



**Universiteit
Leiden**
The Netherlands

Analecta Praehistorica Leidensia 37/38 / Schipluiden : a neolithic settlement on the Dutch North Sea coast c. 3500 CAL BC

Kooijmans, L.P.L.; Jongste, P.; et al., ; Jongste, P.F.B.; Kooijmans, L.P.L.

Citation

Kooijmans, L. P. L., Jongste, P., & Et al.,. (2006). Analecta Praehistorica Leidensia 37/38 / Schipluiden : a neolithic settlement on the Dutch North Sea coast c. 3500 CAL BC, 516.
Retrieved from <https://hdl.handle.net/1887/33080>

Version: Not Applicable (or Unknown)
License: [Leiden University Non-exclusive license](#)
Downloaded from: <https://hdl.handle.net/1887/33080>

Note: To cite this publication please use the final published version (if applicable).

ANALECTA PRAEHISTORICA LEIDENSIA 37/38

PUBLICATION OF THE FACULTY OF ARCHAEOLOGY
LEIDEN UNIVERSITY

SCHIJPLUIDEN

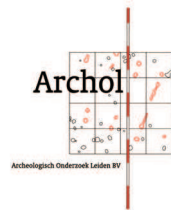
A NEOLITHIC SETTLEMENT ON THE DUTCH
NORTH SEA COAST *c.* 3500 CAL BC

EDITED BY LEENDERT P. LOUWE KOOIJMANS
AND PETER F.B. JONGSTE



LEIDEN UNIVERSITY 2006

The publication of this volume was made possible by financial and organisational support from:



Translation by Susan Mellor

Series editors: Corrie Bakels / Hans Kamermans

Copy editors of this volume: Leendert Louwe Kooijmans / Peter Jongste

Editors of illustrations: Walter Laan and Alastair Allen, Archol BV

Copyright 2006 by the Faculty of Archaeology, Leiden

ISSN 0169-7447

ISBN-10: 90-73368-21-9

ISBN-13: 978-90-73368-21-7

Subscriptions to the series *Analecta Praehistorica Leidensia*
and single volumes can be ordered exclusively at:

Faculty of Archaeology
P.O. Box 9515
NL-2300 RA Leiden
the Netherlands

Contents

Preface IX

Leendert Louwe Kooijmans

PART I INTRODUCTION 1

1 Discovery and working method 3

Peter Jongste

Leendert Louwe Kooijmans

2 Stratigraphy and chronology of the site 19

Joanne Mol

Leendert Louwe Kooijmans

Tom Hamburg

3 Features 39

Tom Hamburg

Leendert Louwe Kooijmans

4 The archaeological remains: a critical spatial approach 67

Milco Wansleebe

Leendert Louwe Kooijmans

PART II MAN AND MATERIALS 89

5 Graves and human remains 91

Liesbeth Smits

Leendert Louwe Kooijmans

6 The Schipluiden pottery 113

Daan Raemaekers

Michiel Rooke

7 Flint, procurement and use 129

Annelou van Gijn

Veronique van Betuw

Annemieke Verbaas

Karsten Wentink

8 Stone, procurement and use 167

Annelou van Gijn

Rob Houkes

- 9 **Ornaments of jet, amber and bone** 195
 Annelou van Gijn
- 10 **Implements of bone and antler: a Mesolithic tradition continued** 207
 Annelou van Gijn
- 11 **Wooden artefacts** 225
 Leendert Louwe Kooijmans
 Laura Kooistra
- 12 **Fabrics of fibres and strips of bark** 253
 Laura Kooistra
- 13 **Birch bark tar** 261
 Annelou van Gijn
 Jaap Boon
- PART III ECOLOGY AND ECONOMY 267
- 14 **Coastal evolution of Delfland and the Schipluiden microregion in relation to Neolithic settlement** 269
 Joanne Mol
- 15 **Diatoms** 285
 Hein de Wolf
 Piet Cleveringa
- 16 **Molluscs** 297
 Wim Kuijper
- 17 **Coprolites, macroscopic analysis** 301
 Mark van Waijjen
 Caroline Vermeeren
- 18 **Pollen analysis and the reconstruction of the former vegetation** 305
 Corrie Bakels
- 19 **Botanical remains and plant food subsistence** 317
 Lucy Kubiak-Martens
- 20 **Roots, tubers and processed plant food in the local diet** 339
 Lucy Kubiak-Martens
- 20a **Analytical report on some archaeological charred residues from Schipluiden** 353
 Jaap Boon
- 21 **Wood and charcoal** 363
 Laura Kooistra
- 22 **Mammals** 375
 Jørn Zeiler

23	Birds	421
	<i>Jørn Zeiler</i>	
24	Background fauna: small mammals, amphibians and reptiles	443
	<i>Jørn Zeiler</i>	
25	Fish	449
	<i>Dick Brinkhuizen</i>	
26	Insects	471
	<i>Tom Hakbijl</i>	
PART IV SYNTHESIS		483
27	Schipluiden: a synthetic view	485
	<i>Leendert Louwe Kooijmans</i>	

Several dozen wooden artefacts and large quantities of woodworking waste had survived in the settlement's wet peripheral zone. In addition, more than a hundred fence stakes had been preserved in varying conditions. These remains provide a remarkable insight into the important role of wood as a raw material in the community, and the people's technical capacities. The patterns of selection of different wood species for different purposes in this coastal environment with its limited diversity of wood show that the people were closely tied to this area. They may well have lived at this site throughout the year.

11.1 INTRODUCTION

11.1.1 Find contexts

Besides natural wood, (parts of) artefacts and pieces of wood with evidence of woodworking were unexpectedly found to have survived in the aquatic deposits bordering the former foot of the dune, some in remarkably good condition. This means that these objects became waterlogged immediately after deposition, and that this zone was consequently very boggy.

By Dutch standards, the assemblage is very abundant and varied. The remains recovered at Schipluiden almost double the number of Neolithic wooden artefacts found in the Netherlands, and enhance the range of known artefacts with a large number of new, technically advanced, but functionally puzzling shapes. This is all the more surprising because this is not a site with extreme wetland conditions. One of the main reasons why so many wooden remains were recovered here is that such a long strip of almost 180 m of former wetland margin was exposed in the excavation. Another is that the settlement was so large that the deposition of wooden artefacts intentionally or unintentionally extended into the adjacent wetland. In absolute terms, considering the duration and size of the settlement and the importance of wood as a raw material, the assemblage incidentally represents only a very small, random sample of the original quantity of wooden artefacts.

In addition to the remains associated with the settlement on the dune, another cluster of around 25 stakes with an average diameter of 7.5 cm was found in trench 22, at a higher level, in Units 1 and 2. These stakes have been dated

to 'phase 4', a good 1000 years later than the settlement, 2300-2050 cal BC.

11.1.2 Research problem

We usually have only direct evidence telling us something about the role of wood in prehistoric societies: postholes indicative of house construction, arrowheads implying the use of bows and arrows, axe blades that of axes, and hearths that of firewood. That wood was an exceptionally important raw material is not under discussion, but we need the wood itself for further specification. Actual wooden remains provide insight into the range of artefacts employed, and that brings us directly to the problem of functional interpretation. It is often virtually impossible to identify synchronic or diachronic stylistic relations in this category of artefacts due to a lack of references. Wooden remains do however provide a good impression of the technical skills that could be achieved with a flint toolkit, and of technical craftsmanship in general. It is interesting to compare tools with use-wear traces with the tool marks observable on the surviving wood!

Another question concerns the purpose and necessity of working wood at the site. Important factors in this context are the selection of specific types of wood for specific purposes, and how this related to the availability of species in the site's immediate surroundings, and in the wider territory as a whole. Unexpected arguments pop up in the discussion of mobility and external contacts versus a stationary way of life of a community with strong ties with its occupation area.

11.2 Methods

All pieces of wood encountered in the trowelling of the find layers were in the field inspected for evidence of woodworking. In principle, everything that did not appear to be a branch covered with bark was collected and recorded. In addition, a random sample of unworked wood was collected for the reconstruction of the former vegetation (chapter 21). This means that no significance can be derived from the ratio of worked and unworked wood.

On conclusion of the fieldwork the two authors assessed and classified all the collected wood. The second author described all the objects according to the standard procedure

employed for this purpose in the Netherlands. This means that the remains were measured, the part of the tree employed (trunk, branch) was determined and the position of the artefact in it, tool marks were described and the shapes of the points of stakes were coded. Wood species were identified with the aid of a transmitted-light microscope with enlargements up to 400x and the identification keys formulated by Schweingruber (1982).

The first author made actual-size drawings of all the artefacts, characteristic pieces of woodworking waste and stakes with sharpened ends. Most of the artefacts were professionally photographed in wet condition – before conservation. A large selection of the artefacts and characteristic objects was conserved by Archeoplan in Delft.

11.3 Remains and context

11.3.1 *Remains, selection*

In total, around 700 pieces of wood were collected. It is not really possible to make a clear-cut distinction between ‘used’ and ‘natural’ wood. More than half of the collected pieces showed evidence of burning, chopping and/or carving and there was a small quantity of split wood. Considering the former landscape and the intensive use of the dune as a settlement site, a large proportion of the ‘natural wood’ may well have been imported by the occupants, for example for use as firewood. With due respect for such considerations, the following were interpreted as artefacts:

- deliberately shaped utilitarian objects
- all stakes of the fences
- pieces of wood showing more than incidental tool marks
- indisputable woodworking waste.

On the basis of these criteria 209 pieces of wood were ultimately classed as artefacts, 24 of which came from the concentration of stakes in Unit 1.

11.3.2 *Classification (table 11.1)*

The selected remains were classified as follows:

- 1 *Implements/tools*. This group comprises first of all a number of functionally readily identifiable artefacts of the kinds already known – if in varying designs – from other Mesolithic and Neolithic sites in the Netherlands: a bow, paddles, axe hafts. Then there is a general group of ‘sticks with carefully sharpened ends’, which are assumed to represent javelins or spears. The third group is a fairly large collection of puzzling ‘miscellaneous artefacts’ – unique objects, mostly shaped with great care, for which no parallels are known. Some would seem to have formed part of larger, composite artefacts, but for the time being they can at best only be functionally interpreted with reservation (section 11.4.1-2).
- 2 *Waste*. The second group comprises different forms of waste formed in woodworking. Besides chips and split

wood this group includes three remarkable ‘tangential rectangles’. A few branches showing evidence of cutting and/or chopping of varying intensity may also be regarded as woodworking waste or semi-finished products (section 11.4.3).

- 3 *Wattle*. The third group consists of osiers showing evidence of deformation suggesting that they formed part of wattlework (section 11.4.4).
- 4 *Post and stake ends*. A last and large group comprises all the posts and stakes found at the site. Most have sharpened ends and formed part of one of the fences that stood at the foot of the dune; a few were recovered from other contexts in other parts of the site. The fence posts did not all show clear evidence of woodworking – some may never have shown such evidence in the first place, in other cases the wood had decayed too much for any evidence to have survived (section 11.4.5).

implements/tools		
bows	1	
paddles	2	
(axe) hafts	8	
functionally not interpretable	10	
pointed sticks	11	
pole	1	
<i>subtotal</i>		33
worked objects		
chopped round wood, branches	12	
osier, wattle	9	
<i>subtotal</i>		21
waste pieces		
tangentially split-off rectangles	3	
chips	4	
split wood, tangential	9	
split wood, radial	3	
<i>subtotal</i>		19
pointed posts		
of fences	104	
other	8	
<i>total</i>		112
<i>Totals</i>		185
post cluster Unit 1		
	24	
<i>Totals</i>		209

Table 11.1 Wooden artefacts, classification.

11.3.3 Phasing (table 11.2)

The great majority of the remains can be dated to phase 2a. They come from Units 18/17 on the southeastern and northeastern sides of the dune, and from the fills of the wells on the northwestern side.

A few artefacts were recovered from the clay of Unit 19S; that means that they date from phase 1: the end of an axe haft and a small 'ball'. Some of the artefacts recovered from the well fills in the northwest could however also date from phase 1.

Only one artefact dates from phase 3: a small part of an axe haft (no. 7826, Unit 11, trench 13).

The differences in the chronological distribution of the remains according to the distinguished phases are largely attributable to differences in the intensity of occupation and the favourable embedding conditions in phase 2a.

11.3.4 Spatial distribution (fig. 11.1)

THE WOODEN ARTEFACTS FROM PHASE 2A SHOW A REMARKABLE SPATIAL PATTERN, WITH LARGE AREAS DEVOID OF REMAINS AND FOUR CLUSTERS COMPRISING 5-10 UNUSUAL ARTEFACTS AND WORKED PIECES OF WOOD. THESE CONCENTRATIONS ARE DEFINITELY NOT ATTRIBUTABLE TO ANY SELECTIVE ATTENTION TO WOOD DURING THE EXCAVATION, BUT REPRESENT A PRIMARY DEPOSITION PATTERN. FEW REMAINS CAME TO

light along the southeastern edge of the dune, but trenches 19-20 did reveal a cluster (Ø 8 m) of seven unusual artefacts. Besides some remains of wattlework, a few pieces of roundwood and woodworking waste in trenches 28-29, no wood was found in the northern part of the site. Pieces of split wood and roundwood were found all over the area of the wells in the northwest, with a remarkable cluster of artefacts in trenches 16-17 and a somewhat less conspicuous group in trenches 12-13.

