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SCHIPLUIDEN

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

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AND PETER F.B. JONGSTE

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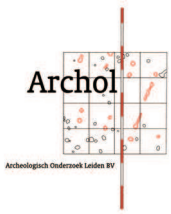

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21 Wood and charcoal

Laura Kooistra

Alder (Alnus), *juniper* (Juniperus communis), *Pomoideae and* Prunus *are the most important of the seventeen wood taxa that were encountered on the Schipluiden dune. The range of species is more or less the same in the case of all the distinguished categories and phases. The minimal differences probably have more to do with preferential use of specific wood species for certain applications than with changes in the woody vegetations. Most of the wood species are characteristic of the* Rhamno-Prunetea *class of scrub vegetations typical of dune slopes at some distance from the sea. The junipers also grew in those vegetations. Alder and willow* (Salix) *grew in alder carrs (*Alnetea glutinosae) *on the peat.*

21.1 Introduction

On the basis of the results of the excavation of the Wateringen 4 site, allowance was during the preparation of the Schipluiden excavation made for the possibility of the discovery of wood, but the site was not expected to yield large quantities of wood. Nevertheless, quite a lot of wood was found to have survived in the substantial area covered by the settlement and the associated large dump zones thanks to the waterlogged conditions on the flanks of the dune and in the lowermost features. The recovered wood includes beautifully carved artefacts and posts with pointed ends that formed part of the fences enclosing the dune (see section 11.4.5). Finds of unworked wood – in the form of branches and twigs – provide an impression of the natural tree and shrub vegetation on and around the dune.

Wood in a carbonised form is not dependent on wetland conditions for survival. As charcoal, it is to be found everywhere where a fire once burned and it has not been pulverised by mechanical pressure. Charcoal was indeed found in large quantities on the dune, both in the find layers (section 4.5.6 and 4.6) and in many of the archaeological features, in particular the fills of hearth pits (section 3.5.1). We assume that the firewood was randomly collected in the settlement's surroundings, as is usually the case. If that is correct, the identifications of the firewood also provide information on the woody vegetation in the settlement's immediate surroundings. People may also have needed firewood for specific purposes (for example the smoking of meat), and may in such cases have deliberately selected firewood of a specific type and species.

Wood owes its great importance as a raw material to its many favourable properties. An equally important factor is that the trees and shrubs, that produce the employed wood, are very common in our temperate climate zone. So for most prehistoric cultures the raw material wood was usually literally within reach. Whether this was also the case for the occupants of Schipluiden is not so certain. In phase 1 at least, the dune was surrounded by fairly treeless salt-marsh vegetations, and most woody species probably grew on the slightly higher dunes. In phases 2 and 3 the dune was surrounded by a peat bog and the potential acreage for trees and shrubs increased (see section 14.6).

This chapter discusses the origins of the wood and charcoal and outlines the woody vegetations.

21.2 Materials and method

21.2.1 Wood

All wood on which tool marks were observed in the field was collected, plus some of the wood showing no visible tool marks or signs of use. In total, 660 pieces of wood were examined, 185 of which were artefacts and 475 were pieces showing no, or very few tool marks.

The wood was very irregularly distributed among the distinguished phases. This is due to a major difference between the two dominant contexts: Unit 18 on the south-eastern side of the dune and the secondary fill of the pits and wells on the northwestern side. Whereas remains from the beginning of the period of occupation (phases 1-2a and 2a) became incorporated in sediments ensuring their survival, far fewer remains have survived from the end of the period (phases 2b and 3, table 21.1, fig. 21.1).

The wood was initially divided into four categories:
- wooden artefacts, that is, wood that was used to make objects,
- fence posts,
- wood showing marks formed in chopping or carving,
- wood showing no visible tool marks.

It was initially assumed that the wood showing no tool marks derived from trees and shrubs that grew on the dune itself, or that it was washed up on the dune. So it was

		phase	1	1-2a	2a	2b	3	1-3	totals	fence	artef.
alder	Alnus		4	69	79	–	3	4	159	19	19
cornel	Cornus		–	4	3	–	–	–	7	–	–
hazel	Corylus avellana		–	1	–	–	–	–	1	–	4
spindle	Euonymus europaeus		–	4	–	–	–	–	4	1	5
ash	Fraxinus excelsior		–	2	1	–	–	–	3	–	4
juniper	Juniperus communis		4	8	30	2	6	–	50	23	4
privet	Ligustrum		–	1	–	–	–	–	1	–	–
honeysuckle	Lonicera		–	–	–	–	–	–	–	–	1
apple type	Pomoideae		–	11	38	–	–	–	49	4	15
sloe (/cherry/plum)	Prunus (spinosa)		1	18	29	–	–	–	48	42	11
oak	Quercus		–	–	–	–	–	2	2	–	–
purging buckthorn	Rhamnus cathartica		–	–	3	–	–	–	3	–	1
rose	Rosa		–	3	–	–	–	–	3	–	–
willow	Salix (excl. S. repens)		–	22	4	–	–	–	26	2	6
yew	Taxus baccata		–	–	1	–	–	–	1	–	1
elm	Ulmus		–	–	–	–	–	1	1	–	–
guelder rose	Viburnum opulus		–	2	5	–	–	–	7	–	2
	bark		–	11	31	–	1	–	43	–	–
	indet.		–	11	18	1	2	–	32	13	–
Totals			*9*	*167*	*242*	*3*	*12*	*7*	*440*	*104*	*73*

Table 21.1 Unworked natural wood. Wood species versus phase compared with fence posts and artefacts.

assumed that this category in particular would provide information on the local vegetation. In the specific situation of Schipluiden, a large proportion of the apparently unworked wood – branches or trunks, parts of trees and shrubs – could however also very well have been imported by the occupants from fairly distant sources, for example for use as firewood or for fence construction. In that case all the wood found at Schipluiden will more likely represent the high vegetation in the site's wide surroundings. For this reason the two categories ('unworked' and 'showing tool marks') were combined.

