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SCHIPLUIDEN

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

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AND PETER F.B. JONGSTE

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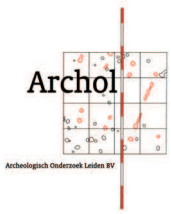

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6 The Schipluiden pottery

Daan Raemaekers
Michiel Rooke

The pottery assemblage from Schipluiden is the largest Hazendonk assemblage available. This, and the phasing of the site's occupation, allowed a detailed analysis of the chronological development of the pottery. The analysis showed that there are two Hazendonk 3 wares, distinguishable on the basis of tempering agents, wall thickness and wall decoration. The first, dominant ware is mainly quartz-tempered, relatively thick-walled and often decorated. The second ware is shell-tempered, relatively thin-walled and rarely decorated. Both wares were probably produced locally.

6.1 Introduction

This chapter discusses the objects of fired and burnt clay that were found at the Schipluiden site: ceramics and lumps of daub. First, the question whether the studied sherds may be regarded as representative of the pottery assemblage as a whole will be considered. After that, the pottery's characteristics will be discussed according to the life cycle of production, use and discard. On the basis of the outcome of that discussion a major research question will then be examined, notably whether it is possible to distinguish different wares. The cultural affinities of the inhabitants of Schipluiden will be examined in relation to those of contemporary sites in the micro-region and sites further upstream the Rhine and Meuse. Finally, the chronological trends in the pottery will be examined and viewed in a broader chronological context.

In section 6.5 the pottery from Schipluiden will be classified as Hazendonk pottery. This term refers to the Hazendonk site where a pottery assemblage was found underneath Vlaardingen find layers (Louwe Kooijmans 1974). This pottery was renamed Hazendonk 3 pottery when two more pre-Vlaardingen assemblages where found at the site (Louwe Kooijmans 1976). Re-analysis of this Hazendonk 1 and 2 pottery (Raemaekers 1999) showed that they should be interpreted as Swifterbant assemblages, albeit with a local touch. In this article we will return to the original classification and use the term Hazendonk pottery (*cf.* Louwe Kooijmans in press).

6.2 Data, selection

The collected sherds are not all the sherds encountered at the site. The assemblage is assumed to include all sherds from the sieved segments; in some of the other segments small sherds will probably have been overlooked. This issue was discussed in chapter 4. All sherds weighing more than 10.0 g were most probably recovered. From our perspective we may assume full find recovery.

All the sherds from trenches 10 and 14 with a minimum weight of 5.0 g were described in the first phase of analysis. On the basis of the 769 sherds in question and the total number of ceramic finds (3767 in total) it was concluded that a description of all sherds with a minimum weight of 5.0 g would involve around 8000 sherds. At an assumed rate of description of around a hundred sherds a day, this would have implied an amount of work probably unjustified for the research questions at hand. The sherds considered in the pilot study were used to determine whether a higher minimum weight would lead to the same patterns in sherd characteristics (chronological development and spatial patterns). Table 6.1 and fig. 6.1 present a comparison of the data based on minimum weights of 5.0 and 10.0 g. The table reveals few differences between the two weight categories. One comprehensible difference is a greater frequency of sherds with wall decoration when only the sherds with a minimum weight of 10 g are considered. The same phenomenon was previously noted for sites with similar pottery (Raemaekers 1997, fig. 26; Raemaekers 1999, figs. 3.8, 4.2). Evidently, the larger a pottery fragment, the greater the possibility of determining whether the pot from which it derives was decorated. In other words, at a certain point the percentage of decorated sherds comes to stand for the percentage of decorated pots. The spatial patterns based on minimum sherd weights of 5.0 and 10.0 g are virtually the same (fig. 6.1). It was concluded that a smaller number of described sherds would allow reliable conclusions to be drawn concerning sherd characteristics, chronology and spatial patterning. The minimum weight was set at 10.0 grams, leading to a total of 4557 described sherds. This number will figure as the total score in the remainder of this text.

The fragmentation of the sherds was studied on the basis of the weights of the individual sherds from trenches 10 and 14 because in the case of these trenches, all sherds with weights between 5.0 and 10.0 g were also analysed (fig. 6.2). The number of sherds decreases when the weight increases.

	minimum weight 5.0 grams		minimum weight 10.0 grams	
	N=	%	N=	%
number of sherds	769		441	
wall thickness				
average (mm)	10.0		10.2	
temper				
quartz	381	49.5	228	51.7
grit	69	9.0	49	11.1
grog	29	3.8	20	4.5
plant	32	4.2	16	3.6
shell	264	34.3	143	32.4
construction				
H-joints	319	94.1	202	94.0
N-joints	18	5.3	12	5.6
Z-joints	2	0.6	1	0.5
firing environment*				
ox-ox-ox	52	6.8	26	5.9
ox-ox-re	14	1.8	9	2.0
ox-re-ox	91	11.9	48	10.9
ox-re-re	54	7.1	35	8.0
re-ox-ox	14	1.8	8	1.8
re-ox-re	5	0.6	2	0.5
re-re-ox	108	14.1	68	15.5
re-re-re	409	53.5	233	53.0
indet.	18	2.4	11	2.5
decoration				
wall sherds	686		382	
wall decoration	58	8.5	49	12.8

* From left to right: inner side, centre and outer side.
ox = light (oxydation) colour; re = dark (reduction) colour.

Table 6.1 Pottery, comparison of characteristics of sherds >5.0 grams and >10.0 grams from trenches 10 and 14.[1]

Interestingly, the fragmentation curve is similar to the curves of both Wateringen 4 and the Hazendonk, level Hazendonk 3, two reference sites that will be discussed in section 6.5.1. One would expect that on average the sherds from the Hazendonk would be larger, because they were deposited in peat, suffered little weathering and could relatively easily be joined with other sherds to obtain larger pottery fragments. So, ruling out the effect of fragmentation, the small number of joined sherds from both Wateringen and Schipluiden must be exclusively attributable to the effect of weathering.

6.3 Methods

The analysis was carried out using the descriptive system developed by Raemaekers (1999) as a basis. Where necessary, the system was expanded in order to include attributes first encountered in the Schipluiden ceramics. Individual sherds were described on the basis of a series of attributes relating to the production and use of the pottery (see section 6.4). The use of this system enables a relatively straightforward comparison with pottery from other sites described using the same system (see section 6.5.1).

6.4 Analysis

6.4.1 Production

Clay sources

The diatom analysis showed that all the pots may have been produced locally; there are no diatom spectra suggesting that clay from other natural sources was used (chapter 15). This means that the pots were either produced at the site or were transported to the site from production areas with similar clays elsewhere. Site characteristics such as a large number of features and large amounts of debris (including pottery sherds) suggest intensive occupation; this makes the option of local production the most plausible.

Tempering agents

The selected clay was tempered with various materials: stone (quartz, granite and other types), shell, parts of plants and grog. Most of the sherds (90.8%) are tempered with only one of these agents. The others contain two or more materials. This high percentage suggests that the clay was often purposefully tempered with only one agent.

Quartz was apparently the most preferred temper. Of the quartz-tempered sherds, 85.7% contain no other types of temper. The most common admixture is grit (6.1%). The density and particle size distributions (table 6.2) show a dominance of low density and an average particle size of 2 mm. The unimodal distribution in the table suggests that this particle size and density were what the makers aimed to realize, but a small peak representing a high density of 1-mm particles suggests a second set of quartz-tempered pottery.

The second largest group consists of sherds tempered with types of stone other than quartz (grit). Of these sherds, 73.5% contain no other type of temper. Quartz is the most frequent admixture (15.7%). In most cases it was impossible to determine which type of stone was used. In 93 sherds (red) granite was identified; it may be assumed that the temper in some of the other grit-tempered sherds will also be granite. A second feature peculiar to Schipluiden is the occurrence of mica (1-4 mm) in various sherds. In this study mica was however not considered a tempering agent because it occurs naturally in deposits around the site. The density and particle size distributions of the grit (table 6.2) are similar to those of the quartz-tempered sherds. There is a similar unimodal distribution revealing a focus on a low density of grit particles with an average particle size of 2 mm. The resemblance to the quartz sherds suggests that clay with similar temper characteristics was desired.

