The articulation of a "New neolithic"

Raemaekers, D.C.M.

3 The Swifterbant Culture

3.1 Introduction

In this chapter, the archaeological remains of the Swifterbant Culture are presented. The most important problem in such an undertaking is that a description of the material requires a definition of the Swifterbant Culture. At the same time, such a definition is possible only *after* a detailed study of the material remains attributed to this archaeological phenomenon. This problem is by-passed by means of a provisional definition of the Swifterbant Culture as those remains restricted geographically to the lowlands between the rivers Scheldt and Elbe and chronologically to those Neolithic remains that are older than the West Group of the Funnel Beaker Culture (pre 3400 cal. BC). Its pottery is characterised as S-shaped with pointed to round bases, coil-built and sometimes decorated on the rim, shoulder or body surface with fingertip/nail or spatula impressions.
The various excavated sites of the Swifterbant cluster in the province of Flevoland are described below. In the next two sections, two sites from the Rhine/Meuse river area, Brandwijk and Hazendonk, are introduced. The next section focuses on the single major site of the Swifterbant Culture in Germany, Hüde I near lake Dümmer. The description of the material culture of these sites (pottery and flint artefacts) is carried out using standard code lists which are reproduced and commented upon in appendices 1 and 2.
This extensive description of a limited number of sites of the Swifterbant Culture is then followed by a survey of other sites attributed to the Swifterbant Culture. In this section, a number of sites with little material are introduced, while some preliminary results are also given about other sites the investigation of which is still in progress. The next section introduces a major category of surface finds: adzes and axes. These may be used to document the presence of Neolithic man in areas from which no other archaeological evidence is known and offers insight into the spatial extent of the exchange relations with other societies.
The last section of this chapter puts all remains of the Swifterbant Culture in context. The material culture and subsistence strategies of the people of the Swifterbant Culture are presented in both general and detailed outlines. Other topics are the mobility strategies of the people of the Swifterbant Culture, an interpretation of the intersite variability and a structuralist approach. The sites mentioned in this chapter are presented in fig. 3.1.

3.2 The Swifterbant cluster

3.2.1 INTRODUCTION

The first traces of prehistoric occupation in the East Flevoland polder were discovered as a result of the geological investigations by the *Rijksdienst voor de IJsselmeerpolders* (Polder Development Authority). Its archaeologist, G.D. van der Heide, carried out trial excavations on lots G42 (levee site S2) and H46 (river dune site S21) in the years between 1962 and 1967 (Van der Heide 1965a; 1965b). A second series of excavations were undertaken by the *Biologisch- Archaeologisch Instituut* of the Groningen University from 1971 to 1977, while sites S11 and S12 were excavated by R. Whallon of the University of Michigan in 1974. T.D. Price of the University of Wisconsin carried out the 1976 excavations of S22 (Van der Waals/Waterbolk 1976, 4-8).
The aims of the archaeological research at the Swifterbant sites were presented in 1976 by Van der Waals and Waterbolk. These included a study of the time-space relations of the Swifterbant inhabitants, a reconstruction of the natural environment and the use of this environment by Neolithic man, the permanence or seasonality of the settlement in the area and the process of neolithisation. To meet these aims, it was decided to carry out the excavations in a detailed manner. All finds were collected within 1-m^2 parcels and recorded three- dimensionally. Small items were collected by wet-sieving the soil per square per spit of c. 10 cm (Van der Waals/Waterbolk 1976, 9-11).

The basis of the natural environment of the Swifterbant area during the Neolithic was formed in the Late Pleistocene. In this period, a number of river dunes were formed in the basin of the river IJssel. During the Holocene, marshes covered the lowest part of the area. Later, marine influence extended eastwards into the area, which resulted in clay deposition. A creek system developed in these Calais II deposits, which consisted of one major creek and a number of smaller creeks, surrounded by backswamps (fig. 3.2).
At the time of the occupation of the levee sites there was a fresh-brackish environment (Ente 1976; Haquebord 1976).

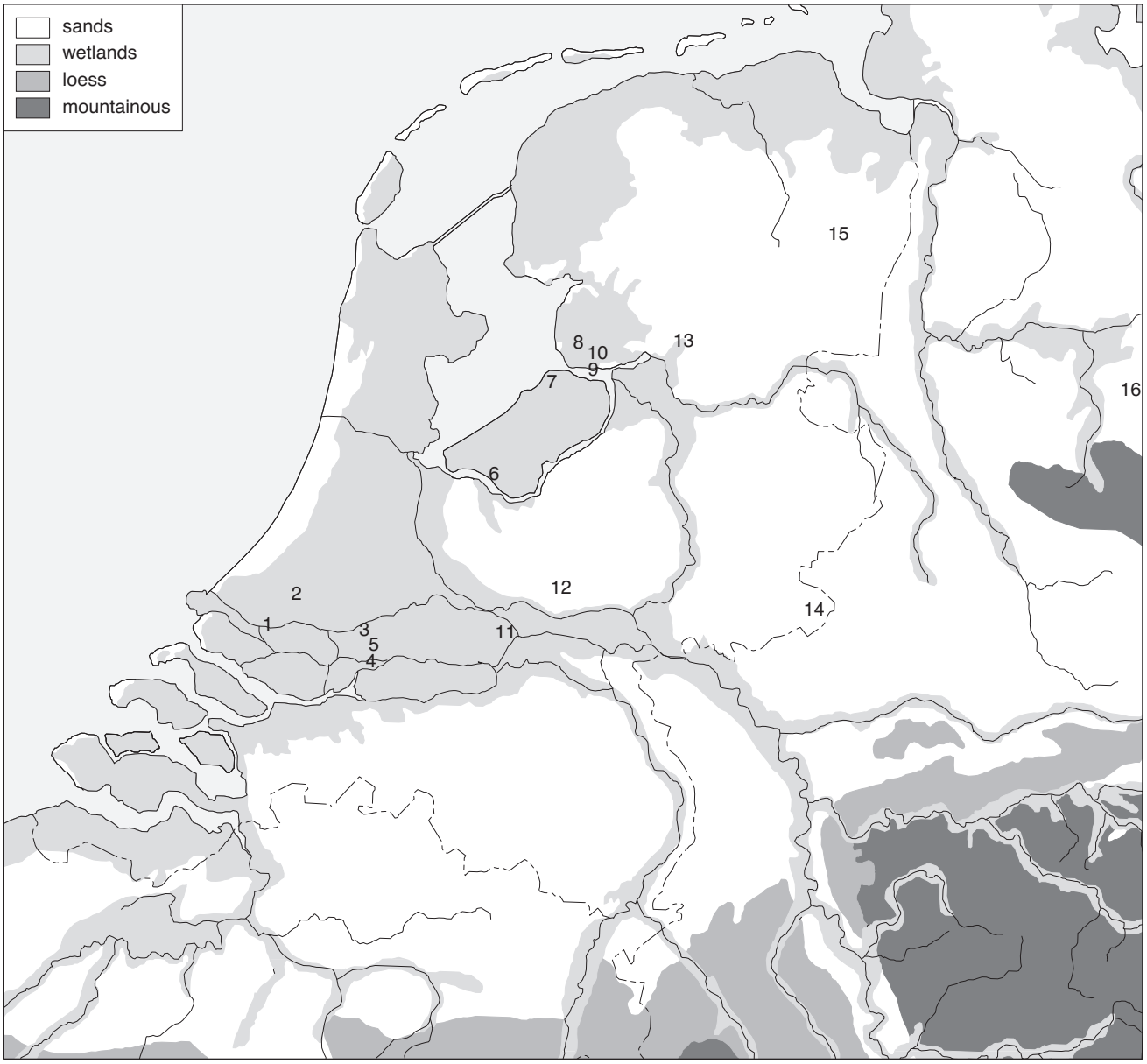


Fig. 3.1. A geomorphological map of the western part of the North European Plain. The Swifterbant sites are indicated. 1=Schiedam; 2=Bergschenhoek; 3=Brandwijk; 4=Polderweg; 5=Hazendonk; 6=Hoge Vaart; 7=Swifterbant cluster; 8=J112; 9=P14; 10=Schokkerhaven; 11=Zoelen-Buren; 12=Ede-Rietkamp; 13=De Gaste-Meppel; 14=Winterswijk; 15=Bronneger; 16=Hüde. Drawing P. de Jong.

Whereas the river dunes were available for occupation throughout the millennia between their formation and eventual inundation around 3520/3370 BC (De Roever 1976, 218), the levees could only be occupied for some hundreds of years at the most. According to Ente (1976, 33), the period in which occupation was feasible lies between about 4360-3800 BC (5500/5450-5000 BP). An even shorter timespan is proposed here, based on ^{14}C dates pertaining to the occupation of both S2 and S3 (appendix 3). When Ente's geological dates are combined with those from archaeological contexts, occupation of the levees seems to have occurred between about 4360 and 3970 BC.

3.2.2 THE SITES

A large number of the discovered sites were partly excavated. Here, a short description of the characteristics of each

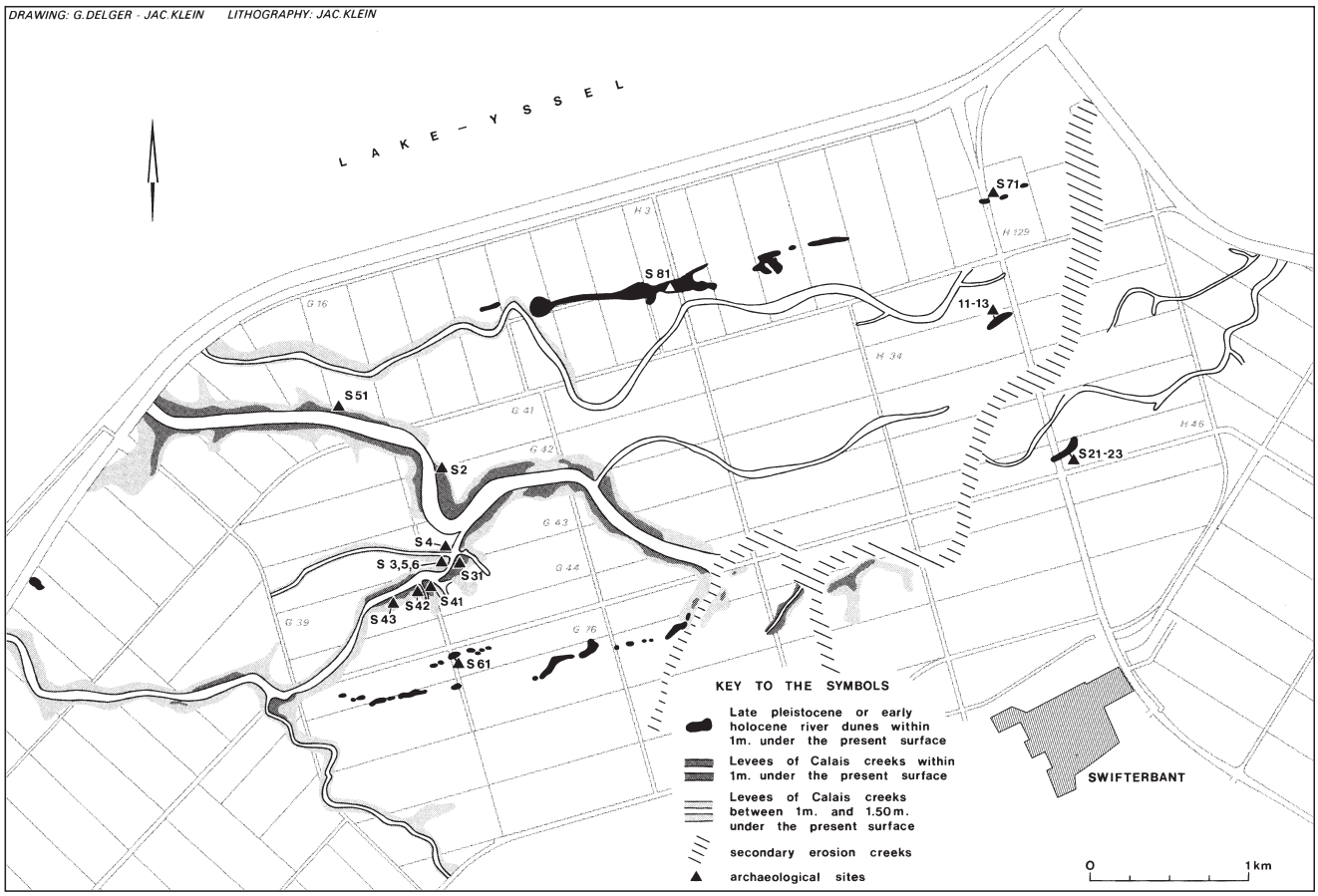


Fig. 3.2. The Swifterbant cluster. Locations of the Mesolithic/Neolithic sites on the river dunes and Neolithic sites on the levees (after Deckers 1979, fig. 1).

excavated site is given. For a description of the pottery and flint artefacts, see sections 3.2.4 and 3.2.5 respectively.

S2

The levee site S2 is the easternmost site along the principal creek, located some 750 metres east of a second site on this creek (S51) (fig. 3.2). The top of the levee was formed by an occupation layer up to 25 cm thick. Features include a row of eight thin stakes and nine graves. The graves are aligned and seem to be orientated parallel to the course of the creek (Van der Waals 1977, 5-15). The occupation of S2 can be dated between about 4360 and 4000 BC (Van der Waals 1977, 13; see appendix 3 and above).

S3/5

S3 is situated along a side creek, while S5 is a trench which extended from S3 into this creek (fig. 3.2). The surface area of S3 is about 760 m^2 (Van der Waals 1977, 15). The top of the clay levee is formed by an occupation layer up to 75 cm thick. Features are numerous: some 650 stakes and posts and a number of hearths were found. The occupation of this site can be dated between about 4334 and 3970 BC (Van der Waals 1977, 15-22; appendix 3).

S3 is crucial for the interpretation of the Swifterbant sites, as this site had the best-preserved organic remains of all excavated sites. Analysis of the bone material shows that pigs dominate the bone spectrum (Zeiler 1991, tables 1-2; table 3.49). Unfortunately, almost no pig bones could be identified as either domestic or wild. Otter and beaver were the major wild species. These were hunted for their furs and meat (Zeiler 1987, 262). The last major category is cattle. The domestic/wild ratio of all mammals indicates that the two categories were of equal importance (Zeiler 1991, 78-79). The spectrum of bird bones reflects species that are thought to have been locally available. Ducks, especially mallard, are the most imprtant species (Zeiler 1991, tables 1-2). The fish remains include both anadromous (sturgeon, grey mullet and eel) and freshwater species (pike, perch and catfish)

(Brinkhuizen 1975; Clason/Brinkhuizen 1978, 79-82). The botanical part of people's diet consisted of both farming produce and wild plants. Cereal remains were found in large numbers, among which naked six-row barley was the dominant species (n=1967, 96.4%). Other cereals found are emmer wheat (n=72, 3.5%) and bread wheat (n=1, 0.05%). The finds not only include charred kernels, but also threshing waste (Van Zeist/Palfenier-Vegter 1981, 141-145).
Wild fruits and nuts are also attested: hazelnut, crab apple, hawthorn, rose-hips and blackberry (Casparie *et al*. 1977, 51-53).

S4
Situated along the same side creek as S3/5 (fig. 3.2), S4 had an occupation layer about 50 cm thick. Features were rare and comprised one hearth and some stakes and posts (Van der Waals 1977, 23-24). No direct ^{14}C dates are available, so no closer date for the occupation of the site can be suggested than between about 4360 and 3970 BC.

S11-13
S11, S12 and S13 are situated on a river dune some 3.5 km from the levee sites (fig. 3.2). While the eastern part of this river dune (S11) survived fairly intact, the western part (S12 and S13) was 'largely truncated' (Whallon/Price 1976, 228) as a result of erosion. At S11, many hearths and pits were found, including two grave pits. At S13 various features were excavated, while no features were found at S12. Two ^{14}C dates indicate that (part of) the occupation took place between about 5420 and 5080 BC (Whallon/Price 1976; appendix 3). Hogestijn ^{14}C-dated the pottery from this site directly, by its organic temper, in order to assess the existence of a *Ceramic Mesolithic* (Price 1981a, 101). These dates, reproduced in appendix 3, show that different dates are produced by organic material from the same sherd! This fundamental problem needs to be resolved before we can interpret these direct dates (Hogestijn/Peeters 1996, table 1). Until that time, these dates are left aside.

S21-24
The river dune on which S21, S22, S23 and S24 are situated lies about 1 km from the S11-13 river dune and some 3.5 km from the levee sites (fig. 3.2). S21 lies on the northern part of the dune, while the three other excavated areas lie on the southern part. Features were found at S21 (a number of hearths and five graves), at S22 (hearths and six graves) and S23 (a large number of hearths and one grave). At S24, only one small test trench was excavated. Here no features were found (De Roever 1976; Price 1981a). Three ^{14}C dates indicate that this river dune was repeatedly occupied between about 6610 and 5480 BC (De Roever 1976, 217; appendix 3).

S51
The levee site S51 is situated along the main creek, some 750 m northwest of S2 (fig. 3.2). The creek had eroded this site to such an extent that only a small strip of the actual site remained intact (Deckers 1979, 165). A date between 4360 and 3970 seems plausible (see above).

S61
The river-dune site S61 is located some 500 m to the south of the levee sites (fig. 3.2). On this site, a sequence of peaty, clayey and sandy layers was found. The finds from these three layers were collected separately and dated by means of three ^{14}C dates. The lowermost layer, sandy layer C, is dated between about 5270 and 5060 BC. The top layer, peaty layer K, is dated between about 4450 and 3800 BC. Layer B lies between these two layers and is dated between about 4490 and 3800 BC (Deckers 1982, 35-36; appendix 3).

3.2.3 SELECTION OF MATERIAL

The large quantities of flint and pottery from the Swifterbant cluster prohibit an all-inclusive study of these assemblages within the time available. In order to describe the pottery and flint artefacts from the Swifterbant cluster following the standard of this study, a sample had to be taken (tables 3.1 and 3.2). In the first step of this selection, the river dune sites were rejected because of their troublesome dating: as a result of the geological conditions, occupation remains covering thousands of years may be present. A mix of Mesolithic and Neolithic material remains is attested for S21-24, while it is very likely for S11-S14 (see below). This makes it impossible to use these sites for characterising the Mesolithic or Neolithic Swifterbant remains. Rather than through the mixed assemblages from the river dunes, the process of neolithisation can best be studied on the basis of a comparison of Late Mesolithic and early Neolithic sites. While closed Late Mesolithic assemblages are absent in the Swifterbant cluster, the levee sites do present closed Neolithic assemblages. We are therefore left with the levee sites.
A second step in the reduction of the sample size was needed. I decided to limit the sample to the material from S2 and S3, the two major assemblages. The sample size was further reduced on the basis of practical considerations. The S2 find material had been stored per find category in find-number order. It was decided to analyse the pottery sherds with find numbers between 2200 and 4000, 1232 in total. Of these, 380 large sherds were described. This final sample consisted of all decorated sherds, all rims and base fragments and large undecorated body sherds. The remainder of the sherds (1232-380 = 852) consisted of small, undecorated body sherds (diameter less than about 3 cm). The eventual sample size (380) corresponds with 31% of the total number

Site	*Number of sherds*	*Rims*	*Bases*	*Average wall thickness*	*Temper*	*References*
S2	2450	177	8	8.8 mm	74% organic material and grit; 20% grit; ?% organic material	De Roever 1979 (Deckers 1979, table 1: 5708)
S3	1250	165	9	10.3 mm	80% organic material and grit; 7% organic material; 4% grit	De Roever 1979 (Deckers 1979, table 1: 1738)
S4	467	37	1	9.7 mm	70% organic material and grit; 19% organic material; 10% grit; ?% grit and sand	De Roever 1979 (Deckers 1979, table 1: 476)
S11	220	6	–	5.8 mm	75% sand; 18% sand and grit; ?% organic material	De Roever 1979
S12	–				Whallon/Price 1976	
S13	–				Whallon/Price 1976	
S21	40	1	–	4-8 mm	As S11	De Roever 1979
S22	500	25	1	4-12 mm	As S11; ?% crushed quartz and organic material	De Roever 1979
S23	46	1	–	8.0 mm	Sand, grit and organic material	De Roever 1979
S24	–				Price 1981a	
S51	1278	?	?	?	?	Deckers 1979
S61	+	?	?	?	?	Deckers 1982

Table 3.1. Swifterbant cluster. The pottery characteristics of the various sites.

Site	*Number of flint artefacts*	*Number of flint tools*	*References*
S2	1503	295	Deckers 1979
S3	>811	?	Deckers 1979
S4	244	33	Deckers 1979
S11	+	128	Whallon/Price 1976
S12	+	19	Whallon/Price 1976
S13	+	16	Whallon/Price 1976
S21	+	+	De Roever 1976
S22	≥434	≥56	Price 1981a
S23	5262	479	Price 1981a
S24	+	?	Price 1981a
S51	225	41	Deckers 1979
S61	+	+	Deckers 1982

Table 3.2. Swifterbant cluster. The published flint characteristics.

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		98	45	156	81	179	103	61	37	380
Percentage		25.8	11.8	41.0	21.3	47.1	27.1	16.0	9.7	100
Average size of temper particles (mm)		–	–	–	–	–	2.6	2.4	2.4	–
Average wall thickness (mm)		8.9	9.1	9.2	9.4	9.2	9.1	8.8	9.7	9.1
Types of join:	H-joins	15	10	41	28	48	21	18	7	94
	N-joins	10	1	12	2	11	9	4	1	25
Surface finish:	Smoothed	43	28	75	50	102	53	30	11	196
	Uneven	22	7	37	12	33	23	14	8	78
	Roughened	12	2	6	3	2	7	7	7	23
	Polished	5	1	8	3	4	4	5	4	17
	Besenstrich	2	3	8	3	12	4	0	0	16
Base form:	Point	0	0	1	0	0	1	0	0	1
Body decoration:	Spatula	2	1	5	8	7	5	4	0	16
	Hollow spatula	0	0	1	2	3	0	0	0	3
Rim decoration:	Spatula	1	1	3	6	5	4	0	2	11
	Hollow spatula	0	0	0	2	1	1	0	0	2
	Fingertip	0	1	0	1	2	0	0	0	2

Table 3.3. S2. The characteristics of the pottery sample.

of sherds with find numbers between 2200 and 4000; at the same time it is 15% of the 2450 sherds of the total S2 assemblage (De Roever 1979, 16; table 3.1). The S2 flint material was selected from roughly the same range of find numbers: all flint artefacts with find numbers between 2000 and 5200 were described, 188 in total. The sample comprises 34% of the 549 artefacts found *in situ*. If the sieved material is taken into consideration as well, this figure decreases to 12% of the 1503 flint artefacts found at S2 (Deckers 1979, 148; table 3.2).

The S3 pottery had been stored in spatial units. Thus, it was deemed easiest to analyse the pottery from a single strip of squares. This strip, strip XII, was selected in consultation with P. de Roever. In total, 536 sherds were found in this strip. Of these, 400 are described (32% of the total number of sherds of S3). The described sample includes all rim sherds and all decorated sherds from strip XII, while the remainder (n=136) are undecorated body sherds. This last group was not described because of the homogeneity of the pottery in technological terms: a description of these sherds would not have led to any different conclusions on wall thickness, the proportions of the types of join, *etc*. These 136 sherds which are not described do play a role in the calculation of the body decoration percentage.

The sample of S3 flint artefacts was based on the same criteria as the pottery sample. This resulted in a total of 418 flint artefacts from strip XII. Because these 418 flint artefacts included sieved material, this sample is dominated by chips. By contrast, the S2 sample excluded sieved material; consequently, chips are considerably less frequent here. As a result of the inclusion of sieved material in the S3 sample, there were clear differences in the basic morphology and tool spectrum between the S2 and S3 flint samples (see section 3.2.5). Moreover, there were few large flint artefacts in the S3 sample, which prohibit a meaningful discussion of this set of material. In order to collect useful information on the S3 assemblage, it was decided to enlarge the S3 sample. In this additional sample, all hand-gathered flint artefacts with find numbers under 2000 were analysed, a total of 410 artefacts. These 410 artefacts were added to the 28 artefacts from the first sample that were not collected during sieving, thus creating a new S3 sample of 438 flint artefacts. This allowed the S2 and S3 samples to be compared, while excluding the possibility that the differences observed between these two samples might be caused by differences in collecting method: both the S2 and the enlarged S3 sample only consisted of material which was collected by hand.

3.2.4 POTTERY

The pottery of S2

The characteristics of the S2 pottery sample are presented in table 3.3. It shows that most sherds were tempered with organic material, while about half of all sherds contain grit. The average size of the grit particles is about 2.5 mm. No

grog was observed. The average wall thickness is 9.1 mm (n=371); the wall thickness is not correlated to the types and amounts of temper present. Coil-building was observed on 119 sherds (31%), of which 94 showed H-joins (79%) and 25 N-joins (21%). There seems to be a correlation between the presence of organic temper and the presence of H-joins and N-joins: while 74% of the sample consists of sherds with organic temper, 84% of the sherds with H-joins and 60% with N-joins have organic temper. The sample contains only one base, which is a point base. Surface-finishing techniques consist of smoothing (59%), roughening (7%), polishing (5%) and *Besenstrich* (5%). The remainder of the sherds have an uneven surface (24%). Grit-tempered sherds are more frequently roughened or polished, while they are less often finished with *Besenstrich*. Sherds with organic temper are more often finished with *Besenstrich* or have an uneven surface. Roughening occurs less on sherds with organic temper.
Rim decoration is found on 15 of the 44 rims present in the sample (34%). It is applied by a spatula (73%), a hollow spatula (13%) or fingertips/nails (13%). Table 3.4 shows that while fingertip/nail decoration is exclusively found on the outside of the rims, (hollow) spatula impressions are mostly found on the inside of the rims. In general, the inner side is preferred for the location of rim decoration. The presence of rim decoration is positively correlated with the presence of a large quantity of organic temper: while 21% of the sampled sherds have a large quantity of organic temper, 60% of the decorated rim sherds fall within this category.
Body decoration is seen on 19 sherds (5% of the sample, 1.5% of the sherds from strip XII) and consists of spatula impressions (84%) and impressions of a hollow spatula (16%). Seven sherds with spatula impressions have a single row of impressions, one sherd has two rows. No pattern could be identified on the remaining sherds with spatula impressions. As for the hollow-spatula impressions, one sherd has them in a random pattern, while on the two other sherds no distinct pattern could be identified. There is no relation between the amounts and types of temper on the one hand and the absence or presence of body decoration on the other.

A comparison of the characteristics of the S2 sample with the characteristics of the S2 assemblage as presented by De Roever (1979) leads to the following conclusions. The proportion of grit-tempered sherds is considerably smaller in the sample than in the total (53% versus 94%), while the proportion of sherds with organic temper is identical (74%). The average wall thickness is somewhat greater for the sample (9.1 mm and 8.8 mm). De Roever's table 1 lists the body decoration techniques observed. While various spatula impressions are dominant in both the sample and the total assemblage (84% and 76% respectively), fingertip/nail impressions are not present in the sample but adorn 20% of the decorated body sherds in the total assemblage. De Roever's table 2 presents the location of rim decoration. The major types are also found in the sample, with decoration on the inside being considerably more important in the sample than in the total assemblage (80% versus 33%).
The observed differences between the S2 sample and S2 assemblage are certainly related to the sample's size: a larger sample would reduce the differences. Because the S2 sample was based on a range of find numbers, it is likely that the sample consisted of finds that were not scattered randomly over the site. If the sherds remaining of certain broken pots are clustered in specific parts of the site, this will lead to proportional differences of various kinds between subareas of the site. This process may explain the observed differences in tempering agents and decoration. In the comparison of the S2 pottery with that from the other sites of the Swifterbant Culture (section 3.8.2; table 3.46), the data from the S2 sample are preferred because they are most easily compared with the data from the other sites. Subsidiary information is taken from the S2 assemblage characteristics (e.g. table 3.46: the occurrence of rim decoration locations and body decoration techniques indicated with a '+').

The pottery of S3
The characteristics of the S3 pottery sample are listed in table 3.5. It can be seen that a majority of the sherds are tempered with organic material (92%), while grit is found in a large minority of the material. The average size of the grit particles varies between 1.9 and 3.7 mm. Grog temper is absent in the sample. The average wall thickness is 10.3 mm. It seems that the more grit temper is present, the thinner the body sherds are. Coil-building is observed on 17% of the sherds; H-joins predominate (82%), while N-joins (16%) and Z-joins (1%) also occur. Four bases are found in the S3 sample. Two are point bases, while there is one pointed base and one round base. Surface-finishing techniques vary: smoothing (49%), polishing (7%) and roughening (2%). The remainder of the sherds has an uneven surface (42%). There seems to be no relation between the surface finishing technique and the amounts and types of temper present.
Rim decoration is found on 43 of the 74 rim sherds (58%). Spatula decoration is favoured (91%), while fingertip/nail impressions are found on a small number of rim sherds (9%). The location of the rim decoration is varied (table 3.6). Spatula impressions are mostly found on the inside, but also occur on the outside and in combinations of inside/top and inside/outside. Fingertip/nail impressions are found on the top or on the outside of the rim sherds. It appears that the location of the rim decoration and the techniques used are correlated: while the number of rim sherds with spatula decoration is quite large, decoration on the top is absent.

	Spatula		*Hollow spatula*		*Fingertip/nail*		*Total*	
	Number	%	Number	%	Number	%	Number	%
Inside	10	67	2	13	–	–	12	80
Outside	–	–	–	–	2	13	2	13
Top	1	7	–	–	–	–	1	7
Totals	11	73	2	13	2	13	15	100

Table 3.4. S2.The locations and techniques of rim decoration in the pottery sample.

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		31	85	197	87	270	82	31	17	400
Percentage		7.7	21.2	49.2	21.7	67.5	20.5	7.7	4.2	100
Average size of temper particles (mm)		–	–	–	–	–	3.7	2.9	1.9	–
Average wall thickness (mm)		9.8	10.6	10.2	10.3	10.5	10.1	9.8	9.0	10.3
Types of join:	H-joins	4	3	29	20	44	6	3	3	56
	N-joins	1	1	6	3	7	1	1	2	11
	Z-joins	0	0	0	1	1	0	0	0	1
urface finish:	Smoothed	6	29	74	34	106	22	7	8	143
	Uneven	9	32	56	26	77	31	12	3	123
	Polished	3	3	9	6	9	9	1	2	21
	Roughened	2	1	2	0	3	0	2	0	5
Base form:	Pointed	0	0	0	1	1	0	0	0	1
	Point	0	0	1	1	2	0	0	0	2
	Round	0	0	1	0	1	0	0	0	1
Body decoration:	Spatula	2	4	18	11	25	3	4	3	35
	Paired fingertips	1	0	3	1	3	2	0	0	5
	Groove lines	0	0	1	0	1	0	0	0	1
Rim decoration:	Spatula	3	5	20	11	25	12	1	1	39
	Fingertip	0	0	2	2	1	1	1	1	4

Table 3.5. S3. The characteristics of the pottery sample.

	Spatula		*Fingertip/nail*		*Total*	
	Number	%	Number	%	Number	%
Inside	26	60	–	–	26	60
Outside	11	25	1	2	12	28
Top	–	–	3	7	3	7
Inside and top	1	2	–	–	1	2
Inside and outside	1	2	–	–	1	2
Totals	39	91	4	9	43	100

Table 3.6. S3. The locations and techniques of rim decoration in the pottery sample.

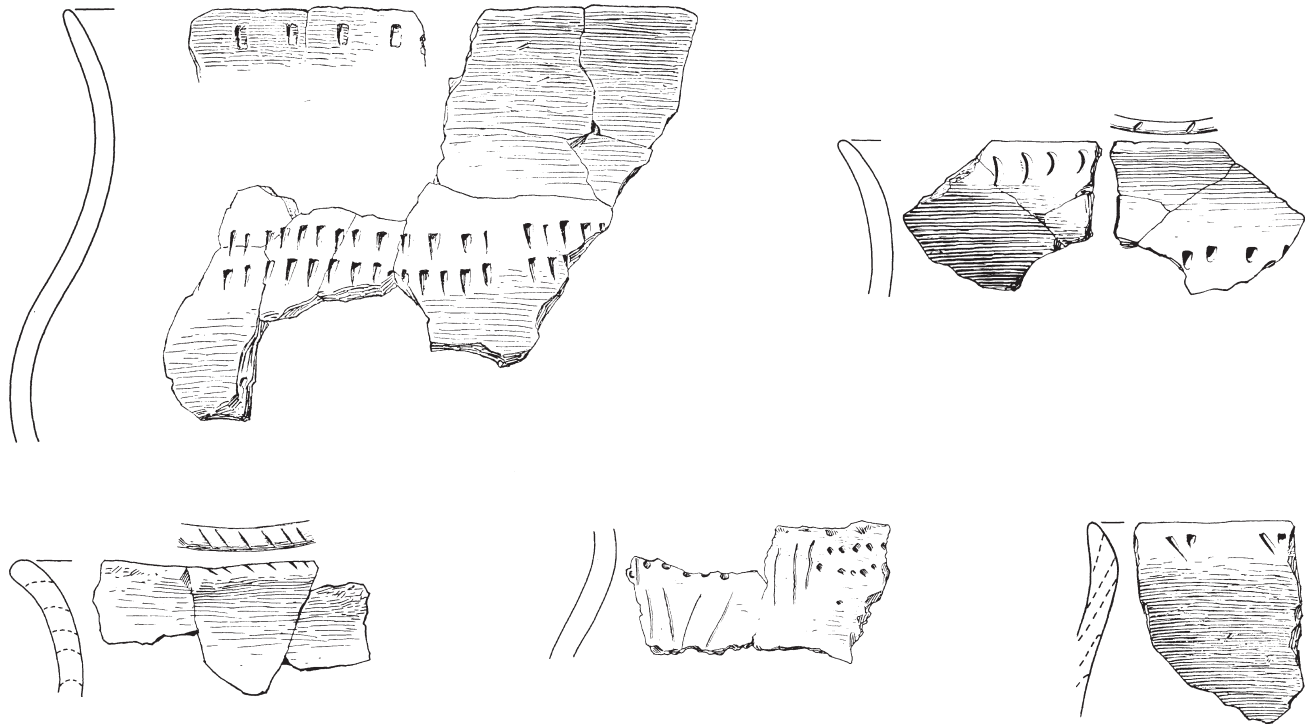


Fig. 3.3. S2 pottery (after De Roever 1979, figs 1-3). Scale 1:3.

This location is exclusively used for fingertip/nail impressions. The inside is reserved for spatula decoration.
Body decoration is found on 41 sherds, or 8% of the 536 sherds from strip XII. Spatula impressions are widespread (85%), while paired fingertip impressions (12%) and groove-lines (2%) also occur. Of the 24 sherds on which the pattern of the spatula impressions could be identified, 13 had a single row of impressions (in one case of which location on the shoulder was certain), two sherds had two rows of impressions and three sherds had multiple rows. Six sherds were decorated in a random pattern (of which two were decorated all over the body surface).

The above-mentioned characteristics of the S3 pottery sample can be compared with the characteristics mentioned by De Roever (1979). This shows that the proportion of grit-tempered sherds is considerably smaller in the S3 sample than in the S3 assemblage (34% and c. 84% respectively). The proportions of sherds with organic temper are more similar (92% and c. 87%). While De Roever mentions that some sherds are also tempered with grog (1979, 18), no grog temper is found in the sample. The average wall thickness is the same in the assemblage and the sample (10.3 mm). In De Roever's table 1, the various kinds of body decoration are listed. It shows that spatula impressions are the predominant type of decoration in both the assemblage and the sample (78% and 85% respectively). Fingertip impressions are found on 19% and 12% of the sherds[1], while groove-lines are found on 2% of the sherds from both the assemblage and the sample. It is notable that on the one hand rim decoration on the inside is more widespread in the sample than in the total assemblage (60% and 32% respectively), while, on the other hand, decoration on the outside and on top of the rim is less frequent (28% versus 42% and 7% versus 19% respectively) (De Roever 1979, table 2).[2]

Discussion
The above description of the S2 and S3 samples and assemblages is followed here by a general description of the pottery from these levee sites. In the following proportional characteristics, the percentages from the S2 and S3 samples are compared. The percentages are listed here in standard sequence: first S2 and then S3. The pottery is S-shaped with pointed, round and point bases. Some sherds show a more pronounced rim-neck transition. Decoration is mostly found on the rim, especially the inner side. Body decoration is less common and takes the form of one or more rows of spatula impressions on the shoulder. In some cases, decoration

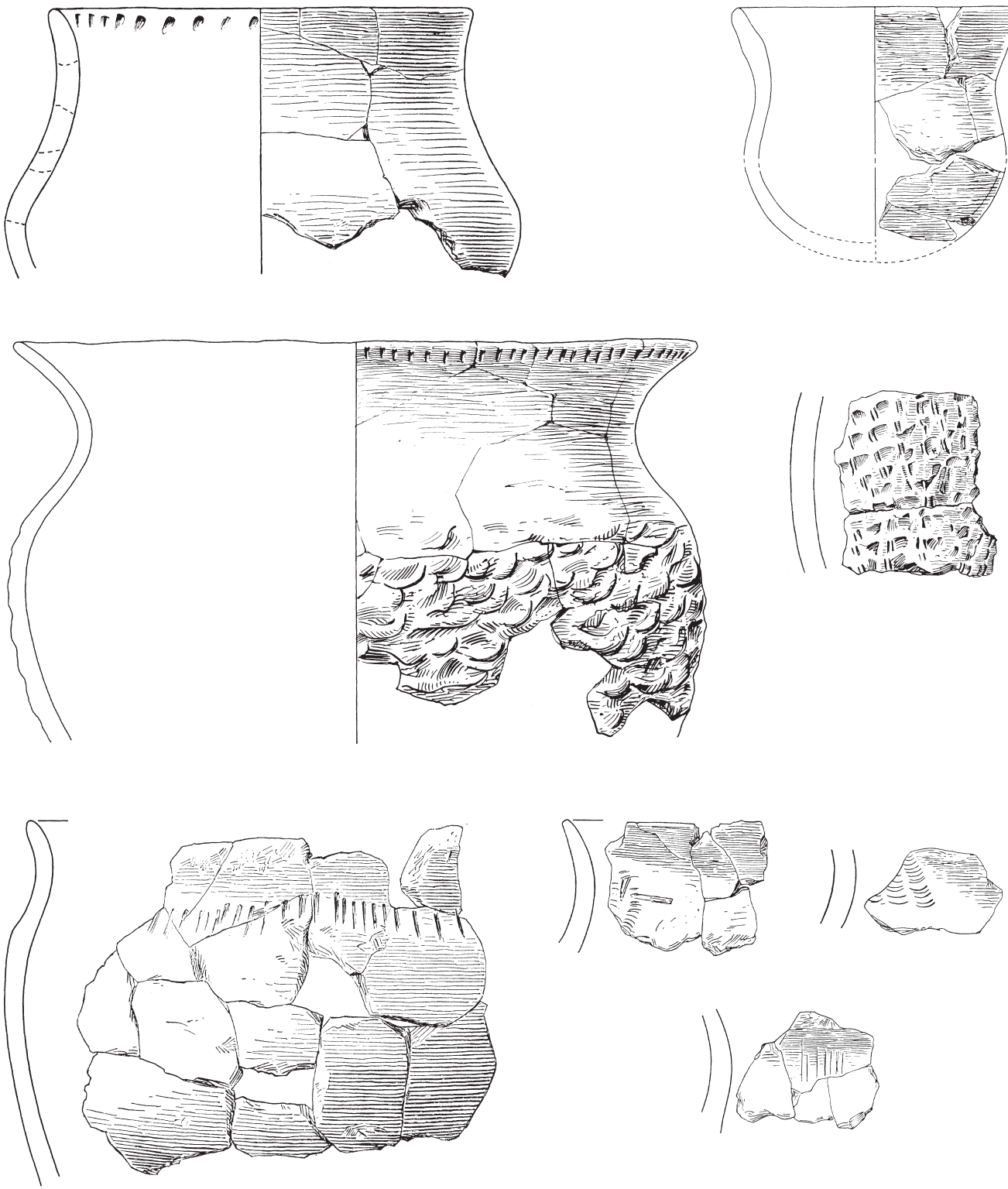


Fig. 3.4. S3 pottery (after De Roever 1979, figs 1-3). Scale 1:3.

covers the entire body surface (figs 3.3 and 3.4). The pottery is tempered with organic material and grit combined (27%, 34%), with exclusively organic material (40%, 65%) or only grit (19%, 5%). The average wall thickness varies between 9.1 and 10.3 mm. The percentage of decorated rim sherds is 34% and 58%. Rim decoration on the inside is most common (80%, 60%), followed by decoration on the outside (13%, 28%) and on the top (7%, 7%). Rim decoration on more than one location is rare (0%, 4%). Body decoration is found on a minority of the pottery (1.5%, 8%) and consists mostly of spatula impressions (84%, 85%). Paired fingertip impressions, hollow spatula impressions and groove-lines also occur.

A comparison of the pottery from the levees and river dunes has to take into account the limited number of pottery sherds from the dunes. At S11-13, a total of 220 sherds were recovered, while S21-24 produced some 600 sherds (De Roever 1979, 16; table 3.1).[3] Although the amount of pottery is small, this pottery is the focus of a debate about the possibility of a *Ceramic Mesolithic* (Price 1981a, 101) like the Danish Ertebølle Culture (see section 5.2.3). Since the ^{14}C dates and Mesolithic flint artefacts seem to reveal that both dunes were inhabited prior to the levee sites (S11-13: Whallon/Price 1976; S21-24: De Roever 1976, 217-218; Price 1981a, 95-96), the question arises as to what phase of occupation the pottery belongs? Is it part of the Mesolithic material culture or is it contemporary to the pottery of the levee sites?

To approach this question, two lines of evidence are available. First, the spatial correlation between the pottery and the Mesolithic flint can be studied. At S11, it appeared that the pottery was restricted to the upper part of the find layer, suggesting a late date. Nevertheless, it was accompanied by typical Boreal Mesolithic microlith types (Whallon/Price 1976, 226). With respect to S23, Price suggests that the pottery dates from a late occupation phase, as it is confined to the upper part of the find layer (Price 1981a, 99). Given these observations, it is not certain whether the pottery from these sites is of the same age as the sherds from the levee sites or otherwise. Consequently, an interpretation of these sherds as Mesolithic cannot be supported by the spatial evidence from the river-dune finds.

A second argument pertaining to the Mesolithic date of the river dune pottery can be found in the character of the pottery itself. How different is it from the pottery of the levee sites? In morphological terms, there are no clear differences between the two groups. De Roever's illustrations show that the morphological description of the S2/S3 pottery which was given above, also fits the pottery from the river dunes. In technological terms, some clear differences are observed. Organic material and grit temper are almost absent in the pottery of the river dunes, whereas they are the only tempering agents of the sherds from the levee sites. The average wall thickness is clearly less at S11 (5.8 mm) and somewhat less at S23 (8.0 mm), than that of the levee-site pottery (9.1-10.3 mm) (De Roever 1979, 20). The percentages of decorated rims cannot be compared, since the number of decorated rims presented by De Roever for S11, S21 and S22 exceeds the total number of rims (cf. De Roever 1979, 16 and table 2). In a comparison of the percentages and types of body decoration, S11-S13 are left aside, owing to the small number of decorated sherds (n=3). Of the c. 600 sherds from S21-24, 86 are decorated (c. 14%), a figure considerably higher than the figures from the levee sites.[4] Differences are seen also in the type of decoration: at the levee sites, spatula impressions are most widespread (84%-100%), while at S21-24 fingertip/nail impressions are clearly dominant (De Roever 1979, table 1: 94%).

How should the differences between the various pottery assemblages be interpreted? The differences between the S2 and S3 samples are much smaller than those between the levee sites on the one hand and the river dunes on the other. It is thought that *if* the pottery from the river dunes were contemporary with that from the levee sites, the differences in pottery characteristics would be much slighter, perhaps of the same order as the differences between the pottery from S2 and S3. Since the differences are much greater, they probably are better interpreted in chronological terms. Arguments in favour of an earlier occupation of the river dunes include the presence of Mesolithic flint artefacts (see below) and ^{14}C dates indicating this period (section 2.2.2). A later occupation phase on the river dunes is proposed by De Roever on the basis of the presence of thin-walled pottery made by a more advanced technique and the presence of a carinated sherd (1979, 23). In other words, it is likely that the technological differences between the pottery from the levees and that from the river dunes are due to a difference in age.

3.2.5 FLINT ARTEFACTS

The sample of flint artefacts from S2

The sample of 188 artefacts described in this study consists exclusively of erratic flint. The majority display no cortex and are unburnt (table 3.7). The sample consists of blades, flakes, blocks, chips, potlids and one borer the basic morphology of which could not be determined (table 3.8). Blade technology is more widespread than flake technology: 63% versus 37%.

The average length of the complete blades is 3.6 cm (n=37) (Deckers 1982, table 4: 3.6 cm). There is almost no difference in length between the blades that seem unused and the blades with use-retouch or modified blades (3.4 cm/n=15 versus 3.6 cm/n=22). Blades are modified into trapezes, borers, one combination tool (reamer/retouched blade),

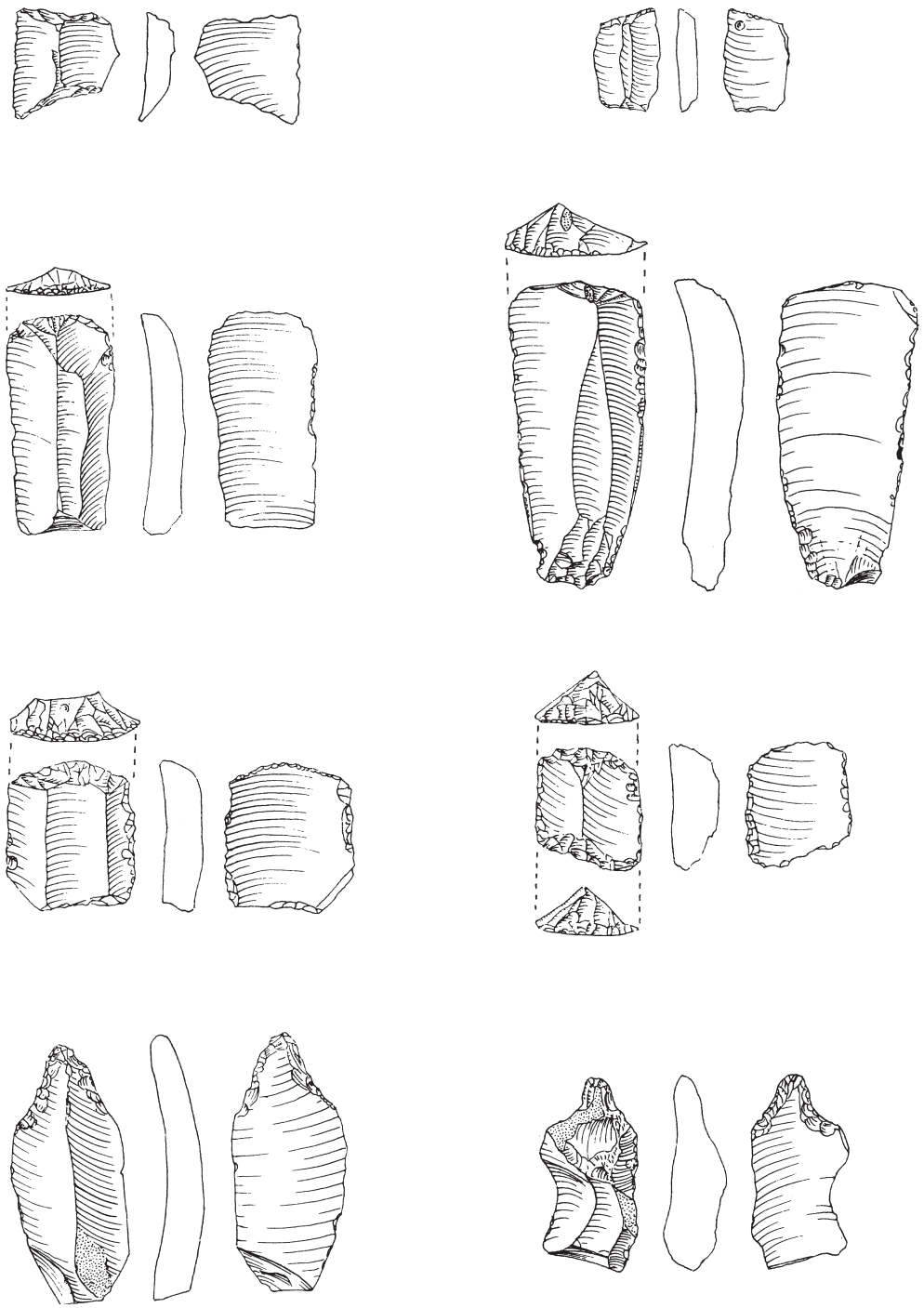


Fig. 3.5. S2 flint artefacts. Trapezia (top row), blade scrapers (second and third row) and borers (bottom row) (after Deckers 1982, fig. 1). Scale 1:1.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Erratic flint	63	98.4	164.6	98.6
Terrace flint	1	1.6	2.3	1.4
Totals	64	100.0	166.9	100.0
Indet.	124		205.5	
Unburnt	129	68.6	269.5	72.4
Gloss	2	1.1	2.8	0.7
Red	2	1.1	2.7	0.7
Crackled	12	6.4	12.9	3.5
Potlidded	43	22.9	84.5	22.7
Totals	188	100.1	372.4	100.0
No cortex	132	70.2		
Smooth cortex, <50%	28	14.9		
Smooth cortex, >50%	12	6.4		
Rough cortex, <50%	13	6.9		
Rough cortex, >50%	3	1.6		
Totals	188	100.0		

Table 3.7. S2. The raw material, degree of burning and extent and kind of cortex of the flint artefacts.

scrapers with and without retouched sides and blades with retouched sides. Blades with use-retouched sides are most frequent (table 3.9). Complete flakes are on average 2.5 cm long (n=31) (Deckers 1982, table 3: 1.7 cm). There is a 7 mm difference in average length between unused flakes and flakes with use-retouch or retouched/modified flakes: the first category has an average length of 2.3 cm (n=22), while the second category is on average 3.0 cm long (n=9). Flakes are the basic form of borers, scrapers with and without retouched sides and retouched flakes. Six flakes show use-retouch.

The above-mentioned characteristics can be compared with those in the two publications on Swifterbant flint artefacts by Deckers (1979, 1982) (fig. 3.5). According to Deckers, the most probable source of the erratic raw material is the boulder-clay area, of which the Urk and Schokland outcrops are quite near by, at 11.5 km and 12.5 km distance, respectively (Deckers 1982, 34-35). Some 55% of the flint material of S2 did not show any cortex or patina; in the S2 sample, this figure is 70% (Deckers 1979, 150-151). The difference between the percentages of burnt flint on the site as a whole and in the sample is somewhat greater: 46% versus 69% (Deckers 1979, 150-151). When the basic morphology of the S2 sample is rearranged to fit the primary categories employed by Deckers (1979, 148), the absence of cores in the sample may be explained by the small number of these

	S2 assemblage		*S2 sample*	
	Number	%	Number	%
Blades	520	34.6	75	39.9
Flakes	430	28.6	41	21.8
Cores	11	0.8	–	–
Other flint material	542	36.0	72	38.3
Blocks			39	20.7
Chips			29	15.4
Potlids			3	1.6
Indet.			1	0.5
Totals	1503	100.0	188	100.0

Table 3.8. S2. A comparison of the basic morphology of the assemblage (Deckers 1979, 148) and the sample.

in the assemblage. The percentages of both flakes and blades are quite similar, all the more satifying when it is realised that Deckers' definition of blades is more strict than the definition used in this study.[5] Deckers' group of *other flint material* comprises the blocks, chips, potlids and undetermined material of the sample. The percentages are similar (table 3.8).
The very detailed tool typology presented by Deckers (1979, 151-152; 1986) is not easily compared with the typology used here. Often, a number of Deckers' types had to be combined within one of the types of this study to allow a quantitative comparison of the tool types possible. The correspondence between the two tool typologies is presented in table 3.9. The percentage of tools is twice as high in the sample as in the total assemblage. This is to be explained by the fact that Deckers' analysis included the sieved material, which will have tended to be very small and unretouched. The proportions of the tool categories in the sample and the assemblage are similar. This suggests that the sample can rightfully serve to represent S2 in a comparison with the flint material studied from the other Swifterbant sites.