The wood was described in the usual manner – *i.e.* the dimensions of each find were specified and the part of the tree or shrub from which it derived. In the latter determination it was assumed that pieces of wood with a diameter smaller than 5 cm are branches, and pieces with a diameter of more than 10 cm are thick branches or trunks. Pieces of wood with a diameter between 5 and 10 cm were interpreted as thick branches or thin trunks. In a few cases the number of annual rings could be determined and the season in which the wood was chopped. The wood species were identified with the aid of a transmitted-light microscope with magnifi-cation up to 400×. The identifications were checked with the aid of the identification literature (Schweingruber 1982) and the reference collection of BIAX *Consult*.

For the discussion of the wooden artefacts, see chapter 11.

21.2.2 Charcoal

All over the site all the find-containing deposits also contained charcoal (section 4.6). The entire site can be said to have been embedded in a blanket of charcoal. Only a small part of all the charcoal – conspicuously large lumps or concentrations – was collected by hand. A representative quantity was moreover spatially recorded in the 4-mm sieved strips. The soil samples taken for the archaeobotanical and archaeozoological analyses of course also contained charcoal.

In selecting charcoal samples for identification, due attention was paid to the distribution among the distinguished occupation phases, and within each phase to a distribution across the different sides of the dune, in order to neutralise any spatial differences. In addition, samples were selected from wells, because they represent a much shorter period of deposition, and of hearth pits, to find out whether specific types of wood were selected for such fires. No samples from phase 2b were selected for various reasons, the most important being that the colluvium of Units 15/16 involved a much greater risk of admixture with older remains than in the case of the larger material categories.

A large proportion of the collected charcoal was not analysed.

It was decided to analyse the charcoal from the layers in the hope of obtaining an understanding of the spatial distribution across the dune per phase. Our efforts were however not entirely successful because fairly little charcoal had

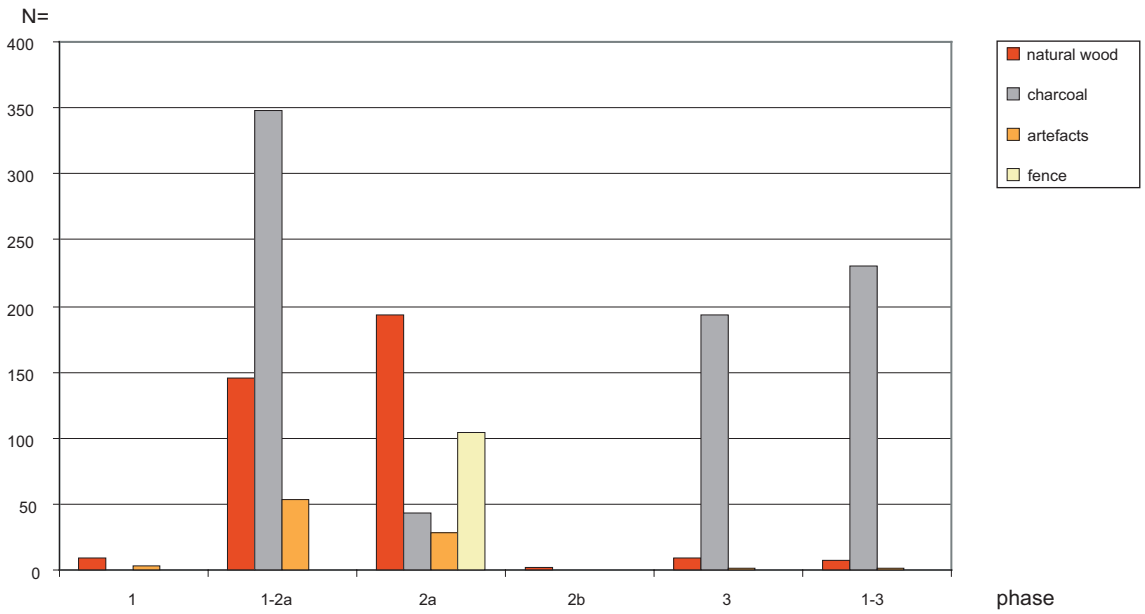

Figure 21.1 Number of wood identifications per wood category showing the unequal coverage of the various phases.

survived from some of the phases, in particular 1 and 2b. We also analysed samples from a few wells and hearth pits and one pit. Differences between the charcoal from the layers and the features could reflect a selective use of wood, in particular of firewood in the hearth pits. In total, 1134 identifications were made.

In charcoal analysis, the number of pieces of charcoal to be identified per context cannot be specified (Heinz 1987; Van Rijn/Kooistra 2001). A hearth pit may for example contain a much narrower range of species than a contemporary find layer due to a selective use of firewood. Usually, the analysis of a sample is discontinued when no new species are for some time encountered in the identification. Experience has shown that in the case of Dutch finds, the identification of 50 to 100 pieces of charcoal per context will usually suffice.