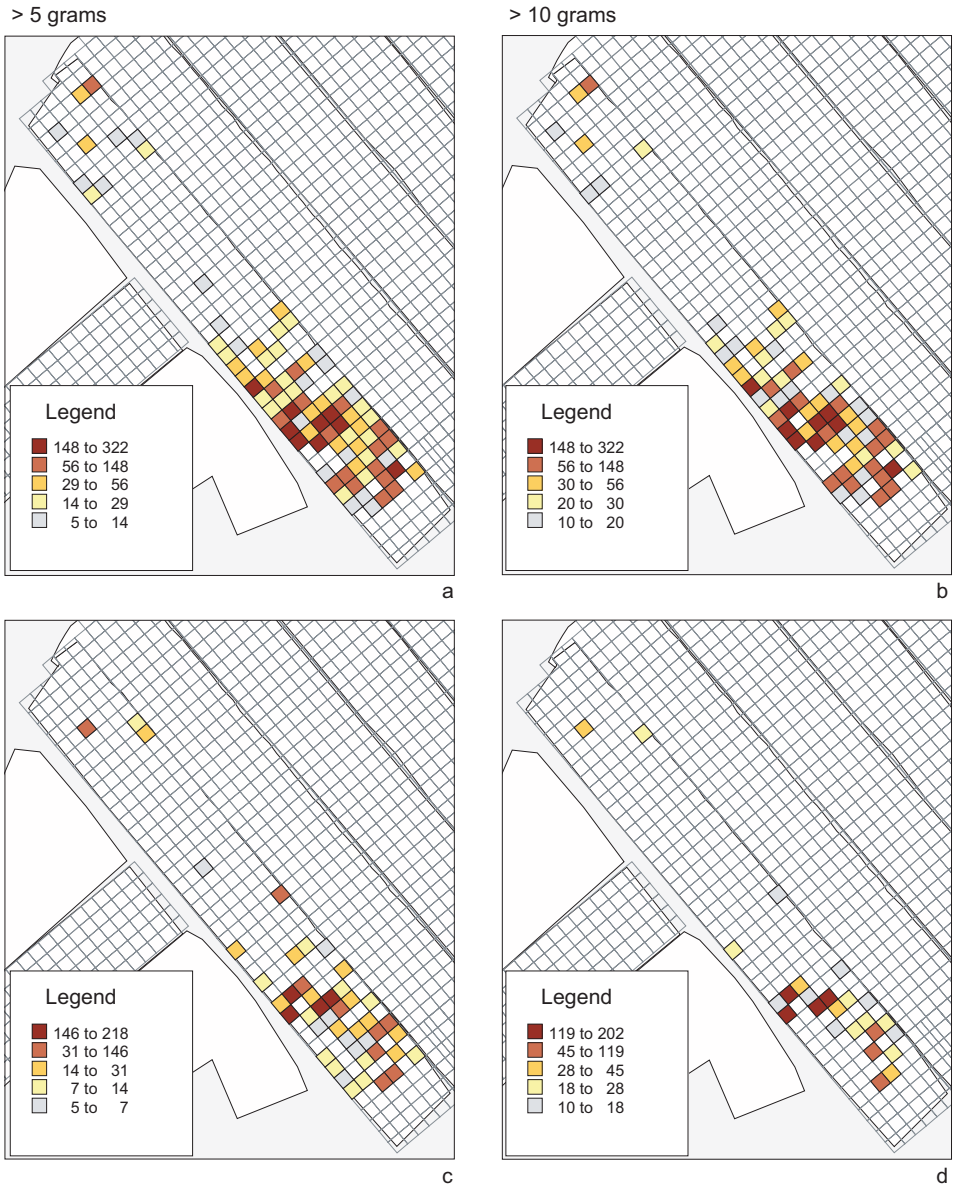

Figure 6.1 Spatial patterns in trench 10 on the basis of minimum sherd weights of 5.0 (left) and 10.0 g (right).
a-b all sherds
c-d shell-tempered sherds.

The third largest tempering agent consists of shell fragments. Of the shell-tempered sherds, 92.6% contain no other types of temper. The main admixture is plant matter (2.9%). Table 6.2 shows a unimodal distribution centring on an average particle size of 2 mm and an average or high density of shell particles. At the start of the analysis, shell-tempered sherds appeared to be difficult to identify. In the first place, shell is an uncommon tempering agent in pottery from this period, so sherds with pores were initially identified as plant-tempered. However, closer analysis of sherds whose temper had not been completely burnt during the firing revealed white crumbs. They were identified as shell fragments on the basis of a thin-section analysis by G. van Oortmerssen (Laboratory of Conservation & Material Sciences, University of Groningen) and microscopic examination by W. Kuijper (Faculty of Archaeology, Leiden University). The crumbs were in two cases identified as deriving from cockle shells, *Cerastoderma* spec.. A handful of sherds showed large identifiable impressions of cockle fragments (fig. 6.3). These positive observations enabled a distinction to be made between plant- and shell-tempered sherds: sherds tempered with ground shell contain small, thick, flake-shaped pores aligned parallel to the wall surface.

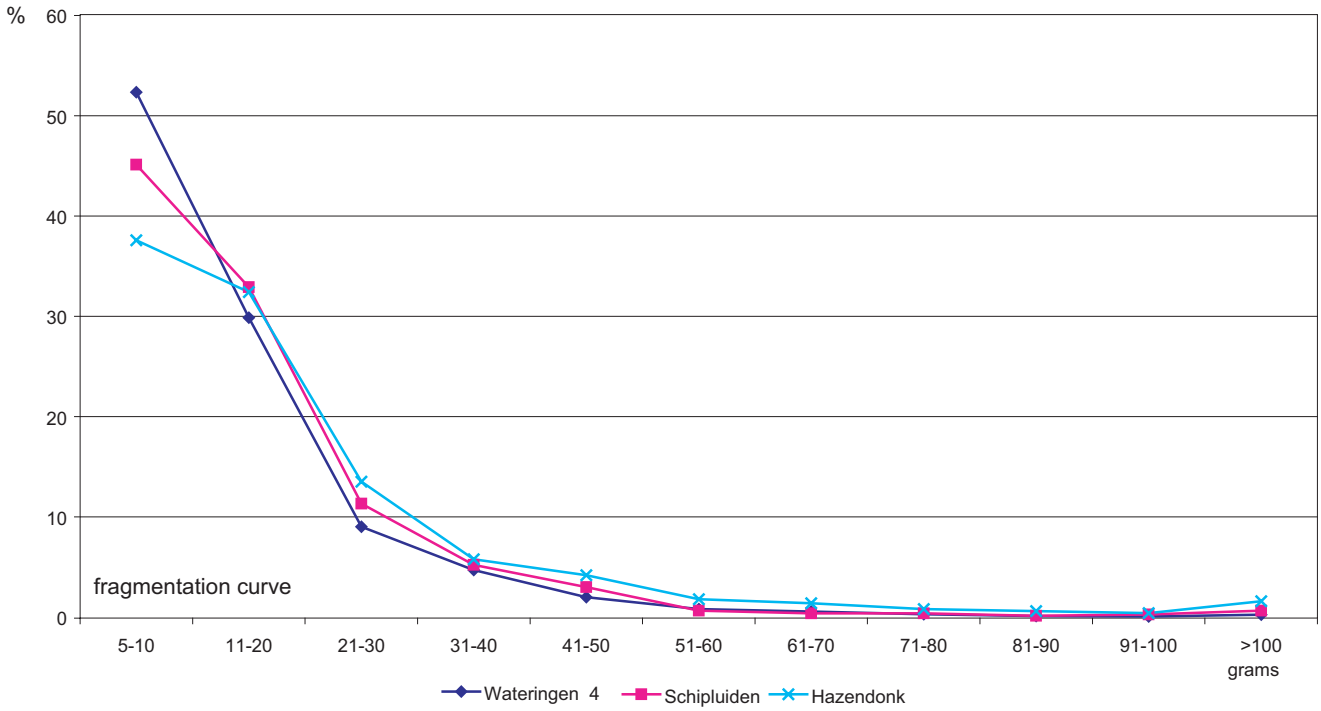

Figure 6.2 Sherd dimensions for Schipluiden, Wateringen 4 and Hazendonk 3.

The fourth tempering agent is plant material. Of the plant-tempered sherds, 73.5% contain no other types of temper. The main admixture is quartz (15.7%). The average particle size was not determined. Plant material was encountered mostly in low or average densities (table 6.2).

