reflect cultural identity, an issue that will be discussed more fully in Chapter 6. I will not dwell extensively on the issue of typology here because it is not the focus of this book and because many typologies are constructs of individual archaeologists that may have had little relevance to the makers and users of the objects (see White *et al.* 1977; Whittaker *et al.* 1998). Nevertheless, every object that was submitted to microscopic analysis was also classified into a particular typological category[1] in order to relate choice of raw material, the investment of skills and knowledge, aesthetic considerations and functionality with tool type. This typological classification, however, was a rather general one and my approach can be 'classified' as that of a 'lumper'. Still, it is apparent that type and function do not always correspond: different tool types may have the same function (fig. 2.6) and, vice versa, one tool type may have served different purposes.

It appeared that some tool types were exclusively made with specific raw materials and had been solely used for very specific purposes. Also, certain tool types were much more extensively invested with stylistic information than others. For example, tools that were predominantly used outside of the domestic context such as arrowheads or daggers have standardized morphological characteristics. There is no clear functional explanation for these explicit morphological attributes, which probably means they were just meant to signify some sort of message. These 'tools with a message' are those often associated with male activities like hunting or warfare, activities that took place in the public domain

1 According to the typological list set up by Archis. For the sake of comparability all sites not having been classified according to the Archis system, were re-coded in the database.

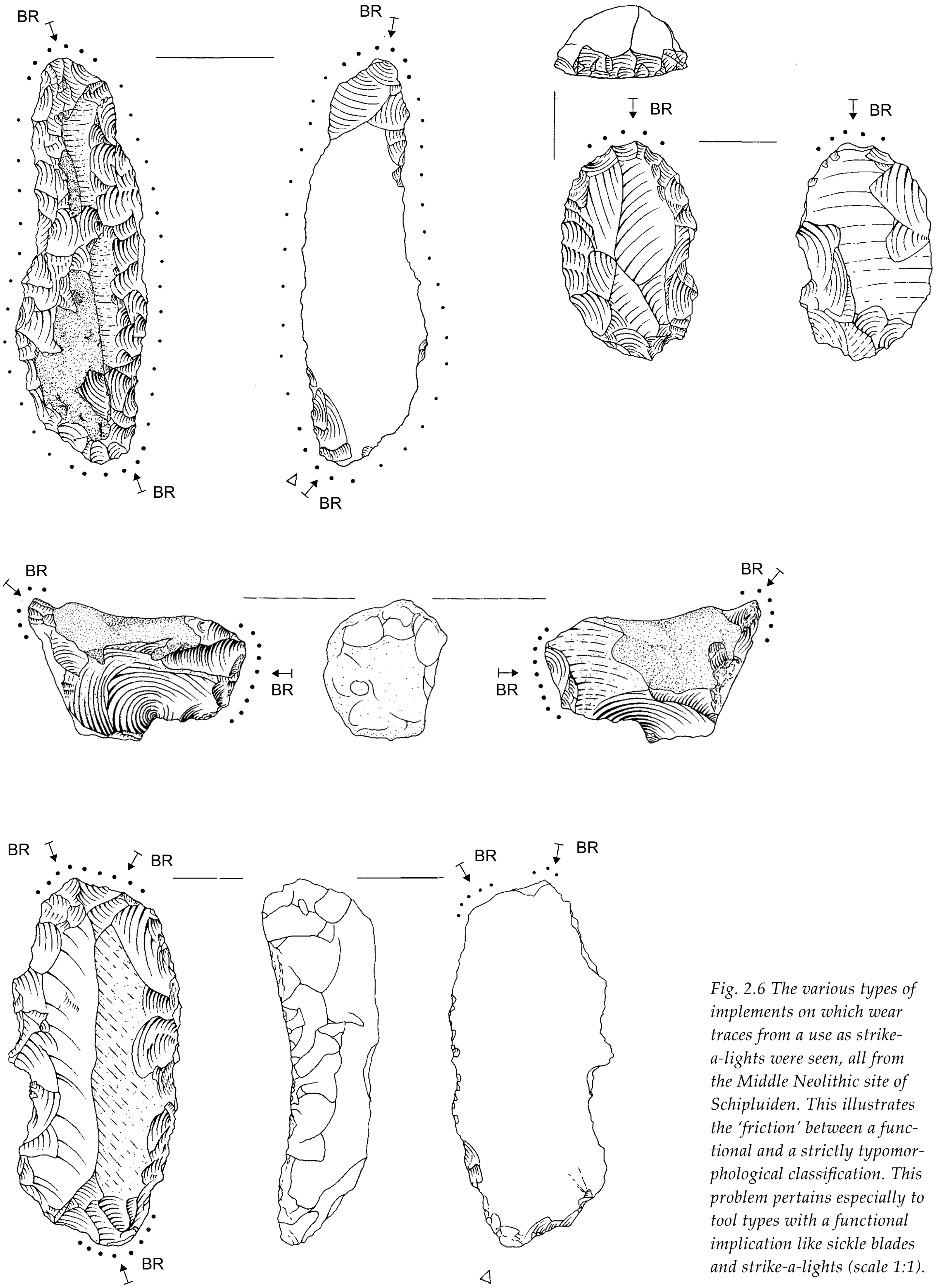

Fig. 2.6 The various types of implements on which wear traces from a use as strike-a-lights were seen, all from the Middle Neolithic site of Schipluiden. This illustrates the 'friction' between a functional and a strictly typomorphological classification. This problem pertains especially to tool types with a functional implication like sickle blades and strike-a-lights (scale 1:1).

and were thus highly visible. Not only were they made of aesthetically pleasing raw materials or stones with exotic origins, they also display a high level of technical skills and knowledge. In contrast, tool types that predominantly related to domestic tasks, such as scrapers and retouched flakes, were frequently made from local raw materials of inferior quality, were produced in an *ad hoc* fashion, and lacked a standardized shape. This issue is dwelt upon much more in this book, but the above makes clear why all tools that were examined for traces of wear and residue also were typologically classified.

2.4 The 'life' of the object: functional analysis

2.4.1 Introduction

The results from the functional analysis of flint tools constitute the backbone of this book and actually provide essential data to understand the role of flint tools in Neolithic and Bronze Age society. Until the early 1970s, there was little interest in the function of tools. From the perspective of the dominant culture-historical approach artefacts were considered as index fossils, used to establish the chronological sequence and to define archaeological cultures. Past human behaviour was only of secondary interest until the advent of the New Archaeology in the 1960s when archaeologists became interested in the human behind the artefact. Although functional analysis was already an established discipline in Russia (Semenov 1933 translated to English in 1964 (Semenov 1964)), it was only then that functional analysis started in the west.[2] It is beyond the scope of this book to provide a historical overview of the development of the method and the reader is referred to earlier publications that extensively address this topic (Ibáñez/González 2003; Juel Jensen 1988; Odell 2001; Van Gijn 1990).

2.4.2 The methods of use-wear and residue analysis

2.4.2.1 Use-wear analysis

The approach taken here is a combination of what is commonly called the Low and the High Power approach (Keeley 1980; Tringham *et al.* 1974; Van Gijn 1990). It is aimed at the interpretation of the wear traces in relation to the morphology of the implement. It is also directed at the retrieval of residue (see below). Wear traces that were recorded include polish, striations, extent of rounding and edge damage.

Although Keeley advocated cleaning all tools by means of chemical solutions (Keeley 1980), most microwear researchers rarely did so because they assumed that the matrix in which these tools had been embedded, would already have removed most residues (such as plant juices) that can obscure the more enduring phenomena of use-wear such as polish and striations. In our studies, oc-

2 In Russia functional analysis already started much earlier. The reason is that from a Marxist perspective technology of course is a crucial aspect of society, strongly determining the social and economic configuration. The most well-known exponent of the long tradition of Russian research into use-wear analysis is Semenov.

casionally a 10% HCl solution, followed by a 10% KOH solution was used to remove residues that interfered with the description and interpretation of polish and striations. For the most part, however, implements were only cleaned with alcohol in order to remove finger grease.

2.4.2.2 Residue analysis

The detection of any remnants of contact material was considered extremely important and all tools were studied for the presence of such residues. Residues found on the flint implements include traces of (birch bark) tar, ochre, sometimes small fragments of pyrite and other mineral materials. Organic remains, like blood or other animal tissues were not found. Stains suspected of being traces of blood were tested by means of Haemastix strips. Moreover, the residue on a dozen tools was tested by immunological methods to check for protein (Wallis/O'Connor 1998), but no positive results were obtained. The few tools that showed extensive polish from contact with cereals or reeds were subjected to phytolith analysis (Fullagar 1998; Kealhofer *et al.* 1999; Nieuwenhuis/Van Gijn 2008). Possible plant remains were removed in order to look at the structure of the plant cells (Barton 1990).[3] Starch grains have hardly ever been found on tools from Dutch sites.

Generally speaking little residue was encountered. Virtually none of the organic material that may have been present on the tools when discarded remained. This could be the result of micro-organisms in the soil or possibly also the effects of a fluctuating groundwater table. As mentioned before, only residues from mineral substances, like ochre or pyrite, were – occasionally – preserved.

2.4.2.3 The sequence of analysis

A stereomicroscope was used to screen each implement for macroscopic wear, the relationship of this wear to the overall morphology of the tool and for the presence of residue. Use was made of stereomicroscopes with both oblique and incident light with magnifications of up to 160X. If residue was detected, additional care was taken in handling the tool in order to avoid contamination. This meant using starch-free gloves to pick up the implement and placing it on a sheet of Parafilm before examining it under the microscope. Residue was documented *in situ*, photographed and filmed to show its position relative to the edges and to any polish marks or other signs of wear. The residue was then removed for further testing. The residue was mounted on a glass slide and examined by means of transmitted light and polarized light microscopy.

An incident light microscope was subsequently employed for the detection of the use-wear polishes and striations with magnifications of 150X and 300X. Frequently the sample was again examined with the stereomicroscope to ascertain the relationship between the polish seen and the morphology of the tool and so check for evidence to support its hypothetical function. In fact, interpretation of each tool's function was based on a constant dialectic between

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3 The method used is the one proposed by Barton (1990). With a pipette (an Eppendorf 10 ml with discardable tips) a small amount of distilled water is dropped on the residue. The residue is soaked for a few minutes and sometimes slightly scraped with the tip of the plastic pipette to loosen it. It is then sucked up with the pipette and put on a glass slide.

Fig. 2.7 A visual comparison of archaeological and experimentally obtained traces of wear lies at the basis of our inferences on tool function: a. experiment with carving bone; b. experimental traces from contact with bone (200x); c. traces on a flake from the Vlaardingen site of Hekelingen III (200x).

hypothetical explanations and incident light microscopy and stereomicroscope analysis. In this way it was possible to relate two or more zones with use-wear and residue and to arrive at statements about the different stages of the use-life of flint objects. This is a somewhat different approach from the traditional one which was very much based on determining the number of used zones, the range of contact materials (activities) represented and the relationship to tool typology (Van Gijn 1990). Admittedly, the latter approach has been used to study much of the settlement material. However, the biographical approach developed after 1995 to study 'special objects' (the burial goods and the finds from depositions), also turned out to be very useful to look at settlement material.

2.4.3 Experiments

Experiments are crucial for the interpretation of wear traces and residue. Use-wear analysis is very much an empirical approach whereby traces seen on modern, newly made and used tools are compared to traces found on archaeological implements. If there is a match between the attributes of experimental and archaeological use-wear traces, it is concluded that in all probability the same contact material was responsible (fig. 2.7). This method of comparison is strictly visual, not analytical, which is its most important short-coming (see below).

The present study is based on comparative data from a large collection of experimentally used implements at the Laboratory for Artefact Studies of Leiden University since 1984. Our experiments fall into two broad categories: generalized and problem-oriented experiments (Van Gijn 1990). Generalized experiments are aimed at reproducing and studying a wide range of used tools. The variables that can be controlled and adjusted include: motion, contact material, duration of use and the type/form of raw material. Typical experiments include cutting, scraping and drilling materials such as bone, antler, hide, or wood. Problem-oriented experiments are aimed at replicating a particular type of archaeological wear trace for which there is no experimental equivalent yet. An example would be 'polish 23', a highly characteristic, but as yet unexplained, type of wear traces (Van Gijn 1990).

Through the years, c.1700 experiments have been carried out, both by students and researchers working at the Laboratory for Artefact Studies, and the collection continues to expand. Ethnographic and ethno-historical research provided the necessary knowledge as to how to carry out various tasks. I will not dwell upon experiments here but relevant information will be discussed in Chapters 4 and 5, which deal with subsistence and craft activities respectively. However, it must be stressed that the same limitations pertain as in all experimental studies (Malina 1983; Outram 2008; Reynolds 1999; Tringham 1978). Most important, in our case, are the lack of expertise and our limited knowledge of techniques and procedures. Our experiments entail activities as varied as butchering deer, producing bone implements or harvesting plant species for fibre processing, all of which require levels of expertise that – in prehistoric times- were usually not combined in one person. It is therefore doubtful whether we can compare our experimental data directly to our archaeological observations. We must be especially careful about concluding the length of time a tool could have been used. In our experimental setting, our lack of knowledge and practice could mean that we are inflicting far more damage on our experimental tools than our skilled prehistoric agents would ever have done. This was brought home to me very forcefully when working together with an experienced butcher who could butcher an entire deer with one flint blade while hardly damaging it, whereas my butchering blade was dull and virtually useless after only half a deer (Van Gijn 1990).

2.4.4 Problems of interpretation

2.4.4.1 Inferential leaps

There are various levels of analysis at which an 'inferential leap' is made (Tringham 1978). First of all, it is well-known that it is impossible to examine a tool completely for traces of use-wear by means of the metallographic or incident light microscope. Because the light has to fall exactly at a 90 degree angle to the surface, we have to continually adjust the position of the tool under the microscope. In practice this is impossible, so we sample the tool and only examine representative parts of the surface thoroughly. This means that, theoretically, we could miss traces of wear, especially those that are restricted to small sections of the edge. Where we look at the surface of an implement under the incident light microscope, we tend to be influenced by our own preconceived ideas of tool use: only those areas that we consider most likely to be involved in its use are examined under optimal lighting conditions (Van Gijn/Raemaekers 1999). A striking example is the Tübingen blind test where four analysts were asked to examine a small burin spall. One of the two organizers of the blind test had a background in Arctic archaeology: she used a burin spall 'the wrong way up' from our West-European point of view: with the proximal end. All four analysts missed the traces, even though these were very clear and should not have been missed had we actually looked carefully at this part of the tool. We did not make a sufficiently careful inspection and the reason is that we had our preconceived ideas about how such a burin spall should be used (Unrath *et al.* 1986). This example illustrates how important it is to remain free from such preconceived ideas and attempt to examine a tool as objectively as possible. Here an important role is given to the stereomicroscope: it is by means of a thorough first inspection by means of low power microscopy that we can detect edge damage, rounding and other indications of past use, as well as traces of residue. The metallographic microscope, where lighting conditions are so crucial for our ability to see use-wear polishes, can then be used to check these places and to sample the remaining parts of the tool. Assuming that we have identified all traces of use and hafting is, however, a leap of faith and probably not a very realistic one.

Another problem with use-wear analysis is the fact that traces from, for example, contact with bone may be similar to traces resulting from antler and hard wood (Van den Dries/Van Gijn 1997). Some of the attributes of wear may overlap between different contact materials. Deciding which contact material is the more likely one, considering the attributes displayed by the polish, striations, use-retouch and rounding, consists of a reasoning process based on analogies with experimental tools. Obviously, conclusions about tool use can only be regarded as interpretations, and not as certainties. As such, statements about the function of ancient implements are very similar to many other archaeological interpretations like the reconstruction of a house plan on the basis of the shape, fill and metrical characteristics of the postholes. They all require a leap of faith.

Sometimes there are clear traces of use-wear on archaeological flint implements, but we have not been able to create an experimental match (yet). The most famous example is 'polish 23', a type of trace that we frequently encounter in the context of Linear Bandkeramik assemblages. In fact any implements with an obtusely angled sturdy edge of a length longer than 3-4 cm seem invariably to display these traces. We know the causal motion involved is a transverse one and we also know some of the properties the contact material must have had, but we still have no idea what exactly caused these typical traces of wear, despite extensive explorative experimentation (Sliva/Keeley 1994; Van Gijn 1990).

It should be clear from the above that to collect even the most basic functional data about motion and the contact material for each tool, entails a reasoning process founded on empirically based comparisons with experimentally made artefacts. This means looking at each used zone and deciding whether the use-wear traces on the implements under study match those on the experimental tools match sufficiently to allow detailed functional inference (e.g. 'cutting meat'). If the match is less clear the inference will be less detailed, like 'soft material and motion unsure'. In some cases the traces may be insufficiently developed to allow a functional inference, or post-depositional surface modifications were such that this is no longer possible (Chapter 3). Ultimately, the functional inference is also checked against the morphology of the tool (Van Gijn, 1990: 21).

2.4.4.2 From contact material and motion to activities

The interpretation of the use-wear traces seen on the tools results in a cross-tabulation of contact material and motion: cutting bone, scraping siliceous plants and so forth. The question is, however, exactly what kind of activities produced these traces? Traces of bone cutting, for example, could be evidence of cutting up a carcass for food or of making bone tools. Similarly, traces of cutting siliceous plants could be evidence of a subsistence task (collecting plants for consumption) or of a craft activity (collecting plants for making baskets). However, it is often difficult to differentiate between subsistence and craft activities. In fact it has been argued that we are only able to infer two real activities: butchering and cereal harvesting (Juel Jensen 1988) and even these two can be ambiguous as the glossed blades from many tell excavations in the Near East show. The *tribulum* inserts found there display traces of 'cereal cutting', but also have some additional features that have led researchers to conclude that they were part of ancient threshing sledges (Anderson *et al.* 2004). These implements should thus be interpreted as processing tools to thresh cereals. However, in a way they are also tools related to crafts because while threshing the cereals, they also cut up the cereal stems, making straw fragments that could be used to temper pottery: clearly a craft activity.

In this book an attempt is made to differentiate between flint tools used for subsistence activities and those related to crafts. Obviously this is not always possible. However, by combining the character and position of the wear traces with ethnographic and experimental information as well as knowledge of the context in which the tools were found, it was often possible to make the distinction between craft and subsistence tools.

2.4.4.3 Two or more used zones on one tool: a tool's biography

If two or more used zones, displaying different attributes, were seen on one and the same implement, we need to unravel their relationship. Four different categories can be distinguished: 1. the tool was hafted; 2. the tool was used for more than one activity; 3. the different used zones were the result of a single but complex activity; 4. the tool had been subjected to 'special treatment' after its use. Obviously, the four different situations are not mutually exclusive. For example, because of the time, effort and materials invested into it, a hafted tool is more likely to have been used on more than one contact material, and it could also have been subjected to special treatment upon discard. We need to carefully study the different used zones displaying traces and/or residue in relation to the overall morphology of the tool. Where possible we must look for 'stratigraphic' information that can provide us with clues about the sequence of traces and residue. We also need to take into account the context in which the tool was deposited: if an object was placed in a hoard or in a grave it is more likely to have been subjected to special treatment. In addition to scientific reasoning, we also need to use our imagination, fuelled by ethnographic accounts and even our own experiences. In this way, we are able to go beyond a simple tabulation of contact materials and motions. Tables of empirical data need to be translated into statements about human behaviour.

2.4.4.4 Interpreting tables of results

Once the analyses have been performed and the individual tools have been interpreted in terms of their use-life, the next step is to assess the use-wear results from an entire site. A major methodological issue is the extent to which we can attribute significance to the absence of specific traces. Crucial for this issue is the degree of preservation. We have to estimate which types of traces are likely to be lost considering the extent of the post-depositional surface modifications present. For example, traces from contact with green plants and from cutting meat may not always be preserved and are likely to be under-represented (Van den Dries/Van Gijn 1997). Another problem is related to the extent of the excavated area and to sampling: how much of the site has been excavated and how does the sample studied relate to this? If only a small part of the site has been excavated, then the absence of certain types of wear traces carries a very different significance than if we had explored the total site and not found these traces. In a similar vein, if we study only a small selection of the total number of implements, we are likely to miss traces related to tasks that were only carried out incidentally. Clearly, for every new site we need to evaluate the significance of the results that were obtained and attribute meaning to them.

2.5 Contextualizing the data

The last step is, of course, to put the data concerning the life-history of these implements in their archaeological context. Only by doing so can we obtain insight into the last phase of the object's biography: its loss, deposition or discard. Loss is unintentional and could well explain the ubiquitous presence of for example single arrowheads across the landscape. But loss can also occur within the dwelling: objects may be accidentally displaced or swept away never to be found again. Obviously we may also have to deal with objects that are simply left behind in their location of use: the primary refuse in Schiffer's terms. This is for example the case with the site of Hekelingen III where flint tools are all concentrated around the hearth areas (Van Gijn 1990). Hekelingen III is however a site which was only occupied on a short-term, probably seasonal, basis. Primary refuse is likely to be a rare occurrence in the context of the long-term or permanently occupied settlements composing the majority during the period this book is concerned with. There we are more likely to find the remnants of deposition and discard, which are of course intentional acts. Discard is considered to be the throwing away of objects that have (accidentally) been broken, are exhausted or are otherwise considered to be no longer useful. Discarded objects are often thrown away in special locations designated for this purpose, like garbage heaps. Wells, pits, and the edges of natural depressions are also likely spots for such discarded objects. However, we must be careful with subsuming all finds from such contexts as discard because it is exactly such places, which in a way can be characterized as liminal, where special depositions take place (Brück 1999). It should also be stressed that fragmentation can be a ritual act, a deliberate destruction of an object that is subsequently deposited in a specific location (Chapman 2000; Verbaas/Van Gijn 2007a).

Clearly it is important to know the location of a find in relation to its original context and direct surroundings: that is to say where it was found within the original settlement and in which stratigraphic position. However, the next step is to relate the objects to other, associated finds. This applies, for example, to the analysis of burials: what other finds are there to illustrate what was considered important to give to the dead? Furthermore, it is also important to relate the object and its context to the landscape setting and to other archaeological contexts from the same period. For example, when examining the special depositions of the TRB culture in Drenthe, their meaning only becomes clear when the depositions are compared with the burial contexts from the same period (Wentink 2006).

Chapter 3

Introducing the databases: selection, chronology and source criticism

3.1 Selection

In order to address the question of the diachronic changes in the way people dealt with flint and the meaning this material had for past peoples, I needed to sample not only sites dated from different periods and regions, but also deriving from different contexts: settlement sites, burial contexts and depositions. An important criterion for selection was the inherent informational value of a site or find, that is, whether it was securely dated and had potential in terms of expected information.

Obviously, in actual practice these criteria were not the only ones dictating the selection of sites. Even though palimpsest sites were not preferred for study, some were included because they were previously studied in the context of commercial projects. Due to large-scale construction activities and reclamation of entire landscapes Dutch field archaeology in the last ten years has been dominated by rescue excavations. Several excavation projects of Mesolithic and Neolithic settlement sites were undertaken in which use-wear analysis of artefacts was a part. Obviously these data were included in the database but the selection of these sites was not dictated by scientific motivations but by the construction activities of local, regional or national authorities. The result is that some areas and periods are better represented than others.

The selection of flint objects from burials and depositions was also the result of more reasons than just scientific ones. Ideally, I intended to have a chronological and geographical coverage but, of course, burials and depositions are not known from many areas. Both burials and depositions are quite rare in the wetlands, while they are more prominent in the uplands. This is clearly the result of visibility: due to extensive Holocene sedimentation in the lower-lying western and northern half of the country, reconnaissance activities are restricted to coring. Moreover, because of this lack of visibility amateur archaeologists are much less active in the Holocene sedimentation area. It is only where large-scale reclamations have taken place, such as in the area of West-Friesland in the province of Noord-Holland, that we know of not only settlements but also of depositions and burial contexts. For example the large concentration of crescent shaped 'sickles' in West-Friesland must be seen in this light (Chapter 8).

In contrast, our knowledge of the flint from the uplands is largely due to the activities of local collectors. In fact, as has been shown for the region of Friesland, it is frequently possible to relate a concentration of finds to the action radius of one particular active amateur archaeologist (Fokkens 1998b).

Fig. 3.1 Surface find of a Scandinavian dagger from Westenes, Drenthe (length 28,3 cm). Note the remnant of cortex on the butt end.

Peat digging in the 19th century in the peat areas of Drenthe and Groningen, organized in small concessions granted to individual families, has also resulted in a large number of finds. Unfortunately, there was often no known context for these finds and they found their way into museums as isolated objects (fig. 3.1). Many of these special finds, like axes and daggers, probably formed part of intentional (special) depositions, but we will never know for certain. If no context was known, there was little point in including the find in the analysis. The lack of sedimentation in the uplands also caused the burials to be much more visible in the landscape: obvious examples are the *hunebedden* and the barrows. As a consequence we know more about such monuments than about flatgraves for example.

Not all of the material that was initially selected for study proved to be accessible. It was clearly impossible to be exhaustive so no attempt was made to trace finds from amateur collections. Some find assemblages were incomplete or could not be found at all. It is a well-known fact that special finds have a tendency to disappear because they are kept separate from the rest of the assemblage and put in a 'safe' place never to be found again (a kind of modern 'structured deposition'). Occasionally, finds are lent to special exhibits, without proper documentation of their whereabouts. Some assemblages could therefore not be included in this study because they could not be retrieved or because crucial finds were missing.

A number of sites that I originally selected for study because they were potentially very informative and well-dated proved, after a microscopic pilot study, to be unsuitable for functional analysis due to post-depositional surface modifications of the flint objects. Some of the settlement assemblages dating from the Late Neolithic, the Beaker period and the Bronze Age proved to be too abraded for analysis because they were located on sandy outcrops: flint becomes abraded in a sandy matrix, making a high power analysis of the material much more difficult. Another reason for the poor quality of many upland assemblages is that the raw material was moraine flint, a flint type that is naturally very shiny due to its glassy texture. Because this material is also often used in an *ad hoc* fashion, use-wear traces are not very well developed and therefore very difficult to distinguish on the reflective surface. These sites have therefore not been included in the database.

However, because it was important to include material from for example the megaliths of the TRB, it was sometimes decided to include material of a lesser quality, taking into account that the amount of information consequently would be less detailed (see below under taphonomy). Incidentally, a site or an object was selected because it was one of a kind and filled a gap in our knowledge. This was for example the case with some of the finds from burials and depositions from later periods, but to some extent also pertained to the TRB settlement site of Slootdorp-Bouwlust.

3.2 The databases

One important corollary of writing this book was the setting up of one homogeneous database of all the flint objects from the territory of the Netherlands and dated from the Late Mesolithic onwards that had been microscopically

Site	Period / Culture	No. on map fig. 3.3a	Total in Database	Total UWA done	total with traces
Hardinxveld-Giessendam - De Bruin (phase 1)	Mesolithic	1	384	17	12
Hardinxveld-Giessendam - Polderweg (phase 1)	Mesolithic	1	17255	105	68
Hardinxveld-Giessendam - Polderweg (phase 1/2)	Mesolithic	1	1062	21	16
Beek-Molensteeg	LBK	2	1704	363	116
Elsloo	LBK	3	404	404	237
Elsloo - Riviusstraat	LBK	3	276	99	79
Geleen - Janskamperveld	LBK	4	170	170	150
Maastricht - Randwijck	Rössen	5	70	70	47
Brandwijk (phase 1)	Swifterbant 1	6	32	7	3
Hardinxveld-Giessendam - De Bruin (phase 2)	Swifterbant 1	1	10796	64	46
Hardinxveld-Giessendam - De Bruin (phase 3)	Swifterbant 1	1	1045	23	15
Hardinxveld-Giessendam - Polderweg (phase 2)	Swifterbant 1	1	182	29	20
Brandwijk (phase 2)	Swifterbant 2	6	355	62	37
Hazendonk (phase 2)	Swifterbant 2	7	1	1	1
Swifterbant - site 2	Swifterbant 2	8	189	95	37
Swifterbant - site 3	Swifterbant 2	8	828	50	23
Swifterbant - site 51	Swifterbant 2	8	3	3	3
Gassel	Hazendonk	9	1	1	1
Hazendonk (phase 3)	Hazendonk	7	15	15	12
Rijswijk - A4	Hazendonk	10	4	4	3
Schipluiden - Harnaschpolder	Hazendonk	11	5106	373	134
Wateringen 4	Hazendonk	12	1065	179	86
Rijswijk - Ypenburg - Site 4	Hazendonk	13	141	141	71
Barendrecht - Zuidpolder (VL)	Vlaardingen	14	4	4	2
Hekelingen III	Vlaardingen	15	337	337	136
Leidschendam	Vlaardingen	16	73	73	27
Groningen - Oostersingel	TRB	17	68	68	39
Slootdorp - Bouwlust	TRB	18	52	52	16
De Bogen - site 29	Late Neolithic / Middle Bronze Age	19	872	34	27
De Bogen - site 30	Late Neolithic / Middle Bronze Age	19	524	20	15
De Bogen - site 45	Late Neolithic / Middle Bronze Age	19	421	20	13
Boog C-Noord	Early Bronze Age	20	83	83	52
De Bogen - site 28-2	Early Bronze Age / Middle Bronze Age	19	26	5	3
De Bogen - site 28-4	Early Bronze Age / Middle Bronze Age	19	23	3	3
Voetakker	Early Bronze Age / Middle Bronze Age	21	1312	46	33
De Bogen - site 28-3	Middle Bronze Age	19	17	4	3
Lienden	Middle Bronze Age	22	17	17	11
Barendrecht - Zuidpolder (BA)	Bronze Age	14	57	57	21
Hazendonk (BA)	Bronze Age	7	1	1	1
Lage Blok	Middle Iron Age	23	10	10	6
			44985	3130	1625

studied since 1984 in the Laboratory for Artefact Studies in Leiden. Over the years the databases in which the findings were entered had been modified and occasionally the commercial setting in which a particular find assemblage was studied required the use of other database structures. This had resulted in the existence of individual databases for the various settlement sites that had been examined over the course of these years. As our knowledge had increased over time, resulting in different interpretations of use-wear polishes, the finding of new types of wear traces, and the use of different descriptive terminology, it was necessary to homogenize them. This would also enable me to ask questions on for example the number of used arrowheads present in the various archaeological periods. This book presented a perfect opportunity to create a new structure in which all data could be fitted and be made comparable. The establishment of the E-depot[4] formed an extra incentive to 'dig up' our old databases and make them usable again.

A new updated structure was created by Milco Wansleeben (Leiden University), a structure that also enabled us to enter functional data on tools made of other materials than just flint. The resulting database includes only settlements and burial sites such as the TRB *hunebedden* from which large quantities of flint derived. Table 3.1 displays all the settlement sites in the dbase (as of April 2008) with the archaeological periods to which they were attributed and the number of artefacts studied for traces of use-wear and residue.

The objects from special depositions and from burial contexts like barrows and stone cists were put in a separate database (an excerpt of which can be found in Appendix). Most of these objects were located in museums. In this database additional information concerning the find circumstances and find location was noted. Variables included the matrix in which the object was found (peat or sand), whether the object was ground, polished or showed multiple phases of modifications. These data are very important because many of these 'special' objects have evidence of a long life-history. The regular database containing the artefacts from sites did not provide for such contextual data. So, in addition to the table used for recording and documenting the data on wear and residue, which was the same for the two sets of databases, the finds from depositions and burials were also described in two separate tables, one focussing on variables related to the biography of the flint implement, the other on the find-circumstances.

In addition to the material that was studied by the author or by students under her supervision, a few additional relevant use-wear studies had been published by others. A sample from the Swifterbant sites S51, S4 and S2 was studied by Bienenfeld in the early 1980s (Bienenfeld 1986, 1988). Some additional material from the S2 and S3 sites was examined by the author in the context of the PhD study of Raemaekers (Raemaekers 1999). This latter material has been incorporated in the database. Schreurs studied the material from the Early Swifterbant site of Hoge Vaart (Peeters *et al.* 2001), the Michelsberg sites of Maastricht-Klinkers (Schreurs 1992) and Heerlen-Schelsberg (Schreurs 2005; Schreurs/Brounen 1998), as well as the Middle Bronze Age site of Eigenblok

Table 3.1. Overview of the settlement sites discussed in the text (UWA = use-wear analysis).

4 The E-depot for Dutch archaeology is part of DANS (KNAW/NWO) and is designed to ensure the durable archiving of digital archaeological information. Reports and data are available online in a way that future archaeologists can understand and use the data.

(Van Gijssel *et al.* 2002). Before starting my PhD project in 1984, I examined the material from the Vlaardingen sites of Vlaardingen and Voorschoten (Van Beek 1990) and the Bell Beaker/Bronze Age site of Oldeboorn (Van Gijn 1983). These studies of course are not part of the database but will figure in the arguments put forth in the remaining of this book. The same pertains to material studied in the last two years such as the sites of the Hanzelijn (Lohof *et al.* in prep.-a; Lohof *et al.* in prep.-b).

3.3 Representativity

3.3.1 Introduction

The question of representativity is relevant for different levels of inference: first, on the level of the site, second at the level of the sample of flint tools selected for microscopic study, and last at the level of the tools themselves (Van Gijn/Raemaekers 1999). At the site level we must take into consideration the geological situation of the Netherlands: the west and north is basically part of the North Sea basin, in which extensive sedimentation (clay and peat layers) has taken place. In contrast, the Pleistocene uplands have been more subjected to various processes of erosion like colluviation and dune formation. In the Holocene sedimentation zone sites are therefore basically well-preserved, but they remain largely invisible to us, especially where it concerns the spatially more restricted phenomena of landscape use like special depositions and flatgraves. Also, because most well-dated finds from wetland sites were found in the dump zones at the water edge, most of the material must be considered as secondary refuse: it concerns material that was thrown away, and not lost accidentally or left behind at the location of use. The fact that many of the finds from wetland assemblages concern secondary refuse has important implications for the interpretation of the sites.

In contrast, sites in the Pleistocene uplands are more easily found, with field walking revealing numerous sites, including more transient traces of human activity or phenomena that do not extend over a large area like special depositions or flatgraves. We thus know of many burial sites and depositions from these regions. Unfortunately, few of these sites are intact as they have been subjected to ploughing, digging activities and colluviation processes. As a result many sites have been decapitated, with much of their actual find layers being located in the plough zone. Moreover, because no sedimentation took place between various occupation phases, many of the sites on the uplands are actually palimpsests. It is clear therefore that the uplands and the wetlands are basically incomparable in terms of their find distributions (Van Gijn/Louwe Kooijmans 2005).

This differential representativity also pertains to samples taken from the sites. Obviously sampling is not relevant for the flint objects from special depositions and burials: generally all objects present in such a context were subjected to microscopic analysis. However, the settlement sites that were examined for use-wear traces through the years have all been sampled in different ways, depending on the amount of time and money available and on the research questions deemed relevant at the time. In the context of commercial projects it was usually possible to examine quite a large sample (200-300 pieces) but of course this was in no way comparable to the total number of finds from these sites (in the thousands). The samples usually included as many modified tools and unmodified blades as possible, supplemented by a small sample of unretouched flakes. Only the sites examined in the course of my thesis project (Van Gijn 1990) could be sampled more extensively. From yet other sites the samples were taken by other researchers and sent to the laboratory for examination. These usually concerned very small numbers (Van Gijn/Niekus 2001). However, even though quantitative differences are definitely present between the various samples, the emphasis has always been on weighed samples, rather than on random ones: modified tools were predominantly selected, as were blades. In this sense the samples should be comparable in a qualitative, albeit not in a strictly quantitative sense. However, the examination of samples from unretouched flakes has demonstrated that the latter are frequently displaying traces of use as well. This is illustrated by the presence of numerous plant processing and bone carving tools amongst the unretouched flakes at Hekelingen III (Van Gijn 1990) (figs. 5.9, 9.1). We are therefore likely to miss certain activities because of our sampling strategies. This is of some influence for questions pertaining to subsistence and craft activities and the differences that may exist in these aspects between sites and through time.

3.3.2 Flint tools and the technological system

Flint tools are ubiquitous in the archaeological record and especially Stone Age researchers sometimes have a tendency to overly focus on flint when considering past technology. Usually a variety of flint tool types is present in the archaeological assemblages we study, ranging from axes, to scrapers to arrowheads. Many researchers unconsciously continue to connect these tool types to specific activities: axes equal wood chopping, scrapers indicate hide processing, and arrowheads indicate hunting. These implicit assumptions about the use of flint implements frequently formed the basis for a 'functional' interpretation of a site (Price 1978). However, use-wear studies have shown that there is not necessarily a correlation between tool type and function: arrowheads 'double' as cutting tool, borer or even strike-a-light, scrapers are often used on materials other than hide. From ethnographic context we know that even axes can have more functions than just cutting trees: the Dani in Papua New Guinea used this tool to chop off parts of the fingers as a sign of mourning (Hampton 1999). This rather 'loose' relationship between tool form and function, combined with the fact that we can only study small samples for the presence of use-wear and residue, leads to a situation in which we may easily miss the evidence for activities that only occurred sporadically.

It should also be emphasized that flint only constitutes a small part of the technological system. We consistently underestimate the complexity of the activities carried out in the past and the variety of tools employed in them. This is made amply clear by wetland sites excavated in recent years, which revealed a range of objects and tools made of wood, bone and antler (Coles/Lawson 1987; Louwe Kooijmans *et al.* 2001a, b). Although it is difficult to quantify the contribution of flint, some authors even suggest that flint tools formed less than 5% of the technological system (Van de Noort/O'Sullivan 2006).

3.3.3 Taphonomical processes affecting flint surfaces

Various taphonomical processes have affected flint tools after their deposition or loss, resulting in an array of so-called post-depositional surface modifications (hereafter frequently abbreviated to '*pdsm*') (fig. 3.2). This involves both mechanical and chemical surface alterations. Mechanical alterations include such phenomena as abrasion, frost damage and scratches from the passing of a plough. This damage occurs after the object ends up in the ground. Excavation and post-excavation damage can be very prominent as well (fig. 3.3). This includes traces of metal from sieving, trowel marks, and splintering and rounding due to long-term storage and handling. Moreover, especially museum pieces frequently display an array of large registration numbers, traces of chalk and graphite that were applied to facilitate drawing finely retouched implements, glue, plasticine, Vaseline, lacquer, white paint, stickers and tape. Occasionally it entails a veritable 'excavation' to arrive at the original surface of the object.

Whether we should see burning as a post-depositional modification depends on the context: we will see later in this book that there is ample evidence of the intentional burning of flint objects in the context of ritual practices like those surrounding burials (Chapters 6 and 7). Flint tools may also be exposed to fire

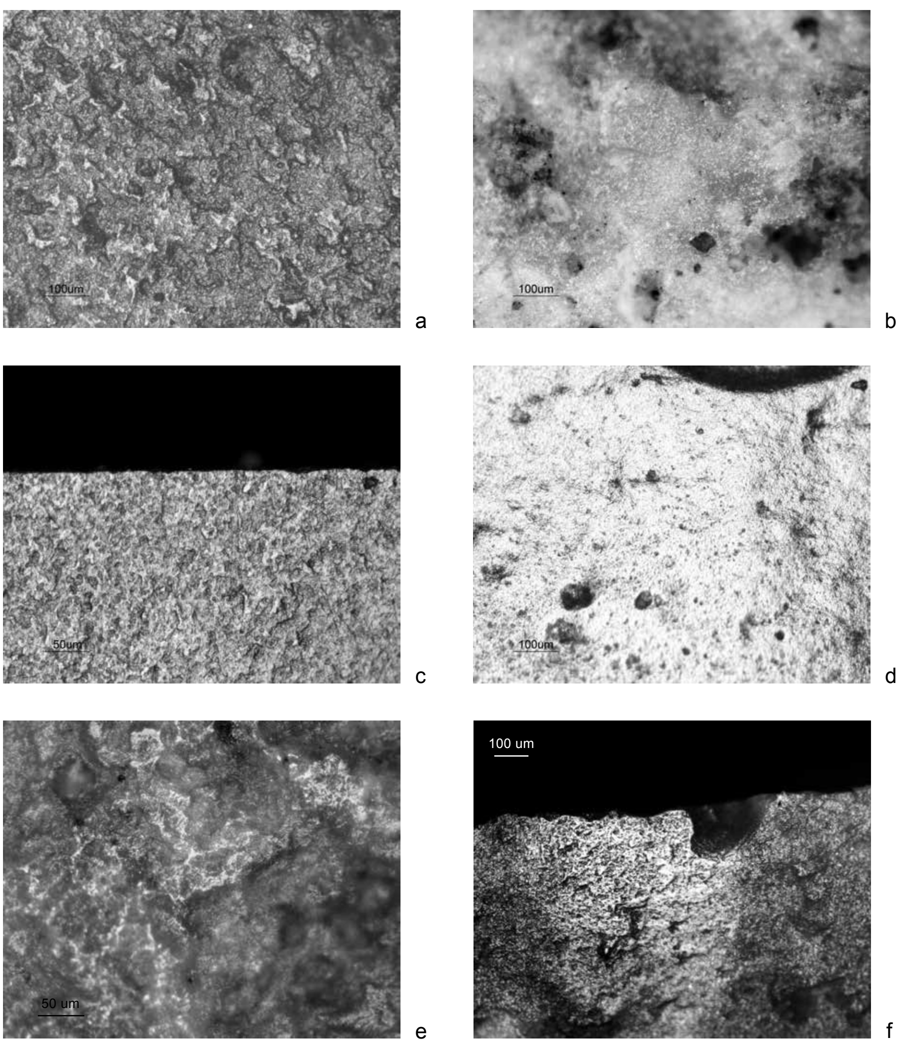


Fig. 3.2 Various post-depositional surface modifications: a. colour patina (100x); b. white patina (100x); c. black patina (200x); d. gloss patina (100x); e. abrasion traces from trampling (200x); f. 'plant-root' gloss (100x).

in the course of retooling and hafting practices (Keeley 1982). Although we have no positive evidence of heat treatment, a method that is used to improve the flakeability of chert, it cannot entirely be ruled out either. However, most often the burning of flint was accidental as when it was lying near the hearth. Cleaning living-floors and dumping the debris in the hearth must have been responsible for a great part of the burned flint that we encounter in settlement assemblages. The burning then took place after the flint artefact had lost its utilitarian function and could be considered as accidental or secondary.

Chemical alterations encompass various kinds of patina such as white or blue patina, gloss patina, and colour patina's like yellow or orange patina (Rottländer 1975a, b; Stapert 1976) (fig. 3.2a, b). White patina can either be a thin layer on the surface of the flint, but can also affect the entire body of the implement. Under the microscope it looks highly porous, with a somewhat 'sugary', granular texture that reflects light in all directions (Van Gijn 1990, fig. 34). Characteristic is a slight weight loss that is attributed to dehydration of the water present in the pores between the quartz crystals. White patina is believed to occur in alkaline environments and experiments have shown the process to occur quite quickly (Plisson/Mauger 1988). However, it seems also to develop af-

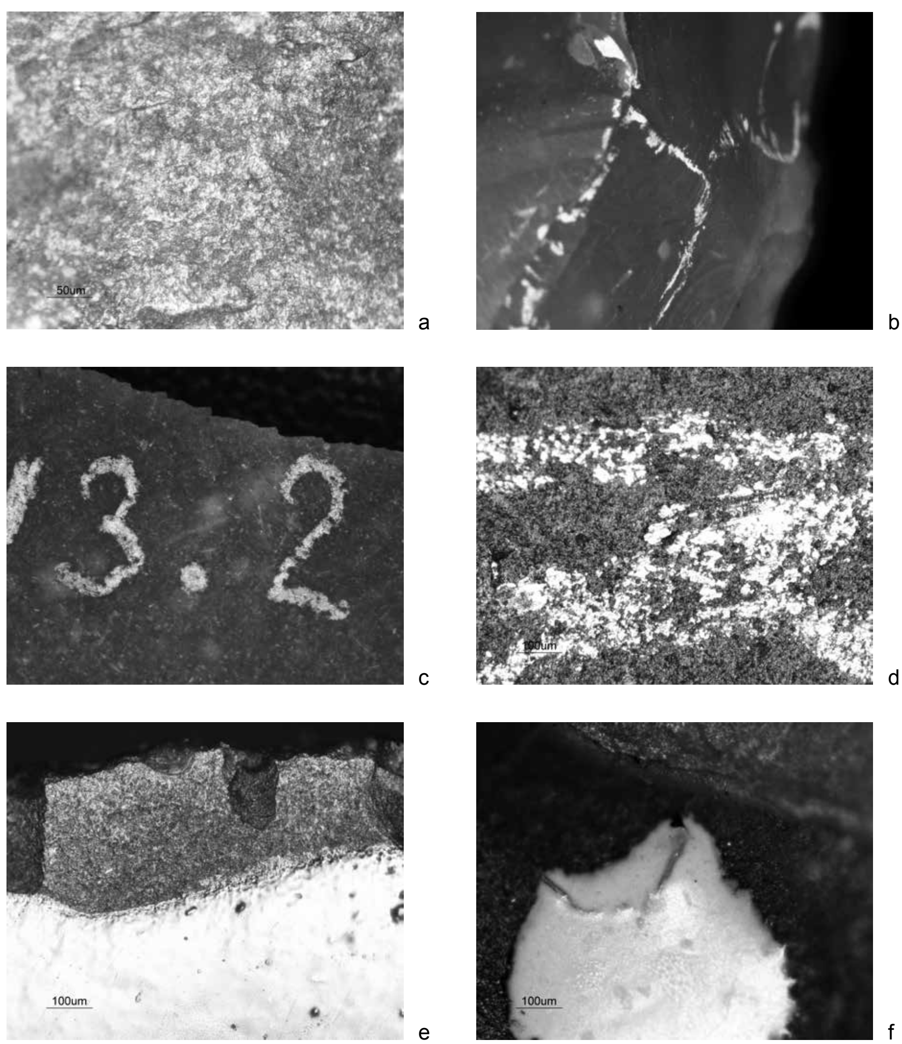


Fig. 3.3 Post-excavation treatment, such as cleaning, numbering and drawing, often destroy use-wear traces or severely obscure their visibility: a. polish from scrubbing the flint surface with a brush to clean off the adhering sediment (200x); b. smearing chalk on the flake scar ridges enhances the visibility of the ridges and facilitates drawing the implement; c. unnecessarily large find numbers, often put directly behind the retouched edge; d. scratches from contact with a metal sieve (100x); e. lacquer smeared onto the registration number to prevent that this is rubbed off (100x); f. strange white residue (100x).

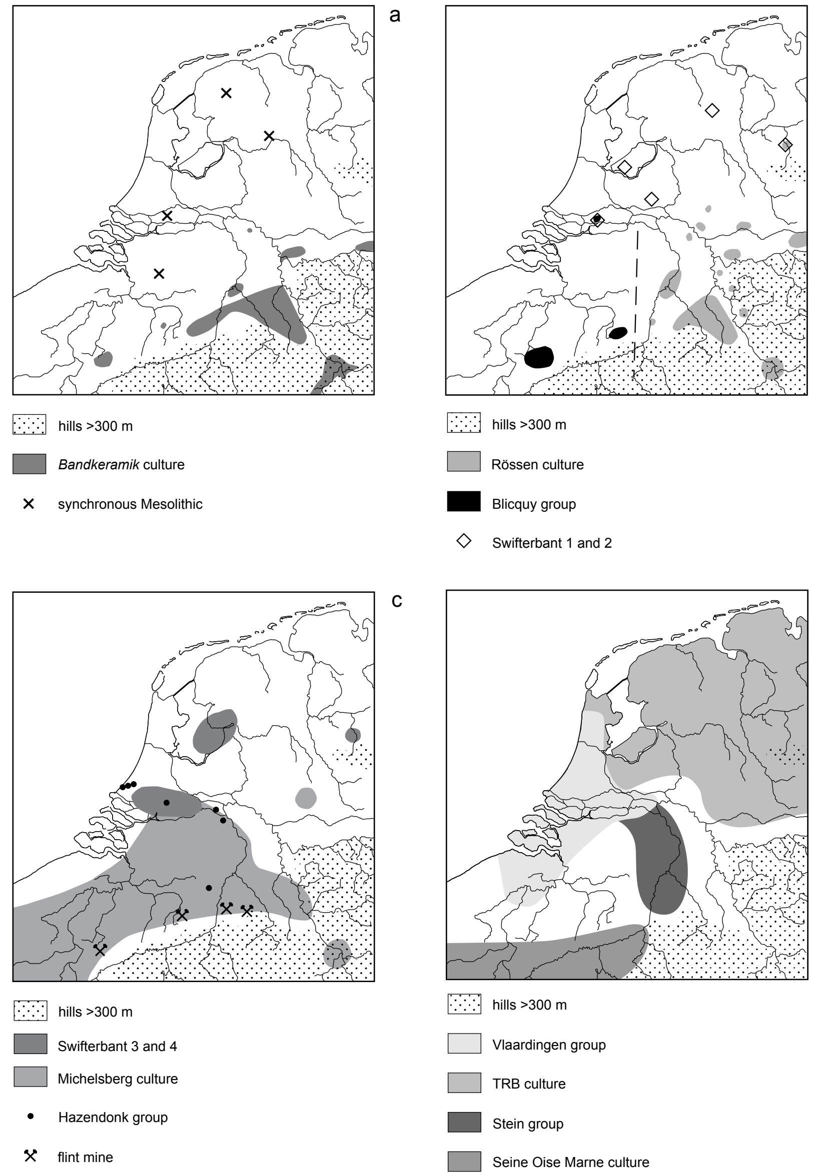
ter exposure to sunlight (Van Gijn 1993). Colour patinas are probably the result of iron infiltration into the flint surface, a process which goes faster when the porosity of the flint has increased due to the presence of white patination. Black and brown colour patina is believed to be the result of implements lying in peat (fig. 3.2c). Gloss patina, the most elusive of the series, develops in an acidic environment, with a pH of 4 or less, such as peat (fig. 3.2d). Under the influence of plant juices the surface of the flint, especially its protrusions like the dorsal ridges, is dissolved into a siliceous gel, which then flows to the lower-lying parts of the surface. This results in a smoothed, almost polished surface (Rottländer 1975a, b). It is frequently very difficult to distinguish from use-wear polishes. When examined under the scanning electron microscope, however, it becomes clear that the surface has completely 're-crystallized', and that the original slight granularity has completely disappeared (Van Gijn 1990, fig. 35).

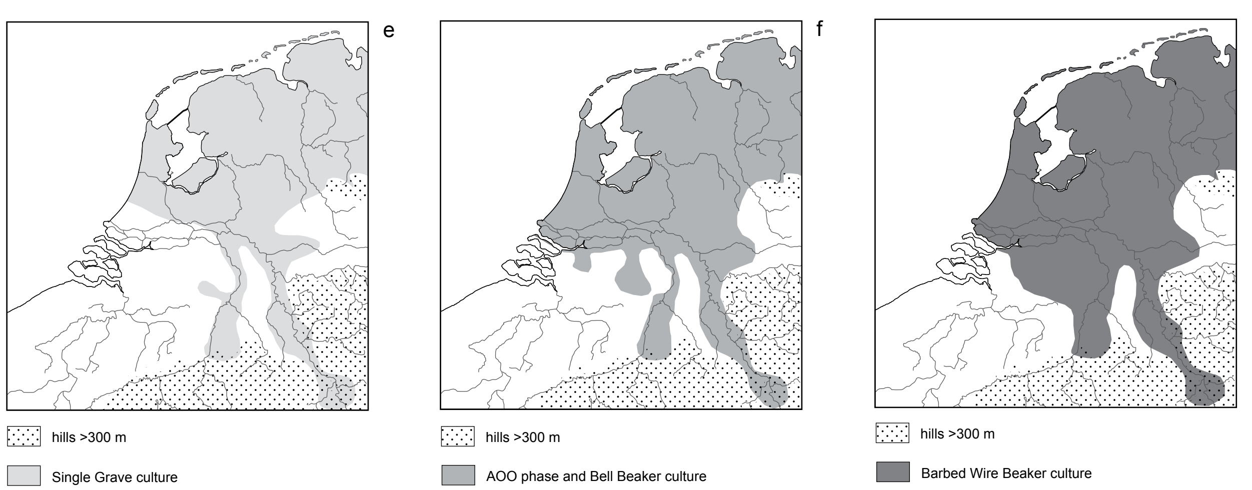
It is a commonly held belief that Palaeolithic flint implements display much more post-depositional surface modifications than assemblages dating to later periods. The extent and intensity of patination especially is sometimes used as a rough dating device. Although in general this may be true, especially Bronze Age flint assemblages also frequently show a yellowish-brown patina. It is not clear why this develops, but it did not affect the appearance of the use-wear traces. Our knowledge of how and how fast patina develops is still very limited and would definitely merit a more detailed investigation.

The matrix in which tools are lying seems to have more influence on the preservation of wear traces on tools than the duration of deposition. Flint tools that were embedded in a sandy, heavily trodden matrix are covered with a strong sheen due to abrasion by the sand (fig. 3.2e). This sand, especially when wet, has a detrimental abrasive effect. This especially pertains to material that has been left lying around on the living surface and has been trampled upon. If the stone tools were thrown into pits, their surfaces remain much fresher. Flint from the LBK, for example, which is predominantly found in the large pits surrounding the houses, is usually in pristine condition even though the loess in which it is found is granular and could potentially have an abrasive effect. Another, probably also mechanical, alteration is the so-called 'plant-root gloss' (fig. 3.2f). It concerns a very smooth reflective polish that bears a close resemblance to the polish resulting from contact with plant materials. However, there is no directionality visible in the patches of gloss which are also randomly distributed across the surface of the tool, without any relationship to the edge.

Although difficult to quantify exactly, the distortions caused by differential preservation can be outlined in general terms. These distortions are important to bear in mind when examining the composition of the database and the conclusions that can be drawn from the results. The most important problem in terms of preservation of use-wear traces and residue is movement of the tool in a sandy matrix. Clearly all settlement flint that has been embedded in sand is to some extent abraded, greatly inhibiting the visibility of the use-wear traces and frequently removing any trace of residue. The result is that settlements from sandy areas generally are much less suitable for use-wear analysis. However, it is not so much the matrix itself that results in the abrasion of surfaces, but the movement of the tools on a wet, sandy subsoil. Generally, burials are not disturbed and burial goods are fixed in place once they are deposited in the grave.

Fig. 3.4 Distribution maps of the various archaeological cultures represented in this book: a. Early Neolithic A (5300-4900 BC); b. Early Neolithic B (4900-4200 BC); c. Middle Neolithic A (4200-3400 BC); d. Middle Neolithic B (3400-2900); e. Late Neolithic A (2900-2500 BC); f. Late Neolithic B (2500-2000 BC); g. Early Bronze Age (2000-1800 BC).





Artefacts from burial context are therefore frequently in reasonable condition even if they had been embedded in a sandy matrix.

3.3.4 Sites studied: chronological context and coverage

From the period of the earliest farmers, those of the Linear Bandkeramik culture (LBK), a number of settlement sites were studied through the years. These include Beek-Molensteeg (Van Gijn 1990), Geleen-Janskamperveld (Louwe Kooijmans *et al.* 2003; Verbaas/Van Gijn 2007b) and Elsloo (Flamman 1990; Modderman 1970; Schallig 1995; Schreurs 1988) (fig. 3.4a). Additionally, flint arrowheads from the Elsloo cemetery were studied for wear traces as well. Special deposits from this period are still poorly understood and were not studied for this book. There are indications that adzes were offered (Bakels/Hendrix 1999). Querns appear to have been stacked in pits covered in ochre (Jadin 2003) or they have been fragmented intentionally and treated with ochre (Verbaas/Van Gijn 2007a). I do not know, however, of Early Neolithic depositions with flint objects.

In order to obtain some insight into the relationship between the LBK and the surrounding Late Mesolithic hunter-fisher-gatherers, the material from Hardinxveld-Giessendam Polderweg and De Bruin is included (Van Gijn *et al.* 2001a, b). These two sites have habitation layers dating between 5500-4450 BC, a crucial period in terms of the neolithisation process. Especially De Bruin is very relevant for the transition from a hunter-gatherer existence to one incorporating domestic elements. The earliest habitation phase here is still fully 'Mesolithic', the second phase sees the introduction of pottery with some typological affinities to the Belgian *Groupe de Blicqui,* whereas the third habitation phase shows the first evidence for domestic animals. Along with Hardinxveld-Polderweg, where the final phases of the Late Mesolithic are represented, these sites therefore illuminate the gradual incorporation of Neolithic elements in traditional Mesolithic society and also illustrate the level and type of interaction between the farmers of the LBK and the Mesolithic hunter-fisher-gatherers further north.

From the Early Neolithic B period (4900-4200 BC), the time of the earlier Swifterbant culture in the wetlands and the Rössen culture in the south-eastern part of the Netherlands, only settlement flint was available (fig. 3.4b). Sites include Hardinxveld De Bruin phase 2 and 3 and Brandwijk phase 1 (layer 30). Only one site from the Rössen culture could be included, that of Maastricht-Randwyck, situated on a lower terrace of the Meuse river (Louwe Kooijmans 1998b; Van Betuw 2004). The Rössen culture extends further east and we are dealing there with only the margins of its distribution area. In the southeast the Rössen culture is followed by the Michelsberg culture (fig. 3.4c). The 'classic' Swifterbant culture, represented by the wetland sites of Swifterbant S2 and S3 (Deckers *et al.* 1980) and Brandwijk phase 2 (layer 50) (Raemaekers 1999; Van Gijn/Verbruggen 1992) is contemporaneous with Michelsberg I and II. Although we know of burials from the Swifterbant culture, they contained no flint artefacts: the dead were adorned with amber and stone ornaments.

The Middle Neolithic A (4300-3400 BC) is characterized by the presence of Michelsberg sites on the sandy uplands of the south-eastern part of the Netherlands and the Hazendonk-group in the Rhine/Meuse delta (fig. 3.4c). In the north we find sites from the later Swifterbant period. Michelsberg sites are relatively rare in the Netherlands. In the Rhine/Meuse delta various wetland sites of the Hazendonk-group were included: the type site Hazendonk (Bienenfeld 1986; Van Gijn pers. observ.) and three sites within the micro-region of Delfland: Schipluiden (Van Gijn *et al.* 2006), Wateringen 4 (Raemaekers *et al.* 1997) and Ypenburg (Van Gijn/Verbaas 2008). Further east the site of Gassel was also studied (Verhart/Louwe Kooijmans 1989). These sites have provided a wealth of information about subsistence and the complexity of the material culture. At Ypenburg a cemetery was excavated but no burial gifts of flint were associated with the graves. There is however one grave at Schipluiden containing flint objects.

The Middle Neolithic B (3400-2900 BC) is the period of the Funnelbeaker culture in the north, the Vlaardingen-group in the wetlands and the Stein-group in the south (fig. 3.4d). The later phases of Vlaardingen and Stein are contemporaneous with the subsequent Single Grave culture and continue to about 2600 BC. The TRB culture is well-represented in the burial context: the contents of several megaliths were examined for traces of use. Megaliths that were studied include Mander in the province of Overijssel (O2), two *hunebedden* near Drouwen in Drenthe (D19 and D26), and G2 and G3 on the Glimmeres in the province of Groningen. The TRB settlement flint was usually severely abraded by the sandy matrix in which it was located. The material from Harderwijk-Beekhuizerzand, for example, was cursorily studied microscopically but proved too abraded for further analysis. TRB settlement sites that were studied include Slootdorp-Bouwlust (Peeters 2001b) and Groningen-Oostersingel. The TRB hoards or special deposits have been subjected to an exhaustive study and because of their deposition in wet locations, were also in very good condition (Wentink 2006, 2008). The axes and other flint objects from 12 special depositions have been studied in terms of their life-history. From the Vlaardingen-group only settlement material was included as no flint burial gifts are known. This comprises the flint from Leidschendam trench 4 and Hekelingen III (Van Gijn 1990). From the Stein-group no settlement material was studied as the two excavated settlement sites from this period, Geistingen (Heymans/Vermeersch 1983) and Koningsbosch (Van Haaren/Modderman 1973) both are palimpsests. Although not subjected to a pilot study these two sites were considered of insufficient quality to merit a functional study. Although the finds from the burial vault at Stein (Modderman 1964) were of course examined, we have very limited information on the Stein-group.

Settlement sites from the subsequent Late Neolithic A (2900-2500 BC) (fig. 3.4e), the period of the Single Grave culture, are quite scarce except in the province of Noord-Holland. Here several Single Grave settlements have been excavated recently, such as Kolhorn, Zeewijk and Mienakker (Hogestijn 1992; Peeters 2001a, c; Van Ginkel/Hogestijn 1997), but for various reasons no use-wear studies have been performed. This lacuna in our knowledge is now being addressed in a new research project. Data on Single Grave burials are however more numerous: in fact for a long time we only knew of the Single Grave people through their burials. The flint objects from a total of 17 Single Grave burial contexts were studied for traces of use-wear and residue, including both barrows and flatgraves. Most of these were located in the province of Drenthe but the sample also includes several from the province of Gelderland. We have examined 12 hoards or special deposits dated to this period.

Settlement finds from the Late Neolithic B (2500-2000 BC) (fig. 3.4f), the period of the Bell Beaker culture, are also very scarce. Small samples from De Bogen sites 29, 30 and 45, located in the riverine area, were studied for the presence of wear but these sites may also have a later admixture (Niekus *et al.* 2002a; Van Gijn/Niekus 2001). Another Bell Beaker settlement site that has been subjected to a functional study is Oldeboorn, but again this material is also mixed with earlier and later settlement refuse. Moreover, I was a novice in microwear analysis when I studied this material in the early 1980s and the results cannot be considered sufficiently 'trustworthy' (Van Gijn 1983). The Oldeboorn data were therefore not included in the database although they are used as comparative material. The abundant presence of burials from this time stands in contrast with the lack of settlement data. Many Bell Beaker burials are known, several of which contain flint knives and points. Unfortunately only a small number could be investigated: the flatgraves of Angelsloo and Buinen, and the barrow of Lunteren (Butler/Van der Waals 1966). No special multiple depositions of flint objects are known from this period, in contrast to the preceding TRB and Single Grave period. However, as will be argued in chapter 7, the Scandinavian daggers (Apel 2001; Bloemers 1968), some of which may date to the later Bell Beaker period, may actually have to be interpreted as intentionally deposited items.

The Early Bronze Age, the period of the Barbed Wire culture (2000-1800 BC) (fig. 3.4g) is also characterized by the lack of well-dated settlement contexts. A small sample from Boog C-Noord, located in the riverine area, was examined for the presence of wear traces but the site may have some later admixture (Niekus *et al.* 2001a). Material from Voetakker was also included but unfortunately this site produced settlement traces from both the Early and the Middle Bronze Age and it has not been possible to differentiate the flint artefacts accordingly (Niekus *et al.* 2002a). Because flint is less and less used in the course of the Bronze Age and the chronological resolution is usually so poor, no further distinction is made between material dated to the Middle Bronze Age A (1800-1500 BC) and that from the Middle Bronze Age B (1500-1100 BC). Only small samples from the Middle Bronze Age settlements of Eigenblok (Van Gijssel *et al.* 2002) and Lienden (Niekus *et al.* 2002b) are included. Last material from Barendrecht was examined, mostly from layer 2 in which material dated to the Bell Beaker and Barbed Wire period was found (Verbaas/van Gijn pers. observ.). Burial gifts of flint become increasingly rare from the Early Bronze Age onwards and are mostly confined to arrowheads. In addition to the flint objects from the famous Drouwen barrow (Butler 1990), the flint points from four more barrows are included in this study. The arrowhead from the mass grave at Wassenaar (Louwe Kooijmans 2005b) was also studied but not put into the database. From the Middle Bronze Age B, around 1500 BC, flint implements no longer figure in burial context.

From the Late Bronze Age (1100-800 BC) no securely dated settlements have produced flint artefacts. However, one group of flint artefacts from this period was intensively studied: the bifacially retouched sickles made of northern flint. Their date extends into the Early Iron Age. A total of 33 such implements were studied for traces of use (Van Gijn 1999).

We have only limited knowledge of the use of flint in the Iron Age. Often flint tools found in Iron Age context are dismissed as intrusions from earlier periods and the possibility of flint being 'scavenged' for *ad hoc* usage by Iron Age people is overlooked (Van Gijn/Niekus 2001). Only the material from the site of Lage Blok, dated to the Middle Iron Age and excavated during the construction of the Betuwe railroad, was examined (Niekus *et al.* 2001b).

3.4 Conclusion

The initial objective, to examine flint from every period in the Neolithic and Bronze Age, taking examples from settlements, burials and depositions, proved to be far too ambitious. Several sites that I wished to include, proved to be either too badly preserved for a microscopic analysis or were difficult to access. Much time was spent on the analysis of several exciting wetland sites that were excavated during the course of this research project, such as the late Mesolithic sites of Hardinxveld-Giessendam and the Middle Neolithic sites in Delfland. These projects were carried out in a commercial setting and were bound by deadlines. Consequently this time could not be spent on the study of assemblages that would fill gaps in our chronological overview. However, the opportunity to work on these interesting and well-preserved wetland sites was too good a chance to miss and resulted in a wealth of data, methodological innovations and ideas that have been instrumental also for this book. Most importantly, the data obtained have greatly contributed to our understanding of the place of flint in the larger technological system. This study therefore does not pretend to be based on a representative sample and, in fact, virtually every period would provide enough material for one or more PhD topics.

When I embarked on this enterprise I had not been sufficiently aware of how imperative it was to fully contextualize the data on use-wear and residue. It was feasible enough to examine the flint objects from, for example, the Single Grave burial contexts and to reconstruct their biography. However, in order for these data to be meaningful, the complete burial content had to taken into account, as well as the landscape setting of all of the Single Grave burials in our study area. Only then could the microscopic data take on their full meaning and enable an understanding of the significance of flint objects in Single Grave rituals and cosmology. Although when formulating the objectives of this research, I had realized that a contextualization of the findings was crucial, I had not envisaged the massiveness of this undertaking: to follow the above example, not only would it have been necessary to make the complete inventory of the Single Grave burial features, these in turn had to be compared to the content of the special deposits and also had to be related to the settlement remains from this period in terms of spatial distribution and landscape features. An excellent example is the detailed study of the special deposits of the southern Netherlands in the Bronze Age (Fontijn 2002). Clearly such detailed research of all the various periods represented in this study cannot be done by one person in a short time period and I had to content myself with a superficial overview of flint use in the later prehistory.

For some periods, such as the Rössen and Michelsberg period during which time the area of the present-day Netherlands constituted only the fringe of these cultural groups, we have very little information. The LBK period, in contrast, is well-represented with both settlement and funerary data. The same pertains to the Hazendonk-group. From the beginning of the TRB period onwards our knowledge is largely based on the burial context, whereas the information from settlements is less detailed. In the last decade more settlements from the Beaker times have been excavated but our knowledge is still very rudimentary and limited to some well-investigated areas. Furthermore, the settlements were excavated in the context of salvage operations, so they are concentrated in areas where large-scale building or reclamation projects were undertaken. In general, many of the sites that are located on the sandy uplands are not very informative because of their palimpsest nature. Whereas 'clean' settlement data from the uplands are lacking, we do have a much better knowledge of burial contexts in this area. Exactly the opposite is the case for the wetlands: we have well excavated stratified sites with good chronological resolution but much less evidence for burial practices and depositions. It is therefore difficult to compare these two areas.

There are, however, a few 'windows' to the past through which we can gain a little more than a rudimentary picture. For example, quite a bit is known about the LBK habitation of the Graetheide Plateau. Another well-researched area is Delfland where we have a number of sites of the Hazendonk-group, including a cemetery, which were studied in detail. The TRB occupation of the Drenthe plateau in the northern Netherlands is yet another example.

In the course of the thematic chapters that follow, issues of taphonomy, dating and comparability will be touched upon in further detail. It is interesting to note however, that the well-researched Hazendonk micro-region in Delfland has actually raised almost as many questions as it has answered (Louwe Kooijmans 2008). Foremost this research has made clear that an enormous amount of variation can exist between sites that are roughly contemporaneous and located within a few kilometres of each other. This pertains to the selection of raw materials, the production of objects but also to choices made regarding subsistence. Surprisingly, despite the enormous amount of research put into the Delfland sites, the reason for this variability is not always clear. This shows that even when a micro-region is intensively studied it is still very difficult to come to grips with the variability observed in the archaeological record. So, despite the short-comings of the database that lies at the basis of this book, the data obtained are nevertheless illuminative and at times even striking. Especially because of the added value brought in by the use-wear and residue analysis of a very large number of flint implements from a variety of contexts, this research contributes to a more detailed picture of the social significance of flint objects for prehistoric agents.

Chapter 4

Flint and food

4.1 Introduction

Flint tools are often seen as being closely linked to subsistence, especially during the Stone Age. This may be partially due to the fact that, until relatively recently, explanatory models for this period of prehistory were largely concerned with technology and subsistence and much less with social organization and ideology. Although this has obviously changed during the past decades, I will start my examination of the role of flint in Neolithic and Bronze Age communities with its place in various subsistence activities.

4.1.1 Food as a social issue

Anthropologists have long known that the choice of foods varies greatly between societies. What one society considers a delicacy may be regarded as utterly inedible by another. It is not only the choice of food, but also the way food is processed and prepared that may vary between groups of people. One of the best examples of this is the difference between the way the Chinese people chop up a chicken, and the way most western societies dissect their poultry. Such cultural differences in food procurement and processing may thus be visible in a wide range of activities, from butchering to harvesting, and should be reflected in the tools used.

The cultural embedment of food goes even further than the mere differences in the choice of foods and the different ways in which these are obtained, prepared and consumed. It is also the foodstuffs themselves that are frequently of great cultural significance (Fischer 2002; Goody 1982; Gosden/Hather 1999; Lévi-Strauss 1969). Some foods evoke sensual pleasures or are only eaten on special occasions as in ceremonies and feasts. For the Romans, for example, emmer wheat constituted a fundamental ingredient of sacrifice (Papa 1996). Therefore, as Sherratt has already stressed, isolating a separate sphere of past human existence as 'subsistence behaviour' is basically flawed (Sherratt 1999, p. 14). Moreover, the distinction between food and craft products is sometimes very blurred. Many food sources have additional uses: besides linseed oil flax also produces fibres, red deer does not only provide meat but also antlers, tendons and so forth. These raw materials are directly used in craft activities (Chapter 5). Also, some food products, such as the preparation of olive oil or salt, require a substantial level of technological knowledge and skills to extract or produce and can be considered craft products in themselves. Such special food stuffs frequently constitute commodities for exchange or trade.

Even though Sherratt has suggested to abolish the term 'subsistence' altogether (Sherratt 1999), I will continue to use it as a concept, being aware that the distinction between craft and subsistence is not always a strict one. I do not adhere to its reductionist implications and see the term as encompassing also such products as honey, milk and other edible (or consumable) products. Secondary products that are not edible and instead are used for various craft activities are discussed in the next chapter. It should be emphasized that this chapter is not an attempt to provide an overview of subsistence strategies during the Neolithic and Bronze Age. Obviously archaeozoological and palaeobotanical data are far more suited to this task, and the reader is referred to many specialist papers on this subject (Bakels 2009; Bakels/Zeiler 2005; Vermeeren/Brinkkemper 2005).[5] This chapter is therefore focused on the contribution of flint implements to the food-acquisition and processing technology.

4.1.2 Flint and its role in food getting technology

Various flint tools are commonly linked to specific subsistence tasks: knives are seen as butchering tools, arrowheads as hunting equipment and sickles as cereal harvesting implements. Flint tools do indeed play a role in obtaining and processing food because they are usually readily available, easily produced, have a sharp edge and can be re-sharpened in the course of use. In fact it is often believed that only flint produces the sharp edges required for butchering, for example. Additionally, flint implements are also very versatile and to some extent can be modified from one type of tool to another as the need arises. They thus make very good tools and weapons, aimed at a variety of activities. However, we tend to assume too easily that flint tools are indispensable for prehistoric life to function in an effective manner.

For three basic reasons the role of flint tools in the subsistence system may actually have been overrated. First, ethnographic research has shown that a large portion of the animals consumed was obtained by means other than weapons. Oswalt differentiated a range of tended and untended facilities such as weirs, traps and snares (Oswalt 1976). It is likely that such facilities were very important in Late Mesolithic subsistence strategies and probably Neolithic ones as well. Evidence, however, is sparse as such facilities generally are *off- site* phenomena: they are difficult to prospect and hence constitute chance discoveries if encountered. As a consequence such facilities are severely underrepresented in the archaeological record. Although it is impossible to quantify the respective contributions to the diet by facilities on the one hand and weapons and instruments on the other, it is clear that the latter two categories are not as predominant as the general image will have it.

The second reason why flint may have been less important in subsistence activities is that many weapons and instruments do not entail the use of flint. Flint is considered to be highly effective for making weapons, a belief that is based on the ubiquitous presence of those highly visible flint arrowheads. Flint however, is not the only suitable material for the production of effective weapons. The ethnographic record shows wooden boomerangs, slings, blowguns, and bolas,

5 See Bakels/Zeiler 2005 and Brinkkemper/Van Wijngaarden-Bakker 2005 for specific references.

whereas from the archaeological record we know of wooden spears, wooden and bone leister prongs and bone and antler harpoons (Andersen 1987; Clark 1975; Louwe Kooijmans/Kooistra 2006). The bone points found in the burial vault of Stein form another striking example (Modderman 1964). Although flint is used as inserts in slotted points for example, the material may actually have been of only minor importance in the construction of weapons. Even as a processing tool, for which purpose flint with its naturally sharp edges is deemed to be far superior, flint has competitors. Elsewhere shells make very effective cutting tools as well (Lammers-Keijsers 2007), as do flakes of different hard stones and also bone knives (Akerman 1995; Stewart 1973). It can also be argued that flint may actually have played only a very minor role in obtaining plant foods. Roots and tubers could effectively be obtained by means of digging sticks, usually of wood. No tools were necessary in the collection of many edible plants. This also pertains to many of the domestic crops, a number of which could quite effectively be uprooted, especially in loose, sandy soils. All in all, flint tools may not have been so very crucial to subsistence tasks, neither in obtaining food, nor in processing it, and could certainly have been replaced by various technological alternatives. This implies that flint provides only a limited (and probably biased) source of information on subsistence activities.

Third, flint is very visible in the archaeological records because it is well-preserved, and because it usually displays traces of human interference in the form of such attributes as bulbs of percussion and flake scars. However, many weapons and instruments of other raw materials are actually 'naturefacts', objects picked up from the surroundings and used without further modification (Oswalt 1976). These include hard stones, wooden sticks and shells. Stones can be used in an unmodified form for a variety of purposes, both as a weapon (club) and as an instrument (pounder for smashing up bones, grinding nuts, but also as a weight for nets or skins). Such tools will not be recognized as such, because these activities generally leave very few traces, and will consequently not receive proper study. At the site of Hardinxveld-Polderweg for instance, almost none of the hard stone artefacts displayed any signs of modification or traces from extensive use[6] (Van Gijn *et al.* 2001a). Shells too could have been used as instruments without any further modification. This has been documented in the Caribbean context (Lammers-Keijsers 2007), and it may be that oyster or clam shells, for instance, functioned the same way in northern latitudes.

4.1.3 Differentiating subsistence from craft tools

It is not always easy to differentiate between craft and subsistence activities on the basis of use-wear analysis (Chapter 2). A blade with traces from cutting siliceous plants can be interpreted both as a craft and a subsistence tool because plant collecting is done in both contexts. Cutting fresh hide may be related to butchering or to obtaining strips of raw hide to be used as a wrapping material in hafting or binding. In order to decide whether a particular flint tool

6 Some of these activities may have left traces that are not macroscopically visible. Unfortunately at the time the stones from Hardinxveld-Polderweg were studied for traces of wear we did not yet have the metallographic microscope with free arm that enables us to examine large objects. The stones were therefore only examined by stereomicroscope and we may have missed the more subtle traces.

constitutes a subsistence or a craft implement, each case needs to be treated separately, taking into account evidence from ethnography, experimentation and the archaeological configuration in which the tool is found. Some types of tools are pretty straightforward. Points are generally considered to be reflective of hunting activities although I am well aware that they may have played a role in warfare and also had a ritual and social significance. In fact, several instances are known within the confines of the Netherlands of points embedded in skeletons, indicating their use in violent interaction between individuals or groups. The most noteworthy is the point found in a skeleton in the Middle Bronze Age collective burial at Wassenaar (Louwe Kooijmans 2005b). However, if found in settlements, points are considered to be hunting equipment and their presence is believed to be due to hafting and retooling activities (Keeley 1982).

Another, apparently, straightforward subsistence tool made of flint is the sickle, a tool type that is almost automatically associated with cereal harvesting. Usually all flint tools displaying extensive gloss that is visible to the naked eye are subsumed under this category but, as we have seen in chapter 2, it is not only cereal harvesting that causes gloss: contact with wild siliceous plants as well as various other materials like soil, leather-hard pottery and hairs can cause a similar polish (Van Gijn 1994 (1997)) Although in experimental context it is possible to differentiate between these various wear traces, this may not be the case in archaeological context. Hence under the heading 'siliceous plants unspecified' both cereals and wild siliceous plants are subsumed. The flakes and blades used for scraping siliceous plants that frequently occur in Late Mesolithic and Early Neolithic wetland contexts are especially problematic (Beugnier 2007; Juel Jensen 1994; Van Gijn *et al.* 2001b).

