Sowing the seed ? : human impact and plant subsistence in Dutch wetlands during the Late Mesolithic and Early and Middle Neolithic (5500-3400 cal BC)

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Appendix VI. Archaeobotany of the Late Neolithic site Vlaardingen, the Netherlands

VI.1 Introduction

The site Vlaardingen was excavated between 1959 and 1964 by the Institute for Prae- and Protohistory (University of Amsterdam, now the Amsterdam Archaeological Centre). Archeological results have been published in Van Regteren Altena *et al.* (1962, 1963a, b) and Van Beek (1990). The site, located on a levee along a channel, was occupied at 3350-1950 BC, corresponding with the Vlaardingen group and Bell Beaker culture. Most finds correspond with occupation by the Vlaardingen group, dating to 3350-2550 BC (Van Beek 1990, 249).

This appendix presents the results of botanical macroremains identifications of the site Vlaardingen. The text is based on a manuscript from Prof. dr. W. van Zeist sent to Dr. B.L. van Beek.[44] Prof. dr. W. van Zeist kindly gave permission to publish the results. The interpretation of these finds has been discussed already in Van Beek (1990, 210-211), but the original data set was not included there. The data represent unique results from the site Vlaardingen. The new information is presented in context of a short discussion on earlier published data on pollen, macroremains, wood and charcoal.

VI.2 Materials and methods

Researchers of the Biological-Archaeological Institute (now the Groningen Institute of Archaeology) were involved in the sampling and investigation of the botanical macroremains from Vlaardingen. In 1964, J.A. Bakker and W.A. Casparie collected three samples for analysis of botanical macroremains. W. van Zeist identified the material. The samples were collected near the channel, probably at the southern side of the excavated area. Sample 1 was collected from refuse layer Vlaardingen 1b in the channel (see fig. 10 in Van Regteren Altena *et al.* 1962). At the sample location, a concentration of finds was present. Sample 2 was collected next to a concentration of finds located 30 cm below refuse layer Vlaardingen 1b. Sample 3 was collected from layer Vlaardingen 1a, representing a drift litter deposit. All samples can be related to the Vlaardingen occupation period. The volume of the samples and sample preparation methods are unknown. The presence of seeds of *Juncus* sp. indicates that sieves with a fine mesh width were used. Plant names are according to Van der Meijden (1996). *Brassica* sp. probably represents *B. rapa*, since this is the only identified species of this genus for this region and period.

VI.3 Results

VI.3.1 Macroremains

Table VI.1 shows the macroremains found at Vlaardingen. The taxa are grouped according to ecology. The number of samples is small and as a result one can only make tentative conclusions. The samples only contained waterlogged remains. Most taxa may represent natural vegetation present near the site, although it cannot be excluded that some macroremains were gathered for use or consumption. In the original manuscript, Van Zeist tentatively concluded that the environment consisted of dryland vegetation, alder carr, marsh vegetation, humid grasslands and open water. The environment was mainly a fresh-water environment, although some minor brackish influxes occurred. Human activity resulted in the presence of ruderals of dry and humid terrain, and probably also in the clearance of the alder vegetation.