If we assume that the same preservation conditions prevailed in phase 2a along the entire southeastern side of the dune and at the foot of the northwestern slope, it would seem that the deposition of wooden artefacts was in that phase restricted to a small number of areas, and hence probably also to specific moments within this occupation phase. The distribution of split wood and worked pieces of roundwood seems to suggest a similar, though slightly less distinct, pattern for the woodworking activities. Large quantities of waste were discarded along the entire southeastern edge, from trench 3 to trench 18, *i.e.* over a stretch of 80 m. A lot of unworked, natural wood was collected here, too, but hardly any implements. Apparently different kinds of waste were deposited in different ways, and wooden objects were on the whole not deposited in the

phase	1	1-2a	2a	2b	3	1-3	totals	fences
Alnus	–	11	7	–	–	1	19	19
Cornus	–	–	–	–	–	–	–	–
Corylus avellana	–	2	2	–	–	–	4	–
Euonymus europaeus	–	5	–	–	–	–	5	1
Fraxinus excelsior	–	3	1	–	–	–	4	–
Juniperus communis	–	–	4	–	–	–	4	23
Lonicera	–	–	1	–	–	–	1	–
Pomoideae	2	9	4	–	–	–	15	4
Prunus	–	5	6	–	–	–	11	42
Rhamnus cathartica	–	1	–	–	–	–	1	–
Salix	–	3	2	–	1	–	6	2
Taxus baccata	1	–	–	–	–	–	1	–
Viburnum opulus	–	2	–	–	–	–	2	–
bark	–	–	–	–	–	–	–	–
indet.	–	–	–	–	–	–	–	13
trunk	–	12	3	–	–	1	16	–
trunk/branch	1	5	4	–	–	–	10	67
branch	2	21	18	–	1	–	42	34
twig	–	–	–	–	–	–	–	–
root	–	–	1	–	–	–	1	–
gnarl	–	–	–	–	–	–	–	–
indet.	–	3	1	–	–	–	4	3
<i>Totals</i>	<i>3</i>	<i>41</i>	<i>27</i>	<i>–</i>	<i>1</i>	<i>1</i>	<i>73</i>	<i>104</i>

Table 11.2 Wooden artefacts, identifications of wood species per phase.

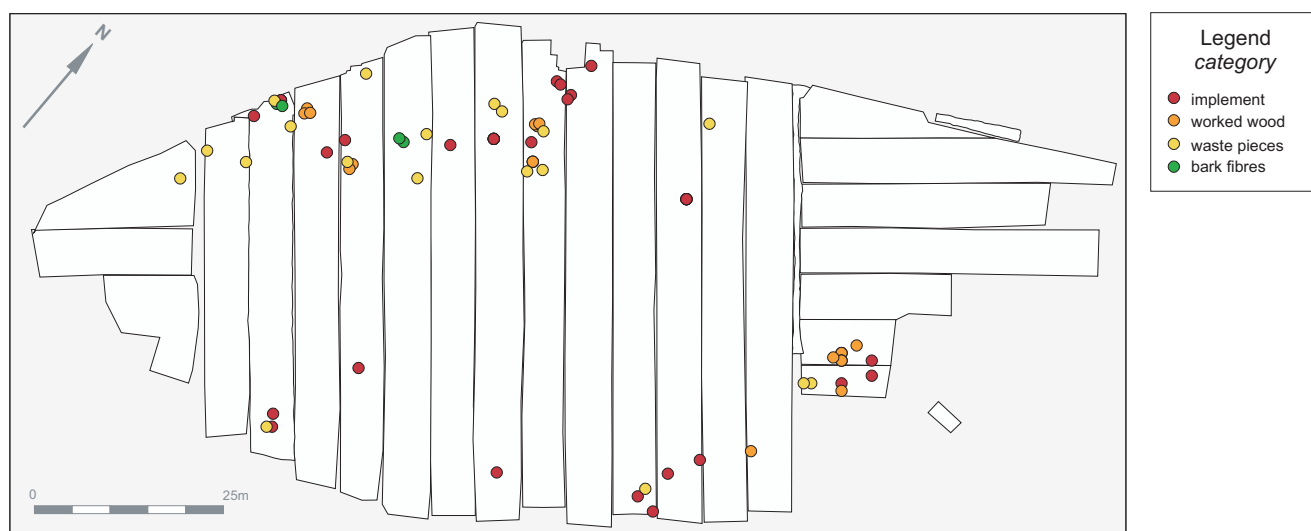


Figure 11.1 Findspots of wooden and bark fibre artefacts per main category.

general waste zone at the edge of the bog bordering the foot of the dune. This need not necessarily have any symbolic significance. It could simply reflect some 'ordinary' difference between (domestic) waste formed in women's work and waste formed in the men's activities (woodworking).

11.4 The artefacts

11.4.1 Functionally identifiable artefacts

Bow (fig. 11.2)

A 23-cm-long end of a bow made from a juniper (*Juniperus communis*) branch. The bark was stripped from the branch and the branch was given flat edges on the side where the string was attached. The bow has a maximum width of 2.1 cm and a thickness of 1.8 cm. A 2-mm-deep shallow notch was made for the string at 1.5 cm from the end.

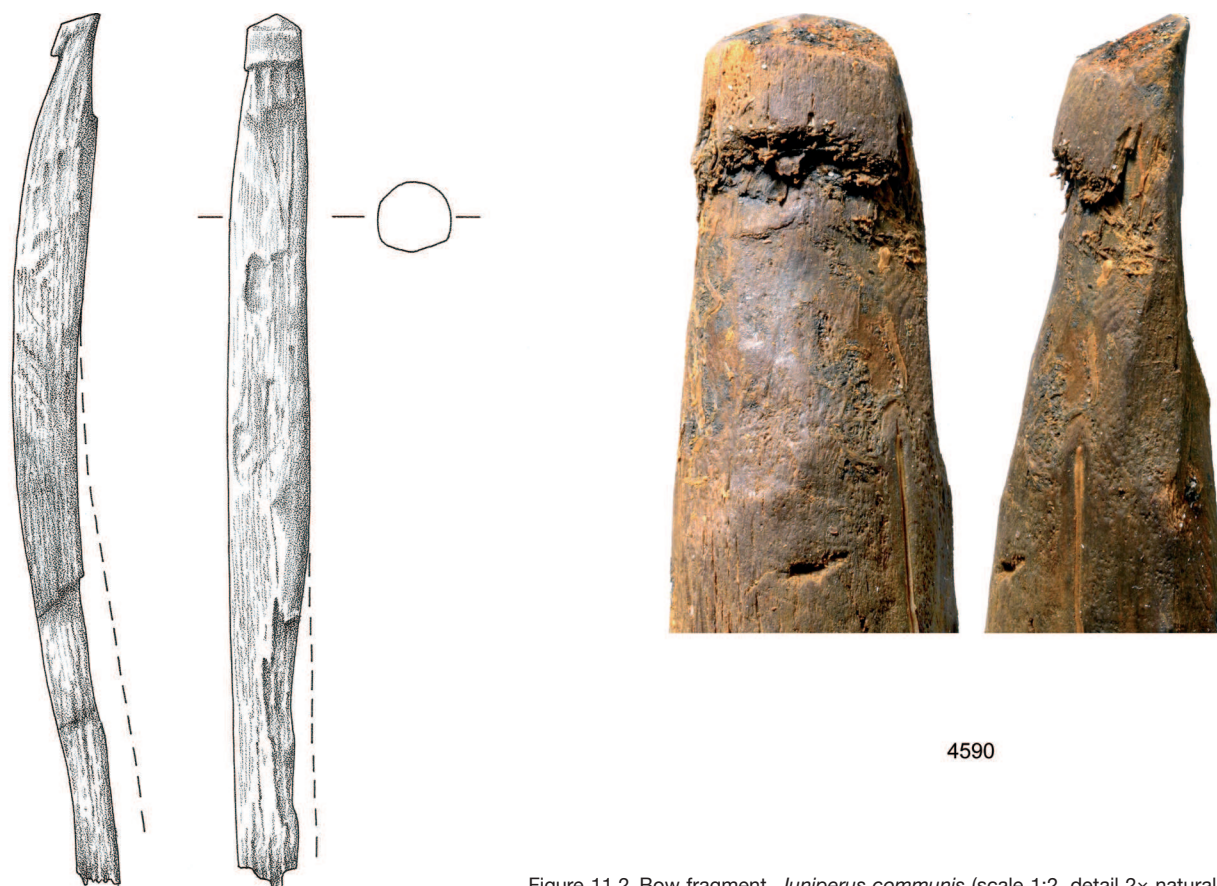
The bow is of a different shape than the heavy, man-size bows of the Mullerup type with their broad curved parts and narrowed grips (Brøndsted 1957), parts of which were found at the two Hardinxveld sites (Louwe Kooijmans *et al.* 2001a & b) and the Hazendonk site (unpublished). A variant with a narrow curved part was found at Hekelingen (Vlaardingen group, Louwe Kooijmans 1985). In the Mesolithic and Neolithic use was also made of a lighter bow with a round or D-shaped cross-section, examples of which are known from Tybrind Vig and Ringskloster (Denmark, late Ertebølle, Andersen 1994/1995). In the Netherlands a complete Late Neolithic example of such a bow was recovered from peat at Noordwijkerhout (Clark 1963). The different types of bow will have been used side by side for hunting different kinds of animals, the heaviest for killing large game and the lighter ones possibly for fowling.

In the Mesolithic, bows were always made from elm (*Ulmus*), the best kind of wood available at the time. In the course of the Neolithic people started using yew (*Taxus baccata*), whose long fibres and elasticity make it ideal for use in bows. The bow that was found at Hekelingen (Vlaardingen group) was for example made of yew. The use of juniper at Schipluiden is exceptional. Juniper is also a long-grained wood, but it is not as resilient as yew. Apparently neither yew nor elm was locally available, and no efforts were made to obtain wood of these species from sources elsewhere. A branch of a local juniper was a satisfactory second-best option for this light bow.

Paddles (fig. 11.3)

Paddle 1 (no. 4270) is complete except for the top part of the handle. The surviving part is 94.5 cm long. The blade is pointed-oval in shape and highly asymmetrical in cross-section, with one convex and one slightly concave side. Its maximum dimensions are 44 × 10.5 × 1.9 cm. There is a marked constriction between the blade and the handle, which gradually decreases in width to 3.2 cm at the top. The handle shows a slight thickening 5 cm beneath the missing end, which may mark the beginning of the grip. The paddle's original length can no longer be determined. The entire paddle has a carefully finished, smooth surface, devoid of tool marks. The paddle was made from a tangential piece of split wood from the outer part of the trunk of an ash (*Fraxinus excelsior*) that was at least 12 cm thick.

Paddle 2 (no. 10,199) is almost complete, except for the tip of the blade. The surviving part is 94.3 cm long, the original length will have been about 104 cm. The maximum



4590

Figure 11.2 Bow fragment, *Juniperus communis* (scale 1:2, detail 2× natural size).

width of the long, narrow blade is 5.9 cm; the blade has an asymmetrical cross-section. There is a very gradual transition between the blade and the heavy handle, which gradually decreases in thickness to 3.0 cm at the top. At the top, the paddle has a broadened, carefully carved, U-shaped end, which will have afforded a good grip for the hand and thumb. The entire paddle has a carefully finished, smooth surface. The paddle was made from the halved trunk of an ash, which likewise had a diameter of at least 12 cm.

Aspects that the two paddles have in common is that they were both made from a thick branch or the trunk of an ash, they are both fairly heavy, but nevertheless elegant in design and they were both carefully finished. They differ from one another in particular in the shape and dimensions of the blade. They may well have differed very little in length originally.

Paddles from the Dutch Mesolithic and Neolithic vary considerably in shape (fig. 11.4). There seems to have been a development from long, narrow blades with pointed ends of the kind known from the late Mesolithic Hardinxveld (c. 5400 BC) to shorter, broader blades, also with pointed

ends, as found at Swifterbant (4100 BC), followed by the heavier, subrectangular blades of the Vlaardingen group (Louwe Kooijmans *et al.* 2001a, 410-411). The two Schipluiden paddles date from between those of Swifterbant and the Vlaardingen group, but are in typological terms entirely in line with the older tradition. Paddle 1 is only a little shorter and broader than that of Swifterbant, which it otherwise closely resembles. With its long, slender shape and the gradual transition from blade to handle, paddle 2 comes closest to the almost 2000 years older Hardinxveld paddle. Even when we allow for differences in preservation, the Schipluiden paddles stand out from the others for the careful way in which they were finished and their sophisticated design, especially of the blade of paddle 1. The Hekelingen paddle however also has one flat and one convex side.

