Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek

jaargang 24, 1974

AFKORTINGEN

APL	*Analecta Praehistorica Leidensia*
BAI	Biologisch-Archaeologisch Instituut, Groningen
BJ	*Bonner Jahrbücher*
B(K)NOB	*Bulletin van de(n) (Koninklijke) Nederlands(ch)e(n) Oudheidkundige(n) Bond*
BRGK	*Bericht der Römisch-Germanischen Kommission*
BROB	*Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek*
IJNA	*International Journal of Nautical Archaeology and Underwater Exploration*
IPP	Instituut voor Prae- en Protohistorie (Albert Egges van Giffen Instituut), Amsterdam
JRGZM	*Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz*
JVT	*Jaarverslag van de Vereeniging voor Terpenonderzoek*
MA	*Medieval Archaeology*
MM	*Mariner's Mirror*
NAFN	*Neue Ausgrabungen und Forschungen in Niedersachsen*
NAP	Nieuw Amsterdams Peil (Dutch Datum Level)
NDV	*Nieuwe Drents(ch)e Volksalmanak*
NKNOB	*Nieuwsbulletin van de Koninklijke Nederlandse Oudheidkundige Bond*
NNU	*Nachrichten aus Niedersachsens Urgeschichte*
OML	*Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden te Leiden*
PPS	*Proceedings of the Prehistoric Society*
RMO	Rijksmuseum van Oudheden, Leiden
ROB	Rijksdienst voor het Oudheidkundig Bodemonderzoek
TAG	*Tijdschrift van het Koninklijk Nederlands(ch) Aardrijkskundig Genootschap*
TZ	*Trierer Zeitschrift*
VORG	*Verslagen en Mededeelingen van de Vereeniging tot Beoefening van Overijsselsch Regt en Geschiedenis*

NOOT

Het aardewerk is op schaal 1:4 afgebeeld, tenzij anders aangegeven; de profielen van het handgevormde aardewerk zijn wit, die van gedraaid aardewerk zijn zwart getekend.

Unless otherwise stated, the pottery is drawn to a scale of 1:4; the profiles of hand-made pottery are represented in white, of wheel-thrown pottery in black.

BERICHTEN VAN DE RIJKSDIENST
VOOR HET OUDHEIDKUNDIG BODEMONDERZOEK

Staatsuitgeverij – 's-Gravenhage 1976

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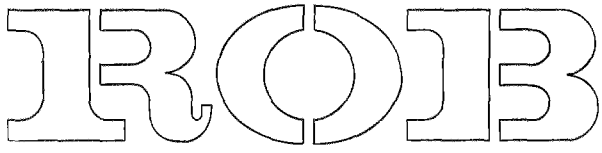

Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek

Proceedings of the State Service
for Archaeological Investigations
in the Netherlands

jaargang 24, 1974

REDACTIE

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INHOUD

R.S. HULST/L.TH. LEHMANN*

The Roman Barge of Druten

With a contribution by W. Groenman-van Waateringe

figs. 1–10; pls. I–IV

INTRODUCTION

In a country like the Netherlands, which historically and economically has been and is so closely connected with the water, the discovery of a shipwreck is not a rare occurrence. Because of the abundance of water, however, systematic and thorough excavation is almost inevitably a very costly affair. The Roman ship at Druten is a fortunate exception to this rule since the site of discovery was a large, deep construction-trench where the subsoil water was artificially kept at a very low level; consequently, the work could be done on a dry location. Investigations of this kind depend greatly on the other parties concerned. Both the principal and the contractor of the construction project were quite willing to cooperate, but unfortunately

* L.Th. Lehmann wrote the chapters 'Description of the Wreck,' 'Discussion of the Ship,' 'Wood Analysis,' and 'Finds: Metal'; R.S. Hulst wrote the rest of the article.

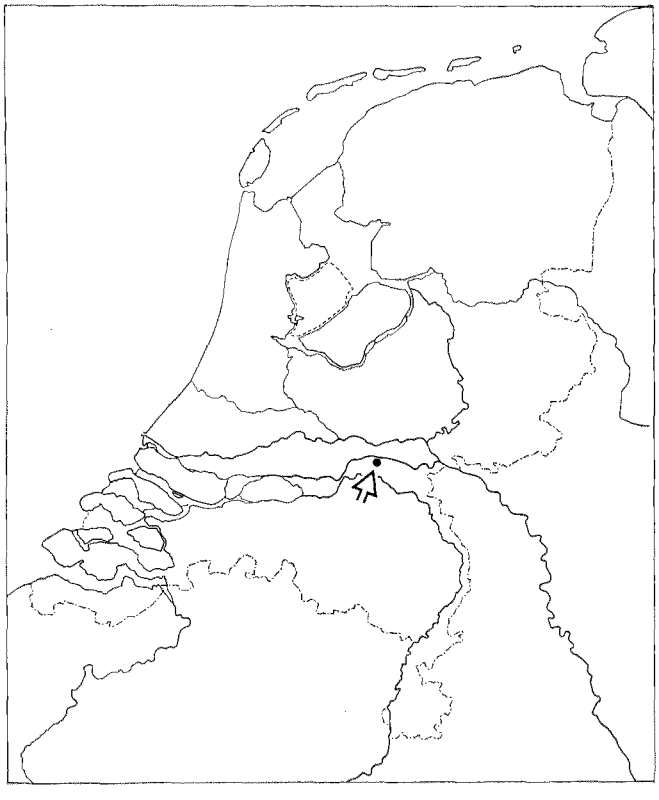

Fig. 1a

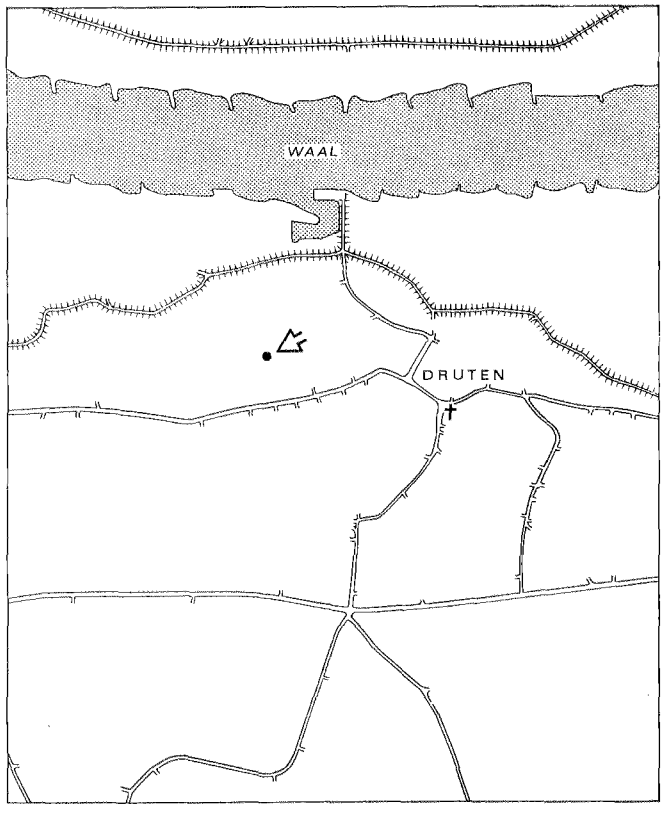

Fig. 1b Situation, scale 1:25,000

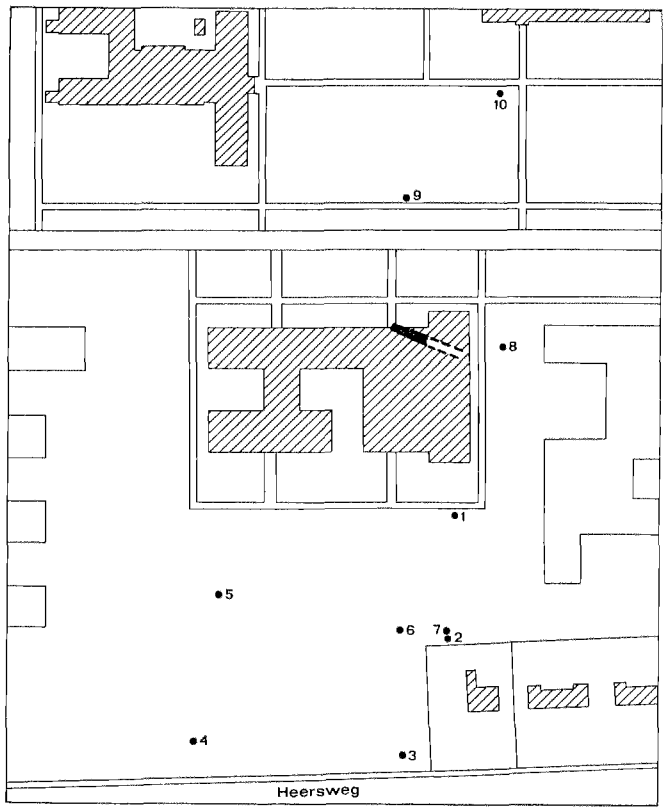

Fig. 2 Situation of the barge in the construction-trench, location of borings, scale 1:2,500

the building time-schedule allowed for no more than three days' excavation. It is thanks especially to the efforts of the great number of the people involved that the result of this rescue dig can be presented in this publication.
The construction-trench was dug for a building for the auxiliary medical services of the Boldershof Institute (Stichting Boldershof) at Druten (fig. 2). On 17 August 1973, R.S. Hulst supervised the removal of the eastern section of the ship from the construction-trench. The day before, some of the ship's timbers had already been taken away, so that the exact length of this part was difficult to estimate, although it was probably about 11 metres. The condition of most of the wood could be termed poor. On this first occasion, a general impression was obtained of the ship's construction. After permission had been obtained to work on the site, the remains of the shipwreck could be further examined on 4, 6, and 7 September. The subject was recorded photogrammetrically by De Waal Archi-Foto B.V., Hattem (fig. 5). Moreover, great care was taken to describe and record all details that appeared to be of value in any way. As a result of the very limited time available, some data are, of course, missing. A fragment was taken from the northwestern part of the ship and sent to the archaeological laboratory for ships of the State Service for the IJssel Lake Polders (Rijksdienst voor de IJsselmeerpolders) at Ketelhaven (pls. II–III).[1]

THE GEOLOGICAL SETTING OF THE SHIP

The site of the discovery lies a short distance to the west of the centre of the town Druten, 300 m on the landside of the medieval Waal River dike (fig. 1b).
The wreck lay embedded in a layer of fine to medium-coarse river-sand about 1.50 m thick (fig. 3). Blue clay containing fine sand was found under this layer of sand. The coarsest section of the sand stratum appeared in a layer between 5.09 m and 5.41 m +NAP, separated from the underlying sand by a thin layer of clay about 0.02 m thick. Higher up in the sand there was a second thin layer of clay. Overlying this sandy deposit was a stratum consisting of sandy clay and fairly heavy clay, the clay content increasing towards the top. The top lay at 6.85 m +NAP. All these deposits are calcareous. Only the clay at the top is deficient in lime.
These deposits are characteristic for a so-called meander belt,[2] that is, the bed in which a river flows throughout its existence. When the discharge capacity of the river decreases, sands are no longer deposited. At the very end of the river's life span only a small gully, filled with clay, remains. Such a gully was discovered in a boring 85 m north of the wreck (fig. 4). The contents of the gully, at first sandy clay and then above, in succession, light and heavy clay, are rich in lime and thinly covered with humus at the top. The top stratum lies at 5.68 m +NAP. The influence of the gully is still present 40–50 m north of the wreck. The gully is covered with a 0.85-m-thick layer of lime-deficient, heavily textured basin-clay, which is laterally connected with the clay of the top stratum at the findspot of the ship.
The stratigraphical position of the ship suggests that the deposits are from the Roman Waal, 'latior et placidior (Rheno) Vahalis'.[3] Borings have not shown clearly how

1 The wood is being used in the experimental phase of the wood preservation study at Ketelhaven.

2 Havinga 1969, 17 and 32–3.
3 Tacitus, *Ann.* II, 6.

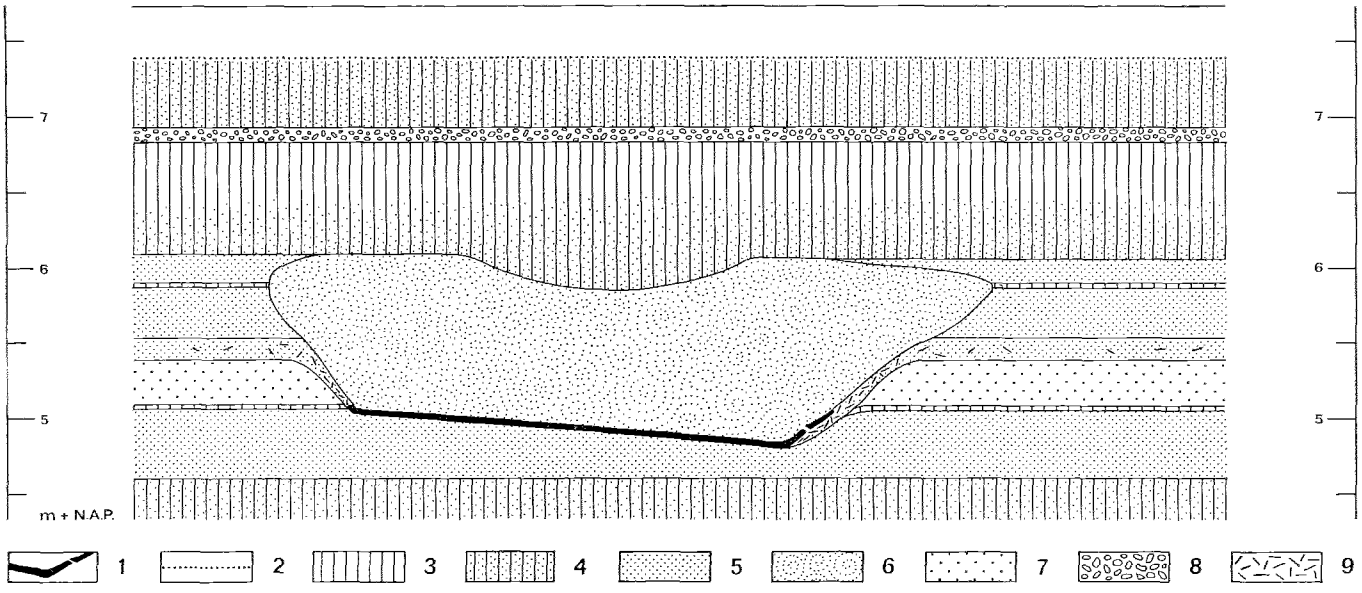

Fig. 3 Schematic section through the eastern end of the excavation, scale 1:50; 1. shipwreck; 2. topsoil; 3. clay; 4. sandy clay; 5. sand, fine; 6. turbulent sediments; 7. sand, coarse; 8. gravel; 9. wood-particles

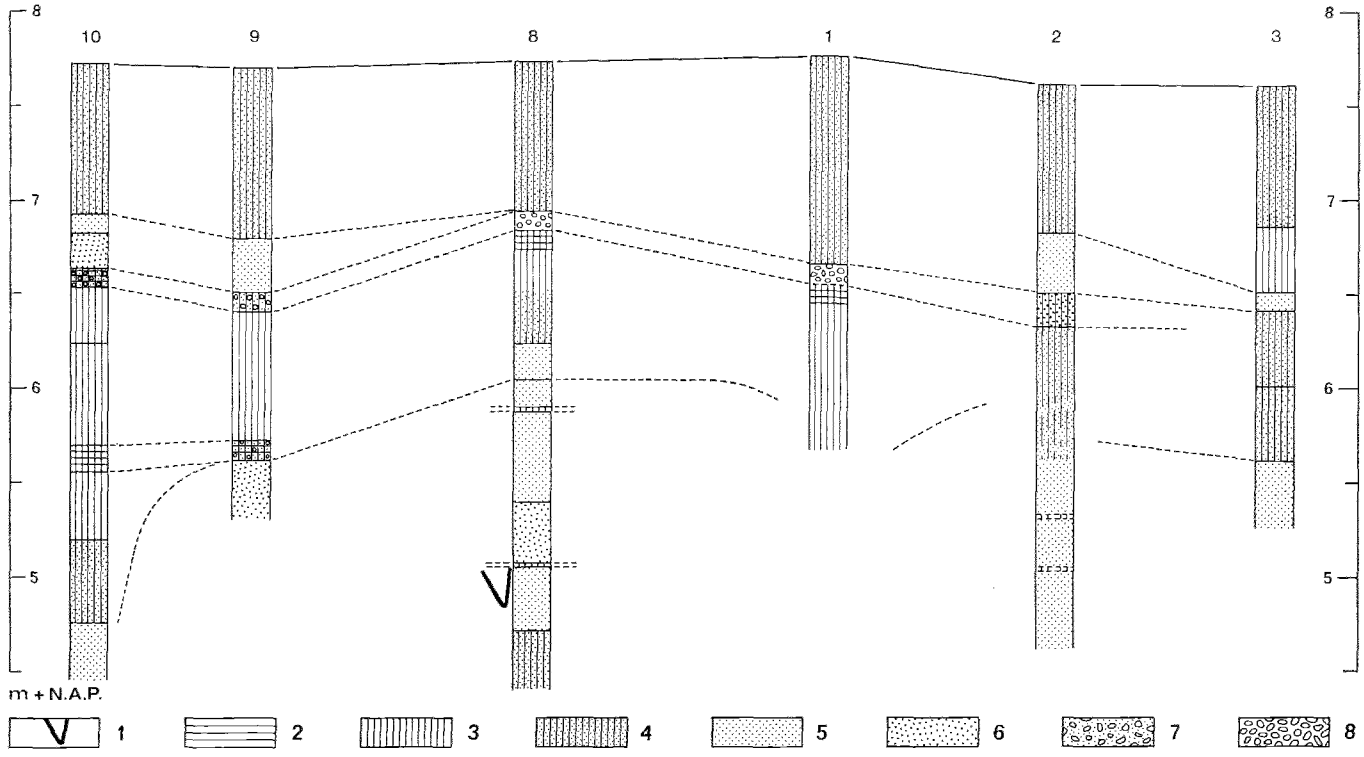

Fig. 4 Geological setting of the barge; borings and hypothetical connection; 1. shipwreck; 2. vegetation-level; 3. clay; 4. sandy clay; 5. sand, fine; 6. sand, coarse; 7. sand with gravel; 8. gravel

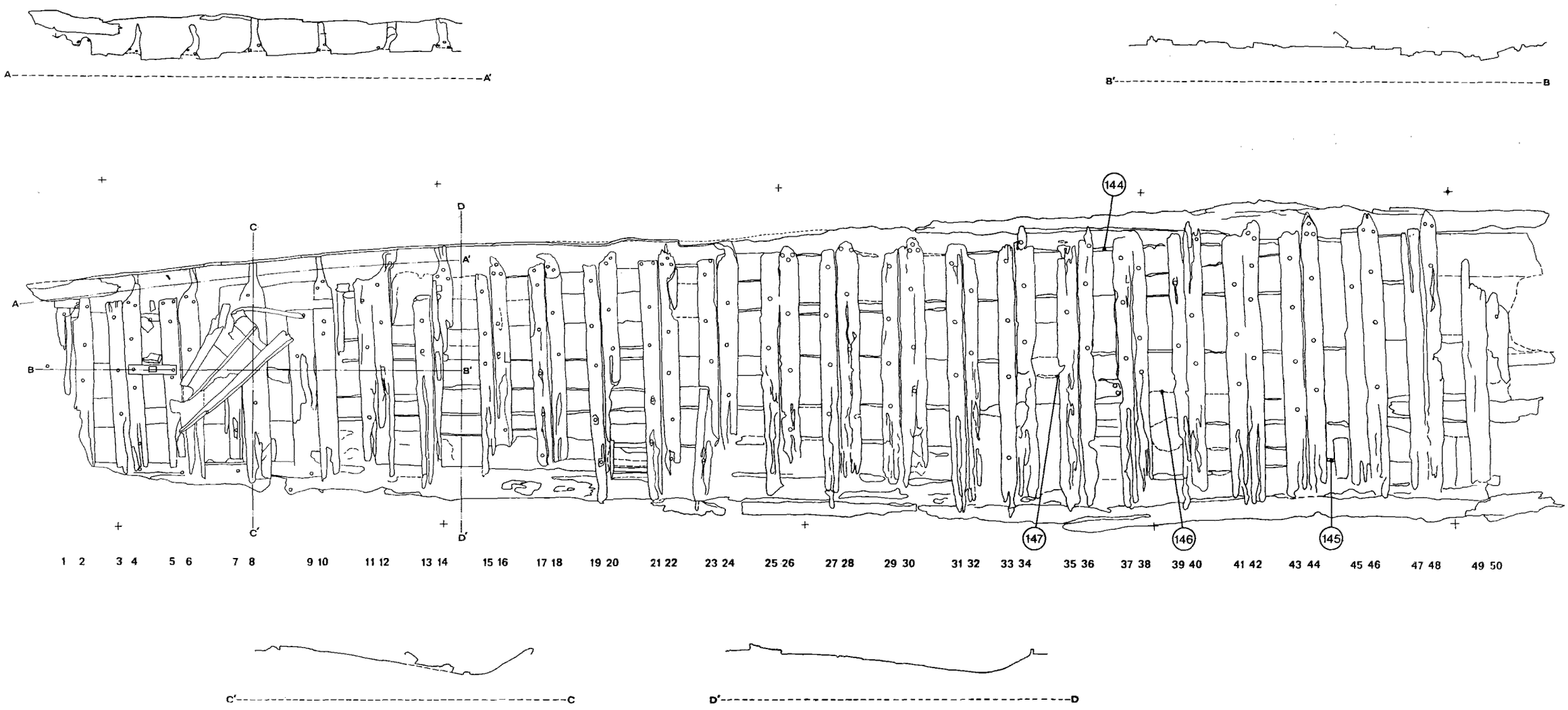

Fig. 5 Photogrammetrical record, scale 1:50 (De Waal Archi-Foto B.V.); floor-timber numbers and numbers of IPP-samples (see Appendix, p. 21)

far the meander belt extends to the south. In any case, identical deposits occur at a distance of *c.* 100 m in a southern direction. It is even quite possible that the shoreline lay double or more this distance away.

At what level did the ship first come to rest? We assume that the specific movements that water makes when encountering an obstacle gradually propelled the ship to a somewhat lower level; how much lower is not, of course, known. The possibility should be considered, however, that there is a relationship between the wreck and the layer of coarser sand which occurs directly above the level of the ship (fig. 3), and indicates a (very) active phase of the river. In this context, the question arises as to whether the ship was sunk on the spot where it was found or in the immediate vicinity, or whether it drifted in from elsewhere. In the latter case, it is also possible that the ship had already sunk upstream, and as a wreck[4] had been set adrift by a swift current. The coarser deposits just mentioned suggest this possibility. Moreover, this theory

4 The southeastern part of the bottom of the ship has a strikingly black colour, suggesting charring. At the site there were also many charcoal remains in the sand overlying the wood. It is possible that the ship was damaged there by fire.

provides a simple explanation for the poor condition of the ship itself and most of the timbers, as well as the fact that no detached parts were found around the ship. On the basis of these considerations, we are inclined to favour this theory, but no more than that.

The only traces of wood that occur in a wide area around the ship are fine particles in great density near the ship and more dispersed further away. These particles were found only in the lowest 0.10–0.15 m of the fine sand that covered the coarser stratum, a situation which suggests calm water. The indications are that these particles became detached in a late, if not the last, stage of the partial desintegration of the ship.[5] Nevertheless, the wreck was not completely covered in that stage: it also continued to influence the movement of the water thereafter to such an extent that deposits beneath the covering layer of clay show a turbulent structure.

DESCRIPTION OF THE WRECK

Left for excavation were 16 m of the bottom (fig. 5; pl. I), preserved over all its width but broken off at the western end, a considerable part of one side and less of the other, twenty-five frames, and some loose-lying wood. We do not know whether the preserved part was fore or aft, so for orientation within the remains we have to resort to the points of the compass.

The bottom tapered from east to west from 2.80 m wide to 1.72 m wide. In the process the number of bottom-planks seems to have decreased from five to three, the actual transition probably taking place under the fifth frame from the west, though cracks, possible scarfs, and ancient repairs sometimes rendered the course of the planks unclear. There was no time to examine the outer bottom. The bottom-planks were from 6 cm to 8 cm thick.

The best preserved side was the north side. It consisted of a long beam rounded on the outside and hollowed on the inside. This is what has been called an *Übergangsplanke* (transition strake),[6] but might be called a 'pre-shaped chine.' The curve of the side is higher than it is wide. Where it joins with the bottom, it is flattened and flush with the bottom over a width of 11 cm (fig. 6: 2–3; pl. II: 1). At the western end, the hollow on the inside becomes shallower and ends rather abruptly, and the outside curves inward and upward, the flat part following the upward curve. These curves have been cut through the grain (pl. II: 2), which weakened the transition strake, so that at the western end it was left thicker than elsewhere. The flattened strip went on in the upward curve, as indicated in the reconstruction-drawing fig. 7: 4. On top of this thickened part lay a piece of wood that showed similar curves, but the two did not fit together. Still the loose-lying fragment was probably part of the strake, which had been higher, being only 40 cm high at the the western end, but 70 cm where it was best preserved. From the point where the northern strake was broken off in the east to *c.* 10 m westward, a brown line ran through the sand, parallel to and 25 to 30 cm above this strake, which was preserved here to a height of *c.* 30 cm. In this brown sand a few concentrations of iron rust were visible, apparently nailheads.

Little was left of the southern transition strake, and that little only in the eastern half of the remains. The twenty-five frames each consisted of two floor-timbers. These were cut out of tree-trunks in such a way that they were straight but had a protruding limb at one end. Part of this limb was left so that the floor-timber curved upward there. The westernmost timber of each frame curved up at the south side and the easternmost one at the north side. These vestigial limbs, which functioned as futtocks, were nailed to the strake by three nails set in a triangle. Floor-timber 8 shows a 'step' (pls. II: 1 and III: 1) approximately 3 cm high and 20 cm wide, before it curves up, and similar 'steps' may have existed in other timbers. The curves of chine and floor-timber did not fit together. Many of the nails were missing, also many of the long square ones which attached the floor-timbers to the bottom-planks. The latter were clenched over and seem to have been hammered in in pairs, one from the outside and one from the inside. Only some of those hammered in from the inside have been retrieved, because the heads were preserved. These formed a zig-zag pattern.

The floor-timbers with an uneven number (counted

5 The superstructure rotted away in a period of relative calm, which was perhaps also accompanied by a low water-table. At any rate this could be the explanation for several iron nails which, in our opinion, had remained in their original position in the sand just above the preserved part of the ship's northern side. The layer of blue-grey clay which was found on the bottom of the northwestern and lowest part of the ship was also apparently deposited in such a period. The attached report of the pollen analysis was received after we had concluded this article. The report indicates a position of the vessel confirming our idea of the ultimate fate of the ship.

6 Crumlin-Pedersen 1969, 27.

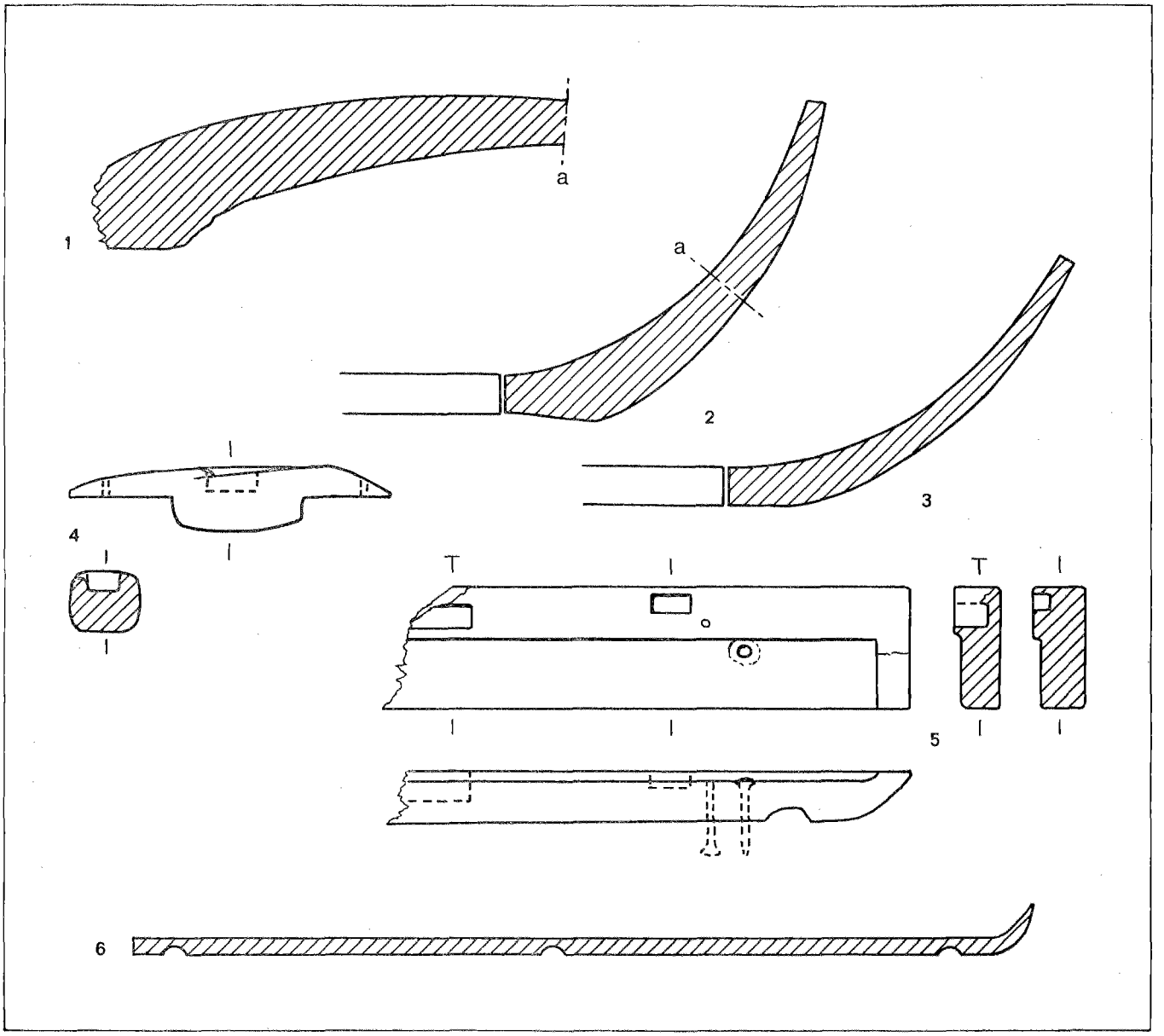

Fig. 6 1. Section lengthwise through curved end of transition strake; 2. vertical cut through transition strake facing floor-timber 4; 3. vertical cut through transition strake east of floor-timber 8; 4. piece of wood housed over floor-timbers 4 and 5; 5. floor-timber 7 seen from above, side-view and vertical sections through mortises; 6. vertical section lengthwise through floor-timber 47; 1–5 scale 1:10, 6 scale 1:20

from the west) showed a nailhead south of the seam between two floor-planks, the even-numbered ones had a nailhead north of that seam. Frames 21–22, 25–26, 39–40, and 41–42 showed the pattern in reverse. In frames 1–2, 9–10, 47–48, and 49–50, the pattern could not be verified. Floor-timber 37 (much decayed) seems to have had an extra nail north of an expected one. The frames were 31–39 cm wide, 20–24 cm apart, and 5–6 cm high. In the underside of each floor-timber three rounded limber-

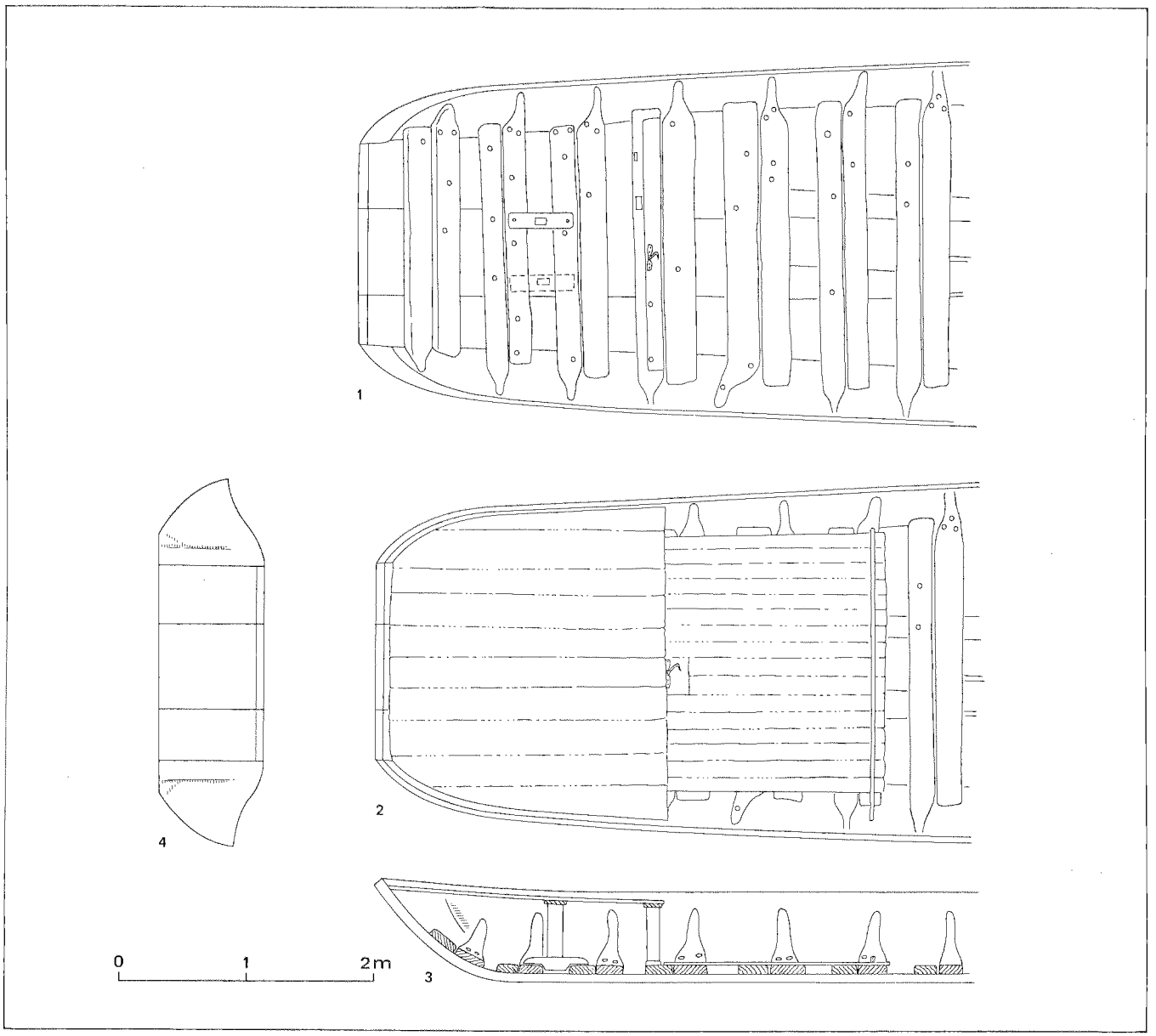

Fig. 7 1. Hypothetical reconstruction of the western part of the barge, including 14 floor-timbers, extant parts completed; 2. idem, hypothetical parts added; 3. vertical section according to no. 2; 4. hypothetical front-view of the barge; scale 1:50

holes were cut (fig. 6: 6). On floor-timber 7 a ridge (fig. 6: 5) was left 2 or 3 cm higher along the northern end (5 cm wide) and the western side (8 cm wide). In this ridge two mortises were cut: one was 37 cm from the northern end, 5.5 cm long (NS), 2.5 cm wide, and 2.5 cm deep; the other was 68 cm from the northern end, 9 cm long (NS), 4.5 cm wide, and 3 cm deep. An iron hook (fig. 10: 4) was attached to the middle of the lower part of floor-timber 7. Between several frames extra cracks or seams were visible, running with the grain in the bottom-planks. From frame 37–38 to frame 43–44 a seam, slanting but straight, runs through the northernmost bottom-plank.

On top of floor-timber 14 lay what looked like a batten

on its side. Whether it had been nailed down could not be seen.
On the northern end of the floor-timber lay the remains of three narrow planks, longships, passing underneath or through the batten (the softness of the wood made the construction unclear). To the eastern end these three planks seemed to end as they were originally cut. The northernmost one was preserved a little way westward and was broken off on top of floor-timber 12, the others were not preserved beyond 13. Between floor-timbers 10 and 11 two short pieces of similar planks were lying in nearly the same line. A longer piece of narrow plank lay athwartships near floor-timber 10.
On the southernmost bottom-plank (much decayed towards the east) a plank (probably nailed down) was fitted athwartships in between floor-timbers 44 and 45. A sample was taken from the material between this plank and the bottom, to see whether this was caulking material.
Two planks about 60 × 14 cm filled the southern end of the interstice between floor-timbers 48 and 49; a sample of the material found under them was also taken here.
Housed over floor-timbers 4 and 5 was a piece of wood 50 cm long, 10 cm wide, and 11 cm thick in the middle (fig. 6: 4). At each end, it was attached by a nail. In the middle, a mortise, 8 cm long, 6 cm wide, and 4 cm deep, was cut. Its centre was 74 cm south of the northern end of floor-timber 5 and about 112 cm north of the southern end of floor-timber 6. In the same interstice lay some small, scattered fragments of planks.
Floor-timbers 5, 6, 7, 8, and 9 were partly covered by what seemed to be an irregularly shaped thin layer of wood. This layer turned out to be made of planks about 6 cm wide and only 6 mm thick, whose edges were sharpened alternately up and down, and thus overlapped to form a smooth surface. They lay out of line and were unconnected with any part of the ship. At right angles to them and on top of them lay a batten. Its average width was 3 cm, and its thickness 2.2 cm. It turned out to be attached to the planks. Parallel to it and also on top of the planks lay a longer and thicker piece of wood 6 cm wide and 6–8 cm thick. Apparently, this had not been attached to the planks. A third, irregularly shaped piece of wood lay beside the planks.
Some unidentifiable planks of the destroyed eastern part of the ship remained. Mr P. van Dinteren, the finder of the wreck, reported that among those remains a post was found, trapezoid in diameter and 1.70 m long. Nothing is known about its context, and it had disappeared.

DISCUSSION OF THE SHIP

In attempting to explain these data, we run into a few probabilities and many, perhaps far-fetched, possibilities. We should pursue the latter, if only in the hope of testing them when (and if) more ships of this construction are found.
The bottom was slightly warped, but it had apparently been flat. At the west end only could the bottom planks be seen to curve upwards together with the underside of the transition strake, although the bottom planks apparently have sagged after the construction disintegrated (pl. III). The westernmost frame lay on this upward curve. We may conclude that this ship was a prototype of what on the Rhine is called an *aak*, of which the most noticeable feature is the construction of the prow and stern. There are no stemposts: 'The bottom-planking or plating forms a flat surface which curves up longitudinally.'[7] It should be said that this kind of craft is not limited to the Rhine, but is known under other names in many parts of the world.[8] Not every ship that is nowadays called *aak* is strictly an *aak*, nor is it known how old this name is. Prospects of cities on the Rhine, drawn by Antonius Woensam and Wenzel Hollar,[9] show that *aak*-like vessels have been plying the Rhine at least since the sixteenth century. Witsen[10] mentions *beitelschepen* (chisel-ships) on the Rhine, but he does not illustrate them.
The later *aken* have, as far as we know, no pre-shaped chine but normal strakes meeting the upcurving bottom. Still, the transition strake seems to have been not uncommon until far into the Middle Ages.[11] A Roman example from the Netherlands has been published[12]: the Zwammerdam 2 ship. Here, as usual, the chine was angular. In this ship, too, frames were found with limbs as futtocks. The Druten barge is as yet remarkable because of its carefully shaped and rounded transition strakes, which, when intact, must have been comparable to a dug-out cut in half lengthwise. As many blunt-edged dug-outs did, since the Pesse dug-out was fashioned, they showed the thickening at the ends where the wood is cut against

7 Kerchove 1948, *s.v. aak*.
8 Greenhill 1973.
9 Ellmers 1969, *Taf.* XVII: 3.
10 Witsen 1671, 483; 2nd ed. 1695, 579.
11 Ellmers 1973, 95 f., 109 f., 122, 282, 306, 311, 314, 316, 324.
12 De Weerd/Haalebos 1973.

the grain.[13] As the west end had been broken off, we do not know how far bottom and sides continued, nor how high they were. At least the bottom-planks must have gone on to the top of the transition strake. This has been assumed in the reconstruction drawings (fig. 7: 1–4) which show the principles of the construction of the west end, but they do not pretend to show the actual appearance of this part of the ship when afloat. There is no sign at this end of upper planking (as in Zwammerdam 2). There may have been none, but the traces may also have vanished because of hurried excavation by mechanical grab. The marks in the sand over the eastern part of the remains of the northern transition strake may have been upper planking, but also the decayed top part of the strake. If there was upper planking, it may also have been in the shape of 'wash-boards', that did not reach the prow and the stern. A later *aak*-like Rhine ship, the *Lauertanne*, showed this feature.[14] At Yverdon in Switzerland an *aak*-like barge was found [14a] with transition-strakes which ended in the same way as those in Druten, but without the drastic thickening at the end. As these strakes were much narrower than those in Druten and there was upper-planking and the upcurving bottom went beyond them, they did not have to bear the brunt of possible collision, so thickening was not necessary. So the thickening of the Druten strakes may indicate that there was no upper-planking and that the bottom ended where they ended. Moreover, the transition strake plus upper-planking of the Yverdon barge were 80 cm high which may have been the original height of the transition strake at Druten, which in that case was perhaps not a transition strake but the whole side. When a ship tapers, one expects the sides to be curved horizontally. There is no sign of that here. In any case, the bending of a transition strake has its special problems, for it has to be done before the actual shaping takes place. This seems to have been done for a Roman barge found at Bevaix in Switzerland if she did not have transition strakes scarfed midships, where, however, the ship is much damaged.[14b] Thirteen centuries later, but perhaps earlier too, there existed an *aak*-like Rhine ship called the *Oberländer* (Uplander), which seems to have had a wedge-shaped bottom and straight sides,[15] the broad end forming the poop. A ship, depicted on the tombstone of a certain Blussus, dating from the fourth century A.D. and found at Mainz, looks very similar to the later Uplander, but unfortunately the tombstone only shows a side-view.[16]

Another remote possibility is that the trapezoid post found in the debris in the east was a stempost, although nobody seems to have seen rabbets. Boats with a stempost at one end and a transom at the other are shown on Roman reliefs and wall-paintings.[17] In the Netherlands several recent types of river-ships had an *aak* prow and a stern with a stempost, in order to accommodate a stem rudder,[18] which by all available evidence was unknown in Roman times. Moreover, strakes should be flat and not dug-out in order to bend towards the stempost. It should be noted that the transition from pre-shaped chine to flat strake was realized in a subtle way about ten centuries earlier by the makers of one of the Ferriby boats,[19] and differently some ten centuries later by the builders of the Falsterbohus barges.[20] In the case of the Ferriby boat a pre-shaped chine existed for 70 cm in the preserved part of the prow or stern; then the part that was flush with the bottom ended, and an inserted bottom-plank took its place, while the upstanding part continued as an ordinary side strake. In the second case, the transition strake was attached to strakes and bottom planks by a complicated system of scarfs.

Because we have not found all the nails, we do not know what was the function of the pattern in those we have. We observe that the zig-zag pattern, which occurred inverted in a few floor-timbers, is also found in one of the Falsterbohus barges.[21] In the Druten barge we may assume that some irregularities in the placing of the nails have a purpose. The extra nail in floor-timber 37 seems to be there because the bottom plank was split at that point. The northernmost nails in floor-timbers 42 and 43 seem to follow the slanting seam in the bottom plank underneath, thereby making it probable that this seam was a scarf.

The mortises in floor-timber 7 (its southern half probably had similar mortises, but was decayed) are paralleled in the Hellenistic ship at Kyrenia in Cyprus (oral communication by Mr Michael Katzev[22]), which are there found in a floor-timber lying in a place where, as the visual arts

13 Van Zeist 1957; Mitzka 1933, fig. 6.
14 Schwarz 1928, pl. xv, fig. 40.
14a Weidmann/Kaenel 1974.
14b Arnold 1974.
15 Ellmers 1969, *Taf.* XVII: 3.
16 Aubin 1925, 6, *Abb.* 4; Ellmers 1969, *Taf.* XVII: 2.
17 Bonino 1963; Marsden 1964; Casson 1964.
18 Sopers 1971, 98–100.
19 Wright 1964.
20 Ellmers 1973, fig. 77.
21 Crumlin-Pedersen 1972.
22 Katzev 1972.

and literature suggest, the quarter-deck in Greek and Roman ships in the Mediterranean ended. Hence it is probable that these mortises held in place stanchions or a bulkhead which supported a deck-beam. Similar mortises were found in side-keelsons in the New Guy's House ship[23] and in ship 2 from Lake Nemi.[24] In the latter case stanchions for an all-over deck were found *in situ*.

It is quite possible that the Druten barge had a deck at its western end. If this were so, the hook attached to floor-timber 7 shows that the deck stopped at that point. The piece of wood housed over floor-timbers 4 and 5, with a mortise in it, may have been the support of another deck stanchion. Because of its excentric position one would expect a fellow support a little to the south, but no such trace was found there. The nearest parallel of this mortised block is found in the Punic wreck off Isola Lunga.[25] There a beam was housed over three ribs and showed a mortise where a poop deck would probably have ended. In prow or stern of the Druten barge, a possible deck may have rested on the thick end of the transition strake. This is assumed in the reconstruction drawing (fig. 7: 2). If this deck existed, the plank construction found lying loose was probably no part of it. These planks seemed too thin to walk on. They may have been part of a roof or a hatch-cover, but there is nothing to corroborate this guess.