The sample of flint artefacts from S3
The 418 described flint artefacts from strip XII are mostly of erratic flint. Flint which was acquired over a large distance is present in very small quantities: two artefacts show a polished facet, while one other specimen is interpreted as Rijckholt-type flint. A large majority are without cortex and unburnt (table 3.10). The sample consists of chips, blocks, flakes, blades, potlids, one core and four scraper fragments of unknown basic morphology (table 3.11). The flint is worked in both blade and flake technology, of which flake technology was the more important: 67% versus 33%.
The average length of complete blades is 2.4 cm (n=6); modified blades are on average somewhat larger than the

Correspondence		*S2 assemblage*		*S2 sample*	
This study	Deckers (1979; 1986)	Number	%	Number	%
Points		**10**	**4.4**	**2**	**4**
Trapezes	195, 200, 821, 826, 883	10		2	
Borers		**9**	**4.0**	**5**	**9**
Blade borers	302	6		2	
Flake borers	300	3		2	
Borer, indet.	–	–		1	
Combination tools		**–**		**1**	**2**
Reamers/retouched blades	–	–		1	
Scrapers		**37**	**16.4**	**10**	**18**
Blade scrapers	400, 433, 435	10		2	
id., with retouched sides	–	–		5	
Double scrapers	425	2		–	
Blade scrapers with concave end retouch	430	2		–	
Blade scrapers with nosed end	438	2		2	
Flake scrapers	405, 434	10		1	
Thumbnail scrapers	406-408	8		–	
Round scrapers	412	1		–	
Side scrapers	440	2		–	
Retouched blades		**145**	**64.1**	**27**	**49**
Retouch > 1 mm	250, 550, 570, 604-606	62		7	
Retouch < 1 mm	609-611, 613	66		20	
Truncated blades	450, 451	11		–	
Denticulated blades	580	6		–	
Retouched flakes		**22**	**9.7**	**9**	**16**
Retouch > 1 mm	490, 500	19		3	
Retouch < 1 mm	630, 640	2		6	
Denticulated flakes	520	1		–	
Retouched blocks and other material		**–**		**1**	**2**
Retouched blocks (< 1 mm)	–	–		1	
Other tools		**3**	**1.3**	**–**	
Indet.	999	3		–	
Totals		**226**	**99.9**	**55**	**100**

Table 3.9. S2. A comparison of the flint tool spectra of the assemblage (Deckers 1979, 151-152) and the sample. The correspondence between the two typologies is also indicated.

unmodified ones: 2.7 cm (n=2) and 2.3 cm (n=4) respectively. This difference may be the result of the limited number of complete blades. Blades were modified into one triangular, straight-based point and retouch that covers half of the surface, two blade borers and one blade scraper. Two blades with use-retouch complete this list. Complete flakes are on average smaller than blades: 1.9 cm. Again, modified specimens are on average larger than unmodified ones: 2.1 cm (n=6) as against 1.8 cm (n=23). Two borers, one flake scraper and one round scraper were made on flakes. Two flakes show use-retouch.

Since the flint material from S3 has not been published, a comparison with the flint artefacts from the S2 sample is presented here. Correspondence is evident in the type of raw material and the proportions of artefacts without cortex and unburnt artefacts. Not only are there similarities between the flint artefacts from the samples of S2 and S3, there are also differences which require attention. The first difference is in the proportions of the basic morphological categories (table 3.11). Of course, this could be the result of the different sampling strategy: while the S3 sample includes all material from a strip of the excavation, the S2 sample is

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Erratic flint	58	92	58.1	93
Terrace flint	1	2	1.2	2
Pebble-Meuse eggs	1	2	1.3	2
Long-distance flint				
Rijckholt	1	2	0.6	1
Polished fragments of indet. material	2	3	1.1	2
Totals	63	101	62.3	100
Indet.	355		112.0	
Unburnt	289	69.8	126.3	72.5
Red	9	2.2	3.5	2.0
Crackled	44	10.6	13.6	7.8
Potlidded	72	17.4	30.8	17.7
Totals	414	100.0	174.2	100.0
Indet.	9		0.1	
No cortex	356	86.0		
Smooth cortex, <50%	25	6.0		
Smooth cortex, >50%	25	6.0		
Rough cortex, <50%	5	1.2		
Rough cortex, >50%	3	0.7		
Totals	414	99.9		
Indet.	4			

Table 3.10. S3. The raw material, degree of burning and the extent and kind of cortex of the flint artefacts.

based on a range of find numbers. As a result, artefacts found during sieving are included in the S3 sample and absent in the S2 sample. This explains the predominance of chips in the S3 sample. To test this explanation, a re-calculation of the basic morphological categories was carried out, in which the chips were left out. The result of this re-calculation is that although the percentages change, the differences between the two samples remain.[6]

This structural difference between the two samples is also reflected in the different proportions of flake and blade technology in the samples. Another difference is seen in the average length of complete blades and flakes: these are larger in the S2 sample. A final difference is seen in the tool spectra: these differ not only in the absence and presence of various artefact types in the samples, but also at the level of tool categories (table 3.12).

A second S3 sample

Becuase of the limited size of both samples, one might wonder whether the differences mentioned above are real or only the result of sample size. As the characteristics of the S2 sample and the S2 assemblage are similar, an answer to this question is not to be found in expanding the S2 sample, but in enlarging the number of sampled artefacts from S3. For this reason, a second sample of artefacts from S3 were coded to determine the validity of the differences between the S2 sample and the S3 sample in terms of basic morphology, average length of complete blades and flakes and tool spectrum.

	S3 sample 1		*S3 sample 2*		*S2 sample*	
	Number	%	Number	%	Number	%
Blocks	55	13.1	170	38.9	39	20.7
Flakes	40	9.6	127	29.0	41	21.8
Blades	17	4.1	58	13.2	75	39.9
Chips	288	68.9	52	11.9	29	15.4
Boulders	–	–	8	1.8	–	–
Potlids	13	3.1	5	1.1	3	1.6
Cores	1	0.2	2	0.4	–	–
Indet.	4	0.9	16	3.6	1	0.5
Totals	418	99.9	438	99.9	188	100.0

Table 3.11. Swifterbant cluster. A comparison of the basic morphology of the first S3 sample, the second S3 sample and the S2 sample.

The proportions of the basic morphological categories in the second sample turn out to deviate from those of the first S3 sample (table 3.11). For some categories, the difference from the S2 sample clearly decreases (flakes, blades and chips), while for the other categories (blocks, boulders and cores), the differences increase. The tool spectrum of the second S3 sample is presented in table 3.12. It shows that some marked differences with respect to the S2 sample remain, not only in the proportions of the various categories, but also in the types of points and scrapers found. It is important to note that the second S3 sample includes a fragment of a triangular or leaf-shaped point (Deckers 1982, 39) and several transverse arrowheads. The difference between the S2 and S3 samples in the average length of complete blades and flakes decreases when the second S3 sample is considered. The average length of complete blades of the second S3 sample is 2.8 cm for unmodified ones (n=7) and 3.3 cm for retouched/modified ones (n=14). For complete flakes these figures are 2.0 cm (n=55) and 2.2 cm (n=32), respectively. Here, it suffices to conclude that the differences between the S2 and S3 flint samples seem unrelated to sample size.

Discussion

If the discussion about the flint artefacts from the levee sites includes the S4 and S51 finds (Deckers 1982), it may be

	S3 sample 2		*S2 sample*	
	Number	%	Number	%
Points	**8**	**7.5**	**2**	**4**
Trapezes	2		2	
Transverse arrowheads with straight base	3		–	
Transverse arrowheads with pointed base	1		–	
Other points (fragments)	2		–	
Borers	**2**	**1.9**	**5**	**9**
Blade borers	1		2	
Flake borers	1		2	
Borer, indet.	–		1	
Combination tools	**–**	**–**	**1**	**2**
Reamers/retouched blades	–		1	
Scrapers	**40**	**37.4**	**10**	**18**
Blade scrapers	3		2	
Blade scrapers with retouched sides	7		5	
Double scrapers with retouched sides	2		–	
Blade scrapers with nosed end	–		1	
Flake scrapers	6		1	
Flake scrapers with retouched sides	6		–	
Double flake scrapers	2		–	
Thumbnail scrapers	3		–	
Round scrapers	2		–	
Block scrapers	6		–	
Scraper, indet.	3		–	
Retouched blades	**20**	**18.7**	**27**	**49**
Retouch > 1 mm	4		7	
Retouch < 1 mm	16		20	
Retouched flakes	**23**	**21.5**	**9**	**16**
Retouch > 1 mm	2		3	
Retouch < 1 mm	20		6	
Denticulated flakes	1		–	
Retouched blocks and other material	**9**	**8.4**	**1**	**2**
Retouched blocks (> 1 mm)	3		–	
Retouched blocks (< 1 mm)	6		1	
Other tools	**5**	**4.7**	**–**	**–**
Indet.	5		–	
Totals	**107**	**100.1**	**55**	**100**

Table 3.12. Swifterbant cluster. A comparison of the flint tool spectra of the second S3 sample and the S2 sample.

concluded that the proportion of burnt flint displays considerable variation (minimum is 27.5% in the first S3 sample; maximum is 45.3% for the S51 material) (Deckers 1982, 165-167). The difference in the proportion of partly cortex-covered artefacts is twice as great: it varies from 14% (first S3 sample) to 45% (S51) (Deckers 1982, 165-167).[7] The average length of blades is least at S3 (second sample: 2.4 cm) and greatest at S51 (4.2 cm) (Deckers 1982, table 8). The average length of flakes varies from 1.5 cm (S51) (Deckers 1982, table 7) to 2.5 cm (S2 sample). In basic technology, S2 differs from the three other sites: in the S2 sample, blade technology predominates over flake technology, while in S3, S4 and S51 flake technology is dominant (compare tables 3.8, 3.11 and 3.13; Deckers 1979, 158-170; 1982, table 1). It is probably more important to note that both technologies are common at all sites. A further observation

	S4		*S51*	
	Number	%	Number	%
Flakes	112	46.3	84	37.3
Blades	76	31.4	61	27.1
Blocks	8	3.3	4	1.8
Other flint material	46	19.0	76	33.8
Totals	242	100.0	225	100.0

Table 3.13. Swifterbant cluster. The basic morphology of the flint material from S4 (Deckers 1979, 161) and S51 (Deckers 1979, 165).

can be made about the proportions of the basic morphological categories. Of course, the proportions of blade and flake technology is based on the proportions of blades and flakes. As Deckers does not specify the content of his category *other flint material* (OM), it is impossible to conclude which morphological categories (as used in this study) cause the differences in OM between the sites (S4 14%, S3 second sample 28%, S51 34% and S2 38%). Lastly, a comparison of the tool spectra shows that the differences between the S2 and S3 samples are not exceptional: there are also large differences between the S4 and S51 tool spectra (compare tables 3.9, 3.12 and 3.14). It is difficult to determine to what extent these differences are caused by the small numbers of tools from S4 and S51 and whether a functional difference between the sites should be proposed. There seem to be no significant differences in the types of tools found.
An analysis of the flint tool spectra from the river dunes is hindered by the large time-depth of their occupation. The possibility of a shift in the function of these sites when the levee sites became available for habitation cannot be ruled out as well. For this reason, attention is focused here on the indications of Mesolithic and Neolithic occupation of the river dunes. At S11-S13, Mesolithic occupation is attested by ^{14}C dates and various tool types: lancette points, scalene triangles and backed blades. Distinctly Neolithic tools are also present: nosed scrapers and *pièces esquillées* (Whallon/ Price 1976, table 1). Other tools can be dated to either the Neolithic or the (Late) Mesolithic. S21-24 also show a combination of a Mesolithic and Neolithic tool kit. Typically Mesolithic elements include A, B and C points, needle-shaped points, double points, triangles and mistletoe points (*feuilles de gui*). Neolithic occupation is attested by the presence of surface- retouched points, transverse arrowheads and *pièces esquillées* (De Roever 1976, 215; Price 1981a, 95-96). Trapezes are seen by Price (1981a, 96) as typically Mesolithic, but since they are also found at the Neolithic levee sites, it is concluded that these types were used during both the (Late) Mesolithic and the Neolithic (Deckers 1982, 36-37). The lowermost layer of S61, layer C, is clearly Mesolithic. It contained blade cores, a Mesolithic point, trapezes and no pottery or Neolithic flint tools. Layer K, the top layer, is of Neolithic character, an interpretation based on the ^{14}C date and the presence of pottery. It also contained trapezes. The intermediate layer B cannot be characterised as either Mesolithic or Neolithic (Deckers 1982, 35-37).

3.2.6 THE QUESTION OF SEASONALITY

In this final section on the Swifterbant cluster, one question remains: were the sites occupied on a year-round basis or were they seasonally occupied? As S3 is the best-documented site (and the only site on which ecological information is available), this question will first be discussed for this site only. In his 1986 article, Zeiler presents the various categories of archaeo-zoological evidence that point to activities in specific seasons. He concludes that it is impossible to determine whether the occupation of the site was restricted to the summer season (April-September) with an occasional winter visit, or whether a year-round occupation is most probable (Zeiler 1986, 94; Louwe Kooijmans 1987, 237; 1993b, fig. 6.17). To assess the possibility of year-round occupation, Zeiler uses information from other sources: wet winter conditions on the levee and the absence of house structures can be regarded as indications of only summer occupation, while the presence of a small cemetery at the neighbouring site S2 suggests that the site was used by families (= base camp, hence year-round occupation).
An additional argument for year-round occupation are the finds of human deciduous teeth at S2 and S3 (Meiklejohn/ Constandse-Westermann 1978). Zeiler concludes that an alternation of seasonal and year-round occupation is most likely (Zeiler 1991, 109). The debate on the interpretation of the cereal remains from S3 also centres on the seasonal character of the S3 occupation: local cultivation might imply long-term residence while imported cereals might indicate greater mobility. The central point in this discussion is the interpretation of the threshing waste. Often, threshing waste is interpreted as a reliable indication of local cultivation: "if the plants had been cultivated at a great distance from the site, threshed grains would have been transported because they are much less bulky than unthreshed ears" (Casparie *et al* 1977, 143). Bakels refutes this argument by reference to ethnography: "in countries where similar kinds of grain are traded and transported, this still occurs in batches of unthreshed grain" (1986, 5; my translation). It is concluded that on the basis of mere archaeological data, the question of seasonality at S3 (and the other levee sites) may not be resolved.
The river dunes were spared the wet winter conditions of the levee sites, which suggests that the river dunes could very well have been occupied during the winter or on a year-round basis. Because organic remains are absent, there are

	S4		*S51*	
	Number	%	Number	%
Points	**–**	**–**	**2**	**6**
Trapezes	–		2	
Borers	**2**	**7**	**–**	**–**
Blade borers	2		–	
Scrapers	**6**	**21**	**14**	**41**
Blade scrapers	1		1	
Double scrapers	1		–	
Blade scrapers with nosed end	–		1	
Flake scrapers	1		7	
Thumbnail scrapers	2		5	
Side scrapers	1		–	
Retouched blades	**20**	**69**	**11**	**32**
Retouch > 1 mm	12		6	
Retouch < 1 mm	8		4	
Denticulated blades	–		1	
Retouched flakes	**1**	**3**	**7**	**21**
Retouch > 1 mm	–		4	
Retouch < 1 mm	1		3	
Totals	**29**	**100**	**34**	**100**

Table 3.14. Swifterbant cluster. The flint tool spectra of S4 (Deckers 1979, 164) and S51 (Deckers 1979, 167-168).

no indications that the river dunes were indeed occupied during the winter season. This absence of evidence can be interpreted in favour of habitation on the river dunes during the winter months, and this cannot be falsified. From this position, a settlement system in which the area of the Swifterbant cluster was permanently inhabited can be proposed. Gehasse describes such a system as follows: "within this regional settlement system, the levee sites are sometimes permanently and sometimes seasonally occupied with the main purposes, at least at S3, of hunting fur animals, fowling and fishing, while on the river dunes the base camps and arable fields are located" (1995, 202; my translation). Although this is indeed a plausible explanation of the archaeological phenomena at hand, one may wonder whether the proposed geographical scale of such a settlement system is correct. For example, why not include the P14 boulder-clay outcrop in this settlement system? It is located only about 12.5 km from the Swifterbant cluster and offers far better opportunities for crop cultivation (see section 3.6.10). From this base camp, the Swifterbant sites could have been used as short-term or seasonally occupied sites. The discussion about seasonality, the scale of the settlement systems and the mobility of the people of the Swifterbant Culture will be continued in section 3.8.4.

3.3 Brandwijk

3.3.1 INTRODUCTION

The river dunes (Dutch: *donken*) in the Lower Rhine and Meuse area were formed during the Late Pleistocene and/or early Holocene. In this period, the low water table made sand available for wind erosion, leading to the formation of over a hundred dunes and dune clusters in the wide river basin. In the subsequent Holocene, these dunes were slowly covered by peat and clay deposits as an indirect result of the relative rise in the sea level (Louwe Kooijmans 1974, 83-90; Van der Woude 1983). Research by Louwe Kooijmans (1974) and Verbruggen (in prep.) shows that the river dunes, including Brandwijk-Het Kerkhof, were intensively occupied during the Neolithic.

The Brandwijk excavation was carried out as part of the *Donkenproject* of M. Verbruggen, at the time staff member of Leiden University. In this project, the representativity of the Hazendonk site for the Neolithic occupation history of the river dunes of the Lower Rhine and Meuse area was tested by means of extensive augering on the buried slopes of some twenty river dunes. This question of representativity can be divided into two separate questions. First, are occupation phases on other river dunes synchronous with those at Hazendonk? An affirmative answer to this question would

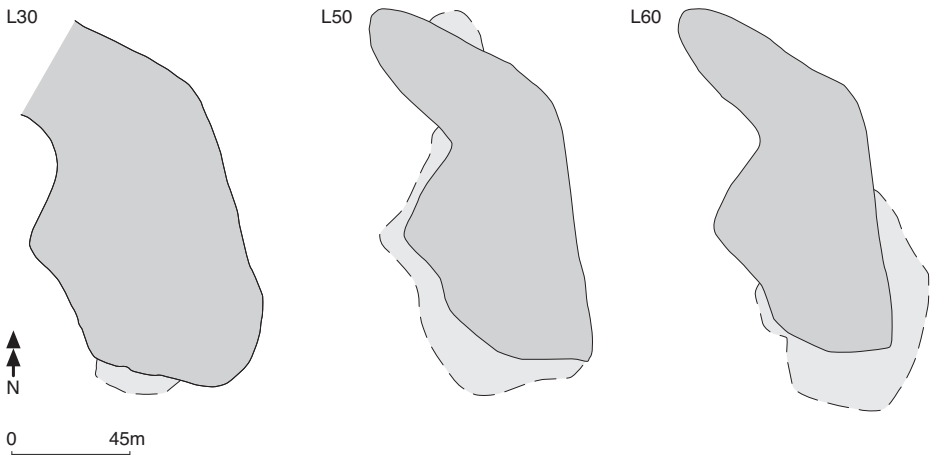


Fig. 3.6. Spatial distribution of the Brandwijk occupation layers. Reproduced with kind permission of M. Verbruggen. Drawing P. de Jong.

imply that the river area as a whole was populated and abandoned a number of times during the Neolithic. The second question is related to the nature of the habitation. As will be made clear in sections 3.4.1, 4.4.3 and 4.5.2.2, the Hazendonk find layers vary in thickness and extent, the two oldest find layers being less extensive than the younger ones. Is this trend in the extent of find layers representative for the find layers on the other river dunes or is it specific for Hazendonk? (Verbruggen 1992; in prep.).
The answers to these questions will be found in Verbruggen's thesis (in prep.). Here it suffices to say that Verbruggen needed an evaluation of the augering observations. To interpret the various amounts of charcoal and burnt bone in the augers, one of the investigated river dunes was selected for excavation: Brandwijk-Het Kerkhof. This small river dune is located some 4.5 km to the northwest of Hazendonk (Van Gijn & Verbruggen in Hagers/Hessing 1992; Verbruggen 1992). In 1991, a small section of the find layers adjoining the southern slope of the river dune was excavated.
All individual finds were three-dimensionally recorded by infrared theodolite. In this way, an electronic database was available from the beginning of the analysis, which included the coordinates of the finds and allocated them to one of the three find layers: L30, L50 and L60. To avoid the stratigraphical problems of Hazendonk (see section 3.4.1), the excavation grid was orientated perpendicular to the slope of the dune (Van Gijn & Verbruggen in Hagers/Hessing 1992). Micro fabric analysis revealed that L50 could be subdivided into three sublayers: a base and top zone rich in charcoal and finds, separated by a intermediate zone which was poorer. This realisation led Van Hoof to try to separate the finds from L50 into two new units: L50 base and L50 top. Since the find density is too high for the use of visual methods, a different approach from the one used by Jonkers for Hazendonk was needed (Jonkers 1992; section 3.4.1). Van Hoof's approach is based on his assumption of a development in the characteristics of the material culture during the c. 150 years in which the find layer as a whole was formed. Van Hoof developed a software package which enabled him to describe the material-culture characteristics of small spatial units in statistical terms. The contrasts in the characteristics of the lowermost and uppermost units were used to allocate the finds that were found in between, according to the degree of similarity. By varying the size of the spatial units, various possible subdivisions were produced. The one which maximised the differences between L50 base and L50 top was preferred by Van Hoof and is reproduced here (Van Hoof 1994). An evaluation of this method is difficult to achieve: how can one falsify his conclusions? The only way to check his results is to establish whether the fragments of individual pots (which take several find numbers, coming from different findspots) were assigned to one of the sublayers or were variously assigned to both sublayers.[8] Fortunately, the fragments of most pots were assigned to only one sublayer, which suggests that Van Hoof's subdivision of L50 seems justified. The few pots who have numbers in both sublayers are presented in a separate list and are not included in the general characteristics of the sublayers.
The oldest find layer (L30) is located on the southern slope of the river dune (fig. 3.6). The total surface of the find layer is some 200 m^2. The ^{14}C date from L30 is listed in appendix 3, accompanied by the reduced calendar age range proposed by Verbruggen. L30 probably dates from between 4610 and 4550 BC. The subsequent find layer L50 extends over 1500 m^2 on the southern, eastern and northern sides of the river dune. The group of ^{14}C dates pertaining to this find

		Organic temper				*Grog temper*				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	0	1	2	3	
Number		47	52	326	340	761	1	–	3	278	184	192	111	765
Percentage		6.1	6.8	42.6	44.4	99.5	0.1	–	0.4	36.3	24.0	25.1	14.5	100
Weight (g)		808	979	6632	7564	15877	10	–	96	4493	4833	4453	2114	15983
Percentage		5.0	6.1	41.5	47.3	99.3	0.1	–	0.6	28.1	30.2	28.4	13.2	100
Average weight (g)		17.2	18.8	20.3	22.2	20.9	10.0	–	32.0	16.2	26.3	23.7	19.0	20.9
Average size of temper particles (mm)		–	–	–	–	–	4.0	–	2.1	–	2.6	2.9	3.2	–
Average wall thickness (mm)		9.9	10.0	10.8	10.4	10.5	9.0	–	12.0	10.5	10.1	10.6	11.3	10.5
Types of join:	H-joins	12	18	95	96	221	–	–	–	71	67	48	35	221
	N-joins	1	3	19	11	34	–	–	–	16	8	7	3	34
	Z-joins	–	–	–	1	1	–	–	–	1	–	–	–	1
Surface finish:	Uneven	12	12	87	114	223	1	–	1	73	72	60	20	225
	Smoothed	2	2	16	10	30	–	–	–	7	8	12	3	30
	Smeared	–	–	1	5	6	–	–	–	1	2	3	–	6
	Roughened	–	–	–	1	1	–	–	–	1	–	–	–	1
Body decoration:	Paired fingertip	3	4	33	61	93	–	–	1	33	28	30	3	94
	Single fingertip	1	2	6	5	14	–	–	–	3	6	2	3	14
	Spatula	6	–	10	4	20	–	–	–	4	4	8	4	20
	Hollow spatula	1	1	7	1	10	–	–	–	–	3	6	1	10
Rim decoration:	Spatula	–	–	–	4	4	–	–	–	1	1	2	–	4
	Hollow spatula	–	–	–	1	1	–	–	–	–	–	1	–	1

Table 3.15. Brandwijk L50base. The characteristics of the pottery sample.

layer may to some extent be subdivided into dates relating to the base or top of the find layer. The reduced calendar age range for L50 base is 4220-4100 BC. The age of L50 top may be deduced from the *terminus post quem* provided by the reduced calendar age of L50 base, the *terminus ante quem* from L60 and the single ^{14}C date that pertains to L50 top. A combination of these dates reveals that L50 top probably dates from between 4030 and 3940 BC. L60 is situated on the southeastern side of the river dune. Its surface covers some 1600 m^2. It is dated between 3940 and 3820 BC by means of the reduced calendar age range. One last date relates to L70, the peat cover of L60. As one large pot sherd was found in this peat layer, the date of the peat matrix becomes of interest. The single date reveals that the peat with a 2σ certainty dates between 3760 and 3550 BC. (surface areas and reduced calendar ranges based on Verbruggen in prep.).

3.3.2 POTTERY

Brandwijk L30

Only 9 sherds, with a total weight of 45 g, can be dated to this occupation phase. Six of these sherds are very small; the three remaining sherds are somewhat larger and are described below. Of course, it is impossible to generalise on

	Spatula	*Hollow spatula*	*Totals*
Inside	2	1	3
Outside	2	–	2
Totals	4	1	5

Table 3.16. Brandwijk L50 base. The locations and techniques of rim decoration.

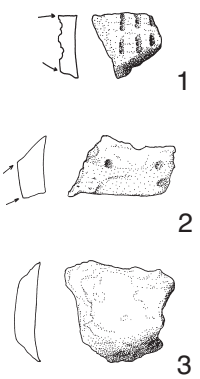


Fig. 3.7. Pottery from Brandwijk L30. Scale 1:3. Numbers refer to text. Drawing M. Hense.

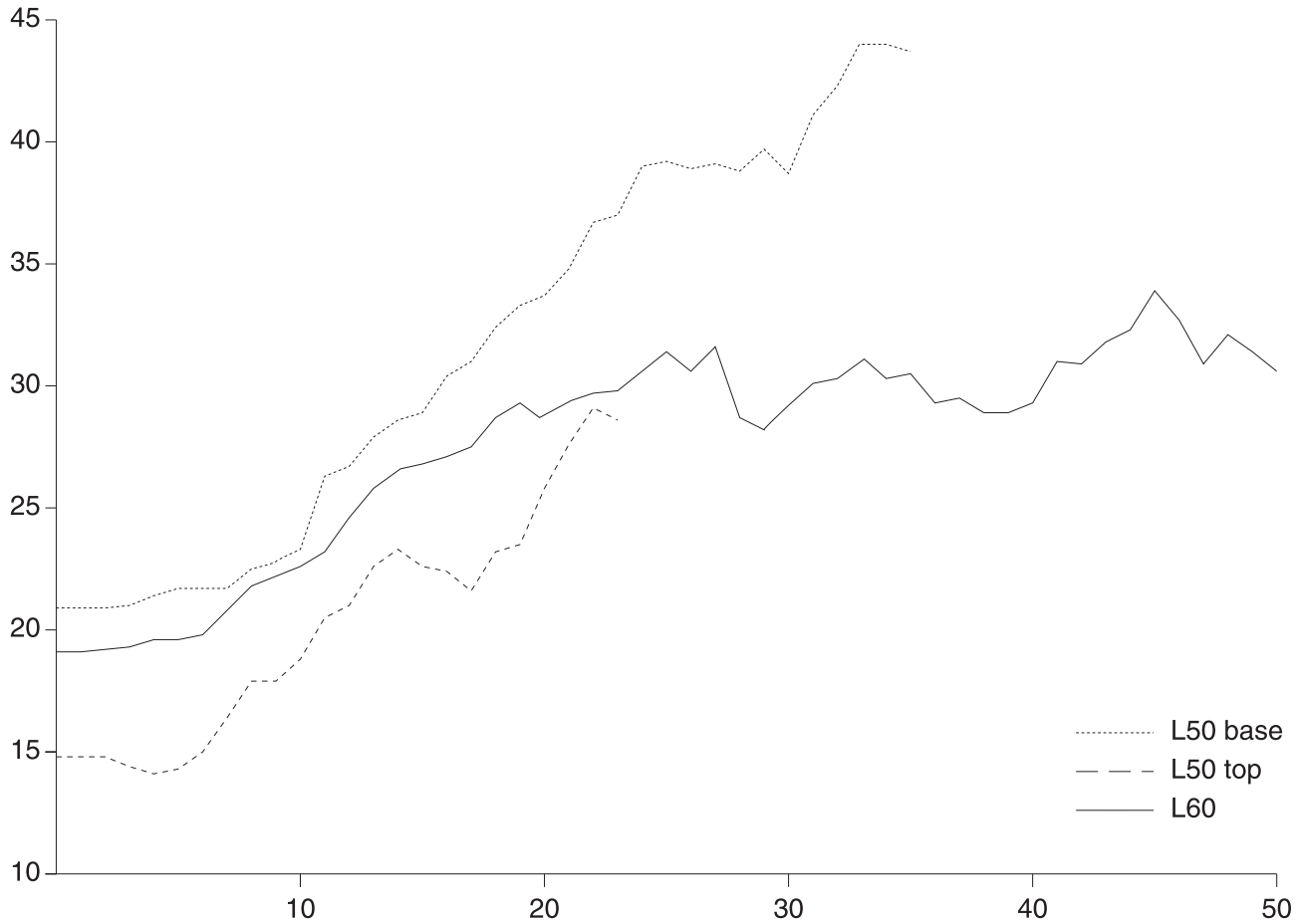


Fig. 3.8. Relation between minimal sherd size in gr. (horizontal) and decoration percentages (vertical) for Brandwijk L50 base, L50 top and L60. Drawing P. de Jong.

the basis of such a small number of sherds, but it can be said that both organic material and grit were used as tempering agents and that the wall thickness varies between 6 and 10 mm. Both H-joins and N-joins are present. These characteristics are also found in the pottery from later occupation phases.

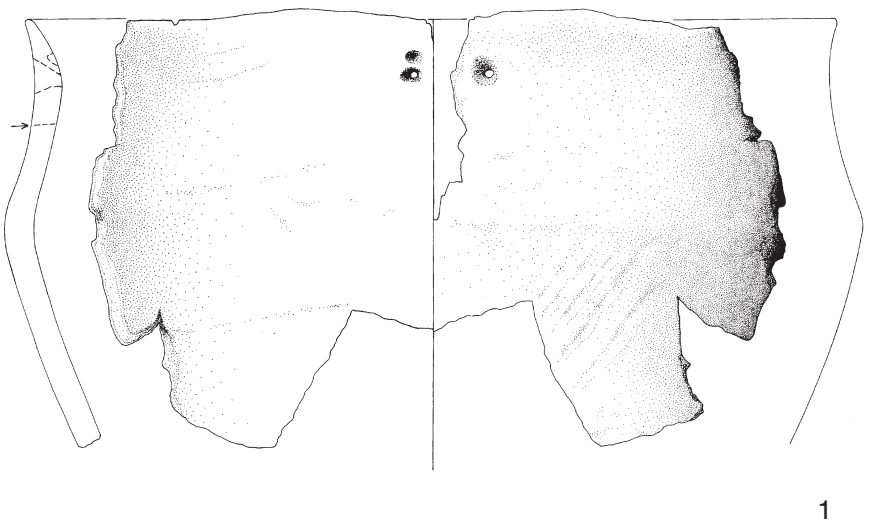
The following descriptions relate to the three illustrated sherds (fig. 3.7):

1. Body sherd tempered with a medium quantity of organic material. Coil-building with H-joins. Decorated by a three-pointed spatula of which the middle point was larger than the two exterior ones.
2. Body sherd tempered with a large quantity of organic material. Coil-building with both H-joins and N-joins.
3. Body sherd tempered with a large quantity of organic material.

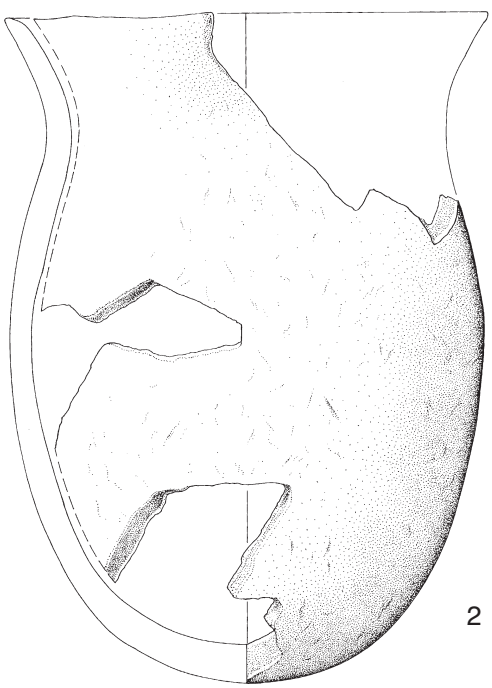
Brandwijk L50 base

A total of 765 sherds — 15,983 g in weight — were found in L50 base. The characteristics of these sherds are listed in table 3.15. It can be concluded from this table that the fragmentation of the pottery was not related to the amount and types of temper: the number and weight percentages are similar. In a large majority of the sherds (87%), organic material is used as temper in average or large quantities. Grit was also used: 40% of the sherds contain an average or large quantity of grit. Grog is very rare. The average wall thickness is 10.5 mm. Coil-building is visible in many sherds (33%): H-joins predominate (86%), but N-joins (13%) and Z-joins (1%) occur as well.

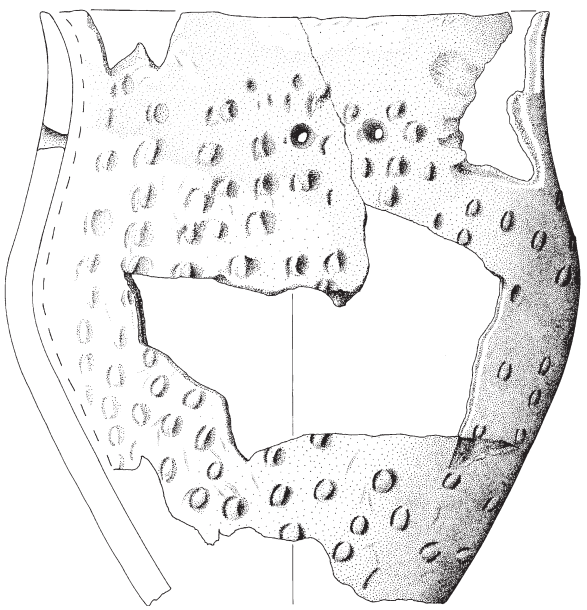
Five rim sherds are decorated among a total of 64 rim fragments (8%; see table 3.16). While decoration on the inside was carried out with spatulas and hollow spatulas (pot 6, fig. 3.9), decoration on the outside took the form of spatula



1



2



3

Fig. 3.9. Pottery from Brandwijk L50 base. Scale 1:3. Numbers refer to text. Drawing M. Hense.

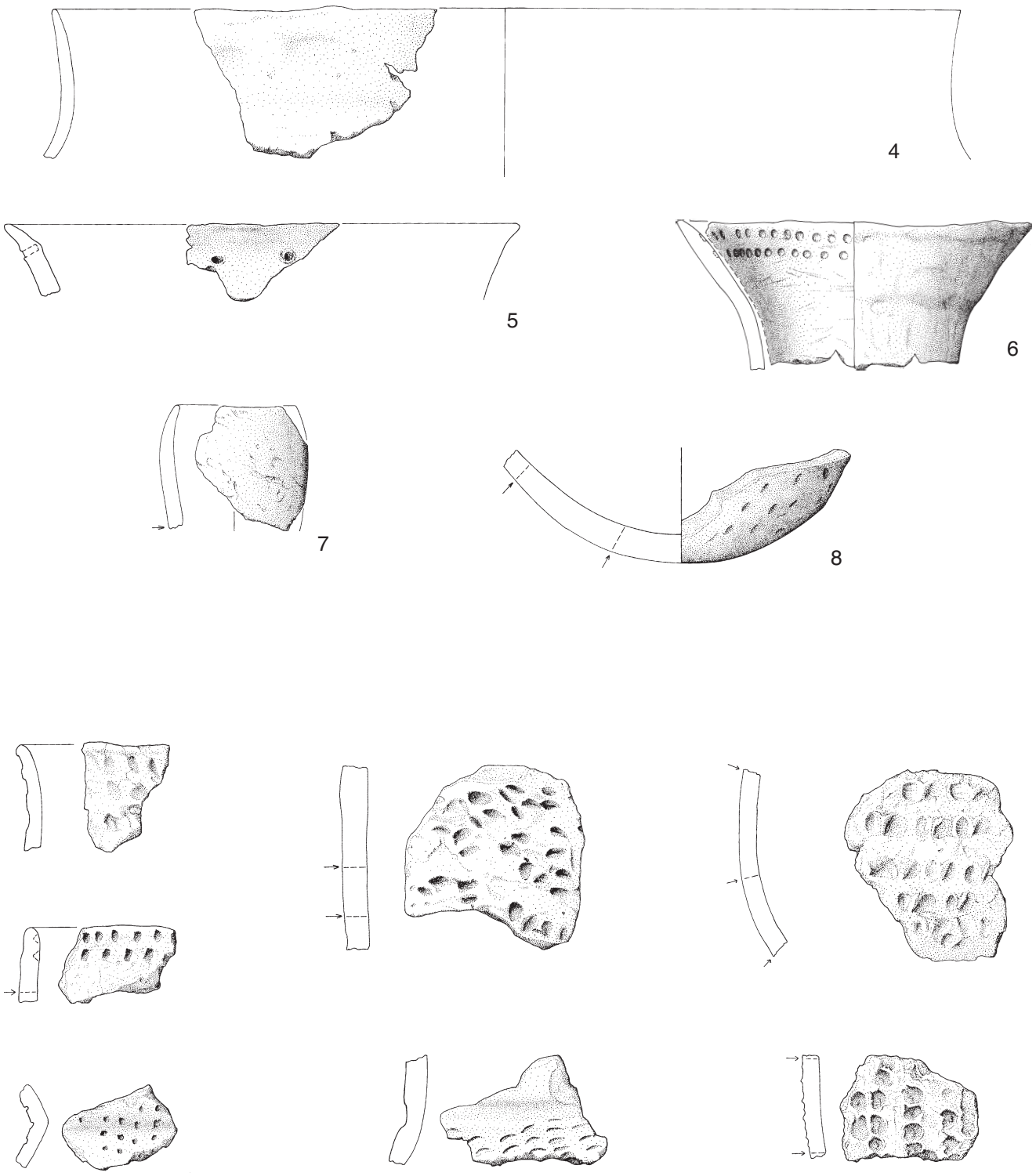


Fig. 3.9. Continued.

		Organic temper				*Grog temper*				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	0	1	2	3	
Number		49	25	123	71	266	–	2	–	37	30	75	126	268
Percentage		18.3	9.3	45.9	26.5	99.2	–	0.8	–	13.8	11.2	28.0	47.0	
Weight (g)		928	386	3,143	1,628	6,065	–	20	–	640	637	1,877	2,931	6,085
Percentage		15.2	6.3	51.6	26.7	99.7	–	0.3	–	10.5	10.5	30.8	48.2	
Average weight (g)		18.9	15.4	25.5	22.9	22.8	–	10.0	–	17.3	21.2	25.0	23.3	22.7
Average size of temper particles (mm)		–	–	–	–	–	–	3.5	–	–	3.0	2.8	3.4	
Average wall thickness (mm)		10.9	9.8	10.4	10.4	10.4	–	10.0	–	9.4	9.9	10.3	11.1	10.4
Types of join:	H-joins	8	6	34	22	70	–	–	–	11	12	21	26	70
	N-joins	5	1	4	4	14	–	–	–	3	2	8	1	14
	Z-joins	–	–	1	–	1	–	–	–	–	–	1	–	1
Surface finish:	Uneven	16	14	38	25	93	–	–	–	20	10	26	37	93
	Smoothed	1	2	6	–	8	–	1	–	2	3	3	1	9
	Smeared	1	–	2	2	5	–	–	–	–	1	2	2	5
	Roughened	–	–	1	–	1	–	–	–	–	–	1	–	1
	Besenstrich	1	–	–	–	1	–	–	–	–	–	–	1	1
Body decoration:	Paired fingertip	3	–	10	9	22	–	–	–	5	4	6	7	22
	Single fingertip	2	3	10	3	18	–	–	–	2	1	4	11	18
	Spatula	5	2	5	2	14	–	–	–	1	2	3	8	14
	Hollow spatula	–	–	–	1	1	–	–	–	–	–	–	1	1
Rim decoration:	Spatula	1	–	5	–	6	–	–	–	–	1	–	5	6
	Thumb + spatula	–	–	1	–	1	–	–	–	–	–	1	–	1

Table 3.17. Brandwijk L50 top. The characteristics of the pottery sample.

impressions only. One rim fragment was decorated with a row of spatula impressions that nearly perforated the rim, thus creating not only a series of deep circular impressions on the outside of the rim, but also a series of bumps on the inside (pot 5, fig. 3.9). In German, this type of decoration is referred to as *Lochbuckel* (see section 4.4.2).
Body decoration is more frequent: 138 sherds are decorated (18%) with fingertip/nail impressions (78%) or impressions of instruments (22%). When only the larger sherds are considered, the percentage of body decoration increases to about 28-30%, fig. 3.8. This last figure is probably a fair indication of the percentage of decorated pots. Body decoration covers the entire surface and is mostly applied with fingertips/nails, both as paired (68%) and single (10%) impressions (pots 3 and 8 in fig. 3.9). The decoration involving instruments was carried out with spatulas (14%) and hollow spatulas (7%).

Illustrated pottery fragments from L50 base (fig. 3.9):

Pot 1. Rim-body fragment tempered in medium quantities with both grit (average size 3 mm) and organic material. Coil-built with H-joins. Uneven surface. One repair hole plus one incomplete one. S-shaped pot.

Pot 2. S-shaped pot tempered in a large quantity with organic material and in a medium quantity with grit (average particle size 3 mm). Uneven surface.

Pot 3. Rim-body fragment tempered with a large quantity of organic material. Two repair holes in the rim zone. S-shaped pot. Body decoration with paired fingertip impressions. Uneven surface.

Pot 4. Rim sherd tempered with an medium quantity of grit (average particle size 2 mm). Uneven surface.

Pot 5. Rim sherd tempered with a large quantity of organic material. Smeared surface. Row of *Lochbuckel*.

Pot 6. Rim sherd tempered with a large quantity of organic material and a medium quantity of grog (average size 4 mm). Inside of the rim zone decorated with two horizontal rows of hollow spatula impressions. Uneven surface.

Pot 7. Rim-body sherd tempered with a medium quantity of organic material. Coil-built with H-joins. Uneven surface. Small cup.

Pot 8. Round base fragment tempered with a large quantity of grit (average size 3 mm). Coil-built with H-joins. Body decoration with paired fingertip impressions. Uneven surface.

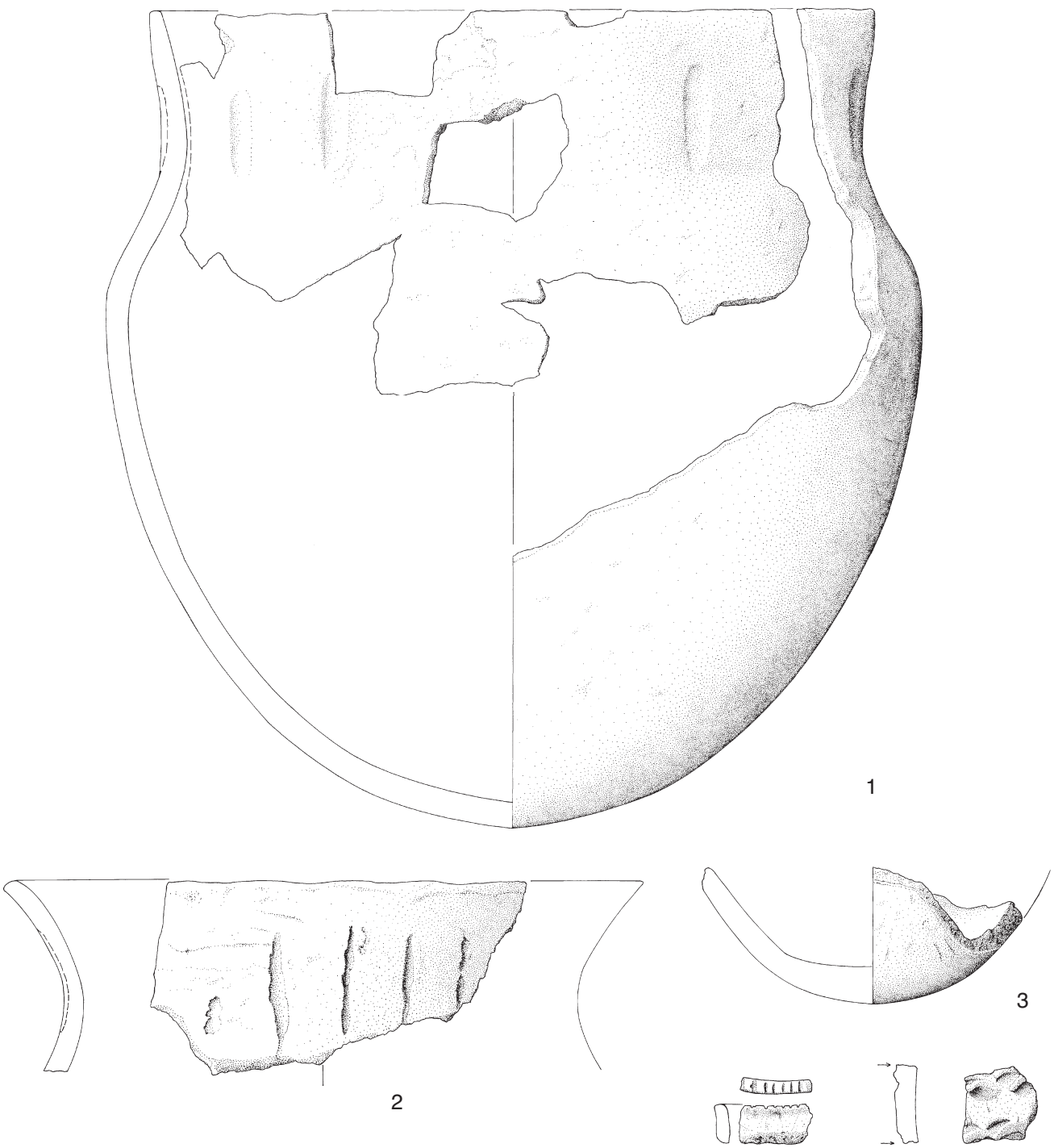


Fig. 3.10. Pottery from Brandwijk L50 base or L50 top. Scale 1:3. Numbers refer to text. Drawings M. Hense.

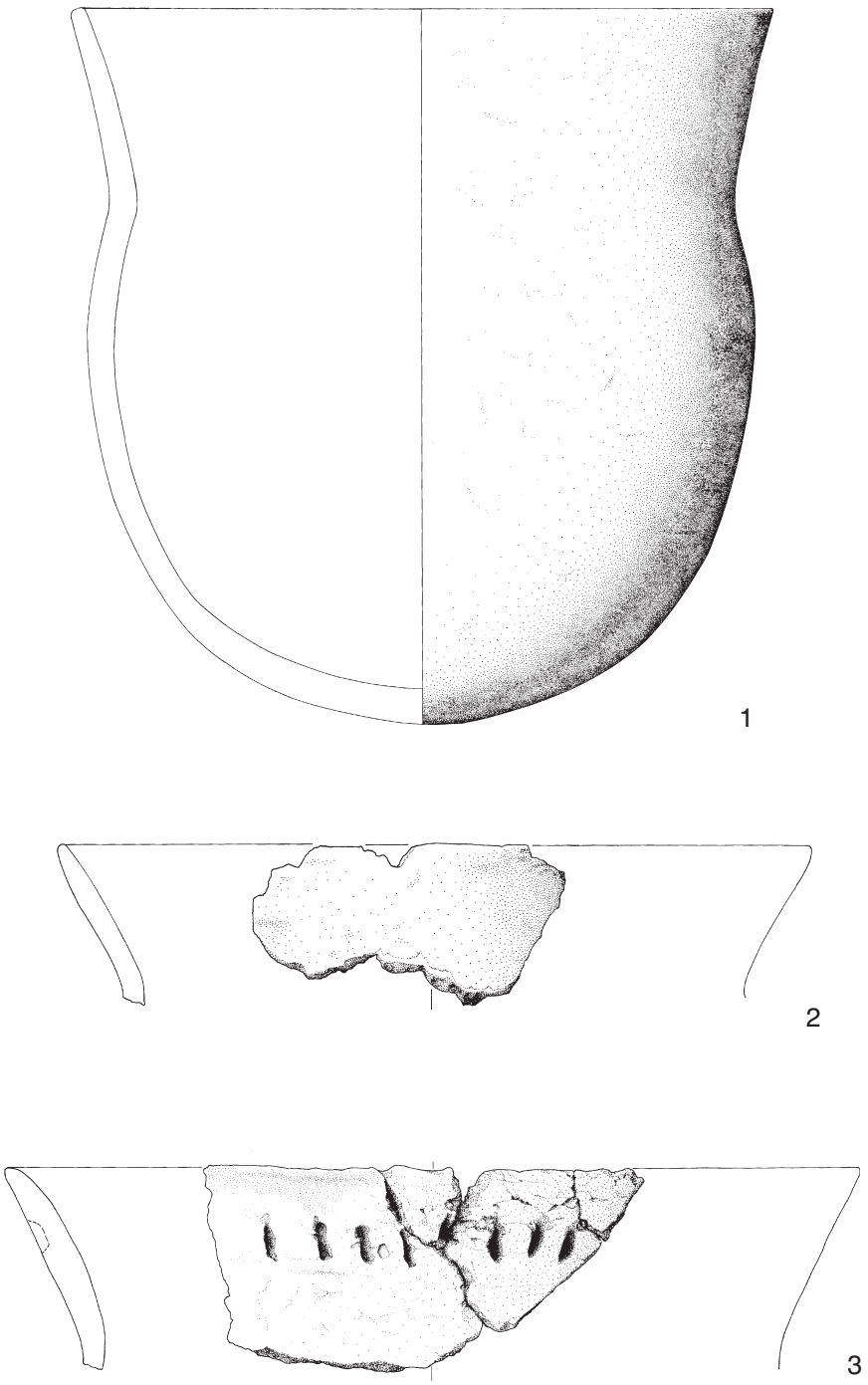
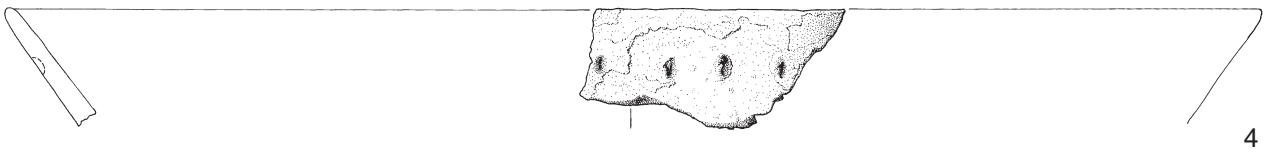
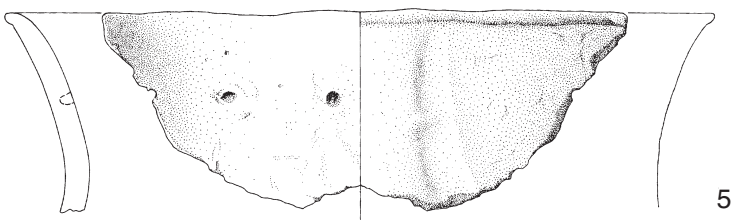
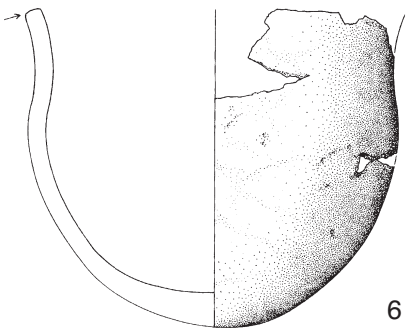
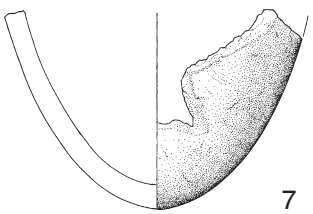


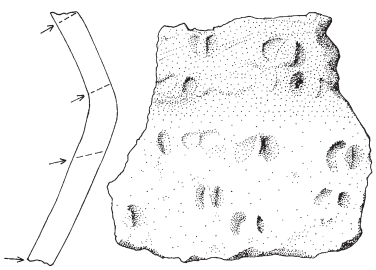
Fig. 3.11. Pottery from Brandwijk L50 top. Scale 1:3. Numbers refer to text. Drawings M. Hense.