Paddles were in the Mesolithic and Neolithic almost always made from ash, as is indeed still the case today. Typical of ash wood are the long fibres, which make it resilient to substantial bending forces. This property makes it particularly suitable for paddles and oars, but also for axe handles. So the fact that ash wood was used to make these

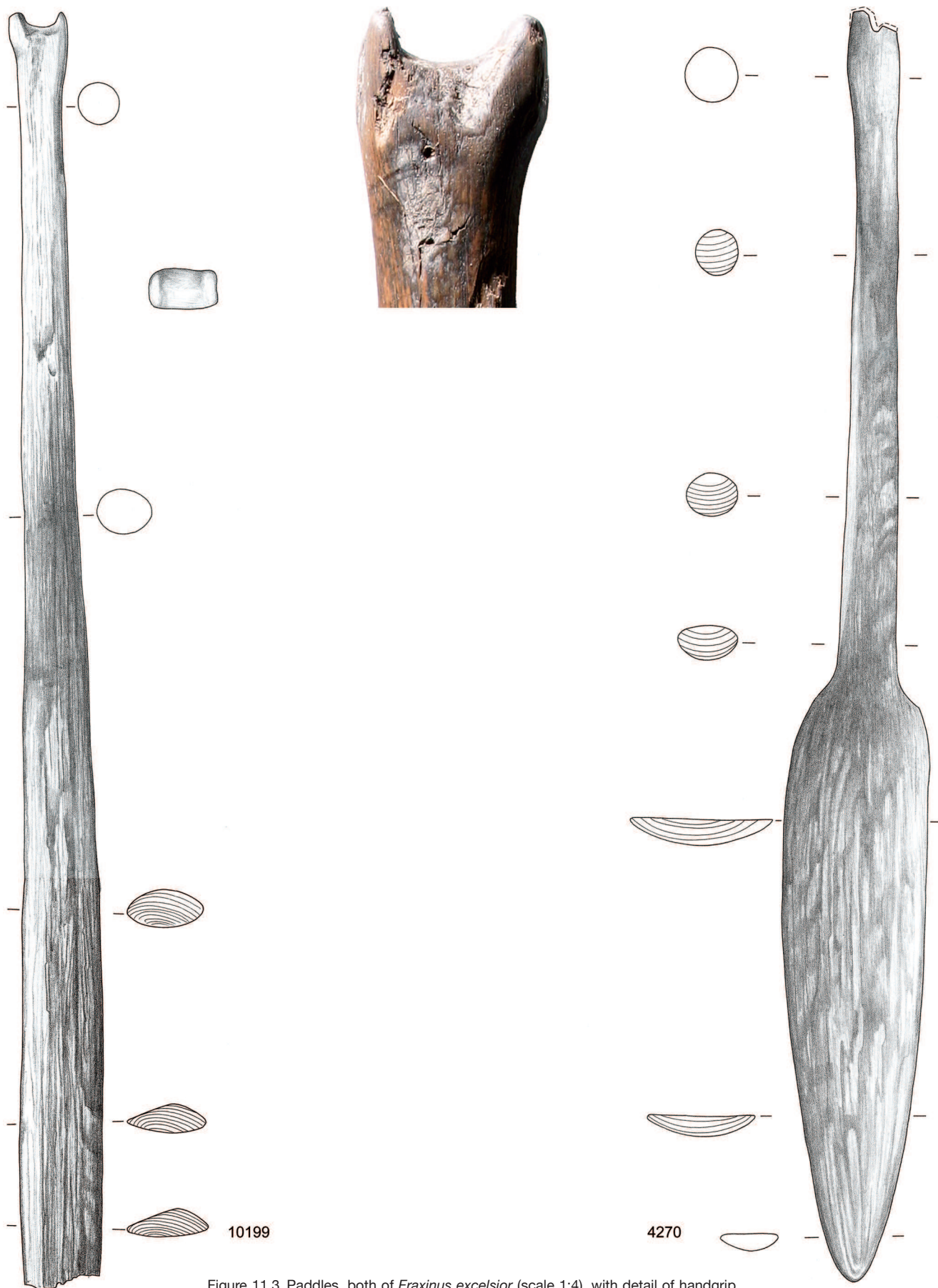


Figure 11.3 Paddles, both of *Fraxinus excelsior* (scale 1:4), with detail of handgrip.

paddles is not surprising *per se*. There are however strong arguments suggesting that there were no ash trees in the site's immediate surroundings: not one axe haft is made of ash wood, and apart from three large objects with a distinct shape and one large piece of split wood only two small pieces of ash wood were found at the site. This means that the wood must have been imported from a source outside the territory; the paddles may even have been carved elsewhere. The nearest possible sources of ash wood were riverine forests in the tidal rivers area or at the periphery of the southern sandy areas, both of which lay more than 30 km from the site, or possibly a large river dune like that of Hillegersberg, which lay less than 10 km away as the crow flies.

Axe hafts (figs. 11.5-6, table 11.3)

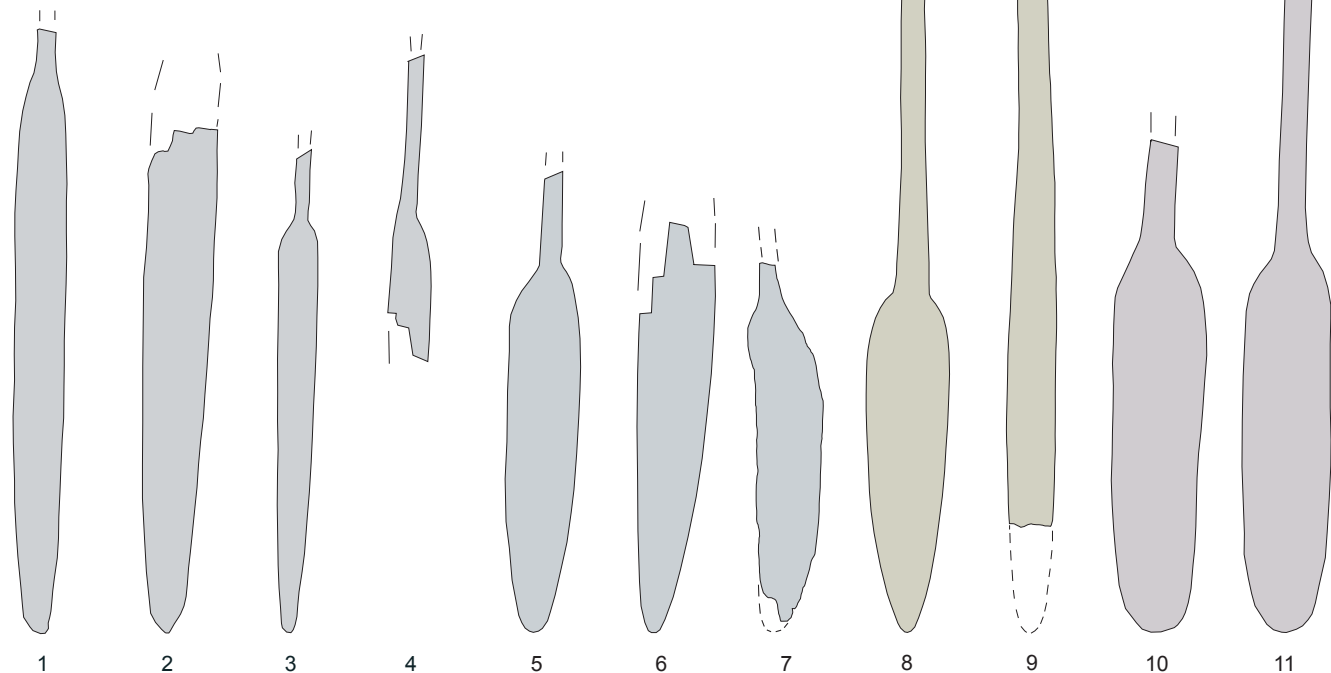
In total, eight parts of (axe) hafts were identified, six of which date from phase 2a and one each from phases 1 and 3. All remains are parts of the end that was held in the hand; no remains of the ends that held the axe blade or any transition to that end were identified. In two cases the end

of the haft was fairly coarsely chopped on two sides, in three cases it was finished to a round-oval cross-section by careful carving allround and in two, or probably three, cases it had been broadened towards the base. The (axe) hafts were made from branches with cross-sections of 4-5 cm, from which the bark was stripped. The branch was then carved to an oval cross-section with a diameter varying from 2.3 × 3.5 to 4.0 × 4.5 cm. The employed wood species are spindle (*Euonymus europaeus*), hazel (*Corylus avellana*), alder (*Alnus*), willow (*Salix*) and apple or hawthorn (*Pomoideae*, 4x). The surviving lengths vary from just over 40 cm (3x) to 16 - 8 cm (5x). Of the employed wood species, alder and willow can be qualified as definitely unsuitable, the others as a good second-best after ash and maple (*Acer*).

Oval cross-sections and carefully shaped broadened ends are also known from axe hafts from Denmark – the well-known hafted axe from Sigerslev Mose for example (*e.g.* Andersen 1981, 49) – and from *e.g.* Egolzwil, Burgäschisee and Twann in Switzerland (*resp.* Wyss 1969, 1983; Müller-Beck

Figure 11.4 Dutch Mesolithic and Neolithic paddles and paddle blades (scale 1:10).

1-4	Hardinxveld	c. 5400 cal BC	Late Mesolithic
5-6	Swifterbant	c. 4100 cal BC	Swifterbant culture
7	Hoge Vaart	c. 4200 cal BC	Swifterbant culture
8-9	Schipluiden	c. 3600 cal BC	Hazendonk group
10	Hazendonk	c. 3200 cal BC	Vlaardingen group
11	Hekelingen	c. 3000 cal BC	Vlaardingen group



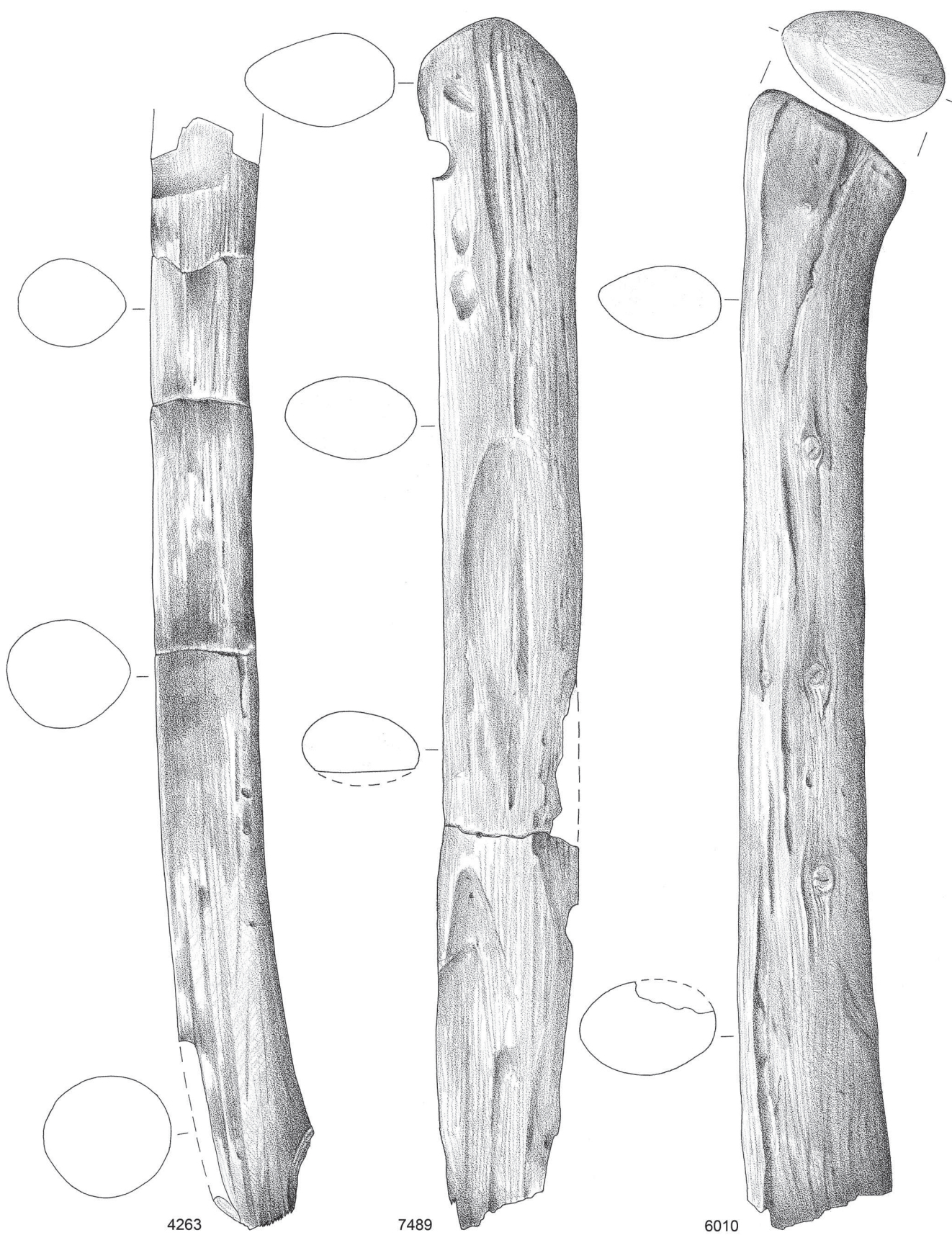


Figure 11.5 Axe hafts (scale 1:2).

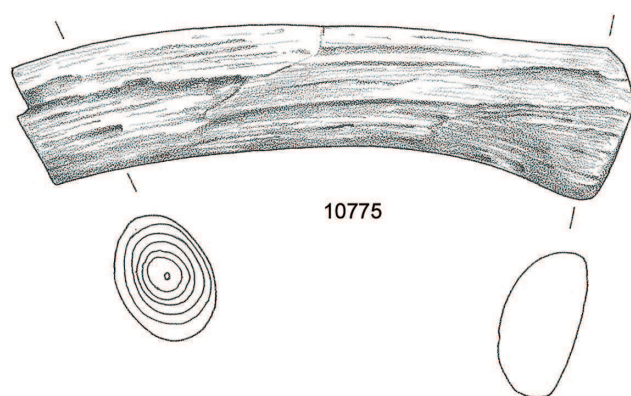


Figure 11.6 Small axe haft (scale 1:2) and details of haft ends (scale 1:1).

no.	phase	surviving length (cm)	cross-section w × h (cm)	wood species	shape of end
4263 A	2a	41,0	4.0 × 4.5	<i>Euonymus europaeus</i>	two-sided
4594	2a	13,5	3.7 × 5.0	Pomoideae	two-sided
5432	1	8,0	2.3 × 3.5	Pomoideae	round
6010	2a	42,0	2.9 × 4.5	Pomoideae	broadened
7489	2a	44,5	3.0 × 4.3	<i>Corylus avellana</i>	round
7826	3	10,0	2.8 × 4.0	<i>Salix</i>	round
10,775	2a	16,0	2.5 × 3.5	Pomoideae	broadened
10,778	2a	12,0	3.5 × 3.5	<i>Alnus</i>	broadened?