The batten, the remains of planks on top of floor-timber 14, and the remains of planks between floor-timber 10 and 11 strongly suggest ceiling- or limber-planks. Their presence is assumed in the reconstruction drawing (fig. 7: 2 and 3). In the latter case the planks would have been held in place by the ridge in floor-timber 7 and by the step on floor-timber 8. In both instances there must have been a hole for the hook. In any case, this part of the ship must have been open to allow the handling of whatever was attached to the hook. It is tempting to see the batten on floor-timber 14 as the remains of a bulkhead to the east of which the cargo was stowed, but the fact that planks were found passing underneath or through it makes this improbable. It should be noted that small fragments of slate, probably the remains of the ship's last cargo, were found everywhere, even at the western end. These fragments may, of course, have been displaced and washed around when the ship sank.

The planks between floor-timbers 44 and 45, and between 48 and 49, may have been ancient repairs or reinforcements.

The question whether the western end of the Druten wreck was the prow or the stern hangs together with several other problems. For centuries it has been an axiom that in a ship with non-parallel sides the widest beam lies forward; as the greater part of the Druten ship was preserved and showed no sign of narrowing towards the east, this principle would locate the stern at the western end. The principle, however, was not always valid. Van Doorninck's reconstruction drawing of the Yassi Ada ship[26] shows the widest beam aft. The afore-mentioned *Oberländer* is another case in point. Woensam's detailed picture of an *Oberländer* shows it to have had an extra steering-oar at the prow slung between two posts or bitts protruding from the foredeck. Moreover, Tacitus wrote that the Germanic tribes frequently had steering-oars mounted in the prows of their river-ships.[27] We could imagine that the Druten barge had the same arrangement as the *Oberländer*. Thus, the billet with mortise over floor-timbers 4 and 5 and its hypothetical fellow could have supported the two bitts from which the steering-oar could be slung. To discourage us, however, Blussus' ship shows the extra steering-oar attached to the port side. The presence of this extra steering-oar would make the western end the prow. Then there is the hook (fig. 10: 4). Modern man, seeing a hook in such a place, thinks of one thing: that it secured a block, through which ran the sheet of a fore-and-aft sail. The western end would then be the stern.

The Romans knew fore and aft rigs,[28] but it is highly improbable that such rigs were used on long and flat ships like this one from Druten, especially because there is no sign that the Romans knew sideboards.

In Roman times and later, barges were commonly towed. This was done by means of a towing-mast placed forward at about a quarter of the ship's length. Roman reliefs showing towed ships are not very detailed.[29] In prints of the seventeenth century and later we see the towline passing aft from the towing-mast and being belayed on the stern.[30] If the west end of the Druten ship were the stern, the hook would have been in an excellent place for leading the tow-line to, well aft and out of the helmsman's

23 Marsden 1965.
24 Ucelli 1950, *tav.* 3 and 6.
25 Frost 1972.
26 Van Doorninck 1972.
27 Tacitus, *Ann.* II, 6.
28 Casson 1956.
29 Ellmers 1969, *Abb.* 9.
30 Van Beylen 1970, pl. XXXIX; Sopers 1947.

way. But the question 'prow or stern' must remain open.
Caulking material was looked for (*cf.* appendix on p. 21), but it is doubtful whether any was found. Casson[31] discussed in 1971 what was known about caulking in Roman times. Moss is never mentioned. Relevant for us might be the use of hazel-twigs for caulking in the New Guy's House and Blackfriars boats[32] and Pliny's mention of the use of 'certain reeds.'[33] The two Roman barges from Switzerland both showed moss-caulking. For the one from Yverdon[33a] only *sphagnum* is mentioned. For the one from Bevaix[33b] the moss is specified as *Neckera crispa*. The caulking-method was very complicated: moss as well as string, willow twigs, and nails were used.
Certain is that the Druten barge was narrow for her length. Where the bottom was 2.80 m wide, the transition strakes may have added 1 m to this. Assuming this to be the maximum (which is far from certain) we have a beam of 3.80 m to a length of *c.* 28 m. So the proportion may have been *c.* 1 to 7.5.
The attempt to find out by what name the type of ship represented by the Druten barge was known to its builders and users is essentially hopeless, given the present state of our knowledge. So when a guess is made here it is only in the hope that it may once be tested by new discoveries.
Some types of ship are long-lived. *Aaks* exist to the present day, the wooden ship being copied in steel, but it is unknown how long the name *aak* has existed.
Some names have existed for a long time too, but have wandered from one ship to another. For example, since the sixteenth century frigates have been oared ships, much smaller than galleys, full-rigged three-masters, and a class of power-driven men-of-war.
There is one Latin ship-name of which derivations are still in practical use. There is a tiny possibility that it was connected not only with the *aak*-shape, but also with northwestern Europe. This name is *ponto*.
Pontones are first mentioned in the Caesarian *Bellum Civile*.[34] It is said of them 'quod est genus navium Gallicarum,' which suits the present case very well. But then Mark Anthony used them in the Adriatic, and the Druten barge may not have been very seaworthy. Paulus, a lawyer who was possibly a contemporary of the Druten ship, wrote about a river that 'pontonibus traiciatur.'[35] So here a *ponto* is a ferryboat. A modern Dutch word for ferryboat is *pont*, especially for one that carries vehicles, and traditionally the wooden *pont* was a broad-beamed *aak*.[36]
In the fourth century A.D., in the *Grammatomastix* by Ausonius,[37] the question is put: 'Lintribus in geminis constratus ponto sit an pons?' What is described here might in modern parlance be called a catamaran. Dettlev Ellmers[38] points out that these catamarans were probably used as ferryboats. He refers to two sketchy descriptions of them by the sixth-century writer Gregory of Tours,[39] who called them *pons*, thereby answering Ausonius' question, and suggesting that in Ausonius' time there was some doubt about what to call two different kinds of ferryboat.
In the seventh century Isidore of Seville mentions the diminutive *pontonium*.[40] He says it is a 'navigium fluminale tardum et grave, quod nonnisi remigio progredi potest.' We do not know how the Druten barge was propelled, but the rest of the quotation seems apt.
In Ducange's *Glossarium* is generally said that *pontones* are 'navigia quae 'bacs' vocantur.' He also gives an interesting reference to a Saxon glossary, the *Glossarium Aelfrici* of *c.* A.D. 1000, where *pontonium* = *punt*. Still one cannot stress sufficiently that, judging by the vagaries of other ship-names, we can be sure that Aelfric's punt was the modern English punt, which is an *aak*.
Judging from the literary evidence, it would have been logical if the Druten barge had been called a *ponto* when afloat, but the chain of evidence is very slender and may not be straight.
The only iconographical evidence as yet available is discouraging. A marine mosaic from the fourth century A.D. found at Althiburus in Tunesia[41] shows a considerable number of different ships and boats with their names written next to them. The name *ponto* is given to a vessel that looks like a classical warship with a ram, but without oars.

31 Casson 1971, 209, notes 38 and 39, and 339, note 56.
32 Marsden 1965 and 1967.
33 Pliny, *Nat. hist.* XVI, 158.
33a Weidman/Kaenel 1974.
33b Arnold 1974 and 1975.
34 Caesar, *Bell. civ.* III, 29, 3 and III, 40, 5.
35 *Digesta* XIII, 3, 38 in *Corpus iuris*.
36 Van Konijnenburg 1895–1905, fig. 78.
37 Part of the *Technopaegnion*, ed. Peiper, XII, 152.
38 Ellmers 1969, 104–6.
39 *Hist. Franc.* V, 49, *Liber de Virt. S. Martini* II, 17.
40 *Origines* XIX, 1, 24.
41 Duval 1949.

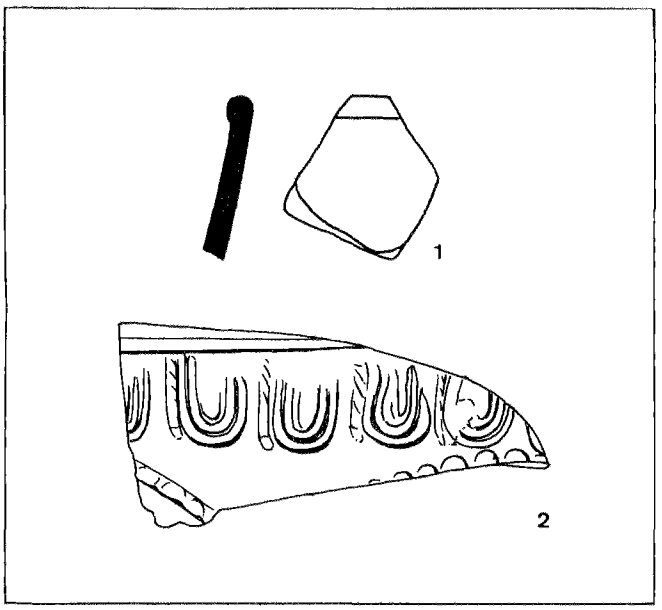

Fig. 8 Finds, pottery; 1. colour-coated ware 1*c*; 2. terra sigillata 1*a*; scale 1:1

WOOD ANALYSIS

Several samples of wood were analysed in the Botanic Laboratory of the Agricultural University of Wageningen. Three samples belonged to the hull proper:

1 From the western end of the middle bottom-plank;
2 From floor-timber 3;
3 From the piece housed over floor-timbers 4 and 5.

All three samples turned out to be *Quercus robur* L., an oak found throughout Europe.

Five samples did not belong to the hull proper:

1, 2, and 3 From the planking lying across floor-timbers 5, 6, 7, 8, and 9;
4 From the thicker piece of wood lying cross this planking;
5 From one of the possible ceiling-planks running from floor-timbers 12–14.

Samples 2 and 3 turned out to be alder, probably *Alnus glutinosa* Vill., a tree found throughout Europe. Samples 1, 4, and 5 were oak, identified with some reservation as *Quercus petraea* Lieblein. This oak occurs around the Mediterranean and in central European and Alpine mountainous country.

The Laboratory of the Institute for Pre- and Protohistory at Amsterdam analysed a sample of the northern transition strake; the sample was also *Quercus robur* L.

CONCLUSION

The ship may have been built anywhere along the Rhine and its tributaries, but it was certainly refitted on the Upper Rhine, if not built there.

FINDS

All the finds came from the ship. As none of them show signs of transport in water, it can readily be assumed that they belonged to the inventory of the ship (figs. 8–10).

1 *Pottery*

a Terra sigillata wall-sherd, dull brown, Drag. 37; ovolo with small smooth centre and two encircling bands, at left asymmetrically placed tongue twisted in four coils ending in a triangular point; in addition, two arches or

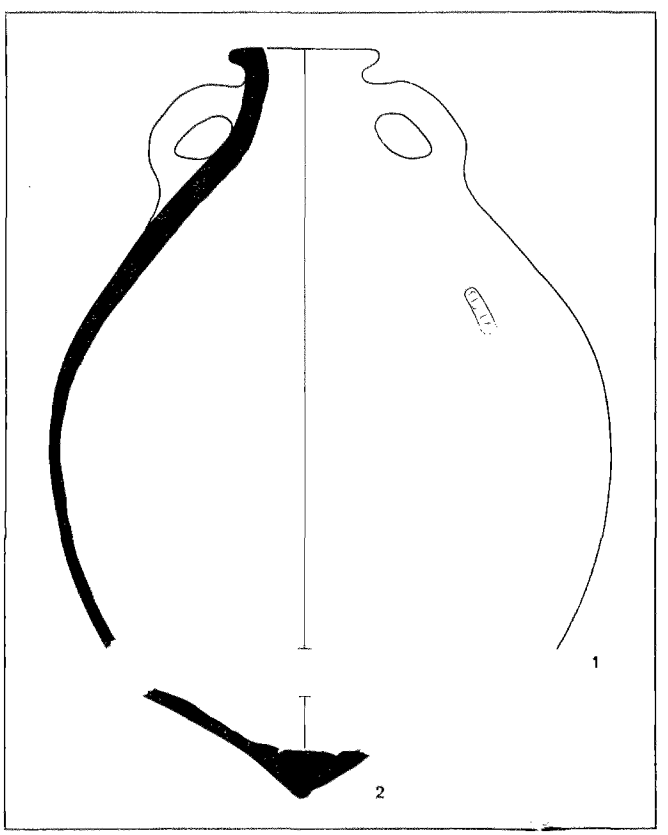

Fig. 9 Finds, pottery; 1. amphora 1*f*, scale 1:8; 2. amphora 1*g*, scale 1:4

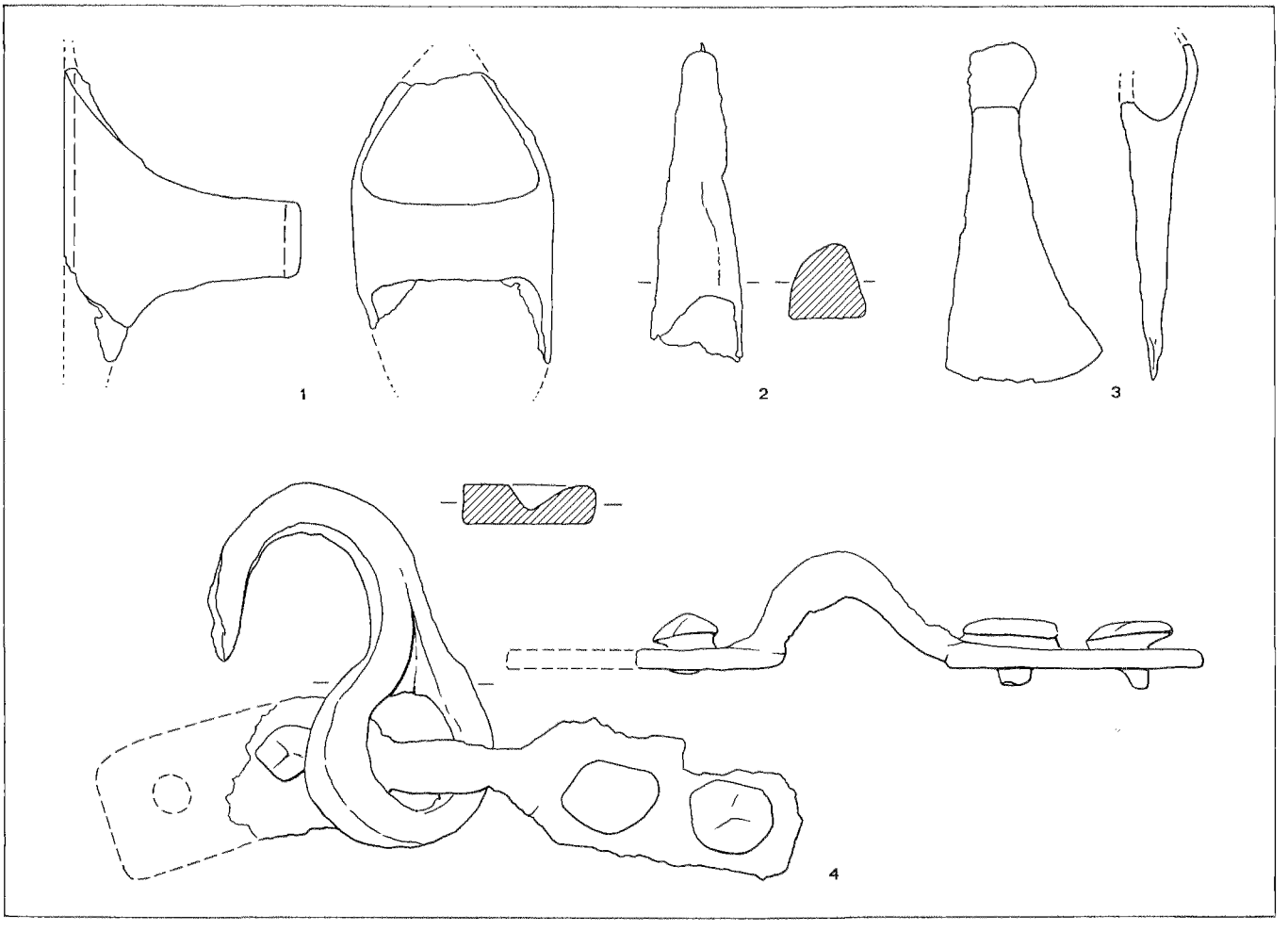

Fig. 10 Metal finds; 1. iron 2*c*; 2. iron 2*d*; 3. iron 2*e*; 4. iron 2*b*; scale 1:2

circles placed next to each other consisting of a coarse rectangular-square bead; as to the combination of ovolo and arch or circle, see Ricken/Fischer E 23/KB 100 (Julius II and Julianus I); Rheinzabern (fig. 8:2).

b Terra sigillata sherd of a foot-ring with short diameter (34 mm), dull red-brown, at fracture pale-pink; on the basis of quality, dating probably II.

c Colour-coated pottery rim-sherd, moderately lustrous black on the outer wall, at fracture (red-)brown, Niederbieber technique b,[42] narrow rim and curved profile; relatively thin-walled, beaker Niederbieber 31 (or 33?), as copy in technique b[43] (fig. 8: 1).

d Terra nigra wall-sherd, thick-walled, porous, dark-grey, smudged, unpolished.

e Rough-walled pottery; two wall-sherds, grey, cooking-pot or bowl.

f So-called *Schwerkeramik*, upper part of an amphora Hofheim 76–Niederbieber 78[44]; on the shoulder, an incomplete seal in relief (pl. IV), indistinct, at the end a symbol resembling the sun or a star, found between the floor-timbers 38 and 40, upside down (fig. 9: 1).

g *Schwerkeramik* (see above); bottom-sherd, orange-brown, porous pottery, relatively thin-walled, probably of a small form (fig. 9: 2).

42 Oelmann 1914, 35.
43 Oelmann 1914, 40.
44 Callender 1965, form 11: 1.

2 *Metal*
Bronze
a Coin: worn from use, sestertius. All that remains of the legend on the obverse is I(?)–VS, dating II–III A (identification, Royal Coin Collection (Koninklijk Penningkabinet), The Hague).
Iron finds
b The lifting of the thin plank-construction overlying floor-timbers 3 to 9 revealed an iron object. After it was cleaned it turned out to be an iron hook, 10.7 cm long. It ended in a ring, through which ran a curved rod, flattened at both ends into strips, attached to floor-timber 7 by two nails (fig. 10: 4). Half of one of the strips was lost.
c A short iron tube, diameter 5.5–6.5 cm. At one end of the longest diameter it is 5 cm long, at the other end 8 cm, but there it was broken off at both ends over a width of 5 and 2.4 cm. The iron is 2 to 5 mm thick (fig. 10: 1).
d An iron prong, 8.8 cm long. Its thick end is concave, but its edges are broken (fig. 10: 2).
e An iron axe, broken off at the shaft-hole. The preserved part is 9.5 cm long, the length of the cutting edge is 4.5 cm (fig. 19: 3).
f Two broken-off large nails, rectangular, 6–8 mm thick. Conical heads 25 and 30 mm wide, 6 and 8 mm high. Length more than 10 cm.
g Two short nails, square, greatest thickness 6 mm. Conical heads, one flattened, 6 and 3 mm high; length 7 and 7.5 cm.

Discussion of the iron finds
b The possible function of the hook, which was nailed to the ship, has been discussed elsewhere.
c Appears to have been fitted round a barge-pole or stout boat-hook shaft. Apparently the prongs of such utensils are still sometimes attached by sockets which form a strip along one side of the pole and several rings around it.[45] The tube may have been part of such a socket.
d May have been the prong of a boat-hook or barge-pole, probably ending in a socket. Several Roman boat-hooks have been found.[46] An alternative possibility is that it was a marlin-spike with a wooden handle, but the workmanship is rather rough for this purpose. Such a lack of finish is common in boat-hooks.
e A common Roman axe-shape. It may have been a single axe, but also a part of a pickaxe or an axe-adze.
f May have been used in hull construction.
g Probably too small for hull construction.

3 *Bones*[47]
a Vertebra, *Bos taurus* L.
b Vertebra, *Capra/Ovis*.

4 *Brick*
a Fragments of *tegulae* and *imbrices*.

5 *Stones*
a Great number of slate fragments, mainly found in the southwestern part, west of floor-timber 14, stacked in sheets; one fragment with a drilled hole 8.5–12 mm in diameter.
b Fragment (23 × 10 × 10 cm) of stromatoporid limestone.[48]
These stones probably originated either from the Ardennes or from the Rhineland secondary mountain chain. This particular kind of limestone is mainly found along the Maas.[49]

DATING EVIDENCE AND FURTHER COMMENT

Data that furnish dating evidence on the wreck are scarce. In this regard only the pottery and the coin (see Finds) are of use. Perhaps in due time facts related to ship construction will emerge that will also be helpful. The present limited knowledge of river-ships from the Roman period is still inadequate.
The little that is known, however, makes it clear that the ship belongs to the middle-Roman period. The finds in the ship can be taken as *terminus post quem* for the date of the shipwreck. The decorated terra sigillata sherd and the rim-sherd of a colour-coated beaker (Finds 1 *a* and *c*) are of importance as data. It is generally agreed that the production of Julius II–Julianus I occurred in the last phase of Rheinzabern, *i.e.*, roughly IId/end II–IIIa.[50]
The beaker Niederbieber 31 is generally dated end II–III A; the same dating can be employed in the case of Niederbieber 33, if we regard the thin wall of our specimen as being an early feature, according to Gose.[51]

45 Oral communication, Mr H.W. Wijnman, Amersfoort.
46 Curle 1911, pl. LXVI; De Weerd/Haalebos 1973, fig. 6; Ellmers 1972.
47 Both identified by Dr A.T. Clason, Groningen.
48 Identified by Dr G.J. Boekschoten, Groningen.
49 Oral communication, Dr G.J. Boekschoten, Groningen.
50 *Cf.* Roller 1969.
51 Gose 1950, 18.

Because finds of a later date are lacking, the conclusion is that the ship was abandoned at the end of II–III A at the earliest. In view of the appearance of a probably second-century terra sigillata sherd (Find 1 *b*), we are inclined to place the abandonment in the aforesaid period. It is likely that the stones and the roof-tiles were part of the ship's cargo. A coating of very tiny silvery slate-slivers was found almost all over the ship. Of course, it is not clear whether these slivers belonged to the ship's last cargo or whether they are traces of previous freight. There was a great demand for building materials in the second and third centuries. Ships were undoubtedly the obvious means used in the large-scale transport employed to supply this need. We can assume that the Druten barge functioned in this capacity, although it should be said that slate cannot be considered as building material in the strict sense of the word, and neither was it used as such in the Roman period. There was, however, a great demand for it in Belgium and Germany, namely, for use as roofing for the villas. It is not known whether this type of roofing was also employed to any extent in the Rhine delta. Slate has been found in many settlement sites but always in small quantities, in contrast to the great number of sherds of fired tiles.[52]

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APPENDIX

Analysis of the 'Caulking' from the Roman Barge at Druten, by W. Groenman-van Waateringe

In view of the results of the pollen-analytical studies of caulking material of ships from the Roman period at Zwammerdam,[53] which at first seem to correspond with data identifying the wood of the ships, Mr M.D. de Weerd secured four specimens (P1973-144/147) of the caulking of the Druten boat during his visit to the excavation on 7 September 1973.
The specimens can be differentiated as follows (fig. 5):
P 1973-144 from the seam between bottom-plank and transition strake;

P 1973-145 under a repair;
P 1973-146 from a seam between the bottom-planks;
P 1973-147 from a seam next to the middle bottom-plank (scarf?).

These specimens contained little or no vegetable matter, however, but were composed principally of rather sharp, fine sand. It was therefore not possible to determine the nature of the material. Thus in this case the theory basic to pollen analysis of vegetable caulking cannot be applied, namely, that a sufficient quantity of pollen from the original vegetation clings to the vegetable matter so that the place of origin can be determined.
Where, then, does the pollen found come from?
Analysis of a vertical section of the old river-bed at Zwammerdam produced many grains of pollen, and so it was apparent – as has long been known – that river-deposits can contain pollen.

52 In the Nijmegen castra, slate fragments with bored holes have been found similar to one of the fragments from the Druten ship (oral communication, Mr R. Woudstra, ROB, Amersfoort); in a civilian settlement near Alblasserdam, slate was used as roofing-material (oral communication, Mr H. Sarfatij, ROB, Amersfoort).

53 De Weerd, in the press.

The composition of this pollen is as follows:
1 pollen from weathered source material from the regions supplying the rivier with its water;
2a pollen from vegetation in the regions through which the river flows;
2b pollen from vegetation in the area where the specimens have been secured.
The sources referred to under 2a and 2b are essentially the same, but as a rule the pollen mentioned under 2b is the most important component of the total pollen present in the deposit.[54]

The Results of the Analysis (table 1)
P 1973-147 appeared to contain only a few grains of pollen and hereafter will not be included in the discussion. Besides tree-pollens and pollens from land-plants, the other specimens contain grains of pollen from water-plants. Exotics (by which is meant trees or plants that did not exist here in the Roman era) were encountered only in limited quantity. They are specifically *Picea* (spruce), *Abies* (fir), and *Castanea* (chestnut); some *Pinus* (pine) could have come from elsewhere, *i.e.*, transported by the river from regions upstream. In the latter case, they would have originated in southern Germany, where the varieties mentioned grew in Roman times. It is also possible that erosion of older deposits released the pollens into the river-water.[55] Wind transport is also conceivable, namely, for *Picea* (spruce) and *Abies* (fir), but where the quantities encountered were clearly larger than in comparable areas where river-water was of no influence, wind transport does not seem of primary importance.
The rest of the pollen content of the specimens does not differ from what is known of the Roman era in the Netherlands. De Jong's analyses of vertical sections from areas located 30–35 km west of Druten and partly stemming from a comparable milieu are useful for purposes of comparison. The supposition that most of the pollen comes from vegetation formerly in the vicinity of the boat's last anchorage (?) or resting-place appears to be a reasonable one. If we assume that the boat settled in a quiet tributary or a backwater of the mainstream, the situation would be similar to that of a lake or a fen, where pollen collects, slowly sinks to the bottom, and is preserved there.
The differences in the percentages of the various kinds of pollen in the three specimens are still quite marked. It

54 *Cf.* De Jong 1970–1, 76–7.
55 *Cf.* De Jong 1970–1, 76.

TABLE 1

DRUTEN	P 1973–144	P 1973–145	P 1973–146
Pinus (pine)	9.6	14.5	11.5
Picea (spruce)	1.9	2.4	3.0
Abies (fir)	0.6	0.6	1.2
Betula (birch)	7.0	3.3	12.1
Ulmus (elm)	3.2	2.1	1.8
Tilia (lime)	–	0.3	0.6
Quercus (oak)	20.4	9.3	13.3
Alnus (alder)	35.7	47.6	35.2
Fagus (beech)	3.2	1.5	3.6
Fraxinus (ash)	–	0.9	0.6
Carpinus (hornbeam)	1.9	0.9	3.0
Salix (willow)	3.8	2.1	3.0
Corylus (hazel)	12.7	11.4	10.3
Castanea (chestnut)	–	–	0.6
Σ AP	157	332	165
Ericaceae	1.3	1.8	2.4
Gramineae	36.3	18.7	24.2
Cerealia (cereals)	4.5	1.8	1.8
Plantago lanceolata (ribwort)	1.3	1.5	2.4
Rumex (sorrel) type	4.4	0.9	–
Ranunculaceae	1.9	1.8	1.2
Compositae liguluflorae	1.9	1.8	13.3
Compositae tubuliflorae	3.2	3.3	3.0
Filipendula	0.6	1.5	2.4
Cyperaceae	7.0	7.2	13.3
Typha latifolia (cat's tail)	5.7	–	1.2
Dryopteris	15.2	20.5	6.1
Sphagnum	0.6	7.5	1.2

Further, in P 1973–144 *Chenopodiaceae* 1.9%, *Labiatae* 1.2%, *Linum* 0.6%, *Umbelliferae* 1.9%, *Scrophulariaceae* 0.6%, *Galium*-type 0.6%, *Humulus/Cannabis*-type 0.6%, *Filipendula* 0.6%, *Thalictrum* 0.6%, *Lythrum* 0.6%, *Typha angustifolia* 1.3%, *Potamogeton* 1.3%, *Nuphar* 0.6%, *Alisma* 0.6%;
n P 1973–145 *Chenopodiaceae* 0.6%, *Plantago maior* 0.3%, *Artemisia* 0.3%, *Labiatae* 0.6%, *Papilionaceae* 0.3%, *Umbelliferae* 0.6%, *Cruciferae* 0.9%, *Scrophulariaceae* 0.3%, *Humulus/Cannabis* type 0.3%, *Filipendula* 0.3%, *Typha angustifolia* 0.3%, *Potamogeton* 0.9%, *Sparganium erectum* type 0.3%, *Pteridium* 0.6%, *Equisetum* 0.3%, *Pediastrum* 0.3%;
in P 1973–146 *Artemisia* 2.4%, *Labiatae* 1.2%, *Papilionaceae* 1.2%, *Umbelliferae* 3%, *Scrophulariaceae* 1.2%, *Myrica* 0.6%, *Galium*-type 1.2%, *Humulus/Cannabis*-type 0.6%, *Filipendula* 2.4%, *Thalictrum* 0.6%, *Lythrum* 1.2%, *Potamogeton* 1.2%, *Nuphar* 0.6%

should be borne in mind, however, that the number of pollens that were counted in two of the three specimens is low (for P 1973-144, the tree-pollen figure is 157, and for P 1973-146, it is 165), which can cause rather wide fluctuations in the percentages. The greatest deviations are apparently shown in specimen P 1973-145, the repair caulking. Perhaps what happened here was that contact with the river-water was cut off earlier than in the case of the other two specimens, so that no younger pollen could infiltrate: the percentages for *Fagus* (beech) and *Carpinus* (hornbeam) are lower than those for the other two specimens. The picture of vegetation that emerges from the analyses indicates a situation in a calm, sweet-water area with a river-bank growth of reeds, sedges, and various plants, as well as trees: *Alnus* (alder), *Salix* (willow), *Betula* (birch), *Corylus* (hazel), *Ulmus* (elm), and *Quercus* (oak).

The percentages of field and pasture weeds and of *Cerealia* (cereals) for this period are relatively low, so that it must be assumed that the ground in the immediate vicinity was not under cultivation. For the Roman period in our region, the percentages of *Ulmus* (elm) is rather high. It is possible that a part of it comes from more southern areas, although the ratio tree-pollen and non-tree-pollen points to a rather thickly wooded river-bank, where the *Ulmus* certainly would have felt at home.

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M. MIEDEMA

A Native Roman Settlement at Ermelo

figs. 1–19

The environs of Ermelo are known to be rich in archaeological monuments and prehistoric finds ranging from the Neolithic period up to and including Roman times: these have been described in the older literature and more recently in a number of articles in *Westerheem* 1973, no. 4, and 1974, no. 6.

The landscape in that area consists of the ice-pushed ridges of the Veluwe, which gradually slope down to the waters of the IJsselmeer. Much of the prehistoric material was found on this sloping ground between *c.* 20 and 10 m +NAP.

The part of the settlement that dates from Roman times – which is where the finds published here were found – is

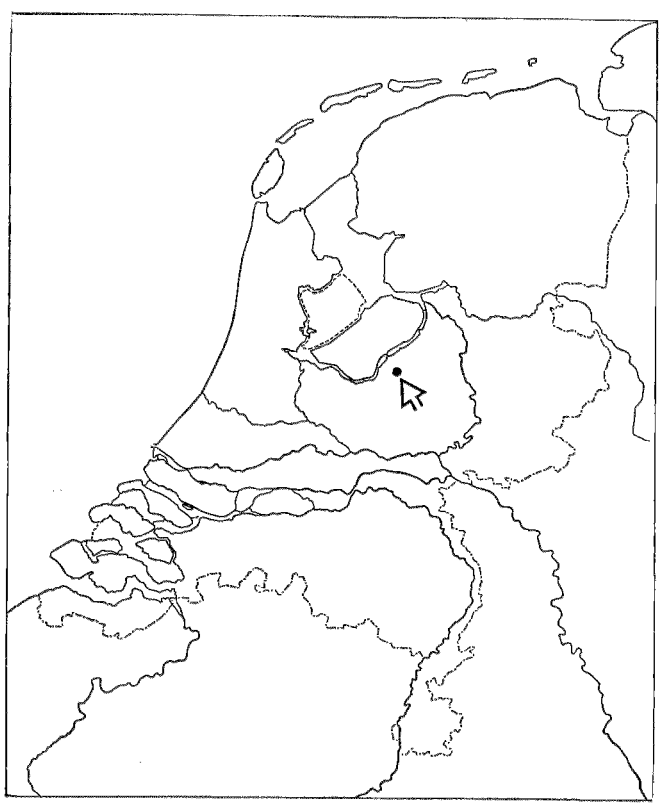


Fig. 1 Ermelo: situation

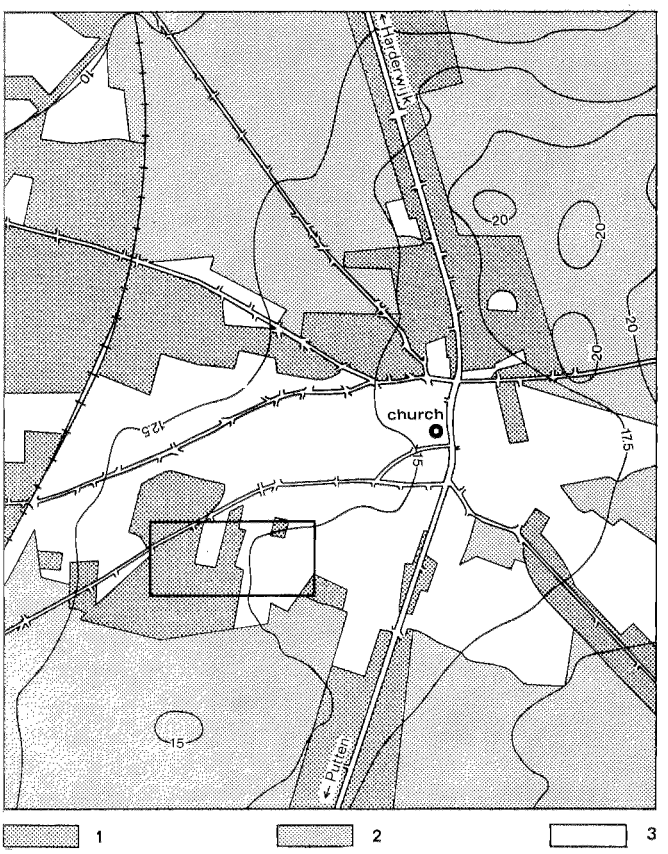


Fig. 2 Ermelo: topographical situation after the *Topografische kaart* 1:50,000, edition 1916, scale 1:25,000; 1. forest; 2. heath; 3. *es*; 4. outlined area see fig. 3

also situated in this area, on a projecting, slightly raised lobe (*c.* 15 m perimeter) surrounded by sloping ground (fig. 2).

The centre of the village of Ermelo as it is today – it dates from the Middle Ages – is situated further northeast. During the past twenty years all the arable land to the southwest of the village has been built up. In the course of these extensions to the village, various finds were dug up between 1952 and 1958, including sherds, loam that was used for huts, and iron slag. Concentrations of finds occurred in the following sites (see fig. 3):

a the corner of Dirk Staalweg and Hoge Enk;

b between the canoeing pond and Hamburgerweg, and on the corner of Hamburgerweg and Suikerbakker.

Both findspots have been published earlier as Ermelo V and Ermelo VI by A. van Sprang in the *Berichten ROB* 1962–63 and *Westerheem* 1963, no. 5, respectively.

These finds date from Roman times; the material of Ermelo V was situated at a depth of between 1 and 1.5 m below the surface of the arable layer. The finds gave rise to a small-scale excavation in December 1958 and January 1959, undertaken by the State Service for Archaeological Investigations, under the supervision of H. Halbertsma, A. van Pernis, and C. van Duijn, and G.J. de Vries, respectively.

EXCAVATION 1958/59

This emergency excavation was carried out in the foundation-trenches of the blocks of houses on Hamburgerweg, Dirk Staalweg, Kozakkenkamp, and Kosterland (fig. 3). The settlement-traces consisted of a row of post-holes – probably the wall of a house – in a foundation-trench on Kozakkenkamp; in the trenches along Hamburgerweg and Kosterland traces were found of what were probably two sunken huts; on Dirk Staalweg traces of what was probably some kind of fence and the ground-plan of probably four sunken huts, two of which with a very distinct outline and post-holes. Since one of these sunken huts cuts across the traces of the fence it is likely that we are in fact dealing with several phases of habitation (figs. 4 and 5).

The sunken huts are *c.* 2.7 m long and 2 m wide. Two of

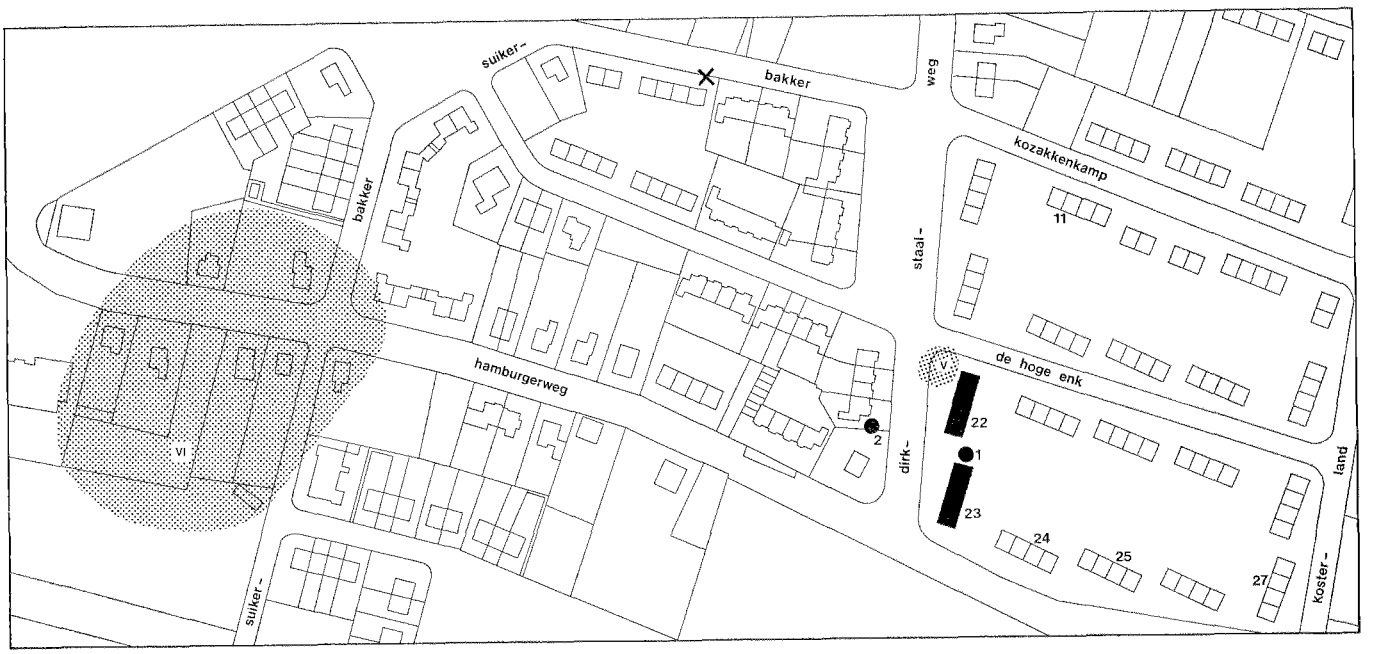


Fig. 3 Ermelo: cadastral situation 1974, scale 1:3000; distribution area of finds; x. findspot Roman coin; v. findspot Ermelo V 1952–58; VI. findspot Ermelo VI 1952–58; 11, 22–25, 27 excavated areas 1958–59; for 22 and 23 *cf.* figs. 4 and 5; 1–2 findspots described in this publication

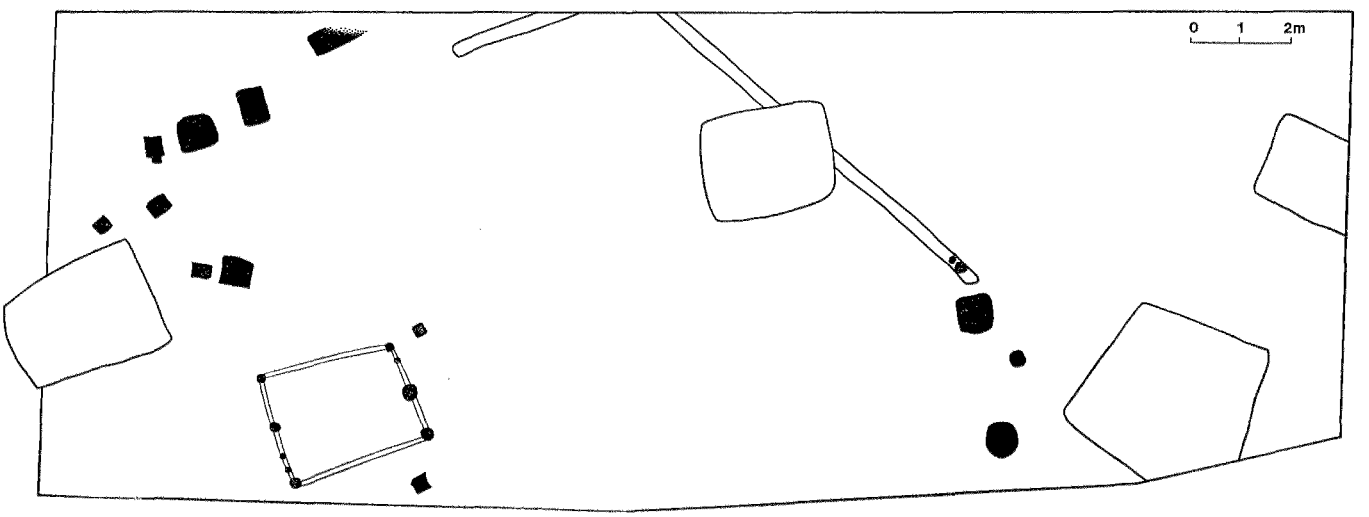


Fig. 4 Ermelo: excavated area 22, plan

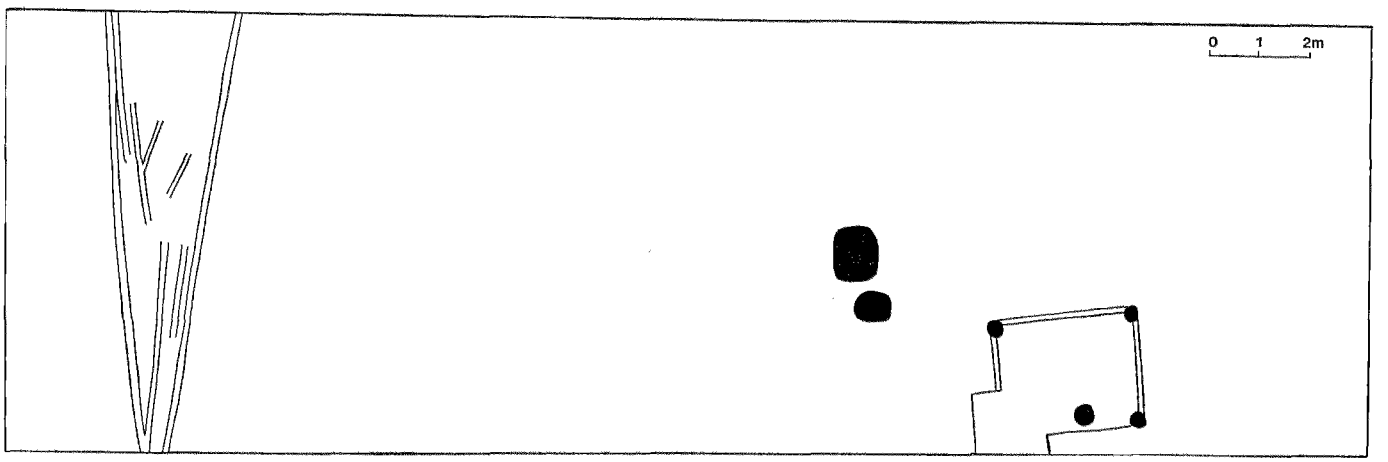


Fig. 5 Ermelo: excavated area 23, plan

them evidently belong to the six-post type, *i.e.* one post at each corner and one post in the centre of the short walls. These two huts have a clearly visible ground-plan: the vestiges of the foundation-trench. One hut has small post-holes in the outline, which suggests that a wickerwork construction was used for the walls (figs. 4). The six-post type of sunken hut is not uncommon in native settlements from the Roman period. In Wijster[1] a large number of such huts have been unearthed, and they have also been found in the settlement at Bennekom.

In addition to the aforementioned stray finds, mainly sherds, and those that will be described below, this excavation yielded very clear traces of a settlement which probably lasted through several phases of habitation.

In the same year, 1959, Mr J. Mooibroek, who lives at 83 Dirk Staalweg in the direct surroundings of the Ermelo v complex, came across sherds, iron slag, as well as some iron fragments, while digging in his garden; he stored these finds carefully in his home. Mr E. J. Feenstra heard of the existence of these finds only recently, and it is

1 Van Es 1967, 77–83.

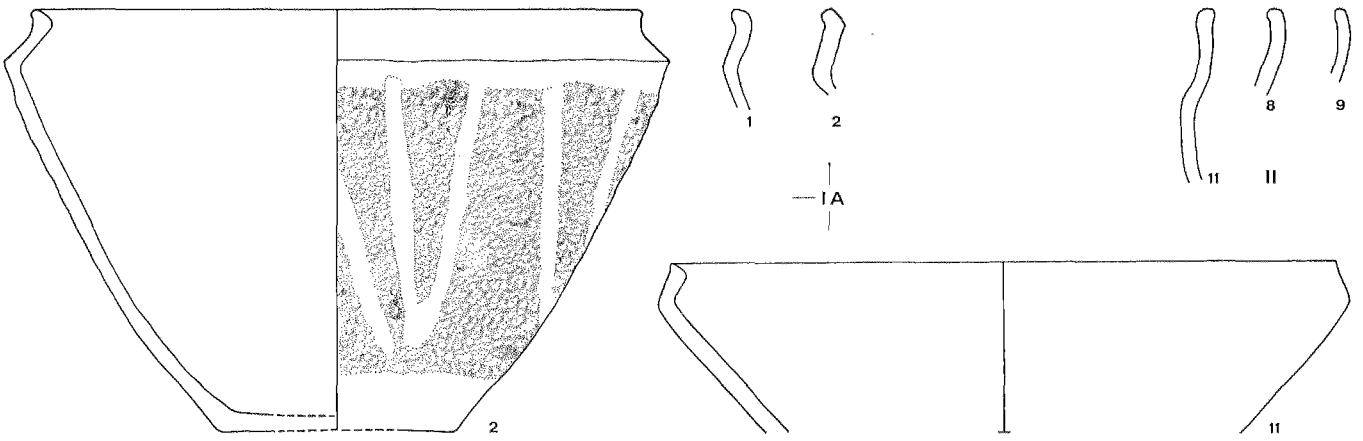


Fig. 6 Ermelo: hand-made pottery, types I A and II

thanks to him that this complex, together with some material from 88 Dirk Staalweg, has been studied and permission for publication has been granted.