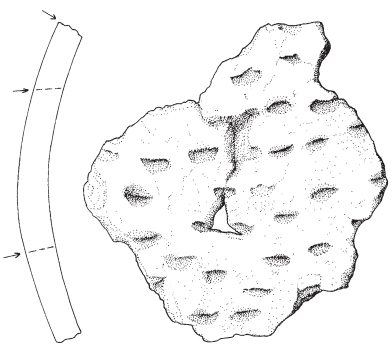


Fig. 3.11. Continued.

Pots from either L50 base or L50 top (fig. 3.10):

Pot 9. Pot tempered in medium quantities with both grit (average particle size 5 mm) and organic material. Coil-built with H-joins. Outer rim zone decorated with thumb impressions. S-shaped pot. Smoothed surface.

Pot 10. Rim sherd tempered with a large quantity of organic material and a medium quantity of grit (average size 3 mm). Outside of rim decorated with vertical grooves. Uneven surface.

Pot 11. Round base sherd tempered with large quantities of both organic material and grit (average particle size 3 mm). Uneven surface.

Brandwijk L50 top

The characteristics of the 268 sherds, with a weight of 6,085 g, that are attributed to L50 top are listed in table 3.17. The number and weight percentages are again very similar, which means that the fragmentation of the pottery was not influenced by the amount or type of temper. These sherds are mostly tempered with organic material: 72% contain an average or large quantity of organic temper. Grit was also used in a large number of sherds; 47% contain an average or large quantity. Grog was rarely used. The average wall thickness is almost the same as in the pottery from L50 base: 10.4 mm. Coil-building was evident in 32 % of the sherds: H-joins are again dominant (82%), while N-joins (16%) and Z-joins (1%) are also found.

Rim decoration is seen on 7 of a total of 42 rim sherds (17%; see table 3.18). One sherd is decorated with a series of spatula impressions on the top of the rim, while five other rims are decorated with spatula impressions on the outside (pots 3 and 4, fig. 3.11). Pot 5 shows a combination of two types of rim decoration: the inside is decorated with a series of spatula impressions; the exterior decoration is a series of large thumb impressions (fig. 3.11).

Body decoration is frequent: 55 sherds were decorated (20%). This percentage increases to about 38-40% if only the larger sherds are considered, fig. 3.8. This percentage to some extent reflects the percentage of pots with body decoration, but it is not very reliable owing to the small size of the assemblage. Body decoration was made with fingertips/nails (73%) and instruments (27%). Fingertip/nail impressions occur both as single (33%) and paired impressions (40%). Impressions were also made with a spatula (25%) or hollow spatula (2%). The body decoration covers the entire body surface.

Depicted pottery fragments from L50 top (fig. 3.11):

Pot 1. Pot tempered with a large quantity of grit (average particle size 6 mm) and a medium quantity of organic material. S-shaped pot with round base. Uneven surface.

	Spatula	*Spatula + thumb*	*Totals*
Outside	5	–	5
Top	1	–	1
Inside and outside	–	1	1
Totals	6	1	7

Table 3.18. Brandwijk L50 top. The locations and techniques of rim decoration.

Pot 2. Rim sherd tempered with a large quantity of organic material. S-shaped pot. Smeared surface.

Pot 3. Rim sherd tempered with a large quantity of grit (average particle size 4 mm) and a medium quantity of organic material. Exterior rim zone decorated with a row of vertical grooves. S-shaped pot. Uneven surface.

Pot 4. Rim sherd tempered with a large quantity of grit (average particle size 2 mm) and a medium quantity of organic material. Exterior rim zone decorated with a row of spatula impressions. Smeared outer surface, smoothed inner surface.

Pot 5. Rim sherd tempered with medium quantities of grit (average particle size 3 mm) and organic material. Rim zone decorated on the inside with a row of spatula impressions, the outside with a row of thumb impressions. Uneven surface.

Pot 6. Pot tempered with a large quantity of grit (average particle size 4 mm) and a medium quantity of organic material. S-shaped pot with round base. Uneven surface.

Pot 7. Point base tempered with medium quantities of grit (average particle size 6 mm) and organic material. Uneven surface.

Brandwijk L60

The L60 pottery assemblage consists of 203 sherds with a total weight of 4,429 g. An average or large quantity of organic material is used as temper in 91% of the sherds. The percentage of material tempered with an average or large quantity of grit is very similar to that of L50 top: 81%. Table 3.19 shows that, on average, sherds with a large quantity of grit temper are larger than those with less grit. A plausible explanation is that more grit was used in thicker pottery, but it is also possible that the amount of grit was overestimated in the larger sherds. The average wall thickness is 10.7 mm. Coil-building was evident in 31% of the sherds: again mostly H-joins (92%), while N-joins (6%) and Z-joins (1%) are also found in small numbers.

Rim decoration is rare: one rim is decorated with a row of impressions on the top of the rim, among a total of 15 rim fragments (7%). Body decoration is also less common than in the older Brandwijk assemblages: 14%. When only large

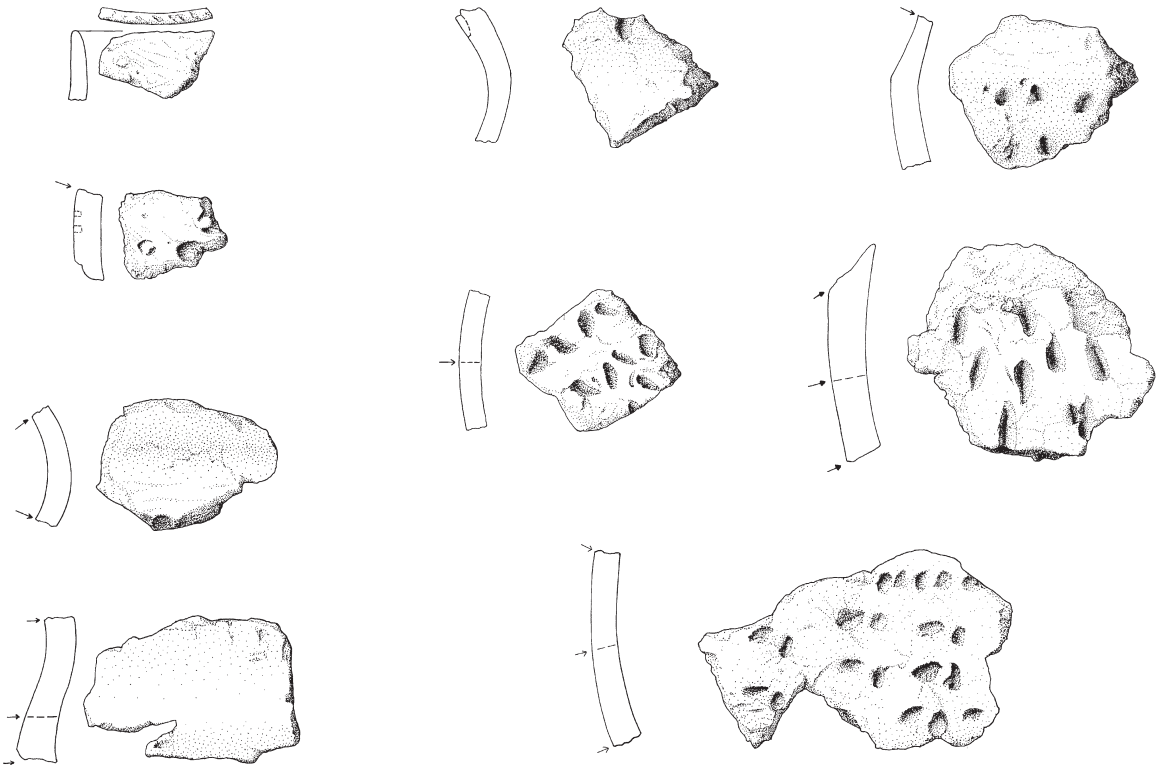


Fig. 3.12. Pottery from Brandwijk L60. Scale 1:3. Drawings M. Hense.

		Organic temper				*Grog temper*				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	0	1	2	3	
Number		11	8	106	78	201	1	–	1	19	19	51	114	203
Percentage		5.4	3.9	52.2	38.4	99.0	0.5	–	0.5	9.3	9.3	25.1	56.1	100
Weight (g)		217	168	2,697	1,346	4,419	4	–	6	257	212	1,057	2,903	4,429
Percentage		4.9	3.8	60.9	30.3	99.7	0.1	–	0.1	5.8	4.8	23.9	65.5	100
Average weight (g)		19.7	21.0	25.4	17.2	22.0	4.0	–	6.0	13.5	11.1	20.7	25.5	21.8
Average size of temper particles (mm)		–	–	–	–	–	6.0	–	5.0	–	2.6	3.1	3.4	–
Average wall thickness (mm)		13.0	11.0	10.8	10.0	10.7	11.0	–	–	12.3	10.1	10.2	10.9	10.7
Types of join:	H-joins	4	–	31	23	58	–	–	–	6	4	13	35	58
	N-joins	–	–	4	–	4	–	–	–	1	–	1	2	4
	Z-joins	–	–	1	–	1	–	–	–	–	–	1	–	1
Surface finish:	Uneven	2	3	27	18	49	1	–	–	4	8	14	23	50
	Smoothed	–	–	2	–	2	–	–	–	–	–	2	–	2
	Smeared	–	–	1	–	1	–	–	–	–	–	–	1	1
Body decoration:	Paired fingertip	1	–	6	6	12	1	–	–	–	1	3	9	13
	Single fingertip	–	–	2	3	5	–	–	–	–	1	–	4	5
	Spatula	2	–	3	6	11	–	–	–	2	–	2	7	11
Rim decoration:	Spatula	–	–	1	–	1	–	–	–	–	–	1	–	1

Table 3.19. Brandwijk L60. The characteristics of the pottery sample.

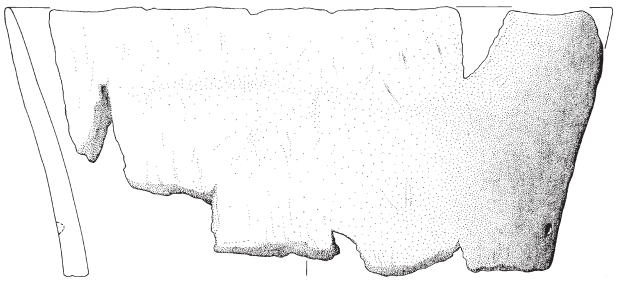


Fig. 3.13. Pottery from Brandwijk L70. Scale 1:3. Drawings M. Hense.

sherds are considered, this percentage increases to about 21-24%, almost half the figure of L50 top (fig. 3.8). Body decoration was carried out with fingertips/nails, in both the single (17%) and paired (45%) variety and with a spatula (38%). The body decoration covers the entire body surface. Pots were probably S-shaped, while the shoulder zones of some pots were accentuated (fig. 3.12).

Brandwijk L70

One large rim fragment was found in the peat cover of L60. This pot was tempered with a large quantity of organic material and a medium quantity of grit; the average size of the grit particles is 4 mm. The shape is uncertain (fig. 3.13). One uncompleted repair hole is present. Although L70 is dated to around 3600 BC, contemporaneous with the Hazendonk 3 occupation phase at Hazendonk, the form of this fragment does not correspond to the Hazendonk 3 pottery (section 4.4.4).

Discussion

The pottery from the various Brandwijk find layers was described in the section above. Of course, it is argued here that the pottery from the Brandwijk find layers is of Swifterbant character. In this context, the few sherds from L30 merit special attention. The similarities in tempering and coil-building to the pottery from the younger find layers might suggest that the pottery from L30 should be interpreted as pottery of the Swifterbant Culture. Contrary to such an interpretation is the type of decoration that is found on the first-mentioned sherd from L30. Decoration carried out with a three-pointed spatula is absent not only in the other Brandwijk pottery assemblages, but is also unknown from the other sites of the Swifterbant Culture.

If parallels to this type of decoration are searched for elsewhere, the contemporaneous Late Rössen/Bischheim sequence in the Rhineland and the Western European Blicquy Group come into view. Both Rössen and Bischheim pottery are generally tempered with sand. Decoration was applied in *Furchenstich* or *Doppelstich* and is more frequent and abundant in Rössen pottery than in the Bischheim material (sections 4.3.2 and 4.3.3). Most Blicquy pottery is tempered with burnt and crushed bone but other types of temper also occur. Decoration consisted of impressions made with a single-pointed spatula, occasionally with a two-pointed instrument. It covered the body surface or consisted of straight or curved rows of impressions. Blicquy material is found in both northern France and Belgium (section 4.3.4). More contemporaneous sites, especially in the southern Netherlands, are needed to interpret the singular type of decoration of the L30 sherd. For the time being, it has to be concluded that neither Late Rössen/Bischheim nor Blicquy pottery provides a convincing parallel.

As a result of the size of the L50 base pottery assemblage, this assemblage is easier to typify than the L30 pottery. It is characterised by S-shaped pots with round bases, mostly tempered with organic material (but often with grit as well), rim decoration on both the inside and outside of the rim and body decoration that covers the entire body surface. When compared with the pottery from the contemporaneous Swifterbant levee sites (section 3.2.4), the ceramics from L50 base are found to bear close similarities to it in technological respects such as morphology, tempering agents, average wall thickness and proportions of the types of join. These technological similarities are accompanied by stylistic similarities such as the types and location of rim decoration. A major difference is observed in the frequency of body-decoration types: while the pottery from the Swifterbant levee sites mainly has shoulder impressions and hardly any surface decoration, this ratio is reverse in the Brandwijk L50 base assemblage. I conclude that this Brandwijk assemblage may be interpreted as a site of the Swifterbant Culture, while the differences in body decoration are a significant example of the variation within the pottery of the Swifterbant Culture.

The pottery from L50 top is very similar to the material from L50 base in its general S-shape with a round or point base, average wall thickness and types of join. The types of decoration are similar, as are their relative frequencies. There are also some differences: organic material is used less often as a tempering agent, while grit temper occurs more frequently in the sherds from L50 top. Rim and body decoration are more frequent in the pottery from L50 top (table 3.20). From the similarities between the pottery from L50 base and L50 top, it follows that the pottery from L50 top is also of the Swifterbant Culture.

The pottery from L60 is similar to the material from L50 top in its average wall thickness, the types of join and types of body decoration. The L60 sherds are more often tempered with a mix of grit and organic material, while they are less frequently decorated, on both the body surface and the rim zone (table 3.20). The pottery was probably S-shaped, as in

		L50 base	*L50 top*	*L60*
Organic temper	0	6	18	5
	1	7	9	4
	2	43	46	52
	3	44	26	38
Grog temper	0	99	99	99
	1	0	–	0
	2	–	1	–
	3	0	–	0
Grit temper	0	36	14	9
	1	24	11	9
	2	25	28	25
	3	14	47	56
Average wall-thickness (mm)		10.5	10.4	10.7
H-joins		86	82	92
N-joins		13	16	6
Z-joins		0	1	2
Rim decoration	%	8	17	7
	Spatula	80	86	100
	Thumb	–	14	–
	Hollow spatula	20	–	–
Rim decoration location	Inner side	60	–	–
	Outer side	40	71	–
	Top	–	14	100
	Inner and outer side	–	14	–
Body decoration	%	18	20	14
	Paired fingertip	68	40	45
	Single fingertip	10	33	17
	Spatula	14	25	38
	Hollow spatula	7	2	–

Table 3.20. Brandwijk. The proportional development of pottery characteristics.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	2	296	6.7	29
Pebble-Meuse egg	3	43	5.2	23
Long-distance flint				
Rijckholt	1	14	8.4	37
Light-grey Belgian	1	14	2.5	11
Totals	7	100	22.8	100
Indet.	24		25.9	
Unburnt	23	74	38.6	79
Red	1	3	2.0	4
Crackled	7	23	8.1	17
Totals	31	100	48.7	100

Table 3.21. Brandwijk L30. The raw materials and proportion of burnt flint.

the earlier occupation phases. The absence of distinct base fragments suggests that bases were round: fragments from round bases are difficult to distinguish from body sherds. Given the above-mentioned similarities to the L50 pottery, this occupation phase must also represent the Swifterbant Culture.

3.3.3 FLINT ARTEFACTS

The sample of flint artefacts from L30 consists of 31 items, 48.7 g in weight. The raw material types are varied: terrace flint, pebble-Meuse eggs, Rijckholt and Light-grey Belgian flint types are all represented. The proportion of artefacts without cortex is large, while most artefacts are unburnt. The basic morphology shows a predominance of flakes, which have an average length of 2.7 cm (n=8). Of the five blades present, only one is complete: it has a length of 2.4 cm. Flake technology is more frequent than blade technology (74% versus 26%). The four tools from this assemblage are

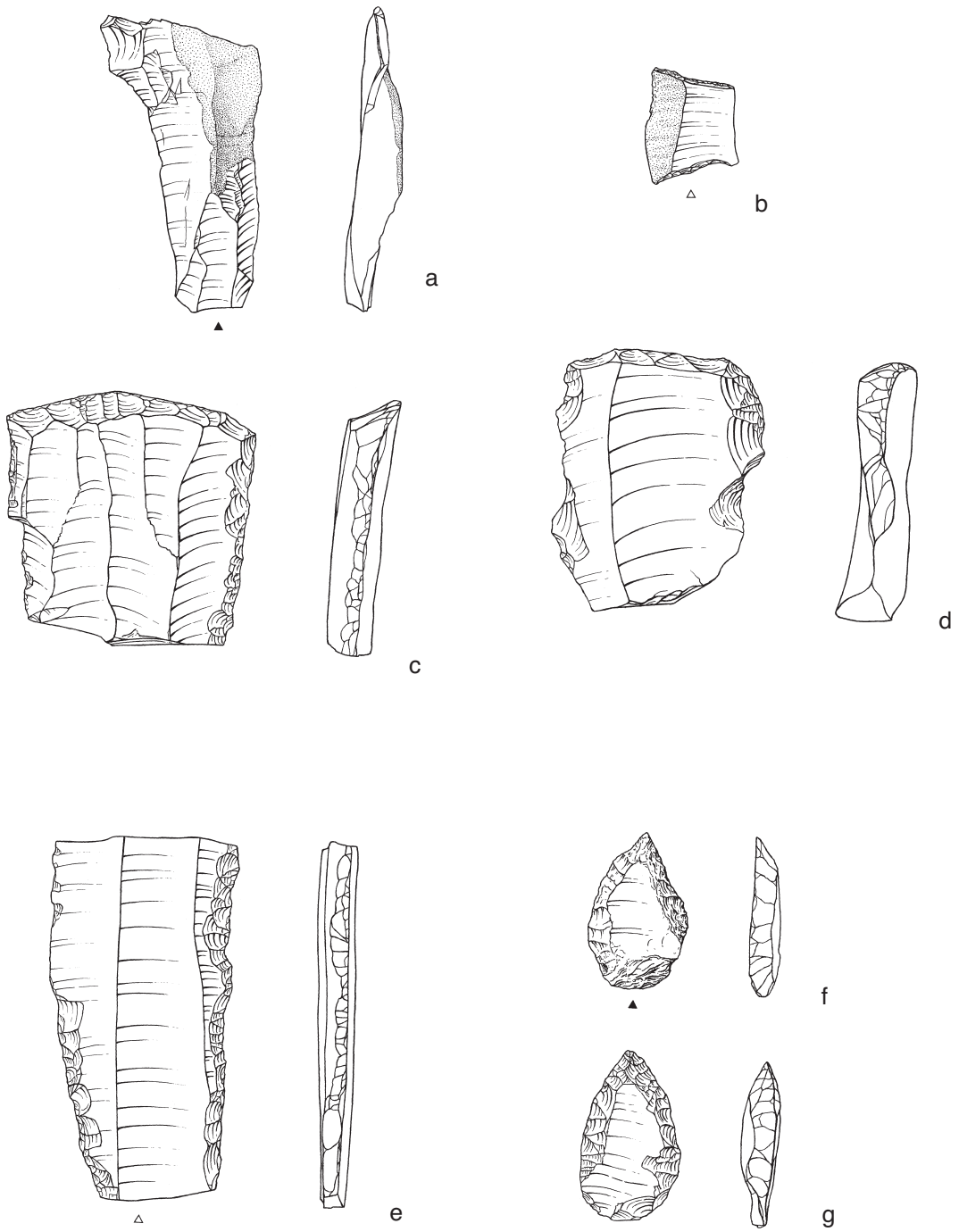


Fig. 3.14. Flint artefacts from Brandwijk. L30: a: flake, b: trapeze; L50 base: c-d: scrapers, e: retouched blades, f-g: drop-shaped points. Scale 1:1. Drawings C. Dijkstra.

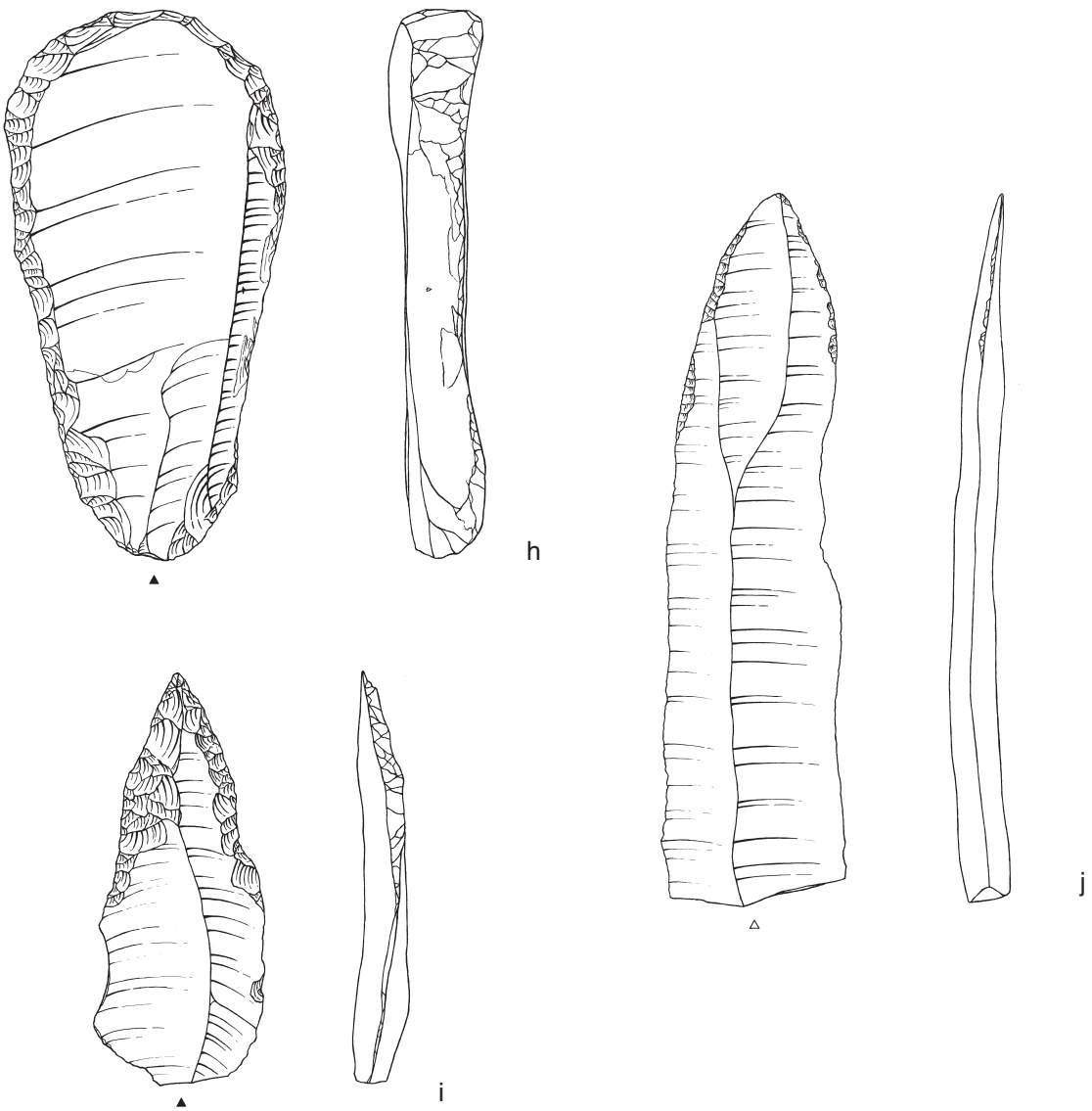


Fig. 3.14. Continued. L50: h-i: pointed blades, j: scraper.

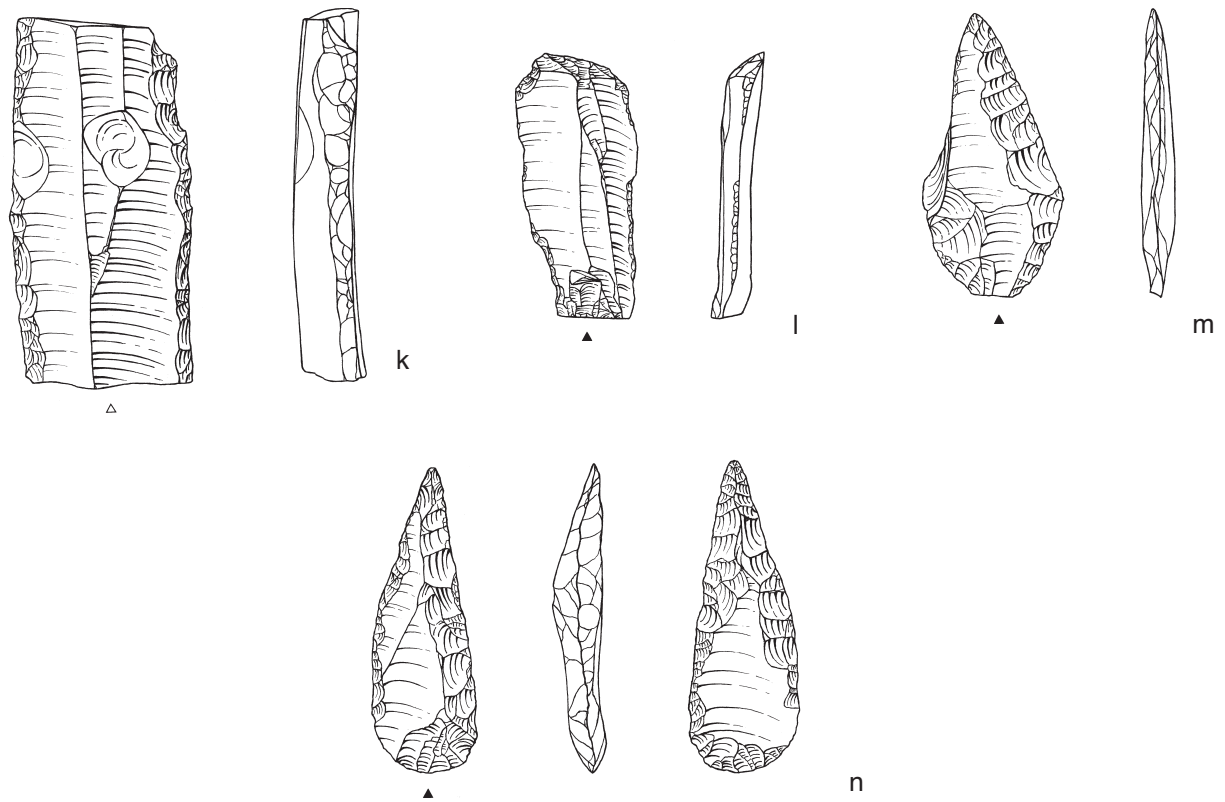


Fig. 3.14. Continued. L50 top: k: retouched blade, l: scraper, m: leaf-shaped point; L60: n: drop-shaped point.

one trapeze and three retouched flakes (tables 3.21 and 3.22; fig. 3.14).

The 80 flint artefacts from L50 base weigh 319.4 g. As in the previous occupation phase, the raw material stems from different sources: terrace flint, pebble-Meuse eggs, Rijckholt and Light-grey Belgian. The proportion of artefacts without cortex is greater than at L30, while burnt artefacts are also more frequent. The basic morphology is almost identical to that of L30 with flakes, waste and blades being the major categories. The technology is based on flake (79%) and blade technology (21%). The average length of flakes is 2.5 cm (n=24), while the average length of blades is 2.9 cm (n=2). The three cores are all flake cores. The list of tools comprises one drop-shaped point, one leaf-shaped point with straight sides, one pointed blade, one small blade borer, one blade, one flake scraper and several retouched blades and flakes (tables 3.22-3.24; fig. 3.14).

L50 top contains 29 flint artefacts (110.5 g). Rijckholt was probably the most-used flint type, but terrace flint is also found. The percentage of artefacts with cortex decreases in comparison to L50 base, while the proportion of burnt flint artefacts and the basic morphology are very similar to those of the previous occupation phase. Flake technology is more common than blade technology (67% versus 33%). The average length of flakes is 2.5 cm (n=9), while no complete blades are present. The list of tools comprises one leaf-shaped point with curved sides of Rijckholt flint, two blade scrapers (one of Rijckholt flint) and one retouched blade (tables 3.22 and 3.25; fig. 3.14).

The 53 flint artefacts from L60 weigh 105.9 g. As in L50 top, Rijckholt flint is the principal type of raw material. The proportion of artefacts without cortex increases even further compared to the three previous occupation phases. A majority of the artefacts are unburnt. The basic morphology shows that flakes, waste and blades are again the major categories, while flake technology is again more common than blade technology: 77% and 23% respectively. The average size of the flakes is 2.4 cm (n=14), while blades are on average 4.5 cm long (n=3). Only one tool was recovered: a drop-shaped point (tables 3.22 and 3.26; fig. 3.14).

It is difficult to compare the flint artefacts from L30 with contemporary assemblages because of the absence of diagnostic tool types, apart from the trapeze. Such an approach is therefore not pursued here. The flint artefacts from the three

	L30		*L50 base*		*L50 top*		*L60*	
No cortex	19	63	58	72	26	90	48	91
Smooth cortex, < 50%	6	20	11	14	–	–	2	4
Smooth cortex, > 50%	2	7	6	7	3	10	1	2
Rough cortex, < 50%	3	10	4	5	–	–	2	4
Rough cortex, > 50%	–	–	1	1	–	–	–	–
Totals	30	100	80	99	29	100	53	101
Indet.	1		–		–		–	
Flakes	17	55	40	50	10	34	23	43
Blocks	7	23	16	20	10	34	18	34
Blades	6	19	11	14	5	17	7	13
Chips	1	3	6	7	2	7	4	7
Cores	–	–	3	4	–	–	–	–
Potlids	–	–	1	1	1	3	–	–
Indet.	–	–	3	4	1	3	1	2
Totals	31	100	80	100	29	98	53	99

Table 3.22. Brandwijk. The extent and kind of cortex and the basic morphology of the flint artefacts.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	7	32	67.5	41
Pebble-Meuse egg	1	4	1.8	1
Long-distance flint				
Rijckholt	11	50	65.4	40
Light-grey Belgian	1	4	1.6	1
Polished fragments of indet. material	2	9	27.7	17
Totals	22	99	164.0	100
Indet.	58		155.4	
Unburnt	45	56	196.9	62
Gloss	1	1	0.7	0
Red	4	5	9.5	3
Crackled	29	36	89.6	28
Potlidded	1	1	22.7	7
Totals	80	99	319.4	100

Table 3.23. Brandwijk L50 base. The raw materials and proportion of burnt flint.

other find layers may be given similar interpretations, not only because of the strong resemblance between the flint assemblages from these three layers, but also because of the correspondence in the other category of material culture presented here, the pottery. Since the pottery from L50 base, L50 top and L60 is interpreted as pottery of the Swifterbant Culture, parallels of the flint assemblages with the flint artefacts from the Swifterbant cluster are expected. The Swifterbant affinities of the flint artefacts can be seen in the combination of flake and blade technology, the small size of the artefacts and the scraper forms (Deckers 1979; 1982; section 3.2.2). While triangular, drop-shaped and leaf-shaped points are rare at the Swifterbant levee sites, these are the only point types from Brandwijk. This reveals an important difference between the Brandwijk assemblages and those from the Swifterbant cluster; this will be further discussed in sections 3.8.2.3 and 3.8.5.

3.3.4 SUBSISTENCE DATA AND SEASONALITY

So far, the evidence from the botanical remains from Brandwijk is still limited. Cereal remains include emmer wheat and naked barley, both found in L50 and L60. L30 did not yield any remains of cereals (pers.comm. C. Bakels 1998). The zoological evidence is more abundant (based on Robeerst 1995). Table 3.49 reveals that while the number of identified bone elements is limited for both L30 and L50 base, the proportions of pig/wild boar, otter and red deer in these two find layers agree with the importance of these species in the larger spectra of L50 top and L60. The proportion of pig/wild boar bones varies between 20% (L30) and 33% (L50 top), while the proportions of otter and red deer are also constants in the Brandwijk assemblages (otter: 19%-24%; red deer: 8%-20%). This finding of similar mammal-bone spectra suggests that similar activities are reflected in the archaeological record, which in its turn is an indication that the economic function of the site remained the same throughout its documented occupation. Domestic animals constitute a minority in the four assemblages. Attested domestic species include cattle, dog, pig and sheep/goat.

	Number	*Tool category*	*%*	*Identified raw materials*
Points		**3**	**23**	
Drop-shaped point	2			1 × Rijckholt 1 × Light-grey Belgian
Leaf-shaped point	1			
Pointed blade		**1**	**8**	
Borers		**1**	**8**	
Blade borer	1			
Scrapers		**2**	**15**	
Blade scraper with retouched sides	1			1 × Rijckholt
Flake scraper	1			1 × Rijckholt
Retouched blades		**1**	**8**	
Retouch > 1 mm	1			
Retouched flakes		**5**	**38**	
Retouch < 1 mm	5			1 × Rijckholt
Totals		**13**	**100**	

Table 3.24. Brandwijk L50 base. The flint tools and identified raw materials.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	1	10	6.5	11
Long-distance flint				
Rijckholt	7	70	23.8	39
Polished fragments of indet. material	2	20	61.3	51
Totals	10	100	61.33	100
Indet.	19		49.2	
Unburnt	17	61	34.9	33
Crackled	10	36	55.3	53
Potlidded	1	4	13.8	13
Totals	28	101	104.0	99
Indet.	1		6.5	

Table 3.25. Brandwijk L50 top. The raw materials and proportion of burnt flint.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	3	17	4.6	7
Long-distance flint				
Rijckholt	12	67	59.4	89
Light-grey Belgian	3	17	2.5	4
Totals	18	101	66.5	100
Indet.	35		39.4	
Unburnt	29	58	77.3	74
Gloss	1	2	1.0	1
Crackled	20	40	26.3	25
Totals	50	100	104.6	100
Indet.	3		1.3	

Table 3.26. Brandwijk L60. The raw materials and proportion of burnt flint.

If the small number of bird remains are interpreted in terms of seasons of occupation of the site, only limited conclusions may be drawn (table 3.27). Mallard, shelduck and teal were probably resident birds, while long-tailed duck and whooper swan are winter visitors (Clason *et al*. 1979, table 1).
The numerous fish remains represent freshwater species, anadromous species and marine species. The group of freshwater species includes the carp family, eel, perch and pike. Anadromous fish species are represented by sturgeon and salmon/sea trout, while the marine species are of mullet family. This last group of marine species is known to venture into freshwater conditions and may have been caught nearby (Ball 1997). A comparison of the remains from L30, L50 and L60 reveals distinct similarities in bone spectra (table 3.27). Besides the similarities in the mammal-bone spectra from Brandwijk, the similarities between the fish assemblages is another indication that the site function did not change much.
If one accepts a functional continuity of the site from L30 to L60 on the basis of the similarities in the mammal and

Birds:	*L30*	*L50base*	*L50top*	*L60*
Long-tailed duck (*Clangula hyemalis*)	1	–	–	–
Mallard (*Anas platyrhynchos*)	–	1	1	–
Shelduck (*Tadorna tadorna*)	–	1	–	–
Teal (*Anas crecca*)	–	–	1	–
Whooper swan (*Cygnus cygnus*)	–	–	3	–
Large bird of prey	–	–	–	1
Indet.	0	0	1	1

Fishes:	*L30*		*L50*		*L60*	
	n	%	n	%	n	%
Carp family (Cyprinidae)	36	53	678	68.4	202	48.7
Eel (*Anguilla anguilla*)	–	–	21	2.1	9	2.2
Mullet family (Mugilidae)	–	–	4	0.4	1	0.2
Perch (*Perca fluviatilis*)	5	7	19	1.9	11	2.6
Pike (*Esox lucius*)	24	35	236	23.8	172	41.4
Salmon/sea trout (*Salmo salar* cf. *trutta*)	3	4	2	0.2	4	1.0
Sturgeon (*Acipenser sturio*)	–	–	31	3.1	16	3.8
Totals	68	99	991	99.9	415	99.9

Table 3.27. Brandwijk. The bird and fish remains. After Robeerst 1995 and Ball 1997.

fish-bone spectra, then one could combine the scarce indications for seasonal occupation from the site's four find layers. In this case, one might conclude that both summer (sturgeon, salmon/sea trout) and winter occupation (long-tailed duck and whooper swan) are attested at Brandwijk and year-round occupation is a possibility. Arguments against this interpretation are the limited number of seasonal indicators among the mammal bones and the time depth of the various find layers, which is bound to result in palimpsests. Nevertheless, the observed similarities in the bone material still are suggestive of similarities in other aspects of the occupation.[9]

3.4 Hazendonk 1 and Hazendonk 2

3.4.1 INTRODUCTION

The archaeological study of the Hazendonk river dune started in 1963 with a series of test pits and ended with a large-scale excavation during the three successive summers of 1974, 1975 and 1976 (fig. 3.15). A total of 57 trenches were excavated in order to gain insight into the Neolithic occupation of this river dune. The environmental history of the area was studied by means of augering in the surrounding sediments in combination with palynological research (Louwe Kooijmans 1974, 127-168; 1976a, 255-259, 263-271, 280-290; Van der Woude 1983).

The orientation of the excavation grid was determined by the orientation of the Hazendonk dune. The excavation trenches, with a standard size of 2 × 3 metres, were positioned in this grid. All finds in these trenches were recorded three-dimensionally. The eastern end of the dune, which was examined in ten adjoining trenches, was designated Unit C. This Unit C is crucial to the interpretation of the site for two reasons. First, this is the only place where a series of five find layers in the Holocene deposits around the dune could be distinguished owing to intermediate zones with few finds. This means that the changes in the site's occupation history can best be studied through the finds from this area. The second reason for a detailed analysis of Unit C is that the second oldest occupation phase is present only at this spot. For these two reasons the analysis presented in this section is limited to the material from Unit C. Material from two later occupation phases (Vlaardingen 2b and Bell Beaker) was found elsewhere on the site, but as these phases fall outside the scope of this study, they will not be discussed here (Louwe Kooijmans 1976a, 286-289). This section deals with the two oldest assemblages (Hazendonk 1 and Hazendonk 2), since these finds are interpreted as remains from the Swifterbant Culture. A discussion of the Hazendonk 3 finds will be found in section 4.4.3; the finds of the Vlaardingen Group in Unit C are presented in section 4.5.2.2.

The find layers were formed in the Holocene deposits around the river dune. The subsequent compaction of the embedding peat changed the slope of the original stratigraphy. This peat compaction was strongest far from the river

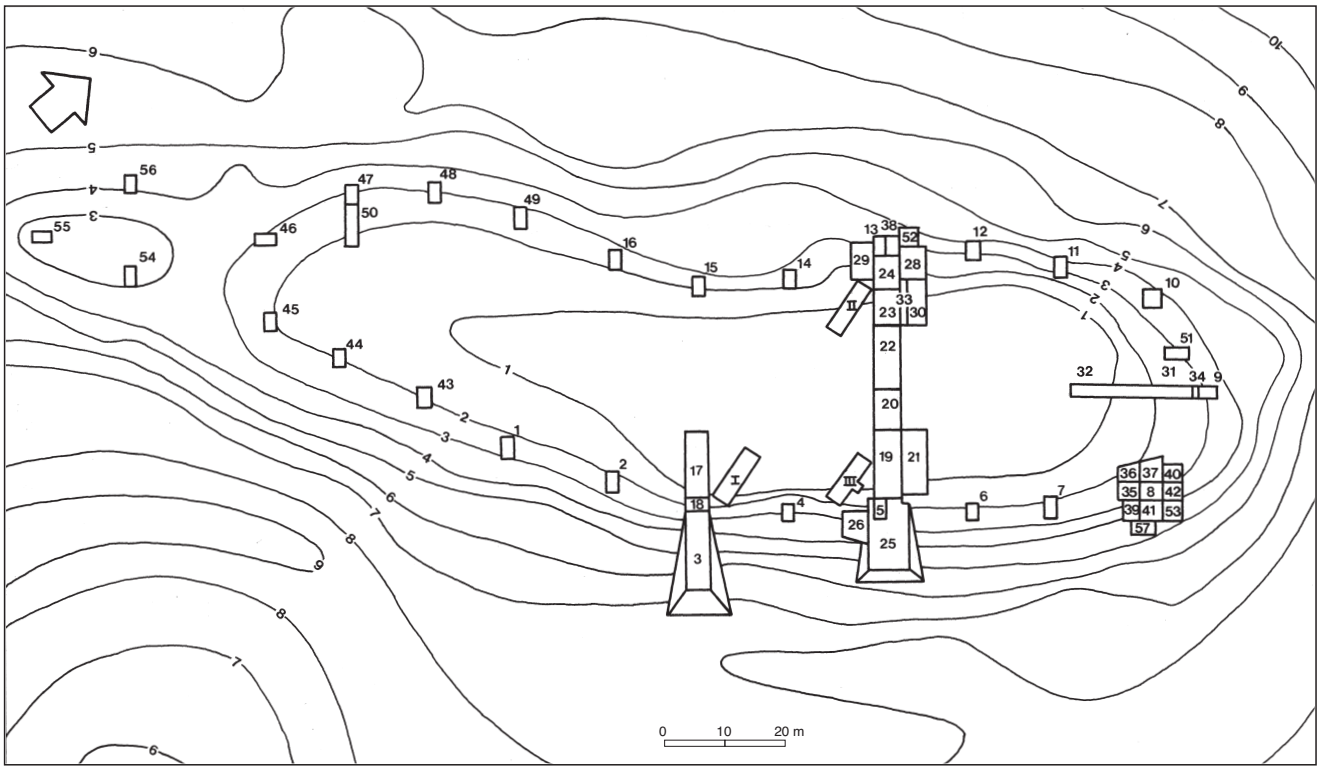


Fig. 3.15. Hazendonk. Excavation trenches and dune contours (after Zeiler 1991, fig. 8).

dune and absent on the river dune itself (where no peat developed). As a result, the originally more or less horizontal find layers were forced into a sloping position. This deformation is the first aspect of the problem in the analysis of the material from this site.

The second aspect arises out of the discrepancy between the direction of the slope of the dune in Unit C and the excavation grid: due to the location of Unit C at the southeastern end of the dune, there is an angle of about 45° between the grid on the one hand and the slope of the river dune and all the find layers on the other hand (fig. 3.15). When all finds are projected onto a grid-oriented section, the intermediate zones with few finds are diffused and it is hard to separate the assemblages.

The problem is solved by allocating the finds to the different find layers by taking into account the slope of these find layers. In other words: the direction of the projection must be made perpendicular to the contour lines of the river dune. This reprojection was carried out by Jonkers (1992). His research resulted in a database file in which finds are related to both his reprojection results and an earlier allocation by L. Verhart. In order to establish a set of reliable data, only those finds allocated by both studies to the same find layer were selected for the following study. The rest of the material was analysed only if the characteristics of this material required special attention because of singularities. This material is discussed separately. Thus it is ensured that all characteristics of the flint artefacts and pottery are presented here.

Hazendonk 1, the oldest excavated occupation phase of the site[10], was found in two distinct areas: a small zone in the southwestern part of the river dune and a larger one in the southeast, including Unit C (fig. 3.16). The total area of the Hazendonk 1 layer is about 800 m^2 (Verbruggen in prep.). The ^{14}C dates from Unit C are listed in appendix 3, including Verbruggen's reduced calendar age (1992). It is concluded that the Hazendonk 1 material dates from around 4000 BC. The natural environment of the Hazendonk 1 occupation can be described as dominated by lakes in which Hazendonk was a solitary sandy outcrop. The natural vegetation consisted of alder brushwood in combination with mixed oak stands on the higher grounds such as the river dunes (Van der Woude 1983, 87).

The Hazendonk 2 occupation phase is reflected in two thin, discontinuous charcoal layers on the eastern part of the river dune, fig. 3.16. These two distinct layers (Hazendonk 2a

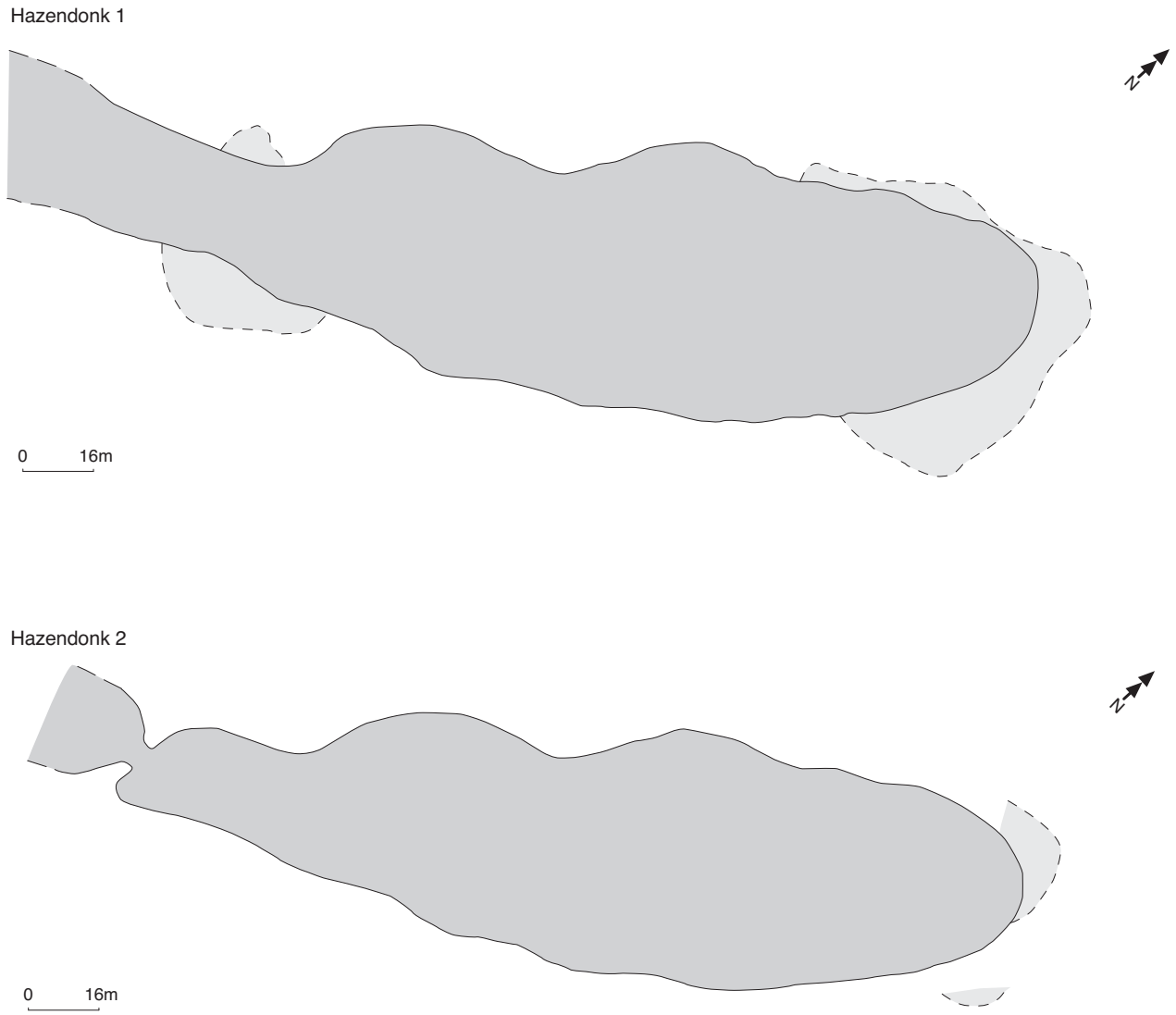


Fig. 3.16. Spatial distribution of the Hazendonk 1 and 2 occupation layers. Reproduced with kind permission of M. Verbruggen. Drawing P. de Jong

and 2b) were observed in the excavation sections but could not be separated in the augering campaign which was carried out during the excavation. Moreover, Jonkers was unable to subdivide the Hazendonk 2 material. Therefore, the Hazendonk 2 material is presented here as a single assemblage. The Hazendonk 2 layer is small, only some 300 m^2 in surface area (Verbruggen in prep.). The ^{14}C dates for this phase from Unit C are also listed in appendix 3, which shows that the Hazendonk 2 occupation probably dates to between 3910 and 3790 BC, i.e. at least 50 years later than the Hazendonk 1 occupation. In this phase, the natural environment was less dominated by alder and oak than during the Hazendonk 1 phase: the lakes had expanded and there was a more open landscape.

3.4.2 POTTERY

The Hazendonk 1 pottery

The selected Hazendonk 1 pottery sample consists of 173 sherds, with a total weight of 3,175 g. The characteristics of these sherds are listed in table 3.28. The clay was predominantly tempered with organic material: in 80% of the sherds, a medium or large quantity of organic temper is present. Grit

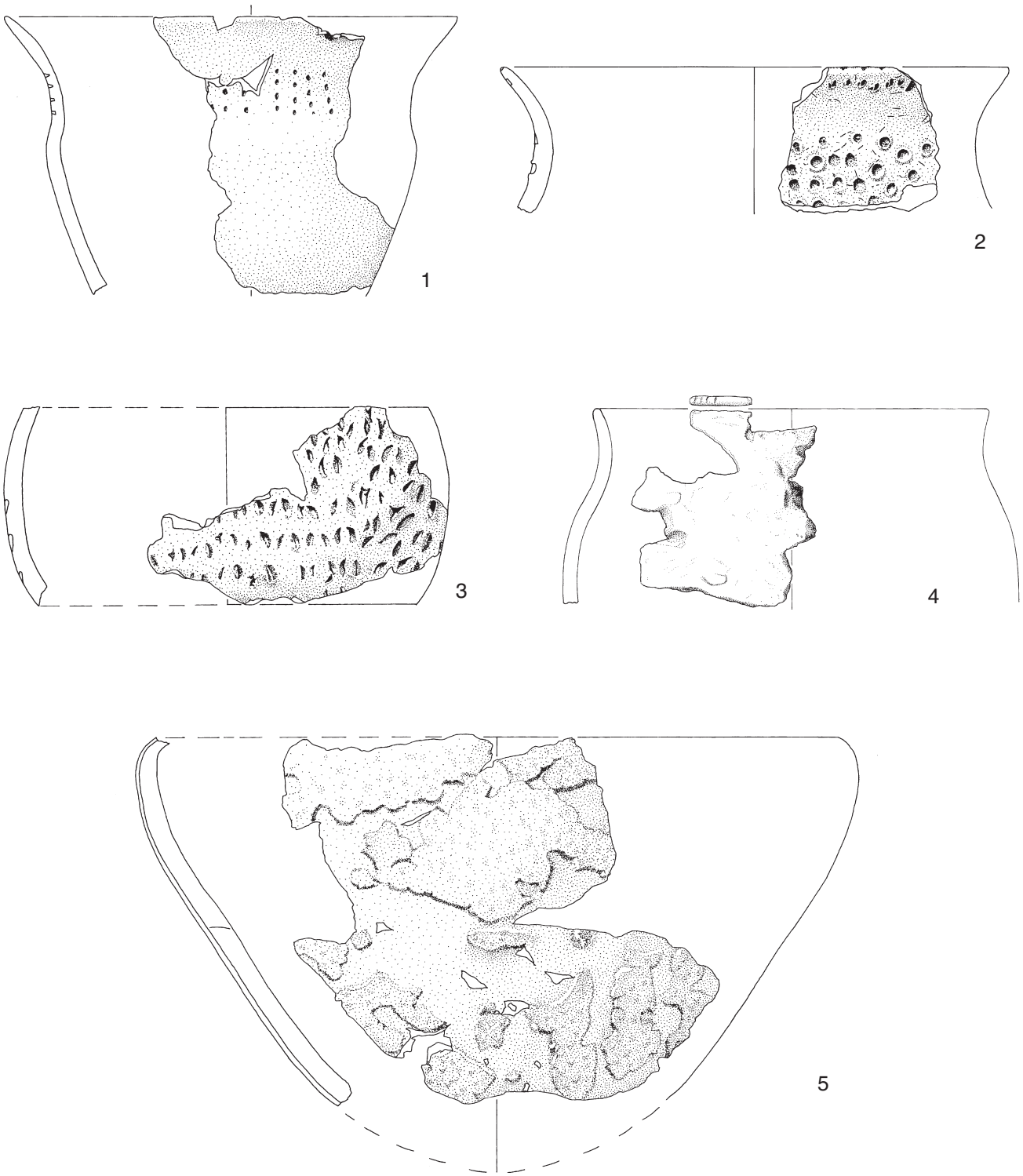


Fig. 3.17. Hazendonk 1 pottery. Scale 1:3. Numbers refer to text. Drawings M. Hense (no. 4) and L. Verhart.