In the analysis of the charcoal samples the wood species was determined, and where possible the part of the tree or shrub from which the wood derived. The charcoal was analysed with the aid of an incident light microscope with magnification up to 400×. The species identifications were checked in the same manner as in the case of the wood samples.

21.2.3 Wood species and wood taxa

In a number of cases it was not possible to identify the wood to species level purely on the basis of anatomical characteristics. This holds for *Alnus*, *Cornus*, *Ligustrum*, *Lonicera*, Pomoideae, *Prunus*, *Quercus*, *Rosa*, *Salix* and *Ulmus*. Various considerations do however allow us to identify likely candidates.

The first of those considerations is the present occurrence of species in the (western) Netherlands. The only *Ligustrum* (privet) species occurring naturally in the Netherlands nowadays is *Ligustrum vulgare* (wild privet); it is likely that this is also the species encountered at Schipluiden. Two *Lonicera* (honeysuckle) species occur in our parts, the general species, especially in the coastal region, being *Lonicera periclymenum* (also referred to as honeysuckle).

The second consideration is the occurrence of seeds among the botanical macro-remains as a frame of reference (chapter 19). Whether the wood represents the same species is of course not certain, but it is very likely. Several species identifications are hence based on this consideration. The genus *Alnus* (alder) was represented only by seeds of *Alnus glutinosa* (also referred to as alder) and the genus *Cornus* (cornel) only by seeds of *Cornus sanguinea* (dogwood). Of the family group of Pomoideae only the berries, pips and fruits of *Crataegus monogyna* (hawthorn) and *Malus sylvestris* (crab apple) were found. The wood of *Prunus* (cherry/plum/sloe) can be identified to species level in a non-committal way. At Schipluiden, only the wood of sloe (*Prunus spinosa*) was positively identified. This is in accordance with the many sloe stones found at the site.

The other botanical material categories yielded no further indications of willow. It may however with some certainty be assumed that creeping willow (*Salix repens*) did not grow at Schipluiden. This low shrub has branches with a diameter of only one centimetre and the branches found at Schipluiden are much thicker.

In some cases samples could not be identified to species level with certainty. Such uncertain identifications are usually referred to by 'cf.'. For convenience of comparison, the uncertain identifications have been grouped under 'indet.' in the tables.

21.3 Results

21.3.1 The wood species per phase (figs. 21.2-3)

The 'unworked' natural wood, the charcoal and the wooden artefacts in principle provide different, complementary pictures of the tree and shrub vegetation. The species spectrum of the wooden artefacts is in principle biased due to (preferential) use of specific types of wood and import from distant sources. If we assume that the charcoal was formed in deliberately made fires and by accidental burning, then we must also assume that the charcoal spectra are probably biased due to the selection of specific types of firewood. The natural wood, finally, may – like the firewood – derive from a wide zone around the dune, which can be interpreted as the central part of the group's daily territory, up to a distance of one hour's travelling or 'a few' kilometres.

The unworked wood provides good information on the first occupation phases (table 21.1). There are five dominant species: alder, Pomoideae, *Prunus* (sloe, plum, cherry), juniper and willow. They will have determined the character of the surrounding vegetation. In addition, a large range of shrubs were represented (each identified in several samples), plus three deciduous trees (*Quercus*, *Fraxinus excelsior*, *Ulmus*) and – remarkably – yew. The greater part of the wood derived from trunks and branches (table 21.2). The scarce data available on phase 1 show that the main tree species were to be found in the area already at the beginning of the occupation period. The evidence on the later phases shows no deviations from these ratios.

The charcoal identifications essentially reveal the same picture for the investigated phases (table 21.3). Of the five dominant species, only juniper was less frequently identified in the charcoal samples. This means that the firewood was randomly selected, except that juniper was not, or only rarely used for making fires. Also conspicuous in the earliest spectrum is the high frequency of purging buckthorn (*Rhamnus cathartica*), for which we have no obvious explanation. Even more surprising is the biased composition of the firewood in each of the four analysed hearth pits. 87% of the charcoal in one of these pits was found to derive from Pomoideae, 84% of that in another pit derived from *Prunus*