Table 11.3 Axe hafts.

1965; Wesselkamp 1980), all of which date roughly from around the middle of the 4th millennium, which means that they are contemporary with those found at Schipluiden. Such a design promotes a good grip of the axe; it is still used for hafts today.

Remarkably, not one of the hafts is made of ash, the species usually selected for this purpose. Moreover, the hafts are not made of wood from a trunk, but randomly of wood from branches of various species. This implies that the hafts were locally produced. Their makers presumably made the most of the available wood, and did not go to any effort to obtain ash wood via external contacts or expeditions. In this respect the hafts contrast markedly with the paddles. Another conspicuous aspect of the hafts is that the majority were made from a branch with a slightly thicker cross-section instead of from a trunk of the same species, which would have been much sturdier.

Straight sticks (fig. 11.7, table 11.4)

Eleven ends of straight sticks with a round or oval cross-section have a long, slender point (4×), a rounded (4×) or a chopped (3×) end. They vary in diameter from 1.5 to 3 cm and have surviving lengths of 5.5-35.5 cm. The bark

was stripped from the branches. Tool marks consist of long, parallel facets. The employed species are *Prunus* (3×), purging buckthorn (*Rhamnus cathartica*), spindle (*Euonymus europaeus*, 2×), hazel (*Corylus avellana*, 2×), juniper (*Juniperus communis*), honeysuckle (*Lonicera*) and Pomoideae. Like the axe hafts, the artefacts of this category betray random use of the locally available wood.

All the sticks date from phase 2a. They were recovered from the various find areas surrounding the dune.

Sticks with sharpened ends, 'spears' or 'javelins', rank among the less conspicuous artefacts. They have been found in many Late Mesolithic assemblages in Denmark and were also encountered in different sizes at the two Hardinxveld sites and at Bergschenhoek (Louwe Kooijmans 1986; id. *et al.* 2001a, b). There is however no mention of any such finds in the reports of the excavations of Swifterbant S3 and the Vlaardingen sites in the delta area.

We interpret the sticks with sharpened ends as unreinforced (= without a flint point) spears or javelins. They are too heavy for arrow shafts, and their ends are unsuitable for arrows, too. Spears of this type may well have been quite suitable for use in fishing.

no.	phase	surviving length (cm)	cross-section w × h (cm)	wood species	shape of end
4263B	2a	7.5	1.5	<i>Rhamnus cathartica</i>	pointed
4263E	2a	35.5	2.2	<i>Prunus</i>	pointed
4590C1	2a	16.0	1.7	<i>Corylus avellana</i>	pointed
4590C2	2a	9.0	1.7	Pomoideae	rounded
4593	2a	13.0	1.5 × 3.0	<i>Prunus</i>	rounded
7814	2a	9.0	2.2 × 1.4	<i>Juniperus communis</i>	rounded
10,409	2a	17.5	0.8 × 1.3	<i>Lonicera</i>	chopped
10,456	2a	9.5	2.6	<i>Prunus</i>	rounded
10,707	1-2a	45.5	2.2	<i>Euonymus europaeus</i>	chopped
10,709	1-2a	20.5	1.9	<i>Corylus avellana</i>	chopped
10,779A	1-2a	5.5	1.5	<i>Euonymus europaeus</i>	pointed

Table 11.4 Straight sticks.

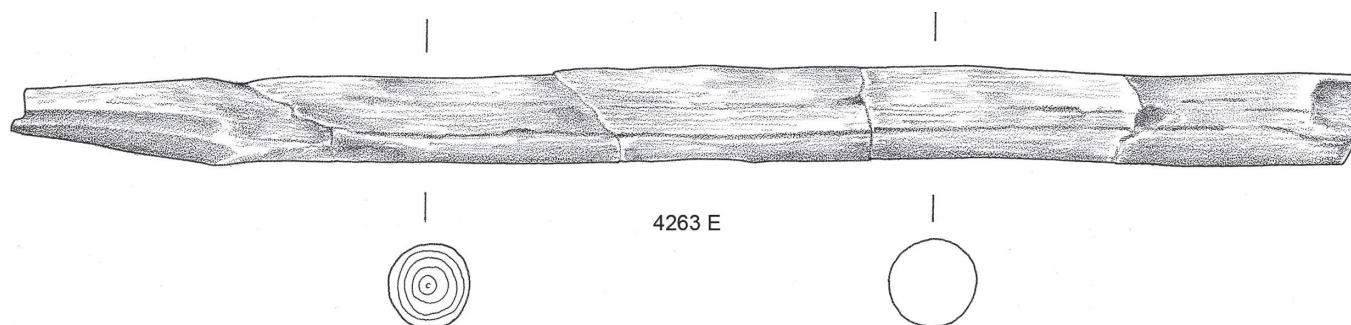


Figure 11.7 Straight pointed stick made of *Prunus* (scale 1:2).

11.4.2 New types of artefacts without an identifiable function (fig. 11.8, table 11.5)

The group of artefacts with an unidentifiable function comprises eight types of unique objects, or parts of objects, with highly diverse shapes for which we know of no parallels in the Mesolithic and Neolithic of northwest Europe. Two specimens were found of at least two of these types. The objects' function is on the whole unclear or unknown.

Crescent-shaped plank: canoe partition? (no. 4555)

A thick, crescent-shaped plank with a width of approximately 19.2 and a height of 16 cm. One of the projecting ends broke off in antiquity. The plank has one slightly concave and one slightly convex side and is a little thicker in the middle (3.9 cm) than at the edges. The plank is also substantially thicker on the convex side (3.7 cm) than at the end(s) (2.4 cm). It is beautifully symmetrical and has a carefully finished surface, almost entirely devoid of tool marks except for two facets at the side. The plank was made from half of the trunk of an ash, which must have had a diameter of at least 20 cm. The slightly concave side coincides with the split side across the heart of the trunk.

The plank was found in an open concentration of wooden artefacts in Unit 18, in the middle of the southeastern side of the dune.

For the same reasons as mentioned in relation to the paddles we assume that the object was not made at the site. In terms of its massiveness and design, this is an exceptional object. There are no devices for or evidence of attachment to other parts, but it is inconceivable that it had an independent function. On the basis of its shape and heavy design it has been suggested that it may have been used as a loose partition in a (dug-out) canoe, in which case its dimensions would imply that it was positioned in the canoe so as to reinforce one of the two bows. Such partitions were however not commonly used in prehistoric canoes. The Middle Bronze Age *Schotten* for dug-outs from Steinhausen-Chollerpark,

Switzerland, (Eberschweiler 2004) differ in many respects. They are much larger (1 metre) less sophisticated in design and less carefully finished. Neither is their use attested for (sub)recent canoes, but an example of oak wood can be seen in the bow of one of the small Viking boats of Gokstad (McGrail (1998, 149). There is no clear reason why it should be necessary to make such an object from ash wood. If it was indeed a transverse element in a canoe, it will have had to absorb primarily forces in the longitudinal direction of the grain.

Horn-shaped plank with a hole in it (no. 4590A)

A horn-shaped end of a broad plank containing a large, perfectly round hole (diameter approx. 5.3 cm). The plank has a thickness of 1.9 cm, which decreases to 1.3 cm at the horn-shaped end. The edges of the plank and horn have been rounded to an oval cross-section. Its entire surface is smoothly finished and the end of the 'horn' is also carefully finished to two facets. The hole is perfectly round with a straight wall and a sharp edge. Parallel carving marks perpendicular to the edge are visible on the inside. At some stage the plank broke at its weakest point, at the hole.

no.	description	wood species
4555	canoe partition?	<i>Fraxinus excelsior</i>
4590 A	horn-shaped plank	<i>Prunus spinosa</i>
9411	plate-shaped end	cf. <i>Alnus</i>
3205	triangular point	<i>Prunus</i>
3554	triangular point	<i>Prunus</i>
9506	'ball'	Pomoideae
6013	'ball'	Pomoideae
4263 C	corrugated stick	<i>Prunus</i>
7006	(adze) haft?	Pomoideae
10,512	(adze) haft?	<i>Prunus</i>

Table 11.5 Functionally unidentifiable artefacts.

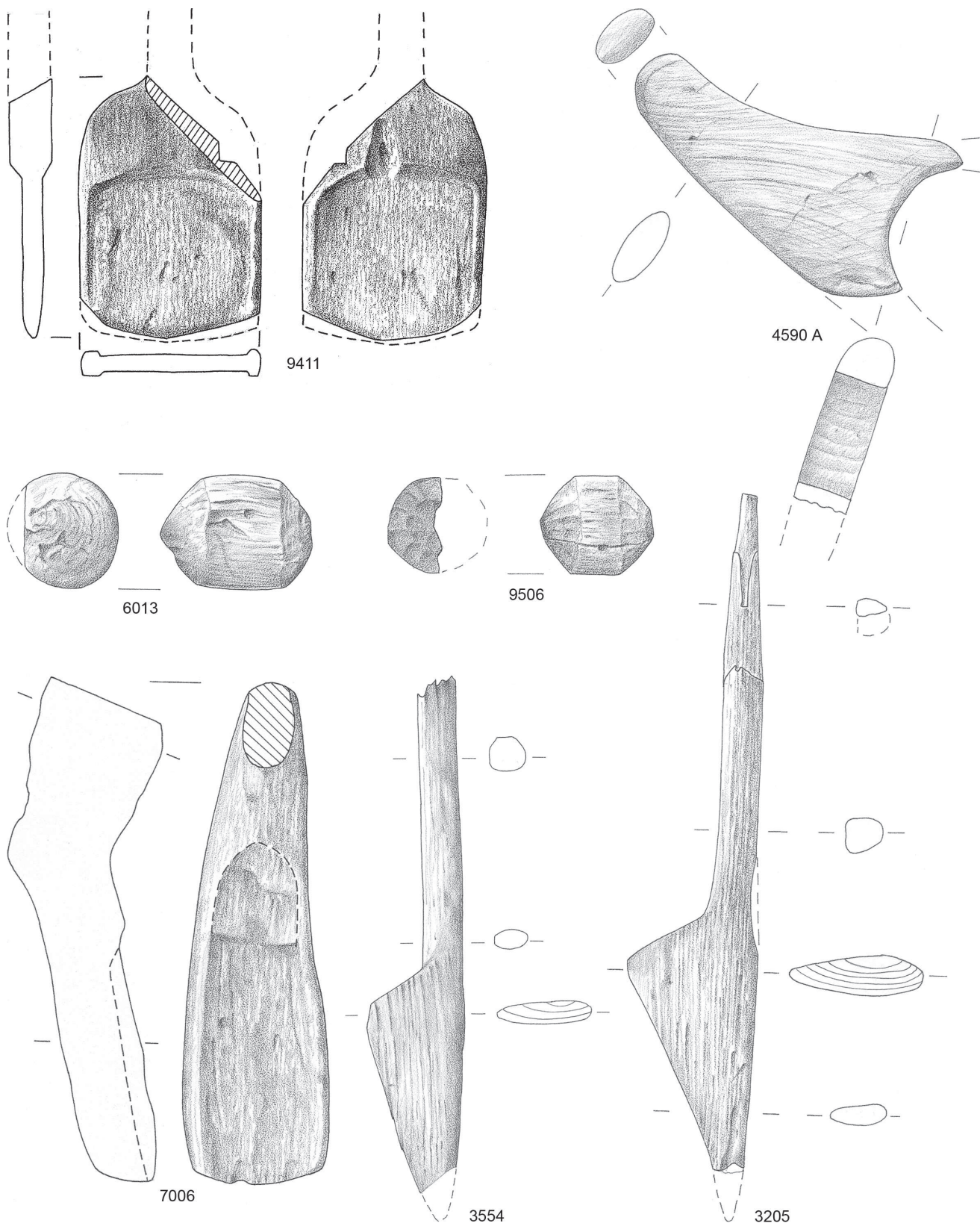


Figure 11.8 Functionally unidentifiable artefacts (scale 1:2).