Fig. 3.17. Continued.

and grog were also used as temper, but only in a minority of the sherds. The number and weight percentages are similar, which suggests that the fragmentation of the pottery was not affected by the amount or type of temper. The average wall thickness is 8.5 mm; wall thickness also seems to be unrelated to the amount and type of temper. Coil-building is only visible on 11 sherds (6%), and is evident from both H-joins and N-joins. A variety of surface treatments is present: smoothing (15%), smearing (10%) and roughening (9%), but the majority of the sherds have an uneven surface (65%). Rim decoration is frequent: nine out of twenty-five rim sherds (36%) are decorated with spatula impressions on the top of the rim (89%) or impressions of a spatula on the outside and top of the rim (11%). Body decoration is less common: only 21 sherds are decorated (12%). If only the larger sherds are considered, this percentage remains similar (fig. 3.18). Decoration was carried out with paired fingertips/nails (14%), spatulas (14%) or hollow spatulas (71%). It occurs on the shoulder (3 sherds, pot 1, fig. 3.17) or covers the body surface excluding the rim zone (18 sherds, see pots 2 and 3, fig. 3.17).

Illustrated pottery fragments (fig. 3.17):

Pot 1. Pot tempered with a medium quantity of organic material. Shoulder zone decorated with four-pointed spatula. S-shaped pot. Smoothed surface.

Pot 2. Rim sherd tempered with a medium quantity of organic material. Top of rim and exterior rim zone decorated with a row of impressions. Body surface decorated with a hollow spatula. Smoothed surface.

Pot 3. Pot tempered with a large quantity of organic material and small quantities of grit (average particle size 3 mm) and grog (average particle size 2 mm). Body surface decorated with paired fingertip impressions. S-shaped pot. Uneven surface.

Pot 4. Pot tempered with a medium quantity of grit (average particle size 3.5 mm) and small quantities of grog (average particle size 2 mm) and organic material. Top of rim decorated with a row of incisions (*Randkerbung*). S-shaped pot. Smoothed surface.

Pot 5. Body fragment tempered with medium quantities of grit (average particle size 4.5 mm) and organic material. Coil-built with H-joins. Smeared surface.

The Hazendonk 2 pottery

The Hazendonk 2 pottery sample weighs 2,219 g and consists of 110 sherds. The characteristics of this pottery are listed in table 3.29. In general, the Hazendonk 2 pottery is tempered with organic material: 84% of the sherds contain an average or large quantity of organic temper. Grit temper is also present in the majority of the material (68%). In about a fifth of the sherds, grog was used as well. The number and weight percentages are similar, which means that the fragmentation of this assemblage was not influenced by the amount or type of temper. The wall thickness (9.2 mm on average) also appears to be unrelated to the amount and type of temper used in the pottery. Coil-building is visible in 30 sherds (27%): H-joins predominate (76%), but N-joins are also present (24%). Most sherds have an uneven surface (79%), others have a roughened (13%), smoothed (7%) or smeared surface (1%).

Rim decoration is absent on all of the six rim sherds; one rim sherd can be described as a *Tupfenleist*. Body decoration is rare: only six body sherds are decorated (5%) (see also fig. 3.18). Body decoration was applied with paired fingertips (5 sherds) or a spatula (1 sherd). It covered the entire body surface.

Depicted pottery fragments (fig. 3.19):

Pot 1. Pot tempered with a medium quantity of organic material and grit (average particle size 2 mm). Tulip beaker. Rough surface. In Michelsberg terminology: *Tulpenbecher Typ 5* (Lüning 1967, appendix 7).

Pot 2. Rim sherd tempered with a large quantity of organic material and a small quantity of grit (average particle size 2 mm). S-shaped pot. Uneven surface.

		Organic temper				*Grog temper*				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	0	1	2	3	
Number		20	15	63	75	129	30	10	4	87	32	43	11	173
Percentage		11.6	8.7	36.4	43.3	74.6	17.3	5.8	2.3	50.3	18.5	24.8	6.3	100
Weight (g)		357	244	1318	1256	2205	687	193	90	1435	569	980	191	3175
Percentage		11.2	7.7	41.5	39.5	69.4	21.6	6.1	2.8	45.2	17.9	30.9	6.0	100
Average weight (g)		17.8	16.3	20.9	16.7	17.1	22.9	19.3	22.5	16.5	17.8	22.8	17.4	18.3
Average size of temper particles (mm)		–	–	–	–	–	2.2	2.9	3.3	–	2.3	3.3	3.3	–
Average wall thickness (mm)		8.1	7.8	8.8	8.5	8.5	8.3	9.3	9.2	7.8	8.5	10.1	8.2	8.5
Types of join:	H-joins	2	–	1	2	2	1	2	–	3	2	–	–	5
	N-joins	1	–	2	2	4	1	–	–	2	1	2	–	5
	Z-joins	–	–	1	–	1	–	–	–	–	–	–	1	1
Surface finish:	Uneven	10	9	28	41	54	23	7	4	50	20	13	5	88
	Smoothed	1	2	9	9	18	2	1	–	13	5	2	1	21
	Smeared	1	–	6	7	13	1	–	–	3	3	8	0	14
	Roughened	2	1	9	1	12	1	–	–	3	2	5	3	13
Body decoration:	Hollow spatula	2	1	5	7	14	1	–	–	3	2	10	–	15
	Spatula	–	1	2	–	2	–	1	–	1	2	–	–	3
	Paired fingertip	–	–	–	3	1	2	–	–	1	2	–	–	3
Rim decoration:	Spatula	–	–	7	2	9	–	–	–	3	–	5	1	9

Table 3.28. Hazendonk 1. The characteristics of the pottery sample.

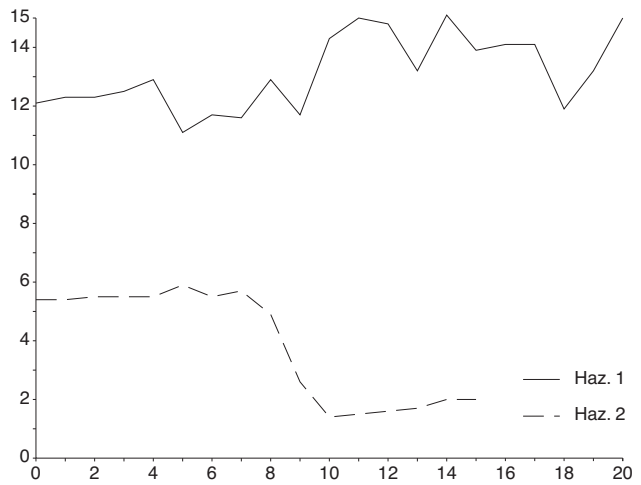


Fig. 3.18. Relation between minimal sherd size in gr. (horizontal) and decoration percentages (vertical) for Hazendonk 1 and 2. Drawing P. de Jong.

Pot 3. Sherds tempered with a large quantity of organic material. S-shaped pot. Uneven surface.

Pot 4. Pot tempered with a large quantity of grit (average particle size 4 mm) and a medium quantity of organic material. Coil-built with N-joins. Bucket-shaped pot. Uneven surface. In Michelsberg terminology: *Flaschenformige Vorratsgefaß, Typ 16 Variante 1* (Lüning 1968, appendix 7).

An interlude

The following two pots merit special attention, because of their morphological and technological singularity and their stratigraphical position. On the one hand, Jonkers's analysis dates these pots to the Hazendonk 3 occupation phase, while, on the other, Louwe Kooijmans dates them to the Hazendonk 2 phase (1976a, fig. 13). According to the criterion mentioned in section 3.3.1, allocation of these pots is therefore impossible.

A re-analysis of the exact location of the finds shows that both pots were found in the sand body of the river dune, incorporated in the basis of the Hazendonk 3 find layer. This suggest that they *could* have been deposited prior to the Hazendonk 3 occupation; another possibility is that they were discarded during the Hazendonk 3 habitation phase. As these pottery types are absent in the remainder of the Hazendonk 3 assemblage, and are also lacking in the other closed Hazendonk 3 assemblage of Wateringen 4 (see section 4.4.4), their attribution to the Hazendonk 2 occupation is favoured.

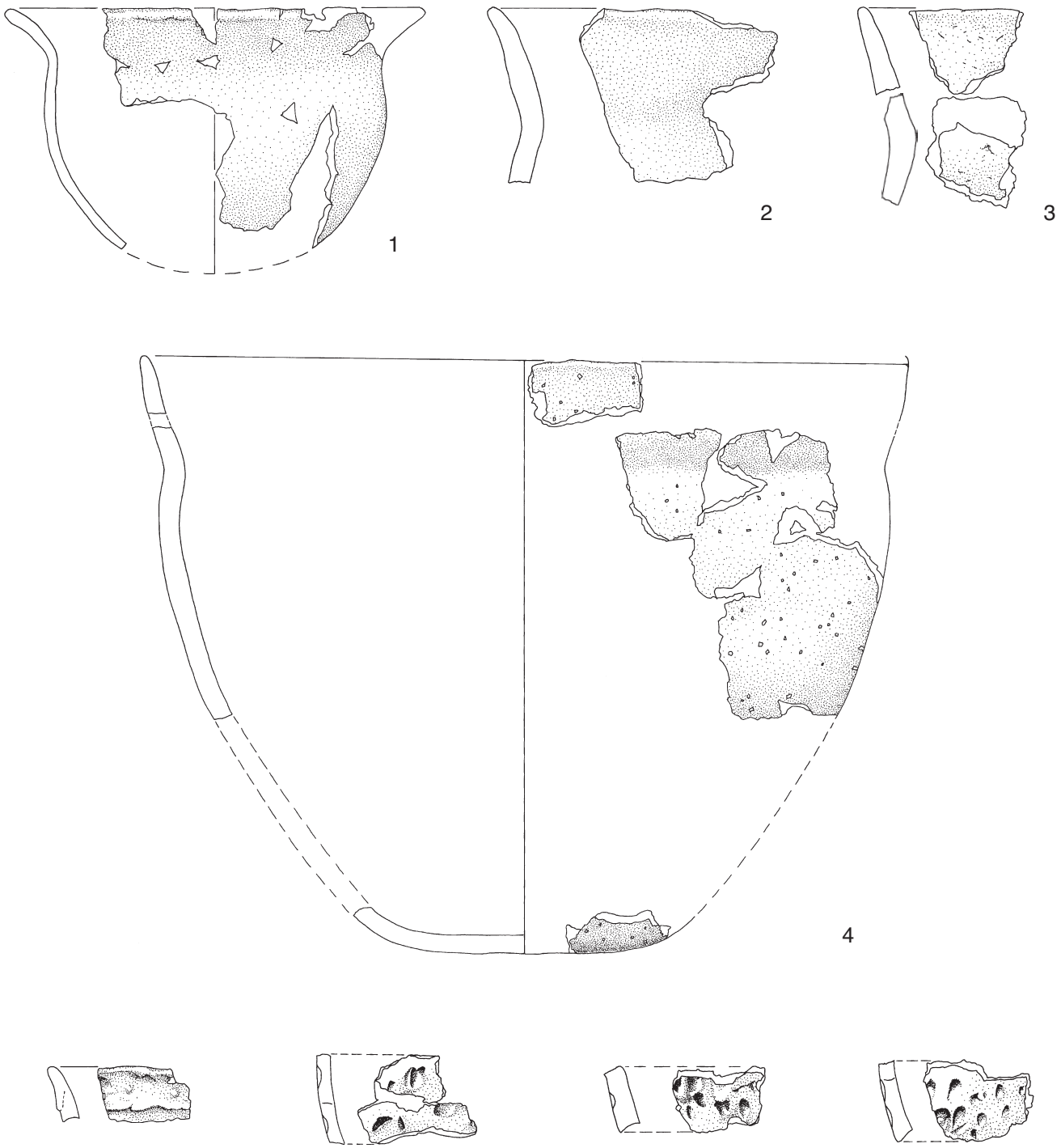


Fig. 3.19. Hazendonk 2 pottery. Scale 1:3. Numbers refer to text. Drawings L. Verhart.

		Organic temper				*Grog temper*				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	0	1	2	3	
Number		7	11	50	42	87	3	12	8	20	15	55	20	110
Percentage		6.4	10.0	45.4	38.2	79.1	2.7	10.9	7.3	18.2	13.6	50.0	18.2	100
Weight (g)		143	278	779	1019	1698	35	189	297	315	374	1095	435	2219
Percentage		6.4	12.5	35.1	45.9	76.5	1.6	8.5	13.4	14.2	16.8	49.3	19.6	100
Average weight (g)		20.4	25.3	15.6	24.3	19.5	11.7	15.7	37.1	15.7	24.9	19.9	21.8	20.2
Average size of temper particles (mm)		–	–	–	–	–	2.3	3.0	4.5	–	2.1	2.7	3.6	–
Average wall thickness (mm)		5.6	11.0	9.5	9.1	8.8	10.0	10.3	11.5	10.1	10.0	9.0	8.5	9.2
Types of join:	H-joins	–	1	15	7	20	–	3	–	6	3	11	3	23
	N-joins	–	–	6	2	7	–	1	–	3	–	4	–	7
Surface finish:	Uneven	5	8	32	35	63	2	9	6	16	11	40	13	80
	Roughened	1	2	6	4	11	–	–	2	–	1	6	6	13
	Smoothed	–	–	4	3	4	1	2	–	2	2	2	1	7
	Smeared	–	–	1	–	1	–	–	–	1	–	–	–	1
Body decoration:	Paired fingertip	–	–	5	–	5	–	–	–	–	–	5	–	5
	Spatula	–	–	1	–	1	–	–	–	–	–	1	–	1

Table 3.29. Hazendonk 2. The characteristics of the pottery sample.

Apart from the technological and morphological characteristics of these pots, the following descriptions include references to the morphological typology of the pottery from Het Vormer (Louwe Kooijmans 1980b, 143-146, 201; see section 4.4.4) are given. See fig. 3.20.

Pot 5.* Carinated bowl tempered with a medium quantity of bone. Smoothed surface. Shoulder decorated with a row of spatula impressions. Vormer typology: carinated dish (I C).

Pot 6.* Bucket-shaped pot tempered with a medium quantity of organic material. Outer rim zone decorated with a row of fingertip impressions. One repair hole in the rim zone. Uneven surface. Vormer typology: S-sectioned beaker (II A).

Discussion

The Hazendonk 1 pottery is mainly tempered with organic material, S-shaped and frequently decorated on both the rim and the body surface with a variety of instruments, including fingertips/nails, spatulas and hollow spatulas. The body decoration either covers the entire body surface or consists of a series of spatula impressions on the shoulder. The absence of base fragments suggests that the pots had round bases.

There are marked stylistic similarities between the Hazendonk 1 pottery and the pottery from the nearby Brandwijk river dune, especially in L50, which is contemporary with Hazendonk 1. This pottery is very similar with respect to the S-shape, the proportions of the types of temper, the decoration techniques and the types of join. They differ in the average wall thickness and percentage of sherds with evidence of coil-building. The difference in the frequency of rim decoration is perhaps less significant than other observed differences, given the small number of Hazendonk 1 rim sherds. In section 3.3.2, it was argued that the various assemblages from Brandwijk may be interpreted as material from the Swifterbant Culture. Because of the strong similarities between the pottery of Brandwijk L50 and Hazendonk 1, Hazendonk 1 is also interpreted in this way. In 1976, Louwe Kooijmans described the Hazendonk 1 assemblage as differing markedly from the material from the Swifterbant cluster (1976a, 257, 259); therefore he called it *Hazendonk 1 pottery*. More recently, however, he underlined the similarities between the pottery from the two sites (1993a, 129). The similarities between the pottery from Hazendonk 1 and Swifterbant were already pointed out by De Roever (1979, 25) and are now widely acknowledged (Ten Anscher in prep.; Hogestijn *et al.* 1995, 84; Louwe Kooijmans 1998). This means that the term *Hazendonk 1* should only be used in reference to the material from the Hazendonk excavation. In referring to the characteristics of this pottery style, the term *Swifterbant pottery* is preferred.

In 1976, both the Hazendonk 1 and Hazendonk 3 material was seen as representative of larger groupings of material culture and thus became type assemblages (Louwe Kooijmans 1976a, 255-259, 267-271). As a result, the material from the Hazendonk 2 phase also became representative of a Middle Neolithic phase, named Hazendonk 2. The heterogeneity of

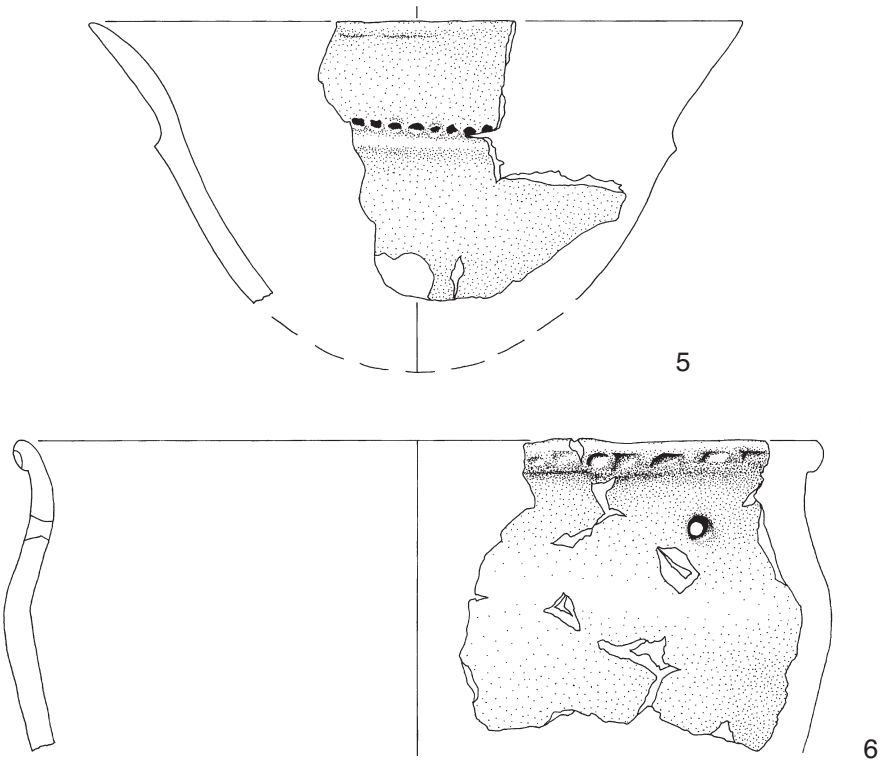


Fig. 3.20. Pottery from Hazendonk 2 or 3. Scale 1:3. Drawings L. Verhart.

pottery forms, illustrated in fig. 13 of Louwe Kooijmans 1976a, was perhaps its principal feature. Much of the material presented there as stemming from this phase, was later placed in other occupation phases (Verhart/Louwe Kooijmans 1989, note 27). Two of the three remaining pot fragments in this figure were allocated to the Hazendonk 3 phase by Jonkers's analysis, but probably date from the Hazendonk 2 occupation phase (pot 5* and 6*). Because of their uncertain attribution, these two pots have not been included in the general description of the Hazendonk 2 material. The Hazendonk 2 pottery is perhaps less heterogeneous than stated earlier by Louwe Kooijmans (1976a, 263). It can now be described as consisting of a tulip beaker (pot 1), a flat-based bucket-shaped pot (pot 4), and a *Tupfenleist* rim sherd, all in Michelsberg style, and S-shaped Swifterbant pottery (pots 2 and 3). It is mostly tempered with organic material and grit (quartz), built of coils joined with H-joins and N-joins and rarely decorated.

If the Hazendonk 2 pottery is compared with the Hazendonk 1 pottery, there are strong similarities in the abundance of organic temper, the decoration techniques and the presence of S-shaped Swifterbant pottery. Differences from the Hazendonk 1 assemblage are the presence of pottery in Michelsberg style, the greater abundance of grit temper and the near-absence of decoration in the Hazendonk 2 pottery. In view of the small size of both assemblages, it is difficult to determine the significance of these similarities and differences. At this point, it should be remembered that the descriptios of the Hazendonk 1 and Hazendonk 2 pottery have traditionally stressed the differences (Louwe Kooijmans 1976a, 269; 1993a, 129).

The Hazendonk 2 pottery may also be compared with the pottery from contemporaneous Brandwijk L60. This comparison reveals that the pottery differs in the following characteristics: the Hazendonk 2 material was tempered with less grit and more grog, it is on average thinner, coils were more often joined with N-joins and decoration is less common, while the Brandwijk L60 assemblage lacks both tulip beakers and bucket-shaped pots and therefore includes no pottery in Michelsberg style. The absence of Michelsberg-style pottery at Brandwijk L60 may be explained by the lack of large pot fragments. Of course it is also possible that such pottery was never present. Similarities are found in the amount of organic temper, some decoration techniques and the percentage of sherds with visible coils. The S-shaped pots in Swifterbant style occur at both sites. When the above

comparisons are taken together, it becomes clear that parallel to Brandwijk L50 and L60, both Hazendonk 1 and Hazendonk 2 may be interpreted as assemblages of the Swifterbant Culture. The pottery in Michelsberg style from Hazendonk 2 has traditionally been the focus of attention for the interpretation of Hazendonk 2 in terms of cultural affinities (Louwe Kooijmans 1976a, 266; Louwe Kooijmans/Verhart 1990, 83), while the similarities to Swifterbant pottery have been disregarded. The consequences of this re-interpretation for the definition of the *Michelsberg Northwest Group* will be presented in section 4.4.4.

3.4.3 FLINT ARTEFACTS

A total of 16 flint artefacts were allocated to the Hazendonk 1 occupation phase. Table 3.30 shows that both flint from river terraces and pebble-Meuse eggs were used. A large minority of the flint artefacts are burnt (table 3.30). Flint was worked in both blade and flake technology: there are six blades and four flakes. Indeed, flint technology was not merely based on blade technology, as suggested by Louwe Kooijmans (1976a, 257). The average length of complete blades is 3.4 cm (n=3), while complete flakes are on average 1.9 cm long (n=4). The remainder of the assemblage consists of four blocks, one chip and one scraper fragment (table 3.31; fig. 3.21).

The second occupation phase of Hazendonk yielded 15 flint artefacts. Table 3.32 shows that, in contrast to Hazendonk 1, terrace flint and flint acquired from more distant sources co-occur in this phase. As in the Hazendonk 1 occupation phase, most flint artefacts are unburnt (table 3.32). The Hazendonk 2 flint assemblage consists of six flakes, four blades, three blocks, one terrace-flint boulder and one chip (table 3.31): hence, both blade and flake technology occur. The single complete blade is 2.5 cm long; the average length of the four complete flakes is 1.4 cm. Apart from the fragments of polished flint axes, no tools or tool fragments were found. Both axe fragments are too small to allow a reconstruction of the shape of the flint axe. The big triangular arrowhead, which according to Louwe Kooijmans (1976a, 265) stems from this occupation phase, actually dates from the Hazendonk 3 occupation phase (see section 4.4.3; fig. 3.21). A comparison of the flint artefacts from the Hazendonk 1 and 2 find layers with flint artefacts from other sites of the Swifterbant Culture is of limited relevance, owing to the scarcity of flint tools in the Hazendonk samples.

3.4.4 SUBSISTENCE DATA AND SEASONALITY

Carbonised remains of emmer wheat and naked barley were recovered from the Hazendonk 1 find layer, whereas the Hazendonk 2 find layer yielded remains of emmer wheat. According to Bakels, these remains represent either imported grain or small-scale local production. Large-scale production

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	5		9.6	
Pebble-Meuse eggs	1		3.0	
Totals	6		12.6	
Indet.	10		18.2	
Unburnt	10	62	22.6	73
Crackled	4	25	5.0	16
Potlidded	2	12	3.2	10
Totals	16	99	30.8	99

Table 3.30. Hazendonk 1. The raw materials and proportion of burnt flint.

	Hazendonck 1		*Hazendonk 2*	
	Number	*%*	*Number*	*%*
No cortex	10	62	12	80
Smooth cortex, <50%	1	6	–	–
Smooth cortex, >50%	1	6	1	7
Rough cortex, <50%	3	19	2	13
Rough cortex, >50%	1	6	–	–
Totals	16	99	15	100
Flakes	4	25	6	40
Blades	6	37	4	27
Blocks	4	25	3	20
Chips	1	6	1	7
Terrace flint nodules	–	–	1	7
Indet.	1	6	–	–
Totals	16	99	15	101

Table 3.31. Hazendonk 1 and 2. The extent and kind of cortex and basic morphology.

	Number	*%*	*Weight (g)*	*%*
Short-distance flint				
Terrace flint	3		57.4	
Long-distance flint				
Polished fragments of indet. material	2		2.6	
Totals	5		60.0	
Indet.	10		7.6	
Unburnt	10	67	63.5	94
Gloss	2	13	1.1	2
Crackled	2	13	2.1	3
Potlidded	1	7	0.9	1
Totals	15	100	67.6	100

Table 3.32. Hazendonk 2. The raw materials and proportion of burnt flint.

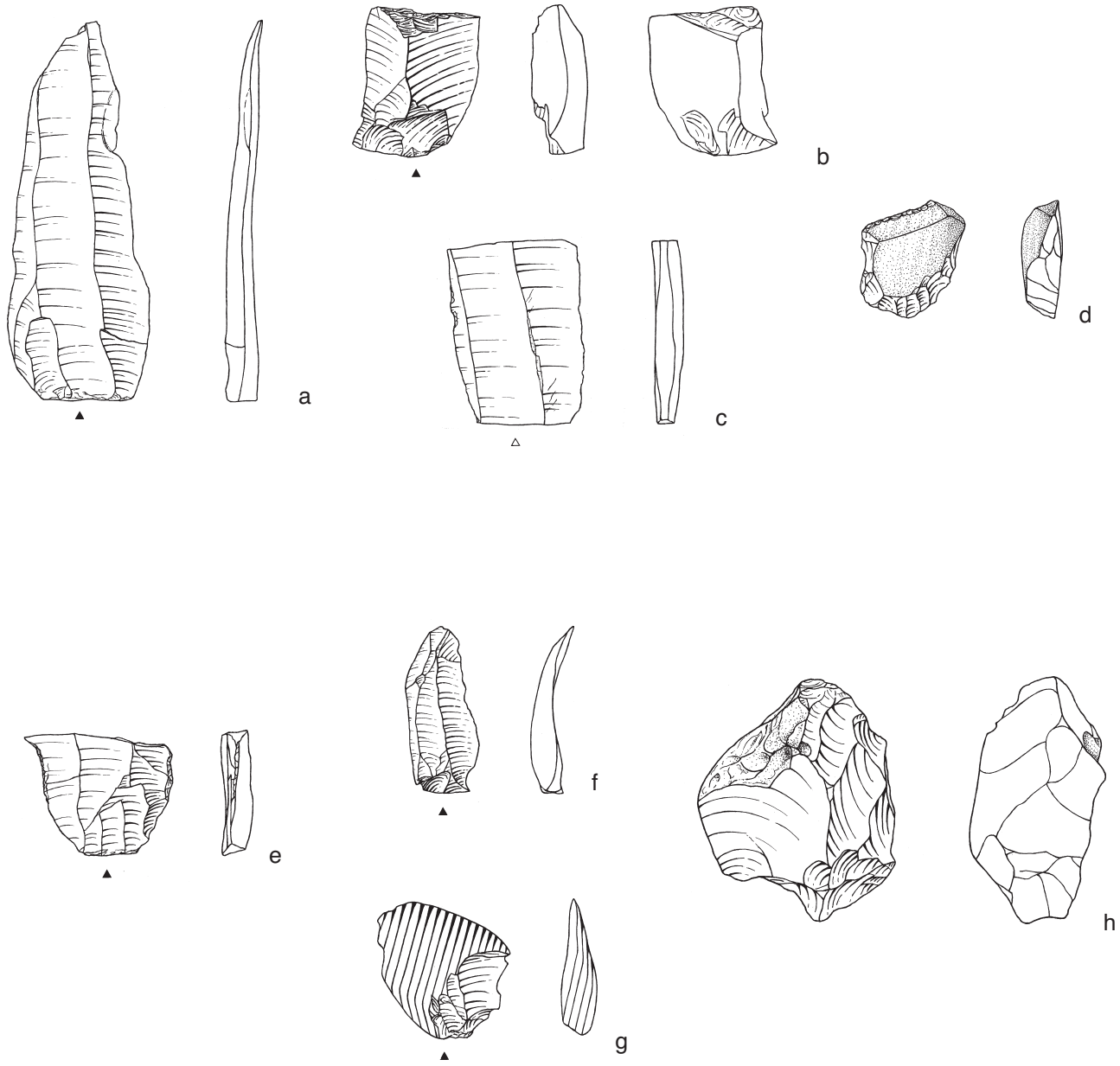


Fig. 3.21. Hazendonk 1 and 2 flint artefacts. Hazendonk 1: a-c: blades, d: scraper. Hazendonk 2: e-f: blades, f: flake on polished axe fragment, g: block. Scale 1:1. Drawings C. Dijkstra.

is dismissed on the basis of the small size of the dune, in combination with the absence of any pollen evidence for large clearings and the lack of potential field locations nearby (Bakels 1981, 143; 1986, 5).

The faunal component of the diet is reflected in the bone spectrum, in which the bone material from Hazendonk 1 and Hazendonk 2 is combined (table 3.49). While it shows that domestic cattle and pig were kept, the site was perhaps more important to the occupants of Hazendonk for the possibility of hunting beavers and otters. These species were probably killed both for their fur and their meat (Zeiler 1987, 255-260; 1991, table 3).

The very few bird remains from the Hazendonk 1 and 2 find layers do not suggest any specific season in which they were

taken: mallards (3 bone fragments) were probably available on a year-round basis, while the other remains could not be further identified than as duck (6 bone fragments) (Zeiler 1991, table 3).
The fish remains are more numerous, but, unfortunately, the analysis of the fish remains combines the material from all Hazendonk find layers. The fish species include freshwater species which could have been caught throughout the year and three anadromous species, which are only found in freshwater environments for spawning (sturgeon, allice shad and salmon/sea trout) (Brinkhuizen 1979, table 1). The remains from these three species suggest that at least some activity took place during the summer season (Brinkhuizen 1979, table 3-5).
Winter activities are reflected in the cutmarks on the bones of otters and beavers (all find layers combined). These cutmarks are interpreted as an indication for the production of furs, which are at their best during the winter season (Zeiler 1991, 108). A final indication of the season of occupation is the age distribution of various pre-adult animals (Zeiler 1997, 81-82, tables 21, 24, 27, 30, 33 and 35-37). These data reveal that summer occupation is certain, while winter occupation is possible as well (Zeiler 1997, 86).
Since the total period in which Hazendonk was repeatedly occupied and abandoned lasted around 1000 years, it cannot be assumed that the seasonality of its occupation remained the same throughout this period. Secondary arguments in favour of site function continuity, which were available for Brandwijk (section 2.3.4: similar mammal-bone spectra and fish-bone spectra) are absent for Hazendonk. Nevertheless, if all strands of evidence are taken together, it may be concluded that there are arguments for both summer and winter occupation of the site. Of course, this is not the same as year-round occupation, which is impossible to deduce from zoological remains alone. Zeiler suggests that in some years the occupation was restricted to the summer, while other years saw more permanent settlement (1991, 109). While this interpretation is followed by Gehasse (1995, 205), Louwe Kooijmans favours a special-activity function during the summer season, on the basis of the site's unattractiveness for crop cultivation and to a lesser extent for animal husbandry (1993a, 131). Perhaps it should be concluded that the faunal *pros* and *cons* of permanent settlement on Hazendonk are not decisive. In the concluding section of this chapter (section 3.8.4), a broader approach to this problem will be proposed.

3.5 Hüde I

3.5.1 INTRODUCTION

The site Hüde I was discovered in 1953 when the area around lake Dümmer (municipality of Diepholz, Lower Saxony, Germany), was drained. In 1956, a test excavation was carried out by A. Genrich; this showed the great potential of the site for research of the Neolithic. Further research was carried out by J. Deichmüller, who conducted a large-scale excavation in the years 1961-1967. This resulted in an excavated area of some 1100 m^2, almost the complete site surface (Deichmüller 1964; 1965a; 1965b; 1968; 1969; Kampffmeyer 1991, 35-40; Stapel 1991, 3).
Hüde I is located on the southern margins of lake Dümmer and was surrounded by extensive marshes, which were dissected by small creeks. Hilly conutry is present at a distance of some 5 km (Kampffmeyer 1991, fig. 3). The site was located on a low elevation, only 10-30 cm higher than its surroundings (Stapel 1991, 5). On the northwestern edge of this elevation, a creek led to the lake (Kampffmeyer 1991, Fig. 226, 228, 230). During the Neolithic occupation of the site, a sequence of gyttja, alluvium and brushwood peat filled up this creek. At the same time, archaeological material was being deposited into the creek, and stratigraphically separated as a result of the continuing natural deposition. By contrast, the centre of the elevation was used during all occupation phases of the site. As a consequence, the material in this area did not become vertically separated (Kampffmeyer 1991, 74-77; Stapel 1991, 10).

3.5.2 SITE FORMATION PROCESSES

Site formation processes are hardly touched upon in the various analyses of Hüde I. Yet, in order to evaluate the chronological resolution of the site and hence its potential for analysis, I believe that site formation processes need serious attention. Site formation processes are here divided into depositional, post-depositional and recovery processes. The analysis of the development of the occupation starts with a depositional model. This model is presented in fig. 3.22. In this model, a series of three occupation phases is used to demonstrate the effects of long-term and multiple occupation on the formation of the archaeological record. The number of occupation phases is set at three for convenience: this is the smallest number needed to illustrate the effects of site formation processes. The hypothetical three occupation phases have the following effect on the archaeological record:

Phase A. The first occupation phase results in the deposition in the creek of archaeological material, which is subsequently covered by new deposits and thus spatially separated from later material. At the centre of the site, material is left on the surface (there are no features in which material can be deposited).

Phase B. The next occupation phase results in further deposition in the creek. This material consists of primary and secondary waste from the site, which is dumped and then covered by new natural deposits. Thus, it consists not only

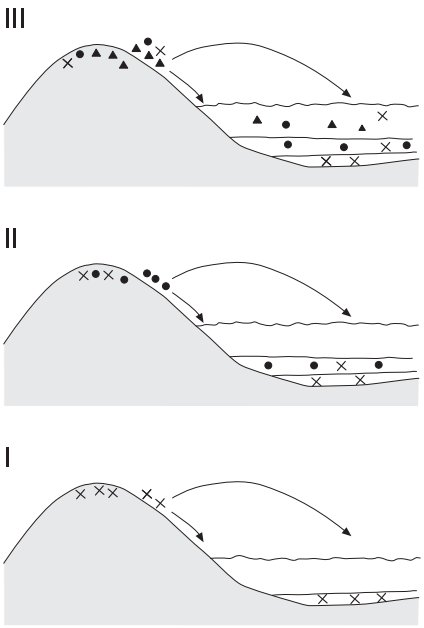


Fig. 3.22. Model of Hüde I site formation processes. Vertical scale exaggerated. Drawing P. de Jong.

of material from this phase, but also of material from the first occupation phase. The proportion of older material is difficult to estimate, as this depends on the relative intensity of the occupation and the behaviour of the occupants.[11] The material from phase A probably constitutes a minority of the material. At the centre of the site, material from both phases is mixed as a result of continuing activities.

Phase C. The third occupation phase adds even further to the mix of material in the central part. New deposits in the creek will largely consist of material from this phase, but material from the previous phases is also redeposited. This admixture probably constitutes a minority of the material in this context.

This model of the depositional processes suggests that an analysis of the development of the occupation should begin with the material from the creek, since this material is mixed up to a lesser extent than that from the centre of the site. The post-depositional processes are not considered in any of the studies on Hüde I. It can be inferred from the above that the effect of later occupations was that the spatial patterning of archaeological material from earlier occupation phases on the central part of the site was disturbed. After the abandonment of the site, millennia of animal and plant activity resulted in further disturbance of the spatial patterning. The recovery process produced the final disturbance of the spatial patterning. Finds were collected individually in squares with a size of 1 m^2. The depth of the finds was recorded in two ways: some finds were measured three-dimensionally, while others had a minimum and maximum depth (and thus a depth range) (Kampffmeyer 1991, 80).

3.5.3 LENGTH OF OCCUPATION AND OCCUPATION HIATUSES

The site formation processes described above lead to the next step in the analysis. The question is whether there are any arguments for the presence of hiatuses in the occupation history of Hüde or whether the site was continuously occupied. This question has to be answered in order to evaluate the chronological resolution of the site. Possible arguments for hiatuses in its occupation history are:

1) *The absence of cultural markers*. Flint tools do not allow a sharp chronological resolution (Stapel 1991, 152) and there is no reason to presume a hiatus on the basis of the analysis of flint tools (see section 3.5.6). Kampffmeyer's analysis of the pottery shows that a continuous sequence of well-dated pottery types is found at Hüde. The earliest Central European pottery is of the Bischheim Group, followed by Michelsberg-like pottery. Pre-*Tiefstich* Funnel Beaker pottery (of Rosenhof and Satrup type) is also recognised, bridging the gap to Funnel Beaker West Group material (Kampffmeyer 1991, figs 213-220).

2) *Gaps in the ^{14}C sequence*. A series of 58 ^{14}C dates is presented by Kampffmeyer (1991, figs 249 and 250). He rejects dates based on charred food remains, since the content of a pot may be considerably younger than the pot itself (ibid., 327-328). By eliminating these dates, he is able to distinguish four occupation phases, the first and last of which are separated by hiatuses from the second and third occupation phases (Kampffmeyer 1991, fig. 250). This view is contradicted by Ten Anscher, who points out the strong stylistic and chronological correlations of the sherds from Hüde I with pottery and dated charred food remains from P14 (Ten Anscher in prep.). Indeed, even if a ^{14}C date is not related to the use of a specific pot, the ^{14}C date is still an indication of activities at a certain time and therefore may bridge a presumed hiatus. As a result, Kampffmeyer's hiatuses are not seen as relevant (see Meurers-Balke/Weniger (1994, 260-261) for a discussion of the ^{14}C dates).

3) *The absence of anthropogenic environmental change in pollen diagrams*. The Funnel Beaker occupation phase is recognised in the various pollen diagrams, which point to large-scale environmental change as a result of human activity (Schütrumpf 1988, figs 4, 5, 6: pollen zone IX). Earlier human activity is demonstrated by the correspondence between pollen spectra of peat near individual finds and the pollen spectra of earlier pollen zones (especially zone VIII; Schütrumpf 1988, 16-23). These earlier traces of occupation

are related to the occupation phases proposed by Geyh (1971, 205-207), who has identified three pre-Funnel Beaker occupation phases (one Neolithic and two Mesolithic), the oldest one of which is not present in the series of ^{14}C dates.

If all the above analyses are combined, it is clear that only Kampffmeyer presumes a hiatus between two Neolithic pre-*Tiefstich* Funnel Beaker Culture occupation phases on the basis of the ^{14}C dates. However, this hiatus cannot be sustained, since his rejection of some ^{14}C dates seems unjustified. Moreover, there is no absence of cultural markers for any of the Neolithic cultural phases between the periods of the Bischheim Group and the Funnel Beaker Culture West Group. This suggests that with the chronological resolution provided by the pottery and ^{14}C dates, no gaps in the occupation history may be detected. Given the proposed model of site formation processes, this means that the potential of this site in establishing rather than illustrating developments in subsistence and material culture is limited.

3.5.4 METHODOLOGY

The analysis of the pottery

Kampffmeyer's publication serves a five-fold goal: it presents the occupation history of Hüde I, its characteristics of ecology and subsistence base, the morphological, functional and stylistic development of the pottery, the date and cultural grouping of the pottery and evaluates the significance of Hüde I for the early Neolithic of the northwestern German Plain (1991, 80). These themes are dealt with by a combination of Kampffmeyer's own analysis of the pottery and an extensive survey of the literature on other find categories. The methodology of the pottery analysis is re-examined here.

The first step in Kampffmeyer's analysis was the reduction of the assemblage of some 40,000 sherds to 6256 'significant' sherds: rim and base fragments, decorated body sherds, lugs, knobs and large body fragments. This selection was carried out during the excavation: the rest of the material was collected in a less meticulous way and thus became unsuited for a spatial analysis (Kampffmeyer 1991, 80).

For the analysis of the pottery, Kampffmeyer used one figure to indicate depth, and to this end averaged the depths of the finds with a depth range to obtain a single value (Kampffmeyer 1991 (catalogue), 17). In the analysis, depths were rounded off to the nearest 10 cm.

These 6256 sherds were described in both technological and stylistic terms. The correlations of the various technological characteristics were subsequently used to define seven wares, which were related to specific sources of raw material identified by Drews (1977). Since an unspecified number of sherds could not be related to these wares on the basis of their technological characteristics, these were allocated on the basis of stylistic and spatial attributes (Kampffmeyer 1991, 103-140).

As a result, a set of 6256 sherds were available which on the basis of their technological and stylistic characteristics could be attributed to various archaeological cultures. In combination with the spatial distribution of these sherds, this evidence was used to present the occupation history of Hüde I (Kampffmeyer 1991, 239-288).

A methodological critique

The selection of 'significant' sherds limits the number of sherds to be analyzed in such a way that a reconstruction of the occupation history of Hüde I becomes manageable. In my opinion, Kampffmeyer's replacement of depth ranges by single depths will cause problems: finds with large depth ranges are not suited for stratigraphical analysis, yet are included in Kampffmeyer's analysis as if the margins of error have been eliminated. As a result of this replacement of depth-ranges by depths, it is impossible to sustain, for example, that pointed-based pottery lies on average deeper than pottery with other base forms, as it is not shown how accurate the depths of the individual bases are. I therefore cannot subscribe to the interpretation of the pointed-based pottery as being older than the round-based pottery (Kampffmeyer 1991, 271-282).

The second step in the analysis, the grouping of the sherds into seven wares, seems problematic. First, it is not possible to assess the relevance of the proposed wares, as the internal consistency of each ware and its difference from the other wares are not discussed. Secondly, the percentage of sherds that could not be attributed to these wares on the basis of their technological characteristics is not specified. Thirdly, since this last group of sherds were attributed to these wares on the basis of stylistic features, one may wonder about the potential of a classification based exclusively on stylistic traits: would such a subdivision provide different insights into the chronology of the site?

A final problem with Kampffmeyer's analysis is his sometimes problematic stylistic attributions. In some instances, his determinations are contradictive, as when specific sherds are variously attributed to different phases. These problems are augmented by the absence of stylistic attributions in his catalogue. He subsequently uses such attributions in many of his figures, which results in unverifiable statements (see Ten Anscher in prep.). In the light of these objections, it is difficult to assess the value of Kampffmeyer's conclusions regarding the development of the pottery from Hüde I.

The analysis of the flint tools

In Stapel's publication on the flint tools of Hüde, he states that his objective is to present the flint tool repertoire which is complementary to the pottery of each of the distinguished

archaeological cultures in the Neolithic of northwestern Germany (Stapel 1991, 1). It follows that the subdivision of the assemblage of flint tools into subsets of different age is essential. This subdivision is based on those zones where the flint tools can be separated stratigraphically, even though it is realised that the subsets arrived at are not free of admixtures (Stapel 1991, 10). Three subsets are proposed:

Phase 1, 5200/5100-4500 BC (4200-3700 uncalibrated bc): phase of the pointed-based pottery. The flint tools of the oldest occupation phase are identified on the basis of their spatial correspondence to the distribution of the pointed-based pottery. This pottery is found *in situ* in the northwestern part of the site, deeper than 40 cm below the surface.

Phase 2, 4500-4000 BC (3700-3180 uncalibrated bc): phase with Bischheim and Dümmer ware. This set of material is selected on the basis of the corresponding spatial distribution of these flint artefacts and the remains of various wooden constructions. In its turn, the dating of the structural remains is based on the spatial distribution of pottery from this phase (Kampffmeyer 1991, 285-286). This set is enlarged with material from the site's northern and southern margins with depths 30-40 cm below the surface. This flint material comes from a depth range between the first and third occupation phases. Finally, material from the eastern margins is added to this set of artefacts. It was found among structural remains, more than 40 cm below the surface.

Phase 3, 3700-3500/3400 BC (2950-2700 uncalibrated bc): phase of developed Funnel Beaker Culture.[12] This material is distinguished from the remainder of the assemblage on the basis of its spatial separation from earlier flint material. The spatial separation is the result of the continuing growth of brushwood peat. These finds date to the occupation of the Funnel Beaker Culture, during which the settlement extended over the creek area (Stapel 1991, 10-15).

A methodological critique

Stapel's subdivision of the flint artefacts into three sets on the basis of stratigraphically distinct areas is, of course, a promising one. However, in his selection of material for the first and second phase, some problems arise. The material from the first phase is selected on the basis of its association with pointed-based pottery. In its turn, pointed-based pottery is related to both the earliest occupation phase (Kampffmeyer 1991, 271-283), and the Funnel Beaker Culture (ibid., 167), which suggests that the additional condition of a minimum depth of 40 cm is wise. Since the depths of round and pointed bases are similar (Kampffmeyer 1991, figs 150.1 and 152.3), it is doubtful whether pointed bases are suitable markers of the earliest occupation phase.[13]

The second occupation phase is based on more problematic foundations. First, it is assumed that the association between flint artefacts and building remains is primary, while the effects of site formation processes are left unexamined. Secondly, the dating of these building remains is based on their association with pottery. Again, it is not investigated whether site formation processes influenced this association. If it were shown that the building remains were indeed the remnants of dwellings and were hardly moved by site formation processes, this would imply that site formation processes had little effect on the spatial patterning of the house remains. It might subsequently be suggested that the spatial distribution of pottery and flint was also little affected by site formation processes. Since no analysis of the site formation processes was carried out, it remains doubtful whether these flint tools really represent the second occupation phase, while Deichmüller's statement that it was impossible to reconstruct any house plans (1969, 35) suggests that if houses or huts stood at Hüde, the original spatial patterning of the posts apparently was transformed as a result of activities during subsequent occupation and/or natural processes. The association between the building remains and the flint tools is therefore probably the result of site formation processes rather than a primary association.

An alternative approach

I would argue that Kampffmeyer and to a lesser degree Stapel overestimate the potential of this site for the analysis of developments in its subsistence base and material culture. In my opinion, an analysis of the development of the cultural characteristics of the site can only be successful in terms of general trends in the material, based on zones with a vertical stratigraphy. The analysis should therefore not be based on single sherds or flint tools, but instead on the varying proportions of characteristics in a series of units, which are defined for the specific purpose of subdividing the material. These 'Units' are defined on the basis of the continuous sedimentation in the creek (table 3.33). Of course, these Units represent partly overlapping time ranges, which is obvious if site formation processes are taken into account (fig. 3.22), and is also a consequence of Kampffmeyer's use of an average depth for the pottery. This overlap in time depth is the reason why only trends in the material can be presented and not the exact set of pottery and flint tools belonging to each occupation phase. Another consequence of this view is the realisation that a gradual change in pottery characteristics and flint tool kit may be the result of site formation processes rather than a reflection of gradual stylistic change during the Neolithic occupation.

Selection of material

The first selection was already mentioned above: the material to be analysed was taken from the creek fill rather than the dwelling site. The topic of this thesis directs the second

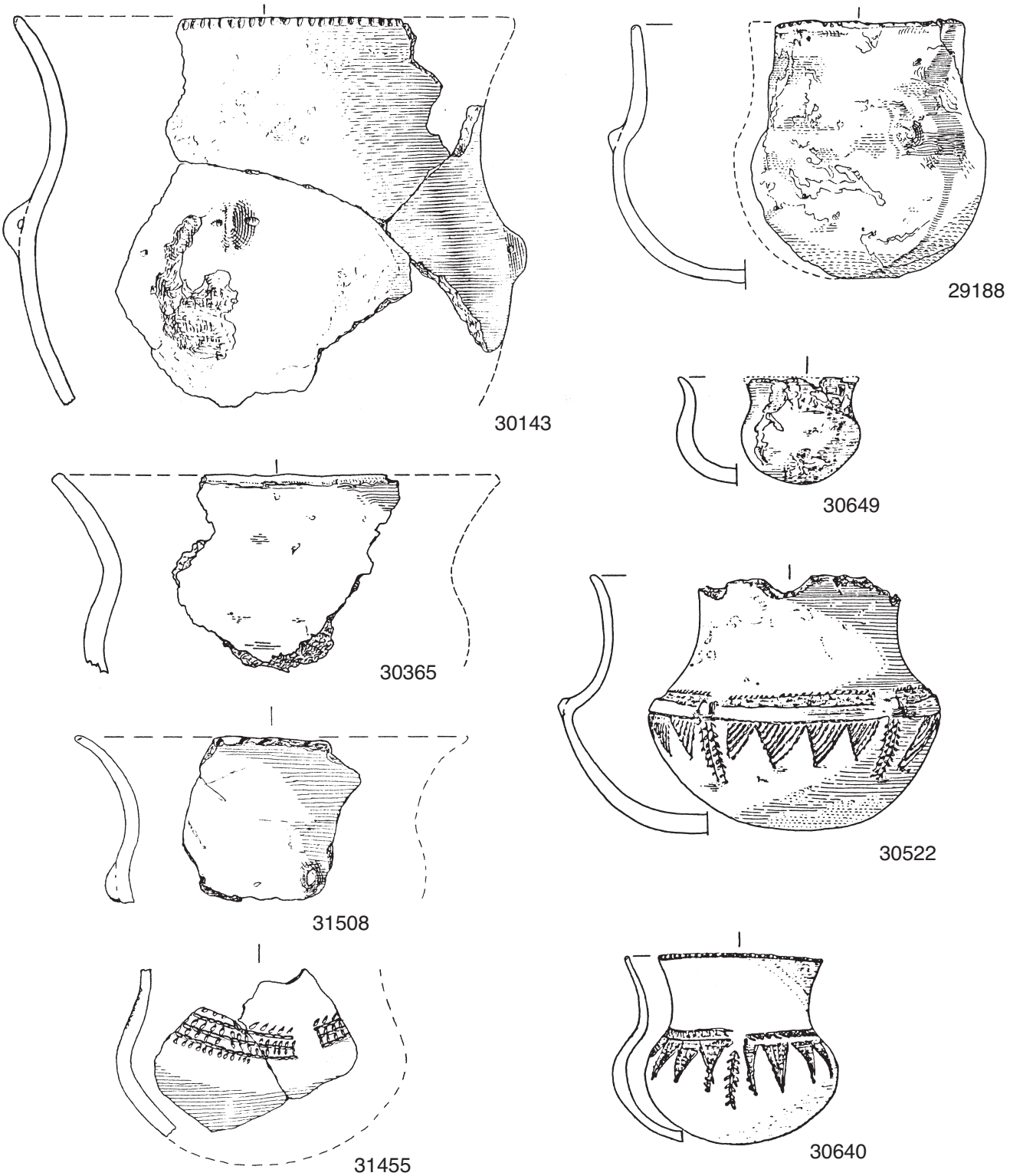
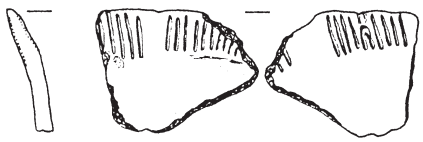
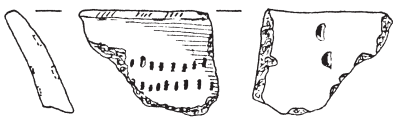


Fig. 3.23. Pottery from Unit 1. After Kampffmeyer 1991. Scale 1:3.