The last tempering agent found in the pottery is ground sherd fragments (grog). Only 49.7% of the grog-tempered sherds contain no other types of temper. The most important admixture is quartz (39.8%). The density and particle size distributions (table 6.2) are fairly similar to those of the quartz-tempered sherds. There is again a unimodal distribution with a focus on a low density of grog particles with an average particle size of 2 mm. The close resemblance to the quartz-tempered sherds suggests that clay with similar temper characteristics was desired.

Types of joints

The pottery was built up from coils (fig. 6.4e) that were connected via three types of joints (H, N, Z: Raemaekers 1999, 195). The coiling technique was rather crudely employed, judging from the large proportion of sherds with fractures revealing the type of joints (56.1%). Most joints are fairly straight H-joints. The others are N-joints and Z-joints (table 6.6). There is no relation between the type of joints and the employed tempering agents.

Figure 6.3 Impressions left by burnt shell temper (magnification 5×).

Wall thickness
The average wall thickness is 10.6 mm. The wall thickness appears to be related to the employed tempering agent(s) (see section 6.4.3). Grog-tempered sherds are on average the thinnest (9.5 mm); shell-tempered sherds have the greatest average wall thickness (11.3 mm).

Morphology
Due to the fact that the assemblage concerns settlement debris, information on morphological aspects is rather limited (figs. 6.5-6). The 44 largest rim fragments were all selected to make profile drawings and measure rim diameters. The drawings show that the majority of the sherds derive from open types (buckets, N=16) and closed types (barrels, N=27). One beaker and one vessel with an S-shaped profile were represented. When the sherds are considered in relation to the tempering agents, those tempered with grog, plant material and shell are all found to derive from buckets, but this is a biased conclusion, based on only a small number of observations. Rim diameters could be estimated in the case of 26 rim fragments. They vary from 14 to 28 cm. There appear to be no size groups. The rim diameters seem to be unrelated to the tempering agents (fig. 6.7).

The shapes of the bases vary considerably, with pointed (2), round (17), flat (54), hollow (4) and protruding foot bases (2) being represented. There is no relation between base shapes and tempering agents. The assemblage contains two elongated lugs, one with a horizontal perforation (nos. 6331 and 7855, fig. 6.5).

Surface finish
Finishing techniques were rather simple. Most of the sherds have a smooth, uneven or rough surface. Polishing was observed on only three sherds and brush marks (*Besenstrich*) were found on ten sherds.

Wall decoration
A total of 401 wall sherds are decorated (9.6%). Of these sherds, 270 bear single fingertip impressions; 16 sherds have paired fingertip impressions. Spatula impressions were observed on 103 sherds and grooves on 38 sherds. One sherd was decorated with a hollow spatula and two show a combination of single fingertip and spatula impressions. It is not possible to say what instrument was used to create the decoration on the remaining eight sherds. In general, the wall decoration covers the entire wall surface excluding the rim zone (the top 2 cm), which was in the case of many pots a separate zone characterised by narrowing of the wall thickness and/or a curve outwards. Six sherds derive from pots on which the rim zone was included in the wall decoration *(e.g.* nos. 1358 and 5740, figs. 6.5-6).

quartz					
average particle size (mm)	1	2	3	>3	total
low density	268	**470**	247	73	**1058**
average density	112	229	185	46	572
high density	192	155	139	58	544
total	572	**854**	571	177	2174
grit					
average particle size (mm)	1	2	3	>3	total
low density	123	**217**	110	12	**462**
average density	47	114	54	2	217
high density	53	93	45	17	208
total	223	**424**	209	31	887
grog					
average particle size (mm)	1	2	3	>3	total
low density	12	**53**	24	5	**94**
average density	8	31	17	1	57
high density	2	23	11	0	36
total	22	**107**	51	6	187
shell					
average particle size (mm)	1	2	3	>3	total
low density	20	85	34	6	145
average density	25	**229**	111	5	**370**
high density	39	196	122	8	365
total	84	**510**	267	19	880
plant					
	total				
low density	**233**				
average density	226				
high density	91				
total	550				

Table 6.2 Pottery, size versus density for various tempering agents. The highest scores are indicated in **bold**.

This general picture can be given more detail by relating it to the tempering agents. This reveals first of all a striking similarity in the proportions of the aforementioned types of decoration (table 6.3). The proportions of decorated wall sherds reveal major differences, with 15.6% of the quartz-tempered sherds and only 1.1% of the shell-tempered sherds being decorated (see section 6.4.3).

Rim decoration
In total, 418 rim fragments were described. Rim decoration was recorded for seven sherds, six of which are sherds on which the wall decoration included the rim zone (see above); this should therefore not be interpreted as rim decoration *per se*. One sherd has a rim perforation. So the overall conclusion must be that rim decoration is absent.

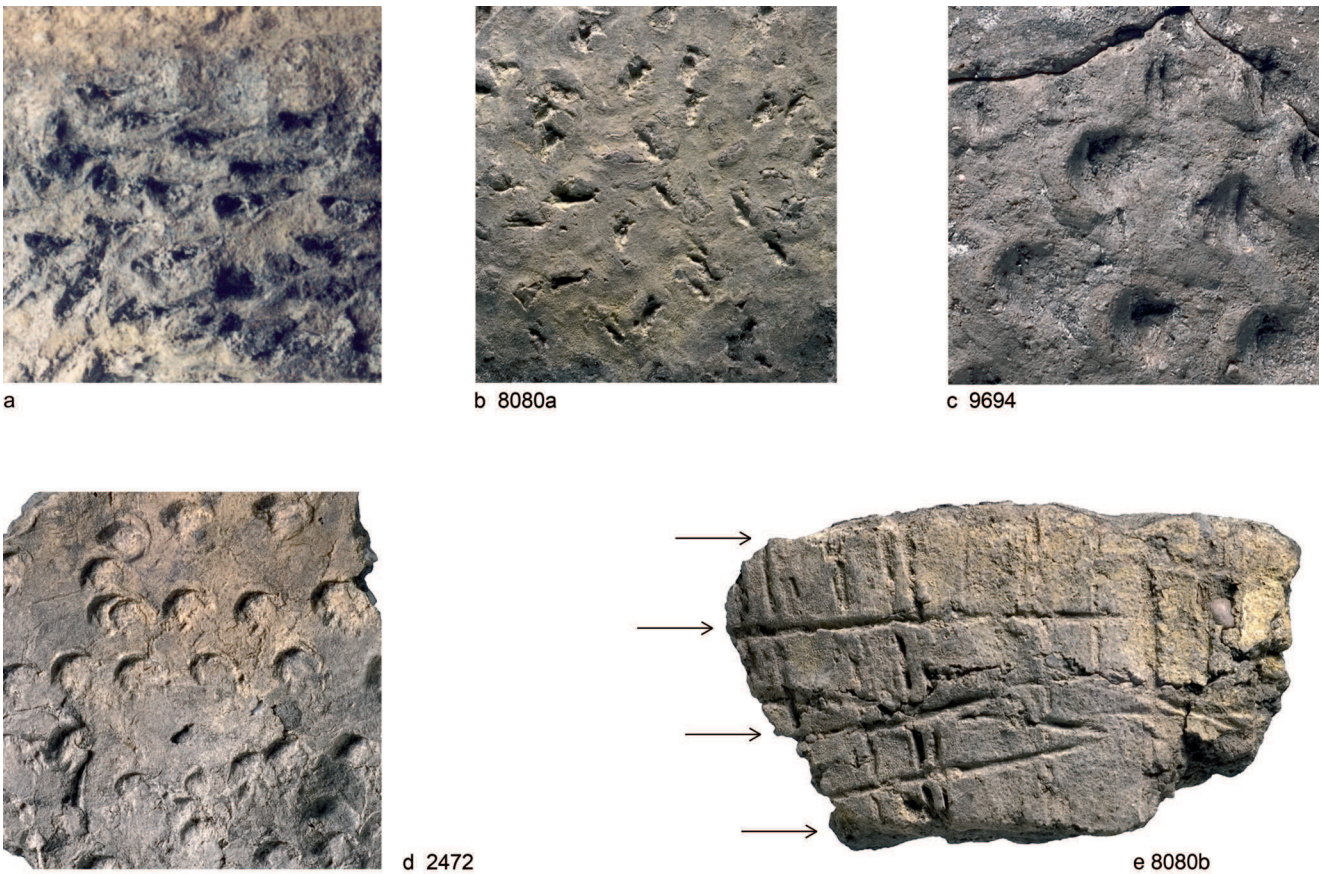

Figure 6.4 Typical aspects of the Schipluiden pottery (scale 1:1).
a, b, d spatula impressions
c fingertip impressions
e vertical lines, horizontal fractures reflecting joints of coils