FINDS FROM 1959

This material, which consists exclusively of stray finds, comprises native sherds, a number of Roman and Merovingian import-fragments, and several medieval and more recent sherds.
In addition to pottery fragments, some metal fragments and two lumps of basalt-lava were found.

Pottery
The hand-made pottery may be divided into six chief types or shapes[2]: I. Forms which correspond with the *situlae* known from Wijster, to be classified as type I A; II. Forms which are known from various places in West Germany, described by Von Uslar as type II; IV. Globular or more or less shouldered forms, classified here as Tureens and corresponding with type IV at Wijster; V. Plates; VI. Dishes; VII. Bowls.
The types V, VI, and VII correspond with types V, VI, and VII from Wijster, respectively.

2 The typology of Wijster is used for the classification of the hand-made pottery. Narrow-mouthed biconical pots (type III) from Wijster are missing in the Ermelo finds; consequently, type III is not included in this publication.

TABLE I

	Century								
Pottery	1st	2nd	3rd	4th	5th	6th	7th	8th	
Hand-made Types									
I A	I	I							
II			I	I					
IV A		I	I	I					
IV B		I	I	I					
IV C		I							
IV D	I	I	I	I					
V	I	I	I						
VI	I	I	I						
VII A	I	I	I						
VII B	I	I	I	I					
Roman Red-painted ware				I	I				
Terra nigra			I	I					
rough-walled			I	I					
coin				I					
Merov. biconical pot							I		
rough-walled barrel							I		
Globular pot							I	I	
Carol. Pingsdorf									± 1100

Type I A Situla (fig. 6)
By 'situla' is understood a biconical pot with a straight, everted wall which makes a sharp angle with the likewise straight shoulder. The pots are wide-mouthed and usually medium-sized.
The fragments in this Ermelo complex have a fairly broad shoulder and virtually no neck; the different rims give rise to the following classification:
I A 1 a smoothed or rounded rim, which ends in a rim-lip
nos. 1, 3, 4, 5, 6, 7.
I A 2 a rim smoothed obliquely towards the interior
no. 11
I A 3 with a short curved neck, a rim smoothed obliquely towards the interior, and rim-lip
The fragment with a complete profile – no. 2 – is decorated over the entire wall with a closely set ornament of alternately roughened and polished vertical bands, the so-called *eingeglättete* ornament (orn. E). In total there are eight fragments from eight pots, fairly hard-baked and tempered with sand, shell, and fine gravel-grit. The wall section of the small fragments is burnished: the large fragment no. 11 has a smooth surface.
The colour is predominantly dark-grey.

Type II (fig. 6)
In this form the straight conical wall joins a curved, very narrow shoulder, clearly set-off from a long, almost cylindrical neck which ends in a rim with rim-lip. These pots, like those of type I, are wide-mouthed, medium-sized, and usually not very deep.
Three rims belong to this type: nos. 8, 9, 11.
The quality of the ware is good; it is tempered with sand and/or fine gravel-grit, it is hard-baked (reducing) and has a polished surface.

Type IV Tureens
The majority of the pots in this type are wide-mouthed and have a rounded, sometimes slightly globular form probably with a flat base.
The differences in the shoulder-neck-rim profile call for a division into sub-types.

Type IV A (fig. 7)
This group comprises the fairly globular, relatively narrow-mouthed medium-sized pots with a broad rounded shoulder and curved neck ending in a rounded rim. Fragment no. 12 has a rusticated wall (orn. A 1) and no. 6 is extremely thin-walled, decorated with a coarse

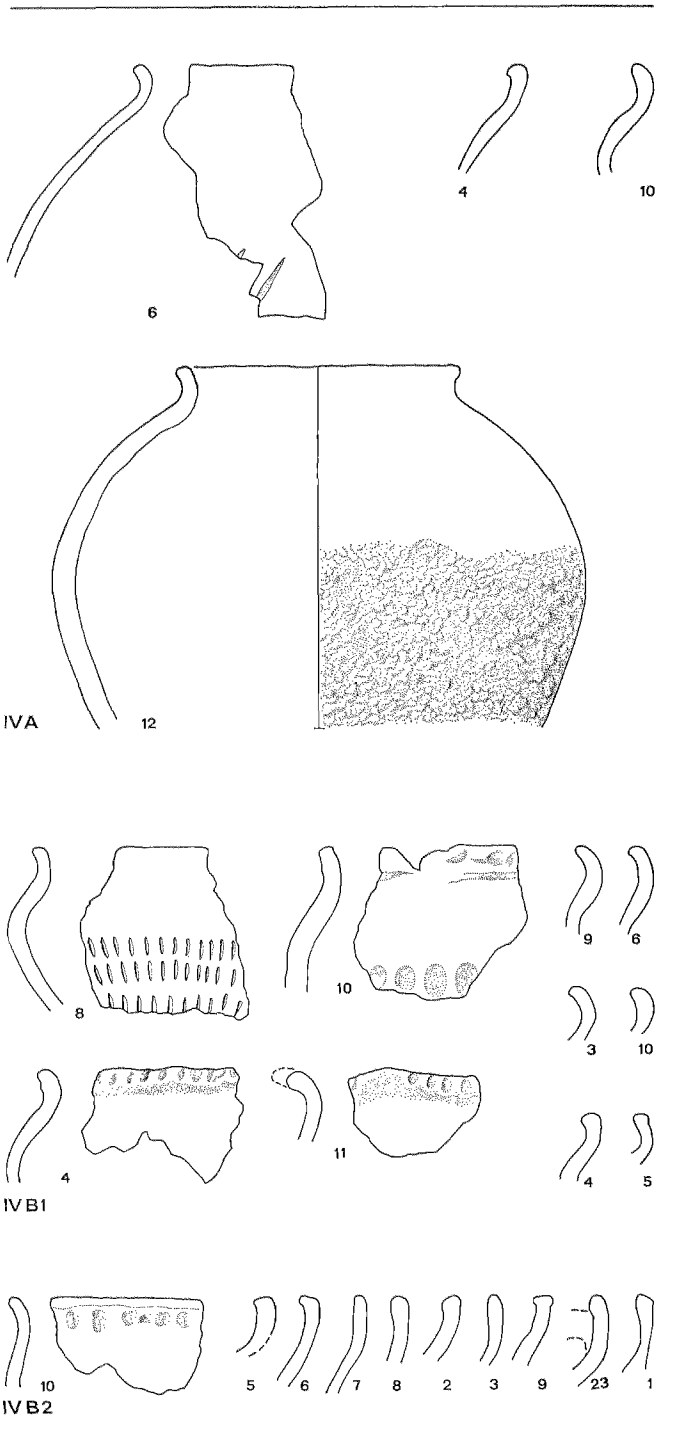


Fig. 7 Ermelo: hand-made pottery, types IV A, IV B 1, and IV B 2

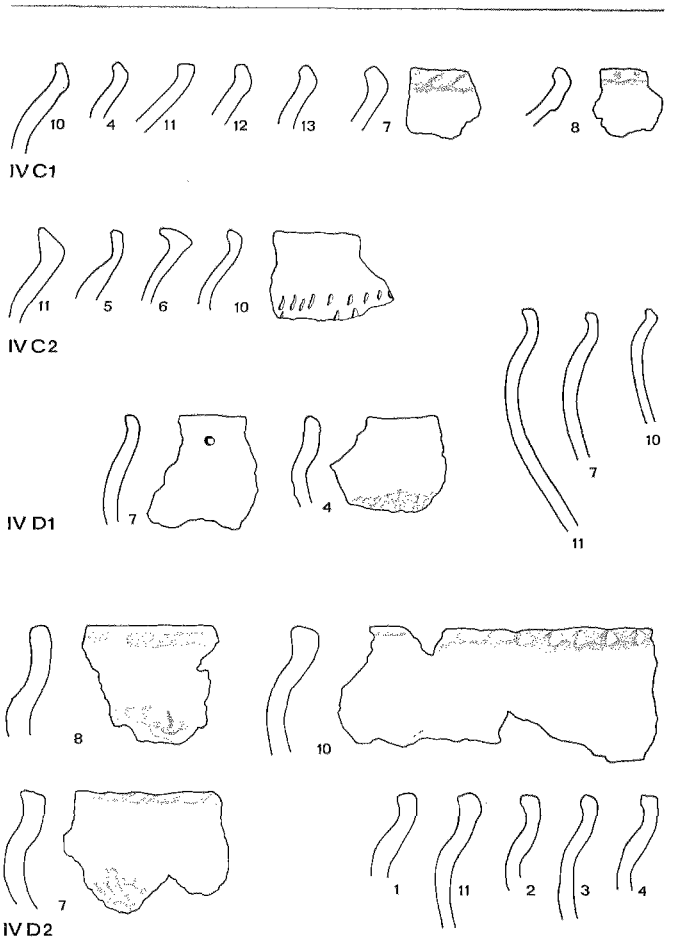


Fig. 8 Ermelo: hand-made pottery, types IV C 1, IV C 2, IV D 1, and IV D 2

Ahrenmuster, which is applied zonally in vertical bands (orn. A 3).
In total six sherds from four specimens, nos. 4, 6 (3 ×), 10, 12.

Type IV B
Included are the rounded, relatively wide-mouthed and hence less globular pots than those of type IV A.
Differences in neck profile give rise to a subdivision in IV B 1 and IV B 2

Type IV B 1 (fig. 7)
Pots with a short everted curved neck and a rounded rim.
In total ten sherds from ten specimens.
Undecorated: nos. 3, 4, 5, 6, 9, 10.
Decorated with finger-impressions against the rim (orn. B 1): nos. 4, 8, 10, 11.
One sherd, no. 10, also displays impressions on the wall-shoulder transition (orn. B 2). No. 8 is less characteristic because the wall-shoulder transition is angular and the shoulder is straight. The side is decorated with an overall ornament of vertical nail-impressions (orn. A 5b).

Type IV B 2 (fig. 7)
Pots with a straight, more cylindrical neck and a rounded or flat smoothed rim. In total thirteen sherds from thirteen specimens.
Undecorated: nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, and 23 with handle attachment.
Decorated with finger-impressions against the rim (orn. B 1): no. 10.
The paste of types IV A and IV B varies considerably: the pots are all fairly hard-baked, but the tempering of IV A consists of gravel-grit, and that of IV B of sand, organic material and gravel, which varies from coarse to very fine. The firing of some pots is oxidized, of others reduced, the surface of the former being smooth and of the latter polished.

Type IV C
This type comprises the shouldered, rounded pots without neck. The angle that marks the transition between shoulder and rim is generally undecorated: in some cases it is emphasized by a slight groove. The difference in rims gives rise to a subdivision into IV C 1 and IV C 2.

Type IV C 1 (fig. 8)
The rim is always flattened, and hence slightly triangular in section. Of the thirteen sherds in total:
nos. 4, 10, 11, 12, 13, 14, 15, 16, 17 are undecorated;
nos. 4, 7, 8, 9 are decorated with fingertip-impressions against the rim (orn. B 1)

Type IV C 2 (fig. 8)
These pots have an obliquely everted rim: 5, 6, 10, 11
One specimen (no. 10) has a double encircling row of vertical nail-impressions on the shoulder (orn. B 2).
Firing, tempering, and finish correspond with IV A and IV B.

Type IV D
These wide-mouthed pots have an S-shaped profile, and are subdivided in: Type IV D 1 (fig. 8) consisted of forms with a fairly highly-placed rounded shoulder and a short,

more or less cylindrical neck. The pots are probably deeper than they are wide, and have a fairly slender profile.
Characteristic specimens with smoothed rim: nos. 4, 11, and 7 (two sherds of no. 7, one of which is pierced on the shoulder-neck transition, probably for a rope or hook whereby the pot could be hung over the fire).
Less characteristic is fragment no. 10, with a very short, curved neck and rim-lip.
The tempering consists mainly of shell-grit, fine gravel, and sand; the firing is hard and oxidized, while the grey-orange-brown surface has been smoothed.

Type IV D 2 (fig. 8)
These S-shaped profiled pots are probably less deep than those of group IV D 1, and hence more squat. The shoulder is rounded but fairly flat and merges into an outward-curving neck.
Nos. 1, 2, 3, 4, and 11 have a slightly thickened, rounded or flattened rim.
No. 7 has finger-impressions against the rim (orn. B 1).
Fragments no. 8 deviate from this type: an elongated neck and nail-impressions against the rim and on the shoulder-angle (orns. B 1 and 2).
No. 10 has a plain profile with a very short neck and nail-impressions against the rim (orn. B 1).
The paste is usually tempered with sand and gravel-grit, and fairly hard-baked. Two specimens (nos. 7, 8), however, are very porous with an organic tempering and more softly fired.
The surface of the latter is smooth, as is that of no. 10, while the former group has a polished surface.

Type V Plates (fig. 9)
In this type the wall joins the rim, which is slightly thickened and flattened. One specimen (4) has finger-impressions against the rim (orn. B 1). Most of the fragments do not have a straight, slanting side, while the upper section is more vertical; consequently, there is a very slight carination on the inner side: nos. 1, 2, 3, 4, 9.
The fragment with a complete profile (no. 10) has a straight, almost vertical side and is, thus, a shallow dish.
The paste is finely tempered and hard, and has a polished or smooth surface. The colour varies from yellowish-brown to dark-grey.

Type VI Dishes (fig. 9)
The dishes have steep sides, generally with a slightly thickened and smoothed or rounded rim. Some sherds

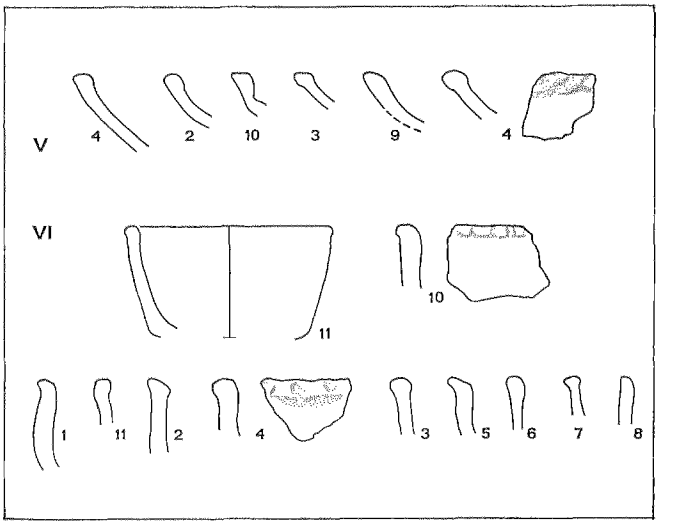


Fig. 9 Ermelo: hand-made pottery, types V and VI

have a rim-lip and two specimens (4, 10) have impressions against the rim (orn. B 1).
A total of twelve sherds: nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 (2 ×), of which one specimen has a complete profile.
The paste is not homogeneous, but displays all sorts of tempering ingredients; the finish varies, and the colour is generally dark-grey.

Type VII Bowls
The bowls of this type are fairly deep, and their profiles can be subdivided into two groups.

Type VII A (fig. 10)
These bowls have a very light wall-to-shoulder angle, and the shoulder-rim profile tends toward an S-shape. The rim is slightly thickened, flattened obliquely towards the interior, and slightly everted.
In total there are six fragments from six bowls: nos. 4, 7, 8, 10, 11, and 12. Nos. 4, 10, and 11 are less characteristic forms.
Specimen no. 12 is a very large bowl with a diameter of 34 cm; it has finger-impressions against the rim (orn. B 1), and the entire wall is decorated with a pattern of alternating *Ahrenmuster* and rows of fingernail-impressions. The *Ahrenmuster* is applied both horizontally and vertically (orn. A 3).
All the other fragments have a finger-nail impression ornament against the rim (orn. B 1); moreover, some

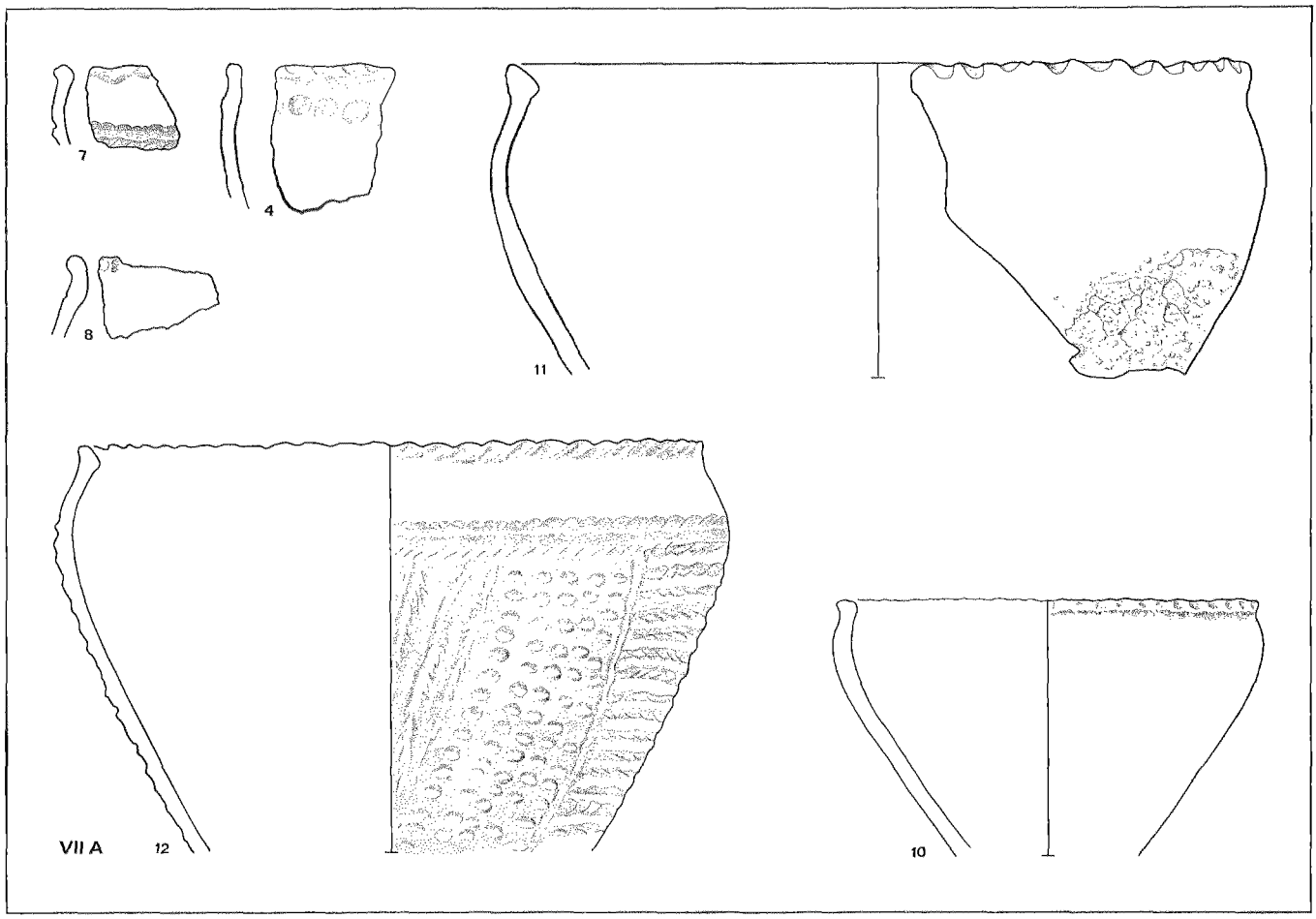


Fig. 10 Ermelo: hand-made pottery, type VII A

sherds also display a wall ornament, notably no. 4 has finger-impressions on the shoulder (orn. B 2) and a rusticated wall (orn. A 1), no. 7 has an encircling *Ahrenmuster* on the shoulder (orn. A 3), and no. 11 has a rusticated wall (orn. A 1).

Type VII B (fig. 11)
These bowls have a rounded wall-shoulder transition, whereby the shoulder often curves towards the interior and ends in a rim that is rounded or flattened towards the interior.
Undecorated specimens, in total 15 sherds, nos. 4(6 ×), one of which with knob-handle on the wall; 5, 7, 8, 9, 10 (4 ×) and one fragment no. 11 with complete profile.
Nos. 10 and 6 are decorated with finger-impressions against the rim (orn. B 1), and nos. 7, 10, and 11 with nail-impressions against the rim (orn. B 1).
The latter (no. 11) also bears an overall decoration of nail-impressions, in alternately horizontal and vertical bands (orn. A 5b). An overall ornament also occurs on no. 2: *Besenstrich* (orn. A 2), and on no. 3: finger-impressions (orn. A 6).
The fragment with complete profile, nos. 1/7, has a sharp wall-shoulder transition and thus deviates somewhat from the common profile. This bowl has an entirely decorated wall with a vertical *Ahrenmuster* (orn. A 3), is tempered with gravel, and has a rough surface. The colour is greyish-yellow. The other bowls are tempered with

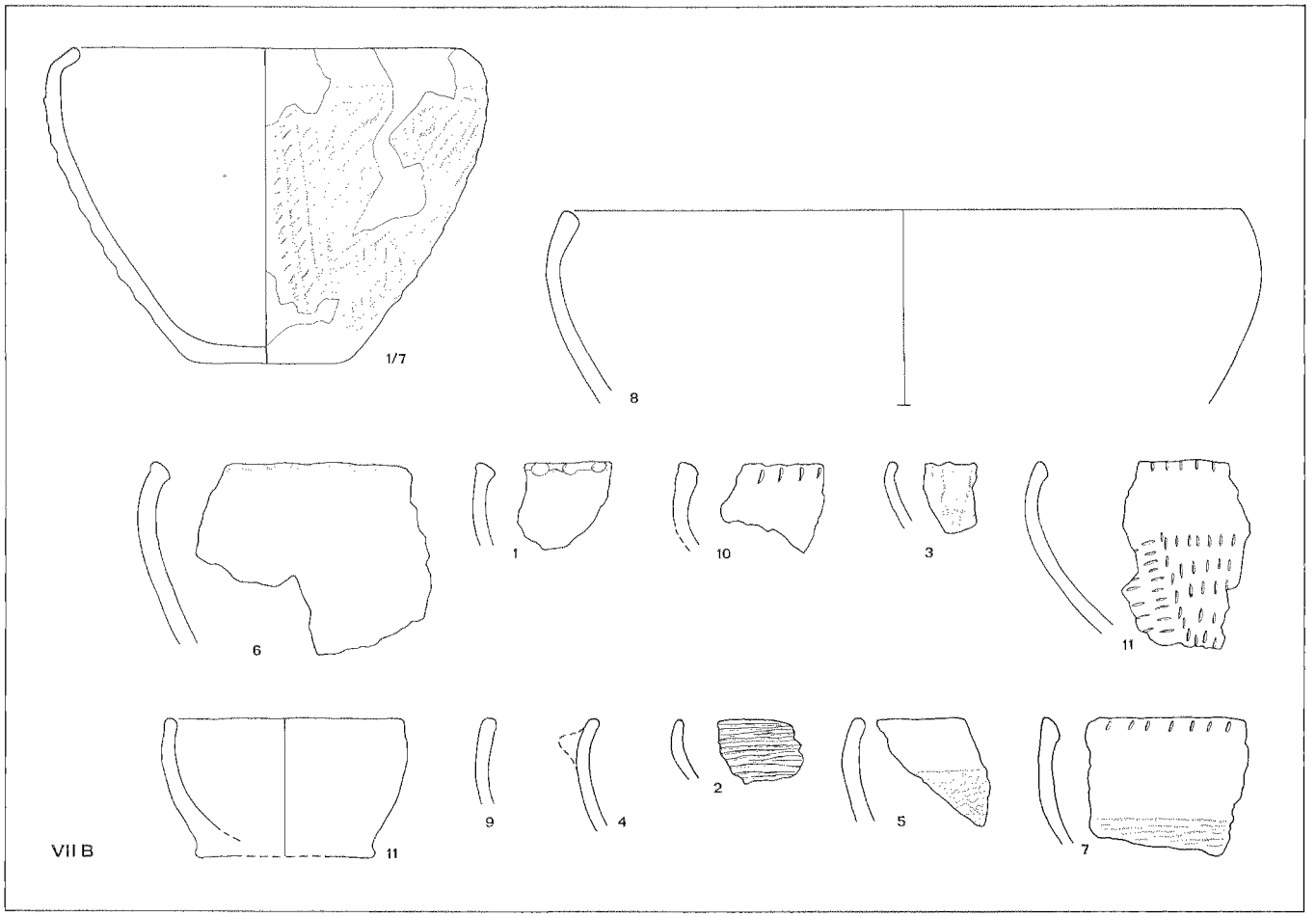


Fig. 11 Ermelo: hand-made pottery, type VII B

sand, shell-grit, gravel, and organic matter. The paste varies from fairly hard to porous and soft. The surface is generally polished on the upper section (shoulder), the rest being smooth or slightly rusticated. The colour varies between brownish-yellow and dark-grey.

Miniature pot (fig. 14)
One rim-sherd (no. 7) is a fragment of a very small pot.

Decorated wall-sherds
Group A: overall ornament (fig. 12)
This category comprises the wholly decorated wall-fragments. The various patterns of decoration may be subdivided as follows:

Ornament A 1
Rustication or *Schlickung* obtained by throwing wet clay against the wall of cooking-pots to produce quicker heating.
In total thirty-nine fragments, nos. 5, 8 (2 ×), 12 (4 ×), 13 (19 ×), 14 (6 ×), 15 (4 ×), 16 (3 ×).
Among the large rim-fragments this ornament occurs in types IV A, VII A, and VII B

Ornament A 2: *Besenstrich*
This decoration consists of concentrations of grooves, scratched into the surface with a brush or comb. Only three fragments are decorated thus: two wall sherds –

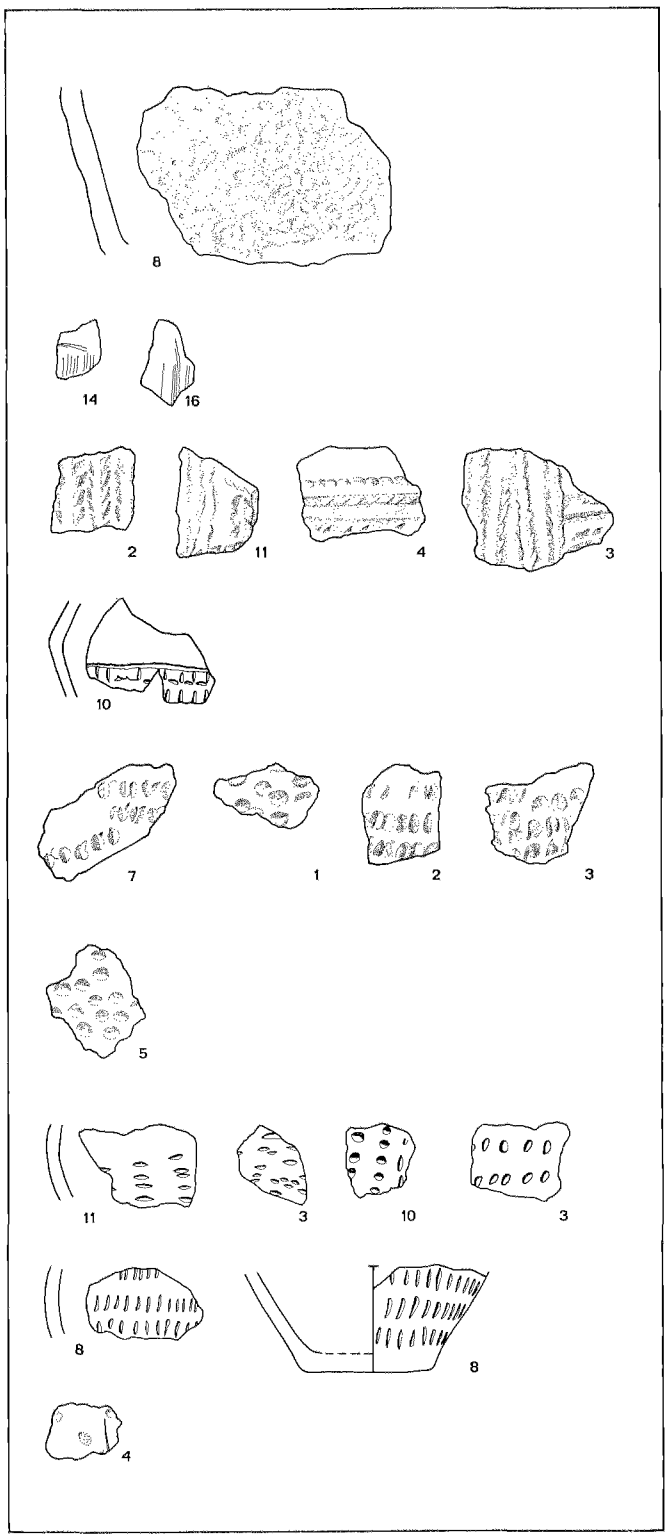


Fig. 12 Ermelo: hand-made pottery, ornament, group A

nos. 14 and 16 –, one base – no. 5 –, and, finally, bowl type VII B no. 2 is also decorated with this pattern.

Ornament A 3: *Ahrenmuster*
This decoration consists of a vertical, sometimes also horizontal or diagonal ridge flanked by slanting impressions, the whole resembling an ear of corn.
A total of twenty-nine wall-sherds are decorated with this pattern: nos. 1, 2, 3 (6 ×), 4, 5, 6 (4 ×), 7 (4 ×), 11; in addition ten sherds (no. 6) which belong to the rim-sherds (6) of type IV A. In the latter the wall is decorated with vertical zones of this ornament alternated with undecorated bands. Among the bowls, too, the *Ahrenmuster* ornament occurs (type VII A and B).

Ornament A 4: *Warzen*
A decoration of bosses or warts. This occurs only once in this complex: no. 10.

Ornament A 5: Impressions
These impressions are made with the nails or with the thumb and nail.

Ornament A 5a: Thumb-nail impressions
The wet clay is pushed out with the thumb, making a small lump next to the nail-impression. This ornament usually occurs in a succession of horizontal encircling rows.
In total seven sherds: nos. 1, 2, 3, 4, 5, 7 (2 ×).

Ornament A 5b: Finger-nail impressions
The vertical impressions are made with the finger-nail and usually arranged in a series of horizontal encircling rows. Diagonal rows also occur, and sherd no. 11 has horizontal impressions. In total seventeen walls and one base: no. 3 (9 ×), 5, 8, (one wall and one base) 9, 10 (4 ×), 11.
Some bowls, too, – type VII B – are decorated in this manner.

Ornament A 6: Pit decoration
Vertical rows of pits between two grooves: no. 4.

Group B zonal impressions (fig. 13)
The impressions may be made with the finger, nail, or

thumb and nail. Depending on the position of the decoration, the ornament may be subdivided into:
B 1 impressions against the rim;
B 2 impressions on the shoulder/wall transition.

Ornament B 1 occurs on some of the rim-fragments, which are subdivided into types IV A, IV B, IV C 1, IV D 2, V, VI, VII A, VII B.

Ornament B 2. Two wall-fragments display finger-impressions: nos. 5 and 10. This ornament also occurs on various other fragments, which are classified as types IV B, IV C 2, IV D 2, VII A.

Group C: Zonal grooves (fig. 13)
Single grooves or lines occur on the wall section of two fragments: nos. 9 and 16.

Group D: Plastic decoration (fig. 13)
Only one fragment (no. 1) in this find complex bears this ornament, which consists of a pattern of a horizontal ridge alternating with a row of small bosses of clay pinched between forefinger and thumb.

Group E: *Eingeglätte* decoration (fig. 13)
This ornament consists of polished vertical bands or stripes on a more or less roughened, slightly rusticated surface.

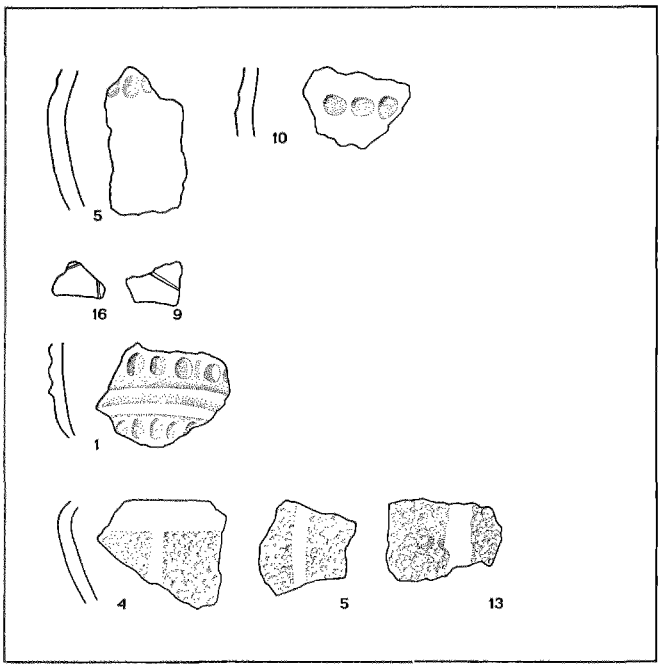
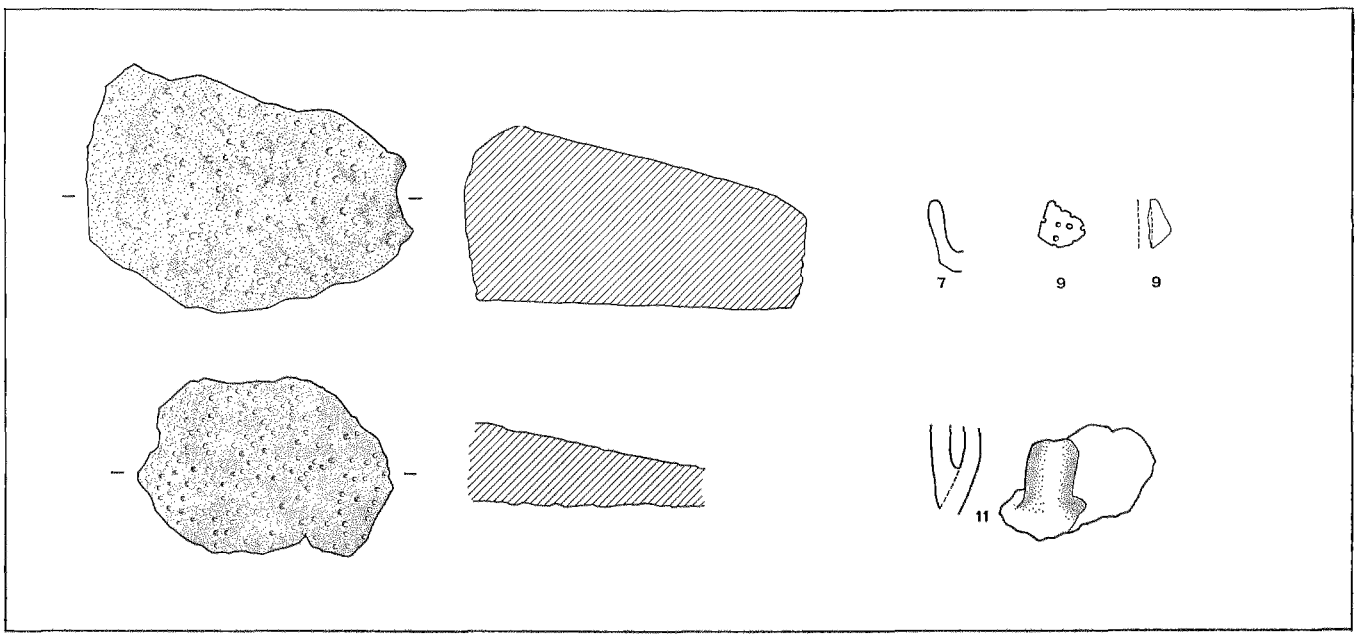


Fig. 13 Ermelo: hand-made pottery, ornament, groups B, C, D, and E

Fig. 14 Ermelo: hand-made pottery, miniature pot, sieve, handles, spindle-whorl, querns of basalt-lava



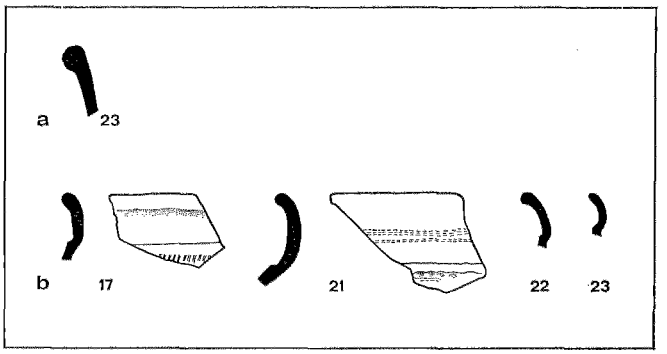


Fig. 15 Ermelo: Roman wheel-made pottery; red-painted ware and terra nigra-like material

In total eight sherds: nos. 4, 5 (4 ×), 13 (3 ×).
This ornament also occurs on a fragment with complete profile (no. 2) in type I A 3.

RIM-SHERDS NOT CLASSIFIED INTO TYPES

Some sherds are so small that it is not possible to classify them according to specific types.
Undecorated: nos. 4 (5 ×), 10 (9 ×), 16, 23.
Decorated with ornament B 1 – impressions against the rim: no. 10 (4 ×). Besides these rim-fragments and decorated wall-sherds the hand-made pottery in this find complex comprises 567 undecorated wall-fragments and 48 base-fragments, which are likewise undecorated and smooth.

Handles (fig. 14)
Three handle-fragments have been found, notably: two band-shaped handles: nos. 10 and 11, and one knob handle: no. 7.

Sieve (fig. 14)
A small sherd with three perforations, which make it likely that the sherd is a fragment of a sieve: no. 9.

Spindle-whorl (fig. 14)
One fragment of a biconical whorl (no. 9); the paste is tempered with sherd and gravel-grit.

ROMAN WHEEL-MADE POTTERY

Terra sigillata
One base-fragment (no. 23). The sherd is too small for identification, but it probably belongs to a plate Drag. 45.

Red-painted ware (fig. 15)
One rim-sherd (no. 23), reddish-brown, with rough surface. It is an imitation of terra sigillata, and the rim-type corresponds with Chenet 320. Another interesting parallel occurs in Wijster.[3]
Dating: late fourth and early fifth centuries A.D.

Terra nigra-like material (fig. 15)
Two rim-sherds (nos. 17 and 21) with a curved neck and roulette ornament; two rim-sherds, nos. 22 and 23, with curved neck and typical shoulder carination and rim. The four fragments probably belong to footed cups similar to those in the Wijster complex,[4] and may be dated to the third century.
Also included in this complex are: one rim-sherd, ten wall-sherds, and one wall-sherd with roulette ornament; the form cannot be determined.

Smooth-walled ware
This group comprises a number of indeterminate sherds: one decorated rim-sherd, four wall-sherds, and three decorated wall-sherds.

Thick-walled ware
Three wall-fragments of amphoras.

Rough-walled ware (fig. 16)
a One rim-sherd of a bowl with rim thickened towards the interior (no. 24). This sherd may be compared with Pirling 120[5] and Niederbieber 104.[6]
b Cooking-pots with lid-ridge. Three rim-sherds nos. 25, 26, 27 similar to Niederbieber 89 and *Abb.* 55: 1–5[7]; they may also be compared with Alzei 27 and *Abb.* 21,[8] and are dated to the fourth century. One rim-sherd with plain rim and groove, no. 28, as Gose 502,[9] datable to the first half of the third century A.D.

Handles
Three fragments of jugs nos. 23, 24 (2 ×); twenty-six

3 Van Es 1967, 177, and fig. 88: 200.
4 Van Es 1967, 168, and figs. 79 and 82.
5 Pirling 1966, I, 92, and II, pl. 26: 5 and 28: 2.
6 Oelmann 1914, 76, and pl. IV: 104.
7 Oelmann 1914, 72, and pl. III: 89.
8 Unverzagt 1916, 33–4, and pl. II: 27.
9 Gose 1950, 43, and pl. 49.

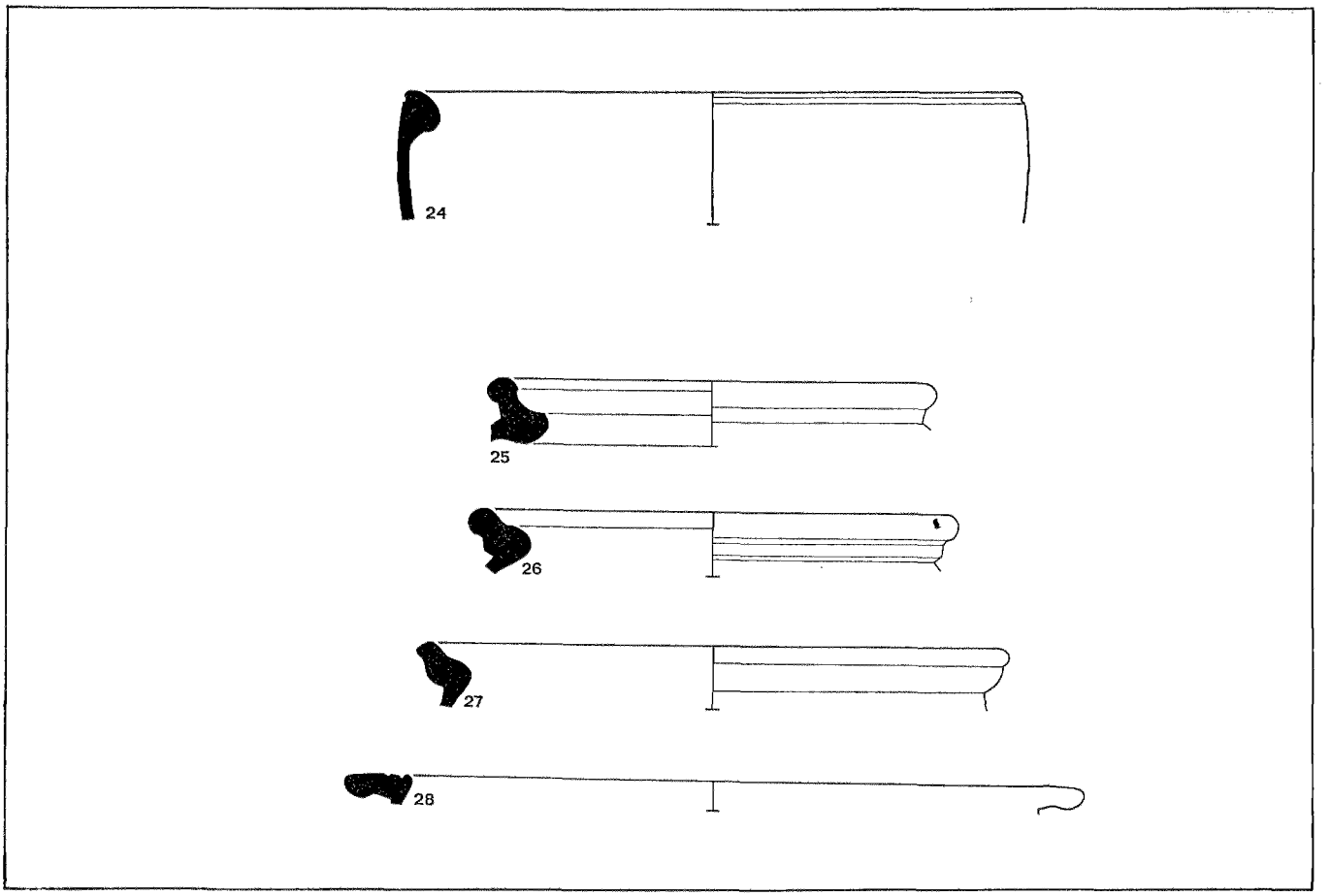
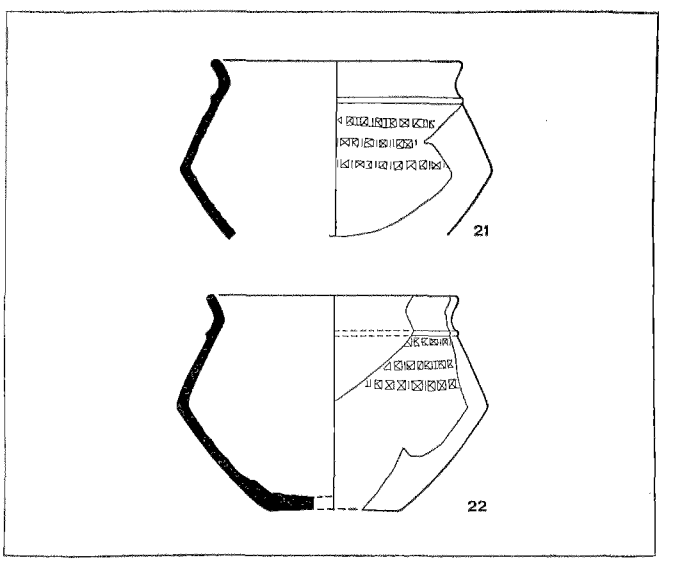


Fig. 16 Ermelo: Roman wheel-made pottery, rough-walled ware

Fig. 17 Ermelo: Merovingian wheel-made pottery, biconical pots

wall-sherds; ten base-sherds of jugs and cooking-pots; three rim-sherds.