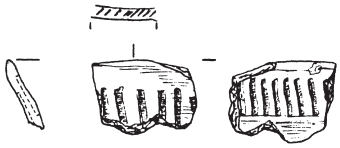


31944



31491

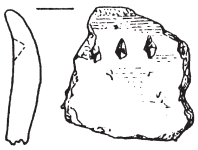
704



706

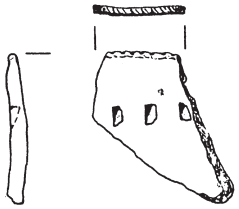
707

31813

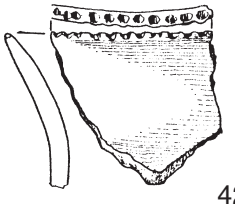


703

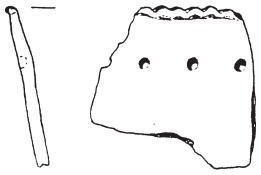
836



702



424



31808

Fig. 3.23. Continued.

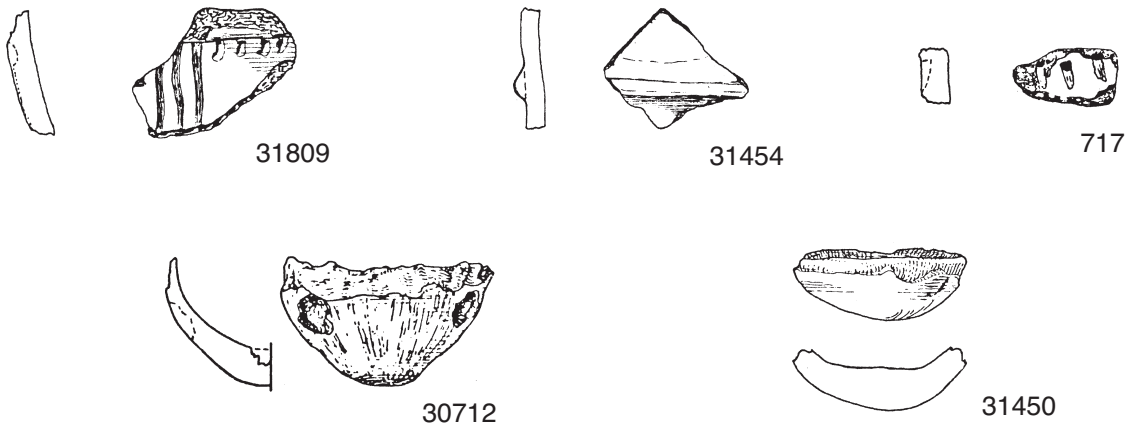


Fig. 3.23. Continued.

selection: the analysis is here restricted to the Neolithic pre-*Tiefstich* Funnel Beaker Culture occupation of Hüde. All illustrated pottery fragments from Kampffmeyer 1991 that were attributed to the creek fill, were used to produce sets of pottery from the gyttja, alluvium and each 0.1 m of brushwood peat (figs 3.23-3.26). A total of ten Units were thus created. I found that from Unit 6 (brushwood peat, depth 0.5 m) upwards, Funnel Beaker pottery was present in the sets of illustrated pottery. Therefore, the pottery from Units 6-10 was not included in the analysis. By means of this selection, the number of sherds to be analysed was reduced from 6256 'significant' sherds to 102 sherds from the gyttja, 50 from the alluvium and 454 from the lower part of the brushwood peat, a total of 606 sherds (Kampffmeyer 1991, fig. 52.2). For the analysis of the flint tools, the (unpublished) catalogue of Stapel (1991), was used. Stapel presents both the minimum and maximum depth, rounded off to 5-cm intervals, which are derived from the original field data (Stapel 1991, 20). The Units were established to balance the need for detailed Units for analysis (with potentially a smaller time depth) with the need for well-founded conclusions (based on sufficiently large numbers of sherds and flint tools). As the ratio of sherds to flint tools is not similar for all Units, the Units for analysis of both find categories are not identical (table 3.35).

3.5.5 POTTERY

Pottery Unit 1

The depicted pottery fragments from Unit 1 (fig. 3.23) are used to illustrate the presence of various pottery styles and the time depth of this Unit. The most conspicuous component is of Bischheim character (nos. 30522, 30640). This pottery is characterised by its decoration motifs, its thin-walled globular beakers (*Kugelbecher*) and a single row of incisions on the top of the rim (*Randkerbung*). Lugs (*Ösen*) and knobs (*Knubben*) are often found at the point of maximum circumference (see section 4.3.3). Swifterbant pottery constitutes the second component, which is clearly present in decoration types (nos. 704, 706, 707) and pottery forms (no. 30365). One *Tupfenleist* is present as well.

The time depth of this Unit is determined by the presence of Bischheim pottery on the one hand and a *Tupfenleist* on the other. As a *Tupfenleist* may date to any Michelsberg phase, it is not clear which Michelsberg phase it represents (Lüning 1969, fig. 2). The maximum time range of this Unit therefore is between 4450 and 3500 BC.

It may be concluded that this Unit is of a mixed character with Bischheim, Michelsberg and Swifterbant elements. Most of the 95 analysed sherds cannot be assigned to any particular component of this assemblage. For this reason, the technological characteristics of this Unit (presented in table 3.34) also reflect the mix of the constituent components. The predominant tempering agent is organic material, but grit is also found in a majority of the sherds. The grit consists exclusively of pounded quartz, as in all Units. Grog is absent. The average wall thickness is 7.5 mm, while there seems to be no relation between wall thickness and the amounts and types of temper. H-joins are the predominant kind of join. Smoothing is the most frequent surface finish (67%), but even, smeared, uneven and polished surfaces are also present. Rim decoration is very common: of 60 rim sherds, 38 are decorated (63%). Generally, rim decoration consists of a row of spatula impressions; only two rims were decorated with nail impressions. Table 3.35 shows that most rim decoration is found on the top of the rim, but the inside and outside of the rim zone also are often decorated, while many rims are decorated in more than one location. One rim sherd is finished with a *Tupfenleist*. Seven sherds have body

Pottery Unit	*Number of sherds*	*Flint tool Unit*	*Number of flint tools*	*Geology*
		Unit 6	47	Brushwood peat, depth 0.5 m
Unit 5	236			Brushwood peat, depth 0.6 m
Unit 4	195	Unit 2-5	14	Brushwood peat, depth 0.7 m
Unit 2-3	73			Brushwood peat, depth 0.8 m or more + alluvium
Unit 1	102	Unit 1	13	Gyttja

Table 3.33. Hüde I. Units of analysis.

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		18	5	47	25	42	16	25	12	95
Percentage		18.9	5.3	49.5	26.3	44.2	16.8	26.3	12.6	100
Average wall thickness (mm)		7.1	6.8	7.7	7.7	7.4	6.9	7.9	7.7	7.5
Types of join:	H-joins	14	2	39	16	32	11	20	9	72
	N/Z-joins	0	1	2	5	3	0	4	1	8
Surface finish:	Smoothed	10	3	32	15	30	9	14	7	60
	Even	4	2	8	4	4	5	7	2	18
	Smeared	0	0	4	3	4	2	1	0	7
	Uneven	0	0	1	2	0	0	1	2	3
	Polished	0	0	0	1	1	0	0	0	1
Base form:	Round	3	1	2	1	0	2	3	2	7
	Point	0	0	1	1	2	0	0	0	2
	Sagging	0	1	0	0	1	0	0	0	1
Body decoration:	Spatula	2	0	3	1	4	0	0	2	6
	Groove lines	0	0	0	1	1	0	0	0	1
Rim decoration:	Spatula	4	2	21	9	15	8	9	4	36
	Fingertip	0	1	0	1	1	1	0	0	2
	Tupfenleist	0	0	1	0	1	0	0	0	1
Lugs:	Vertically perforated	1	1	12	6	10	4	5	1	20
	Horizontally perforated	0	0	1	1	2	0	0	0	2
Knobs		0	1	1	0	2	0	0	0	2

Table 3.34. Hüde I, Unit 1 (Gyttja). The characteristics of the pottery sample.

	Spatula		*Fingertip/nail*		*Totals*	
	Number	%	Number	%	Number	%
Top	14	37	–	–	14	37
Outside	8	21	1	3	9	24
Inside and outside	5	13	–	–	5	13
Inside	4	10	–	–	4	10
Top and outside	3	8	1	3	4	10
Inside, top and outside	2	5	–	–	2	5
Totals	36	95	2	5	38	100

Table 3.35. Hüde I, Unit 1 (Gyttja). The locations and techniques of rim decoration.

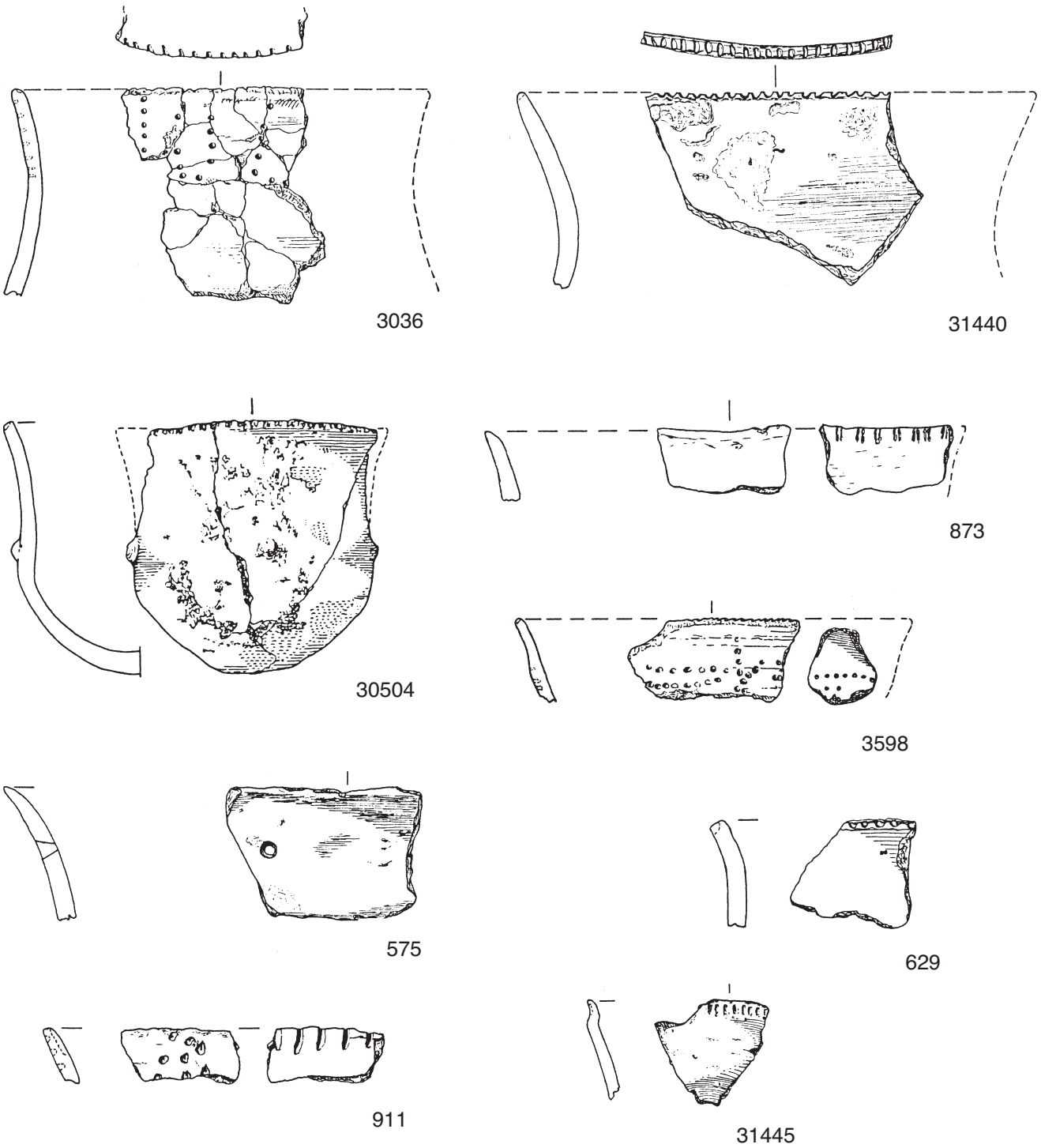


Fig. 3.24. Pottery from Unit 2/3. After Kampffmeyer 1991. Scale 1:3.

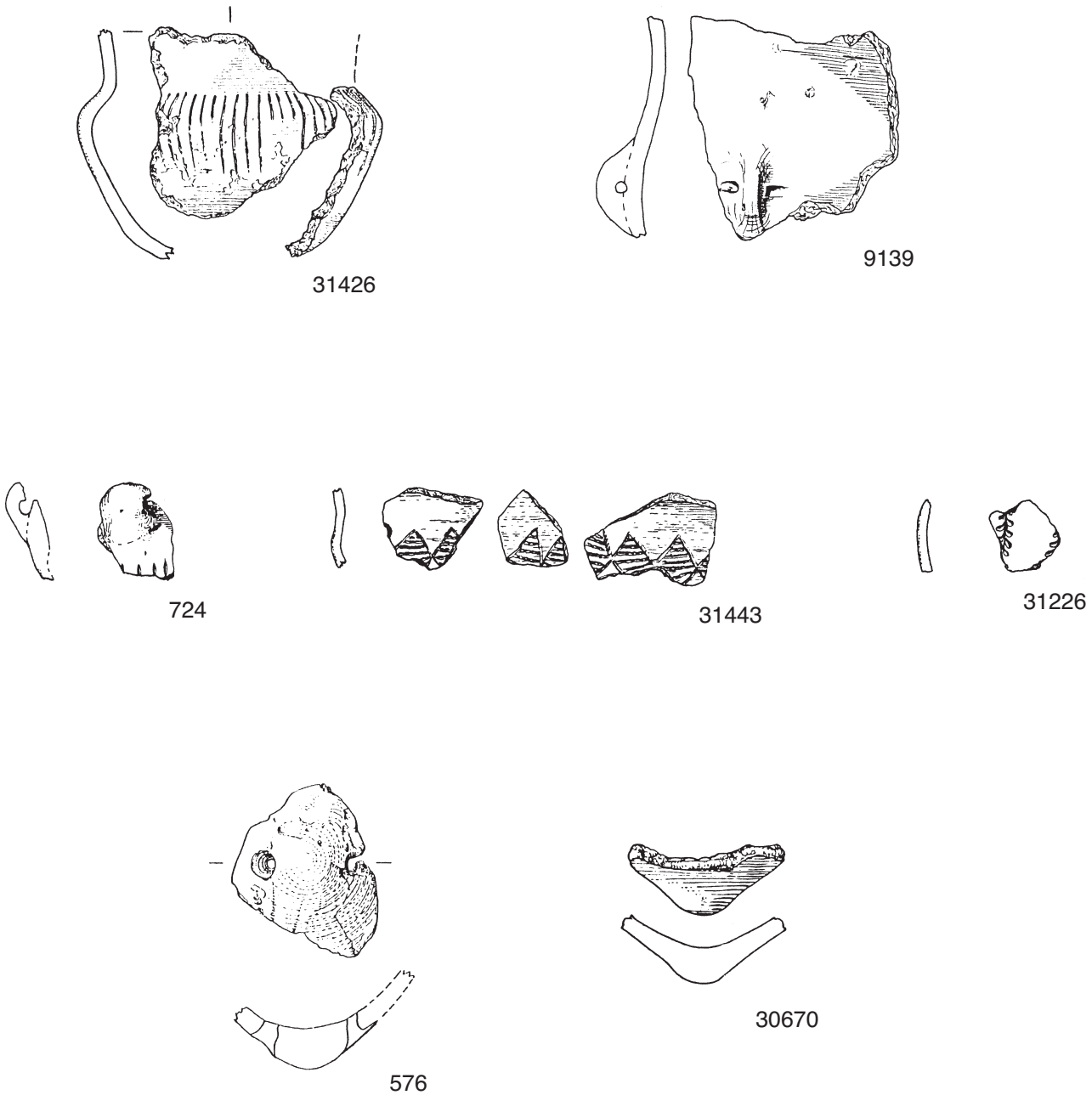


Fig. 3.24. Continued.

decoration (7%), which was carried out with spatula impressions (86%) and grooves (14%). Base fragments are of various kinds, with round bases being the dominant type. Pointed bases are absent. Lugs are common: there are 20 vertically perforated lugs; two others are horizontally perforated. Two knobs complete the list.

Ertebølle at Hüde?

The question arises whether Ertebølle material is present at the site, as it is clearly absent in figs 3.23-3.26. On the one hand, there is Kampffmeyer's description of the earliest occupation phase (*Hüde-Swifterbant-Horizont*), as containing both Rössen imports and Ertebølle-Ellerbek material (1991,

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		20	6	34	7	23	17	16	11	67
Percentage		29.8	8.9	50.7	10.4	34.3	25.4	23.9	16.4	100
Average wall thickness (mm)		8.7	7.8	7.1	7.6	7.5	7.2	8.9	7.3	7.7
Types of join:	H-joins	15	5	32	7	19	15	14	11	59
	N/Z-joins	2	1	1	0	2	1	1	0	4
Surface finish:	Smoothed	12	1	26	4	17	13	8	5	43
	Even	4	1	3	2	2	1	4	3	10
	Smeared	2	0	3	0	0	2	2	1	5
	Uneven	0	0	4	0	1	0	3	0	4
	Polished	1	1	1	0	1	0	1	1	3
Base form:	Round	3	0	1	0	1	1	2	0	4
	Pointed	0	1	1	1	2	1	0	0	3
	Point	2	0	0	0	1	1	0	0	2
	Protruding foot	1	0	0	0	0	0	1	0	1
	Hollow	0	0	1	0	1	0	0	0	1
Body decoration:	Spatula	1	1	3	0	3	0	1	1	5
	Groove lines	1	0	0	0	0	0	0	1	1
Rim decoration:	Spatula	4	1	13	3	9	7	3	2	21
Vertically perforated lugs		2	1	13	1	10	5	2	0	17
Knobs		0	0	1	0	1	0	0	0	1

Table 3.36. Hüde I, Pottery Unit 2/3 (alluvium and brushwood peat, depth 0.8 m or more). The characteristics of the pottery sample.

283-284 and fig. 250). On the other hand, Stapel's research on the flint tools from Hüde I did not reveal any similarities to the Ertebølle flint tools (Stapel 1991, 158-159), while the outlying position of Hüde I in relation to all other sites of the Ertebølle Culture might also be seen as problematic.
First of all, it is important to note that Kampffmeyer appears inconsistent in his use of the term *Ertebølle*. It is primarily used to designate an archaeological culture in northern Europe, comprising a Swifterbant Group, Ellerbek Group and Ertebølle Group (1991, 338). In Kampffmeyer's terms, Swifterbant is then both part of the Ertebølle Culture and different from the Ertebølle Group. As Kampffmeyer uses the term *Ertebølle* freely, it is often not clear which Ertebølle he refers to. In this analysis of his work, it is assumed that his references to Ertebølle relate to the Ertebølle-Ellerbek Groups, excluding the Swifterbant Group.
After this preamble, Kampffmeyer's arguments for identifying Ertebølle pottery at Hüde I may be examined as done earlier by Ten Anscher (in prep.). In Kampffmeyer's fig. 212.1, five pottery fragments are attributed to Ertebølle, of which two are also classified as Swifterbant-like.[14] These two fragments cannot, of course, be used to document the presence of Ertebølle material in Hüde. In my opinion, two of the three remaining fragments can also be interpreted as Swifterbant pottery. A good parallel for rim sherd 7917 is known from S4 (De Roever 1979, fig. 2.7).[15] The shape of base fragment 30670 is also known from, for example, S22 (De Roever 1979, fig. 5.13) while the last fragment (22869), according to Kampffmeyer, is also parallelled by pottery from Rössen and Michelsberg contexts[16] and can therefore not be used to illustrate the presence of Ertebølle pottery at Hüde. Concluding, the candidates put forward by Kampffmeyer to attest Ertebølle presence at Hüde are not convincing.

Pottery Unit 2-3
Owing to the relatively small size of this Unit, a characterisation in terms of constituent elements is difficult (fig. 3.24). Decorated Bischheim pottery is absent, but the horizontally perforated lug 724 and decorated rim sherd 629 could be of Bischheim origin. Swifterbant characteristics are also difficult to identify, but rim sherd 911 is reminiscent of Swifterbant rims with decoration both on the inside and outside of the rim. Pottery in Michelsberg style is also present in this Unit. Pot 30990, classified by Kampffmeyer as Ertebølle (note 875) and (!) Swifterbant (fig. 212.3.2) and (!) Michelsberg (fig. 216.2.5), most closely resembles Michelsberg pottery

	Spatula	
	Number	%
Top	13	62
Outside	5	24
Inside	1	5
Inside and outside	1	5
Top and outside	1	5
Totals	21	101

Table 3.37. Hüde I, Unit 2/3 (alluvium and brushwood peat, depth 0.8 m or more). The locations and techniques of rim decoration.

(Ten Anscher in prep.). I conclude that the time depth of this Unit is probably very similar to that of Unit 1.
The technological characteristics of this Unit are presented in table 3.36. Of the 73 find numbers attributed to this Unit, 67 were analysed. These are mostly tempered with both organic material and grit. The average wall thickness is 7.7 mm; wall thickness seems unrelated to the amount and kind of temper. H-joins form the dominant kind of join, as they did in Unit 1. Smoothing is again the predominant surface-finishing technique, with even, smeared, polished and uneven surfaces also occurring. Rim decoration is less common than in Unit 1, with 44% of 48 rim sherds decorated. Rim decoration consists exclusively of spatula impressions, which are mostly found on the top of the rim. Decoration on the inside of the rim is less common than in Unit 1 (table 3.37). Body decoration is found on seven sherds (10%); six of these are decorated with spatula impressions, one other is decorated with grooves. The eleven base fragments are of five types: round, pointed, point, hollow and protruding foot. Vertically perforated lugs and knobs are also part of this Unit.

Pottery Unit 4
The pottery fragments depicted in fig. 3.25 again show a heterogeneous Unit. The Bischheim component is very distinct as to decoration types (nos. 8812, 11263, 31124) and pottery forms (nos. 9722, 29183, 31029). Swifterbant pottery is the second component, seen in rim decoration (nos. 30978,

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		53	23	92	19	80	37	45	25	187
Percentage		28.3	12.3	49.2	10.2	42.8	19.8	24.1	13.4	100
Average wall thickness (mm)		7.3	6.6	7.2	7.4	7.1	7.3	7.4	6.6	7.2
Types of join:	H-joins	32	12	59	16	53	27	27	12	119
	N/Z-joins	3	2	6	1	7	1	4	0	12
Surface finish:	Smoothed	29	16	58	11	52	29	23	10	114
	Even	12	3	14	7	12	6	13	5	36
	Uneven	3	1	3	1	2	1	0	5	8
	Smeared	1	1	5	0	6	0	1	0	7
	Polished	0	0	4	0	1	0	3	0	4
Base form:	Round	6	0	14	1	9	2	6	4	21
	Point	2	0	7	0	4	2	1	2	9
	Pointed	2	3	2	0	1	3	2	1	7
	Sagging	0	1	0	0	1	0	0	0	1
	Hollow	0	0	1	0	0	0	1	0	1
Body decoration:	Spatula	3	0	5	1	3	0	3	3	9
	Groove lines	2	1	2	0	2	0	0	3	5
Rim decoration:	Spatula	14	8	42	11	27	18	20	10	75
	Fingertip	2	0	2	0	2	0	2	0	4
	Tupfenleist	1	0	0	0	1	0	0	0	1
Lugs:	Vertically perforated	10	8	29	5	18	13	12	9	52
	Horizontally perforated	2	0	2	0	2	2	0	0	4
Knobs		0	1	2	0	2	0	0	1	3

Table 3.38. Hüde I, Unit 4 (brushwood peat, depth 0.7 m). The characteristics of the pottery sample.

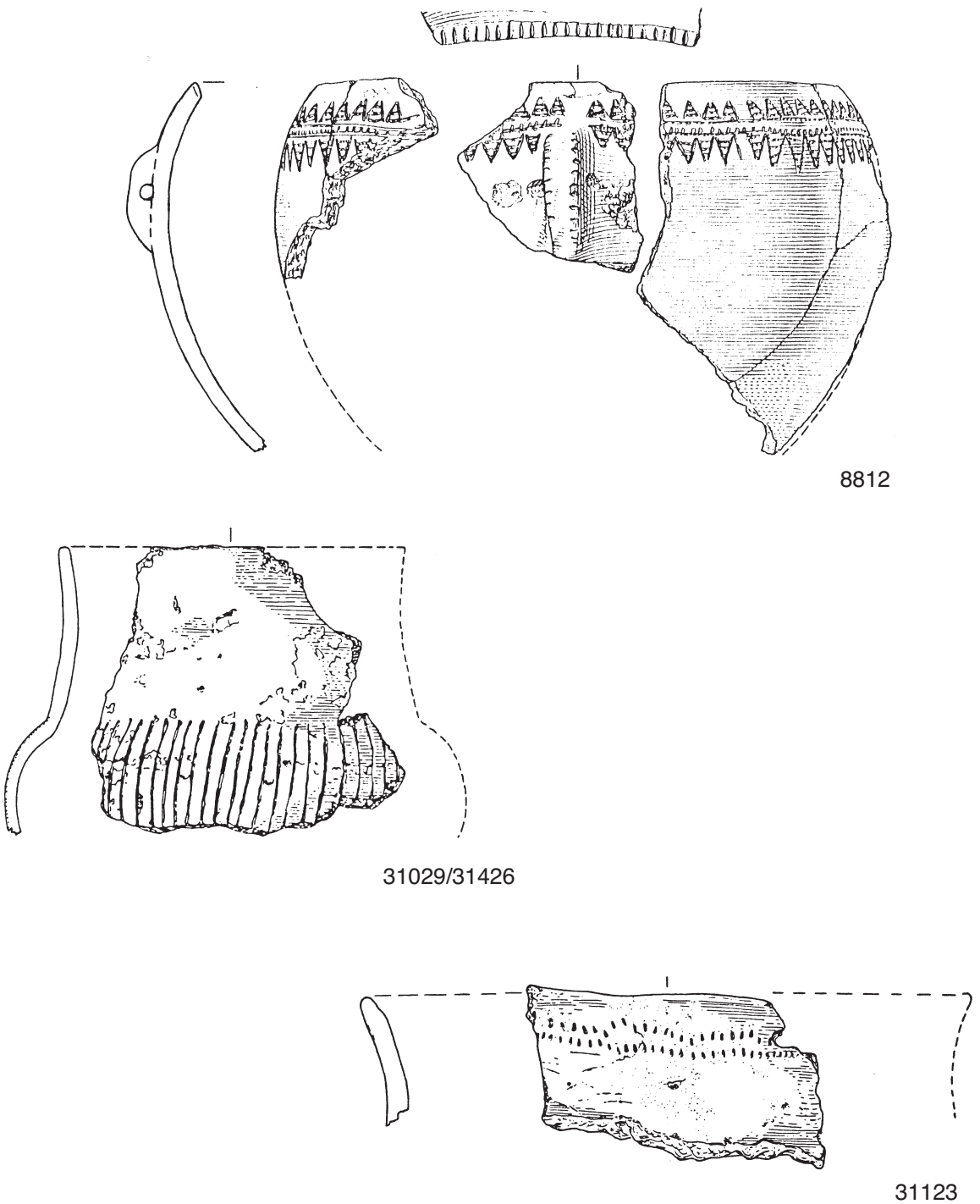


Fig. 3.25. Pottery from Unit 4. After Kampffmeyer 1991. Scale 1:3.

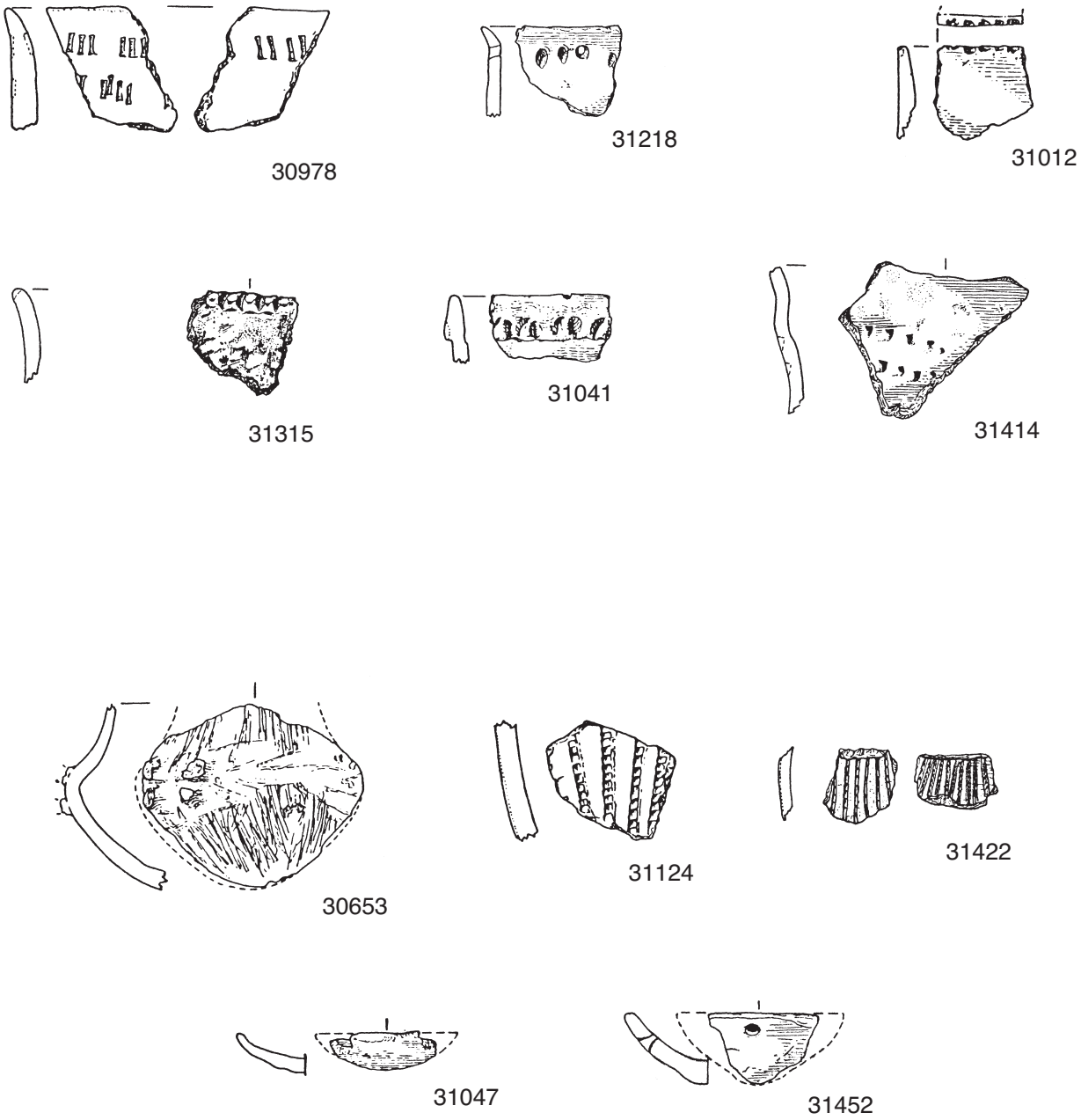


Fig. 3.25. Continued.

31042) and pointed base 31452. There is one rim sherd with a *Tupfenleist*. This seems to imply that this Unit represents the same time range as the previous Units, between about 4700 and 3500 BC.

In total, 187 sherds were studied of the 195 sherds attributed to this Unit. The technological characteristics of these sherds are presented in table 3.38. The pottery is mostly tempered with organic material, but grit is also used in about half the sherds. The average wall thickness is 7.2 mm. Of all the observed joins, 91% are H-joins. As in the previous phases, smoothing is the predominant kind of surface finish. Rim decoration is very common: 68% of the rims are decorated.

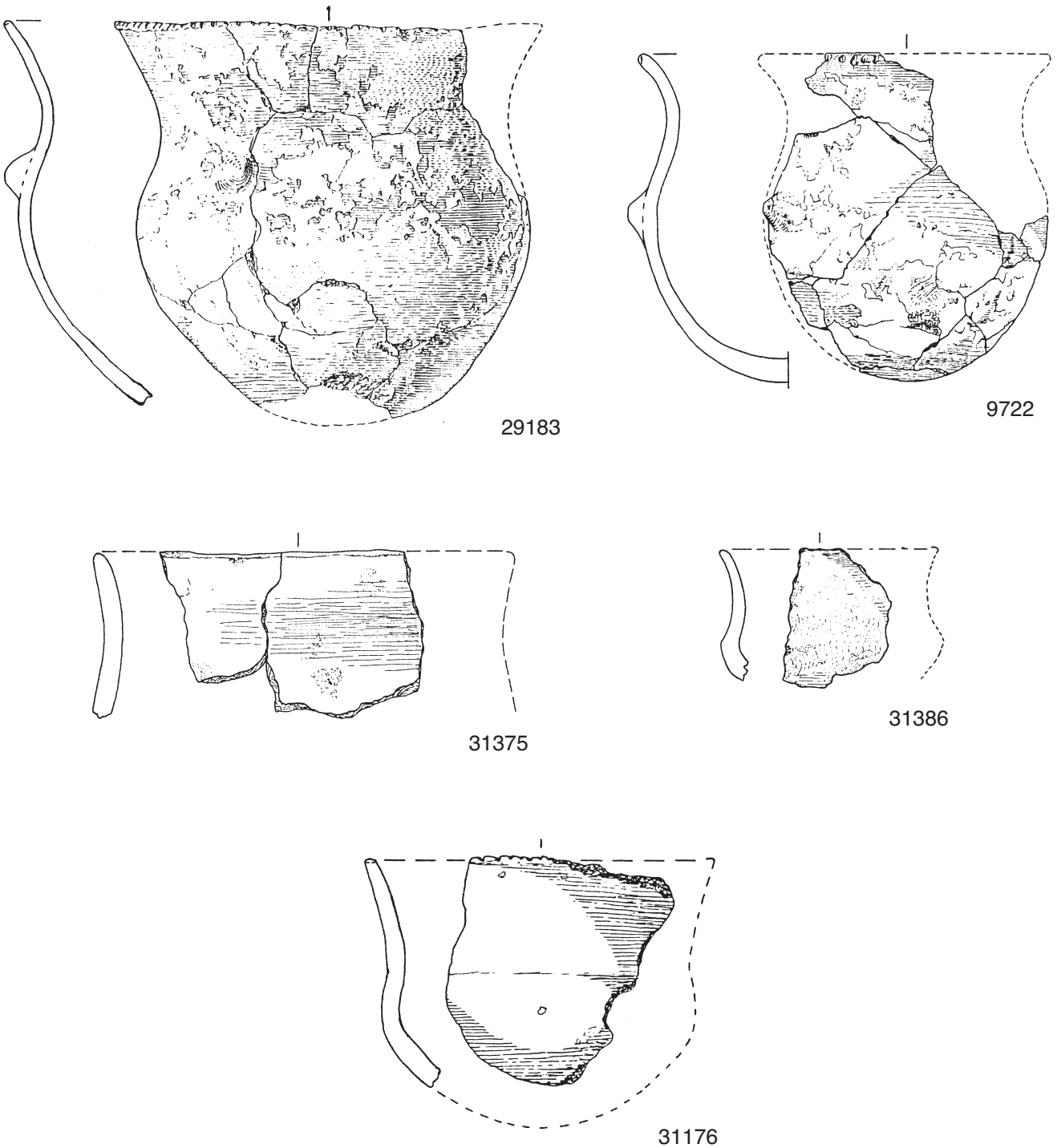


Fig. 3.26. Pottery from Unit 5. After Kampffmeyer 1991. Scale 1:3.

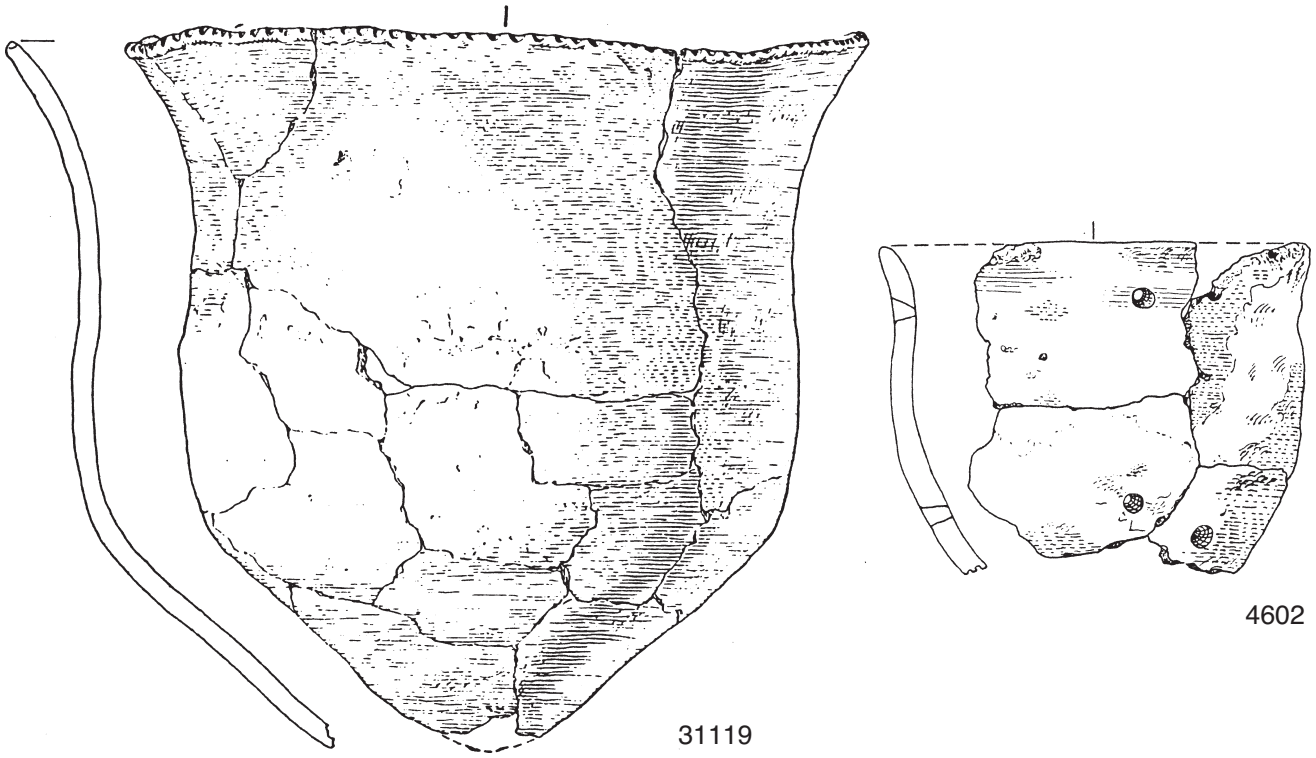


Fig. 3.26. Continued.

The tops of the rims are favoured, as in the previous Units (table 3.39). Body decoration is present on 14 sherds (7%). Both spatula impressions and grooves are found. Base forms are again varied, with round bases making up about half of the total. Other base forms are pointed, point, sagging and hollow. Lugs are frequent and present in two types: vertically perforated and horizontally perforated. Knobs are found as well.

Pottery Unit 5

The illustrated pottery from this Unit is again of a mixed character (fig. 3.26). The Bischheim component is seen in the decoration of nos. 19824, 31226 and 31426. Swifterbant traits are reflected in the rim sherd 31021 with its single row of spatula impressions both on the inside and outside of the rim zone and in point base fragment 30670. Three *Tupfenleist* rims point to a component of Michelsberg age. The presence of these three components shows that, like all previous Units, this Unit represents a time range between about 4700 and 3500 BC at the latest.

Of the 236 sherds attributed to Unit 5, 223 were analysed. Their technological characteristics are given in table 3.40. The pottery is evenly tempered with organic material and grit; a combination of the two types of temper is also frequent. The average wall thickness is 7.4 mm. Again, H-joins form about 90% of the observed joins and, again, most wall surfaces are smoothed (60%). Rim decoration is common with 57% of the rims being decorated (table 3.41). The top of the rim is favoured. Body decoration is found on 26 sherds and consists of both spatula impressions and grooves. Base forms are varied, though round bases are most frequent. Other bases are flat, pointed, sagging, point, hollow or with a protruding foot. Lugs are vertically or horizontally perforated, while knobs occur as well.

Discussion

The strong similarities in cultural components and technological characteristics of the Units prompts to the conclusion that all of these Units represent the same time range, from around 4700 until 3500 BC at the latest. Therefore it has to be concluded that an analysis of developments in the subsistence strategies and material culture of Hüde I is impaired, as already suggested in section 3.5.3. It appears that site formation processes had a marked effect on the assemblage, at least on the remains from the occupation predating the Funnel Beaker West Group. The apparent absence of Funnel Beaker West Group pottery in the Units presented here, suggests that their material can be used to represent the pre-Funnel Beaker occupation of the site.

	Spatula		*Fingertip/nail*		*Totals*	
	Number	%	Number	%	Number	%
Top	49	62	1	1	50	63
Outside	22	28	3	4	25	32
Inside and outside	3	4	–	–	3	4
Top and outside	1	1	–	–	1	1
Totals	75	95	4	5	79	100

Table 3.39. Hüde I, Unit 4 (brushwood peat, depth 0.7 m). Locations and techniques of rim decoration.

		Organic temper				*Grit temper*				*Total*
		0	1	2	3	0	1	2	3	
Number		73	26	92	32	87	29	53	54	223
Percentage		32.7	11.6	41.2	14.3	39.0	13.0	23.8	24.2	100
Average wall thickness (mm)		7.6	7.3	7.4	6.7	7.3	7.4	7.4	7.3	7.4
Types of join:	H-joins	54	16	69	18	64	18	40	35	157
	N/Z-joins	6	1	8	6	9	4	1	7	21
Surface finish:	Smoothed	38	14	50	21	58	15	25	25	123
	Even	21	6	19	5	14	8	14	15	51
	Uneven	4	1	11	1	3	2	5	7	17
	Smeared	1	1	5	0	3	1	2	1	7
	Polished	0	0	2	3	3	0	2	0	5
Base form:	Round	5	1	4	2	5	0	6	1	12
	Flat	2	1	1	1	0	1	2	2	5
	Pointed	2	1	1	0	0	0	1	3	4
	Sagging	0	0	3	0	2	0	0	0	3
	Point	1	0	0	1	0	2	0	0	2
	Protruding foot	1	0	0	0	0	0	0	1	1
	Hollow	0	0	1	0	0	1	0	0	1
Body decoration:	Spatula	7	2	6	3	6	0	8	4	18
	Groove lines	5	1	1	1	2	1	1	4	8
Rim decoration:	Spatula	23	5	40	9	35	10	18	14	77
	Fingertip	4	0	1	0	0	1	3	1	5
	Tupfenleist	3	0	0	0	0	0	3	0	3
Lugs:	Vertically perforated	36	8	19	4	19	6	34	8	67
	Horizontally perforated	0	0	3	2	3	0	1	0	5
Knobs		0	2	2	2	6	0	0	0	6

Table 3.40. Hüde I, Unit 5 (brushwood peat, depth 0.6 m). The characteristics of the pottery sample.

When the Units described above are combined, this assemblage can be characterised as consisting of Bischheim and Swifterbant components clearly visible in decorative motifs and pottery forms.
Michelsberg-like pottery is represent by five *Tupfenleist* rims and a single vessel (no. 30990). Other features of Michelsberg pottery such as carinated forms, spoons and *Schlickrauhung* are absent. To me, this suggests that the *Tupfenleist* can better be seen as a Michelsberg-influenced element, than as a Michelsberg element proper. The presence of *Tupfenleist* and *Arkaden* rims outside the area of the Michelsberg Culture proper is a widespread phenomenon (for example Hazendonk 2 and Brandwijk L60; see sections 3.8.2 and 4.4.2).
In the case of Hüde I, clay discs may be added to this list of

	Spatula		*Fingertip/nail*		*Totals*	
	Number	%	Number	%	Number	%
Top	56	68	–	–	56	68
Outside	15	18	3	4	18	22
Top and outside	5	6	–	–	5	6
Inside	1	1	–	–	1	1
Inside and top	–	–	1	1	1	1
Inside and outside	–	–	1	1	1	1
Totals	77	94	5	6	82	100

Table 3.41. Hüde I, Unit 5 (brushwood peat, depth 0.6 m). The locations and techniques of rim decoration.

Michelsberg-style ceramics (Kampffmeyer 1991, note 496). A final element in the pottery predating the Funnel Beaker West Group is pottery in Baalberg style (Kampffmeyer 1991, 262-263, fig. 219). Of the six finds thought to represent this pottery style[17], three are uncertain. Of the three remaining fragments, two could be interpreted as coarse Bischheim ware. The last find, a flat-based pot with a shoulder and wide rim, is certainly to be attributed to the Baalberg pottery style.
If all characteristics of pottery Units 1-5 are combined in order to identify trends in the frequency of various characteristics, it may be concluded that some trends do occur. Of course, it is difficult to decide to what extent these trends are a result of the size of the samples or of true developments in the pottery characteristics. Table 3.42 shows that there is a trend in the types and amounts of temper used. It is interesting that the proportion of sherds with a large quantity of grit temper increases in Unit 5. A change in the proportion of sherds with a large quantity of organic temper occurs from Unit 2/3 onwards: it decreases from 25% to 10-14%. At the same point, the proportion of sherds without organic temper increases from 19% to 28-33%. Other trends are found in the location of rim decoration: the inside is especially popular in Unit 1, often in combination with decoration on the top or outside of the rims. Rim decoration on the top of the rim is most frequent from Unit 2/3 onwards. Trends in the techniques of body decoration are less clear, though the proportion of groove-line decoration increases from Unit 4 onwards. A large variety of base forms occur throughout Units 1-5, though flat bases are only present in Unit 5 and could be interpreted as a late development. Not all variables show trends: coil-building and surface-finishing techniques hardly change at all, while the prevalence of lugs and knobs seems fairly constant.

3.5.6 FLINT TOOLS

Two characteristics of flint artefacts prohibit a spatial-chronological subdivision equally detailed as that based on pottery. First of all, the morphology of flint artefacts is more conservative, as flint tool types are generally used over long time ranges (Stapel 1991, 1). Combined with the conclusion that the pottery from Units 1-5 appears to represent a maximum time range of 1200 years (4700 and 3500 BC), it leads to the realisation that the subdivision of the flint tools into various Units is of no use for establihing any chronological development in the flint tool kit of the pre-Funnel Beaker occupation. Apart from the longevity of tool types, it is also common for tool types to be found in combination with pottery of different but contemporaneous archaeological cultures. The 'Michelsberg' points from Brandwijk (section 3.3.3) may illustrate this point. Although these triangular points are as a rule identified as typically Michelsberg, they also occur outside those areas where Michelsberg pottery is found.
In my opinion, these two restrictions on the use of flint tools as cultural markers lead to the conclusion that it is of no use to subdivide the flint tools from Units 1-5 according to the various pottery styles present. None of the 134 flint tools from this set can be closely associated with any one of the identified pottery styles. For this reason, the analysis of the flint tools listed in table 3.43 is restricted to a listing of those artefacts known to be associated with Swifterbant pottery. The flint tools of the Swifterbant Culture can be typified as consisting of various point types, such as trapezes, transverse arrowheads and drop-shaped and leaf-shaped points. Other tools include pointed blades, blade borers, block borers, borers with a curved tip, various blade and flake scrapers, retouched blades and flakes, notched blades and *pièces esquillées* (Deckers 1979, 148-152 and fig. 29-37; 1982, 34-37 and fig. 1; Stapel 1991, 159-161; sections 3.2.5 and 3.8.2). There are strong similarities between this tool kit and Hüde's flint tools from Stapel's first and second occupation phases. These similarities are seen in the occurrence of trapezes, triangular points, blade borers, retouched and truncated blades, blade scrapers, double blade scrapers, flake scrapers, thumbnail scrapers, microlithic scrapers, round scrapers, *pièces esquillées* and fragments of polished flint axes (Stapel 1991, 159-161, 165-166).

		Unit 1	*Unit 2/3*	*Unit 4*	*Unit 5*
Organic temper	0	19	30	28	33
	1	5	9	12	12
	2	49	51	49	41
	3	26	10	10	14
Grit temper	0	44	34	43	39
	1	17	25	20	13
	2	26	24	24	24
	3	13	16	13	24
Average wall thickness (mm)		7.5	7.7	7.2	7.4
H-joins		89	94	90	87
N/Z-joins		10	6	9	12
Rim decoration	% of rim sherds	63	44	68	56
Rim decoration technique	Spatula	86	83	95	94
	Fingertips/nails	14	17	5	6
Rim decoration location	Inner side	10	5	–	1
	Top	31	62	63	68
	Outside	21	24	32	22
	Inside and top	–	–	–	1
	Inside and outside	13	5	4	1
	Top and outside	8	5	1	6
	Top, inside and outside	5	–	–	–
Body decoration	% of body sherds	7	9	7	12
Body decoration technique	Spatula	86	83	64	69
	Groove lines	14	17	36	31
Surface finish	Smoothed	67	68	67	60
	Even	20	16	21	25
	Smeared	8	8	4	3
	Polished	1	5	2	2
	Uneven	3	3	5	8
Lugs	Vertically perforated	91	100	93	93
	Horizontally perforated	9	–	7	7
Knobs		+	+	+	+
Base forms	Pointed	–	27	18	14
	Point	20	18	23	7
	Round	70	36	54	43
	Sagging	10	–	2	11
	Flat	–	–	–	18
	Hollow	–	9	2	3
	Protruding foot	–	9	–	3

Table 3.42. Hüde I. The occurrence of the characteristics of the pottery from Units 1-5 expressed in percentages.

3.5.7 SUBSISTENCE DATA AND SEASONALITY

The settlement at Hüde was located in an environment dominated by alder, pine and hazel vegetation. In this landscape, there are no indications of man-made environmental change in general and agricultural activities in particular (Schütrumpf 1988). The only evidence of the use of cereals is found in the impressions of cereal grains in three sherds. These were of naked barley and einkorn, but it is unknown from which phase of occupation these sherds date (Kampffmeyer 1991, note 970).[18] The presence of domestic animals is attested as well. Although the subdivision of pig and cattle into their domestic and wild varieties did not include all bones, it can be said that at least some of the pigs and cattle were domestic (Hübner *et al*. 1988, tables 30 and 44). The

	Number	*%*	*Tool category*	*%*
Points			**10**	**7.5**
Trapezes	6	60		
Triangular	1	10		
Transverse	1	10		
Indet.	2	20		
Borers			**19**	**14.2**
Borer on blade	6	31		
Borer on flake	2	10		
Pointed blade	1	5		
Reamer	1	5		
Borer on block	6	31		
Borer with curved tip	3	16		
Scrapers			**48**	**35.8**
Single blade scraper	17	35		
Single blade scraper with retouched sides	5	10		
Double blade scraper	2	4		
Blade scraper with concave end retouch	2	4		
Single flake scraper	11	23		
Single flake scraper with retouched sides	6	12		
Round scraper	1	2		
Side scraper	3	6		
Indet. scraper	2	4		
Retouched blades			**33**	**24.6**
Retouch > 1 mm	16	48		
Retouch < 1 mm	17	52		
Retouched flakes			**17**	**12.7**
Retouch > 1 mm	17	100		
Retouched blocks and preparation flakes			**7**	**5.2**
Retouched blocks	4	57		
Pièces esquillées	3	43		
Totals			**134**	**100.0**

Table 3.43. Hüde I. The flint tools from Units 1-5.

mammal bone spectrum from the first Neolithic occupation period (pre-*Tiefstich* Funnel Beaker) is dominated by cattle (*Bos* sp.), pig (*Sus* sp.) and red deer (table 3.49). Apart from mammals, birds and fish formed part of the menu. The list of identified bird remains mainly consists of species that probably were present in the Dümmer environment on a year-round basis. White-tailed eagle and mallard were the most frequently identified birds (Boessneck 1978, table 1).[19] The fish remains from the first occupation period are less varied, with only six species present of which pike and perch are the most frequent (Hüster 1983, table 24). The subsistence base of the first occupation period of Hüde I can be typified as relying on both wild resources and domestic animals (and plants?); the wild resources seem to have been of prime importance.