Firing

The last step in the production process was firing. The absence of kiln remains and the poor quality of the pottery suggest that the pots were fired in an open fire. The colour of the pots could be influenced by controlling the influx of oxygen. Plenty of oxygen leads to a light-grey to yellow-red fabric; reducing the influx of oxygen by covering the fire with sods leads to a dark-grey to black fabric. The atmo-sphere in which the pots were fired was analysed on the basis of the colour of the cross-section of the sherds. As a rule of thumb, the colour of the central part is taken to be indicative of the first stage of firing; the colours of the exterior and interior surfaces are assumed to indicate the firing conditions in the last stage. Most sherds have a dark cross-section all through; sherds of which only the exterior is light-coloured may have been fired in a hot oxygen-rich atmosphere (for use as a cooking vessel). Other sherds have a dark centre and a lighter exterior and interior, suggesting a low oxygen concentration in the first firing phase and a high oxygen concentration in the second phase. The other sherds have cross-sections comprising other colours. The percentages suggest that firing in an atmosphere with a low oxygen content was preferred: the dark colour results from deliberate influencing of the influx of oxygen. There is no relation between the firing atmosphere and the tempering agents.

6.4.2 Use

Food remains / soot

746 sherds were found to be encrusted with food remains or soot, suggesting that many, if not all of the pots were used as cooking vessels. Analysis of food remains found on seven sherds showed that porridge was made (see chapter 20). Remains were found encrusted on interior surfaces (387 sherds), exterior surfaces (280) and both surfaces (79).

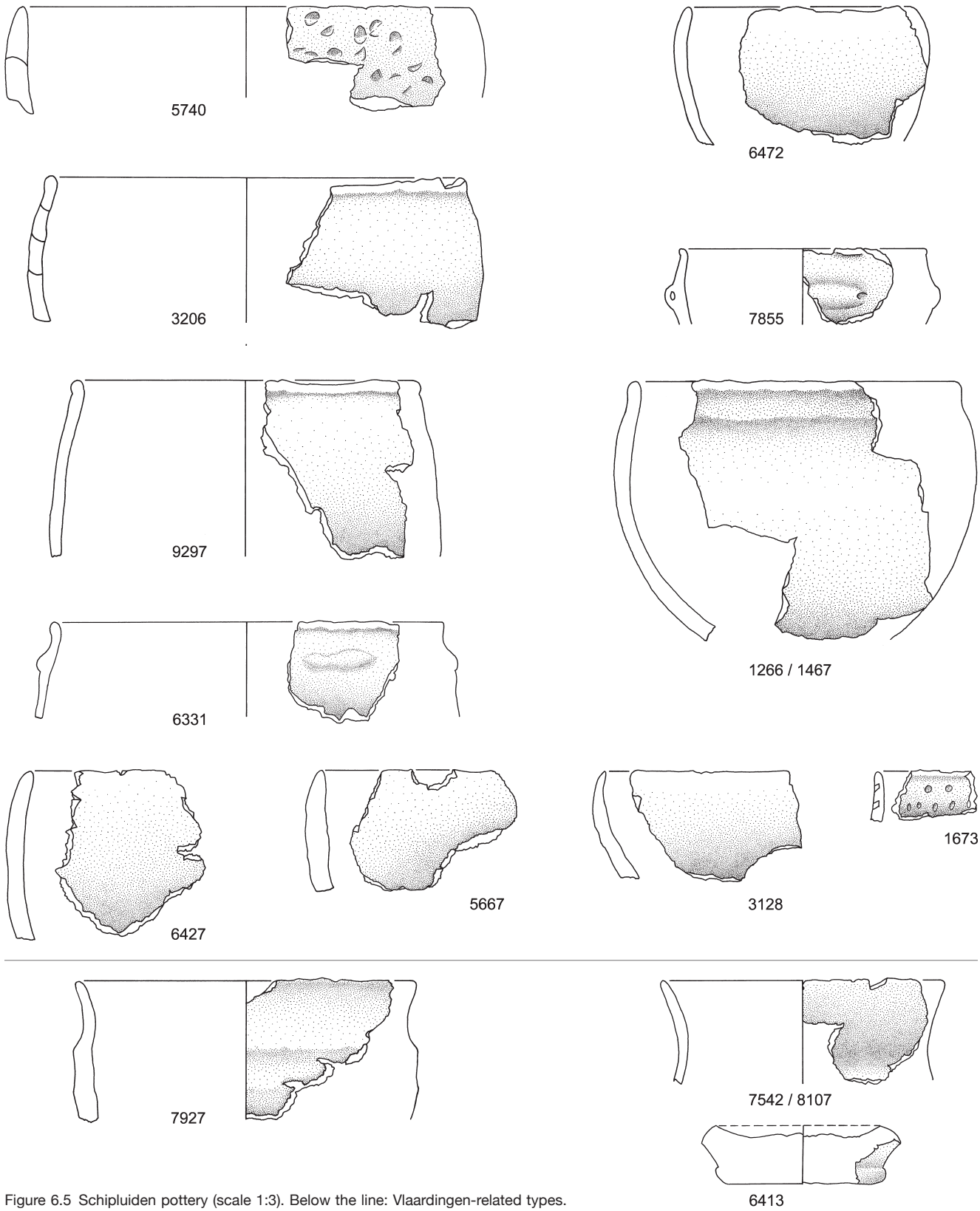

Figure 6.5 Schipluiden pottery (scale 1:3). Below the line: Vlaardingen-related types.

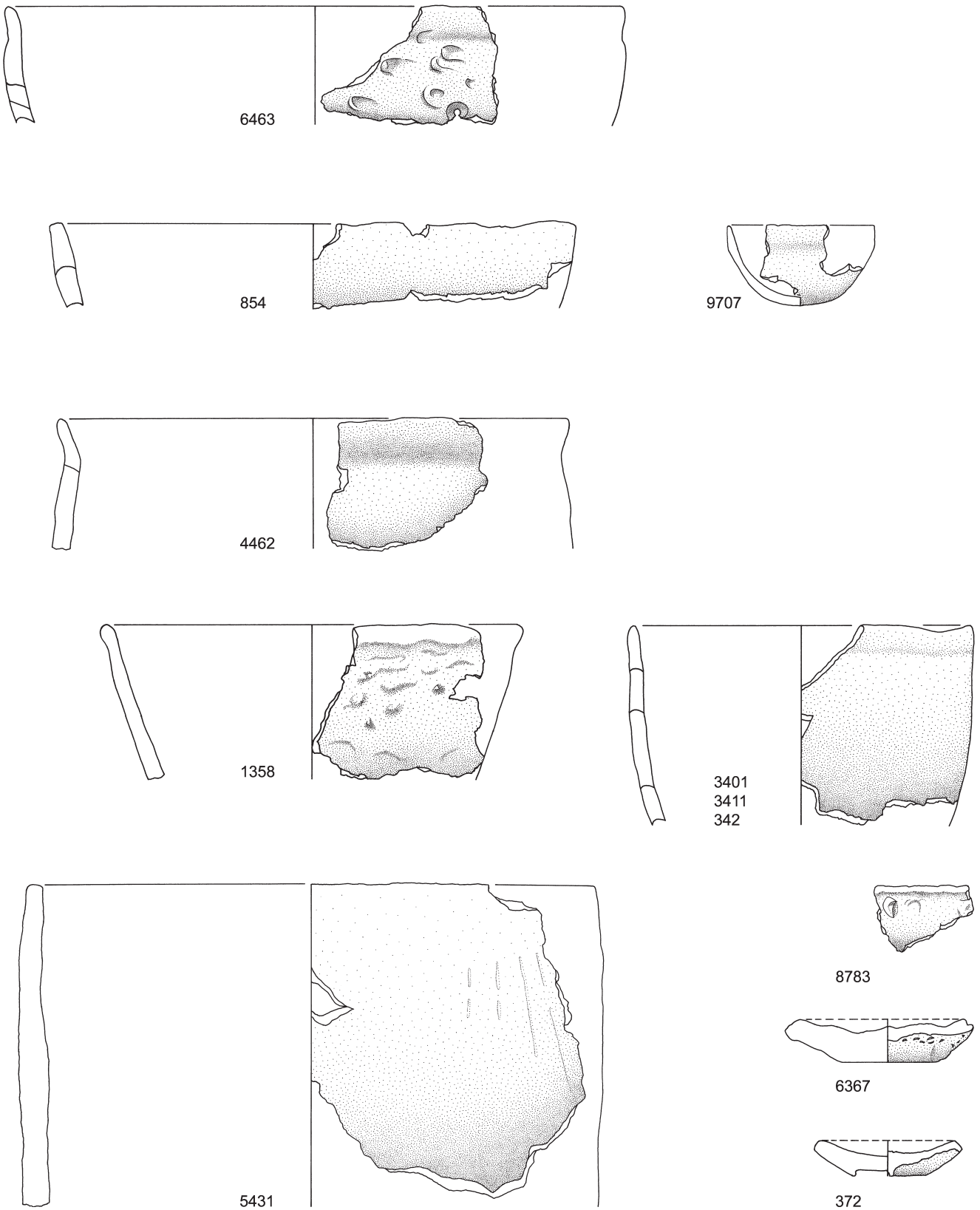

Figure 6.6 Schipluiden pottery (scale 1:3).