The traces from wood- and bone working are also ambiguous when it comes to differentiating craft from subsistence tasks. Coarse wood working such as we find on flint axes may be related to the clearing of fields, obtaining firewood for food preparation but also to house or canoe construction. Finer wood working traces such as are visible on the smaller flint tools is, however, more likely to be associated with the production of small wooden items. Wood working is thus treated in the chapter on craft (Chapter 5). This also pertains to bone working. Only if the traces from contact with bone occur together with traces from contact with soft animal material, like meat or wet hide, are they interpreted as butchering tools. Such tools, although in fact displaying traces from contact with bone, are obviously related to subsistence activities and will thus be discussed in this chapter.

4.2 Hunting

4.2.1 Introduction and experimentation

Hunting (fig. 4.1) is a very distinct subsistence activity that is mostly addressed from an archaeozoological angle, except in Palaeolithic archaeology where hunting techniques are related to point morphology (Shea 2006). Use-wear studies indicate a strong relationship between points, whatever their exact shape, and a use as projectile. Unfortunately, it is not always possible to determine whether it concerns arrowheads or spearheads (Ellis 1997). Still, I will used the terms

Fig. 4.1 Reconstruction drawing of a prehistoric hunting scene.

points and arrowheads interchangeably in this book because the small size of most Neolithic and Bronze Age points makes it likely that most of them were arrowheads.

Experiments with the use of arrowheads (fig. 4.2) have shown that wear traces are quite diagnostic and develop in roughly two of the three shooting instances (a.o. Fischer *et al.* 1984; Odell/Cowan 1986; Van Gijn 1990). It should be reiterated that absence of traces does not mean the point has not been used (Chapter 2). Traces include impact scars, linear traces of polish and sometimes some incidental spots of polish from contact with bone and meat. Frequently points also display signs of hafting, usually in the shape of remnants of wood tar. Considering this strong relationship between points and their use as projectiles, it is tempting to interpret the relative number of points as a reflection of the importance of hunting. However, points can also be used in combat and may be reflective of the martial values in a society. It is however impossible to differentiate between the wear traces from hunting and those from combat. We can only assume violence (manslaughter or warfare) between humans if the arrowhead is found in a human bone. For the sake of simplicity however, I will assume that the points found in Early and Middle Neolithic settlement context are more likely to be related to hunting activities. During the Beaker period and in the Bronze Age the points found in settlements may well have served in battle, to be taken home for repair. Obviously, points found in burial context also do not have to be related to hunting as they can be the cause of death or given along as a veneration of martial qualities (Chapter 6).

Fig 4.2 Experimental hunting: a. shooting a (dead) deer with a transverse arrowhead; b. tracing the path of the arrows and butchering the deer; c. characteristic linear traces of polish caused by impact (200x).

4.2.2 The archaeological evidence for hunting with flint points in the wetlands

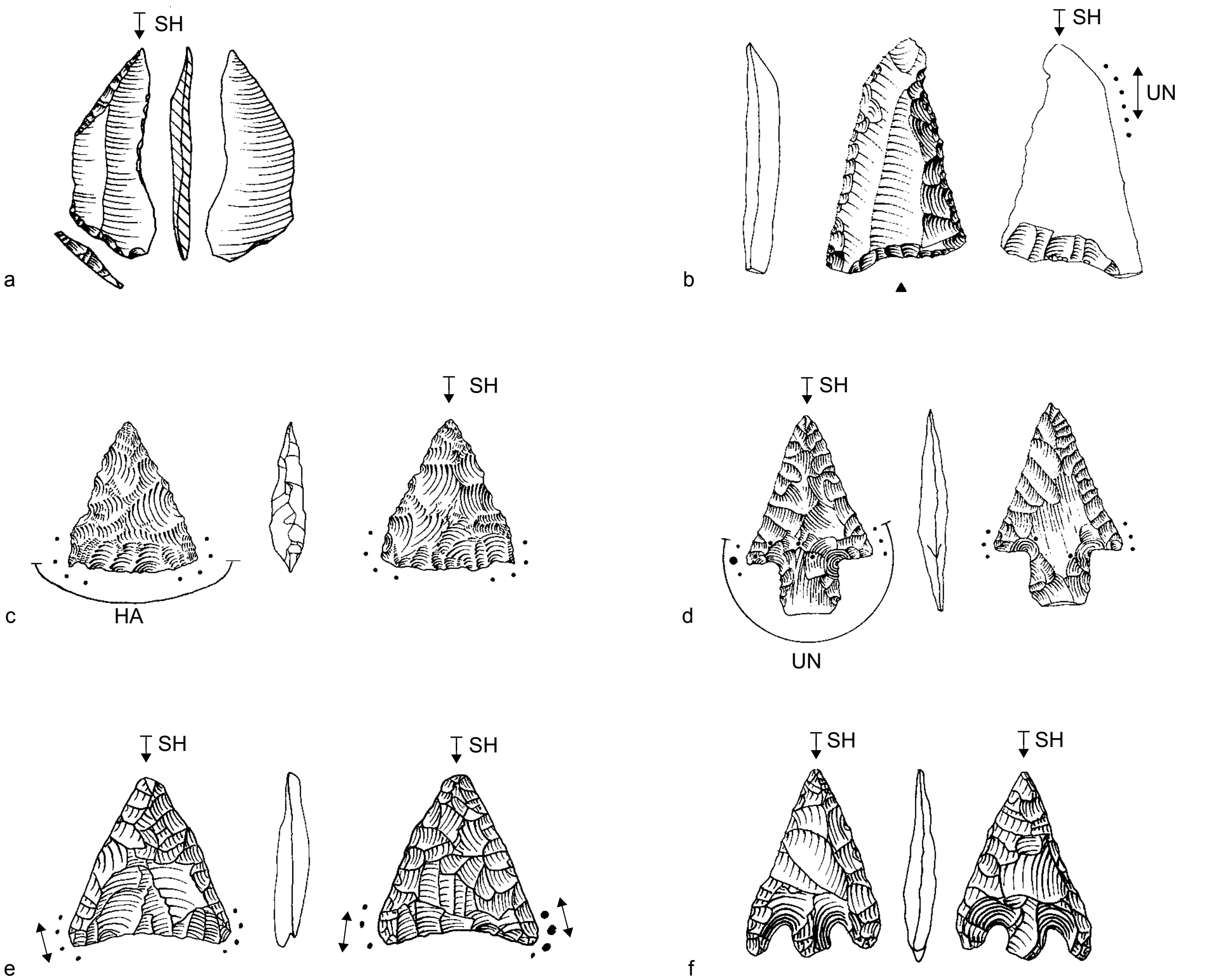
Archaeozoological evidence has shown that hunting contributed substantially to the subsistence system of wetland communities far into the Neolithic (Bakels/ Zeiler 2005). However, the number of points with signs of wear from the Late Mesolithic levels of the wetland sites of Polderweg and De Bruin is relatively small. It may be that used points were lost *off-site* and that we are dealing here mostly with specimens that were used to repair and retool arrows. In contrast, the site of Hoge Vaart, dated to the very early Swifterbant culture, has produced a large number of points, mostly trapezes, many of which with traces of use. Of the 111 points that were studied 46 show wear traces indicative of a use as projectile (Peeters *et al.* 2001, p.43). Other Swifterbant sites from which points have been examined do not produce such high figures however. The northern Swifterbant culture is characterized by the presence of trapezes (Deckers 1979, 1985). In Bienenfelds research no trapezes were examined (Bienenfeld 1986, 1988). My own research of these assemblages only concerned a meagre 12 points, a third of which displayed impact traces. In the southern Swifterbant culture, at the site of Brandwijk phase 2, leaf-shaped points predominate. Very likely this is a cultural choice, due to southern cultural influences, as there is no evidence that the type of animals hunted is any different between the northern and the southern variant of the Swifterbant culture (Bakels/Zeiler 2005). Four of the seven Brandwijk phase 2 points displayed impact traces.

Points are abundant at the Hazendonk sites of the micro-region of Delfland and they are also frequently used. For example at Schipluiden almost a hundred, mostly triangular, points were found, as well as 41 half-products of points. This amounts to 14% of the modified tools. Of the 41 examined for traces of use, 17 displayed traces of wear and many showed traces of hafting (Van Gijn *et al.* 2006). At the nearby site of Wateringen 4 a considerable number of points was encountered as well and half of the 30 such implements had been used (Raemaekers *et al.* 1997). Lastly, from Ypenburg a total of 26 points have been retrieved (Houkes 2008); only three points were studied, all of which had been used (Van Gijn/Verbaas 2008).

The Vlaardingen sites situated on levees of tidal gullies, such as the type-site of Vlaardingen and Hekelingen showed small numbers of arrowheads (Van Beek 1990; Van Gijn 1990), but this never amounted to the numbers encountered in the preceding Hazendonk period. The site of Leidschendam, situated on the dunes, did not produce any points at all (Van Gijn 1990). This difference corresponds with the archaeozoological findings that indicate the importance of hunting on the levees, with red deer, wild boar and various fur animals being the prime targets. Hunting seems to have played a less important role in the sites located on the dunes, such as Leidschendam and Voorschoten (Bakels/Zeiler 2005) These findings support the idea that the Vlaardingen-group encompasses sites of very different character: on the dunes and in the eastern riverine area we find permanently occupied settlements of farmers, whereas the sites on the levees and in the peat district such as Vlaardingen, Hekelingen III and the Hazendonk must be interpreted as extraction points from which specific resources were exploited (Van Gijn 1990). The latter were used for hunting and fishing, perhaps as part of the settlement pattern of groups living in the sandy uplands of Brabant located to the south-east. This inference is based on the different origins of the raw material the flint tools are made of (Van Gijn 1990).

From the Single Grave culture we have only a few excavated settlements, almost all situated in the province of Noord-Holland. The flint material from the largest of these excavations, Kolhorn, has never been systematically studied, so we do not know the number of arrowheads. Both in Aartswoud and in Mienakker only one point is reported (Peeters 2001a; Van Iterson Scholten/De Vries-Metz 1981). The hunting of mammals seems to have been practised only to a limited extent in this area. In contrast, the hunting of waterfowl, especially of a large variety of duck species, must have been of paramount importance (Bakels/Zeiler 2005).

Interestingly enough points do appear in relatively large quantities in Bell Beaker and Bronze Age settlement context. It always concerns arrowheads with barbs (fig. 4.3), a feature that may be related to their use in warfare. Barbs make it much more difficult to pull out the arrow. Only a few arrowheads from settlements have been examined and it seems that most display traces of use in the shape of impact scars or even linear traces of polish. The tips of the barbs of many of the Bronze Age points are ground (fig. 8.4), the purpose of which



is not clear. It may be that this was done to facilitate hafting, to minimize the chances of the barbs breaking upon impact or to facilitate penetration. Middle Bronze Age points found at the site of Oldeboorn in Friesland all have impact fractures from shooting. The location of this site, near the river Boorne, makes it an excellent place from which to hunt, because animals can be surprised when drinking. I would therefore interpret these points as having been used for hunting, rather than for warfare (Van Gijn 1983). The presence of points in what we can interpret as permanent settlements is less clear: points have not been found in such permanently inhabited settlements as Bovenkarspel-Het Valkje in West-Friesland (Hristova and Drenth pers. comm.) or Tiel-Medel (Van Hoof/Jongste 2007) and Zijderveld in the riverine area (Theunissen/Hulst 1999). Quite a number however have been found at various sites at De Bogen, but it concerns sites with a palimpsest of Late Neolithic and Bronze Age occupations (Niekus *et al.* 2002a).

Fig. 4.3 Arrowheads from different settlements: a. Hardinxveld-Polderweg; b. Beek Molensteeg; c. Schipluiden; d. Hekelingen III; e. De Bogen site 30; f. De Bogen site 29 (scale 1:1).

4.2.3 The archaeological evidence for hunting with flint points in the Pleistocene uplands

In the past a common image of the LBK farmers of southern Limburg was that they had turned their back on nature and that hunting and gathering only played a minor role in the subsistence system (Louwe Kooijmans 1998a). However, evidence for hunting by LBK communities is increasing all the time (Amkreutz 2004) and sites like Liège-Place St. Lambert (Cordy/Stassart 1984) can no longer be dismissed as an anomaly. In this context the occurrence of used points in LBK flint assemblages, albeit in small numbers, should come as no surprise. For example, at Beek-Molensteeg points constitute three percent of the total number of modified tools and half of them were used for shooting (Van Gijn 1990) (fig. 4.3). LBK points also occur outside the settlement areas on the loess, often as single finds not accompanied by other find material (Van der Graaf 1988). The question is whether they constitute evidence for 'extra-territorial' hunting activities of the LBK farmers or whether they are the reflection of social interaction between the farmers and the hunter gatherers, be it peaceful – exchange –, or violent – warfare. There is ample evidence that strife occurred during the later phases of the LBK, certainly between LBK communities (Wahl/König 1987), but it is impossible to ascertain whether the points were meant for hunting or warfare. The only Rössen settlement excavated, that of Maastricht-Randwyck, has not produced any arrowheads (Van Betuw 2004), but such tools do occur in the Rhineland (Fiedler 1979).

Characteristic for the subsequent Michelsberg period are triangular points and, in lesser numbers, tear- or leaf-shaped variants (fig. 4.3). Again, as in the preceding LBK and Rössen periods, points constitute only a small percentage of the total number of modified tools. At Maastricht-Klinkers only two complete points were found (of the 144 modified flint artefacts), one tear-shaped and one triangular one with a straight base. Both were used as projectiles (Schreurs 1992). The sites of the Hazendonk-group in the eastern riverine area only show a small number of points (Louwe Kooijmans 1980; Louwe Kooijmans/Verhart 1990). At the site of Gassel three projectile points were found, one of which certainly was used as projectile (Verhart/Louwe Kooijmans 1989).[7]

Points also occur in TRB find assemblages. In the megaliths large numbers of transverse arrowheads were deposited along with the human remains. Only some of these implements were used as projectile prior to their deposition, but they show extensive modifications, probably due to ritual activities (Chapter 7). In contrast, points are a much rarer occurrence in TRB settlements as illustrated by the sites of Laren and Beekhuizerzand (Bakker 1966; Modderman *et al.* 1976). Recently a TRB site was excavated in a wetland environment where we can presume that hunting and fishing were important, analogous to sites like Hesselø and Sølager in Denmark (Skaarup 1973) and Bistoft in Schleswig Holstein (Johansson 1981). It concerns the site of Slootdorp-Bouwlust, located in the province of Noord-Holland, near the open sea. Only seven transverse points (6% of the modified flint) were found amidst more than 10.000 flint artefacts (Peeters 2001b). From another recently excavated TRB settlement site,

7 A fourth point was found but this one is likely to be of Mesolithic origin. It did display traces from use as projectile.

Groningen-Oostersingel located at the edge of the Pleistocene sands, absolute counts of flints are not available yet. Of the four arrowheads from this site that were studied for traces of wear, only one displayed impact traces from shooting. Because bones have not been preserved in the sites located on the Pleistocene uplands it is difficult to assess the contribution of hunting in the subsistence system.

4.2.4 Flint points and hunting

From the preceding overview we may conclude that in most Neolithic and Bronze Age flint assemblages that were examined points only constitute a small percentage. The Hazendonk sites form an exception: here large numbers of used points were encountered, corresponding with a likewise heavy reliance on game as demonstrated by the archaeozoological findings (Zeiler 2006). If points do occur and use-wear analysis has been carried out, surprisingly few points show clear traces of use. Can the number of points and especially of used ones, be seen as a reflection of the importance of hunting? If this were so, then hunting was not important for the communities on the Pleistocene uplands nor for the Single Grave settlements on the coast. This is likely to be an incorrect conclusion. Flint points may end their use-lives at another location than the settlement: they can be lost in action, something that must have occurred regularly considering the large number of surface finds encountered everywhere on the sandy uplands. There are also various reasons why flint points may lack traces of use. Foremost this can be attributed to the fact that impact does not always result in interpretable traces of wear. Another reason for the lack of used points can be sought in their biography. It may well be that the points we find in settlement context still had to be hafted and used.

Nevertheless, the conclusion is warranted that hunting played only a subsidiary role in the subsistence system of the agricultural communities of the LBK, Rössen and Michelsberg culture (Bakels/Zeiler 2005). However, the lack of points in the Single Grave sites of Noord-Holland is peculiar because waterfowl was clearly on the menu (Schnitger 1990). However, hunting birds is frequently carried out by means of blunt arrowheads, and it may thus well be that wooden arrows were used for hunting waterfowl, akin to the situation at the earlier site of Bergschenhoek where such arrows were indeed found (Louwe Kooijmans 1977). The lack of flint points in these Single Grave sites may thus be reflective of a technological choice, related to the predominant choice of game, not to the lack of hunting as such.

On the other hand, the presence of flint points, does not always relate to the actual importance of hunting activities. The large number of transverse arrowheads in TRB burial context is interpreted as the reflection of the veneration of the old hunting gathering lifestyle (Chapter 7). The same may apply to the presence of points in the burial vault of Stein. Similarly, the flint arrowheads in Bell Beaker burial contexts do not have to be indicators of the importance of hunting. Instead, they may be reflective of the worship of martial qualities in Bell Beaker society (Chapter 7). This also pertains to the Bronze Age. The archaeozoological information indicates the greatly diminished contribution of hunting in the diet in the Bronze Age: wild animal bones constitute less than

1% of the total (Brinkkemper/Van Wijngaarden-Bakker 2005). Moreover, the appearance in graves of complete sets of archery equipment and the great investment in the style of Bell Beaker and Bronze Age arrowheads indicate that the points were not so much important as a hunting tool, but rather that bows and arrows were representing and reinforcing martial values (Fokkens 1998a; Fokkens *et al.* 2008a) (Chapter 7).

4.3 Fishing

In many of our wetland sites large numbers of fish remains have been found. Obviously fish bones are our most important evidence about the contribution of fish to the prehistoric food choice, but in those areas where these are not preserved, tools may provide indirect evidence. Flint tools probably had no function in the actual catching of fish, but were potentially very useful in the subsequent processing phase. Anthropological evidence shows that when fish was caught for winter storage, usually some form of cleaning was necessary before the product was smoked or dried. For example, most of the Northwest Coast Indian tribes slit open the salmon, removed the entrails and cut off the head. Larger fish were filleted to obtain thin slices for faster drying or smoking. The Indians used bone knives, slate knives and sometimes mussel shells for this activity (Stewart 1977). It is likely that flint implements would have served equally well for this task and were involved when large quantities of fish were processed for storage. However, there are many ethnographic instances in which the fish were not cleaned prior to consumption. The Tanaina for example buried silver salmon in the permafrost, alternating layers of fish, fish-eggs (containing a high percentage of salt, possibly acting as a preservative) and grass (Osgood 1937). The Huron buried fish in mud or hung it up, without removing the viscera; the resulting product was considered to be a good seasoning (Rostlund 1952).

From ethnographic sources it can be gathered that when fish is caught on a regular basis and in small quantities for immediate consumption the amount of cleaning performed is often very limited: the fish is roasted in the fire and consumed immediately. The amount of cleaning, if done at all, would have been so minimal as to cause virtually no damage on the eventual flint tool used in the process. Experiments with cleaning fish show that gutting only results in the appearance of spots of a bright, smooth polish that resembles regular bone polish. Characteristic wear traces do result from scaling: a corrugated polish often distributed in a linear band away from the edge (Van Gijn 1986). We may therefore expect fish working traces to be present only in those situations where large quantities are caught within a short time-span, such as is the case with anadromous fish like salmon and sturgeon. These fishes swim upstream in huge shoals in order to spawn in lower-lying shallow waters. They are usually caught by means of traps and weirs, tended facilities that need to be monitored daily during the period the runs arrive. This is the reason why specific expeditions were organized at the time of the runs and why camp was set up close to the weirs or traps (Balicki 1970; Osgood 1937). The Huron, basically an agricultural people, built fish cabins of bark on the island to which they went to fish and they gutted the fish on the spot and hung them to dry on long racks

(Tooker 1964; Trigger 1969). Other people are also reported to have processed the fish close to the catch site if large numbers are involved (for example the Kutchin (Nelson 1973) and the Tanaina (Osgood 1937)).

What lithic evidence do we have from prehistoric times? From the late Mesolithic site of Hardinxveld-Polderweg one beautiful blade of Wommersom quartzite displayed traces of fish cutting (Van Gijn *et al.* 2001a). This is the only tool on which we were able to find such traces. This surprising lack of traces from fish processing requires an explanation, especially in the coastal zones of the Netherlands where fishing must have been important. Fish traps have been found at several Neolithic coastal sites such as Bergschenhoek (Louwe Kooijmans 1985) and the type site Vlaardingen (Van Iterson Scholten 1977). Some locations may have derived their prime attraction from their suitability for fishing. This may have been the case with Hekelingen III, a site attributed to the Vlaardingen-group. The site is located along a river levee and consists of a series of small find concentrations. These concentrations date from different phases, from the Vlaardingen 1b period (3100-2950 BC) to Vlaardingen 2a (2900-2650 BC). At the mouth of a small side creek remnants of poles were found that were interpreted as a fish weir (Boddeke 1971). The location of this possible fish weir makes it eminently suitable for trapping sturgeon when they swam up the tributary to the hinter-lying swamps to spawn. The lack of clear patterning of the poles has led other authors to suggest a different explanation: the poles may have been used to support traps (Bakels/Zeiler 2005). All the fish species demonstrated at Hekelingen III, with the exception of sturgeon, can be caught with such nets. Whatever the means of catching, the fish remains at Hekelingen III, as well as its location in the landscape, indicate the great importance of this resource. So, why do we find so little evidence of fish processing on the flint implements? One possible answer has already been outlined above: only if fish are scaled in great quantities can we expect flint to display wear traces. If fish are gutted the wear traces are virtually indistinguishable from those developing from contact with bone. This also pertains to tools used to butcher the large sturgeons, even if these are opened up in the belly, without touching the dorsal plates (Van Gijn 1986).

Fish processing tools are also absent in those assemblages that have been extensively studied and where fish was likely to have been processed, such as in the Swiss and French lakeside settlements (Beugnier 1997). The prominent absence of wear traces from fish in archaeological assemblages has already been noted before (Juel Jensen 1986) and it remains somewhat of a mystery because traces from scaling fish are quite distinct on experimentally used tools (Van Gijn 1986). However, even though individual experimental tools used on fish may appear diagnostic, a quantitative analysis of their attributes reveals that this is not always so and that traces from fish overlap with various other categories of wear (Van den Dries/Van Gijn 1997). It is thus quite possible that we are systematically missing traces from fish.

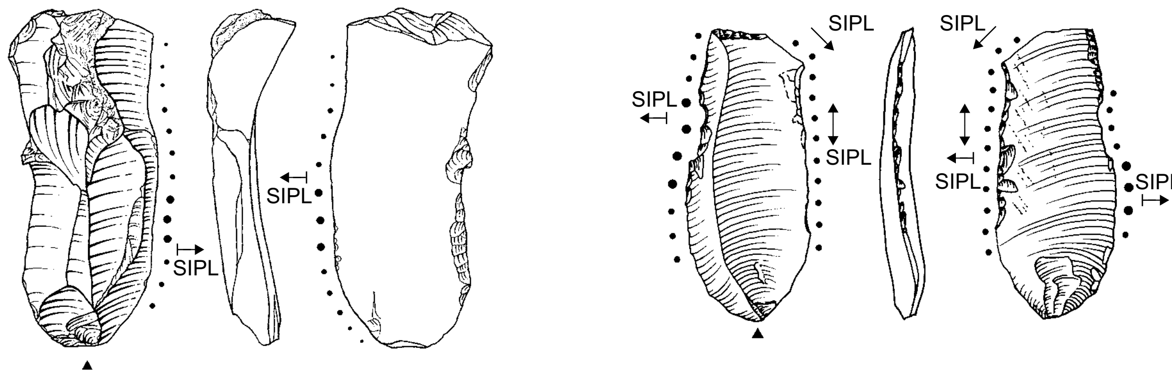
4.4 Butchering

There is little ethnographic information on the use of flint for butchering. Most ethnographically documented people had converted to the use of steel knives by the time researchers started to become interested in technological processes such as butchering. In Australia, several ethnographic experiments were performed, in which Aboriginal people were asked to use traditional stone implements to butcher a kangaroo (Binford 1984; Gould/Saggers 1985). As various experiments have shown (fig. 4.2b), butchering leaves few diagnostic traces on the edge of a flint implement if done by an experienced butcher (Patterson 1975; Van Gijn 1990). The resulting wear traces will be limited to incidental patches of bone polish, resulting from occasional contact with bone when dismembering the animal, in combination with a band of greasy, rough polish from contact with the skin and meat of the animal. Striations are generally absent but directionality may be visible and edge damage rarely occurs. The ephemeral polish and the, usually very minimally developed, edge damage will probably be frequently missed by microwear researchers in archaeological context (Unrath *et al.* 1986). It is therefore very likely that butchering tools will be severely underrated in tables of results (Van den Dries/Van Gijn 1997).

Flint tools frequently must have served to butcher animals as is shown by the ample evidence of butchering traces on bones (Bakels/Zeiler 2005). In fact, we do have quite a number of instances in which a tool was interpreted to have been used to cut 'soft animal material'. Such tools are actually present from most periods, albeit in small numbers, regardless of whether it concerns upland or wetland assemblages, or sites of hunter-gatherers or farmers. This should come as no surprise because it makes no difference in terms of resulting wear traces whether a tool is used to butcher a deer or a cow. In both cases the skin has to be cut, after which the animal has to be dismembered. The resolution of use-wear traces is not such that we can differentiate between the butchering of cows and deer. It is only when a spatial association is demonstrated between a flint tool with soft animal traces and specific bones, that such a distinction may be possible. An exception seems to be the butchering of an elephant or rhinoceros, animals whose skins are not only very tough and thick, causing a kind of hide polish, but also contain a lot of soil particles that scratch the surface of the tool (Van Gijn 1989).

4.5 The collection of wild plants

Plant foods are often documented in the archaeological record in the form of carbonized seeds, fruits and nuts (a.o. Bakels/Zeiler 2005). Other parts of the plants, the leaves, roots and tubers, are reported rarely. Recently, the contribution of these plant sources to the subsistence economy of the inhabitants of the Middle Neolithic wetland site of Schipluiden has been demonstrated (Kubiak-Martens 2006a, b). These data show that wild plants continued to be an important food source far into the Neolithic. Ethnobotanical sources document the uses of these various wild plants: for example, fresh leaves of sorrel (*Rumex*) and stinging nettles (*Urtica*) were used for making soups (Kalkman 2003, p. 117).

a


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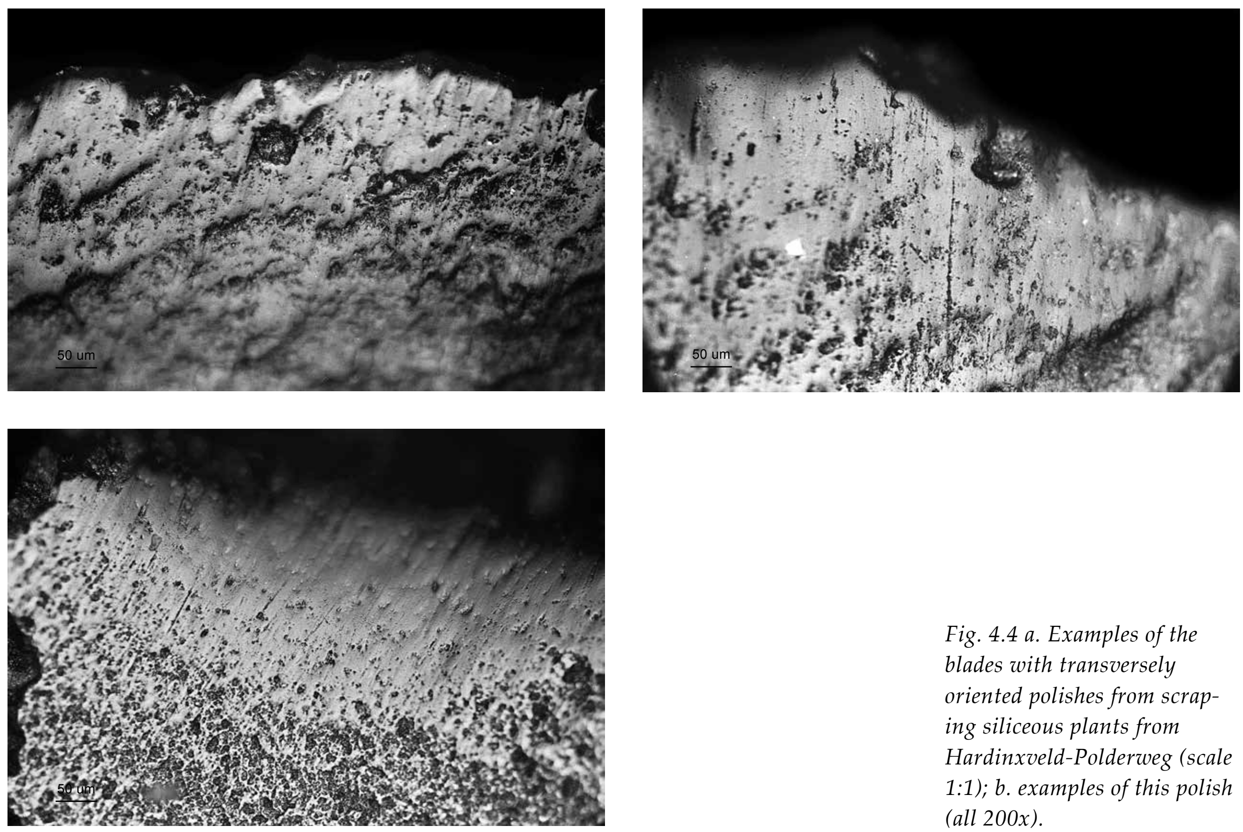


Fig. 4.4 a. Examples of the blades with transversely oriented polishes from scraping siliceous plants from Hardinxveld-Polderweg (scale 1:1); b. examples of this polish (all 200x).

The roots of water-plants like cat's tail (*Typha*) contain nutritious starches, especially from autumn to early spring. They can be consumed fresh, roasted or they can be dried and processed into flour.

When microwear analysis was first introduced it was hoped that this method might shed some light on the collection of these elusive wild food sources. It was believed that if we performed enough experiments we should be able to observe meaningful variability in the use-wear polishes. However, experiments have considerably tempered these expectations. Most importantly, they pointed to the relatively limited use of flint cutting implements in the harvesting or collecting of plant resources. For example, most green plants are much easier to handpick, either by uprooting or else by breaking their stems, than it is to cut them. Obviously collecting fruits and nuts is an activity for which no flint tools are necessary. Flint tools are also virtually useless for collecting tubers; it is far easier to dig these up with a wooden stick. Moreover, with the exception of nettles (a plant species containing a small amount of silica causing the characteristic siliceous plant polish), collecting green plants does not produce distinguishable polishes or other attributes of wear. It may be that the abundant plant juices prevent the surface of the tool to pick up any polish. Green plants also do not cause the occurrence of edge removals. This means that the contribution of wild plant resources in past diets cannot be approached from a flint tool perspective.

Notwithstanding, many of the Late Mesolithic and Early Neolithic blades display a characteristic siliceous plant polish with transverse directionality that is generally associated with processing wild plants (Beugnier 2007; Bienenfeld 1986; Juel Jensen 1994; Van Gijn *et al.* 2001a, b). The polish on these blades is very smooth, highly reflective, has an undulating topography that indicates the direction of use and lacks the fine striations that are so characteristic for cereal harvesting tools (fig. 4.4). These blades are exclusively found in wetland sites, dated to the (Late) Mesolithic and Early Neolithic. However, it remains unclear whether craft or subsistence activities were responsible for these ubiquitous traces. Even though most of the experiments carried out to explore the function of these enigmatic blades departed from the assumption that the blades had been involved in craft activities (Chapter 5), subsistence tasks were tested as well. These included the peeling of rhizomes, the opening of hazelnuts and the harvest of wild grasses. Opening hazelnuts by means of a small pointed blade proved rather effective but the resulting wear traces were minimal and very similar to the sort of polish obtained from contact with wood. This option will therefore not be discussed any further.

Several experiments were done using small flint blades in a transverse motion to peel tubers of various water-plants like cat's tail (*Typha*) or water-lily (*Nymphea alba).* Although the blades proved to be effective for this task, only a vague polish developed on the tools edges that did not bear any resemblance to the polish seen on the archaeological specimens. Peeling tubers is therefore an unlikely explanation for the ubiquitous blades with transversely oriented plant polish, a conclusion corroborated by another argument. During the Mesolithic living experiment of Diederik Pomstra and his colleagues in the autumn of 2005 it became clear that it is unlikely that prehistoric peoples peeled their tubers. Pomstra's group consumed a large quantity of tubers of *Typha*. At my instigation they first tried to peel them with flint blades, but it turned out to be much more effective and tasty to roast the unpeeled roots in the fire and then consume them without any further treatment (D. Pomstra pers. comm.). It is thus less likely that the Late Mesolithic and Early Neolithic blades with this characteristic transversely oriented polish were used for this task.

Lastly, experiments were done with the gathering of wild grasses. When ripe the seeds easily drop out of their rachis and can be effectively stripped off by hand. A flint tool is superfluous for this task. An alternative is to snap off the heads, using a blade in an almost transverse way (the type of movement is shown in fig. 4.5b). Juel Jensen's experiments point to the possibility that the blades with transverse polish may have functioned in the gathering of seeds of wild grasses (Juel Jensen 1994). Our own 'snapping' experiments resulted in a very smooth polish distributed in a narrow band along the edge. The directionality of the polish, however, is not transverse as is the case with the prehistoric blades, but rather indicates a more cutting movement. It is therefore unlikely that these blades were used for stripping the seeds of wild grasses or snapping off the heads, a conclusion that is supported by the lack of botanical evidence for the consumption of such seeds (Out 2009). For lack of a better solution I will therefore continue to regard these blades as tools involved in plant-based craft activities (Chapter 5). Nevertheless, it should be stressed that the period of their occurrence and their disappearance in the period of the first cropping activities in the wetlands during the Middle Neolithic, is highly suggestive of a subsistence-related function. Experiments along this line are therefore continuing.

The role of flint tools in the gathering of wild plants is thus rather minimal and confined to a small numbers of tools which were interpreted as having been used on 'soft plant unspecified'. Such implements lack diagnostic traces that would allow a more detailed functional inference like cereal or reed cutting.

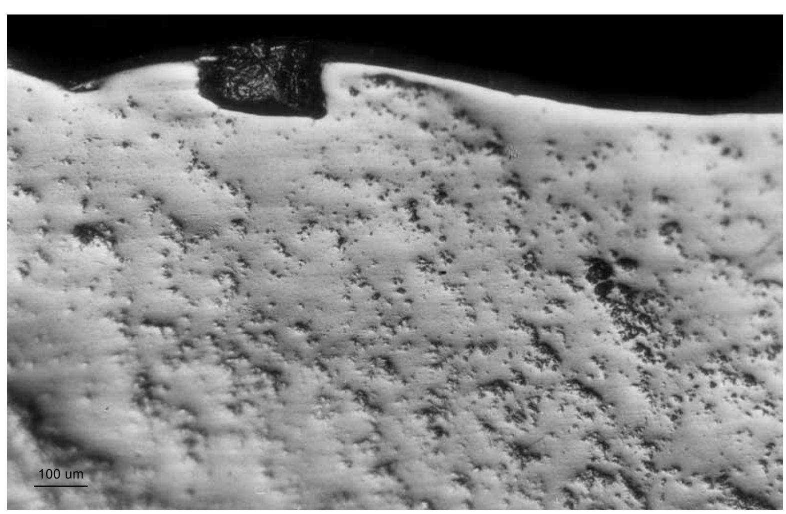
4.6 Harvesting and processing of cereals

4.6.1 Introduction and experimentation

Harvesting cereals clearly is a subsistence activity and several experiments have been conducted with different tool types and different harvesting techniques (fig. 4.5). Sickle blades are one of the few tools that derive their typological classification not so much from their shape, but from their traces of wear: a very well-developed gloss that can be distinguished with the naked eye (this gloss however, can easily be missed if the flint assemblage is studied without proper light). Tools with this macroscopically visible gloss are usually referred to as 'sickles', i.e. cereal harvesting tools, even where no actual use-wear analysis has been done. There is some justification for this interpretation as it has long been known that contact with cereals results in a distinctive sheen on the tools (Curwen 1930; Spurrell 1892). However, not all tools with gloss are sickles. Use-wear analysis has made amply clear that macroscopically visible ('sickle') gloss can also result from contact with a variety of contact materials such as soft stones (Astruc 1994 (1997); Van Gijn *et al.* 2006), soil (Van Gijn 1999), hide with the addition of various mineral substances like ochre (Astruc 2001; Beyries *et al.* 2001), hair and leather-hard clay (Van Gijn 1994 (1997)) (fig. 4.6). All these wear traces can generally be distinguished from real sickle gloss with the use of high-power microscopy, at least in experimental context. I am not sure that this will always be the case with archaeological material where post-depositional modifications may have obscured the more subtle distinguishing attributes. The most controversial type of 'sickle-gloss-like' traces is that on the alleged threshing sledge inserts (Anderson *et al.* 2004). We know many ethnographic examples around the Mediterranean of simple, usually wooden, threshing sledges that are fitted with small stone inserts in the bottom (Anderson *et al.* 2004; Ataman 1992; Kardulias/Yerkes 1996; Whallon 1978; Whittaker 1996) (fig. 9.4). These sledges are pulled by means of animal traction across a threshing floor, usually a circular area covered with stone or earth. Various

a

b



c

Fig. 4.5 Harvesting cereals: a. harvesting barley with a crescent-shaped bifacial sickle; b. snapping off the heads of barley; c. polish and striations on an experimental sickle blade used for 4,5 hours to reap barley (100x).

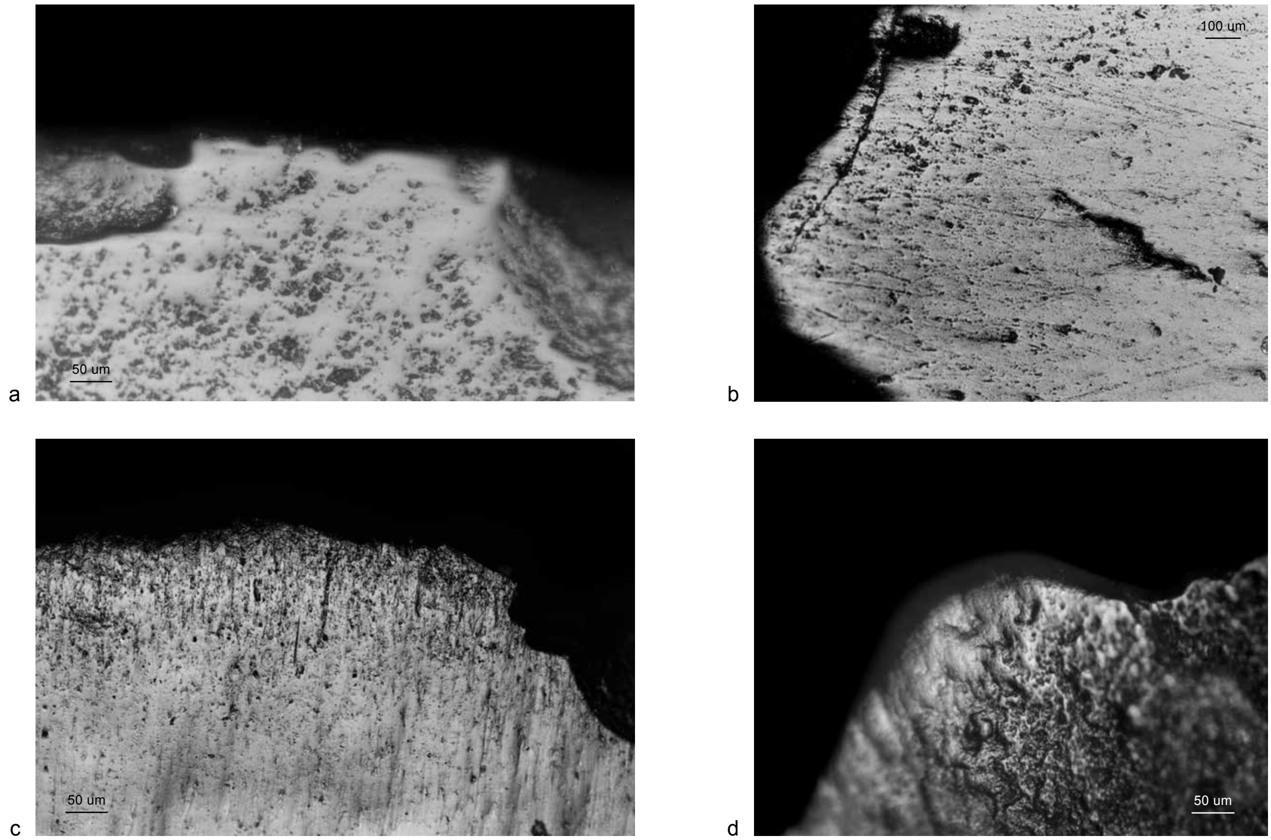


Fig. 4.6 'Sickle-gloss-like' polishes from: a. cutting reeds (200x); b. cutting turves (100x); c. scraping leather-hard clay (200x); d. scraping wet hide with the addition of ochre (200x).

Neolithic and Bronze Age sites in the Near East have produced glossed blades, sometimes also displaying bitumen remains from hafting, that most researchers assume to be proper harvesting tools (Rosen 1997). However, they display some additional wear traces such as 'drawn features' due to the pull of the sledge across the straw and the surface of the threshing floor, that are never observed on sickles. Such glossy blades have therefore been used to process cereals rather than to harvest them.

Another problem with sickle blades is that traces from harvesting domesticated cereals are not always distinguishable from traces resulting from cutting various other siliceous plants such as *Phragmites*, *Scirpus*, *Typha* and so forth. In experimental context tools used to cut these wild siliceous species display a more undulating topography and have a smoother surface (with virtually no striations), than the 'real' sickles. The latter have a polish displaying a myriad of longitudinally oriented, very shallow, narrow, and frequently 'filled in' striations, with a flat topography and a slightly rough texture (fig. 4.5c). In contrast, in archaeological context these subtle differences cannot always be distinguished, resulting in interpretations like 'siliceous plants unspecified'.

The final issue is that sickles are often notoriously rare or even absent in tool assemblages. This has been attributed to a loss of sickle blades, basically inserts of a composite tool, in the fields, but it remains strange that we find so few sickle blades. Moreover, sickles would have to be retooled, an activity expected to result in a regular occurrence of (damaged) sickle blades in the domestic context. It can thus be imagined that harvesting was done by other means than by sickles with flint inserts. Instead we can think of wooden tools like the Spanish *mesorias*, bone sickles or bone forks to rake the stalks (Ibáñez Estévez *et al.* 1999). Alternatively, flint sickles may have been deposited in special places that are generally missed in our archaeological record (Chapter 7). Sickles are therefore not such a straightforward tool type as is frequently assumed and not all the glossy blades can automatically be considered harvesting implements. Conversely, in all likelihood we are also missing a large number of cereal harvesting tools.

4.6.2 The sickles of the farmers in the uplands

The loess soils on which the first, LBK, farmers settled were relatively easy to work. The crops grown include cereals like emmer and einkorn wheat, as well as flax, pea, lentil and poppy (Bakels 1988, 1991). All LBK sites examined produced a sizable percentage of sickle blade inserts, with the exception of Beek-Molensteeg. The wear traces include a well-developed zone of polish, visible with the naked eye, extending c. 5-7 mm across the surface of the tool (fig. 4.7a). Usually the polished zone is distributed in the shape of an elongated triangle, indicating that the flint piece was inserted at a slight angle to the haft not unlike the famous Karanovo sickle (Stordeur 1987, figs. 2, 3). The polish itself has a flat topography, a matt texture and a totally linked distribution that gradually fades out as you move into the surface of the tool. In these respects the polish resembles that on the experimental sickles. A peculiar feature of the LBK sickle blades, however, is the large number of striations that cover the polished area (fig. 4.7a). Although a general linear distribution can be discerned, the scratches are not as fine and 'filled in' as on the experimental pieces, but instead have irregular margins, deep troughs and a 'bumpy' bottom. There are also deep pits that vaguely resemble the ones on threshing sledge flints. Have these LBK sickle blades also been used as inserts in a threshing sledge? This is highly unlikely because both emmer and einkorn, the cereal crops grown by the LBK people, are glume wheat species: in order to remove the seeds these glumes have to be pounded first (Bakels/Zeiler 2005).

As only one Rössen site in the Netherlands has been studied, little is known about harvesting practices during this period. Palaeobotanical research of Maastricht-Randwyck has demonstrated that crops were grown on the lower terrace of the Meuse. The range of crops grown by the LBK farmers was extended with bread wheat and naked, six-rowed barley (Bakels 1990; Bakels *et al.* 1993). On one small blade sickle gloss was visible resembling that observed on the LBK sickles. This tool had been re-sharpened and subsequently used again.

The Dutch Michelsberg sites are completely devoid of sickle blades, even though we know that cereals were processed in the sites of Maastricht-Klinkers and Heerlen-Schelsberg (Bakels 2008). From the only Michelsberg site for which a wear trace analysis has been published so far, Maastricht-Klinkers, no sickle blades have been found, despite the fact that a large sample was subjected to research (Schreurs 1992).

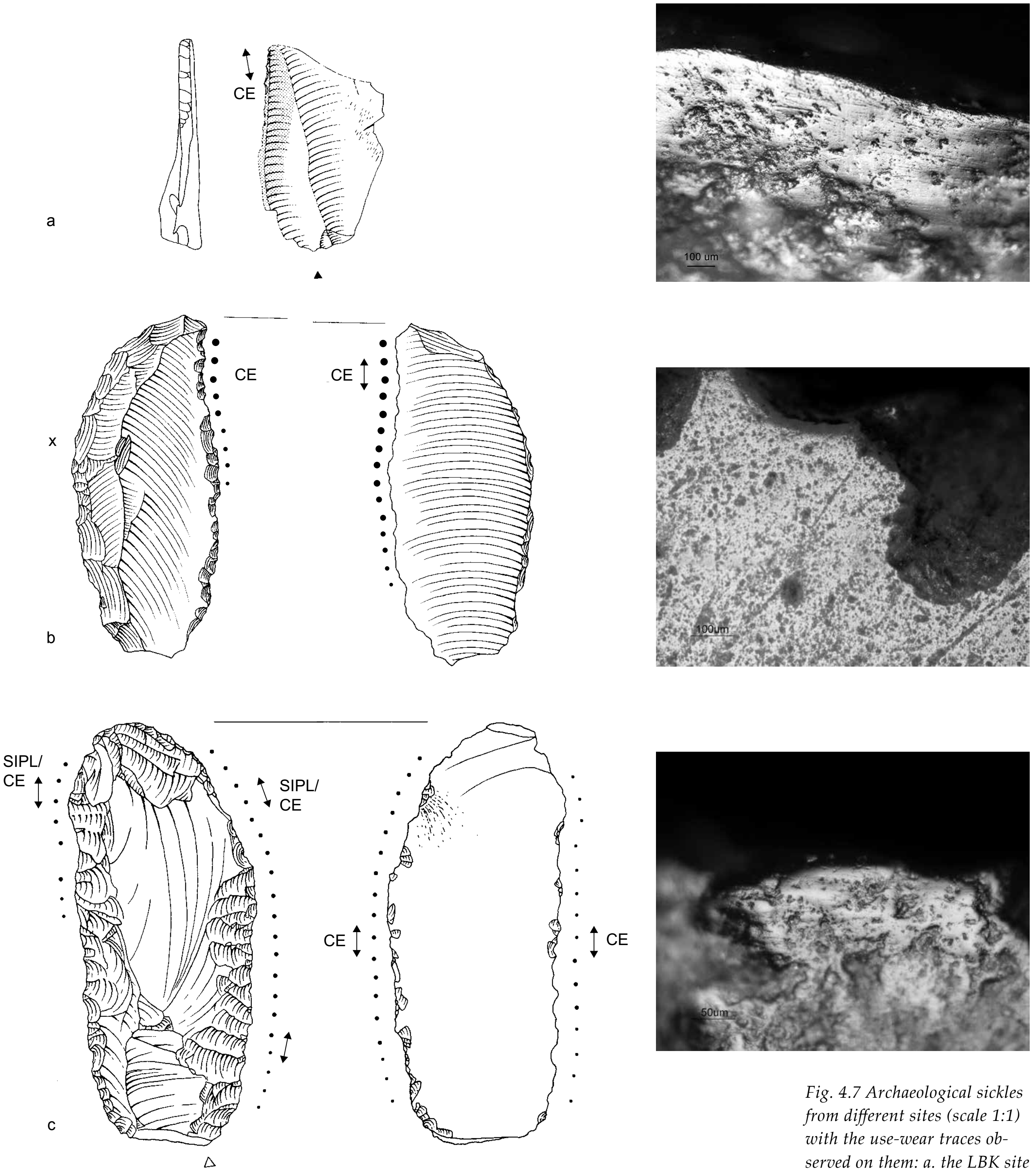


Fig. 4.7 Archaeological sickles from different sites (scale 1:1) with the use-wear traces observed on them: a. the LBK site of Beek-Molensteeg (100x); b. the hunebed of Mander (TRB) (100x); c. the Hazendonk site of Schipluiden (Hazendonk-group) (200x).

Few sickle blades have been found in TRB settlements, even though the ard marks found at the site of Groningen-Oostersingel pay unequivocal testimony to the practice of agriculture (Bakels/Zeiler 2005, fig. 14.15). This site yielded only one tool that was used for cereal harvesting. Ard marks are also known from the late TRB site of Bornwird, a site that, like Groningen-Oostersingel, is located at the edge of the Pleistocene (Fokkens 1982). Sickles do, however, consistently appear in the megaliths, albeit not in large quantities (Brindley 1983, 1986a; Brindley/Lanting 1991/92; Brindley *et al.* 2001/02) (fig. 4.7b). This is remarkable because this means that they were intentionally collected to be deposited in the tombs with the dead. The fact that they are virtually absent in settlements indicates that they were not left lying about. It is unlikely that they have been systematically overlooked. Their deposition in tombs and the fact that it always concerns the best blades in the assemblages (in a technological sense) clearly suggest that they were not treated like any ordinary tool (Chapter 6, 7).

4.6.3 Sickles in the wetlands

None of the Early Swifterbant sites, like Hoge Vaart and Brandwijk phase 1, all of them contemporaneous with the Rössen culture further south, have evidence of local cropping of domesticated cereals. Concurrently, no sickles have been encountered in the use-wear analyses (Peeters *et al.* 2001). Bienenfeld (1986, 1988) has reported several cereal harvesting tools from the 'classic' Swifterbant sites but this research was done in the late seventies when the method of use-wear analysis was still in its infancy. A recent scan of a large number of blades with gloss from several Swifterbant sites revealed that most were used in a transverse motion on siliceous plants, whereas only a few had longitudinal traces that could be associated with harvesting plant material.[8] The traces, however, display a brightness and undulating topography quite unlike the flatter, more matt appearance of typical cereal harvesting tools; they also lack the fine striations that are always present on the latter. They are therefore not associated with cereal harvesting.

In contrast, sites of the Hazendonk-group have provided evidence for cereal harvesting and processing (Kubiak-Martens 2006a). Ypenburg, Schipluiden and Wateringen 4 all have produced flint sickles for harvesting crops, albeit in small numbers (fig. 4.7c). Interestingly, in the case of Ypenburg these sickles had a special biography. They were made on exotic, imported flint. After their use-life was finished the used edge was destroyed by flaking, the tool was burned and maybe rubbed with ochre (Chapter 7).

The Vlaardingen sites on the Older Dunes are probably permanently inhabited agrarian settlements whereas the sites on the levees and in the peat can be interpreted as extraction points aimed at fishing, hunting and collecting (Van Gijn 1990). This is also visible in the archaeobotanical record. At Leidschendam, located in the dunes, the pollen analysis shows peaks in the curves of cereals (Bakels/Zeiler 2005; Groenman-van Waateringe *et al.* 1968), and two flint sickles were found (Van Gijn 1990) (fig. 4.7d). In contrast, no clear evidence for

8 Pers. observ. Nieuwenhuis and Van Gijn, to be published in Devriendt in prep.

local cropping has been found on the levee sites like Hekelingen III or the sites in the peat like the Hazendonk, although Hekelingen III has cereal pollen (Out 2009).

Flint sickles have not been encountered from the Late Neolithic and Early and Middle Bronze Age settlements nor from graves dating to the same period. We know however, that growing crops was practised widely as evidenced by ard marks at the sites of Zandwerven (Vlaardingen-group/Single Grave culture) (Bakels/Zeiler 2005). The absence of sickles from this period may be due to alternative harvesting methods (uprooting is quite easy in the loose sandy soils of the dunes on which these agricultural settlements are commonly situated) or alternative tools that make no use of flint. Evidence for cropping for the Bell Beaker and Early Bronze Age periods is limited to ard marks under burial mounds. Oostwoud, dated to the Bell Beaker and Barbed Wire period, forms one example (Casparie/Groenman-van Waateringe 1980; Van Giffen 1962), but they were also found under barrows 5 and 6 of Hijken-Hooghalen (Van der Veen/Lanting 1989).

The beautifully made bifacially retouched crescent-shaped implements of northern import flint from the Late Bronze and Early Iron Age were long considered unequivocal sickles (Brongers/Woltering 1978) (figs. 7.16, 8.5). These crescent-shaped tools display a very intense polish across their surface and often have a very blunt edge. They were long believed to be sickles used for harvesting although it has also been proposed that they were involved in hide processing (Brongers/Woltering 1978) or had served as a coulter in a plough (Bruyn 1984). Use-wear research, however, has shown them to be predominantly used for cutting sods or turves, and not for harvesting cereals (Van Gijn 1988). Cutting turves may seem a very profane task for such precious import implements but we must not forget that in the tree-less surroundings of the northern and western Netherlands sods or turves constituted an important building material (Van Gijn 1999) (Chapter 7). As we find bronze sickles from this period, it is likely that most of the harvesting was performed with metal tools instead.

4.7 Food preparation

It is not only in the selection of things to eat, and in the way these foodstuffs were collected or grown, but also in the way they were subsequently prepared, that we can observe large differences between various cultures. Obviously we know almost nothing of this for the Neolithic and Bronze Age, and certainly flint tools can tell us even less. This is more a subject for residue analysis of pottery vessels or botanical analysis like the evidence for porridge of emmer wheat at the Middle Neolithic site of Schipluiden (Kubiak-Martens 2006b). In the absence of visual images about the preparation of food we are left with very little empirical evidence to go by. We can safely assume that much of the food was heated. Meat as well as plant roots and tubers can easily be roasted. At the Middle Neolithic site of Schipluiden charred remains of sea beet (*Beta vulgaris maritima*) and sea club-rush (*Bolboschoenus maritimus*) were encountered. The tubers of the latter were dried before being charred (Kubiak-Martens 2006b), posibly indicating that the inhabitants were cooking stored foods. From a lithic point of view we have evidence for food processing in the form of heated sandstone elements of open hearths and heated quartzites that were most probably cooking stones (Van Gijn/Houkes 2006).

The presence of flint strike-a-lights indicates the role of fire in general and, obviously, fires were made in order to prepare food. Flint tools may also have served to cut up various ingredients. The generalized blades such as have been found in the LBK context, indeed display a range of wear traces, indicating their function as a sort of prehistoric Swiss knife. However, at this stage, the role of flint in food preparation activities is impossible to reconstruct and may indeed have been rather limited.

4.8 Conclusions

Flint tools were indeed involved in obtaining food. Maybe slightly contrary to our intuitions, however, it has also become evident that flint implements constitute only a small part of past subsistence technologies, in which bone, antler and wooden tools were probably equally important. The use-wear analysis showed that flint has been used to cut soft animal tissue, tools that were likely related to butchering animals. Fish processing could only be demonstrated in one instance; for various reasons we are missing these tools in the archaeological record, despite the fact that scaling fish results in distinctive wear traces. Flint tools also figured in hunting and cereal harvesting. Flint sickles, however, seem to be surprisingly rare in the archaeological record. It is still not clear whether this absence is due to taphonomical reasons (they are lost off site), whether harvesting was done by means of non-flint implements (like *mesorias*) or methods not requiring any tools at all (uprooting), or whether we must seek the explanation in, for instance, the ritual sphere. It should be noted that use-wear traces from cutting plants can be ambiguous: for example, amongst the category 'siliceous plants unspecified' more cereal harvesting implements may be present. Points are ambiguous too because they also function in warfare and may have been a symbol of male prowess and martiality. Still, I assume that the points found in Early and Middle Neolithic settlement contexts were most likely involved in hunting. The same probably pertains to the points from Vlaardingen context. Points from Beaker and Bronze Age settlements may have been either for hunting or for warfare.

As a result of different excavation and sampling strategies and for taphonomical reasons quantifying the importance of various subsistence tasks on the basis of data obtained from use-wear analysis is impossible. Still, the great number of points in the Hazendonk sites of Delfland suggests that hunting constituted an important part of the subsistence economy there.

It has also been shown that two important subsistence tools of flint, arrowheads and sickles, displayed a special biography in some of the periods discussed in this book. The example illustrating the apparent special significance of arrowheads derives from the TRB culture. Although points are largely absent in settlements of this cultural group, they are abundant in the megalithic burials. If we recall that the TRB people seem to have been the first real agriculturalists in these upland areas, practising a slash-and-burn type of agriculture that may have been perceived as very different from (and almost hostile to) the previous hunting-gathering way of life, then the deposition of points may actually have to be interpreted in a different way: rather than being reflective of the importance of hunting in the actual subsistence pattern, it may have been a way to appease the spirits of the forest, a way to reconcile the new ways of life, directed at the subjugation of nature, with the old, traditional beliefs about living with and within nature. From this perspective hunting was considered important, maybe not so much as a source of food, but as a way of life that was close to nature: the ancestral way of life. This example will be further discussed in Chapter 7.

Sickles too sometimes display a special biography. In the marshlands of the western Netherlands, in the sites of Schipluiden, Ypenburg and Wateringen 4 the sickles were produced from exotic flint, imported from southern Belgium. Some of these sickles were intentionally destroyed after their use-life ended. The new agricultural activities, so different from the gathering way of life that must still have been part of the collective memory, may have been perceived as dangerous to the balance of nature. Sacrificing the tools may have been a way of restoring this balance (Chapter 7). In the TRB period sickles were also treated as special. We only find them in the collective burial chambers, never in the settlements. Retooling activities would have resulted in at least a small representation of these tools in settlements. Instead it seems that they were carefully collected to be deposited along with the dead (Chapter 7).

In this chapter I attempted to understand the role of flint in food getting activities during the Neolithic and Bronze Age. It was shown that it is difficult to approach subsistence from the point of view of the flint tools involved. As Out (Out 2009) also stresses, it is only through a holistic approach, encompassing palaeobotanical and archaeozoological material, environment and tools that we can hope to address complicated issues as the importance of hunting or cereal domestication. From a flint tool perspective few subsistence activities can be 'traced': this is limited to hunting, fishing and cereal harvesting and to some extent maybe wild plant gathering and food preparation. With respect to all of these subsistence activities, several taphonomical and methodological restrictions made it impossible to really assess the contribution of flint tools. It was also shown that we must be attentive to the way apparently simple subsistence tools are treated: where are they deposited, are they burned, can we observe any residue? Too often we treat subsistence as something mundane and easy to understand and we overlook the possible ritualisation of simple domestic tools (Chapter 7).

Chapter 5

Flint and craft

5.1 Introduction

5.1.1 Crafts: some pertinent issues

Craft activities are often 'forgotten' or overlooked because in most sites craft products are rarely preserved and because, in stone age research at least, we tend to focus on subsistence. Still, craft activities tell us a great deal about the character of the site and the composition of the group in terms of gender and age. Knowing more about craft activities enables us to better understand daily life, the objects that figured in domestic context and the meaning these objects may have had. Such information allows us to make more detailed reconstruction plates that focus on people and their tasks (fig. 5.1), instead of the usual bird's eye views of houses and fields. Use-wear analysis is an effective, albeit indirect method to obtain knowledge about craft activities in the absence of the actual products.

Fig. 5.1 Reconstruction plate of the interior of a LBK house, lined with hides to create compartments. One of the women is preparing flax fibres using a quartier d'orange. The other is spinning a thread with the fibres using a forked stick.

The distinction between craft and subsistence activities is obviously an academic one, probably not experienced as such by prehistoric people. Various subsistence goods, like olive oil, require a substantial investment of knowledge and skills akin to those associated with the activities we traditionally tend to label as craft such as hide working and textile production. Moreover, some of these food stuffs may have been considered special because they were consumed on ritual occasions and hence were prepared with extra care and attention, according to traditional knowledge. On the other hand, many of the activities that we would label as craft, such as the manufacture of baskets, fish traps or spears, are obviously meant to be used either to obtain food or to process, store or transport it. Also, the raw materials required for craft products are frequently obtained as an integral part of food getting activities (Van Gijn 1994 (1997)). For example, before we can process a hide to make a blanket, it needs to be collected from the animal, which is, in most societies at least, also consumed. A killed deer is not only food, it also constitutes a stock of useful raw materials crucial for the livelihood of prehistoric people: the bones and antlers for tool production and glue, sinew for binding material, hide for making tents or clothing, and teeth for ornaments and tools. Another example illustrating that obtaining raw materials for craft objects is closely linked with food getting activities is the use of straw from wheat and other cereals for making various baskets, as tempering material in pottery production, or for roofing. Certainly at the collecting phase of raw materials it is therefore almost impossible to differentiate between manufacturing and subsistence activities. Considering the fact that craft and subsistence are so much intertwined, it is highly likely that prehistoric agents themselves did not make such a distinction, certainly not before a certain level of specialisation occurred. Still, for the purpose of this book a differentiation will be made between subsistence and craft activities. I consider all activities that are concerned with making *other* objects a craft activity (Juel Jensen 1994, p.162). This would include everything except the subsistence activities themselves (Chapter 4) and would encompass the production of implements of bone, wood and antler, textile and basket production, the making of ornaments and hide processing.

There is also some confusion about the terminology used. Use-wear specialists generally use the term 'maintenance' activities to refer to anything that is not related to food getting. This term ultimately derived from Binford's work on the Nunamiut (Binford 1978). The way the term was used in past use-wear studies was somewhat misleading because it implied that objects were never made in the first place, but only had to be repaired (maintained). The term 'manufacturing' activities is therefore a more appropriate indication for tasks like the making of bone awls or weaving mats. Another typical use-wear term is 'processing' activities. It refers to both food getting and craft activities. A good example is the threshing sledge: this is a processing tool *par excellence* used for loosening the cereal grains from the husks. At the same time however, tempering material for ceramics and plaster is produced (Anderson *et al.* 2004).

Last, the very term craft automatically evokes the association with some form of specialization and, consequently, of social stratification. During most of the Neolithic in the Netherlands there is no unequivocal evidence for formal craft specialists that furnished their community with a specific product and produced an excess that could be used as trade commodity. However, some sort of more informal specialization is likely. There is still discussion whether the exploitation of the Rijckholt flint mine was done by specialists who subsequently furnished other communities with blanks or even finished products, or whether several groups had access to the flint mines. Informal, *ad hoc* specialization has been proposed for the production of lithic implements in the LBK culture (De Grooth 1987). Most of the large ceremonial axes of the TRB culture must have been made by highly skilled flintknappers and the same pertains to the daggers and sickles of later date (Chapter 7). Whether this concerns household production is unlikely. Olausson has proposed for southern Scandinavia that these objects were made by specialists attached to an aggrandizer who wished to achieve or consolidate a more prestigious position in society (Olausson 2000).

Clearly, certain activities related to the making of objects were in the hands of specialists, if only because all crafts require knowledge, know-how and skills and therefore a period of apprenticeship. This implies that not everybody at a given time and space would have been able to perform the craft. The question subsequently is how access to this knowledge was structured and thus whether the craft was organized on an *ad hoc* basis or whether it concerned a more formalized specialisation. Flint tool production in the Neolithic and Bronze Age can most likely be considered a household production or household industry (Olausson 1997, 2000). Incidentally we have evidence for objects in which an extraordinary amount of time and expertise has been invested and which seem to be linked rather with attached specialist production in Olausson's words (Olausson 2000). In the Late Neolithic and the Bronze Age we may see the first evidence for workshop industries of flint objects: it may well be that the Scandinavian daggers, of which more than 13.000 were found in Denmark and Scania alone (Olausson 2000), were produced in the context of established workshops of full-time specialists that were producing for a larger market linked by exchange (Chapters 7 and 8).

5.1.2 Toolkits

The issue of toolkits is especially pertinent to craft activities. Whereas reaping cereals generally involves only one tool, a sickle, maybe occasionally supplemented by forks or other instruments to gather the stems in bundles, most craft activities rely on an entire set of functionally related implements (fig. 5.2). We all know that a carpenter's workshop is filled with a multitude of objects that most of us do not even know the function of. All of these objects are related to one craft activity: wood working. Although carpenters may specialize in making specific objects, most will be able to use their carpentry skills to make a large variety of wooden 'things' and so the contents of their workshop can be considered one toolkit: for wood working. Obviously such a general designation of toolkit can be further subdivided: a toolkit for making wooden shoes will involve different implements than one for making barrels.

Past technological capacities and the complexity of the technological processes are often underestimated (Ingold 2007). Use-wear and residue analysis has been quite instrumental in drawing our attention to this complexity, although still, most of it will remain invisible to us. I have argued before that we rely too much on the ubiquitous flint for drawing inferences about past technologies:

Fig. 5.2 *Photograph of an experimental hide working toolkit.*

flint is only a small part of a much more varied and complex technological system. Flint implements form part of composite tools or constitute only one of the many tools composing a toolkit. It is only recently that we have begun to look at toolkits because use-wear analysis on materials other than flint is a relatively recent development. The example of the hide scrapers of bone and antler from Hardinxveld-Polderweg has been mentioned before, and the use-wear analysis of different find categories from Schipluiden has also demonstrated that many activities involved a variety of tools other than flint (Van Gijn 2008b). Because especially craft work entails a sequence of actions, each involving different motions and different tools, it is especially important to remain aware of the limited perspective that flint tools will provide. The following should be read with that *caveat* in mind.

5.2 Hide processing

5.2.1 Introduction

Hides are known to be a very important raw material for present-day hunter gatherers, especially those living in northern latitudes. As a result, all reconstruction plates of the past depict people walking around in skin clothing and living in tents or in huts with at least some elements of hides, like blankets and doors (fig. 5.1). There is no doubt that hides must have been a very important resource in the past, but we have very little direct knowledge of items of skin or leather. In the Netherlands such objects are only known from Roman and Medieval context but elsewhere earlier examples are preserved occasionally, under very special circumstances like permafrost or extremely arid conditions (see Audoin-Rouzeau/Beyries 2002 for examples from across the globe). We therefore have to rely on indirect evidence of hide cleaning and processing such as hide working tools or features that are interpreted as tanning pits (Gronenborn 1989; Van de Velde 1973).

5.2.2 Hide processing stages

A skin consists of two layers: the epidermis and the corium or dermis. The epidermis (the outer layer) contains the hair follicles. In order to make leather the epidermis, along with the hairs, must be removed. The corium or dermis is the part that is tanned. It is covered by a membrane referred to as the *subcutis*. This membrane needs to be removed because it prevents the tanning agents from penetrating the dermis (Stambolov 1969). Skins have to undergo at least some processing in order to last, ranging from a simple cleaning and drying, to smoking or to a series of treatments including tanning, thinning and softening. Products therefore may vary from a stiff, raw dried skin to the highly supple buckskins of the Native American Indians of the Plains. Drying the skin is sufficient for some purposes, but it will not be waterproof and is very prone to rotting every time it gets moist. Raw dried skin is useful as binding material in hafts: if applied wet it tightens itself because it shrinks when drying. For most other purposes like bedding or clothing, the skins have to be tanned and made supple.

We can therefore distinguish several processing stages. It is important to clean the skin soon after butchering, removing all subcutaneous fat and remnants of flesh. This is most easily done by means of an implement with an irregular, somewhat toothed edge like a flint scraper or the denticulated bone and antler scrapers of the Late Mesolithic sites of Hardinxveld (Louwe Kooijmans *et al.* 2001a, b). Ethnographic sources document both these types of tools (Beyries 2002, fig. 5, 10). Some skins come off the carcass relatively clean, like those of deer and sheep, and can be dried without much further work. Fur animals, however, usually have a lot of subcutaneous fat that first needs to be removed. This is often quite liquid and difficult to remove; the process is greatly facilitated if absorbents are added such as fine sand or flour. It should be borne in mind however, that such absorbents also have an abrasive effect, both on the scraping tool used, and on the skin itself. After this initial cleaning, frequently referred to as 'fresh hide scraping' in use-wear reports, the skins must be dried. This can be done by staking them onto the ground or by stretching them on drying racks. After drying, the skins can be stored for a long time. Sometimes the skins are salted to prevent putrification. Most skins are at their best in autumn and this is usually the time that game is hunted. The subsequent processing, a very time-consuming activity, often takes place in the long winter months when more leisure time is available. For example, many Inuit typically process their skins in winter time (Jenness 1970).

When time has come to process the skins, they first need to be thoroughly soaked. When leather is the intended product, the hairs need to be removed. To depilate the skin, it is soaked in warm water, allowing bacterial growth. Sometimes ashes or stale urine are added to further the process and to obtain the alkaline milieu of a pH 12 or higher, needed for the process of de-hairing (Stambolov 1969). The loosened hair can easily be scraped off with a flint or bone scraper after which it must be thoroughly washed to stop the bacterial processes. This is sometimes done by adding animal dung and washing again.

Before tanning can begin, it is also necessary to remove the *subcutis*. This is more difficult when the hide is fresh or wet, and one needs a toothed implement to remove it. When the hide is dry, the *subcutis* can however be rubbed off easily with a coarse-grained sandstone. However, my own experiments showed that this also produced a lot of unwanted scratching of the surface of the hide.

There are different ways of preserving hides: it is frequently assumed that the oldest technique is what can be referred to as curing or pseudo-tanning (Van Driel-Murray 2002): this was done by means of animal products like brains, liver, grease or fish oil. This was also the way most North American Indians tanned their skins. The brain or the liver is either rubbed directly onto the hide, or is first dissolved in water upon which the hide is left to soak in this solution for some time (Osgood 1937). It is a rule of thumb that the amount of brain required to tan a hide corresponds with the size of the brains of the animal in question (Witthoft 1958). The brains can be preserved by keeping them in birch bark (Densmore 1928). Other animal tanning products include fish oil, egg yolk and oils from sea mammals (Chahine 2002). During tanning the hides can be worked with a stone cobble to allow for better penetration of the tanning agent. Subsequently the hide is washed and dried. Drying is usually done in the course of the softening process. This is a long and tedious process and a lot of pulling and rubbing is necessary to restore the original suppleness of the hide. This can be done by means of a rough edged stone, or by pulling the skin over a wooden beam. A well-know way of softening hides is by chewing, a technique commonly practiced among Inuit women (Balicki 1970). Sometimes fish oil is added as a softener, as observed among the Tanaina (Osgood 1937). At the same time the hide is also scraped to thin it and regularize its thickness. The final phase of hide processing among Native American Indians was smoking: smoking causes the hide to remain soft, irrespective of exposure to moisture, which is important when used for *moccasins* (Lowie 1954). It also prevents decay.

'Real' tanning is done by means of vegetal substances. Van Driel argues that there is no evidence for this practice in the Netherlands prior to the Roman period (Van Driel-Murray 2002), but this is difficult to prove and it cannot be excluded that tanning with bark of oak was already practiced much earlier. Several plants contain tannic acids that react to the collagen in the dermis and replace the moisture that is naturally present in the skin. The most important is the bark of the oak tree but Beyries reports that the bark of alder is equally effective and frequently used by the Siberian peoples of the sub-arctic regions (Beyries 2002). The bark is either left to soak in large pieces or it is first pounded to powder after which the hide is left to soak for a few days. Sometimes this is done a second time, with the addition of urine (Beyries 2002).

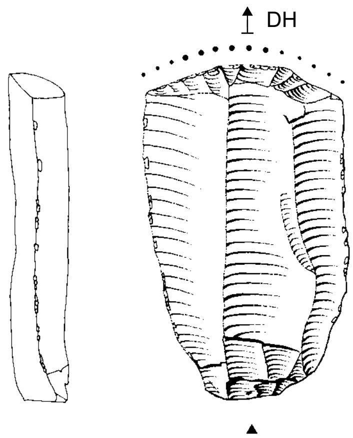
5.2.3 Archaeological visibility

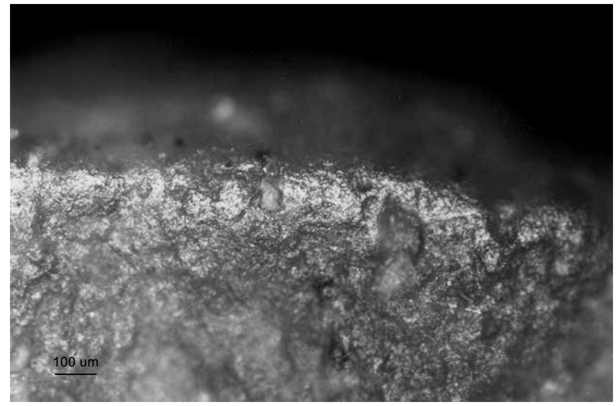
From ethnographic observations we have some knowledge of the range of tools commonly used in the various stages of hide processing (Audoin-Rouzeau/ Beyries 2002; Beyries *et al.* 2001; Brandt/Weedman 2002; Gallagher 1977; Weedman 2002). A relatively sharp and slightly irregular edge is necessary to remove the last remnants of flesh, grease and the *subcutis*. Toothed bone tools are used among the Athapaskan Indians to clean the inner side of the hide (Beyries 2002). From eastern Africa we know of large hafted stone scrapers (Gallagher 1977). Stone tools are also frequently used for depilating (Ibáñez Estévez *et al.* 2002) and are essential to rub the animal fats into the skin. In fact, during the several stages of washing, drying and loosening, the hide is also thinned and regularized, frequently by means of stone scrapers. The loosening and pulling of the cured skins is more commonly done by hand, or else on a wooden beam: stone tools are really not that necessary in this stage, although they are occasionally used, especially when the loosening is combined with the addition of fat or colorants.

Most of these tools are not so specific in terms of their shape and are therefore not recognizable as hide working implements without the aid of functional analysis. Scrapers, for example, are frequently used on hide but can also be employed for other tasks (Juel Jensen 1988). Fortunately, hide working traces are usually quite distinctive. Flint tools, and especially scrapers, are likely to have been used during the initial cleaning of the hide. Experiments show that this results in a continuous, narrow band of greasy looking polish. Only when absorbents are added does extensive polish develop: this polish usually has a very matt, rough and somewhat striated appearance but the continuous polish distribution is indicative of contact with hide. Rubbing grease, powdered plant material or dung into the skin also results in substantial rounding, especially if for example ochre is added (fig. 4.6d). The thinning and loosening (or currying) stage will wear out the flint tools considerably and produce rounding and polish: this is generally referred to as 'dry hide working'. However, I am not sure if we will always be able to distinguish between 'dry hide scrapers' that were used to scrape fresh hides from fur-bearing animals with the aid of absorbents, from *real* 'dry hide scrapers' that were involved in the various processing stages (rubbing in tanning agents, thinning and loosening). In archaeological context we generally differentiate between 'fresh hide scrapers', that is scrapers that were used to clean the skins (without absorbents), and 'dry hide scrapers' involved in all subsequent processing stages and displaying considerable rounding and a matt polish.