The issue of seasonal or year-round occupation of the site is addressed by a number of authors (Boessneck 1978, 157; Hüster 1983, 449; Kampffmeyer 1991, 318-321; Schütrumpf 1988, 26-30). The first three authors agree on seasonal (late) summer/autumn occupation, while Schütrumpf argues in favour of year-round habitation. Since the material at hand can be described as a palimpsest and represents a time range of about 1200 years, the possibility cannot be excluded that both year-round and seasonal occupation occurred. It is impossible to determine whether the site had a consistent function throughout its occupation or fulfilled shifting functions (see also section 3.8.4).

3.6 Other Swifterbant sites

3.6.1 INTRODUCTION

Apart from the Swifterbant sites described above, there are other archaeological remains in the Netherlands and north-western Germany that are (perhaps) related to the Swifterbant Culture. A survey of the literature on these sites shows

that they are not all sites of which the Swifterbant affinities are certain. Therefore, wat is needed is a site classification according to the amount and nature of the material recovered and the availability of ^{14}C dates. Depending on these characteristics, all sites are grouped into one of the following categories:

A category. Sites with a large amount of pottery which may be interpreted as Swifterbant pottery, combined with ^{14}C dates and a clear stratigraphy. This category includes the sites of the Swifterbant cluster (section 3.2), the various find layers from Brandwijk (section 3.3), Hazendonk 1 and Hazendonk 2 (section 3.4), Polderweg (section 3.6.2), Hoge Vaart (section 3.6.3) and Schokkerhaven/E170 (section 3.6.4). The last three sites are as yet unpublished, which precludes an extensive description of the recovered material. For this reason, these sites are not presented in a separate section in this chapter, but instead in a sub-section, below.

B category. This category comprises ^{14}C-dated Swifterbant sites with little pottery. These sites include Bergschenhoek (section 3.6.5), Zoelen-Buren (section 3.6.6), J112 (section 3.6.7), Ede-Rietkamp (section 3.6.8) and Bronneger (section 3.6.9). The B category is enlarged by Hüde I (section 3.5) and P14 (section 3.6.10). Although these sites are ^{14}C-dated and yielded large amounts of material which is clearly related to the Swifterbant Culture, the stratigraphical problems of both sites clearly set them apart from the sites of the A-category.

C category. The sites from this category yielded little material and are not ^{14}C-dated. Their Swifterbant affinities are therefore far from certain and are based on mostly secondary arguments. The three sites in this category are Schiedam (section 3.6.11), Winterswijk (section 3.6.12) and Meppel-De Gaste (section 3.6.13).

All other Dutch sites that at one time or other have been linked to the Swifterbant Culture are dismissed here. These sites yielded no characteristic material remains and lack ^{14}C dates. These sites include:

* Zwolle-Groenlo (Ten Anscher in prep.; Lanting/Mook 1977, 57; Schut 1981, 198; 1987, 54);
* Heemse-Hardenberg (Ten Anscher in prep.; Van der Waals 1972, 168) and
* Spoolde (Ten Anscher in prep.; Van der Waals 1972, 162; Clason 1983).

The number of sites in northwestern Germany which (Lichardus 1991, 777) related to Hüde I (and thus to the Swifterbant Culture) through the proposed existence of a *Dümmer B Group* is even larger. All of these sites are dismissed here, see the references preceding Lichardus for interpretations *contra* Lichardus:

* Buthlede/Uthlede (Funnel Beaker or Michelsberg Culture; Strahl 1990, table 10.2; Lichardus 1991, fig. 2.7);
* Deilmissen (Funnel Beaker or Michelsberg Culture; Ten Anscher in prep.; Leiber 1983; Lüning 1967; Maier 1970; Lichardus 1991, fig. 1.8);
* Ecksteven (?; Strahl 1990, table 103.2; Lichardus 1991, fig. 2.6; Ten Anscher in prep.);
* Eime (Funnel Beaker or Michelsberg Culture; Ten Anscher in prep.; Leiber 1983; Lüning 1967; Maier 1970; Schwaedissen 1957/1958);
* Einbeck (Michelsberg Culture; Ten Anscher in prep.; Leiber 1983, figs 3-8; Lichardus 1991, fig. 1.10, 11, 13);
* Engern-Brinckhof (Michelsberg Culture; Ten Anscher in prep.; Brandt 1961, figs 2-3; Erdni 1941, figs 1-6; Lichardus 1991, fig. 1.7, 9);
* Farven (?; Deichmüller 1959; Strahl 1990, table 31.3, Lichardus 1991, fig. 2.9; Ten Anscher in prep.);
* Göttingen-Grone (Michelsberg Culture; Ten Anscher in prep.; Leiber 1983; Maier 1970, fig. 5.1-8, 7, 10.5);
* Gross Giesen (Heege 1989) and
* Zwischenahner Meer (Funnel Beaker or Michelsberg Culture; Zoller 1958, 33.1; Lichardus 1991, fig. 1.6; Ten Anscher in prep.).

In the following sections, the remaining sites of categories A, B and C are presented in a sequence in which the sites of the A category are discussed first, those of the B category second and the sites of the C category last. Within these categories, a southwest-northeast direction is followed.

3.6.2 POLDERWEG

Location and research history. Polderweg is located on a river dune in Hardinxveld-Giessendam (Rhine-Meuse river area). As a result of construction works on a new railway line, the site was threatened by differential lateral displacement as a result of differences in compaction between the sand of the river dune and the surrounding peat-clay matrix. As part of the *Betuweproject* of the *Nederlandse Spoorwegen-Rail Infra Beheer* (Dutch Railways)) and the *Rijksdienst voor het Oudheidkundig Bodemonderzoek* (State Service for Archaeological Investigations), the threatened part of the site was excavated in 1997 and 1998 by *ARCHOL bv.* of Leiden University. This excavation uncovered two occupation layers. The following preliminary descriptions lump together the finds from these two layers. Pottery is significantly restricted to the youngest find layer, layer 2.
Finds: flint artefacts. The numerous flint artefacts predominantly consist of coastal flint pebbles, with an admixture of terrace flint, Rijckholt flint and a very small number of Light-grey Belgian flints. Both blades and flakes are found, while cores include flake and microlithic blade cores.
Tools are scarce and comprise end scrapers, side scrapers,

Fig. 3.27. Polderweg pottery. Scale 1:3. Drawing M. Hense.

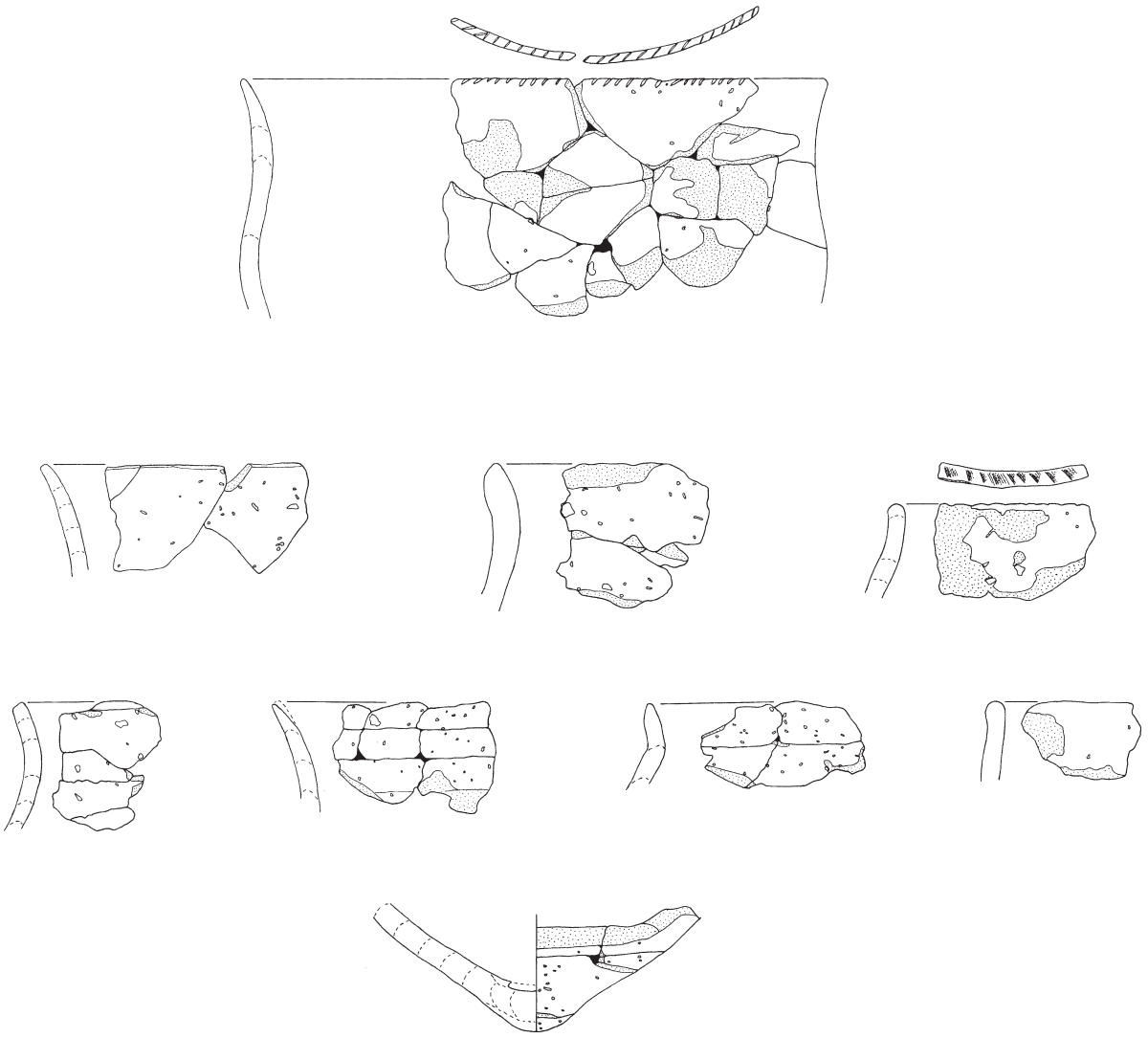


Fig. 3.28. Hoge Vaart pottery. From Hogestijn *et al.* 1995, figs 15 and 16. Scale 1:3.

truncated flakes and blades and various points: B points, one possible LBK point (section 4.2.2) and trapezes (pers comm. V. Beugnier/A. van Gijn 1998).
Finds: pottery. The few dozen sherds are mostly tempered with grit, but also with grog and organic material. They are coil-built with both H-joins and N-joins, of which H-joins are the most common. The average wall thickness is 10.0 mm. Most sherds have an uneven surface, others are smoothed, roughened or polished. Pottery forms include open forms, pots with an inward-curving rim and S-shapes with short necks. Base forms are pointed or sagging.
Two knobs are an additional morphological characteristic. Rim decoration takes the form of a series of spatula impressions and *Randkerbung*. Body decoration is restricted to a few shoulder sherds decorated with at least two series of large spatula impressions; it cannot be ruled out that this decoration covered the body surface (fig. 3.27) (Raemaekers in prep.).
Finds: organic material. The extensive study of the well-preserved macroscopic plant remains reveals that cereals were absent (pers.comm. L. van Beurden 1998), Bones of domestic mammals (apart from dog) are absent as well. The mammal-bone spectrum mainly consists of otter, beaver, red deer and wild boar, but also encompasses wild cat, common

seal and grey seal. Bones of aurochs are restricted to a small number of tools (pers. comm. K. Cavalho 1998).
Features. Features include a series of postholes, a few large pits and a number of burials, probably all dating to the oldest occupation phase of the site (pers. comm. T. Hamburg 1998).
Dating. The single ^{14}C date of layer 2 has a 2σ range of 4770-4520 BC, while layer 1 dates from between 5470 and 5250 BC (pers. comm. T. Hamburg/J. Mol 1998).

3.6.3 HOGE VAART

Location and research history. The site is situated on a coversand ridge along the former riverbed of the Eem. The excavated area includes both the top of this ridge and its two sides. The possibility that important archaeological sites could be disturbed by the construction of a new road in southern Flevoland led to a large augering campaign to discover such sites. If possible, these sites were to be protected by rerouting or protective measures. For one of the discovered sites, this was no option and an extensive excavation was decided upon, which took place in 1995 and 1996. The following is based on the preliminary results presented by Hogestijn and Peeters (1996) and Hogestijn *et al*. (1995; 1996).
Finds: flint artefacts. As there are no known flint sources nearby, all flint was probably transported to the site by its occupants. The recovered artefacts consist of flint types of both northern (boulder-clay) and southern origin. The flint was won from unknown source areas. It was worked in blade technology, but maybe flake technology was used to produce specific tools. The tool list comprises trapezes (c. 30%), flake and blade scrapers (c. 30%), used blades (c. 30%) and various other tools: borers, burins, one core axe, one flake axe and used flakes (c. 10%). Mesolithic point types are also present.
Finds: pottery. The sherds are most often tempered with grit (quartz), while tempering with organic material is rare. Coil-building was done with H-joins. A few sherds display a polished surface. The pottery was S-shaped but, because of the fragmentation of the material, few large fragments have been reconstructed. The decorative elements are knobs and spatula impressions on the top of the rim (*Randkerbung*). Base forms include round and pointed bases (fig. 3.28).
Finds: organic material. The animals bones from the site reflect fishing (perch, eel and possibly pike), fowling (various duck species) and hunting (roe deer and perhaps elk). Domestic animals are also present: the identification of cattle bone is certain, but it is also possible that domestic pigs were kept. The identification of domestic pig is uncertain: the metric characteristics of the bone material suggest that pigs were domestic, but the fragmented and burnt condition of the bone is a serious hindrance for interpretation. The pig bones constitute the major part of the bone assemblage (more than 90%!). The (burnt) mammal bones from the ridge reveal a singular emphasis on pig, suggesting that the site had a special function. The unburnt mammal bones from the creek fill present a distinctly different spectrum: red deer, dog, beaver, a marten species, grey seal, horse, brown bear, cattle/aurochs, and possibly sheep/goat (Hogestijn/Peeters 1996, 96). Plant remains include hazelnuts, acorns, berries and wild apples. No cereal remains were found.
Features. A large number of features were excavated. These include some 150 surface hearths which were restricted to the eastern slope of the sand ridge, some 50 hearths in pits and dozens of postholes.
Dating. The sixteen ^{14}C dates presented by Hogestijn *et al*. (1996) date (parts of) the occupation between around 5200 and 4530 BC. A later date is possible, since the sand ridge was not covered until 4000 BC (5200 BP; Hogestijn *et al*. 1995, 81), but is dismissed here: the lack of ^{14}C dates relating to the 500 years prior to the covering of the site is considered as indicative of an absence of occupation during this period. The use of pottery is even more securely dated: when only the four dates of charred food remains on sherds are considered, the use of this pottery can be dated to roughly between 4900 and 4770 BC. Of course, parts of the occupation debris may be of older[20] or younger date (Hogestijn *et al*. 1995, 66-89; 1996, 93-113).

3.6.4 SCHOKKERHAVEN / E170

Location and research history. In the Noordoostpolder, all fields are designated by the combination of a letter and number. In 1984, a refuse layer was found in a ditch between the fields E170 and E171. It was excavated in 1988. This refuse layer was located on the slope of a river dune in the northern part of the IJssel river valley. Underneath the plough soil, a brushwood peat layer contained the archaeological material discussed here.[21] This section is based on Hogestijn 1990, 171-174 and 1991, 114-115.
Finds. The list of flint tools consists of polished flint axes with oval cross-sections, scrapers, borers and trapezes. The technology is more often based on flakes than on blades. The pottery is tempered with grit (both quartz and granite), while organic material is also frequently used. It is S-shaped with flat to round bases and vertical to everted rims, while coil-building is rarely visible. Fingertip and spatula decoration is found on the exterior rim zone and body (fig. 3.29). The bone spectrum of this site reveals the presence of aurochs, wild boar, elk, beaver, red deer, wild horse and perhaps fox, all represented in small numbers. Cereals are also found: emmer wheat and naked barley (Gehasse 1995, 70, table 4.32).
Dating. One ^{14}C date of hazelnuts dates the beginning of the deposition of archaeological material: GrN 14122: 5035 ± 30 BP, which gives a 2σ range of 3950-3720 BC.

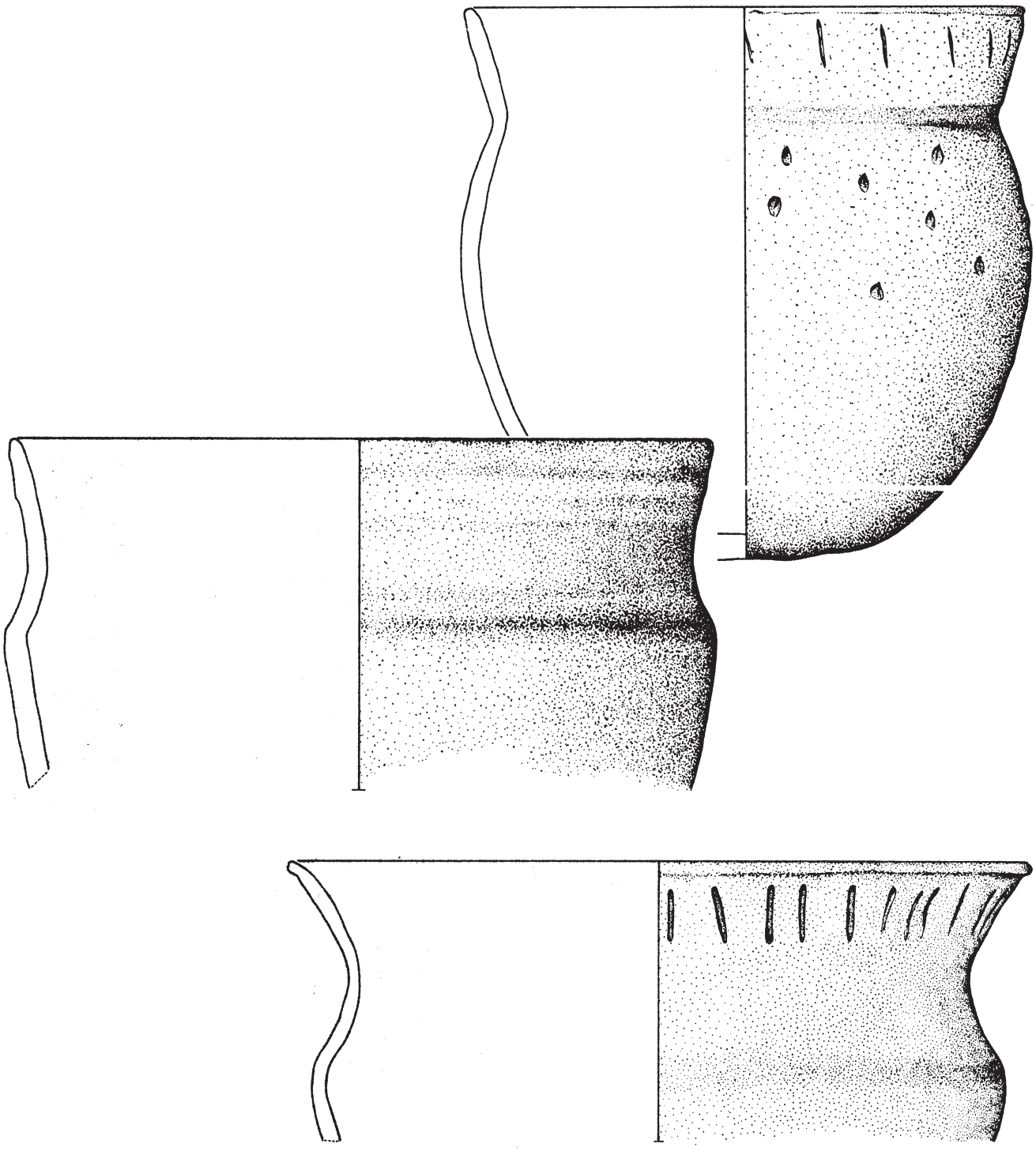


Fig. 3.29. Schokkerhaven pottery. From Hogestijn 1990, fig. 4. Scale 1:3.

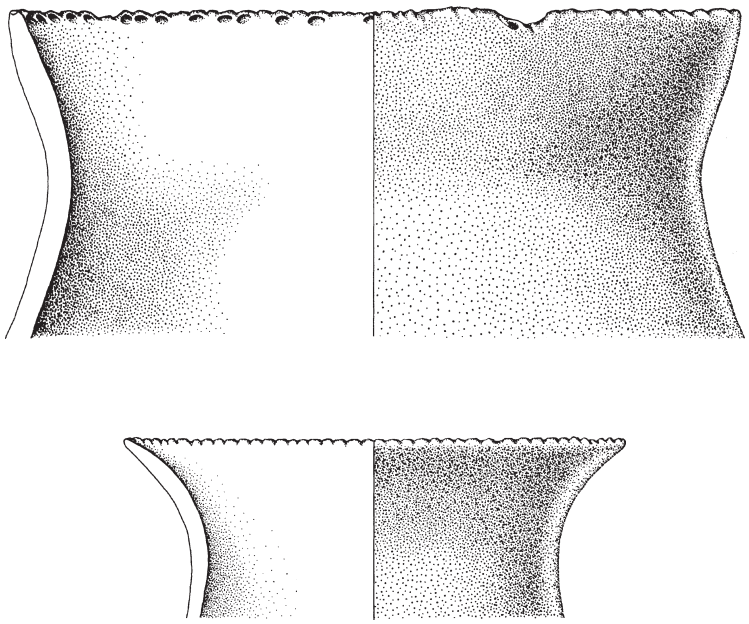


Fig. 3.30. Bergschenhoek pottery. From Louwe Kooijmans 1985, p. 98. Scale 1:3.

3.6.5 BERGSCHENHOEK

Location and research history. In 1976, the Bergschenhoek site was discovered during the digging- out of a pond at a depth of -8 m NAP. The excavations in 1978 revealed the well-preserved remains of a small fowling station (± 100 m^2). The site was located on the peaty border of a lake that contained fresh or slightly brackish water, judging by the shell and fish species found. Apparently, the lake was cut off from the surrounding (saline) mudflat environment. After the occupation of the site, the shore on which the site was located, broke away and subsequently ran aground nearby (pers comm. L.P. Louwe Kooijmans 1997). Next, it became embedded in clay deposits that eventually covered the site. The lifespan of the site is estimated at approximately ten years. This interpretation is based on the number of small superimposed hearths and the various thin clay layers incorporated in the occupation layer: these clay layers probably correlate with the number of winters. This section is based on Louwe Kooijmans in Sarfatij 1977; 1978 and Louwe Kooijmans 1985 and 1987.

Finds. The most numerous and important find category is animal bone, which provides insight into the economic potential of the environment and the seasons of the site's occupation. Fowling was a major activity; the presence of winter visitors like Bewick's swan, widgeon, golden-eye, eider and goosander attents to activities during the late autumn or winter season, while typical summer visitors are absent. The absence of fish remains from anadromous species such as sturgeon and thin-lipped mullet is another indication of man's absence during the summer. If we presume that the fowling took place for the birds' nutritional value, it can be assumed that the site was occupied during late autumn, when birds still have meat and fat. The remains of mammals consist of grey seal and otter. Other organic material was also perfectly preserved: there are remains of several fish traps, wooden arrows, pointed sticks and fishing spears, bone and antler tools, pieces of rope and the remains of a number of successive, superimposed hearths. Non-organic find material is scarce: there were three flint artefacts, one of which is a small retouched blade and one other a fragment of a stone axe with an oval cross-section (Louwe Kooijmans 1985, 92-97; 1987, 238-242). The few dozen sherds of S-shaped pots were tempered with organic material. On a few sherds, coil-building with H-joins was observed. Most sherds have a smoothed or polished surface. Decoration is very rare and consists of a single row of spatula impressions on the top of the rim (*Randkerbung*). One sherd shows a roughly turned-over rim, reminiscent of a *Tupfenleist*. A final feature is the presence of a number of sherds with repair holes in the rim zone (fig. 3.30).

Dating. One ^{14}C date (GrN 7764: 5415 ± 60 BP) gives a 2σ range between 4360 and 4050 BC.

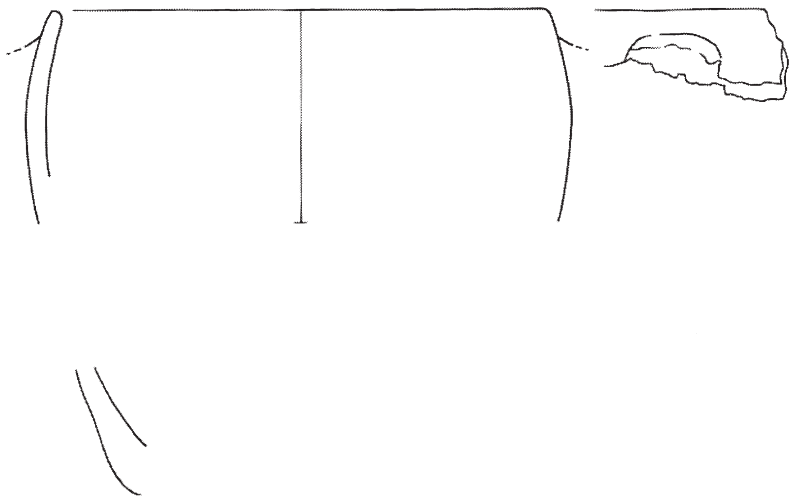


Fig. 3.31. Ede-Rietkamp pottery. From Hulst 1993, fig. 1.1. Scale 1:3.

3.6.6 ZOELEN-BUREN

Location and research history. As ground work threatened the field in which the site was located, an archaeological investigation of the area took place in 1991 (Hogestijn/ Lauwerier 1992 and Hulst *et al*. 1993).
Finds. The finds consist of one grave pit containing three inhumations. The lowermost burial consists of the remains of one seven-years-old child and a mature woman (aged 50-70). Both bodies were buried prostrate and were probably covered with leafs or bark. Separated from this burial by a thin layer of soil, the remains of a second adult woman were deposited. These remains consist of the more decay-resistant bones, which had probably been selected from an earlier grave in a different location. Three sherds found nearby, tempered with both organic material and grit, may be related to the Swifterbant Culture.
Dating. One ^{14}C date of 5190 ± 50 BP (Utc-1961) on one of the bones dates the inhumation with a 2σ certainty to between 4220 and 3810 BC.

3.6.7 J112

Location and research history. In 1985, a great number of flint artefacts were collected on a large river dune, after which an excavation followed. The river dune is located in the northern part of the Vecht river valley, in the Noordoostpolder, Flevoland (based on Hogestijn 1991, 118).
Finds. The finds consist of small potsherds, tempered with organic material and sometimes also grit. The ^{14}C date suggests an occupation in the period of the Swifterbant Culture. This is supported by the presence of a number of scrapers and trapezes.
Dating. The ^{14}C dating (GrN 14124: 5635 ± 40 BP) of a pointed wooden post puts the archaeological remains with 2σ certainty between 4540 and 4360 BC.

3.6.8 EDE-RIETKAMP

Location and research history. The site is located on a coversand ridge. The soil was disturbed as a result of construction work, during which dozens of sherds were collected. This section is based on Schut in Hulst 1993, 206.
Finds. The sherds are probably the remains of a single pot tempered with grit, grog and organic material. It has a polished surface and two knobs, and an inward-curving rim. The base probably has a round or pointed shape (fig. 3.31).
Dating. The ^{14}C date of 6050 ± 110 BP on the organic temper indicates that the pot dates with 2σ certainty to between 5220 and 4720 BC.

3.6.9 BRONNEGER

Location and research history. During dredging activities in the Buinen-Schoonoord canal in 1990, slurry was deposited on the banks of the canal. It was in this soil that the archaeological remains were found. Since these were collected in an area of 2.5 by 2.5 m, it is presumed that all finds were also spatially related in primary deposition. The presence of a crust of bog-ore on many of the finds suggests that the finds originate from a sandy river deposit, probably of the Voorste Diep stream, the natural predecessor of the canal (based on Kroezenga *et al*. 1991, 32-36).
Finds. The remains of three red-deer antlers were recovered. Though some skull parts were found as well, no other parts of their skeletons were present. This suggests that these

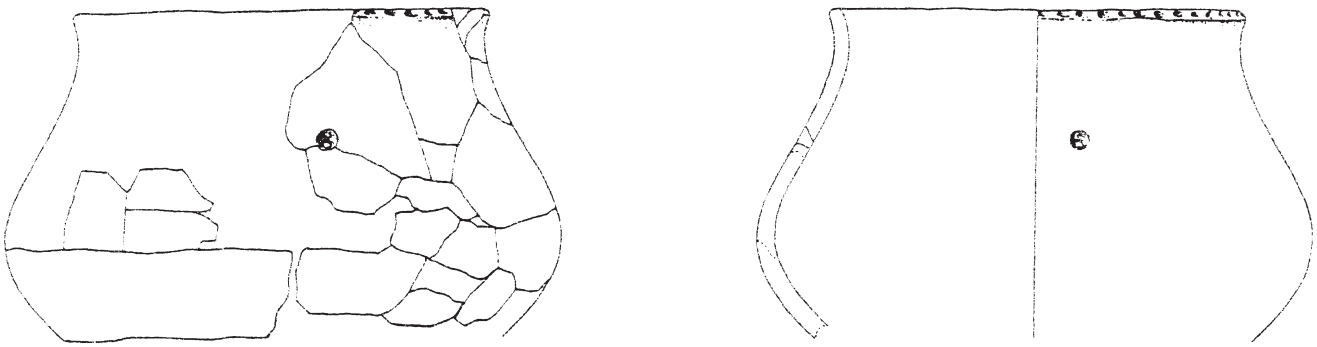


Fig. 3.32. Bronneger pottery. From Kroezenga *et al.* 1991, fig. 3. Scale 1:3.

animals did not die of natural causes and that after the killing of the deer, the antlers were deliberately deposited by man. Some sherds of a pot in Swifterbant style accompanied this find. It was S-shaped and had a rim diameter smaller than its body diameter (fig. 3.32). It was tempered with grit and built out of coils joined with H-joins. It had a smoothed surface and a repair-hole in the rim zone. The top of the rim was decorated with a single row of oval spatula impressions (Kroezenga *et al*. 1991, 32- 36).
Dating. The ^{14}C dates from this site indicate that this assemblage is one of the oldest Swifterbant sites. A date between 4770 and 4610 BC seems most likely (appendix 3).

3.6.10 P14

Location and research history. The field P14, with the archaeological site of the same name, is located at the eastern end of a Pleistocene boulder-clay outcrop, the former island of Schokland. During the Neolithic occupation of the site, the river Vecht ran alongside the site. At that time, the natural environment consisted of deciduous forest on the higher grounds, while alder brushwood and sedge lined the river. In 1957, partial excavation of the site was carried out by G.D. van der Heide, at the time archaeologist of the *Rijksdienst voor de IJsselmeerpolders* (the Polder Development Authority). In 1982-1991 the *Instituut voor Prae- en Protohistorie* of Amsterdam University conducted new research on the site.
Dating. Though material remains from the Late Palaeolithic to the Middle Bronze Age were found at the site, the Neolithic occupation is of interest here. Before the analysis of the pottery from trench WP89-17 was completed and ^{14}C dates became available, it was thought that the pre-Funnel Beaker pottery represented a Late Swifterbant occupation of the site, bridging the gap between the occupation of the levee sites of Swifterbant and the start of the Drouwen phase of the Funnel Beaker West Group (Ten Anscher/Gehasse 1991; 1993; Ten Anscher *et al*. 1993). Now it has to be transpired that the Swifterbant occupation of P14 started much earlier and spans a time period of around 1400 years (Ten Anscher in prep.).
WP89-17. Trench WP89-17 is essential for the pre-Funnel Beaker Culture occupation history of the site. It is located in the southeastern part of the site, where a sequence of riverine sediments and peat layers was found. In this trench, all finds were collected per square metre in 5-cm spits. Ten Anscher's study of the pottery from this trench shows that there were developments in its characteristics through the stratigraphy. These could be related to a large number of ^{14}C dates on charred remains from these sherds. The overall sequence could then be subdivided into five units (Ten Anscher *in prep*.; Gehasse 1995, 27):

Layer E	3600-3300 BC
Layer D	3600-3350 BC
Layer C	3800-3600 BC
Layer B	4100-3800 BC
Layer A	4900-4100 BC (the bulk of the material dates to 4400-4100 BC)

By means of these units for analysis, the developments in subsistence and material culture of the pre-Funnel Beaker Culture occupation of P14 may be studied in detail.
Finds: cereal remains. Cereal remains were found in three different contexts. First, three finds stem from the stratigraphic sequence of WP89-17: a charred internode of emmer wheat from Layer A, a charred grain of naked barley in Layer B and another charred grain of naked barley in Layer C. Secondly, impressions of emmer wheat and naked barley were recognised in a few sherds. Thirdly, pollen from the same types of cereals features in pollen diagrams (Gehasse 1995, 59-60).
Finds: zoological remains. The mammal bone spectra from the five sequential layers in WP89-17 show that bones of

	Layer A		*Layer B*		*Layer C*		*Layer D*		*Layer E*	
	n	%	n	%	n	%	n	%	n	%
Domestic	**9**	**4.1**	**13**	**2.3**	**12**	**4.2**	**–**	**–**	**18**	**26**
Cattle (*Bos taurus*)	8	3.7	10	1.8	7	2.4	–	–	7	10
Dog (*Canis familiaris*)	1	0.4	2	0.3	2	0.7	–	–	2	3
Sheep/goat (*Ovis/Capra*)	–	–	1?	0.2	3	1.0	–	–	9	13
Domestic/Wild	**104**	**47.7**	**181**	**32.2**	**118**	**41.4**	**13**	**65**	**25**	**37**
Cattle/aurochs(*Bos* sp.)	19	8.7	37	6.6	18	6.3	8	40	–	–
Pig/wild boar (*Sus* sp.)	85	39.0	144	25.6	100	35.1	5	25	25	37
Wild	**105**	**48.2**	**368**	**65.5**	**155**	**54.4**	**7**	**35**	**25**	**37**
Elk (*Alces alces*)	–	–	4	0.7	3	1.0	–	–	2	3
Water vole (*Arvicola terrestris*)	–	–	1	0.2	–	–	–	–	8	12
Aurochs (*Bos primigenus*)	–	–	2	0.3	–	–	–	–	–	–
Roe deer (*Capreolus capreolus*)	2	0.9	2	0.3	2	0.7	–	–	–	–
Beaver (*Castor fiber*)	58	26.6	233	41.4	96	33.7	6	30	7	10
Red deer (*Cervus elaphus*)	42	19.3	117	20.8	42	14.7	–	–	5	7
Horse (*Equus caballus*)	–	–	–	–	–	–	1	5	1	1
Cat (*Felis silvestris*)	–	–	–	–	1	0.3	–	–	–	–
Otter (*Lutra lutra*)	1	0.4	5	0.9	9	3.1	–	–	1	1
Pine/ stone-marten (*Martes martes/foina*)	1	0.4	3	0.5	1	0.3	–	–	–	–
Badger (*Meles meles*)	–	–	–	–	1	0.3	–	–	–	–
Polecat (*Mustela putorius*)	–	–	1	0.2	–	–	–	–	1	1
Brown bear (*Ursus arctos*)	1	0.4	–	–	–	–	–	–	–	–
Totals	**218**	**100.0**	**562**	**100.0**	**285**	**100.0**	**20**	**100**	**68**	**100**
Large herbivores	61		181		79		?		?	
Large mammals	258		227		195		≥14		?	
Medium-sized mammals	91		205		131		≥5		?	
Small mammals	25		86		45		≥1		?	
Mammals	4195		11,228		4435		≥42		?	

Table 3.44. P14, Layers A, B, C, D and E. The mammal bone spectra (based on Gehasse 1995, 42-53).

both domestic and wild animals are common (table 3.44). Important species are pig (either wild or domestic), beaver and red deer. The decrease in the proportion of bones of wild animals (and increase in the proportion of bones from domestic animals) between Layers ABC on the one hand and Layers DE on the other may be explained by a shift in subsistence strategy, although Gehasse leaves open the possibility that changes in site formation processes created the differences in the mammal bone spectra. The range of identified bird remains is limited to duck (two bones from Layer C), mallard (four bones from Layer E) and thrush (one bone from Layer E). Fish remains are more numerous. These represent the freshwater carp family, pike, perch and sheatfish, the freshwater-tolerant species eel, thin-lipped mullet and flounder, the anadromous salmon, and the marine plaice family (Gehasse 1995, table 4.20). The freshwater species were available on a year-round basis, while eel was perhaps caught during the autumn when it exchanges the marine environment for the freshwater environment. Thin-lipped mullet and plaice can be found in freshwater environments during the summer. The season of salmon fishing is less specific: they were probably available from January to April and from June to August (Gehasse 1995, 67; Boddeke 1974; Nijssen/De Groot 1987). The fish remains are especially useful for determining the seasonality of the occupation of P14. A minimum option is a summer occupation, while the possibility of year-round occupation of the site cannot be refuted by zoological indicators (Gehasse 1995, 65-68).

Finds: pottery. A detailed analysis of the pottery from P14 will be given by Ten Anscher (in prep.). Here, some preliminary remarks will be presented, based on Ten Anscher *et al.* 1993. Unfortunately, the re-interpretation of the time-depth of the stratigraphy of WP89-17 means that only a general description of the pottery is possible. In 1993, the pottery characteristics presented below were thought to represent only a small time span, but now it is clear that traits cover a

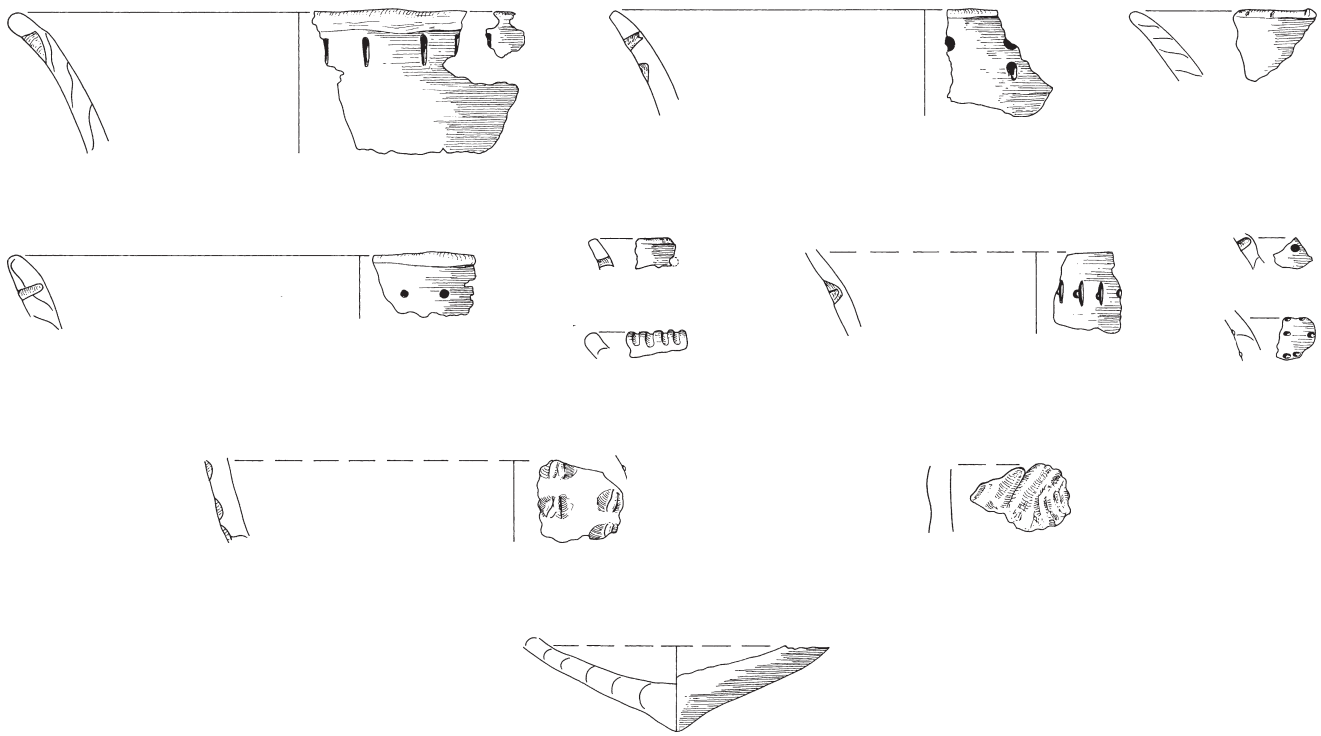


Fig. 3.33. P14 pottery. From Ten Anscher *et al.* 1993, fig. 1. Scale 1:3.

much longer period, between about 4400 and 3300 BC (Ten Anscher in prep.; Gehasse 1995, 27). The pottery is tempered with organic material, often accompanied by granite grit. It is built out of coils joined with H-joins and N-joins. The base forms include the pointed, round and sagging kinds. Rim decoration is varied and consists of impressions on the rim, perforations and spatula impressions on the outside. Body decoration types include paired fingertip impressions, rows of fingertip impressions, random small spatula impressions (*pin-pricks*) and roughened surfaces (Ten Anscher *et al*. 1993) (fig. 3.33).

Finds: flint artefacts. The projectile points recovered from trenches other than WP89-17 were studied by Wilhelm (1996). Her selection of material comes from that part of the excavated area where no stratigraphical evidence is available. This, in combination with the general longevity of various point types makes it difficult to determine which points date to the Swifterbant occupation of the site and which do not. Nonetheless, some inferences may be drawn. The largest group of the 256 points studied is formed by transverse arrowheads (N=160). The second largest group of points, the trapezes, is the dominant type of point in most Swifterbant assemblages (N=30). One other important group of projectile points is formed by triangular points (with various subtypes: N=32). Leaf-shaped points (N=5) may also date to the pre-*Tiefstich* Funnel Beaker Culture occupation of the site (Wilhelm 1996, 3). Almost all projectile points were produced on boulder-clay flint material, while three points were produced on Light-grey Belgian type flint, two others on Rijckholt flint, and one is of Obourg-type flint. Two more points were made on flakes of polished flint axes (Wilhelm 1996, 6, 20).

Features. The numerous features include two special groups. First, the remains of at least two house plans are a most important find. The plans have axial supports and are approximately 6 × 12 m in size (Ten Anscher in prep.; Gehasse 1995, 67). The second group of features mentioned here consists of graves. Seven of the fourteen graves are dated to the Swifterbant occupation of the site. These inhumation graves contained the remains of at least eleven individuals. In one grave (number 13), three articulated skeletons were accompanied by a number of teeth from at least four more individuals. Grave goods were sparse (Ten Anscher in prep.; Ten Anscher/Gehasse 1993, 36-37; Hogestijn 1991, 123-125).

3.6.11 SCHIEDAM

Location and research history. The Schiedam finds are the first discovered remains of the Swifterbant Culture, a decade

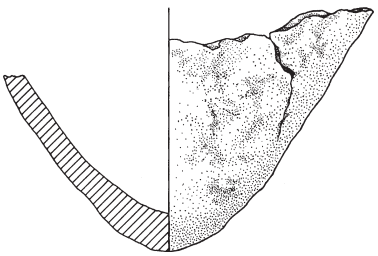


Fig. 3.34. Schiedam base fragment. From Louwe Kooijmans 1974, fig. 4.a. Scale 1:3.

before the first excavations at Swifterbant. At first, they were simply dated to the Neolithic (Modderman 1955, 30); later they were incorporated into the newly defined Vlaardingen Group (Pons/Van Regteren Altena in Van Regteren Altena *et al*. 1962/1963, 19-20). On the basis of their depth and geological position, Louwe Kooijmans concluded that these finds must predate the Vlaardingen Group and related them to the Swifterbant Culture. The finds originate from a peat layer with its top at about -6.50 m NAP. Above this layer was a Calais IV clay cover (1974, 19, 164, 343).
Finds. The point-based fragment is tempered with organic material and has a smoothed surface (fig. 3.34). It is accompanied by an antler object.
Dating. Combining the depth of the peat layer and the curves for the relative sea-level rise, Louwe Kooijmans (1974, 164) concludes that the *terminus ante quem* for the top of the peat layer -and hence the finds- is about 3800 BC (5000 BP).

3.6.12 WINTERSWIJK

Location and research history. During earth-moving activities, finds from various periods were collected. The site is located on a sand ridge that formed the only high ground in a wetland environment. Based on Schut 1984, 214-215.
Finds. Only one sherd of Neolithic origin was recognised. This rim sherd is tempered with organic material and quartz grit. In shape and appearance, it is not only quite similar to sherds from the Hazendonk 1 and 2 levels, but also to sherds from the Swifterbant cluster. This rim sherd could therefore be the remainder of a Swifterbant-style pot. Another clue to its age and cultural affinities is found in the impressions of two fragments of cereals. One impression is of a rachis internode of emmer wheat, the other of a grain of barley. Both types of cereal are common finds in Swifterbant contexts (see table 3.49).
Dating. On the basis of the similarity of the sherd to the Swifterbant and Hazendonk 1 and 2 finds, a date between 4240-3700 BC (5350-4950 BP) is proposed.

3.6.13 MEPPEL-DE GASTE

At least two sites on river dunes produced Mesolithic and Neolithic flint tools The associated pottery is tempered with granite grit. Fingertip impressions on the top of the rim are the only decorative element. Since flat, point or pointed bases are absent, this pottery probably had sagging or round bases (Van der Waals 1972, 167-168). According to Lanting and Mook, this pottery "bears some similarity to the pottery of Swifterbant" (1977, 57).

3.7 Adzes and axes

3.7.1 INTRODUCTION

A major find category in the study of the Neolithic are stone adzes and axes of both flint and other kinds of stone. Thanks to these artefacts' resistance to decay and their distinctly man-made appearance, quite a large number of adzes and axes are found in collections and publications. This relative abundance makes it possible to use this find category as supplementary evidence to the scarce settlement sites: distribution maps on which both settlement sites and contemporary types of adzes or axes are presented, show that human activity was more widespread than could be inferred from the settlement sites alone (see figs 3.35 and 3.36).
Two problems inhibit the use of adzes and axes for an interpretation of the occupation of the Neolithic landscape. First, the number of closed associations of adzes/axes and well-dated other archaeological remains is limited, which means that the period in which various types circulated is often uncertain.[22] This makes it difficult to correlate settlement sites of a specific period with particular types of adze or axe. To resolve this problem, a number of Neolithic burials were studied in order to collect a set of closed associations.
The second problem also arises from this lack of association. Because adzes and axes are rarely found associated with other material remains, the context in which they functioned is poorly understood: were they primarily tools or should one stress the potential symbolic connotations? We can safely say that no clear-cut answer is possible. Some specimens were clearly used as tools: they are broken or bear scars or other use marks. The remains of these definitely-used items are sometimes found in settlement sites (S3, Brandwijk L50 base, L50 top and L60, Hazendonk 2, Schokkerhaven and Bergschenhoek). Other adzes/axes do not show such use wear, while the length of some perforated wedges suggests that these were not used as tools but instead had a ceremonial function. Apparently, this category of artefacts functioned in a variety of contexts. Their symbolic meaning may well be a mirror of their functional importance in man's appropriation of the natural environment. In other words, the important role of these artefacts in the opening up of the forest and the creation of arable fields predetermined the role of adzes and axes in ceremonial contexts.

	LBK	Hi	GG	Rö	MK	VSW	TRB
High adze	9	13	4	2	–	–	–
Middle-high adze	12	5	–	–	–	–	–
Low adze	15	10	3	4	1	–	–
Perforated wedge	–	4	4	6	–	–	–
High perforated adze	–	–	–	2	–	–	–
Stone axe with oval or round cross-section	–	–	–	1	11	–	6
Flint axe with oval cross-section	–	–	–	–	3	27	8
Stone axe with rectangular cross-section	–	–	–	–	1	1	9

Table 3.45. The correlation between adze and axe types and archaeological periods based on a sample of grave finds. LBK = Linear Bandkeramik Culture, Hi = Hinkelstein Group, GG = Grossgartach Group, Rö = Rössen culture; MK = Michelsberg Culture; VSW = Vlaardingen-Stein-Wartberg complex and TRB = Funnel Beaker Culture (West Group).

3.7.2 THE AGE OF VARIOUS TYPES OF ADZES AND AXES

Grave goods from various burial sites were studied in order to date stray finds of adzes and axes. In this way, closed association between adzes/axes and other archaeological remains could be established for the Bandkeramik period[23], the subsequent Hinkelstein[24] and Grossgartach[25] phases, the Rössen period[26] and the Funnel Beaker period.[27] For the Michelsberg period, no multiple burial sites are known.
To characterise the adzes and axes used during this period, it was necessary to use finds from various settlement sites.[28] For the Vlaardingen-Stein-Wartberg complex (section 4.5.2.1), finds from settlement sites[29] had to supplement the single flint axe from the Stein burial vault (Modderman 1964).
The stone and flint adzes and axes from these sites were described using the terminology of Brandt (1967). This was done for a practical reason: his terminology is in part used by many other authors, enabling a swift comparison of the various studies (cf. Hoof 1970; Van der Waals 1972; Schut 1987; 1991). Table 3.45 summarises the collected data.
The following observations were made:

1) Middle-high adzes are confined to the Bandkeramik period and the Hinkelstein phase (5300-4900 BC). This artefact category may thus be used to securely date human presence beyond the loess during Bandkeramik times;
2) Perforated wedges appear in the Hinkelstein and Grossgartach phases and the Rössen period. Since the Hinkelstein and Grossgartach phases are not found in the Netherlands, it is proposed that the perforated wedges from the Netherlands date from the period of the Rössen Culture (4900-4400 BC);
3) The perforated high adzes are only found in the Rössen period (4900-4400 BC);
4) Less clear-cut is the significance of stone axes with round or oval cross-sections. These are found in Rössen, Michelsberg and Funnel Beaker contexts, but appear to be 1) of limited importance during the period of the Rössen Culture, 2) more common but not predominant during the period of the Funnel Beaker Culture and 3) the principal type of axe during the period of the Michelsberg Culture. On the basis of these observations, I propose to regard the stone axes with oval cross-sections as indicative for the period of the Michelsberg Culture (4400-3500 BC). The increased importance of stone axes as against flint axes during this period was already noted by Willms (1982, 33).
5) All other categories of adzes and axes were used for considerably longer periods and are therefore less suited to provide a backdrop to the sites of the Swifterbant Culture.