MEROVINGIAN WHEEL-MADE POTTERY

a Biconical pots (fig. 17)

Two rim-fragments of one pot (no. 21), and one fragment with complete profile (no. 22). The sherds have a roulette ornament on the shoulder and may be compared with Böhner type 3b.[10] This type of biconical pot occurs in the

10 Böhner 1958, 40–2, and pl. 2.

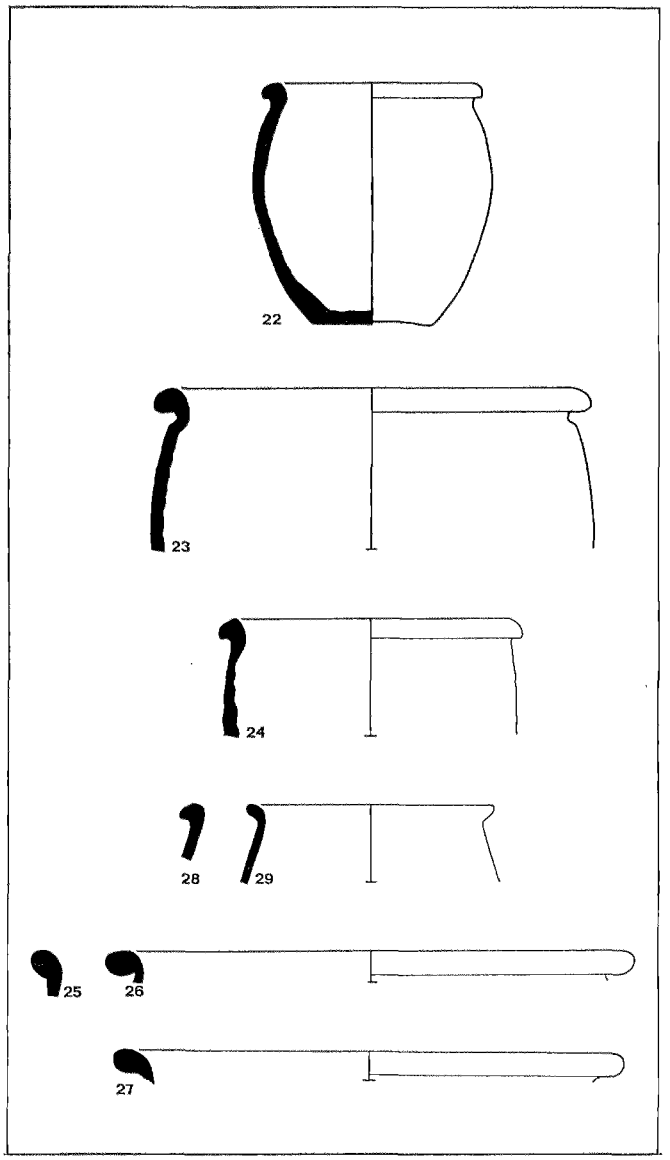


Fig. 18 Ermelo: Merovingian wheel-made pottery, barrel-shaped type

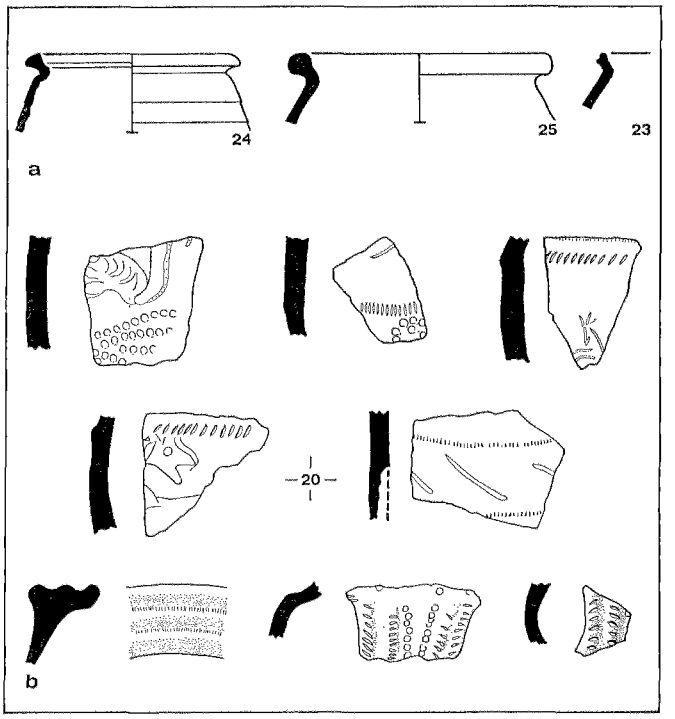


Fig. 19 Ermelo: Merovingian wheel-made pottery, globular pots (a) and wheel-made sherds of a pot or bowl (b)

seventh century A.D. In addition there are: three decorated and two undecorated wall-sherds of biconical pots. The ware is reducing-baked, with a polished surface. The colour is grey or black.

b Rough-walled ware

1 Barrel-shaped types (fig. 18)

One fragment with complete profile (no. 22), and two rims (nos. 23, 24). Regarding form and rim profile they correspond with Wageningen fig. 89: 7.[11] Three rim-sherds nos. 25, 26, 27 which may be compared with Wageningen fig. 89: 3 or 2. Two rims nos. 28, 29 as Wageningen fig. 89: 10. This ware may be dated to the seventh century A.D.

2 *Globular pots* (fig. 19a)

One rim-sherd (no. 24) as Wageningen fig. 91: 3[12]; one rim-sherd as Wageningen fig. 91: 5; one rim-sherd (no. 25) as Wageningen fig. 91: 2; two rim-sherds (no. 23) as Wageningen fig. 91: 4. These fragments should probably be dated to the eighth or late-seventh centuries A.D. In addition there are: one rim-sherd and ten wall-sherds.

Late Carolingian wheel-made pottery

The finds included a very small rim-sherd which cannot be more precisely identified; it probably dates from the

11 Van Es 1964, 265, 268.

12 Van Es 1964, 265–8.

period after A.D. 1000 and is contemporaneous with late Pingsdorf material.[13]

Finally, there are sherds of a wheel-made bowl or pot, consisting of two fragments with a broad horizontal inverted rim, in which are two lid-ridges. A broad band-shaped handle was attached to the wall, of which two separate fragments have been found.
In addition there are five wall-sherds (fig. 19b).
Very small vertical grooves occur in the lid-ridges and on the wall in zones. A row of nail-impressions encircles the shoulder carination and the wall is decorated with a circle ornament impressed in the wet clay with a straw. In addition several animal fragments, probably of an ox, are visible; this decoration is partly scratched into the surface and partly dotted in outline. The handle is decorated with a row of circles in the centre and nail-impressions on the sides.
The position of the rim and also the flat wall-sherds indicate that the wall was fairly straight and vertical, and there is reason to assume that the fragments belong to some kind of deep bowl rather than to a profiled pot.
The vessel is fairly thick-walled with a brownish-yellow core and a reduced grey-black interior and exterior. The tempering consists of sand and fine gravel-grit; the surface of this fairly hard-baked ware is smooth.
No parallels have been found in the literature, and none of the experts who were questioned had ever come across this product. Indeed, the fragments are described here with a view to informing the student and to eliciting reactions from those who may have come across this type of pottery in the past, or even have such sherds in their possession.

QUERNS OF BASALT-LAVA (fig. 14)

Four pieces of this stone occur in the find complex; they are fragments of millstones, for which the material was imported from the Eifel.

DATING OF HAND-MADE POTTERY

(*cf.* Table I, p. 28)
Type I A 1, 2, and 3 corresponds in general as to shape with Form I in Von Uslar, notably with the early type which he dates to the first and early second centuries.[14]
The Ermelo forms, however, are more similar to the two pots from Ezinge illustrated in the book on Wijster than to the German types, and Van Es holds the opinion that the above-mentioned Ezinge specimens date from as early as the first century.[15]
This type also occurs in Paddepoel, dating from the first and early second centuries.[16]
A dating to the end of the first and the early second centuries would seem appropriate for the *situlae* from Ermelo.

Type II
The three sherds in this complex, which were identified as Von Uslar Type II, are somewhat coarse forms and strongly resemble the profiles *Tafel* 43:3 and *Tafel* 15:20. Von Uslar dates them to the end of the second and the third centuries.[17]
In view of the absence of the rim-lip in this group it is perhaps more appropriate to regard them as late forms, and to date them accordingly to the third century and possibly the fourth.

Type IV: Tureens
IV A This form is reminiscent of Paddepoel type III and Wijster IV B. They certainly date from the second and third centuries but it is not unlikely that they still occurred in the fourth century.
IV B may be compared with some profiles Wijster IV A. In Wijster special mention is made of the early forms with a short neck and thickened rim from the first century.[18] Since the Ermelo rims are not thickened or only very slightly and the neck is not very short, dating from the second up to and including the fourth centuries would seem most acceptable.
IV C These profiles share the short neck and sharp rim indentation on the interior with Wijster IV C. They are therefore probably second-century forms.[19]
IV D Forms with an S-shaped profile are difficult to date exactly: this form occurs at a very early date, and its popularity continued undiminished throughout the Roman period. Dating between the first and well into the fourth centuries is possible.

13 Professor W.A. van Es, Amersfoort, oral information.
14 Von Uslar 1938, 59–60.
15 Van Es 1967, 293.
16 Van Es 1968, 262.
17 Von Uslar 1938, 63–8.
18 Van Es 1967, 307.
19 Van Es 1967, 244 and 308.

Type V: Plates
Von Uslar dates these to the second and third centuries,[20] but the Ermelo types are slightly different from their west-German counterparts and more similar to the forms found in Drente.
Van Es suggests an early dating: the first century.[21] With regard to the present group a dating between the end of the first and the middle of the third centuries appears to be most appropriate.

Type VI: Dishes
Like the plates, these are difficult to date accurately, so it would seem reasonable to regard this group as a parallel of type V.

Type VII: Bowls
VII A is dated by Von Uslar between the first and third centuries.[22]
VII B forms occur both in Von Uslar and in Wijster. It is a form with a long history, and was probably in use in Ermelo during the entire period, *i.e.*, from the first to well into the fourth century.

DATING OF WHEEL-MADE POTTERY

(cf. Table 1, p. 28)
The terra sigillata may be dated to the late fourth and early fifth centuries, the terra nigra-like forms belong in the third and fourth centuries, while the rough-walled bowls and cooking-pots are very nearly all fourth-century material. In general it may be stated that the imports should be dated to the third and fourth centuries, and it is on this fourth-century material in particular that I base my assumption that the native pottery is not exclusive to the third century, but that type II and certainly type IV A and B and type VII B must still have been in use in the fourth century. The find complexes Ermelo V and VI published earlier by Van Sprang correspond with the group described here as regards the shape. Van Sprang dates these finds to the second and third centuries,[23] but this strikes me as a too restricted chronology: his groups IV and V include forms which still occurred in the fourth century.
Besides the finds from the Roman period the 83/88 Dirk Staalweg concentrations also include a number of fragments from the Merovingian period as well as the sherds of the same type in Mr E.J. Feenstra's private collection. The latter concerns seventh and eighth-century material that did not occur in the findspots Ermelo V and VI. But this pottery is not completely isolated, for a Merovingian cemetery was found in the heathland to the southeast of the village, and it seems likely that there is some connection between these finds and the cemetery.

CONCLUSION

The finds indicate occupation from the end of the first century up to and including the fifth century, while most of the material is concentrated in the second, third, and fourth centuries. The settlement was presumably abandoned in the fifth century, as was the case for example, in Wijster, Bennekom, and Ede/Veldhuizen – an almost standard sequence of events at that time. But what is so remarkable about Ermelo is that exactly the same site must have been re-occupied in the seventh and eighth centuries – as witness the Merovingian finds. This is a slight deviation from the common pattern, for as a rule occupation from the Merovingian period did not take place on the same site, but in the surrounding area on slightly lower ground.
The most intriguing aspect here, however, is the settlement itself, for if all findspots are placed on one map we see that there are in fact two concentrations, one in the area of Hamburgerweg/Dirk Staalweg and the other around Hamburgerweg north of the canoe lake. The question is now whether there were a few houses about 400 m away in Roman times, or whether the concentrations of finds mark the west and probably east boundaries of a larger settlement.
Before the present-day development scheme came into being there was a small fen to the west of Dirk Staalweg; we cannot be sure whether it dates from as early as the Roman period, but if so it is quite possible that occupation was concentrated around this small lake. The southern boundary of this hypothetical settlement is uncertain.
While the foundations were being dug between the Kozakkenkamp and the centre of the village, Mr E.J. Feenstra kept an eye open for any finds or traces which might indicate an extension of the settlement in a northern direction. However, no such evidence was found.
A fourth-century coin was found on Suikerbakker, but

20 Von Uslar 1938, 75–7.
21 Van Es 1967, 311–2.
22 Von Uslar 1938, 75–7.
23 Van Sprang 1962–3, 34 and 38; Van Sprang 1963, 126.

since no other material was found on this site the coin may have simply been lost, and need not therefore be indicative of occupation.
It seems reasonable to assume, therefore, that the northern boundary of the settlement ran roughly along Hoge Enk and further northeast up to Kozakkenkamp. It will be very difficult to obtain more certainty concerning the exact extent of the settlement because, by the time it became clear that interesting archaeological material lay concealed in the soil in this area, construction was already in such an advanced stage that it was too late to undertake more than very small-scale excavations.
The only possibility of ascertaining whether or not we are dealing with one large settlement would be to undertake exploratory excavations in the gardens of the various houses in the area.

ACKNOWLEDGEMENTS

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J.C. BESTEMAN

Carolingian Medemblik

With contributions by W. Groenman-van Waateringe and J. Barelds

figs. 1–43; pls. v–xiv

INTRODUCTION

The numerous archaeological studies that have been made in recent years in central and eastern Westfriesland (fig. 1), the area east of the boundary Hoogwoud-Spierdijk, have added much to our knowledge of human habitation there in prehistoric times. Little is known, however, about the region's history in the early Middle Ages. Although the area certainly was habitable despite extensive marshy areas, until recently there were only a few known finds of Carolingian pottery.[1] Moreover, there were no traces of settlements from the early Middle Ages. The archaeological investigation carried out at Oude Haven in the centre of Medemblik and at Schuitenvoerderslaan just outside the town during the years 1967–1970 may be considered a first step towards the clarification of the early medieval history of Westfriesland and its oldest town. Therefore, the traces of Carolingian settlements discovered during the excavations at Medemblik have been given first importance in this article, and little attention will be paid to finds of the Bronze Age and later Middle Ages which were found at the same time.

Medemblik and its environs formed a blank spot on the archaeological map of Westfriesland up to the 1967–1970 excavations. On 31 March 1967, when Mr A.J.F. Koelen, then director of Public Works at Medemblik, reported a find made during ground preparations for the construction of Schuitenvoerderslaan for the Randwijk extension scheme south of the city, the response was immediate. An exploratory excavation was done by the Westfries Museum from 3 to 13 April under the direction of M.D. de Weerd, followed by an excavation by the Institute for Pre- and Protohistory of the University of Amsterdam.[2] Archaeological activities at Medemblik were not limited to the excavations at Schuitenvoerderslaan (fig. 2). Moreover, there are still other places in the town centre of Medemblik where archaeological investigations can be carried out. Such possibilities will soon be expanded temporarily when plans to rehabilitate the old town are realized, at which time research can be done for a short period. It was therefore decided to make an exploratory excavation at Oude Haven (fig. 2 and pl. v), on behalf of the State Service for Archaeological Investigations (ROB) at Amersfoort in cooperation with the Institute for Pre- and Protohistory.[3]

Before the excavations at Medemblik, any ideas on the earliest form of local habitation preceding the granting of town rights in the thirteenth century were merely guesswork. After that, however, it was clear that people had lived in and around Medemblik as early as the Bronze

1 Braat 1947, 68; Van Regteren Altena/Bakker 1968, 207–8.

2 Now the Albert Egges van Giffen Instituut voor Prae- en Protohistorie (IPP). The investigation took place in three campaigns of excavation, respectively from 20 April to 12 September 1967, from 24 May to 4 October 1968, and from 21 October to 26 November 1969. The following persons assisted: J.A. Bakker, J.C. Besteman, H.N. Donker, E.J. Harenberg, H.A. Heidinga, F.R. van Iterson Scholten, W.H. Metz, H.H. van Regteren Altena, J. Slofstra, and A. Visser, all, at that time, staff members of the IPP, G.P. Nes, then attached to the Westfries Museum, Hoorn, and for some time several students from the University of Amsterdam. The owners of the land, the Municipality of Medemblik and Mr C. Commandeur kindly cooperated in every way. The Provincial State of North Holland subsidised the first two excavations. Preliminary reports of excavations: Van Regteren Altena/Bakker 1967; Van Regteren Altena/Bakker 1968; Van Regteren Altena/Heidinga/Harenberg 1968; Slofstra 1970.

3 The investigation was carried out at Oude Haven and lasted from 4 October until 24 December 1970. H. Halbertsma (ROB) was in charge of the scientific direction, A. van Pernis (ROB) conducted the excavations in the field and J.C. Besteman (IPP) assisted. The Municipality of Medemblik again cooperated in every way. Preliminary report: Halbertsma 1971.

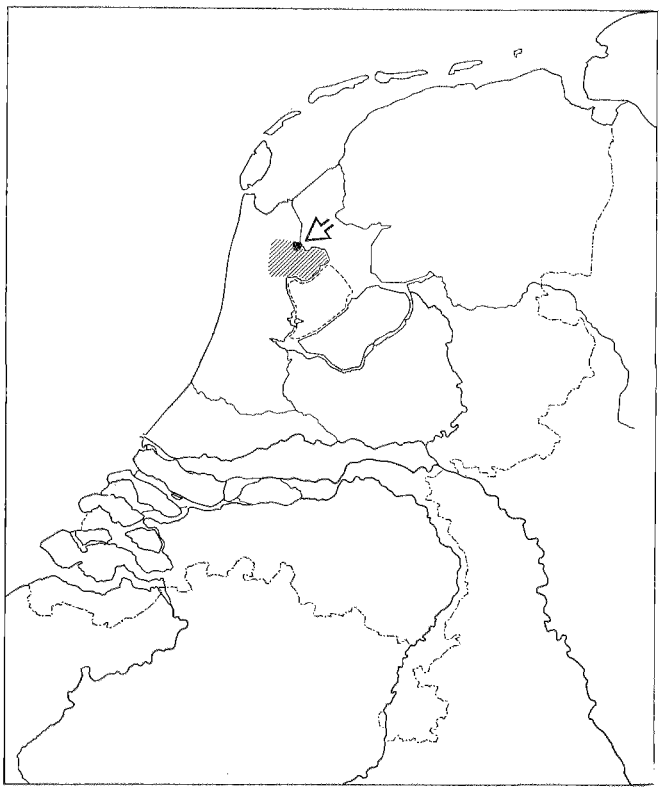


Fig. 1 Medemblik and Middle and East Westfriesland.

Age, and that they have lived there uninterruptedly since the early Middle Ages. In this article emphasis will be given to human habitation and other activities in the early Middle Ages. The intention is to present a discussion of the many problems involved, rather than to give a complete picture. Due in part to the kind of excavations – a limited exploratory one and a rescue excavation – more new problems arose than solutions to old problems. Consequently, we do not consider that the research at Medemblik has been completed. We hope that this article may serve to stimulate further research. It deserves attention if only because recent discoveries indicate that prospects are favourable for a thematic study of Medemblik's early medieval settlement and its development into the medieval town. In addition, as has been said, present circumstances are fortunate in that it is possible to carry out excavations in the town centre. The publication of the results of the excavations and, even more, the newly created, unanswered questions related to them, which will have to be considered hereafter, will, we hope, underscore the need to continue investigations at Medemblik. An important aim of this article will have been achieved if it contributes to the continuation of these investigations.

4 The pedological data were taken from: Pons 1974; Dekker/De Weerd 1974; Dekker/De Weerd 1973; Du Burck/Dekker 1968; Dekker/Wagenaar/Zegers 1968; Ente 1963 and Pons/Wiggers 1959–1960.

MEDEMBLIK AND ENVIRONS[4]

Westfriesland owes its existence to the marine sediments which were deposited in thick layers in the Holocene Period. This took place during many transgressional stages, when the sea broke through the coastal barrier and changed the area beyond into an open tidal flat, where peat could be formed during periods of regression. Two transgressional stages, the Calais IV B and the Dunkirk O, of 2200–1500 B.C. and of 1500–1200 B.C., respectively, determined to an important degree the soil and the landscape of central and eastern Westfriesland. During these periods, via a widespread system of creeks, clay and sand sediment was deposited, clay in stagnant areas outside the creeks and sand in the water gullies. Due to the shrinkage of the clay deposits in relation to that of sand, considerable variations in height evolved. The old creeks filled with sandy material less subject to shrinkage thus developed into ridges in the landscape. The drainage system clogged up and peat formation occurred in basins and low-lying areas. Since then, no new deposits were laid in many places in the relatively high terrain. People have lived in this area since the Neolithic Age, though probably not continuously, showing preference for creek ridges. Since 1967 traces of human habitation from the Bronze Age and once from the (Roman?) Iron Age have also been ascertained in various places around Medemblik which lies on the eastern end of the large creek ridge of Abbekerk (fig. 15).

A number of factors are responsible for the geographical situation of Medemblik in the early Middle Ages (fig. 3). Medemblik, *Medemelacha* in Latin, is well located at the end of the large northern creek ridge. Its name is derived from the former watercourse of the same name, the *Medemelacha* ('Middenleek') mentioned in 985 as the one that formed a district boundary.[5] It probably was a

5 Koch 1972, 106; see also Blok 1969, 353 and De Cock 1969, 156–7.

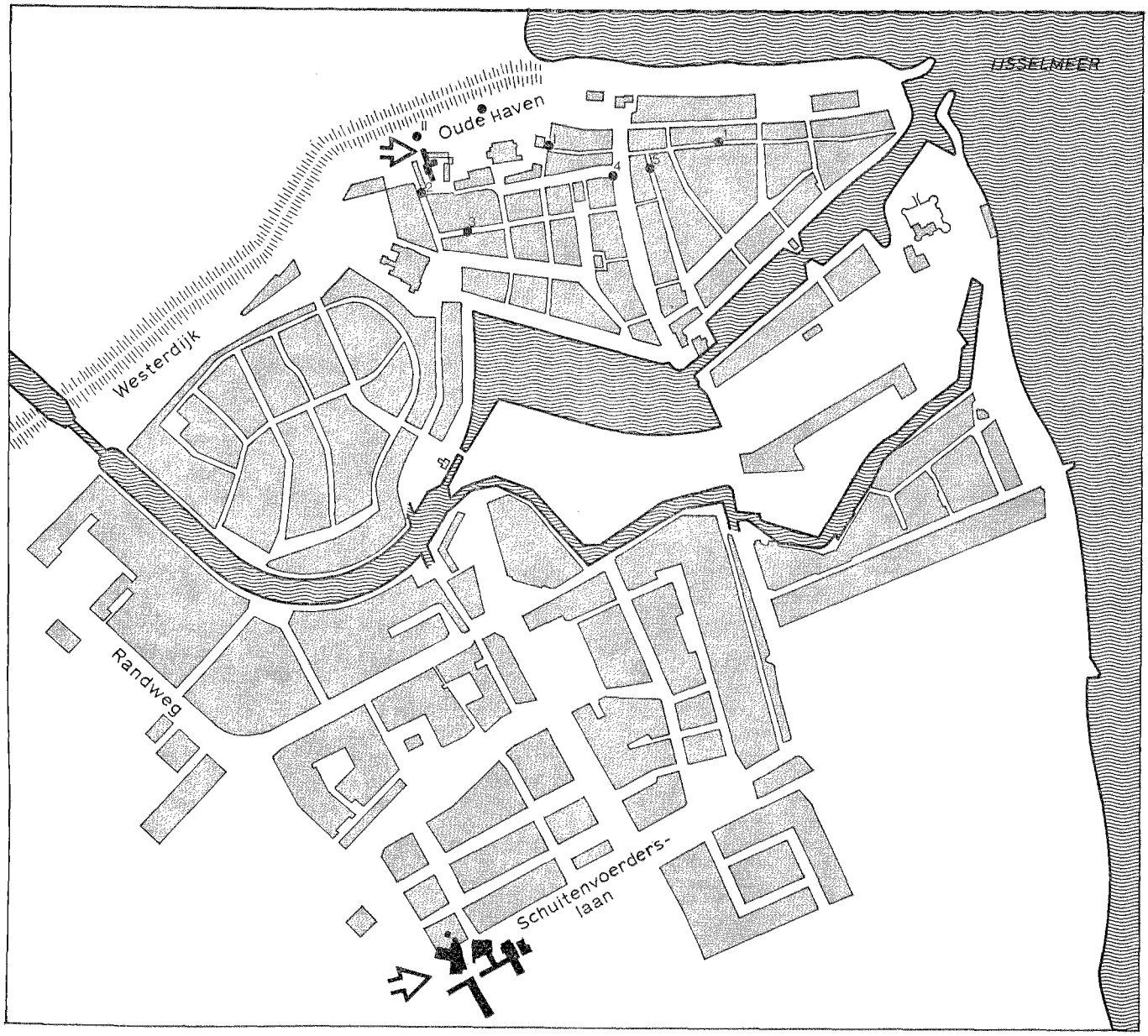


Fig. 2 Medemblik: Situation of the excavations at Oude Haven and Schuitenvoerderslaan and the borings in the centre of the town: 1. Oostersteeg; 2. Ridderstraat; 3. Bagijnhof; 4. Nieuwstraat; 5. Tuinstraat; 6. Oude Haven; I. Kerksteeg/ Herensteeg; II. Oude Haven.

fen stream that partly drained the extensive peat region between Westfriesland, Wieringen, and the coast.[6] Flowing from the west, at Medemblik this stream passed along the end of the high creek ridge of Abbekerk and, a little further, emptied into the complex of waters called 'Almere'. Via the latter, it was connected with the Vlie

6 Schoorl 1973, 23. Fig. 3 for the northern part is based on data from Schoorl.

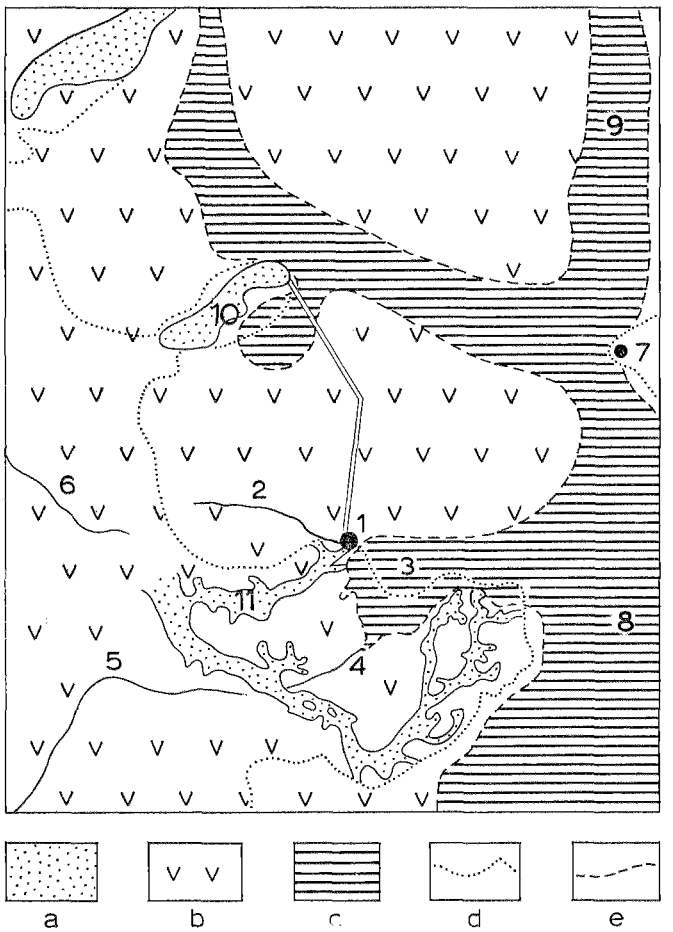


Fig. 3 Middle and East Westfriesland in the Carolingian period: 1. Medemblik (*Medemelacha*); 2. Middenleek (*Medemelacha*); 3. Meer van Wervershoof; 4. Kromme Leek; 5. Leek; 6. Leek; 7. Staveren; 8. Almere; 9. Vlie; 10. Wieringen; 11. Creek ridge of Abbekerk; a. creek-ridge system of Westfriesland and pleistocene on the surface; b. peat; c. water; d. present coast-line; e. probable coast-line in the Carolingian period.

and the sea, which came in from the north. Directly south and southeast of Medemblik stretched a lake or lake inlet to Andijk, the northeastern shore of which is not known, and which usually is called Lake Wervershoof. This lake connected Medemblik with the Kromme Leek, which emptied into the lake near Wervershoof, and may have been connected to Kennemerland to the west via the Kromme Leek depending on whether the connection excavated at Wognum with another Leek flowing westwards was already present (fig. 3).[7]

The consequences of the Dunkirk III A and III B transgressions of *c.* 850 to 1000 and of *c.* 1150 to 1400, about which there are written records,[8] were of major importance to Medemblik. In and around Lake Wevershoof, a layer of compact, homogeneous, non-calcareous clay, the so-called *kiekklei*, was deposited. The increased activity of the sea from the middle of the twelfth century during the Dunkirk III B transgression was responsible for the development of the Almere into the Zuiderzee. What is more, extensive peat areas to the north of Medemblik gave way, so that habitation there was no longer possible.[9] The dikes built since the eleventh century were unable to withstand this force. Land was lost to the sea until the fourteenth century. Although the large creek ridge, at the end of which Medemblik was situated, proved to be a firm foundation, traces of the fury of the water from a later time also may be clearly discerned in the levelled-off creek ridges, in the gullies in the landscape, and in the action of water on the soil. During such floods, the *kiekklei* was again washed away from the surface and the old Calais IV B and Dunkirk 0 deposits were exposed and in places covered with lighter deposits.[10]

WRITTEN RECORDS OF MEDEMBLIK'S EARLY HISTORY

Written records about the west Netherlands became more numerous at the beginning of the eighth century, when Friesland between the Vlie and Zwin came under Frankish rule for good – followed by the successful efforts of Anglo-Saxon missionaries – because the region was then within the sphere of interest of Frankish chroniclers. Moreover, supported by Frankish rulers, the missions and the conversions that followed soon yielded material returns. The Frankish lords gave gifts of property to the church in the newly acquired territories, and soon, the

7 De Cock 1965, 211. Blok (1959, 19) believes that Medemblik or Middle Leek was the centre from which the names Overleek for the Kromme Leek (Crooked Leek), and Oterleek (= Outer Leek) for the Leek which is situated even further away and ran westwards past the village of Oterleek (near Alkmaar) were taken. A northerly Leek would have run half way between Westfriesland and the former island of Wieringen (see also fig. 3)

8 Gottschalk 1971, 93–4.

9 Archaeological evidence for this in Braat 1932 (datings later revised).

10 Du Burck/Dekker 1968, 146.

recently christianized population of Friesland to the west of the Vlie did the same. Owing to the careful management of records by church institutions, especially the monasteries located closer to the centre of the Frankish realm, these data have been preserved for us.

The picture that emerges from the written sources, of the distribution of the population of West Netherlands in the early Middle Ages, agrees along broad lines with that of the distribution of early medieval archaeological finds.[11] Although the latter provide the most information about habitation during this period, at times the written records add material which has not (yet) been confirmed by archaeological discoveries. This was true until recently of Medemblik. There were no known finds from the town and its environs older than the tenth century. On the other hand, Medemblik had been mentioned earlier in the *Goederenregister*, *i.e.*, the property register of St Martin's Church at Utrecht, dated between 918 and 948. The description of the property belonging to Utrecht itemized in the register was, however, based on documents and notes from the eighth and ninth centuries.[12] According to the list, in Medemblik the Utrecht church owned the *regalis decima*, one-tenth part of royal property and income.[13] Blok has shown that the one-tenth ownership of the Utrecht church derives from the deed of the gift of one-tenth of all royal property and income in the diocese by Pepin III in 753.[14] Consequently, it can be assumed that there was royal property at Medemblik as early as the middle of the eighth century. The presence of royal property is of greater importance because trade preferred the royal protection near to the royal estates. The grant of exemption to church property from the rule of the royal official was even more advantageous to trade. This exemption applied to all the property of the Utrecht church. The chance of evading the king's official close to royal property by settling that one-tenth of the royal estates that had been given to the bishop of Utrecht was also essentially present in Medemblik.[15]

A charter dated 26 June, 985 confirms that Medemblik's trading activities, fostered by its location on important waterways with present Westfriesland and the 'Kop van Noord-Holland' as hinterland, were stimulated by the presence of royal property and also perhaps by the special exemption that the church property of Utrecht had there. In the grant, King Otto III gives a part of the income from tolls, minting, and taxes at Medemblik to Count Ansfried, who previously had held it in feudal tenure from him.[16] This Count is known as a member of one of the families of new regional rulers, who became powerful during and after the Norman period and the decline of central authority, and who could thus act rather independently. The kings, whose authority was weakened, had to submit to this change, and loaned or gave these rulers what they had acquired, in exchange for recognition and support. In this context, Empress Theophano, on behalf of her five-year-old son Otto III, whose succession had been contested until then, granted Ansfried also a part of the tolls, minting, and taxes at Medemblik in 985.

A number of things can be said about this grant. Noteworthy is the fact that a *part* of the income from tolls, minting, and taxes was given. Thus it can be assumed that it was a grant involving actual income and not a matter of theoretical rights. The most likely explanation that a *part* was given is the fact that one-tenth of royal property and royal income at Medemblik had already been given to the Utrecht church by Pepin III in 753, and this was confirmed and increased by Louis the Pious in 815. This apparently also included one-tenth of the tolls, minting, and taxes, so that could not be given to Ansfried in 985. In the grants of 753 and 815, and also in the *Goederenregister* of St Martin's Church at Utrecht, the grant and the right to one-tenth of the income from tolls and other taxes on trade and traffic are stated explicitly.[17] Moreover, the list of property includes other indications of the availability of these taxes at Medemblik by recording the *regalis decima*, the one-tenth part of royal property and income there. It appears that the term *regalis decima* was especially used in the register to record the right to one-tenth of the tolls and other tax collections, which right is only noted in a general sense on the list. It is not mentioned by name elsewhere in

11 Blok 1974, 80.

12 Blok 1957, 102.

13 Muller/Bouman 1920, no. 49, p. 47.

14 Blok 1974, 46 and 53.

15 This opportunity was also present at Dorestad and, as appears from data concerning it, was gratefully used (Blok 1974, 75). De Cock (1967, 127) considers the proximity of monastic immunity and waterways to be important trade-attracting factors and points out Tiel and Staveren.

16 Koch 1972, 102–3.

17 Muller/Bouman 1920, no. 43, 753: *omnem decimam de terra seu de manicipiis aut de toloneo vel de negotio aut undecumque ad partibus fisci census sperare videbatur.* Muller/Bouman 1920, no. 56, 815: *omnem decimam de mancipiis terris et de teloneis vel de negotio vel de omni re undecumque ad partem regiam fiscus teloneum accipere aut exigere videbatur.* Muller/Bouman 1920, no. 45, Goederenregister: *De teloneis quoque et de negotio aut undecumque ad partem regiam ius fisci censum exigere debet omnis decima.*

the register. On the other hand, the right to one-tenth of the more unusual sources of royal income, such as *huslotha* and *koggeschuld*, is stated specifically. For the exceptional notation of the right to one-tenth of salvaged goods at Vartrop on Wieringen, a reason is even given, *i.e.*, there are no toll collections *(quia teloneum non habetur)*. From this explicit statement of the absence of a toll at Vartrop, instead of which the Utrecht church is to receive one-tenth of salvaged goods, it may be assumed that the right to one-tenth of the toll was customary. Searching in the *Goederenregister* for a notation of the possession of the right to a part of tolls and other taxes, we only found a possession described as *regalis decima*. Whenever the latter, as at Medemblik, is recorded in the register, the tenth of the royal income is emphasized besides that of royal property, so that it is very likely that there was a toll collection.[18] This is certainly true of the *regalis decima* recorded at Dorestad, because we know from other sources that an important Frankish realm toll station was established there with a special royal official, the *procurator*.[19] The presumed relationship between the *regalis decima* and the toll, minting, and tax grant of 985 at Medemblik on a smaller scale is comparable with that situation.

In summary, we may then assume on the basis of the record of the *regalis decima* at Medemblik and the related document of 985 regarding a part of the tolls, minting, and taxes that, as early as the Carolingian period, royal taxes were imposed on trade commodities.[20] The importance and amount of each of the tax sources – tolls, tax on goods and excises on the property list, and the toll, minting, and taxes of 985 at Medemblik – are not clear, especially as regards the minting,[21] but the importance of the taxes imposed on trade commodities is evident. As has been said, it is apparent from the records of the *Goederenregister* and the deed of 985, in both of which the income is divided, that it was not a matter of theoretical rights but rather a grant involving actual income.

In another grant of 985, a watercourse, the *flumen Medemelacha*, from which Medemblik derives its name, is mentioned.[22] This river and another recorded in the same deed, the *Chinnelosara-gemerchi*,together form the northern boundary of Kennemerland.[23] They probably are fen rivers, the first flowing eastwards, the second westwards, draining the peat area north of Westfriesland.[24] It is difficult to retrace the course of the *Medemelacha*. Blok called attention to old water channels around Medemblik, and thought it might be the Wijmers.[25] However, the latter lies to the south of the creek ridge of Abbekerk, and the extensive peat area in the 'Kop van Noord-Holland' is north of it. Others have considered the river Vidrus, which might have flowed westwards along Medemblik until the Roman period, or even later.[26] The situation of the Almere, that in the early Middle Ages drained to the north via the Vlie, makes the latter assumption improbable. Most likely it was the important fen river, the *Medemelacha*, that flowed to Medemblik from the west and disappeared when the Wieringermeer was formed. Meanwhile, with the tenth-century record of the place and the river *Medemelacha* (= Medemblik and Middenleek), we have left the Carolingian period behind us. The Norman invasions purposely destroyed Dorestad, the important centre of Frisian trade. Other early medieval trading centres were also plundered, such as Domburg *(Walacria?)* and Witla at the mouth of the Maas River. Nevertheless, Frisian trade survived the Norman period, be it in a more decentralized form. The function of

18 The first mention of the toll at Medemblik after 985 is not dated until 1303 (Municipal archive Medemblik: Oud-archief, no. 1221:3) and after that until 1311 (Berkelbach van der Sprenkel 1937, no. 228).

19 Ganshof 1959, 21; Muller/Bouman 1920, no. 56.

20 That the toll in our country should date back to the Carolingian period is rare, but this is mostly due to lack of data. The toll is a typically Frankish institution adopted from the Roman Empire (Ganshof 1958, 5) and, during the Carolingian period, brought over to the conquered territories. That part of this income should be given to a new mission church, as in the diocese of Utrecht, is not an isolated case. In the Spanish March part of the royal income from the toll was also given to several diocesan churches (Ganshof 1959, 24–5).

21 In many tenth- and eleventh-century royal grants of royal rights and revenues, the minting is mentioned as part of it. Thus, there is mention of 1/10 of *omnium regalium prediorum et theloneorum et monetarum* (Muller/Bouman 1920, no. 111) in a confirmation of the now well-known donation of a tenth part of the royal possessions and revenues by Otto III to Utrecht in 948. As such, it replaces the older definitions mentioned previously (see note 10 above). It is not known to what extent use was made of the right of minting in all the places where a mint is mentioned e.g.: Utrecht, Medemblik, Zaltbommel, Vught, Deventer, Groningen. The oldest coin minted in Medemblik that we know of only dates from 1280 (Wiese 1956, 32).

22 Koch 1972, no. 55

23 De Cock 1967, 32–3.

24 Schoorl 1973, 23.

25 Blok 1959, 18.

26 Edelman 1958, 243–4; Pons 1962, *afb.* 4 and 172–3.

Dorestad was assumed by Utrecht, Tiel, Deventer, Staveren, and Emden.[27] In the western coastal region, places that may have functioned as trade centres included Medemblik, Vlaardingen,[28] Muiden,[29] Rijnsburg,[30] and, perhaps for a very short while, Egmond.[31]

Besides the written records which provide us with direct information about the earliest history of Medemblik, we also have less direct sources which are important for this period. Blok has referred to the antiquity of the name Medemblik and the names of the watercourses in the vicinity of Medemblik, in contrast to the generally more recent Westfrisian names.[32] In addition, we note the great age of the patrocinium of the church of Medemblik, St Martin.[33] The patrocinium of this pre-eminently Frankish saint frequently follows the trail of Frankish expansion and missionary work.[34] The church Willibrord come upon in Utrecht was also dedicated to St Martin. It is not surprising therefore that the church at Medemblik owned by the St Martin's Church of Utrecht was also dedicated to the Frankish patron saint. It was the mother church of Westfriesland, that in turn expanded the St Martin patrocinium there. In 1118 Godebaldus, Bishop of Utrecht, presented his church at Medemblik to the Chapter of St Martin, so that the annual feast of the patron saint could be celebrated from the proceeds.[35]

Around 1100 the communal development of Westfriesland came to an end. The Counts of Holland, who had extended their rule there, came into conflict with the inhabitants of the Westfriesland we know today. At the same time, the names Holland and Westfriesland appear, thus indicating the changed relationship. In 1118 mention is made of *Medemblec in occidentale Fresia*.[36] In the second half of the twelfth century during the Dunkirk III B transgression, new gullies were formed between Holland and Westfriesland, which separated them even more.[37]

Traditionally the most important town in Westfriesland, Medemblik was the first to receive municipal rights (1288) after the final subjugation of the Westfrisians. At the same time, one of the 'pacification' castles of Holland was built there. Medemblik's leading position was based on the part it played in the regional administrative, legal, and economic organization. The town's prominence was undermined by the steady loss of land during the Dunkirk III B transgression, which the dikes could not prevent. Again and again, the Westfrisian sea dike had to be abandoned, with the loss of all the land north of it, principally fens.[38] As late as 1335, the Westfrisians had to build a new dike from Medemblik to Barsingerhorn south of the old one, and thus the village of Gawijzend was abandoned to the sea. The situation became so acute at Medemblik that the Westfrisians promised that, if needed, they would surrender the city and the castle to the sea.[39] This was not necessary, but the constant struggle against the water, and the loss of part of its hinterland, meant the end of Medemblik's leading role in Westfriesland, which thereafter it had to share with Hoorn and Enkhuizen.

Returning to the subject of this chapter, we can summarize the earliest history of Medemblik as follows. As early as the eighth century, there was royal property at Medemblik, one-tenth of which was granted to St Martin's Church at Utrecht. Moreover, there is evidence that tolls and other taxes were levied on trade commodities. This, plus its location on important water routes and the presence of royal and church property that provided protection, indicate that the town may have had a trading function. The extent to which this picture can be supplemented or confirmed by the results of the two recent excavations at Medemblik will be discussed after presenting the results of the excavations.

27 J.F. Niermeyer in Alberts/Jansen 1968, 48.
28 Hoek 1973, 82.
29 J.F. Niermeyer in Alberts/Jansen 1968, 43–4.
30 Confirmed by excavations (information Mr H.H. van Regteren Altena, IPP).
31 De Cock 1967, 126–7.
32 Blok 1959, 18.
33 The patron saint of the church in Medemblik is now St Boniface. The change was not made until recently, according to information from Dr H.J. Kok.
34 Kok 1958, 24.
35 Muller/Bouman 1920, no. 289. The annual proceeds of the church amounted in *c.* 1200 to six Utrecht pounds (Séjourné 1920, p. IV).
36 Blok 1969, 356.
37 De Cock 1965, 30.
38 After the reclamation of the Wieringermeer in the 1930's, a number of medieval dwelling-places were investigated by W.C. Braat. The dating of the pottery found there goes into the beginning of the fourteenth century (see Braat 1932, *pl.* V–VI). With this, the end of the habitation there was also archaeologically determined.
39 Gottschalk 1971, 271.

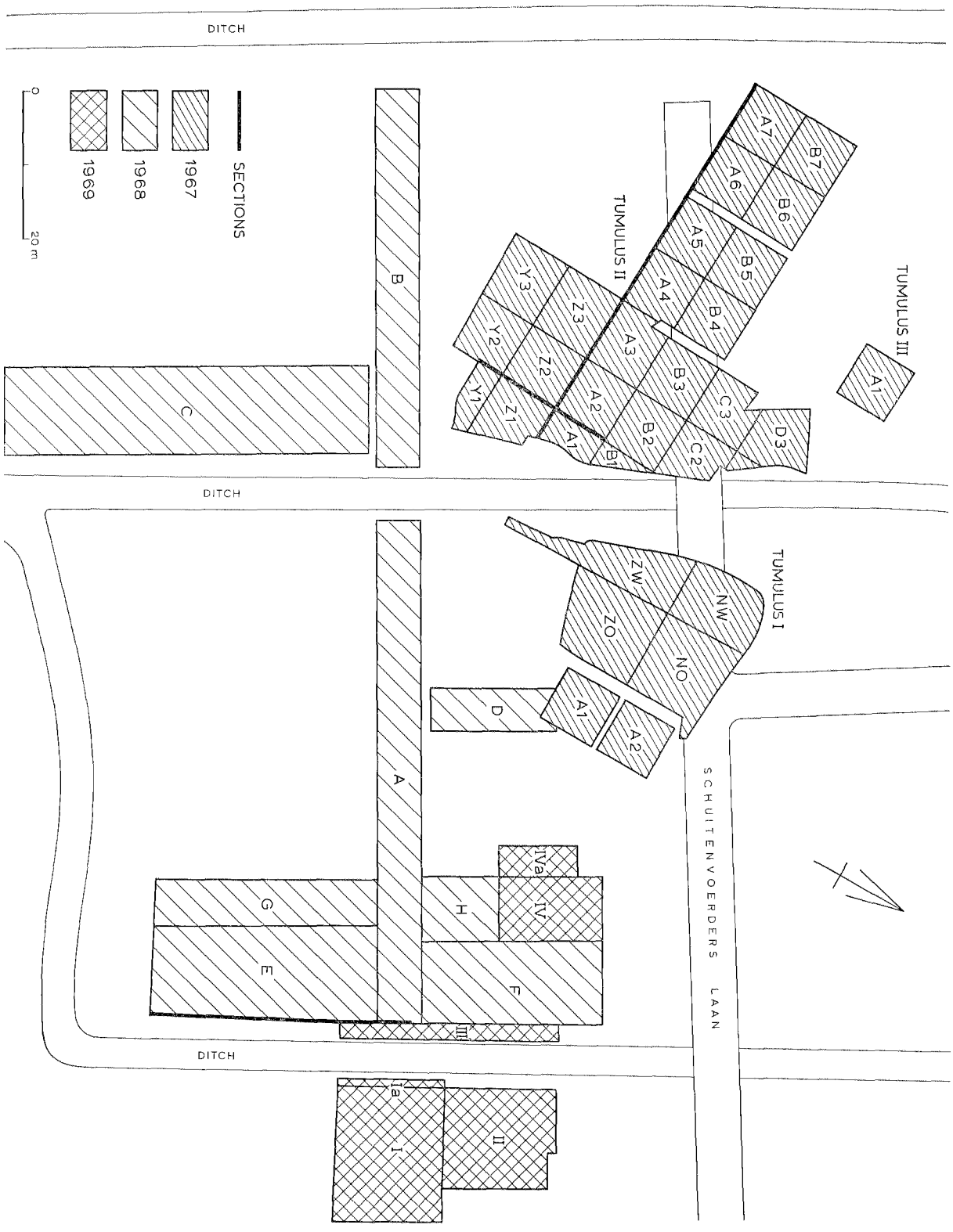


Fig. 4 Medemblik, Schuitenvoerderslaan 1967–1969: Plan of the trenches and situation of the illustrated sections.