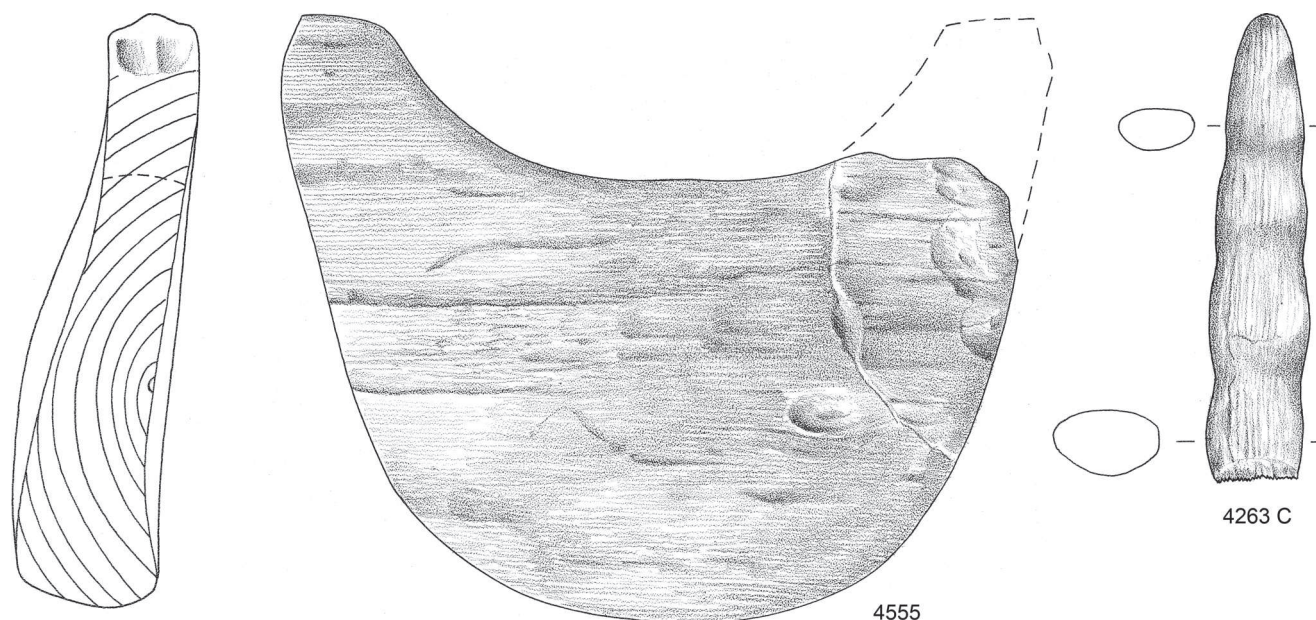


Figure 11.8 (cont.) Functionally unidentifiable artefacts (scale 1:2).

The 'horn' was made from the outer wood of a thick branch with a diameter of more than 5.5 cm or a thin trunk of a sloe (*Prunus spinosa*).

The object was found in the same concentration on the southeastern side of the dune, Unit 18, as the 'canoe partition'.

The object itself offers no clues as to its function. It shows no devices for attachment and no traces of wear, neither on the outside nor in the hole. It would seem that the horn had no specific function and was merely intended as an ornament. It is possible that 'something' was inserted through the hole, but, if so, it caused no wear. What the entire plank originally looked like can no longer be ascertained; it may have been the end of a much longer and larger object.

Plate-shaped end (no. 9411)

A small (9.5 × 6.5 cm) plank of a sophisticated design that must originally have been the end – substantially broadened and symmetrical in two directions – of a 1.5-cm-thick pole. The object was made from a 1.5-cm-thick plank, whose end was over a length of 6 cm thinned to 7 mm, except for a 1.5-mm-high flange. The transverse edge was sharpened. On the other side the plank was narrowed to a handle, the beginning of which is just visible on one side. At this point the object was damaged during the excavation, but its original shape could still be inferred through mirroring via the axis. The plank is assumed to have been made from the trunk of an alder. If so, the trunk was cleft into segments, and the object was made from one of the segments.

The plank was recovered from the fill of a well on the northwestern side of the dune.

Such a detailed, sophisticated object comes as a great surprise in the context of the Hazendonk group, and indeed in the entire North European Neolithic in general. It provides an astonishing impression of the possibilities of and skills achievable with flint knives, but it also raises an interpretative problem: what was the purpose of this object? It would seem that the end was intended to fix the object in or between something, between the two flanges. The sharpened (transverse) edge is badly damaged, especially at the corners. This suggests that it formed part of a composite object, but – in spite of the damage – it was probably not the working end of that object. In spite of these specifications the object's function sadly eludes us.

Triangular points with a handle (nos. 3205, 3554)

Two objects can be described as asymmetrical, triangular sharp points with a handle. They were both made from the outside of a thick branch or a thin trunk of a *Prunus* (sloe, cherry or plum). They differ slightly in size and are both incomplete: the larger misses its point, the smaller one its handle. The larger of the two (no. 3205) will originally have been 26 cm long. Its blade is 5.0 cm wide and 1.5 cm thick. The smaller one (no. 3554) is 3.3 cm wide and 0.9 cm thick and has a surviving length of 19 cm.

Both 'points' were found lying not more than 10 m apart in the clay Unit 18 on the southeastern side of the dune, in a zone that yielded hardly any other wooden artefacts.

A function as reinforcement of some stabbing or thrusting weapon ('spear') would seem to be the most obvious interpretation, but that is not entirely indisputable. The leaf-shaped triangular point was undoubtedly the working end. The tapered handle moreover suggests that it was inserted into something, possibly a shaft, but, if so, it must have been a fairly heavy one. Also remarkable is that the handle of both specimens is thinnest at the transition to the blade. This thinning seems to have been caused not primarily but secondarily – through wear. The blades – especially that of the smaller object – also look rather worn. That would imply that the 'points' were attached deep in something and were used in a scouring medium – the ground or water. An alternative interpretation is that the objects formed part of 'untended facilities', such as traps. The entire object, and the blade in particular, seem too fragile for a third option – the point of a digging stick.

'Balls' (nos. 6013, 9506)

Two more or less spherical objects made from a branch of an apple species (Pomoideae). The bark was stripped from the branch, after which the two ends of a short lump of wood were carefully carved to spherical contours. Both ends of both objects reveal an identical working method, involving the creation of two concentric rings of radially oriented facets, approximately ten in the inner ring and 12-14 in the outer ring.

One of the objects has a cross-section of 4.0 cm and a length of 5.3 cm and was damaged on one side during the excavation. Of the other only half has survived; it was slightly smaller, 3.4 cm long with a cross-section of 4.0 cm.

The two objects were found 60 m apart on different sides of the dune: in clay Unit 18 on the southern side of the dune and in a well dated to phases 1/2a on the northwestern side.

We can only guess at the function of these 'balls'. They would appear to have functioned in this shape, for they show no traces of any form of attachment. They do show some signs of wear.

Stick with a corrugated end (no. 4263C)

Stick, ending in a blunt point with one flat side and a side with four transverse corrugations varying in length. The object is 12.5 cm long and measures at most 2.6×1.7 cm in cross-section. It seems to have broken off at a tool mark. The object was made from a thick branch of *Prunus*.

The object's function is a great mystery. Were the corrugations functional or merely decorative?

(Adze) hafts? (nos. 7006, 10,512)

Two, fairly unwieldy and rather worn pieces of wood, which may have been the hafts of a hacking implement. Both objects lack the sophisticated design and finish characterising

many of the other wooden artefacts. But this could be largely attributable to severe weathering before the objects became buried.

The objects were found far apart, no. 7006 in a well fill in the northwest and no. 10,512 on the northeastern side of the dune.

The first (no. 7006) consists of a broad, concave part showing clear tool marks, which after an angle continues in what may have been the end of a haft. The latter was cut off in recent times, so its original length can no longer be ascertained. An adze blade may have been attached to the broad part. It has a low flange along both long sides, the hollowed-out part tapers upwards from a width of 4 cm to 3 cm and is 8 cm long. The 'haft' is at an angle of approximately 150° relative to the blade and has an oval cross-section (1.7×4.5 cm), with its main axis perpendicular to the broad blade. The object was made from a knee of an apple species, the broad part from the branch, the 'haft' from the trunk. The trunk had a diameter of at least 9 cm; the diameter of the branch was at least 5 cm.

The second object (no. 10,512, not illustrated) also has a slightly angular shape, with a long, flat part and a short, heavier part. The flat part is 14 cm long and increases in width from 3 to 4.5 cm from the bend to the end. The short part has a cross-section of 3.5-4 cm and was hollowed out to a depth of 4.5 cm. The raw material for this object was a branch, possibly of a *Prunus* tree.

The first object is certainly *not* the end of an adze haft, as the angle between the haft and the blade is far too blunt. It may however well have been the haft of a chisel, though its shape and dimensions also coincide with those of an average Neolithic axe.

We have our doubts about the second object. It is more irregularly shaped and shows no clear evidence of working. The hollow may well have been naturally formed; the same can actually be said of the entire object. The intriguing shape is best regarded as a freak of nature.

Long pole with a spatula-shaped end (no. 10,701, fig. 11.9)

A long, straight pole with a worked end. At the top the pole has a diameter of 3.2 cm, above the worked bottom part it is 4 cm. Its present length is 166 cm, but the pole was longer originally, because the top part was cut off in recent times. One of the facets at the bottom may have been formed in lopping the branch from a tree trunk. The facet in question measures 6.5 by 6.5 cm and is on the concave side of the base of the branch. Two parallel facets are visible on the convex side, one having a length of 3.5 cm and the other a length of 5 cm. They were presumably not functional with respect to lopping the branch from the trunk, and must have been made after the branch had been removed from the trunk. The branch comes from a hazel (*Corylus avellana*).



The pole stands out on account of its length, straightness and its seemingly worked end. The end shows no traces of wear and the bark covering a large part of the pole also shows that it was used either very little or not at all. This makes it puzzling why this pole should have been lopped from a tree, brought back to the site and discarded – unused. Perhaps it was intended for use as a digging stick, a shepherd's crook or a punting-pole.

11.4.3 Woodworking waste (tables 11.6-7)

Besides discarded artefacts, different typical forms of waste and semi-finished objects produced in woodworking were found at Schipluiden. They provide useful information on the woodworking processes at the site.

- Waste is formed in trimming branches. This waste was classified as 'worked roundwood'.
- Chopping leads to the formation of chips. Chips were also found at the site.
- 'Tangential rectangles' are produced when a tree-trunk is prepared in a specific way.
- A trunk can be divided into planks either tangentially (parallel to the outside), or it can be cleft across the heart (radially).

These by-products formed in woodworking will be successively discussed below.

Worked roundwood (table 11.6)

The group of 'worked roundwood' comprises a number of fairly long parts (12-57 cm) of branches showing traces of carving and/or chopping in varying intensities. They are to be interpreted as woodworking waste or semi-finished products. Twelve pieces of wood from different tree species were classified as such. The remains of this group are fairly diverse, with a straight or curved shape, varying diameters (2.3-4 cm) and signs of woodworking ranging from modest tool marks at the end to a groove carved all the way round a branch (no. 10,180). Represented in this group are eight species of trees which all grew in the vicinity of the site.

A few of the remains deserve separate mention: 10,108 is the base of a spindle branch that was half lopped and half ripped from the tree. The other end was chopped all round and broken off. A groove was carved all round the branch a short distance above the base. This would seem to be a waste product: first the branch was lopped from the tree, then the groove was made with the purpose of shortening the branch, but it was finally decided to chop off part of the branch higher up.

Figure 11.9 Long pole of *Corylus avellana* and detail of the chopped base (scale 1:4, detail natural size).

no.	length (cm)	wood species
4757	23.5	<i>Juniperus communis</i>
6073 A	24.5	<i>Viburnum opulus</i>
6073 B	15	<i>Salix</i>
8083	24	<i>Juniperus communis</i>
9929 A	27.5	<i>Pomoideae</i>
9929 B	16	<i>Salix</i>
9929 C	30	<i>Prunus</i>
10,179	27	<i>Euonymus europaeus</i>
10,180	32.5	<i>Euonymus europaeus</i>
10.702 C	57.5	<i>Prunus</i>
10.702 D	28.5	<i>Prunus</i>
10.702 E	12.5	<i>Viburnum opulus</i>

Table 11.6 Worked roundwood.

Nos. 10,702C-D are two 3-4 cm-thick forked *Prunus* branches, each with one end showing small chopping facets all the way round. In this respect they differ from most of the fence stakes. It is hence more likely that the tool marks were made in lopping the branch from the tree rather than in an effort to sharpen its end.

Wood chips (fig. 11.10)

Four wood chips with lengths of 11-13 cm were identified. They are typical of the kind of chips formed in the initial stages of woodworking, for example in chopping down trees. It should be borne in mind that such chips are produced in large quantities in tree-felling, but that trees were felled

predominantly in dry areas, and that such chips were moreover ideal firewood, so the great majority will have disappeared. With due respect for these restrictions, the four chips (3× alder, 1× *Pomoideae*) are evidence of tree-felling and primary woodworking in phase 2a.

Tangentially split-off rectangles (fig. 11.10)

One way of removing the outer part of a tree-trunk is by hacking notches of a few centimetres deep at regular distances around the trunk. The wood between two notches can then be removed in one piece with the aid of a wedge. Such pieces of wood are rectangular and usually a few centimetres thick. The marks of the notches are often still visible at the two transverse edges.

Three such tangentially split-off rectangles were found at the site: two in the northwest and one in the middle of the southeastern side; they were all dated to phase 2a. All three pieces come from the trunks of apple species with diameters of 15-30 cm. The split surface of one of them (no. 10,778A) shows marks formed by the wedge that was driven into the wood.

These rectangles may also be the semi-finished products of an artefact type that was found at Wateringen 4 (Raemaekers *et al.* 1997, fig. 17). The artefact in question is a comparable rectangle, but slightly smaller (12 cm long) and made of the wood of a maple (*Acer*). It shows signs of careful working over its entire surface on two sides and appears to show no traces of wear or damage caused during use. Remarkably, maple wood was used at Wateringen 4, but not at Schipluiden. Evidently the occupants of Wateringen 4 did have access to this species, which can be particularly well worked.