3.7.3 THE SPATIAL DISTRIBUTION OF MIDDLE-HIGH ADZES AND PERFORATED WEDGES IN THE WESTERN PART OF THE NORTH EUROPEAN PLAIN

The scatter of adze finds from northwestern Europe is heavily influenced by site formation processes. Nearly all finds are recovered from the Pleistocene area where Neolithic material may be collected as surface finds. In those areas where the Neolithic landscape has largely been covered by later deposits, large numbers of adzes may still lie undetected. Of course, this formation of the archaeological record has to be taken into account in interpreting the scatter of adzes in terms of human behaviour.
The interaction zone between the LBK people and their Mesolithic neighbours seems to correspond with the distribution of the middle-high adzes beyond the loess zone (fig. 3.35). This zone extends some 70 km from the loess and has also yielded other remains from the Bandkeramik Culture, such as projectile points and pottery. It is this same area in which La Hoguette and Limburg pottery is found (Van der Graaf 1987; see sections 4.2.3 and 4.2.4).
During the period of the Rössen Culture, this interaction zone encompassed a much larger area (fig. 3.35). The two categories of adzes used by Van der Waals (1972) to outline

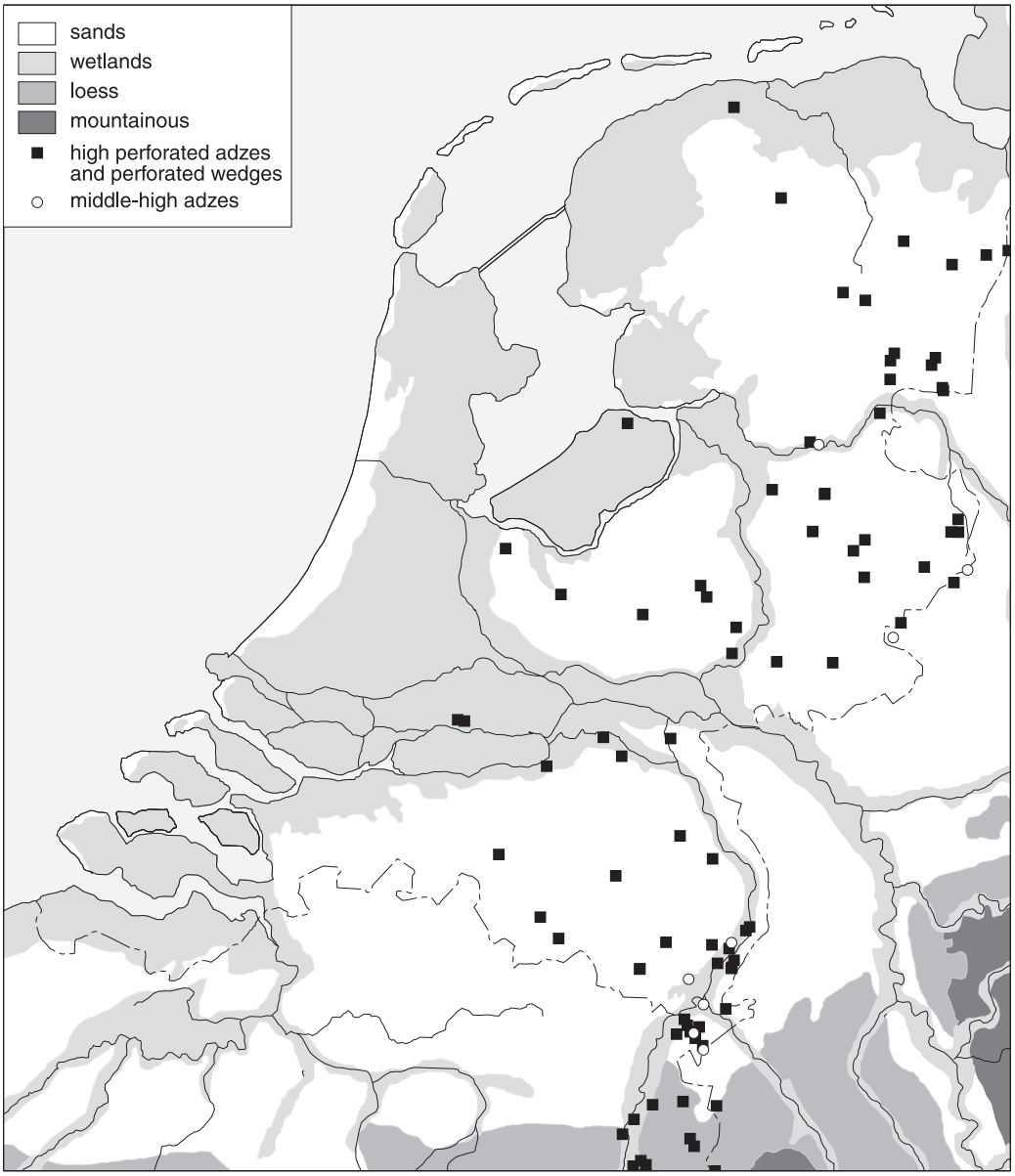


Fig. 3.35. A geomorphological map of the western part of the North European Plain. Indicated are finds of middle-high adzes (■) and high perforated adzes and perforated wedges (❍) in the Netherlands. Drawing P. de Jong.

the beginning of the Neolithic in the Netherlands and Belgium beyond the loess, perforated wedges and high perforated adzes, may both be used as guide artefacts to this period between 4900-4400 BC. The extent of their distribution shows that human activity in the Pleistocene areas of the Netherlands and Lower Saxony during this period was perhaps more widespread and intensive than is often thought (contra Fokkens 1998, 95). It also shows that the interaction between the people of the Rössen and Swifterbant Cultures was widespread and spanned the entire area of the Swifterbant Culture (and indeed far beyond, see section 5.2.3). In this case, the near-absence of finds from the wetland areas should probably be interpreted as a result of the formation process described above. As the scatter of perforated wedges and adzes clearly encompasses the entire Pleistocene area, without exclusions, the bordering wetlands were probably

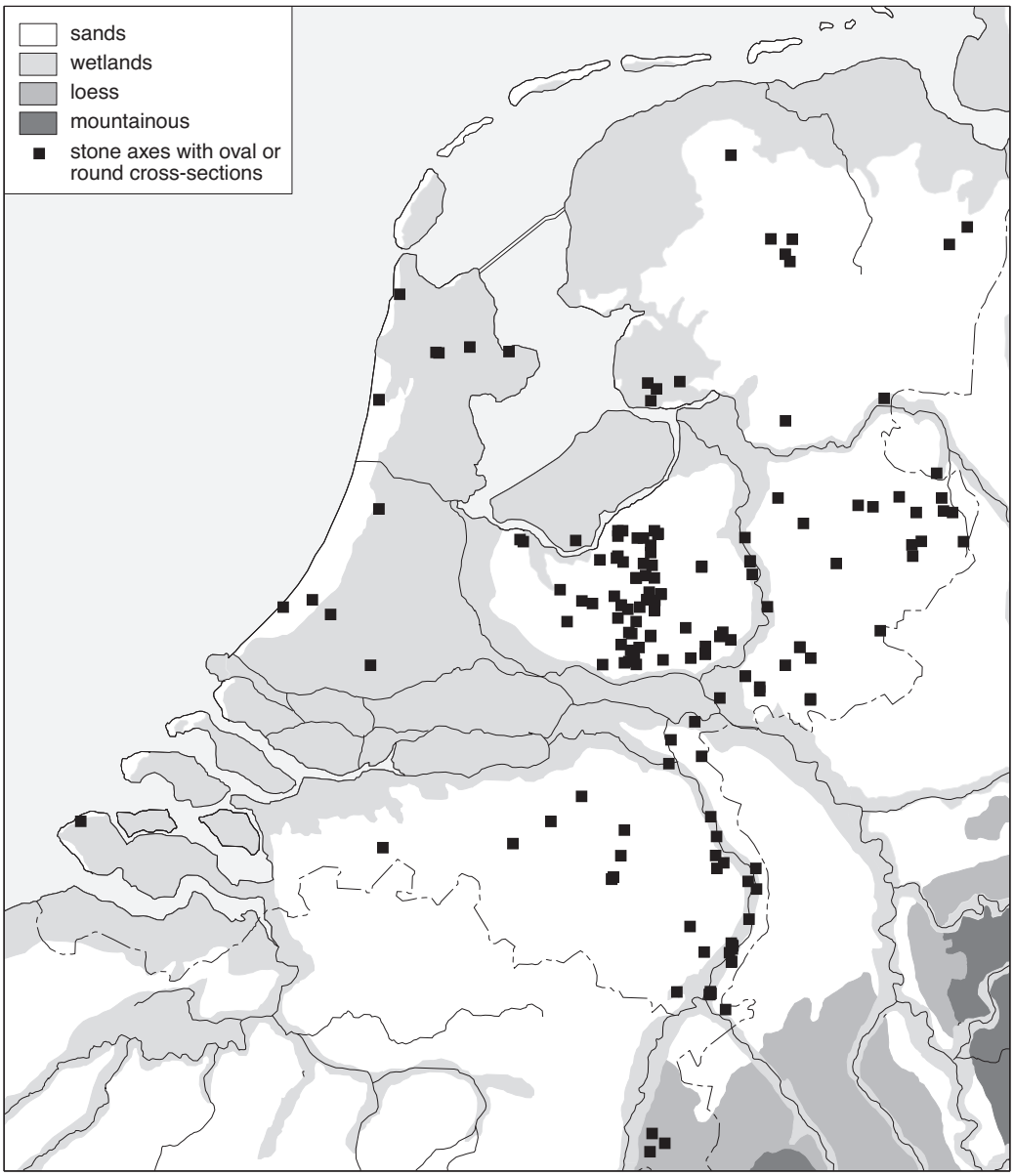


Fig. 3.36. A geomorphological map of the western part of the North European Plain. Indicated are finds of stone axes with oval or round cross-sections in the Netherlands. Drawing P. de Jong.

also included in this interaction zone. In this respect, the fragment of a perforated wedge from the Swifterbant site cluster is insightful (appendix 4: Fl. 1). The stone axes with oval cross-section which represent the subsequent Michelsberg period may of course be interpreted in a similar way (fig. 3.36).

If the archaeological remains are divided into stray finds of adzes or axes and settlement debris, the former category is mainly found in the Pleistocene areas, where finds from the latter category are almost absent. For the Holocene areas, the situation is reversed. While the near-absence of adzes and axes in the Holocene area is generally interpreted as a result of formation processes (Van der Waals 1972, 160), the lack of settlement sites in the Pleistocene area is often interpreted in terms of human behaviour: the absence of finds is considered indicative of the unattractiveness of these areas (for

example, Fokkens 1998, 97). I would like to interpret the absence of settlement sites in the Pleistocene areas in a different way and underline the important role of site formation processes in this matter. First of all, the presence of adzes and axes indicates that people did carry out activities all over these areas (Schut 1987, 89). The large number of these finds suggests that these activities were at least repetitive and perhaps quite intensive. Moreover, if settlement had occurred, the acid soils of the Pleistocene sand would have reduced the archaeological remains to a scatter of flint artefacts, which rarely allows a detailed dating because of the generally poor chronological resolution of flint typology (see section 3.8.2.1). A final argument in favour of the important role of formation processes is provided by the few remains of Neolithic settlement sites that have been discovered: these were protected within features (two sites at Toterfout-Halve Mijl: Glasbergen 1954 and Van Beek 1977). On the basis of these three arguments, I am inclined to conclude that the near-absence of settlement sites in the Pleistocene areas may well be the result of formation processes.

3.8 The Swifterbant Culture: a synthesis

3.8.1 INTRODUCTION

In the sections above, the various sites of the Swifterbant Culture were presented, to be followed by a general description of the Swifterbant Culture here. In this section, the artefactual evidence is presented first. When the (spatial-chronological) patterning of the material culture is understood, an interpretation of these patterns in terms of human behaviour comes within reach (section 3.8.2). Apart from the material culture, the subsistence activities represented at various Swifterbant sites are an important stepping-stone towards a fuller understanding of not only the subsistence of these people (section 3.8.3), but also their mobility strategies and social relations. A detailed analysis of the subsistence strategies will be combined with examples from the anthropological literature on the mobility strategies of people who combine farming with hunting and gathering (section 3.8.4). After this outline of the material culture and subsistence data, an interpretation of the intersite variability is presented in section 3.8.5. This chapter is concluded with a structuralist analysis of the Swifterbant Culture (section 3.8.6).

3.8.2 THE POTTERY AND FLINT ARTEFACTS OF THE SWIFTERBANT CULTURE

3.8.2.1 Introduction

Before presenting the pottery and flint artefacts of the Swifterbant Culture, it is necessary to examine the restrictions and possibilities of a spatial-chronological subdivision. First of all, the subdivision of a set of material culture into chronological subsets allows a grip on developments. Did developments in, for example, material culture and subsistence base occur simultaneously or otherwise? When this subdivision is correlated to a geographical subdivision of the same set of material culture, it is possible to bring even more detail into the study of developments. It might then be possible to determine whether developments occurred synchronously over a large area, or whether developments started earlier in one area, while in another area they lagged behind. One of the pragmatic goals of a spatial-chronological subdivision of material culture is that it allows more precise dating of smaller assemblages which lack evidence other than pottery. This implies that the presence or absence of rarities (specific decorative elements, imported pottery types) should not be a prominent element in the characterisation of the spatial-chronological units. Rather, the widespread, general characteristics that are observable in small assemblages as well should be the decisive traits, such as morphology, tempering agents, percentage or location of rim decoration and body decoration.

Traditionally, the spatial and chronological subdivision of the Neolithic is based on pottery characteristics, as this find category is often available in large quantities and shows marked differences from region to region and through time. A subdivision based on characteristics of flint tool types would produce a less-detailed image of this period, since types of flint tools were generally longer-lived and distributed over larger areas than pottery types. While such a flint-based subdivision would be less suited for distinguishing of small spatial-chronological units of material culture, it is more useful when long-term developments over large areas are considered. One could say that a pottery-based phasing sheds light on changes, while a phasing based on the accompanying flint artefacts reveals the absence of change in other domains of the material world. A combination of these two resolutions allows a meaningful insight into the role material culture played in society. This realisation of the significance of the coarse-grained image based on flint tool types is opposed to a traditional view, in which a set of flint tool types is tacked onto a spatial-chronological unit based on pottery characteristics (see for example Fiedler 1979, fig. 34-36, Wansleeben 1989, 15, fig. 3-4; section 3.5.4 of this study). In these studies, the longevity of flint tool types is seen as a hindrance to be overcome, rather than as a significant piece of evidence to be incorporated into the analysis of the past. Nonetheless, Wansleeben realises that “in this way, most of the individual artefact types [...] were used to date the artefacts more precisely than is, in fact, possible” (1989, 15).

The ^{14}C dates of the various assemblages are the limiting factor in a spatial-chronological subdivision of the Swifterbant pottery. The calibration of the ^{14}C dates relating to these assemblages results in 2σ ranges of several hundred years. When all 2σ ranges of the Swifterbant sites are plotted in one diagram, the large chronological overlap between most

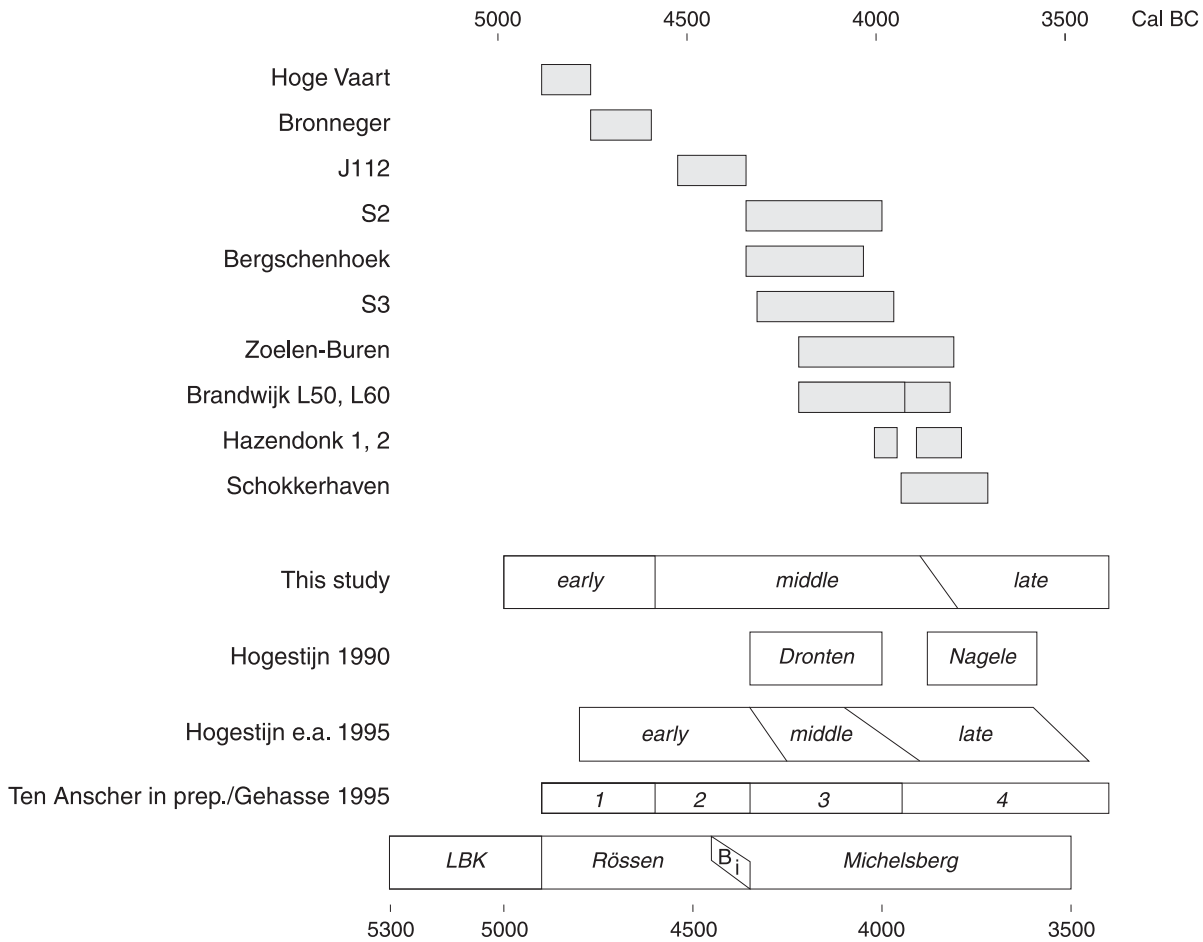


Fig. 3.37. 2σ date ranges of sites of the Swifterbant Culture and the phasing proposed in this study compared with three other temporal subdivisions of the Swifterbant Culture and the Central European cultural sequence. Drawing P. de Jong.

of these ranges becomes apparent (fig. 3.37). A result of these long and overlapping ranges is that, for example, the habitation of S2 could be 400 years earlier than the Hazendonk 1 occupation, but the two could also be contemporary. A reduction of these long periods by means of reducing the statistical certainty from 2σ (95%) to 1σ (67%) would only partly resolve this problem. First of all, the date ranges for the occupation of Hazendonk and Brandwijk have already been reduced through reference to the river gradient (Verbruggen in prep.). This relation to the river gradient results in an interconnection of the dates pertaining to these sites' occupation phases with a large series of other dates. The use of 1σ ranges would be problematic in view of these connections: it would become impossible to reconstruct the river gradients, because on statistical grounds one of every three dates has to fall outside the 1σ range (pers. comm. M. Verbruggen 1996). A second problem inherent in the use of 1σ ranges is that the end of the date ranges for a number of sites of the Swifterbant cluster is not based on a single ^{14}C date but instead on a correlation between the occupation and the geomorphology (section 3.2.1). If the contemporaneity of S2 and Hazendonk is reconsidered on the basis of 1σ ranges, the range pertaining to Hazendonk remains, while the reduction in the S2 ranges would still allow both an affirmative and a negative answer. In other words, the replacement of 2σ ranges by 1σ ranges would only slightly enhance the chronological resolution. At the same time, the uncertainty pertaining to the dates would be increased.

3.8.2.2 A general description

The morphology of Swifterbant pottery may be characterised as S-shaped with sometimes a more pronounced transition at

the point of the maximum circumference or at the neck/shoulder. Bases are pointed, point, round, sagging or flat. Tempering agents are varied. The pottery is tempered with organic material, grit (mostly quartz) or grog, often in combination. The pottery is built out of coils, which are most often joined with H-joins, while N-joins and Z-joins are often found as well. Rim decoration is an important characteristic of the Swifterbant pottery. It is both common and varied. The variation is seen in the location of the decoration (inside, top, outside, combination) and the instruments used (spatulas, hollow spatulas, fingertips/nails and thumbs). Body decoration is prominent in a number of assemblages, while it is absent in others. Two types of body decoration are distinguished. The first consists of one or two rows of spatula impressions or vertical grooves on the shoulder. The second type are fingertip impressions which cover the total body surface from the base to the neck-shoulder transition (table 3.46).
The flint industry of the Swifterbant Culture is typified by the combined use of flint types acquired over short and long distances, the production of artefacts by both blade and flake technology and tool spectra comprising points, scrapers and retouched blades and flakes. Point types are varied and include trapezes, transverse arrowheads, drop-shaped points and leaf-shaped points. Fragments of polished flint axes from a number of sites indicate the use of these tools (table 3.47).

3.8.2.3 A detailed analysis

If we consider the pottery from the A-category Swifterbant sites (which produced a large number of sherds and flint artefacts and are reliably dated thanks to ^{14}C), the above-mentioned general description of the pottery can be further differentiated. The pottery from these sites allows the distinction of three phases within the Swifterbant Culture, even though both the Early Phase and Late Phase are represented by a minimal number of sites.

Early Phase (4900-4600 BC)

The largest assemblage of the Early Phase is from Hoge Vaart (section 3.6.3), while Polderweg (section 3.6.2), Ede-Rietkamp (section 3.6.8) and Bronneger (section 3.6.9) also represent this phase. Less secure is the dating of the finds from Meppel-De Gaste (section 3.6.13). Parts from the assemblages of Hüde (section 3.5) and P14 (section 3.6.10) may also be placed in this Early Phase, on the basis of ^{14}C dates. The beginning of the Early Phase is dated by the earliest ^{14}C dates relating to the pottery finds from Hoge Vaart, while the end of the Early Phase (and thus the beginning of the Middle Phase) is marked by the gap in ^{14}C dates between Bronneger on the one hand and J112 (section 3.6.7) on the other hand.
In morphological terms, the pottery from this phase consists of S-shaped pots without pronounced transitions. Base forms include pointed and sagging bases. All pottery is tempered with grit, while a small number of sherds from Polderweg and Hoge Vaart are also tempered with organic material. Coil-building was predominantly done with H-joins, but N-joins also occur at Polderweg. Rim decoration is only found on the top of the rim and consists of spatula impressions and *Randkerbung*. Body decoration is found only at Polderweg. A final feature is the presence of knobs.
The only published flint assemblage of the Early Phase is that from Hoge Vaart. It consists of flint artefacts of varied raw material types and is worked predominantly in blade technology. In the tool spectrum, points (trapezes), scrapers and retouched blades are important. No (fragments of) polished flint axes were found at Hoge Vaart.

Middle Phase (4600-3900/3800 BC)

A large number of assemblages are known from the Middle Phase. These include the various sites on the Swifterbant levees (S2, S3, S4; section 3.2), various assemblages from Brandwijk (section 3.3) and the Hazendonk 1 and 2 assemblages (section 3.4). The smaller assemblages from Bergschenhoek (3.6.5), Zoelen-Buren (3.6.6) and J112 (3.6.7) can also be dated to this phase. The dating of the sherds from Schiedam (section 3.6.11) and Winterswijk (3.6.12) is less certain. More material from the Middle Phase is found at Hüde (3.5) and P14 (3.6.10). The start of the Middle Phase is based on the ^{14}C date from J112. The end of this phase is more difficult to determine. On the basis of the characteristics of its archaeological remains, Schokkerhaven (section 3.6.4) is placed in the Late Phase of the Swifterbant Culture, while it is ^{14}C-dated to almost the same time range as Brandwijk L60 and Hazendonk 2. The end of the Middle Phase can be put between 3900 and 3800 BC, incorporating Brandwijk L60 and Hazendonk 2 into the Middle Phase, while at the same time excluding Schokkerhaven.
The pottery is S-shaped, while a small proportion shows a pronounced neck-shoulder transition or a pronounced transition at the point of maximum circumference; morphological traits that are absent in the Early Phase. Base forms include pointed, point, sagging and round bases. Organic material is the most important tempering agent (as against grit temper in the Early Phase), while grit and grog are also often found. Coil-building was predominantly done by means of H-joins, but N-joins and Z-joins are also present. Rim decoration is more widespread and varied than in the Early Phase. It is executed by impressing spatulas, hollow spatulas, fingertips/nails or thumbs or by drawing grooves and is found on the inside, top, outside or more than one of these locations. Body decoration is either made with fingertip/nail impressions and covers the body surface or it consists of one or

	Hoge Vaart	Bronneger	Polderweg	S2	S3	S4	Bergschenhoek	Brandwijk			Hazendonk		Schokkerhaven
								L50 base	L50 top	L60	1	2	
Tempering agents:													
Organic material	+	–	9	74	92	89	100	94	82	95	82	94	+
Grit	++	+	56	53	33	80	–	64	86	91	50	82	++
Grog	–	–	12	–	+	–	–	1	1	1	25	21	–
Average wall thickness	8	?	10.0	9.1	10.3	9.7	?	10.5	10.4	10.7	8.5	9.2	?
Types of join:													
H-joins	100	100	78	79	82	?	++	86	82	92	45	74	?
N/Z-joins	–	–	22	21	18	?	+	14	18	8	55	26	?
Rim decoration %	+	+	44	34	58	30	+	8	17	7	36	–	+
Rim decoration technique													
Spatula	100	100	100	73	91	56	100	80	86	100	100	–	100
Hollow spatula	–	–	–	13	–	–	–	20	–	–	–	–	–
Fingertips/nails	–	–	–	13	9	44	–	–	–	–	–	–	–
Thumb	–	–	–	–	–	–	–	–	14	–	–	–	–
Rim decoration location:													
Inside	–	–	–	80	60	14	–	60	–	–	–	–	–
Top	100	100	100	7	7	57	100	–	14	100	89	–	–
Outside	–	–	–	13	28	14	–	40	71	–	–	–	100
Inside and top	–	–	–	–	2	–	–	–	–	–	–	–	–
Inside and outside	–	–	–	+	2	7	–	–	14	–	–	–	–
Top and outside	–	–	–	+	+	7	–	–	–	–	11	–	–
3 locations	–	–	–	+	–	–	–	–	–	–	–	–	–
Body decoration %	–	–	6	1.5	8	2	–	18	20	14	12	5	+
Body decoration technique:													
spatula	–	–	100	84	85	100	–	14	25	38	14	17	100
hollow spatula	–	–	–	16	–	–	–	7	2	–	71	–	–
grooves	–	–	–	–	2	–	–	–	–	–	–	–	–
fingertips/nails	–	–	–	+	12	–	–	78	73	52	14	83	–
Body decoration location:													
shoulder	–	–	?	89	75	?	–	+	+	+	14	–	100
total body surface	–	–	?	11	25	?	–	++	++	++	86	100	–
	Early Phase			Middle Phase Northern Group			Middle Phase Southern Group						Late Phase

Table 3.46. The pottery characteristics of the major Swifterbant sites. '+' = present; '++' = dominant. All figures are percentages (apart from average wall thickness).

	Hoge Vaart	S2	S3	Brandwijk L50 base	Brandwijk L50 top	Brandwijk L60	Hazendonk 1	Hazendonk 2
Number of flint artefacts	?	188	438	80	29	53	15	15
Raw material:								
Local	+	100	95	40	12	17	100	60
Imported	+	–	5	60	87	83	–	40
Polished flint axes	–	–	+	+	+	+	–	+
Basic morphology								
Blades	?	40	13	14	17	13	37	27
Flakes	?	22	29	50	34	43	25	40
Cores	?	+	0	4	–	–	–	–
Blocks	?	21	39	20	34	34	25	20
Chips	?	15	12	7	7	7	6	7
Potlids	?	2	1	1	3	–	–	–
Boulders	?	–	2	–	–	–	–	7
Indet.	?	0	4	4	3	2	6	–
Blade technology	++	63	31	21	33	23	60	40
Flake technology		37	69	79	67	77	40	60
Number of tools	?	29	24	16	14	2	7	0
Percentages of tool categories:								
Points	30	4	7	23	25	100	–	–
Pointed blades	–	–	–	8	–	–	–	–
Borers	+	9	2	8	–	–	–	–
Burins	+	–	–	–	–	–	–	–
Combination tools		2	–	–	–	–	–	–
Scrapers	30	18	37	15	50	–	100	–
Retouched blades	30	49	19	8	25	–	–	–
Retouched flakes	+	16	21	38	–	–	–	–
Other tools	+	2	13	–	–	–	–	–
Point types								
Trapezes	100	100	100	–	–	–	–	–
Transverse arrowheads	–	–	+	–	–	–	–	–
Drop-shaped points	–	–	–	67	–	100	–	–
Leaf-shaped points	–	–	–	33	100	–	–	–
	Early Phase	Middle Phase Northern Group		Middle Phase Southern Group				

Table 3.47. The characteristics of the flint artefacts of the major Swifterbant sites in percentages. '+' = present; '++' = dominant; '0' = less than 0.5%; '–' = absent.

two series of spatula impressions or grooves on the shoulder. At some sites, alongside this kind of pottery, other sherds are strongly reminiscent of pottery of the Michelsberg Culture. This element includes types of decoration (*Lochbückel*, *Tupfenleist*) and pottery forms (tulip beakers). Lugs and knobs are absent.
The characteristics of the flint artefacts found at the various sites of the Middle Phase indicate that, as in the Early Phase, flint material acquired over both short and long distances was used. While in the Hoge Vaart assemblage blade technology predominated, flake technology also was commonly used in the assemblages from the Middle Phase. The few assemblages with large numbers of tools show that scrapers are the largest tool category; retouched blades and flakes are also widespread. Apart from trapezes (which were the only type of point in the Hoge Vaart assemblage), transverse arrowheads, drop-shaped points and leaf-shaped points occur as well. Most of the sites of the Middle Phase produced some fragments of polished flint axes.

A further subdivision
Thanks to the large number of assemblages from the Middle Phase, a geographical subdivision of this material is possible as well. It is of course no surprise that this subdivision echoes the twenty-year-old debate on the similarities and dissimilarities between the pottery from the Swifterbant levee sites and Hazendonk 1 (compare Ten Anscher in prep.; Hogestijn *et al*. 1995, 84; Louwe Kooijmans 1976a, 259; De Roever 1979, 25). Here, the differences between the two assemblages are embedded *within* the variability of the pottery characteristics of the Swifterbant Culture: the differences are differences of degree and not differences of kind (cf. De Roever 1979, 25). The similarities are found in the pottery morphology and technology (coil-building with H-joins), while the differences are restricted to the relative importance of the various decoration instruments and locations of rim and body decoration. For a comparably detailed analysis of the flint assemblages, it is a serious hindrance that many sites yielded only a limited number of flint artefacts. Thus, the only difference in flint characteristics between the two Groups proposed below is found in the point types and the proportion of flint that was acquired over a long distance.
It has to be stressed that although the Middle Phase covers some 700-800 years, most sites date from between 4300 and 3800 BC. It might be argued that the differences between the southern and northern Groups discussed below are of a chronological rather than a geographical nature because the difference in age between S2 and S3 on the one hand and Hazendonk 1 and 2 on the other. This explanation for the observed differences between the two groups of sites is dismissed on the basis of the Brandwijk assemblages: L50 base is contemporary with S2 and S3 and displays the distinct characteristics of the southern Group, also found in the later assemblages Brandwijk L60, Hazendonk 1 and Hazendonk 2. In other words, the differences observed between the southern and northern Groups of the Middle Phase are structural and of a geographical nature.
The as yet sparse information on the Early Phase of the Swifterbant Culture suggests that the proposed subdivision of the Middle Phase into a southern and a northern Group is a further articulation of differences already in evidence between the pottery from Polderweg and Hoge Vaart: the Polderweg pottery prefigures the later assemblages in this area (Brandwijk and Hazendonk) in its use of body-surface decoration and grog temper, while the Hoge Vaart pottery is more similar to that from the Swifterbant levees (table 3.46).

The Southern Group
The southern Group is embodied by the pottery from Brandwijk and the Hazendonk 1 and 2 layers. Because of their geographical proximity, Bergschenhoek and Zoelen should probably be included in this group as well.
Differences from the pottery of the northern Group are found in the importance of grog as a tempering agent (up to 25% for Hazendonk 1) and the proportions of the various kinds of decoration. Rim decoration is less frequent than in the northern Group and consists almost exclusively of spatula impressions. It is most frequently found on the top and outside, while decoration on the inside and decoration in more than one location is rare. Body decoration is more widespread here than in the northern Group. At most sites, fingertip/nail impressions covering the body surface predominate, a type of body decoration almost absent in the north. Spatula and hollow spatula impressions occur as well.
The few recovered points do not include trapezes but are drop-shaped and leaf-shaped points, which are also found in the contemporary Michelsberg Culture (section 4.4.2). Long-distance flint is more prominent in the southern Group than in the northern Group.

The Northern Group
The Swifterbant levee sites produced the major assemblages of the northern Group, which also encompasses P14, J112 and Hüde.
The characteristics that set apart the pottery from the northern Group from that of the southern Group include the near-absence of grog as a tempering agent, while rim decoration is more frequent and more varied. It was put on the inside, the top, the outside or on combinations of these locations. Decorative techniques include impressions of spatulas, hollow spatulas and fingertips/nails. The percentage of body-decorated sherds is lower than in the southern Group. Body decoration is mostly restricted to one or two series of spatula

impressions on the shoulder, while overall fingertip impressions are rare.
While in the southern Group only drop-shaped points and leaf-shaped points are found, the northern Group predominantly yielded trapezes and transverse arrowheads. This strict division of the Middle Phase into two geographical groups on the basis of their point types is partly a construct: the flint assemblage of P14 does include a number of leaf-shaped points. Nevertheless, the preference for different types of point in the southern and northern Groups is probably real, since trapezes outnumber the other types of points at P14 (section 3.6.10) and Hüde (table 3.45). Flint material acquired over a long distance is nearly absent.

Late Phase (3900/3800-3400 BC)
The single site attributed to the Late Phase is Schokkerhaven (section 3.6.4). In the Middle Phase, two geographical units were distinguished (a southern and a northern Group), and in the Late Phase the differences between these northern and southern regions increased even further. In the northern area, the Swifterbant tradition continued and a Late Phase of the Swifterbant Culture developed, while in the southern area a new cultural group evolved, bringing together characteristics of the Swifterbant and Michelsberg Cultures: the Hazendonk 3 Group. The end of the Late Phase of the Swifterbant Culture is thought to postdate the youngest possible date of the Schokkerhaven occupation. Indeed, it is set at the conventional advent of the Drouwen phase of the Funnel Beaker Culture (4700-4600 BP, Lanting/Mook 1977, 79).
The typical S-shape of the Swifterbant pottery is still present in this phase. A new feature is the funnel-shaped rim. The pottery is mostly tempered with grit, while organic material is used as tempering agent as well. The predominantly organic temper in the pottery of the Middle Phase is thus replaced by grit. Rim decoration is not as varied as in the Middle Phase: it is only applied on the outside by means of a single series of spatula or fingertip/nail impressions. The same instruments are used for the rare body decoration. The flint industry consists of trapezes, polished flint axes with oval cross-sections, scrapers and borers. Flake technology predominates. Parallels to the flint industry of the Middle Phase are to be found in the presence of trapezes and polished flint axes with oval cross-section, while flake technology is more common than it was in the Middle Phase.

A comparison with other geographical-chronological subdivisions
The subdivision presented above is not the first attempt to bring order into more than a thousand years of Neolithic occupation in large parts of the Netherlands and Lower Saxony. The Schokkerhaven excavation led Hogestijn to the presentation of a bipartition of the Swifterbant Culture in a *Dronten phase* and a *Nagele phase* (fig. 3.37). Both phases were named after the municipalities in which the type-sites are located: the Swifterbant levee sites and Schokkerhaven, respectively. The dating of the phases was based on the ^{14}C dates relating to the occupation of these sites, which left a gap of 200 ^{14}C years between the two phases (Hogestijn 1990). Hogestijn's Dronten phase corresponds with the Middle Phase presented above, while his Nagele phase is identical to the Late Phase. After the discovery of Hoge Vaart (section 3.6.3), this bipartition of the Swifterbant Culture was extended to encompass an earlier phase (Hogestijn *et al*. 1995, 85-87). The three phases were simply named *early*, *middle* and *late* Swifterbant (fig. 3.37). His *early* phase begins one hundred years after the start proposed here: at the time no ^{14}C dates were available for Hoge Vaart and the dating of its earliest occupation was therefore uncertain. The end of his *early* phase (and hence the beginning of his *middle* phase) is some 150/250 years later than the one proposed above. An explanation of this difference in dating is difficult to give, as Hogestijn distinguishes these two phases by the same criterion as was used in this study: the replacement of grit temper as the predominant tempering agent by organic material. The late date presented by Hogestijn results in the incorporation of J112 in the *early* phase, while its pottery is mainly tempered with organic material, a characteristic of the Middle Phase. Since it is preferable to put this assemblage in the Middle Phase, ending the Early Phase around 4600 BC seems more logical.
In terms of dating, the *late* phase as defined by Hogestijn corresponds with the Late Phase as presented above.
An alternative chronological subdivision of the Swifterbant Culture is proposed by Ten Anscher (fig. 3.37) (in prep.; Gehasse 1995, 44). His phases are based on similarities in pottery characteristics between the assemblage of P14 (section 3.6.10) and the chronological sequence in the German Rhineland. A large number of ^{14}C-dated sherds from P14 trench WP89-17 underlined these similarities (Ten Anscher in prep.). Features typical of the Rössen, Bischheim and Michelsberg pottery are also present in Swifterbant assemblages, which allows a subdivision of the Swifterbant Culture parallel to the stylistic evolution of pottery in the Rhineland. This phasing bears remarkable similarities to the one presented here: the Early Phase corresponds to Ten Anscher's phase 1, the Middle Phase encompasses his phases 2 and 3 and the Late Phase equals phase 4. This suggests that the phasing proposed here (based on internal characteristics) may operate alongside Ten Anscher's phasing, which is based on a combination of external and internal arguments.

3.8.3 SUBSISTENCE
A consideration of the subsistence strategies of the people of the Swifterbant Culture has to start with the question of

	Emmer	Emmer/ Einkorn	Einkorn	Bread wheat	Naked barley
S3	+	–	–	+	+
Brandwijk L50	+	–	–	–	+
Brandwijk L60	–	+	–	–	+
Hazendonk 1	+	–	–	–	+
Hazendonk 2	+	–	–	–	–
Schokkerhaven	+	–	–	–	+
P14 - layers ABC	+	–	–	–	+
Hüde I	–	–	+	–	+

Table 3.48. The cereal remains from various sites of the Swifterbant Culture.

representativity. As the economic data are restricted to wetland sites, one can only guess about the nature of sites located in areas that lack their excellent conservation conditions. One might argue that these areas were scarcely inhabited during the period of the Swifterbant Culture (Fokkens 1998, 95). However, the presence of dozens of perforated wedges in these parts reveals that although settlement locations are as yet unknown, occupation of the Pleistocene regions is a fact to be taken into account (see section 3.7.3 for a more extensive discussion). If one accepts the idea of contemporaneous occupation of the wetland areas and the neighbouring upland areas, the relations between these two regions in terms of subsistence strategies become of prime importance. I agree with Louwe Kooijmans, when he observes that the differences between the wetlands and uplands may be perceived to be of greater importance than they were to Neolithic man, who was not schooled in geology but did have an intimate knowledge of natural environment and its economic potential (1997, 19). The apparent contrast between uplands and wetlands is weakened when one realises that the uplands were dissected by many small streams and larger rivers, while the wetlands contained numerous drier elements: river and coastal dunes, boulder-clay outcrops, levees and alluvial ridges (Louwe Kooijmans 1997). Nonetheless, the upland areas were probably better suited for large-scale cereal cultivation because, apart from the extensive coastal dunes, the dry elements in the wetlands were too limited in size to allow substantial farming (Bakels 1986). The differences between wetlands and uplands in economic potential for Neolithic man result in three possible scenarios regarding the representativity of the wetland sites. These are discussed below.

The various sites of the Swifterbant Culture presented in this study reveal similarities not only in their material remains, but also in terms of the subsistence activities reflected in the archaeological record. In general, the subsistence base of the Swifterbant Culture may be described as combining domestic plants and animals with wild food resources. This may be interpreted as an extension of the Mesolithic broad-spectrum subsistence base, which led Louwe Kooijmans to describe it as an *extended broad-spectrum economy* (1993b, 103). Of the cereal types available to the people of the Swifterbant Culture, emmer wheat and naked barley were probably the most important, judging from the large proportion of sites that yielded remains of these grains (table 3.48). Meat sources were more varied and most frequently included cattle, pig, sheep/goat, red deer and roe deer. Otter and beaver remains were also often found in large numbers; these animals were probably killed both for their fur and their meat (table 3.49). The proportional importance of game is similar for most sites, which suggests that population density was low: over the centuries a higher population density would have reduced the game density to such an extent that the nutritional role of game would have become limited (pers. comm. Van Wijngaarden-Bakker 1997). A reduction of the mammal bone spectra to the three categories of 'wild', 'domestic' and 'pig' (following Gehasse 1995, 4-5 and her tables 9.3, 9.6, 9.8-9.10, 9.12), reveals that the wide variation in the sites' natural surroundings is not reflected in the mammal bone spectra (compare figs 3.38 and 4.5). This suggests that the combination of subsistence strategies found at the sites was to a large extent determined by cultural preferences rather than the specific possibilities of the natural environment. In this respect, it is significant that the bone spectrum from boulder-clay outcrop P14 has a similar percentage of domestic animals as the levee site S3, while the natural surroundings are quite contrasting. This suggests that the subsistence data from the wetland sites of the Swifterbant Culture may also be representative for unknown Swifterbant occupation of the Pleistocene areas.

This description of the subsistence base of the Swifterbant Culture makes it clear that farming, hunting and gathering were practised. This interpretation of the archaeological remains of the Swifterbant Culture is opposed to the general opinion in that hunting-gathering and farming are incompatible (cf. discussion in Sponsel 1989; Zvelebil/Rowley-Conwy

	Hoge Vaart	Brandwijk L30	S3	Brandwijk L50 base	Brandwijk L50 top	Brandwijk L60	Hazendonk 1 & 2	Schokker-haven	Hüde I	P14 Layers ABC
Number of identified mammal bones	?	5	4047	16	63	100	167	26	2066	1065
Domestic	**+**	**20**	**10**	**6**	**10**	**10**	**16**	**–**	**1**	**2**
Cattle (*Bos taurus*)	+	–	8	–	–	–	15	–	1	2
Dog (*Canis familiaris*)	–	–	1	–	3	–	–	–	0	0
Pig (*Sus domesticus*)	–	–	1	–	2	–	–	–	0	–
Sheep/goat (*Ovis/Capra*)	–	20	0	6	5	10	1	–	0	0
Domestic/Wild	**>90**	**20**	**56**	**31**	**32**	**21**	**10**	**38**	**27**	**40**
Cattle/aurochs (*Bos* sp.)	–	–	0	–	–	–	–	27	13	7
Horse (*Equus*)	–	–	–	–	–	–	–	–	8	–
Pig/wild boar (*Sus* sp.)	>90	20	55	31	32	21	10	11	6	31
Large cervid/bovid (Cervidae/Bovidae)	–	–	1	–	–	–	–	–	–	–
Small cervid/ovicaprid (Cervidae/Ovicapridae)	–	–	0	–	–	–	–	–	–	–
Wild	**+**	**60**	**29**	**61**	**59**	**69**	**74**	**61**	**69**	**57**
Aurochs (*Bos primigenus*)	–	–	0	–	6	1	–	–	16	0
Badger (*Meles meles*)	–	–	0	–	–	–	–	–	0	0
Beaver (*Castor fiber*)	–	–	13	12	9	16	36	11	10	36
Brown bear (*Ursus arctos*)	–	–	0	–	–	2	–	–	0	0
Cat (*Felis silvestris*)	–	20	0	–	–	1	–	–	0	0
Common seal (*Phoca vitulina*)	–	–	0	–	–	–	–	–	–	–
Elk (*Alces alces*)	–	–	0	–	–	–	–	4	6	1
Fox (*Vulpes vulpes*)	–	–	0	–	2	–	–	?	0	–
Horse (*Equus ferus caballus*)	–	–	0	–	–	–	–	4	–	–
Mole (*Talpa europaea*)	–	–	0	–	–	–	–	–	–	–
Otter (*Lutra lutra*)	–	20	15	19	24	22	30	–	0	1
Pine marten (*Martes martes*)	–	–	–	6	3	5	–	–	0	–
Polecat (*Putorius putorius*)	–	–	0	–	–	–	–	–	–	0
Red deer (*Cervus elaphus*)	–	20	3	12	8	8	6	42	20	19
Roe deer (*Capreolus capreolus*)	+	–	–	–	2	1	–	–	4	0
Root vole (*Microtus oeconomus*)	–	–	0	–	–	–	–	–	–	–
Water vole (*Arvicola terrestris*)	–	–	–	–	–	–	–	–	–	0
Wild boar (*Sus scrofa*)	–	–	1	–	–	1	–	–	13	–
Wolf (*Canis lupus*)	–	–	–	–	–	–	–	–	0	–
Deer (Cervidae sp.)	–	–	0	–	–	–	1	–	–	–
Pine/stone marten (*Martes martes/foina*)	–	–	–	–	–	–	–	–	–	0
Small carnivore (Carnivora sp.)	–	–	0	12	5	12	1	–	–	–
Small rodent (Rodentia sp.)	–	–	0	–	–	–	–	–	–	–
	Early Phase		Middle Phase					Late Phase	All phases	

Table 3.49. The mammal bone spectra of the major Swifterbant sites expressed in percentages. P14-layers ABC recalculated on the basis of table 3.44. '0' = less than 0.6%, '–' = absent. See text for references.

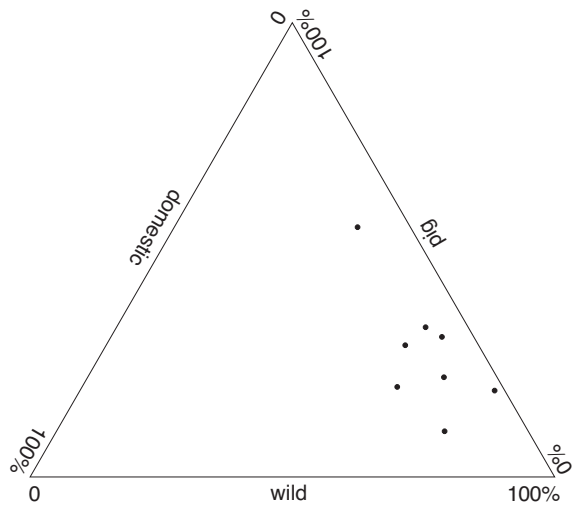


Fig. 3.38. Triangular diagram of mammal bone spectra from the major Swifterbant sites. From Raemaekers *et al.* 1997, fig. 39.

1984; 1986). According to Zvelebil and Rowley-Conwy, "groups with integrated economies, where farming and foraging form an important part of overall subsistence strategy, face problems of scheduling and manpower requirements" (1984, 105-106). Of course, such groups need to reconcile the sedentarity required for successful crop cultivation with the mobility of wild animals. Zvelebil and Rowley-Conwy suggest that this problem is resolved by a spatial separation of good farming areas and good hunting grounds (1984, 106). It is implied that the adoption of crop cultivation is never half-hearted: one either is a farmer or one is not. Here, it suffices to note that in the case of the Swifterbant Culture, it apparently was possible to be a 'part-time' farmer. This notion is supported by cross-cultural studies which focus on the importance of wild animals for farming communities (Kent 1989; Raish 1992).

3.8.4 Mobility strategies of farmer-hunter-gatherers

3.8.4.1 Archaeological introduction

While the Swifterbant Culture spans a period of at least 1400 years, the large majority of the sites date to its Middle Phase, between 4600 and 3900/3800 BC. As it is this phase that is best known, the following analysis of site characteristics is restricted to the sites from the Middle Phase. In this section, various features of these sites are compared in order to provide the necessary elements for a discussion of the mobility strategies and settlement systems of the Swifterbant Culture. Before presenting the data, it is necessary to discuss a number of methodological aspects.

First of all, the frequently assumed relation between the relative importance of projectile points and hunted animals (cf. Verhart 1992), seems unjustified: Hüde I combines the highest proportion of hunted animals with a low percentage of projectile points, while the same percentage of projectile points is associated with a much lower percentage of hunted animals at S3 (tables 3.47 and 3.49). This supposed correlation becomes even more problematic if retooling is taken into account: projectile points may have been modified into for example scrapers, thus changing the proportional importance of projectile points in the assemblage, while the mammal bone spectrum remains the same. Moreover, it appears that the proportion of burnt flint is no indication of the intensity of a site's occupation: most sites have remarkably similar percentages of burnt flint. An alternative interpretation of this similarity bypasses all differences in other site characteristics: the occupation intensity of all sites was similar and the differences in seasonality proposed below are not valid: they might merely be a projection of present-day conceptions about the natural environment on to the past. Thirdly, the differences in tool spectra are limited. One might interpret this similarity in terms of similar site function, but it has to be realised that for most sites the number of flint tools is too small to allow such a conclusion.

A fourth problem is related to seasonality. This concerns the concept of *palimpsest*: activities during the occupation history of any site are written into the archaeological record in such a way that it is impossible to separate them, thus creating a palimpsest of these activities. If a site was occupied on a seasonal basis and this season of occupation changed during its occupation history, this would result in a palimpsest suggesting that year-round occupation took place. The absence of occupation during one season would be overlain by human presence during another year in the same season, resulting in an archaeological record which no longer holds any clues to the absence of occupation during some seasons. Of course, the length of the time-range in which material was deposited determines the intensity of this process. This time-range varies between about 10 (Bergschenhoek) and more than 1000 years (Hüde I, P14). The long period during which the archaeological record of especially Hüde and P14 was formed suggests that a palimpsest situation must be reckoned with. Yet there is one argument which counters the effect of a palimpsest situation. The bone spectra from the various find layers at P14 (layers ABC) and especially Brandwijk are clearly consistent: the bone spectra from the various find layers are quite similar. This suggests that people carried out similar tasks at the same location on multiple occasions and to propose a shift in function seems unnecessary. This implies that for those sites where the bone assemblage is not divided into differing chronological subsets, a continuity in site function may be assumed. In other words, the consequences of the palimpsest effect are perhaps somewhat attenuated.

	P14 Layers ABC	Brandwijk L50 base	Brandwijk L50 top	Brandwijk L60	Hazendonk 1 & 2	S3	Hüde I	Bergschen- hoek
Surface areas (m^2): find layer available area	 – 250,000	 1550 6,500	 – –	 1600 6,000	 812 / 268 12,000	 760 –	 1200 –	 100 –
Seasonality: minimum option maximum option	 summer year-round	 summer + winter year-round	 summer + winter year-round	 summer + winter year-round	 summer + winter year-round	 summer year-round	 late summer / autumn year-round	 late autumn
Percentage of wild mammals	57	63	59	68	74	35	79	(100)
Projectile points (% of tools) Scrapers (% of tools) Burnt flint (% of assemblage)	? ? ?	23 15 44	25 50 37	(100) – 42	– / - (100) / - 33 / 33	7 37 30	7 36 <5%?	– – –
Presence of cereal remains	+	+	+	+	+ / +	+	+	–
Presence of graves Presence of house plans	+ +	? ?	? ?	? ?	? ?	+ –	– –	– –

Table 3.50. Various characteristics of sites of the Middle Phase of the Swifterbant Culture. Figures in brackets refer to small numbers. The available area of the Hazendonk after Bakels 1986, 4; the percentages of wild mammals based on Gehasse 1995, tables 9.3, 9.6 and the percentage of burnt flint from Hüde I based on Stapel 1991, 34. '–' = absent. Other data: see text for references.