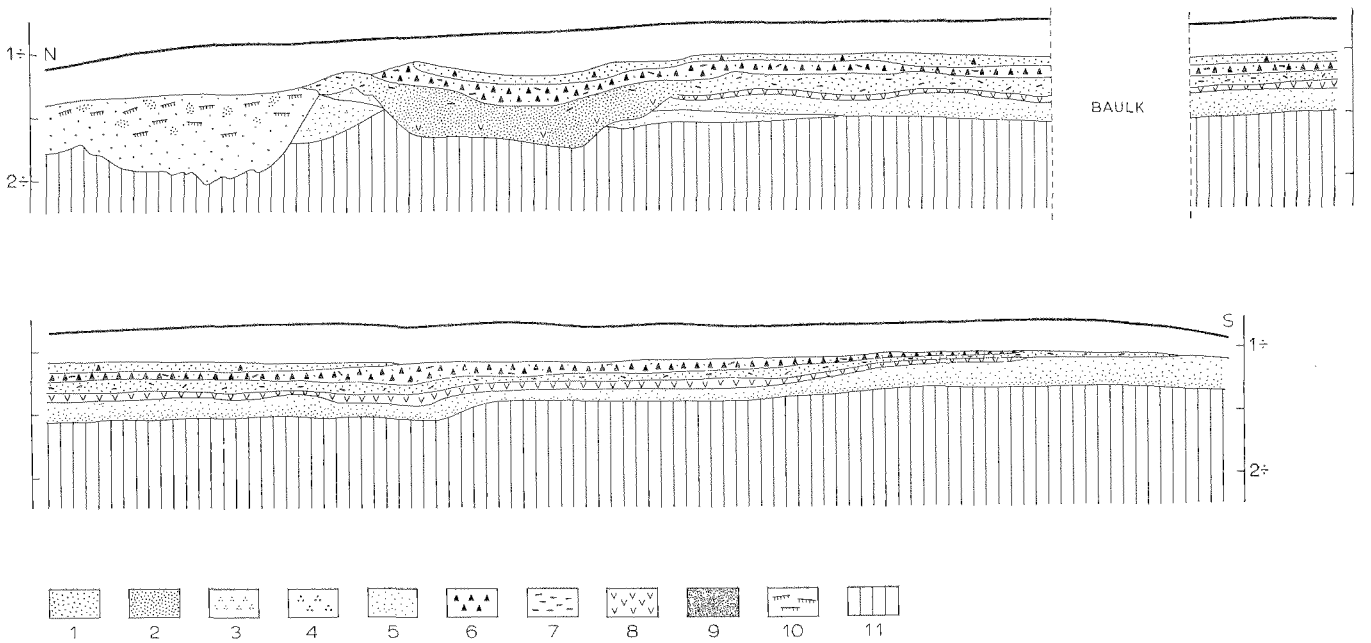


Fig. 5 Medemblik, Schuitenvoerderslaan: East section trench tumulus II squares A2, Z2, Y2: 1. clay; 2. humic clay; 3. fine sand; 4. dark-grey humic sand; 5. water eroded fine sand; 6. daub; 7. charcoal; 8. very humic dark clay; 9. very humic dark sand; 10. sods; 11. fine sandy subsoil.

THE SCHUITENVOERDERSLAAN EXCAVATION CAMPAIGNS

Situation and general condition of the terrain

In 1967 during the Randwijk extension scheme, excavations at Medemblik started on two plots of pastureland, jointly about 150 by 200 m in size (Grid Ref. 14H: 135.85/530.60) with a small extension into a field to the east (14H: 135.90/530.65). On the terrain there were a number of low round mounds visible on the flank of a creek ridge which ran ENE–WNW. The height of the surface varied from 0.74 m – NAP (Dutch ordnance datum) on the creek ridge to – 2.10 m in the southern part of the area. Apart from the creek ridge, there was a general slope to the south. On the northern part, construction work was being done on housing and roads. To the south, the location of the trenches was determined by sites where presumed tumuli might be expected. The trenches were named: tumulus I, II, and III, usually divided in 8×8 m squares marked with a letter-number grid (fig. 4). During the 1968 campaign, a number of long trenches, usually six metres wide, were dug in the area still available south of Schuitenvoerderslaan, which had meanwhile been built. Where needed, they were made wider (trenches A–H). In 1969 they were supplemented by trenches I–IV, two of them in the field east of trench A, F. In the trenches, usually two, but at times, one or three, levels were drawn, the upper one generally about 50 cm under the surface, and the lower one *c.* 15 cm deeper. Local excavation conditions were far from ideal. Building operations in progress limited the possibilities of digging where it seemed necessary to do so. Moreover, it appeared that in the course of time the unprecedented activity of moles had riddled the area with mole passages, which made surfaces and sections difficult to interpret. In addition, the recurrent annual ploughing of the land had levelled it, so that many traces must have disappeared, especially on the creek ridge; as the surface became lower ploughing went deeper into the ground. Repeated floods, also had affected the stratigraphy. Since the late Middle

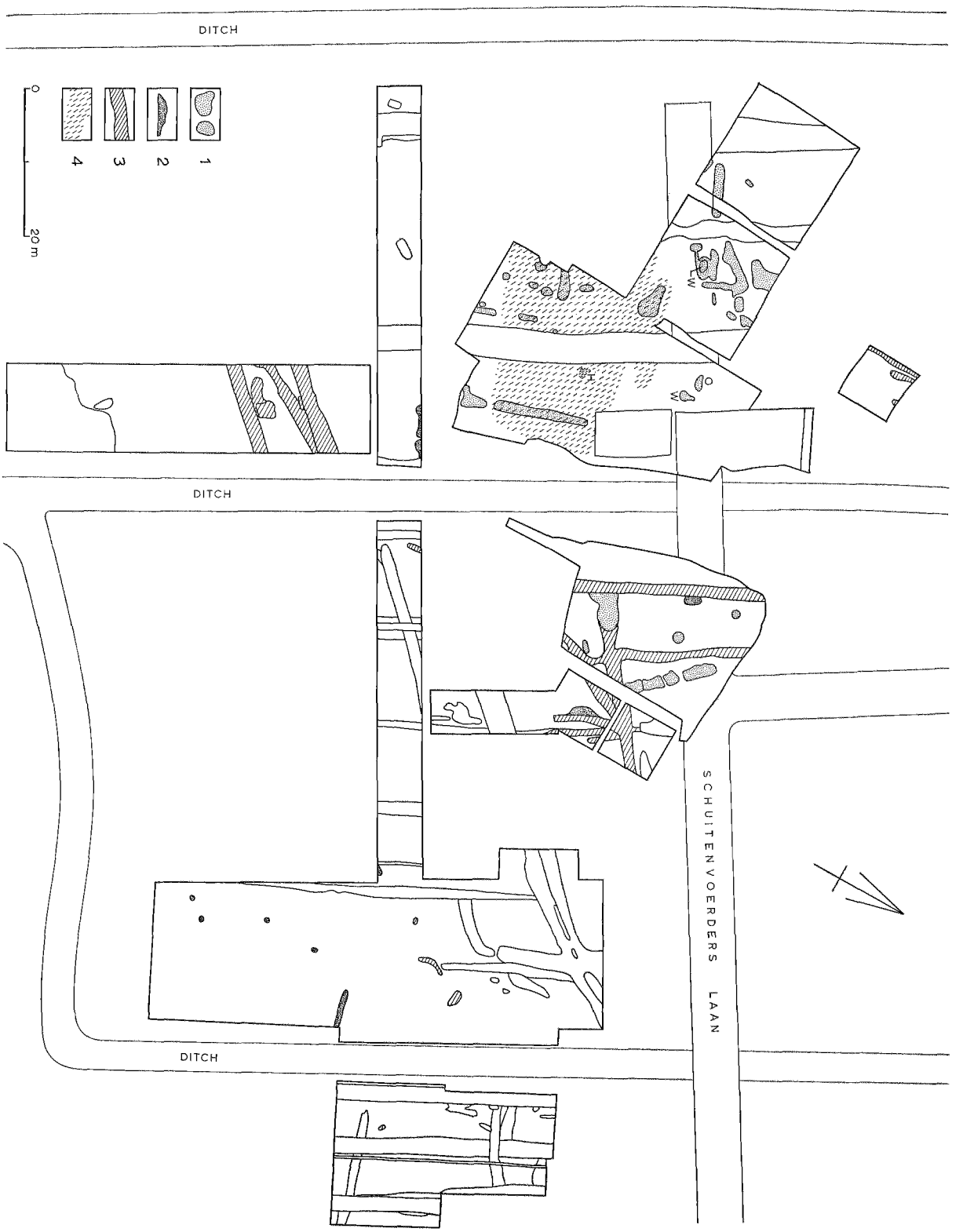


Fig. 6 Medemblik, Schuitenvoerderslaan: survey of early medieval and later traces: 1. early medieval traces; 2. probably early medieval traces; 3. traces older than fourteenth century; 4. burnt clay layer with daub.

Ages, these floods have washed away older levels and soil patterns in a large part of the excavation area. This erosion is increasingly evident towards the south.

Short survey of the stratigraphy
For the sake of clarity, a short stratigraphic review now follows, insofar as this is necessary for a better understanding of the situation, and for the classification of the remains. When the sections are described, we shall treat the stratigraphy in more detail.
In its most complete form, the section shows the following structure (fig. 5, section at 5 m).
1 0.75–1.00 m below NAP: top soil, grey-brown humic, clay, rich in iron, containing some debris, daub, charcoal and sherds.
2 1.00–1.06 m below NAP: *kiekklei:* very compact, grey, non-calcareous clay.
3 1.06–1.16 below NAP: clay containing burnt daub, Carolingian sherds and much charcoal.
4 1.16–1.30 below NAP: *kiekklei:* blue-grey, very compact, non-calcareous clay, which locally appeared to be washed out and churned up, with some charcoal and Carolingian sherds.
5 1.30–1.35 below NAP: humic to peaty layer, dark-brown silty sand turning into very humic clay, with some early medieval pottery sherds.
6 1.35–1.50 below NAP: fine-grained sand, humic going down to silty humic grey-brown sand, with clear evidence of wash-out.
7 1.50–1.55 below NAP: grey-brown light clayey sand, fine sandy humic with prehistoric pottery sherds.
8 1.55 below NAP: upper demarcation of yellow sand, calcareous, fine-grained sand, layered.
The stratigraphy of the humic layer, that changes without a clear border into an initially humic *kiekklei* covered by a burnt layer of daub rich in finds, makes it possible to consider all the finds, together with the related soil traces, as one circumscribed find, which should be dated in the Carolingian period. Unfortunately, the section just described is absent on most of the excavation terrain because of erosion caused by floods and ploughing. Consequently, we have not found a Carolingian habitation layer there, and the few remaining traces still present cannot be dated by means of the stratigraphy. Because Carolingian sherds are numerous till in the arable layer, they alone do not prove that the traces are equally old.

40 The results of the investigation of the Bronze Age settlement and burial mounds will be reported in a separate publication.

The traces (fig. 6)

The prehistoric traces[40]
Most of all the traces observed belong to the Bronze Age cultivation layer (layer 7). These included two tumuli, one of them with a tangential grave of a skeleton cremation, two three-aisled houses, and, in their vicinity, some twenty circular ditches. Numerous ditches and rows of little postholes demarcated the fields, within which many plough marks were still visible. Long rows of post-holes in particular were evident. The presence of cattle was confirmed by the numerous hoofprints in the low-lying southern part of the terrain.

Traces from the brown sand (layer 6)
Under the brown sand, which had no finds, there were a few shallow shapeless traces to be seen. Probably the bottom of this eroded layer was uneven, and the traces were made by the natural process of wash-out.

Carolingian traces in the humic layer (layer 5)
See layer 4.

Carolingian traces from the oldest *kiekklei* (layer 4)
Unless otherwise stated, these traces were filled with a humic to silty clay which higher up gradually changed into *kiekklei*. Because the content was at times difficult to distinguish from that of the silty clayey sand in the humic layer (layer 5), which also changed into *kiekklei* without a clear line of demarcation, several traces could not be attributed to layer 4 or 5 with certainty. In the interest of caution, we have classified such doubtful evidence under *kiekklei*. The traces may be divided into the following groups:
a pits: the shape varies, the distribution is irregular, the function uncertain, and, as is apparent from the contents, at times are rubbish pits.
Occurrence
Trench tumulus I, NW: round pit (find number 54); NE: round pit (58, 94, 125); SE: rectangular pit in SE corner (51, 81, 132) and irregular shallow rubbish pit, rich in finds (52, 74, 134–5).
Trench tumulus II, squares A3–4: deep, pear-shaped pit (704, 710, 732, 745); A5: irregular pit around a water well; A6: pit close to the southern section, and rectangular pit in the north; B4: round pit (674) and irregular pit near the northern section (675, 682); B5: rectangular pit (676, 683); Z3: pit near the western section; Z3–Y3: round pit; Y2: small square pit (798); Y3: small square

pit in the south, oval pit in the north, and irregular one near to the western section (797); Z2 near Z3: small round pit.

b oblong pits, consecutive or as extensions of ditches. The relationship to the little ditches is often unmistakable. At times it looks like a sectioned ditch, or the bottom of a ditch of very irregular depth.

Occurrence

Trench tumulus I, NE: four almost connecting oblong pits extending NW–SE (85, 86, 139).

Trench tumulus II, B5: two connected pits (677, 722, 684); B4–5–A5: two pits connected at a higher level (672, 617, 723); Z1–Y1: deep pit in the length of a ditch extending NS (775, 776, 784, 785).

c Ditches and small ditches: short, with clear pattern, very variable depth, also within the same ditch. This indicates that there is only a slight difference between group *b* and *c*.

Occurrence

Trench tumulus II, A 5–6: running SW–NE (730), A1–Z1: running NS (771, 783); Y2: ditch running NW–SE near to western section (799).

d Two probable water wells: a round pit with the remains of a timber cladding against which is an oblong trace (561) in tumulus II, B3. The second in A5: oval, at a deep level round in shape, filled with silt and grey, clayey sand, clearly layered. The surface appears washed out (616).

e Probably a small fieldoven, oblong pit with charcoal on the outside and filled with ashes in tumulus II, B5 (632).

Daub layer with hearth (layer 3)

In trench tumulus II, there was a thin layer of clay with traces of fire, that was rich in burnt daub and Carolingian sherds. Fig. 6 shows the distribution. In this layer, a hearth was found with a clay floor (603, 605) which was burnt through to the undisturbed yellow sand in square A2. The great quantity of finds from layer 3 were classified under find numbers 35, 98, 107, 513, 531, 534, 544, 564, 567, 581, 594, 623–4, 686, 707, 709, 744, 749, 759, 762–3.

Traces of probably Carolingian age

This group comprises a number of traces that cannot be placed with certainty in the Carolingian period because of the absence of the *kiekklei* stratigraphy. On the basis of the finds and the location under the late medieval deposits, however, their age is probably Carolingian. This applies to a little ditch with turbulent, dark-grey, loam (990, 1128) and a number of small round pits. Out of one of them came Carolingian pottery (1170), all in trenches E–G. In trench A: the pit close to the easternmost ditch running NS and the south section (930). The pit in the centre of trench tumulus I (48, 57). Two pits close to the north section in trench B filled with *kiekklei* (946).

Traces older than the late medieval deposits

Such traces include all those lying beneath the late medieval deposits (late *kiekklei* and light-grey sand) containing twelfth- and thirteenth-century sherds, or no finds at all. They are principally situated in trenches A, B, D, F, H, and I and II (find numbers 928, 948, 918, 1123, 1132, 1194). This group also includes the old ditches demarcating the fields, filled with *kiekklei* from an later deposit phase, dated by the twelfth- and thirteenth-century finds (578, 1133, 1143).

Recent traces from the topsoil (layer 1)

Many dividing ditches, usually running NW–SE, are filled with grey-brown compact clay in which sherds of all periods occur. Two rectangular pits dug deep into the undisturbed sand occur, ascribed to sand extraction for bulb-growing industry. Such pits are filled with turbulent grey-brown clay with a definite turf structure; size larger than 10 m × 5 m and 10 m × 6.50 m.

Description of the principal sections

The most complete section, as has been already briefly described, occurs on the northern side of the creek ridge in trench tumulus II. The base consists of fine undisturbed sand, a deposit of the Calais IV B transgression, here dated 2200–1800 B.C. Almost everywhere in the trench, it has developed as fine sand. It is more clayey only in the south and the west. During the prehistoric period of settlement, a cultivation layer was formed on this sand. It consisted of humic grey sand, and where the terrain was wetter, dark-grey to black sandy clay mixed with much humus. In many places this layer has disappeared as a result of erosion. Afterwards a brown sand wash was deposited, which had no finds, and which covered what remained of the prehistoric cultivation layer. The very humic, at times gyttja-like layer above it changes without sharp demarcation into a layer of *kiekklei*, so that the *kiekklei* sedimentation must have taken place very gradually. Both deposits were dated by Carolingian sherds. It could not always be determined whether the traces had been dug from in this layer or that of *kiekklei*, because the contents of the pits and ditches under this *kiekklei* usually

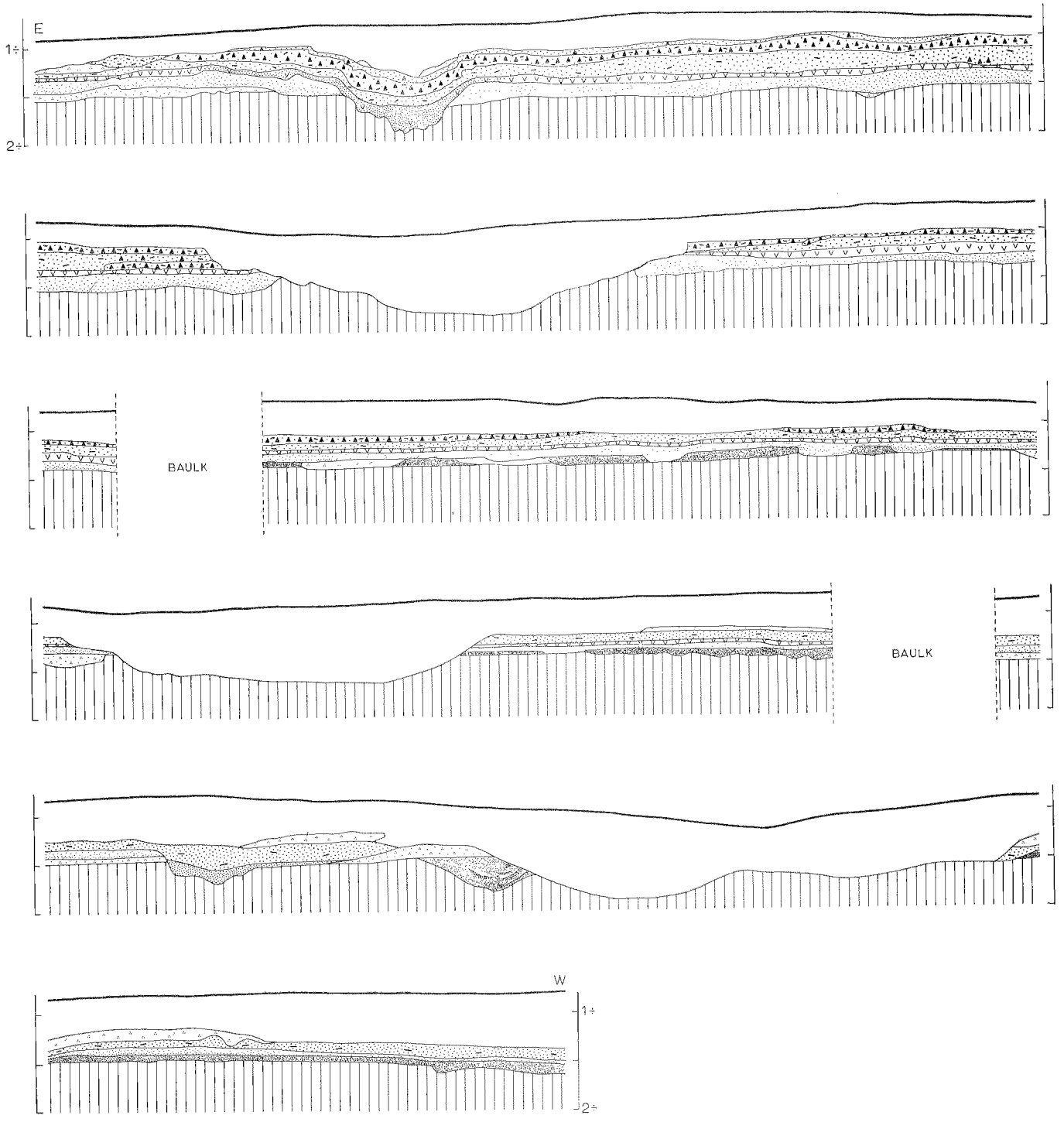


Fig. 7 Medemblik, Schuitenvoerderslaan: South section trench tumulus II squares A1–A7.

consisted of very humic clay difficult to distinguish from the content of the humic layer. The *kiekklei* layer was divided by a thin layer of burnt clay, rich in daub and Carolingian sherds, into a layer of older Carolingian *kiekklei* and one of younger *kiekklei*, the former having a disturbed appearance. It was smeared with charcoal and contained some daub as well as sherds. The younger *kiekklei* had no finds at the site of the daub layer except for some small fragments of daub. Finally, the section was covered with a layer of grey-brown clay which also appeared in the topsoil in a more homogenized form. When the clay was less homogeneous, more *kiekklei* could be seen in it. This recent layer held sherds from the Bronze Age and from the period preceding the early Middle Ages.

When we follow the east section of trench tumulus II, squares A2, Z2, Y2 (fig. 5) from north to south, we see a part of the recent sand extraction pit quite close to the tumulus ditch of tumulus II, followed by a Carolingian ditch covered by the burnt clay layer and younger *kiekklei*. Initially the stratigraphy is complete, but in square A2 the cultivation layer of the Bronze Age has already disappeared. Following the section southwards, we see that the subsoil of the creek ridge and the washed-out sand above the subsoil rise somewhat. At the same time the humic layer, older *kiekklei*, the daub layer, and younger *kiekklei* gradually thins out and disappears southwards in reversed order. The question remains as to whether it ever existed here at all, or whether it disappeared later. There is no certain answer, but the gradual thinning-out suggests it ran up against the creek ridge.

The south section of trench tumulus II, squares A 1–7 (fig. 7 and pl. VI: 1) initially shows from east to west the complete *kiekklei* stratigraphy, which also passes through the Carolingian ditch in square A 1, the same as in the previous section but now showing a clearer stratigraphy. The prehistoric cultivation layer soon disappears except from the contents of a ditch (square A 2), after which it is seen again in square A 4 in a more humic, darker form. The younger *kiekklei* disappears to the west in square A 2. The burnt clay layer with daub appears in two successive thin layers before the recent ditch which cuts the section obliquely in squares A2–3, and emphasizes the disturbed character of the older clay here. The daub layer vanishes entirely just in front of square A5. The bottom of the washed-out sand in square A4 is rather irregular, suggesting that we are concerned with ditches. In square A6, a pit starts from the *kiekklei* with characteristic humic contents at the bottom, and a little farther there is a small prehistoric ditch. The humic layer is absent from the beginning of square A6. Thus at the end of the section above the sand, there is still only the prehistoric cultivation layer, the washed-out sand, *kiekklei*, and the recent topsoil. The absence of some of the layers may be accounted for in a number of ways: washed-out, ploughed away, or perhaps they may never have been present there. The available data do not provide the answer.

When these two rather well-preserved sections are compared with other sections, we note that on the sandy bottom of trench tumulus III in the north there is only washed-out sand, a humic layer, and *kiekklei*. The burnt clay layer is absent. We see here an unbroken *kiekklei* deposit which attains its maximum thickness of 40 cm. The fact that only Pingsdorf pottery was found at the top indicates that this is a more recent layer of *kiekklei*.

In the sections of the quadrants of trench tumulus I, the daub layer is also missing, but the older Carolingian *kiekklei* is present in the traces. These have already disappeared in squares A1 and A2. Between the undisturbed sand and the top soil, there is only a late medieval, grey sand deposit that traverses the ditches filled with clean, post-Carolingian *kiekklei*.

The degree to which the erosion from the south and the ploughing on the creek ridge have contributed to the destruction of the original section is best seen on the east section of trenches A, E (fig. 8). In the north there is only 15 cm of topsoil on the sandy subsoil at the site rich in finds. Only prehistoric traces going deeper are visible in the section. From the beginning of trench A (also the start of fig. 8), a layer of grey, very light clayey sand may be seen ever more clearly under the topsoil, which is the most recent natural deposit present on the excavation terrain. In the section of trench E, a humic dark-grey sand appears between the undisturbed sand and this light sand, which passes through the section of the probably Carolingian ditch. On top farther to the south, young *kiekklei* appears, while the light-grey sand is again incorporated into the topsoil. Farther to the south, a Bronze Age cultivation layer has also been preserved on top of the undisturbed clayey sand. The section cuts through several small prehistoric ditches and a large ditch. South of the latter, the cultivation layer is very muddy and washed-out. The dark-grey sand above it becomes more clayey and becomes difficult to distinguish from the post-Carolingian *kiekklei* lying on top of it.

Conclusion and discussion

The great quantity of finds from the Carolingian period

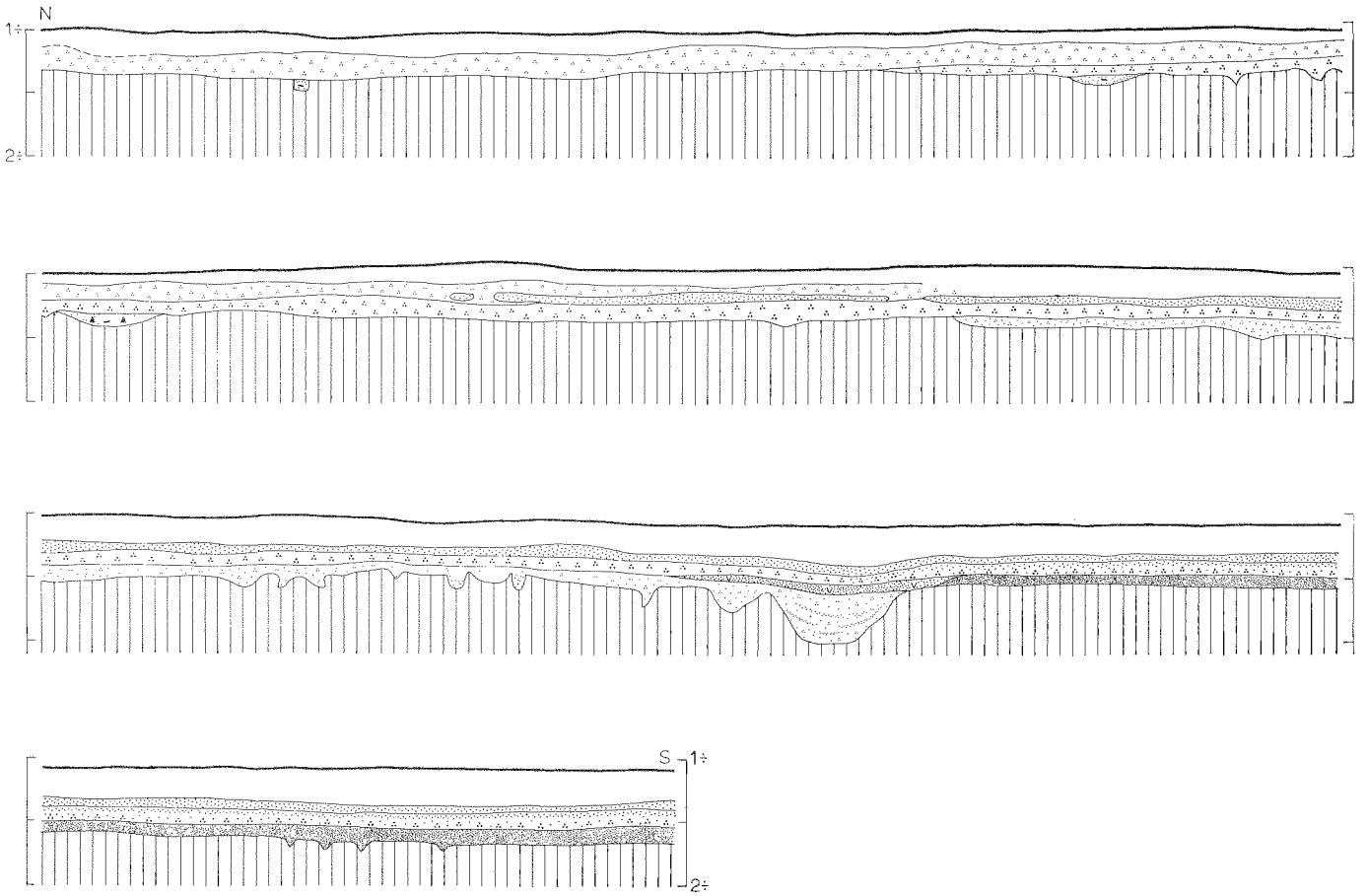


Fig. 8 Medemblik, Schuitenvoerderslaan: East section trench A, E.

that have been recovered from a number of soil traces testify to intense human activity in that period. The nature of this activity, however, remains largely obscure. Evidence of wash-out present in all the sections emphasize the effect of periodic flooding suffered until the recent past. The accompanying erosion partly or entirely eradicated most traces of Carolingian activity. The degree to which later cultivation is responsible for further destruction can be seen in the distribution of Carolingian finds in the topsoil. The find concentration around the eastern part of trench A is mainly due to objects from the topsoil (fig. 9). The scattering of pottery sherds which belong together across the excavation terrain must be largely attributed to these disturbing factors (fig. 9). As may be seen on the creek ridge, the Carolingian level lies close to the topsoil because more recent deposits are missing, and because of the gradual reduction of differences in height by ploughing.

On the basis of field observations and of the results of pollen and diatom analysis,[41] we can form the following picture of the environment of man in the early Middle Ages. The creek ridge that traverses the terrain in a west–southwest–east–northeast direction is a southern spur of the big creek ridge of Abbekerk, which was formed during the Calais IV B transgression. The broad circumscription of the creek ridge on the excavation terrain was established on the basis of the height of the sand of the Calais IV B deposit and the more clayey appearance in the northwest, and more particularly in the south. There already was a fresh-water lake to the south of the ridge,

41 Published in Voorrips/Jansma 1974.

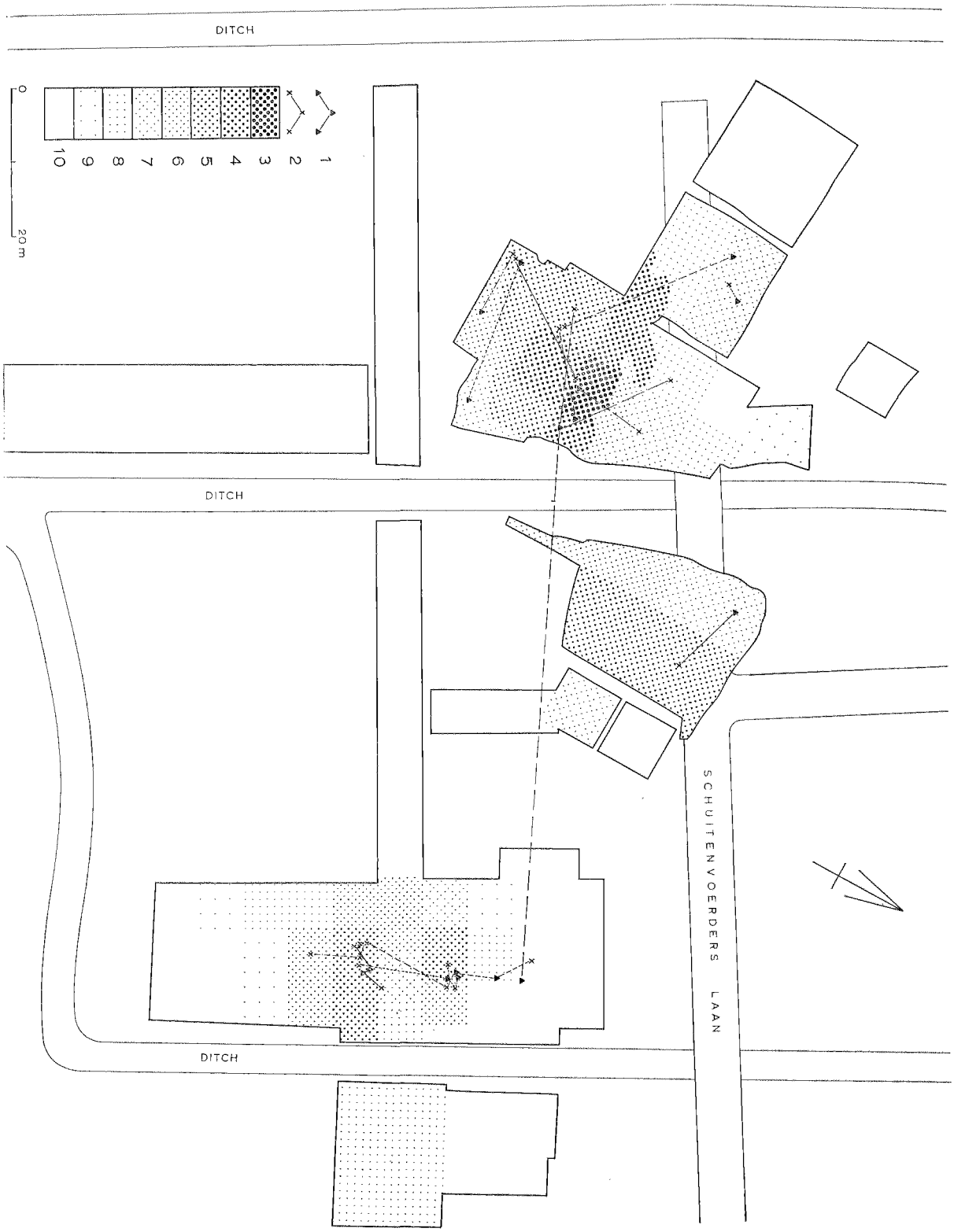


Fig. 9 Medemblik, Schuitenvoerderslaan: Findspots of dispersed but conjoining pottery sherds and density of finds. 1. conjoining sherds from scattered finds *in situ;* 2. conjoining sherds from scattered collective finds; 3. more than 10 sherds per m²; 4. 7,5–10 sherds per m²; 5. 5–7,5 sherds per m²; 6. 2,5–5 sherds per m²; 7. 1–2,5 sherds per m²; 8. 0,5–1 sherd per m²; 9. 0,25–0,5 sherd per m²; 10. less than 0,25 sherd per m².

Lake Wervershoof, before the Carolingian period, in the shore zone of which the site is located. The deposit of brown sand wash, which gradually modified or covered the Bronze Age cultivation layer, is a deposit of reworked Calais IV B material brought up from the lake bottom and redeposited under fresh conditions on the shore of Lake Wervershoof. The pollen from this layer show evidence of agricultural activity (wheat and barley, grains, no rye) near the lake shore. The shore areas were very moist and were flooded from time to time, as is shown by the nature of the deposits. Unfortunately, this sedimentary layer contained no finds, but because there is no marked difference between it and the Carolingian layer on top in the pollen diagram, it may be placed rather late in the phase between the middle Bronze Age and the Carolingian period. The humic, gyttja-like clayey sand which formed on top can be dated by the Carolingian sherds, and often is indistinguishable from the humic clayey contents of most pits and ditches. Rye was also present in the pollen from this humic layer. On the shores of the still fresh-water Lake Wervershoof, the alder increased in numbers and the presence of pollard-willows has been ascertained. The beginning of the *kiekklei* deposit that followed this phase occurred very gradually in a calm environment. The pollen diagram also shows a slow flooding during which human habitation was still possible. The slow increase in marine elements in pollen as well as diatoms is not related to the onset of the salinization of the lake. The continuation of rye cultivation near the shore and the great number of unbroken fresh-water diatoms present rule this out, so that we must assume that marine deposits were dislodged elsewhere and the marine elements were secondarily deposited.[42] The presence of *Sphagnum* and *Ericaceae*, which must be considered as allochtonous in this mineral section, reveals that peat complexes elsewhere had been eroded.

The beginning of *kiekklei* deposits at the site is dated by the many Carolingian pottery sherds in this clay. This calls for a modification of the general belief that the *kiekklei* was deposited in the twelfth and thirteenth centuries.[43] From the *kiekklei* stratigraphy in trench tumulus II (pl. VI: 1), consisting of *kiekklei* dated by Carolingian sherds, covered by a thin layer of charred clay with daub rich in Carolingian sherds, clearly distinguishable from the *kiekklei* on top, it is obvious that there were more phases. At any rate, on the basis of the dating of the finds, the start of *kiekklei* deposits south of Medemblik must have occurred about the beginning of the ninth century, and can be considered a deposit of the Dunkirk III A transgression. We do not presume to make a direct connection between this gradual flooding and the only reliable documentary evidence dated in this period which we have, *i.e.*, the report of the great flood of 838 in the coastal areas of the Low Countries.[44] We cannot omit mentioning this fact, however. We have already seen that the results of the pollen and diatom analysis rule out direct influence by the sea.[45] More likely the floods were a consequence of the damming-up of Lake Wervershoof and the Almere, due to the high floods and storms impeding drainage via the rather narrow Vlie in the north (fig. 3). This agrees with the supposition that in *c.* 900 direct tidal influences were only apparent to the north of Wieringen.[46] The Dunkirk III A transgression brought the influence of the sea closer, which in the future would endanger the area south of Wieringen and Westfriesland on the one hand, and on the other would benefit the drainage of this area. After the brief phase of the older *kiekklei* deposits, before the middle of the ninth century, human settlement returned to the *kiekklei* on the shore of Lake Wervershoof. The daub layer in this *kiekklei* testifies to this revival of human activity. This is also confirmed by the increase in rye in the pollen. Though it has been established that the *kiekklei* sedimentation started in the Carolingian period, more recent *kiekklei* and sand deposits are present everywhere on the excavated terrain, but especially to the south of the creek ridge. These can be attributed to the Dunkirk III B transgression, dated by Pingsdorf sherds.[47] Floods accompanied by erosion and sedimentation, however, also occurred regularly thereafter. The old gully south of the excavated terrain offers an explanation as to why all sections in the south have been damaged right up to the creek ridge. With the aid of *kiekklei* stratigraphy, it is possible to distinguish at least two phases in the Carolingian soil traces. One concerns traces belonging to the humic layer and older *kiekklei*. Because of the lack of data, this phase could not, unfortunately, be classified in two separate periods. The other phase concerns traces in the burnt clay layer. In addition,

42 Voorrips/Jansma 1974, 432–3, § 3.2.4 en § 4.3.

43 Du Burck/Dekker 1968, 145-6; Ente 1963, 9; Pons/Wiggers 1960, 49.

44 Gottschalk 1971, 14.

45 See above.

46 Schoorl 1973, 13–4 and 30–3.

47 Ente 1963, 163, found Pingsdorf sherds under the *kiekklei* near Oostwoud.

we have presumably Carolingian traces which we cannot attribute to either one of these periods because of the absence of *kiekklei* stratigraphy. There are also late medieval and more recent remains, principally ditches marking off land plots, which show interesting changes in the pattern of parcelling out land. This deserves further study.

In advance of the comparative study of pottery from the various stratigraphic units, it can be said that no clear difference can be discerned in the Carolingian finds. The present knowledge of Carolingian pottery only allows approximate dating, which it too vague to be able to distinguish the two Carolingian periods in the *kiekklei* in the pottery. We must therefore assume that they occur fairly close together in time.

In view of the great quantity of very different kinds of pottery and other household utensils, we should first like to consider the human settlement. Had the latter been more one-sided and less intensive, this would be reflected in the finds, or in their scarcity. Actual traces of habitation consisted of two water wells, some rubbish pits (judging from the contents), a probable field-oven, and a hearth. It is notable that typical traces of houses, such as post-holes and foundation-trenches, are entirely absent. We may therefore consider turf wall construction, of which no trace remained after later floods. The attempt to identify the many shallow pits under the *kiekklei* as post-holes washed out by storms had to be given up because of the lack of coherence.

The pits and ditches belonging to the Carolingian period have much in common. There are little ditches and oblong pits lacking a definite system, with almost the same stratigraphy as the exterior section (fig. 5). It appears that they had been exposed for a long time and had filled with the material also deposited outside them. We have also thought of the so-called *daliegaten*, *i.e.*, pits found elsewhere in Westfriesland, especially in (former) peat areas, from which clay was extracted for soil improvement.[48] The pollen diagram shows no evidence of peat. The possible extraction of sand or clay need not only be related to fen land improvement, in view of the very recent sand extraction sites in our trenches. Nevertheless, there is no ready explanation for these traces.

After the older *kiekklei* was deposited, which partly accounts for the irregular and washed-out appearance of the older Carolingian traces, habitation on the clay was resumed, resulting in a high level of disturbance locally. Of this, only debris remained and settlement traces, such as daub and pottery sherds, settled in a thin layer on the clay, followed by new *kiekklei* sedimentation. The habitation remains were not scattered far about, so that a house site can be reconstructed from the distribution of the layer with daub. Within the scatter of debris, some 30 × 18 metres in size, it is possible to trace out an oblong house site.

In view of the extensive area of the daub layer, we cannot interpret it as being a prepared clay dwelling-floor, such as is found in some medieval houses.[49] The clay platforms with daub discovered at Geestmerambacht offer a better comparison. They are larger than those of Medemblik, and have been interpreted as soil stabilization preceding the construction of houses.[50] The possibility that the daub layer is not *in situ* but was transported from ruins elsewhere must be discounted, since the hearth and other burnt traces penetrated right into the sand.

Despite the many unsolved problems and the fact that we cannot produce any definite traces of houses, we are inclined to believe that there was a settlement there in the Carolingian period, in view of the few traces of habitation and the large number and varied nature of the finds. There have been two phases in this habitation, one before and one during the *kiekklei* deposit. We have no data as to the nature of the habitation. We can only point out that the results of the pollen analysis of the surroundings show that cereals were cultivated, rye increasing later, and that the creek ridge at the site offered a suitable place for settlement. That the site where people lived is now low-lying, *i.e.*, 1.20–1.50 m below NAP does not necessarily rule out settlement. Similar low sites for ancient settlements are common in Westfriesland. Presumably this low position is due to subsidence as a result of drainage. Moreover, the mediated high water level has risen nearly 1 m since the ninth century.[51] The theory that the low position is the consequence of the oxydation and soil formation of a peat layer after the reclamation and the improved drainage of Westfriesland[52] does not apply to the creek ridges

48 Dekker 1972 and Dekker 1974, 235–238.

49 Braat 1948, 75 and letter of 12.5.1971 by the same in which he endorses the interpretation of the 'clay floor' as house site.