5.2.4 Hide working in the Dutch Neolithic and Bronze Age

Hide working tools are the most common craft implements encountered in archaeological context. Scrapers are a dominant tool type and have frequently been used for processing hides (fig. 5.3). The Early Neolithic LBK culture is characterized by a large number of hide working tools. These early farmers were also remarkably consistent in their choice of tool: in most cases it concerns scrapers, although there are the occasional blades that were used to cut hide. The latter indicate that hides were not only cured and preserved, but were also turned into





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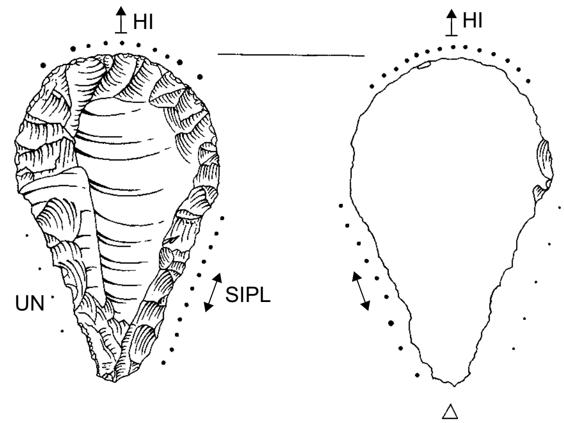

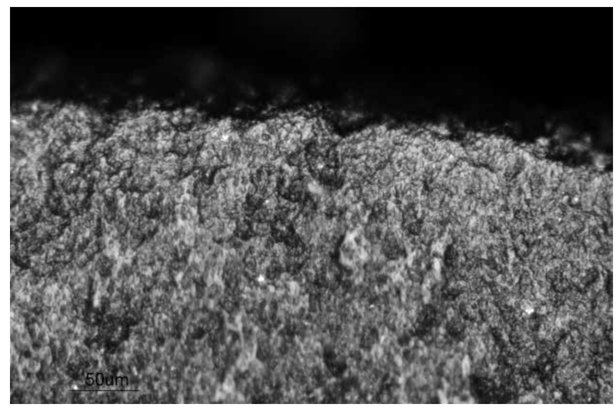

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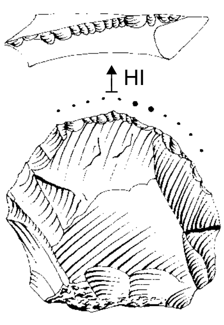

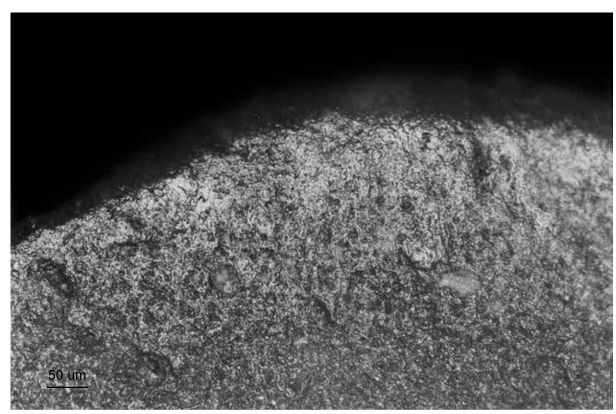

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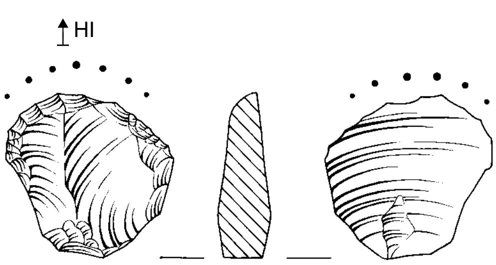

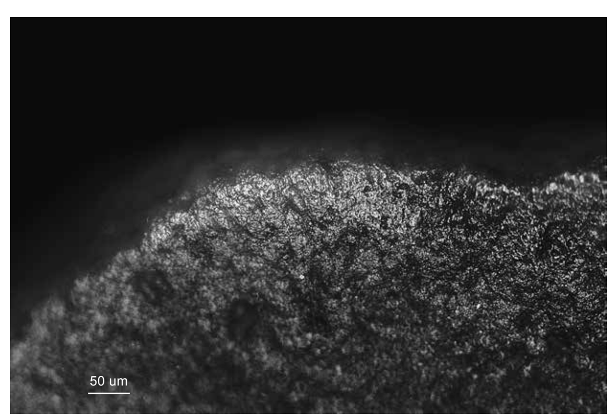

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various objects, such as clothing, shoes or household utensils like containers. It is also remarkable that the hide polishes on LBK scrapers display substantial variability. This may indicate that there was a range of specific stages of production in which these tools were involved. Because the differences in polishes are quite subtle and are 'continuous', it has so far not been possible to match these polish attributes to specific procedures or stages in the hide working process. Combined with the fact that there are many hide scrapers and that the traces are heavily developed, this variability indicates that hide processing constituted a very important activity in this period. If the strange pits (*Schlitzgruben*), occasionally found in settlements, really were tanning pits, as has been suggested (Gronenborn 1989; Van de Velde 1973), this would further corroborate the importance and sophistication of LBK hide processing craft.

Questions remain of course why hide processing was so important in LBK society and what all these hides served for? Obviously one reason for this over-representation may be that hide processing was performed within the settlement, resulting in large numbers of scrapers to be discarded on-site: the pits alongside the houses are artefact traps *par excellence*. This would explain the large number of scrapers but would not explain why on settlement sites from other periods hide scrapers occurred in much smaller quantities. I assume therefore that this emphasis on hide processing reflects a technological choice on the part of the LBK people: either they processed a large number of skins or they used specific techniques. One application requiring a substantial number of hides is the lining of the large wooden houses in order to create smaller compartments (fig. 5.1). It may also be that the LBK people extensively used skin for clothing. Last, hides may have been an exchange item, in which case too, large numbers of hides may have been needed. These explanations, however, do not account for the variability in wear traces. I would therefore argue that the large number of hide scrapers found in LBK context is the result of specific processing and preservation techniques. As ethno-archaeological research has shown, thinning and currying hides rapidly dulls flint edges (Gallagher 1977). Many of the LBK scrapers are broken in a haft or are relatively short by recurrent resharpening. The more you scrape a hide, the softer and suppler it becomes, and hence the more scrapers you need. The large number of scrapers in LBK context may thus be an indication of the high quality of the processed hides rather than their quantity. Hide processing also seems very prominent in the Rössen site of Maastricht-Randwyck (Van Betuw 2004) and the Michelsberg site of Maastricht-Klinkers (Schreurs 1992): here similarly worn-out scrapers were encountered in large numbers. Apparently this extensive hide working craft formed part of a long technological tradition (Van Gijn 1998).

In the wetlands hide working tools do not figure as prominently in the flint assemblages as in the uplands. Hide processing was an important task in Late Mesolithic sites, but instead of flint implements they mainly used used tools of bone and antler (Van Gijn 2007). Also in subsequent periods, hide working is prominent, but the extensive rounding of the flint scrapers so characteristic for the scrapers of LBK, Rössen and Michelsberg culture, is absent: the edges bear more resemblance to what we obtain experimentally from cleaning fresh

Fig. 5.3 Hide working tools in the Neolithic and Bronze Age (scale 1:1) and the wear traces observed on them. a. from the LBK site of Beek-Molensteeg (100x); b. from the Hazendonk site of Schipluiden (200x); c. from the Vlaardingen site of Hekelingen III (200x); d. from the Late Neolithic/Early Bronze Age site of Boog-C Noord (200x).

hides. I would suggest that this indicates that hides were less extensively treated after cleaning and did not undergo a prolonged processing. This pertains to the Swifterbant, Hazendonk, Vlaardingen and TRB scrapers.

Remarkably enough, the scrapers of Late Neolithic and Bronze Age times from the riverine sites also display the extensively rounded edges with a rough polish. It seems that during this period hide processing techniques had changed and that the hides were more intensively scraped and worked than in previous periods (Van Gijn/Niekus 2001). Again, the most likely explanation is that the hides were processed in order to obtain a high-quality product, akin to the buckskins of the Native American Indians. Hide working may have been an important craft activity, either for domestic use or for exchange.

5.3 Plant-based crafts

5.3.1 Introduction

Craft objects made with plant material (fig. 5.4) are rarely found in excavations. Only in wetland contexts do we find artefacts made of plants like fish traps, pieces of textile or fragments of baskets. Examples include textile fragments made of the woven bast fibres of willow found at Schipluiden (Kooistra 2006) and fragments of cordage and baskets found at the Late Neolithic site of Aartswoud and the Bronze Age site of Hoogkarspel (Van Iterson Scholten 1977). We also have the beautiful fish traps from Bergschenhoek (Louwe Kooijmans 1985). Spectacular textile and basketry fragments have been en-

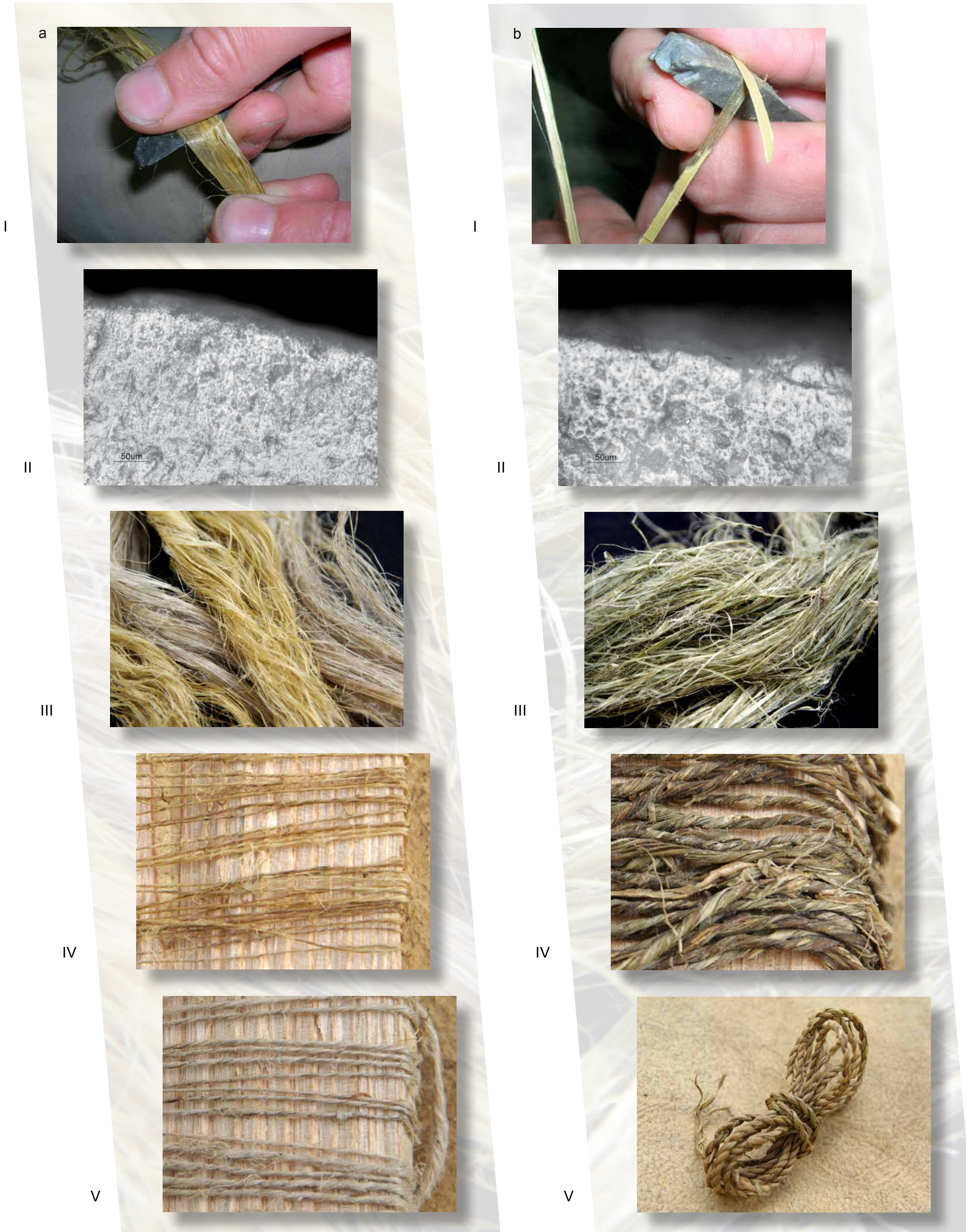
Fig 5.4 Experimentally made objects of plant materials. Clockwise from left to right: sandal of bulrushes (Scirpus), 'knotless' net of lime bark, coiled basket made of rushes (Juncus) with willow bark wrapping, 'knotless' net of nettles (Urtica) and 'knotless' net of willow bark rope.

countered in lake side villages in the Alps and Jura (Pétrequin/Pétrequin 1988) and in Denmark (Bender-Jorgensen 1986). Because the actual artefacts are rarely preserved, however, we often have to rely on indirect evidence, but this is not always sufficiently informative. Palaeobotanical analysis does not help us much because if plant species used in craftwork are demonstrated by pollen analysis, they are usually interpreted as being reflective of the local flora and not as a possible resource for basketry and fibre processing. A new, recent approach towards the reconstruction of baskets and textiles is the indirect knowledge obtained in the shape of impressions of cordage, textiles and baskets on clay figurines dating to the Upper Palaeolithic (Soffer 2004) or on ceramic vessels (Dixon Hutcheson 2008). Some ceramic vessels resemble baskets in shape and decoration; it has been suggested that they are in a way lasting skeuomorphs of perishable containers (Hurcombe 2000a). Although in these instances the impressions are detailed enough to detect the pattern of the basket, it is often difficult to determine the plant species involved. Other indirect evidence for plant-based craft activities comes from plant working tools such as combs, spindles, whorls, net meshes, netting needles and the various attributes associated with looms, especially weights. Again, however, many of these objects are made of bone or wood and they are only preserved under special conditions. Use-wear analysis of bone awls from Dutch wetland sites have shown them to be frequently used for plant working (Van Gijn 2005; Van Gijn 2006a).

Flint tools used in plant processing are more lasting, but can usually not be detected on the basis of shape alone. It is only by means of use-wear analysis that we have a chance to detect them. A range of flint tool types from the Neolithic and Bronze Age, especially unmodified blades and flakes, display traces from contact with plants (fig. 9.1). These results are however not without ambiguity. Tools used in a longitudinal motion and therefore presumably used to collect plants, could have been associated with subsistence tasks, craft or both (Chapter 4). The blades with transversely oriented plant polishes that derive from Late Mesolithic and Early Neolithic wetland sites are another problematical type of tool (fig. 4.4). These blades are interpreted as craft implements but it cannot be entirely excluded that they were used to harvest cereals by means of a stripping technique (Juel Jensen 1994) (Chapter 4). Another problematical tool is the *quartier d'orange*. This tool type may well have been involved in plant-based craft activities, but because this has not been conclusively demonstrated, this tool type is discussed separately below (see paragraph 5.8).

5.3.2 Processing fibres from plants and bast

In our latitudes woven plant-based textiles are predominantly made from flax, hemp, stinging nettle and the bast of willow and lime. Flax was grown already in LBK times (Bakels/Zeiler 2005) and although it was possibly only intended for the production of linseed oil, it is likely that the fibres were used as well. If flax stems are left in a humid place, the stems soon rot, leaving the distinctive fibres to be collected and used without further treatment. In the lake-side settlements of the Alpine and Jura region textile fragments of flax have been found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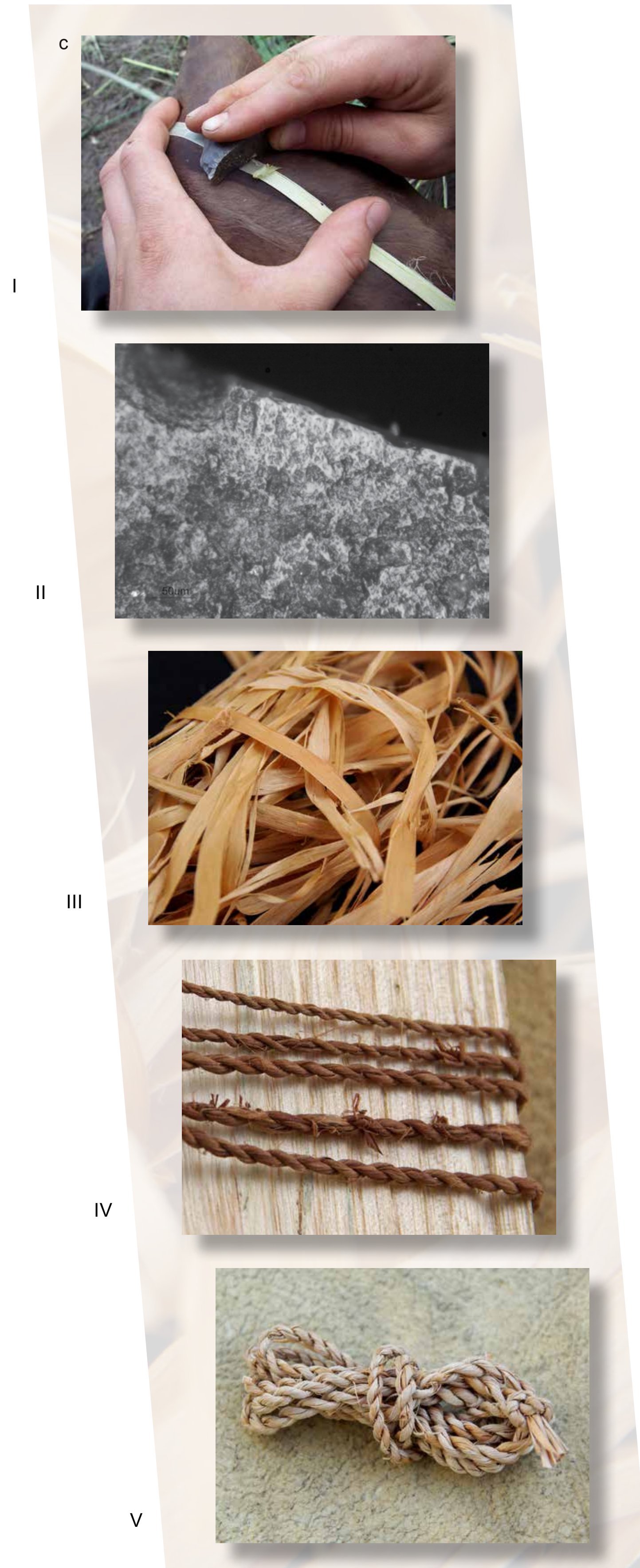


Fig. 5.5 Processing plant fibres of a. flax, b. nettles and c. willow bast. From top to bottom: I. the use of a quartier d'orange for obtaining the fibres; II. the resulting wear traces on the flint tool; III. resulting fibres; IV. spun, untreated flax and nettles, and twined willow; V. spun, boiled flax and twined rope of nettles and willow.

as well as spindle whorls indicating that weaving took place (Martial/Médard 2007; Médard 2003). There the flax seems to have undergone the same series of treatments that we know from historic times: the flax was retted, subsequently the stems were broken and then hackled and combed to obtain clean flax fibres. This was inferred from the presence of flax stem fragments in pit fills (Körber-Grohne 1991). The traditional and historically documented flax processing tools include implements to break the fibres and a comb to remove the last stem fragments (De Wilde 1984; Van Iersel 1985). Neither of these tools seems to have a counterpart in flint.

Our own experiments with obtaining flax fibres showed however, that they can also be released without the traditional retting process (fig. 5.5a).[9] These experiments were carried out in order to shed light on the mysterious 'polish 23' found on the *quartiers d'orange* of the LBK (see paragraph 5.8). After harvesting, the stems were dried and then scraped with a *quartier d'orange* to break the stems and loosen the fibres. This was easy to do, effective, but very time consuming. Also small fragments of woody tissue were still adhering to the fibres. These could be removed by subjecting the fibres to a second scraping: this produced beautiful fibres that could easily be spun and woven. The resulting wear traces duplicated the traces found on one aspect of the *quartiers d'orange* and produced a comparable edge rounding (fig. 5.5a). Unfortunately the smooth, antler-like polish that is always seen on one aspect of the prehistoric *quartiers* was not reproduced exactly, even though the tool had been used for 22 hours (estimated actual contact time c. 11 hours).

Nettles similarly produce beautiful fibres for weaving (fig. 5.5b). The nettle fibres are located at the outside of the stem and can be removed without the aid of a tool: after harvesting, the nettle stems need to be dried for a few days whereupon the stems can be broken and the outer skin with fibres can be peeled off. With a blunt-edged flint tool like a *quartier d'orange*, the yield can be enlarged by pushing the fibres outwards (fig. 5.5b). The flint tool can also be used to give the fibres a secondary scrape in order to remove all hard woody particles.

Lastly, fibres can also be obtained from the bast of notably lime and willow tree. Flint tools are only useful in scraping off the outer bark from the bast, a task for which they are very effective (fig. 5.5c). However, if retting is practiced this processing stage is not necessary because the bast loosens itself in the water as it putrefies, leaving the bast fibres to be collected. Once the fibres are obtained there does not seem to be a role for flint tools in the subsequent stages of spinning and weaving, except for cutting a thread here and there.

5.3.3 Cordage and basketry

Cordage can be made with a variety of materials like bast, nettle fibres, grass stems, twisted twigs or roots. Excellent cordage can be made with the fibres of stinging nettle, which provide for a very strong rope with much tensile strength (fig. 5.5b). By feeding in new fibres this rope can be made as long as needed. It is however not so easy to make a very thick rope with this material because

9 From 2004-2008 a series of experiments dealing with plant-based crafts was carried out at the Lejre Forsøg Center in Denmark (published in internal reports of the centre).

one needs an enormous amount of nettles in order to thicken the rope beyond ca. 3-4 mm. Although nettles grew profusely as undergrowth in the carrs of the Rhine-Meuse delta (C.C. Bakels pers. comm.), good nettle patches probably were a precious and carefully managed resource (A. Batzer, pers. comm.) Rope of nettles is especially suitable to knot (fishing) nets or to make flexible, permeable containers for collecting shell fish by means of a technique called knotless netting (fig. 5.4). Cordage can also be sewn into baskets, a technique that also works with twisted bundles of plants like rushes *(Juncus)* or bulrushes *(Scirpus)*. Experiments have shown that flint tools are of no use, neither in net nor in basket making (Van Gijn 2007). Knotless netting can be done with a bone or wooden spatula, whereas sewing a coiled basket requires an awl or needle, preferably of bone, antler or wood. A flint awl would be inappropriate for this task because it would be too sharp and the denticulation of the retouched tip would damage the fibres. Flint knives can however be used for trimming.

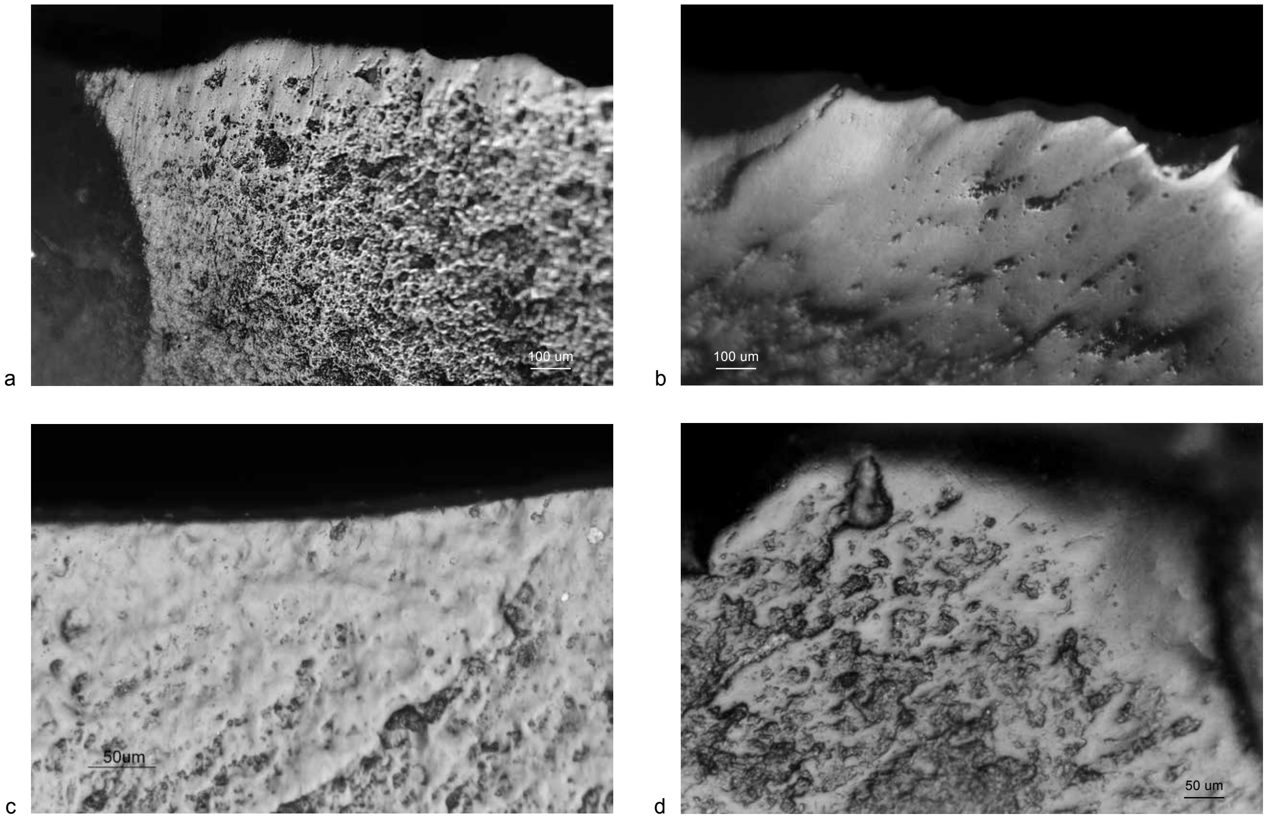
Especially the bast (inner bark) of lime, willow and hazel also provides beautiful fibres with considerable tensile strength, making excellent ropes or cordage (fig. 5.5c). The yield of lime trees is much larger than of nettles and it is likely that the thicker ropes were made of tree bast fibres. The bast was obtained by first taking strips of bark from the trees, after which the inner bast was separated from the outer bark by either soaking in water (the common procedure for lime bark) or by scraping the outer bark off. Obtaining the bark from the trees does not require much in terms of the necessary tools. A cut has to be made on the tree in order to pull off the bark, something easily done by means of an axe. Scraping the outer bark from the inner bast does however require a scraper and a flint tool is very suitable (fig. 5.5c).

5.3.4 Wickerwork

Another general activity in which plant material was used in craft activities is wickerwork, the making of sturdy, largely unbendable objects of plant material. Raw materials for wickerwork include willow and hazel shoots or split roots. Several experiments with splitting willow stems were carried out with the aid of a pointed flint knife. The stems were slit at one end, after which the actual splitting was done by hand. Willow and bramble shoots were also scraped with a flint tool in order to remove the bark and thorns to prepare them for wickerwork or coiled basketry. Flint tools were therefore useful in the preparation of the raw materials. In the actual process of producing wickerwork objects, however, flint tools again do not seem to figure.

5.3.5 The role of flint tools in plant-based craft activities in the Neolithic and Bronze Age

From our experiments it has become clear that flint tools probably did not play a major role in plant-based craft activities. In LBK context we rarely find wear traces from working soft siliceous plants, in stark contrast with the situation in the contemporaneous Late Mesolithic and Early Neolithic sites in the wetlands. It is there that we find the numerous blades with transversely oriented siliceous plant polish that, until proven otherwise, are considered to be craft related items (Chapter 4) (fig. 5.6a, b). For the Rössen and Michelsberg periods we



lack sufficient knowledge but it seems that the situation is akin to that of the LBK: there are virtually no siliceous plant processing tools (Schreurs 1992; Van Betuw 2004).

Fig. 5.6 Variability in plant working traces in the Neolithic wetlands. a. polish from scraping siliceous plants on a blade from Hardinxveld-Polderweg (100x); b. idem from Swifterbant S2 (100x); c. polish from cutting plants on a tool from Schipluiden (200x); d. traces from splitting plants or soft wood on a flake from the site of Hekelingen III (200x).

In the Hazendonk sites many plant working tools, both unequivocal and more ambiguous ones, were encountered. The latter include tools with traces that resemble those from contact with siliceous plants, but that also display the rough texture that is characteristic for hide processing tools. It is not clear which contact-material is responsible for these traces. Another type of ambiguous traces we occasionally find on Hazendonk material is an undulating, very smooth type of gloss that for the time being is believed to have been caused by a siliceous plant (fig. 5.6c). It is remarkable that the transversely oriented plant polishes on blades that were so predominant in the preceding periods, have disappeared almost entirely. Instead, plant cutting implements occur frequently. It seems that the task that caused the transversely oriented traces had either lost its significance amongst the agricultural groups of the Hazendonk-group or was practised in another manner.

In the subsequent Vlaardingen period another shift in plant working technology is visible: pointed flakes, often hardly modified, were used to split medium-hard plant material such as willow shoots (Van Gijn 1990, fig. 60) (fig. 5.6d). It may be that these tools were instrumental in the manufacture of the fish traps, some of which were found in Vlaardingen context (Van Gijn/Bakker 2005). These traps have a rather short use-life, are quite cumbersome to transport and may therefore have been made on the spot. Pomstra has demonstrated that these traps can be made in ca. one day (D. Pomstra pers. com.). In the contemporaneous TRB culture, flint tools with plant working traces (with the exception of harvesting tools) occur in the sites of Slootdorp-Bouwlust and Groningen-Oostersingel but not in large numbers. Plant polishes are found on flint objects from the Bell Beaker period and the Bronze Age, but the samples examined are too small to be reliable indicators of the relative importance of plant-based craft activities.

Our statements are thus limited to such inferences as 'siliceous plant working' or 'plant working general' because the data do not allow the differentiation between different plant species or the specificity of the techniques. So, although use-wear traces on flint tools provide evidence for the actual practice of plant-based craft and the general character of the latter (the motion involved), it does not provide detailed enough evidence about the actual products themselves. Experimentation by various use-wear specialists has shown that the range of wear trace attributes that develops on flint surfaces is relatively limited and does not reflect the variability in the plant sources processed and worked. This may however be partially attributable to the fact that experiments have been of a general kind, rather than task oriented (Chapter 2). Our own recent and on-going experiments with the use of various kinds of flint, bone and antler tools show that if the experiments are carried out with exact replicas of the prehistoric implements, we can actually obtain a strong match between archaeological and experimental traces. Recent experiments carried out at the Lejre Research Centre suggest a greater variability in wear trace attributes from contact with different plant species than was expected. Much can therefore still be gained from continued and detailed experimentation.

The relatively limited amount of information obtained from flint tools about plant-based crafts is especially unfortunate because this activity is considered to be gender related. Ethnographic accounts show that fibre processing and weaving can be considered women's work (Hardy 2007), at least during most of the period addressed in this book. Such jobs are close to home, can be easily interrupted, do not involve danger and can therefore be combined with the supervision of children (Barber 1994). Obviously, the correlation between gender and various tasks is a tricky one that is prone to circular reasoning. However, in the case of fibre processing I would argue that the tediousness of this task and the number of hours required to obtain even small amounts of usable material, suggest that it was largely performed within the confines of the settlement, in a socially amiable context and in combination with other chores such as child minding and cooking.

5.4 Wood working

5.4.1 Introduction

Wood is a versatile and often very accessible raw material largely used for the construction of houses, fences and wells. However, it is also used for the production of a variety of objects, ranging from dug out canoes, spears, bows and arrows to small wooden utensils like spoons and boxes. It was used as a raw material from Palaeolithic times onwards as testified by the wooden spears

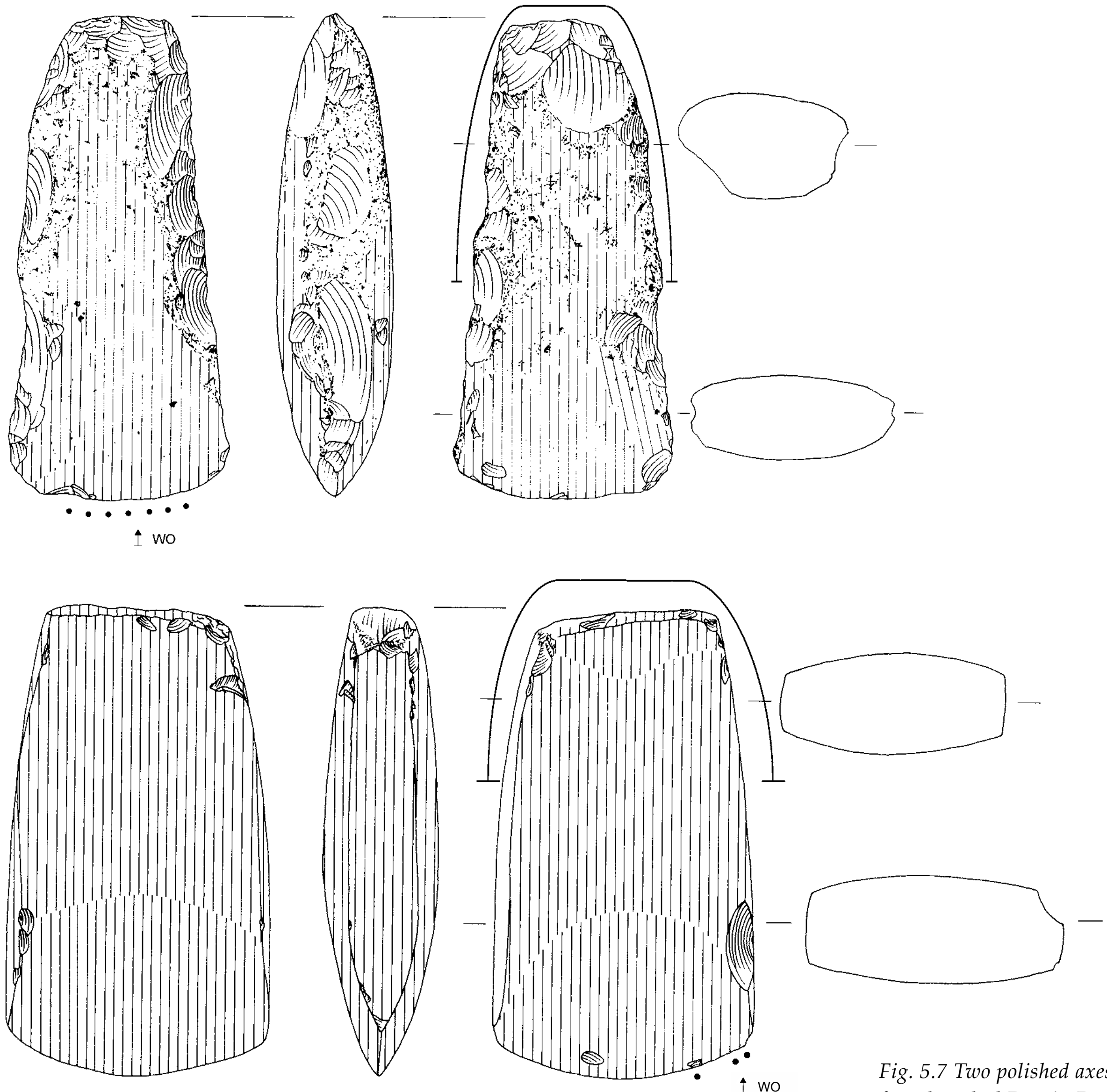


Fig. 5.7 Two polished axes from hunebed D19 in Drenthe, dated to the TRB period (scale 2:3).

from Schöningen.[10]Trees provide an enormous range of raw materials: the trunks served to produce dug-out canoes or were used as house posts, the solid branches provided the basis for the manufacture of all kinds of larger implements, the roots were used for binding material, whereas the bark provided fibres (lime, willow, hazel), was used for tanning hide (lime and oak), or to make boxes (birch). Some woods also produce resin for hafting (pine, birch) (Beyries/Hayden 1993). Wood obviously was also collected for firewood to heat, prepare food and bake pottery. The woods therefore constitute an extremely important

10 In 1996 several flint tools from Schöningen were examined for traces of use and residue, in collaboration with Judith Field. One of the scrapers showed clear traces of wood working. Unfortunately this finding has never been published.

source of raw materials. They may however, also have been imbued with special powers and certain species of trees seem to have been selected for their magical properties.

Different kinds of wood display a great variation in terms of their hardness, strength, toughness and ease of modification. The selection of wood depends on the quality (in terms of durability, flexibility and cleavability) and availability (especially relevant for construction purposes) (Vermeeren/Brinkkemper 2005). Oak has a much longer use-life than willow, but is much harder to work. It is ideal for house construction, whereas willow and red dogwood are selected for the making of fish traps and wickerwork and other objects that are relatively easy and fast to make.

In the course of the years many experiments have been done with ca. 20 species of wood. The resulting wear traces display quite a large variation, from highly characteristic domed, bright spots of polish that would be considered 'classical wood polish', to greasy and rough varieties that would be typified as 'unknown' if seen on a prehistoric tool. This results in a great overlap in the aspects of wood working traces with those from other materials (Van den Dries/Van Gijn 1997). Some of these traces also quite closely resemble certain post-depositional surface modifications. Not all wood working tools will therefore be identified as such in archaeological context.

5.4.2 Wood working traces in the Dutch Neolithic and Bronze Age

Wood working traces are present on tools from all of the periods studied, from Late Mesolithic to the Bronze Age, but it never amounts to high percentages. For the most part it concerns tools used in a longitudinal or transverse motion: borers are quite rare and it may well be that other drilling techniques were used on wood. The number of axes with wood working traces is also quite small, probably due to curation.

In the LBK period flint tools do not seem to have been very significant for wood working as the number of such items is relatively limited, certainly considering the large number of LBK tools that were examined through the years. I would argue that the apparently limited role of flint in wood working in LBK context is 'real' and that most wood working was probably done by means of the large variety (in terms of shape and size) of stone adzes. The larger adzes probably served in the clearance of the forest and the construction of the large houses (Dohrn-Ihmig 1979/1980), whereas the smaller ones were suitable for fashioning small household utensils, tools and weapons. Until now, this proposition cannot be corroborated because unfortunately no systematic use-wear study of LBK adzes has been done.

Moving to the subsequent Rössen culture, the number of wood working tools is comparatively high, certainly considering the fact that only one such site was studied (Van Betuw 2004). This pertains even more to the Middle Neolithic Michelsberg site of Maastricht-Klinkers where a substantial number of wood working tools was encountered (Schreurs 1992). Apparently during these two periods the tasks adzes had carried out in the LBK were carried out by means of flint implements instead.

Turning to the wetlands, it turns out that the Late Mesolithic assemblages of Hardinxveld-Giessendam produced only a small number of flint wood working tools. We also have relatively little information about the Swifterbant[11] culture: from the southern Swifterbant site of Brandwijk only one wood working tool derives. This lack of information changes with the subsequent Hazendonk period. The comprehensive study of the site of Schipluiden shows that working wood seems to have been an important activity at this site. Objects like paddles, axe shafts and some objects of unknown function were finely shaped (Louwe Kooijmans/Kooistra 2006). Moreover, the site was surrounded by a wooden fence. Not surprisingly, quite an extensive range of wood working tools has been found, not only amongst the flint assemblage, but also made from hard stone and bone. A distinction can be made between coarser wood working tasks, involving the felling of trees and the rough shaping of the material, and the fine workmanship that involved the shaping of smaller wooden objects. As a consequence two wood working toolkits could be differentiated: one for the coarse wood work and one for fine (Van Gijn 2006a; Van Gijn/Houkes 2006; Van Gijn *et al.* 2006; Van Gijn/Verbaas 2008). The toolkit for the coarse wood working consisted of hard stone and flint axes, stone wedges and relatively large quartzite flakes for sawing, all of which involved in wood collecting and construction. Some pointed posts display the irregular marks of a damaged cutting edge of a flint or stone axe, but none of the axes found matched the traces on the wood. This is not entirely surprising as broken axes were repaired and rejuvenated, and in a last stage even used as cores for the production of flakes. The tools composing the toolkit for fine wood working include small bone chisels and flint blades. Most of the bone chisels are broken and their small size is probably due to recurrent re-sharpening; they were clearly thrown away because they were at the end of their use-life. The example of the well-studied site of Schipluiden shows the minor role of flint in the wood working toolkits. Flint implements were used for shaving wood, but generally speaking, flint does not seem to have played a very important role in the two different wood working toolkits. The contemporaneous sites of Ypenburg and Wateringen 4, although less intensively studied, display a similar picture.

In the TRB and Vlaardingen period flint continues to be used for wood working. The polished flint axes so common in this period constituted the wood working tool *par excellence*. Unfortunately it is seldom possible to study axes in settlement context because complete axes are a rare occurrence: if still usable they were not likely to be lost or discarded, and if they were broken they were used as cores (as shown by the numerous axe flakes in especially Vlaardingen settlements). However, there are two contexts in which we can systematically study complete axes: burials and special depositions (Chapters 6 and 7). The TRB megalithic graves frequently contain axes that display evidence of a long use-life (fig. 5.7). Although the axes are re-sharpened prior to their deposi-

11 Because of the problematic nature of wood working traces on flint, it was decided not to incorporate the early use-wear analysis of Bienenfeld (1986, 1988) in this study. This means that no information is available on the Swifterbant sites proper.

tion in the grave, polish from contact with wood is frequently still visible in the edge removals. In contrast, no used axes were present in the TRB special depositions (Wentink 2006). From the subsequent Single Grave culture we also have numerous axes from burial context and, again, these axes usually have a long use-life as wood working tool behind them. The same pertains to the axes that ended up in Single Grave depositions. Contrary to those from the TRB period, the axes from the Single Grave depositions often display traces from contact with wood and have also been hafted (Chapter 7). Taking into account the large numbers of polished axe fragments that are found in Hazendonk and Vlaardingen settlement assemblages we must assume that axes were relatively numerous. Following the above argument, it seems not unreasonable to assume that wood working, as carried out by means of flint axes, was a more widespread activity than the exact counts of wood working traces may suggest.

Considering the small number of Beaker and Bronze Age sites studied, the number of instances with wood working is relatively large. This is even more remarkable because by this time metal axes have largely replaced their flint counterparts as wood working tool *par excellence*. Still, we find small often *ad hoc* tools that were involved in wood working tasks like wedging or scraping.

5.4.3 The importance of wood working

It seems safe to conclude that wood working constituted an important activity during all of the Neolithic and Bronze Age. It is however impossible to assess what these flint tools were used for exactly: without the actual wooden artefacts we can never relate the flint tools to specific objects. This is not only due to the fact that the wooden objects themselves have rarely been preserved, it is also due to the limited role of flint objects in wood craft and to the biography of the flint implements. Regarding the first issue, it is clear that the more we study other implements than just flint for traces of wear, the more it becomes clear that flint contributes only to a minor degree to the toolkit of specific craft activities. This seems especially pertinent to wood craft: tools of bone, antler and hard stone seem to have been far more important in chopping and shaping wood than flint items. For example the predominant wood working tools during the Late Mesolithic were made of antler T-axes and bone chisels (Louwe Kooijmans *et al.* 2001a, b). Apart from the polished axe, flint implements seem to have been of relatively minor importance for wood working. This is probably due to the nature of flint tools. Whereas bone chisels have a smooth and regular working edge, which can easily be re-sharpened, flint tools tend to scratch the surface of the wooden object that is being made. Unretouched blades and flakes are more appropriate but they wear out relatively fast, certainly on hard wood and then need re-sharpening, resulting in an irregular toothed edge.

Notwithstanding, the range of flint tool types employed on wood is extensive: axes, pointed blades, borers, scrapers, combination tools, blades, flakes and waste material. Generally speaking there is only one type of tool, the axe, which seems to be exclusively associated with wood working: to chop wood for all kinds of purposes. We may have to seek the explanation in the fact that making wooden objects, certainly smaller utensils, most likely was performed in the context of the household. It was carried out when one had time on ones hand.

Fig. 5.8 Cut marks from flint tools on bone and antler production waste and beads: a. the distal end of a metapodium from the site of Schipluiden (scale 1:1); b. cut marks on two bone beads from Schipluiden (scale 1:1); c. cut marks on a base of a red deer antler from Hardinxveld-Polderweg (scale 1:2); d. an example of the groove- and splinter technique from Schipluiden (scale 1:2).

Because of the minor contribution of flint tools in shaping wooden objects, people may have selected a tool that happened to be close by, instead of producing one specifically for it. However, there are also special wooden objects that are sometimes highly stylized and even decorated like the paddles of Tybrind Vig (Andersen 1985). In ethnographic context the production of such objects as paddles, bows, or wooden statues is surrounded by rituals and secrecy, taking place far into the woods (Hampton 1999). It may thus be that the lack of formal fine wood working tools can be explained from a taphonomical point of view: they may have been discarded off-site more often than for example hide working implements.

5.5 Bone and antler tool manufacturing

5.5.1 Introduction

Bone and antler artefacts are only rarely preserved. Wherever they do, however, it is evident that bone and antler constituted extremely important materials to make objects of. Bone can almost be considered the ‘plastic’ of the past: it is hard and durable, but it is at the same time also very malleable and can be transformed into a multitude of objects. Antler is softer, more elastic, has very good shock absorbing properties and breaks less easily than bone. Horn may also have been used regularly for the making of objects but because of its softness it is not very appropriate for making tools and instruments: in Neolithic context we can expect it to have been used for drinking vessels and maybe as musical instruments. It is hardly ever preserved. Boar tusks and beaver incisors have been used as tools and were clearly modified, most likely by means of flint (Maigrot 2001). However, no unequivocal traces from these materials have been found on the flint implements studied.

5.5.2 Bone tool production techniques

Bone objects that were retrieved from wetland contexts in the Netherlands show two basic techniques of artefact production: first the very formalized metapodium technique, secondly the more *ad hoc* production of implements from waste material (waste either from butchering or from the formal metapodium production). The metapodium production has been described extensively elsewhere (Louwe Kooijmans *et al.* 2001a, b; Maarleveld 1985; Van den Broeke 1983; Van Gijn 2006a) so a short summary will suffice here. The proximal or distal end of metapodia from deer, red deer, or sheep/goat is sawn off (fig. 5.8a) and the natural depression in the bone is deepened in order to split the bone lengthwise into two halves. These two halves form the blanks from which awls and adzes can be produced. Another production line with metapodia, especially relevant for the larger ones such as those of aurochs and cattle, is to cut the bone halfway at an angle. This creates two halves each with an already prepared cutting edge. This results in two blanks for shaft-hole adzes. The *ad hoc* production of bone tools is, as the term already indicates, not dictated by a traditional technique but rather depends on what happens to be available amongst the waste material. Pieces of bone with an appropriate edge for the task in mind are selected and modified slightly.

The range of bone tools in the wetlands is quite diverse: awls, large needles, ornaments, small adzes, large adzes, toothed scrapers and shaft-hole adzes. In the past years several of these assemblages have been studied for traces of wear and the range of tasks carried out with these tools show them to be an integral part of the technological system (Van Gijn 2006a, 2008c; Van Gijn/Verbaas 2008). There are also various production marks visible on the tools, indicating the frequent use of flint implements for incising and sawing the bone. These marks are usually situated on the distal fragments of the metapodia (fig. 5.8a). Cut marks of flint are normally absent on the final products because of subsequent grinding, polishing and re-sharpening of the working edges, a few exceptions aside (fig. 5.8b).

5.5.3 Antler tool production techniques

Antler forms the basis for a range of implements, like T-axes, denticulated scrapers, sleeves, hammers, punches, awls and hafts. The most common production technique is the segmentation of the antlers, almost always from red deer (Louwe Kooijmans *et al.* 2001a, b; Van Gijn 2005, 2006a). The antler has a rather resistant outer surface and a soft and porous inner part. It is the outer part that is cut through until the soft porous inner part is reached, whereupon the tine or the main stem can be broken off (fig. 5.8c). Experiments with this segmenting technique show that flint is very effective to cut through the outer layer, producing traces very similar to those seen on the archaeological production waste. However, other ways of segmentation have been proposed: for instance a rope can be used in combination with sand and water,[12] or a tranchet axe can be employed to hack through the outer layer. After segmentation the various blanks can be further modified, but traces from this shaping stage are usually absent on the implements: they are ground away or sometimes also worn away by use. Some of the parts of the antler, notably the tines, can be used without any further modification, for instance by flint knappers as pressure flaker or as a punch for indirect percussion. There is also considerable evidence for the use of waste material as tool (Louwe Kooijmans *et al.* 2001a, b).

In addition to the segmentation technique we know from the Hamburg culture and from the Early and Middle Mesolithic the so-called groove-and-splinter technique: a pointed flint tool (like a burin) is employed to carve two long insertions in the main stem of the red deer antler, parallel to each other. These insertions are applied until the soft, spongeous part of the antler is reached. In this way it is possible to obtain long splinters of the resilient outer part of the antler, splinters that can subsequently be turned into items as barbed points, harpoons, pins or awls. Interestingly enough, we have no finds demonstrating the use of this technique dating to the Late Mesolithic and Early Neolithic in the Dutch wetlands. However, evidence for this technique re-appeared in the find material from the Middle Neolithic site of Schipluiden (Van Gijn 2006a) (fig. 5.8d). Again, experiments showed the role of flint tools in the production process: there does not seem to be an alternative to a pointed flint tool for making and deepening the long grooves. In fact, the manufacturing marks on the three pieces of waste from Schipluiden all indicate cut marks that can only have resulted from the use of a flint tool.

12 Experiments by the author and by Ans Nieuwenburg-Bron have shown that cutting antler by means of a thin leather band or other kind of thread is rather difficult: the sand added to speed up the process wears down the rope faster than the antler.

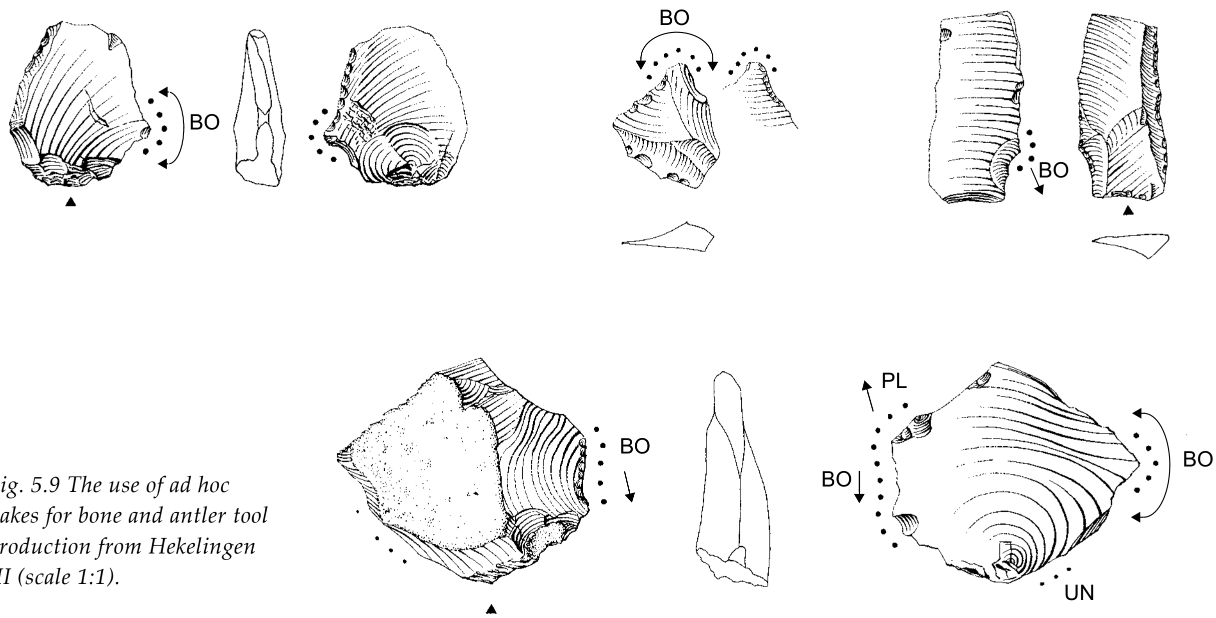


Fig. 5.9 The use of ad hoc flakes for bone and antler tool production from Hekelingen III (scale 1:1).

5.5.4 Bone and antler working traces on archaeological flint tools through time

Bone and antler tools frequently display cut marks indicating that flint tools played a role in their production process (fig. 5.8). Strangely enough however, evidence for traces of wear from contact with bone and antler on flint tools is relatively rare, even in most wetland assemblages. From the site of Hardinxveld-Polderweg phase 1 only five tools displayed such traces. One of these, a rectangular shaped block of unretouched flint with a number of 90 degree angles, had a total of seven used zones. Apparently, once a suitable flint tool was found, it was used very intensively. It seems likely that bone and antler working tools were not included in the relatively small sample, especially because the emphasis of the selection lay on retouched implements. During the LBK period flint tools played a minor role in bone and antler tool manufacturing. This is seen to be a reflection of the real situation considering the large number of implements studied from this period and the generally very good preservation. It is unlikely that bone and antler working tools have been systematically missed. Sites from the Swifterbant culture have produced a higher percentage of bone and antler working tools (Bienenfeld 1986, 1988). Very surprising is the extremely low number of such tools in Hazendonk context, even though we have considerable evidence for bone and antler tool production with flint tools from Schipluiden. The reason for this is not altogether clear but may be similar to the one proposed above for Hardinxveld (a small sample focused on retouched tools). This is in stark contrast with the high number of bone working tools in Vlaardingen context. I would contend that this difference in numbers does not reflect a difference in the importance of flint tools for bone and antler tool production and assume that this is the result of our sampling strategies. Bone and antler working traces are also seen on Bronze Age flint tools, indicating the continued importance of flint implements for this activity.

5.5.5 Conclusion

Flint tools seem to display bone and antler working traces too rarely to account for the substantial number of bone and antler tools found in wetland contexts. Why are they so rare here? The blocky flint tool with seven used zones from Hardinxveld-Polderweg (Van Gijn *et al.* 2001a, fig. 6.26a) indicates that we may be selecting the wrong flint artefacts: because only small samples are taken from the unretouched material, the chances of such irregularly shaped flint implements to be included in the sample for use-wear research are very slim. The absence of bone and antler working tools may therefore be very much a result of our sampling. This is supported to some extent by the findings of the analysis of the material from the Late Neolithic site of Hekelingen III also situated in the wetlands. There a much larger sample of unretouched tools was examined and bone and antler working traces were encountered frequently. However, these traces were for the most part found on small unretouched flakes with a sturdy point to carve with (Van Gijn 1990) (fig. 5.9). This suggests that much of the bone and antler tool production may have been carried out with unretouched flint implements, implements which are less likely to end up in the rather small samples that nowadays make up the pilot studies of commercially financed excavation projects. So, even though use-wear traces from bone and antler working are relatively easy to distinguish, fast to develop and not likely to be so easily destroyed by post-depositional surface modifications, we still are not likely to find them. The solution would be to examine a much larger sample from the unretouched material in order to search for past selection criteria: what kind of morphological attributes of flint implements were deemed suitable for making bone and antler objects? For the Late Neolithic Hekelingen III site this already became quite clear, a sturdy tip, but this criterion did not help us detecting bone and antler working tools in the earlier assemblages. The people during the Late Mesolithic and Early and Middle Neolithic must have selected tools with different morphological characteristics. The production of bone and antler objects is therefore still difficult to demonstrate: the objects themselves are rarely preserved and the indirect evidence in the form of use-wear traces on flint tools still largely eludes us.

5.6 Ornament making

5.6.1 The significance of ornaments

Ornaments come in a wide variety of shapes and kinds: beads and pendants are made of teeth, bone, shell, flat pebbles, jet and amber and in later times also of metal, faience and glass. They are attractive finds that trigger our imagination because we associate them with individual human beings: they are personal ornaments that were valued by those who wore them. Ornaments are however not merely decorative objects, they are also invested with meaning and are related to personhood. They may play a role in various rites of passage. For example, they can be produced for a newly born or initiated child, be given at a name giving ceremony, or placed in the grave along with the dead person's body. Ornaments,

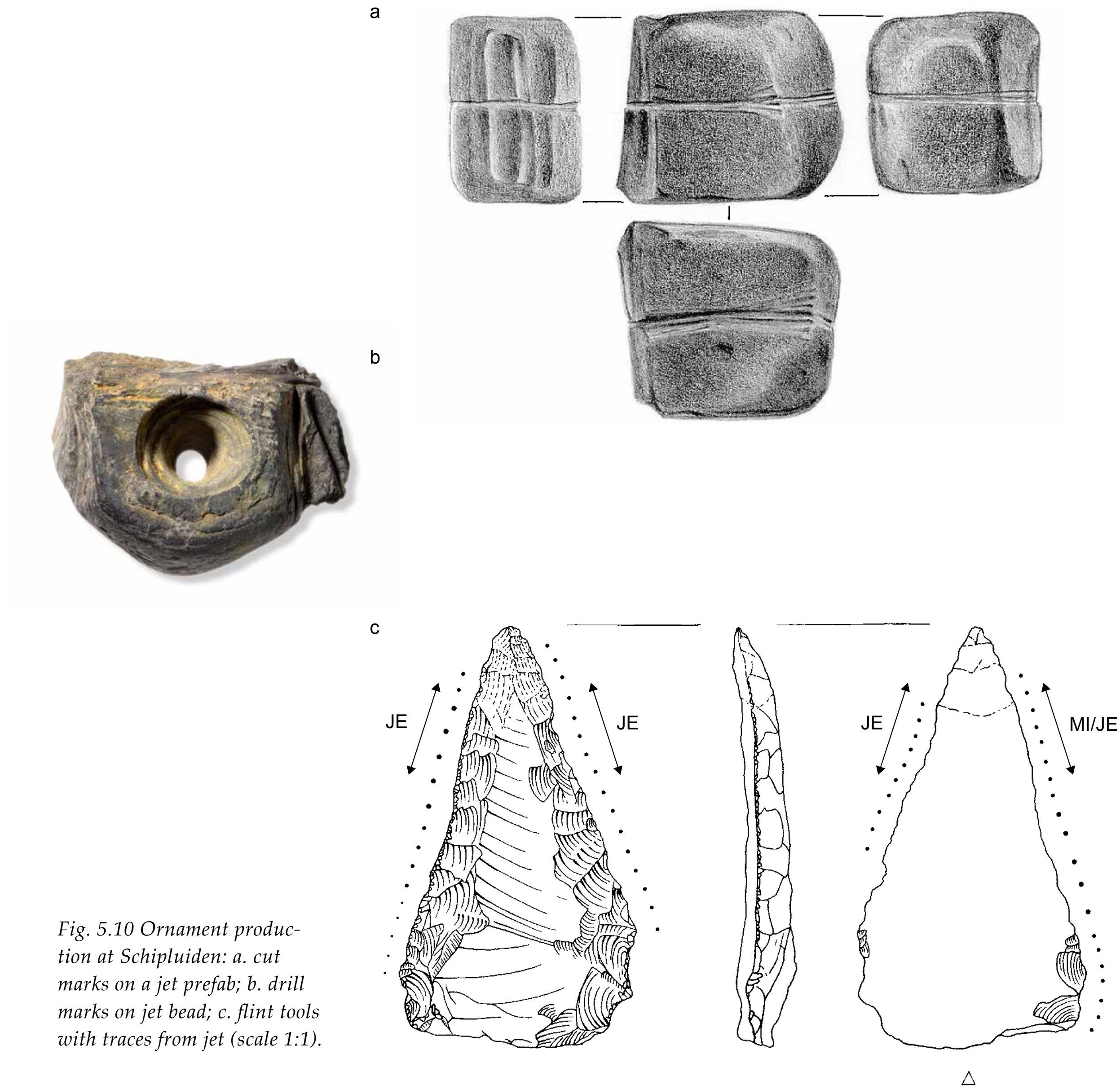


Fig. 5.10 Ornament production at Schipluiden: a. cut marks on a jet prefab; b. drill marks on jet bead; c. flint tools with traces from jet (scale 1:1).

as part of a new costume or set of clothing, signify the role the person has in society. They are therefore very much part and parcel of the construction and mediation of identity.

Because of their rarity, ornaments in archaeological context are often seen as a sign of prestige, telling us something about the status of the bearer or owner. Many of the ornaments are made of special materials: amber and jet for example are electrostatic and even today are believed to have healing powers. Ornaments of teeth often concern the teeth of animals that have special connotations in the cosmology of a society, akin to the totems of the Northwest Coast Indians. Hence they serve as talismans, protecting their bearer against ill fortune or evil spirits. This significance is not so much related to their rarity, often quite the contrary, but to their significance as a subsistence animal (red deer), or because of the powers that are ascribed to them (bears). Sometimes ornaments are heirlooms, embodying memories of previous generations (Haveman/Sheridan 2006; Sheridan/Davis 2002). The examples are numerous but clearly ornaments have a story to tell, not in the least because they are often connected with the gender and age of the people they belong to.

On the production side ornament making as a craft may be significant because it potentially embodies social information. Small scale ornament production is frequently said to be a woman's task (Sciama 1998). However, the Kula objects were made by men. When beads are produced as commodities it is usually done by men like is the case with the cornelian bead factories in India (Roux/Blasco 2000). At Schipluiden, where we have evidence for the complete production sequence of the jet ornaments, there are occasional mistakes made by the prehistoric ornament makers. This was interpreted as evidence for the possibility that children may have been involved in the manufacture (Van Gijn 2006b).

5.6.2 The role of flint in ornament making

Flint tools have conceivably been quite important in the production of these ornaments, at least for the ornaments made of softer materials like jet and amber, bone, teeth and shell. Flint is considerably harder than these materials. Flint knives could have cut the basic shape of the beads or pendants and perforations could have been made by means of flint drills. Although not so many ornaments have been studied in great detail for the presence of manufacturing marks, some indeed bear evidence for the use of flint implements (fig. 5.10a, b). This is especially evident at the Hazendonk site of Schipluiden where (waste) products from the entire production sequence of jet beads were encountered (Van Gijn 2006b). Several flint tools were interpreted as having been involved in this production process. The polish on these tools resembles the very bright polish, with a flat topography that was experimentally obtained by cutting and drilling jet. One flint awl with a long and sharp tip showed traces from contact with mineral substances and it is very plausible that this implement was used for drilling the perforations in the amber beads. These display much finer perforations than the jet ornaments. We thus have evidence for the use of flint tools in two stages of ornament production: to cut the rough shape of the bead from a piece of raw material (jet in our case) and for drilling the perforations. The final shaping of the ornaments of amber and jet was probably achieved by means of a polishing stone. Experiments have shown the traces from grinding jet to be very distinctive but none of the examined polishing stones display this kind of wear. Additionally, Schipluiden produced several tools with traces from contact with unspecified mineral substances, most notably borers but also tools used for cutting and scraping. It is likely that these implements were also largely involved in ornament making.

Ornaments were also found in the cemetery of the contemporaneous site of Ypenburg (Koot 2005; Koot/Van der Have 2001; Koot *et al.* 2008). The beads and pendants were almost exclusively associated with women and small children (Van Gijn 2008c). Again several flint implements displayed traces from mineral substances and in some cases this could be specified to jet. This indicates that ornaments were produced locally. In fact, the spatial analysis suggests the presence of an activity area near one of the houses where a considerable number of flint tools with traces from contact with mineral substances were located (Van Gijn 2008c).

Traces from ornament making were found less on material from other Neolithic and Bronze Age assemblages. It should be noted that partially this may be a result of our lack of experience with these traces. For example, the LBK site of Beek-Molensteeg was studied in the late 1980s (Van Gijn 1990) and no mineral working tools were reported. However, a small number of such implements were found at the recently studied LBK site of Geleen-Janskamperveld, but whether these are related to producing ornaments is not clear (Verbaas/Van Gijn 2007b).

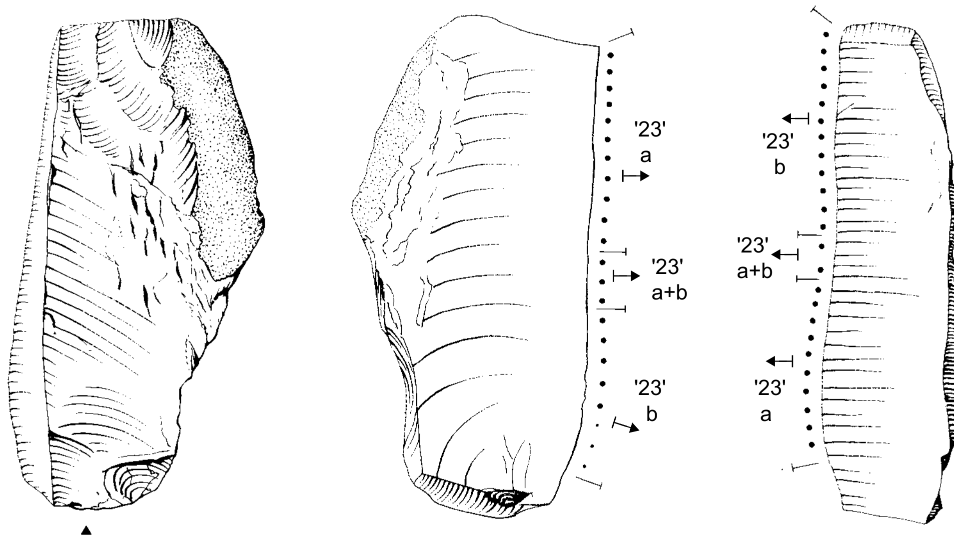
Ornament making also seems to have been an important craft activity during TRB times, as inferred from the number of flint implements with mineral working traces. Their presence in the TRB settlement sites of Oostersingel and Slootdorp-Bouwlust shows that ornaments were most likely produced locally. Similar to the Hazendonk period, most TRB beads derive from burial context. They are predominantly made of amber and to a lesser extent of jet (Brindley 1986a). Vlaardingen sites have produced few mineral working flint tools but again this may be due to the fact that these sites were analysed a long time ago when such traces were not recognized (Van Gijn 1990). Tools with traces from contact with mineral substances are consistently present in all of the Late Neolithic and Bronze Age sites, albeit never in great numbers.

5.7 Making and maintaining stone tools by means of flint

For most people it is easy to imagine that making beautiful stone vessels of alabaster or other soft stones can be considered a craft. Delicately worked alabaster objects have been found in several Neolithic sites in the Near East. In Neolithic Cyprus flint was used for making stone objects (Astruc 2001), whereas use-wear analysis has shown that flint played a role in the manufacturing of schist bracelets in the early Neolithic Blicqui sites of Belgium (Caspar/Burnez-Lanotte 1996).

No such telling examples are known from the Netherlands. However, LBK assemblages show a relatively large number of exhausted blade cores, with battering on their distal end, indicating that they were used as hammer stones (fig. 2.5a). They were probably used to create and rejuvenate the surfaces of querns. The querns, displaying an elongated, saddle-like shape, were made on blocks of fine sandstone and shaped by means of percussion: their sides display flake scars. In the course of use their contact surface gradually became concave because the greatest pressure during milling was exerted in the middle part of the quern. As a consequence, the surface became very smooth during use, making the quern less effective as a milling device. It is this part that thus needed roughening by pounding. Experiments have shown that exhausted flint cores are very effective for this. The surfaces of the experimentally rejuvenated stones show similar impact traces as the prehistoric querns (Verbaas/Van Gijn 2007a)

Other flint tools that may have been involved in the manufacturing of stone tools are the picks from the TRB. They are sometimes believed to have served as *retouchoirs* and indeed some display impact scars on their tips (Chapter 7).



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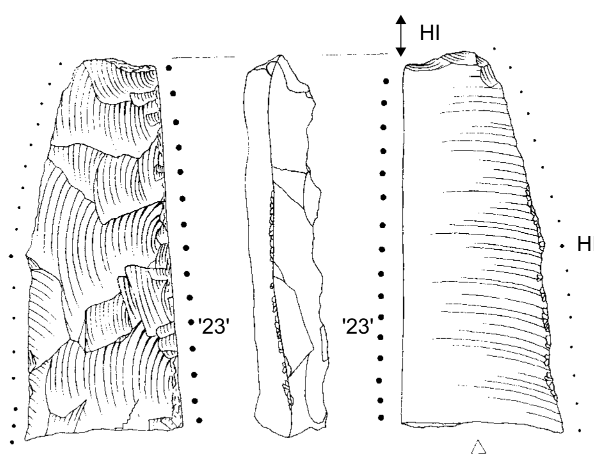

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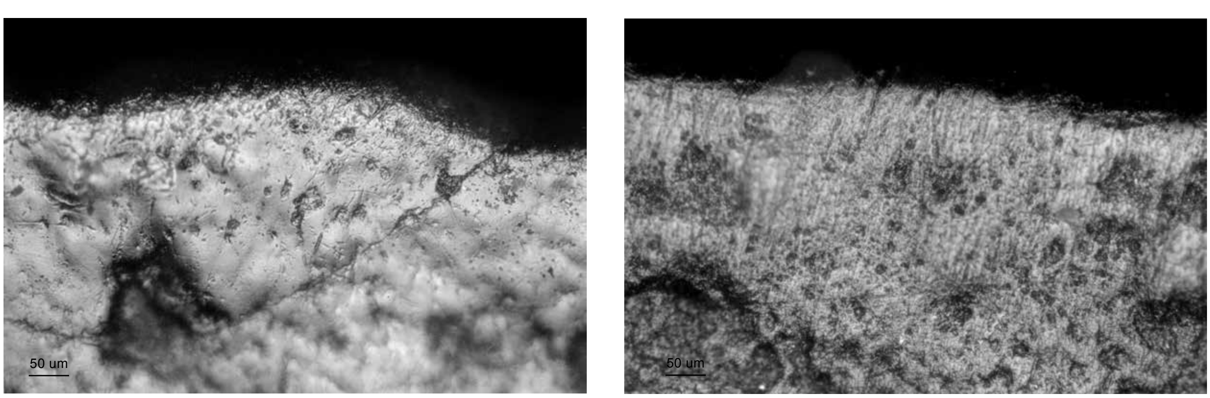

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5.8 Well-defined but mysterious activities

Occasionally the attributes of wear displayed by prehistoric implements do not resemble any of our experimentally obtained wear traces: there is simply no match. Although we know from experiments that some contact materials, notably wood, can cause attributes of use-wear that vary considerably, some of these mysterious traces are so different that they clearly fall outside of the known range of variability of the contact materials investigated so far. They are very distinct and have been given a special type designation like 'polish 23' or 'polish 10' (Schreurs 1992; Van Gijn 1990). We encounter this problem of mysterious traces for the first time in the Neolithic. It is unlikely that these traces are caused by contact materials that have so far eluded our experimental efforts: hundreds of researchers have done thousands of experiments and although much of this experimentation was directed at the same, frequently basic, tasks, it is unlikely that we have missed entire contact materials. I would suggest that instead we have to search the explanation in the emergence of more complex processing techniques in the Neolithic, perhaps involving more than one contact material (analogous to processing hides with additives). Most likely we are underestimating the complexity of Neolithic technology. In fact, we are usually hardly aware of the character of the components that compose day-to-day tools. Ingold mentions a fascinating example of the strange combination of ingredients, including oak galls, copperas and gum arabic, that make up the writing ink in our fountain pens (Ingold 2007, pp 8-9).

A first enigmatic type of wear trace is 'polish 23' (fig. 5.11). It was first seen on *quartiers d'orange* or *debitage en frites* amongst the LBK material from Bavaria by Keeley. He proposed that the wear resulted from de-hairing wet hide with the addition of mud particles (Keeley 1977). In subsequent years this particular trace consistently turned up in every use-wear analysis of LBK times (Cahen *et al.* 1986; Van Gijn 1990). It is characterized by the fact that the two aspects constituting the working edge display a different polish: on one side we observe a rough, matt and heavily striated variety, on the other a smoother, brighter and more linked polish in which hardly any directionality is visible. The two polish versions merge on the very edge. The tool was unmistakably used in a transverse motion. This type of polish is confined to unretouched, steep angled edges like those on *quartiers d'orange.* These implements have a triangular or rectangular cross-section, and one longitudinal edge with a 70-90 degree angle, obtained by the intersection of two previous removals. The objective of the knappers clearly was to obtain a long and sturdy working edge with an obtuse angle, which was not further retouched or modified. Despite extensive experimentation it is still not clear which contact material or consistent combination of materials is responsible for this type of wear (Keeley 1977; Sliva/Keeley 1994; Van Gijn 1990). The closest match is obtained by scraping flax and nettle stems in order

Fig. 5.11 Quartiers d'orange displaying 'polish 23'. a. quartier from Beek-Molensteeg; b. quartier from Geleen-Janskamperveld (scale 1:1); c. the two different aspects of 'polish 23', with the smooth 'antler-like' variety of polish and the rough 'hide-like' aspect (200x).

to obtain fibres (fig. 5.4). Scraping the soft fibres from the woody core (the *xylem*) is possibly responsible for the fact that the two aspects of the flax and nettle scraping tools display a different wear pattern.

Another mysterious polish is 'polish 10'. Schreurs, who first distinguished this type of polish on material from the Michelsberg site Maastricht-Klinkers, describes this type of polish as follows: *"…a bright, cratered, rough polish which is distributed in a band…..At the more elevated parts of the surface the polish has a more flat, smooth and almost fluid appearance*" (Schreurs 1992, p. 147). The polish generally displays many striations, the edge is severely rounded and both longitudinal and transverse motions are evident. Curious is the considerable internal variability. As Schreurs also emphasizes, the character of the wear traces is both similar to those obtained from contact with plants, and to those from hide. This variability may even apply to one and the same edge, where in one spot the polish is more 'hide-like' and in another more 'plant-like'.[13]

'Polish 10' also occurs in LBK and Rössen context and has also been located on imported flint material found in several coastal sites, notably those of the Hazendonk-group (Raemaekers *et al.* 1997; Van Gijn *et al.* 2006). 'Polish 10' is, however, not found in northern Swifterbant, Vlaardingen, TRB, and later contexts. It is still not clear what activity is behind this type of wear trace. Schreurs has suggested that maybe these tools were used to harvest and process cereals, as sickle blades are absent during the Michelsberg period (Schreurs 1992). Yet, despite many harvesting experiments by different researchers, matching traces have never been found. For lack of a better explanation, I tend to subsume 'polish 10' for the time being under craft activities, but it may also be associated with agricultural activities. Hopefully experiments will solve this functional riddle, but as for now we have no idea in which direction we have to seek the solution.

5.9 Craft traditions through time

In the preceding pages a range of craft activities has been discussed in which flint tools played a role. Most likely, flint figured in more tasks than the ones described above. As so few artefacts from each site could be subjected to use-wear analysis, the likelihood that we encounter rare traces from incidental craft activities is slim. For example, flint may have been used to incise decoration in pottery vessels, but this has never been demonstrated archaeologically. In all likelihood ornaments and objects of shell were carved by means of flint and in fact one tool from the Vlaardingen site of Hekelingen III was interpreted as a shell drilling implement (Van Gijn 1990). Generally speaking, we still have a very limited knowledge of craft activities and the role flint tools played in the manufacture of various objects.

Variation in craft activities between different areas and through time will only become apparent if complete toolkits are taken into account. Obviously this will not always be possible if only because much of those past toolkits in-

13 In some recent publications the author made use of the designation Hi/Si Pl to refer to tools with wear traces that bear a resemblance to the traces from both materials. Again, the polish is variable, even along one and the same edge. Possibly it concerns the same type of trace as 'polish 10' but experiments still have to be continued.

cluded tools made of perishable material. Nevertheless, it is apparent already, solely on the basis of the differences in flint tool use, that different technological choices are made across time and space (Van Gijn 1998). These choices have a long time-depth and we can refer to them as technological traditions. Roughly we can distinguish an upland tradition in the south-east during much of the Early and Middle Neolithic, encompassing the LBK, Rössen and Michelsberg culture. The wetland tradition in the western and northern areas includes the Late Mesolithic sites of Hardinxveld, the Swifterbant culture, the Hazendonk-group and the Vlaardingen-group. The TRB, Beaker and Bronze Age flint assemblages do not really fit into one of these traditions and seem to reflect a combination of local traditions and practices acquired through long-distance contacts.

In the Early Neolithic in the south-eastern parts of the Netherlands, a number of craft activities figure prominently in the LBK, such as hide processing and the activity responsible for 'polish 23'. Evidence for plant processing and for the manufacturing of bone and antler objects is absent, at least in the flint assemblage. The absence of the latter two kinds of traces seems 'real', at least for the LBK, as both types of wear are easily distinguishable and by now a large number of LBK flint has been examined for traces of use. The absence of plant working traces is especially noteworthy as plenty of suitable plant species abound in the river valleys in the loess zone. The infamous 'polish 23' is present on *quartiers d'orange* or *debitage en frites* and may well be linked to a plant-based craft, most likely fibre processing. The upland tradition is also characterized by a considerable number of wood working implements, although this activity was mainly carried out by means of stone adzes of varying sizes and shapes in the LBK period. These wood working tools reflect the land clearing activities for agriculture and the importance of wood in house construction. This pattern of activities continues into the Rössen and Michelsberg periods and can be referred to as the upland tradition.

The upland tradition is quite different from the wetland tradition which characterizes the assemblages in the coastal lowlands, dating from Late Mesolithic to the Vlaardingen period. There evidence for plant processing and bone and antler tool manufacture is more prominent. The plant processing traces on the Late Mesolithic and Early Neolithic blades may be the result of preparing rushes and other plant materials for basketry, plaiting or fibre production. Especially in the Vlaardingen period we find considerable number of bone and antler working tools. Tools with hide working traces are present in the wetlands, but their internal variability is minimal and we rarely find the heavily worn scrapers that are so characteristic for the upland tradition. We also do not find many tools involved in the conversion of hides to other products like pieces of clothing and so forth. This can be seen as an indication that the hide working craft is much less developed and sophisticated than in the upland tradition. Last, the two mysterious polish types '10' and '23' are largely absent in the coastal assemblages except on some imported tools (Chapter 6).

Throughout the Late Mesolithic and the Neolithic the wetland tradition in the western part of the Netherlands (the one from which we have most information) displays a distinct southern influence. The upland and the wetland traditions are thus not totally separate. In the Late Mesolithic we already find import flints from the south and this practice continues in the subsequent Swifterbant period. For the northern areas we have insufficient knowledge, but it is in any case clear that Rössener *Breitkeile* made their way to the north. However, during the Swifterbant times the transversely oriented plant polishes characteristic for the wetland tradition are still visible on many blades and bone and antler working tools are present. It is not until the period of the Hazendonk-group that we really see a significant influx of southern elements, including evidence for upland craft traditions. During this time the characteristic blades with transverse polish disappear. However, the hide working tools still are very basic, mostly geared towards cleaning the hides, and not reflective of a sophisticated hide processing tradition such as is visible in the uplands. In the Vlaardingen period an emphasis on plant working implements is apparent, this time of a different character: it concerns simple pointed flakes that appeared to have been used to split plant material like willows for the construction of fish traps. Also bone and antler working tools figure more prominently during this period.

We know too little of the settlements of the Late Neolithic and Bronze Age to say much about their technological tradition. It seems that the TRB is to some extent a culture with very strong local Mesolithic roots (Ten Anscher 2000), along with a substantial influence from northern peoples in southern Scandinavia and Schleswig Holstein visible in, among many other things, the import of axes. Craft activities that were demonstrated include wood working and ornament making. Too few Beaker settlement assemblages have been studied to conclude much about the character of their technological tradition. Bone and antler tool manufacturing seems to have played only a minor role and plant processing tools are virtually absent. Instead, we see an increase in the number of hide processing and mineral working tools. This trend continues into the Bronze Age: a predominance of intensively used hide working tools very akin to what we saw in the LBK assemblages, some mineral working tools and an absence of characteristic wetland activities like plant processing and bone and antler tool manufacturing. Flint tools thus continued to be used for quite a variety of craft activities far into the Bronze Age.