Various characteristics of the sites inhabited in the Middle Phase are listed in table 3.50. Apart from the general characteristics mentioned above (a combination of wild and domestic food resources), these sites also display a number of distinct differences. These differences cover a range from the short-term fowling station of Bergschenhoek to P14 on a large boulder-clay outcrop, which may have been occupied on a year-round basis.
If any site of the Swifterbant Culture was occupied on a year-round basis and for many consecutive years, it would have to be P14 (=group 1). This site on a large Pleistocene outcrop is the only onee that yielded both graves and house plans, while a large surface was potentially available for arable fields and herds of cattle and pigs (Gehasse 1995, 65-68). Although the pollen diagrams of P14 did not reveal the presence of arable fields (Gehasse 1995, 61), small-scale farming could have been practised. Bakels (1986, 4) presents a number of studies in which the farmland for one household is estimated to be between 0.2 and 4.5 ha., a surface area easily available on the 25 ha. of the Pleistocene outcrop.
In the surrounding wetlands, large numbers of wild animals could have been hunted, caught and shot. It is significant that judging by the environmental conditions, it must have been possible to live predominantly on the products of crop cultivation and animal husbandry. Nevertheless, large numbers of wild animals were hunted as well. This strongly suggests that the combination of both domestic and wild food resources, recognised at all Swifterbant sites, was not determined by the environment, but instead was an intentional combination of different subsistence strategies.
The arguments for year-round occupation of the Brandwijk and Hazendonk river dunes (=group 2) are less convincing: there are no house plans and no graves. Moreover, the limited size of the dunes prohibited a substantial production of cereals, while space for livestock herding could not be found on the river dunes. The high percentages of beaver and otter bones at Hazendonk 1/2 (see table 3.49) might indicate that this site was a seasonally occupied hunting station rather than a site inhabited on a year-round basis. If one should favour a year-round occupation, the above arguments may be countered by pointing out that the river-dune tops were eroded (thus eliminating the possibility of finding a house plan or graves)[30], while other river dunes in the area could have held a number of arable fields, which together might have yielded an adequate harvest. In theory, the river dunes are equally suitable for crop cultivation as other sandy areas (pers. comm. Bakels 1997). Moreover, the high percentages of beaver and otter at Hazendonk 1/2 are accompanied by the highest proportion of cattle from any Swifterbant site, which suggests that the spectrum is perhaps the result of a palimpsest of distinct occupation phases (cf. Louwe Kooijmans 1993b, 78), or that the hunting of beaver and otter was perhaps only seasonally important in a year-round subsistence strategy. A preliminary conclusion is that both river-dune sites could have been occupied on a year-round basis.
The difficulty of deciding between a seasonal (summer) and year-round occupation for S3 was already discussed in section 3.2.6. The ecological evidence allows both a seasonal and a year-round interpretation. On a more general level, it appears that the wet winter conditions on the levees set S3 apart from the group 2 river dunes, as Brandwijk and Hazendonk provided a dry habitation throughout the year. In my opinion, the availability of alternative sites for winter habitation in the Swifterbant area (the river dunes) is an auxiliary argument for suggesting that during the winters the levees were abandoned. Similar remarks may be made for Hüde I, which is located on a low elevation in a large area of marshes. This site was probably also too wet for continuous, year-round occupation, while dry alternative locations were available at some 5 km distance (Kampffmeyer 1991, fig. 3). In any case, the possibilities for year-round occupation were clearly more limited here than at the river dune sites. S3 and Hüde I thus constitute group 3.
The last site to be mentioned in this section is Bergschenhoek (group 4). Clearly, it was a fowling and fishing station, visited only during late autumn.

3.8.4.2 Anthropology

Introduction of terminology

Before describing a number of anthropological case studies in which the mobility strategies of farmer-hunter-gatherers are addressed, a brief introduction on terminology is given. It will be shown that these sets of concepts not only are relevant for describing hunter-gatherer communities, for which the concepts were developed, but that they also provide an interpretative framework for the description of those societies that combine hunting and gathering with small-scale farming.
The first pair of concepts is *delayed-return* versus *immediate-return* systems (Woodburn 1988). In immediate-return systems, food is consumed on the day it is obtained, or in the following days. This stands in sharp contrast with delayed-return systems, in which the procurement and consumption of food is planned for a considerable time-depth. This planning may involve 1) the construction of labour-consuming technical facilities for the procurement of food at a later date (fish traps, beehives etc.); 2) the storage of seasonal staple foods (salmon, nuts, berries) and 3) the close herding of wild animals or plant food management (Woodburn 1988, 32; Zvelebil 1994, 40). Societies may practise a combination of immediate-return and delayed-return economic activities; in Woodburn's terminology these societies are characterised by the presence of the delayed-return component. Although it seems that this pair of concepts only deals with food-

procurement strategies, the implications of this classification seem to include differences in mobility strategies and even a 'pre-adaption' to the adoption of crop cultivation and animal husbandry, or in other words, the transition to farming (Woodburn 1988, 57). The relevance of these concepts for hunter-gatherer mobility strategies will be explained first.

In his famous 1980 article *Willow Smoke and Dog's Tails*, Binford defines two different mobility strategies. The first strategy, *residential mobility*, is practised by *foragers* who regularly move their residential sites among a series of resource patches. The patchy character of the food resources prohibits a long sojourn at a residential site because the nearby resources are limited and food tends to run out within day-trip distance. After this depletion of nearby resources, a re-location of the residential site has to follow. Residential mobility produces two types of site in the archaeological record: *residential sites* (occupied seasonally or shorter) and *locations*, where extractive tasks are carried out. Residential mobility may be correlated to the immediate-return system as described above: apparently the resource depletion (and thus the regular re-location) is not obviated by labour investment in technical facilities or storage of food. Perhaps, environmental restrictions prohibit these solutions in most cases: there are no seasonal staple foods available for storage, while the patchy nature of the resources is too extreme to enable year-round exploitation.

The second mobility strategy is practised by what Binford calls *collectors*. In their *logistic mobility* strategy, the residential sites are less often moved (summer and winter camps). The more abundant natural environment allows the long-term exploitation of food resources, which are located within a large area around the residential site. This different mobility strategy produces a different archaeological record: apart from *residential sites* and *locations*, there are *field camps* (camps during overnight trips), *stations* (for the observation of game movements) and *caches* (for field storage). The logistic mobility strategy is clearly linked to the delayed-return system: the use of elaborate technical facilities and the procurement of staple foods for storage makes possible the long-term sedentarity of the collectors.

Now that these two sets of concepts have been introduced and the correlation between the concepts has been demonstrated, it is necessary to qualify these seemingly clear-cut distinctions. It is important to realise that the difference between residential and logistic mobility is not absolute. Binford concludes that "it should be clear by now that we are not talking about two polar types of settlement systems, instead we are discussing a graded series from simple to complex" (1980, 12). He describes the logistic mobility strategy as having "all the properties of a forager system and then some" (1980, 12). Moreover, over the years a society may shift from one mobility strategy to the other in response to (perceived) changes in the natural environment (pers. comm. E. Rensink 1997). This leads to the situation that a society, which at one time might be typified as logistically mobile, practises a residential mobility strategy in another year (see Rensink 1995, 86-89 for a review of other critical notes regarding these concepts). In my view, the value of the concepts of logistic and residential mobility is that they provide descriptions of the well-defined ends of a continuity scale. Anthropological and archaeological situations may be positioned between these two extremes.

The case studies

The following studies are of course by no means an all-inclusive list of societies which combine farming with hunting and gathering. These short sketches should rather be seen as illustrations of the variety of ways in which recent and present-day farmer-hunter-gatherers combine the procurement of wild and domestic foodstuffs in their subsistence and mobility strategies.

The Negev desert. The nomadic people of the Negev desert not only keep sheep, goats and camels, but they also practise extensive crop cultivation of barley and wheat. The fields are ploughed and planted shortly after the autumn rains. The amount of rain in the following spring determines the yield of the fields. The unreliability of the spring rains results in many poor harvests: only once in three or four years will a harvest be successful. For these pastoralists, the crop yields are clearly of secondary importance, as they are unpredictable and limited, while the fields are left unattended between the time of planting and harvesting. The importance of hunting and gathering is also limited. The yearly round is dictated by the location of the arable fields (which the people visit in autumn and April-May) and the scarcity of water during the dry summer, which necessitates a lengthy stay near the scarce permanent waterholes (Korsching 1980).

North America. The yearly agricultural cycle of the Pawnee Indians of the Great Plains started in mid-spring with the preparation of small arable fields (0.4-1.2 ha per household). While the Pawnee women took care of the planting and hoeing, the men hunted in the vicinity and carry out maintenance tasks. During this time of year, the menu was largely based on stored corn and dried bison. From mid-June to early September, the bison hunt took place, in which all Pawnee participated, apart from the very old and sick. Some of the captured bison were immediately consumed, while another part of the kill was preserved and stored. On return to the residential site in October, the farming products were harvested and stored. When the harvest was completed, the winter hunt for bison, deer and elk began; a portion of the maize harvest was taken along, while little of the game kills was stored. The winter hunt carried on till mid-spring,

when the agricultural cycle began anew (O'Shea 1989). The subsistence system described here clearly combined delayed- (maize and bison) and immediate-return systems (spring and winter game). The mobility system might be called logistic mobility, as it encompassed a range of site types such as residential sites, field camps, stations and caches. Nevertheless, during the winter season there was no residential site and a series of smaller field camps were occupied.

Central Africa. The practice of crop cultivation is only rarely documented for the various groups of Central-African pygmies. If it is mentioned at all, it is stated as being unimportant or the result of long-standing contacts with farming neighbours. For instance, Pedersen and Waehle discuss two separate groups of Pygmies. They mention that "some Bagambi also farm a little" (1988, 77), while "the Efe experience with agriculture is limited, but some households clear small gardens which are left untended during stays in the forest" (1988, 78). While the importance of their arable fields may be limited indeed, both groups on a regular basis provide labour to their farming neighbours. Apparently, both the Bamgambi and Efe groups are able to combine hunting and gathering with some crop cultivation into one mobility strategy. It is this combination which is of importance here. The Efe live near their farming neighbours the Lese Dese for most of the year, but leave their small villages for two long stays in the forest. From December to March they go into the forest for hunting and fishing, while from July to October they go to collect honey and termites. The Bagambi hunter-gatherers live in the vicinity of their Mpimu neighbours, but leave their villages in February to live in small camps in the forest for hunting, gathering and collecting honey for two to three months before returning (Pedersen/Waehle 1988). Both Pygmy groups apparently combine delayed-return (crops such as manioc and bananas (Turnbull 1965, 34, table 3a)) and immediate-return systems (game, gathered foods, honey), while their mobility strategy combines residential sites occupied for most of the year with a sequence of field camps for the remainder of the year.

Amazon Basin. The combination of hunting, gathering and farming is a common practice in the Amazon Basin of South America. According to Sponsel, "mixed subsistence economies (including farming, gathering, hunting, and/or fishing) overwhelmingly predominate" (1989, 44). From a nutritional point of view, garden products (carbohydrates) and game (proteins) are an ideal mix (Sponsel 1989). The mobility strategy which enables the use of these two different food sources may be typified by the co-occurrence of year-round occupied residential sites and field camps. Flowers documents a Brazilian community of the Amazon in which the agricultural cycle commences with the clearing of (new) gardens in July and August. During September, the men hunt in the vicinity, while the women gather wild vegetables. At the end of September, the garden planting of especially maize, manioc and rice starts, after which weeding follows. From January till March, the harvest of the various crops takes place. In March, the women's work is focused on the threshing of rice, while the men go out hunting. From April to June, fishing is the main economic activity, after which the yearly cycle begins anew with the preparation of the gardens for a new crop (Flowers 1983, 372-373). A somewhat different mobility strategy is practised by the Sions-Secoyans of northeastern Ecuador. Their villages (up to two dozen households) are inhabited throughout the year and for a number of years in succession. Although the gardens are located near the villages, it is not uncommon for some of the gardens to be left unattended for long periods at a time. The hunting activities are mostly conducted on a daily basis, while each year a number of expedition hunts (lasting several days or weeks) take one hunter, a small group of hunters or a nuclear family to field camps, from which the environment is exploited (Vickers 1989). The above makes it clear that the Amazonian people combine immediate-return (game) and delayed-return resources (garden products). The logistic mobility strategy encompasses residential sites, locations and a series of field camps.

Philippines. While the Agta on the island of Luzon are generally perceived as hunter- gatherer communities, maintaining close relations with neighbouring farmers (Griffin 1989; see section 4.2.3), some of the Agta groups, such as the Nanadukan Agta, also practise small-scale crop cultivation. The mobility strategy of this last-mentioned group of hunter-gatherer-farmers is discussed here. The farming activities of these Agta take place during the dry season (March-September), starting with the clearing and burning of the fields (March-April), followed by the planting of rice (May) and the subsequent harvest in September (Griffin 1989, fig. 6.2). During this season, simple shelters are occupied near the fields. During the wet season (October-December), more substantial buildings are occupied in which the harvest is stored. The wet-season and dry-season dwellings are both located near the fields, probably because of the constant threat of land seizure by neighbouring non-Agta farmers. This year-round sedentarity results in a logistic mobility strategy in which the yields from long hunting trips are brought into the settlement. In the Agta case, the limited nutritional and ideological value of the farming products determines the mobility strategy, rather than the more important hunting activities: "Agta hunting is a year-round activity that dominates the subsistence system, the attentions of the people, and relations with non-Agta" (Griffin 1989, 63). The Agta groups that do not practise horticulture have a greater residential mobility in which residential moves are determined by good hunting and fishing spots or opportunities for trade (Griffin 1989).

A cross-cultural overview

When these case studies are characterised in terms of delayed-return versus immediate-return economies and of mobility strategy, three conclusions may be drawn. First, the combination of farming and hunting into one mode of subsistence may lead to a specific mobility strategy in which residential sites and field camps co-occur. The residential sites are clearly linked with one aspect of the mode of subsistence (crop cultivation) while the field camps are related to the other (hunting and cattle-herding). Crop cultivation minimally requires attention during the preparing of the fields, the planting and the harvest of the crops. In this minimalistic perspective, people have only limited influence on the yield: animal and human intruders are not chased off, while weeds may florish as successfully as the crops. For people to influence the size of the harvest, their attention is required for a longer time of the year. This leads to the conclusion that crop cultivation is a pull factor for sedentism.[31]

Secondly, there seems to be a negative correlation between the degree of residential mobility (as opposed to logistic mobility) and the nutritional importance of game: the smaller the importance of game, the higher the sedentarity (Kent 1989, 6-7). Kent differentiates horticulturalists who practise hunting into groups of semi-sedentary and sedentary horticulturalists. For nomadic to semi-sedentary horticulturalists, such as the Negev pastoralists, the Pawnee Indians and Efe and Bagambi Pygmies presented above, the nutritional value of animal protein (be it from game or domesticates) is important, while the value of the farming produce is restricted. This relative unimportance of the harvest characterises one extreme mobility strategy: people like the Negev nomads are only present at their fields for planting and harvesting and leave the fields unattended in the intervening period. Fully sedentary horticulturalists, such as the Philippine Agta, do practise hunting, although "hunting among sedentary horticulturalists contributes proportionately little to the overall diet" (Kent 1989, 6). The importance of the farming yields is reflected in the intensive control of the agricultural cycle and hence the continuous occupation of a residential site in the vicinity of the fields. Although the nutritional value of hunting is limited in these societies, its social significance is of greater importance: men may derive prestige and status from their hunting expertise (Kent 1989, 6-10).

Thirdly, although the above sketches are generalisations based on research by various researchers and the picture is obscure in respect to differences between men and women, it is plausible that there were substantial differences in mobility not only between men and women, but also between younger and older individuals. If the anthropological research at hand does not provide the necessary detail, it is of course impossible to add it here. The unfortunate effect is that the models of mobility strategies presented below are somewhat mechanistic, as they do not contain different options for men and women or young and old. Some of the case studies endorse the traditional maxim that the women more often take care of crop cultivation, while the men are primarily occupied in hunting. This not only creates structural relations between men and animals on the one hand and between women and plants on the other, but it is also an important indication that the mobility of men and women may be quite different. The greater mobility of men suggests that most contacts with outsiders might be between (groups of) men, rather than (groups of) women.

3.8.4.3 Archaeological implications

The anthropological case studies reveal significant variation in mobility strategies of farmer-hunter-gatherers, ranging from year-round sedentary societies to mobile societies only present at the arable fields for planting and harvesting. When this last scenario is seriously considered, the moments of planting and harvesting become points of interest. The most commonly found cereals of the Swifterbant Culture, emmer wheat and naked barley, exist as both winter and summer varieties: the summer variety is planted in the spring and harvested in late summer, while the winter strain is planted during the autumn and harvested the subsequent summer (pers. comm. C. Bakels 1997). On the basis of these crops, it is therefore difficult to establish when the farming activities demanded the presence of the farmers. The remains of chess (*Bromus secalinus*) found in the Hazendonk 1 and Hazendonk 2 find layers (Bakels 1981, 143) prove that winter cropping is certain for these two assemblages, since chess does not occur as a weed in summer crops. One might speculate whether the Hazendonk 1 and Hazendonk 2 occupants practised summer cropping in other years, or restricted their crop cultivation to winter cropping. Moreover, it is uncertain whether the evidence for winter cropping at Hazendonk means that winter cropping was also practised on the other sites of the Swifterbant Culture.

Before embarking on an analysis of possible mobility strategies, we should note that it is difficult to determine the extent of the area included within one settlement system. If all sites of the Middle Phase of the Swifterbant Culture formed part of the same settlement system, then all sites would have to be interpreted within one mobility strategy. On the basis of the archaeological record, such an interpretation may be dismissed: the apparent co-existence of two contemporary sub-groups in the Middle Phase of the Swifterbant Culture suggests that (at least) two separate settlement systems functioned alongside each other. Moreover, one could envisage that different mobility strategies were practised by the inhabitants of sites like P14 and those from the river dunes or Hüde. This prohibits an identification

of *the* mobility strategy of the people of the Swifterbant Culture. Are there then two settlement systems or is it necessary to shrink even further the size of the area that is yearly exploited by one group? This question is impossible to answer on the basis of present-day studies of farmer-hunter-gatherers as the natural environment in Neolithic northwestern Europe is not comparable to other environments inhabited by the farmer-hunter-gatherers known from anthropology, such as those presented in section 3.8.4.2. An archaeological answer to this question depends on the excavation of more contemporaneously occupied sites and subsequent detailed studies of their material culture.
On the basis of the overview of present-day farmer-hunter-gatherer mobility strategies, three descriptive models of mobility strategies for the Swifterbant Culture can be proposed. These three models are presented below. In section 3.8.4.1 the sites of the Middle Phase of the Swifterbant Culture were divided into four groups according to the possible length of occupation. Where possible, these groups are interpreted in terms of the presented mobility strategies in order to test the plausibility of the models.

Year-round sedentism / logistic mobility strategy (fig. 3.39a)
In this model, the residential site near the arable fields is occupied throughout the year. It is not important whether summer or winter cereals are grown. Hunting, fowling and/or fishing trips are carried out as day trips, starting and ending at the residential site. A part of the population of the residential site may leave the site for a longer period on a field trip. Long droving trips will provide the herds with fresh grazing grounds; this suggests that a section of the population may not be fully sedentary but has a greater mobility. When the four groups of sites are plotted into this model, Bergschenhoek (group 4) may be termed a location, while P14 and the river-dune sites (groups 1 and 2) may have functioned as residential sites. The natural environments of S3 and Hüde (group 3) seem to prohibit year-round occupation of these sites, while an interpretation of these sites as locations (and thus a functional interpretation similar to that of Bergschenhoek) fails to do justice to the obvious functional differences between these two sites on the one hand and Bergschenhoek on the other. An interpretation of S3 as a field camp where part of the population lived for a longer period seems unjustified in view of the graves found on the site, which contain adults of both sexes and children. It has to be concluded that the sites of group 1, 2 and 4 may be interpreted in terms of logistic mobility strategy, while the position of S3 and Hüde is problematic.

Seasonal sedentarity (figs 3.39b and 3.39c)
A second possibility is that the residential site near the arable fields is only occupied during the growing season of the sown cereals. During this season, droving trips may take the herds and a section of the population away from the settlement for longer periods. The choice between summer- and winter-grown cereals results in two different mobility strategies. If the cereals are grown during the summer, the residential sites are occupied from spring to late summer (fig. 3.39b). In this season, the sites of groups 1-3 may have been occupied. During this season day trips for game, fowl, fish or gathered foods may have taken place. Locations during such trips may be embedded in the archaeological record of the sites of groups 1-3. During the winter season, the residential site is not occupied and a sequence of field camps is inhabited (groups 1, 2 and 4). If winter-grown cereals are cultivated, a somewhat different mobility strategy will be adopted: in this case the residential sites are found in groups 1 and 2, while the locations of the day trips during this season may be found among sites of groups 1, 2 and 4. In this scenario, field camps are inhabited during the summer season (groups 1-3; fig. 3.39c).

Mobile / residential-mobility strategy (figs 3.39d and 3.39e)
In the third mobility strategy presented here, the care of the arable field is limited to the time of planting and the harvest period. This results in two different mobility strategies for winter and summer-grown cereals, as in the semi-sedentary model presented above. As a result of the minimal attention to the arable fields, the mobility strategies for growers of winter and summer cereals are almost identical (compare figs 3.39d and 3.39e). In both cases, the residential sites may be found in groups 1-3. During the stays at the fields, day trips for hunting, fowling, fishing, gathering foods may take place from sites of all four groups. In the winter season, field camps of groups 1, 2 and 4 may have been inhabited, while the summer season may have seen sites of groups 1-3 occupied.

The confrontation of the archaeological data with the three models make it clear that an identification of *the* mobility strategy of the people of the Swifterbant Culture is problematic. Moreover, it has to be realised that different groups and/or phases of the Swifterbant Culture may have employed different mobility strategies. Nevertheless, the difficulty in determining that the group-2 and group-3 sites were occupied on a year-round basis, the environmental restrictions on their year-round occupation and the availability of alternative, dry site locations in the case of the group-3 sites suggest that residential mobility may have been a typical feature of the Swifterbant Culture.
The issue of the representativity of the wetland data for the area at large is taken up next. Three possible scenarios may be proposed. The first option is to assume that the subsistence data of the wetland sites are representative of the upland

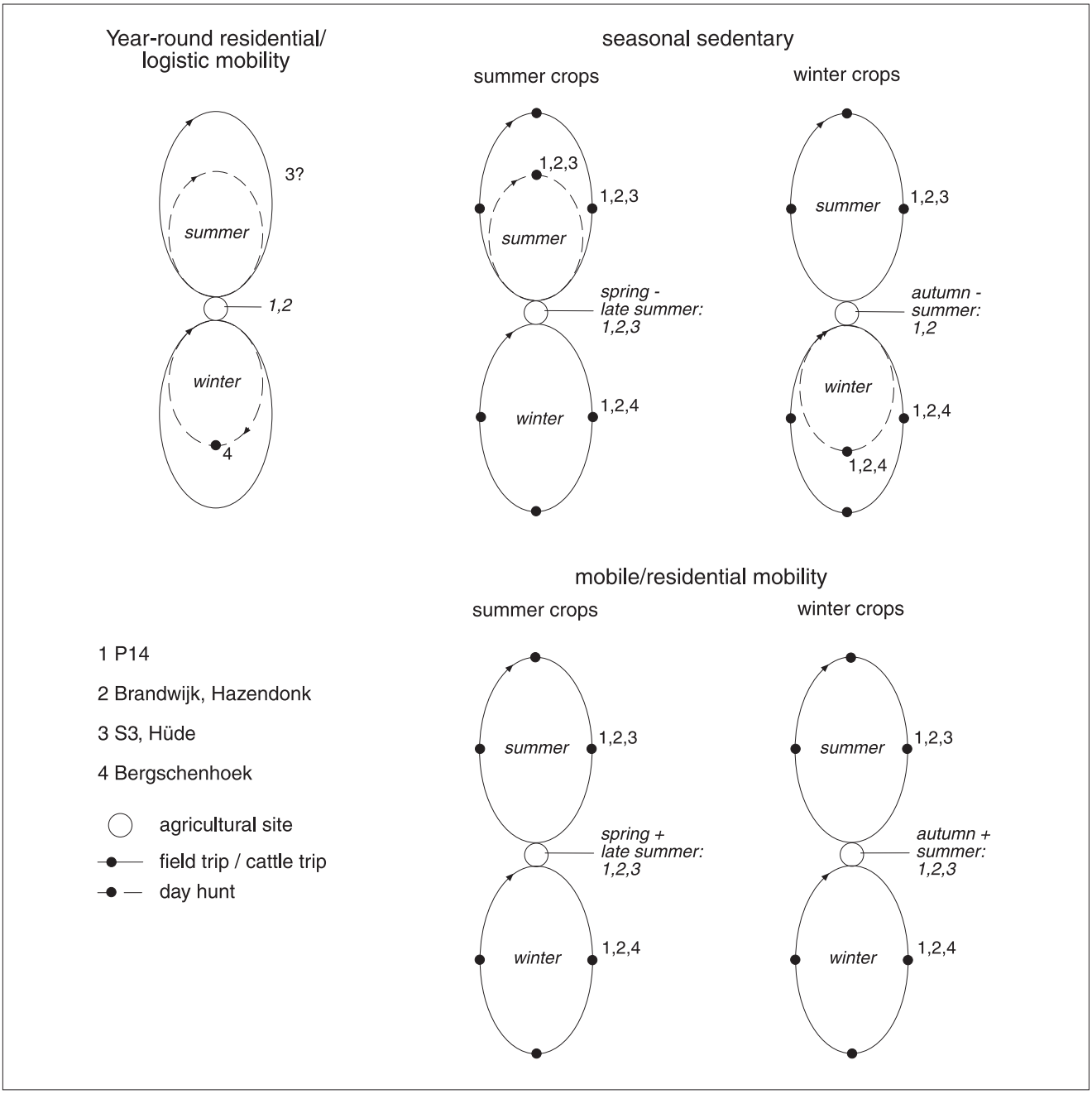


Fig. 3.39. Models of mobility strategies. Drawing P. de Jong.

subsistence base as well. In this case, the problem of representativity vanishes altogether. In this case, it follows that a model of the mobility strategy based on the wetland data is valid not only for the wetlands, but for the western part of the North European Plain at large. The second option is to regard the wetland subsistence strategies as an adaptation to the specific natural environment, in which wild animals and plants are the major resources. One would suppose that the subsistence strategy of the unknown upland communities would to a larger extent rely on domestic animals and crop cultivation. By means of exchange, the wetland inhabitants could acquire products of their upland neighbours. In this

second scenario, it is not a major problem that the subsistence data are restricted to the wetland sites, as the latter reflect a system in which the upland subsistence potential is of secondary importance. In other words, the wetland data are representative for the wetland area only. The last option is to propose a settlement system in which the wetland and upland areas are combined. In this scenario, one part of the settlement system is relatively well-known (the wetlands), while there is no knowledge about the other part (the uplands). This may seem a problematic situation, as it is impossible to deduce the presence of an integrated upland component of the settlement system by means of archaeological data alone, but is has to be realised that for some later periods in prehistory, upland data are near-absent as well, and the issue of representativity is never even raised.
The question of representativity remains difficult to answer, although some further remarks can be made. First of all, a settlement system restricted to the wetland areas is possible: there is nothing in the natural environment to prohibit small-scale crop cultivation and/or animal husbandry. A settlement system similar to that of the wetland area may have functioned in the uplands (option 1). Secondly, if wetland and upland forms of subsistence were different (option 2), this is probably a difference of degree rather than kind, with the wetland dwellers relying less on crop cultivation than their upland neighbours (pers. comm. L. Louwe Kooijmans 1997). The third option, a settlement system in which wetland and upland sites are combined, also cannot be dismissed on the basis of the archaeological data. Nevertheless, the similarities in the subsistence data of the sites of the Swifterbant Culture in different environmental settings suggest that this strategy is not specifically a wetland adaptation, but instead may be seen as representative of Swifterbant occupation in a larger area, including the Pleistocene areas bordering the wetlands.

3.8.5 INTERSITE VARIABILITY

The previous sections presented a description of intersite variability in terms of material culture, subsistence strategies and site function. At this point in the analysis, an interpretation of this variation is sought. The following analysis is restricted to the Middle Phase of the Swifterbant Culture because most of the evidence pertains to this period. At the same time, restricting the analysis to the Middle Phase will considerably reduce the influence of the time factor: the majority of the sites of the Middle Phase have partly overlapping ^{14}C date ranges. The analysis is further reduced to those sites of groups 2 and 3, defined above, whose occupation was restricted to the Middle Phase (Brandwijk, Hazendonk, S2 and S3). By means of this restriction, the observed differences in material culture relate with certainty to the Middle Phase and are not the result of differences in age, while a functional explanation of such differences seems unlikely: all sites from both groups were certainly occupied on a seasonal basis (summer), while occupation during the winter season remains difficult to attest.
Fig. 3.40 presents the intersite variability based on these restrictions. It shows that the concept of *archaeological culture*, as a series of overlapping patterns constituting a well-defined geographical and chronological unit, does not explain the observed spatial patterning (see section 2.2). On all spatial scales (supra-regional, regional, local), similarities and differences co-occur, which inhibits a definition of culture as being bounded. Should one speak of the Swifterbant Culture if the culture concept is abandoned? The concept of *archaeological culture* may of course still be used as shorthand for a complex of interrelated archaeological phenomena, in this case specific material-culture aspects such as pottery morphology, technology and style, flint technology and raw-material sources, together with other aspects such as subsistence strategies, burial ritual and mobility strategy. The intersite variability within the Swifterbant Culture is considered to be slighter in terms of these aspects than its differences from the neighbouring Michelsberg Culture.
This analysis starts on the supra-regional level (fig. 3.40: top part). Perforated wedges and polished flint axes are found throughout northwestern Europe. Since these artefact categories were produced outside the Swifterbant area, their use within Swifterbant society reveals that extensive and/or repetitive social relations were maintained with non-Swifterbant communities. The occurrence of these artefact categories on this supra-regional scale forms the background against which observed differences are projected. In other words, the wide distribution of perforated wedges and polished flint axes makes it clear that the observed differences on the regional scale may not be explained by any lack of interaction (see section 2.2), but instead should be interpreted as meaningful differences (re-)produced over many years. While the source of these differences may be both stylistic and isochrestic behaviour, the etic interpretation of these differences as stylistic is relevant for both the archaeological observer and the contemporary 'outsider', who will interpret the distinct difference in material culture as a symbol of the 'otherness' of the producer/user, regardless of his/her behavioural background (see section 2.2).
The three remaining sets in fig. 3.40 bring to the fore various boundaries in spatial pattering on a regional scale. The first boundary to be discussed is that between the Swifterbant and Michelsberg Cultures. It may come as no surprise that this difference is reflected in the pottery, because this artefact category is as a rule the basis for any spatial-chronological subdivision in the Neolithic.
Another boundary divides the northern Group from the southern Group. The occurrence of 'typical' Michelsberg

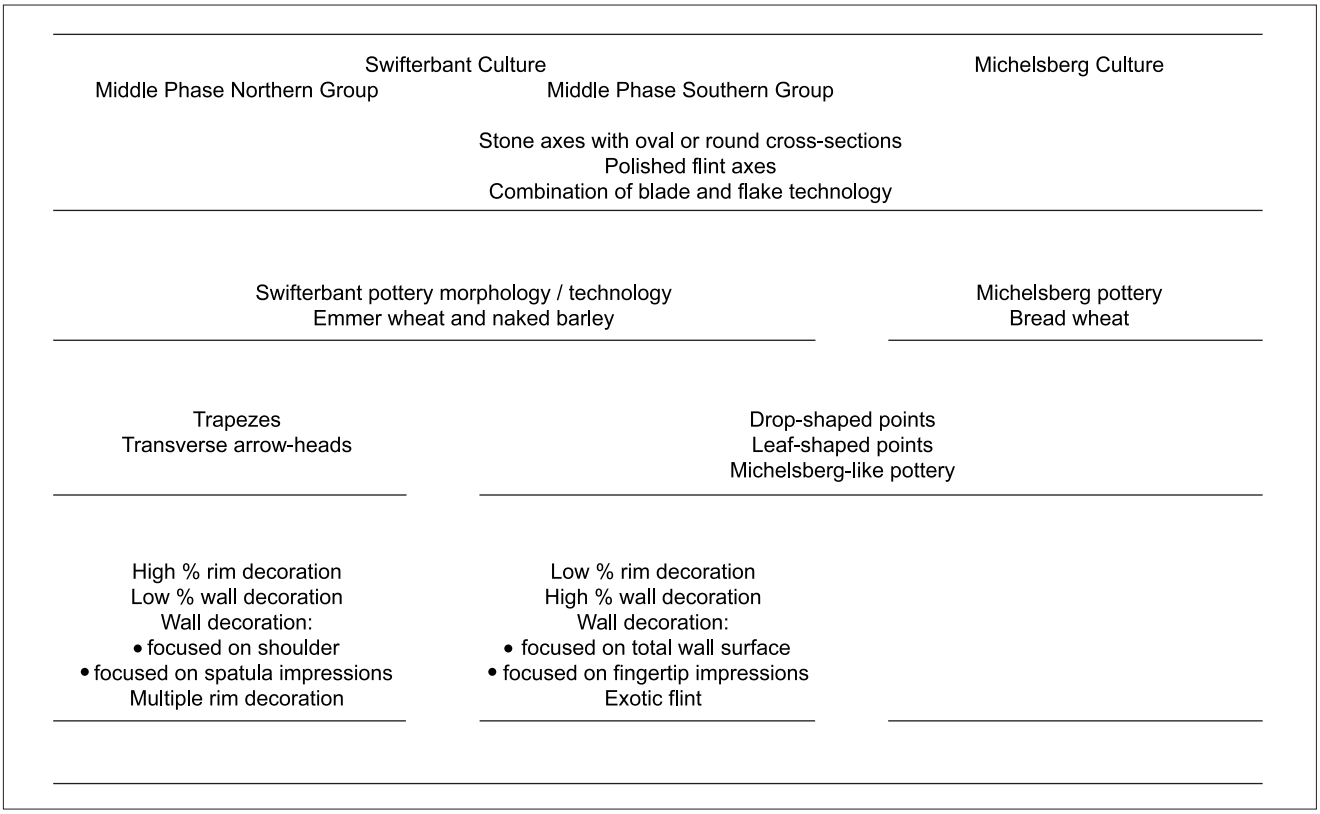


Fig. 3.40. Intersite variability of pottery and flint artefacts of the Middle Phase of the Swifterbant Culture.

elements in the sites of the southern Group reveals that the contacts between the people of the Swifterbant southern Group and the Michelsberg Culture were probably more intensive than those between the people of the Swifterbant northern Group and the Michelsberg Culture. The relatively high percentage of southern flint material in Brandwijk and Hazendonk may reflect comparatively frequent contacts, whereas few such indications are found in S2 and S3. Maybe the people of the southern Group performed an intermediate role in exchange relations which encompassed people of both the northern Group and the Michelsberg Culture.
The difference in point types between the northern and the southern Group is certainly not a result of this difference in the intensity of interaction. The similarities between the northern and southern Group in other aspects of material culture reveal that there were frequent contacts between these groups. The people of the southern Group produced point types different from those of the north and similar to those of the Michelsberg Culture. In other words: by means of point types a stylistic message was conveyed that referred to the Michelsberg Culture, an 'outside world' recognised by the people of the Swifterbant northern Group. While it is likely that the production of point types was isochrestic behaviour (the people of the southern Group did not aim to make an identity statement in the production of these artefacts), the people of the Swifterbant northern Group may have perceived these points as items of stylistic expression: in their eyes, the points were not only distinct, but were probably identified with Michelsberg points. This is a first indication that the northern and southern Group were two separate social entities within the Swifterbant Culture.
Further indications for the existence of two regional groups within the area of the Swifterbant Culture are listed in the last set of fig. 3.40. Most of the differences listed here are of a proportional character: the relative abundance of rim decoration or the type and location of body decoration. The occurrence of decoration types 'typical' of the southern Group on pottery from the northern Group and *vice versa*, shows that whereas the spectrum of 'available' decoration types was known to all potters, tradition determined which decoration styles were preferred. In this case, isochrestic behaviour again allows emblemic interpretation (section 2.2). Because of the small number of sites, differences within the defined regional groups equal differences between sites.

These differences include the proportional differences in the location of rim decoration, the importance of grog temper at Hazendonk and the presence of thumb impressions at Brandwijk L50 base (table 3.48). The limited number of sites prohibits an interpretation of these differences. If, on the one hand, these differences are restricted to one site, one could propose personal preference as an explanation. On the other hand, if they are more widespread, it could be a strong argument for the identification of those sites which were occupied by a particular group of people during their yearly round. This in turn would suggest that the northern and southern Groups may be subdivided into smaller geographical units.
The distribution patterns reveal that observable material-culture characteristics on a local scale are restricted to pottery. One could argue that this results from the stylistic freedom offered by pottery: it is relatively easy to produce stylistic characteristics readable to archaeologists, whereas flint artefacts, apart from projectile points, are less suited for stylistic messages easily read today (and in the past?). According to this view, the observed difference in scale on which pottery and flint characteristics occur is determined by etic readability. Another option is to focus on the scarcity of flint tools found at most sites: if more flint tools were be at hand for analysis, the observed differences in pottery characteristics might be echoed by differences in the flint tool kits. I would like to argue that both options are minimalistic: one can always state that observed patterns are the result of superficial analysis or insufficient data, but such a position leads to superficial and insufficient archaeology. In my opinion, an archaeologist has to produce a meaningful interpretation of observed patterns, which may be rejected later. If we return to the observation that pottery does reveal local characteristics, whereas patterns in flint artefacts only occur on a larger scale, an interpretation in terms of social behaviour is needed.[32] In section 3.8.4.2, it was suggested that women and men may have different mobility strategies: hunting and cattle-herding may take men a long distance from the settlement, while the mobility of women may largely have been confined to the environs of the settlement and arable fields. In terms of conceptual oppositions, we may translate these differences in mobility into a pair of concepts, termed *inside* and *outside*. If we apply these concepts to the different spatial patterning of flint tool types and pottery, we can relate the large spatial patterns of flint tools with *man* as we may relate pottery to *woman*; in other words: man : woman :: flint : pottery. In this way, the structural oppositions man : woman :: animal : plant :: outside : inside may be related to specific categories of material culture. Apart from the large-scale spatial patterns reflected in the flint artefacts, there is one further argument to relate flint with the outside category. Flint material is scarce in large parts of the wetland area, which means that exchange relations with other groups (of the Michelsberg Culture) are needed to acquire flint. In my opinion, it is meaningful that the point types of the Michelsberg Culture are reproduced by the people of the southern Group: this not only distinguishes the latter from the people of the Swifterbant northern Group as argued above, but may also betray the origin of the point type of the Swifterbant southern Group. The repetitive contact between people of the Swifterbant southern Group and people of the Michelsberg Culture may have resulted in the adoption of a Michelsberg point type by the people of the Swifterbant southern Group.
This analysis of similarities and differences makes it clear that abandoning the closed archaeological culture concept creates room for a detailed appreciation of the various categories of material culture. This liberation from a concept ill-equipped for an analysis of intersite variability makes it possible to gain access to the meaningfulness of material culture. Different artefact categories (or even different aspects of a single artefact category) may yield different sorts of information. It has been shown that material culture plays both an active and an isochrestic part in the construction of identity on different scales: local groups (?), regional groups and supra-regional groups (see Osborn 1989 for an ethnographic example).

3.8.6 AN ANALYSIS OF STRUCTURAL ELEMENTS

As a result of the above discussion on mobility strategies and intersite variability, a series of conceptual oppositions was proposed which may be of relevance for our understanding of Swifterbant society. These oppositions are:

man : woman
flint : pottery
animal : plant
outside : inside

In this section, I would like to present a number of archaeological contexts which may strengthen these proposed oppositions.
The first context is the single site the ritual significance of which seems beyond doubt: Bronneger. It may be recalled that it consists of a number of red deer antlers and one pot, deposited in a stream (section 3.6.9). A number of structural elements are deliberately brought together in this ritual find: the red-deer antlers are of course both male and animal, while the hunt occurred outside the settlement. The other side of the opposition is represented by the pot, which was probably made inside the settlement (by women?). Not only do these two artefact categories represent the oppositional pairs presented above, they also suggest a new opposition between water and earth. First of all, the *inside* category may be equated with *earth*. Of course, plants root in earth and

	Hazendonk 1 & 2		*Brandwijk*		*S3*		*P14 Layers ABC*	
Bones:	Number	%	Number	%	Number	%	Number	%
Cattle	25	47	5	6	326	12	101	16
Horse	–	–	–	–	2	0	–	–
Pig	17	32	49	58	2295	83	329	52
Red deer	10	19	15	18	121	4	201	31
Sheep/goat	1	2	15	18	9	0	4	1
Artefacts:	Number	%	Number	%	Number	%	Number	%
Cattle	2	33	–	–	3	8	2	67
Horse	–	–	–	–	1	3	–	–
Pig	–	–	–	–	30	77	1	33
Red deer	4	67	6	67	5	13	–	–
Sheep/goat	–	–	3	33	–	–	–	–

Table 3.51. A survey of the preference for cattle or red deer bones for the production of tools. Antler tools are excluded from the analysis. Based on Van den Broeke 1983, table 2 and Zeiler 1991, table 3 for Hazendonk; Raemaekers *et al.* in prep. for Brandwijk; Zeiler 1991, 73 and tables 1-2 for S3; table 3.44 of this study and Gehasse 1995, table I.1 for P14.

thus are intimately connected with it. Moreover, earth is the raw material for the production of pottery. By contrast, the *outside* category may be connected with *water*, which as a concept may be interpreted as being fluid and transitional and coming from and going to distant places. On a more prosaic level, it is probably the most important route of transportation for both man and animals. In the densely forested Neolithic environment, the various watercourses feed the landscape as arteries feed a body. For both game and domestic animals, water is of extreme importance. This focus on water is reflected in the bone spectra: otter and beaver are aquatic mammals which were hunted on a regular basis, while red deer is also well at home in wetland areas and proportionally the most important wild animal in many bone spectra (Van de Veen 1979, 6; Corbet/Harris 1991, 497). This is also attested by the presence of red-deer bones in most sites located in a distinctly wetland environment. There may also have been a conceptual link between water and flint: much of the flint material will have been collected at short or longer distances from the site. The scarcity of flint in the wetlands, where most of the sites of the Swifterbant Culture are situated, suggests that excursions to collect flint from the boulder-clay area and the beaches were combined with exchange transactions to acquire the various southern flint types. Such transactions were probably only possible by means of the waterways. Moreover, if one considers the properties of flint, the relation with water is also found in other aspects: not only is it found in or near water (in rivers or on beaches), but it also shares its visual characteristics: it has similar colours and a similar shiny surface. The exotic origin of adzes and axes places these artefacts in the *outside* category. At Bronneger, water perhaps not only signifies the *outside* category, but also the liminal place between the world of the living and the world of the ancestors. By means of this ritual deposition of the oppositions in society (symbolised by the red-deer antlers and the pot), the ancestors may have been asked to secure the continuity of the cosmos, in other words to allow the traditional way of life to continue. Other offerings of red-deer antlers in water may have similar connotations, but unfortunately the antiquity of these antler offerings is unclear (Clason 1983; Ufkes 1993).

A second context attesting the ritual significance of red deer (bones) is attested is found at Brandwijk and Hazendonk, where the bones of red deer seem to have been favoured for the production of tools over bones from cattle (table 3.51). Unfortunately, the small number of bone tools from these sites restricts the interpretation of this pattern: the preference for red-deer bones is not statistically significant. Moreover, a preference for red-deer bones on functional rather than symbolic grounds cannot be excluded. On the basis of the same table, it also becomes clear that red deer is the only game animal used for bone tool production. In other words; red deer represents all wild animals.

A third context providing evidence of the conceptual oppositions is provided by various cattle horns found in the peat bogs of the province of Drenthe. These comprise four specimens, dated to the period of the Swifterbant Culture. The horns include two of domestic cattle and two of aurochs (Prummel/Van der Sanden 1995, tables 3-4). First of all, these finds again indicate the symbolic importance of water as a liminal place. Secondly, the horns are all of male individuals, which

is another parallel to the red-deer antler offering at Bronneger. Because both domestic and wild cattle are found, it may be that the distinction between wild and domestic was not relevant for this community (in this particular context). Finally, these finds indicate that the ritual significance of red deer is not an isolated phenomenon, but that other animals also play a role in rituals.

A final archaeological context which may be of importance is that of hearths. Tilley, in accordance with Lévi-Strauss, concludes, that "cooking is a code, not just one that marks a transition from nature to culture but one that can be used to structure culture itself" (1990a, 24). In this perspective, cooking not only brings together food items from the *inside* and *outside* categories (plants and animals), but also unites the female cooking pot with the male flint tools. As such, it reconciles all structural oppositions. The process of cooking not only provides food for the survival of individuals, it is also crucial to the survival of society. In the combination of plant and animal food, female and male food items are brought together, and thus men and women. The combination of plants and animals in a meal thus symbolises the reproduction of men and women for the survival of society in general. Moreover, the process of cooking involves fire, a symbolic element *par excellence* as it can be seen and felt, yet is intangible. As such, it is an excellent raw material for symbolic expression. In the case of the Swifterbant levee sites, this importance of cooking is reflected in the materiality of the hearths: they are constructed on top of a clay base. Clay may be seen as ambiguous: it is earth from water and as such reconciles earth and water. This makes clay an excellent substance for the ideological reconciliation of *inside* and *outside*, female and male, plant and animal, and earth and water.[33] Indeed, the excavations at Swifterbant and Bergschenhoek reveal that hearths are often placed on top of one another, or rather, new hearths are as a rule constructed on top of old ones. Thus hearths are deliberately reproduced at the same location, so that cooking at this hearth symbolises the reproduction of society at the exact place of earlier cooking. All in all, it seems that the central importance of cooking may not only be inferted from the proposed structural oppositions within society, but also from the archaeological record itself.

On the basis of these archaeological contexts, I would suggest that the binary oppositions presented at the start of this section actually find evidence in the archaeological record and may even be expanded with an opposition between earth and water. Nevertheless, this interpretation should be seen as tentative.

notes

1 De Roever does not distinguish between single and paired fingertip impressions in her categories *pushed-up fingertip impressions* and *roughened surface*. This makes it difficult to compare the percentages of these kinds of decoration with the percentage of paired fingertip/nail impressions in the sample. To make a comparison possible, the percentages of the single and paired fingertip/nail impressions are combined here.

2 De Roever combines rim decoration and body decoration in one table. Here these locations of decoration are presented separately. This explains the differences between the percentages listed in De Roever's table 2 and the percentages cited here.

3 The sherds from S51 (Deckers 1979, table 1) have not yet been published and are left aside here.

4 One may wonder whether differences in site formation processes between the levees and river dunes led to a difference in the average size of the sherds, which in its turn would influence the percentage of decoration. This is probably not the case. If so, sherds from the river dunes would have a smaller average size, which would lead to a *lower* percentage of decorated sherds. For an example of this proposed correlation between sherd size and decoration percentage, see figs 3.8 and 3.18.

5 In Deckers' terminology blades not only have a length of at least twice the width of the implement, but also " straight sides that run parallel to the length axis" (1986, 23).

6 New percentages of the S2 sample: blades 48%, flakes 26% and blocks 25%. For the S3 sample: blades 15%, flakes 35%, blocks 49% and cores 1%.

7 The low proportion of cortex-covered artefacts at S3 may be the result of the inclusion of the sieved material in the analysis. As a rule, the sieved material is very small and less often displays cortex than the larger artefacts. When the sieved material is left out, only 28 of the 418 artefacts of the first S3 sample remain. Eight of these 28 pieces are partly cortex-covered : 29%. This recalculation partly bridges the gap between S3 and the three other sites.

8 During the refitting of the pottery, the finds from L50 were not yet subdivided, so Van Hoof's spatial analysis did not influence the refitting. This made it possible to perform such an independent evaluation.

9 A site report on Brandwijk is in preparation by Raemaekers *et al*.

10 In the pollen diagram, one more possible habitation horizon is identified. This zone is dated to around 4950-4900 BC (6050 BP) (Louwe Kooijmans 1974, 140).

11 One could imagine that a detailed study of the pottery would reveal that sherds from the older occupation phase are on average somewhat smaller and more weathered. In this way, the relative importance of the admixture might be determined.

12 This occupation phase predates the start of the West Group Funnel Beaker Culture (see section 4.5.1.2). This suggests that either the date is right and the third occupation phase concerns the (pre-*Tiefstich*) Funnel Beaker Culture or that it relates to an occupation

phase of the developed Funnel Beaker Culture and the date is too early. The impossibility of distinguishing early Funnel Beaker Culture flint artefacts from flint artefacts from the developed Funnel Beaker Culture (Stapel 1991, note 196) suggests that on the basis of the flint artefacts alone, either option may be valid. Stapel's continued use of the term 'developed Funnel Beaker Culture' when referring to the third occupation phase leads me to conclude that the date is wrong.

13 Remember the elimination of the depth ranges, used in Kampffmeyer's analysis.

14 The find numbers relating to Ertebølle pottery are 461, 7917/7891, 22869, 30670 and 31145. Of these, find numbers 461 and 31145 also relate to Swifterbant pottery.

15 This particular pot is decorated, but in general decoration is rare on the pottery from the Swifterbant cluster: c. 5% (De Roever 1979, 16).

16 See Kampffmeyer's catalogue, p. 344, where this sherd is related to publications by Lichardus (1976) and Willms (1982), which discuss Rössen chronology and two Michelsberg sites, respectively.

17 Fig. 219: nos. 150, 17429? and 30996?; p. 262-263: nos. 3039, 4602 (fig. 216: Michelsberg) and 4741.

18 As cereal pollen were only recovered from pollen zone IX (Funnel Beaker period) (Schutrümpf 1988, 23), it is suggested that the sherds with cereal impressions also date from this period.

19 The analysis of the bird remains includes all material found at the site. Boessneck presumes that there were no changes in preference in the fowling activities of the inhabitants and no environmental changes leading to a changing bird population (1978, 156). As the analysis of the fish remains does show a significant shift in species and there does seem to be an environmental change during the Funnel Beaker period, Boessneck's assumption is doubted (Hüster 1983, tables 23-24; Schütrumpf 1988).

20 E.g. the Mesolithic tool types.

21 From deeper sediments, more finds were collected. These finds are considered contemporary to the Swifterbant levee sites on the basis of the similarity of the pottery.

22 See, for example, the often problematic associations presented by Brandt (1967), Van der Waals (1972) and Schut (1991).

23 Elsloo (Modderman 1970). His types I and II can be related to Brandt's high adzes (*hohe Schuhleistenkeile*), type III to the middle-high adzes (*mittelhohe Schuhleistenkeile*), while his types IV, V and VI correspond to Brandt's low adzes (*flache Schuhleistenkeile*). See also Farrugia 1992.

24 Worms (Farrugia 1992, tables 52-55; Meier-Arendt 1975, tables 54-99).

25 Lingolsheim (Farrugia 1992, tables 75-83; Lichardus-Itten 1980, tables 1-15

26 Rössen (Lichardus 1976). His types 24 and 25 correlate with Brandt's low adze; type 28 corresponds to Brandt's perforated wedge; Häsering (Lichardus 1976; 1991); Göhlitzsch (Lichardus 1976; 1991); Klein Ableben (Schwarz 1950; Farrugia 1992); Laucha (Farrugia 1992); Oberröblingen (Marschall 1975; Farrugia 1992); Rochau (Schwarz 1949; Farrugia 1992); Wittmar (Farrugia 1992).

27 Various sites in Bakker 1979.

28 Altenbanberg, Delkenheim, Niederstein and Untergrombach (all Lüning 1967); Osterwick (Willms 1982). Added are the following finds from the Hazendonk 3 Group: Kraaienberg (Louwe Kooijmans/Verhart 1990); Het Vormer (Louwe Kooijmans 1980b) and Wateringen 4 (Raemaekers *et al*. 1997).

29 Vlaardingen Group: Ewijk (Asmussen/Moree 1987); Haamstede-Brabers (Verhart 1992); Hazendonk-Vlaardingen 1b (section 4.5.2.2); Hekelingen I (Modderman 1953); Hekelingen III (Louwe Kooijmans/Van der Velde 1980); Vlaardingen (Glasbergen *et al*. 1961); Voorschoten-Boschgeest (Glasbergen *et al*. 1961) and Voorschoten-De Donk (Van Veen 1989). Stein Group: Koningsbosch (Van Haaren/Modderman 1973).

30 The recent find of several late Mesolithic graves on the river dune of Polderweg (section 3.6.2) indicates that grave finds at Brandwijk and Hazendonk should have come as no surprise.

31 Wild plants are not considered, because of the lack of data in the presented case studies.

32 The case studies on Bushmen arrowheads and East-African spears in section 2.2 reveal a similar pattern: large-scale spatial patterning of male items of material culture, as against small-scale patterning of categories of material culture associated with women.

33 The Bergschenhoek hearths were constructed on peat slurry (Dutch: *veenslik*) (Louwe Kooijmans 1985, 94), which perhaps had a similar connotation of earth from water.