44 The title of the manuscript is *De vegetatie van Neolithisch Vlaardingen*.

sample / taxon	1	2	3	sample / taxon	1	2	3
Dryland vegetation				*Carr and marsh vegetation (cont.)*			
Corylus avellana	+	+	-	Rumex hydrolapathum	+	-	-
Rosa canina	+	-	-	Schoenoplectus tabernaemontani	++	+	-
Atriplex patula/prostrata	+	+	-	Scirpus sylvaticus	+	-	-
Brassica sp.	+	-	+	Solanum dulcamara	+	-	+
Chenopodium album	+	-	-	Typha angustifolia/latifolia	-	-	+
Chenopodium ficifolium	+	+	-	Urtica dioica	+	-	+
Cirsium cf. arvense	+	-	-	*Wetland pioneer vegetation*			
Conium maculatum	+	-	-	Carex obtrubae	+	+	+
Persicaria lapathifolia	+	-	-	Chenopodium glaucum/rubrum	-	+	-
Persicaria maculosa	++	+	+	Juncus articulatus-type	+	+	-
Plantago major	+	+	+	Juncus bufonius	+	+	-
Polygonum aviculare	++	-	-	Juncus effusus-type	-	+	-
Rumex obtusifolius	-	-	+	Persicaria hydropiper	+	+	-
Solanum nigrum	+	-	-	Ranunculus cf. repens-type	+	-	-
Stellaria media	+	+	-	Ranunculus sceleratus	+	+	-
Crop plants				Rumex conglomeratus	+	-	-
Papaver somniferum ssp. setigerum	+	-	-	Rumex crispus	+	-	-
Carr and marsh vegetation				*Open water vegetation*			
Alnus glutinosa	++	+	+	Ceratophyllum submersum	+	-	-
Alisma plantago-aquatica	+	-	-	Najas marina	+	-	-
Bolboschoenus maritimus	++	-	-	Najas minor	-	-	+
Carex riparia/acutiformis	++	+	+	Potamogeton cf. pectinatus	+	-	-
Cladium mariscus	+	-	-	Potamogeton perfoliatus	+	+	-
Eleocharis palustris	+	+	-	Ranunculus aquatilis-type	+	-	+
Epilobium hirsutum	+	+	-	Zannichellia palustris	+	-	+
Eupatorium cannabinum	+	-	+	*Salt marsh vegetation*			
Galium palustre	-	-	+	Apium graveolens	+	-	-
Hypericum tetrapterum	+	-	-	Juncus gerardii	+	-	+
Lychnis flos-cuculi	+	-	-	Salicornia europaea	-	+	+
Lycopus europaeus	+	+	-	*Ecologically indeterminate*			
Lythrum salicaria	+	+	-	Agrostis sp.	-	-	-
Mentha aquatica	+	-	+	Alopecurus sp.	+	+	-
Myosotis scorpioides	+	-	-	Odontites sp.	-	+	+
Peucedanum palustre	-	-	+	Poa pratensis/trivialis	+	-	-
Phragmites australis	+	+	+				

+ = present
++ = present in relative large numbers
- = not present

Table VI.1 Vlaardingen, waterlogged macroremains from three samples dating to the Vlaardingen period, collected from 1) the refuse layer Vlaardingen 1b, 2) a find concentration located 30 cm below refuse layer Vlaardingen 1b and 3) a drift litter deposit layer Vlaardingen 1a (Van Zeist unpublished data).

It can be added that the samples probably represent the vegetation from open patches along the levees. The number of taxa indicative of closed deciduous woodland is small, although this vegetation may have been present nearby. The presence of salt marsh taxa and water plants that tolerate brackish conditions indicates some marine influence. The assemblage of plants nevertheless also contains species that do not tolerate brackish conditions, such as *Alnus glutinosa*, *Cladium mariscus*, *Eupatorium cannabinum*, *Lycopus europaeus*, *Lythrum salicaria* and *Urtica dioica*, indicating that marine influence was restricted in time and/or space.

The only crop plant found in the investigated samples is *Papaver somniferum* ssp. *setigerum* (opium poppy). Other Neolithic finds of poppy are known from Brandwijk-Kerkhof, Schokland-P14 and Flevoland (see paragraph 11.2.1). Other potential food plants found in the samples are *Corylus avellana* and *Rosa canina*. In addition seeds, fruits and leaves of many herbs may have been consumed (*Chenopodium* sp., *Persicaria* sp., *Apium graveolens*, *etc.*), as well as the roots s.l. of taxa such as *Typha* sp. and *Bolboschoenus maritimus*. The information from other archaeobotanical studies from Vlaardingen (see below) indicates that the material from the presented three samples only represents a part of the complete assemblage of potential food plants.

An interesting find are the fruits of *Conium maculatum*. This species has also been found at Swifterbant-S3 (Van Zeist and Palfenier-Vegter 1981) and Hekelingen III (Bakels 1988). The presence of the remains of this plant at Vlaardingen confirms that it was probably part of the natural vegetation of levees (*cf.* Bakels 1988).