Chapter 6

Flint and identity

6.1 Introduction

6.1.1 Identity and personhood

The concept of identity encompasses a myriad of different aspects of society. It may refer to such diverse categories as ethnicity, class, caste, gender and age (Insoll 2007). Individuals operate at different levels of identity at the same time, constantly negotiating their relationship with other individuals and groups within their social world. The concept of identity is also implicit in the very concept of archaeological culture, as prevailing in the culture historical approach:

> *"bounded, homogeneous cultural entities correlate with particular peoples, ethnic groups, tribes and/or races. This assumption was based on a normative conception of culture"* (Jones 1997, p. 24).

The material representations of a specific group of people are therefore believed to reflect a common identity that bonds a group of individuals and differentiates them from neighbouring groups.

The concept of identity has been frequently equated with that of ethnicity. Studies that attempt to identify ethnicity date back to the work of Montelius, but figured more prominently in processual studies of, for example, stylistic differences in flint objects (Gendel 1984; Vang Petersen 1984) or Mesolithic ornaments (Newell *et al.* 1990). The problem with these studies is that they are prone to circular reasoning and are therefore teleological. We assume that ethnicity is expressed in materiality, and looking for differences in material culture from this perspective departs from the idea that ethnic identities are discrete and identifiable. However, the expression of ethnicity is not always explicit and depends largely on circumstances. As Barth expressed it:

> *"ethnic identification must depend on ascription and self-ascription: only in so far as individuals embrace it, are constrained by it, act on it, and experience it, will ethnicity make organizational difference"* (Barth 1994).

Ethnicity is thus very difficult to come to grips with: is it determined by race, language, social organization or customs (self-ascribed common tradition)? The equation of ethnicity with such categories of social organisations as bands and tribes is also debatable and almost impossible to translate into archaeologically observable entities, at least where it concerns the Neolithic. I will therefore not look for ethnicity or for particular social units in the anthropological sense. Instead, reference will be made to the more neutral terms 'social group' and ‘collective identity’. A social group is bound by a sense of collective identity, in which memories, myths and materiality are instrumental in structuring and continuing the shared sense of belonging. This social group may be a lineage or a corporate group in the anthropological sense of these terms, but I will refrain from such detailed taxonomic designations.

I assume that flint assemblages from settlements reflect long-term traditions of tool making and use that were guided by collective traditions that people were largely unaware of. This identity may manifest itself in stylistic aspects of the tools that lie at the basis of our archaeological classifications and may result in the definition of specific index fossils that typify certain periods (for example the typology of arrowheads). I also assume that these ostentatious stylistic markers must be related to a need to differentiate between ‘us’ and ‘them’, to mark the larger social group people commonly associate with. Clearly, this is not always a conscious process on the part of the actors but it is, nevertheless, obvious to outside observers. However, traditions of tool use can also operate at a much more invisible level: that of actual use. Here the analysis of wear traces plays a crucial role in revealing these hidden patterns in tool use across time and space. Such choices are not intended to be messaging devices because they take place within the confines of the household and are not visible to outsiders. It is also likely that such choices were largely unconscious and formed part of the *habitus,* the habitual surroundings of a human being (Bourdieu 1977).

Burial ritual is also closely related to issues of identity and actual practices vary greatly across time and space (Huntington/Metcalf 1979; Parker Pearson 2001). Clearly, if preserved, the remains of the body itself provide a direct clue about gender and age and sometimes even of his or her origin and subsistence habits. Unfortunately such is often not the case and we have to rely on burial gifts to provide us with information about the identity of the dead. Burial gifts may include the personal belongings of the deceased, like ornaments or objects used during life, but also encompass objects deposited by the descendants. The dead are often dressed up in their best clothes and adorned with various paraphernalia. However, it is important to realize that it is the descendants who do so and who decide what ends up with the deceased. As such the latter may choose objects that represented the deceased through life, and in doing so they may actually idealise the roles this person played. At other times burial ritual may be politized: we know from ethnographic accounts that they can be manipulated by individuals or larger social entities for their own political ends (Parker Pearson 2001).

In this context it is important to recall the distinction between the individual and the person as originally made by Mauss (1985). The individual is the biological entity, to which we attribute agency and intentionality and which is bounded by the actual body. This particular concept of personhood is a product of the Enlightenment and typical for modern western society. A person on the other hand is a ‘product’ of an entire life and is constituted by the various roles he or she played in society. These roles are accompanied and symbolised by material attributes and therefore recognised by others. The western notion of the individual is sometimes contrasted with that of the dividual, a concept derived from studies of Melanesian societies where people’s identy is defined in terms of their relationships with other members of society (a.o. Strathern 1988). Fowler presents the distinction between individuals and dividuals almost as a dichotomy (Fowler 2004), when in actuality there may be various ways in which a person may be constructed and represented. For this reason and because the concept of the dividual seems to be specific to Melanesia, I will not use it in the context of this book (see also Jones 2004, p.168). Nevertheless, it is important to stress that in non-western, small-scale societies the western concept of the individual is not known and the identity of a person is constituted by the social roles the individual plays in society. These roles are bound by collective values and traditions. They change through the life of the person and are also specific to the different contexts in which a person finds him or herself. Consequently, the material attributes that define and endorse this type of 'embedded' personhood may also change from one context to another.

In order to more fully understand past funerary rituals we need detailed studies of each period, incorporating the total burial package and not just the flint. This is clearly beyond the scope of this book. Here I will only focus on the place of flint objects in the larger burial practices. A complete study of burial kits from mounds dating from the Late Neolithic A to the end of the Middle Bronze Age, including sourcing of the materials and use-wear and residue analysis, is carried out by K. Wentink and incorporated in the current project *Ancestral Mounds* (NWO-project of dr. D. Fontijn, prof. dr. C.C. Bakels and the author).

6.1.2 Flint, style and the expression of identity

Within the culture-historical paradigm, stylistic aspects of artefacts have been interpreted as signalling the cultural identity of prehistoric peoples. According to the definition of Newell (*et al.* 1990, p.3):

> *"Style is any variation or embellishment of an artefact beyond that which is inherent in the basic raw material or determined by its primary function".*

From this point of view style is added on. Obviously such a typological, stylistic approach has worked well for studies of pottery where vessel shape and decoration can be easily distinguished and allow an infinite variation which is immediately obvious to the outside observer. Certainly pottery decoration clearly fits the aforementioned definition by Newell *et al.* 1990. It is thus the study of pottery styles that lies at the basis of the definitions of many archaeological cultures, cultures that traditionally have been equated with different cultural identities and result in such designations as the 'Linear Bandkeramik' or 'Funnelbeaker' culture.

Flint tools have always played only a subsidiary role in issues of identity, at least in more recent prehistory. The stylistic information with which a flint artefact can be imbued is believed to be relatively limited. Several researchers have proposed that stylistic attributes are incorporated in the technology involved in producing the lithic artefact themselves (Lechtman 1977). In the same vein, Sackett has argued for what he calls the 'isochrestic' approach of style. He suggests that stylistic information is part and parcel of the production techniques of lithic implements (Sackett 1977, 1990). Such an isochrestic approach may indeed be more appropriate for most flint tools: apart from a few tools in which style obviously plays a role, like arrowheads, stylistic attributes in flint tools reside in all aspects of artefact variability (Sackett 1977). Along the line of the discussion of whether style is active or passive, it is interesting to recall the debate between Sackett and Wiesner (Sackett 1990; Wiessner 1983, 1984, 1989). Wiessner considers style as a means of communicating the distinction between the in-group and the out-group (Wiessner 1983). She differentiates between emblemic style that is intended to transmit a message about affiliation and identity and assertive style that carries individual identity. The latter is similar to the use of stylistic attributes in spearheads among the Loikop in Kenya, where spears are appropriated in order to signify one's age group (Larick 1991). Flint tools like arrowheads, axes and adzes (those used outside the domestic sphere) are more likely to carry emblemic messages but may also be used in an assertive way by individuals. The same object may thus carry different meanings in different contexts. As Jones, following Kopytoff (Kopytoff 1986) has expressed it:

> *"Material culture may operate simultaneously in a number of social fields and its meaning is not fixed, but subject to reproduction and transformation in terms of both material curation and interpretation throughout its social life."* (Jones 1997, p. 118)

So, objects are imbued with qualities during their production, qualities that are translated by us in techno-stylistic attributes, and that were probably relevant to some extent to past actors as well. Objects also acquire meaning throughout their use lives, by their role in society and the way they are handled and treated by prehistoric actors.

Decorative elements may be relatively easy to imitate, but it is far more difficult to copy a complete *chaîne opératoire*. This forms an argument to study the technological aspects of material objects rather than stylistic decorative motives, at least if our aim is to investigate identity (Van der Leeuw 1993). The sequence of steps necessary to arrive at the final product is often not directly visible, certainly not to the untrained eye and with only a superficial examination. When studying the production sequence of a flint object, it is often necessary to refit the assemblage in order to understand the steps in the decision making process of the flintknapper. Clearly, however, this time consuming technique cannot always be applied and relevant information can already be obtained by studying the general production sequence and by having an eye for peculiarities such as the presence of small remnants of cortex at the tip of sickles or axes to signal the size of the original nodule and hence the skill of the knapper (Rüdebeck 1998). Such indications have nothing to do with the stylistic aspects of a flint tool but carry important information regarding technological choices: they are messages to fellow knowledgeable flintknappers. At the same time these technological choices are closely related to the identity of past peoples (Lemonnier 1986, 1993; Pétrequin 1993).

6.1.3 Flint tools as part of the habitus

Material culture forms an integral part of the *habitus*, in which people are born, live and die. As such, objects not only structure people's behaviour, but also reflect their habitual ways of doing things. This habitual behaviour must to some extent be reflected in the archaeological patterning and it is this patterning that we should search for. People are surrounded by objects from the moment they are born. Objects become so intimately entwined with daily life that they are also part of a person's identity. It is through the routine use of objects that daily life is structured. This is an unconscious process and individual agents are usually quite unaware of the structuring effect objects have on their behaviour, including their sense and perception of identity.

Because objects constitute such an integral part of the *habitus*, they are also mnemonic devices: they hold meaning and memory, not only for the individual members of society but also for society itself. Because objects embody habitual ways of doing things, they reflect traditions, or long-term technological choices. Flint objects can also 'collect' history, akin to the famous Kula in the Pacific (Malinowski 1922; Weiner 1992). Because stone artefacts are portable and do not break easily (in contrast to the more 'residential' pottery) they are a very good medium of exchange. By travelling from their source of origin to other places, stones accumulate stories, stories that can also contain important memories and myths pertaining to the cosmological notions of a society. Because of their portability, they can thus serve as 'pieces of places', representing remote places of special importance in the belief system (related, for example, to origin myths) or symbolising far-away exchange partners.

Technological and functional analysis of flint tools provides clues to the habitual choices people made regarding their tools. These choices are basically invisible and are therefore more likely to reflect the unconscious routine ways of doing things than stylistic attributes that are more easily copied and manipulated. In this chapter I want to examine these habitual choices, following the use-life of flint objects from raw material acquisition, to production techniques, to use and finally to deposition or discard. In this way it is possible to write as it were a biography of the different flint tools. The biography of tools that are habitually used in daily life should be intimately connected with the identity of past peoples. General patterns of tool production and use on the broader, assemblage level should relate to communal identity. The funerary data may tell us about the personhood of the deceased and about his or her roles in the society he or she is part of. On the other hand, patterns in burial packages may also reveal something about the society at large. For example, the presence of relatively uniform burial kits across large areas of Europe during the Single Grave and Bell Beaker period, suggest a shared identity at the supra-regional level. So in this chapter, the patterns and idiosyncrasies emerging in the data from settlements and burials will be assessed in terms of the different kinds of identities people are part of.

6.2 Two identities: the LBK and contemporary Late Mesolithic hunter-gatherers

6.2.1 Introduction

The first farming communities settled in southern Limburg around 5300 BC (fig. 3.4a). The Lower Rhine Basin was at that time the territory of hunter-gatherer-fisher communities, generally referred to as Late Mesolithic. The relationship between these two groups of people, so different in their way of life, has been a source of debate for a long time (a.o. De Grooth 2008; Louwe Kooijmans 1993, 1998a, c, 2007; Pluciennik 2008; Vanmontfort 2008; Zvelebil 1986) . Because we have only very scanty information on Late Mesolithic settlements, much of the discussion on interaction between farmers and hunter-gatherers centred on their flint technology (Gronenborn 1990; Huyge/Vermeersch 1982; Newell 1970). LBK flint technology is different from that of the Late Mesolithic so we can generally assess whether or not assemblages display elements of one or the other. There is however a long-term discussion about the validity of the distinction between 'real' LBK points and 'LBK-like' points that may well have been produced by Late Mesolithic people (Vanmontfort 2008; Vermeersch 1990). Still, there is very little evidence of Mesolithic flint implements in LBK context in our region.

6.2.2 The LBK

6.2.2.1 Settlement flint

LBK flint technology is quite homogenous and is in fact sometimes seen as 'pathologically conventional' (Keeley 1992). Closer study, however, reveals differences in for example knapping technique (De Grooth 2003, 2007) Most of the raw material utilized is Rijckholt-type flint, generally of eluvial origin (De Grooth 2008). In the later phases Valkenburg flint is also exploited, like at the sites of Beek-Molensteeg (Van Gijn 1990) and Beek-Kerkeveld (De

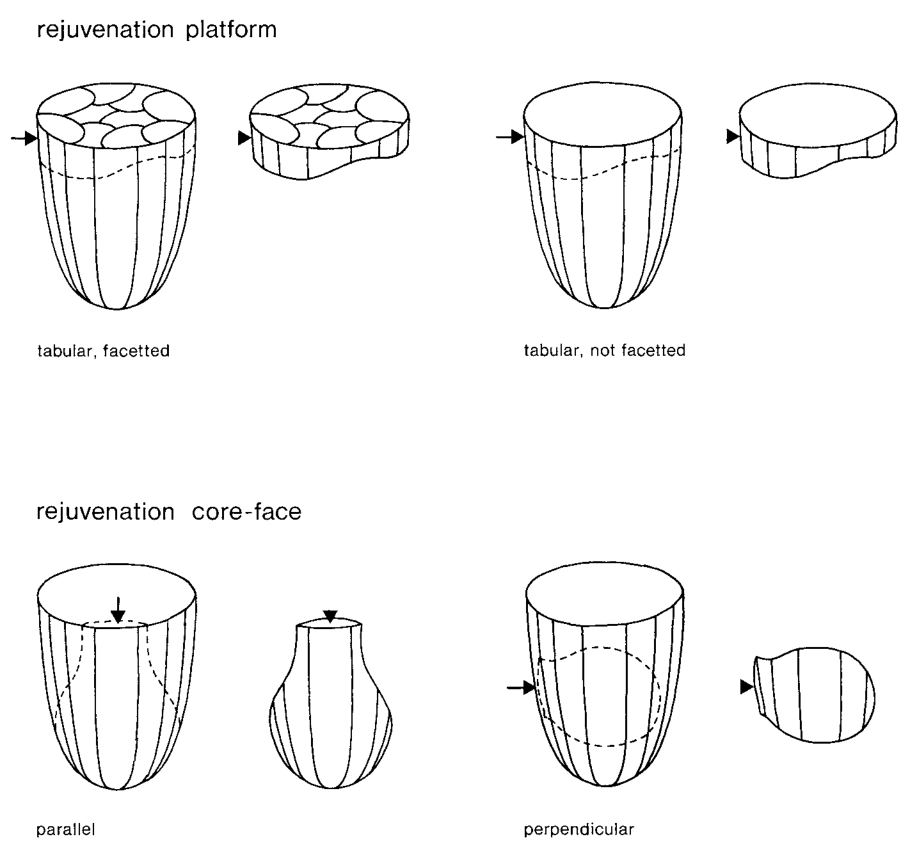


Fig. 6.1 The standardized LBK flint technology is exemplified by the way cores are rejuvenated.

Grooth 1987). Although the early site of Geleen-Janskamperveld predominantly displays a flaking technology (De Grooth 2003), later assemblages from the Graetheide cluster have focused more on the production of blades. This is shown by the presence of substantially larger cores, regular long blades, and a series of highly standardized rejuvenation pieces (Van Gijn 1990) (fig 6.1). Also the tool typology is quite standardized: long end-scrapers are a predominant tool type, followed by retouched blades, arrowheads, sickle-blades and the enigmatic *quartiers d'orange* or *débitage en frites.* This latter tool type was never recognized in traditional LBK typologies, until use-wear analysis of this so-called waste material, pointed to the presence of very consistent and highly characteristic use-wear traces (Cahen *et al.* 1986; Keeley 1977; Van Gijn 1990). There are therefore some distinctive LBK types of flint tools. Still, a large component of the LBK flint assemblages consists of flakes.

Use-wear studies of LBK flint tools showed that characteristic wear traces are visible on the end-scrapers and the *quartiers d'orange* or *débitage en frites.* As already outlined in chapter 5, hide processing techniques in LBK times were probably varied and complex, accounting for the range of sometimes subtly different hide working traces found on the flint end-scrapers. These implements are almost never found outside LBK territory and seem to be strongly related to the LBK technological system. This also pertains to the *quartiers d'orange* whose relevance may not have been immediately clear to outside observers. To the LBK agents however, these must have been very distinctive implements that were important in their technological system. So, 'polish 23' and an array of hide working traces seem to characterize the LBK. This is very different from contemporaneous Late Mesolithic flint assemblages in which especially plant processing tools figured prominently.

6.2.2.2 LBK burial goods of flint

The total population living within the Graetheide cluster is estimated at c. 2000 at the most (De Grooth/Van de Velde 2005; Modderman 1970), but we have very little evidence for burials. Although the area has been thoroughly investigated, until recently only one cemetery is known: that of Elsloo, situated just adjacent to the LBK settlement there.[14] It dates to the youngest phases of the LBK, phases IIc and IId and has been completely excavated (Modderman 1970). The cemetery consists of 113 graves, both inhumations and cremations. No skeletal remains have been preserved, but on the basis of some preserved corpse silhouettes it is clear that the dead were buried on their sides, in crouched position, a general LBK practice (Nieszery 1992). Grave goods included pottery vessels, querns, haematite, adzes and flint implements, mainly arrowheads and blades (De Grooth/Van de Velde 2005) (fig. 6.2). Although none of the contents of the graves could be sexed positively due to decalcification of the bones, the variation in burial goods led Van de Velde to assume that both men and women were buried in the cemetery (Van de Velde 1979a, b). In all graves decorated ceramic vessels are found, but in some graves these vessels were accompanied by querns and lumps of ochre, whereas other graves contained high

14 Recently a LBK cemetery has been found at Maastricht-Lanakerveld (pers. comm. Archol BV, Leiden) which will be excavated in 2010.

Fig. 6.2 Arrowheads from the LBK cemetery of Elsloo (scale 1:1).

stone adzes and arrowheads (Van de Velde 1992, tables 4 and 5). The first are seen as women's burials, also because of the presence of ochre (supposedly a symbol of life), while the presence of high adzes and archery equipment are interpreted as male graves (De Grooth/Van de Velde 2005). Blades, including *quartiers d'orange* and sickle blades are found in both groups but seem to predominate in female graves.

It is, however, not at all clear whether arrowheads should be considered a grave good. There are several instances in which it seems the arrowhead was the cause of death and not a funerary object (Modderman 1988; Van de Velde 1992). Some of the arrowheads show signs of burning, indicating that they were put on the pyre along with the deceased (Modderman 1988). Consequently, it will be impossible, with respect to the cremation graves at least, to determine whether these points were the cause of death or constituted a burial gift.

Both women's and men's graves contained flint tools that formed part of the daily toolkit. This certainly applied to the sickle blades and to the other stone objects like adzes and querns. Recently a number of querns from the Elsloo cemetery were studied, showing that it concerns objects with a use-life behind them (Q. Carlier pers. comm.; pers. observation of the author). The same is likely to apply to the adzes although these have not yet been examined for the presence of use-wear. As for the arrowheads, it is not clear whether they really should be considered part of the burial set, but certainly there is no indication that they were specifically manufactured to be given along to the dead. The one *quartier d'orange* from grave 3 (interpreted as that of a male) further confirms the image of domestic tools being the key element of the burial inventory of both men and women.

6.2.3 Late Mesolithic flint

Late Mesolithic assemblages generally are characterized by the presence of microlithic artefacts, most notably transverse arrowheads (Vermeersch 1990). However, the exact assemblage composition varies a great deal between sites.

For example, at Hardinxveld-Polderweg the transverse arrowhead, index fossil for the Late Mesolithic, is completely lacking and the microlithic industry consists almost exclusively of B-points (Van Gijn *et al.* 2001a). Although microliths are clearly very much a part of the Late Mesolithic technological system, we almost never find them in contemporary assemblages of Neolithic farmers. It has been suggested that the hunter-gatherers exchanged furs, meat, honey and other products from nature and maybe also women with the farmers (Louwe Kooijmans 1993, 1998a). It seems that Mesolithic flint tools did not carry any symbolic significance to surrounding farming societies: at present there does not seem to be one Late Mesolithic flint item that functioned as a Mesolithic signifier to outsiders.

Obviously, however, the flint technology of Mesolithic societies must have been intimately entwined with cultural traditions. Lithics were certainly used to express cultural identity in this period. During the Middle Mesolithic the use of Wommersom quartzite seems to be linked to one social group (Gendel 1984). In the same study Gendel also shows that lateralization of trapezia and the distribution of the *feuilles de gui* varies according to region. Gendel explains this consistent pattern by postulating territories in which customary ways of doing things prevail and he assumes these regions correspond to social entities. A similar study has been done in Denmark, where flake axe types display regional variation that is believed to be reflective of different social groups (macro-bands) (Vang Petersen 1984). Also in terms of the actual use of flint tools, traditional ways of doing things are apparent. The most frequently occurring type of wear-traces is that from processing siliceous plant materials (fig. 4.4). It is unlikely, however, that this is linked to specific social territories as such plant processing tools have also been documented elsewhere (Beugnier 2007; Juel Jensen 1994).

6.2.4 Identity issues and the relationship between the LBK and the Late Mesolithic hunter-gatherers

There is ample evidence that there were contacts between the Mesolithic and Neolithic inhabitants of the Lower Rhine Basin. In the Meuse valley of Limburg arrowheads have been found of a type generally attributed to the LBK (Van der Graaf 1988). LBK influence as far away as the delta is indicated by the find of LBK arrowheads at the site of Hardinxveld-Polderweg where, in addition to two LBK-type arrowheads, a large pre-core of Rijckholt flint was excavated (Van Gijn *et al.* 2001a) (fig. 6.3). The rather thin distribution of the LBK stone adzes extends north across the Pleistocene uplands, most likely as a result of exchange or expeditions (Verhart 2000). Considering the numerous LBK finds in Mesolithic territory, contacts clearly existed between both groups of people, something that has been supported by isotope analysis on skeletal material in Germany (Bentley *et al.* 2002; Price *et al.* 2001).

The extent and character of interaction between these two groups of people has long been a subject of great fascination for archaeologists (Gronenborn 1990; Verhart 2000). Some suggest that the relationships were actually of an unfriendly nature and that acts of violence took place (Christensen 2004; Guilaine/Zammit 2005; Keeley 1996). They base their argument on the appearance of enclosures during the late LBK. Although interpreted by others as cult places or cattle enclosures, their distribution in the western LBK is instead seen as support for their role as fortifications (Christensen 2004). Keeley draws attention to the settlement distribution in Belgium where he claims to have detected a no-man's land between the Mesolithic and Neolithic sites (Keeley 1997). None of these arguments are entirely convincing, but clear evidence for violence during these times does exits in the form of several LBK mass graves with indications of a violent death, the most famous of which is the site of Talheim where individuals were struck from behind with a LBK adze (Wahl/ König 1987). This example actually rather suggests the emergence of internal strife towards the end of the LBK. So far there is no conclusive evidence for violence between the farmers on the loess and the Mesolithic hunter-gatherers.

Whether the presence of these foreign objects in the territory of the Late Mesolithic hunter-gatherers must be interpreted as the reflection of exchange, expeditions or raiding is difficult to make out. For example, it is tempting to interpret the presence of a large pre-core of Rijckholt material at the site of

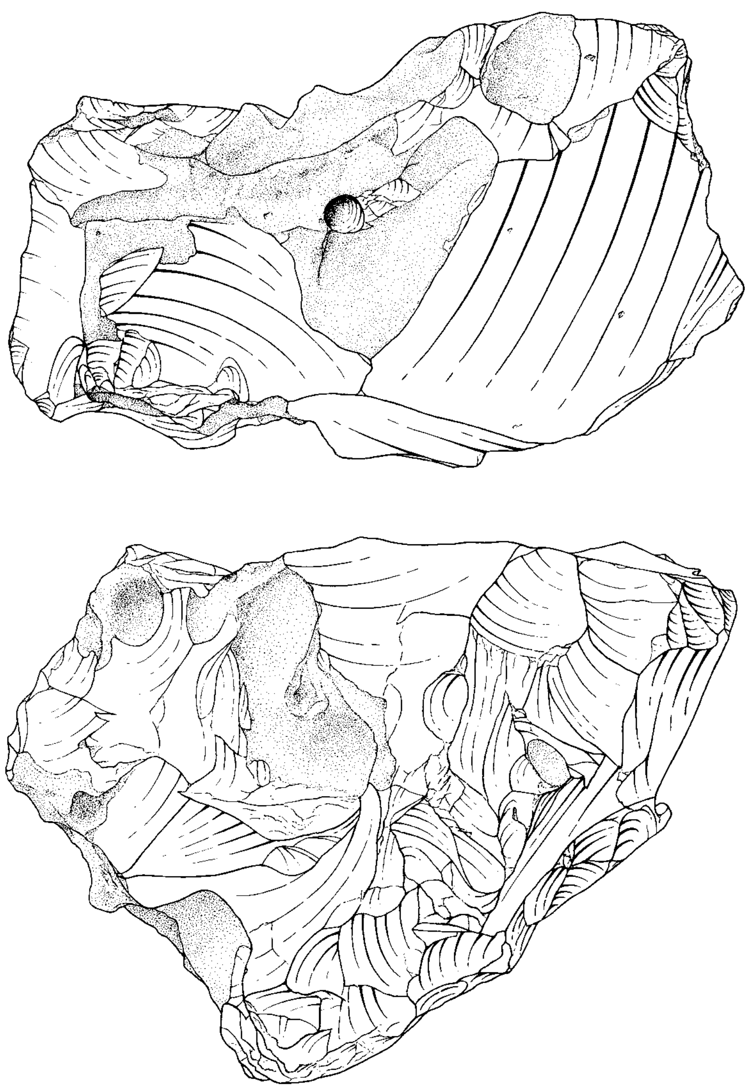


Fig. 6.3 Pre-core of Rijckholt flint found at the Late Mesolithic site of Hardinxveld- Polderweg (scale 1:2).

Hardinxveld-Polderweg as a product of exchange, but of course it cannot be excluded that it was taken along as some sort of trophy after a skirmish or raid in LBK territory. The arrowheads could well be associated with acts of warfare between farmers and hunter-gatherers, but this would only pertain to those found in the areas directly surrounding the LBK settlements. Christensen notes that arrowheads are only present in the flint assemblages of the north-western distribution of the LBK and, as he considers hunting only a minor activity in LBK context, he contributes this to violent interaction along these fringes of LBK territory (Christensen 2004). However, hunting has probably been more important to LBK subsistence economy than previously assumed (Amkreutz 2004), so the conclusion that all LBK arrowheads outside LBK territory are associated with warfare seems a little premature. Although use-wear analysis of adzes has shown them to have been predominantly involved in wood working (Dohrn-Ihmig 1979/1980), they also make very good weapons for close combat. The location of several arrowheads, inside a skull or possibly in the spine, in the Elsloo cemetery suggests that some people were killed by archers (Van de Velde 1992). Because it concerns LBK points, this would indicate internal strife rather than strife between farmers and hunter-gatherers. The arrowheads and adzes may thus have functioned in both hunting and land clearance respectively, as well as in combat.[15]

Hunter-gatherers thus probably associated LBK type arrowheads and adzes with the far-away farmers to the south. It is unlikely that these constituted trophies of war, as there is no evidence of strife between hunter-gatherers and farmers. Hence they must have been the result either of incidental gifts or souvenirs picked up in the course of a mobile existence or, alternatively, as the result of a prolonged system of exchange. The extensive numbers of adzes and arrowheads in the areas inhabited by the Late Mesolithic populations would suggest that they do not reflect some *ad hoc* occurrences, but that they were part of a regular exchange between both groups of people. We can probably characterize the mechanism as down-the-line exchange, because it is unlikely that direct contacts occurred across such vast distances. Unfortunately it is not known what objects were given in return by the Mesolithic hunter-gatherers; most likely these consisted of perishable goods, maybe food items. Nor will we know whether the LBK people only exchanged adzes and arrowheads or whether they also included other items in the exchange.

Seen from a perspective of exchange, it is significant that it is exactly adzes and arrowheads that formed the object of exchange. Both types of objects functioned outside the domestic sphere, in hunting, warfare and land clearance and could therefore serve as public signatures of LBK identity (Larick 1991). They could be *seen* by people outside (or not allowed in) the LBK settlement context and as such may have served as symbols of the far-away farmers to the hunter-gatherers. Their very presence in Mesolithic territory indicates that they were recognized as such by the knowledgeable[16] outsiders, which the hunter-gather-

15 De Grooth and Van de Velde (2005, fig. 11.3) interpret the scatter of arrowheads and adzes just north of the Graetheide cluster as the result of hunting and herding.

16 The term 'knowledgeable' is crucial in this context. They have been meaningful only to someone who has knowledge of the association of these objects. We would only have found them in such quantities in hunter-gatherer territories if they were considered meaningful.

ers undoubtedly were. We should also recall that adzes were, at least in the early phase of the LBK, made of amphibolite, a stone source that had to be imported from the Carpathians, at a distance of c. 800 km (Bakels 1987). These objects, made of an exotic type of stone, must have had a particular value and meaning to the Neolithic farmer.

Although studies of the distribution of LBK objects outside LBK territory are available (Van der Graaf 1988; Verhart 2000), these exchange items have never been studied systematically. We know almost nothing of their exact find context, nor do we know whether these objects were used in a special way or underwent a special treatment. Such a study may shed more light on the value attributed to these objects by the recipient hunter-gatherers: did these tools undergo a special treatment or were they simply used in a utilitarian fashion? If treated in a special manner (like rubbing with ochre, burning, fragmenting, or putting them to specific uses), this may indicate a certain reverence for these objects and, ultimately also for the LBK people and their values. If however, the adzes and arrowheads were used in a utilitarian fashion, being incorporated in the technological system of the hunter-gatherers, this would indicate a very different, more independent attitude towards the farmers. Such a study may thus shed light on the nature of the exchange between them and the LBK farmers and ultimately on the nature of the neolithisation process.

6.3 Contacts intensify: Rössen and Early Swifterbant

6.3.1 Rössen

Little is known of the Early Neolithic B period, at least from a flint perspective. Contact between the Mesolithic hunter-gatherers and Early Neolithic farmers seems to intensify during the period of the Rössen and the contemporary Blicquy culture, dated to the Early Neolithic B (fig. 3.4b). We find so-called Rössener *Breitkeile* across the entire Lower Rhine Basin, all the way up to southern Denmark (Raemaekers 1999, fig. 3.35; Verhart 2000, fig. 1.17). Typical Rössen flint tools, such as triangular points and pointed blades, have not been demonstrated in contemporaneous wetland assemblages such as Brandwijk phase 1, nor have we found fragments of *Breitkeile* there. Also, Rullen flint, the raw material predominantly used by Rössen communities, has not been encountered in Brandwijk phase 1 or Hoge Vaart (Peeters *et al.* 2001). The absence of Rössen type of flint tools can be attributed to the fact that the Rössen occupation in the south-eastern Netherlands constituted the very fringe of its distribution area. Also, it seems that the south-western group of the Swifterbant culture rather has links to the contemporaneous Blicquy culture in Belgium (Louwe Kooijmans 2001; Raemaekers 1999). However, the absence of typical Rössen types of flint tools in contemporaneous wetland assemblages also suggests that flint implements did no longer represent those 'strange folks' in the south. Instead, it was the *Breitkeile* that emphasized and expressed the contacts of the local hunter-gatherers with the far-away farmers. The more extensive distribution of the *Breitkeile* in comparison with the LBK adzes indicates that these southern farmers, symbolized by these stone objects, held a fascination for an ever larger area. Verhart draws comparisons with the situation in Papua New

Guinea at the time of the first contacts between the western missionaries and the local population. The latter were fascinated by almost any objects brought by those strange westerners and adorned themselves with plates, cans and other trinkets that were worthless in our eyes (Verhart 2000).

Only one Rössen flint settlement assemblage could be studied, that of Maastricht-Randwyck (Van Betuw 2004). The results show that the predominant raw material was Rullen flint, followed by Rijckholt. The range of tool types is quite restricted and typical Rössen arrowheads, such as encountered in the nearby Rössen sites in the Rhineland (Fiedler 1979), do not occur. Only one sickle blade has been found, displaying gloss very similar to that seen on LBK sickles (fig. 4.7a). Hide cutting was the most frequently occurring activity. It seems that tool use traditions were a continuation of the LBK. Burials from this period are not known from the present-day Netherlands.

6.3.2 The earlier Swifterbant culture

The Swifterbant culture, which is found in the wetlands of the western and northern Netherlands, dates from 5000 to 3400 BC. We can distinguish a southern and a northern tradition (Raemaekers 1999). The earliest phase of the Swifterbant culture (5000-4200 BC) is contemporaneous with Rössen and Blicquy (fig. 1.3). In terms of flint technology the Swifterbant culture has its roots in Mesolithic knapping traditions: blade technology seems to be the preferred technique (supplemented by flake reduction) and trapezia are the most frequently occurring tool type. The site of Hardinxveld De Bruin phases 2 and 3 can be dated to this period. Compared to the assemblages from the Late Mesolithic levels of Hardinxveld-Polderweg the number of flint hide working implements is remarkably high. An additional difference lies in the relatively low number of tools with traces from siliceous plant processing (Van Gijn *et al.* 2001b).

6.4 Becoming agriculturalists: Michelsberg, 'Classic' Swifterbant and Hazendonk

6.4.1 Michelsberg

The Michelsberg period is the one during which agricultural practices became established in much of the territory of the present-day Netherlands (4200-3400 BC). However, it should be realised that the Lower-Rhine Basin constitutes the very margin of the distribution of the Michelsberg culture (fig. 3.4c). Excavated Michelsberg sites in the Netherlands include the settlement sites of Maastricht-Klinkers and Maastricht-Vogelzang (Brounen 1994; Schreurs 1992) and the enclosure site of Heerlen-Schelsberg (Schreurs 2005; Schreurs/Brounen 1998). We know little of the early phases of the Michelsberg culture: Maastricht-Vogelzang (Michelsberg I), located in the valley of the Meuse, largely lacks the characteristic Michelsberg macrolithic appearance (Brounen 1994). From the Michelsberg culture III onwards, somewhere between 3940 and 3750 BC (De Grooth 2005), large-scale mining of flint began at Rijckholt, resulting in the standardized macrolithic artefacts that are deemed to be so characteristic for the

Michelsberg culture. A vast quantity of pre-cores, mining tools and waste-products has been found at Rijckholt (De Grooth 2005). Much of the macrolithic industry concerns blades, but flakes are present in large numbers as well, forming the blank for different types of implements, such as large horse-shoe shaped scrapers. Typical Michelsberg flint tools include pointed blades, heavy borers, triangular and leaf-shaped points and end-scrapers on blades (Schreurs 2005). A few flake axes have been found at Maastricht-Vogelzang (Brounen 1994), but this tool type is more typical for the Belgian Michelsberg culture.

Around this time thin-butted axes with an oval cross-section, sometimes with facetted lateral edges, appear. These axes have been found as stray finds across north-west Europe. Their appearance coincides with the first convincing evidence of local cropping of cereals by the inhabitants of the wetlands (Chapter 4). It may well be that the axes did not merely express the fascination of the 'hunter in transition' (Zvelebil 1986) for the agricultural groups, such as is likely for the earlier objects of exchange. Instead, these axes were so widely distributed because they also had a very functional application: to clear the land for cropping. This may have increased the demand for these axes, a demand that may have relied on the long-distance contact lines that already existed since the Early Neolithic. From this perspective it may be no coincidence that around 3700 BC, all over Europe flint started to be mined: in the Netherlands we know mines at Rijckholt (Rademakers 1998) and Valkenburg (Brounen/Ploegaert 1992). It is frequently assumed that, because of the presence of internal cracks, the eluvial flint was not of sufficient quality to manufacture axes with and flint mining provided the solution. However, it is likely that social and cultural factors played an important role as well with flint mines being special places producing characteristic 'pieces of places', namely axes. This can only be elucidated with a systematic axe inventory akin to those carried out elsewhere (Bradley/Edmonds 1993; Cooney/Mandal 1998; Pétrequin *et al.* 1993). Preferably, a use-wear and residue analysis will form part of this research.

6.4.2 'Classic' Swifterbant: the northern group

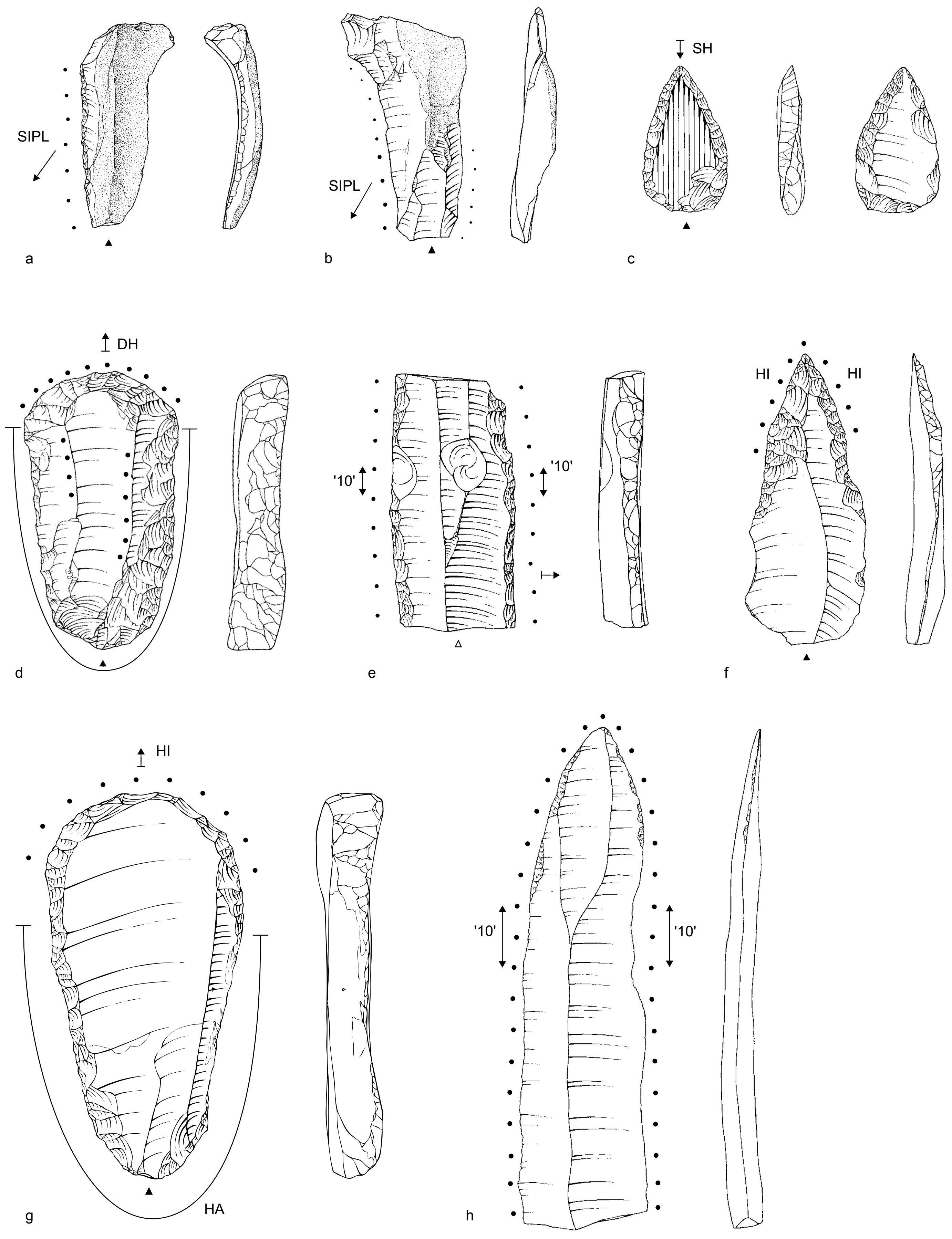
The northern group of the Swifterbant culture displays a strong similarity in flint technology to the earlier Mesolithic tradition and does not seem to have many 'flint links' with the contemporaneous Michelsberg groups in the south. The raw material selected is of local origin: erratic flint at the various sites near Swifterbant, terrace flint (including some of Rijckholt material) at Hoge Vaart. Blade technology predominates and modified tools include trapezes, borers, scrapers and retouched blades and flakes (Deckers 1982, 1985; Raemaekers 1997). The strong Mesolithic roots of the Swifterbant culture are not only visible in the flint technology and the tool types present, but also in the way tools are used. Blades very frequently display traces from plant-processing, very akin to what was found on the blades from the Hardinxveld sites (Bienenfeld 1986). It concerns very distinct polishes, in a transverse direction, sometimes displaying striations. The blades may have been used to scrape reeds and rushes in order to make them supple for plaiting mats (Chapter 5). Although the exact purpose of these tools is not altogether clear, they certainly belong to the Late Mesolithic and the earlier Neolithic flint working traditions of the wetlands

(Beugnier 2007; Van Gijn *et al.* 2001a, b). These glossed blades are also present in Denmark (Juel Jensen 1994) indicating that the activity they were involved in must have been essential to these Late Mesolithic and Early Neolithic societies. Although not directly visible to the outside observer, these tools most likely formed an important part of the cultural tradition. Additionally, it may well be, that the products made or modified by means of these blades, like special basketry or items of clothing, did have a very visible 'marker function' to outsiders. This is for example the case with the different styles of basketry among the Northwest Coast Indians (Croes 1997). In the Pacific, among the Vanuatu, plaited items made of plant material are an expression of identity (Keller 1988) and in Papua New Guinea the *bilum* or string bags also display local styles (Thomas 1991). This however, is not something that we will be able to trace, unless of course we have the actual perishable objects or other evidence for basketry like skeuomorphs or basketry marks on pottery.

6.4.3 'Classic' Swifterbant: the southern group

In contrast to the northern Swifterbant variant the southern group is more oriented towards the south and the south-east in terms of its material culture. Besides the widespread distribution of the Michelsberg flint axes (Raemaekers 1999, fig. 3.36), we also see the occasional macrolithic flint implement in the southern group of the Swifterbant culture. For example, at the site of Brandwijk phase 2, large pointed blades, end-scrapers and triangular points, all made of mined Rijckholt flint, were found (fig. 6.4d-h). One arrowhead was made on a fragment of a polished axe of light-grey Belgian flint (fig. 6.4c). Apparently, the southern group of the Swifterbant culture had long-distance contacts in a southerly direction. The fact that these contacts have a long time-depth is already shown by the presence of Rijckholt flint and Wommersom quartzite in the Late Mesolithic site of Hardinxveld-Polderweg. It concerns the import of finished products as no production waste of exotic flint sources was found. Intriguingly, some tools from Brandwijk displayed typical Michelsberg traces of use, such as 'polish 10', a type of polish that displays attributes that resemble both hide and plant-working traces (fig. 6.4j). These particular wear traces are found on Michelsberg material (Schreurs 1992), but have rarely been found in wetland assemblages.[17] It is therefore likely that these tools were imported not only as *finished* products, but also as *used* tools. The fact that these tools had a use-life before they were exchanged indicates that it is very likely that they were the possession of either a person or a specific group. As such this tool can be seen as an exchanged item that was commensurable with its previous owners or users. Because the object was not subsequently modified or used by the Brandwijk people after the exchange indicates that it was primarily this attributed meaning, rather than the practical properties of the tool that was significant. It is reasonable to assume that the Michelsberg implements were brought to the coastal wetlands, not so much to be used as actual tools, but as a trophy or token of a special relationship with a person or social group far away.

17 At Hardinxveld-Polderweg there are a few implements with possible 'polish 10', but it concerns inferences with a low probability.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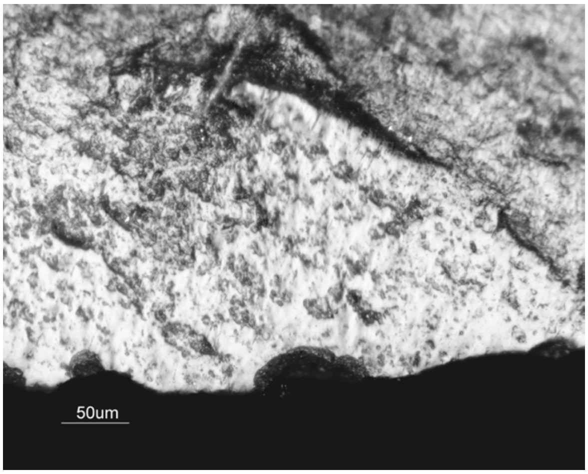

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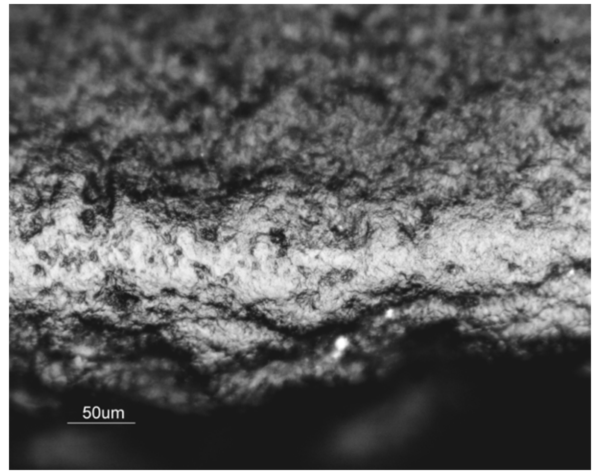

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Fig. 6.4 Flint from Brandwijk phase 2: a, b. blades of local flint used to scrape siliceous plants; c-h import tools such as typical macrolithic Michelsberg implements like pointed knive (h), and large end scrapers (d, g) (scale 1:1).; i. polish from scraping siliceous plants seen on b (200x); j. 'exotic' use-wear, probably from scraping hide seen on g (200x).

6.4.4 The Hazendonk-group

6.4.4.1 Settlement flint

In the course of the Michelsberg period, around 3700 BC, regional differentiation increases and the Hazendonk-group develops out of the southern tradition of the Swifterbant culture (Louwe Kooijmans 2005a). The Hazendonk sites in the eastern riverine area such as Het Vormer show a mixture of import and local flint. The large import artefacts only constitute a small component of the flint assemblage, whereas the majority is made up of flakes produced on irregular rolled nodules with a maximum diameter of c. 6,5 cm (Louwe Kooijmans 1980). These small nodules could probably be collected nearby. Typologically the material bears a close resemblance to typical Michelsberg tool types: a pointed blade, a large retouched blade and a typical leaf shaped point, usually produced on Rijckholt flint (Louwe Kooijmans 1980).

The Hazendonk flint assemblages from the wetlands further west are all characterized by the presence of two types of flint technologies, one more *ad hoc* on small rounded pebbles of probably local origin, and an exotic one, composed of large, imported implements of southern origin. These imported flint implements have a very clear Michelsberg signature. Use-wear analysis shows that they were used for 'special activities' like harvesting cereals, making fire and working mineral substances like jet into ornaments (Raemaekers *et al.* 1997; Van Gijn *et al.* 2006) (fig. 6.5). In fact, the import material in general seems to be more heavily used than the local component of the flint technology.[18] This may be related to their large size but I suggest it rather indicates the special value attributed to these large flint tools of Michelsberg style and the role these objects had in negotiating a new, agricultural identity (Van Gijn 2008a).

18 Unfortunately at the site of Ypenburg raw material was not systematically examined so we do not know the exact quantities of exotic flint there.

Fig. 6.5 Exotic flint from Schipluiden settlement: a scraper and retouched knife of flint from Spiennes or Rijckholt and a large borer of flint, probably originating from Hesbaye in Belgium (scale 1:1).

6.4.4.2 Flint from Hazendonk burials

One of the most spectacular prehistoric cemeteries from the Netherlands has been found near Ypenburg (Koot/Van der Have 2001; Koot *et al.* 2008). The skeletons have been preserved and could be studied for sex and age, as well as for habitual wear and pathology (Baetsen 2008). Ornaments of jet and amber were found with some of the skeletons (Van Gijn 2008c), but no flint objects were associated with any of the bodies. In the nearby site of Schipluiden one grave with flint burial gifts was encountered (Louwe Kooijmans/Smits 2006; Van Gijn *et al.* 2006). It concerns the skeleton of a c. 35 year old male, in crouched position. In his hand, which is located in front of his mouth, he holds three pieces of flint and a nodule of pyrite (fig. 6.6a). The flint objects have a severely rounded tip and display wear traces that are typical of a use as strike-a-light (fig. 6.6b). In combination with the pyrite, a stone type that contains sulphur, this constitutes a toolkit for making fire. Fire not only provides warm it also has spiritual connotations (Chapter 7). The fact that this toolkit was given along to this particular deceased inhabitant of the Schipluiden dune, must therefore be considered as significant. It is the only example of its kind in our region although we do find parallels as far as southern Germany, dating to the Early Neolithic (Nieszery 1992). I would argue that this configuration of burial goods, the fire making toolkit, should be interpreted as an indication of a special kind of personhood. This man may have had a special role in society, a religious specialist, maybe akin to the ethnographically documented shaman of Siberia and elsewhere (Kroll-Lerner 2007; Thorpe 1993).

a

Fig. 6.6 Three strike-a-lights and a piece of pyrite were found in the hand of a male individual buried on the dune of Schipluiden. The hand was held in front of the mouth, evoking the image of someone blowing a spark: a. close up of the skeleton; b. characteristic wear traces seen on one of the strike-a-lights (100x).

b

6.4.5 Identity issues and the relationship between the Michelsberg culture and contemporary wetland groups

The typical Michelsberg flint tools reflect a shared identity across large areas of north-west Europe and in a way served as 'icons'. These icons found their way to the wetlands both in the early Michelsberg phase, seen at the Swifterbant site of Brandwijk phase 2, and during the later period, represented by the sites of the Hazendonk-group. In Brandwijk the macrolithic Michelsberg tools were imported in a used state, displaying typical Michelsberg traces of use like 'polish 10' and heavily developed hide working traces. In contrast, in the later Hazendonk sites in the Delfland area, tools of southern, Belgian flint seem to have been imported in an unused state, probably as finished implements, although we do find occasional production waste of exotic flint. These typical Michelsberg tools were appropriated into the local Hazendonk technological tradition by putting them to specific uses which can be designated as 'special' such as cereal harvesting, ornament production and fire making (Chapters 4, 7). It is suggested that this indicates a change in attitude towards the (supposedly dominant) Michelsberg interaction sphere. Swifterbant agents kept Michelsberg implements as a sort of token of their allegiance to the larger Michelsberg identity sphere. Hazendonk communities actually appropriated these Michelsberg icons and gave them a place in their own technological system. To some extent therefore, they have incorporated Michelsberg identity. At the same time however, these implements were treated different from the implements made of local flint, indicating that they still were attributed a special meaning.

Although pottery styles are traditionally the basis for the definition of archaeological cultures, I would argue that the above described example of the shift from an affiliation to an appropriation of exotic flint tools shows that flint may provide a clue to the wider cultural allegiance of past peoples (Van Gijn 2008a).

6.5 Different flints for different contexts: TRB, Vlaardingen and Stein

6.5.1 Introduction

The beginning of the Middle Neolithic B, around 3400 BC, sees the emergence of the TRB (dated 3400-2900 BC). The distribution of the TRB extends across the north-eastern part of the Netherlands, south to the Veluwe and west across to the Wieringermeer (fig. 3.4d). It is during the TRB that we see for the first time a clear differentiation in flint tool types associated with settlements, burials and depositions. To the south, people of the Vlaardingen-group (dated 3400- 2600/2500 BC) inhabited the coastal as well as the eastern riverine zone. Remnants of the Stein-group are found in the Pleistocene uplands. Both groups are closely affiliated, producing a similar range of pottery styles, that has led Louwe Kooijmans to subsume them, along with the German Wartberg-group, under the so-called Wartberg/Stein/Vlaardingen (WSV)-group (Louwe Kooijmans 1983). As the northernmost Stein site, Kraaienberg, is only situated 10 km from the Vlaardingen site of Ewijk, this supports the supposition that Vlaardingen and Stein may constitute the 'wet' and the 'dry' component of one and the same cultural complex, a complex that also has affinities with the Seine-Oise-Marne culture in northern France and Belgium (Van Gijn/Bakker 2005). Settlement material from known Stein context, like Koningsbosch (Van Haaren/Modderman 1973) and Geistingen (Heymans/Vermeersch 1983), is mixed with other periods so the settlement sites of the Stein-group will be left out of consideration here.

6.5.2 The TRB culture

6.5.2.1 Settlement flint

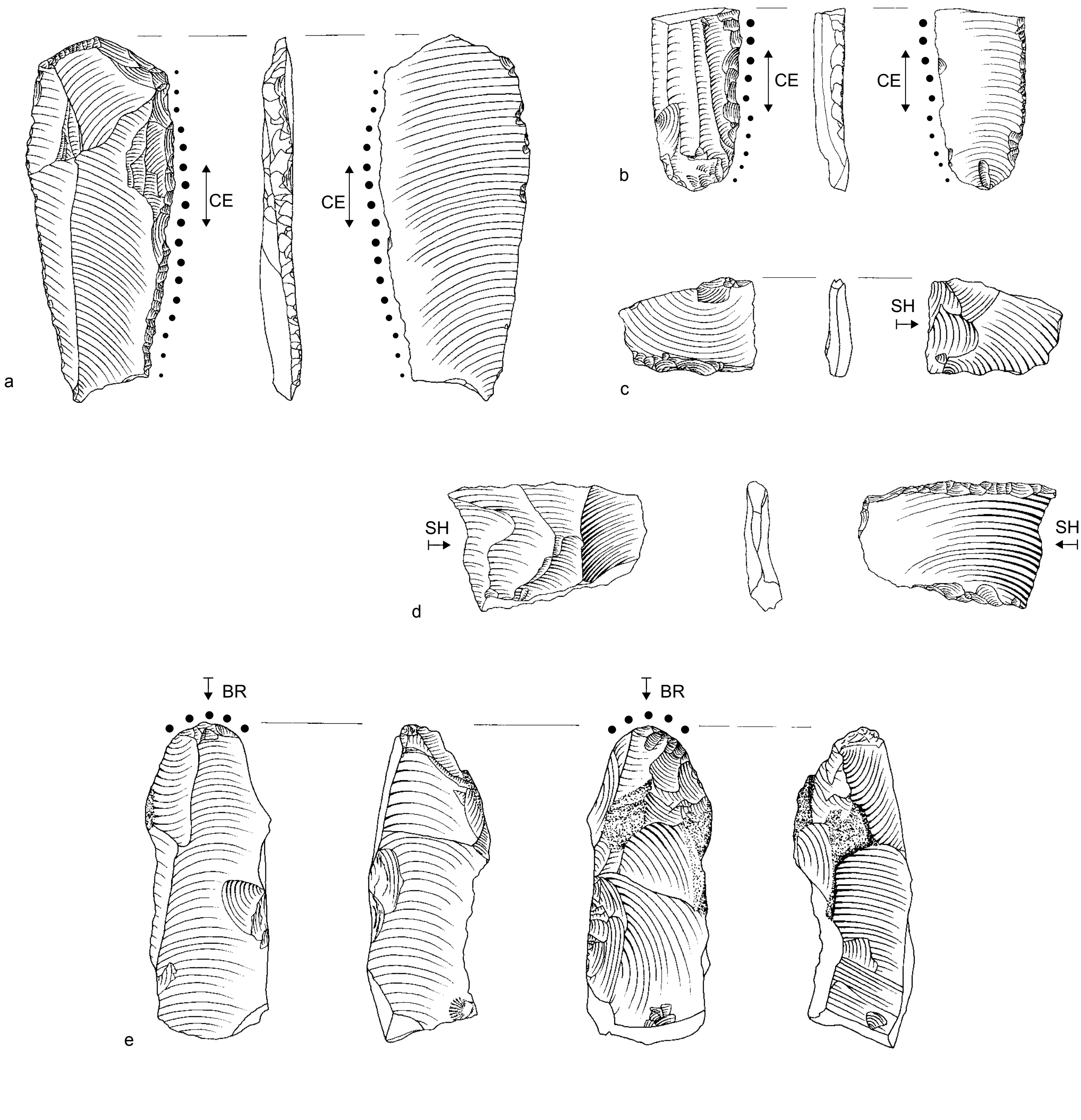
Because of the distribution of the TRB north of the major rivers, locally available flint was limited to moraine outcrops. It is this raw material that predominates in settlement assemblages. For example, at Slootdorp-Bouwlust flint was obtained on the moraine outcrop at Wieringen, situated at a distance of c.10 km. Nodules were taken to the site and the quantity of production waste is therefore considerable (Peeters 2001b). The available moraine flint is usually confined to small nodules with abundant internal cracks that do not allow for a systematic blade technology. As a consequence, the reduction strategy can be typified as *ad hoc*, with little or no platform preparation and a rather opportunistic reduction of the cores. This results in flakes of varying sizes, as well as some occasional blades. Direct hard hammer percussion predominates but there is also evidence for the use of the bipolar technique.

The number of formal tool types is limited, with retouched flakes and scrapers occurring most frequently. Such is the case at the site of Harderwijk-Beekhuizerzand, situated on the Veluwe, where also an incidental borer or arrowhead was encountered (Modderman *et al.* 1976). Other tool types include splintered pieces, borers, 'becs' and some transverse arrowheads. Strike-a-lights rarely occur in settlement context: at Slootdorp-Bouwlust only one strike-a-light was found (Peeters 2001b) and they also occur at the, in itself unusual, site of Anloo (Waterbolk 1960). In both cases the classification as strike-a-light has not been confirmed by microscopic analysis. At Bornwird, a site dating to the last phase of the TRB (the Late Havelte phase), scrapers also predominate and well-defined tool types are lacking (Fokkens 1982).

If the number of excavated TRB settlements is limited, this pertains even more so to assemblages suitable for use-wear analysis (Chapter 3). As sites as Laren and Beekhuizerzand are located on sand, the flint is severely abraded, limiting the possiblities for use-wear study (Chapter 3). Use-wear analysis of the material from Slootdorp-Bouwlust shows that most of the tools were used in a very *ad hoc* fashion: retouched flakes were employed for a variety of purposes, and generally only very briefly, probably as the need arose. Functional analysis of a sample from the site of Groningen-Oostersingel shows several hide scrapers, a few used blades, one of which was used for harvesting cereals and a few strike-a-lights with the typical impact traces, rounded tip and linear traces of polish. Recent use-wear and residue studies of the TRB material from the site of Hattemerbroek-Bedrijventerrein Zuid (Lohof *et al.* in prep. a) shows that hide working tools predominate, followed by implements with traces from contact with wood (pers. observ. of the author).

6.5.2.2 Flint in TRB burials

The TRB culture is associated with the so-called *hunebedden*, basically a megalithic phenomenon. Most of the *hunebedden* are passage graves, with an entrance halfway along the long south or south-east side. The floors of the graves were paved with cobbles and a thin layer of crushed granite. The chamber was probably closed with a wooden or stone door (Bakker 2005). The tombs were no longer erected after 3200 BC, although they were still frequently used after this date. The duration of use varied but from detailed typological analysis of the pottery assemblages it is clear that some of the *hunebedden* were used for up to 250 years (Brindley 1986b). The *hunebedden* are interpreted as communal graves, representing local kinship groups but, as it concerns inhumations, no human remains have been preserved in the acidic sandy soils that could tell us about the state in which the bodies were deposited or their gender. The 'cha-



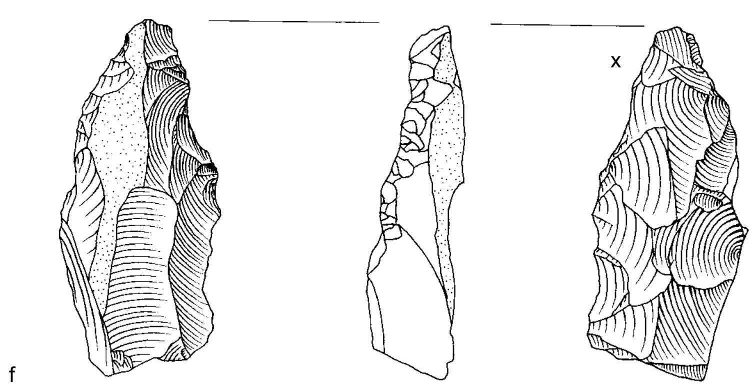


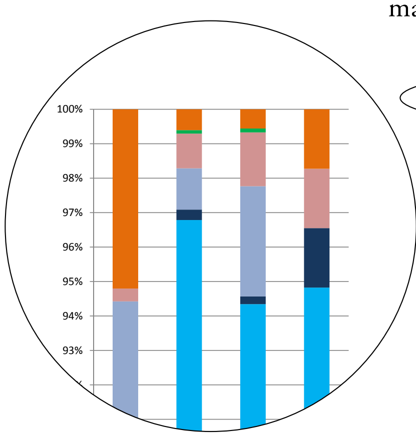
Fig. 6.7 TRB burial flints from the hunebed of Mander: a, b. harvesting tools; c, d. transverse arrowheads; e. strike-a-light; f. pick (scale 1:1).

otic' arrangement of skeletal parts in some German and Danish tombs indicates that there has been considerable manipulation of the skeletons there (Midgley 1992).

The *hunebedden* were such a conspicuous feature in the landscape that a considerable number of them were destroyed before any proper archaeological investigations took place. The stones were especially valued for the construction of dykes and dams. Van Giffen investigated several *hunebedden* in the first decades of the 20th century but never published the exact contents in detail. In recent years several *hunebed* inventories have been re-examined and published, with an emphasis on the pottery typology (Brindley 1983, 1986a; Brindley/Lanting 1991/92; Brindley *et al.* 2001/02; De Groot 1988).

The flint assemblages of several megaliths have recently been studied by Van Woerdekom (Van Woerdekom in prep.). The typological range of flint objects deposited in the *hunebedden* differs substantially from that of the settlements (table 6.1). Instead of the retouched flakes and scrapers that are so ubiquitous in settlements, we find large quantities of transverse arrowheads and 'picks', as well as some small worn out axes, sickle blades and only an occasional scraper (fig. 6.7). The almost complete absence of sickle blades in the settlement versus their presence in the *hunebedden*, albeit in small numbers, is especially noteworthy (Chapter 7). These typological trends seem very consistent across the various *hunebedden*. There is also a large amount of production waste, like small splinters, deposited in the tombs. This is apparent from the *hunebed* D26 at Drouwenerveld where use was made of sieves to retrieve debitage and small objects (Bakker in prep.).

Use-wear and residue analysis was done on samples from five *hunebedden*: that of Mander in Twente, D19 and D26 from Drenthe and G2 and G3 situated on the northern fringe of the Drente Plateau (Appendix). In comparison to the axes from the special depositions (Chapter 7), the axes from the tombs were much smaller and invariably showed extensive traces of use. They also displayed hafting traces (fig. 5.7). Their small size is largely due to the fact that they were made on locally available flint and, because they were meant to be used, never



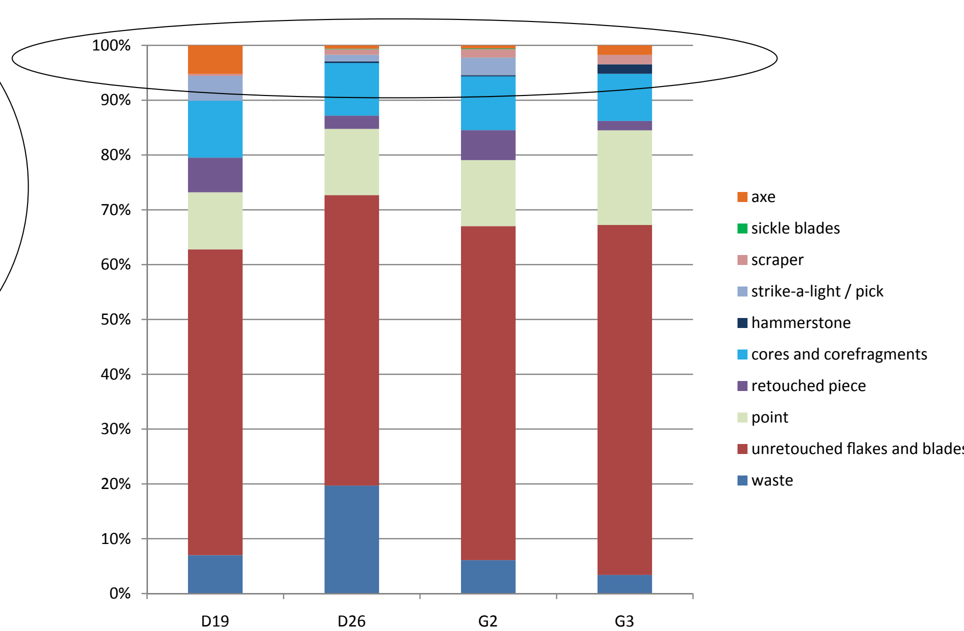


Table 6.1 Typomorphological composition of the modified flint assemblage of some megaliths (after Van Woerdekom in prep.).

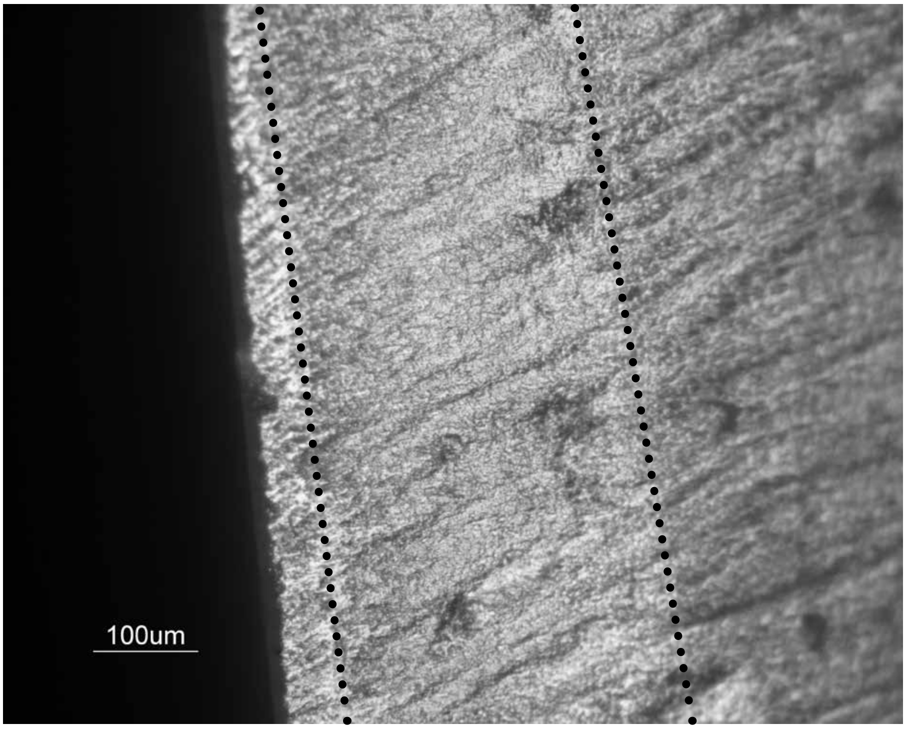


Fig. 6.8 Evidence for the re-sharpening of the edge of a used axe from TRB burial context (hunebed D19) (100x).

had sizes comparable to the axes found in depositional context. Frequently, they were re-sharpened (fig. 6.8). In fact on most funerary axes we can still see several re-sharpening facets, although this does not necessarily mean these were successive ones. None of the axes in the megaliths were deposited in worn state: prior to their deposition in the *hunebedden,* the axes were given 'a new life' by re-sharpening them and obliterating all evidence of prior use. However in some scars, use-wear polish is still visible because the scars were not completely removed by the subsequent re-sharpening. The traces visible inside these scars most probably result from chopping wood. The hafting traces usually include patches of friction gloss on the butt end.

Blades are the other type of flint implement which was deposited in the tombs in a used state (fig. 6.7a, b and 6.9). Usually blades or blade-like flakes were selected for harvesting cereals. They occur in small numbers in all the studied tombs and always show signs of being quite heavily used. The polish is 'typical' cereal polish: a flat topography, highly reflective and of a smooth texture. The wear traces are a little variable in appearance in the sense that some were more heavily striated than others. The striations are very fine and shallow, indicating a cutting movement. The general distribution of the polished zone is rectangular and parallel to the edge, indicating that the flint inserts were hafted parallel to the handle and not at an angle like the LBK sickle inserts. This is similar to what has been observed for contemporaneous sickle blades in the TRB North-Group (Juel Jensen 1994).

The majority of the so-called picks, elongated roughly knapped tools (fig. 6.10), do not display traces of use. Some of these picks however have rounded tips, linear distributed patches of matt and rough polish and stacked impact scars, indicating they had been used as strike-a-lights. Remarkably enough,

Fig. 6.9 Sickle blade from the hunebed of D19. Note the well-developed polish from cereal harvesting.

none of these traces were heavily developed, in contrast to the heavily used and curated strike-a-lights from Hazendonk context. This indicates a short duration of use. It may be that they had been produced especially to be used during the burial ceremony after which they could be given along to the dead. The strike-a-lights could have formed part of an elaborate burial ritual in which fire played an important role (Chapter 7). Other picks seem to have traces from contact with a hard material but lack any evidence for a former use as strike-a-light.

Another category of burial gifts concerns the ubiquitous transverse arrowheads. Few seem to have any traces of hafting or indications of impact scars but we cannot be sure because they are considerably affected by what we initially characterized as post-depositional surface modifications. Now we interpret these traces as intentional modifications of the flint surface, related to ritual activities taking place at the tomb (Chapter 7, fig. 7.4). It is likely however that impact scars would still have been visible if these tools had been regularly used, certainly because we looked at quite a large number of them. Experiments with the use of transverse arrowheads show that frequently entire corners break off upon impact (Fischer *et al.* 1984), a feature the points from the megaliths lack. Also, many of the transverse arrowheads seem to have been made in a rather haphazard fashion, with no attempt to regularize the shape. Some are so bent in cross-section that they would have been rather unstable arrowheads. It is therefore proposed that these objects were also especially produced to be given along with the dead and had not gone through a use-life prior to deposition.

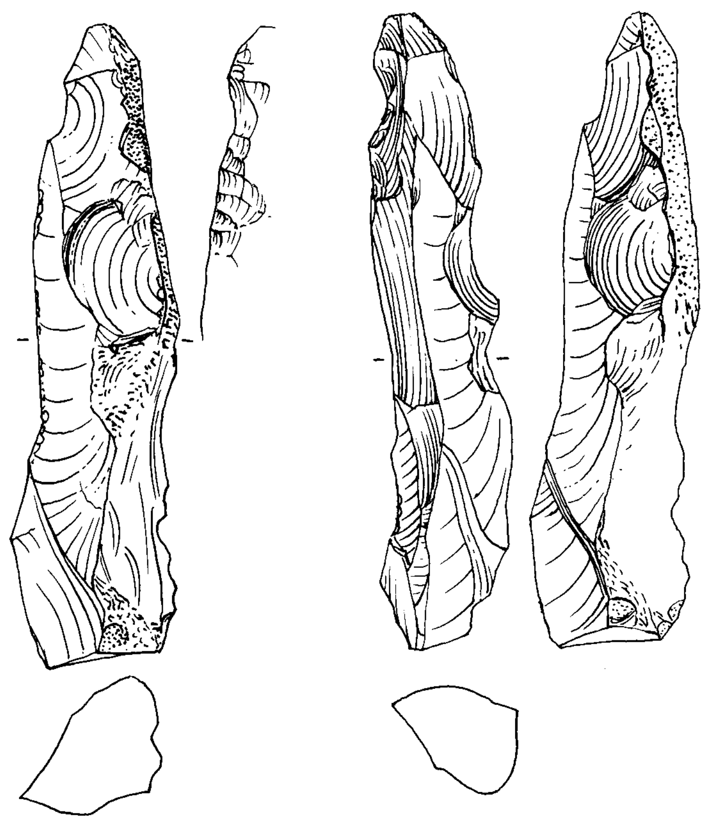


Fig. 6.10 Roughly knapped pick from the hunebed of G2 (scale 1:1).

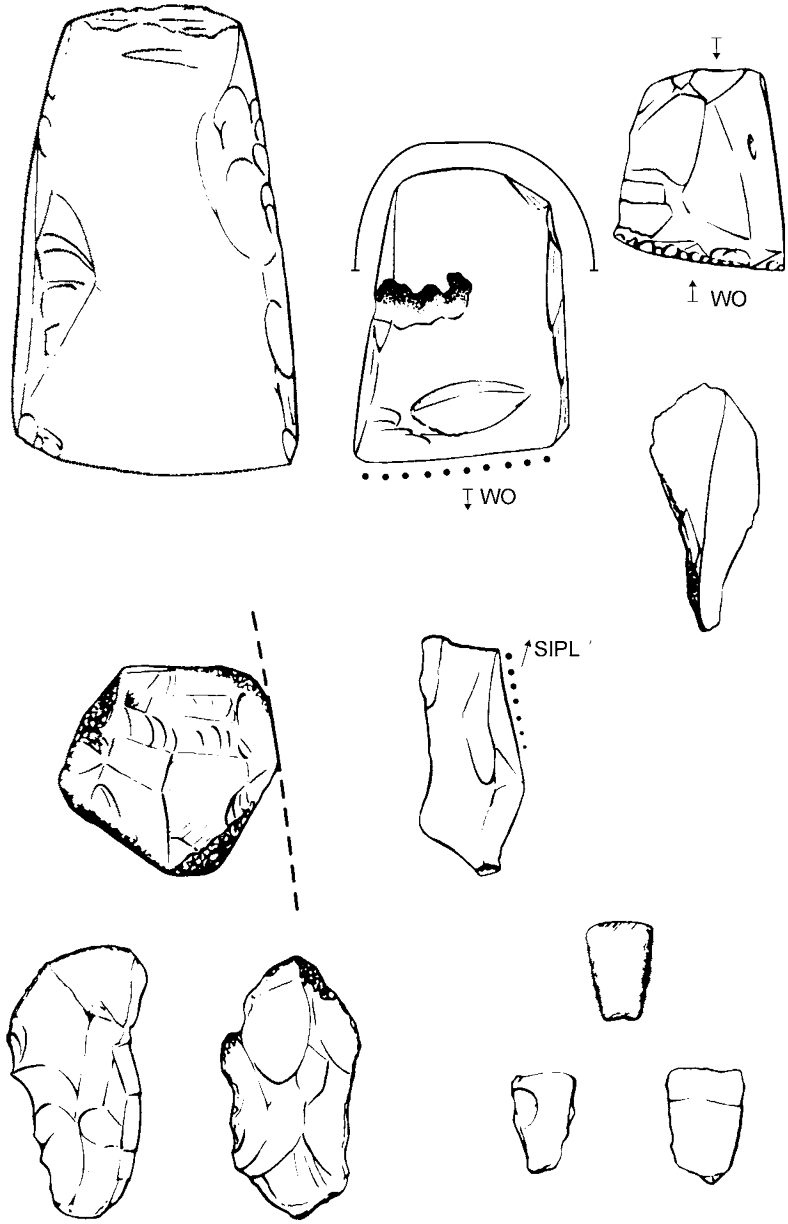


Fig. 6.11 Flint objects found in the stone cist of Diever dated to the TRB (scale 1:1).

Scrapers are occasionally found in the tombs. Some of those examined could not be interpreted due to extensive modifications. If traces were seen, they invariably derived from hide processing. The tools have rarely been used extensively, something that is quite remarkable because hide working traces are usually very well-developed. This may indicate that these are fresh hide working traces. Lastly, in order to obtain some idea of the uses the more informal tools were put to, a small sample of retouched and unretouched flakes was examined as well. Generally these flakes showed no traces of use.

Not everybody was buried in the *hunebedden*: some individuals were interred in flatgraves or incidentally in stone cists. The number of flint tools in flatgraves seems limited. In Angelsloo five TRB flatgraves were found but none of them contained flint grave goods (Bakker/Van der Waals 1973). Near

Heek, Kreis Borken, a total of 15 flatgraves were excavated, constituting a veritable cemetery. The burial goods almost solely consisted of ceramic vessels but one flint flake was encountered as well (Finke 1984). The only flatgrave with flint remains that could be studied microscopically was the flatgrave of Mander (Lanting/Brindley 2003/2004). The finds included an axe, several axe flakes and two transverse arrowheads. None of the axe flakes displayed any traces of use nor did the axe, but this latter object has probably been re-sharpened. One of the two arrowheads displayed the same strange scratches as other transverse points from *hunebedden* (Chapter 7).