This technique was clearly not intended to obtain long, tangential planks as intermediate products for the manufacture of utilitarian objects, but as a preparatory act for manufacturing an object from the trunk itself. That object may have been a tree-trunk canoe (fig. 11.11) or structural elements, such as beams. The tree-trunks that were worked at Schipluiden were however too thin for the manufacture of tree-trunk canoes, but they may well have been used to make beams.

The tangentially split-off rectangles do show that trees of apple species with trunk diameters of at least 30 cm grew on the dune itself in phase 2a, for it is unlikely that this community, with its limited means of transport, should have imported such heavy tree-trunks from sources in the vicinity. They are also evidence of heavy woodworking at the site. It is only difficult to say what the intended end products may have been.

Tangentially split pieces of wood, the outer parts of tree-trunks

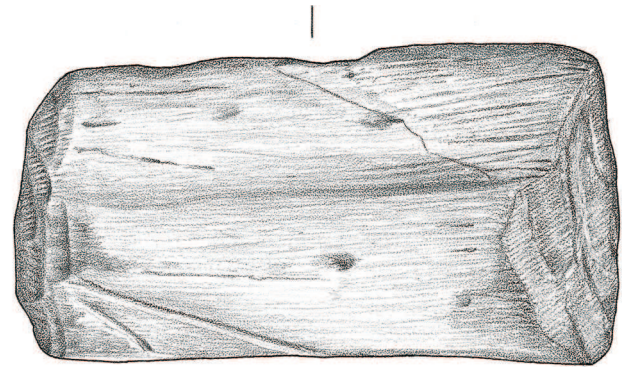
From the collected pieces of wood were selected nine indisputable pieces with bark and outer annual rings that had

no.	length cm	width cm	thickn. cm	Ø trunk cm	wood species
tang.split-off rect.					
7807	31	15	5	20	<i>Pomoideae</i>
10,702 A	16	8	3	15	<i>Pomoideae</i>
10,778 A	17	11	3	30	<i>Pomoideae</i>
tangentially split pieces					
378	17	4.5	1.4		<i>Salix</i>
1404	81	10	4		<i>Alnus</i>
1898	88	10	4		<i>Alnus</i>
2346	105	10	4		<i>Alnus</i>
2852	11	3	1.1		<i>Alnus</i>
2886	11.5	4	1.1		<i>Alnus</i>
3292	18	7	2.5		<i>Alnus</i>
8095	49	19	4		<i>Alnus</i>
10.377	17	6.5	4		<i>Pomoideae</i>
radially split pieces					
5432 B	16	3.5	1.5		<i>Taxus baccata</i>
6619	29	8	3.8		<i>Alnus</i>
8656	75.5	7	4.5		<i>Fraxinus excelsior</i>

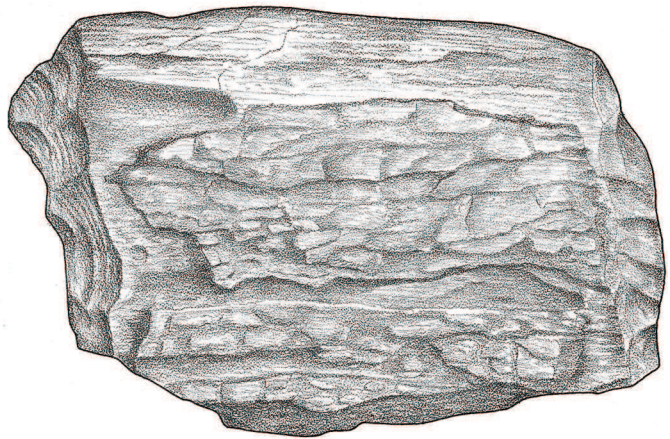
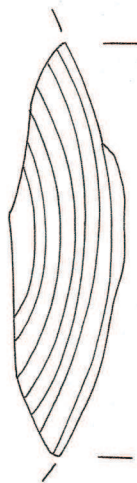
Table 11.7 Woodworking waste.



9929 D



10702 A



10189

10778 A

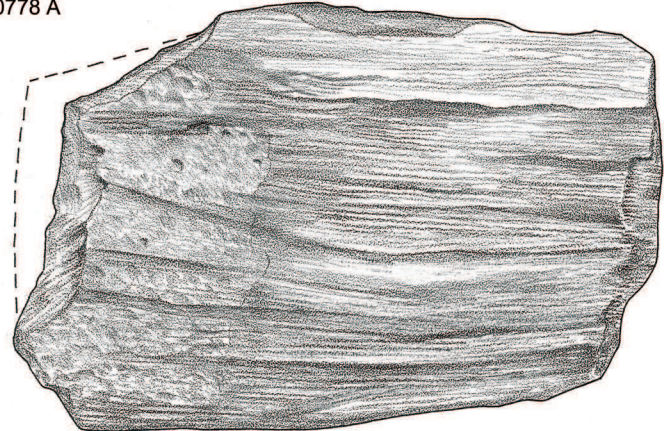


Figure 11.10 Woodworking waste: two wood chips and two tangentially split-off rectangles (scale 1:2).

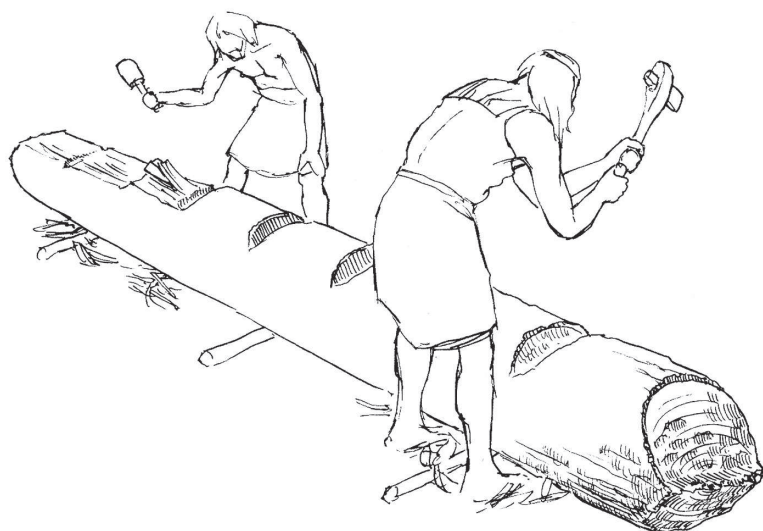


Figure 11.11 The first stage in making a dug-out canoe by producing 'tangential rectangles', as based on present-day experience. After Nielsen 1981, 57.

been split tangentially from the trunk. They vary tremendously in dimensions. There are a few long alder planks with lengths of 81-105 cm and widths of around 10 cm, which must have been split from trees with diameters of 15 to 20 cm. One of the planks was used to line a well (see section 3.4.2). There were also some smaller split pieces, the majority of which were of alder plus 1× willow and 1× Pomoideae. Among the less well-preserved wood remains were at least a few less clearly identifiable tangentially split pieces, which were left out of consideration.

The dominance of alder is remarkable. The fact that the long pieces in particular were split from sturdy tree-trunks makes it plausible that – besides apple species (see above) – sturdy alders were also to be found either on the dune itself or in its immediate surroundings in phase 2a.

In addition to these large pieces there were also some flat strips, which were only a few centimetres broad and thick. They were also of alder wood.

Wood split radially, across the heart

Three pieces of wood were split radially from a tree. Two of them deserve special attention on account of the wood species concerned.

The first is an 18-cm-long part of a branch of a yew with a thickness of more than 3 cm, which had been radially split into three parts. It shows signs of chopping at one end. The wood dates from phase 1 and was certainly imported from a distant source in the river dunes area, the southern sandy areas or the basin of the Scheldt. It may be a trimming from a much larger branch that was used to make a bow.

The second find is a trunk or thick branch of an ash with a diameter of 12 cm that was hewn into quarters. Its dimensions are 74 × 6 × 7 cm. At one end it shows some rather indistinct chopping facets. The wood would appear to have been suitable for the manufacture of a spear or even an axe haft, but it was not worked any further. Besides three finely shaped artefacts (the two paddles and the 'canoe partition') and this cleft trunk only three small pieces of ash wood were found at the site. They may all be waste formed in woodworking. Partly in the light of the results of other botanical research we assume that the ashes did not grow at or near the site, and that the wood was imported from a source elsewhere.

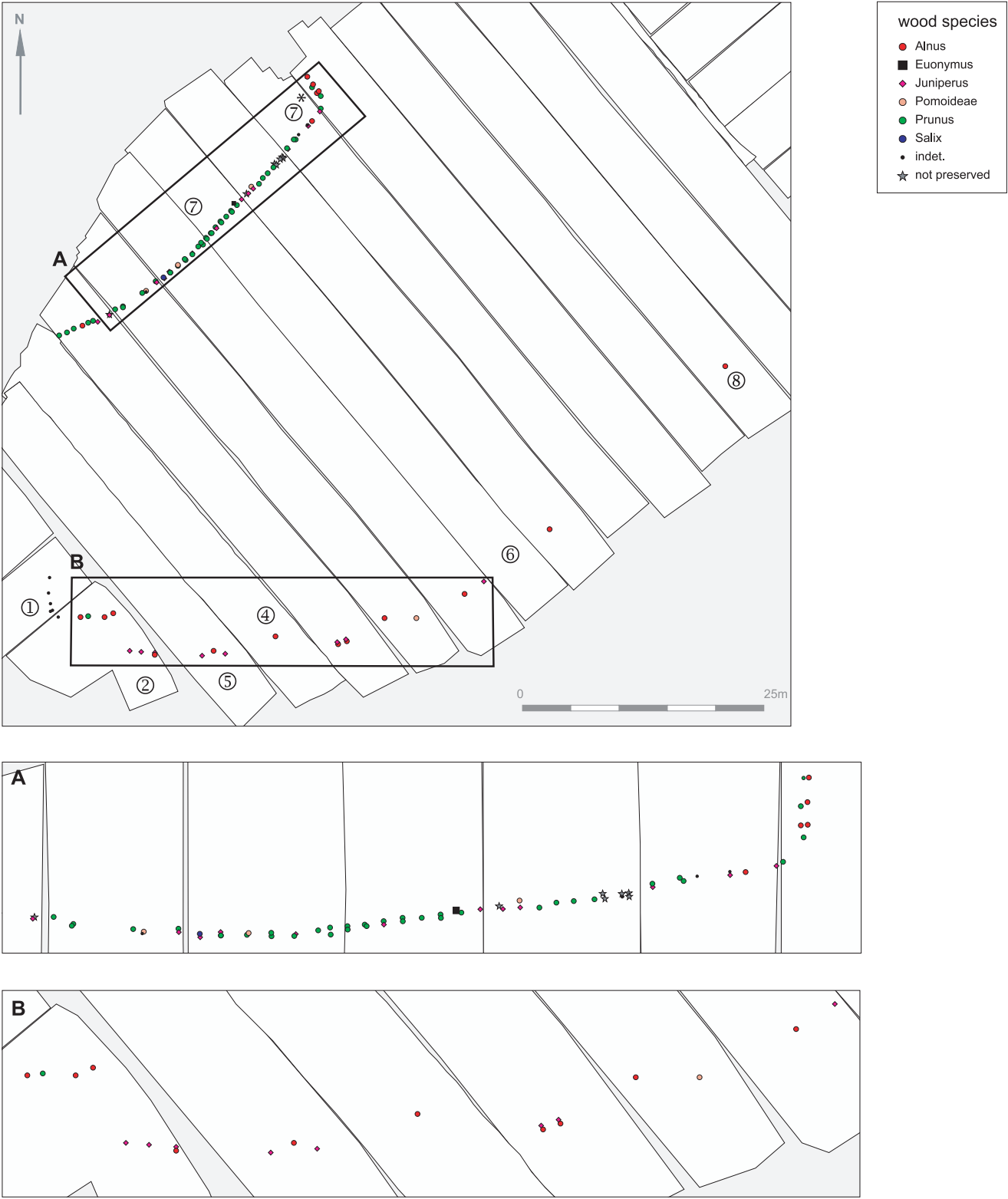
11.4.4 Use of unworked wood: wattlework

In two places – in a well fill in the northwest and at the northern end of the dune – a number of branches were found that showed traces of wear and deformation of the kind observed in the active elements in wattlework. The nine branches concerned have diameters of between 1 and 2.6 cm and comprise six alder (*Alnus*), two willow (*Salix*) and one apple species (Pomoideae).

11.4.5 Fence posts and stakes

Wooden post and stake ends

Section 3.8.2 discussed the features of fences that stood along the former foot of the dune. It was mentioned that many of those features were found to contain the surviving ends of the wooden posts and stakes. These remains provide information on the selected species, the trees growing in the vicinity of the site and the organisation of work.



section	wood species							totals fence posts	total fence features
	Juniperus	Prunus	Pomoidae	Alnus	Euonymus europaeus	Salix	indet.		
youngest									
1	–	1	–	5	–	–	1	7	23
3	–	–	–	–	–	–	–	0	10
middle									
4	–	–	–	1	–	–	–	1	45
oldest NW									
7	13	38	3	3	1	1	11	70	91
7*	–	3	–	4	–	–	–	7	12
(7)	1	4	1	1	–	–	–	7	–
9	–	–	–	–	–	–	–	–	–
oldest SE									
2	5	–	–	2	–	–	–	7	9
(2)	1	–	–	–	–	–	–	1	1
5	4	–	1	4	–	1	–	10	71
6	–	–	–	–	–	–	1	1	34
8	1	–	–	–	–	–	–	1	3
Totals	25	46	5	20	1	2	13	112	299

Table 11.8 Fences, wood species per section. In brackets: pointed stakes from well fills.