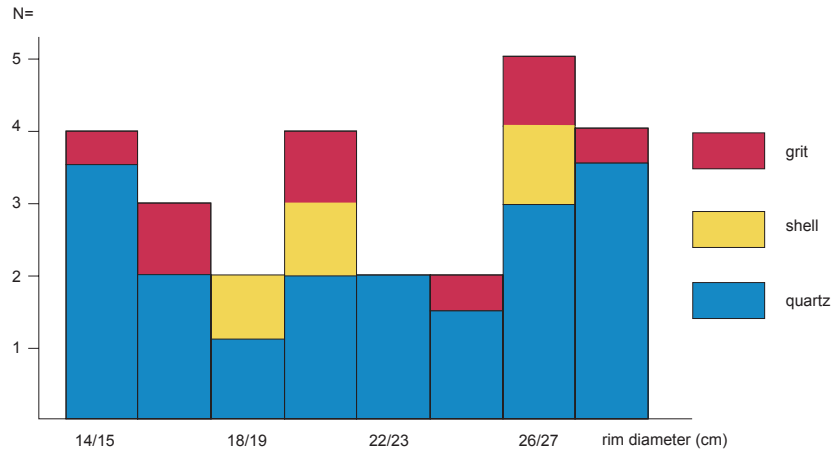

Figure 6.7 Tempering agents in relation to rim diameters.

temper	quartz	grit	grog	plant	shell	all
N=	1881	754	165	477	745	3922
wall decoration %	15.5	8	10.3	5	1.1	10.2
single fingertip	62.7	55	82.4	66.7	75	63.6
paired fingertip	3.8	5	–	4.2	–	3.7
single fingertip + spatula	0.7	–	–	–	–	0.5
spatula	27.4	8.3	17.6	20.8	–	23.4
hollow spatula	0	0	–	4.2	–	0.2
groove lines	4.5	30	–	4.2	12.5	7.5
indet.	1	1.7	–	–	12.5	1
Totals	*100*	*100*	*100*	*100*	*100*	*100*
av. wall-thickness (mm)	10.2	10.6	9.5	11.1	11.3	10.6

Table 6.3 Pottery, wall decoration and average wall thickness versus tempering agents.[1]

Repair holes

Holes with a typical hourglass cross-section were found in 24 sherds (*e.g.* no. 6463, fig. 6.6). The holes were produced after firing, probably to repair fractures. Small fracture lines – resulting from thermal stress after repeated use of a cooking vessel – will have been repaired by making holes on either side of the fracture and tying the parts together with a cord or a leather thong. This way, a cooking vessel could be given a new lease of life as a storage vessel.

6.4.3 *Chaîne opératoire or chaînes opératoires?*

The concept of *chaîne opératoire* proposed by Lemonnier (1986) is often used to describe the technological framework in which artefacts were produced. The concept is gradually becoming a common tool in the study of flint assemblages, but it also holds promise in the study of pottery. In the case of pottery, it entails considering described attributes in the sequence in which a pot was produced and used. The various production stages will be considered below, except for the final discard stage, which will be discussed in a separate section (section 6.4.4).

The Schipluiden pottery was produced from locally available clays. The clay was tempered with mostly low densities of various tempering agents and formed into bucket- and barrel-shaped pots with diameters of between 14 and 30 cm using the coiling technique. In some instances the pottery was subse-quently decorated with fingertip or spatula impressions applied to the wall surface. The rim zone (approx. 2 cm) was left undecorated. Pots were fired in an open fire in which the influx of oxygen was to some extent controlled, resulting in a dark fabric. The pots were used as cooking vessels and storage vessels. Their life ended as sherd debris in and around the settlement. A few sherds saw rebirth as grog temper in new pots.

With this general description as a starting point, the question arises whether other attributes were predetermined in the second stage of the production process, the tempering of the clay. A positive answer to this question would imply that we are dealing with wares with specific characteristics, and not with a single large group of pottery, in other words, that there were several *chaînes opératoires*. In the case of most attributes no relation to the tempering agents was

observable. Below, the attributes that seem relevant to the discussion will be considered one by one.

First of all, the selection of tempering agents is noteworthy. There was apparently a cultural preference for quartz and other types of stone that were not locally available that was so strong that they were deliberately imported. The quartz, grit and grog tempers were processed in more or less the same way, leading to relatively homogeneous fabrics containing low densities of tempering agent(s) with an average particle size of 2 mm. Quartz was evidently the most preferred tempering agent; it was replaced with grit (and grog) if not available. Shell temper is uncommon in the Netherlands, but was frequently encountered in the Schipluiden pottery. The divergent characteristics in terms of temper density suggest that the shell-tempered pottery represents a second type of ware at this site. On average, shell temper was found in a higher density than quartz temper. Perhaps their white colour made shell fragments a suitable replacement for quartz. It should however be borne in mind that shell temper will have been burnt away from the surface during firing, leaving no visual reminder of the employed tempering agent. When this division between pottery tempered with quartz/grit/grog and shell-tempered pottery is followed through it is found that the choice of temper admixtures follows similar lines (fig. 6.8). Quartz and grit were evidently mutually replaceable favourite admixtures, while shell temper is generally encountered without admixtures.

Secondly, this division is also observable in the average wall thickness. The sherds tempered with quartz, grit or grog have an average wall thickness of 10.3 mm; the average wall thickness of shell-tempered sherds is 11.3 mm. A third attribute in which this contrast is observable is the presence of wall decoration. Wall decoration is relatively abundant (13.2%) on sherds tempered with quartz/grit/grog whereas shell-tempered sherds are rarely decorated (1.1%).

The patterns outlined above are based on the assemblage as a whole; a subdivision according to the three occupation phases would be preferable. Such a subdivision is presented in table 6.4. It shows that the aforementioned differences between quartz-tempered and shell-tempered sherds in terms of average wall thickness and wall decoration percentage are observable in pottery from all the occupation phases (see also section 6.5.2). This is a strong argument in favour of the existence of two wares, and hence two *chaînes opératoires*, the first ware being relatively thick, shell-tempered and virtually undecorated and the second (usually) quartz-tempered, thinner and more frequently decorated.

phase	1	2a	2b	3 Unit 10	3 Unit 11
av.wall thickness (mm)					
quartz	11.6	10.4	10.1	10.1	9.8
shell	12.8	11.6	10.8	11.1	10.6
wall decoration %					
quartz	15.0	14.8	16.2	20.0	13.7
shell	1.0	1.1	4.0	–	4.0

Table 6.4 Pottery, average wall thickness and percentage of wall decoration for sherds tempered with quartz and shell per occupation phase.[1]

6.4.4 Discard

After some time, the Schipluiden pots were discarded. Fitting sherds were found at maximum distances of 10 m. The small number of refits (ten) suggests that pots were generally not discarded in one go.[2] When a pot broke beyond repair, some fragments were discarded while other, larger ones were used for storage purposes (see above) or perhaps as bowls or spoons (although there is no evidence to support the latter forms of secondary use). In other words, pots were discarded over a period of time and their remains ended up scattered across the site – and probably also beyond. Some pots are easily identifiable among the sherds. Many of the sherds concerned do not form part of the assemblage. They were destroyed by weathering or trampling, discarded (just) outside the excavated area or taken away on trips outside the site. A few sherds were ground to obtain grog for tempering new pots.