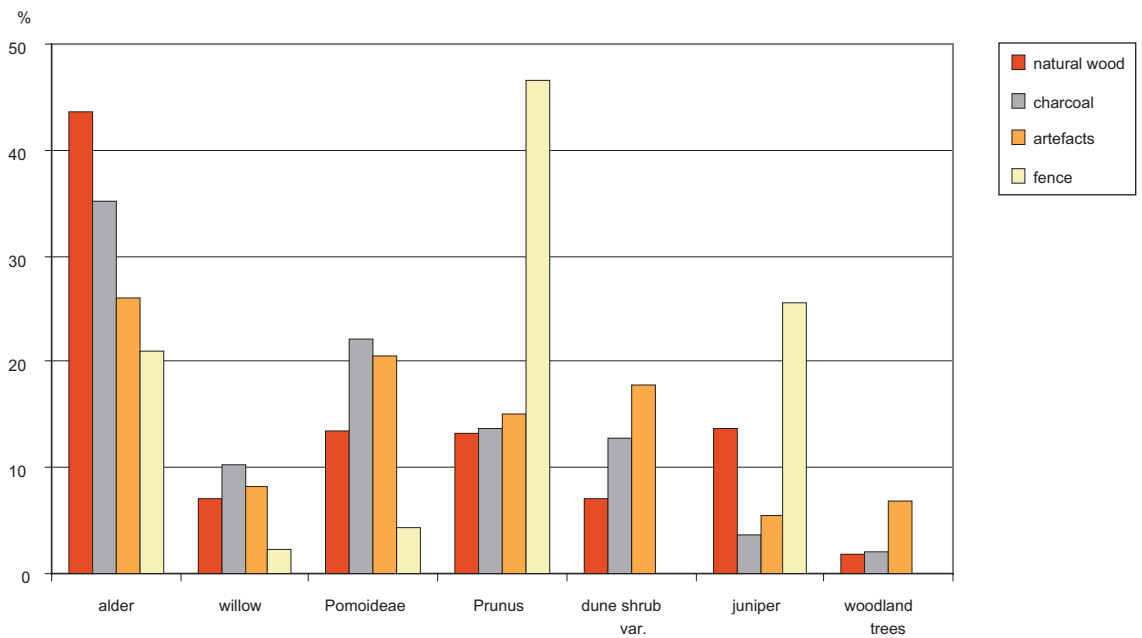

Figure 21.2 Representation of the various wood species in different wood categories. Note the preference for *Prunus* and juniper for the fence posts and the relative importance of alder in all categories.

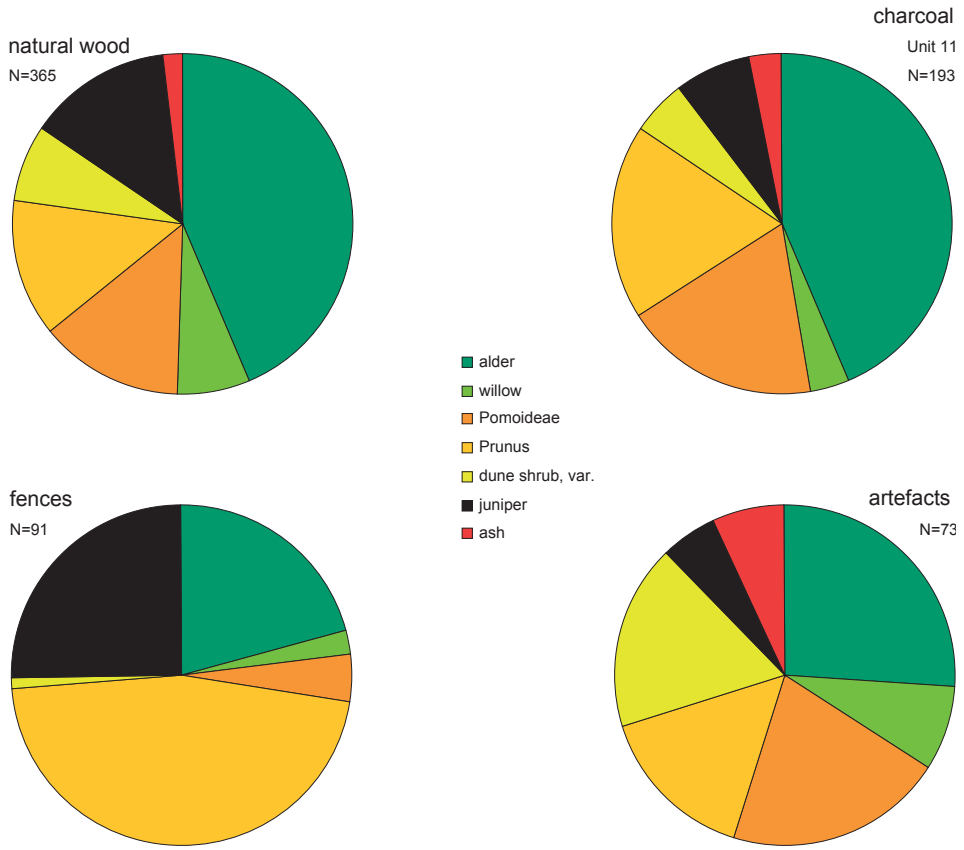

Figure 21.3 Proportions of the main wood species in the different wood categories. Note the comparable compositions of the natural wood and charcoal samples and the selective use of wood for fence posts and artefacts.

and 74 and 80% of the charcoal of the other two pits derived from alder. This is however probably not attributable to a selective use of firewood as alder yields firewood of rather poor quality (Taylor 1981, 45). The three species are moreover the most commonly occurring species at Schipluiden. All that can be said with certainty is that the people who made these fires did not use mixtures of the different species, which suggests that the firewood was collected in different parts of the surrounding area.

The greater part of the identified charcoal derived from branches and twigs, so we may assume that the occupants regularly went on wood-gathering expeditions in their site's surroundings.

The ends of the wooden fence posts constitute a separate source of information within the category of artefacts. They reveal a large-scale, low-profile, utilitarian use of the available wood. We see no evidence of distinct preferences for specific types of wood. Use was made of thin trunks/thick branches of the four prominent species, with a shift in emphasis towards juniper at the expense of Pomoideae. Willow wood was used only once. Perhaps willow was considered unsuitable for fence posts, or perhaps it was reserved for other applications. We may assume a comparable use of wood for the houses. This is indeed confirmed by the Wateringen 4 house, which had (thick) central roof supports made of alder and wall posts consisting of thinner juniper trunks. See chapter 11 for the use of wood for artefacts.