In total, 299 features of the various fences were recorded. Of those features 104 were found to contain surviving wood and in 99 cases the species of the wood could be identified; another eight post ends were recovered from the fills of wells that lay next to the northwestern fence stretches (table 11.8-9). In 62 cases the post/stake end had survived in such good

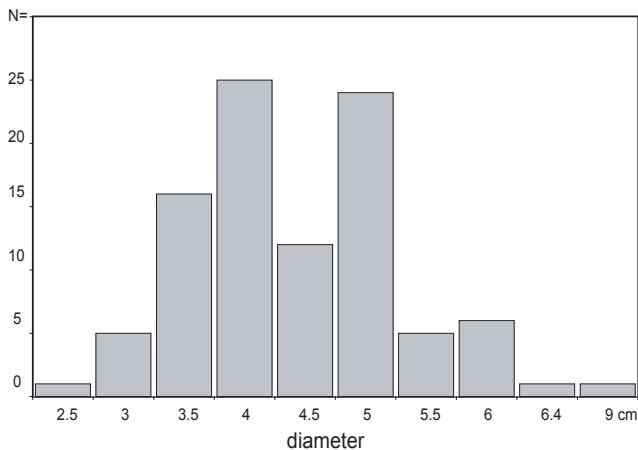


Figure 11.13 Diameters of fence stakes, N = 96.

condition that aspects such as dimensions, tool marks and the like could also be described.

The majority of the post/stake ends (N=77) had survived along the northwestern stretches (7, 7*), where 75% of the features were found to contain wood. In the case of fence stretches 2 and 5 only 22% of the features contained wood. The features of the younger fence stretches likewise contained only very little wood, which was moreover poorly preserved.

It is not so easy to explain these substantial differences. The differences between the early fence stretches and the later ones are most probably attributable to differences in preservation. The posts/stakes of the later fence stretches were probably not driven into the ground to a depth beneath the former groundwater level, which would explain why the majority had completely decayed. The posts/stakes of stretches 7 and 7* evidently did stand partly in the groundwater, and the fence was apparently not pulled down, but left to rot. With due consideration for the assumption that many of the features of stretch 2 were overlooked in the excavation, this does not – or at least not to the same extent – hold for the combined stretches 2 and 5. Many of the post/stake ends in question are longer than 30 cm and have survived in such good condition that we must assume that these posts/stakes were deliberately left in place, and that the others were pulled out of the ground, possibly for re-use.

Wood species

The identifications of the wood of all the fence posts/stakes together (table 11.8) provide a good impression of the tree species that grew in the dune's surroundings at the end of phase 2a. We assume that the occupants obtained their wood from their immediate surroundings in view of the quantities they required and the limited means of transport; carts were not yet known at this time. The represented spectrum is quite remarkable, with a dominance of *Prunus*, juniper and alder, and the complete absence of species such as hazel and ash. *Prunus* is remarkably the dominant species in the most complete spectrum of fence stretch 7-7* and is totally absent in the other fence stretches except for one post in fence stretch 1. Presumably the people who pulled down the combined fence stretches 2-5 deliberately left the juniper and alder stakes in place. Another possibility is that for these fence stretches they exploited a different nearby wood in which there were no *Prunus* trees (fig. 11.12).

Dimensions and sharpened points (fig. 11.13-14)

With the odd exception, the posts/stakes all have diameters of 3-5.5 cm (fig. 3.13). The thickest is an alder post from stretch 1, which has a diameter of 8 cm. Insofar as can be assessed, the fence builders used straight posts/stakes, though a few are clearly crooked. Most of the posts/stakes still show

bark, showing that the wood was used in a fresh condition.

The surviving lengths are 7-50 cm, with an average of 20.4 cm from level C downwards, in which the soft wood was cut with the spade. Posts/stakes of the hard wood of junipers are relatively long because they could often be recovered intact in the excavation. This holds in particular for the posts/stakes of fence stretch 7, which were embedded in Unit 19N. The post/stake moulds and surviving ends show that the fence posts/stakes were on average driven 50 cm into the ground, which means that the fence was a good 1 metre high.

The ends of the stakes were fairly coarsely sharpened to points (fig. 11.14). A few show no signs of woodworking whatsoever; in those cases a broken-off branch or trunk was evidently driven into the ground without further ado. In many cases a branch or trunk was chopped to a third or half of its thickness and then broken off. That resulted in a crude, ragged point. A quarter of the posts (N=24) were driven into the ground without sharpened ends. In the case of half of the posts the end was sharpened, either unilaterally or bilaterally, and often asymmetrically or at an angle. One juniper stake end was shaped all round. Many of the stakes have quite sharp points, in the sense that the length of the point exceeds the stake's diameter. Various stakes, in particular those of

juniper wood, however have a blunt point, presumably due to the hardness of the wood. There are no striking differences between the employed species except for one conspicuous exception: the stakes of alder wood in all the fence stretches were almost all neatly bilaterally shaped to a sharp point. Alder wood is fairly soft and can be comparatively easily worked. Creating a fine sharp point will have involved no extra effort, though it is possible that other, less practical motives played a part, the same motives that determined why the alder stakes of fence stretches 1-2-4-5 were not pulled down.

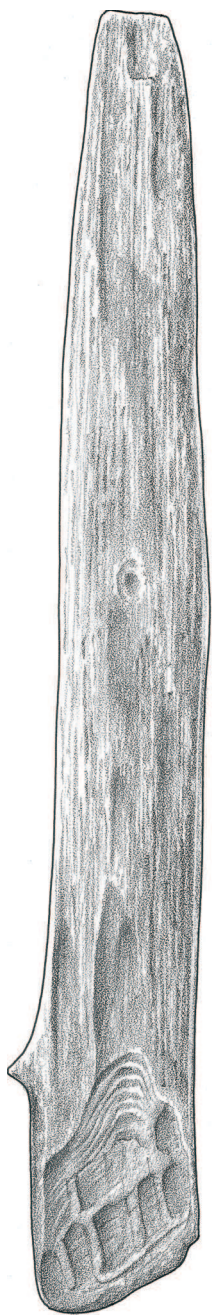
Marks of damaged axes and the chopping method (figs. 11.15-16)

In the case of four stake ends one of the facets showed that the stake had been chopped with an axe with a damaged cutting edge. The burrs are observable as short, straight parallel marks. In three cases the marks were observed on a bilaterally chopped point; the other cutting surface shows no such marks, and was apparently created with a smooth, undamaged axe. This shows that – in these three cases at least – the work took place in two separate phases: the chopping of the trees in the field and the sharpening of the ends at the time when the fence was built. The fact that this was done with two different axes implies that at least two persons (men) worked on the fence.

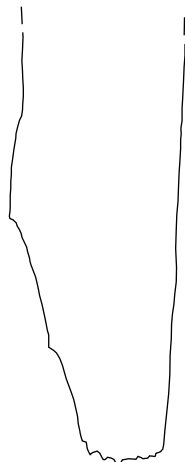


Figure 11.14 Fence stake ends, showing range of point shapes (scale 1:2).

- 994 *Juniperus communis*, carefully made two-sided point.
- 4606 *Juniperus communis*, curved stake, chopped on one side and ripped from the tree.
- 4274 *Prunus spinosa*, point with two facets.
- 2894 *Prunus avium*, curved stake with broken end.



4604



6004



2327



6004



1889

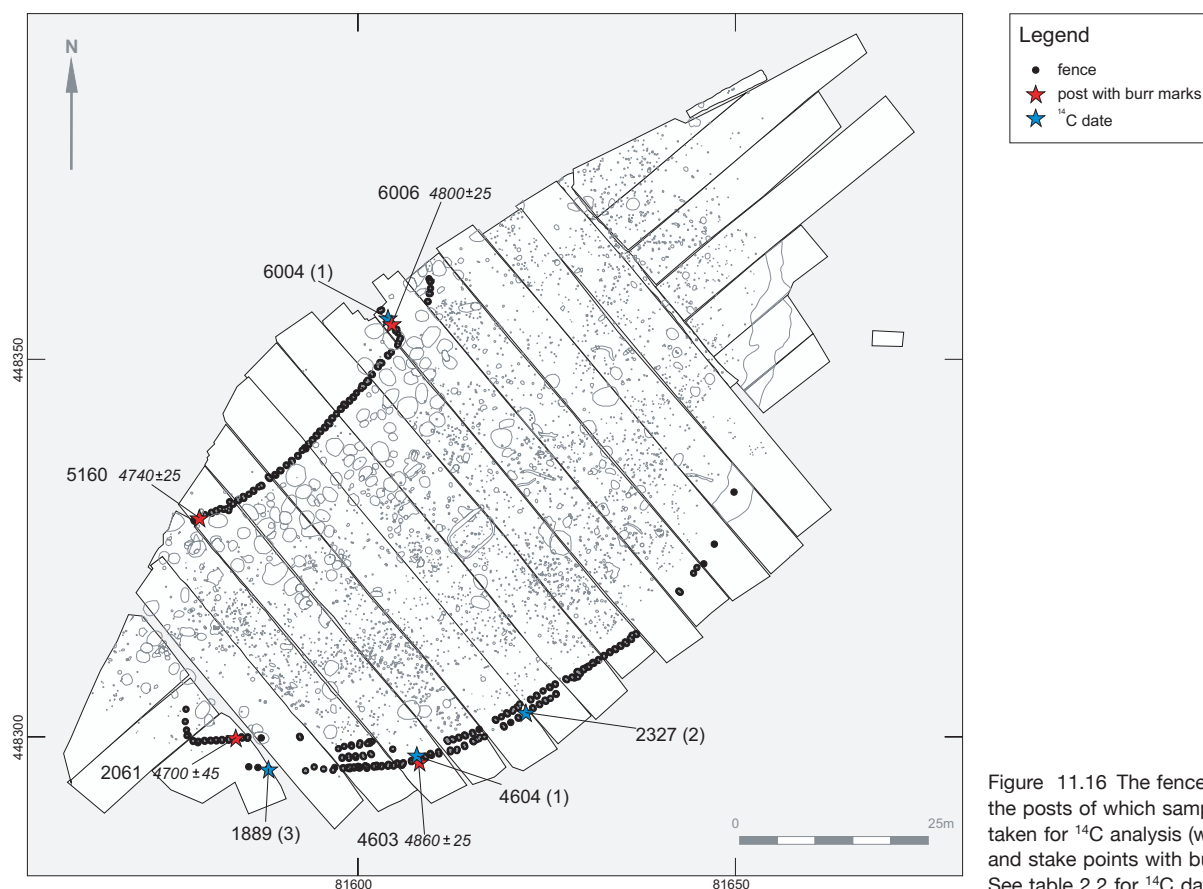


Figure 11.16 The fences showing the posts of which samples were taken for ^{14}C analysis (with dates BP) and stake points with burr marks. See table 2.2 for ^{14}C dates.

This is of course fairly obvious, but it is interesting to actually find evidence of it. The burr marks were not all made by the same axe. That is not surprising either when we consider that the fences appear to have been repaired and/or replaced on several occasions. At least three different patterns can be distinguished – all three on the comparatively scarce stakes that have survived in the combined stretches 2 and 5, within an overall distance of around 35 m. If we assume that such a fence stretch was built in one run, the conclusion is that at least four men will have worked on its erection.

The pattern of cutting edge damage on a stake from stretch 5 bears a remarkable resemblance to that on a stake from stretch 7*, one of the carefully sharpened alder stakes.

The resemblance is indeed so great as to suggest that they were chopped with the same damaged axe, *i.e.* by the same man and within a very short space of time, before the axe was sharpened or discarded. This poses no serious chronological problem. It would simply mean that stretches 7 and 7* belonged together after all, and that the entire older fence stretch was built in one run.

11.6 Stakes from Unit 1-2, 2300-2050 cal BC
During the removal of the overlying layers, the ends of 24 thin stakes that had been driven vertically into the ground were found in a cluster with a diameter of 5 m in Unit 2 on the eastern side of the dune (see section 2.2.8.7).¹ They had

◀ Figure 11.15 Four examples of ends of fence stakes, showing marks of the damaged cutting edges ('burs') of the axes used in the chopping (scale 1:2, details scale 1:1). The marks on 4606 and 6004 are (almost) identical.

4604 *Juniperus communis*, blunt (broken) end with one facet.

6004 *cf. Alnus*, point with two facets, one with burr marks.

2327 *Juniperus communis*, point with two facets, one with burr marks.

1889 *cf. Alnus*, point with two facets, the larger one with burr marks.

been compressed like a concertina and distorted by the weight of the peat and heavy Dunkirk I sediments that were later deposited on top of them. Most of the stakes had diameters of 3-7 cm; two were substantially thicker (9 and 14 cm). The wood employed was exclusively alder (N=8) and willow (N=16), which will have been the dominant, if not the only wood species available in the reed swamp that surrounded the dune in those days.

The ends of the stakes had been sharpened in a different way than those of the stakes of the older fence that enclosed the dune: the length of the point was (much) greater than the stake's diameter and most of the points show one or two chopping facets.