50 Schermer 1969, 225–7.

51 Louwe Kooijmans 1974, 54.

52 Edelman 1958, 242–4; De Cock 1969, 155; Dekker 1974, 235; Pons 1974, 24, 85, and 89; Borger 1975, 207 and 221.

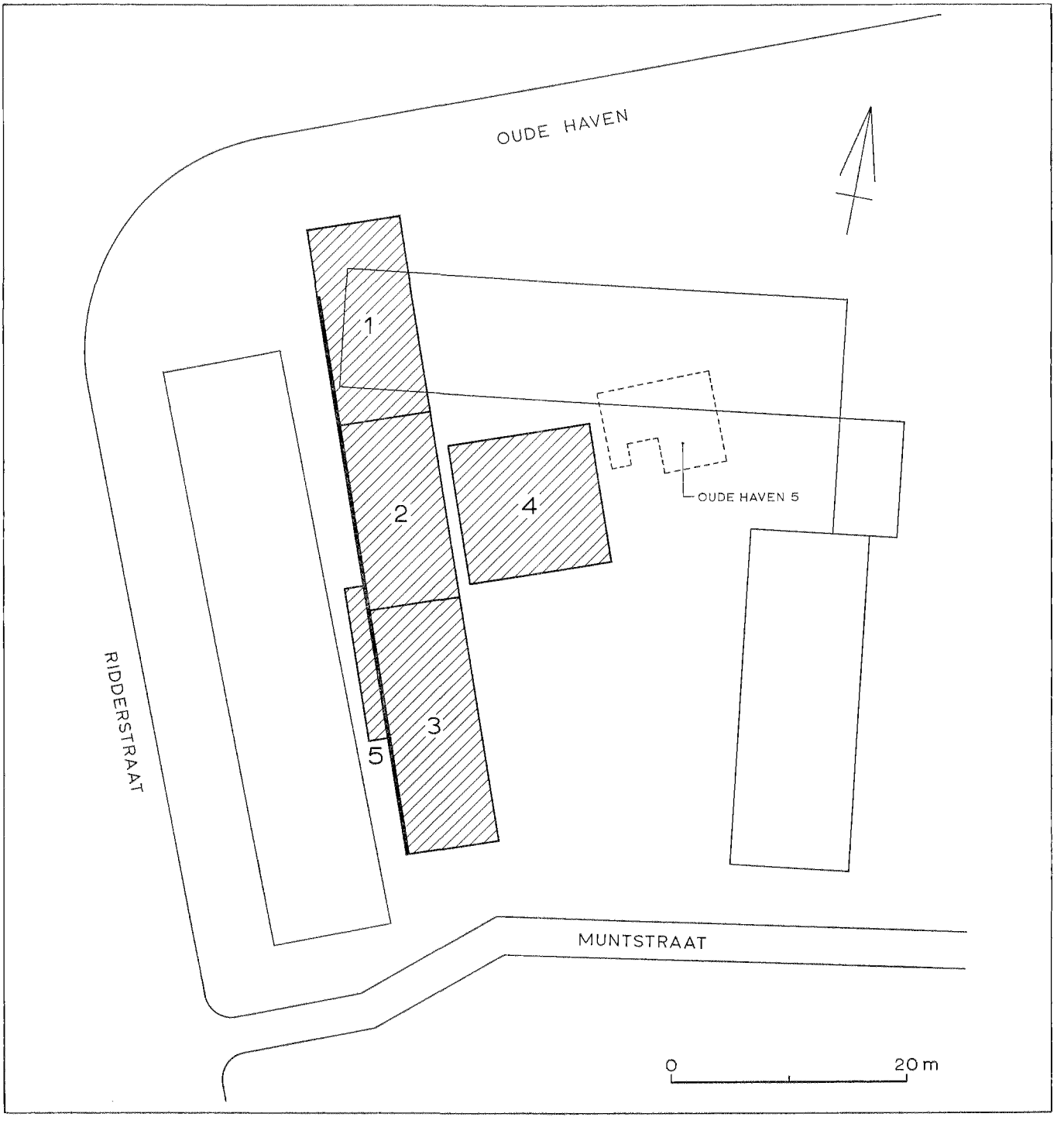


Fig. 10 Medemblik, excavation Oude Haven-Ridderstraat 1970: Plan of the trenches and situation of the illustrated sections.

near Medemblik. The Carolingian settlement traces under the *kiekklei* were dug too deep in the undisturbed sand. Moreover, even assuming that there was an early medieval peat layer, this must have disappeared before the first *kiekklei* deposit about the beginning of the ninth century. Shortly thereafter, settlement on the *kiekklei*, under which there was then no peat layer, was resumed. Thus we again are faced with a very low position (1.10–1.30 –NAP), which cannot be explained by the disappearance of a peat layer. The interpretation which identifies the burnt clay layer on the shore of Lake Wervershoof with salt production from salt peat must also be rejected. Apart from the absence of peat at the site, the pollen and diatom analysis[53] shows that there was no direct salinization of the milieu. In a separate article which follows in this volume, we shall return to the subject in connection with the problem of Frisian salt known from the literature.[54]

THE EXCAVATION AT OUDE HAVEN IN MEDEMBLIK

Situation and excavation conditions

The excavations in the town centre of Medemblik took place in 1970 on an undeveloped area west of the Dutch Reformed Church on the corner of Oude Haven, *i.e.*, the old harbour, and Ridderstraat, the site of St. Maartenshof, a home for the elderly, completed in 1973 (Nat. Grid 14H 135.75/531.05) (fig. 2 and pl. v). The terrain appeared very suitable for an investigation of the town's oldest harbour. The surface lay at a height between 0.70 and 1.40 m above NAP, but originally must have been higher, as is still the case to the east of the church. Fourteen metres to the west of the former dwelling Oude Haven 5, a long trench of almost 50 m was excavated at right angles to the filled-in former old harbour (fig. 10 and pl. VI: 2). It was divided into three consecutive trenches. The excavations went down into the undisturbed light-grey clayey sand, which slopes from 1.70 m –NAP in the south to 5.60 m –NAP in the north. The width of the trench was 8 m in the upper part, lower down it was reduced to 4 m. Unfortunately, work begun on trench 4, between the dwelling Oude Haven 5 and trench 2, could not be completed. Finally, in trench 3 behind the west section, a small strip was shaved off with the shovel: trench 5.

It was apparent, especially in the southern part, that many recent traces of habitation had been cleared away because the terrain had been lowered. Numerous pits disturbing the older layers show how intensive this more recent habitation had been. In addition, it was autumn and weather conditions were not ideal for excavations in a trench several metres deep. Partly because of the narrowness of the trench, a coherent plan could not be obtained, and the plans should be seen rather as a supplement to the stratigraphy in the section. Therefore we shall be principally concerned with the latter here. Although the oldest settlement traces have only been preserved on a limited part of the terrain, we cannot omit a brief description of the entire section using fig. 11, which presents the simplified west section of trenches 1, 2, and 3. After describing the meagre traces in plan, we will return in more detail to that part of the west section where Carolingian traces were noted.

Brief survey of the stratigraphy (fig. 11)

The west section was cleared down into the undisturbed fine-grained clayey sand (a). From 25 m from the south, this sand slopes sharply and then forms the bottom of a natural watercourse. This divides the section into two: the packing plus the settlement layers on the bank of this watercourse, and the sediments and dumped material in the water. On the sandy subsoil (a) of the shore, there were a number of deposits most of which contained no finds (b), above which several layers of earth had been dumped (c) which were dated by Carolingian pottery sherds and pieces of glass. These were sealed by a charred level and a packing deposit (d) in which the most recent sherds were of the tenth–twelfth centuries. These levels disappeared around 15 m from the southern edge and were replaced by packing levels of mostly organic material which sloped away to the north, and which were dated by twelfth- to early fourteenth-century sherds(e). These also covered the ditch at 22 m (f). From 24 m out, the sand sloped abruptly and formed the bed of the originally natural watercourse. On top of this a level of silty clay and sand (g) was formed and a very humic silty layer (h), over which the deposits dumped out from the shore continue. The section on the shore appears to be decapitated by a raised layer (i), which can be followed from 3 to 35 m and on the basis of sherd content can be dated to the fourteenth century. In the harbour filling, several breaches can be seen in the section, interpreted as the bank line (j). Vestiges of wood indicate the timber cladding of the harbour since the late Middle Ages (k). Remains of post-fourteenth-century buildings over the

53 See above p. 59.

54 See further p. 171–4.

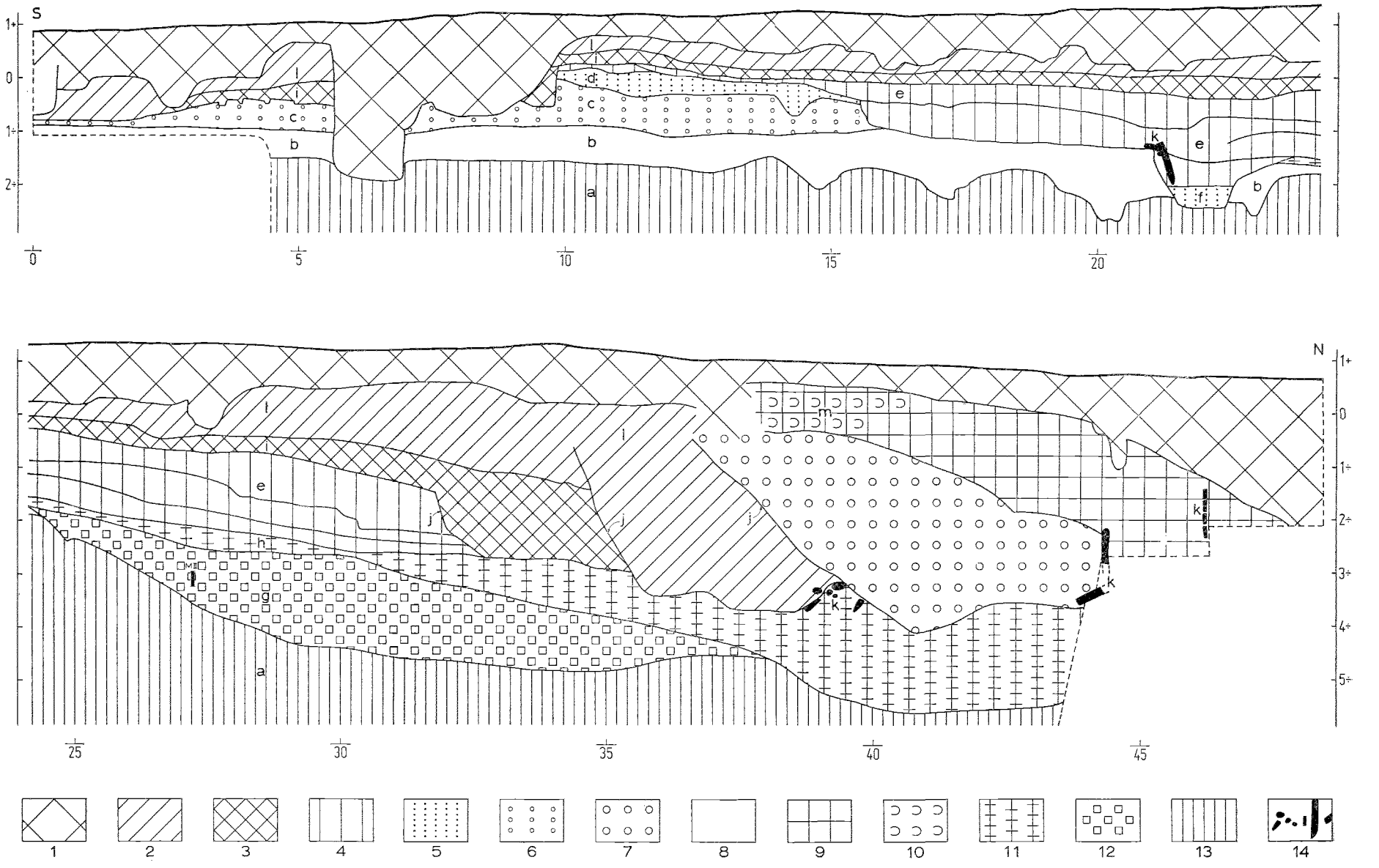
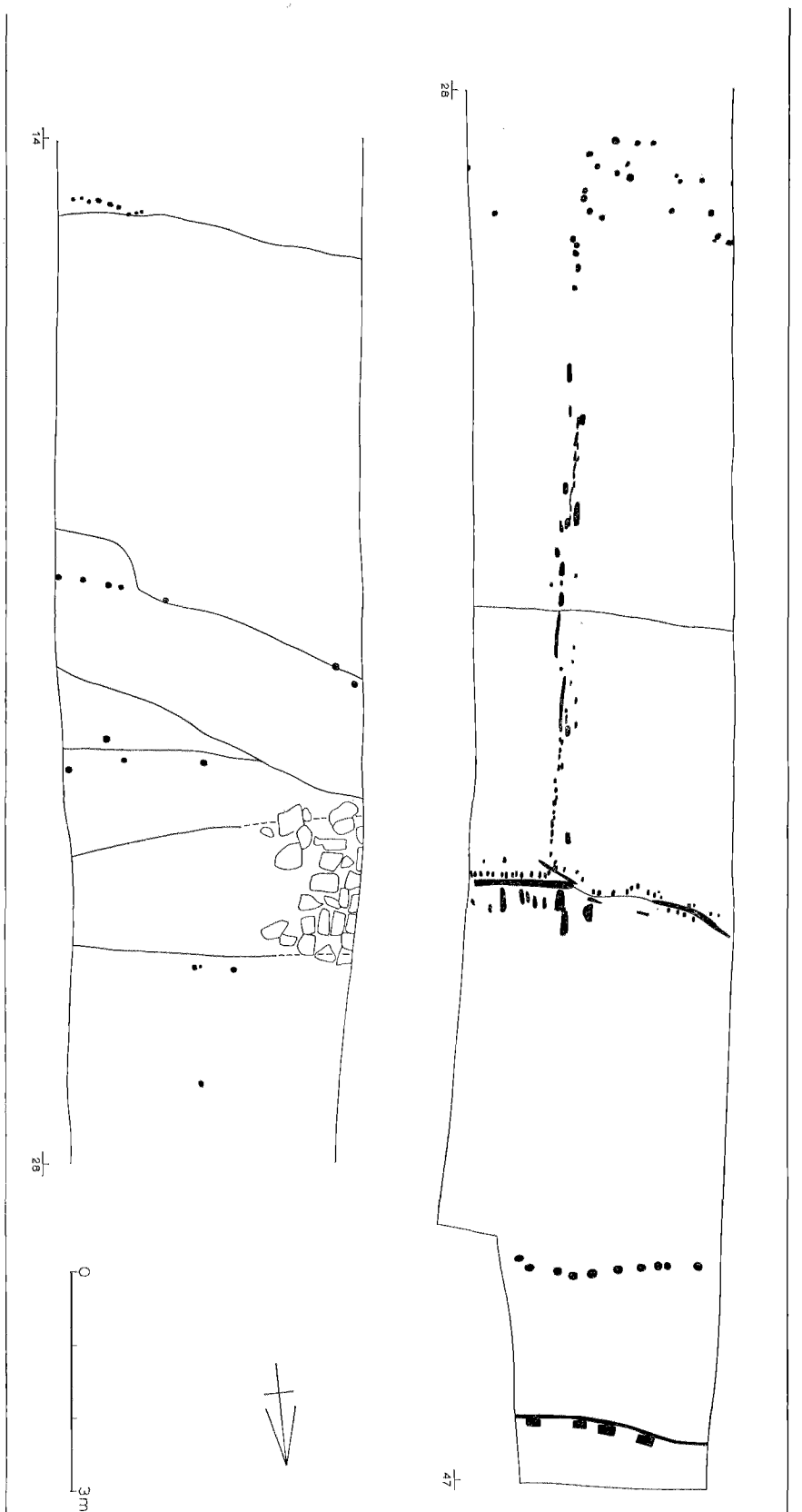


Fig. 11 Medemblik, Oude Haven: West section trench 1,2 and 3: 1. disturbed soil; 2. late medieval heightening and habitation layers; 3. 14th-century raised layers; 4. 12th – beginning 14th-century habitation and raised layers; 5. 10th – 12th-century layers; 6. early medieval heightening-layers; 7. 15th-century heightening-layers; 8. natural deposits; 9. 16th-century heightening-layers; 10. shell-layers; 11. 12th – beginning of 14th-century silting deposit; 12. silting deposit post dating the Carolingian period; 13. fine sandy subsoil; 14, wood.

Fig. 12 Medemblik, Oude Haven: traces of old banks, bank limitation, reinforcement, timber-cladding and plot-boundary.



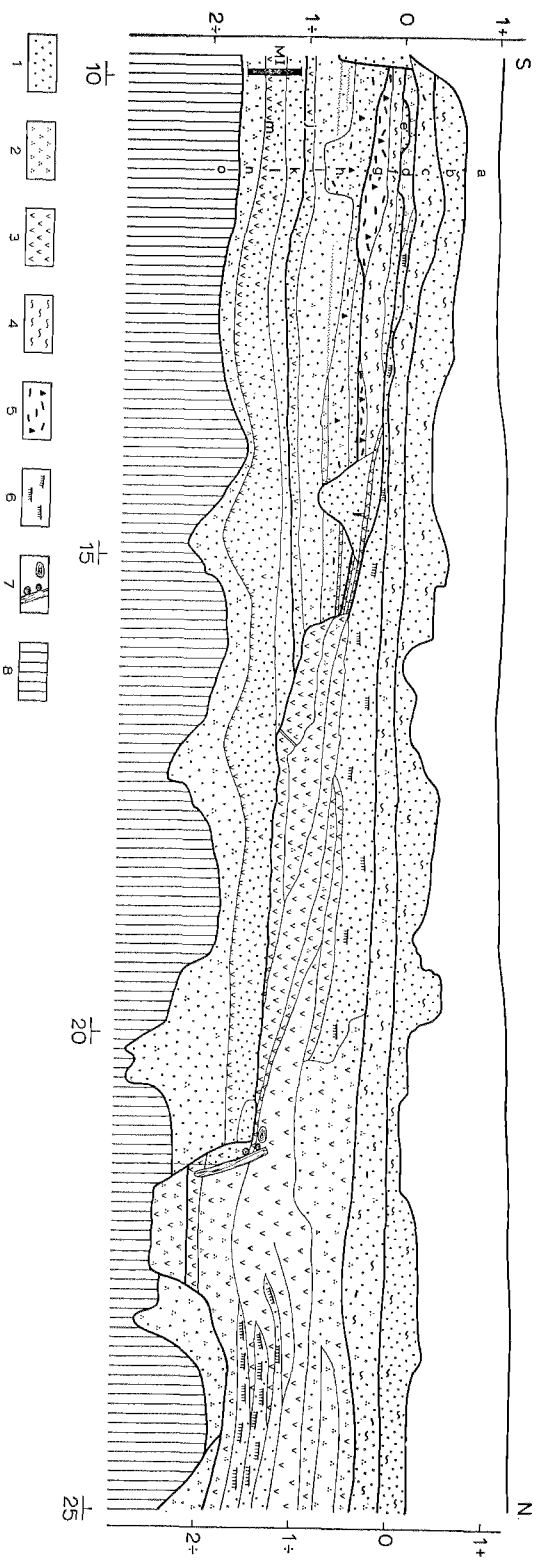


Fig. 13 Medemblik, Oude Haven: detail west section trench 3: 1. clay; 2. sand; 3. organogeneous material; 4. mixed soil; 5. charcoal and daub; 6. sod structure; 7, wood; 8. sandy subsoil.

back-filled harbour were recovered, as was the shell-surfaced road which ran along the harbour from that period on (m).

The remains

The oldest habitation traces are found only on the banks of the former watercourse, *i.e.*, in trenches 3 and 5, to about 15 m from the south. The first 10 m were, moreover, very disturbed by later pits. Thus it is hardly surprising that too few traces were visible in plan to form any idea of the earliest activities on the site.

All traces are listed below, classified on the basis of stratigraphic data:

1 In the undisturbed light-grey sand, there were four pits, probably small ditches dug by man, filled with light-brown, at times darker grey humic sand.

2 Traces in the layers dated by early medieval sherds: a rectangular pit, possibly a post-hole, several hearths with charcoal and ashes.

3 Traces in the layers dated by the tenth- to twelfth-century sherds: large scorched areas, several refuse pits, a ditch at 22 m, a series of small posts at right angles to the bank at 15 m (fig. 12).

4 Settlement traces on the raised shore dated by twelfth- to early fourteenth-century pottery sherds: a 7-m-long turf wall to the west of which a small ditch, several refuse pits, a water well with a wicker basker at the bottom.

5 Remains of wooden constructions in the harbour fill (fig. 12). At the bottom of the harbour fill at 39 m from the south and 3.40 below NAP, the remains of a timber cladding are visible. At right angles to it, a 7-m-long wooden construction of posts and wattle runs southwards. A second heavy timber cladding occurs at a depth of 3.75 below NAP at right angles to the section at 44 m and extending to 2.30 below NAP. A third timber cladding at 46 m occurs at 1.40 to 2.40 m below NAP.

6 Remains on the filled-in harbour: a broad band of shells extends at right angles to the section in successive layers which form a mass more than a metre high, identified as the old shell road along the harbour. To the south of this, there are foundation posts and other traces of buildings from the period beginning with the late Middle Ages.

Description of the section

Illustrative of the stratigraphy on the bank of the original watercourse is the section at 10.5 m from the south (fig. 13) described below.

a 1–0.65 m above NAP: recently disturbed very humic clay, much brick, debris, sherds, and other occupation refuse.

b 0.65–0.30 m above NAP: turbulent, hardly homogeneous, humic grey clay, from which came numerous fourteenth-century and older sherds.

c 0.30–0.13 m above NAP: brown to light-grey humic clay, turbulent, containing many lumps of blue-grey greasy clay and peaty fragments, pottery sherds until the beginning of the fourteenth century.

d 0.13–0.05 m above NAP: clean yellow sand.

e 0.05 m above NAP – 0.02 m below NAP: grey compact clay.

f 0.02–0.15 m below NAP: brown humic clay mixed with fragments of clayey sand, peaty material, charcoal, and daub, and tenth- to twelfth-century sherds.

g 0.15–0.30 m below NAP: burnt clay, charcoal, ash in layers.

h 0.30–0.55 below NAP: dark-grey humic sandy clay, numerous charcoal particles.

i 0.55–0.95 m below NAP: grey compact clay with beige flecks, in places changing to clayey sand with humic streaks here and there, on which Carolingian sherds were found.

j 0.95–1.05 m below NAP: brown, ferruginous, compact clay, containing some bone and sherds.

k 1.05–1.25 m below NAP: light-grey compact clay.

l 1.25–1.38 m below NAP: brown humic clay.

m 1.38–1.46 m below NAP: dark-brown clayey, very humic to peaty band.

n 1.46–1.70 m below NAP: light-brown, slightly humic, fine-grained clayey sand.

o 1.70–2.35 m below NAP: light-grey, very fine-grained clayey sand.

In the undisturbed clayey sand (*o*), four pits are visible filled with light-brown clayey sand (*n*). The peaty band (*m*) presents, especially towards the north, the appearance of a vegetation horizon. Towards the south, it is thicker, and the transition to the brown humic clay lying above (*l*) is less sharp. The light-grey compact clay (*k*) and the ferruginous clay (*j*) which follow, contain two *Kugeltopf* sherds (findnumber 79), bone (478a), and Badorf pottery (463), although the first-mentioned clay does not look disturbed. The layer of grey clay above (*i*) was deliberately laid and contained fragments of daub. In the north this layer was very sandy. The sherds of Carolingian pottery and glass were found especially on the thin humic streaks in this layer (352, 457, 461, 462). The somewhat darker clay with charcoal and daub (*h*) was also deliberately laid on, and it too contains much Carolingian pottery (452, 450, 458, 451). At 11 m from the south, there was a rectangular pit, possibly for a post. This layer was partly present in dug-out form in the turbulent layer of mixed clay (*f*) and in the burnt areas (*g*) which were dated by the Pingsdorf sherds there. From 15 m northwards, the structure of this section changes. The layers characterized by Carolingian and tenth- to twelfth-century sherds stop abruptly, while from there, dumped layers of organogeneous material mixed with sand and clay and rich in twelfth- to early fourteenth-century sherds slope northwards. These layers also cover the ditch at 22 m, the bottom of which is clearly layered. On top is a humic band, and, finally, a mass of unlayered humic sand. The finds from the ditch cover the period to the fourteenth century (470, 472, 474). To the south of this ditch, there was some wood; the bank between the ditch and the harbour was reinforced with clay sods. Under this on the sharply sloping undisturbed clayey sand, there was a subaquaeous deposit of layered clayey sand, while above, there was a layer of brown humic silty clay, in which cardium shells and twelfth–early fourteenth-century pottery sherds occurred. On the organogeneous raised layers on the bank, a north-south turf wall cut the section between 11 to 20 m, dated by thirteenth- to fourteenth-century sherds. Like all remains in the higher southern part of the terrain, it has been partly decapitated by the levelling packing layer of crumbly brown to blue-grey humic clay (*c*) dated by sherds to the fourteenth century. Finally, the section is sealed by a layer with remains of late medieval habitation (*b*) and by the more recent disturbed topsoil (*a*).

Conclusion and discussion

The section at Oude Haven in the centre of Medemblik shows that the virgin soil consists of very fine clayey sand, a sediment deposited in the Calais IV B transgression until about 1800 B.C. that is part of the Abbekerk creek ridge which ends at Medemblik. In the south of the section, a number of pits in the sand may be seen, probably dug out by man, though they contained virtually no finds. The presence of a small bowl from the late Bronze Age[55] (fig. 14), though found in a secondary position, lends weight to the supposition that people were active in Medemblik as

55 Dating by Mr R.W. Brandt (IPP).

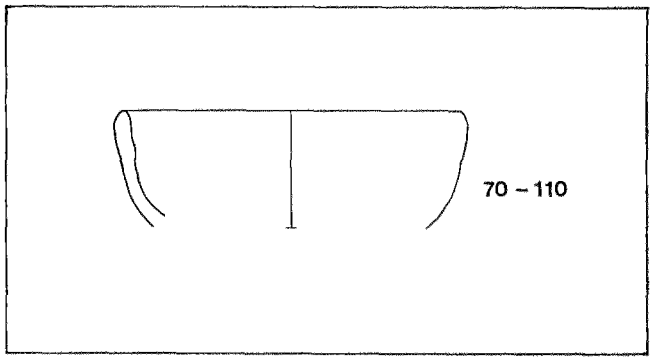


Fig. 14 Medemblik, Oude Haven: bowl fragment from late Bronze Age.

early as the prehistoric period. The height of the top of the clayey sand, *c.* 1.70 m below NAP, agrees with that of the prehistoric sites found around Medemblik.

The first two deposits on the sandy subsoil of the section at Oude Haven (fig. 13, layers *n* and *m*) show great similarity to that of Schuitenvoerderslaan. This is also confirmed by the results of the palynological investigation of these deposits.[56] In both cases, there is an open landscape that changes into a more wooded one where the alder is dominant during a drier period.[57] It is not possible to determine the influence of cultivation on the vegetation from the pollen of the deposits in the section at Oude Haven, since they are practically indistinguishable from some pollen from a halophile milieu brought here from elsewhere.[58] In view of the increase of *Fagus* pollen, the clay deposit (fig. 13, layer *k*) that succeeded the period of the peaty clay deposit (layer *l*) could have started in the post-Roman period. Therefore it may be considered as a D II deposit.[59] The presence of two sherds of early medieval hand-made pottery (478), however, refutes this theory. The brown, ferruginous clay above it also contained a similar sherd (468). In the south of the excavation terrain, deposits of raised clay (layers *i* and *h*) were present on a small part of these levels. Streaks of humic material in them, with Carolingian pottery and broken glass, indicate the occupation levels used by man at that time.

We should state here that there could not have been a peat layer on the creek ridge at Medemblik because the Carolingian packing was laid directly on top of the clay deposit. Moreover, on the basis of the palynological investigation, the clay continued to be deposited until after the Roman period.

The numerous Carolingian sherds that occurred in more recent layers make it likely that many early medieval traces have been cleared away. The same may be said of the tenth- to twelfth-century settlement traces which are represented here only by a charred level and a layer of packing (fig. 13, layers *g* and *f*). The Pingsdorf pottery characteristic for this period and also found frequently elsewhere in Westfriesland, however, occurs in significant quantities, second only to the hand-made *Kugeltopf*, though it comes chiefly from tip and packing levels. We must assume that many early medieval and tenth- to twelfth-century settlement traces have disappeared as a result of the floods that later ravaged Westfriesland. The original bank of the broad natural watercourse to the north of the creek ridge was swept away and with it a part of the early medieval and tenth- to twelfth-century settlement remains. The row of posts at 15 m from the south of trench 3 (fig. 12) marks the new shoreline.

The broad natural watercourse that later was to become the medieval harbour of Medemblik was in any case already present in the early Middle Ages, and we may identify it with the *Medemelacha*, the Middenleek, mentioned in the tenth century. A glance at the oldest maps of Medemblik (pls. VII and VIII) shows that the Oude Haven was the town's main artery along which medieval habitation was concentrated, a situation substantiated by the excavated evidence of early medieval habitation. Moreover, this can still be seen in the height of the terrain at the south of the old harbour, which was not levelled. Due to the higher position of the creek ridge and the continuous raising of the land, the area looks like an oblong *terp* about two metres higher than its surroundings. In the Middenleek, in which our excavations were made, there is a two-metres-thick, finely layered accretion of sand and clay (fig. 11, g), that was deposited since the Carolingian period, in view of the finds at the bottom (311, 344). The deepest point of the still partly present Carolingian bedding is situated at 4.80 m below NAP, about 4 m under the Carolingian level on the shore. If we take this deepest point as the middle of the Carolingian Middenleek,

56 The results of the palynological investigation carried out by J. Barelds (then IPP) are published in an appendix following this article.

57 See p. 103.

58 See p. 103.

59 See p. 103.

then this watercourse must have been more than 20 m wide, if only on account of the remnant of the deposits still present. However, if we take the deepest point of the thirteenth-century watercourse as the axis of the Middenleek, then we get a width of 30 m. The actual width must have been about 30 m. Palynological analysis was undertaken of the accretion on the Carolingian bed and the peaty layer.[60] The composite origin of the pollen present made it impossible to prove the influences of cultivation on the vegetation. The archaeological dating of the deposit, however, between the Carolingian period and the thirteenth century, makes it obvious that there must have been such influences. From the diagram it is apparent that there was a resedimentation of material from peat bogs elsewhere under eutrophic conditions. This substantiates the interpretation that the Middenleek was a fen stream,[61] assuming that this material was brought here from the west. The frequent occurrence of *Pediastrum* suggests a predominantly fresh-water milieu. The marine elements are attributed to resedimentation of marine deposits cut into elsewhere.

In the twelfth century, the advancing water, that as we have seen also affected the bank, tore out a new bed in the sand bottom. It also deeply eroded the deposits which had silted up since the Carolingian period, as could be seen in the surface and the decapitated stratigraphy. The depth of this twelfth-century bed reached to more than 5.50 m below NAP. The deposit of humic muddy clay (fig. 11, h) that followed has been dated to the twelfth to early fourteenth centuries on the basis of Pingsdorf and Paffrath sherds, sherds of early Rhineland stoneware, and *Kugeltopf* sherds with brushwork decoration. The presence of many cardium shells, moreover, shows that seawater had penetrated as far as Medemblik. At the same time there are traces of considerable activity on land to regain what had been lost. The old bank was reinforced with clay sods and the terrain to the south was again raised. The sherds from the material used to raise the ground give a dating from the twelfth into the fourteenth century. The erosion phase that preceded it can therefore be dated in the twelfth century, and be attributed to the Dunkirk III B transgression. This dating seems to agree with that provided by the written records.[62]

The systematic filling-in of the water and heightening of the land in the Middle Ages reinforced and extended the shore terrain. The timber and wattle construction present at the bottom of the packing levels in what may indeed be called the medieval harbour (fig. 12) is probably an old property boundary, on both sides of which each owner took care of the raising of his premises. This is confirmed by the difference in the fill-in material on both sides of the wooden construction. The property boundary ended at right angles to the remains of a heavy timber bank reinforcement (fig. 11, k and 12). From this point, there is a clear upward breach in the section which can be interpreted as a breach caused by slumping into the water,[63] or as an old bank line. We prefer the latter interpretation because in the case of subsidence, it should be possible to reconstruct the breach on the basis of the layering of the material. The material on both sides of the breach is, however, of a totally different composition. Other older, less clearly defined slopes are also distinguishable. At the end of the Middle Ages the town council took over the work of the landowners in order to reclaim land in the harbour. There are no new property boundaries any more. A shell road was built on the newly reclaimed terrain parallel to the harbour, and the waterside was systematically provided with durable timber cladding. The plots south of the road were built up. This is illustrated on a town map of Medemblik in the sixteenth century (pl. VII). At the end of the sixteenth and in the first half of the seventeenth centuries new harbours were excavated to the south of the town causing the centre of Medemblik to move to the south part of the town. The old harbour, in Dutch *oude haven*, fell into disuse and the terrain along it partly came to lie waste (pls. VIII and IX). This situation has continued unchanged until the twentieth century.

In conclusion, we should establish how large Carolingian Medemblik was. We can be guided by the height of the creek ridge suitable for settlement (*c.* 1.70 below NAP) and by the thickness of the layers of material used to raise the land, which indicate the length of time or the intensity of the settlement. The theory that the Middenleek flowed from the northwestern fens running at Medemblik along the northern flank of the Abbekerk creek ridge, which ended there, is confirmed by the following observations. The top of the sandy Calais IV B deposit was seen in the excavation trench at 1.70 m below NAP. Bore cores made for the Medemblik Public Works (figs. 2 and 15) furnish

60 See further appendix p. 99–103.
61 See above p. 44–5.
62 Gottschalk 1971, 92–4, 128–9.
63 Halbertsma 1971, 74.

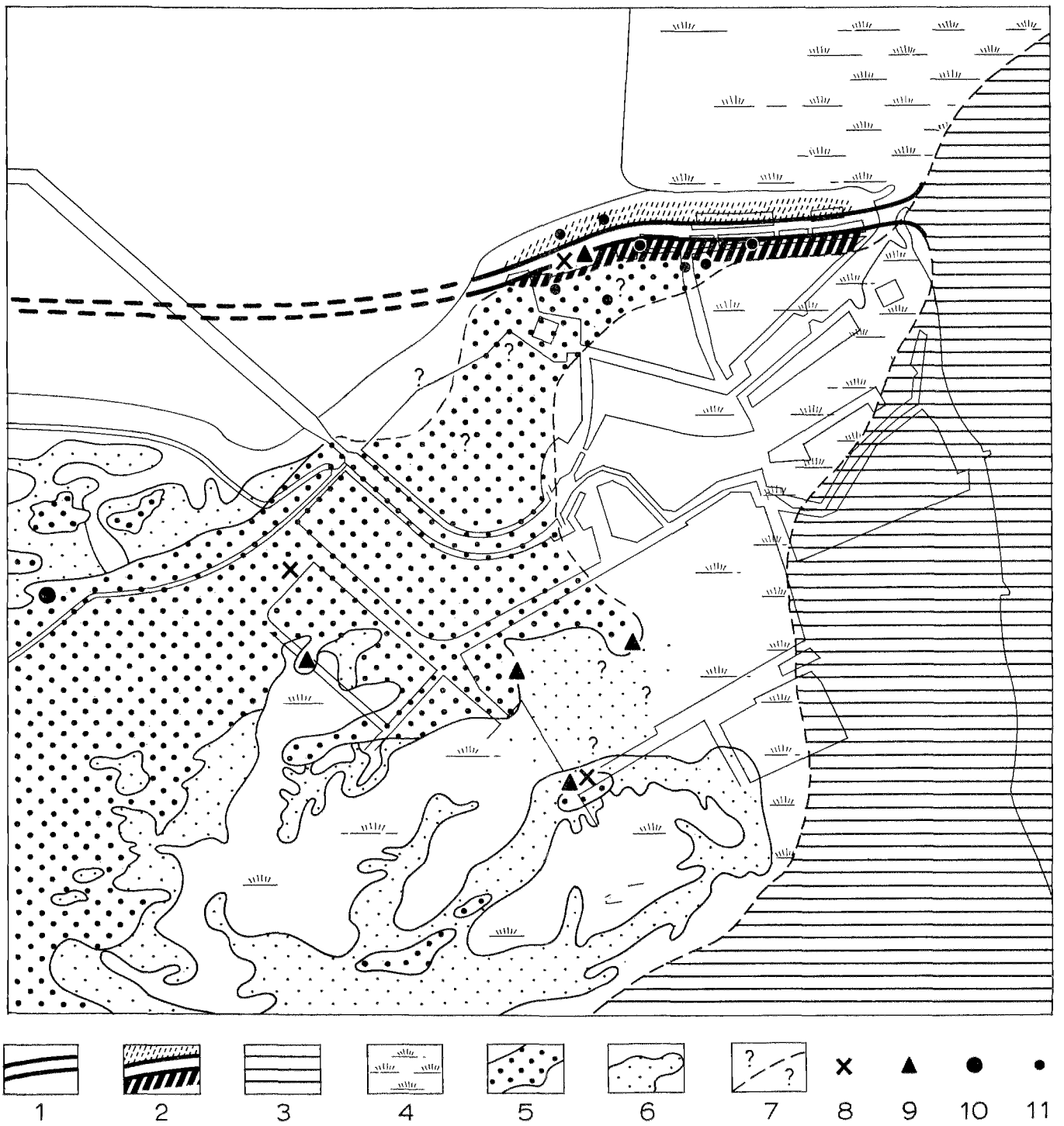


Fig. 15 Medemblik and environs in the early Middle Ages: 1. Middenleek (*Medemelacha*); 2. Middenleek with the south bank inhabited in early Middle Ages and the north bank probably inhabited later; 3. Lake Wervershoof; 4. shore zone of Lake Wervershoof; 5. region with present surface higher than 1 m –NAP in relation to present creek ridge; 6. remaining sandy soils of creek-ridge system; 7. border or interpretation uncertain; 8. early medieval finds; 9. prehistoric finds; 10. (Roman) Iron Age find; 11. place of borings.

the following height measurements for the surface of this sandy bottom.[64]
1) Oostersteeg: 1.40 m –NAP. 2) Ridderstraat: 1.75 m –NAP. 3) Bagijnhof: 1.80 m –NAP. 4) Nieuwstraat: 2 m –NAP. 5) Tuinstraat: 2.20 m –NAP.
All other bore cores give a subsoil of soft sandy clay lying at a deeper level. The above-mentioned data make it possible to map out roughly the creek ridge along the southern shore of the Middenleek/Oude Haven. The several metres' difference in height between the area south of Oude Haven and the town districts situated to the south of this area is not only due to the higher position of the creek ridge subsoil, but also to the metres-high layers of packing. The latter are the result of the centuries-long settlement of just this strip of land, and especially of the deliberate heightening in the twelfth to fourteenth centuries against the intruding sea, and they have given it the appearance of a long *terp*. The boring made east of the church at the corner of Kerksteeg–Herensteeg (figs. 2 and 15), where the street is *c.* 3 metres above NAP, to a depth of 3.50 m under the street brought up only material from the packing layers.[65]
All this suggests that the earliest settlement of Medemblik was on the terrain south of Oude Haven (fig. 15). The question remains as to whether the north bank of the old Middenleek was also inhabited at an early date. The Middenleek, however, flows along the creek ridge and not through it, so that the northern side was not suitable for settlement. The stream probably formed the border of the extensive peat area between Wieringen and Westfriesland. The boring on the north bank of the Middenleek opposite to the excavation (figs. 2 and 15) to a depth of 4.05 m under the surface, *c.* 3.50 m – NAP, brought up a grey sandy clay, the clayey facies of the Calais IV B deposit.[66] The boring made for the Medemblik Public Works north of Oude Haven at the level of the church produced this clay from 3.70 m –NAP.[67] The deep position and the clayey nature of the deposits show that the creek ridge was not present there, and that in the early Middle Ages the southern shore of the Middenleek was probably settled first (fig. 15).

THE FINDS

THE POTTERY

Most of the finds are pottery sherds (*c.* 12,000), the majority of which date from the eighth and ninth centuries. In view of the subject of this article, we shall only discuss the Carolingian finds. Attempts to classify this pottery create a number of problems. The ceramics from this period, especially those made by hand, do not appear to be much affected by changes in design. The origin is often unknown, and if important changes in form or technical execution do appear, it is not always possible – in view of the number of factors which can influence the end product – to determine whether this was due to chance or a deliberate change. Despite the increasing number of pottery studies,[68] in which the origin of the raw materials and the technical process of firing are given increasing attention,[69] it has not yet been possible to devise a generally accepted classification of the pottery from the Carolingian period. The language confusion that prevails with regard to the terminology of this pottery is illustrative of the problem. Consequently, to identify the pottery, place of origin, find site, form, decorative or technical characteristics are used interchangeably, so that some kinds of pottery are listed under various names, *e.g.*, Tating jug, Frisian jug, Birka jug, 'Nordic' jug.
In describing the pottery found at Medemblik, use has been made of the provisional classification of pottery which was employed for the Dorestad excavations at Wijk bij Duurstede. This was done because the object excavated was comparable, a Carolingian settlement on the periphery of the Frankish territory, and also because of the similarity in the very varied pottery.[70] This classifica-

64 Municipal works Medemblik, March 1960, drawing R. Med. 3, borings no. 5, 6, 3. Also bore-reports November 1974, boring 8 and 4. In fig. 2 numbered 1–5 resp.
65 Boring Medemblik I carried out by Mr D.P. Hallewas (ROB) and the author on 4 February 1975. In fig. 2 numbered I.
66 Boring 4 February 1975, Medemblik II. In fig. 2 boring II.
67 Municipal works Medemblik, March 1960, drawing R. Med. 3, boring 15. In fig. 2 boring 6.
68 For a critical survey of the literature up to 1968 see Lobbedey 1968, 1–12.
69 Böhner 1952; Tischler 1952; Stamm 1962 and Weidemann 1964, of whom Stamm especially deserves attention in this respect.
70 Published in Van Es 1969b, 198–202. W.J.H. Verwers (ROB) and Professor W.A. van Es (ROB) cooperated and offered assistance with the application of this classification. Since the preliminary publication several alterations have been made: W I A and B were combined, W I C therefore became W I B. W II A and C were switched, and also W IV A and C. The difference between the fabrics 1 and 2 of hand-made pottery has been withdrawn so that fabric 3 becomes fabric 2.

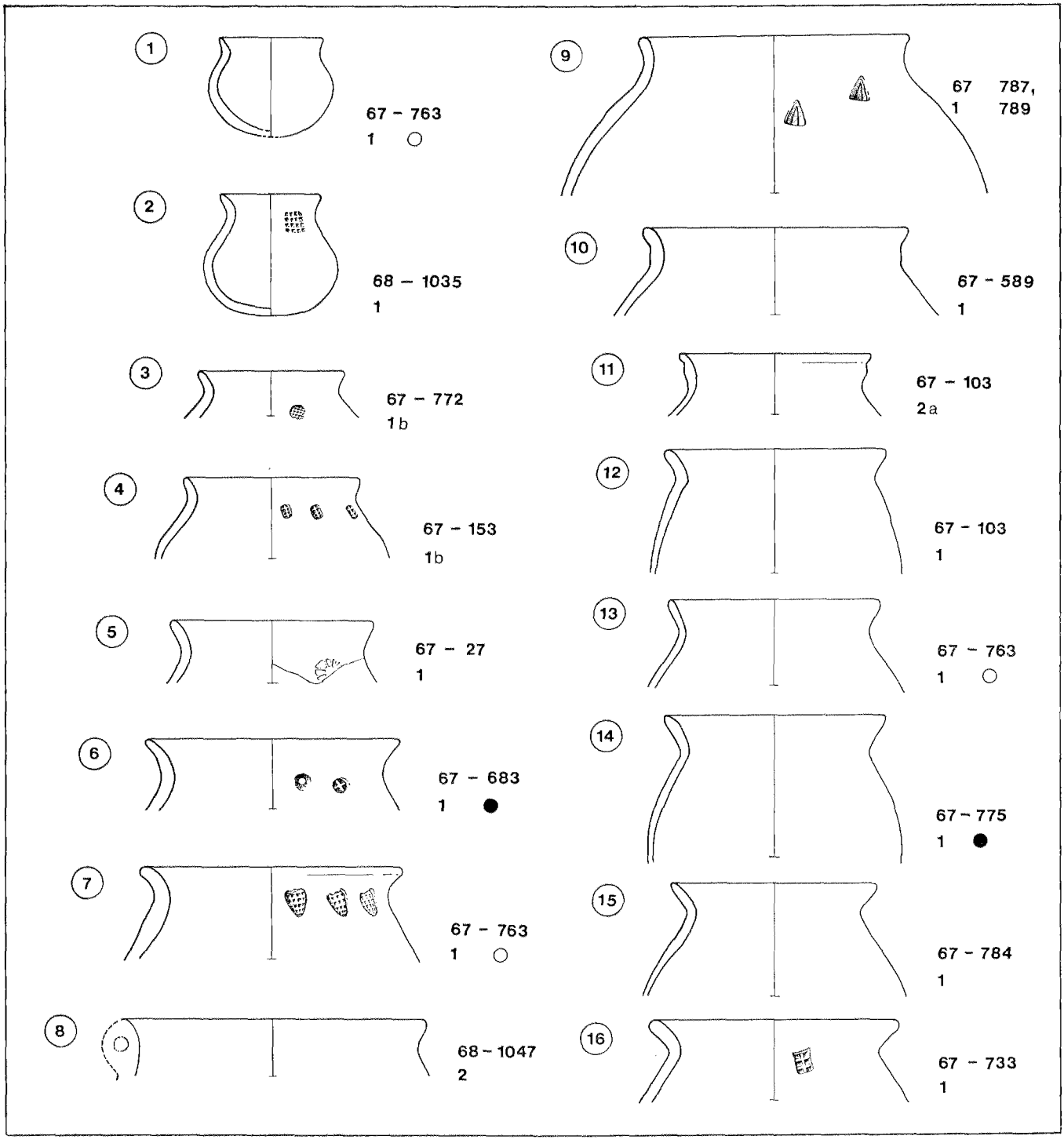


Fig. 16 Medemblik, pottery: Type H I A, nos. 1–16.