Another TRB burial structure, the stone cist of Diever, has produced a number of flint tools (fig. 6.11). The cist dates to 3350-3300 BC and contained several TRB vessels, an amber bead, a nodule of marcasite, two flint pebble hammer stones, three flint axes, two flint strike-a-lights, a sickle blade, three transverse arrowheads and a few flint flakes (Bakker 1979). Three axes, a transverse arrowhead, a flake and the sickle blade were studied for traces of use. The largest axe had been re-sharpened before deposition and did not display traces of prior use nor of hafting. A smaller axe still showed traces of wood polish in the scars, but had subsequently been polished. The wood polish on this axe has comet-tails and a bevelled distribution, indicating that it was used to chop a relatively hard wood like oak. This small axe also has remnants of a black residue on its butt end, probably tar from the hafting arrangement. A last axe, even smaller than the previous one, had actually been used as a wedge. It has severe pounding marks on its butt end, and stacked hinge fractures on its cutting edge and occasional traces of wood polish. Again, this tool was ground and polished prior to deposition but no attempt was made to remove all the scars from use along the edge. In addition, a flake, the sickle blade and a transverse arrowhead were examined as well. The first two objects display strange scratch marks of the kind that is also visible on some of the artefacts from the *hunebedden*. These scratch marks are interpreted as the result of ritual activities surrounding the burials (Chapter 7). The flake has no use-wear traces, whereas the sickle blade shows polish from contact with siliceous plants and was indeed a harvesting implement. The transverse arrowhead also shows no traces of impact or hafting.

Largely, the burial kit of the individuals buried in the stone cist of Diever and the use-life of the objects, conforms with what we have seen in the communal *hunebedden*: the used and worn out axes that were re-sharpened prior to deposition, the used sickle blade, the transverse arrowhead without a use-life, are all features of the standard burial kit of the *hunebedden*. However, the combination of strike-a-lights and the nodule of marcasite is a very rare occurrence in Dutch TRB burials. A nodule of pyrite or marcasite was found in another ‘special’ TRB grave, the tomb of Eext (D13) with its unique stepped entrance (Bakker 1979). Recently Beuker found yet another specimen in *hunebed* D42-Westenes-N (Beuker 2008). This ‘fire making toolkit’ maybe seen as an indication of the special position the deceased must have held in past TRB society. The configuration of strike-a-lights and pyrite or marcasite recalls the burial of Schipluiden. In this site the grave was interpreted as having been of a religious specialist (Van Gijn *et al.* 2006). A similar explanation can be put forward in the case of the stone cists of Diever. However, even though we may see here an example of the expression of a special kind of personhood in TRB context, the rest of the burial kit explicitly refers to the communal nature of the burial rites, reinforcing the shared identity of TRB society.

What do these observations about the use-wear traces on TRB flint burial goods tell us in terms of identity? Although it is frequently assumed that burial kits provide evidence of the individual identity of the deceased, this is most definitely not the case with the *hunebedden*. The fact that they are communal burial places implies that there was not even meant to be any long-term association between individual bodies and specific burial goods. Rather it seems that the flint tools form part of an elaborate burial ritual that commemorated not so much the deceased individual but tied in with the communal values and beliefs. Several observations support this idea. First of all, there is evidence for extensive mixture and rummaging in the contents of the megaliths. Moreover the lack of (ordinary) use-wear traces on specific types of implements suggests that at least some of the flint objects were especially created for the occasion.[19] This pertains especially to the picks, a tool type that is virtually absent in settlement assemblages, but also to the transverse arrowheads, which are rarely found in settlements.[20] Both types of tools are present in varying quantities in the megaliths and display a rather haphazard method of production. Some of the picks were used as strike-a-lights, resulting in rounded and striated tips. Fire played a role in the burial ritual and it is no coincidence that strike-a-lights are found in the megaliths. The presence of axes and sickle blades in the *hunebedden* and their almost complete absence in settlement context is seen as an indication of the special importance of agricultural tools. These tools are related to the land and hence to the ancestral grounds. The sickle blades and the axes were, in contrast to the picks and the transverse arrowheads, not specifically produced to be given along with the dead, but were deposited in a used state. Assuming that agricultural activities like clearing fields and harvesting were communal activities, these tools closely tied in with the continued existence of the local group.

6.5.3 Vlaardingen and Stein

6.5.3.1 Settlement flint

Evidence of the Vlaardingen-group has been found in a variety of environments, from the coastal dunes to the inland riverine zone (fig. 3.4e). The sites share a similar pottery style but their subsistence pattern and their flint assemblage are more varied (Van Gijn/Bakker 2005). At Voorschoten and Leidschendam, situated on the coastal dunes, use was made of small rolled nodules of local flint that were worked by means of bipolar reduction. The resulting tools were small. Tool types include predominantly convex scrapers, thumbnail scrapers, bor-

19 Unfortunately refitting the large amount of material has never been attempted but would probably also be considerably impeded by the fact that much flint waste was probably never retrieved, because of the lack of sieving and the small size of the debitage. The character of the raw material, moraine flint, is also very difficult to refit.

20 It may be fruitful to systematically measure sizes and regularity of the transverse arrowheads from settlements versus those from *hunebedden*. I would expect the latter to be more irregular and to have more variability in terms of their metric proportions.

ers, small transverse arrowheads and an incidental arrowhead (Van Gijn 1990; Verhart 1983). The scrapers show signs of recurrent re-sharpening, suggesting that good flint was a rare commodity.

The Vlaardingen sites located on the river levees and on the old Pleistocene dunes, display a very different picture. There flint was evidently more abundant. It was for the most part of southern origin and brought to the sites in the form of nodules or (broken) polished axes. We find many artefacts with facets from polished axes, usually of the characteristic grey, mottled flint that is sometimes referred to as 'Vlaardingen flint' but really should be called light-grey Belgian flint; this material has a southern origin (Chapter 2). Even though the quality of the flint was higher than the material used by the Vlaardingen-groups on the coastal dunes, a blade technology is altogether absent. Tool types are basically similar to what is seen on the dunes, but of larger size and used less intensively. Scrapers and retouched flakes predominate, supplemented by some incidental borers and points (Van Gijn 1990). The use of the tools is of a very *ad hoc* nature. It seems it was not so much the overall shape of the implement the people were concerned with, but rather the actual edge. We thus find many unretouched flakes, sometimes of a general irregular shape, that were nevertheless used for a variety of tasks, notably bone tool manufacture and plant processing (Chapter 5) (fig. 5.8, 9.1). People seemed not to be overly concerned anymore with the exact morphology of their flint implements and were mainly interested in obtaining a functional edge.

6.5.3.2 Flint from Vlaardingen and Stein burial contexts

In comparison to the spectacular funerary monuments of the TRB culture, the Vlaardingen burial practices form a sharp contrast: no cemeteries or formal burials are known. At the site of Hekelingen III the remains of a 20-40 year old man were found who was cremated in a seated position, but no objects were associated with him (Hoogland 1985). At the type site of Vlaardingen four concentrations of human cremation remains were retrieved, again with no associated burial goods (Van Gijn/Bakker 2005). We therefore know very little about the burial practices from this period. The invisibility of the dead from the Vlaardingen period contrasts with the Stein-group, named after an unusual funerary monument: the burial vault of Stein, located in southern Limburg (Modderman 1964). The underground vault measures 5.5 by 1.75 m. and has a paved floor. The presence of four large post-holes indicates the former supports of a roof. The chamber probably had two compartments, very much like the French *allées couvertes* and akin to the *Galeriegräber* of Hessen. It contained the cremated remains of at least five adults and one child (L.P. Louwe Kooijmans/G. Maat pers. comm.). The grave goods included a vessel with an S-shaped profile, a small collared flask with a star-shaped collar, 96 transverse arrowheads and eleven bone points (fig. 6.12). An axe that was found in the spoil heap may be part of the burial kit. With the exception of the ceramic goods, most finds were burned, maybe along with the dead. The axe and 12 of the 96 transverse arrowheads were examined for traces of use and residue. The axe, of oval cross section and measuring almost 14 cm in length, is made of a light-grey Belgian flint, of mottled appearance and displaying coarser-grained enclosures. The implement appears to have been used, as it shows a bright, smooth polish along

Fig. 6.12 A selection of the flint arrowheads from the burial vault of Stein and the axe found in a nearby spoil heap.

the cutting edge, which results from contact with wood. The cutting edge also displays multiple phases of re-sharpening, applied from different angles. On the butt end several spots of friction gloss were encountered, indicating that the axe had been hafted. Whether the arrowheads were also used prior to their deposition is more difficult to determine. All twelve arrowheads were burned to such an extent that use-wear and residue had been obliterated. Still, some of the points did not display fire cracking and potlids were only minimal. Half of the examined points were not interpretable. The remaining six displayed impact scars on their functional edge, as well as traces of a black residue that was probably tar from hafting. This indicates that the points had been used. One explanation may be that that used personal implements were given along with the dead. However, considering the unusual configuration of the vault, it may be that we are dealing not with an ordinary burial but with a mass grave. If this is the case, the points would have been the cause of death of the individuals.

6.5.4 Identity and the relationships between TRB, Vlaardingen and Stein

How does flint figure in the representation of cultural identity during the Middle Neolithic B? It was shown that for the TRB people flint tools were significant in identity issues. This was probably not so much the case with the settlement flint, which testifies to a very opportunistic attitude towards raw material selection, tool production and use. However, the highly structured composition of the flint assemblage in burial context indicates that flint was very much part of the TRB *habitus* and played an important role in constructing TRB identity. This is also indicated by the structured deposition of oversized axes of northern origin (Chapter 7).

In contrast, it is likely that the Vlaardingen people did not consider flint as something important in the expression of their own identity: flint tools were made and used in a very opportunistic fashion. Raw material selection was not systematic and does not display a distinct preference for a particular type of flint. With the exception of the arrowheads tool types are indistinctive. It is likely that the Buren-axe, made of southern light-grey flint and with a distinctive oval cross-section, constituted some sort of identity marker. Stein communities may have played a role in their production (Bakker 2006). Their distribution, encompassing areas inhabited by TRB, Vlaardingen and Stein-groups, suggests that they may have had a special significance. Because many of these axes are stray finds, they were not included in the use-wear study so knowledge about their life-history is not available. We do know, however, that broken Buren axes were frequently used as cores by Vlaardingen flintknappers (Metaxas in prep.; Van Gijn 1990; Verhart 1983). Whether this is due to an opportunistic attitude on the part of the Vlaardingen people, - broken axes constituting perfectly prepared cores -, or whether the axes were preferred for tool making because of their exotic origin and aesthetic qualities, is difficult to ascertain without a thorough quantitative analysis of polished axe fragments from different contexts.

We have only a few indications of contacts between the Vlaardingen and TRB society. Only during the later phases of the TRB do we find evidence of mutual contact, like for example the presence of a typical southern axe of the Buren type that was deposited in a TRB flatgrave in Denekamp (Van Gijn/Bakker 2005), an axe of oval cross-section from megalith D19 made of light-grey Belgian flint and a complete Vlaardingen ceramic vessel in Kootwijk. Vice-versa, we know of a TRB pottery fragment in the Vlaardingen levels of the Hazendonk and of TRB sherds in the recently excavated Vlaardingen site of Hellevoetsluis. However, the typical TRB large transverse arrowheads that occur so frequently in burials are never encountered in contemporaneous Vlaardingen assemblages. We thus find only an occasional TRB find outside of the TRB distribution area, such as some knob-butted axes in the southern Kempen region (Van Gijn/Bakker 2005), but the smaller flint tools have not crossed the 'borders' and thus had no significance in communicating identity to outsiders. So, even though the TRB and Vlaardingen interaction sphere are not mutually exclusive, the Vlaardingen-group seems to have had its contacts mainly to the south, the TRB to the north (Louwe Kooijmans 1983). This changed in the later TRB and Vlaardingen period and evidence of contacts became even more pronounced during the subsequent Late Neolithic A.

6.6 Conveying special kinds of personhood: the Single Grave culture

6.6.1 Settlement flint

The Single Grave culture (2900-2450 BC), part of the Corded Ware complex, is the time during which the ard is introduced and the first disc wheels appear. In terms of the flint technology the trends already outlined for the TRB culture continue and intensify. Settlement flint is still relatively numerous - a site like

Kolhorn for example has produced over 10.000 flint artefacts - but clearly less and less effort and skill is put into the production of the utilitarian flint. Peeters has made a thorough technological study of the flint from the site of Mienakker, an early Single Grave encampment occupied during the early spring and summer, used for herding cattle and fishing and hunting (Peeters 2001a). He concludes that the technology is opportunistic, making use of small flint nodules and the recycling of broken polished axes. The number of formal tools is very small, with scrapers and borers as the most frequently occurring tool types and a general absence of a standardized technology. Occasionally a stemmed arrowhead is found in a settlement as in Aartswoud (Van Iterson Scholten/De Vries-Metz 1981). A similar picture emerges from the sites of Molenkolk 2 and Maantjesland. Here more than 90% of the artefacts were flakes, formal tools only constituting less than 10% of the assemblage. Most of the artefacts were made from moraine flint that was available at the nearby outcrop of Wieringen (Peeters 2001c). This was also the case with Aartswoud, where broken axes were used as a source of raw material, similar to what was demonstrated for the Vlaardingen sites (Van Iterson Scholten/De Vries-Metz 1981). Such an opportunistic use of raw materials seems quite typical for the later half of the Neolithic. It remains difficult, however, to make comparisons as excavated sites from the Single Grave culture are largely limited to those found in the province of Noord-Holland (Hogestijn 2005).

All in all, it does not seem very likely that the settlement flint, used for daily activities, was imbued with much stylistic information. The characteristic stemmed arrowhead may be the only tool type from settlement context that was used to signal collective identity. Again, it concerns a relatively public tool, visible to those involved in hunting or warfare, making it an appropriate vehicle for information exchange. Otherwise the *ad hoc*, opportunistic use of flint suggests that choices were primarily based on pragmatic motives, and not so much determined by tradition. Flintknapping was done within a domestic context for tasks around the house. Besides locally available moraine flint, broken axes formed an important source of raw material. This is a practical choice because broken axes form perfect cores, having a production platform and prepared core face. These axes, upon breaking in the course of their use-life, still constituted an aesthetically pleasing material that was not only easy to use as a core but also ‘pleasing to look at and good to feel’. The very fact that these axes were made of exotic flint and frequently were part of the Single Grave burial package, may also have contributed to their ‘specialness’. The same ambiguity may apply to the recycling of a broken dagger-fragment of Grand-Pressigny flint at Mienakker (Peeters 2001a). Daggers of this honey-coloured flint form an important element in the burial kit of the later Single Grave period (see below). Using this piece of flint may therefore not only be driven by pragmatic but also by aesthetic, and maybe even ideological, motives: reverence for an exotic raw material out of which one of the most conspicuous elements of the Single Grave burial kit, the daggers, were made of.

Unfortunately we know nothing of the hidden choices of tool use, as so far no settlement material from this period has been examined for traces of wear. Without data on the choice of tools for specific activities it is very difficult to ascertain how the Single Grave people regarded their own flint technology. The newly started Odyssee-project *Unlocking Noord-Holland's Late Neolithic treasure chest* will provide in this lacuna.

6.6.2 The role of flint in the Single Grave burial package

6.6.2.1 Introduction

The Single Grave burial practice is characterised by burial mounds erected over the grave of one single individual. Occasionally secondary internments are present, but nevertheless the change from the communal burials in the *hunebedden*, to the individual deposition in burial mounds is considerable and has led various authors to postulate changes in the social structure (Fokkens 1998a). The fact however that flatgraves were present both in the later TRB and in the Single Grave culture and that various other aspects of Single Grave material culture show much resemblance to the preceding TRB 'package' indicates that there is also substantial continuity between the two periods.

The flint objects from a total of 14 Single Grave barrows and three flatgraves were examined microscopically (Appendix). Many of the burials from which flint material was examined could unfortunately not be attributed to a subphase of the Single Grave culture and were therefore dated anywhere between 2900-2450 BC (Lanting/Van der Plicht 1999/2000, 2003).

The Single Grave burial kit has previously been described and studied (Hulst *et al.* 1973; Lanting/Van der Waals 1976). Most graves contain a ceramic vessel of the Protruding Foot or All Over Ornamented Beaker type, supplemented by three or four additional objects (fig. 6.13). This can either be a small flint

Fig. 6.13 The burial kit from the Single Grave barrow of Renkum, containing a flint axe and a blade of northern flint.

and/or stone axe, a stone object conventionally called a battle axe, one (or incidentally two) unretouched blades of imported northern flint, some roughly shaped amber beads, or, in the final phases of the Single Grave culture, a dagger of French Grand-Pressigny or Romigny-Léhry flint. There does not seem to be a difference between the composition of the burial kit from barrows and the one from flatgraves.[21] In the following I will first describe the burials with unretouched blades and flint axes. Because the graves with daggers date from the final phase of the Single Grave culture, they will be dealt with in a separate paragraph.

6.6.2.2 Burials with unretouched blades of northern flint, axes and arrowheads

Blades of Scandinavian flint were found in both barrows and flatgraves. They seem to have been imported as finished products because there is no evidence of production waste known from Single Grave context. At Nieuw-Dordrecht a hoard of seven such blades was found, along with a very large rectangular axe of Lindø type (Harsema 1981) (fig. 2.1). On the basis of the latter, this deposition may therefore be dated to the transition from TRB to Single Grave period, suggesting that the import of these northern blades dates from the earlier phases of the Single Grave culture. The blades are made of northern flint and are generally well made, probably by means of soft hammer percussion. They are fairly large: their average length is just over 10 cm (range from 5.4 to 15.7 cm) and they have not been retouched. None of the blades from the Nieuw-Dordrecht hoard displays traces of use, nor does the large axe.

In most burials only one blade was deposited, on four occasions (the barrows of Lieveren, Eext Tumulus I, and Borger Tumulus VI and the flatgrave of Angelsloo) two blades. Some of these blades were abundantly covered with ochre. Most of the remaining blades showed vague traces on several zones but these do not seem to be related to actual use but rather to incidental damage or to packaging or transport. Two blades displayed traces of tar, in combination with friction gloss, indicating that they had been hafted. The blades of northern flint are therefore not intensively used or not used at all. It should be noted, however, that all of the blades studied but one, originated from the northern province of Drenthe. A blade from a recently excavated barrow near Ede on the Veluwe displayed traces from contact with hide and siliceous plants. This tool was hafted and the polish is very similar to the type observed on the Grand-Pressigny daggers that are found in some of the later Single Grave barrows. This hafted blade can be seen as a 'look-alike' of the larger Grand-Pressigny counterparts, but serving a similar function (see below).[22] This is in support of the observation of Van der Beek that (retouched) blades and Grand-Pressigny dag-

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21 This cannot be quantitatively substantiated until a systematic inventory is made of all the known Single Grave barrows and flatgraves along with the composition of their burial kits. This was not done for this study. Instead, only a sample of burial contexts were examined in further detail (Chapter 3).

22 Drenth refers to these pointed blades as pseudo-Grand Pressigny daggers (Drenth 1990). Unfortunately a clear definition of what exactly constitutes a pseudo-GP dagger is lacking and it is not clear which blades need to be subsumed under this category. I therefore have not used this term in this book.

Fig. 6.14 The contents of the Single Grave flatgrave of Hijken. Note the fact that it concerns a large and a small axe.

gers are never found together in one grave and may thus have a similar meaning (Van der Beek 2004). The blade from Ede also indicates that there may be more variability in Single Grave burial practices, not only in the type of objects given along to the dead, but also in the actual biography of these gifts.

Flint axes form another integral part of the burial package. Occasionnally, we find a large and a small axe in one barrow (fig. 6.14). It seems as if this juxtaposition of small and large was intentional; maybe they were linked with different types of wood working or they may have had different symbolic connotations. Eleven axes from Single Grave burials were studied for wear traces and residue. Their mean length was 12 cm but this varied substantially from a mere 2.5 to 27.0 cm (in the case of the axe from Vaassen). This latter axe, because of its exceptional size, clearly falls outside of the range of 'usable axes' and indeed displays no signs of use or hafting (Appendix). If use-wear traces were encountered on the axes, it always concerned traces from chopping wood (fig. 6.15). If used, they were invariably also hafted, shown by the presence of friction gloss and sometimes black residue. Traces of ochre were occasionally present. They were re-sharpened prior to their deposition in the grave, and sometimes showed multiple phases of polishing or grinding. This re-sharpening was not always effective in a utilitarian sense, as shown by an axe from a Single Grave burial found in the recently excavated site of Hattemerbroek-Bedrijventerrein Zuid. The edge of this axe was perfectly polished prior to deposition but instead of

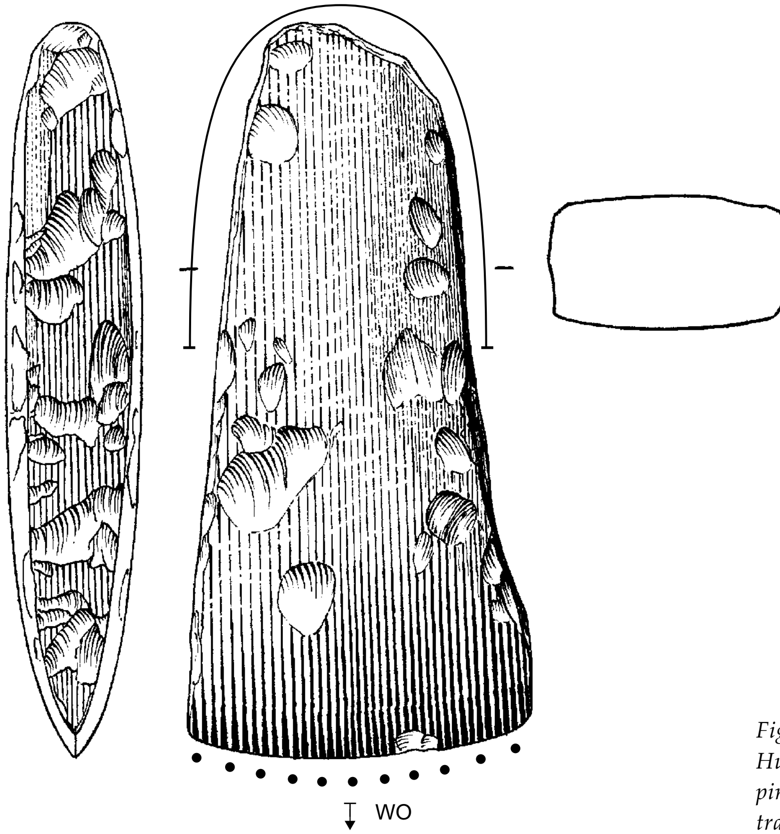


Fig. 6.15 Axe from Eext-Huttenheuvel used for chopping wood and displaying traces from hafting (scale 1:1).

sharpening the edge, it actually dulled it. It seems therefore that the aim was to remove the traces of use rather than to actually sharpen the edge (pers. oberv. of the author) (Lohof *et al.* in prep. a).

The grinding or polishing marks on the Single Grave axes are very different from those seen on their TRB counterparts: polishing traces are also present in the more pronounced flake scars, indicating that the stone surfaces were not ground on a sandstone slab, but were probably treated with a softer, more pliable material. Preliminary experiments with polishing flint with leather, water and sand, show similarities to the polishing marks on the archaeological specimens, but need to be further extended.

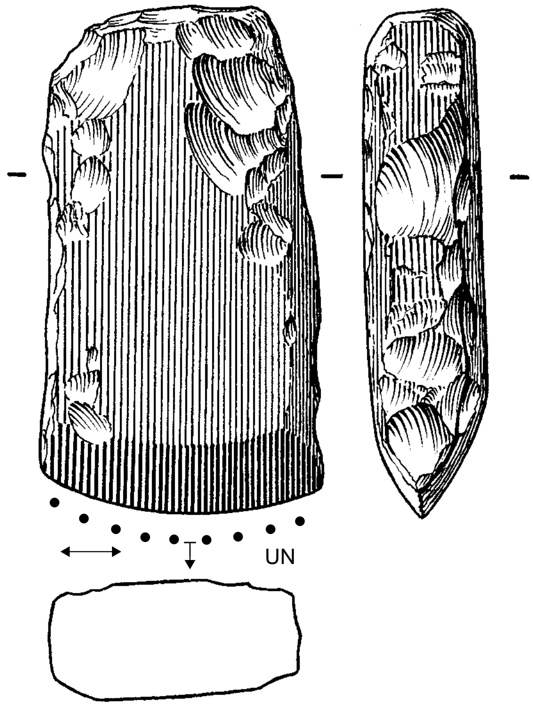
Arrowheads have not been found in Single Grave burials, with the exception of Tumulus I at Borger, which possibly must be dated to the very early Single Grave culture. This barrow produced eight arrowheads, four of which were reported to be transverse (hence TRB), four were of the typical Single Grave stemmed variety. However, at least three of the so-called transverse arrowheads were actually broken and transformed stemmed specimens. All of the points display traces of use. It may therefore be proposed that these transformed arrowheads were broken during use, to be subsequently rejuvenated for deposition in the grave. Because of the quantity it is unlikely that they could be the cause of death of the person interred.

Last, a number of Single Grave barrows contained unretouched flakes. This is for example the case with the barrow of Putten in which, besides a Grand-Pressigny dagger, a flint axe, a beaker and a battle axe, four unretouched flakes were found (Van Giffen *et al.* 1971). Other examples of the presence of unretouched flakes include Eext-Bergakkers barrow 2 (Jager 1985) and the barrow at the Eese (Waterbolk 1964a). In one of the recently excavated Single Grave burials from Hattemerbroek-Bedrijventerrein Zuid, this was also the case. Here eight unretouched flakes were excavated, only one of which displayed lightly developed traces of wear (pers. observ. of the author).

6.6.2.3 The French daggers of Grand-Pressigny and Romigny-Léhry flint

From c. 2600 to 2450, that is the later Single Grave culture (often referred to as the All Over Ornamented (AOO) period), we occasionally find another grave good: beautifully made daggers on very long blades made of French Grand-Pressigny and Romigny-Léhry flint (fig. 2.4). It is not always easy to differentiate between these two types of flint (Polman 1993). The number of such French daggers in the Netherlands is small: a cursory inventory produced c. 40 complete daggers or dagger fragments. Only thirteen complete daggers were situated in certain grave context, several others were most likely from destroyed barrows. These daggers are found across the entire Netherlands: in the north they are associated with Protruding Foot Beakers, in the south with All Over Ornamented (AOO) beakers (Drenth 1990, 1992). As 86 barrows are surely dated to the Single Grave and AOO period (Q. Bourgeois pers. comm.), only 15% of the barrows contained a French dagger. Fragments of daggers are, however, regularly found in settlements, where they are modified into practical tools. It is likely that especially the number of dagger fragments, modified into other types of tools, is substantially higher because they are not always recognized. It looks as if the daggers came as finished but unused implements to the area of the Netherlands as we have no evidence for local production in the form of exhausted cores or production waste. Such production waste, like the famous *livres de beurre*, is abundantly present at the source area of the honey-coloured Grand-Pressigny flint in La Touraine, at a distance of c. 700 km from the region of the Netherlands.

The blades from which these daggers are made vary between 25 and 35 cm in length and 4 and 6 cm in width. They display a very particular platform preparation that facilitates the removal of these long blades by indirect percussion (Pélegrin 2006). The bulb of percussion is diffused and percussion waves are absent. The blades only display traces of modification on their dorsal surface, which is covered with beautifully executed surface retouch, often in combination with grinding and polishing (fig. 2.4 and 6.16). The ventral surface on the other hand was left completely untouched. It should be stressed that it is the ventral aspect which holds the clues about the production technique. The fact that so little traces of production are present on the ventral aspect of these blades is, I would argue, highly significant. The makers of these blades deliberately developed a technique (one very difficult to replicate, as experiments by Pélegrin have shown) that would result in a lack of normal technological traces. It almost seems as if the intention was to hide any evidence for the human production of these blades. Instead, the suggestion is made for a non-human origin of these exceptional blades (Helms 1993). These blades originated in the world



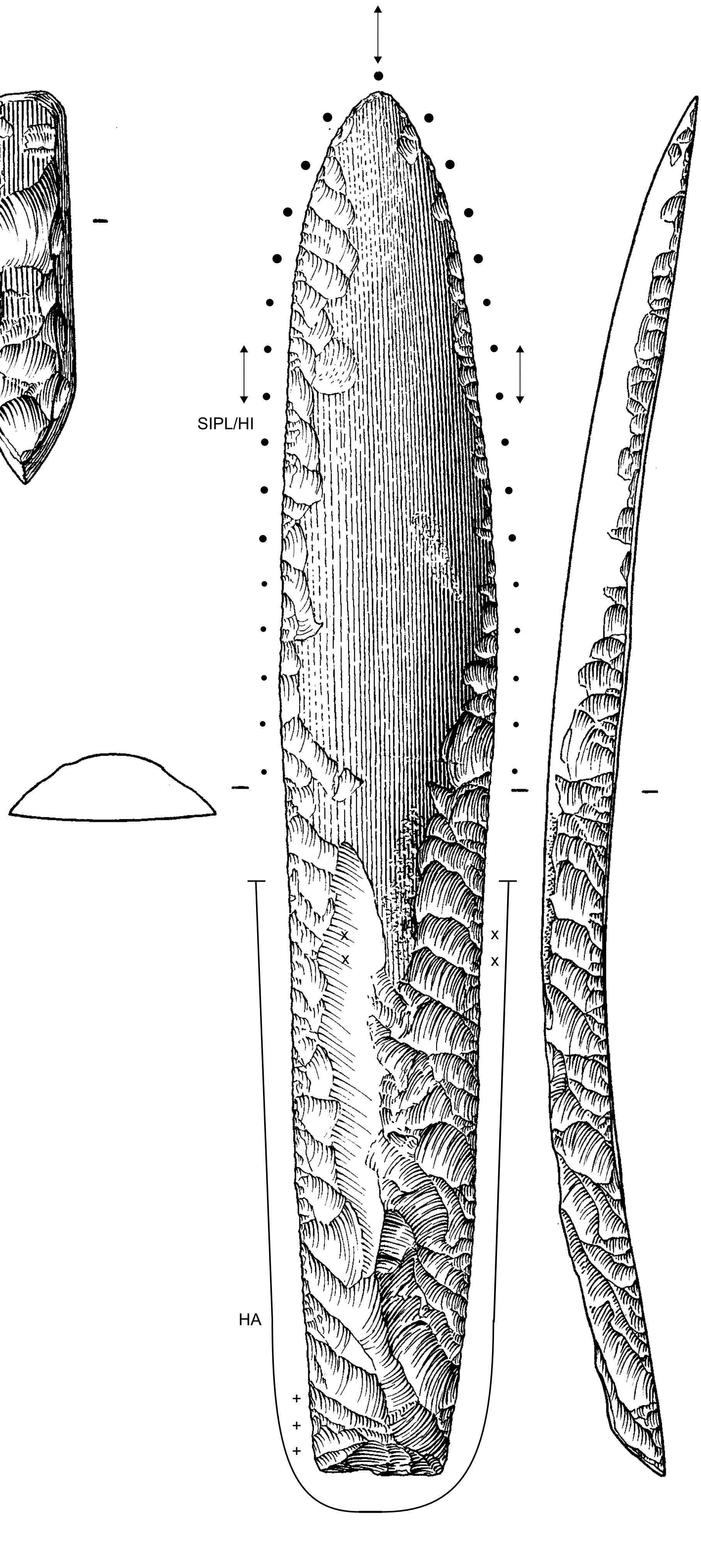


Fig. 6.16 Grand-Pressigny dagger from Eext-Galgwandenveen with wear traces and axe found in the same grave (scale 1:1).

beyond that of daily community life and were therefore suited to partake in the long-distance exchange networks of the larger Single Grave society.

Eight complete French daggers from Single Grave barrows have been examined for traces of residue and wear. They all display the same wear pattern: a plant-like polish, sometimes vaguely resembling the polish that results from contact with hide, distributed all along the edges and ridges. The directionality of the polish is strictly parallel to the long axis of the implement and does not follow the shape of the cutting edge. At first sight these tools seem to have been used to cut plants. Recent microwear research of French and Swiss daggers has indeed shown that they were used to harvest cereals (Beugnier/Plisson 2000; Vaughan/Bocquet 1987). The daggers in Dutch Single Grave context, however, were definitely not used for cutting plants. If they had been used for cutting plants the use polish would have been most well-developed on the edge, gradually fading out as you move away from the edge. Instead, the edges are only moderately worn and well-developed polish is also present much further into the tool's surface, especially on the dorsal ridges. Additionnally, the directionality of the polish would not be strictly parallel to the long axis of the tool, but instead would have followed the shape of the edge.

The daggers also show traces from hafting, including friction gloss and a plant-like polish with no directionality. Hafting arrangements seen on archaeological specimens from the French and Swiss lake-side settlements show quite some variability. The plant-like gloss located on the hafted part of the Dutch daggers may be due to an arrangement such as that seen on a dagger retrieved at Charavines: first the dagger was covered with a soft plant material, maybe grass, after which it was bound with roots (Bocquet 1984). This way of hafting would explain the presence of both the plant polish without directionality and the patches of friction gloss.

The configuration of traces on the complete daggers of French origin found in the barrows in Drenthe and the Veluwe indicates an alternative interpretation that differs from the one proposed for their French and Swiss counterparts. I suggest that the plant-like polish on the blade is due to contact with a sheath, made of woven plant material. This sheath could have been made of plaited siliceous plants or from bast; bast can cause polish that is very akin to the one caused by hide. Still, it cannot be excluded that hide also formed part of the sheath. Frequent contact with a sheath would explain the curious distribution of polish on the blades: only a moderate development on the functional edges and presence on the dorsal ridges. The daggers, that were definitely hafted, must have been pulled in and out of this sheath numerous times to account for the development of the wear traces. In combination with the absence of utilitarian traces, I would argue that these daggers have been pulled in and out of their sheath not to be used, but in order to be displayed, most likely at special occasions.

It is tempting to see these daggers as typical male display items. Because they are classified as *daggers*[23] they are frequently seen as reflective of a martial identity, in congruence with the old war-like image of the Single Grave culture.

23 Some authors are careful in their designation of these 'daggers' and refer to them as 'knives' (Van der Beek 2004).

From this perspective the daggers can be seen as paraphernalia of a special kind of personhood, reflective of the prowess of the, supposedly, male warrior buried with it. There is, however, a different explanation possible. It should be noted that the majority of the French and Swiss Grand-Pressigny daggers originate from settlement context, where they ended up after a long use-life as a harvesting tool. These exhausted daggers were also sometimes deposited in burial kits; complete daggers, however, were not present in these burial contexts (Beugnier/Plisson 2000). The different attitude versus these objects can be interpreted as a reflection of a different value attributed to them: whereas in France there seems to have been a pretty constant supply of daggers, this was certainly not the case in the Netherlands. There the small number of Grand-Pressigny daggers indicates it was a rare item that only occasionally made its way to the north. This rarity may explain why these objects were treated as 'special', rather than as integral parts of the technological system as seems to have been the case in the French and Swiss context.

There are other arguments why these so-called daggers may not have been connected with martiality. Firstly, the long and quite fragile blades, with a concave cross-section, would not have made very effective stabbing devices: they are likely to have snapped upon impact. I also consider it unlikely that such a specific tool type underwent a substantial conceptual change of function: from a harvesting tool, used in communal activities, to a dagger associated with the martial identity of the person it is buried with. Although we do not know how these objects were transported to the north, it is unlikely that such a distinctive object would entirely loose its symbolic connotations in a new setting. Last, the Grand-Pressigny daggers are commonly associated with male burials but until solid evidence is available as to who was buried in these mounds, we will not know whether they were associated with male or female deceased.

6.6.3 Single Grave personhood

We know very little about Single Grave lithic technology in general as hardly any domestic flint material has been studied. More is known about the role of flint in the burial practices although it should be stressed that we have only a fraction of the total number of dead represented in our record. The considerable change in burial practices from the preceding TRB can be explained as a change in the perception of individual personhood. The communal burials of the TRB reflected a concern with the continuity of the social group and stressed the link to the local ancestors (the tomb group). Individuals were invisible in these tombs and were part and parcel of the communal identity and its continued existence. The tombs and their contents were deeply embedded in the history and genealogy of the local group. The grave gifts deposited in these places were often objects associated with communal activities performed by the local group such as usable axes, cereal harvesting tools and arrowheads. Only in the later TRB flatgraves and in the special stone cist of Diever are we dealing with individual burials. The shift to the Single Grave practice of individual burials in barrows has often been interpreted as a reflection of social differentiation and competition between different groups (Drenth/Lohof 2005; Lohof 1994). In such a competitive setting we would expect a redundancy of objects, but the number of preserved grave goods rarely exceeds four or five items. The Single Grave burial package is relatively restricted in terms of the range of objects represented and even though the exact composition varies, the choice was limited and socially circumscribed and reflective of the specific kind of personhood of the deceased. Still, even though evidence for social competition is absent, the small number of barrows, in comparison to the total number of deaths which must have occurred, indicates that those buried in barrows must all have had a special kind of personhood.

At first sight the Single Grave burial package seems relatively circumscribed, a feature we can observe over large distances and which indicates that long-distance relationships existed and that local Single Grave communities made reference to a joint identity through their material culture. These common practices indicated and consolidated a certain social cohesion, supporting unity rather than competition (Van der Beek 2004). However, there does seem to be some variability in the choice of objects found in each grave and also in their exact biography. This indicates that there are variations in the way the dead are represented in the funerary ritual, albeit within the bounds of 'standard Single Grave practice'. This is an avenue which needs further exploration and which can only be addressed in a wider, contextual approach such as the Ancestral Mounds project.

A last point is that the Single Grave culture in its early phases seemed to have had links to the north, at least from the perspective of the flint assemblage: the axes and blades found in burial context, all derive from southern Scandinavia or northern Germany. This can be seen as a continuation of TRB traditions. The shift to the south around 2600 BC concurs with the adoption of All Over Ornamented beakers over much of France and Great Brittany, and thus to the establishment of new networks of exchange.

6.7 The domestication of flint: the Bell Beaker Culture

6.7.1 Introduction

Around 2500 BC we see the emergence of the Bell Beaker culture. Whereas in the preceding periods the main rivers divided the territory of the Netherlands in a northern and a southern interaction area, during the Late Neolithic B all of the Netherlands are part of the contact sphere of the Bell Beaker culture (Fokkens 2005). Clearly, in terms of the pottery and burial kits, this is a very distinctive archaeological entity and quite a substantial number of Bell Beaker barrows have been excavated in the course of the years. Unfortunately, flint tools are an infrequent occurrence in Bell Beaker funerary context. Our knowledge of settlement flint is limited because the number of sites without any mixing with earlier or later find material is exceedingly rare.

6.7.2 Settlement flint

Settlement flint is characterised by the use of locally available material, even if this material was of inferior quality. Generally speaking the knapping technique can be typified as opportunistic and the number of formal tools is very limited.

In Molenaarsgraaf, dated to the transition between the Bell Beaker time and the Early Bronze Age, so-called terrace flint was the predominant raw material from which flakes were produced, blades being absent (Louwe Kooijmans 1974). Scrapers, usually round and quite small, were the most important formal tool type, followed by borers and retouched flakes. One tool may have been a strike-a-light (Louwe Kooijmans 1974, fig. 97a). At the Meerloër Heide (Verlinde 1971) no study was made of the raw material used, but the photographs in the publication show quite distinctive tool types such as tanged-and-barbed arrowheads, arrowheads with a concave base and retouched knives that are usually referred to as Bell Beaker knives (Lanting/Van der Waals 1976). There too, strike-a-lights were probably present: the tools described as borers (Verlinde 1971, fig. 8) certainly merit a detailed inspection whether or not they display the characteristic battering damage. Other supposed Bell Beaker sites such as Oldeboorn have mixed assemblages (Fokkens/Van Gijn in prep.). At Oldeboorn several typical Bell Beaker finds were found such as three Bell Beaker knives (fig. 6.17) and two tanged-and-barbed arrowheads (Van Gijn 1983). Although it is impossible to separate the flaking debris from the different periods of occupation, it seems that the general technology was opportunistic.

Two characteristic Bell Beaker tool types from settlements may have been significant in signalling cultural identity: arrowheads and Bell Beaker knives. Both types also occur in burial context. Arrowheads had a function outside the settlement – in hunting and warfare – and their shape probably conformed to the cultural norms of Bell Beaker society. The few that were studied from settlement context all display traces of impact, indicating that they were probably maintained in settlement context. Only a few Bell Beaker knives have been subjected to a use-wear analysis so far. Two Bell Beaker knives from the settlement of Oldeboorn did not display traces of use (Van Gijn 1983), but a recent find from Naaldwijk, made of Grand-Pressigny flint, was used as a strike-a-light (K. Wentink, pers. comm.). Clearly this type of object merits a more thorough study in the future. To conclude, it seems that although most of the flint in-

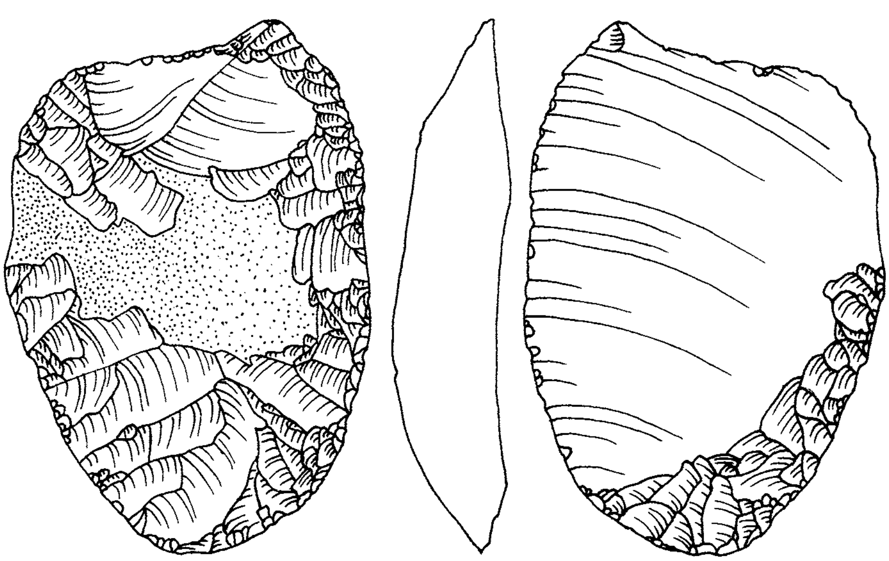


Fig. 6.17 Bell Beaker knife from Oldeboorn (scale 1 :1).

dustry of this period is of an opportunistic nature, directed towards domestic tasks taking place within the confines of the house or the settlement, some tool types do have a distinct style that probably had some sort of signalling function in terms of identity: it was, apparently, imperative to make the right kinds of arrowheads and knives.

6.7.3 Flint in Bell Beaker funerary context

The Bell Beaker burial kit has already been extensively described and discussed (Lanting/Van der Waals 1976). It is said to concern a highly standardized set of burial gifts, often referred to as the Bell Beaker package. In many respects there is considerable continuity with the preceding Single Grave Culture: in both contexts the pottery vessel forms the central element of the burial kit, which is always present, even in the absence of other items. Other characteristic burial gifts include copper tanged daggers, wrist-guards and V-perforated amber buttons. Only a few types of flint implements are encountered in Bell Beaker context: the so-called Bell Beaker knives, and triangular tang-and barbed arrowheads. In addition unretouched flint flakes are frequently found, illustrated for example by the contents of the barrow at the Ginkelse Heide (Butler/Van der Waals 1966, fig. 4a-b) and a recently found grave from the Hanzelijn where 32 pieces of flint were found (Lohof *et al.* in prep. b).

The number of Bell Beaker burial sites from which flint was studied for traces of wear and residue is limited: only the flint tools from the barrow of Lunteren and from the graves of Angelsloo and Buinen were examined. In the three burial sites in question the range of flint implements was limited to arrowheads, all of them bifacial triangular points with tang and barbs, although the types from the barrow of Lunteren vary somewhat in shape (Butler/Van der Waals 1966, fig. 13b). The retouch is usually very regular, covers the entire surface of the points and has probably been applied by means of pressure retouch. As copper was available by this time, the points were especially scrutinized for evidence of residue from an eventual copper pressure tip. No copper residue was found however, but obviously this does not necessarily mean that no copper tips were used for applying pressure retouch.

The five arrowheads from Buinen display an unusually fresh surface. Northern flint was used for their production, possibly import material as the quality of the stone was high. The edges and ridges are very sharp and half-removed slivers of flint are still present. Great care was put into their production: the cortex was removed and the points were trimmed to an even thickness of c. 2 mm. They are clearly the work of a skilled flintknapper. No traces of impact were seen on their tips. Also, no evidence for hafting was found. Two points show abrasion of the barbs that is also seen on points from contemporary settlement assemblages (Van Gijn 1983) (fig. 8.4). It is not clear whether this abrasion was applied to facilitate a haft, allow easier penetration, or whether it had another, still unclear reason like strengthening the edge during pressure flaking. The 14 points recovered from a grave with cremation remains found between the Bronze Age houses of Angelsloo display a similar picture: they are of excellent workmanship and have very sharp edges, although a few specimens are a little thicker (fig. 6.18). Because they were all burned, the raw material from which they were made could not be determined. Despite of the burning most of the points remained completely intact, with no potlids or extensive heat cracking. It is tempting to see this burning as an intentional, carefully controlled act, aimed at obtaining the beautiful white colour that these points display. Just like the points of Buinen, the points lack any impact scars.

The Bell Beaker barrow of Lunteren (grave 1) is one of the most spectacular burials of this period. Not only does it contain a beautifully decorated beaker of Veluwe type and a wrist-guard, it also contained a set of tools that are interpreted as a metal worker's toolkit (Butler/Van der Waals 1966). The flint tools, consisting of concave-based, triangular or barbed-and-tanged arrowheads and a small flint axe, are only of moderate interest in comparison to the other spectacular finds, but they were nevertheless subjected to microscopic analysis. The axe, actually a rare occurrence in Bell Beaker funerary context, displays traces from wood working and the friction gloss on its butt end indicates it was hafted. It almost looks like a re-cycled larger axe. The arrowheads are made of moraine flint. They are beautifully shaped by pressure retouch, covering the total surface and creating points of an even thickness along their entire length (of c. 2 mm). There is also some evidence of an improvised method of flintknapping: one point that was probably intended to be a tang-and barbed arrowhead, was modified into one with a hollow base because one of the barbs broke, either through previous use or during manufacture. None of the examined points showed any traces of use, nor of hafting. Impact fractures have not been observed. This corresponds with the lack of such traces on the points deriving from the contemporaneous graves.

Recently, four Bell Beaker burials were excavated at Hattemerbroek (Lohof *et al.* in prep.a, b). In grave 1 at the site of the Hattemerbroek-Hanzelijn a small Bell Beaker knife was found. It has been used to scrape a soft pliable material

Fig. 6.18 Burned arrowheads from the Bell Beaker grave of Angelsloo, Drenthe.

(pers. observ. of the author). As is the case with all of the Bell Beaker knives in both burial and settlement context (fig. 6.17) the bulb of percussion has been retouched away. Unfortunately, this knife forms the only Bell Beaker knife from burial context that was studied microscopically.

In comparison to the preceding Single Grave burial set, that of the Bell Beaker culture displays more variability and seems to allow for the representation of special kinds of personhood. This is exemplified by the grave of Lunteren, in which cushion stones were found that suggest the deceased to have been a metal worker or the Late Bell Beaker/Barbed Wire burial of a 30 year old man in Molenaarsgraaf (Louwe Kooijmans 1974) who was buried with an antler pick, three bone fishhooks and some flint flakes, possibly the implements symbolizing the way this person used to provide in his livelihood. Nevertheless, the almost universal presence of the ceramic vessel, as well as typical Bell Beaker elements like the V-perforated buttons, indicates that it was equally important to adhere to a common Bell Beaker tradition that linked people across vast distances in social networks. Most likely, these networks involved long-distance travels by individuals who may have acquired a special position in society, not one solely related to individual prestige and power, but one that was commensurate with the local group.

6.8 Two flint technologies: the Bronze Age

6.8.1 Introduction

In the Bronze Age flint continued to be used, although the contribution of flint in the technological system has greatly diminished. The Barbed Wire Culture, encompassing the Early Bronze Age, has pretty much the same distribution as the preceding Bell Beaker culture (fig. 3.4g). It is during the Middle Bronze Age that we observe regional differentiation, justifying the distinction of three different cultural groups: the Hilversum, Elp and Hoogkarspel culture (Fokkens 2005, fig. 16.3). These cultural differences may be visible in other aspects of the material culture, but the flint industry from settlements is so indistinctive and poorly described, that I will not make any subdivision within this general period and refer to the Bronze Age as one unity. A serious problem is also that many of the excavated Bronze Age sites actually are mixed assemblages with habitation remains ranging from the Late Neolithic to the Late Bronze Age. This is, for example, the case with De Bogen, Boog C-Noord and other Bronze Age sites excavated in the Betuwelijn. Because an entire chapter is devoted to Bronze Age flint (Chapter 8), the following description of Bronze Age settlement and burial finds will be kept short.

6.8.2 Settlement flint

The tendency towards an opportunistic use of raw materials continues into the Bronze Age, as do the *ad hoc* reduction strategies, aimed at producing usable edges. The flint nodules, of local origin, are usually relatively small and can be 'opened' by means of the bipolar technique (Hayden 1980). Some of the so-called splintered pieces may have been a by-product of this technique. This implies that it mainly concerns a flake technology, blades being a very rare occurrence indeed. As far as tool typology is concerned, in all sites attributed to the Bronze Age retouched flakes abound, whereas the most frequently occurring formal tool is the scraper. The scrapers seem to have been re-sharpened frequently, suggesting that once a suitable tool was obtained, it was preserved for longer use (Van Gijn in press; Van Gijn/Niekus 2001). Borers and reamers also occur, albeit in small numbers. Strike-a-lights are often found, at least in the Bronze Age settlements from the riverine area. They have not been reported, however, in most of the older site reports and it is not clear whether they were also present at such sites as Bovenkarspel or Twisk (Hristova 1984). It is possible that they were not recognized as such. Flint axes are completely absent and have been replaced by bronze counterparts. The flint axe is the only tool type that by the Middle Bronze Age has been fully replaced by metal ones. Metal knives, chisels and sickles existed side by side with flint counterparts well into the Bronze Age and were used in domestic context (Fontijn 2002, chapter 7).

Use-wear analysis of Bronze Age settlement flint has demonstrated that the tools were used for a wide variety of tasks (Chapter 8). There is no evidence, however, for very specific cultural choices with respect to flint objects that may be related to conveying aspects of the identity of Bronze Age communities. One point is worth mentioning: the Bronze Age hide scrapers display an extraordinarily rounded edge akin to those observed in LBK context (Chapter 5). Again, this is suggestive of extensive hide processing techniques. It may be that these flint tools form indirect evidence for the making of clothing and foot wear, material items frequently imbued with stylistic elements related to identity.

From the point of view of cultural identity, the characteristic arrowheads must also be mentioned. They display pressure retouch of excellent workmanship. These points are of exactly the same type and quality as those found in burial context (see below). As in preceding periods the arrowhead was invested with skills and expertise, resulting in a highly distinctive type of object. Again, this choice is a logical one because of the more public role points have in comparison with, for example, typical domestic tools such as scrapers or retouched flakes. Most likely arrowheads were used by men in activities like warfare and may have symbolized a warrior identity.

6.8.3 Flint in Bronze Age funerary context

The Bronze Age sees a further decline in the number of flint tools found in burial sites, to disappear entirely during the Middle Bronze Age B. The diminished importance of flint as a burial gift is seen by the reduction of tool types found in Bronze Age burials to arrowheads and, occasionally, a flint strike-a-light. No Early Bronze Age funerary finds were studied with the exception of a type 2 Scandinavian dagger from Eext-Visplaats mound 1. It should be noted that this dagger is one of the very rare Scandinavian daggers from burial context. The dagger probably derives from a secondary burial in an older, Single Grave barrow in which a Grand-Pressigny dagger and a small polished axe were found (Jager 1985). Although this may be dismissed as chance, it is tempting to see this secondary deposition of a dagger, an object otherwise associated with hoards or special depositions (Chapter 7), as an intentional act of appropriating a special ancestral place. It may well be that in the collective long-term memory this particular barrow was remembered as a place of significance.

The Middle Bronze Age barrow of Eext 1940 (Jager 1985) revealed three beautiful barbed arrowheads of the Sögel type. They display fine pressure retouch and were produced on northern flint. Only one of them shows impact traces from use as an arrowhead but, as said before (Chapter 2), this does not necessarily mean that the other two have not been used. The barbs on all three implements were ground intentionally. Although the evidence is somewhat ambiguous, I would assume that these tools had a use-life prior to their deposition in the grave.

The same somewhat ambiguous picture emerges from the famous Middle Bronze Age grave of Drouwen (Butler 1990) (fig. 8.1). There, nine Sögel points were found along with a flint strike-a-light and several metal objects such as a sword. Use-wear analysis of the flint points has shown that two of the arrowheads displayed traces of impact, whereas others have more ambiguous use-wear like linear traces of polish. One point has extensive remains of what has been identified as birch bark tar (Beuker 1991). At least some of the points apparently had a use-life before ending up in the grave. This observation could be seen as an indication that the grave goods actually were more related to the identity of the individual buried there.

Strike-a-lights form another regular occurrence in Bronze Age burials, especially in those from the Middle Bronze Age. Besides the above described barrow of Drouwen, one has also been found in Tumulus 9 of Hooghalen-Hijken (Van der Veen/Lanting 1989). Here a total of ten barbed-and-tanged arrowheads of sheet bronze were also retrieved along with two bronze pins. The strike-a-light was covered with iron concretions, making a use-wear analysis virtually impossible. The concretions may be remnants of oxidized pyrite (Van der Veen/Lanting 1989). Some rounding is visible on the flint, and although the characteristic microscopic features of a strike-a-light could not be detected due to the iron concretions, a function as strike-a-light is indeed likely. Another example of a strike-a-light from a Middle Bronze Age burial context comes from Balloërveld, Tumulus IV. Other finds there include three Sögel type flint points, which could not be interpreted, and a grinding stone of schist.

The burial gifts from especially the Middle Bronze Age A seem to be confined to strike-a-lights and Sögel points. Both types of tools were deposited with the dead in used state. This observation could be seen as an indication that the grave goods were personal items, intimately connected with the identity of the buried individual. By the Late Bronze Age flint has totally disappeared from the burial scene. This does not mean that nobody could knap flint anymore. The bifacial sickle-shaped objects of Scandinavian origin indicate the continued existence of skilful flintknappers. However, these implements no longer were part of the burial package (Chapter 8).

6.9 Conclusions

6.9.1 The representation of collective identity

In this chapter it was argued that flint tools were instrumental in expressing a collective identity at various times during the Neolithic and the Bronze Age. This is most obvious with the arrowheads, a tool type that took very distinctive shapes through time. This can obviously be attributed to the fact that arrowheads are a type of tool that functions outside of the confines of the settlement or household: in hunting or warfare. It is a public object and its meaning would have been recognized by knowledgeable outsiders. As such arrowheads can signal a sense of shared identity. Standardized, highly distinctive types of flint arrowheads were present until the Middle Bronze Age, so we can assume that even at this time flint still reflects aspects of the collective identity, 'flagging' the sense of belonging to a larger social entity.

Apart from the ubiquitous arrowheads, another, albeit less obvious, example of flint tools displaying emblemic style (*sensu* Wiessner 1984) are the macrolithic Michelsberg tools: the large end-scrapers and pointed blades, along with the leaf-shaped arrowheads, seem to refer to a collective Michelsberg identity. These Michelsberg emblems were especially relevant to the contemporary groups in the wetlands who had to redefine their identity in the course of the neolithisation process. During the entire Michelsberg period macrolithic flint objects found their way into the wetlands. It was shown above that during the early Michelsberg period, such objects were imported as finished and even used implements. In Brandwijk several large Michelsberg tools displayed use-wear traces that were typical for the uplands. These tools were not used or modified by the wetland communities even though they consituted perfectly suitable implements and high-quality flint was not locally available. Instead, these exotic used tools were kept as tokens of their affiliation with the farmers.[24] They seem to have been seen as inalienable objects, commensurate with the identity of their original users because they were kept intact and not modified or used. During the later Michelsberg period typical Michelsberg flint tools continued to find their way into the wetlands. There, people of the Hazendonk-group imported for the most part finished items but in contrast to their predecessors, they actually *used* the tools, albeit for special activities like ornament production, harvesting and fire making. This indicates that the Hazendonk actors appropriated the typical Michelsberg implements, giving them a place in their own technological system. In terms of negotiating a new Neolithic identity this is a very different attitude towards the agricultural outsiders than was the case in the earlier Michelsberg period (Van Gijn 2008a).

Another avenue of approach towards an understanding of collective identity that was explored above is through the 'hidden traditions of tool use': customary ways of doing things that people are usually not explicitly aware of. Such choices of tool use are very much part of long-term traditions, resulting in patterns that can be traced by means of use-wear and residue analysis (Van Gijn 1998). In chapter 5 it was shown that the character of craft activities carried

24 An alternative interpretation is that they were trophies of war, but evidence for violence is so far lacking for this period.

out by means of flint tools differed substantially between the LBK, Rössen and Michelsberg cultures in the south-east and the coastal people in the delta area. It was possible to distinguish two technological traditions, an upland and a wetland one (Chapter 5.9). We can assume these craft activities to have a long time-depth and to be reflective of technological traditions that are strongly embedded in society.

The upland tradition is characterised by an emphasis on hide processing and by the activity carried out with the enigmatic *quartiers d'orange*. This latter tool, although highly characteristic for the LBK, probably in itself did not have a signalling function to outsiders, although it cannot be excluded that the objects that were made with this tool may well have had such a role. Largely absent in this upland tradition is evidence for scraping and splitting silicious plants. It may be that clothing, containers and other objects made elsewhere with plant material, were instead produced with hide. Especially clothing is intimately related to identity (a.o.Küchler/Were 2005) so the predominance of hide-working tools over plant-processing ones in the uplands can be interpreted as indirect evidence for a different expression of identity, possibly related to clothing styles. Bone and antler working traces are also largely absent in the uplands. Only the Michelsberg site of Maastricht-Klinkers revealed the presence of a few tools that were used on bone and antler (Schreurs 1992).

The wetlands of the western and northern Netherlands offer a very different picture. The heavily worn dry hide scrapers are absent, nor do we observe the variation in hide working traces that is attributed to the tanning and softening stages of production. We also do not find *quartiers d'orange* with the characteristic 'polish 23'. Instead, plant processing implements are numerous, indicating a preoccupation with making basketry, wickerwork, plating and maybe the processing of fibres from plant materials. Additionally, we also have extensive evidence for bone and antler working: in the wetland sites waste products from bone and antler tool manufacture abound, displaying the cut marks from flint implements (fig. 5.8). Although the number of flint implements displaying use-wear traces from contact with bone is small in the Early and Middle Neolithic (we do find them on the Late Neolithic Vlaardingen material), it was argued that this is probably due to our sampling strategies (Chapter 5).

What the existence of these different traditions of craft practices mean in terms of categories of social identity is not clear. I am reluctant to correlate these archaeological patterns of tool use with social categories derived from ethnographic sources like 'dialectic tribe' or language family (*contra* Newell *et al.* 1990). However, the cultural entities, reflected in technological traditions, have a considerable time-depth and extend over large territories. They must therefore have transcended more local levels of social organization and referred to a sense of identity that encompassed a large number of local groups. We loose sight of these long-term traditions by the Late Neolithic when the domestic flint technology becomes more and more *ad hoc*, with an emphasis on usable edges rather than standardized overall morphology. This may relate to the relegation of flint technology to the domestic sphere where it lost its association with identity. Only the arrowheads, being a public object, continued to be distinctive.

6.9.2 Gender

Gender is a very elusive category of identity and is haunted by modern assumptions about gender roles and consequent circular reasoning. This is the reason that gender is not an explicit theme in this chapter on identity. However, we occasionally do have bits of information that may give us a glimpse on gender in prehistory. In the Early Neolithic there seems to be a differentiation between male and female burial kits in LBK cemeteries (Van de Velde 1992). Unfortunately as skeletal material is seldom preserved in our soils, such associations can rarely be tested but there are a few exceptions. In the Middle Neolithic cemetery of Ypenburg many of the skeletons could be sexed and it appeared that amber and jet ornaments were almost solely associated with women and children (Baetsen 2008; Van Gijn 2008c), a finding which is in support of our preconceived ideas that women wear jewelry.

Another, more debatable avenue to approach gender is through the various activities that were carried out in settlements (Chapter 4 and 5). Costin has argued that whereas craft activities in ethnographic context are almost always engendered, the actual division of crafts along gender lines is highly idiosyncratic and historically contingent (Costin 1996). However, although we have to be careful about linking specific crafts to gender, there seems to be a certain consensus that stone tool making, especially the production of axes, is often a man's task (Pétrequin/Pétrequin 2000, p. 81), whereas the processing of fibres, textile work and basketry generally is women's work (Barber 1994; Hardy 2007; Hurcombe 2000b; Owen 2000). I am aware that this may be a projection of present-day notions onto the past, but it is supported by ethnographic data from for instance Papua New Guinea. Moreover, as was stressed before (Chapter 5), anyone having done experiments with processing fibres from plants will subscribe to the thesis that this task can only be performed in domestic context alongside a range of simple chores like cooking or watching over the children. If the blades with transversely oriented gloss indeed may be interpreted as plant processing implements, as was argued in chapter 5, then we can see them as indicators of women's work. This activity was normally done with tools made of locally available flint, while 'typical' male tasks like hunting and fighting involved arrowheads of either exotic flint or of high craftsmanship (as in the case of the Michelsberg-like arrowheads in Hazendonk context). Another type of tool which may be related to women's work are the *quartiers d'orange* from the Early Neolithic LBK. These may be related to plant fibre processing and again, for the same reasons as outlined above, this is most likely done within the confines of the settlement alongside other simple tasks.

We may thus infer a series of dichotomies: women/plants/domestic versus male/hunting/public, related to differences in tool use behaviour along gender lines. Following this line of thought it may even be suggested that through time a shift in emphasis took place in the representation of the sexes: in the course of the Neolithic evidence for plant-associated, female activites gradually disappear from the burial context, to make place for a stronger presence of martial symbols, expressed in skilfully made flint objects like axes, daggers and Sögel points. This may be related to a change in society: from one in which female values embodied in plant-related activities ('weaving the thread of life and fertilitiy') were emphasised, to one in which public symbols, associated with a male valuation of martiality and public display, were central.

6.9.3 Burials and personhood

Burial gifts are generally believed to bear a strong relationship with the identity of the buried individual. Unfortunately we lack burials from many of the periods represented in this book. If they are present, flint is not always included in the burial gifts. Our knowledge of the role of flint in burial practices is limited to the LBK, the Hazendonk-group, the TRB, the Beaker period and the Early and Middle Bronze Age. In the LBK graves of the Elsloo cemetery the flint burial gifts were confined to blades (including both sickle blades and *quartiers d'orange*) as well as arrowheads. Some of the latter may not be gifts but the cause of death. Van de Velde has sexed many of the graves on the basis of their contents (Van de Velde 1979b). However, I think that the important point to stress about the flint burial gifts in LBK times is that they refer to collective activities: the sickle blades to harvesting cereals, a collective activity, and the *quartiers d'orange* to, most likely, plant processing and fibre production. Both tasks were in all likelyhood carried out by women (see above). The inclusion of broken querns and adzes in burial kits support the idea that it is items related to agriculture, food and collective enterprise that are pivotal in LBK burial tradition and that individual personhood is not represented in the gifts.

Due to the find of the exceptional flatgrave cemetery of Ypenburg and the graves in the settlement of Schipluiden, burial practices of the Hazendonk-group are relatively well-documented. Generally, flint is not part of the burial kit with the exception of the strike-a-lights and a piece of pyrite (a fire making toolkit) in the hand of an adult male at Schipluiden. It was argued above that this can be interpreted as an example of a special kind of personhood. Because of the presence of a fire-making toolkit, he was interpreted as a religious specialist (Van Gijn *et al.* 2006).

TRB burial practices are very much a collective affair. The tombs represented places that were visited time and again. They contained the remains of members of the local group and formed the focus for rituals performed by those very people. As such they formed places that were deeply embedded in the history and genealogy of the local group. The grave gifts deposited in these places were often objects associated with communal activities such as axes, cereal harvesting tools and arrowheads. Both polished axes and sickle blades are involved in the agricultural process, the axe in 'destroying' the forest to create agricultural fields, the sickle to reap the crops. These activities are communal and it may well be that these early agricultural activities were surrounded with rituals and magic to ward off the spirits of the forest that used to be the main life giving entity prior to the introduction of cropping. The axe is also a pivotal implement in the construction of the house, again a communal and often highly ritualised activity. As was argued above and will be more extensively discussed in the next chapter, there are indications that specific rituals took place surrounding the burial of individual deceased that were reinforcing collective group identity, rather than commemorating the individual dead (Chapter 7).

Still, despite this emphasis on collectivity in TRB funerary practices, there is occasionally an allusion to a special kind of personhood. One such example is the stone cist of Diever in which the remains of two individuals were buried. Here a strike-a-light was found in combination with a pyrite nodule. In addition, the 'normal' burial gifts of flint that are commonly encountered both in *hunebedden* and flatgraves and which made reference to collective values of the community were present as well. This burial package is a striking example of a combination of 'markers' of a special kind of personhood (the fire-making toolkit) and collective TRB 'markers'.

The burial package of both Single Grave barrows and flatgraves is at first sight relatively circumscribed and the number of gifts rarely exceeds four to five objects. It is therefore unlikely that they must be interpreted as a display of power and prestige. Rather, the presence of the skilfully made daggers of French flint can be seen as a reflection of the long-distance social networks the local Single Grave groups felt part of. As such, the dagger may have been an inalienable object symbolizing the collective sense of belonging to a larger social and cultural entity. It should be recalled that the daggers lack evidence for human intervention in their production, like a bulb of percussion. Helms (1998) has argued that chiefly rulers can be seen as living ancestors: the French daggers would constitute the perfect material symbol of such a role. The fact that the number of graves with French daggers is small suggests that the presence of these objects in a particular grave is related to a particular kind of personhood. This is supported by the observation that, despite the apparent uniformity of Single Grave burial kits, closer examination reveals more variation both in the choice of objects and in the biography of these objects. Unfortunately the scope of the present research was too limited to reveal patterns in this variation and elucidate their possible meaning.

A similar situation seems to pertain to the Bell Beaker graves, where seemingly structured burial packages were found, suggesting that it is unlikely that these gifts solely symbolized the power and prestige of the deceased. A common element is the beaker but otherwise there is more variability in the actual composition of the burial kit than in the preceding Single Grave period. This variability is quite substantial and suggest that special kinds of personhood may be represented that tell us something about the role, whether it be real or idealised, of the deceased in society. The picture for the Bronze Age is more ambiguous, partially because flint tools formed a decreasing part of the burial package, to disappear altogether by the end of the Middle Bronze Age A. Remarkable is the role of strike-a-lights in the Sögel-Wohlde graves, concurring with the continued importance of such implements in Bronze Age settlement context. They seemed to be part of a structured set of burial gifts and indicate the continued special importance of fire, and its relation to special kinds of personhood.

Chapter 7

The ritualisation of flint

7.1 Introduction

Archaeologists frequently have a tendency to relegate anything in the archaeological record that appeared 'irrational' or non-functional to the ritual sphere (Brück 1999). Defining what constitutes 'ritual' is highly problematic, if only because many peoples across the world do not make a conscious distinction between ritual and profane. Still, it is difficult to deny that there is a certain sphere of social practice that stands apart from daily life. This is because ritual is closely linked with liminality, with the transitions between different stages of life (Turner 1979). It is important to stress that this does not only concern the live phases of people, like birth, coming of age, and death. The cycle of life also pertains to the natural surroundings and to the material world in which the people live. Transformations in the natural surroundings like clearing the forest are surrounded with rituals to ease the transition (Godelier 1986). House building is another example that is highly ritualised. In many parts of the world the house is seen as a metaphor of the human body and consequently the building and destruction of the house are events that involve rituals. The same pertains to agricultural practices (Bradley 2005). Rituals are repetitive, structured, symbolic and formal, characteristics that allow ritual practices to be recognized in the archaeological record. It is, however, far more difficult to fathom their meaning.

How is it with flint objects? Certain aspects of flint are certainly special: the transformation of an amorphous lump of stone into an axe surely is. The same pertains to the characteristic ringing of the flint when struck: this rhythmic 'singing of the stones' adds to the special feel of a flintknapping event (or a knap-in as Americans call it). Although flint is generally associated with the mundane, we have seen in previous chapters that even simple flint objects can have special connotations. Highly crafted flint implements like axes or daggers have often been referred to as ritual objects, especially if they were found in 'special' contexts or if they appeared basically 'unusable' (fig. 7.1). Matters become more complicated because objects 'change roles' during their lives. Bradley has convincingly demonstrated that many simple and apparently profane tools also have a ritual role (Bradley 2005). Simple flint tools that are associated with food procurement can undergo transformations indicating that they had a special significance for the communities involved. For example, all across the world the various stages in the agricultural process, from sowing to bringing in the harvest, are surrounded by ritual or ceremonial activities and taboos (Bradley 2005). The same applies to hunting (Brody 1981).

In the course of this chapter various case studies will be discussed that illustrate the role of flint objects in the expression of the cosmology or world view of past people. It will also be shown that domestic flint tools may occasionnally be ritualised when they were involved in activities that were surrounded with taboos. Several themes recur again and again: the special importance of agriculture, the notion of martiality, the lore of far-away places and the role of fire and fragmentation in ritual activities. These themes will be briefly introduced in the beginning of this chapter and will be illustrated with the case studies that follow. Obviously, these case studies are not exhaustive and new findings are coming up all the time leading to new insights.

7.2 Theoretical background

7.2.1 Skills, craft and the supernatural

Flint artefacts are by definition transformations of a natural substance: creating a beautifully crafted dagger from a lump of stone is to an outside observer like a magical act. Even nowadays seeing an expert flintknapper at work results in awe and amazement on the part of the casual observer (Whittaker 2004). The colours and texture of knapped flint and the patterns created by the skilled application of pressure retouch are in great contrast to the nodule of stone they originated from. These features may be enhanced by polishing. Surely, the large majority of the objects produced by flintknapping are very simple flakes that can be made by anyone who understands the basic principles of flintknapping. Generally these flakes are indeed associated with the mundane and are not attributed special significance, although we also find simple flakes as grave goods in burial context, indicating that they too were deemed important, maybe in juxtaposition to the modified flint (Chapter 6). The basic knowledge as to how to make flint tools is not very hard to obtain and anyone watching somebody doing it can copy the basics without too much difficulty. Children may have acquired these basic knapping skills already early in their youth, by watching the other members of the group (Högberg 1999, 2008; Pigeot 1990).

However, many flint objects like axes and daggers are much harder to make and require substantial skill. Casual observation of how others produce these objects is not sufficient to be able to copy these objects, nor is a theoretical knowledge of the basic steps of the reduction sequence. A long apprenticeship is necessary before a novice can produce such an object (Bamforth/Finlay 2008). Learning how to make axes and daggers requires a long-term commitment to a learning process that involves the transmission of knowledge and the acquisition of motor skills. It is only in the context of an apprenticeship that these skills can be obtained (Apel 2001; Bamforth/Finlay 2008; Nunn 2006; Stout 2002).

In ethnographically documented societies, highly capable craftsmen who have very specialized (and often secret) knowledge or have acquired skills after a long apprenticeship, take a special position in society. Because such knowledge or skills are difficult to obtain and generally mystifying to outsiders, they are often considered to have a supernatural origin (Helms 1993). Those in possession of such knowledge and skills are therefore often held in great esteem by the

Fig. 7.1 Reconstruction of the deposition of oversized axes in wet locations by the TRB people.

other members of the group. They are, however, also feared for the very same reason: their knowledge and skills are 'not of this world'. Craftsmen and craftswomen are thus surrounded by special taboos and are frequently not allowed to intermarry with the other members of the group. In many West-African societies, for example, the potter (invariably women) and the smithy (invariably men) are destined for each other and cannot marry anyone else (N'Diayé 1970). Both are involved in transformations of natural materials like clay and lumps of ore to lasting and often aesthetically pleasing objects like ceramic vessels and metal swords. These transformations involve the use of the elements of fire, air and water and are hard to fathom for outsiders.

It is important in this context to differentiate between knowledge and skills or know-how. Knowledge is often surrounded by secrecy as it is relatively easy to obtain, whereas skills are not. Those parts of the production process that rely on knowledge, most notably about where to acquire raw materials, are therefore frequently surrounded by secrecy and taboos. Such secrecy is necessary in order to control the accessibility of these special resources. In Papua New Guinea, for example, women and children are not allowed to accompany the axe makers on their trips in search of the necessary raw materials (Burton 1984; Hampton 1999). In contrast, the knapping process itself, the actual production of the axes, often takes place inside the settlements, for anyone to observe. Obviously, this allows the knappers to be admired for their skills in producing these beautiful axes (Pétrequin/Pétrequin 2000). However, there does seem to be variability between the different groups of the New Guinea Highlands in terms of the context in which the various production phases of the axes and adzes took place. Among the Langda for example, the knapping is done within a secluded space, involving only teachers and apprentices, not to be observed by those not involved (Stout 2002).

In many ethnographically documented societies the objects made by specialist craftspeople are believed to be imbued with supernatural power because they are seen as gifts of the spirits, deities or mythical ancestors (a.o. Helms 1993). The belief is that ordinary people would not be able to make such things without the ancestral intervenence. This pertains especially to highly crafted items or those made of exotic raw materials. Such objects are surrounded by ritual and ceremony because their origin is believed to lie beyond that of daily experience, hence in the world beyond, that of the ancestors. Remote in time is thus equivalent to remote in space, hence the equation of far-away and exotic with ancestral beings. These objects are treated according to very specific rules and are usually kept apart from the objects that are involved in mundane, daily tasks (a.o. Hampton 1999).

Because the objects are regarded as belonging to another world - that of the ancestors - they are not owned as such by the producers. Rather, the latter are generally seen as intermediaries. Many of these objects are so much part of the identity of the larger community (or their individual representatives) that they are in fact inalienable and cannot be handed over to others. Other special objects are exchanged as gifts with other groups, and play a role in ritual feasting or they are sacrificed. Many of these special objects may have been agents in their own right, accumulating history during their travels: who made it, with which kind of special material, what is the land of origin, which hands did it pass through? Special objects like swords may even be given a name like Excalibur, King Arthur's sword. The objects involved in the famous Kula exchange of the Pacific are a well-known example (Malinowski 1922; Strathern 1999; Weiner 1992).

The extent to which skills were involved in the manufacture of an object is frequently clear to anyone who has even a cursory look at an object: a TRB axe of 30 cm length is awesome to any observer, hence their frequent occurrence in museum showcases. However, there are also indications of skills that are only visible to knowledgeable insiders, fellow craftsmen who are intimately familiar with the objects involved. Taking the example of these same large TRB axes, it was noted that they frequently displayed a small piece of cortex on their butt ends (Rüdebeck 1998). This piece of cortex could have been easily removed by the skilful flintknappers that were clearly involved in the production. However, these remnants of cortex indicated to the knowledgeable fellow flintknapper that the maker produced a maximum size axe out of the available flint nodule: the axe could not have been made any longer (Wentink 2006, 2008; Wentink/Van Gijn 2008). This sort of information will impress a fellow flintknapper, but may not have been recognised by most observers of the axe, who may only recognize its 'special-ness'.[25] Other inside information on the extent of skill involved in the production of these axes would be the degree of surface retouch: these axes display an intricate maze of flake negatives, displaying great care in simultaneously reducing the four sides of the axe (Madsen 1984). It is frequently not realized how much more difficult it is to produce a TRB axe with square or rectangular cross-section, in comparison to bifacially worked (Atlantic) axes of for example the Michelsberg culture and the Vlaardingen-group (Madsen 1984). Many of the large TRB axes have only been partially polished and it may well be possible that the facets were intentionally displayed to those experts who can recognize and acknowledge the skills involved in axe production. It is noteworthy that the fine maze of flake negatives on the surface of these axes is also explained from a strictly functional perspective: the more ridges there are, the easier it is to grind and polish the axe (Madsen 1984).

The display and recognition of skills operate therefore at different levels: there is the fellow expert, there are the apprentices who can acknowledge skills to some extent, there are the knowledgeable outsiders who form part of the cultural entourage but do not have the skills themselves, and, finally, there are those outside to whom the skills may mean nothing at all.

7.2.2 The magic of exotic raw materials

7.2.2.1 Mobility and long-distance travellers

Certainly the presence of exotic stones, imported from far-away places, pays testimony to long-distance contacts. Such imports represent the place they originated in and as such they are 'pieces of places'. It is unlikely that all import items concern down-the-line exchange. The actual movement of people, even large segments of society, may well have been much more common than

25 Such remnants of cortex are in fact also present on other types of special objects, such as daggers (fig. 3.1) and crescent-shaped 'sickles' (fig. 7.16).

we tend to think, and not confined to a few lone adventurers or brave traders. Obviously hunter-gatherers display extensive mobility and descriptions of for example the Australian Aboriginals have shown the importance of such long-distance contacts for the maintenance of social networks (Akerman *et al.* 2002; McBryde 1984; Paton 1994). Invariably, objects were exchanged during these large-scale social gatherings, objects that symbolized the contacts with these far-away partners.