VI.3.2 Information from earlier publications

Published information on other macroremains from Vlaardingen concern finds of cereals and wild plants. Identified cereals are *Triticum aestivum* s.l. (bread wheat/club wheat), *Triticum dicoccon*, *Hordeum vulgare* var. *vulgare* and *Avena* sp., found in a refuse pit in a house (Van Zeist 1970, 55-58). Other macroremains from the Vlaardingen occupation period are shells of hazelnuts and stones of *Prunus* sp. (Van Beek 1990, 46, 82, 103, 159). Concerning *Prunus* sp., Van Beek refers to cherries (*kersepit*), which implies it would concern *Prunus avium*. However, if this indeed concerns a Neolithic find, it probably represents *Prunus spinosa* or possibly *Prunus padus* and not *Prunus avium*. Finds of stones of *Prunus avium* are only known in the Netherlands from the Roman period onwards while the other two species have been found at other Neolithic sites in the same region as Vlaardingen. Moreover, *Prunus spinosa* was also identified in the wood assemblage of Vlaardingen.

The pollen analysis by Groenman-van Waateringe and Niessen-Boomgaard is based on two cores. The first core was sampled in the backswamp area some 60 metres away from the edge of the natural levee (Van Regteren Altena *et al.* 1962, 22, 1963a, 53). The published diagram shows a selection of taxa. The analysis indicates the presence of woodland of dry terrain present on the levees, alder carr vegetation in the higher parts of the back swamps at the transition to the levees, and marsh vegetation in the back swamps. It is concluded that the woodland at the levees represented *Ulmion* woodland, comprising *Ulmus* sp., *Fraxinus excelsior*, *Quercus* sp., *Corylus avellana*, *Acer* sp. and some *Tilia* sp. The results of the first core confirm the occurrence of marine influence and the presence of ruderals indicative of human impact. The second core was sampled in the channel at less than 5 metres away from the refuse layer (Groenman-van Waateringe and Jansma 1969), and is partly contemporaneous with the Vlaardingen occupation. The range of taxa of trees and shrubs is similar to the results of the first core. Comparison of the periods during and after occupation indicates that occupation resulted in the presence of Cerealia-type pollen, *Artemisia* sp., *Polygonum persicaria*-type and *Polygonum aviculare*-type. Local crop cultivation is suggested (Groenman-van Waateringe and Jansma 1969, 114).

The publication of Van Beek (1990) presents the wood and charcoal identifications, based on the work of C.H. Japing (Landbouwhogeschool Wageningen, now Wageningen University). The material was collected in several squares at the location of the former channel and levee. Table VI.2 shows the identifications of both material categories dating to the Vlaardingen and the Bell Beaker occupation periods. The precise plant names are not always clear since Van Beek gives most names in Dutch. *Alnus glutinosa/incana* probably represents *A. glutinosa*. The remains of *Aesculus hippocastanum* and *Myrica gale* probably represent contamination with recent material (Van Beek 1990, 41, 184). The identification of *Sorbus aucuparia* is remarkable since this is usually not identified on species level. The small diversity of species from the Bell Beaker period can be related to the relatively small number of samples available from this period.

In the wood and charcoal assemblage from the Vlaardingen period, *Alnus* sp., *Fraxinus excelsior* and *Acer* sp. are very common, *Quercus* sp. and *Corylus avellana* occur in an intermediate frequency, and *Salix* sp., *Ulmus* sp., *Sorbus aucuparia*, *Lonicera periclymenum*, *Prunus spinosa*, and *Taxus baccata* are very scarce (Van Beek 1990; Van Regteren Altena *et al.* 1963b). Most taxa identified in the wood and charcoal assemblage may have been part of the local vegetation in the exploitation area of Vlaardingen: *Quercus* sp., *Corylus avellana*, *Fraxinus excelsior*, *Ulmus* sp., *Acer campestre*, *Betula* sp., *Crataegus monogyna*, *Sorbus aucuparia*, *Prunus spinosa*, *Lonicera periclynemum*, *Alnus glutinosa* and *Salix* sp. The information on frequencies indicates that *Alnus* sp., *Fraxinus excelsior* and *Acer* sp. were probably dominant in the local vegetation, when assuming that the wood represents the local and extra-local vegetation. However, it cannot be excluded that wood was imported from elsewhere in the exploitation area of the site.