The discard patterns are illustrated in figs. 6.9-10. The general pattern (fig. 6.9) is that of a dense spread on the southeastern slope and a thinner spread on the northwestern slope. It should be borne in mind that erosion resulted in the almost complete absence of finds on the central part of the dune (chapters 2 and 4). A breakdown of this general pattern into phases 1, 2a, 2b and 3 yields no new information (figs. 6.10a-d). No discrete patterns of, for example, types of decoration are observable within these general patterns. The fact that subsets of sherds based on temper or decoration all reveal similar patterns suggests that the whole site was occupied throughout the entire period of occupation. There are no small-scale spatial patterns suggesting shifting occupation or households with individual pottery characteristics.

The second group of burnt clay objects consists of lumps of daub. Only 22 of such lumps were recovered, evenly distributed over the excavation area and the various units.

6.5 Conclusion

6.5.1 General

The locally available clay was mixed with different types of temper and formed into bucket- and barrel-shaped pots with diameters of between 14 and 28 cm with the aid of the coiling technique. The pots were decorated with fingertip or spatula impressions applied to the wall surface. When the clay had dried, the pots were fired in an open fire in which

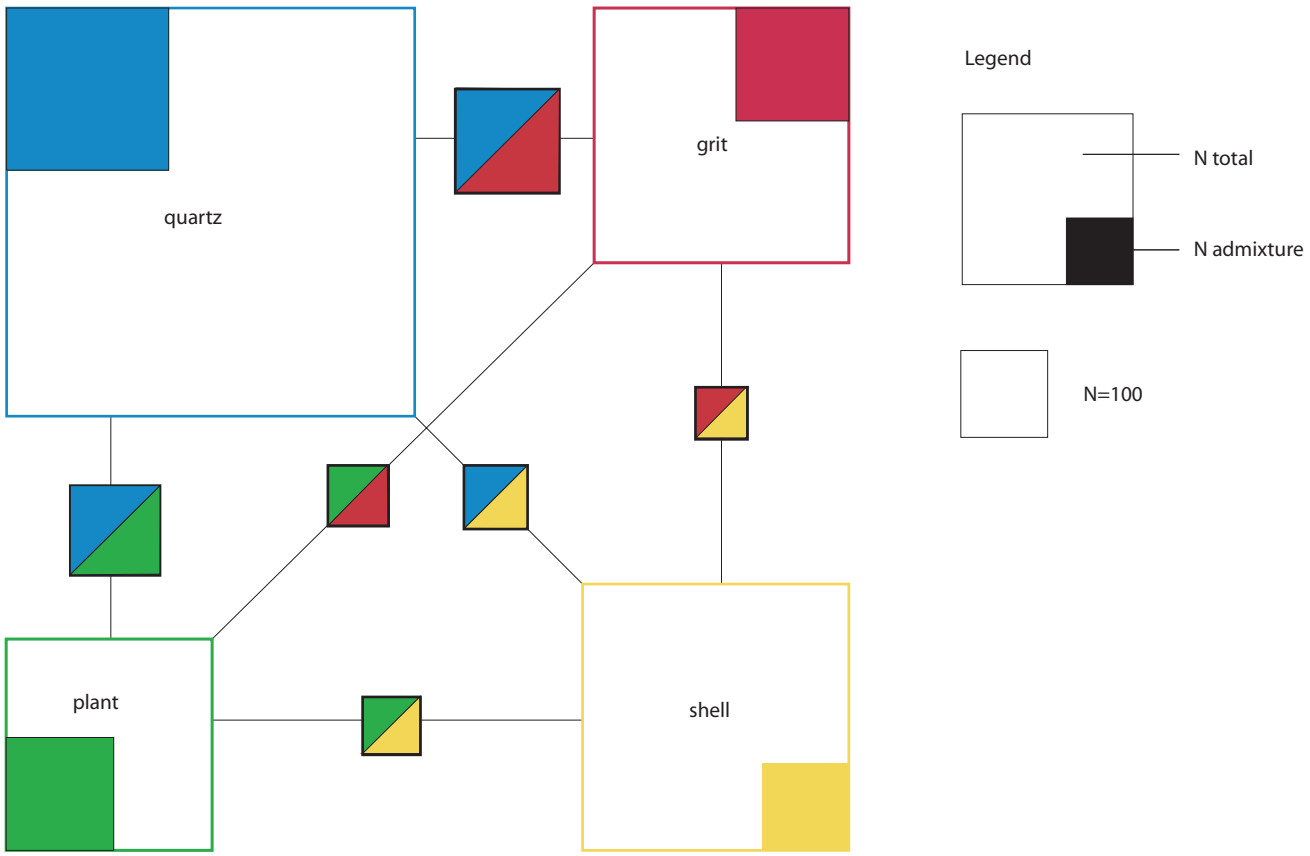

Figure 6.8 Admixtures of tempering agents. Open squares: total number of sherds containing a specific tempering agent. Colour: sherds with admixtures.

the influx of oxygen was to some extent controlled. The pots were used as cooking vessels and storage vessels.

All characteristics suggest that the Schipluiden pottery is to be classified as belonging to the Hazendonk pottery group. This is further supported by the ^{14}C dates obtained for the site. A recent overview of the sites of this group can be found in Raemaekers 1999. In this section, the Schipluiden pottery will be compared with two major assemblages from the same region, notably those of Ypenburg (Koot/Van der Have 2002; Raemaekers unpublished report) and Wateringen 4 (Raemaekers 1997), and the eponymous assemblage from the Hazendonk site, further upstream (Louwe Kooijmans 1974; Raemaekers 1999).

The Schipluiden assemblage is the largest set of Hazendonk 3 pottery available for study. More important is that this assemblage has for the first time made it possible to subdivide the Hazendonk 3 pottery into three phases (see section 6.5.2). A key question is whether these three phases are of relevance to the Schipluiden site only, or allow more precise dating of the other Hazendonk 3 assemblages, too. This question is rather difficult to answer due to the possibility of differences between assemblages being attributable not only to chronological changes in style, but also to regional or local preferences for, for example, specific tempering agents or types of decoration.

Some of the sherd characteristics of the four sites are given in table 6.5. Two distinct patterns emerge from this table. First, there seems to be a major difference between Schipluiden and Ypenburg on the one hand and Wateringen 4 and the Hazendonk on the other. The pottery from the first two sites shows a correlation between tempering agents, average wall thickness and percentage of wall decoration not observable in the earthenware from the other two sites. Secondly, there is a distinct difference in the frequency of different types of decoration between the pottery of the three sites on the coastal dunes and that of the Hazendonk river-dune site. Grooves were a popular form of decoration at Hazendonk but are much less frequently observed on the pottery from the coastal area. So there is a considerable degree of variation in terms of tempering agents and