Helms has described the position and role of travellers in different societies (Helms 1988). Travellers, upon return in their native community, have a position not unlike the craftspeople whose skills are believed to have derived from the supernatural. In fact *making* special things is often seen as equivalent to being able to *acquire* special things, so the craftsman and the trader/traveller take a similar position. As Helms has expressed it:

> *'Similarly, long-distance "merchants" and local and travelling craftsmen ….. who are intimately involved in the acquisition or preparation of such goods are ipso facto agents in an ideologically powerful process of acquiring cosmologically charged "wealth" from the uncontrolled, chaotic outside world and making it available and useful (by transporting or crafting) for society's consumption'* (Helms 1988, 114).

Hence also travellers have access to and knowledge of the world beyond the daily domestic territory. For most people this unfamiliar world is frequently feared and considered to be full of dangers. Those who dare to venture beyond the common boundaries are assumed to have close links with the ancestors (Helms 1988). Their long-distance travels bequeath them with powers and knowledge that is inaccessible and frightening to those who stayed at home. The unfamiliar objects they may return with are considered imbued with magic and cosmic power and almost always receive a special treatment. Just like the skilled craftspeople, long-distance travellers are thus bestowed with privileges and/or surrounded by circumscriptions and given a special position in society. This position is legitimized by the very fact that their travels have proven them to be in some way connected to the 'Others', the deities or the mythical ancestors.

Long-distance travelling certainly occurred in the Bronze Age, as evidenced by the Dover boat and the material connections between Wessex, the Dutch coast and Brittany (Fitzpatrick 2002), but may probably date much earlier if we consider the resemblances between megalithic monuments from Portugal to the Netherlands and beyond (Sherratt 1990). How early actual long-distance travelling occurred is very difficult to determine. Obviously the action radius of hunter-gatherers was substantial, but objects of a far-away provenance can 'travel' in different ways and do not necessarily indicate that travellers personally took objects with them. For the study of long-distance contacts it is essential to be able to provenience different raw materials. Stone can be source-specific and several projects in the past have elucidated long-distance contacts by means of petrochemical analyses (a.o. Cooney/Mandal 1998; Pétrequin 1993). Still, even though the stones can be sourced, it is frequently impossible to determine the actual mode of transport. It is argued here that, rather than speculating on the mode of transport, it is the roles the foreign object plays in the recipient society and the references it makes to aspects of identity that is of concern to us and that will be visible in the archaeological patterning (Chapter 6).

7.2.2.2 Stone sources: remote, dangerous and inaccessible

Exotic stone not only derives its significance from the actual distance it has covered from its source area to the recipients. Frequently it has been obtained from remote and highly inaccessible locations such as Great Langdale in the case of the British tuff axes (Bradley 2000; Bradley/Edmonds 1993), or Monte Viseo in the case of the jadeite axes (Pétrequin *et al.* 2006, 2008). It entails great dangers to reach the outcrops and prepare prefabs on the steep slopes and it must have been exceedingly hazardous to bring down the rough-outs. Still, despite the presence of equally suitable stone at lower and more easily accessible elevations, it was invariably the remote outcrops that were selected for axe production. The outcrops at Pike O'Stickle at Great Langdale give a fantastic view of the surrounding landscape and it can easily be imagined that youngsters were initiated in the cosmological order of their society in this special spot. The particular combination of stone acquisition, axe production and initiation rites is documented in ethnographic context. For instance, the Tungei of Papua New Guinea only visited the stone sources every three to five years; these visits were associated with male initiation rituals (Burton 1984). Also in Aboriginal Australia the gathering of raw materials was closely connected with long-distance travelling. The sources of raw materials were important in the world view of the Aboriginals as they were closely connected with ancestral spirits. Visits to these sources were surrounded with ceremonies and were instrumental in maintaining social relationships with far-away groups of people (Akerman 1995; Akerman *et al.* 2002; McBryde 1984, 1997).

It may well be that the exploitation of the flint mines must be seen in the same light. Although it is sometimes suggested that by the time of the Michelsberg culture suitable and easily available outcrops of flint were depleted, it is nevertheless remarkable that flint mines appeared all across Europe at roughly the same time. It is therefore more likely that ideological motives lay behind the the exploitation of this hidden flint. The exploitation of flint took place far below the surface out of sight from those not being part of the process. These flints could thus obtain special qualities not present in a piece of flint picked up from the local streambed. It is likely that during this period there was a general social or cultural need for special materials that were imbued with cosmic powers and that could play a role in the exchange between different, widely separated areas in north-western Europe.

7.2.3 The aesthetic qualities of stone

Aesthetic considerations of objects are frequently forgotten but may actually lie at the basis of many of our choices (a.o. Jones 2004; Jones/MacGregor 2002). Although flint is generally regarded as something ordinary and not directly associated with beauty, flint can be very pleasing to the eye - due to special colours -, or it can be good to touch - because of a special texture - and it certainly gives a good sound when struck. It thus has an effect on our senses. We are very much focused on the visual appearance of archaeological objects and tend to forget all the other qualities of the objects we study: we seldom touch, smell or taste them. Also, it is necessary to actually work with the material, instead of relying on publications only. The way we depict our flint objects in publications have of old been in black and white photographs or line drawings, greatly reducing our appreciation of the material properties (Hurcombe 2007).

Stones vary in many ways: in colour, texture, or in the presence of shiny inclusions, some of which have symbolic connotations related to for instance gender (Taçon 1991). There are numerous examples indicating that prehistoric people were highly sensitive to colours. For example, in Britain and Ireland white quartz seems to be especially significant and is frequently found in association with burials and monuments (a.o. Darvill 2002). Colour symbolism of standing stones has been investigated in megalithic monuments in Brittany (Scarre 2004a), but is equally relevant in studying individual objects of flint. Unusual colours, like the honey-colour of the flint from Grand-Pressigny in France, contribute greatly to the special qualities an object may be attributed with. The same pertains to the beautiful reddish flint from Helgoland which also was exchanged over great distances (Beuker 2005) (fig. 7.2). The red colour of this flint may have been associated with blood or life itself, akin to the role of ochre in Australian Aboriginal mythology (Taçon 2004). Stones with a mottled appearance, displaying a variety of colours are considered attractive, especially if there is a lot of internal contrast (fig. 1.1). Some of the flint from southern Belgium, like that of Avennes, may have been specially selected because of this (Van Gijn *et al.* 2006). Such a juxtaposition of different colours frequently has a meaning attributed to it, with different colours symbolizing different qualities and hence even different deities in the cosmological scheme (Cooney 2002).

Fig. 7.2 Pre-fab of an axe of red Helgoland flint from the hoard of Een 1940 (scale 1:2).

The addition of water adds brilliance to the colours of stone and there are indications that prehistoric peoples used water to enhance features of the stone (Bradley 2000; Ingold 2007).

Texture is also highly important: objects are not only good to look at but also good to feel. This may be why so many stones were ground or polished: it not only brought out their colours, but it also made the stones smooth to touch and very shiny and rounded. Unpolished jet looks less attractive than when it is polished to a shine. The same applies to amber and many semi-precious stones like carnelian or amethyst. Even nodules of ochre look metallic when polished. Shiny inclusions are also highly appreciated, and it may well be that the shiny Wommersom quartzite owed its wide distribution pattern in the Late Mesolithic at least partially to its aesthetic qualities.

Other properties that may have added to the attractiveness of stones include electrostatic qualities, like in the case of amber, or medicinal properties like jet was assumed to have. In the case of flint its capacity to create sparks must certainly have contributed to its magical qualities. As already cursorily mentioned, flint may even have appealed to our auditory senses: good-quality flint gives a wonderful ring when struck and the rhythmic sounds produced by a flintknapper reducing a nodule of flint may have been a crucial part of ceremonies carried out during burial rites or ceremonies.

7.3 Recurrent themes

7.3.1 The lore of far-away places

I have alluded already several times to the great importance of exotic flint in Dutch Neolithic and Bronze Age flint assemblages. We can look at this import of flint from a strictly functional point of view: material is imported because there is a lack of suitable raw material. From this perspective the exchange of resources like stones can be explained as an economic strategy. The ensuing maintenance of long-distance exchange networks can be viewed as a form of risk management. In times of food shortages one can draw upon one's exchange partners to alleviate the burden, hence the designation 'social storage' (Halstead 1981; Halstead/O'Shea 1989). However, the exchange of items, be it food or otherwise, is frequently highly meaningful from a cosmological point of view and surrounded by ceremonies and regulations like is the case with the production and exchange of salt by the Baruya (Godelier 1986). The exchange may strengthen the social ties between various local groups and the gatherings are the moment that marriage partners are exchanged. Clearly however, it was probably totally irrelevant to the actual people whether their dealings are classified by us as economic transactions or as socially and cosmologically significant behaviour. Because economic and social reasons are so closely entwined, validated and structured by cosmological notions, there is little point in trying to find monocausal explanations that invariably depart from an etic point of view.

However, there is yet another aspect to exotic stones. People have extensive knowledge of their surroundings, and therefore also of stone sources and must have been very aware of the fact that certain stones were unusual and came from afar. It is very likely that the selection of exotic stones was an intentional one, indicating the links with distant places and hence with spirits, mythical ancestors or deities. In megaliths we see that stones of different origins are often placed in juxtaposition, as if to reconcile two different worlds, a closer and a more distant one (Scarre 2004a, b; Cooney 2000, fig.5.2). Stones can thus make reference to places near and far. As described in the introduction of this chapter, objects from distant places are often associated with the land of the gods, deities or mythical ancestors. They are therefore exchanged also when there is no obvious economical or social reason to do so. The find of a non-local type of flint in an assemblage thus always requires an explanation.

7.3.2 Growing crops: an activity surrounded with taboos and rituals

As was already mentioned in chapter 4 and 6, the transition to agriculture is not a self-evident one. Viewed from the old cultural evolutionary paradigm, the transition to agriculture was almost inevitable and the question rather was why, after the initial occupation of farmers in the Central European loess zones, it took the local hunter-gatherer communities so long to change to a sedentary existence based on crop farming and pastoralism. Many books have been filled with treatises as to why hunter-gatherers were continuing their traditional Mesolithic way of life, sometimes for well over a 1000 years after 'first contact' (a.o. Fokkens *et al.* 2008b; Price 2000; Van Gijn/Zvelebil 1997; Whittle/Cummings 2007). Hunter-gatherers in the Rhine/Meuse delta first accepted ceramic technology and pastoralism, before starting to grow crops. Crop growing was probably not immediately incorporated in the traditional hunter-gatherer way of life because it had severe repercussions in terms of scheduling the various subsistence activities (Carlstein 1982). Even though it has been suggested that already during Mesolithic times, plant resources were managed and even to some extent purposefully modified (Zvelebil 1994), it is quite another matter to largely rely on crops as an important subsistence base. The long delay between land preparation and sowing and the actual harvest is generally seen as most precarious. Bradley has argued that it is the strategic long-term decisions that need to be made (saving part of the crop for sowing for example) and the concept of property (families or small communities own their agricultural lands and livestock) that makes the new way of life so precarious and caused an outburst of monument building and ritual activities (Bradley 2004). In ethnographic context, sacrifices are made when the land is prepared and when the sowing takes place. During the growth of the crops amulets are protecting the crops and rituals are performed to ensure sufficient rainfall and a prosperous harvest. After the harvest there are celebrations to thank the gods for their benevolence in allowing the crop to come to fruition.

It should therefore come as no surprise that prehistoric agricultural tools often display special cultural biographies: they are for example found in specific depositional contexts or they are intentionally destroyed after their use-life is over. For example, LBK sandstone querns have, after their actual use-life ended, been the subject of a specific ritual: first they were fragmented after which the surfaces were rubbed with ochre (Verbaas/Van Gijn 2007a).[26] The fragmentation is clearly intentional because the querns did not only display fractures on their thinnest section (where they were recurrently re-sharpened and hence likely to break), but also on thicker parts of the tool. The quern fragments are sometimes deposited in pits, probably to be interpreted as special depositions (Jadin 2003). LBK flint sickle blade fragments from settlements do not display traces of destruction although they do occur in graves and as such end their use lifes in a special context.

7.3.3 The destruction of objects and the importance of fire

Fire is a source of both life and death and, as a consequence, people through the ages have had quite an ambiguous relationship with it (Gheorghiu/Nash 2007; Larsson 2002, 2004; Parker Pearson 2004). Most obvious is of course the transformation of human bodies by fire, as evident in the numerous instances of cremation burials. Fire is good and bad at the same time: it kills and it brings life, it destroys and it rejuvenates. It provides us with warmth and comfort, it purifies and it allows us to prepare food. Also, in the slash-and-burn system that typified some of the early agriculture in our landscapes, fire was instrumental in burning down the forest: again, it created life (by making space for the crops to grow), but at the same time it killed life (it destroyed the forest that constituted the source of food and raw materials throughout the ages). Fire can be destructive and as such it can be very threatening. It may also have been experienced as something magical because it is not entirely clear where it comes from and how it develops. Fire therefore often played a role in rituals and ceremonies all over the world, and, supposedly, also in prehistory. For example, there is evidence that fire was used to ritually 'kill a house' in the TRB site of Skumbarberget in eastern central Sweden (Apel *et al.* 1997). There are also numerous examples of huge amounts of burned flint and bones found in the Neolithic causewayed enclosures in the British Isles (Edmonds 1995). This may also be the case in the Netherlands: at Heerlen-Schelsberg, an enclosure site from the Michelsberg period, 80% of the flint had been burnt (Schreurs/Brounen 1998).

Fire is also instrumental in many transformations of materials: it turns the raw into the cooked, the soft, unbaked clay into a durable ceramic vessel and clumps of iron ore into a beautiful shiny sword. Again, as was argued above for the special taboos surrounding craftspeople like the smith and the potter, such transformations are frequently attributed to powers beyond the control of normal human beings. The transformative qualities of fire thus often play a role in ceremonies to appease the gods or to transform objects or persons (the practice of cremation) that are in a liminal state: they are halfway two 'states of being' and can therefore not be categorized (Turner 1979).

The use of fire is frequently closely connected with the intentional destruction or fragmentation of objects. Breaking objects is encountered in archaeological settings (Chapman 2000). Breaking takes place to ritually kill an object that may otherwise pose a threat to the daily existence of the community. Such is the

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26 The ochre of two querns was sampled and examined by means of a polarized light microscope and X-ray diffraction by dr. J. Dik of the Technical University of Delft). His analysis has confirmed that it concerns ochre.

case with agricultural objects. Axes for example are sometimes subjected to intentional destruction by fire (Larsson 2000, 2004). This may also have been the explanation for the presence of fragments of a ceremonial axe in megalith D19 that was burned and broken (Van Woerdekom in prep.; Wentink 2006).

It may also be that objects that are considered to be in some way significant, are broken in pieces to be distributed among different people or groups. In this way such groups are bound together because each has a fragment of this shared object. Chapman refers to this as enchainment (Chapman 2000). By distributing fragments of an object, relations are established amongst people and between people and things. These fragments may have played a role in long-term processes of remembrance (Jones 2003, 2004).

7.3.4 Martiality

Flint can be seen as male (Pétrequin/Pétrequin 2000). Even though it is highly likely that certain flint objects were also made by women (Gero 1993), flintknapping is very much a male, even macho, activity. Producing the biggest axe or the longest dagger was likely to have enhanced one's prestige inside society. Whittaker, in his fascinating account of present-day flintknapping groups in the US, has made amply clear that this is still the case even today (Whittaker 2004). When you ask people about flint tools the first object that will spring to their mind is usually the arrowhead, and indeed many such objects have ended up in the private collections of amateur archaeologists. It is remarkable that most of the skilfully made and elaborate flint objects are somehow involved in killing or destruction such as arrowheads, spearheads, axes and daggers. In Chapter 6 it was argued that such implements are also the more public ones: they function outside the domestic sphere and may signal identity to knowledgeable outside observers. Male, flint and killing are intimately linked.

In the earlier periods of prehistory killing concerned hunting activities, and hunting big animals was probably a sure way of impressing the rest of the social group. The number of accounts of hunters and their important role in society is numerous: North American Indian stories abound with them (a.o. Brody 1981). In later prehistory we find more and more evidence for violence between humans (Christensen 2004; Guilaine/Zammit 2005; Keeley 1996). When exactly we should date the first evidence is still very much open to debate, but certainly during the period we are concerned with in this book, the Neolithic and the Bronze Age, violence between human beings occurred and we have quite a bit of evidence for it. I prefer to call it violence in order to avoid semantic arguments whether it concerns (ritualized) warfare, skirmishes, raids or even ritual offerings. Whatever name we give it, already in the Early Neolithic evidence for rampant violence is prominent in the form of arrowheads lodged in human bones, skulls smashed in with hard objects and so forth. A famous example is of course Ötzi, the Iceman, who died a violent death in the high Alps.

Apart from such acts of violence, it is frequently suggested that there are also less explicit references to the importance of martiality in Late Neolithic and Bronze Age society ((Fokkens *et al.* 2008a). These take the shape of material objects that refer to martial qualities, even if they may not actually be involved in interpersonal violence. Such objects would include the bracers, Single Grave battle axes, the Scandinavian daggers and the ubiquitous arrowheads, all of which are commonly associated with warfare. There is, however, no convincing evidence to support such assumptions. The danger is that we project our own notions about martiality and the objects imbued with martial values to the past.

7.4 The special biographies of agricultural implements

Throughout the Neolithic agricultural implements seem to have been subjected to a special treatment. This is already evident in the LBK period when querns were intentionally fragmented and the broken facets rubbed with ochre (Verbaas/Van Gijn 2007a). In the wetlands the harvesting tools from the Middle Neolithic B site of Ypenburg and to some extent those of Schipluiden as well, display a number of features that are unlikely to be accidental. First of all, they are made of southern, exotic flint, and were probably imported as finished products (Van Gijn/Verbaas 2008; Van Gijn *et al.* 2006). It concerns relatively large tools. After their use as harvesting implement had been completed, they were first burned, sometimes quite heavily so. Although it is possible to argue that the burning may have been due to retooling activities near the fire, this does not seem to be the case. First of all, no hafting traces are seen on most of these tools. Because of their size they could easily be held in the hand. One tool from Ypenburg was actually turned around and displayed wear traces on two edges. Moreover, it is unlikely that the harvesting tools were subjected more frequently to accidental burning than other types of tools. After burning the Ypenburg sickles were fragmented and the used edges were subjected to coarse flaking (fig. 7.3). It seems that the edges were destroyed intentionally as the flaking was done in such a way as to actually remove the working edge, not to re-sharpen it. It also does not make much sense to flake an edge after burning, as the burning makes it brittle and unusable. Last, red residue was observed not only in these flake scars but also on the breaks of the implements. This residue may be ochre, rubbed into the burnt and broken edge (Van Gijn/Verbaas 2008). All of these treatments cannot be explained from a utilitarian point of view. It almost seems like the sickles had to be 'killed'.

What could all of this mean? First of all I would argue that it is significant that exotic tools, that were produced elsewhere, were selected as cereal harvesting implements. In the case of the sickles from Ypenburg, it seems that although they were used locally, they were nevertheless perceived as 'foreign'. Hunting, gathering and fishing still substantially contributed to the subsistence base, which may be characterized as an extended broad-spectrum economy (Louwe Kooijmans 2006). Although keeping livestock was important, the extent to which cropping contributed towards the daily diet is not clear (Chapter 4). The crops may have been seen as a festive food (Fischer 2002). The sickles therefore functioned in an activity that was probably surrounded with ritual, maybe because crops were not yet fully incorporated into the subsistence system, or because crop growing is inherently precarious due to the long period of waiting for the fruition of the crops. Crop growing may have been perceived as a threat to the balance between the hunter-fisher-gatherers and their natural surroundings. The intentional destruction of the tool and subsequent treatment

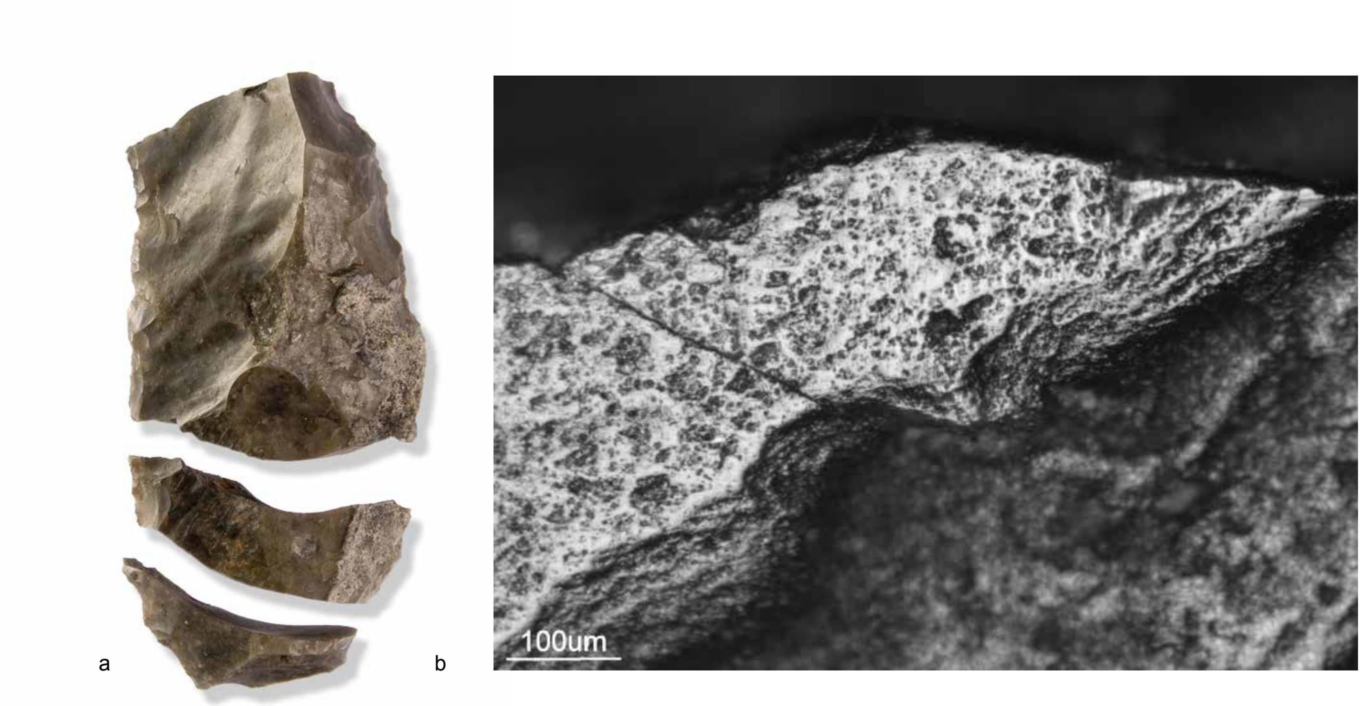


Fig. 7.3 a. Sickle from the Middle Neolithic site of Ypenburg, with traces of burning and fragmentation; b. use-wear seen on the implement (100x).

with ochre may be seen in this context: the sickle needed to be returned to nature, and spirits needed to be appeased. Rubbing ochre into the burnt and broken stone may have been a way to heal the wounds of the stone and to prepare it to go back to nature. In New Guinea, for example, stone axe makers rub red pigment in the negatives of adzes, like putting blood in the wounds of the axe (Pétrequin/Pétrequin 2000, p. 250). The special treatment of the sickles from Ypenburg is a clear example of the ritualisation of a domestic tool.

Also in other periods we see that agricultural implements have a special significance. During the TRB period sickle blades and axes are almost exclusively deposited in burial context. Land clearing and harvesting are communal activities and donating the tools involved to the ancestors may be a way to ensure the continued existence and prosperity of the local group (see below). Likewise, it may be no coincidence that during the Late Bronze Age the crescent-shaped sickles from Scandinavia, were used to cut turves, a building material with which to construct the *domus* of both the living and the dead (Chapter 8). Sometimes these 'sickles' can be seen as selective depositions as evidenced by the hoard of Heiloo (fig. 8.5).

7.5 The prolific use of flint in TRB ritual life

7.5.1 Introduction

The TRB has delivered abundant evidence for the ritualualisation of flint. In part, this may have to be attributed to the fact that more systematic research was carried out in this particular period, partially it is due to taphonomical reasons. Obviously the megaliths are highly visible monuments: they were already reported in the 17th Century by Picardt but were also destroyed on a large scale as a source of stones. The axe depositions had a good chance of being discovered during the large-scale peat digging activities in the 18th and 19th Century.

Whether the TRB people really performed more ceremonial and ritual activities than their predecessors is hard to tell, but it may be no coincidence that the megalithic phenomenon occurred all along the Atlantic Coast (Sherratt 1990).

7.5.2 Ritual activities related to the megaliths

There is substantial evidence for ritual behaviour surrounding the *hunebedden* and the burial practices taking place there (fig. 7.4). We have (albeit disputed) evidence for sacrificial zones in front of the entrance of the *hunebedden*: for example at D26 ceramic sherds have been found, suggesting that food stuffs have been offered there (Bakker/Luijten 1989; Van Gijn/Bakker 2005). As was already demonstrated in chapter 6 there is a significant difference between the flint objects deposited in the megaliths and those found in TRB settlements. Flint sickles are almost exclusively deposited in burial context. It is significant that apart from the used sickle blades, axes also were deposited in the tombs. These axes all display traces from contact with wood (visible in the small use scars) and must have been instrumental in clearing the forest and undergrowth to lay out the fields (Pétrequin 1984). The axes were probably also used for carpentry and house building, activities related to the creation of the *domus*.

The axes clearly had a use-life behind them by the time they were deposited in the megaliths. Upon deposition in the megaliths they were re-sharpened to prepare them for further use in the afterlife prior to their deposition with the deceased (fig. 6.8). The fact that they were re-sharpened suggests that they still had a life ahead of them, becoming part of the 'life' of the ancestors.

We may also put the strike-a-lights in the context of slash-and-burn agriculture. Fire obviously is important in this method of clearing the land, so strike-a-lights too may be seen as ambiguous: on the one hand instrumental in destroying the forest that used to be life giving, on the other, enabling the crops to grow. Axes, sickle blades and strike-a-lights are thus related to an activity that must have been a communal affair: the preparation and maintenance of agricultural fields in the forest and the harvest of the crops. Their deposition in the communal burial grounds of the *hunebedden* may therefore be reflective of values and beliefs that are shared by the community: these objects symbolized activities relevant to the community at large.

The deposition of agricultural tools in the *hunebedden* may not only relate to the special importance attributed to agricultural activities, but also reflect the ambiguity of these activities in terms of the nature-culture dichotomy. The hunter-gatherer way of life that preceded the agricultural TRB probably had a very different outlook towards nature: many present-day hunter-gatherers consider the forest in which they hunt and the streams in which they fish as living entities, inhabited by the spirits of nature. It can well be imagined that the slash-and-burn type of agriculture, involving the destruction of the life-giving woods, as practised by TRB farmers, was circumscribed with rules and regulations that were supported and reinforced by various rituals.

As already cursorily mentioned in chapter 6, much of the flint from the *hunebedden* seems to display modifications that were initially characterized as post-depositional, including a very strong gloss and scratches. Many objects were therefore dismissed as 'not interpretable'. A closer look at these strange

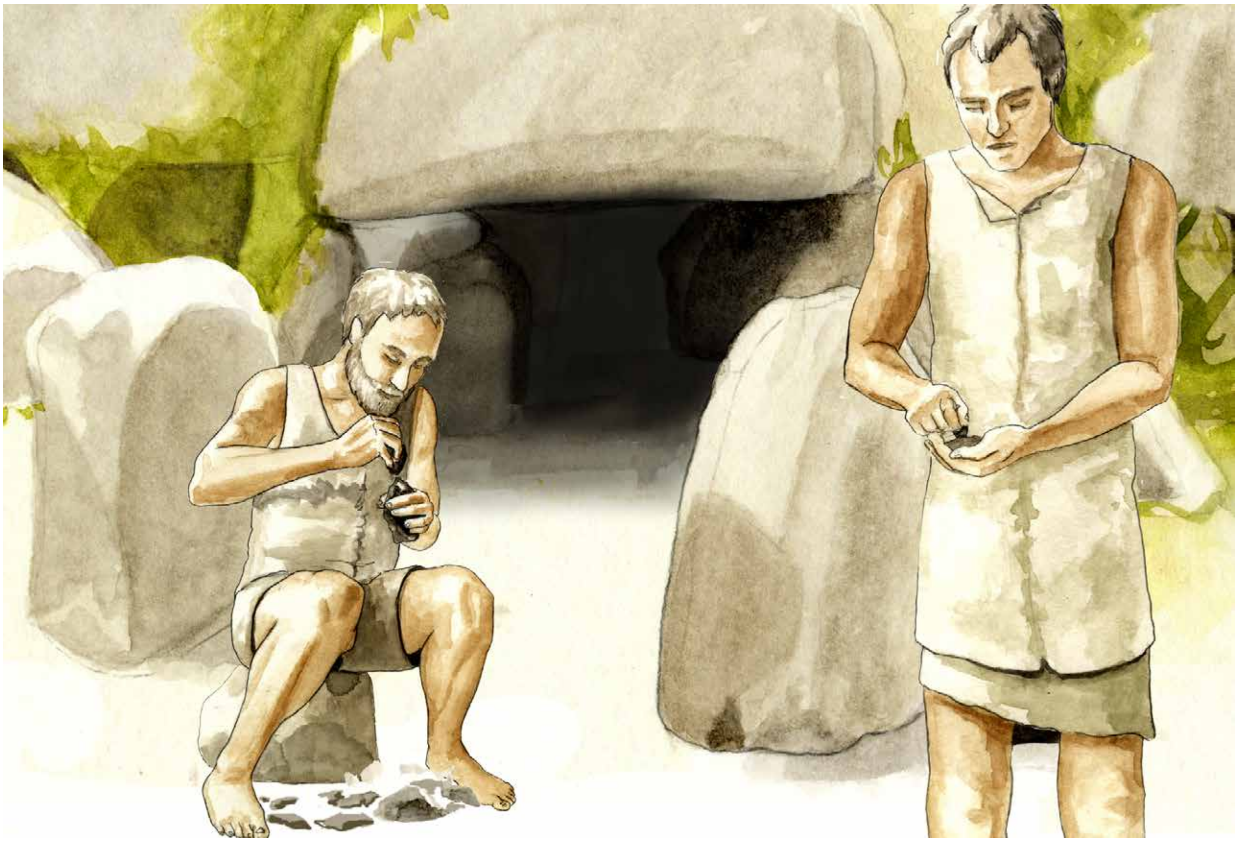


Fig. 7.4 Reconstruction of ritual activities involving flint that may have surrounded TRB burial practices: one figure is knapping flint, another is scratching the surface of a flint tool.

'post-depositional' surface modifications on some of the flint implements, notably from the *hunebedden* G2 and G3, resulted in an alternative interpretation. The gloss never covers the entire surface of the implements, and some implements do not show any gloss at all. If we accept the idea that the *hunebedden* were frequently cleared out and filled again, a conclusion based on the fact that sherds from the same pot were located all over the *hunebed* and in various vertical positions, this must have affected the other burial goods as well. This reshuffling of the contents of the *hunebed* could, at least to some extent, have been responsible for the severe gloss that some of the flint implements display. Ashes especially have a strong polishing effect on flint. The fresher implements were probably deposited in the grave during the last stages of its function as a funerary monument and were subjected to less reshuffling activities.

Re-examination of the scratches led to an even more surprising conclusion. Under the stereomicroscope these scratches appear as sets of parallel lines covering the surface of the tool. Sometimes more directions can be discerned, in one occasion even a cross-hatched pattern (fig. 7.5). The scratches are always very regular and run parallel to each other making it highly unlikely that they were the result of trampling. Under the metallographic microscope they appear as linear lines of a bright polish that can be characterized as 'mineral' polish. Experiments by Van Woerdekom show that these scratches can be made by a pointed flint flake that was strongly pushed against the surface of the flint surface (Van Woerdekom in prep.). It may well be that many of the picks that are so abundantly present in the megaliths and which frequently do not dis-

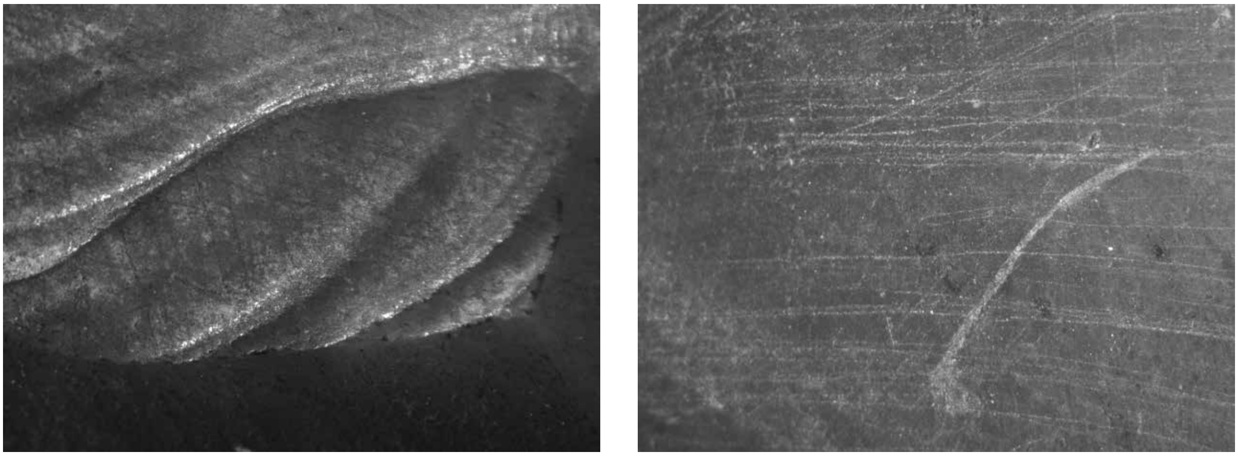


Fig. 7.5 Evidence for scratching the surface of flint objects from TRB megaliths. Note the cross-hatched pattern in the photo left that is unlikely to have been caused by post-depositional surface modifications (stereomicroscope c. 10x).

play traces of use, were involved in this ritual activity. Obviously there is no utilitarian reason for scratching a flint surface with a flint tool. However, this practice suggests that flint implements were treated in even more curious ways than merely tossing them about during the re-arranging of the contents of the *hunebedden*.

In addition to the curious surface modifications, there is other evidence that flint played an active role in burial rituals. Apart from the axes and the sickles, most implements do not display any evidence for use. They are moreover, made in a rather curious way: the transverse arrowheads are frequently so crooked that their aerodynamic qualities are highly questionable. The picks seldom show wear traces and also seem to have been produced in a haphazard fashion. A few exceptions aside, they certainly were not used as strike-a-lights. Considering the high number of unused (and sometimes unusable) transverse arrowheads and picks, I would argue that much of the flint deposited in the tombs was knapped specifically for the occasion, to be deposited in the tomb. This is of course difficult to substantiate as none of the megaliths have been properly excavated and refitting has not been attempted.

7.5.3 The special deposition of oversized axes

The TRB has produced some of the most spectacular finds from the Neolithic: the large 'ceremonial' axes (fig. 7.6). Their distribution centres on the Drenthe Plateau in the northern Netherlands. In total seven multiple object depositions were studied, as well as several single object depositions (Wentink 2006, 2008; Wentink/Van Gijn 2008) (Appendix). Most of these depositions consisted of large thin-butted axes, often only polished along their cutting edge. In addition, flint nodules sometimes formed part of the multiple object depositions (fig. 7.6). The deposition of Een 1940 is such an example: it consists of flint nodules, a prefab and finished axes (Harsema 1979). It should be emphasized that is highly likely that flint nodules were a much more common occurrence and in fact they were mentioned in several of the original find reports. However, because they did not display traces of manufacture, they were not collected but left behind in the find spot. The special significance of these 'hoards' has long been recognized, not only because of the size of the axes and the skills with which they must have been made, but also because of their find location in waterlogged places (Achterop 1960, 1961; Bakker 1979; Harsema 1979; Ter Wal 1996).

Wear trace analysis of a sample of axes in the mid 1990s had already shown these axes to be devoid of traces from regular (utilitarian) use and to display ochre on their cutting edges (pers. observ. of the author; Wentink/van Gijn 2008). However, it was not until the systematic inventory of Wentink that clear-cut patterns emerged in terms of the size of the axes, their find loca-

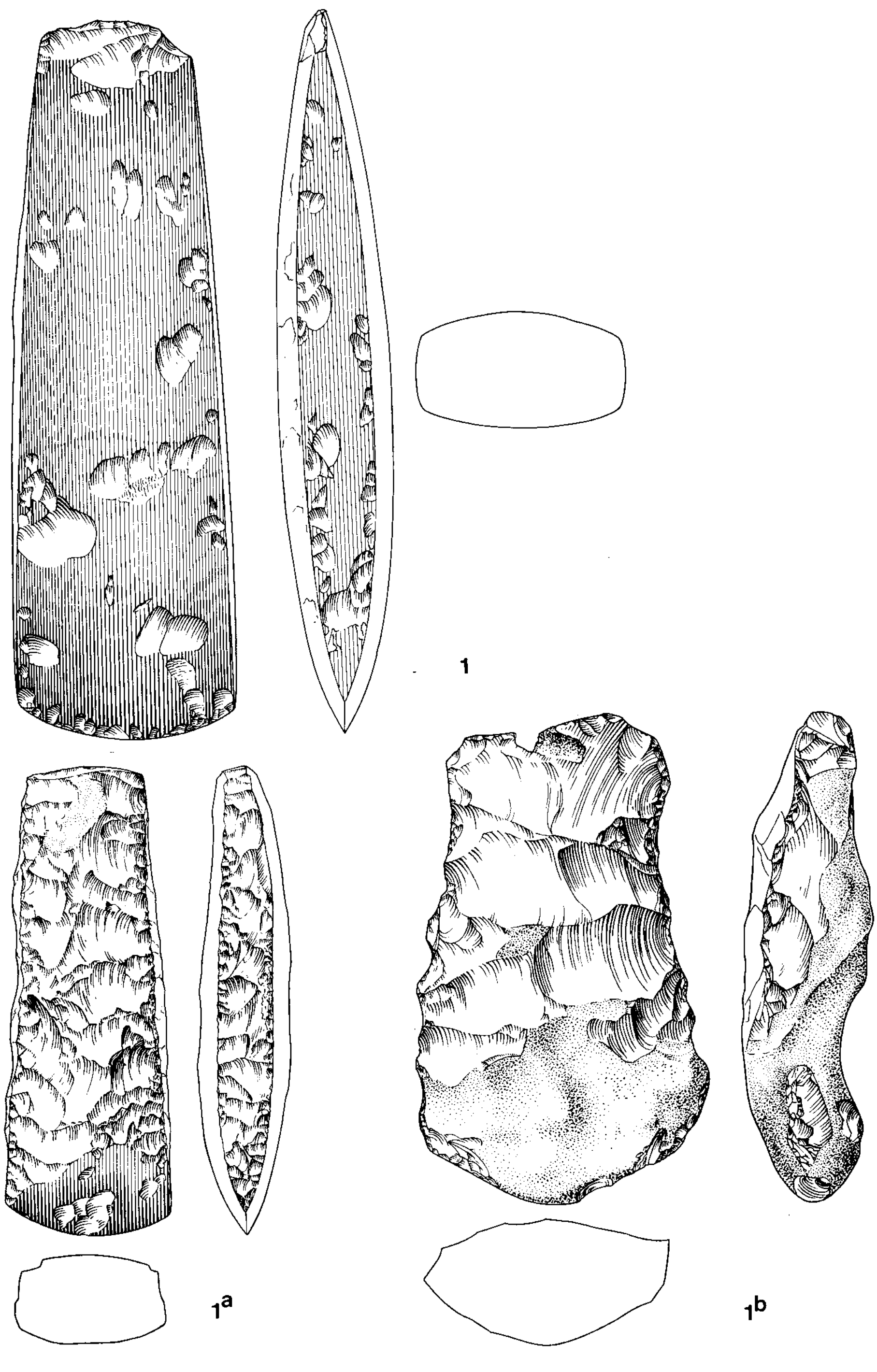
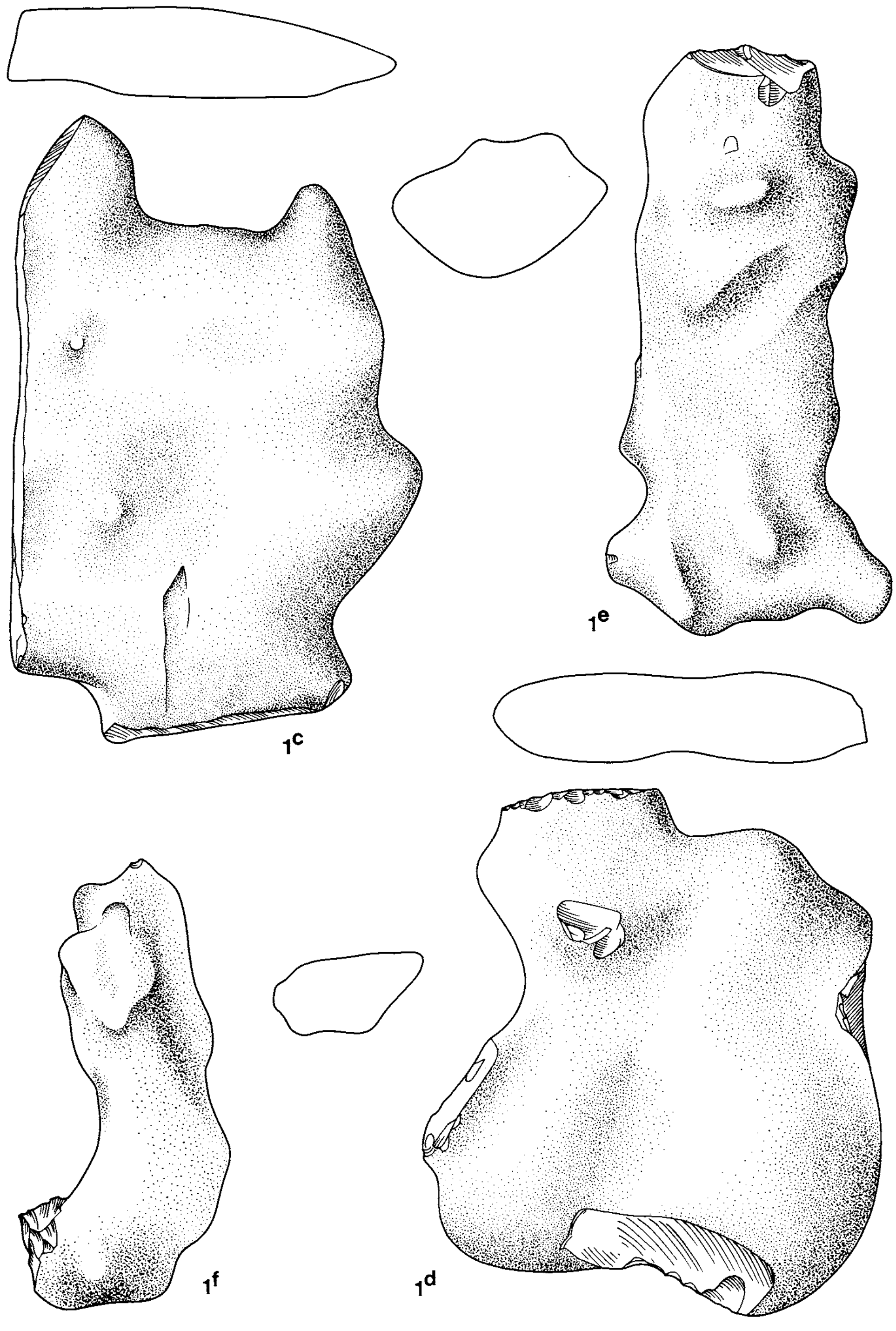


Fig. 7.6 The hoard of Een 1940 encompassing axes in different stages of production as well as unmodified nodules of flint (scale 1:3).

tion and the traces of wear and residue seen on them (Wentink 2006, 2008; Wentink/Van Gijn 2008). First, it turns out that the ceremonial axes are substantially larger than the probably largely locally made axes found in the megalithic burials (table 7.1). They were made on Scandinavian flint, deriving from northern Germany or southern Scandinavia and imported as finished products. The exact flint source is not always known, but it appears that at least some of the flint came from Helgoland. This was for example the case with Een 1940:



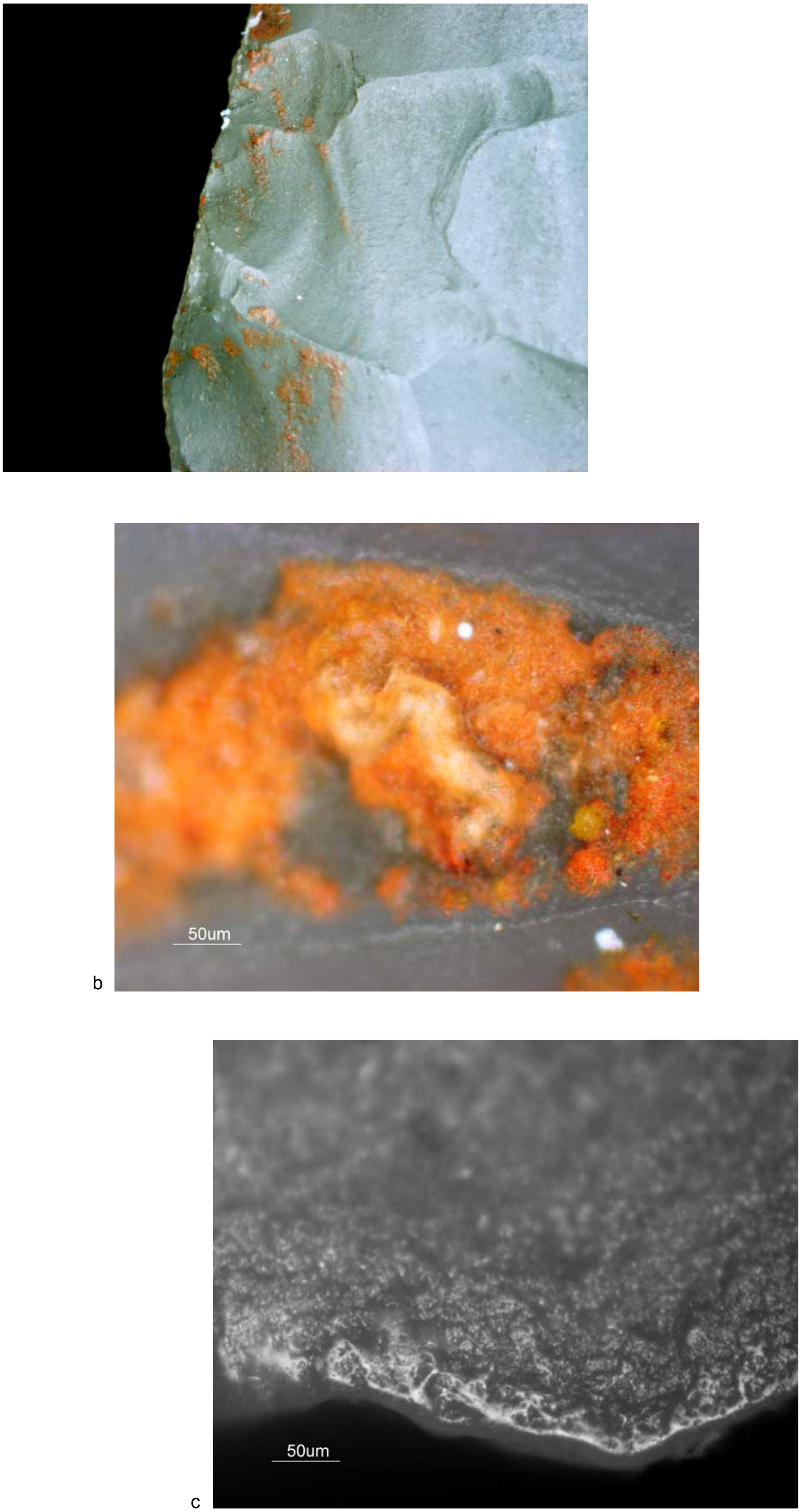


Fig. 7.7 Features observed on the ceremonial axes. a. ochre seen on the edges (stereomicroscope 10x); b. ochre seen through polarized light (200x); c. traces from wrapping observed on the ridges of the object (200x).

the axe prefab was made on the beautiful red Helgoland material (fig. 7.2), whereas the flint nodules and the smaller axe were of the grey Helgoland variety (Beuker 2005; Harsema 1979).

The skill invested in these axes is considerable and here and there subtle indications are left, such as a small patch of cortex on the butt end of the axe, indicating the proficiency of the makers to knowledgeable others. The axes do not display 'regular' traces of use that would suggest a functional use-life. Instead they have freshly looking edges that only display traces of ochre (fig. 7.7a, b). Moreover, the ridges and edges have traces from having been recurrently wrapped and unwrapped in an, as yet, unidentified material (fig. 7.7c). Last, they were not just deposited in waterlogged places, but along streams, at the edge of habitable, sandy areas and bog lands (Wentink 2006, 2008).

Wentink interprets the axes as inalienable objects that represent a larger TRB cosmology that encompasses both southern Scandinavia and the TRB West group. The biography of the axes is special from the moment of their production onwards. Because they were not used during their transport from southern Scandinavia to the northern Netherlands, it must have been clear to everybody along the way that these axes were special and had to be treated in a different way. They were made specifically as ceremonial objects to be eventually deposited in waterlogged places: their life-history was pre-determined 'at birth'. The fact that they are prohibitively large and would certainly snap upon impact due to end-shock further supports the idea that they were intended as sacred objects of ritual exchange and were not meant to be used in a utilitarian way. Godelier has argued that sacred objects cannot be part of daily life and cannot have a practical application. Even though such sacred objects may look like axes, daggers or other weapons, their specific features rule out that they were put to such uses (Godelier 1999). This may well pertain to the TRB ceremonial axes as well.

It is not clear where exactly these axes were produced. In Denmark a large production site has been found at Hastrup Vænget where not less than 168 kg of flint debitage was retrieved (Hansen/Madsen 1983). The flint was brought to the site from elsewhere. No settlement material was encountered indicating that

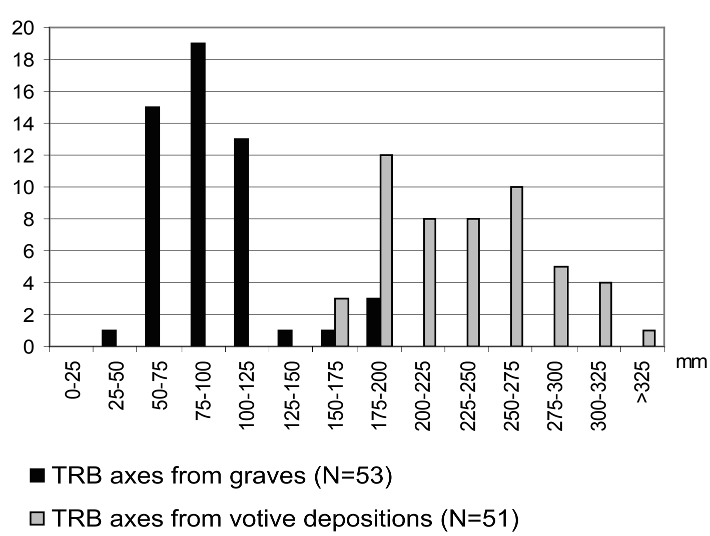


Table 7.1 Size differences between axes from graves and axes from depositions or hoards (Wentink 2008, fig. 3).

the axe production took place away from the domestic context. This would suggest that the production of these special objects was surrounded with secrecy. This is not so strange because the biography of the axes indicates that they did not get imbued with meaning through their use-life, but rather that their meaning and significance was already conferred to them during their production. The knowledge as to how to make these special objects could have been a gift from the ancestral spirits to the specialist flintknappers (Helms 1988, 1993). Through production this ancestral knowledge, and hence the supernatural powers this represents, is materialized and can be exchanged with other groups.

The highly skilled makers of these axes knew exactly what cultural rules these objects were surrounded with, and what powers and knowledge these objects represented. By wrapping the axes these powers were kept secret, not to be seen by those who were not initiated. Experiments by Wentink show that the axes must have been wrapped and unwrapped numerous times. This suggests that they may have played a role in recurrent ceremonies, either during their transport or in the region of their final destination. The wrapping also indicates that these axes were only to be seen by those initiated. Wrapping of sacred objects is often reported in ethnographic context (Akerman *et al.* 2002; Godelier 1999). These meanings were clear to everyone dealing with these objects on the way, until eventually they were deposited in streams in the northern Netherlands, according to a strictly defined set of rules known both to the producers and to the recipients of these objects. By doing so, these axes, probably agents in their own right and embodying ancestral powers and knowledge pertinent to TRB cosmology, united the various local groups that shared the TRB identity. The loca-

Fig. 7.8 Nodule from the hoard of Een 1940 showing the juxtaposition of a patinated (ancestral) flake negative and a more recent one. Note that the shape of this nodule does not lend itself for manufacturing a large axe, indicating that it was not imported as raw material resource.

tion of these depositions, in streams separating different territories and on the edges of uninhabitable bog areas, indicates that these axes were not owned by particular local groups. Being inalienable objects, their significance transcended that of the local group. The local group was on the other hand represented in the various megaliths (Chapter 6).

Remains the question of the deposition of unmodified flint nodules alongside these highly crafted axes: what meaning can be attributed to their presence in the special depositions? As said above, the nodules also had their origin in southern Scandinavia or northern Germany and were transported over large distances. Yet, their shape made them utterly unsuitable for axe manufacturing (fig. 7.6 and 7.8). Microscopic examination of the nodules from the Een 1940 deposition showed the presence of ochre on three of the four nodules. On a few spots, where the cortex was removed, it was possible to discern evidence for the same wrapping traces as seen on the finished axes. Another remarkable observation was that all of the nodules displayed ancient, heavily patinated scars alongside flake removals of more recent origin, presumably from TRB times (fig. 7.8). It can be suggested that these nodules constituted a visual reminder of the mythical origin of the axes: only the ancestral spirits can make such beautiful axes. The knowledge to produce them is a gift from them and without such magical knowledge these axes are impossible to make. As such the nodules were part of the same narrative as the axes. The ancient flake scars may represent the ancestral spirits, the more recent ones that are juxtaposed to the patinated, ancestral, scars, are the ones of the skilful knappers who received their gift from these very spirits. The fact that the nodules were also treated with ochre, either during deposition or during the course of their life, supports this interpretation.

7.5.4. An abundance of ritual activities

Burial ritual is a social practice by excellence (Huntington/Metcalf 1979) and the TRB funerary practice forms no exception. The TRB period has produced much evidence on ritual behaviour and flint seemed to play an important role in the various ceremonies. It is the period during which we see for the first time a distinct difference in the type of tools deposited in burial context from those found in settlement assemblages. This includes both flint objects with a long use-life behind them, such as the axes and the sickles, and implements that seem to have been produced specifically for the burial ritual such as the picks, strike-a-lights and transverse arrowheads (Chapter 6). It may well be that the very act of flintknapping, with the characteristic rhythmic 'ringing of the stones', formed an integral part of the burial ceremony. Funerals around the world are often a noisy affair (Huntington/Metcalf 1979) and sound seems to play a role whenever contact with 'the other world' is sought. Needham has noted that especially percussion is pivotal in such ceremonies (Needham 1967). The drums of the shaman, bringing the latter in a trance and in contact with the spirits are of course a well-researched example. Needham (1967) seeks the explanation for the relationship between percussion and the spiritual world in the neurological and other bodily effects sounds have on human beings. He contends that percussive sounds are pivotal in rites of passages or transitions such as birth and death maybe because the rhythmic sounds reverberate the beating of the heart (Needham 1967). Although admittedly highly speculative, it can be proposed that flint percussion produced the rhythmic sounds that were important in TRB funeral ceremonies. Recently archaeologists have become more aware of the importance of the auditory experience, something that has, somewhat understandably, been ignored by archaeologists for a long time (Scarre/Lawson 2006).

It has been argued that the presence of axes and sickles with a use-life indicates the special importance of agriculture for the local group (Chapter 6). Both tools are involved in agrarian activities, clearing the land and harvesting, activities that were likely performed in communal fashion. Depositing such tools in the megaliths indicates not only the special importance of agriculture to the TRB communities, but also referred to the identity of the local group. This is in great contrast with the deposition of the large ceremonial axes. As said above these axes did not have a utilitarian use-life prior to their offering, but instead were meant to be handled and displayed as secret objects, strictly outside of the daily domestic activities. Importantly, the knowledge as to how to handle these axes was shared by the producers of these axes in the north, and the receivers in the Netherlands who eventually deposited them in waterlogged contexts. The biography of the ceremonial axes is thus entirely different from the biography of the axes found in burials: the former embody notions about larger TRB cosmology, shared by communities far apart, the latter relate to the local ancestors.

Whereas we normally only have knowledge of subsistence patterns, settlement locations and other matters pertaining to daily life of past peoples, the reverse is true for the TRB: in fact we know little of their domestic context, at least in the area of the present-day Netherlands. Hopefully, in the future more TRB settlements can be excavated, elucidating the relationship between the domestic and ritual context. In the meantime it is clear that TRB cosmology must have been very complex and flint formed an extremely important material reference to this cosmology. Similar conclusions have been drawn by Midgley who has stressed the importance of fire in TRB context (Midgley 1992) and by Larsson who has done likewise (Larsson 2004).

7.6 Continuity and change: the ideological significance of exotic flint for Single Grave communities

7.6.1 Axe depositons

The practie of depositing axes in wet context continues in the early Single Grave culture albeit with modifications (Achterop 1960, 1961; Ter Wal 1996) (fig.7.9). An inventory of the depositions, revealed a total of six multiple hoards. In addition two single axes from possible depositional context were studied as well (Appendix). Most of the find locations are from the province of Drenthe. Just like in the TRB, the Single Grave depositions took place in wet locations, mostly near running water, in the boundary zones between the inhabitable sandy zones and the bog areas (fig. 7.10). Their composition however, is more variable than their TRB predecessors: although large axes are still present, much smaller axes, made of local flint, as well as chisels (often of TRB origin),

Fig. 7.9 Single Grave hoard of the Pieperij, displaying a mix of different types of used implements and objects without traces (scale 1:2).

blades and an occasional scraper were also deposited. Flint nodules are however completely absent. Technologically the axes were of the same rectangular cross section as during the TRB period, indicating technological continuity. On the other hand, the way of polishing the axes is different from the TRB axes. The TRB axes were, often only partially, polished on a grinding stone, so that only the ridges were polished. The Single Grave axes on the other hand also display signs of polishing in the deeper scars, most probably because of the use of a pliable polishing material (Chapter 6).

The most noteworthy difference between the TRB special depositions and those of the Single Grave culture is that the latter contain used implements: they display polish (generally from contact with wood), retouch and traces of hafting. Although occasionally large axes are still present, most of the deposited axes are actually substantially smaller than the TRB ones, probably due to recurrent re-sharpening. This indicates that these axes had a use-life in, most likely, domestic context. Yet, before deposition they were invariably rubbed with ochre, just like in the TRB period. This practice continued to be essential, in contrast to the wrapping of the axes, for which no traces were found on the Single Grave axes. It seems therefore that the role these objects played in society changed drastically with respect to the preceding TRB. During the TRB the oversized axes from hoards were interpreted as objects symbolizing the larger TRB cosmology: they were never used. In contrast the axes found in the TRB

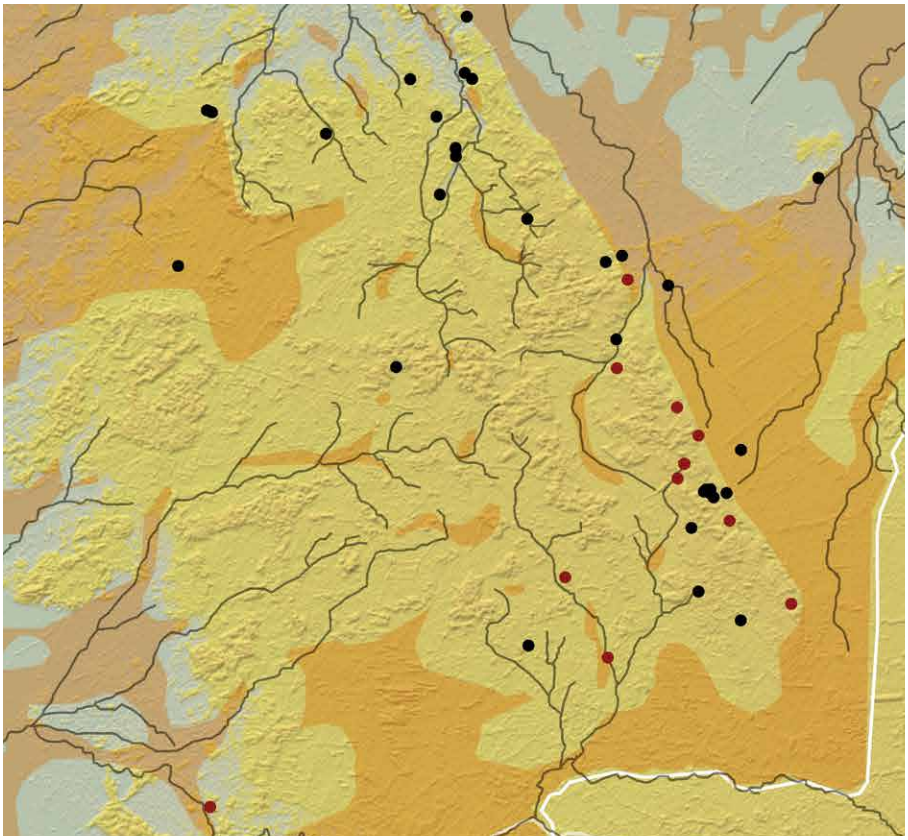


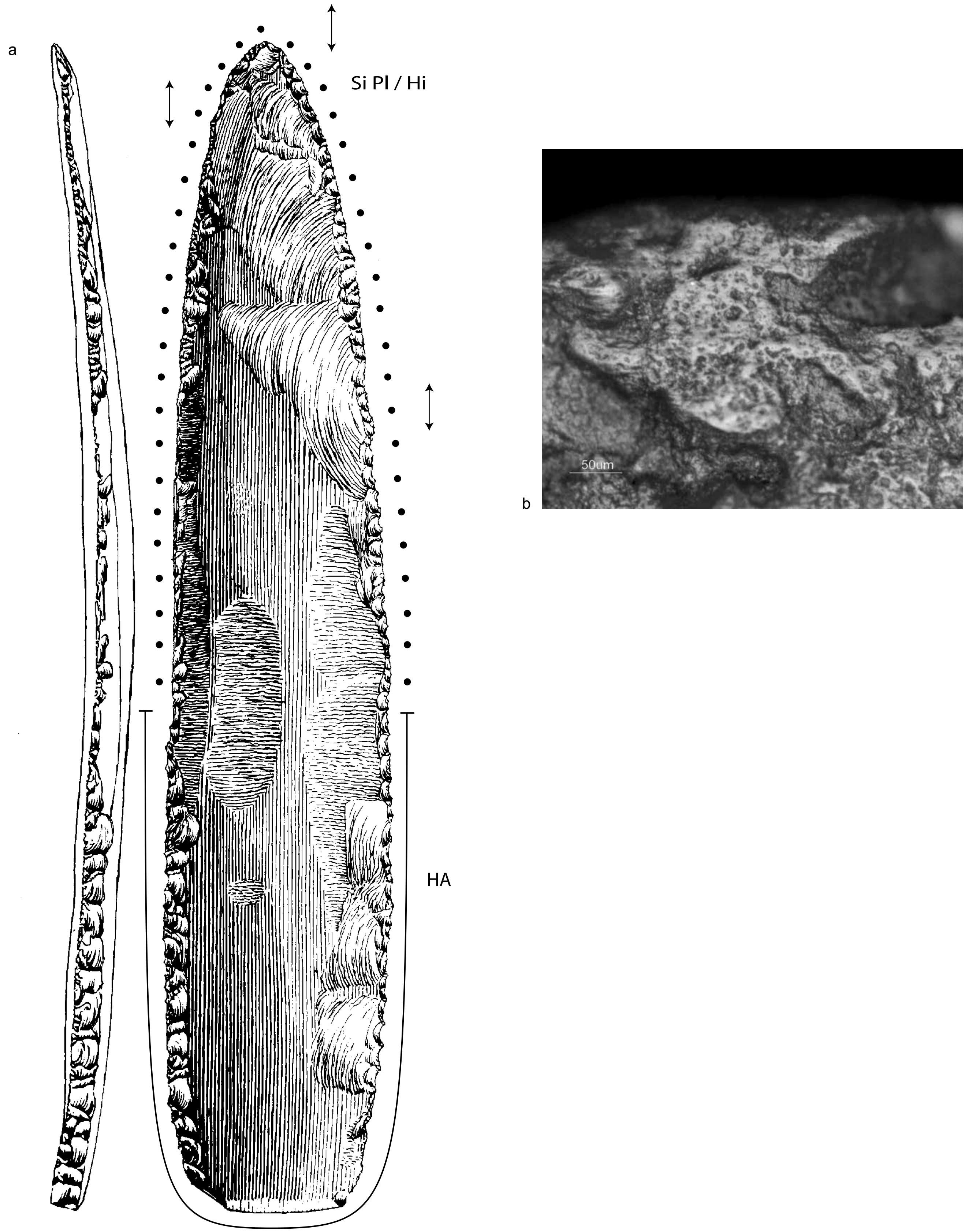
Fig. 7.10 Distribution map of TRB (black dots) and Single Grave (red dots) hoards in the province of Drenthe (in brown peat extension c. 2900 BC).

megaliths represented the collective activities of the local group. During the Single Grave culture used axes were found both in burial context and in special depositions. The concept of offering to the deities shared across vast distances was lost, and instead the deposition of objects became a more local affair, in which no attempt was made to adhere to the old TRB belief system. Instead, this old TRB belief system had already broken down and was modified into a Single Grave system of beliefs and practices.

7.6.2 The French daggers

In Chapter 6 I discussed the daggers of Grand-Pressigny and Romigny-Léhry flint from the perspective of identity. Here I will address their possible ideological significance, being well aware that the two are intimately entwined. Because the daggers were already extensively discussed in chapter 6 a short summary will suffice here, highlighting some of the features that may be related to their possible ritualisation. First of all, the great distance across which these objects were transported, most likely in finished state, is remarkable. Another telling feature is the fact that any signs for the – human – production of these blades were either painstakingly avoided or else removed: the bulb of percussion was removed by flaking and percussion waves could only be detected with great difficulty, if at all. This is interpreted as a wish on the part of the flintknappers to suggest a non-human, mythical origin for these objects. The aesthetic qualities of the flint, notably the pretty honey-colour, must also have contributed to the attractiveness. Last, the wear traces on these southern daggers were not related

Fig. 7.11 Dagger of Grand-Pressigny flint found in a late Single grave barrow at Eext-Schaapsdijkweg (scale 1:1) and wear traces observed (200x).


a
Si Pl / Hi
HA
50um
b

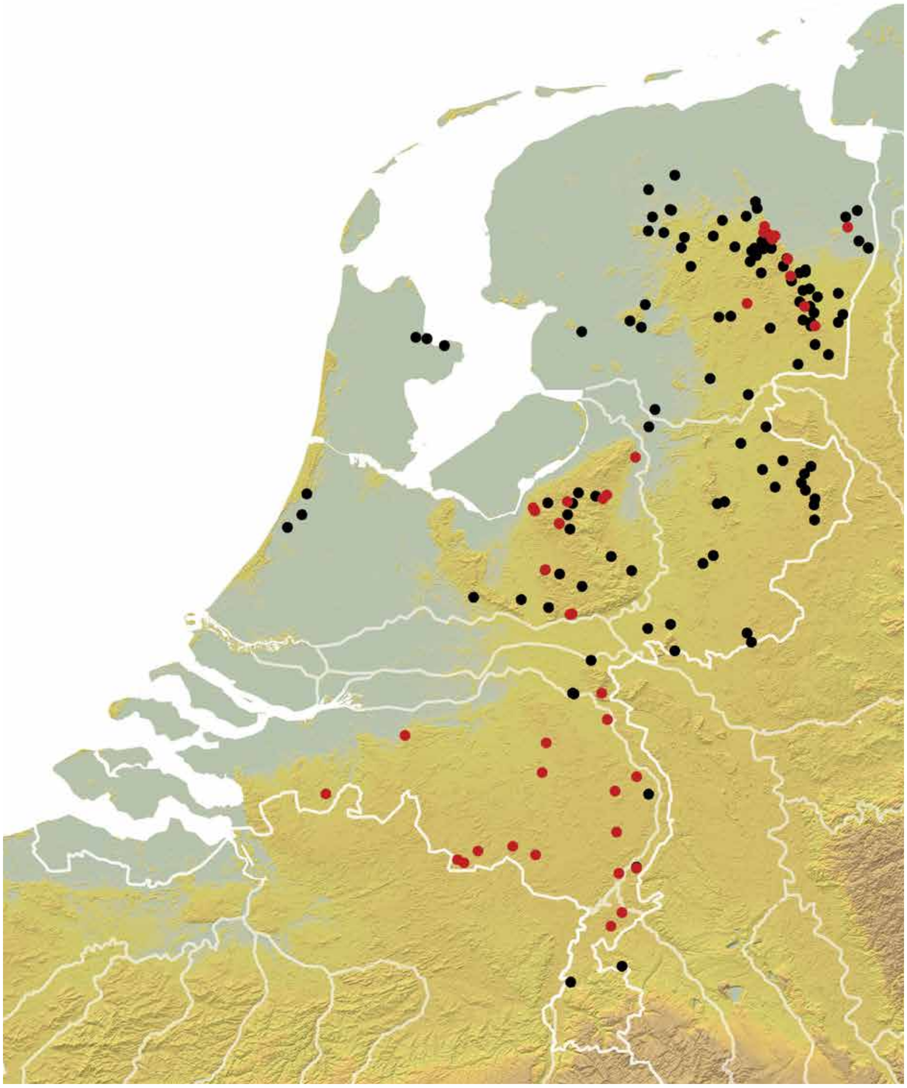


Fig. 7.12 Distribution map of southern Late Single Grave (red dots) and northern (Late Bell Beaker and Early Bronze Age) (black dots) daggers in the Netherlands.

to a specific subsistence or craft activity but instead were caused by recurrent rubbing with a sheath of plant material (fig. 7.11). They were therefore interpreted as items of display, to be shown on presumably special occasions. As such they must have had an ideological significance extending beyond the person with whom they were buried.

Despite the typological designation as dagger, it was argued that it was highly doubtful whether these daggers really ought to be seen as indicative of martial (male) values (Chapter 6). Their ideological significance lies rather in the long-distance connections they represent. These skilfully made 'daggers' stood for a changing orientation of the later Single Grave communities: it seems that the ties with the north continued but were supplemented with connections in southern direction. This late Single Grave phase can be seen as a transitional phase between the almost exclusive orientation of the Early Single Grave groups to the north (a continuation of TRB tradition), to an eventual incorporation of the communities in all of the Netherlands into the pan-European Bell Beaker influence sphere. It should be noted however, that the northern connection never disappears altogether as Scandinavian daggers are prominently present in Later Bell Beaker and Early Bronze Age context in the north-eastern part of the country (see below).

The spatial patterning of the French daggers seems in support of this proposition (fig. 7.12). In the TRB period the exchange lines seem to be confined to the north, with almost all TRB finds located in the areas north of the rivers, predominantly on the Pleistocene uplands. However, the distribution of the French daggers extends across pretty much all of the Netherlands including not only those areas traditionally focused on the south, like the riverine zones and the southern coastal area, but also including barrows situated in the northern province of Drenthe. The numbers of such daggers indicate that it is not an incidental affair but that indeed there was an increasing interest in southern affiliations on the part of the northern communities.

7.7 The significance of northern flint

7.7.1 The Scandinavian daggers

The Scandinavian daggers are made of northern flint and were produced in specialized workshops of individual craftsmen in Denmark, from 2350 until about 1500 BC (Apel 2001). They are distributed across large areas of north and west Europe (Barrowclough 2004). They started to appear in the northern Netherlands around 2300 BC. A cursory inventory produced 127 specimens, for the greater part of Lomborg/Apel type I, II and III (Beuker/Drenth 1999, 2006; Bloemers 1968) (fig. 7.13). Unfortunately, very few of these are found in datable contexts. Type I seems to be dated to the Late Bell Beaker culture, type II to the transition of the Bell Beaker and Early Barbed Wire culture (Early Bronze Age), and type III daggers to the full Early Bronze Age. Types IV-VI are dated to the Middle Bronze Age but are rarely found in the Netherlands. It should also be noted that the chronology of the daggers is a matter of debate, also in Denmark (see for a discussion of this issue Apel 2001). As we find no production waste in the Netherlands, they were likely imported as finished products.

A total of 16 Scandinavian daggers were examined for traces of use, one of which was not interpretable. One dagger had been treated with ochre prior to deposition. All daggers display a polish that resembles the wear resulting from contact with siliceous plants. In some cases a rougher texture of the polish suggests contact with hide but this may also be bark which causes a similar rounding and rough-textured polish (fig. 7.14). This type of polish is located all along the edges but is also found far into the piece, on the ridges. The polish displays a very strict directionality oriented strictly parallel to the long axis of the implement. All of the daggers with wear traces also revealed hafting marks. Four of these, all of them type III daggers, were hafted in hide. It should be noted that the type III daggers is characterized by a handle with a seam, applied by means of the punch technique. This seam may simulate the handle of a metal dagger around which a leather sheath was stitched (Callahan 2006). Especially the type

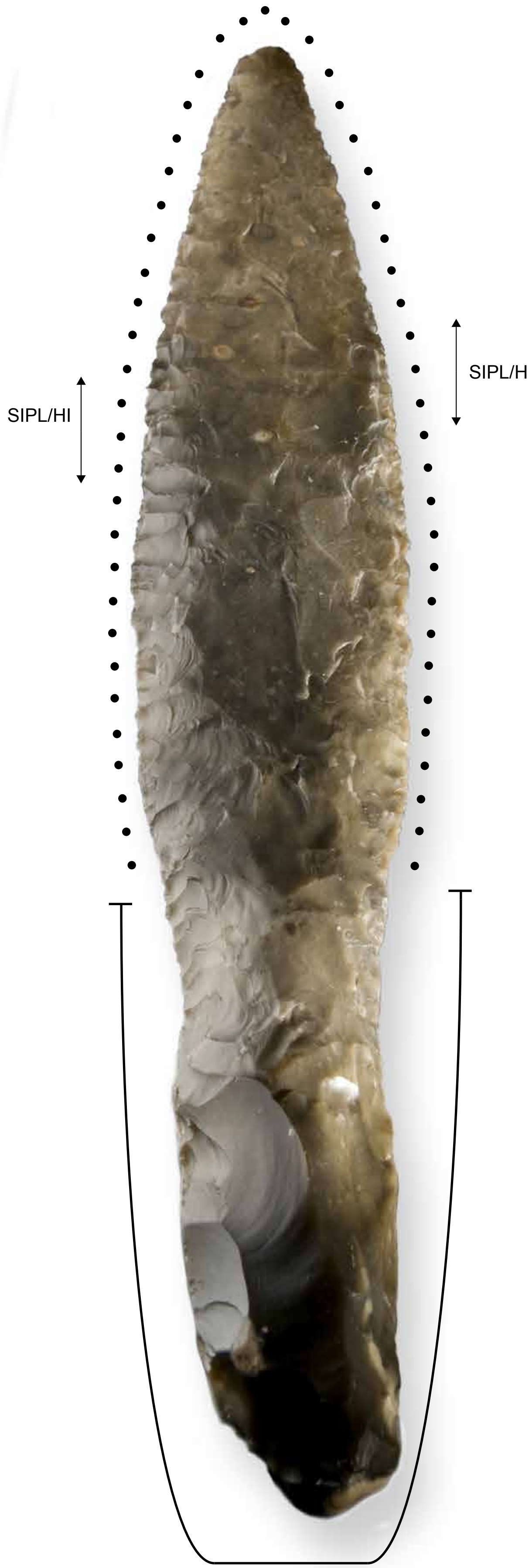


Fig. 7.13 Scandinavian type III dagger from Exloërveen. Note the presence of cortex on its butt end. The object displays wear traces from frequent contact with a sheath (scale 1:1).

Fig. 7.14 Two experimental northern daggers with different kinds of hafting arrangements and different types of sheaths, one of lime bark modelled after the Ötzi find, the other made of cherry bark.

III and IV daggers are actually basically *skeuomorphs* of metal counterparts and it has been suggested that they were produced in order to compete with metal look-alikes.

The configuration and character of the traces suggest contact with a sheath of plant material or of a combination of plant and hide. The implement must have been pulled in and out of this sheath numerous times to account for the development of the wear traces. It is thus likely that they can be interpreted as items of display, akin to the role ascribed to the earlier French daggers. This interpretation seems to be substantiated by the metrical properties of these daggers. It was shown that the specimens from Dutch territory have not become shorter through use and re-sharpening (Apel 2001) although exceptions do exist (Beuker 1984; Beuker/Drenth 1999). This could indicate that the daggers were not meant for utilitarian purposes. Still, it cannot be excluded that the daggers were effective stabbing devices and were indeed used as such. Traces from this activity would hardly have been visible because they would have been overlain by the extensive polish from contact with the sheath. Still, an interpretation as 'special objects' is nevertheless appropriate. Whatever else they may have been briefly used for, they were certainly displayed and made visible to an audience to whom this was relevant.