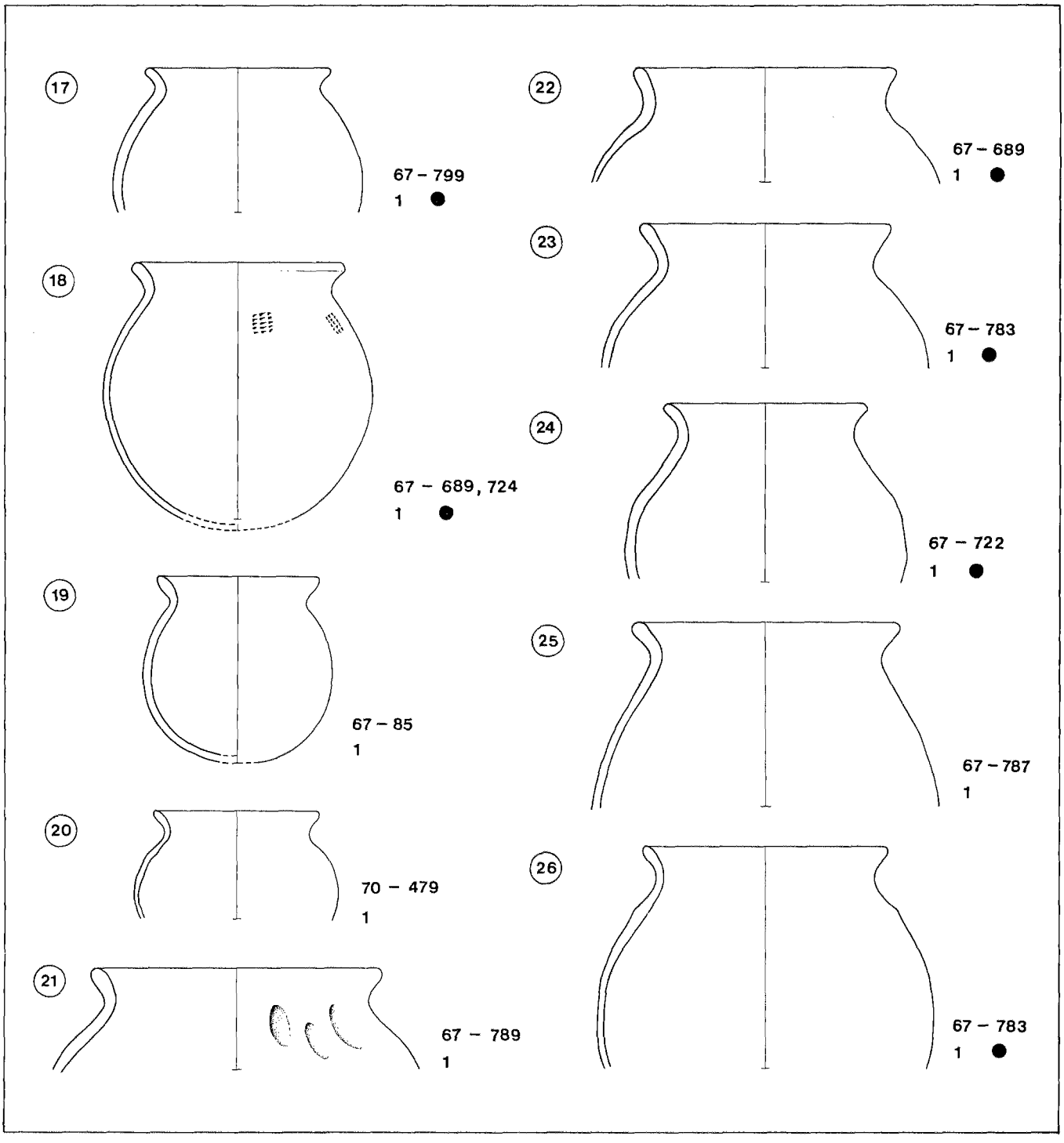


Fig. 17 Medemblik, pottery: Type H I A, nos. 17–26.

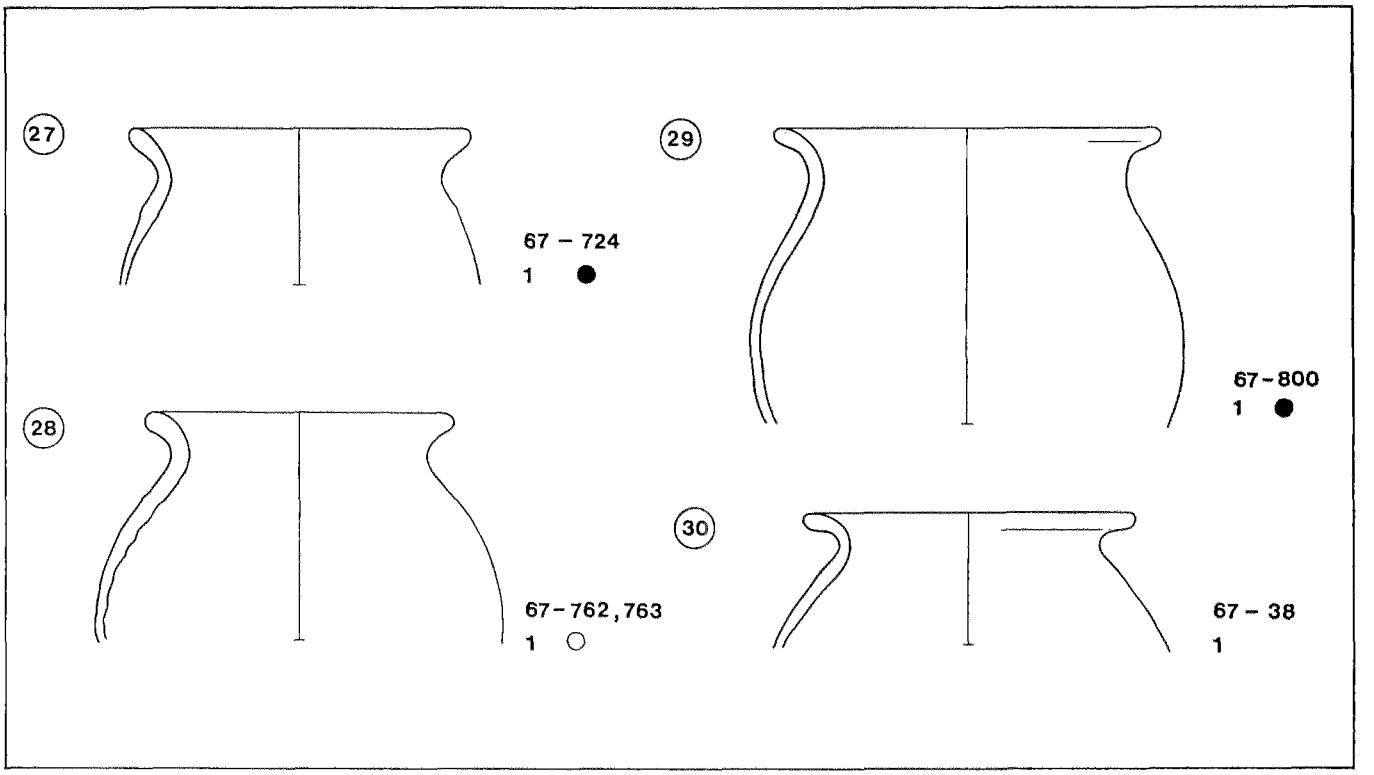


Fig. 18 Medemblik, pottery: Type H I A, nos. 27–30.

tion is, moreover, easy to employ because it is based on macroscopically observable characteristics, and provides various entries by which it can be adapted to another classification.

The pottery is divided into hand-made and wheel-thrown pottery and then classified according to the form of complete examples. Further differentiation is based on a combination of a number of technical features which determine the fabric. Finally, the shape of details, particularly the rims, and the method of decorating are used for an even more detailed sub-division. For the sake of convenience and rapid identification, the names usually found in the literature were used for easily identifiable types of pottery and fabric, despite terminological objections.

In the publication of the finds at Medemblik, emphasis has been placed on the drawings and photographs.[71] The criterium in making the selection was that all form aspects – the principal shape, details, and decoration – must be shown in drawings. For the fabric, photographs were used. Consequently, the descriptions are very brief. The figures and the plates present the scope of the variety of the pottery. Thus no quantitative conclusions can be drawn from them.

DESCRIPTION OF THE POTTERY

Hand-made pottery

Fabric 1 (pl. X: 3). Course tempered (to 5 mm), usually heavily tempered, tempering uneven with stone (quartz,

71 The codification of the drawings concerns a circled serial number on the left of each drawing per pottery type. On the right are the find-numbers with, below, a fabric-number, if any, and followed possibly by a black dot for sherds from period I or a circle for those from period II (see p. 88–9).

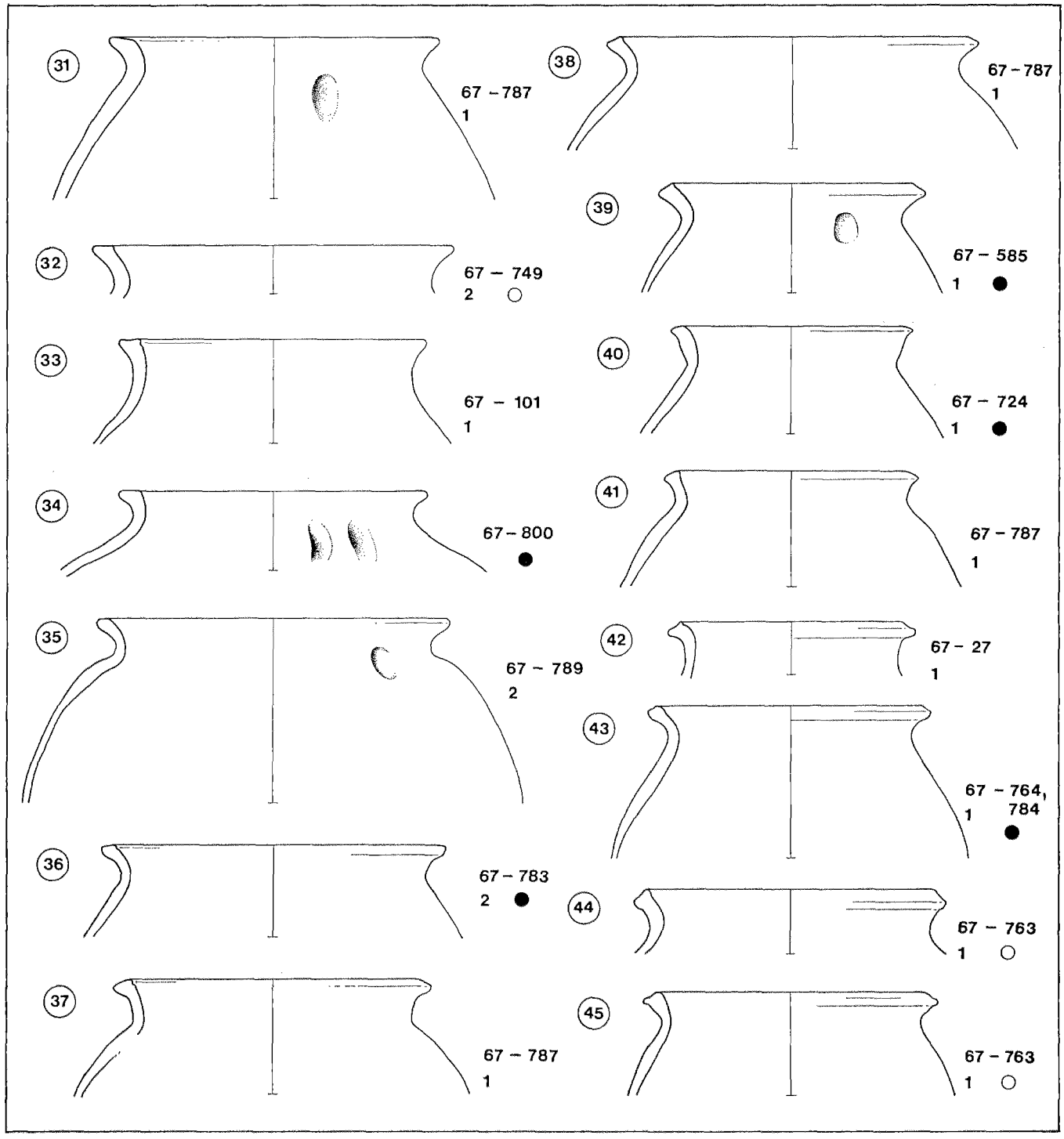


Fig. 19 Medemblik, pottery: Type H I B/C, nos. 31–45.

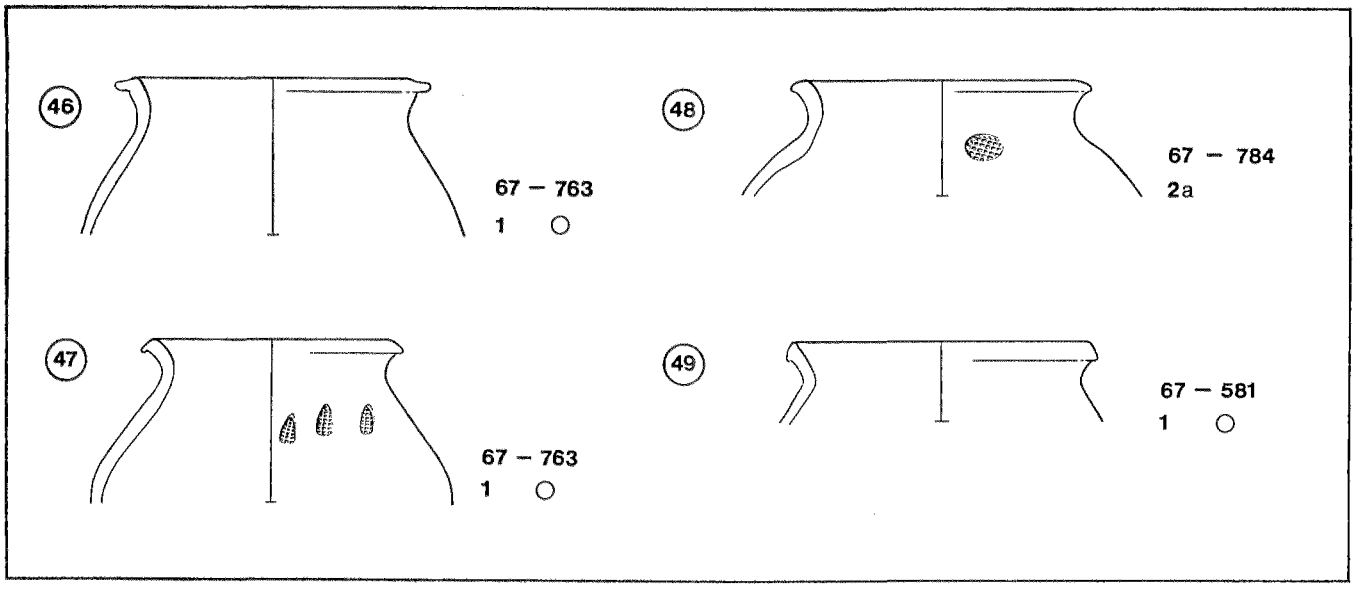


Fig. 20 Medemblik, pottery: Type H I B/C, nos. 46–49.

granite, and mica are noticeable), at times grog, and once, mixed with organic matter. The colour is grey or beige to black and dark-brown, this also varies in the same pot, especially in low-fired examples. Once completely orange-red, perhaps due to secondary firing. The surface is rough, temper often projects.

Variant a. Wet surface treatment resulting in a smooth slip, which after firing is usually lighter in colour than the core.

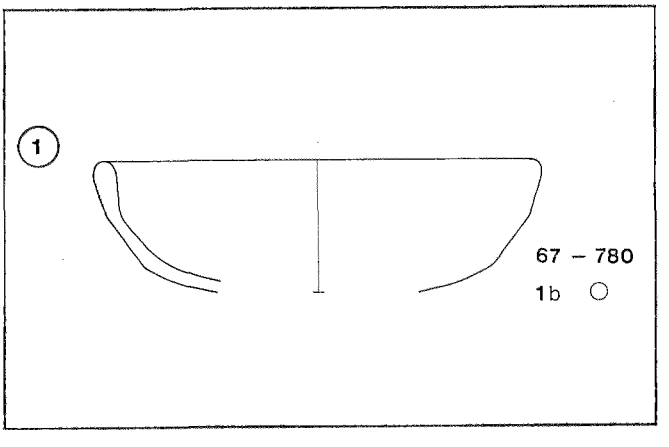
Variant b (pl. X: 2). Tempering is usually slightly more even, the surface is carefully polished.

Fabric 2. The original heavy to medium-fine to coarse tempering has disappeared, but has left countless tiny cavities in the pottery. Thus it is also known under the name of *Keramik mit blasiger Oberfläche*.[72] Even in a new fracture no tempering can be discerned. The pottery has been well-fired, medium hard, rather even in colour, dark-brown to black. The surface is smoothly finished, at times has a dull lustre. A case apart are a rim-sherd and a complete rim (pl. X: 1,4), where in addition to the numerous tiny cavities, the coarse temper partially remains, consisting of bone and an unidentified ashy temper.

H I *Kugeltopf* (figs. 16–20)

Almost all the hand-made pottery consists of *Kugeltöpfe*. The most important shape criterium, the globular body and base, can only be shown in reconstructable finds, since the body and base can scarcely be distinguished. On the other hand, the very lack of flat bases in Medemblik points to *Kugeltopf*. The girth circumference varies from 8 to more than 32 cm. Two miniature examples are noteworthy (nos. 1 and 2). The round shape varies from rather steep to squat. In view of the steep-walled and wide-mouthed pots, it was difficult to determine whether the small sherds belonged to the *Kugeltopf* or pouch-

Fig. 21 Medemblik, pottery: Type H II.



72 Hübener 1959, 24.

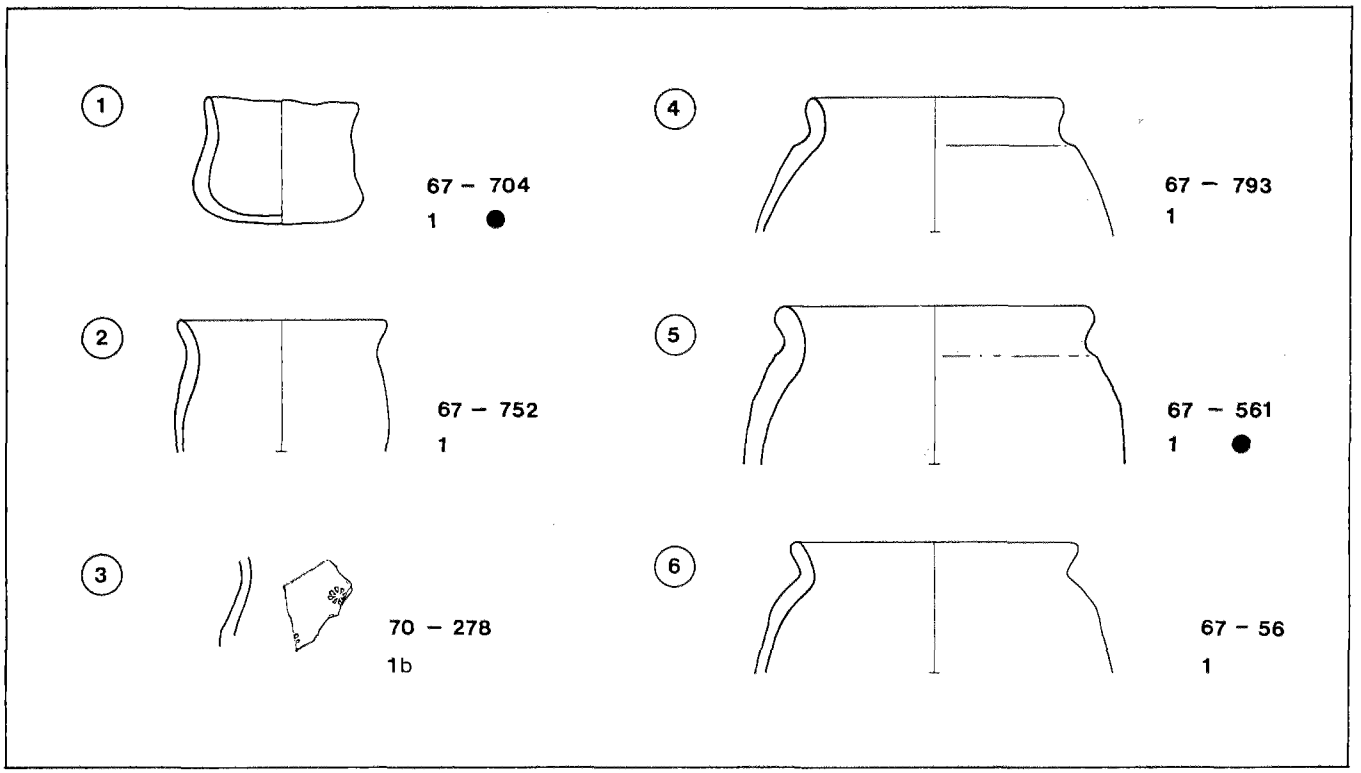


Fig. 22 Medemblik, pottery: Type H III.

shaped vessels (H III) *Sacktopf*. The greatest variation occurs in the rim.

H I A: Rounded rim (figs. 16–18). Rim variations from short to long, pointed to thickened, upstanding to widely everted, steep to curved shoulder, smoothly everted to angular everted. These variants occur in such different combinations that no further grouping is possible on this basis. One rim-sherd also shows the beginning of a vertical pierced lug (no. 8).
Fabric 1.
Decoration: once and again there is a shoulder decoration of an impressed grill pattern stamp (all illustrated in the figures), sometimes finger impressions. Special feature: pierced rim (no. 6).

H I B/C: Flattened rim (figs. 19, 20). As to the stand, length, thickness, and curve of the rim or shoulder, the same differences occur as above. There does seem to be more of a suggestion of a longer neck (nos. 33, 37, 42). Frequently there is a shallow groove on the inside of the rim. The finishing of the rim varies from the simple horizontal or slightly inturned to bevelled, whereby the rim may be angularly smoothed or even be profiled on the outside (nos. 40–47). Once a rim occurs almost pierced through.
Fabric: 1 and 2 with variants.
Decoration: stamped twice, otherwise mostly finger impressions.

H II: *Crucible* (fig. 21 and pl. X: 2).
Half a pan from which a possible handle is missing. Rim well-rounded, somewhat thickened inwardly. Wall joins not quite flat base with slight carination.
Fabric 1b finely tempered carefully poslished black.

H III: *Pouch- or bag-shaped pots* (fig. 22).
Rare at Medemblik. Small fragments difficult to classify, usually grouped with H I. Wide-mouthed and steep-walled. At times clearly defined irregular short rim (nos. 4–6). Rim not thickened, short with round edge.
No. 1, shows a small complete pot, roughly finished. The sherd (no. 3) was carefully polished and also had a stamped decoration.
Fabric 1 and 1b.

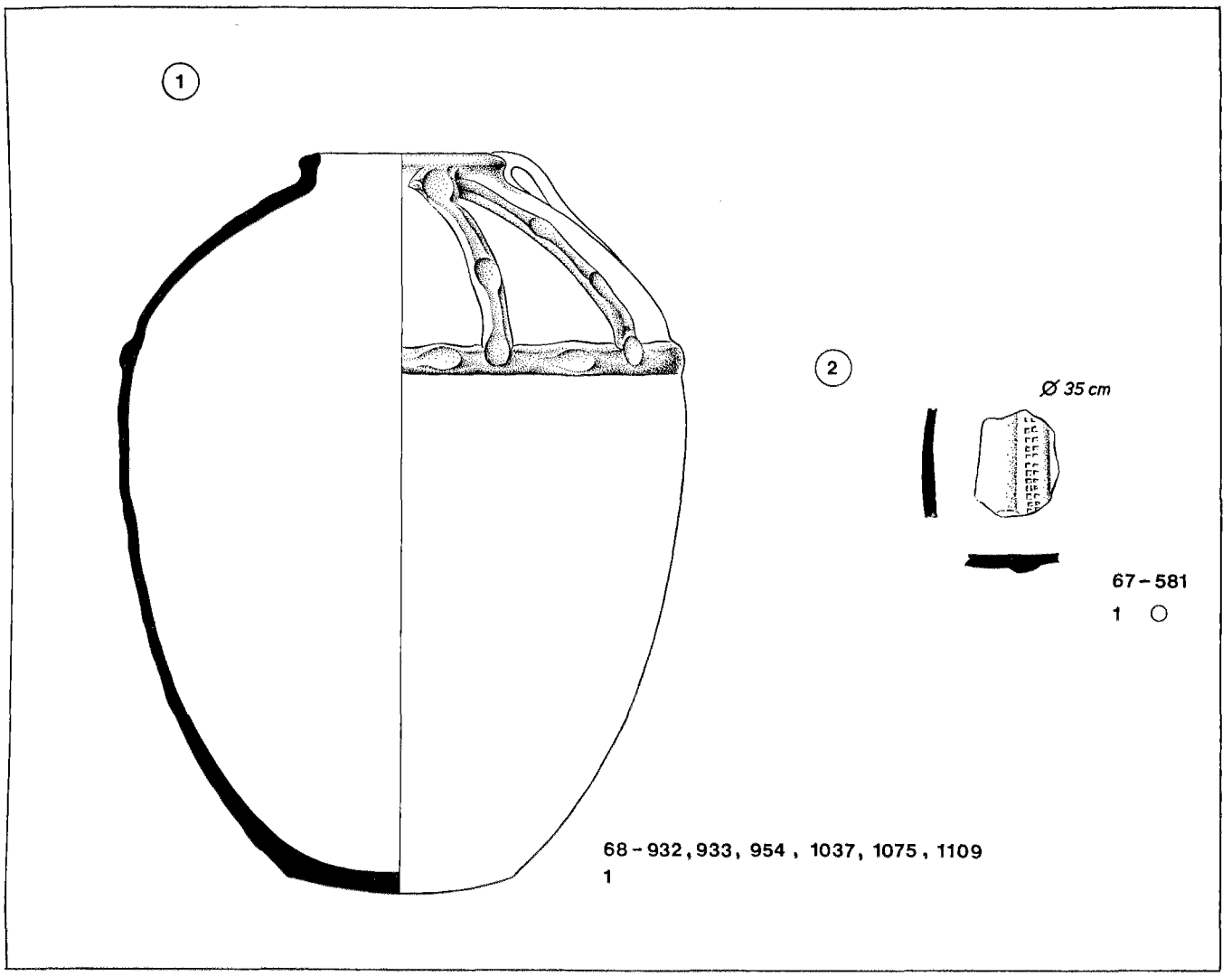


Fig. 23 Medemblik, pottery: Type W I A.

Wheel-thrown pottery

W I: *Reliefband amphora* (fig. 23)
A complete profile is present (no. 1) with cylindrical rim, short and bevelled (type I A). The bands are decorated with finger impressions. A roulette pattern also occurs as decoration. Undecorated body sherds are difficult to distinguish from other pottery types.
Fabric: 1, very finely tempered, some coarser fragments of grog and stone filler occur; low-fired, surface smooth or fine sandy to the touch, yellowish-white to orangey-yellow colour (pl. XI:1).

2. the same but better fired, slightly smoother surface, colour: yellow, light-grey to ochre (pl. XI:2).

W II: *Large Badorf pot* (fig. 24)
Rather large pots; it is difficult to reconstruct the complete shape because large fragments are missing, therefore we must confine ourselves to rim variations.
W II A: The very short rim broadens towards the edge and is folded down horizontally or flattened, and is often roughly triangular in section (nos. 1–3). On the rim of no. 3, which resembles type D, two band-shaped handles

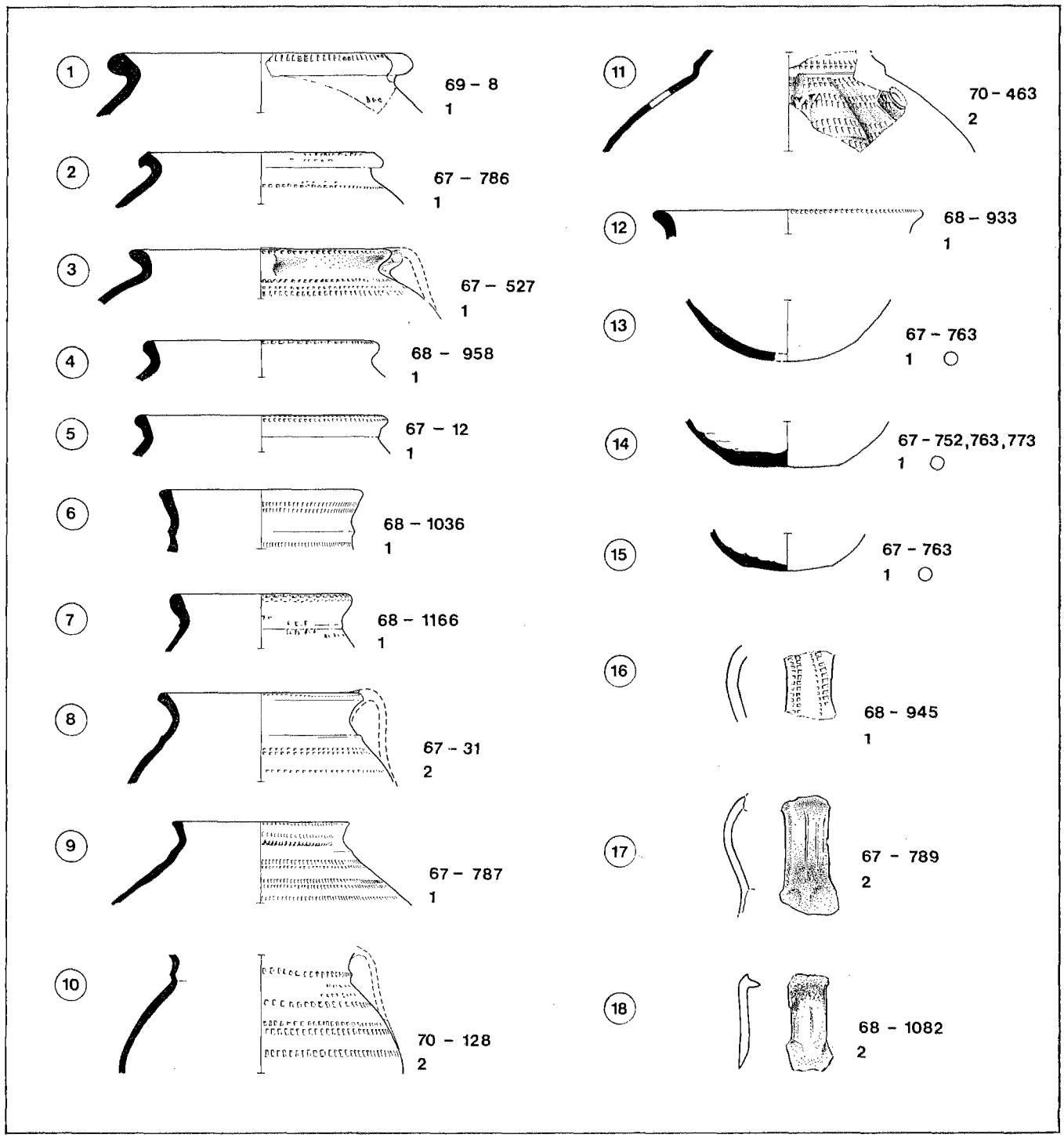


Fig. 24 Medemblik, pottery: Types W II A, nos. 1–3, W II B, nos. 4–5, W II C, nos. 6–11, W II D, no. 12.

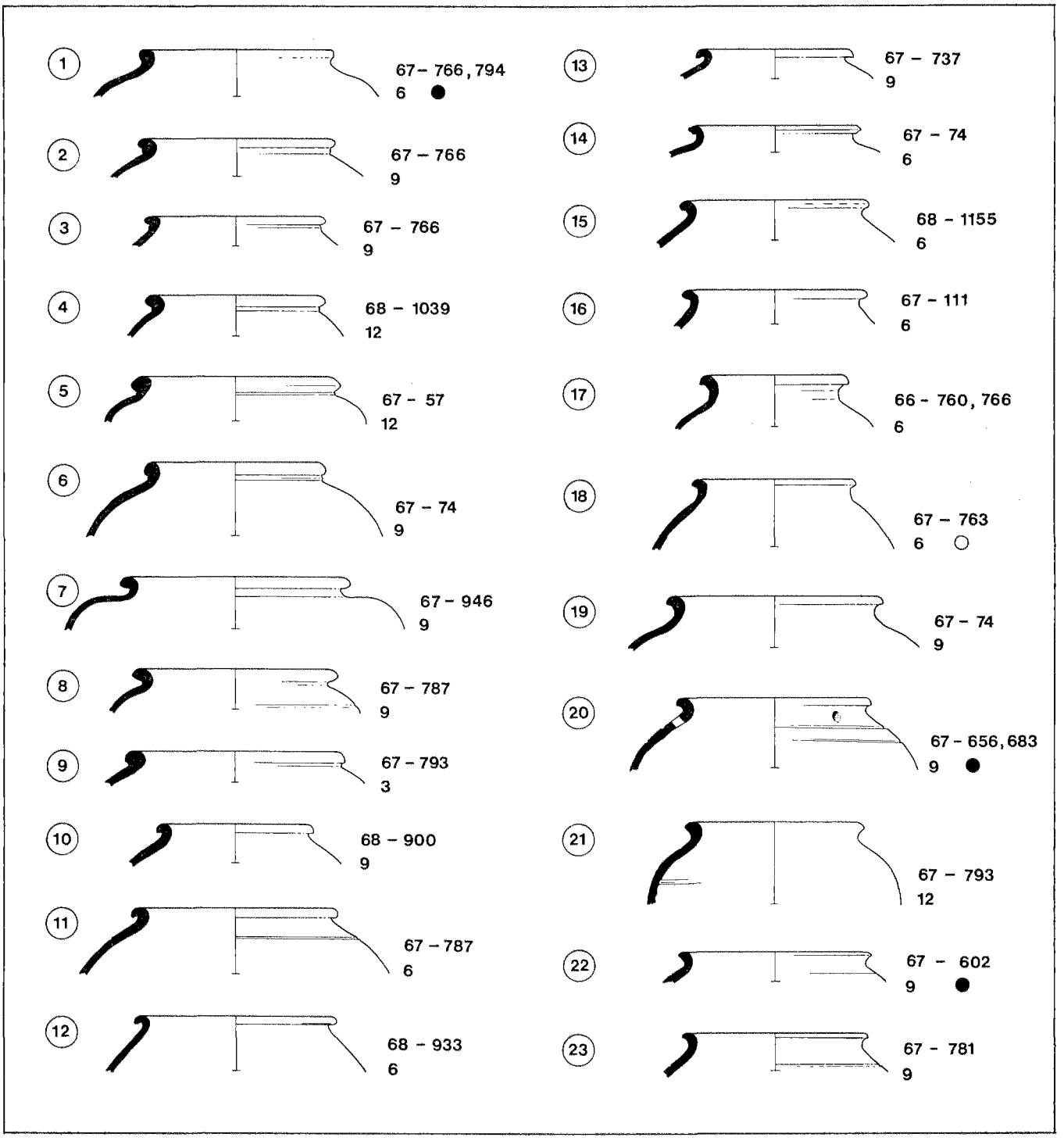


Fig. 25 Medemblik, pottery: Type W III A.

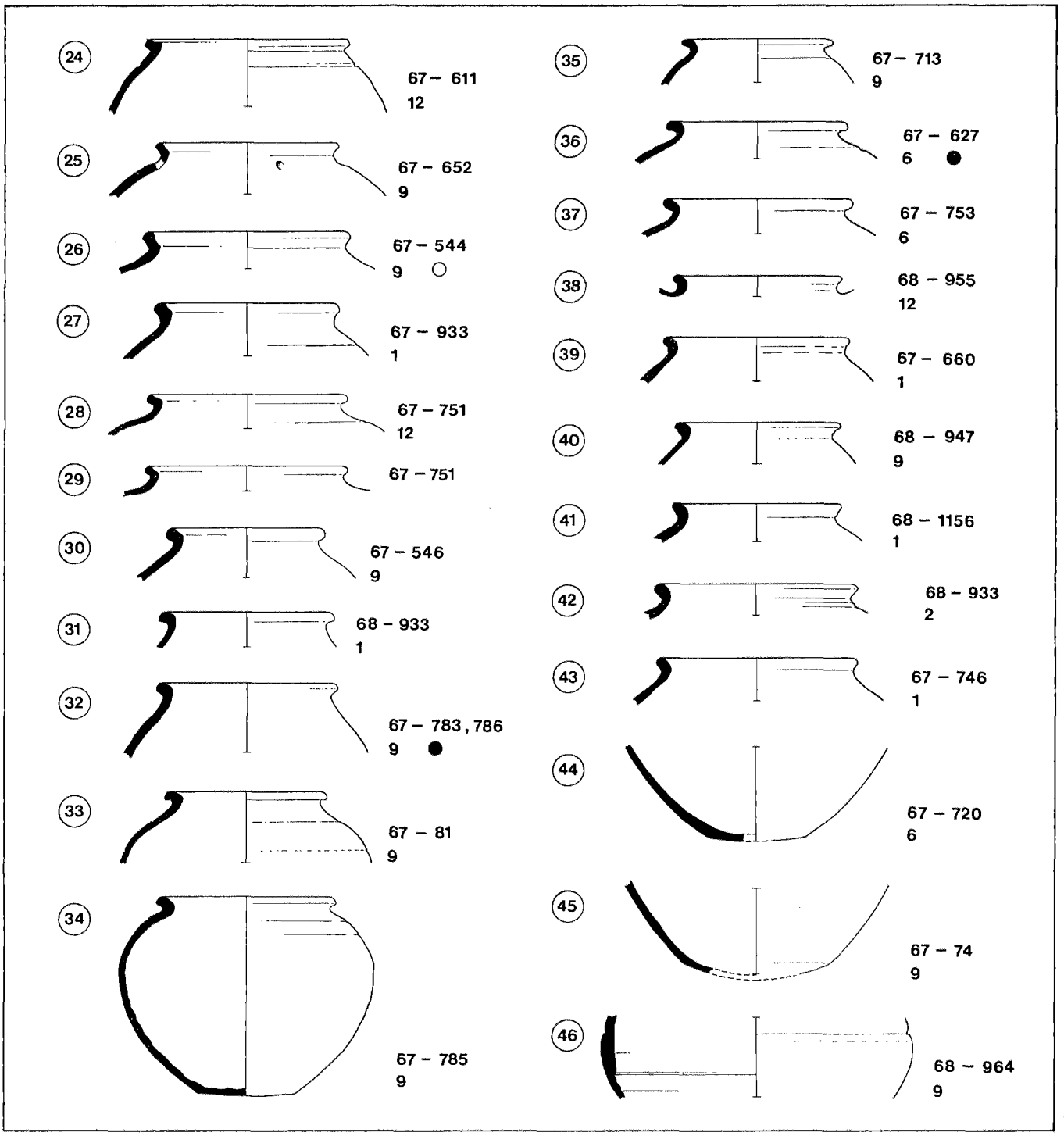


Fig. 26 Medemblik, pottery: Types W III B, nos. 24–33, W III D, nos. 34–43.

occur set at 90°, so that there may have been four handles originally.
W II B: The rim is somewhat everted and only slightly flattened (nos. 4–5).
W II C: The rather high neck with a marked ridge or groove at the shoulder occurs often. The neck diameter is *c.* 12 cm. This contrasts with the other rim types which generally have a relatively squat shoulder and a very short neck with a diameter of 15 cm or more. Rim type C varies from cylindrical to slightly everted (nos. 6–9). Band-shaped handles and once a hole of a broken spout (no. 11) occur.
W II D: A short fragment of a rounded, not thickened, everted rim (no. 12).
It is difficult to decide which of the bases on hand belong to the pots of this group. Round, lenticular, and almost flat bases occur that could belong to these pots as to size and fabric (nos. 13–15). On the base of no. 15, there is a scratched cross, probably a counting mark.
The decoration consists of rows of squares or rectangles applied with a doubled-rowed roulette. Deviations in this decoration can be seen in nos. 1 and 11. The latter also shows a finger-applied indented decoration.
Fabric: 1 and 2.

W III: *Medium-sized globular pot with lenticular base* (figs. 25, 26).
Globular, usually without a neck, having a horizontal shoulder and small lenticular base; width at girth usually 15 to 20 cm, generally above the mid-height of the pot.
W III A: The rim shape that occurs most frequently is the very short, entirely or partly folded-out rim which forms a rolled-up rim, often with a ridge beneath (nos. 3, 5, 6). If the rim is not completely rolled up, or is hollowed on the outside by further turning, it runs to a sharp outer edge.
W III B: This type comprises rims with a more or less angular profile, having a broad flattened top, or a cover groove (nos. 24–33).
W III C: Not found at Medemblik.
W III D: Has a flowing everted almost unthickened rim (nos. 34–43).
The lenticular base is relatively small in comparison with the high, rather wide girth circumference (nos. 44, 45). At times a hole is pierced just under the rim (nos. 20, 25). The characteristic decoration of these pots consists of one or two horizontal grooves on the shoulder (including nos. 11, 20). Body-fragment no. 46 comes from a pot made of a separate upper and lower half.
Fabric: Occasionally 1 and 2, more rarely 3, predominantly, however, fabrics 6, 9, and 12 (pl. XI:5, 3 and 4, respectively). These fabrics have a mixed fine and coarser temper that usually does not appear on the surface. The surface is rather smooth. The fabric varies from low-fired with yellow and ochre to red-brown colour, having at times a contrasting core (fabric 6) to very hard-fired with dark-brown, dark-grey, and violet tints, and an even fracture (fabric 12). Fabric 3 has a fine and a coarse temper. Coarse fragments of white quartz and rarely grog appear on the rough surface, hardness and colour like fabric 1 (pl. XII:1). Fabrics 4 and 8 have the same temper but are hard and very hard-fired (pl. XII: 3 and 2).

W IV: *Miniature pots* (fig. 27)
There is great similarity to Badorf pottery in shape and technique. The neck diameter is *c.* 8 cm. The body is usually globular and squat (no. 9), at times steep (no. 14). Thick-walled small pots (nos. 12, 16) are rare.
W IV A: The rim is sometimes folded outward so that a short, somewhat thickened rim is formed, rounded or ending in a sharp outer edge (nos. 1–7).
W IV B: Somewhat obliquely flattened rims with a straight inner surface, or cover groove, also occur (nos. 8–12).
W IV C: The rim, however, is usually unthickened, obliquely everted and rounded (nos. 13–19).
Some rimfragments (nos. 5, 6, 19) can come from a larger type of pottery with narrow neck, bottle-shaped. They illustrate the problem that arises when we adapt a pottery classification based on the complete shape to rim fragments. For that reason, the assignment is at times rather arbitrary. The bases that belong to type W IV are flat or flat inclining to round.
Decoration is rare: ridges on neck (no. 6), shoulder (no. 4), and rouletted decoration (no. 19). Moreover, nos. 6 and 19 are not very representative of type W IV.
Fabric: 1, 2, and rarely 9; once, a divergent fabric most resembling fabric 3, with a slightly coarser temper projecting than fabric 1, mica is noticeable, yellow-brown, low-fired.

W V: *Medium-sized pot with flat base* (fig. 28).
Globular to ovoid, rather thick-walled pot with flat heavy base. One obliquely everted rim-fragment, slightly thickened, lightly flattened (type W V A). The heavy base may have belonged to a pot of the W V type, considering the fabric that is characteristic for this group.

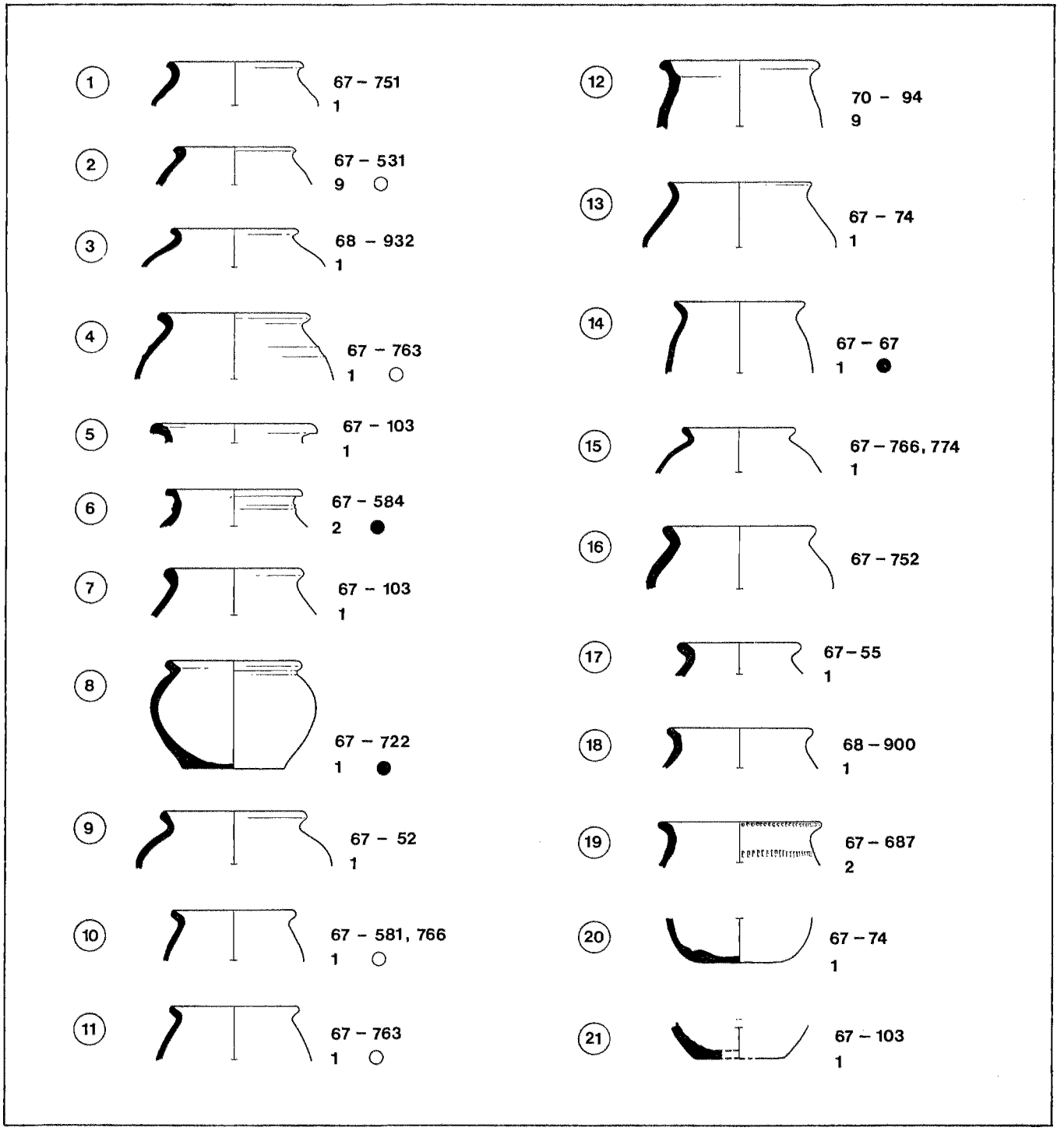


Fig. 27 Medemblik, pottery: Types W IV A, nos. 1–7, W IV B, nos. 8–12, W IV C, nos. 13–19.