11.7 Conclusion

11.7.1 General

Throughout the entire span of prehistory wood was indisputably a very important raw material, even at this site, which lay in a comparatively open landscape. This is not reflected in the archaeological record, certainly not in quantitative terms. Wooden artefacts are known from only a very small number of Mesolithic and Neolithic sites in the Netherlands, and then only one or a few objects per site. Even the finds from relatively rich sites such as Hardinxveld and Schipluiden represent only an exceptionally small, random sample of what the living community made and used. This is in marked contrast to other categories of objects, in particular earthenware and flint objects, which to a point may be seen as representative samples. This underrepresentation of wooden artefacts forces us to pay excessive attention to them in our interpretation of the prehistoric communities. What we see is actually only a small glimpse of the full picture.

The worked wood provides information in particular on the range of artefacts and use of wood in phase 2a. All that has survived from phase 1 is one axe haft of *Pomoideae* wood and a split piece of yew wood, and the only wooden artefact datable to phase 3 is a willow axe haft (table 11.2). This means that we are unable to present a diachronic development of the use of wood; we will have to make do with a synchronic impression. All that can be said with certainty is that the piece of yew from phase 1 constitutes evidence of external relations at this early stage already. The use of willow for an axe haft in phase 3 illustrates the poor availability of good wood in the swampy landscape of those days.

11.7.2 Typology, range of artefacts

Besides the traditional artefacts (bow, paddle, spear), the range represented at Schipluiden comprises a number of surprising, puzzling objects that cannot, or virtually not be functionally interpreted. They are objects with a sophisticated design ('horn', 'corrugated stick'), complex utilitarian objects ('handle with a plank-shaped end') and practical parts of

equipment ('ball', 'point with a handle'). The 'canoe partition' may represent an otherwise virtually unknown type of boat. In terms of diversity and finish, the worked wood of Schipluiden, and in a broader respect that of the Dutch delta, is in no way inferior to that known from other sites with optimum preservation conditions, notably the Alpine lake dwellings (Wyss 1969) and settlements in southern Scandinavia. Their artefact ranges are comparable, but not identical. We should not assess the Neolithic delta communities solely on the basis of their simple pottery, but should re-evaluate them with due consideration for their woodworking skills.

What is surprising for a Neolithic community is that all the artefacts – insofar as they can be functionally interpreted – relate to 'Mesolithic' activities: chopping wood, hunting, sailing and possibly fishing. Perhaps the range of wooden farming and domestic implements was limited and/or these implements were not discarded at the swampy periphery of the site.

11.7.3 Technology

Equally surprising is the high level of technological expertise that was evidently achievable with a simple flint toolkit. The artefacts display a high standard of craftsmanship, good symmetry, close attention to detail and careful finishing, all of which were realised with simple flint axes, blades, drills and piercers. The surface of a few objects was in one way or another smoothed, possibly with quartzite or quartzitic sandstone flakes (see section 8.6.8), for example the surfaces of the 'horn' and axe haft no. 6010, but this was not usually the case. A few axe hafts (nos. 4263A, 4594) have only a roughly chopped end.

In this respect, too, we must upgrade the Dutch Neolithic. It is interesting to compare the Neolithic implements showing evidence of skilled woodworking techniques with the products that were made with them (sections 7.10.5 and 10.7.2). That the Neolithic people also handled wood in an entirely different manner – when no great attention to detail was required – is shown by the wooden stakes: they are the products of fast, crude mass-production, and it would be incorrect to regard them as representative of Neolithic woodworking techniques.

11.7.4 Woodworking at the site

The scarcity of semi-finished products and waste makes it difficult to say what fine woodworking activities took place at the site. Interestingly, the range of employed wood species closely resembles that represented by the fences, with high proportions of *Prunus* and *Pomoideae*. This makes local production plausible. The predominant use of less suitable types of wood, and of branches rather than trunks, is also a strong argument in favour of local manufacture of most of the artefacts. What should also be mentioned in this

	implements	worked	wattle	waste	total	fence posts
<i>Alnus</i>	2	–	6	11	19	19
<i>Cornus</i>	–	–	–	–	–	–
<i>Corylus avellana</i>	4	–	–	–	4	–
<i>Euonymus europaeus</i>	3	2	–	–	5	1
<i>Fraxinus excelsior</i>	3	–	–	1	4	–
<i>Juniperus communis</i>	2	2	–	–	4	23
<i>Lonicera</i>	1	–	–	–	1	–
<i>Pomoideae</i>	8	1	1	5	15	4
<i>Prunus</i>	8	3	–	–	11	42
<i>Rhamnus cathartica</i>	1	–	–	–	1	–
<i>Salix</i>	1	2	2	1	6	2
<i>Taxus baccata</i>	–	–	–	1	1	–
<i>Viburnum opulus</i>	–	2	–	–	2	–
indet.	–	–	–	–	–	13
<i>Totals</i>	<i>33</i>	<i>12</i>	<i>9</i>	<i>19</i>	<i>73</i>	<i>104</i>

Table 11.9 Artefact type versus wood species.

context is the waste produced in trimming branches, such as no. 10,180.

There are several indications of heavy woodworking at the site: the tangential rectangles of *Pomoideae*, the long tangentially split pieces of alder and a few large chips, which all ended up in the swampy zone entirely by chance. The greater part of the waste formed in woodworking will have decayed or been burned.

11.7.5 Selection of wood species (table 11.9)

It is generally assumed that prehistoric man obtained his wood from the immediate surroundings of his settlement (Groenman-Van Waateringe 1988). This holds in particular for heavy construction timber and wood needed on a daily basis, *i.e.* firewood. At Schipluiden this principle holds especially for the fences, for which a quick calculation (section 3.8.2) showed that roundwood with diameters of 4–6 cm and a total length of 2.5 km was used. It also holds for the house at Wateringen 4, which was built from alder (the central roof supports) and juniper (the wall posts) (Hänninen/Vermeeren 1995).

A second doctrine is that of the ‘native knowledge system’, according to which people critically and selectively chose the wood species that were most suitable for particular purposes. This holds to a point only in the case of Schipluiden. Many different wood species were randomly used in the construction of the fences, ranging from high-quality *Juniperus communis* to the moderate alder and even some willow wood. This we regard as an indication that wood

was in scarce supply. The occupants of Schipluiden could not afford to make selective use of the available wood. This same principle of random, suboptimum use of wood is also observable in the artefacts, first of all in the bow, which was made from juniper instead of elm or yew, and also in the spears and even the more critical axe hafts, if to a slightly lesser extent: alder and willow were virtually not used. Other species, in particular *Pomoideae* (apple or hawthorn), hazel and spindle, were however good substitutes for alder in the manufacture of axe hafts. The occupants of Schipluiden were less critical than people elsewhere in a second aspect, too: they often made use of branches whereas people at other sites used the better-quality standing timber.

All this leads to the conclusion that the preferred wood species (ash, maple, yew) did not grow in the site’s immediate surroundings, and that external contacts or means of exploitation were not used to ensure an adequate supply of wood for the manufacture of artefacts. Not only was the selection of wood species not optimum, but use was also



Figure 11.17 *Juniperus* with its many slender trunks was a convenient potential resource for fence posts. Ginkelse Hei reserve, Veluwe, January 2006.

made of branches instead of the more commonly employed sturdier standing timber. There are only a few exceptions: the paddles, the 'canoe partition', a radially split piece of ash and a split piece of *Taxus baccata*, which must be waste formed in the manufacture of a bow. So the occupants of Schipluiden did incidentally import complete artefacts from elsewhere, or high-quality wood for the manufacture of artefacts.

11.7.6 Concluding remarks

The vegetation at and around the Schipluiden-Harnaschpolder site yielded only a limited range of wood for use in the manufacture of artefacts (chapter 21). Species that were commonly used in the Neolithic and Mesolithic did not occur in this region: no ash for axe hafts and paddles, no elm or yew for bows, no oak for use as construction timber. Whereas flint and stone were imported from distant sources, most of the wooden artefacts were made from locally available species, which were by no means always the most suitable. Exceptions are the two paddles of ash wood. This suggests strong regional ties and is an important argument against for example the option of seasonal mobility. The assumed limited 'external relations' are also in accordance with the local manufacture of the pottery. They however do conflict with the import of fairly large quantities of stone and flint from distant sources.

It is possible that a meaning that was more than utilitarian alone was attached to some species. In two places we observed special attention to two strongly contrasting species: the prickly *Juniperus communis* typical of the coastal area with its hard, straight branches, and the broad-leaved *Alnus* typical of swampy habitats, with its conspicuous orangey, soft wood. The juniper offered natural straight and strong stakes (fig. 11.17), the alder probably the largest straight trunks. These two species were combined in different structures – the fence at Schipluiden and the house at Wateringen 4. In the fence, the alder branches were the only ones with carefully sharpened ends. The stakes of both species appear to have been spared when the southeastern fence stretch (2-5-6) was pulled down. And precisely these two species were also used in the construction of the Wateringen 4 house – alder down the middle and juniper in the wall. The latter is quite understandable in a functional respect, and alder may have been selected for the central roof supports especially for its good, straight trunks. But such functional considerations aside, the two species may also have had an ideological significance, which partly determined their use.

notes

1 In the processing of the finds the label of a large stake of alder wood was evidently mistakenly switched with another label. The stake in question, which was 75 cm long and had a diameter of

6-8 cm, definitely derives from this cluster of stakes, judging from its characteristic post-depositional deformation and its typically sharpened end (fig. 3.27). It may be the missing stake no. 1865, but this could unfortunately not be confirmed.

References

- Andersen, S.H. 1994/1995. Ringkloster, Ertebølle trappers and wild boar hunters in eastern Jutland: a survey, *Journal of Danish Archaeology* 12, 13-59.
- Brøndsted, J. 1957. *Danmarks Oldtid*, volume 1, Copenhagen.
- Clark, J.G.D. 1963. Neolithic bows from Somerset, England and the prehistory of archery in North-western Europe, *Proceedings of the Prehistoric Society* 29, 50-98.
- Eberschweiler, B. 2004. *Bronzezeitliches Schwemmgut vom "Chollerpark" in Steinhausen* (Zug), Basel (Antiqua 37).
- Groenman-van Waateringe, W. 1988. Lokale bosbestanden en houtgebruik in West-Nederland in IJzertijd, Romeinse tijd en Middeleeuwen. In: J.H.F. Bloemers (ed.): *Archeologie en oecologie van Holland tussen Rijn en Vlie*, Amsterdam (Studies in praë- en protohistorie 2), 132-153.
- Hänninen, K./C. Vermeeren 1995. *Giant Junipers. Houtonderzoek aan een Middenneolithische opgraving te Wateringen*, Amsterdam (BIAXiaal 8).
- Louwe Kooijmans, L.P. 1985. *Sporen in het land*, Amsterdam.
- Louwe Kooijmans, L.P. 1986. Het loze vissertje of boerke Naas? het een en ander over het leven van de steentijdbe-woners van het Rijnmondgebied. In: M.C. van Trierum/ H.E. Henkes (eds.), *A contribution to prehistoric, Roman and medieval archaeology*, Rotterdam (Rotterdam papers 5), 7-25.
- Louwe Kooijmans, L.P./C.E. Vermeeren/A.M.I. van Waveren 2001a. Artefacten van hout en vezels. In: L.P. Louwe Kooijmans (ed.), *Hardinxveld-Giessendam Polderweg, een mesolithisch jachtkamp in het rivierengebied (5500-5000 v. Chr.)*, Amersfoort (Rapportage Archeologische Monumenten-zorg 83), 379-420.
- Louwe Kooijmans, L.P./K. Hänninen/C.E. Vermeeren 2001b. Artefacten van hout. In: L.P. Louwe Kooijmans (ed.), *Hardinxveld-Giessendam De Bruin: Een kampplaats uit het Laat-Mesolithicum en het begin van de Swifterbant-cultuur (5500-4450 v. Chr.)*, Amersfoort (Rapportage Archeologische Monumentenzorg 88), 435-478.
- McGrail, S. 1998. *Ancient Boats in North-West Europe. The Archaeology of Water Transport to AD 1500*, New York.

Müller-Beck, H. 1965. *Seeberg-Burgäschisee-Süd, Teil 5: Holzgeräte und Holzbearbeitung*, Bern (Acta Bernensia 2).

Nielsen, P.-O. 1981. *Stenaldern, Bondestenaldern*. Copenhagen.

Raemaekers, D.C.M. /C.C. Bakels/B. Beerenhout/A.L. van Gijn/K. Hänninen/S. Molenaar/D. Paalman/M. Verbruggen/C. Vermeeren 1997. Wateringen 4: a coastal settlement of the Middle Neolithic Hazendonk 3 Group, *Analecta Praehistorica Leidensia* 29, 143-191.

Schweingruber, F.H. 1982. *Mikroskopische Holzanatomie*, Birmensdorf.

Wesselkamp, G. 1980. *Die organische Resten der Cortaillod-Schichten*, Bern (Die neolithischen Ufersiedlungen von Twann, Band 5).

Wyss, R. 1969. Wirtschaft und Technik. In: *Ur- und Frühgeschichtliche Archäologie der Schweiz, Band II Jüngere Steinzeit*, Basel, 117-138.

Wyss, R. 1983. *Die jungsteinzeitlicher Bauerndörfer von Egolzwil 4 im Wauwilermoos, Band 2: die Funde*, Zürich (Archäologische Forschungen).

L.P. Louwe Kooijmans
Faculty of Archaeology
Leiden University
PO Box 9515
2300 RA Leiden
The Netherlands
lp.louwe.kooijmans@arch.leidenuniv.nl

L.I. Kooistra
BIAX Consult
Hogendijk 134
1506 AL Zaandam
The Netherlands
kooistra@biax.nl