If we look at the find circumstances it turns out that most of the Scandinavian daggers were found as single finds; their exact find locations are frequently not known. Their general distribution is however markedly different from the Grand-Pressigny daggers that are clearly associated with graves. The Scandinavian daggers derive from marshy areas, away from the higher grounds (fig. 7.12). They seem to have been deposited in marginal areas far from the settled land. This could indicate that these objects had a special significance for a larger social entity and were not related to particular prestigious or influential individuals. The fact that they were displayed numerous times in combination with a deposition in a space that was not immediately related to a particular individual may support the idea that they had a relatively 'public' role. However, again, the exact social and ideological context in which this display took place, cannot be specified any further without much more detailed contextual evidence. For example, it cannot be excluded that the context in which they were displayed was restricted to those initiated or that the display and deposition in a river or bog was actually related to the glorification of a particular individual.

In this context it is noteworthy to mention another feature of the distribution of the Scandinavian daggers. There seems to be a shift in depositional practice between the Late Bell Beaker and Early Bronze Age period. Whereas the type I and II daggers are found at the edge of bogs and in river valleys, the type III daggers also seem to be located further into the large peat bogs (fig. 7.15). Although the edges of bogs and rivers can be designated as liminal zones, that is, the boundary between group territories or between the lived-in area and nature, the bog itself is beyond that: either no mans land or the territory of the mythical ancestors, spirits or gods. At this time tracks and roads were constructed into the bogs. These do not always seem to traverse the bogs but sometimes end in the middle of it such as seems to be the case with the track of Nieuw Dordrecht (Harsema 1981), suggesting that the bog itself was the intended destination. In

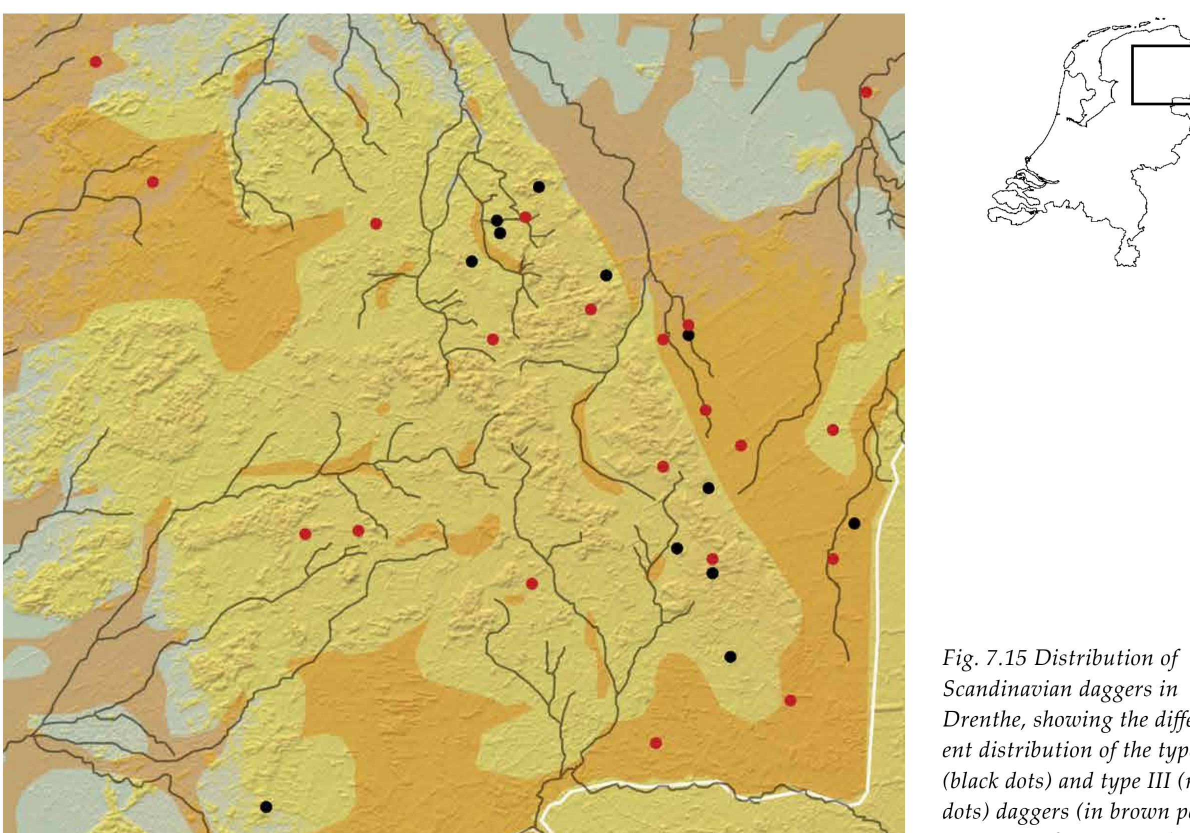


Fig. 7.15 Distribution of Scandinavian daggers in Drenthe, showing the different distribution of the type I/II (black dots) and type III (red dots) daggers (in brown peat extension of c. 2900 BC).

fact, one dagger of type III was found in the peat bog, 2 meters from the remnants of a fire and close to a collection of wedge shaped poles of pinewood. This configuration is highly suggestive of some sort of offering place. It may thus be possible that the daggers were transported along these trackways but this cannot be tested due to the fact that most daggers are stray finds without detailed find documentation.

The deposition of the type I and II Scandinavian daggers may be compared to the depositional practices during the TRB period, when large ceremonial axes were deposited in river valleys between the territories of different groups, indicating their affiliation not with an individual lineage or group but with the common mythical ancestors (see above and Wentink 2006). In contrast, he deposition of the majority of type III daggers, far into the uninhabitable bog, can be seen as a way to stress the communal nature of these items: they are put in the very land of the spirits and the gods, in the extensive peat areas where in this period, more and more, presumably special activities are taking place. The temple of Bargeroosterveld forms the most striking example (Van den Broeke 2005, fig. 29.13 and 29.14).

7.7.2 The Late Bronze Age and Early Iron Age sickles

The Late Bronze Age and Early Iron Age[27] sees the import of yet another implement of high-quality Scandinavian flint: the crescent-shaped sickles (fig. 7.16). They have most frequently been found in the northern and western parts of the Netherlands (Groenman-van Waateringe/Van Regteren Altena 1961; Van Gijn 1999). A cursory inventory led to 116 complete specimens and 65 fragments.[28] Of the complete implements a total of 33 have been studied for traces of wear. Eight multiple depositions of these tool types have been found, composed of 3-5 objects. A famous example is the hoard of Heiloo, in the province of Noord-Holland, consisting of one bronze and four flint sickles (Brunsting 1962) (fig.8.5). The sickles were put in an upright position, indicating that they were not just buried for later use, but must be seen as a special deposition. Whether we should interpret the occurrence of a single sickle as an intentional deposition is a matter of debate, but the fact that the complete sickles were generally found outside settlements may support this idea. Against this, it can also be argued that they were lost in the places where they were used. The sickles were found mainly on the sandy higher grounds and only occasionally in the peat. A concentration was found in West-Friesland during large-scale reorganisation of the landscape in the last century (fig. 7.17). The broken fragments occur more frequently in settlement context and are often modified into other types of tools, like scrapers. Apparently, when sickles were broken they could be recycled into domestic tools to be used and rejected in settlement context.

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27 Because many of these sickles are stray finds most cannot be dated. A Late Bronze Age date is most commonly assumed, but the find at Middelstum-Boerdamsterweg for example indicates a date in the 6th and 5th century BC (Boersma, 1988). In southern Scandinavia similar sickles date to the Late Neolithic.

28 In the 1970s and 1980s F. van Regteren Altena has made an extensive inventory of this type of tool, visiting amateur archaeologists throughout the country. Unfortunately this work was never published, regrettably so, as no one has such an extensive knowledge about these items as van Regteren Altena.

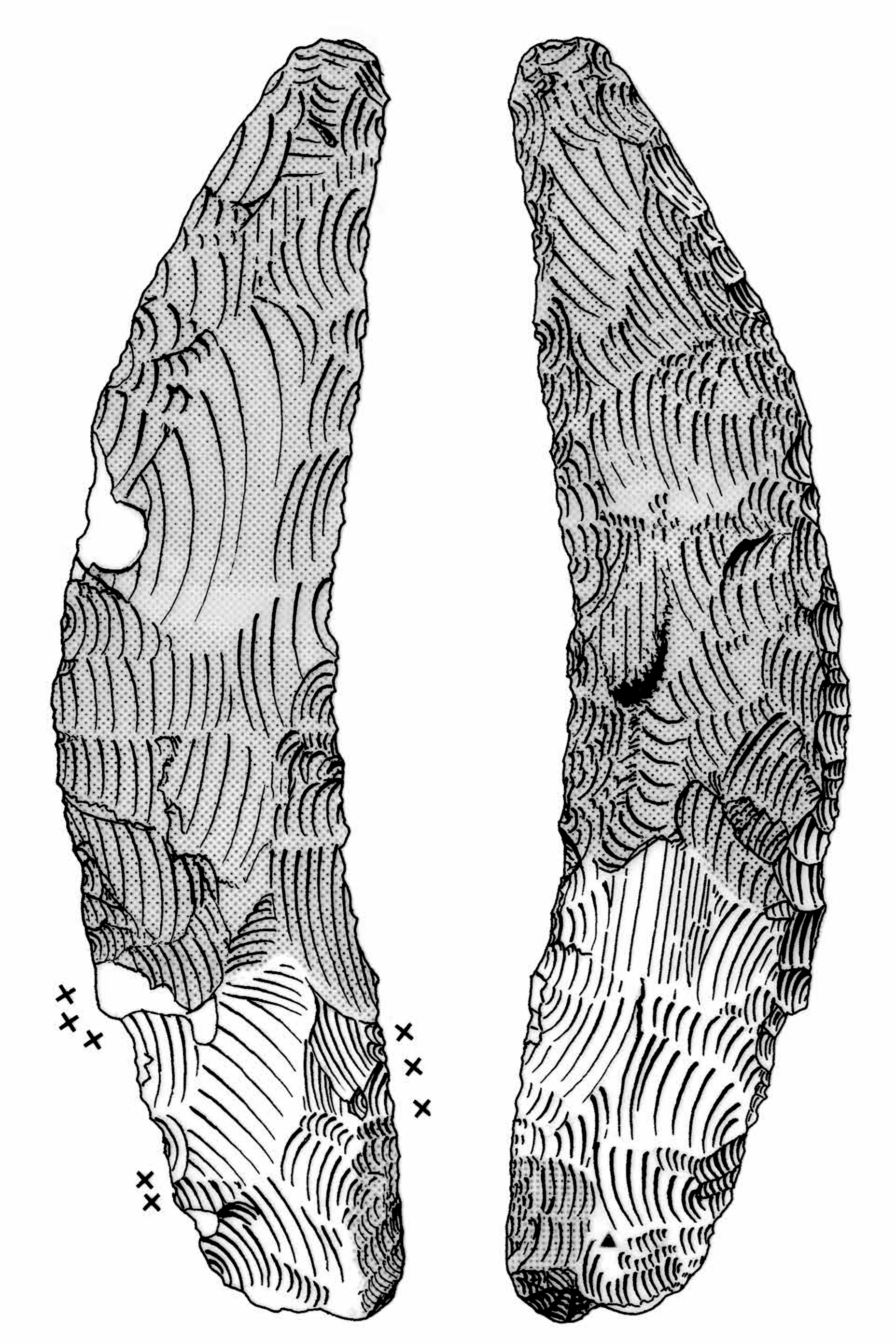


Fig. 7.16 a.Sickle from Andijk, West-Friesland showing the extent of the polish and the area where the sickle was held (scale 1:1). b. extensive gloss and rounding from contact with soil (100x).

b

Because these tools display a very extensive gloss, commonly referred to as sickle gloss, and because of their crescent shape, they have always been classified as sickles and considered typical agricultural tools (Brongers/Woltering 1978). The functional study has however revealed that most of them cannot have been used for harvesting cereals but instead were used on soil. Several arguments were put forward (Van Gijn 1988, 1999). Some of the edges are so blunt that they are 3-4 mm thick. Randomly oriented striations abound and the polish is matt and flat (fig. 7.16b). Experiments have shown that cereal gloss never extends further than c. 1.5 cm at most across the surface of a harvesting tool. Also, you need to re-sharpen the tool for it to continue to be effective as a harvesting implement. One alternative explanation that was proposed in the past was a use as a coulter, a device mounted in a plough to cut through the vegetation cover for easier passage of the plough proper (Bruyn 1984). However, detailed use-wear analysis has refuted this hypothesis. The fact that the use-wear polish extends almost to the butt indicates that most of the tool came into contact with the soil. If only the very butt end would have been hafted in the plough, the leverage would have caused the tool to break. Also, the absence of clear hafting traces and the fact that 'soil polish' is also located on the butt end, indicated that many of these tools were used handheld. We therefore experimented with using them to cut sods, an activity that caused identical wear traces and that was not at all hampered by the tool getting blunt.

Cutting turves may not have been such an unlikely task as it may seem to us. It should be remembered that sods not only provided fuel, but also essential building material in the tree- and stone-less landscape of the western and northern Netherlands. Barrows were erected with turves and we know that in any case some of the Iron Age dwellings were made with sods as well, a practice that continued into historic times. However the question remains why an object made by skilled craftsmen in a place far away, was selected for cutting building material. In this context it must be mentioned that the classification as 'sickle' is actually not unjustified as functional analysis of similar implements in Denmark has shown them to have been used for harvesting cereals (H. Juel Jensen, pers. comm.). Clearly, the interpretation or meaning of these crescent-shaped tools is different for the communities living in southern Scandinavia, compared with those living in our region: for one a harvesting tool, for the other a sod cutting implement. However, incidentally, plant working traces are also found on some Dutch sickles: one sickle was first used for cutting turves, then re-sharpened and subsequently used for cutting plants. This suggests that the typical crescent shape was perceived as appropriate for harvesting as well. Still, whatever the motivation behind the choice of tool, I would contend that cutting sods may not be an inferior task at all, as it may have been involved in the construction of the houses for the living and the dead alike. Tools of Scandinavian flint were apparently deemed appropriate for this task.

7.8 Conclusion

There is little doubt that material things also had ideological connotations and flint implements are no exception. The above examples show that even domestic flint items were sometimes ritualised, especially where it concerns imple-

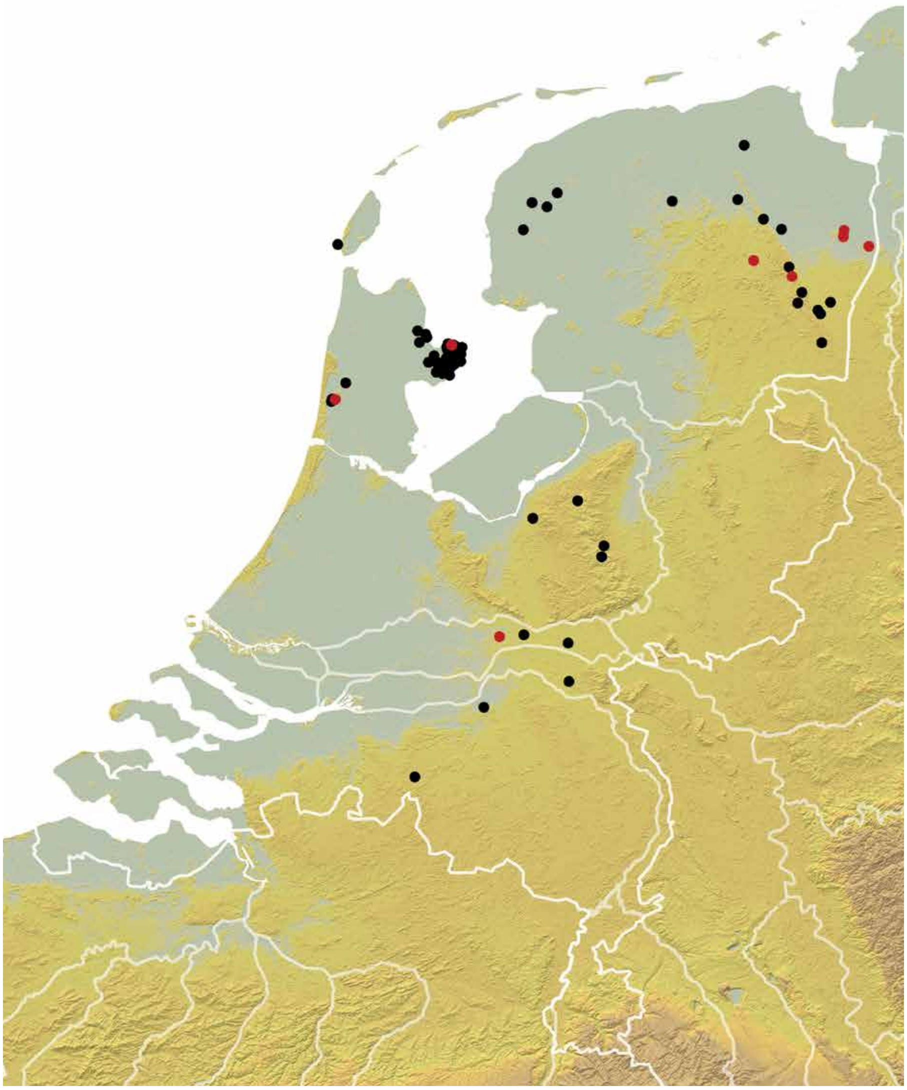


Fig. 7.17 Distribution map of the crescent-shaped sickles. Note the concentration in West-Friesland. The red dots indicate the multiple object hoards, the black dots the single finds (both complete specimens and fragments).

ments involved in agricultural activities. Such objects were used in a domestic context during their actual use-life but underwent a special treatment prior to their deposition. Other flint items were special 'from birth': they never figured in domestic tasks but were instead invested with meaning at their production. This was for example the case with the large axes from the TRB and the later Scandinavian daggers.

One important feature of flint is that it can be transported across large distances relatively easy. Because, at the same time, it is highly distinctive in terms of its properties, its remote origin must have been clear to any observer. As such it can have a very clear signalling function, especially if displayed on special occasions or when used in activities that involve outside observers such as hunting or warfare. By being so visibly foreign, it can represent ideological values of spirits or mythical ancestors that unite communities that are widely apart but who share a common world view and overall identity: flint objects can be 'pieces of places'. Here it is useful to recall the presence of cortex on the butt ends of all the import items of Scandinavian flint. Not only the oversized axes often display such a small piece of cortex, such is also the case with the Scandinavian daggers and the sickles. These can be seen as some sort of signature, as there is no technological imperative not to remove these remnants of cortex. It has been suggested that they indicate the skills of the flintknapper but it may also be that the cortex was left to indicate its northern origin. If that is so, this link to the north must have been important to those receiving these items. That this is so is shown by the fact that all of these objects had unusual biographies. They probably figured in ritual activities, were frequently displayed, and ended up in special depositions.

Flint also played a role in burial ritual. Not only did flint items figure in burial kits (Chapter 6), they occasionally had a more 'active' role as well. This may have been the case during the TRB period, a time during which flint items seem to have been highly ritualised. It was proposed that flintknapping may have been part of the TRB burial ritual and that flint surfaces were scratched before they were put into the megalith.

Some of the special flint objects discussed in this chapter may actually have been agents in their own right, agents that acquired a history of their own through their life. As such these flint objects could cement relations between people across vast distances. These special artefacts could also be seen as 'vehicles for remembrance': they accumulate stories that relate to events, people and places that are remote, both in time and space, from the daily experiences of the local communities. In a way they therefore may be very important as mnemonic devices for long-term storage of crucial memories, part of the cosmology of a social group (Minc 1986; Minc/Smith 1989).

Chapter 8

Flint in the age of metal

8.1 Introduction

The fascination for metals and the rather unattractive looks of Late Neolithic and Bronze and Iron Age flint may explain why so few studies have been done on the lithic assemblages of these periods. Research of Bronze Age flint in the Netherlands was pretty much what a few years ago was called 'the Cinderella of lithic research' (Van Gijn/Niekus 2001). Some exceptions aside (Hiddink 2000; Hristova 1984; Niekus *et al.* 2002b; Van Gijssel *et al.* 2002), few systematic studies of Bronze Age flint in the Netherlands have been undertaken and flint is frequently only cursorily mentioned in site reports from this period. This pertains both to typo-morphological, technological and functional analysis. Reference is only made of the 'pretty items', but these are seldom discussed in any detail or put in a wider context. This pertains even more to the Iron Age, from which hardly any flint objects are known from the Netherlands (Niekus *et al.* 2001a). This lack of research attention can also be attributed to the common assumption that, by the Middle Bronze Age, flint had largely become obsolete and lost its significance, not only as a means of stylistic expression but even as a utilitarian object: it was not worth bothering about.

Admittedly, several well-known Middle Bronze Age sites like Oss/Ussen (Fokkens 1991) and Oss/Horzak (Jansen/Arnoldussen 2007) have produced very few flint artefacts, despite careful collection. At the Middle Bronze Age site of Elp flint was encountered, but hardly any pieces displayed traces of modification (Waterbolk 1964b). It may be that to some extent excavation strategies are responsible for the lack of settlement flint in the Bronze Age. This commonly entails the removal of the topsoil by machine and creating the first excavation level where the soil features are legible, which is far below the original 'living surface'. Extensive ploughing may also be a cause for the absence of flint in many Bronze Age settlements. Whereas pottery ends up in pits, and will thus show up in excavations, flint is more likely to be discarded in a less structured manner. Contemporaneous sites in the Holocene sedimentation zone have yielded a much larger number of flint implements, but again, this may constitute earlier admixture. This brings us to the most important problem: the fact that many of the excavated sites, like the ones in the riverine zone like Eigenblok and De Bogen, display a palimpsest of Late Neolithic, especially Bell Beaker, and Bronze Age occupation traces. Consequently, hardly any well-dated assemblages are available.

At the same time that the flint technology in settlement context deteriorates, beautifully crafted flint objects were produced. It concerns daggers, arrowheads and sickles all displaying an input of skills and knowledge that far exceeds utili-

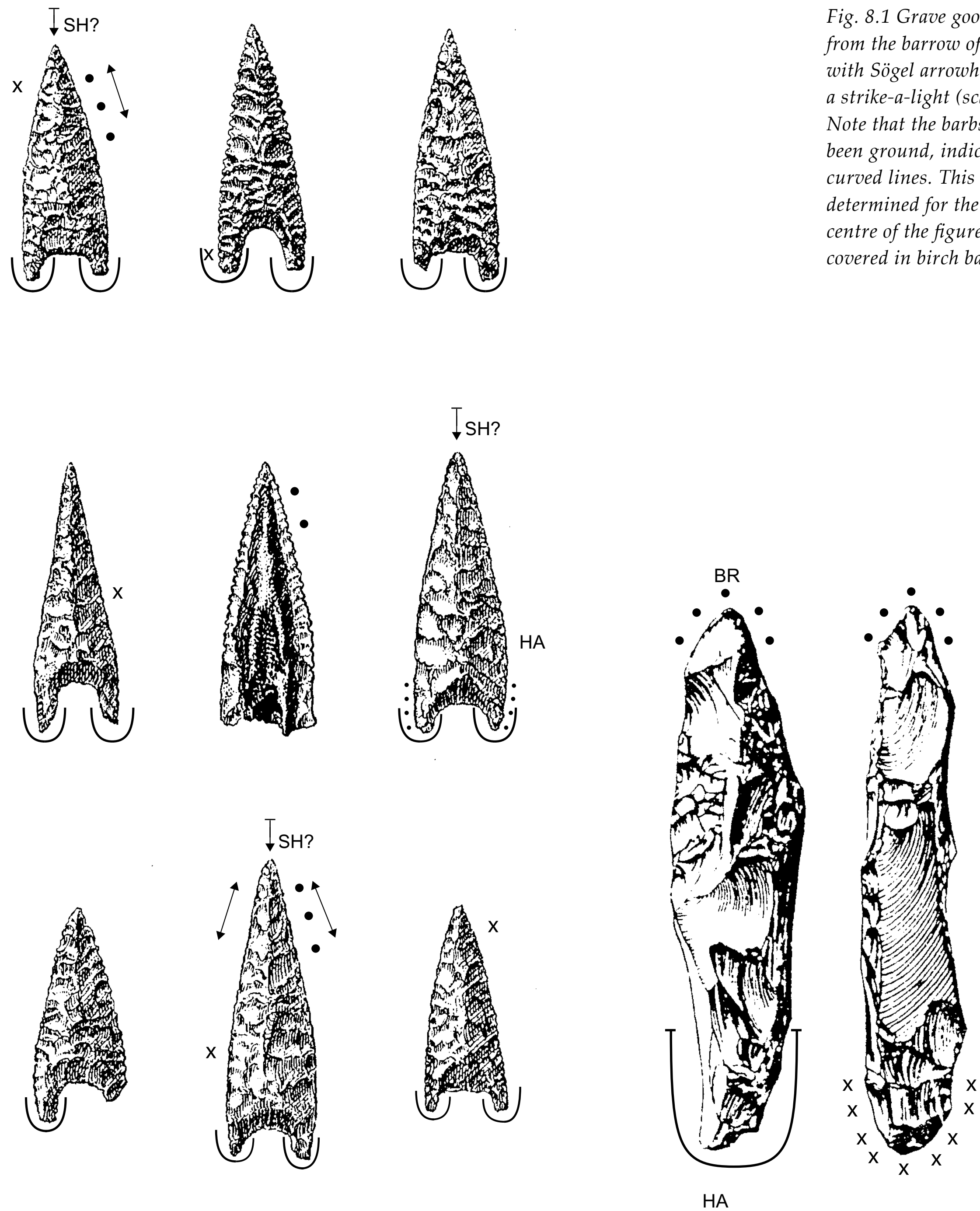


Fig. 8.1 Grave goods of flint from the barrow of Drouwen with Sögel arrowheads and a strike-a-light (scale 1:1). Note that the barbs have all been ground, indicated by the curved lines. This could not be determined for the point in the centre of the figure which is covered in birch bark tar.

tarian demands. Some of these flint objects seem to almost compete with the beauty, size and inherent technological complexity of the metal objects circulating at the time (fig. 7.13, 8.1). These objects are rarely found in settlements, except as fragments. This dichotomy between settlement flint of poor quality on the one hand and 'special flint' of high craftsmanship in burials and depositions on the other, is a remarkable and consistent feature of Late Neolithic and Bronze Age flint technology, not only in the Netherlands but also elsewhere (Edmonds 1995; Rosen 1997).

In this chapter I will examine the relationship between flint and metal technology. How was the flint technology influenced by the introduction of metals? Questions that will be addressed are whether flint really played such a subordinate role in the domestic context with the advent of metals and what could be the significance of the special flint objects in Late Neolithic and Bronze Age society. Another important question is whether the introduction of copper, bronze and iron each had different repercussions for flint technology.

8.2 The introduction of metals

Major technological innovations have always been the object of intense archaeological interest and the introduction of metals is no exception. Many publications have explored the social context in which this important innovation could take place and have addressed the impact of the introduction of metals on prehistoric societies (a.o. Kristiansen 1998; Ryan 1979; Sofaer Derevenski/Sorensen 2002; Vandkilde 1996). The relationship between the 'old flint' and the 'new bronze' is, however, a subject that has not been addressed very frequently (Fontijn 2002; Ford *et al.* 1984; Rosen 1996, 1997; Van Gijn/Niekus 2001). From a traditional cultural-evolutionist point of view the demise of flint would be seen as unavoidable: as soon as the new technology of metal smelting became available, it was only a matter of time for flint to disappear from the technological scene. Viewed from our western functionalistic perspective metal was considered to be far more effective because it was harder, less breakable and more flexible as a raw material, and more easily re-sharpened than flint. It could also be recycled and melted into new objects. Metals obviously also had an aesthetic appeal, being shiny, hard and displaying a beautiful colour.

The incorporation of metals into the technological system was a long trajectory: the first metals may have arrived in the Lower Rhine Basin as early as the TRB period (Bakker 1979). In Denmark the first copper axes appeared during the TRB (Klassen 2004). At first the repercussions for the technological system were probably rather minimal but in due time, new technological knowledge and understanding had to be acquired. With metals this is especially acute as these are radically different from for example bone, wood and stone. These latter materials required no extensive modification and although skills and knowledge were highly important, no radical transformations of the raw material were required. They were very much part of household crafts and did not demand an elaborate system of labour division and organization, beyond possibly a division according to gender and age within the family setting. This is very different for metals: metals are not immediately obvious raw materials and a sequence of technological steps is required to transform the ores to the final product, each requiring tools, practices, knowledge and skills. The technological expertise behind the transformation of ores to metal was probably a relatively restricted affair, limited to only a few members of society. In many societies, especially in West Africa, smiths are surrounded with taboos and are often part of a specific caste (N'Diayé 1970). They are circumspect because they do magical things that are frightening to the other members of the group who are not knowledgeable and do not possess these skills. The extent to which fire is used both in the acquisition of the ores and in their transformation to finished objects may also have contributed to the taboos and circumspection with which those involved in this craft have of old been surrounded.

Those societies actively involved in mining and smelting of the ores were probably greatly affected by the new invention. Part of the population had to become involved in this new industry. Also, as objects reflect and structure existing social relationships, new objects or technologies are potentially destabilizing and may pose a threat to the existing social order (Sofaer Derevenski/Sorensen 2002, p. 118). This would have required a period of adapting and negotiating, giving this new technology and associated objects a place in the technological and social fabric.

The large-scale exchange of metal, however, also had severe repercussions for those societies not actively involved in the acquisition of raw materials and the initial smelting of the ores. For them the introduction of metals did not only require a utilitarian adjustment of the technological system, but more importantly, a social response was called for as well. It can be assumed that societies far and wide apart were more or less forced to 'plug into' the metal trade, because metal objects were instrumental in negotiating new social positions (Sofaer Derevenski/Sorensen 2002, p.117). This notion is important for examining the relationship between metal and flint and to understand the emergence of highly skilled flintknappers at a time during which it was basically '*metal that made the world go round*' (Pare 2000). Lacking metal resources of their own, some societies may have had access to alternative raw materials like high-quality flint, to use in the exchange relationships that were so vital in these times. The emergence of an extremely advanced flint technology, exemplified in the Grand-Pressigny and Scandinavian daggers, at the same time that the importance of flint in the domestic technological system decreased, may be seen in this light.

8.3 Domestic flint in the age of metal

8.3.1 Studies of Bronze and Iron Age settlement flint

Some lithic specialists have not been deterred by the less appealing looks of Bronze and Iron Age settlement material and have examined the range of tool types in domestic sites through time (a.o. Edmonds 1995; Ford 1987; Ford *et al.* 1984; Humphrey/Young 2003; Young/Humphrey 1999). In the Levant, Rosen has done a systematic survey of the quantitative contribution of the various tool types in flint assemblages from Chalcolithic and Bronze Age assemblages (Rosen 1996, 1997). Rosen found that the first tool type to disappear in the Levant is the arrowhead, which he attributes to a change in subsistence, most notably a decline in the importance of hunting. The absence of metal arrowheads in the assemblages is seen as a support for this explanation (Rosen 1996, fig. 6). The next tool type to disappear is the flint axe that is replaced by the copper version. Rosen suggests that the social complexity was such that the trade routes of copper by that time were so well established that it may have been easier and less expensive to obtain a copper axe than a flint one. By the end of the Late Bronze Age the *ad-hoc* tools also gradually disappear. The last tools to disappear are the sickle-blades which continue to be used into the Iron Age. Rosen suggests that this is because flint sickle-blades are equally as effective as those of bronze. It should be mentioned however, that many of these Near Eastern 'sickles' may well have been threshing sledge inserts (Anderson *et al.* 2004), a tool type that still exists today (Whittaker 1996).

In England too a number of researchers have studied Bronze and Iron Age flint. Here a progressive decrease of typological variation in the course of the Bronze Age has been demonstrated (Ford 1987; Ford *et al.* 1984). There, scrapers, awls, 'rods' (often used as strike-a-lights) and knives were the most frequently occurring tool types. This trend continues into the Iron Age when unretouched and retouched flakes greatly predominate but scrapers and borers are still present (Humphrey/Young 2003). Humphrey and Young argue against the tendency to discard Later Bronze and Iron Age settlement flint as 'residual'. Instead, they see it as a purely domestic aspect of technology that had lost its social dimensions but not its utilitarian roles (Humphrey/Young 2003).

In the Netherlands systematic comparative studies like the above are rare. At first sight some differences can be noted. For example, arrowheads continue to be produced until c. 1500 BC, the end of the Middle Bronze Age A. This is in contrast with the findings of Rosen for the Levant and does not seem to be related to a continuation of hunting as during the Middle Bronze Age the hunting component in the bone spectra has almost completely disappeared (Arnoldussen 2008). In order to assess the role of flint in the Bell Beaker period, the Bronze and Iron Age, the number of artefacts, the typological variation and the functions of implements will be examined.

8.3.2 Number of artefacts in domestic context

From the Late Neolithic onwards, the total number of flint tools decreases significantly. Obviously it is impossible to quantify the contribution of flint implements in the technological system. Because of different excavation and collection strategies, absolute numbers of flint artefacts cannot easily be compared between different sites. Palimpsest situations further complicate the issue. The existence of flint artefacts in later contexts even goes unnoticed sometimes. This is probably due to a preconceived idea that flint has become obsolete, so any flint tools found are interpreted as accidental earlier intrusions (for example due to scavenging) that can therefore safely be ignored. Still, even though the total number of flints per site should not be taken as completely representative and mutually comparable, the general tendency of the gradual quantitative decrease of flint tools is nevertheless undeniable. A Single Grave settlement like Kolhorn produced thousands of flint implements, although this large amount may at least partially be due to systematic sieving. The Late Neolithic B site of Boog C-Noord had almost 1500 flint artefacts (Niekus *et al.* 2001a), whereas the Early Bronze Age site of Molenaarsgraaf only produced several hundreds (Louwe Kooijmans 1974). Middle Bronze Age sites like Eigenblok (Van Gijssel *et al.* 2002) and Lienden (Niekus *et al.* 2002a) display similar figures but, as was noted before, it cannot be excluded that there is some admixture of flint from the Beaker period in these sites (Arnoldussen 2008). At the Middle Iron Age site of Lage Blok a meagre 81 flint artefacts were found (Niekus *et al.*

2001b). We can thus see a gradual decline in the number of flint artefacts. There are, however, some strange anomalies. For example, the Middle Bronze Age sites of Dodewaard and Zijderveld have hardly produced any flint tools at all (Theunissen/Hulst 1999). In contrast, a site like Boxmeer 2, dating to the same period, has yielded almost 1000 flint artefacts (Hiddink 2000). It is difficult to assess the meaning of these differences without a systematic inventory of raw material availability and excavation strategies.

8.3.3 The range of tool types in domestic context

In the Late Neolithic the typological variation of settlement assemblages starts to decrease and the so-called *ad hoc* component becomes more prominent. Retouched flakes become the dominant tool type. During the Late Neolithic A we still see an abundance of polished flint axes, the Buren axes, distributed north from their production centres in the Rijckholt-Spiennes flint mine areas of Belgium and the southern Netherlands (Bakker 2006). They are made of a highly distinctive flint with a mottled appearance, accentuated by the extensive polishing (fig. 6.12). Their provenience must have been clear to everyone and these axes can therefore be regarded as 'pieces of places' (Fontijn 2002). They are especially abundant in Vlaardingen context where, if broken, they frequently served as cores. Vlaardingen settlements have many polished axe fragments (a.o. Metaxas in prep.; Van Gijn 1990).

During the Bell Beaker period the typological variation further decreases. Flint axes become exceedingly scarce and their production is likely to have ceased. Instead we find the flat copper axes. Scrapers are the most common formal tool type. Generally speaking, it concerns short end scrapers or side scrapers, which are almost always produced on flakes. They are usually quite small and display frequent re-sharpening; re-sharpening flakes were found at Boog C-Noord (Niekus *et al.* 2001a). Many of the scrapers were probably hafted as vague traces of resin can still be observed on some tools. Splintered pieces are a regular occurrence as are various notched and denticulated flakes. Borers and reamers also occur, albeit in small numbers. The same pertains to arrowheads. Most of these have a concave base, although both at Boog C-Noord and Oldeboorn other types of arrowheads are also present. The characteristic planoconvex Bell Beaker knives (Lanting 1973) are found at both these sites (fig. 6.17). The dorsal surface displays invasive retouch, applied by pressure flaking, whereas the ventral surface is usually only retouched along the edges. The bulb of percussion is frequently removed by retouch, possibly in order to facilitate hafting. Their actual size varies, however, as does the 'quality' of the retouch (Niekus *et al.* 2001a; Van Gijn 1983). One of the most remarkable finds, from the site of 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. Oldeboorn also produced a dagger fragment (fig. 8.2). Because it concerns fragments, it is likely that they are curated fragments of older, broken daggers. Strike-a-lights were not encountered but it should be stressed that this is not a tool type in itself as any sturdy flake or elongated piece of flint could serve as such. At Oldeboorn one axe of rectangular cross-section, one axe prefab and an axe fragment were found but we cannot be sure that these can be attributed to

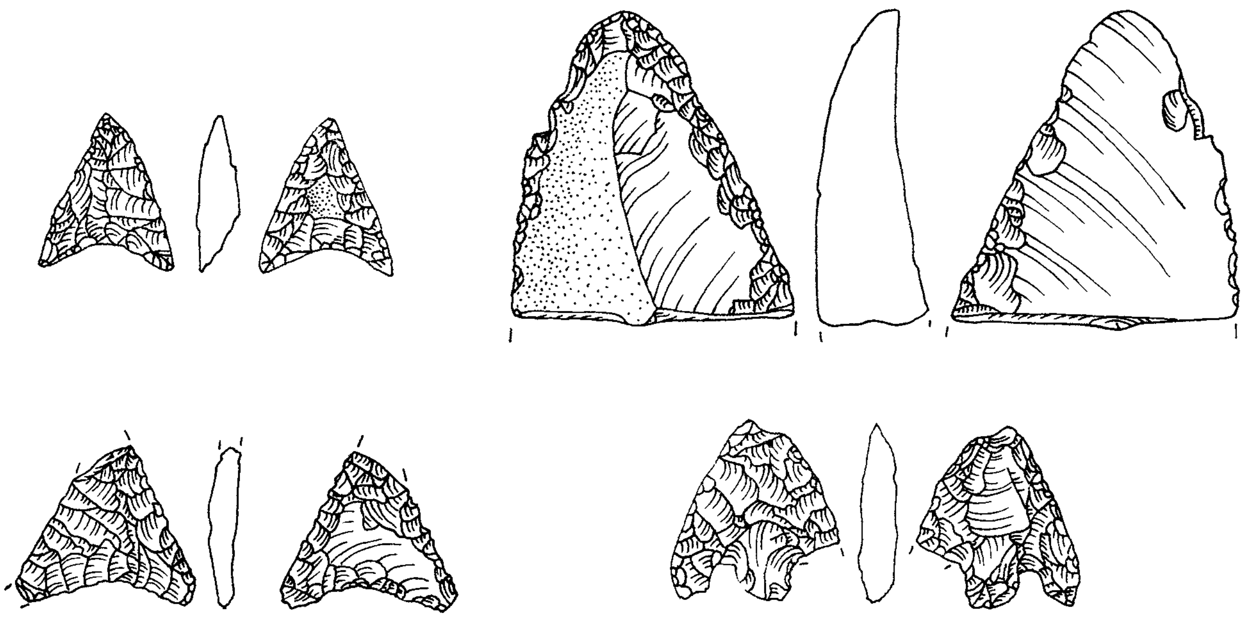


Fig. 8.2 Dagger fragment and arrowheads from Oldeboorn (scale 1:1).

the Bell Beaker occupation as the site is a palimpsest and Bell Beaker axes are a rare occurrence. Besides these formal tool types, the large majority of modified tools at these Bell Beaker sites is composed of retouched flakes. The retouch is often spaced irregularly along the edge of the flakes and is probably largely due to actual use of otherwise unmodified flakes.

Unfortunately, few unequivocal Early Bronze Age sites are available. The site of Molenaarsgraaf, dated to Early Barbed Wire period, lacks some of the tool types still present in Bell Beaker context such as the planoconvex knives and the arrowheads (Louwe Kooijmans 1974). Large numbers of scrapers, a few borers and especially retouched flakes dominate the picture. The Middle Bronze Age is represented by the sites of Lienden (Niekus *et al.* 2002b), Eigenblok (Van Gijssel *et al.* 2002) and Twisk (Hristova 1984). Lienden has the largest variety of tool types, including a strike-a-light and an axe fragment. Strike-a-lights are also documented from various sites at De Bogen but as these sites are all palimpsests, their chronological context may lie anywhere between the Bell Beaker period and the Middle Bronze Age (Niekus *et al.* 2002a). Scrapers predominate at Eigenblok, where borers were found in only very small numbers. In all sites however, the *ad hoc* component is well-represented: retouched flakes occur frequently. Unfortunately, the flint from only one Iron Age site has been documented, that of Lage Blok. Most of the material from this site was not modified and only a few scrapers were present. Retouched flakes predominate (Niekus *et al.* 2001b).

8.3.4 The use of flint

A common assumption is that Bronze Age flint tools were briefly and haphazardly used. Unfortunately only very small samples of Beaker and Bronze Age settlements have been examined for traces of use (Niekus *et al.* 2001a; Niekus *et al.* 2002a; Van Gijn 1983; Van Gijn/Niekus 2001; Van Gijssel *et al.* 2002).

Where a use-wear analysis of the flint artefacts was performed, a wide variety of activities was demonstrated. Many of these sites can probably be interpreted as general domestic sites. One possible exception is Boog C-Noord where an unusually large number of hide working implements has been found, suggesting that we may be dealing here with a special purpose area (Niekus *et al.* 2001a).

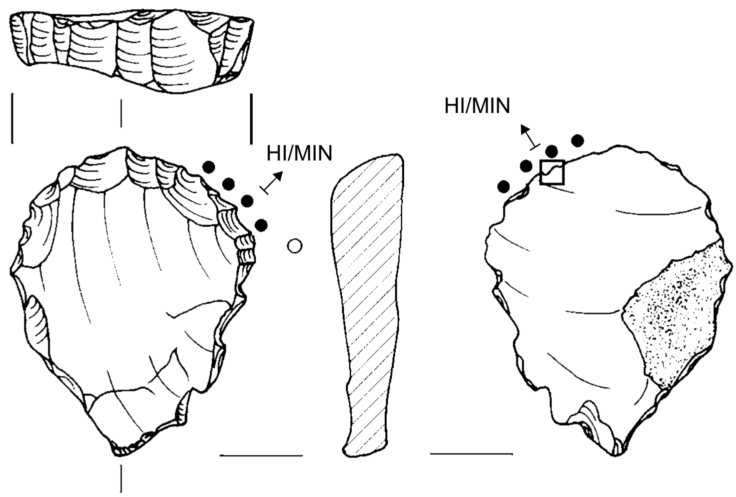
Wear traces from working hide are seen on a large number of scrapers and also on some knives (fig. 8.3a). There seems to be variation in the character of the wear traces, indicating that different stages of hide processing are represented. Hide processing technology was probably sophisticated and extensive (Chapter 5). Leather must have been important for the production of clothes, footwear and other items. The scrapers are almost all heavily used and it seems that once a suitable tool was obtained, it was used again and again. The obtuse, almost overhanging, edges indicate that the implements were recurrently re-sharpened. This observation contradicts the general belief that Bronze Age settlement flint was only used in an expedient fashion to carry out simple domestic tasks. Instead, it seems scrapers were curated and played a pivotal role in an important craft activity.

Another highly curated type of tool is the strike-a-light, usually made on a fine-grained type of flint. These implements occasionally occur in settlement context and are also found in Sögel-Wohlde burials (Chapter 6). If encountered, they are invariably very glossy with rounded ridges due to contact with the fine pyrite dust. 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. 8.3b, c). The fact that they are frequently made on relatively long blades and blade-like flakes facilitates the holding of the implement. It was probably carried around for immediate use when the need arose and formed part of the personal toolkit. Typologically the tools are not uniform: some were initially classified as reamers or pointed retouched blades, only to be identified as strike-a-lights after use-wear analysis was conducted. This obviously does not exclude the possibility that borers and reamers were used secondarily as strike-a-lights.

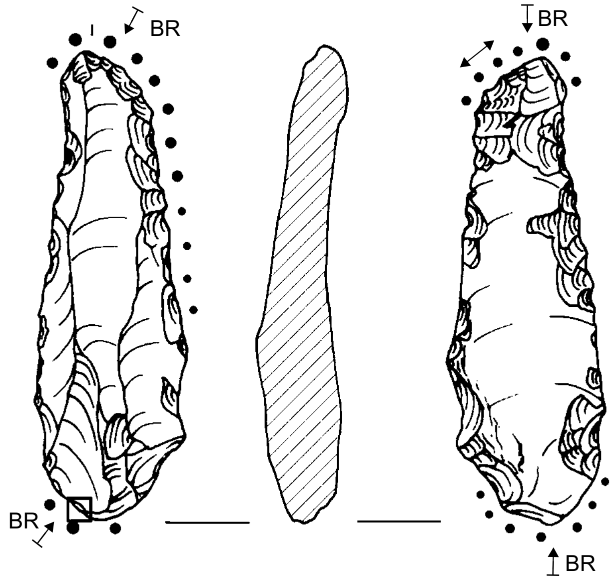
Splintered pieces display traces of use in some cases, but the traces on these tools are never well-developed. Experiments using splintered pieces as wedges on hard contact materials, such as bone or wood, produce streaks of polish on both aspects, distributed in a linear fashion. In addition, stacked step and hinge fractures develop, which are very similar to the ones caused by bipolar reduction (Hayden 1980). 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 for the most part a result of bipolar reduction and do not constitute a specific tool type. Nevertheless, a few splintered pieces 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, whereas others have also been used. They are clearly an expedient tool.

Retouched flakes were used for a range of simple domestic activities like cutting or scraping bone and wood (Van Gijn in press; Van Gijn/Niekus 2001). For the most part these implements were used very briefly and never obtain the extensively developed wear traces that we see on the hide scrapers and the

Fig. 8.3 Heavily used implements from Bronze Age sites (scale 1:1). a. scraper from Lienden with hide working traces with mineral addition (200x); b. strike-a-light from Lienden (200x); c. strike-a-light from De Bogen site 45 (40x).



a



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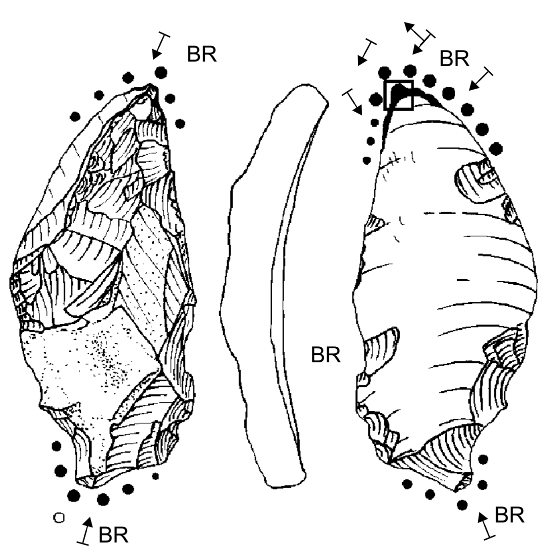
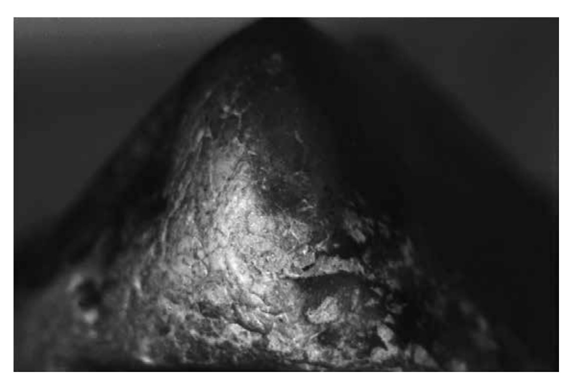




c

strike-a-lights. This suggests that we are likely to miss a great number of them. Many of these flakes may have obtained their retouch through use and were therefore never intentionally modified. Small samples of unretouched flakes were studied and showed traces of use, albeit less frequently than the artefacts with retouch. This has also been observed at the Vlaardingen site of Hekelingen III from which a relatively large number of unretouched implements were subjected to use-wear analysis (Van Gijn 1990) (fig. 5.9 and 9.1). Although the flakes were produced in an *ad hoc* fashion, probably as the need arose, on locally available flint of low quality, their actual use was less haphazard than is apparent at first sight. People carefully selected an appropriate edge for the task at hand. Evidently, it was not so important to have a standardized 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. From an aesthetic point of view, Bronze Age domestic flint had lost the plot, but in terms of functionality it certainly had not.

8.3.5 The replacement of domestic flint tools by metal ones

How do we have to relate the diachronic changes in typological variation of the settlement flint to the introduction of copper, bronze and iron? Flint scrapers are the foremost tool type that continues to figure into the Middle Bronze Age, a time by which metal has become fully integrated into the technological system of even those societies living in non-metalliferous areas (Fontijn 2002). The continued importance of the scraper all the way to the Iron Age may be due to the difficulty of producing an equivalent edge on a metal tool. Most of the scrapers were used on hide (see below). Their obtuse angles have the advantage that they do not cut into the skin. Yet, at the same time, they are quite sharp and their toothed edge serves well to pull off remaining bits of flesh. Replicating these morphological features in metal is not straightforward. It should also be noted that stone scrapers were still instrumental in ethnographically documented societies where hide working was practiced (Brandt/Weedman 2002; Gallagher 1977).

Another flint tool for which a metal equivalent is not apparent is the strike-a-light. Its capacity to produce a shower of sparks when struck on a sulphur-holding stone like pyrite is well-known. Strike-a-lights already occur in the Palaeolithic site of Oldeholtwolde (Stapert/Johansen 1999) and figure in flint assemblages all the way to the Middle Bronze Age to re-appear in historical times (Martingell 2003). It is likely that they continued to be used from the Iron Age to the Medieval Period. Pieces of flint are occasionally present in Roman sites and it would be interesting to see whether these actually concern strike-a-lights.

Flint arrowheads continue to appear in settlement context until well into the Middle Bronze Age: they are for example found at the site of Eigenblok (Van Gijssel *et al.* 2002) and Oldeboorn (Van Gijn 1983) (fig. 8.2). Their presence does not have to be related to a continued interest in hunting, as they may also have served in warfare. The systematic grinding of the barbs, seen on Bell Beaker and Bronze Age arrowheads (fig. 8.4), may be seen in support of this supposition. Blunting the barbs may have facilitated the penetration of the point into

Fig. 8.4 Many of the Late Neolithic and Bronze Age arrowheads display heavily ground barbs. It seems the barbs were dulled on a soft stone causing a polish with a rough texture. The traces displayed were seen on a Sögel point from Eext 1940 (200x).

the human body so that it would be less easy to pull out the arrow during the battle (D.R. Fontijn pers. comm.). The fact that an arrowhead was found in one of the bodies in the mass grave of Wassenaar further substantiates their presumed role in warfare rather than in hunting (Louwe Kooijmans 2005b). Last, Arnoldussen has shown in a recent study that hunting has declined substantially during by the Middle Bronze Age (Arnoldussen 2008).

Notably absent in Bronze Age assemblages are flint axes and sickle blades. The reason for the replacement of flint axes by metal counterparts may lie in the relative vulnerability of flint axes. Axes were predominantly used to cut down trees and perform other wood working tasks. When struck at a wrong angle they tend to snap in half, making the axe unusable, except as a source of flint. Considering the great amount of time put into the flaking, grinding and polishing of flint axes, such accidents must have been a great annoyance. An additional advantage of metal axes is that they are much thinner and therefore sharper than their flint counterparts.

There is no such obvious qualitative difference between flint and bronze sickles. I would expect them to work equally well: both require re-sharpening occasionally because our experiments have shown that cutting cereals quickly dulls the edge of both flint and bronze sickles. Bronze Age flint 'sickles' have been found in the western and northern marshy parts of the present-day Netherlands, but they were not used for harvesting cereals but for cutting turves, possibly as building material (Van Gijn 1999) (see below). Unfortunately the bronze sickles, a regular occurrence in the southern Netherlands, have never been subjected to wear trace analysis so we do not know for sure whether they were indeed used for harvesting cereals. Still, whatever the use of the metal sickles, we have as yet no evidence that flint sickles figured in harvesting cereals.

8.4 Flint in burials and special depositions

The dichotomy between the low-quality domestic flint on the one hand and the generally high-quality flint from burials and depositions on the other has been referred to before. Because the flint items from these contexts were already extensively discussed in chapter 6 (the burials) and chapter 7 (the depositions), I will not dwell too much on them here. It suffices to say that the flint objects from burials and depositions were often made on exotic raw materials, imported as finished products and invested with a large amount of skills and know-how. Still, it should be recalled that the dichotomy is not as strong as sometimes suggested: quite a few Late Neolithic and Bronze Age barrows also produced unretouched flakes (Chapter 6) and arrowheads and broken dagger fragments also show up in domestic context.

Burial gifts of flint still occur relatively frequently during Bell Beaker times. We find, in addition to the beautifully decorated bell beakers, copper tanged daggers, hard-stone objects like anvils and wrist-guards, also objects of flint like planoconvex knives and arrowheads, as well as the occasional axe (Bakels/Zeiler 2005; Lanting/Van der Waals 1976). The exact composition, however, of the gifts varies between barrows. As we move into the Early Bronze Age, flint burial gifts are becoming increasingly scarce and are completely absent in the Late Bronze Age. Sögel points and strike-a-lights form an exception: they constitute a central element in Middle Bronze Age Sögel-Wohlde burial sets. Such is for

example the case with the spectacular Middle Bronze Age barrow of Drouwen in the northern province of Drenthe, where nine flint arrowheads of Sögel type were found along a flint strike-a-light and several beautiful metal objects like a sword, a flanged axe and gold spirals (Butler 1990) (Chapter 6) (fig. 8.1).

It is interesting to note here that the strike-a-light from the Middle Bronze Age Balloërveld Tumulus IV is actually a fragment of a bifacial dagger dating to the Early Bronze Age. The strike-a-light from Drouwen was classified as a re-used TRB pick (see Appendix). This re-use of ancient tools could be interpreted as an opportunistic strategy. However, had it only been an opportunistic act of scavenging, these items would not have ended up in graves and certainly not in the unusually rich barrow of Drouwen. Rather, I would argue that their presence in such highly structured burial sets refers to the special significance attributed to ancestral items. Flint tools were part of this ancestral technology. In this light the 'scavenging' of flint tools dating to an earlier period may actually be a purposeful act, aimed at the appropriation of objects that are linked to the ancestors. These items may therefore be more than just personal tools that were brought along in the graves.

The other special contexts are those of the depositions or hoards. There are two types of flint tools from the Late Bell Beaker and Bronze Age that could be interpreted as intentional depositions: the Scandinavian daggers and the bifacial sickles (Chapter 7). Here I will briefly return to them in order to evaluate their meaning in the light of the introduction of metals and the extensive metal trade that became so important in Europe. Why did people bother to make these highly crafted flint implements when basically metal seemed to be the focal material of the extensive exchange relationships?

The daggers were manufactured in southern Scandinavia by highly skilled flintknappers and date from the Danish Late Neolithic I and II and the Older Bronze Age (Apel 2001; Callahan 2006; Nunn 2006; Siemann 2003). They were produced for at least 800 years and exported across large parts of northwestern Europe. Around 2300 BC they appear in the area of the Netherlands. Apel (2001) has argued that the large-scale production of flint daggers may have been a way on the part of the northern communities, which lacked any direct access to metal, to tie in with the long-distance exchange networks that developed across Europe as a result of the bronze trade. It should be noted that the distribution of the Scandinavian daggers is largely confined to the north-eastern part of the present-day Netherlands (fig. 7.12). This area has of old been oriented towards northern Germany and southern Scandinavia, certainly as early as 3400 BC, the beginning of the TRB (and for that matter, probably even much earlier). It may well be that the exchange of these objects was an attempt to continue and revitalize these long-term links, links that were materialized in objects of northern origin. Seen from this perspective it is less strange to find that these precious flint objects were deposited in marshlands. Again, this is a tradition that has its roots in the TRB, during which time large northern axes were deposited in the marsh. Fontijn has demonstrated that some places contained depositions from different periods, suggesting that the cosmological relevance of these places was remembered across many generations (Fontijn 2007). Depositing northern flint objects in marshes may be a reflection of the existence of such a long-term memory. Seen from this perspective, these objects can be considered

Fig. 8.5 Sickle hoard of Heiloo containing four crescent-shaped sickles (one of which without traces of use) and a metal sickle. The sickles were found in an upright position, indicating they were stuck into the ground.

as more than just a political or economical move on the part of the flintknappers in southern Scandinavia to consolidate their influence sphere and be part of the great chain of exchange of metals. Rather these objects may be reflective of an identity and worldview of great time-depth, shared by the inhabitants of the northern part of the Netherlands and adjacent communities in present-day northern Germany and Denmark.

The bifacially worked sickles from the Late Bronze Age and Early Iron Age are found across most of the Netherlands. Again, they are made of northern flint. As said before these sickles are known to have been used as harvesting

implements in southern Scandinavia (Juel Jensen pers. com.), but in our area they were predominantly used for cutting sods or turf, supposedly as building material or for making fires (Van Gijn 1999). The find location of the complete implements, sometimes as groups in hoards, indicates that they can be seen as special objects. It may well be that they found their way south as commodities rather than gifts: the large hoard of 45 sickles and one large scraper from Trendelbusch in Oldenburg (Jacob-Friesen 1955, p. 86-88) would suggest that they were mass-produced and exchanged in great numbers (fig. 8.6). Also the presence of several hoards in the north-eastern part of the Netherlands points in this direction (fig. 7.17). This would also explain why the inhabitants of the territory of the Netherlands could attribute such a different function to these tools from what was common in their land of origin: because it was a commodity and not part of a general, shared belief system, no cosmological knowledge was passed along, and hence no instructions as to how to deal with these objects. This is in contrast with the exchange of the large TRB axes: in that case everyone knew that these objects were not to be used, and everyone performed the same ritual treatment (Chapter 7). The sickles, however, were re-interpreted somewhere on the way down from their south Scandinavian production centre and fitted into the local cosmological system. Maybe their special significance as an agricultural implement in Scandinavia may have made them suitable to obtain the material for building material[30] (Chapter 7). The presence of four flint 'sickles' and one bronze specimen in one and the same hoard, the one of Heiloo (fig. 8.5), indicates that the people in the past associated these two types of sickles and attributed a special significance to both.

8.5 The different impact of copper, bronze and iron on flint technology

In terms of their impact on flint technology, there is a fundamental difference between the introduction of copper, bronze and iron.[31] Copper and bronze technologies have in common that they relied for the supply of raw materials on an extensive network of exchange between societies living far apart. Such contacts already existed in the Neolithic (and probably before), considering for example the import of amphibolite adzes in the Early Neolithic, the Scandinavian axes in the TRB period and the Grand-Pressigny daggers in the Late Neolithic.

Copper is relatively soft compared to bronze and iron, and has inherent aesthetic qualities (shine and lustre, as well as a pretty colour, even when corroded). In that sense it may not have been perceived as that different from other materials used for ornaments and grave goods such as amber. Although the smelting of copper requires high temperatures and hence the control of fire, there is no need to mix different raw materials, such as is the case with bronze. Still, surely the actual making of objects required considerable skill. The first copper tools were the tanged dagger and the axe. It is not clear if the tanged dagger,

Fig. 8.6 The Trendelbusch hoard from Oldenburg, Germany, containing more than 40 sickles. Note the presence of cortex on their butt ends, indicating their south Scandinavian origin.

30 It should be stressed again that the dating of the crescent-shaped sickles is somewhat problematical (see Chapter 7).

31 As I am mainly concerned with the relationship between flint and metal technology, and hence with the more functional aspects of past material culture, I will leave gold out of this discussion as it is mainly used for ornaments and decoration.

part of the Bell Beaker burial package, was used for specific purposes. Fontijn (2002) suggests that they were probably successors of the Grand-Pressigny daggers from Single Grave burials. The copper flat axe, however, must have been perceived effective enough to at least partially replace the flint axe because of its sharpness and ease of re-sharpening and repair (see above). Many of these axes show traces of use (Fontijn 2002). Other domestic tools continued to be made of flint and other materials. The overall effect of copper on the extant technological system was probably rather minimal.

The situation with bronze is different. The creation of bronze objects entails the gathering and mixing of different raw materials and transforming them into objects. Obviously the mixing of these various materials, heating the alloys to the right temperature, constituted a further technological innovation. Also, in terms of exchange networks, it certainly must have caused a diversification and intensification because the different ores are usually not available in the same location. This could have resulted in the accumulation of power in the hands of those who had access to these networks. So, surely, the introduction of bronze must have had immense social repercussions, and may have intensified the use of material objects as items that embody and signify power and prestige.

Although bronze surely must have had a tremendous impact on the social relationships between and within communities in the Early Bronze Age the repercussions for the technological system aimed at carrying out mundane, day-to-day tasks seem to have been relatively limited. The low-flanged axes, characteristic for this period, have totally replaced their flint and stone equivalents. Hardly any metal tools are found in settlement context but it cannot be excluded that they were re-smelted and used as raw material for new objects. Other bronze objects, notably weaponry, were subjected to selective deposition (Fontijn 2002). The quite limited range of domestic bronze implements known to us therefore does not necessarily represent the full range of objects that was once available, but may actually reflect the choice of objects that were considered significant enough to be deposited in burials or in rivers and marshes. Nevertheless, considering the fact that flint is still present in considerable numbers, it is likely that metal only played a subordinate role in domestic technology.

This gradually changed in the Middle Bronze Age when bronze technology became more entrenched in the general technological system. Utilitarian bronze items as awls, chisels, knives and sickles appear in settlement context. This does not mean that bronze implements completely replace flint counterparts (Fontijn 2002, 141). The presence of a considerable number of informal tools used for a variety of tasks indicates that cutting and sawing was also done by means of flint. It was shown above that flint scrapers and strike-a-lights persisted as important components of the domestic technological system. Flint tools also continued to figure in burials. The 'scavenging' of ancient tools for a use as strike-a-lights is also noteworthy, as is their incorporation in Middle Bronze Age burial context. During this time a variety of bronze weapons were imported, often to end up in depositions, reflecting a growing emphasis on martial values (Fontijn 2002). This preoccupation with martiality is also evident in the deposition of flint arrowheads in the rich Sögel-Wohlde graves such as Drouwen. Flint therefore had not totally lost its domestic function and some flint objects still had a special significance long after the introduction of bronze notably as a reference to the ancestral way of life.

It is the introduction of iron that pushes flint into oblivion. Iron is readily available in the shape of bog iron and allowed local production of simple domestic tools. Still, flint artefacts are still occasionally encountered. It concerns for the most part flakes with some irregular retouch and the only formal tool present is the scraper, a crucial tool in hide processing.

8.7 The significance of flint after the Stone Age

Flint was still used frequently in the Bronze Age and, albeit to a much lesser extent, probably even by Iron Age societies.[32] It kept its utilitarian function in domestic activities for a long time. However, not much time and effort was put into the production of these domestic tools. People selected only easily accessible local flint of small size and of low quality, features that greatly limit the technological options and result in irregularly shaped flakes commonly referred to as *ad hoc* or informal tools. These informal implements, however, display traces from a range of activities, including bone and wood working, showing that flint all but lost its utilitarian significance in the technological system. In addition, some tool types, notably scrapers and strike-a-lights, continue to be very distinct. Although not much use-wear analysis has been done on Bronze Age settlement flint, results obtained so far indicate that scrapers and strike-a-lights were used and rejuvenated recurrently (fig. 8.3). Curation was thus part of the domestic Bronze Age flint technology. This is a conclusion that runs counter to many current ideas about Bronze Age flint. Scrapers and strike-a-lights were part of a personalized toolkit, to be kept and used over a long period. Another formal tool, the arrowheads, are similarly curated: the incidental presence of broken and used arrowheads in settlement contexts indicates that they were retooled there (Van Gijn 1983; Van Gijssel *et al.* 2002).

Despite the fact that flint continued to be widely used, however, most flint tools were no longer invested with stylistic information and had lost their role in the constitution of social identity. Or, as Edmonds expressed it: they were "*no longer caught up in the maintenance or negotiation of social categories and interests*" (Edmonds 1995, p. 187). Although clearly pottery had superseded flint already much earlier as the most important means of expressing social identity, flint had long maintained its significance in this respect because foreign raw materials could be imported, representing 'pieces of places' and signifying the allegiance of the local group in wider exchange networks. Considering the treatment these exotic objects usually received in the course of their use-lives, it is clear that these long-distance contacts, expressed by exotic flint, were extremely important for maintaining the social and ideological fabric of Neolithic groups (Van Gijn 2008a). In the Late Neolithic these exchange networks focused on the import of very specific flint implements, produced by far-away

32 Before this can be ascertained we need unrefutably dated domestic Iron Age find contexts with flint.

skilled craftsmen and imported as finished products. As we have seen above, this process continued into the Late Bronze Age, although the actual meaning of these import objects probably changed.

The importance of flint objects as burial gifts greatly diminished in the Bronze Age. For the most part it concerns single arrowheads that are difficult to interpret as they may not be grave goods at all but the very cause of the death of the buried individual. Exceptions are the few instances of multiple points, such as found in the well-known Sögel-Wohlde barrow of Drouwen and the barrow of Eext Tumulus 1940 (Jager 1985) where the arrowheads clearly were the result of intentional deposition. These arrowheads are often seen as an expression of the warrior identity of the buried individual. The inclusion of strike-a-lights is another recurrent feature of these graves. It concerns 'ancient tools', a TRB pick and a dagger, which were used for a long time as strike-a-lights and ended up in these Middle Bronze Age graves. We can see them as personal belongings but it was argued above that they may also be regarded as a reference to the old ancestral way.

Long-distance exchange of characteristic flint objects, like the Grand-Pressigny dagger, can be seen in the context of an ever intensifying trade in metal, starting with the incidental scraps of copper in Single Grave context. The later Scandinavian daggers are most likely inspired by the metal counterparts that became increasingly available in central Europe. This is most apparent in the Early Bronze Age varieties of the dagger in which morphological characteristics of metal daggers, like the casting seam, are copied in flint (Callahan 2006). Apel interprets the import of Scandinavian flint daggers as an attempt on the part of their producers to use the relatively easily accessible flint as a prestige item in competition with metal objects (Apel 2001). The typical wear traces on these exotic Scandinavian daggers, interpreted as resulting from frequent display, can be seen from the perspective of visibility: only when shown to a relevant audience, is it possible to demonstrate the exotic origin of the flint object, thus supporting and validating the place of the own society in a wider 'European' setting that relied on long-distance exchange networks. It is by the very visibility of their exotic origin and skillful making that these flint objects can compete with metal items. Above, however, I have suggested a slightly different explanation for the presence of these Scandinavian daggers in the northern parts of the present-day Netherlands. The fact that their life ended in remote marshlands, areas traditionally linked with the deities, indicates that these tools had a very important social and ideological role in the local community. Their deposition in areas where they could not be retrieved is reminiscent of the deposition of the large TRB axes, which were also made of Scandinavian flint. It may be that this type of flint symbolises a cosmology shared by groups living in an area extending from the northern Netherlands to southern Scandinavia.

It is generally implicitly assumed that the introduction of metal rendered flint tools obsolete. In the long run, this is true, as flint hardly plays a role anymore in the Iron Age, at least not in the Netherlands. We can see a steady decrease of the number of flint items recovered in archaeological sites, a process that starts in the Late Neolithic. This is often connected with the introduction of metal as a general category. I would argue however, that it is the readily available iron that pushed flint over the edge, not so much copper or bronze. This is clear from the observation that flint continued to be used for domestic tasks throughout the Bronze Age and only lost its utilitarian role in the course of the Iron Age. Still, it should be stressed that the absence of flint artefacts in Iron Age and later context in the Netherlands can also be due to the ploughing of the topsoil and even lack of attention and scepticism on the part of the excavators. The fact that Iron Age flint is much more common in England may be due to a greater awareness there that flint can indeed be found in these late sites.

The introduction of metals certainly had an effect on the significance of flint objects as prestige items and this is very much related to the all-important metal trade across Europe. Because flint can be obtained from far-away and therefore acquire mythical properties, it constituted an alternative to bronze in the maintenance of the long-distance social networks that seem so important for Bronze Age society at large. Seen from this perspective it has been proposed that the introduction of metal not so much caused the demise of flint technology but initially resulted in the very opposite: the rise of highly skilled craftsmen who produced some of the finest flint items ever made in prehistory, as 'look-alikes of the 'real bronze thing'. These beautiful objects played an important role in the ideology of Bronze Age communities, giving them a place in wider exchange networks. At the same time flint may have continued to have a special significance as a focal material to symbolise 'the ancestral way'. It was only in the course of the Iron Age that flint lost both its utilitarian and ideological significance.

Chapter 9

The meaning of flint

9.1 The usefulness of flint

Flint is usually seen as a simple utilitarian material with a predominantly domestic role in subsistence and craft activities. Surely, the fact that flint nodules can be shaped in a variety of tools that can be given different working edges depending on the task at hand, gives it a highly utilitarian 'edge' over many other raw materials like wood or bone. Many flint implements therefore functioned in subsistence and craft activities, tasks that were carried out without the human agents consciously thinking very much about it. In chapter 4 it was shown that flint played a role in various subsistence tasks, notably cereal harvesting and hunting. However, its role in obtaining and processing food is quite elusive and not as pervasive as one would assume. Flint tools were shown to play a more prominent role in various craft activities (Chapter 5). Use-wear analysis has revealed evidence for various tasks the products of which are usually largely invisible archaeologically. This includes hide processing, basketry, wickerwork and ornament making.

Because flint is so ubiquitous in our archaeological record its role in the technological system tends to be exaggerated. Wetland excavations have shown us a range of tools of 'other' materials, the function of some of which eludes us completely (Louwe Kooijmans/Kooistra 2006). Flint therefore tells us only part of the story of subsistence and craft activities. On the other hand, the social and cultural significance of flint is often downplayed as it is largely relegated to the domestic, mundane sphere of past life. However, through their role in daily life even simple flint flakes structured and reinforced the behaviour and interaction of past agents, adding to a sense of shared identity (Chapter 6). It was also shown that flint played a part in rituals (Chapter 7). In this last chapter I want to to examine the various roles of flint from the point of view of the *longue durée*, highlighting some of the long-term trends that have been alluded to only cursorily in the thematic chapters.

9.2 The dichotomisation of flint technology

When examining the development of flint technology from the Early Neolithic to the Late Bronze Age the most noteworthy aspect is the gradual development of two technologies: one ordinary, one special. In the Early and Middle Neolithic the biographies of flint objects from settlements are very similar to those of the flint items ending up in burials. It should be stressed however, that only a specific *selection* of flint items ended up in burials or hoards, items that were often related to communal, agricultural activities. During the TRB period, we see for the first time the special production of skilfully made objects, destined to end up in burials and hoards. This dichotomy between the special objects and the opportunistically produced settlement flint becomes more and more pronounced through time.

The LBK is characterised by a standardized and highly enculturated reduction sequence, making use of good-quality Rijckholt flint. It is likely that the tools ensuing from this production were recognizable to outsiders, whereas to insiders they simultaneously embodied the very LBK identity. This is supported by the fact that LBK tools were not only made but also *used* in a standardized fashion (fig. 5.11). There is no evidence that flint objects were produced specifically to be given along to the dead. Flint burial goods included domestic items with a use-life behind them such as *quartiers d'orange* and sickle blades, which had been pivotal in communal activities like cereal harvesting or plant fibre processing. Even though it basically concerned domestic flint items, the choice of items to be deposited in the graves was highly structured: not just any flint ended up in this context. In terms of their biographies, however, settlement and funerary flint objects display no obvious difference, except, of course, for their ultimate place of deposition.

Although burials are know from the Middle Neolithic A, they are not accompanied by flint items. There is one exception, the grave of a man in the settlement of Schipluiden, in which used strike-a-lights and a piece of pyrite were found (fig. 6.6). Flint strike-a-lights were also present in large numbers in contemporaneous settlement contexts, suggesting that the burial gifts were not made specifcally for the occasion. This indicates that during this period too, there was one technology and that there is no evidence for the special production of flint items for burials. Still, it should be noted that during Middle Neolithic A Hazendonk period we already see the development of two technologies, but then within settlement context: the more *ad-hoc* production of flakes on locally available rounded pebbles and the import of high-quality flint items of Cretaceous flint from the south. The latter were used predominantly for special activities like harvesting cereals, producing ornaments and making fire (Chapter 6).

The relative uniformity of flint technology drastically changes in the TRB period when flint seems to become a focal material for the expression and construction of different aspects of the cultural and social organisation. For the first time we see a strict separation between the settlement flint and the flint deposited in graves and hoards. Flint objects from these three contexts display completely different biographies. Domestic flint is produced on locally available moraine flint of poor quality, with a rather opportunistic technology. Scrapers as well as retouched and unretouched flakes are the most common tool categories, used for domestic tasks like hide processing and wood working. Import flint is absent in TRB settlement assemblages. The megalithic burials also contain domestic, used items but it concerns a very strict selection thereof. We find polished axes, sickles, strike-a-lights and scrapers deposited along with the dead as burial gifts, all of which with a past use-life in domestic context (fig. 6.7). However, with the exception of the scrapers, these tool types almost never appear in TRB settlement contexts. It is remarkable that axes, sickles and strike-a-lights were all involved in communal agricultural practices, involving the lo-

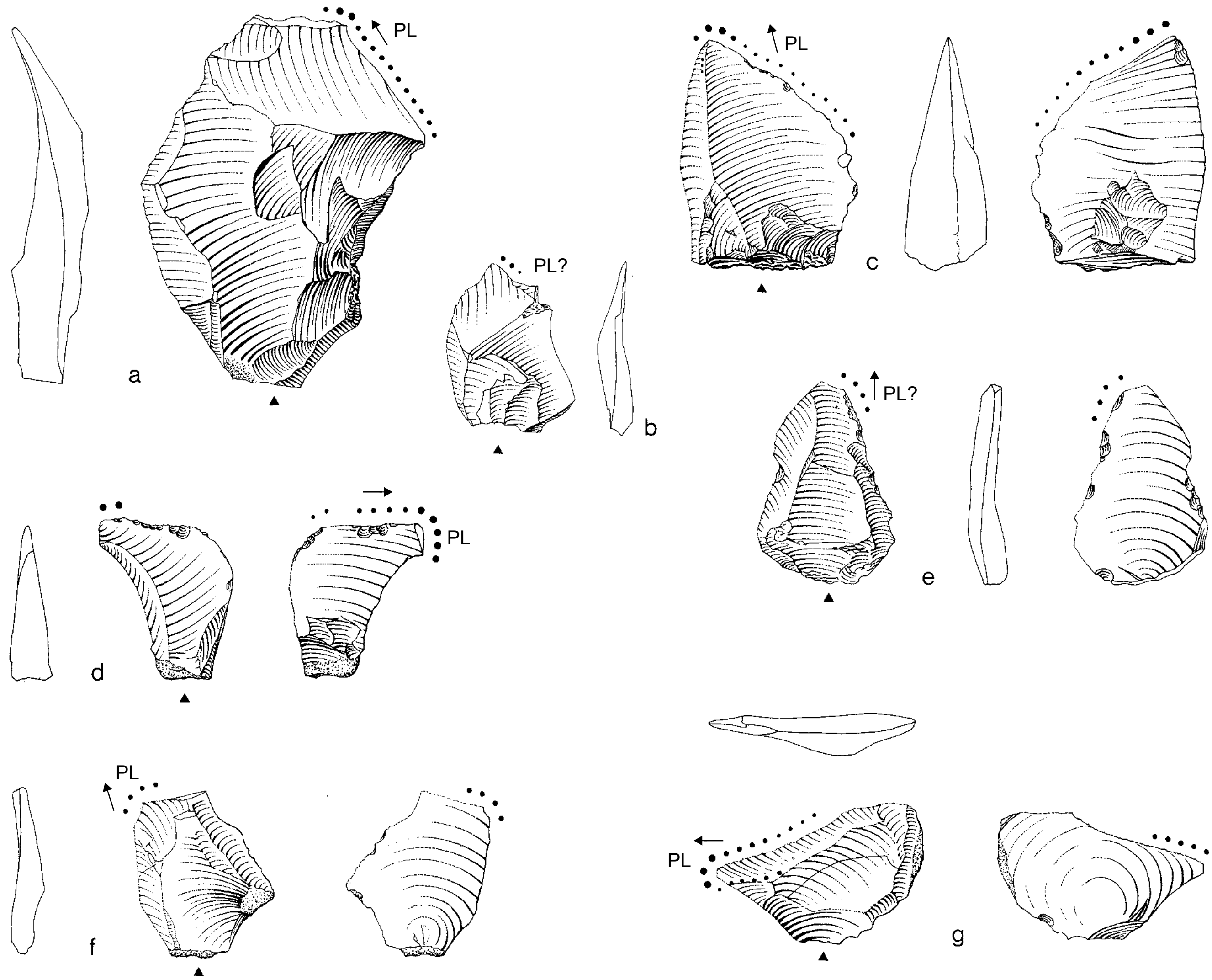


Fig. 9.1 Flakes made in an ad hoc fashion from the Vlaardingen site of Hekelingen III. Unmodified flakes were used for splitting plants (scale 1:1).

cal group. In addition to these used items, however, megaliths also contained a large number of transverse arrowheads, picks and unretouched flakes that display no indication of use and seem to have been made as part of the burial ceremony (Chapter 7). An even bigger contrast exists between the settlement material and the finds from hoards. These hoards contain beautifully crafted axes that were imported as finished products from southern Scandinavia and that were invested with an extensive amount of knowledge and skills (fig. 7.6). They were never meant to be used and were deposited in riverbeds that probably constituted the boundaries between different local groups. It was argued that these objects had a special significance and made reference to a larger TRB identity sphere beyond that of the local communities. This tri-partite division of flint technology is remarkable and constitutes an important departure from preceding periods. Clearly, the settlements, graves and depositions constitute distinct cosmological categories that could not be mixed: that of the living, that of the dead and that of ancestors. Flint seemed to have been a focal material to express this distinction.