Remarkable is the large proportion of wood of branches or thin trunks (tables 21.2 and 21.4). The high percentage of branches and twigs among the firewood can be easily explained by the gathering of dead wood for fires. The fact that many of the artefacts were made from branches or thin trunks seems strange on the face of it. It implies that no thick trees – other than alder and the Pomoideae – grew in the dune's surroundings.

Most of the wood taxa encountered indeed derive from shrubs and low trees, which do not usually develop thick trunks. When the annual rings were counted, it was found

	tree element	trunk	tr/br	branch	gnarl	root	?	totals
alder	Alnus	2	24	108	2	1	22	159
cornel	Cornus	–	–	7	–	–	–	7
hazel	Corylus avellana	–	–	1	–	–	–	1
spindle	Euonymus europaeus	–	2	2	–	–	–	4
ash	Fraxinus excelsior	1	1	–	–	–	1	3
juniper	Juniperus communis	2	9	28	–	–	11	50
privet	Ligustrum	–	–	1	–	–	–	1
apple type	Pomoideae	3	5	30	–	–	11	49
sloe (/cherry/plum)	Prunus (spinosa)	1	5	39	–	–	3	48
oak	Quercus	1	–	–	–	–	1	2
purging buckthorn	Rhamnus cathartica	1	2	–	–	–	–	3
rose	Rosa	–	–	3	–	–	–	3
willow	Salix (excl. S. repens)	–	3	23	–	–	–	26
yew	Taxus baccata	–	–	–	–	–	1	1
elm	Ulmus	–	1	–	–	–	–	1
guelder rose	Viburnum opulus	–	–	6	–	–	1	7
	bark	38	2	–	–	–	3	43
	indet.	3	5	11	3	1	9	32
Totals		*52*	*59*	*259*	*5*	*2*	*63*	*440*

Table 21.2 Unworked wood. Wood species versus tree elements.

	phase / feature	1	1-2a	2a	2b	3	1-3	hearth pits 15-89	hearth pits 17-253	hearth pits 21-75	hearth pits 2-99	pit 15-80	totals
alder	Alnus	–	80	26	–	84	93	39	4	35	5	4	370
cornel	Cornus	–	4	–	–	1	6	–	–	–	–	–	11
hazel	Corylus avellana	–	1	–	–	–	–	–	–	–	–	–	1
spindle	Euonymus europaeus	–	1	1	–	–	1	1	–	–	–	–	4
ash	Fraxinus excelsior	–	–	–	–	6	9	–	–	–	–	–	15
juniper	Juniperus communis	–	2	–	–	14	14	1	–	3	–	–	34
privet/honeysuckle	cf.Ligustrum/Lonicera	–	–	–	–	2	–	–	–	–	–	–	2
apple type	Pomoideae	–	95	4	–	36	43	2	–	–	48	15	243
sloe (/cherry/plum)	Prunus (spinosa)	–	31	7	–	36	36	–	43	3	–	8	164
oak	Quercus	–	1	–	–	–	1	–	–	–	–	–	2
purging buckthorn	Rhamnus cathartica	–	69	2	–	5	13	–	4	–	–	13	106
rose	Rosa	–	–	–	–	–	–	–	–	–	–	–	–
willow	Salix (excl. S. repens)	–	60	3	–	7	13	6	–	–	2	21	112
yew	Taxus baccata	–	–	–	–	–	–	–	–	–	–	–	–
elm	Ulmus	–	–	–	–	–	–	–	–	–	–	–	–
guelder rose	Viburnum opulus	–	4	–	–	2	1	–	–	–	–	–	7
	bark	–	–	–	–	–	–	–	–	–	–	–	–
	indet.	–	27	–	–	19	4	4	–	3	–	6	63
Totals		–	*375*	*43*	–	*212*	*234*	*53*	*51*	*44*	*55*	*67*	*1134*

Table 21.3 Charcoal. Wood species versus phase compared with some hearth pit samples.

	tree element	trunk	branch	twig	gnarl	root	?	totals
alder	Alnus	10	39	13	30	1	277	370
cornel	Cornus	–	2	4	–	–	5	11
hazel	Corylus avellana	–	–	–	–	–	1	1
spindle	Euonymus europaeus	–	1	–	–	–	3	4
ash	Fraxinus excelsior	3	1	–	2	–	9	15
juniper	Juniperus communis	–	12	8	3	–	11	34
privet/honeysuckle	cf.Ligustrum/Lonicera	–	–	2	–	–	–	2
apple type	Pomoideae	8	34	40	7	–	154	243
sloe (/cherry/plum)	Prunus (spinosa)	2	37	7	12	–	106	164
oak	Quercus	1	–	–	–	–	1	2
purging buckthorn	Rhamnus cathartica	2	29	5	–	–	70	106
rose	Rosa	–	–	–	–	–	–	–
willow	Salix (excl. S. repens)	–	12	17	1	–	82	112
yew	Taxus baccata	–	–	–	–	–	–	–
elm	Ulmus	–	–	–	–	–	–	–
guelder rose	Viburnum opulus	–	–	–	–	–	7	7
	bark	–	–	–	–	–	–	–
	indet.	–	1	3	12	–	47	63
Totals		*26*	*168*	*99*	*67*	*1*	*773*	*1134*

Table 21.4 Charcoal. Wood species versus tree elements.

that even some of the thin branches were many years old. Apparently local growing conditions were not optimum. That would indeed be in accordance with the almost complete absence of large deciduous trees (ash, oak and elm). Finally, no relation was observed between branch thickness and the number of annual rings. There would have been such a relation if the occupants had fairly regularly lopped branches from the same trees and bushes. Although few data are available on annual rings, it would seem that the people living on the dune had at their disposal wood of fully-grown low trees and shrubs and did not always gather their wood from the same grove.