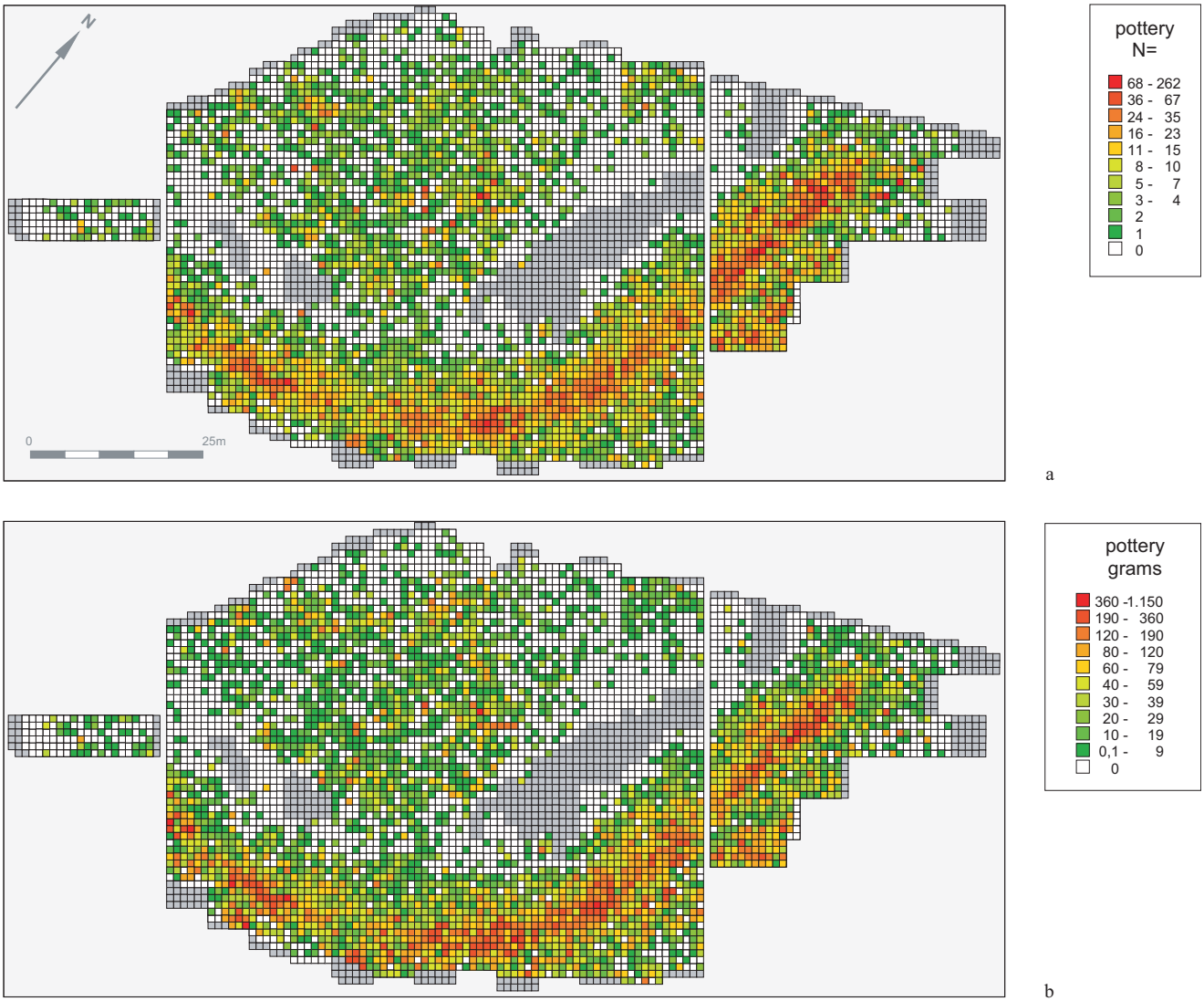

Figure 6.9 Distribution patterns of manually collected pottery per square metre; number of finds (a) and total weight (b).

decoration within the relatively well-defined Hazendonk pottery group. This variation occurs within a group with strong morphological and technological coherence and a common vocabulary of decoration types and themes (covering the entire wall surface except for the top 2 cm). The correlation between tempering agents, average wall thickness and frequency of decoration is also observable in the pottery from Ypenburg, but not in that from Wateringen 4 and the Hazendonk. This difference could be associated with differences in the length of occupation. Schipluiden and Ypenburg were both occupied for several centuries, whereas Wateringen was probably occupied for only one or a few generations. The Hazendonk 3 find layer at the Hazendonk site was probably produced in an even shorter period.

The pottery of two important Hazendonk group sites further upstream is more difficult to relate to that of Schipluiden. The sites in question are Gassel (Verhart/Louwe Kooijmans 1989) and Het Vormer (Louwe Kooijmans 1980), both near Nijmegen. The pottery from these sites was analysed using a different descriptive system. This prohibits a quantitative comparison. A qualitative comparison shows that in terms of morphology, technology (tempering agents, coils) and decoration, the pottery from these sites is definitely to be classified as belonging to the Hazendonk

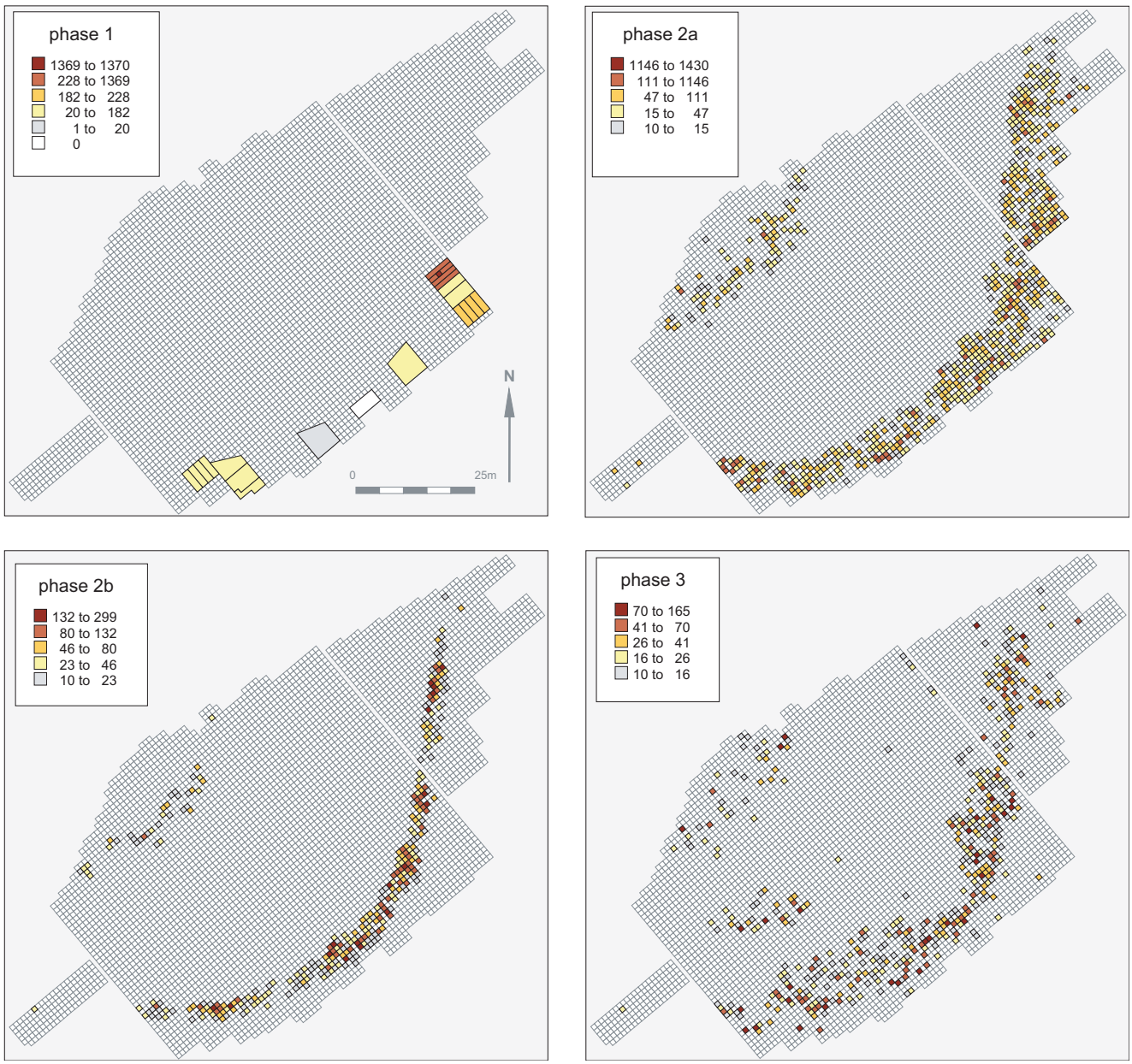

Figure 6.10 Distribution patterns of pottery from phases 1, 2a, 2b and 3.

group. The morphological system developed by Louwe Kooijmans for the pottery of Het Vormer comprises three basic types: bowls (I), beakers (II) and barrels (III). The beakers and barrels are represented in all Hazendonk assemblages; the bowls are absent from some.