In the contemporaneous Vlaardingen period flint does not seem to have been attributed such a structuring role. We only know of the settlement flint from this period, which seems to be characterised by an opportunistic reduction strategy with an emphasis on usable edges (fig. 9.1). The assemblages display quite a bit of variability in terms of raw material selection, technology and use. This can be at least partially attributed to the different landscape settings in which Vlaardingen sites are situated (Van Gijn/Bakker 2005). From a flint perspective there is therefore no such thing as one 'Vlaardingen-group'. The flint is very closely related to the local conditions and to the type of settlement. Most likely flint was therefore not a focal material for the representation of society and personhood. From the contemporaneous Stein-group we know the burial vault of Stein, which has produced flint items (fig. 6.12). However, as it concerns only one instance and little is known of the settlement material of this cultural entity, no conclusions can be drawn about a possible dichotomy in flint technology.

The dichotomy between domestic and special flint objects observed in the TRB period continues in the subsequent Single Grave period. The domestic flint is of poor quality, both in terms of the raw material selected and in the workmanship. The TRB practice of depositing axes in hoards in wet contexts continues, but many of the axes are much smaller, made of local flint and displaying traces of intensive use (fig. 9.2). In TRB times such axes would have ended up in burial context. The Single Grave burials, in contrast, contained flint objects without a previous use-life like large blades of northern flint. In the later phases of the Single Grave culture highly crafted flint objects like the

Fig. 9.2 The Single Grave hoard of Holsloot, containing a mix of used axes and axes without traces. The inclusion of the large blade of northern flint, usually only found in contemporaneous burial mounds, indicates that the strict TRB rules of deposition were shifting in the subsequent Single Grave period.

beautiful daggers of Grand-Pressigny and Romigny-Léhry flint appear in burial context (fig. 7.11). These daggers have a very special biography and do not display any 'normal' signs of use but, instead seem to have served as display objects. They may have been instrumental in the construction and representation of a special kind of personhood. Although the old TRB categories had become less exclusive, it is nevertheless clear that Single Grave settlements, burials and hoards contained different categories of flint objects, each displaying distinct biographies.

In the Bell Beaker period the number of flint objects in burial context diminishes, being largely limited to arrowheads and the occasional Bell Beaker knife. Too few contemporaneous settlements have been excavated to be able to compare the burial flint with that from the settlements. However, there is evidence for the deposition of highly crafted objects made of Scandinavian flint: the daggers (fig. 7.13). These daggers were deposited in marshlands and bogs, usually as single objects, continuing a trend of deposition of special objects of northern origin that already started in the TRB period. They were magnificently made and formed a great contrast with the opportunistic flint technology that is so typical for the settlements. This dichotomy between settlement flint and flint from special contexts is also visible in the Bronze Age. In Middle Bronze Age graves from the province of Drenthe we find highly crafted Sögel points, forming a contrast with the settlement material, in which such items are rarely found. By the end of the Middle Bronze Age flint objects no longer figure in burials. Still, during the Late Bronze Age once again well-made items of Scandinavian origin were imported: crescent-shaped implements frequently referred to as 'sickles'. These were sometimes put in the ground in groups, their upright position indicating that at least some of them should be seen as special depositions and not as hoards of traders.

Through time, therefore, domestic and 'special' flint objects become more and more two separate entities, displaying very different biographies from their production to their deposition. This dichotomy does not exist in the Early Neolithic: although only a selection of domestic tools ended up in burial context, it concerns used implements. Flint objects were not specifically produced to accompany the dead. Hence, no separation is visible between the flint objects found in domestic context and those from burials. This changes during the TRB and continues until flint disappears from the scene.

The significance of the dichotomy between domestic and special flint is still not clear. Why were so few skills and knowledge invested in the production of domestic tools during and after the TRB? It may be that strictly utilitarian reasons lie behind the diminishing attention paid to domestic flint tools: because of a mostly sedentary existence people did no longer need specialised tools for the hunt. The domestic tasks carried out within the permanent settlement did not require planning. Instead, people could select useable flakes within the confines of the permanent settlement as the need arose. It has also been proposed that the flintknapping knowledge and skills largely disappeared in the course of the Neolithic, being confined to a small group of specialists. However, this must have been a deliberate choice on the part of past agents, as it is during the Late Neolithic and Bronze Age that the technologically most complicated flint objects were made. A third explanation is that people just chose to invest stylistic information in objects other than domestic flint tools, such as pottery and metal. Flint objects with a more public role and therefore a wider visibility, such as arrowheads, continued to be stylistically distinguishable throughout the Early and Middle Bronze Age. A last explanation is that the dichotomy is due to the introduction of metals with flint items having to 'compete' with the influx of metal objects. Whatever, the exact motivations on the part of the prehistoric agents, the dichotomy between the flint from domestic contexts and that from burials and special depositions was most likely the result of a series of interrelated factors that changed the technological system and caused the 'domestication' of domestic flint technology.

9.3 Interaction networks and the importance of long-distance imports

The territory of the present-day Netherlands lies at the margin of the Northwest European plain. The landscape underwent great changes through time due to sea level fluctuations and the incoming rivers from the uplands. We can observe two divisions in the landscape that have of been of influence on the interactions of the inhabitants. First, the division between the Pleistocene uplands in the south and east versus the Holocene wetlands in the north and west was important during the neolithisation process (Van Gijn/Louwe Kooijmans 2005). The other division, one dictated by the great rivers that divided the territory in a northern and southern half, also seems to have influenced the direction of the contact networks of the prehistoric agents.

During much of the Neolithic we can distinguish two traditions of flint tool use, an upland and a wetland tradition (Chapter 6) (Van Gijn 1998). The upland tradition is characterized by a predominance of hide working and the activities that are causing the distinctive wear traces referred to as 'polish 23' and 'polish 10'. Agricultural activities are well-represented too. The wetland tradition, in contrast, distinguishes itself by a range of tools used for different plant processing activities, probably related to a pre-occupation with basketry, netting and so forth (fig. 9.1). Bone and antler tool manufacturing is also strongly represented, indicating a continuation of Mesolithic tool making traditions. On the other hand, the hide scraping implements do not display the intensity of use and the variety in treatments visible on the upland counterparts.

Evidence for interaction between the uplands and the wetlands is present throughout the Early Neolithic (Raemaekers 1999; Verhart 2000) (fig. 6.3). Southern flint played a pivotal role in this interaction. It is not until the classic Swifterbant period, contemporaneous with the earlier Michelsberg culture, that we see the first systematic appearance of typical upland Michelsberg flint tools from the south in the site of Brandwijk phase 2, situated in the Rhine-Meuse delta. These objects seem to have been imported as finished and, most importantly, used implements, considering the presence of typical 'upland' types of use-wear traces on them (fig. 6.4). Their prior 'upland' use-lives suggest that we are not dealing with objects especially produced for exchange, but rather with gifts of personal belongings. Their large size and usable edges should have been highly attractive to the Brandwijk people with their inferior local raw materials, but there is no sign of secondary use or re-sharpening. It seemed these exotic tools were kept as tokens of allegiance to the agricultural Michelsberg people (Van Gijn 2008a).

After c. 3700 BC the wetlands of the Rhine-Meuse delta really became incorporated into the Michelsberg influence sphere. I argued that this is visible in the way exotic flint is used by the Hazendonk people (Chapter 6). Instead of keeping used Michelsberg tools as a token of allegiance or fascination with the remote agriculturalists, they were actually appropriating these exotic tools into their own technological system. The typical Michelsberg macrolithic tools were used for ornament making, fire making and cereal harvesting, all of which were probably 'special' tasks (fig. 6.5). This indicates a very different attitude towards the agricultural peoples in the south on the part of the inhabitants of the 'marginal' wetlands of the Rhine-Meuse delta: they are becoming part of the agricultural world (Van Gijn 2008a). This incorporation also results in a breakdown of the distinction between an 'upland' and a 'wetland' technological tradition. Still, at least until the end of the Vlaardingen period we continue to observe an emphasis on bone tool production and plant processing by means of flint tools in sites situated in the wetlands (Van Gijn 1990).

Scandinavian flint seems to be the focus of the long-term interaction networks of the northern half of the present-day Netherlands with the neighbouring areas in northern Germany and southern Scandinavia. The distribution of this type of flint is largely confined to the area north of the great rivers, with only occasional finds appearing in the south (fig. 7.12). The first unequivocal evidence for such long-distance exchange networks dates to the TRB when large ceremonial axes were produced in southern Scandinavia and brought south as finished items. The fact that the specific knowledge as to how to treat these axes was shared by communities hundreds of kilometres apart indicates a common worldview (Wentink 2006). Objects of Scandinavian flint also received a special treatment in the subsequent Single Grave period. Long, unretouched blades of northern flint were given along to those buried in the barrows (fig. 6.13) and large axes continued to be deposited in wet locations. Nevertheless, it is during the later half of the Single Grave period and the subsequent AOO phase that we also see the import of daggers made of French flint. They were even found in burial mounds in the northern province of Drenthe (Lanting/Van der Waals 1976). This indicates that southern connections existed as well.

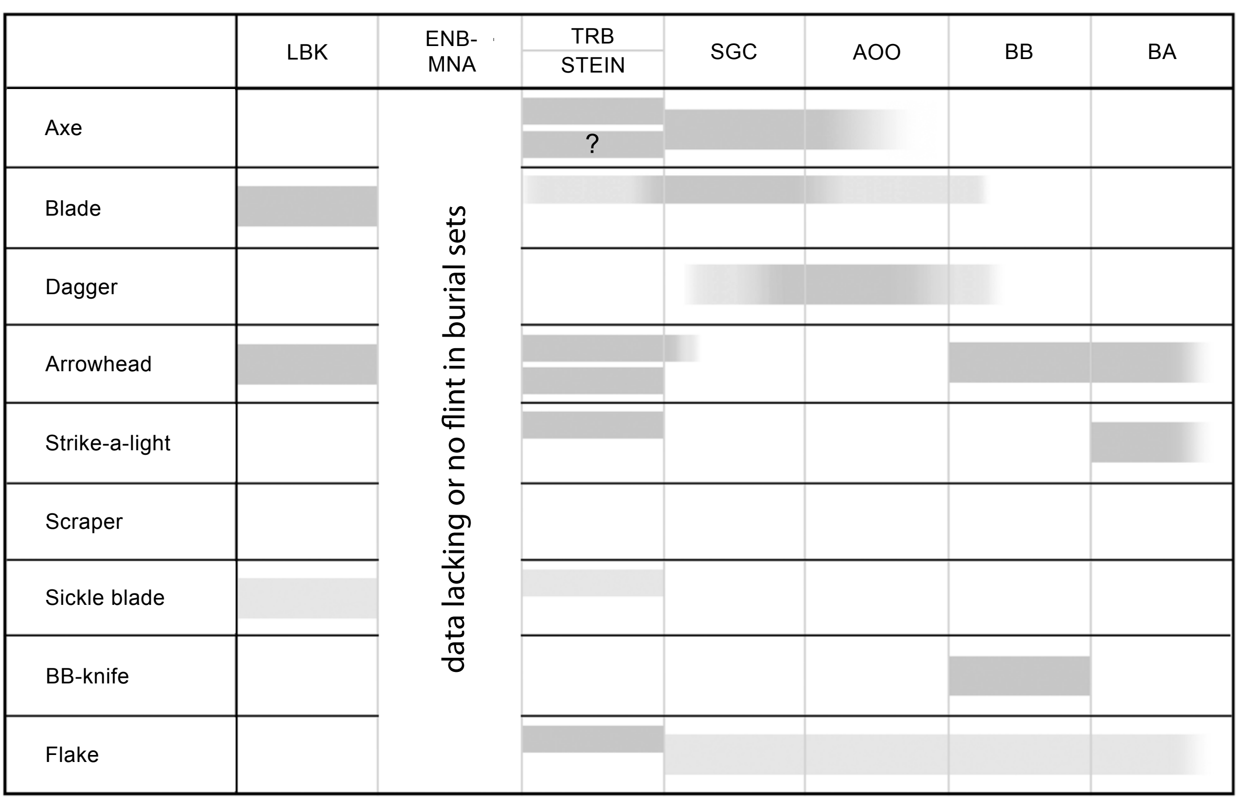
During Bell Beaker times and the Early Bronze Age another beautiful craft item of Scandinavian flint finds its way south: the daggers which were interpreted as single item depositions in wet areas (Chapter 7). These objects were produced on a large scale, as were the crescent-shaped implements (generally referred to as 'sickles') which appeared in the Late Bronze Age and Early Iron Age (but see note 28). Because of the scale of production these items are often seen as commodities, solely meant as trade objects. However, the fact that objects of Scandinavian flint invariably display a very special biography, ending up in marshy areas where they could never be retrieved, suggests that they may have had a deeper significance. They may have symbolised a shared identity and worldview linking communities over vast distances. Scandinavian flint, because of its durability and distinct appearance, may have been regarded an ancestral raw material and therefore eminently appropriate to represent these age-old interaction networks during the age of metal.

9.4 From a farmer to a warrior identity

Burial goods are related to the identity of the deceased. This may be the gender, age or status of the deceased but may also relate to a special kind of personhood, maybe even an idealised one. However, it seems that many burial gifts make reference not so much to the individual deceased but to the community, referring to collective activities that were pivotal for the continued existence of the local group. During the Early and Middle Neolithic the objects include implements associated with agriculture, whereas in the later Neolithic weapons figure more prominently. We may interpret this as a shift from a farmer to a warrior identity (table 9.1).

In the LBK period objects from burial context are regarded as personal items related to the identity of the dead, notably their gender (Van de Velde 1992). Most of these objects, which included flint sickles, hard stone querns and adzes, had a connection with agricultural activities. The arrowheads, which also appear in the graves, can at least partially be explained as the cause of death, partially they should be seen as burial gifts. Apart from the arrowheads all of the tools had performed domestic tasks in the utilitarian stage of their biography and all made reference to farming, an important collective activity. This pattern can also be observed during the TRB period. The megalithic graves contain for the most part implements related to farming: the axes and strike-a-lights can

Table 9.1 Overview of the type of flint grave goods present through time.
ENB = Early Neolithic B
MNA = Middle Neolithic A
SGC = Single Grave Culture
AOO = All-Over-Ornamented
BB = Bell Beaker culture
BA = Bronze Age



be associated with the slash-and-burn type of agriculture we postulate for this period, whereas the sickle blades were used for harvesting the crops. These three types of implements all display heavily developed traces of use and clearly had a use-life in domestic context, only to be ritualised in the burial ceremony (see also below). It seems the burial ceremony and the inclusion of items of collective interest were aimed at ensuring the continuation of the local group by celebrating its farmer identity.

During the Single Grave period the burial ritual changed significantly compared to the TRB culture: instead of the communal megaliths, we find barrows in which a single individual was buried. The emphasis on agricultural implements as burial gifts diminishes and strike-a-lights and sickles are absent. Used axes are present in many of the graves, continuing an age-old practice. However, in addition we find unretouched northern blades or highly crafted Grand-Pressigny and Romigny-Léhry daggers. Although it is tempting to see these daggers as symbolic of the emergence of a warrior elite, it should be stressed that similar daggers were harvesting knives in their land of origin (Beugnier/Plisson 2000).

The interpretation of Bell Beaker burial packages is still very much a matter of debate (Van der Beek 2004; Vander Linden 2004, 2006). Bell Beaker burial gifts of flint are limited to flint arrowheads that are combined with other elements of the Bell Beaker package like wrist-guards and copper daggers. In contrast to the arrowheads from previous periods, the points do not display wear traces: they seem to have been made specifically for deposition in the grave. On one occasion, the flatgrave of Angelsloo, they were all burnt in an apparently controlled way, maybe to give them all the same white colour (fig. 6.18). Flint axes are absent in Bell Beaker funerary context as are all other objects that may be associated with agricultural practices. Instead, the burial package was composed of exotic objects and objects that did not have a functional prior life. The absence of agricultural implements and the presence of objects usually associated with warriors (wrist-guards, arrowheads, copper daggers) in the graves suggest that a transition has taken place from an expression of a communal, agricultural identity to the veneration of the, probably idealised, warrior (Fokkens *et al.* 2008a).

During the Bronze Age flint gradually disappears from the burial scene. Generally speaking flint burial goods are limited to arrowheads, and an occasional strike-a-light. The latter were probably no longer associated with agricultural practices, but were personal items with a long use-life that may have been seen to symbolise the power of fire, for example in the making of metal swords, or as a reference to ancestral technologies (chapter 8.4). The arrowheads frequently display traces of use and could have been personal items of the dead. It is remarkable, however, that especially the Middle Bronze Age Sögel points are intricately made, displaying a workmanship far exceeding utilitarian demands. We can explain this investment of flintknapping skills if we assume that these arrowheads were more than functional items used in hunting or warfare. They may have constituted a material expression of the continued valuation of martiality in Bronze Age society. This is supported by the fact that the barrow of Drouwen, dated to the transition between Early and Middle Bronze Age, also contained a sword, a martial symbol *par excellence*.

9.5 Flint and ritual

We do not frequently associate flint with ritual. Yet it was shown that, in a number of instances, flint was treated in a special way that we would 'classify' as ritual (Chapter 7). Although ritual treatment of agricultural tools is already practised in the LBK, this concerns hard stone tools and not flint (Verbaas/Van Gijn 2007a). The earliest such evidence comes from the Hazendonk site of Ypenburg dated to the Middle Neolithic A (Van Gijn/Verbaas 2008). There cropping was probably not done on a large scale and cereals were part of the extended broad-spectrum economy so characteristic for much of the Neolithic of the wetlands. The flint tools used to reap these cereals showed a distinct biography. They were made of exotic material and were not exhausted to depletion before they underwent an unusual series of treatments prior to their discard: they were burned and the used edge was destroyed by means of irregular flaking (fig. 7.3). Some implements show an orange/red residue on their broken fractures, maybe ochre. The apparently ritual treatment of these domestic tools may be related to the fact that growing crops in these wet environments was perceived as precarious or contradictory to the old way of living as hunter-fisher-gatherers in and with nature. Destroying the sickles in a ritual fashion could have been a way to appease the spirits of nature.

During the TRB culture flint seems to have played a prominent role in rituals. Depositions contain large axes which display a special biography from the beginning of their use-life to the end (fig. 7.1). They are interpreted as inalienable objects, embodying TRB cosmology and recognized as special by local communities living far apart (Wentink 2006, 2008; Wentink/Van Gijn 2008). That the ceremonial axes were not commensurable with the local group is shown by their deposition in liminal places, notably in rivers, which can be seen as the boundaries between territories of local communities. In a way the large ceremonial axes constituted mobile reminders of TRB cosmology, mnemonic devices, with a significance transcending the local community and connecting people across vast areas.

In the TRB burial context, in the megalithic tombs, evidence for the role of flint in ritual practices is also abundant. The megaliths produced numerous transverse arrowheads, unretouched flakes and picks. Many of these implements appear unused, and it was argued that they were knapped specifically for deposition in the grave. It was also proposed that the picks were used to scratch the arrowheads and sickles that were deposited in the tombs (Chapter 7) (fig. 7.5). Ritual knapping sessions and the mysterious scratching of flint surfaces, both causing specific auditory experiences, may have been part of the burial rituals of the TRB people, adding to the soundscape of the event (fig. 7.4).

During the early Single Grave period, until c.2600 BC, axes continue to be deposited in wet places. There are however some important differences in depositional practices compared to the TRB: above all, the axes all display traces of use, they are also smaller and they lack wrapping traces. They are however still rubbed with ochre, indicating their special significance. The breakdown of the strict rules that prevailed in TRB times, suggests that the cosmological significance of these depositions must have changed considerably, even though some of the actual ritual practices continue. Also the contents of these depositions become more varied, including small locally produced axes and the simple scraper as well as exotic implements

The French daggers of the later Single Grave culture have already been mentioned above. They are interpreted as display objects and therefore most likely played a role in social gatherings or ritual practices. This is difficult to specify further. The same pertains to the later Scandinavian daggers that appear in the Bell Beaker and Early Bronze Age. Again these daggers seem to have been displayed, but it cannot be ruled out that they were ritual knives used for sacrificial activities. Wear traces from such a use would not be traceable in the archaeological record as they would be obliterated by the wear traces from contact with the sheath. Their find context suggests that they can be interpreted as special depositions. This pertains especially to the type 3 daggers that were predominantly found far into the bogs (fig. 7.15). Although the edges of bogs and rivers can be designated as liminal zones, the bog itself is beyond that, either no-mans land or the territory of the deities or spirits. The fact that flint tools were seen as appropriate offerings in the age of metal is indicative of the continued ritual significance of, especially Scandinavian, flint (see above).

The ritualisation of flint lasted until the Late Bronze Age and Early Iron Age with the occasional depositions of crescent-shaped objects frequently referred to as 'sickles'. It concerns highly crafted implements that were imported as finished products from southern Scandinavia. Several multiple depositions of these tools have been found, composed of 3-5 objects, deriving mainly from sandy higher grounds but also from back swamps and peat zones (fig. 8.5). These objects display curious wear traces: they were not used as sickles but as knives to cut sods or turf (Van Gijn 1988, 1999). Although this seems an extremely mundane task for such beautiful implements, it is important to realize that sods provided essential building material in the tree- and stone-less landscape of the northern Netherlands. The fact that complete 'sickles' are rarely encountered in settlement context, suggests that their deposition may be designated as 'special': this is corroborated by the presence of multiple-object depositions and the peculiar upright placing of the sickles of the Heiloo find.

Flint objects were thus ritualised throughout most of the Neolithic and Bronze Age. It often concerns domestic items with a special significance in for example agricultural practices that were ritualised at a certain stage of their cultural biography. Such is the case with the Middle Neolithic sickles from Ypenburg and the agricultural implements deposited in the *hunebedden* of the TRB. This indicates that it is impossible to make a strict separation between the domestic and the ritual world (see also Bradley 2005). Other flint objects did not have a past domestic use-life but were produced specifically for a 'special', non-utilitarian life outside of the domestic sphere. Examples are the skilfully made objects of Scandinavian flint like the TRB axes and Late Neolithic daggers. It was also proposed that flint may have played an active role in TRB burial ceremonies by adding to the soundscape of the event (fig. 7.4). It is remarkable that even during the Late Bronze Age when flint becomes largely replaced by metal objects even in the domestic context, the crescent-shaped 'sickles' of Scandinavian flint were chosen for ritual deposition. Most likely this is because flint was of old a focal material to embody and represent ancestral knowledge and values (Cooney 2008). As argued above, this pertained especially to Scandinavian flint as it was so easily distinguishable from the local raw materials, certainly if the distinctive cortex was left in place, as was almost invariably the case with the oversized TRB axes, the daggers and the crescent-shaped sickles (figs. 3.1, 7.6, 7.13 and 8.6).

9.6 Metal and the demise of flint

The introduction of bronze did not immediately bring about the demise of flint. As was shown in Chapter 8 flint kept its utilitarian function for a variety of domestic activities until the end of the Bronze Age and even into the Early Iron Age. During the Bronze Age heavily curated flint implements, like hide scrapers and strike-a-lights that can be considered personal items, are still present. It seemed these objects were used for a very long time indeed, considering the extreme development of use-wear traces (fig. 8.3). These tools were made of local flint and were probably manufactured inside the settlements by non-specialists. In addition to these curated, domestic implements we also find unretouched flakes that seem to have been made and used in a more *ad hoc* fashion.

At the same time, during the Bell Beaker times and the Early Bronze Age, flintknapping becomes a specialist craft for some. The production of Scandinavian daggers, for example, requires great skills. Acquiring such skills would have required a long apprenticeship (Callahan 2006; Nunn 2006). The large-scale production of these objects suggests that they were commodities rather than gifts, allowing the manufacturing communities in metal-less Scandinavia to plug into the all-pervasive trade of bronzes (Apel 2001). This interpretation is supported by the fact that the later Scandinavian flint daggers were in some ways skeuomorphs of contemporary bronze daggers. At the same time, however, it was argued above that these items may have had an ideological significance and may have embodied ancestral notions and beliefs of great time-depth.

After the large-scale introduction of iron, flint lost most of its utilitarian significance. Iron was readily available in many areas of Europe and could also be won from the extensive bogs of the Netherlands. Waste products of bog iron are ubiquitous in the archaeological record. Iron also matched flint in its versatility and its capacity to hold a sharp edge that could easily be re-sharpened. Still, flint kept a, albeit small, role in the technological system of the Iron Age. The fact that flint could produce sparks when struck by iron pyrites ensured its *raison d'être* and flint strike-a-lights continued to be used. Although never systematically studied, the occasional piece of flint from Roman and medieval context, usually discarded as contamination, may actually concern strike-a-lights.

The 'sparkling' properties of flint continued to be known. In Dutch the term for flint is '*vuursteen*', which literally means firestone. The German *Feuerstein* has the same meaning. The fact that flint was used as strike-a-light in guns well into the 19th century indicates that this physical property of flint was well known and continued to form part of our corpus of technical knowledge after the role of flint in other aspects of life had come to an end. In Napoleonic times flintknapping soared as the demand for gunflints grew. Gunflint manufacture was an important industry from the late 1600s until the early 19th century in a

b

Fig. 9.3a Flint as building material (St. Paul's Church, Highmoor, Oxfordshire). b. Knapped nodules of flint used as decorative element (Henley-on-Thames).

especially France and England (Clark/Kurashina 1981; Knowles/Barnes 1937). The gunflint knappers of Brandon in England continued into the last century and kept the flintknapping tradition going (Gould 1981). Although the southern Netherlands were rich in flint, no such industry was present there, possibly because the flint was too coarse-grained to be an effective strike-a-light. The flint sources around Maastricht were, however, exploited until recent times. In the nearby village of Eben Emael flint was worked until very recently for building purposes (Slotta 1990). In southeastern England, even in London, many houses and public buildings are constructed of flint or decorated with knapped nodules (Martingell 2003) (fig. 9.3).

In sub-recent times flint was also attributed all sorts of medicinal and magical qualities, especially in rural areas where ancient flint objects were regularly found during peat cutting, ploughing and the digging of ditches. Books about the history of archaeology tell us about handaxes that were regarded as elf stones or the products of lightning. These stories may well relate to the fire-making property of flint (see Whittaker 1994 for a listing of relevant references). A brief description of the relevance of flint axes from the province of Twente, in the east of the Netherlands, particularly reveals the continued appeal and significance of flint and is actually very relevant for our understanding of the archaeological data (Van Deinse 1925). There the large flint axes, of which there must have been many, were believed to predict whether or not a thunderstorm was pending. These stones also were said to protect the farmstead against lightning. Last, in the same area, axes were believed to be effective against convulsions of children. A small bit of the stone was scraped off and given to the child with some water. Remarkably enough, silica has been shown to have a homeopathic effect against epileptic attacks (Van Deinse 1925). The axes were actively sought after and kept as heirlooms in the family for many generations. Striking in this account is the continued association made between flint and fire or lightning.

Nowadays, flint, once such an important raw material for our predecessors, has largely disappeared from the technological, and hence cultural, scene. In some remote parts of the world, notably Papua New Guinea and Australia, people used stone tools until relatively recently. Their stone tool technology is documented in a range of important case studies (a.o. Binford 1984; Hampton 1999; Hayden 1979; Pétrequin/Pétrequin 2000; White *et al.* 1977). Around most of the Mediterranean flint was used as threshing sledge inserts (a.o. Kardulias/Yerkes 1996) and discarded threshing sledges can be found in many rural areas in Spain, Greece and Turkey (fig. 9.4). The practice continues on the Anatolian Plateau of Turkey even today, where specialists take care of the repair of the sledges, which are often a communal property (Dostal 1971; Whittaker 1996). Interestingly, obsidian has recently been re-discovered as a raw material: because of its exceedingly sharp edges it is occasionally used for the manufacture of scalpels for eye operations.

9.7 Flint studies for the future

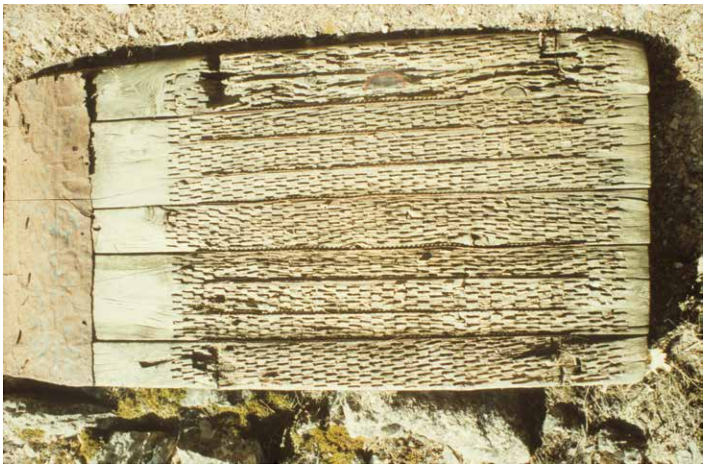
Although not realizing the scope of the endeavour on which I embarked more than ten years ago, *'understanding the meaning of flint'* has turned out to be a rewarding experience. Use-wear and residue studies have traditionally been a  b 

Fig. 9.4 a.Tribulum seen in northern Spain; b. bottom of an ethnographic example from Turkey, showing the alignment of small flint inserts.

practised at site level. This is still very much the case, especially because many such studies are now performed within the context of commercial contracts. These site-oriented studies are certainly very useful: they contribute towards a more detailed knowledge of domestic tasks carried out. Especially craft activities like hide working and plant processing are often not otherwise traceable. On a broader scale these studies have also demonstrated that our traditional typological approach has distinct shortcomings: many unretouched flint artefacts turn out to be tools as well and can no longer be dismissed as waste (fig. 9.1).

The present study, with its emphasis on the life-cycle of flint objects, has shown that not only were seemingly simple and unmodified pieces of flint used as tools, they also displayed special biographies. Because of the very fact that these simple tools were part of daily life, they were not only instrumental in the structuration and reproduction of society, they also embodied and facilitated the negotiation of new identities. Such 'special roles' were not only reserved for the 'usual suspects' (like the impressive daggers and oversized axes), but use-wear and residue analysis has demonstrated that seemingly simple domestic tools have been equally significant in the social and ritual life of past peoples. To comprehend this significance performing a use-wear and residue study is not enough. It is only by studying the entire life-history of flint objects that we can hope to arrive at such an understanding. This book is therefore not only a plea for more use-wear and residue studies but also for a more biographical approach towards artefact studies. Re-assuringly for some, it is even not always necessary to apply a detailed use-wear study, which requires extensive specialist skills, to observe aspects of artefacts that can provide clues about their life-history. A simple stereomicroscope or even a handlens is often enough. The future of flint studies, I would argue, lies in such a biographical approach. However, in order to fully understand the meaning of flint for Neolithic and Bronze Age societies, one must also subject all other artefact categories to a similar biographical study: flint objects are part of a larger technological system, a system that is part and parcel of the social and cultural world of past agents. Clearly, this is a task that will keep us busy for a while to come.

Appendix

Catalogue

ABBREVIATIONS USED

DMA: Drents Museum, Assen
GM: Groninger Museum, Groningen
RMO: National Museum of Antiquities, Leiden
WMF: West-Fries Museum, Hoorn

HOARDS

TRB and Single Grave Hoards

Multiple object hoards

Multiple object hoard, Een, Drenthe, Depot Een 1940, MNB (TRB)

1940-X-1, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 295 x 90mm: no traces of use, no ochre.
1940-X-1a, DMA, axe, rectangular cross-section, thin-bladed, 194 x 68mm: skilfully made axe, only edge ground and polished, no traces of use.
1940-X-1b, DMA, axe, rectangular cross-section, 202 x 113mm: red Helgoland flint, no traces of use, wrapping traces.
1940-X-1c, DMA, nodule (tested), 274 x 181mm: juxtaposition of patinated and fresh scar negatives, ochre.
1940/X1d, DMA, nodule (tested), 230 x 207mm: juxtaposition of patinated and fresh scar negatives.
1940/X1e, DMA, nodule (tested), 252 x 122mm: juxtaposition of patinated and fresh scar negatives, ochre.
1940-X-1f, DMA, nodule (tested), 194 x 92mm: juxtaposition of patinated and fresh scar negatives, ochre.

Multiple object hoard, Een, Drenthe, Depot Eenerveld 1898, MNB (TRB)

c 1898-1.4, RMO, axe, rectangular cross-section, thick-bladed, thick-butted, Bundsø type, 306 x 85mm: no traces of use, no traces of hafting, ochre on cutting edge, wrapping traces.
c 1898-1.5, RMO, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 184 x 71mm: no traces of use, no traces of hafting, ochre on cutting edge, wrapping traces.
c 1898-1.6, RMO, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 249 x 87mm: basically not interpretable, lots of ochre on entire surface.
c 1898-1.7, RMO, axe, rectangular cross-section, 157 x 63mm: burned, not interpretable.
c 1898-1.8, RMO, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 205 x 80mm: no traces of use, no traces of hafting, ochre on cutting edge, wrapping traces.

Multiple object hoard, Wildeveen, Drenthe, Depot Wildeveen, MNB (TRB)

1923-XI-3a, DMA, axe, rectangular cross-section, thin-bladed, 226 x 73mm: no traces of use, no traces of hafting, only edge is ground and polished. This hoard originally contained two more axes which are lost and could not be studied.

Multiple object hoard, Valtherveen, Drenthe, Depot Valtherveen, MNB (TRB)

1931-X-10, DMA, nodule (tested), 525 x mm: nodule completely unsuitable for axe production, possibly some ochre, some scar negatives.
1931-X-10a, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 316 x mm: no traces of use, no ochre, wrapping traces.

Multiple object hoard, Valthe, Drenthe, Depot Valthe Kamperriet, MNB (TRB)

Private ownership, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 303 x 81mm: skilfully made, no traces of use, no hafting, possibly wrapping traces.
Private ownership, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 295 x 89mm: skilfully made, almost entirely ground, no traces of use, no hafting, possibly ochre.
Private ownership, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 271 x 79mm: skilfully made, almost entirely ground, no traces of use, no hafting

Multiple object hoard, Boerakker, Groningen, Depot Boerakker, MNB (TRB)

1961-XII-1b, GM, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 176 x 68mm: edge not ground or polished, no traces of use, possibly ochre, wrapping traces. In hoard also two hard stone axes.

Multiple object hoard, Veenhuizen, Groningen, Depot Veenhuizen, MNB (TRB)

1966-II-1, GM, axe, rectangular cross-section, thick-bladed, thick-butted, Lindø type, 237 x 61mm: very sharp cutting edge, no traces of use, no hafting, wrapping traces, possibly ochre.

Multiple object hoard, Gammelke, Overijssel, Depot Gammelke, LNA (SGC)

355, Overijssel provincial depot, blade, 132 x 28mm: no traces.
356, Overijssel provincial depot, blade, 108 x 29mm: no traces.
367, Overijssel provincial depot, blade, 118 x 30mm: used on both sides for cutting hide/siliceous plant-like polish.

Multiple object hoard, De Pieperij, Drenthe, Depot de Pieperij, LNA (SGC)

1963-III-2, DMA, axe, rectangular cross-section, thin-bladed, 156 x 46mm: used on wood, hafted, re-sharpened, ochre.
1963-III-3, DMA, axe, rectangular cross-section, thin-bladed, 103 x 42mm: heavily used on wood, hafted, re-sharpened, ochre.
1963-III-4, DMA, axe, rectangular cross-section, thin-bladed, 102 x 40mm: heavily used on wood, hafted, re-sharpened, ochre.
1963-III-5, DMA, chisel, TRB type, 189 x 22mm: TRB chisel, probably used, re-sharpened, no traces of hafting, ochre.
1963-III-6, DMA, axe, rectangular cross-section, thin-bladed, 118 x 50mm: SGC-type of polishing, used on unknown material, hafted, re-sharpened, ochre.
1963-III-7, DMA, axe, rectangular cross-section, *Flachbeil*, 101 x 30mm: heavily used on wood, hafted, re-sharpened, ochre.
1963-III-8, DMA, axe, rectangular cross-section, thick-bladed, 56 x 24mm: probably used, hafted, re-sharpened, ochre.
1963-III-9, DMA, scraper, 28 x 24mm: local flint, no traces of use, ochre.

Multiple object hoard, Benneveld, Drenthe, Depot Benneveld, LNA (SGC)

1985-XI-1, DMA, axe, rectangular cross-section, thin-bladed, 162 x 62mm: used on wood, hafted.

1895-XI-2, DMA, axe, rectangular cross-section, thin-bladed, 165 x 60mm: used on wood, re-sharpened, hafted, ochre.
1895-XI-3, DMA, chisel, TRB type, 260 x 22mm: used on wood, re-sharpened.
1895-XI-4, DMA, axe, rectangular cross-section, *Flachbeil*, 116 x 35mm: no traces of use, locally and incompetently made.

Multiple object hoard, Drouwen, Drenthe, Depot Drouwen I, LNA (SGC)

1855-I-28/29, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, 159 x 57mm: heavily used on wood, ochre.
1855-I-30, DMA, chisel, TRB type, 176 x 28mm: no traces.
1855-I-31, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, 142 x 39mm: wood chopping, hafted, ochre.

Multiple object hoard, Holsloot, Drenthe, Depot Holsloot, LNA (SGC)

1959-IX-1a, DMA, axe, *Fels Ovalbeil*, 100 x 50mm: not interpretable.
1959-IX-1b, DMA, axe, rectangular cross-section, thin-bladed, 129 x 60mm: no traces.
1959-IX-1c, DMA, axe, rectangular cross-section, thin-bladed, 94 x 43mm: used on wood, no traces of hafting.
1959-IX-1d, DMA, axe, rectangular cross-section, thin-bladed, 109 x 45mm: used on wood, no traces of hafting.
1959-IX-1e, DMA, blade, 193 x 43mm: no traces of use, probably hafted, wrapping traces.

Multiple object hoard, Nieuw Dordrecht, Drenthe, Depot van Nieuw Dordrecht, LNA (SGC)

c 1955-7.1, RMO, axe, rectangular cross-section, thick-bladed, thick-butted, Lindø type, 242 x 78mm: used on wood, no traces of hafting, all around polish from contact with hide, possibly due to transport.
c 1955-7.2, RMO, blade, 160 x 37mm: no traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.3, RMO, blade, 126 x 30mm: no traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.4, RMO, blade, 120 x 36mm: no traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.5, RMO, blade, 125 x 24mm: possible traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.6, RMO, blade, 105 x 28mm: no traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.7, RMO, blade, 102 x 30mm: no traces of use, all around polish from contact with hide, possibly due to transport.
c 1955-7.8, RMO, blade, 77 x 21mm: possible traces of use, all around polish from contact with hide, possibly due to transport.

Single object hoards

Single object hoard, Zuidbarge, Drenthe, Axe of Zuidbarge, MNB (TRB)

1962-II-143, DMA, axe, rectangular cross-section, thick-bladed, thick-butted, Lindø type, 325 x 73mm: skilfully made, cortex on butt end, no traces of use, no hafting, possibly ochre, wrapping traces

Single object hoard, Oudemolen, Drenthe, Axe of Oudemolen I, MNB (TRB)

1889-VII-4 (S-39), DMA, axe, rectangular cross-section, thick-bladed, thick-butted, Lindø type, 232 x 69mm: skilfully made, cortex on butt end, not much polishing, no traces of use, ochre, wrapping traces.

Single object hoard, Eext, Drenthe, Axe of Westerhout, MNB (TRB)

1939-XI-3, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 218 x 72mm: no traces of use, ochre.

Single object hoard, Hooghalen, Drenthe, Axe of Hooghalen, MNB (TRB)

1994-VIII-1, DMA, axe, rectangular cross-section, thick-bladed, thick-butted, Bundsø type, 255 x 87mm: no traces of use, possibly some ochre, wrapping traces.

Single object hoard, Taarloo, Drenthe, Axe of Taarloo, MNB (TRB)

1950-V-23, DMA, axe, rectangular cross-section, not applicable x 71mm: broken, only cutting edge present, no traces of use, ochre.

Single object hoard, Emmen, Drenthe, Chisel of Emmerhout, LNA (SGC)

c 1938-1.1, RMO, chisel, SGC-chisel, 218 x 35mm: clumsily made, only edge polished, not interpretable.

Single object hoard, Bellingwedde, Groningen, Axe of Bellingwedde, LNA (SGC)

1917-IV-1, GM, axe, rectangular cross-section, thick-bladed, thick-butted, Bundsø type, 203 x 74mm: SGC-type of polishing, traces from contact with wood, hafted, ochre.

Possible hoards

Possible hoard, Patersworlde, Axe of Paterswolde, MNB (TRB)

1924-II-2, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg, 235 x 94mm: no traces of use, no traces of hafting, ochre on cutting edge.

Context unknown, Drenthe, MNB (TRB)

1985-X-4, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 187 x 76mm: no traces of use, ochre, wrapping traces.

Possible hoard (but could also be a destroyed grave), Exloo, Drenthe, Depot Exloo, LNA (SGC)

1890-VI-2, DMA, axe, rectangular cross-section, thick-bladed, 115 x 47mm: no traces.
1890-VI-3, DMA, axe, rectangular cross-section, thin-bladed, 145 x 67mm: no traces.

Possible hoard, Valthe, Drenthe, Single axe of Valthe, LNA (SGC)

1915-X-1, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Blandebjerg type, 196 x 70mm: SGC-type of polishing, hafted, possibly used, re-sharpened while hafted.

Possible hoard, Klijndijk, Drenthe, Possible hoard of Klijndijk, LNA (SGC)

Private ownership, VM5-1, axe, rectangular cross-section, thick-bladed, thick-butted, Valby type, 215 x 60mm: lightly burned, probably used on unknown material.
Private ownership, VM5-2, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 200 x 73mm: lightly burned, used for chopping wood.

Context unknown, Elp, Drenthe, Vermaning Depot, date unknown, possibly SGC

1975-II-43, DMA, blade, 173 x 35mm: found in peat, northern flint, no traces.
1975-II-43, DMA, blade, 137 x 39mm: northern flint, no traces.

(Possible) hoards from other periods

Possible hoard, Linden, Noord-Brabant, Kraaienberg, MNA (MK)

k 1982-2.6.63 A, RMO, blade, 122 x 60mm: no traces.
k 1982-2.6.63 B, RMO, blade, 146 x 53mm: no traces.
k 1982-2.6.63 C, RMO, blade, 122 x 50mm: no traces.

Scandinavian daggers

Possible hoard, Buinen, Drenthe, EBA

1920-III-1, DMA, dagger, Bloemers type 3, 161 x 26mm: no traces of use, plant polish from sheath, hafted, found in peat.

Possible hoard, Exloo, Drenthe, BA

1897-VII-1 (S-52), DMA, dagger, Bloemers type *Feuerslag* A, 112 x 37mm: no traces of use except polish from contact with sheath, hafted, secondarily retouched.

Possible hoard, Emmercompascuum, Drenthe, LN/BA

1918-VI-1, DMA, dagger, Bloemers type 2, 205 x 53mm: no traces of use, polish from sheath, hafted.

Possible hoard, Stieltjeskanaal, Drenthe, LN/BA

1935-X-5, DMA, dagger, Bloemers type 1, 204 x 44mm: grey Helgoland flint, ground on ventral and dorsal aspect, no traces of use, polish from sheath, hafted, secondarily retouched.

Possible hoard, Stieltjeskanaal, Drenthe, LN/BA

1932-IV-1, DMA, dagger, Bloemers type 3, 133 x 23mm: no traces of use, polish from sheath, hafted, re-sharpened in very skilful manner.

Possible hoard, Emmercompascuum, Drenthe, LN/BA

1924-VI-3, DMA, dagger, Bloemers type 3, 141 x 25mm: no traces of use, polish from sheath, hafted.

Surface find, Spier, Drenthe, EBA

1949-VI-1, DMA, dagger, Bloemers type 3, 187 x 29mm: no traces of use, polish from sheath, hafted.

Surface find, Drouwen, Drenthe, EBA

1960-II-1, DMA, dagger, Bloemers type 6, 129 x 27mm: no traces of use, polish from sheath, hafted, ochre.

Surface find, Meppen, Drenthe, EBA

1983-XII-6 (S-54), DMA, dagger, Bloemers type 3, 176 x 31mm: no traces of use, polish from sheath, hafted.

Surface find, Assen, Zwartwaterschenweg, Drenthe, LN/BA

1914-VI-3, DMA, dagger, Bloemers type 3, 137 x 53mm: no traces of use, plant polish from sheath, hafted.

Surface find, Erica, Drenthe, LN/BA

1936-I-7, DMA, dagger, Bloemers type 1, 156 x 40mm: no traces of use, polish from sheath, hafted.

Surface find, Wijster, Drenthe, LN/BA

1979-IX-2, DMA, dagger, Bloemers type 6, 137 x 23mm: no traces of use, polish from sheath, hafted, possibly first wrapped in hide.

Surface find, Exloo, Drenthe, LN/BA

1962-II-153, DMA, dagger, Bloemers type 6, 224 x 36mm: incidental spots of SGC-type of polishing, no traces of use, polish from sheath, hafted.

Surface find, Gammelke, Overijssel, LN

366, Overijssel provincial depot, dagger, Bloemers type 3, 12 x 43mm: SGC-type of polishing, no traces of use, polish from sheath, it is not possible to determine whether it was hafted due to the presence of glue.

Context unknown, Nolde, Drenthe, LNB (BB)

1926-XI-1 (S-52), DMA, dagger, Bloemers type 1, 201 x 51mm: not interpretable.

Context unknown, Grolloo, Drenthe, LN/BA

1867-I-2, DMA, dagger, Bloemers type 6, 152 x 35mm: no traces of use, plant polish from sheath, hafted.

Crescent-shaped sickles

Multiple object hoard, Norg, Drenthe, Depot of Norg, LBA/EIA

c 1914-5,19, RMO, sickle, Beuker type A, 142 x 33mm: cortex on tip, no traces.
c 1914-5.20, RMO, sickle, Beuker type A, 144 x 31mm: cortex on butt end, no traces but worn ridges possibly due to transport.
c 1914-V-19, IA, c 1914-V-18, RMO, sickle, Beuker type A, 126 x 28mm: cortex on butt end, used for cutting turves, re-sharpened.

Multiple object hoard, Heiloo, Noord-Holland, Depot of Heiloo, BA

g 1947-XII-13, RMO, sickle, Beuker type B, 146 x 39mm: used on siliceous plants, possibly hafted.
g 1947-XII-11, RMO, sickle, Beuker type B, 162 x 41mm: used for cutting turves, handheld, clumsily re-sharpened.
g 1947-XII-12, RMO, sickle, Beuker type B, 147 x 41mm: no traces of use.
g 1947-XII-10, RMO, sickle, Beuker type B, 164 x 45mm: used for cutting turves, handheld.

Multiple object hoard, Rolde/Nijlande, Drenthe, Depot of Rolde/Nijlande, LBA/EIA

1914-III-1, DMA, sickle, Beuker type A, 135 x 35mm: used for cutting turves.
1914-III-1a, DMA, sickle, Beuker type A, 128 x 40mm: no traces.
1914-III-1b, DMA, sickle, Beuker type A, 141 x 33mm: no traces.
1914-III-1c, DMA, sickle, Beuker type A, 145 x 36mm: no traces (1a-c are all made from the same flint core, all three have cortex on proximal and distal end).

Multiple object hoard, Bourtange, Groningen, Depot of Bourtange, LBA/EIA

1913-VI-54, GM, sickle, Beuker type B, 147 x 42mm: cortex on butt end, no traces.
1913-VI-54a, GM, sickle, Beuker type A, 126 x 41mm: cutting turves, intensive re-sharpening and secondary modification.
1913-VI-54b, GM, sickle, Beuker type A, 129 x 48mm: cortex on butt end, used for cutting turves, re-sharpened.
1913-VI-54c, GM, sickle, Beuker type A, 148 x 41mm: cortex on butt end, used for cutting turves, handheld, re-sharpened.

Excavation find, Drouwen, Drenthe, LBA/EIA

1939-XII-32, DMA, sickle, Beuker type A, 137 x 38mm: used for cutting turves, used on both ends.

Excavation find, Lent, Gelderland, LBA/EIA

Nr.168, sickle, Beuker type A, 62 x 33mm: fragment of sickle, used for cutting turves, secondarily retouched and used for cutting a medium-hard material.

Surface find, Weerdinge, Drenthe, LBA/EIA

1959-XI-6, DMA, sickle, Beuker type B, 165 x 37mm: used for cutting turves, handheld.

Surface find, Annen, Drenthe, LBA/EIA

1993-IV-9, DMA, sickle, Beuker type A, 139 x 40mm: used for cutting turves, handheld, cortex on butt end.
Context unknown, Odoorn, Drenthe, LBA/EIA
Private collection Koudenberg nr. 20, sickle, Beuker type B, 152 x 40mm: cortex on butt end, briefly used for cutting siliceous plants.
Private collection Koudenberg nr. 21, sickle, Beuker type B, 81 x 45mm: cortex on surface, no traces.
Private collection Koudenberg nr. 22, sickle, Beuker type B, 150 x 41mm: cortex on platform, no traces.

Surface find, Enkhuizen, Noord-Holland, LBA/EIA,

N 1958/Enk. V19, WFM, sickle, Beuker type A, 130 x 35mm: one end broken off, used for cutting turves.

Surface find, Andijk, Noord-Holland, LBA/EIA,

N 1955 AND V8, WFM, sickle, Beuker type A, 176 x 37mm: cortex on platform, used for cutting turves, handheld.

Context unknown, Andijk, Noord-Holland, LBA/EIA

N 1955 AND V9, WFM, sickle, Beuker type A, 173 x 39mm: cortex on platform, same flint as N 1955 AND V8, used for cutting turves, handheld.

Context unknown, Bovenkarspel, Noord-Holland, LBA/EIA

N1959/Bov.V22, WFM, sickle, Beuker type A, 153 x 42mm: cortex on platform, black patina, used for cutting turves, handheld, very clumsily re-sharpened.

Context unknown, Bovenkarspel, Noord-Holland, LBA/EIA

1963-X-a, WFM, sickle, Beuker type A, 152 x 38mm: some cortex, used for cutting turves, handheld.

Context unknown, Grootebroek, Noord-Holland, LBA/EIA

1949-4-IX GR V7, WFM, sickle, Beuker type A, 127 x 31mm: cortex on platform, very briefly used for cutting turves, handheld.

Context unknown, Hoogkarspel, Noord-Holland, LBA/EIA

n 1968-III-a, WFM, sickle, Beuker type A, 170 x 41mm: cortex on platform, used for cutting turves, handheld, re-sharpened.

Context unknown, Venhuizen, Noord-Holland, LBA/EIA

VEN V17, WFM, sickle, Beuker type A, 158 x 40mm: cortex on platform, used for cutting turves, re-sharpened and subsequently used for cutting plant material.

Context unknown, Zwaagdijk Oost, Noord-Holland, LBA/EIA

n 1969-XI-n, WFM, sickle, Beuker type A, 153 x 31mm: no cortex, used for cutting turves, handheld, not re-sharpened much.
n 1969-IX-v, WFM, sickle, Beuker type A, 162 x 37mm: no cortex, used for cutting turves, handheld.
n 1969-XI-o, WFM, sickle, Beuker type A, 145 x 31mm: no cortex, used for cutting turves, handheld, clumsily re-sharpened.

Context unknown, Oss, Noord-Brabant, LBA/EIA

Private ownership, sickle fragment, Beuker type A, 39 x 28mm: used for cutting turves, totally modified into a scraper-like tool, secondary use not interpretable due to post-depositional surface modifications.

Context unknown, Grootebroek, Noord-Holland, LBA/EIA

XIII-9, RCE, sickle fragment, Beuker type A, 58 x 33mm: broken sickle, not secondarily modified, used for cutting turves.

Context unknown, LBA/EIA

1905-VI-250, DMA, sickle, Beuker type B, 170 x 38mm: used for cutting turves, handheld.

BURIALS

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 3, EN (LBK)

l 1980-1.752 C, RMO, blade, 95 x 22mm: 'polish 23', used two-sided.
l 1980-1.752 P1, RMO, arrowhead, LBK type, 23 x 15mm: no traces of use, hafted.
l 1980-1.752 P2, RMO, arrowhead, LBK type, 25 x 18mm: no traces of use, abraded barbs, hafted.
l 1980-1.752 P3, RMO, arrowhead, LBK type, 25 x 19mm: no traces of use, abraded barbs, hafted.
l 1980-1.752 P4, RMO, arrowhead, LBK type, 45 x 20mm: not interpretable.
l 1980-1.752 P5, RMO, arrowhead, LBK type, 28 x 18mm: no traces of use, abraded barbs, hafted.
l 1980-1.752 P6, RMO, arrowhead, LBK type, 32 x 22mm: no traces of use, abraded barbs, hafted.

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 5, EN (LBK)

l 1980-1.781 D, RMO, arrowhead, LBK type, 28 x 15mm: traces from impact, some abrasion, no traces of hafting.
l 1980-1.781 E, RMO, arrowhead, LBK type, 26 x 15mm: no traces of use, abraded barbs, possibly hafted.
l 1980-1.781 P1, RMO, arrowhead, LBK type, 34 x 28mm: possible impact scar, abraded barbs, no traces of hafting.
l 1980-1.781 P2, RMO, arrowhead, LBK type, 18 x 30mm: not interpretable.
l 1980-1.781 P4, RMO, arrowhead, LBK type, 28 x 15mm: possible impact traces, slightly abraded barbs, no traces of hafting.

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 55, EN (LBK)

l 1980-1.813 A, RMO, arrowhead, LBK type, 41 x 24mm: no traces of use, abraded, possibly hafted.
l 1980-1.813 B, RMO, arrowhead, LBK type, 22 x 29mm: no traces.
l 1980-1.813 C, RMO, arrowhead, LBK type, 28 x 21mm: no traces.

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 25, EN (LBK)

l 1980-1.834 P1, RMO, arrowhead, LBK type, 28 x 18mm: possible impact scar, hafted, abraded barbs.
l 1980-1.834 P2, RMO, arrowhead, LBK type, 16 x 11mm: no traces.

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 112, EN (LBK)

l 1980-1.509, RMO, arrowhead, LBK type, 27 x 19mm: no traces of use, abraded barbs, hafted.

Flatgrave, Elsloo, Limburg, Cemetery Elsloo grave 21, EN (LBK)

l 1980-1.714 B, RMO, arrowhead, LBK type, 17 x 15mm: impact traces, hafted.
l 1980-1.714 C, RMO, arrowhead, LBK type, 20 x 15mm: impact traces, hafted.

Grave, megalith, Stein, Limburg, Burial vault of Stein, MNB

l 1980-9. RMO, axe, oval cross-section, 141 x 70mm: used, possibly on wood, no traces of hafting, re-sharpened.

l 1980-9. RMO, arrowhead, transverse, 24 x 18mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 23 x 21mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 24 x 20mm: impact traces, hafted.
l 1980-9. RMO, arrowhead, transverse, 23 x 19mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 22 x 15mm: lightly burned, no traces of impact, possibly hafted.
l 1980-9. RMO, arrowhead, transverse, 25 x 17mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 23 x 17mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 21 x 21mm: lightly burned, impact traces, possibly hafted.
l 1980-9. RMO, arrowhead, transverse, 28 x 22mm: burned, not interpretable.
l 1980-9. RMO, arrowhead, transverse, 28 x 16mm: burned, possible impact scar, possibly hafted.
l 1980-9. RMO, arrowhead, transverse, 22 x 20mm: burned, impact scar, hafted.
l 1980-9. RMO, arrowhead, transverse, 22 x 19mm: lightly burned, impact scar, no traces of hafting.

Grave, megalith, Zeijen, Drenthe, Tomb D5, MNB (TRB)

1857-I-2, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, Old type, 177 x 77mm: traces from contact with wood, hafted, re-sharpened but not extensively so.

Grave, megalith, Drouwen, Drenthe, Tomb D19, MNB (TRB)

Total number of flint implements 269, 40 of which were examined for traces of use. Pieces examined included three transverse arrowheads displaying cross-hatched scratching, five regular long blades (one of which an axe fragment and all hafted) used for cereal harvesting, one pick without traces, two double-sided strike-a-lights (both displaying traces of ochre), a hide scraper re-used as strike-a-light, one retouchoir, 14 flakes without traces (12 of which displaying cross-hatched scratching) and 13 axes (see below) (see Van Woerdekom in prep.).
c 1912-12.1, RMO, axe, rectangular cross-section, thin-bladed, 103 x 44mm: used on wood, hafted, re-sharpened.
c 1912-12.2, RMO, stone axe, rectangular cross-section, 92 x 56mm: not interpretable.
c 1912-12.4, RMO, axe, rectangular cross-section, thick-bladed, thick-butted, 98 x 55mm: possibly used on wood, hafted, re-sharpened.
c 1912-12.5, RMO, stone axe, rectangular cross-section, 111 x 60mm: lydite, not interpretable.
c 1912-12.6, RMO, axe, rectangular cross-section, thin-bladed, 99 x 40mm: edge damage from use, re-sharpened.
c 1912-12.7, RMO, axe, oval cross-section, broad butted, 99 x 52mm: light-grey Belgian flint, used on wood, hafted, re-sharpened.
c 1912-12.8, RMO, axe, rectangular cross-section, 80 x 56mm: heavily used on wood, hafted, re-sharpened, indications that implement was still hafted upon deposition.
c 1912-12.9, RMO, axe, rectangular cross-section, thin-bladed, 77 x 38mm: heavily used on wood, hafted, re-sharpened.
c 1912-12.10, RMO, axe, rectangular cross-section, thin-bladed, 82 x 38mm: heavily used on wood, hafted, several polishing facets from re-sharpening.
c 1912-12.11, RMO, axe, rectangular cross-section, thin-bladed, 85 x 44mm: used on wood, hafted, re-sharpened in several directions.
c 1912-12.12, RMO, axe, rectangular cross-section, thin-bladed, 102 x 46mm: heavily used edge, possibly used on wood, hafted, re-sharpened, some indications of 'SGC-type' of polishing.
c 1912-12.13, RMO, axe, rectangular cross-section, thin-bladed, 74 x 40mm: used on wood, re-sharpened.
c 1912-12.14, RMO, axe, rectangular cross-section, thin-bladed, 58 x 33mm: used on wood, heavily used, hafted, re-sharpened.

Grave, megalith, Drouwen, Drenthe, Tomb D26, MNB (TRB)

Total number of flint implements 992, 12 of which were examined for traces of use. This included seven transverse arrowheads (none of which displayed impact traces), one axe flake with ochre, one retouched flake with ochre and three axes (see below) (see Van Woerdekom in prep.).
1918-VIII-700/d 2004-IV-170, Northern depot Nuis, axe, rectangular cross-section, *Flachbeil,* 60 x 40mm: used axe, hafted, re-sharpened.
d 2004-IV-170, Northern depot Nuis, axe, rectangular cross-section, *Flachbeil*, 66 x 40mm: used on wood, hafted, re-sharpened.
d 2004-IV-169, Northern depot Nuis, axe, rectangular cross-section, *Flachbeil*, 97 x 49mm: probably used.

Grave, megalith, Glimmen, Groningen, Tomb G2, MNB (TRB)

Total number of flint implements 896, 67 of which were examined for traces of use. This included 26 transverse arrowheads, 25 of which displaying cross-hatched scratching, one pick without traces, four scrapers, one with hide working traces, one sickle blade used for cereal harvesting, 12 strike-a-lights (5 two-sided, two on axe flake), 19 flakes without any traces 13 of which displayed cross-hatched scratching, and four axes (see below) (see Van Woerdekom in prep.).
1969-X- GM, axe, rectangular cross-section, *Flachbeil*, 45 x 27mm: possibly used as strike-a-light.
1969-X-4, GM, axe, rectangular cross-section, *Flachbeil*, 111 x 62mm: traces from working wood, hafted, re-sharpened.
1969-X-4, GM, axe, rectangular cross-section, *Flachbeil*, 59 x 33mm: traces from working wood, hafted, re-sharpened.
1969-X-28, GM, axe, rectangular cross-section, *Flachbeil,* 101 x 50mm: possibly re-worked fragment of a much larger axe, heavily used, traces from working wood, re-sharpened.

Grave, megalith, Glimmen, Groningen, Tomb G3, MNB (TRB)

Total number of flint implements 58, 14 of which were examined for traces of use. Pieces examined included five transverse arrowheads four of which with cross-hatched scratches, one retouchoir, one scraper with possible wood working traces, six flakes three of which with cross-hatched scratching and one axe (see below) (see Van Woerdekom in prep.).
1971-IV-19, GM, axe, rectangular cross-section, *Flachbeil,* 100 x 43mm: traces from working wood, hafted, re-sharpened.

Grave, megalith, Mander, Overijssel, Tomb O2, MNB (TRB)

Total number of flint implements examined for traces of use is 102.Pieces examined included 45 transverse points, nine sickle blades used for harvesting cereals (one of which on an axe flake), six strike-a-lights (one of which two-sided), 18 picks without traces of use, two scrapers, eight axe flakes and 14 flakes (see Van Woerdekom in prep.).

Grave, flatgrave, Mander, Overijssel, MNB (TRB)

Total number of flint implements examined for traces of use is six: three axe fragments of the same axe, none of which displayed traces of use, two transverse arrowheads without traces of use (one on an axe fragment and displaying cross-hatched scratches) and a complete axe without traces of use.

Grave, cist, Diever, Drenthe, Steenkist Diever, MNB (TRB)

1929-IV-6, DMA, arrowhead, transverse, 15 x 21mm: not interpretable.
1929-VIII-8, DMA, axe, rectangular cross-section, *Flachbeil*, 95 x 60mm: no traces of use, re-sharpened.
1929-VIII-10, DMA, flake, 30 x 45mm: cross-hatched scratches, no traces of use.

1949-VIII-14, DMA, axe, rectangular cross-section, *Flachbeil,* 38 x 34mm: used as wedge on wood.
1929-VIII-26b, DMA, blade, 45 x 20mm: used as sickle blade, cross-hatched scratches, no traces of use.
1929-VIII-30, DMA, axe, rectangular cross-section, *Flachbeil,* 60 x 43mm: used on wood, hafted, re-sharpened.

Grave, barrow, Eext, Drenthe, Huttenheuvel, LNA (SGC)

1928-IV-2, DMA, blade, 123 x 18mm: no traces.
1928-IV-3, DMA, axe, rectangular cross-section, *Flachbeil,* 103 x 47mm: SGC-type of polishing, used transversely on unknown material, hafted in wood.

Grave, barrow, Eext, Drenthe, Mound B Schaapsdijkweg, LNA (SGC)

1923-I-1a, DMA, dagger, Grand-Pressigny type, 209 x 40mm: plant polish from sheath, hafted,.

Grave, barrow, Lieveren, Drenthe, grave van Lieveren, LNA (SGC)

1930-IV-1, DMA, blade, 138 x 30mm: no traces.
1930-IV-2, DMA, blade, 118 x 20mm: not interpretable.

Grave, barrow, Eext, Drenthe, Visplaats, LNA (SGC)

1936-VIII-1c, DMA, axe, rectangular cross-section, *Flachbei*l, 85 x 41mm: no traces, re-sharpened.
1936-VIII-1d, DMA, dagger, Grand-Pressigny type, 219 x 34mm: polish from sheath, hafted, possibly secondarily hafted again on the other end.

Grave, barrow, Odoorn, Drenthe, Eppiesbergje, LNA (SGC)

1937-V-18, DMA, blade, 100 x 20mm: possibly used.

Grave, barrow, Eext, Drenthe, Mound I, LNA (SGC)

1940-IX-1 (S-53/Q-67/expo), DMA, retouched blade, 157 x 26mm: not interpretable but probably no traces.
1940-IX-1a, DMA, blade, 96 x 28mm: not interpretable but probably no traces.

Grave, barrow, Eext, Drenthe, Mound III Galgwandenveen, LNA (SGC)

1970-XII-26, DMA, dagger, Grand-Pressigny type, 238 x 37mm: finely retouched prior to polishing, polish from sheath, possibly hafted.
1970-XII-29, DMA, axe, rectangular cross-section, *Flachbeil*, 68 x 38mm: used on unknown material, re-sharpened.

Grave, barrow, Borger, Drenthe, Mound I, LNA (SGC)

1984-XI-4a, DMA, axe, rectangular cross-section, thin-bladed, 96 x 44mm: used, hafted, re-sharpened, ochre.
1984-XI-4b, DMA, axe, rectangular cross-section, thick-bladed, thick-butted, Valby type, 166 x 61mm: SGC-type of polishing, used on wood, hafted, re-sharpened.
1984-XI-4c, DMA, blade, 119 x 26mm: polish from hide on both edges (from sheath?), possibly hafted.
1984-XI-4c, DMA, arrowhead, 34 x 16mm: no traces.
1984-XI-4e A, DMA, arrowhead, transverse, 27 x 15mm: possibly used, possibly hafted.
1984-XI-4e B, DMA, arrowhead, 41 x 20mm: possibly used.
1984-XI-4e C, DMA, arrowhead, transverse, 31 x 15mm: made on polished axe fragment, impact scars and MLITS, possibly hafted.
1984-XI-4e D, DMA, arrowhead, transverse, 24 x 13mm: impact scars and MLITS, hafted.
1984-XI-4e E, DMA, arrowhead, 35 x 16mm: impact scars and MLITS, hafted.
1984-XI-4e F, DMA, arrowhead, transverse, 21 x 13mm: no traces.
1984-XI-4e G, DMA, arrowhead, transverse, 25 x 15mm: not interpretable.

Grave, barrow, Borger, Drenthe, Mound VI Molenplaatsweg, LNA (SGC)

1985-XII-6b, DMA, blade, 107 x 21mm: hide polish and heavy rounding on both edges (from sheath?), heavily scratched, possibly hafted.
1985-XII-6c, DMA, blade, 93 x 27mm: northern flint, no traces of use, heavily scratched, covered abundantly in ochre.

Grave, barrow, Emst, Gelderland, Hanendorp mound 2, LNA (SGC)

e 1911-8.5, RMO, dagger, Grand-Pressigny type, 211 x 40mm: finely retouched prior to polishing, polish from sheath, hafted.

Grave, barrow, Vaassen, Gelderland, Mound of Vaassen, LNA (SGC)

e 1945-8.1, RMO, axe, rectangular cross-section, thick-bladed, thick-butted, Lindø type, 270 x 88mm: no traces of use, no traces of hafting,

Grave, barrow, Renkum, Gelderland, LNA (SGC)

e 1936-1.59, RMO, axe, rectangular cross-section, *Flachbeil*, 109 x 50mm: heavily used, hafted, re-sharpened.
e 1936-1.60, RMO, retouched blade, 108 x 32mm: northern import flint, no traces of use, possibly traces of transport.

Flatgrave, Angelsloo, Drenthe, LNA (SGC)

1965-VII-117, DMA, blade, 58 x 19mm: no traces.
1965-VII-324, DMA, blade, 54 x 13mm: probably no traces of use, hafted.

Flatgrave, Hijken, Drenthe, LNA (SGC)

1970-X-81a, DMA, axe, rectangular cross-section, *Flachbeil*, 87 x 36mm: northern flint, SGC-type of polishing, used, hafted, re-sharpened.
1970-X-81c, DMA, axe, rectangular cross-section, thick-bladed, thin-butted, 160 x 52mm: northern flint, SGC-type of polishing, heavily used, hafted, re-sharpened.
1970-X-81e, DMA, blade, 109 x 16mm: struck from a polished axe of northern flint, no traces.

Flatgrave, Ede, Gelderland, LNA (SGC)

slijp-1-v3, retouched blade, 105 x 29mm: hide polish on both ribs and edges, probably from a sheath.
slijp-1-v8, axe, rectangular cross-section, *Flachbeil,* 75 x 39mm: used on wood, hafted.

Grave, barrow, Garderen, Gelderland, Solscheberg mound 4, LNA (AOO)

e 1932-I-3, RMO, dagger, Grand-Pressigny type, 201 x 36mm: not polished, plant/hide polish from sheath, hafted.

Grave, type unknown, Zuidlaren, Drenthe, LNA (AOO)

1939-IV-10, DMA, dagger, Romigny-Lhéry type, 175 x 30mm: polish from sheath, hafted.

Grave, barrow, Lunteren, Gelderland, LNB (BB)

e 1958-6.7, RMO, axe, rectangular cross-section, *Flachbeil*, 75 x 36mm: local flint, used for chopping wood, possibly hafted, re-sharpened.
e 1958-6.10, RMO, arrowhead, triangular, tanged and barbed, 29 x 16mm: no traces.
e 1958-6.12, RMO, arrowhead, triangular, tanged and barbed, 29 x 23mm: not interpretable.
e 1958-6.13, RMO, arrowhead, triangular, tanged and barbed, 31 x 16mm: repaired/recycled piece, no traces.
e 1958-6.14, RMO, arrowhead, triangular, tanged and barbed, 20 x 16mm: no traces.

Grave, flatgrave (or barrow?), Buinen, Drenthe, LNB (BB)

1971-V-66 A, DMA, arrowhead, triangular, tanged and barbed, 28 x 22mm: seems freshly made, no traces of use, ground barbs.
1971-V-66 B, DMA, arrowhead, triangular, tanged and barbed, 22 x 18mm: seems freshly made, no traces of use, ground barbs.
1971-V-66 C, DMA, arrowhead, triangular, tanged and barbed, 22 x 20mm: seems freshly made, no impact traces.
1971-V-66 D, DMA, arrowhead, triangular, tanged and barbed, 27 x 20mm: seems freshly made, no traces of use.
1971-V-66 E, DMA, arrowhead, triangular, tanged and barbed, 20 x 18mm: seems freshly made, no traces of use.

Grave, flatgrave, Angelsloo, Drenthe, LNB (BB)

1964-IX-5b a, DMA, arrowhead, triangular, tanged and barbed, 27 x 27mm: burned, no traces of use.
1964-IX-5b b, DMA, arrowhead, triangular, tanged and barbed, 24 x 25mm: burned, no traces of use.
1964-IX-5b c, DMA, arrowhead, triangular, tanged and barbed, 22 x 23mm: burned, not interpretable.
1964-IX-5b d, DMA, arrowhead, triangular, tanged and barbed, 27 x 25mm: burned, no traces of use.
1964-IX-5b e, DMA, arrowhead, triangular, tanged and barbed, 20 x 24mm: burned, not interpretable.
1964-IX-5b f, DMA, arrowhead, triangular, tanged and barbed, 21 x 24mm: burned, not interpretable.
1964-IX-5b g, DMA, arrowhead, triangular, tanged and barbed, 24 x 14mm: burned, not interpretable.
1964-IX-5b h, DMA, arrowhead, triangular, tanged and barbed, 23 x 20mm: burned, no traces of use.
1964-IX-5b i, DMA, arrowhead, triangular, tanged and barbed, 28 x 24mm: burned, no traces of use.
1964-IX-5b j, DMA, arrowhead, triangular, tanged and barbed, 29 x 28mm: burned, no traces of use.
1964-IX-5b k, DMA, arrowhead, triangular, tanged and barbed, 27 x 28mm: burned, no traces of use.
1964-IX-5b l, DMA, arrowhead, triangular, tanged and barbed, 22 x 16mm: burned, no traces of use.
1964-IX-5b m, DMA, arrowhead, triangular, tanged and barbed, 25 x 24mm: burned, not interpretable.

Grave, barrow, Buinen, Drenthe, grave van Buinen, LNA

1927-IX-11 (S-53, expo), DMA, dagger, Romigny-Léhry type, 252 x 45mm: plant/hide polish from sheath, possibly hafted.

Grave, barrow, Emmen, Drenthe, Emmen mound 3, LN

c 1932-1.2, RMO, dagger, Grand-Pressigny type, 189 x 33mm: plant/hide polish from sheath, possibly hafted.

Surface find, possible grave, Beilen, Drenthe, LNA (SGC)

1937-XI-8, DMA, blade, 94 x 13mm: no traces
1937-XI-7, DMA, axe, rectangular cross-section, *Flachbeil*, 87 x 36mm: used on wood, possibly hafted.

Surface find, possible grave (found close to a barrow after ploughing), Anloo, Drenthe, LNA (AOO)

1991-I-1, DMA, dagger, Romigny-Lhéry type, 145 x 38mm: broken in haft, polish from sheath, hafted.

Grave, type unknown, Weerdinge, Drenthe, LN

1920-VI-1, DMA, retouched blade, 108 x 31mm: red Helgoland flint, used to rub unknown substance.

Grave, barrow, Eext, Drenthe, Visplaats mound 1, EBA

1937-V-5, DMA, dagger, Bloemers type 2, 205 x 35mm: vague polish from sheath, hafted, re-sharpened, as secondary burial in older SGC mound.

Grave, barrow, Eext, Tumulus 1940, Drenthe, MBA

1928-VII-7, DMA, arrowhead, Sögel type, 28 x 11mm: no traces of use, ground barbs.
1928-VII-7a, DMA, arrowhead, Sögel type, 31 x 15mm: no traces of use, ground barbs.
1928-VII-7b, DMA, arrowhead, Sögel type, 32 x 13mm: impact traces, ground barbs.

Grave, barrow, Drouwen, Drenthe, grave of Drouwen, MBA

1927-VIII-40d, DMA, strike-a-light, 85 x 23mm: used for fire-making, hafted (scavenged TRB pick?).
1927-VIII-40g (a), DMA, arrowhead, Sögel type, 45 x 15mm: impact traces, possibly hafted, ground barbs.
1927-VIII-40g (b), DMA, arrowhead, Sögel type, 40 x 13mm: no traces of use, hafted, ground barbs.
1927-VIII-40g (c), DMA, arrowhead, Sögel type, 36 x 13mm: no traces of use, hafted, ground barbs.
1927-VIII-40g (d), DMA, arrowhead, Sögel type, 32 x 13mm: no traces of use, ground barbs.
1927-VIII-40g (e), DMA, arrowhead, Sögel type, 34 x 14mm: no traces of use, ground barbs.
1927-VIII-40g (f), DMA, arrowhead, Sögel type, 35 x 14mm: impact traces, possibly hafted, ground barbs.
1927-VIII-40g (g), DMA, arrowhead, Sögel type, 42 x 15mm: impact traces, possibly hafted, ground barbs.
1927-VIII-40g (h), DMA, arrowhead, Sögel type, 37 x 14mm: no traces of use, hafted, ground barbs.
1927-VIII-40g (i), DMA, arrowhead, Sögel type, 40 x 14mm: no traces of use, hafted, ground barbs.

Grave, barrow, Hooghalen, Drenthe, Mound IX Hooghalen/Hijken, MBA

1953-VII-39b, DMA, retouched flake, 66 x 27mm: iron concretions, possibly a strike-a-light, found with 9 metal arrowheads.

Grave, barrow, Balloo, Drenthe, Mound IV Balloërveld, MBA

1933-III-5d, DMA, strike-a-light, 100 x 27mm: used for fire making on both ends, bifacially re-touched dagger-like tool probably secondarily used as strike-a-light.
1933-III-5 I, DMA, arrowhead, Sögel type, 37 x 15mm: burned, not interpretable.
1933-III-5d, DMA, arrowhead, Sögel type, 27 x 14mm: burned, not interpretable.
1933-III-5o, DMA, arrowhead, Sögel type, 28 x 15mm: burned, not interpretable.

FINDS WITHOUT CONTEXT

Surface find, Monster, Zuid-Holland, LNB (BB)

Private ownership, Bell Beaker knife, Grand-Pressigny flint, 44 x 20mm: used as a strike-a-light.

Surface find, Westerbork, Drenthe, LNA

1870-VI-5, DMA, dagger, Romigny-Lhéry type, 190 x 36mm: no traces of use, plant polish from sheath

Surface find, Benneveld, Drenthe, LN/BA

1988-VIII-5, DMA, retouched blade, 77 x 19mm: red Helgoland flint, made on polished axe fragment, heavily rounded, function unclear.

Context unknown, Weerdinge, Drenthe, NEO

1962-II-10, DMA, axe, rectangular cross-section, *Flachbeil,* 63 x 41mm: red Helgoland flint, no traces, re-sharpened.

Context unknown, Weerdinge, Drenthe, LN/BA

1962-II-34, DMA, dagger, 74 x 22mm: red Helgoland flint, not interpretable.

Context unknown, Hooghalen, Drenthe, LN/BA

1881-VII-9, DMA, dagger, 43 x 22mm: not interpretable.

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Acknowledgements of the sources of illustrations

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Annelou van Gijn is professor of Material Culture and Artefact Studies at the Universities of Leiden and Groningen. She is particularly interested in the cultural biography of artefacts, especially of stone and bone tools, as well as ornaments, and uses microscopy to study traces of manufacture and use. She is the author of books and numerous articles on the Neolithic of the Netherlands, lithic studies and microwear analysis.

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