21.3.2 Comparison with Wateringen 4

At the nearby contemporary, very comparable, but much smaller site of Wateringen 4 the zone in which waste was dumped extended only a short way into the surrounding marsh. There, wood had survived only in a few pits and in some postholes of structures, among which was a small house. 77 pieces of wood were analysed, including 15 pointed posts, and 65 pieces of charcoal were identified (Raemaekers *et al*. 1997, 159; Hänninen/Vermeeren 1995). The results agree largely with those of Schipluiden: alder, juniper, Pomoidea and *Prunus* are the dominant species and various shrubs were identified which also played a minor role at Schipluiden. Alder and juniper were used for posts for the structures, which is comparable with the use of wood for the fences at Schipluiden. *Prunus* and Pomoideae were evidently considered satisfactory for fences, but not for house construction. A conspicuous difference is however the occurrence of maple (*Acer*), among both the worked (4×) and the unworked (likewise 4×) wood, and oak (*Quercus*), three times among the unworked wood, once as a post and among the charcoal. All but one of the pieces of maple were found within a few metres from one another, along with a plank-shaped artefact measuring approx. 12 × 7 × 1.5 cm that had been meticulously chopped on two sides. The absence of *Acer* at Schipluiden suggests that this piece of wood was imported from elsewhere and was partly or entirely carved at the site.

21.3.3 The Bell Beaker structure

Many centuries after the dune had been abandoned as an occupation area and it had gradually been covered with peat, the site was once more visited by people, who hammered posts into the wet peaty ground, down to the hard sandy subsoil (sections 3.8.7 and 11.6). Twenty-four of those posts were examined. Sixteen were found to be of willow wood and eight of alder. Only in the case of alder had two thick trunks been carved into posts. The other posts were branches or thin posts. In addition, five pieces of unworked wood from Unit 2 were examined, plus a trunk of an oak (*Quercus*) with a diameter of 30 cm and some branches of alder and spindle (*Euonymus europaeus*). As this wood was of a much later date it will not be discussed here.

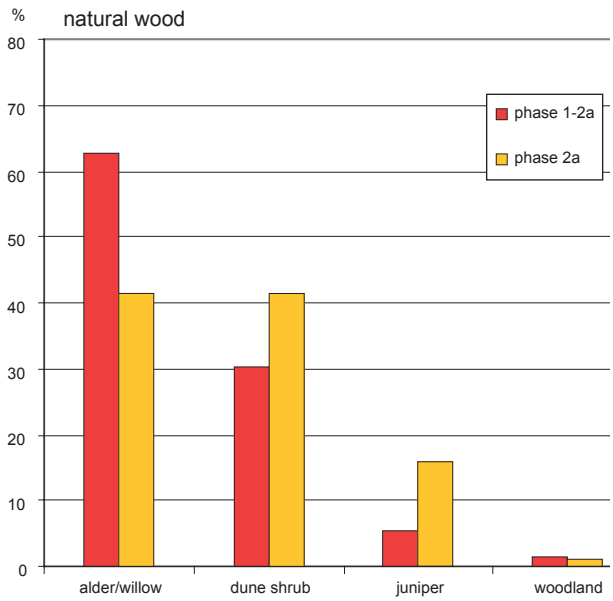

Figure 21.4 Natural wood; main vegetation types represented per phase, *cf* table 21.1.

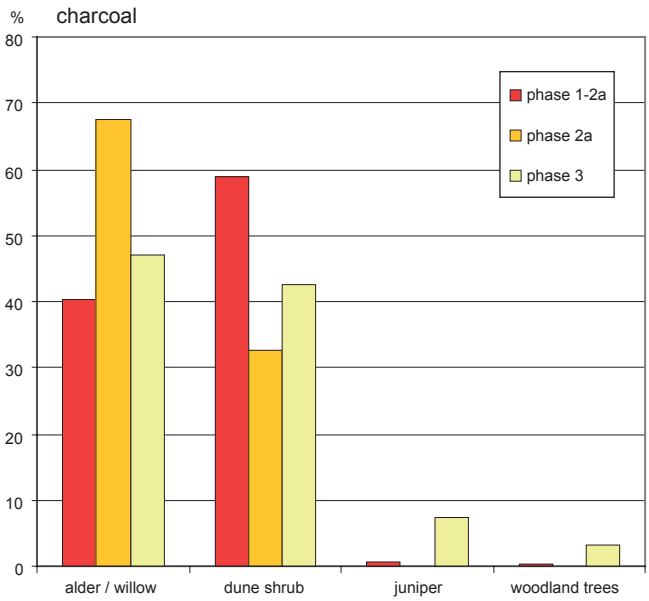

Figure 21.5 Charcoal; main vegetation types represented per phase, *cf* table 21.3.

	dune shrubs	alder carr
Alnus	–	●
Cornus (sanguinea)	●	–
Corylus avellana	●	–
Euonymus europaeus	●	–
Fraxinus excelsior	○	○
Juniperus communis	(●)	–
Ligustrum	●	–
Lonicera	●	○
Pomoideae (*)	●	–
Prunus (spinosa)	●	–
Quercus	○	○
Rhamnus cathartica	●	–
Rosa	●	–
Salix (excl. S. repens)	–	●
Taxus baccata	–	–
Ulmus	○	–
Viburnum opulus	●	○

●	dominant
(●)	disappeared
○	present
–	absent

Table 21.5 Wood species attested at Schipluiden and their occurrence in different types of vegetation.
* = *Crataegus monogyna* and *Malus sylvestris*.