The youngest ^{14}C date obtained for Schipluiden is younger than the oldest date obtained for the Vlaardingen group, the successor of the Hazendonk group in large parts of the western and southern Netherlands (Lanting/Van der Plicht 1999/2000, 68). Although it could be argued that Hazendonk and Vlaardingen were to some extent contemporary, it is preferable to use the calibration curve to pinpoint the transition from the Hazendonk group to the Vlaardingen group. The calibration curve has a large plateau around 4500 BP, spanning the period *c.* 3250-3125 cal BC (Stuiver *et al.* 1998, fig. A14). The available dates for Schipluiden

	Schipluiden	Ypenburg	Wateringen 4	Hazendonk
N=	4557	646	1474	363
tempering agents (%)				
quartz	47.7	43.0	87.1	92.3
grit	19.5	–	20.8	–
grog	4.1	9.4	48.5	19.3
plant	12.1	49.4	73.7	73.8
shell	19.3	6.2	–	–
average wall-thickness (mm)	10.6	8.7	9.9	9.2
quartz-tempered	10.2	7.2	9.7	9.3
grit-tempered	10.6	–	9.8	–
grog-tempered	9.5	8.8	9.6	8.5
plant-tempered	11.1	9.9	9.8	9.2
shell-tempered	11.3	11.6	–	–
wall decoration (%)	9.6	15.9	29.3	28.4
quartz-tempered	15.5	30.0	31.7	26.0
grit-tempered	8.0	–	26.1	–
grog-tempered	10.3	50.8	29.9	25.7
plant-tempered	5.0	6.6	28.5	26.1
shell-tempered	1.1	0	–	–
wall decoration types (%)				
single fingertip	61.6	66	56.0	35.0
double fingertip	3.7	3	9.2	–
single fingertip + spatula	0.5	2	–	–
spatula	23.5	31	24.5	27.2
hollow spatula	0.2	–	5.3	4.9
groove lines	8.7	1	–	32.7
indet.	1.8	–	4.9	–

Table 6.5 Comparison of the Schipluiden pottery with pottery from Ypenburg (Raemaekers unpublished), Wateringen 4 (Raemaekers 1997) and Hazendonk, level Hazendonk 3 (Raemaekers 1999). N.B. All data are based on a minimum sherd weight of 10.0 gr.[1]

(chapter 2) and the one Vlaardingen 1a date (obtained for a tree trunk) make a date of around 3200 most plausible for the Hazendonk/Vlaardingen transition. This would make the Schipluiden pottery from occupation phase 3 the youngest Hazendonk pottery so far known.

The question is whether the transition from Hazendonk to Vlaardingen is observable in the Schipluiden pottery. It would for example be nice to observe a gradual decrease in the percentage of wall decoration, ending in the virtually undecorated Vlaardingen pottery. Unfortunately, this is not the case: the youngest Schipluiden pottery shows the highest percentage of decoration. Nevertheless, there are a few elements in the Schipluiden pottery that are reminiscent of Vlaardingen pottery (fig. 6.5). These elements are three fragments of S-shaped pots (one from phase 3, nos.7927, 7542/8107), one pot with an elongated rim (no. 1059/1060, not illustrated), two protruding foot bases (phase 2) and one sherd with a rim perforation (phase 2).[3] All in all, this is not very strong supporting evidence, but, with the other Hazendonk sites having yielded no evidence whatsoever, it is at least something to go on.

6.5.2 Trends

The sequence of the clay and peat deposited around the dune theoretically allows a detailed analysis of the development of pottery characteristics during the occupation period. The majority of the sherds could however not be used for such an analysis because they were recovered from units containing remains that may derive from different phases. So only sherds recovered from the southeastern slope of the dune were used. Phase 1 comprises the sherds from Unit 19, phase 2a the sherds from Units 17 and 18 and phase 3 the sherds from Unit 10. The limited amount of material from phases 1 and 3 prohibits major conclusions. Table 6.6 presents the sherd characteristics of the three phases. There are no clear-cut present/absent differences between the phases, but a number of trends are nevertheless observable in the characteristics. First of all, the sherds from phase 2a are on average thinner, less often tempered with shell and more frequently decorated than those from phase 1. Compared with the sherds from phase 2a, the phase 3 sherds are more often tempered with quartz and grit than with shell, and show a higher percentage of decoration. The proportion of sherds with dark cross-sections shows a decrease. A development in pottery morphology cannot be proposed on the basis of the limited number of large pottery fragments that can be ascribed to one of the three phases (see figs. 6.5-6).

On the basis of this framework, characteristics of sherds from Units 15/16 (phase 2b, but possibly with some admixture of older remains) and Unit 11 (phase 3, again possibly with some admixture of older remains) were included in the diachronic analysis (table 6.6). The analysis showed that the characteristics of the sherds from Units 15/16 are strikingly intermediate between those of phase 2a (Units 17/18) and phase 3 (Unit 10). This suggests that the remains from Units 15/16 are also intermediate in age, with comparatively little admixture from the earlier phases 1+2a.[4] The characteristics of the sherds from Unit 11 are most comparable with those of the sherds from Unit 10, suggesting limited admixture of older remains in Unit 11.

Table 6.4 shows that the characteristics of the pottery from Wateringen 4 and Hazendonk have most in common with those of the sherds from phase 3, which would place the pottery from those sites relatively late in the chronology of the Hazendonk group.[5] The shared characteristics are no/little shell temper and a relatively high frequency of

N=							%					
phase	1	2a	2b	3	3	total	1	2a	2b	3	3	total
Units				10	11					10	11	
number of sherds	153	1466	739	88	565	4557						
wall-thickness												
average (mm)	12.1	10.8	10.4	10.3	10	10.6						
temper												
quartz	33	559	383	46	363	2174	21.6	38.1	51.8	52	64.2	47.7
grit	29	275	151	32	90	887	18.9	18.7	20.4	36	15.9	19.5
grog	0	30	61	5	45	187	0	2.0	8.2	6	8.0	4.1
plant	12	185	83	10	60	550	7.8	12.6	11.2	11	10.6	12.1
shell	72	357	83	9	55	880	47	24.3	11.2	10	9.7	19.3
construction												
H-joins	80	713	391	41	268	2316	90	88.7	90.3	87	89.6	90.6
N-joins	9	90	41	5	28	230	10	11.2	9.5	11	9.4	9.0
Z-joins	0	1	1	1	3	9	0	0.1	0.2	2	1.0	0.3
total visible joints	89	804	433	47	299	2555	58.2	54.8	58.6	53	52.9	56.1
firing environment*												
ox-ox-ox	2	91	65	8	53	325	1.3	6.3	8.9	9	9.5	7.2
ox-ox-re	0	4	4	0	2	24	0	0.3	0.5	0	0.4	0.5
ox-re-ox	12	105	67	4	77	450	7.9	7.3	9.2	5	13.9	10.0
ox-re-re	3	26	43	8	46	224	2	1.8	5.9	9	8.3	5.0
re-ox-ox	2	17	5	0	6	50	1.3	1.2	0.7	0	1.1	1.1
re-ox-re	0	4	0	2	0	8	0	0.3	0	2	0	0.2
re-re-ox	12	182	107	12	102	664	7.9	12.6	14.7	14	18.4	14.8
re-re-re	121	1017	438	53	269	2755	80.1	70.3	60.1	61	48.5	61.2
wall decoration	8	128	83	13	60	438	5.8	9.5	11.2	15	10.6	9.6
single fingertip	5	87	54	3	34	270	62	68.0	65	23	57	61.6
paired fingertips	0	4	0	0	3	16	0	3.1	0	0	5	3.7
fingertip + spatula	1	0	0	0	1	2	12	0	0	0	2	0.5
spatula	0	24	20	7	13	103	12	18.7	24	54	22	23.5
hollow spatula	1	1	0	0	0	1	0	0.8	0	0	0	0.2
groove lines	0	10	8	3	9	38	12	7.8	10	23	15	8.7
indet.	0	2	1	0	0	8	0	1.6	1	0	0	1.8

* From left to right: inner side, centre and outer side.
ox = light (oxydation) colour; re = dark (reduction) colour.

Table 6.6 Pottery, detailed characteristics per phase.[1]

wall decoration. The similarities in the aforementioned characteristics suggest that the Ypenburg site, whose results have not yet been published, has a chronological range similar to that of Schipluiden.

notes

1 The total number of sherds in the tables is often smaller than the sum of the temper groups because sherds containing two or more tempering agents were counted more than once.

2 The small number of fits is partly attributable to the large number of sherds. The fits were found during the description of the sherds. In an analysis in which refitting is the main objective, such sherd descriptions could be used to assemble subsets of material with similar descriptions and carry out refit analysis.

3 Also known from Ypenburg (Raemaekers unpublished report)

4 These intermediate characteristics cannot be attributable to mixing of older and younger remains. By the time when the remains in Units 15/16 were deposited, occupation phase 3 had not yet begun.

5 The ^{14}C dates obtained for Wateringen 4 and Hazendonk however predate the Schipluiden phase 3 dates by some 200 years and coincide with the dates obtained for phases 1 and 2.

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