cultural group	wood	charcoal
Bell Beaker culture	Alnus glutinosa/incana	-
	Corylus avellana	-
	Fraxinus excelsior	-
Vlaardingen group	Aesculus hippocastanum	-
	Acer sp.	Acer campestre
	-	Acer platanoides
	Alnus glutinosa/incana	Alnus glutinosa/incana
	-	Betula sp.
	Corylus avellana	Corylus avellana
	Crataegus monogyna	-
	Fraxinus excelsior	Fraxinus excelsior
	-	Myrica gale
	Larix decidua	-
	Lonicera periclymenum	-
	Prunus spinosa	-
	Quercus sp.	Quercus sp.
	Salix sp.	Salix sp.
	Sorbus aucuparia	-
	Taxus baccata	-
	Ulmus sp.	Ulmus sp.

- = not present

Table VI.2 Vlaardingen, wood and charcoal dating to the Vlaardingen group and Bell Beaker culture (Van Beek 1990). See the text for comments on the validity of the results.

For some species, their presence in the (extra-) local vegetation is less likely. Firstly, taxa that were scarce in the wood and charcoal assemblage (presented above) may have been collected elsewhere. Furthermore, *Larix* sp. was probably not part of the natural vegetation of the Netherlands. Van Beek (1990, 184) states that remains of *Larix* sp. may have originated from Switzerland and may have reached the Netherlands via the river Rhine. This would represent transport over an unusually large distance. In addition, it is not certain whether *Acer platanoides* was present in the natural vegetation of the Netherlands during the Neolithic, since archaeobotanical finds are not known (Maes 2006, 91). *A. platanoides* was certainly not common, and it is expected that most wood and charcoal identifications of *Acer* sp. represent *Acer campestre*. Interestingly, *Taxus baccata* becomes part of the natural vegetation of the studied regions in the Neolithic (see chapter 7). The wood of *T. baccata* found at Vlaardingen may have been collected in the exploitation area of the site or may have been transported over a larger distance. Finds of wood of *T. baccata* are also known from the Middle Neolithic coastal sites Schipluiden (Kooistra 2006) and Ypenburg (Kooistra and Hänninen 2008). Another find from a Dutch Neolithic wetland site is a bow found in one of the younger layers at the Hazendonk (Louwe Kooijmans 1987).

VI.4 Discussion and conclusions

The identifications of pollen, wood and charcoal all indicate the presence of alluvial woodland and alder carr in the extra-local vegetation of the settlement at Vlaardingen. Therefore, the major part of the wood was probably collected in the near surroundings of the site. It is not possible to conclude for all species from the wood and charcoal assemblage whether they where present in the natural vegetation or not, and there are indications of contamination with recent material. The pollen data only partly support the variety of taxa that is indicated by the wood analysis. This may support the gathering of some taxa from a distance of at least some km, but it should also be kept in mind that at least one of the pollen diagrams only represents a selection of taxa. In contrast to the pollen, wood and charcoal data, the macroremains identifications do not support the presence of alluvial woodland, but emphasise the presence of alder carr, marshes and dry to moist ruderal terrain. This indicates that the macroremains probably represent the vegetation of the disturbed terrain used for occupation and of the levees along the channel, and the drift litter present in this zone. The wood and pollen data probably represent the vegetation around the settlement, such as the less disturbed vegetation of the levees and the backswamp area. In addition, the small number of samples of macroremains and changes in the vegetation through time may explain the differences between the macroremains assemblage and the other assemblages as well. The newly presented macroremains show human impact, since the assemblage contains several indicators of disturbed and eutrophic conditions. Many taxa may have possibly functioned as food plants or may have been used in other ways. However, the absence of carbonised macroremains restricts further interpretation of people's handling of taxa.

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