21.4 Conclusion

21.4.1 Woody vegetations (figs. 21.4-5)

In phase 1 the dune formed part of a coastal plain along with other dunes in its wider surroundings (chapter 14). Salt marshes and tidal channels to the northwest and south of the dune dominated the landscape (see fig. 14.7). In phase 2a reed pools began to develop at some distance from the dune (and reed peat began to grow in them), although there were still salt marshes elsewhere. In phase 2 the reed peat continued to grow and the lower parts of the dunes, including that of Schipluiden, disappeared beneath the expanding peat. This process continued in phase 3, until eventually the entire plain had evolved into a reed swamp in which subsequently – in some parts at least – sedge peat began to grow. By the time of the Bell Beaker culture all the dunes in this area had disappeared beneath the peat.

These landscape-genetic data suggest two types of vegetation for the origins of the tree and shrub wood: first of all the *Rhamno-Prunetea* scrub vegetations on the dunes, and secondly the *Alnetea glutinosae* alder carrs on eutrophic and mesotrophic peat. In table 21.5 the identified wood species have been classified according to these two types of vegetation. Only yew grew in neither type. The few pieces of yew wood that were found on the dune may have been imported from elsewhere. It is not inconceivable that efforts were made to obtain yew, because in the Mesolithic and Neolithic it was known that yew wood was particularly

Figure 21.6 Dune shrubs *(Rhamno-Prunetea)* on a low dune ridge in the present-day Kennemer Duinen nature reserve near The Hague as a reference for those in Neolithic Delfland, except for the absence of *Juniperus*.

suitable for the manufacture of bows. Ash, elm and oak are wood species that were used for many purposes. They were however almost totally absent from Schipluiden. Although these species can in principle grow in dune shrubs, and ash and oak also in alder carrs, it is assumed that they were extremely scarce, or even absent in the surroundings of Schipluiden. It would seem that conditions for alder carrs in particular were not optimal in any of the phases. At first the area was regularly flooded by salt water; later on conditions became fresh, but still very wet. The environmental conditions were more favourable for the *Rhamno-Prunetea* on the higher dune tops. This type of vegetation will probably have been affected by the occupants' use of wood, and the rising water will gradually have caused it to decrease in size.

Rhamno-Prunetea (fig. 21.6)

Many of the wood species listed in table 21.5 nowadays form part of the *Rhamno-Prunetea* that occurs on calcareous sand in dune areas (Haveman *et al.* 1999, 121-130). Representatives of dune shrubs are often the first woody species to grow in a saline environment. As the coastline came to lie further away and the landscape became less dynamic, the *Rhamno-Prunetea* changed in composition. The pioneers of the *Rhamno-Prunetea* in the coastal area are sea-buckthorn (*Hippophaë rhamnoides*) and elder (*Sambucus nigra*). The former has often been identified in pollen diagrams of the Dutch coastal area (see for example Jelgersma *et al.* 1970; De Jong/Zagwijn 1983), but at Schipluiden it was only encountered in one of the coprolites, incidentally in

Figure 21.7 Alder carr *(Alnetea glutinosae)* a nature reserve in the Dutch rivers district as a reference for the wooded fenland to the east of the Schipluiden site.

combination with elder (see section 18.4). The almost complete absence of sea-buckthorn confirms that the coastline lay far from the dune at the time when the site was occupied, and that a scrub vegetation typical of mid- and interior dune slopes characterised by a wider ranger of species had by then developed on the dune of Schipluiden and nearby dunes.

Juniper (*Juniperus communis*) is almost completely absent from present-day dune shrubs, except for the odd specimen in the dunes to the south of Katwijk (Zeiler/Kooistra 2002, 10). Things were different in the past. In his book on the island of Texel written at the end of the nineteenth century, the naturalist Jac. P. Thijsse for example speaks of junipers in the Fonteinsnol dunes (Thijsse 1927). The best evidence of junipers in the dunes was however obtained in palynological research. Those data show that juniper was a common species in the dunes until in the Middle Ages. After that time this evergreen species disappeared, probably as a result of the drifting sand that accompanied the formation of the Younger Dunes (Zagwijn 1997, 101-106). The composition of the range of trees and shrubs encountered at Schipluiden suggests that juniper grew in the scrub on the slopes of dunes at a certain distance from the sea, which comprised a broader range of species.

The shrubs of the *Rhamno-Prunetea* were the tallest elements of the vegetation in the dune area, which was otherwise covered with grassland vegetations or consisted of bare sand. The proportion of shrubs in a dune vegetation may vary substantially. It is assumed that representatives of dune shrubs grew here and there on the Schipluiden dune and on nearby dunes. Nowadays dune shrubs are green only in the summer. The presence of the evergreen junipers will undoubtedly have made the Neolithic dune shrubs look quite different from present-day shrubs.

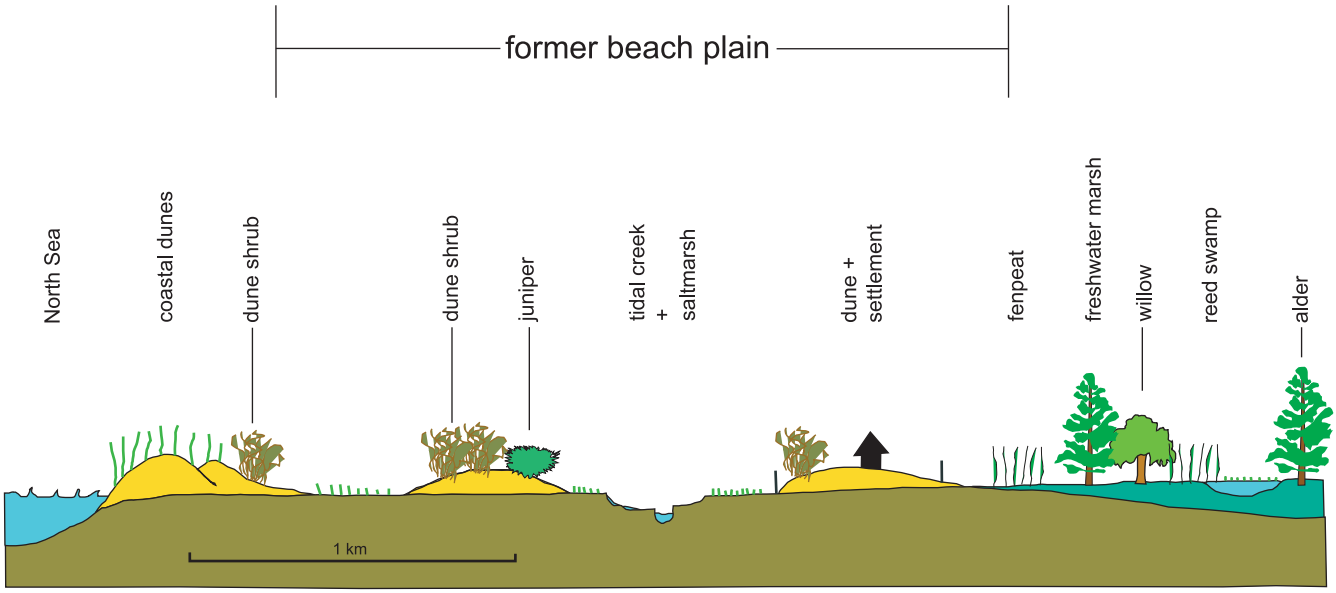

Figure 21.8 Schematic section across the Delfland microregion, *c*. 3500 cal BC, from the coast on the left to the peat fens on the right showing the different types of wood vegetation.

Alnetea glutinosae (fig. 21.7)
Alder, the wood species encountered most frequently at Schipluiden, is the principal representative of alder carrs, followed at some distance by willow (Stortelder *et al*. 1999, 189-193). Both taxa are absent from *Rhamno-Prunetea* dune shrubs.

If the groundwater level remains unchanged, the accumulation of eutrophic and mesotrophic peat will end in the formation of an alder carr. The Schipluiden dune was from phase 2a onwards surrounded by reed and sedge peat (see section 14.7). The dominance of alder and the occurrence of willow make it likely that alder carrs were to be found in this peatland. Unlike those in dune shrubs, the trunks of trees in alder carrs may acquire substantial diameters. It is hence not surprising that at Schipluiden the wood of alders often had the largest diameter.

21.4.2 Woody vegetations in a spatial and chronological context (fig. 21.8)

One of the results of the wood analyses is that the wood supply remained unchanged throughout the entire occupation period. The analyses furthermore showed that the composition of the wood species in the four distinguished categories (artefacts, fence posts, 'partly worked wood' and charcoal) is more or less the same. A third conclusion is that the greater part of the wood consists of thin trunks, branches and twigs. Only in the case of alder, Pomoideae and one ash tree were parts of thicker trunks found. It should however be added that of course only the surviving wood was analysed, and we have no information on the wood that originally stood in the thousands of postholes. The diameters indicate that those postholes held the trunks of fairly large trees.

The species composition implies that the dune shrubs lay some distance from the sea. As far as their situation relative to the coastline is concerned, the Schipluiden dune and the surrounding dunes were suitable areas for these woody vegetations. Alder carrs could theoretically have evolved in parts of the reed and sedge peatland surrounding Schipluiden where the groundwater lay at or below surface level, but the low alder values obtained in the pollen analyses make it unlikely that this was the case. The alders and willows most probably grew a little further east, at the transition of the estuarine zone to the large Holland peat swamp.

Although the wood found on the dune consists predominantly of remains of branches and thin trunks it is not likely that the occupants obtained their wood from sources more than a few kilometres away, because within that distance the landscape – and hence the woody vegetations – began to change. What is surprising is that people continued to gather wood from dune shrubs in phase 3, too, in spite of the advancing peat. Evidently there were still sufficient dunes with tops projecting fairly far above the peat. The many finds of remains of sloes and apples make it likely that some trees or shrubs of these species grew on the dune itself.

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