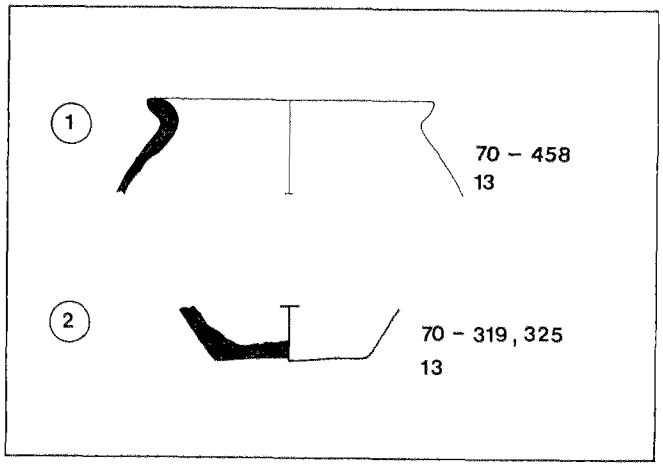
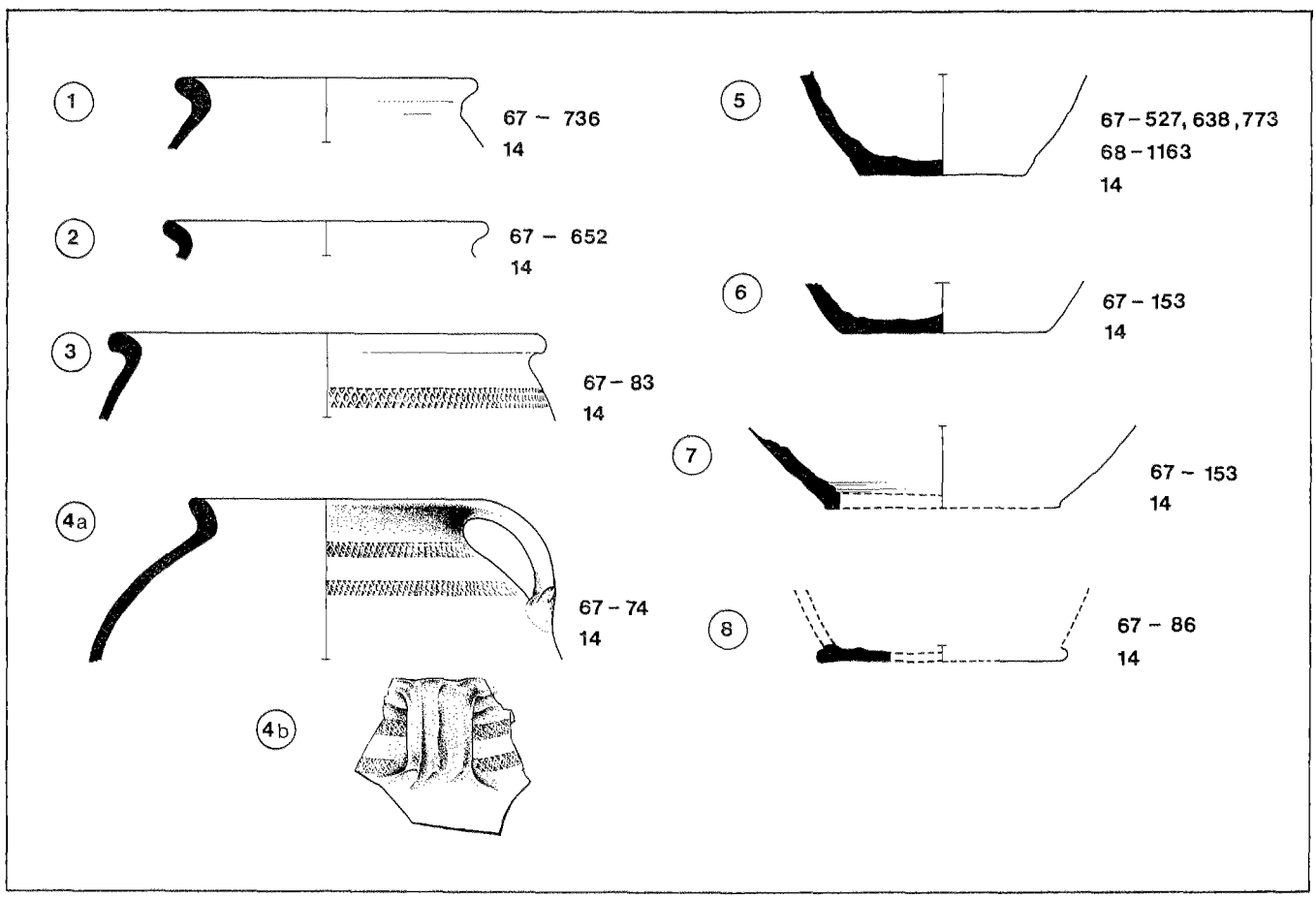


Fig. 28 Medemblik, pottery: Type W V A.

Fabric: 13. Fine to medium-fine tempered, rather low-fired, soft paste, grey colour (pl. XII:4).

W VI: *Medium-sized to large globular pot with heavy flat base* (fig. 29).
Round bodied pot with strongly everted, at times slightly thickened rounded rim, and usually with a thick flat base. Large examples with a diameter of over 25 cm occur. The fragment no. 4 has a broad, bandshaped handle. The bases are heavy, at times scraped along the edge (no. 5), once with an encircling round rim (no. 8). The decoration consists of a grill pattern applied to the shoulder in horizontal rows with a roulette (nos. 3, 4).
Fabric: 14. This fabric is heavily tempered with fine material, is soft to quite hard, porous, and layered at

Fig. 29 Medemblik, pottery: Type W VI.



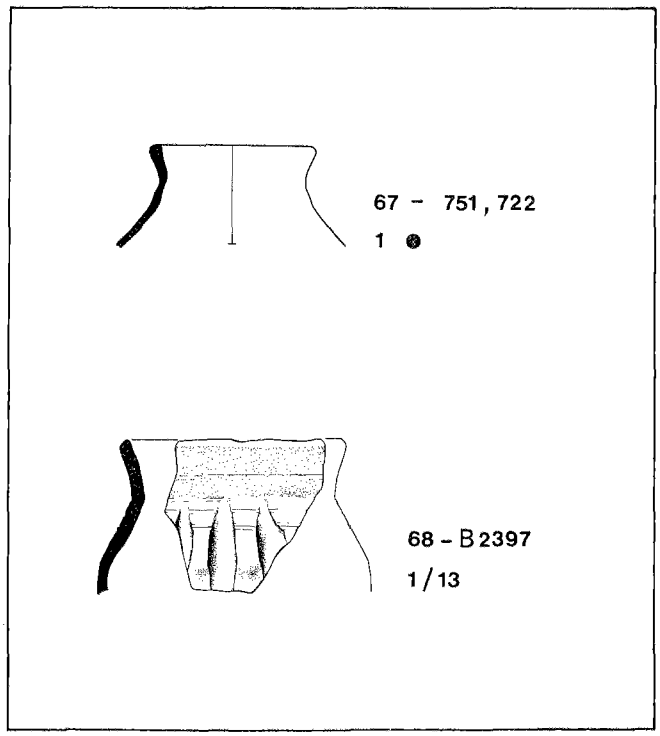


Fig. 30 Medemblik, pottery: Type W VII.

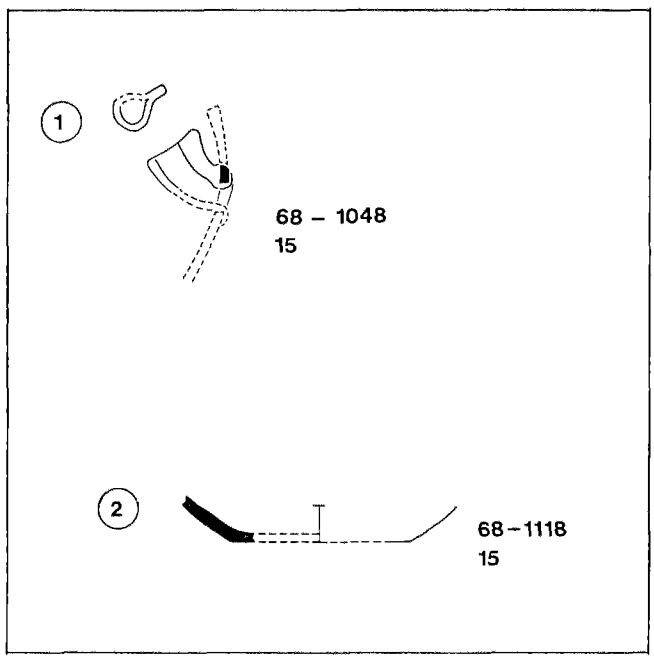


Fig. 31 Medemblik, pottery: Type W VIII.

fracture. The colour is dark-grey to black, at fracture light grey or even white. These lighter colours often gleam through the surface. The fine temper appears on the surface making it rough to the touch (pl. XII:5). There is a marked similarity to fabric 13.

W VII: *Bulbous pot with high neck* (fig. 30)
Two rim-fragments that fit into each other of a rather wide, not very large pot with a high neck clearly separated by a ridge from the body, and a rounded rim, could perhaps belong to this group, although the similarity to type W II G is striking.
Fabric: 1.
A large rim fragment of a bulbous, somewhat biconical pot with a rather vertical long rim clearly set off from the shoulder. The shoulder is decorated with vertical oval indentations. The fragment was found in the in 1968 excavated soil and is at present part of Mr. J.A. Banning's collection in Amsterdam, no. 2397.
Fabric: between 1 and 13, very finely tempered, greyish-white to dark grey.

W VIII: *Tating jug* (fig. 31)
A damaged sharp-cut spout with incised connection, its base curved towards the body, of a Tating jug (no. 1). A base fragment (no. 2) probably also belongs to this group.
Fabric: 15 very finely tempered, low reduction fired, smooth surface, dark-grey; at fracture, light-grey (pl. XIII:2).

W IX: *Wide-mouthed steep-walled pots* (fig. 32)
With small rim-fragments, the distinction between type W X (bowls) is quite difficult because the complete profile is unknown.
The body is only slightly globular and is very steep. The rim is folded over horizontally, at times ending in a sharp outer edge, or more or less flattened on top. Often they are much thickened (W IX A). Flat bases belong to this pottery.
Fabric: The fabric is unusual for Carolingian pottery. Only nos. 5 and 12 resemble fabric 3 and 6. The other sherds have heavy and medium-fine temper of light stone and red grog, which often appears on the surface and give it a rough-surfaced exterior. It has been low- to hard-fired. Accordingly, the colours vary from yellow-grey, orange and pink to grey, beige and brown with a contrasting core in the usually jagged fracture (pl. XIII: 1). This fabric more closely resembles that of Merovingian *rauhwandige* Mayen pottery.

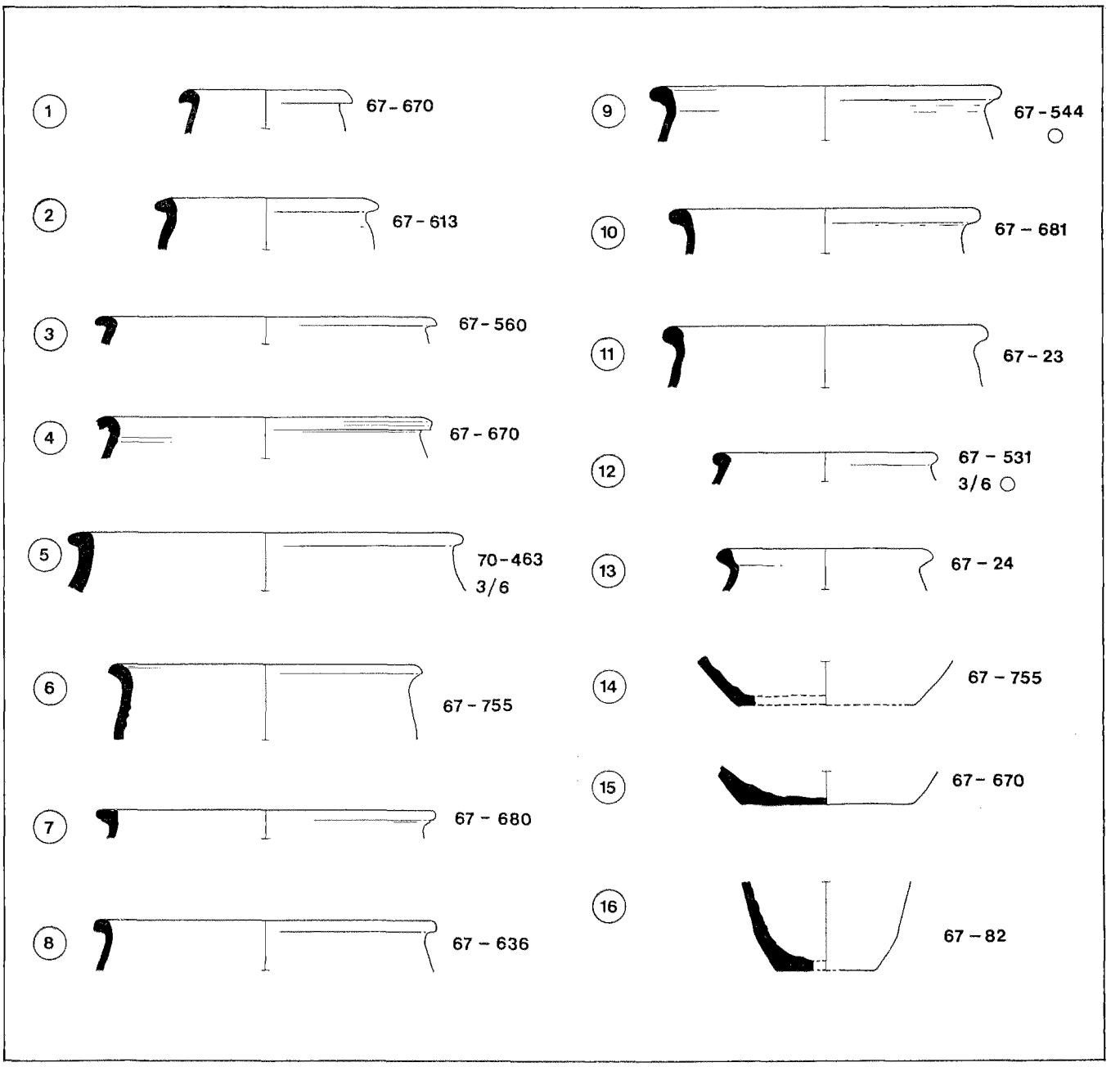


Fig. 32 Medemblik, pottery: Type W IX A.

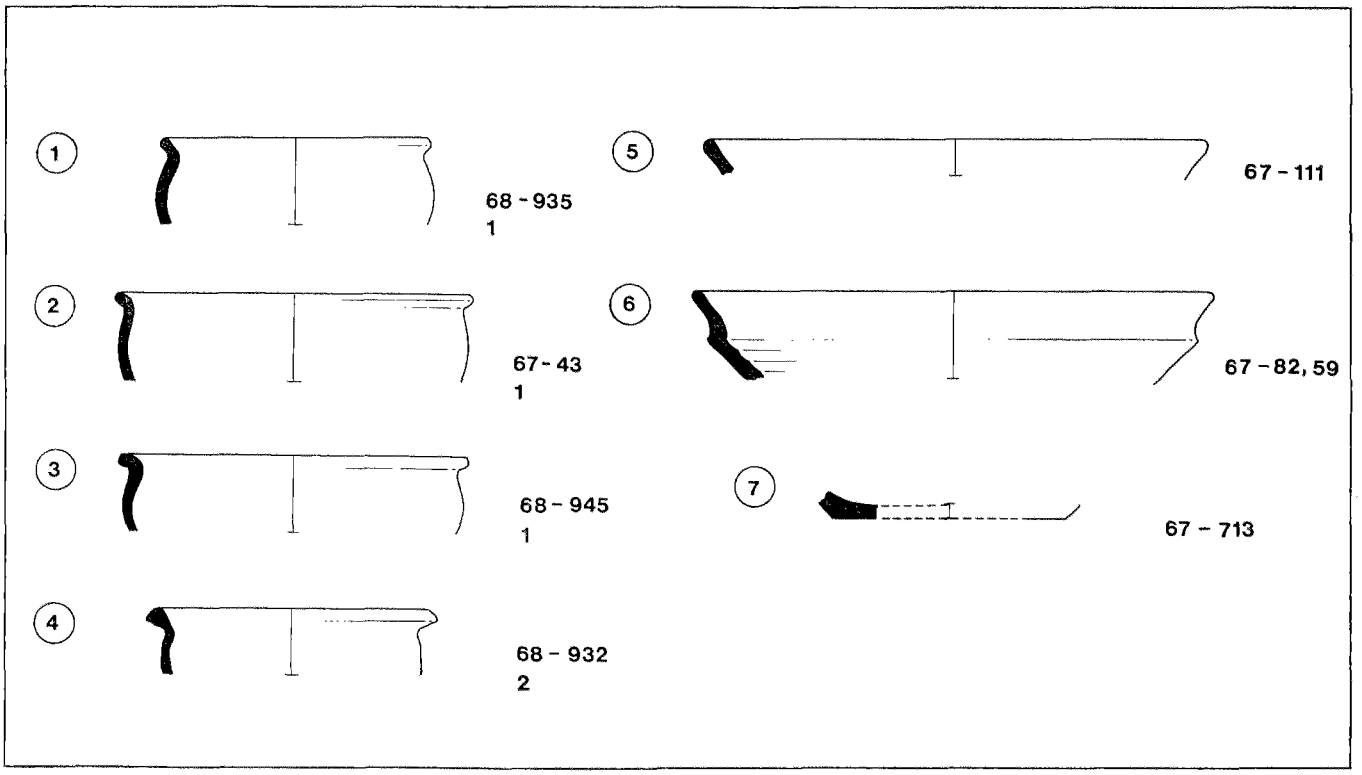
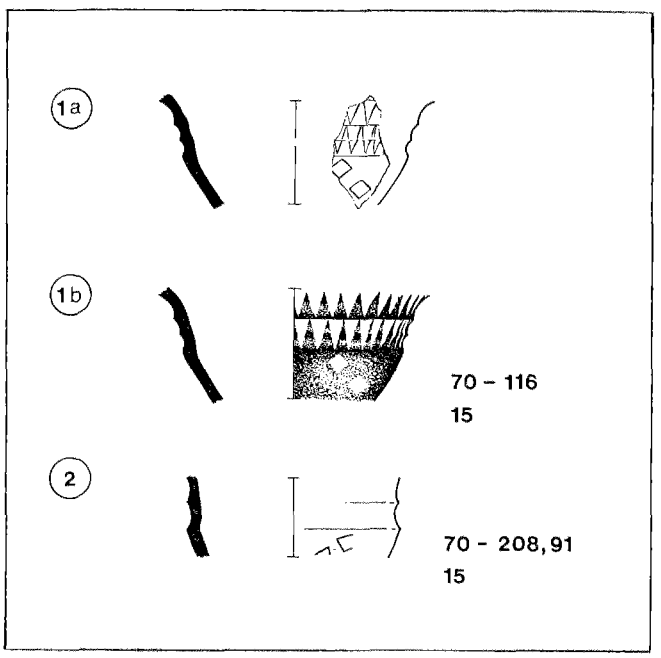


Fig. 33 Medemblik, pottery: Types W X B, nos. 5–6, W X D, nos. 1–4.

Fig. 34 Medemblik, pottery: Type W XI.



W X: *Shallow bowls* (fig. 33)
Only two types were found in Medemblik.
W X B: has a wide straight everted rim with a sharp shoulder carination and a slightly curved body. A flat base probably goes with it.
W X D: has a round body with a sharply everted rim. Base-fragments for this type could not be identified.
Fabric: W X D, 1; W X B, as with W IX, here fired rather hard, brown-grey; at fracture, orange colour.
W XI: *Small 'Tating' bowls* (fig. 34)
The fragments of two small bowls with corrugated body are of an unusual type. Both lack rim and base. As far as can be ascertained, the body is fairly wide up to the more vertical, corrugated zone, after which it continues more horizontally to an unknown rim. As far as reconstruction is possible, the first example was decorated with triangles of tin foil on the corrugated zone and a scantier tin foil decoration on the lower part of the bowl (pl. XIII:2).
Fabric: 15. Low-fired, very fine or fine temper (nos. 2 and 1, respectively), surface carefully polished, black lustre with a light-grey core.

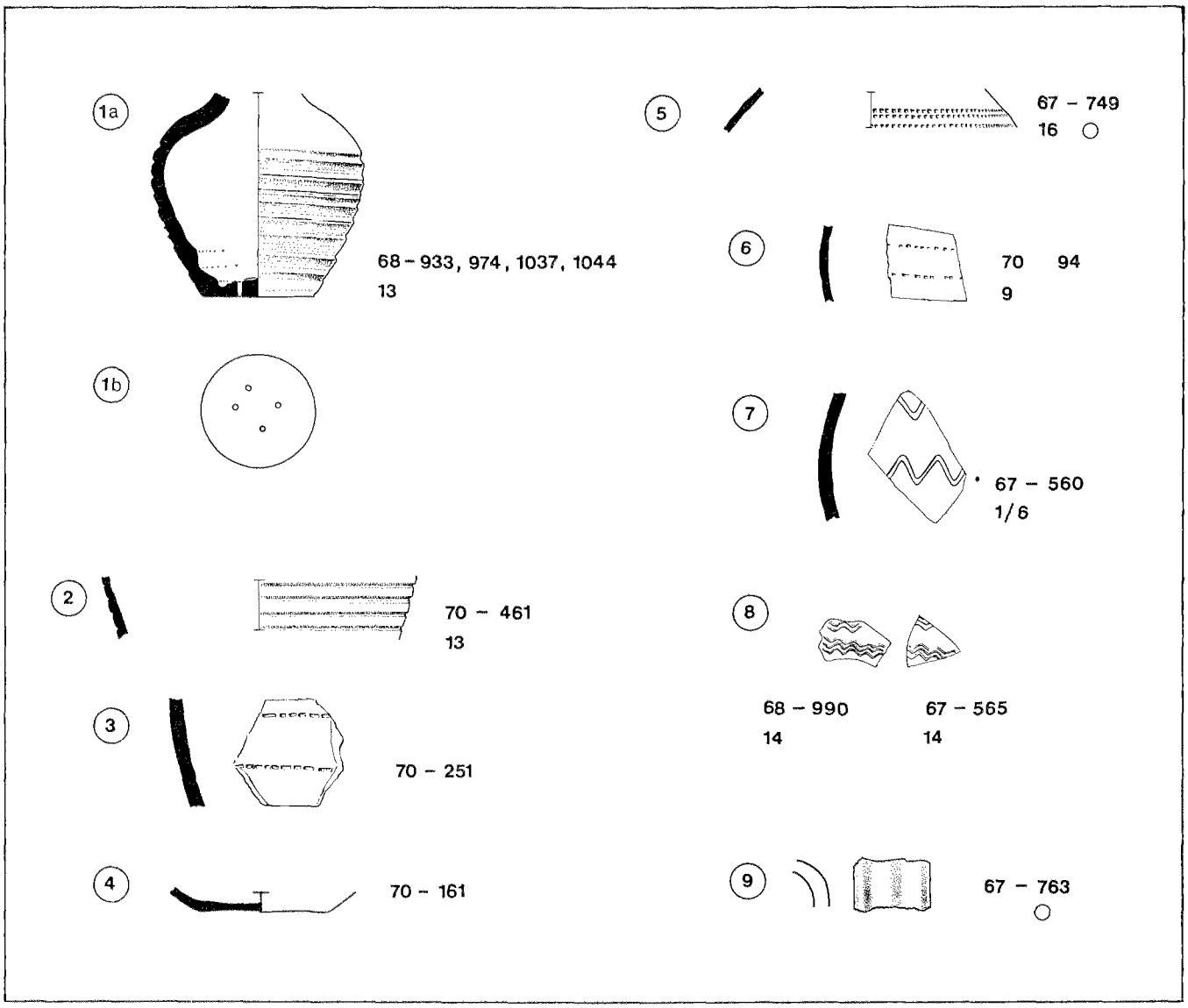


Fig. 35 Medemblik, pottery: unusual shapes, decorations and fabric.

Unusual shapes, decorations, and fabrics (fig. 35).
One pottery shape and several decorations and fabrics could not be classified under one of the above-mentioned groups.
Fig. 35 no. 1 shows a thick-walled bottle, thus suitable for liquids, but the flat base is perforated (pl. XIII:3). A function as sieve is unlikely because the sieve residue would be difficult to remove through the narrow neck. The quite steep body is corrugated and goes over an almost horizontal shoulder.
Fabric: 13. Fine tempered, rather low-fired, colour blue-grey, surface of shoulder polished; below the shoulder, rough to the touch.
Fig. 35, no. 2: Body fragment with deep grooves a regular distance apart.
Fabric: 14.
Fig. 35, nos. 3, 4. Fragments of a large pot and a level slightly lenticular base decorated with simple horizontal roulette decoration of flat rectangles of unequal length.
Fabric: there is some similarity to no. 13. Fairly hard-

fired, heavily, rather finely tempered. The pottery is very porous, shows quite a few tiny cavities, is layered at fracture. Despite the fact that the temper does not actually come through, the surface is rough to the touch. The colour is dark-grey to black, with a lighter core.
Fig. 35, no. 5. A body-sherd with a double-rowed square roulette decoration.
Fabric: heavily and unevenly tempered, low-fired, smooth-walled, dark-grey with a red-brown core.
Fig. 35, no. 6. A body-sherd having a simple roulette decoration of uneven squares and rectangles.
The fabric corresponds with fabric 6, but contains particles of mica.
Fig. 35, no. 7. Body-fragment of a large ovoid pot (possibly W IX) decorated with undulating lines.
Fabric: corresponds with fabric 6 but has heavier temper.
Fig. 35, no. 8. Two body fragments with multiple undulating lines, probably of a pot type W VI.
Fabric: 14.
Fig. 35, no. 9: Fragment of band-shaped handle of unknown form.
Fabric (*Kugeltopf*-like), low-fired, rather coarsely tempered, orange-red, at fracture grey.
Several sherds with unusal fabrics are fabrics that correspond with fabric 14, with a white core, on inside grey, but which are burnished and so have acquired a black lustrous surface.

POTTERY FINDS AND STRATIGRAPHY

The stratigraphy of the *kiekklei* deposits at Schuitenvoerderslaan enable us to distinguish two different groups in the find complex from the excavation there. The first comprises finds from the humic layer and older *kiekklei* (period I) and the second, finds from the burnt clay layer with daub (period II).
Pottery from period I:
Hand-made pottery: type H I A with every possible rim variation; type H I B with horizontal or almost horizontal flattened rims, decorated with finger impressions; fabrics 1, 3; H II (fig. 22 nos. 1 and 5).
Wheel-thrown pottery: types W III A and D, W IV C, and bottle model no. 6, W VII; fabrics: 1, 2, 6, 9 and *rauhwandig* Merovingian.
Number of rim-fragments: hand-made 41, wheel-thrown 8.
Pottery from period II:
Kugeltopf pottery with all rim types, types H I A, B; H III; fabrics 1, 1b, 2.
Wheel-thrown pottery: types W I with roulette decoration, W II A, W III A and B, W IX; fabrics 1, 2, 6, 9, 12, 14, 16 (!), and the rough surfaced fabric of W IX.
Number of rim-fragments: hand-made 90, wheel-thrown 16. Curiously, it appears that two rims thought to be older (W IX) also occur in period II. Fabric 14 is absent in period I. The number of sherds from periods I and II suitable for pottery grouping is too small to draw far-reaching conclusions as to their chronology. In view of the similarity in the pottery of both find groups, it seems unlikely that there was a great gap in time between periods I and II.

The stratigraphy of the section at Oude Haven presents a number of raised layers dated by early medieval sherds (fig. 13, h, i, j and other layers between the thick lines at 1 m and 0.50 m –NAP). The layers were only shaved off over an area of 8 m², so that there are only a few sherds that can be classified on the basis of the stratigraphy.
Layer k: 2 sherds of early medieval hand-made pottery H (I?), fabric 1.

Counts of the Pottery Excavated at Schuitenvoerderslaan, Medemblik, 1967-69

	total	H	W	W IX-X rough-walled	W I-IV, IX fabrics 1, 2	W III-IV fabrics 6, 9, 12	W III, IV, VI, X other fabrics
rim fragments	1122	906	216	12	75	106	23
% of total	100	80.75	19.25	1.06	6.68	9.44	2.04
% of W			100	5.55	34.72	49.07	10.64
all sherds	7019	5695	1324				
% of total	100	81.13	18.83				

Ratio: H:W=1:5.30
rim-fragments: body-fragments=1:5.25
rim-fragments: total number of sherds=1:6.25

Layer j: H I A, fabric 1b (fig. 17, no. 20), H I A, fabric 1; W II A with indented decoration (fig. 24, no. 11); fabric 13, polished; fabrics W 1, 2, 12.
Layer i: H I, fabric 1; W IX, fabrics 3/6; fabrics 1, 2, 6, 9, and 14; glass fragments of two funnel beakers.[72a]
Layer h: H I, fabric 1; W III A, fabrics 2, 9, 12.

DISCUSSION OF THE FINDS

Hand-made pottery

The diatom analysis of some Kugeltopf sherds

Several *Kugeltopf* sherds were examined for diatoms by M.J. Jansma (staff member of IPP). He has allowed us to report some of the results of his investigations in advance of the final publication. One sherd from each of the Carolingian levels of the excavation at Schuitenvoerderslaan was examined: one from the oldest Carolingian *kiekklei* (period I) and one from the daub layer (period II). Then one sherd from each of the different rim types (I A round, I B flattened horizontally and I C obliquely flattened) were examined. Finally, for reasons of comparison, *Kugeltopf* sherds from the Dorestad excavations, two with shell temper, were examined.

1 Medemblik (Mb)-1967-794 (period I). This sherd contained both broken and unbroken brackish-fresh diatoms, which are representative of a marine to brackish-fresh milieu.

2 Mb-1967-763 (period II): diatoms transported from a marine to brackish-fresh environment. The number of broken, brackish specimens is larger than in the previous sherd.

3 Mb-1968-1123 (twelfth- to thirteenth- century rim fragment): the diatom range is totally different from both previous sherds. It is predominantly fresh.

4 Mb-1967-763 (period II, rim type I C (oblique), fabric 1): similar to sherd 2.

5 Mb-1967-766 (period II, rim type I B (horizontal), fabric 1): similar to sherd 1.

6 Mb-1967-783 (period I, rim type I A, fabric 1): similar to sherd 2.

7 Dorestad (Ds)-1970-7 (fabric 1): no marine or brackish diatoms, few diatoms.

8 Ds-1970-8 (fabric 1): fresh, few diatoms.

9 Ds-1970-9 (fabric 2): The kinds of diatom that occur most often are fresh-brackish, few diatoms.

10 Ds-1970-10 (type I A, fabric 1): like 9.

11 Ds-1970-11 (type I A, fabric 2): same picture: fresh with some marine diatoms, almost all broken.

12 Ds-1970-12 (type I C, fabric 1): fresh to fresh-brackish, few diatoms.

Although it is risky to make statements on the basis of the few sherds that have been examined for diatoms, a number of provisional conclusions can, nevertheless, be drawn from this analysis. The similarity between the diatom spectra of the *Kugeltopf* sherds from Medemblik and the spectrum of the *kiekklei* from the section there is such that it can be assumed that the clay employed in making the *Kugeltopf* comes from the environs of Medemblik. The marine influence seen in the spectra, like that in the *kiekklei*, should be attributed to re-sedimentation of older marine deposits eroded elsewhere. The more recent twelfth- to thirteenth-century *Kugeltopf* rim is most unusual, also as regards diatoms. It cannot have been made of Carolingian *kiekklei*. As to the kind of diatoms in the sherds investigated, no clear distinction can be made between periods I and II. It does appear as though all the diatoms of sherds 1, 2, 4, 5 and 6 have come from elsewhere. Apparently, the clay with the diatoms was deposited in a dry milieu where diatoms cannot live.
In the diatom spectra of the sherds from Medemblik and Dorestad, a clear difference is evident. The Dorestad sherds examined cannot be made of Westfrisian clay. They have far fewer diatoms, which are markedly fresh. Curiously, this also applies to the sherds tempered with shell. They contain only a few marine diatoms. It appears that the diatom spectra of the sherds with fabric 2 (*blasige Oberfläche*, or shell temper) show no difference from those of the other fabrics of Medemblik or Dorestad. We may conclude that the general opinion that early medieval hand-made pottery was often produced locally appears to be tenable for Medemblik *Kugeltopf* pottery.

H I *Kugeltopf*

No flat bases of hand-made pottery have been found in Medemblik, so that we can assume that almost all the sherds of this pottery come from *Kugeltöpfe*. Because the flat bases of ovoid pots occur together with *Kugeltöpfe* elsewhere and only appear to have been superseded towards the end of the eighth century and later,[73] it is possible that the Medemblik *Kugeltopf* principally represent an advanced stage in the development of this pottery, to be dated earlier than elsewhere. An approximate late dating is substantiated by the occurrence of more or less profiled

72a See further p. 96.
73 Hübener 1959, 90.

rim shapes and the rather well-fired fabric, an early dating by the occurrence of a few rim-fragments with a fairly steep profile, a sharp outer edge, or upstanding coarse temper and low-fired, that are reminiscent of early *Kugeltopf*. The fragment with slightly everted rim and the stamped decoration on the shoulder (fig. 16, no. 9) can, for instance, be compared with a rim of Feddersen Wierde, dated in the eighth century.[74]

The most current type of pot is a *c.* 25 cm high, undecorated globular pot with a smoothly everted, somewhat thickened, rounded rim (fig. 17). Rims flattened horizontally or obliquely occur far less often. In Hessens these rims appear in settlement horizon 4, and are common in 3. In any case, they can be dated as early as the ninth century,[75] although they are common in the tenth century.[76] The limited number of rims of this type at Medemblik, and their appearance in pottery with vanished temper (*blasige Oberfläche*) also suggests a ninth-century dating. In general the Medemblik rims of type I B/C are still not as modelled as the more recent profiled *Kugeltopf* rims, but have been finished off simply. The rims fig. 19, nos. 44, 45, and fig. 20 have a more advanced profiling. With one exception, they all come from period II.

Decoration rarely occurs on *Kugeltopf*. Usually they consist of stamped grill patterns of various kinds, dated especially to the end of the eighth and the beginning of the ninth,[77] although they also occur in the tenth century.[78] Besides, there is a decoration that was probably made by finger impressions. Waller found this *mandelkernformige* (almond-shaped) decoration always present in a row at the widest girth circumference of the pot and dated it *c.* 700.[79] At Medemblik it occurs at most in groups of three just under the rim, especially with flattened rims, among them, several with vanished temper (fig. 19, no. 35). Hübener's opinion that this type of decoration is a later development and should be dated in the ninth century is thus substantiated.[80]

Fabric 2 (shell temper, or *blasige Oberfläche*) seldom occurs in Medemblik, and then never with shell temper but always with a porous fabric having numerous cavities visible on the surface. This fabric that was present both in periods I and II usually occurs in pots with flattened rims, which corresponds with findings elsewhere,[81] like the combination with almond-shaped decoration.[82] The Medemblik sherds with this fabric, however, also provide a number of new viewpoints. It is generally thought that shell was the original temper material of this fabric and that the temper had disappeared leaving cavities behind.[83] In Medemblik they were classified as fabric 2 to conform with this theory. Various sherds, however, have been found, including a complete rim, in which the temper has not entirely disappeared and where in places a temper can be identified as consisting of calcified bone and ash, probably burnt bone (pl. X: 1 and 4). The sherds with *blasige Oberfläche* therefore need not always have been tempered with shell, although the shape of the cavities, also in some Medemblik sherds, sometimes indicates this. The observation that bone filler occurs as an independent temper, also weathering or burning out probably more easily than shell resulting in a cavity-pocked surface, makes it desirable to distinguish this ceramic with *blasige Oberfläche* from pottery with shell filler, as Hübener has done on other grounds.[84] Schindler[85] and Steuer[86] would place the origin of the ceramic with shell temper, or with a cavity-pocked surface, in the coastal area of the Low Countries. It can be assumed on the basis of the brackish and marine diatoms in the sherds examined from Dorestad and Medemblik that these also originated in the coastal area. Too much stress should not be placed, however, on the proximity of the sea because the allochtonous brackish and marine diatoms involved were deposited in a fresh milieu. It is not altogether unthinkable that such diatoms can have come with the shell temper.[87] There are not enough definite indications, however, that the production centre must be sought in the coastal area of the Low Countries. Steuer believed that since the percentage of this pottery in north German excavation finds increased toward the Netherlands border, this was an argument for its origin in the Low Countries coastal area.[88] Steuer's argumentation, how-

74 Schmid 1969, *Abb.* 4: 2 and 142.
75 Haarnagel 1959, 49 and *Tafel* II: 10, 12, *Tafel* III.
76 Hübener 1959, 91; Haarnagel 1959, 51; Schmid 1970, 72.
77 Schmid 1970, 69.
78 Haarnagel 1959, 53.
79 Waller 1936, 233.
80 Hübener 1959, 103.
81 Steuer 1973, 27; Hübener 1959, 24; Schindler 1959, 68; Hübener 1953, 131.
82 Schmid 1972, *Abb.* 6:2.
83 Steuer 1973, 26; Schindler 1959, 70; Hübener (1959, 24) thought this was due to organic temper.
84 Hübener 1959, 24–5.
85 Schindler 1959, 71.
86 Steuer 1973, 28.
87 Oral communication by Mr M.J. Jansma (IPP).
88 Steuer 1973, *Abb.* 5 and p. 25.

ever, is weakened by the fact that the share of this ceramic in the Medemblik sherds is small, *i.e.*, *c.* twenty-five rim-sherds with *blasige Oberfläche*, eight of which have visible bone temper, and not a single one of which has visible shell temper – in the total of 900 rim-sherds, this is a fraction of the share in Haithabu. As elsewhere, we maintain that the dating of the ceramic with the vanished temper is at the end of the eight and especially the ninth century.[89]

H II *Pouch-shaped or steep-walled pot*

The wide mouth of the rim-sherds grouped under H II is a striking feature. The often somewhat irregular round rims are short and stand fairly upright. At times they are clearly defined at the shoulder. The fabric is soft, coarse tempered and yet not really rough because of the slight clay slip on the surface. By virtue of these characteristics, these fragments represent the difficult to define seventh- to eighth-century group of hand-made pottery of the North Sea coastal area and immediate hinterland from which the *Kugeltopf* developed.

The small bag-shaped pot (fig. 21, no. 1) with its rough shape and unsteady base is a good example of this group. Steep-walled shapes, like fig. 21, no. 2, occur frequently and can definitely be dated in the eighth century.[90] The black polished body-fragment with round stamped decoration is in fabric, decoration, and possibly – the fragment is small – also in shape comparable with a rim-fragment from Texel,[91] which is associated with Merovingian wheel-thrown pottery. The wide-mouthed pots with clearly defined rims are comparable with some from Warendorf,[92] Haithabu,[93] and the environs of Oldenburg.[94]

H III *Crucible*

It cannot be determined whether the black polished shallow bowl once had a handle or not. Parallels for this fragment from period II are not known to us.

Wheel-thrown pottery

Following the standard reference works,[95] Medemblik wheel-thrown pottery should be classified in: rough-surfaced (*rauhwandige*) Mayen ware, Badorf ware, (late) Mayen ware, and a miscellaneous group with various fabrics, particularly reduction-fired. For some time now, the names of these pottery groups have not corresponded with their production centres. Thus it appears that Badorf pottery was representative for all pottery centres in the Vorgebirge[96] and that it was also made elsewhere.[97] During a visit to Professor W. Janssen in the Rheinisches Landesmuseum at Bonn, we were shown kiln finds from the Vorgebirge and Mayen, which were comparable as to shape and technique. This was especially true of type W III in fabrics 6, 9, 12. Thus it is evident that macroscopic observations of the pottery alone do not suffice to determine the origin,[98] and they are therefore increasingly combined with a mineralogical analysis,[99] the possibilities of which are also limited, however. Hinz makes plausible objections to a differentiation according to mineralogical components for the broad zone to the north of the maximum extent of ice during the Riss Glaciation, *i.e.*, almost the whole of the North European Plain and Great Britain.[100] The determination of the origin of pottery by means of tempering material when this is principally composed of moraine deposits, must be interpreted in this light. For the time being, we will proceed from the typological grouping.

W I *Reliefband amphorae*

A reliefband amphora with a complete profile was found in Medemblik (fig. 23). It is over 43 cm high and more than 33 cm wide. The wall thickness lies between 0.5 cm and 1.5 cm at the base. At the rim and the shoulder there were probably three handles. Nine applied strips placed in groups of three between the three handles ran down to

89 Hübener 1959, 98; Steuer 1973, 26 and 28.

90 Schmid 1970, grave 32, dated in the eighth century; Van Es 1969a, fig. 3, found together with Merovingian wheel-thrown pottery.

91 Van Es 1969a, fig. 2: 28.

92 Winkelmann 1954, *Abb.* 9: 4–5 dated in the seventh and eighth centuries.

93 Raddatz 1964, *Abb.* 6: 13.

94 Steffens 1966, *Abb.* 3: 17: dating seventh and eighth centuries.

95 *E.g.*: Hinz 1965, 63–5; Lobbedey, 1968 65–72.

96 Janssen 1970, 224.

97 *E.g.*: Böhner/Tholen/Von Uslar/Frechen 1950, 208; Stamm 1962, 140-1.

98 Weidemann's opinion (Weidemann 1964, 6) that the various centres of production are also macroscopically perceptible in firing-technique and surface treatment seems, to the author, optimistic.

99 For a survey of a similar investigation see Weidemann 1964, 5.

100 Hinz 1965, 266.

join a horizontal applied strip just above the greatest girth of the pot. The strips are decorated with hasty, trailing finger impressions a short distances apart. The rim type I A, not everted here, has a parallel in a kiln find at Brühl-Eckdorf.[101] Fabric 1 has a scant addition of coarser quartz particles. The other reliefband sherds in Medemblik were also mostly decorated with finger impressions. Besides, there were several sherds that had a double-rowed rouletted decoration, two of which from period II.

There is a trend to associate various datings or production sites with the various kinds of decoration.[102] The above-mentioned kiln find at Brühl-Eckdorf furnished reliefband sherds both with and without ornamentation, such as finger impressions, rouletting, and at least three different round stamps.[103] The different fabrics from this kiln, both yellowish and grey and blue-grey from reduction firing,[104] show that one should be sceptical about associating separate production centres with such differences.[105] Reliefband amphorae were, in any case, produced in large numbers in the pottery workshops of the Vorgebirge.[106] Their function as storage jars for wine export may have contributed to the fact that they were distributed over a very extensive area.[107] The dating of this pottery begins in the middle of the ninth century and certainly continues in the tenth century.[108] One reliefband amphora from Xanten can even be dated in 1081/83.[109]

W II *Large Badorf pot*

In Medemblik no specimens were found of the 'older' Badorf pottery with its tall amphorae and bottles, which Tischler differentiated and dated to *c.* 780.[110] The pots of type W II have the shapes typical of 'late' Badorf pottery. A W II B pot found near Krinkberg (Kr. Steinburg) was dated by coins from the last quarter of the eighth century.[111] The discovery of a large number of Badorf pots together with Pingsdorf pots and others resembling Badorf pots can supply a terminal dating. This find made in the St Walburga church at Meschede must be dated to before 893/958.[112] The rouletted decoration becomes less important as a dating factor and identifying feature since it also occurs on later pottery and pottery made elsewhere.[113] Present research would date Badorf pottery to the end of the eighth century and in the ninth century.[114] All types are present in the Walberberg kiln find in the Rheinisches Landesmuseum at Bonn.

Comparable rim-fragments may be found among the few published finds of Badorf pottery, *e.g.*, Haithabu W II B-C,[115] Dorestad W II A–B[116] and C.[117] True similarity is only found between the fragment from Haithabu table 5:98 and Medemblik fig. 24: 4. The fragment with the indented decoration (fig. 24: 11) comes from the oldest Carolingian layer at Oude Haven. A comparable sherd is known from Morken (Kr. Bergheim).[118] On the basis of the typical Badorf fabrics 1 and 2, we suggest the pottery centres of the Vorgebirge between Cologne and Bonn in particular as the place of origin.

W III *Medium-sized globular pot with lenticular base*

This group comprises almost half of the wheel-thrown pottery at Medemblik. Although fairly uniform, there is a great variety of fabrics: 1, 2, 3, 4, 6, 8, 9, 12. This type has also been found in large numbers elsewhere.[119] Well-dated finds are: Leer (Kr. Steinfurt), by coins of 781–800,[120] Xanten, St Viktor before 863,[121] possibly Trier, Altbachtal coin 814–840.[122] It occurs as early as the eighth century in Frankish cemeteries.[123] The stratigraphy of the finds at Frankfurt place the pottery there between 810–820 and the end of the ninth–beginning of the tenth centuries.[124] A dating between the second half of the eighth and the beginning of the tenth centuries is not unlikely.[125]

101 Janssen 1970, *Abb.* 5:1.
102 About this Hübener 1959, 114.
103 Janssen 1970, *Abb.* 5:6.
104 Janssen 1970, 232, 234.
105 Hinz 1965, 267-8.
106 Böhner 1955–56, 379; Janssen 1970, 232.
107 Weidemann 1964, 140 and *Karte* 8.
108 Hübener 1959, 113–4.
109 Bader 1962, 204.
110 Tischler 1952, 200.
111 Weidemann 1964, 92–3.
112 Janssen 1973, 595–6.
113 Lobbedey 1968, 77–80; Steinle/Tauber 1974.
114 Tischler 1944–50, 75; Böhner/Tholen/Von Uslar/Frechen 1950, 214; Hübener 1959, 110–2; Janssen 1973, 193–7.
115 Hübener 1959, *Tafel* 5: 92–101.
116 Van Es 1969b, fig. 18.
117 Weidemann 1964, *Tafel* 10:2.
118 Hinz 1969, *Tafel* 27:19.
119 Survey of the literature, see Lobbedey 1968, 69–71.
120 Hübener 1959, 118.
121 Bader 1962, 192–8.
122 Hussong 1936, 84.
123 Steeger 1948, 264.
124 Stamm 1962, 154.
125 Lobbedey 1968, 70.

Good parallels for Medemblik sherds are: Trier Altbachtal, *Taf.* 4: 9[126] = Mb. fig. 25: 20; Trier, *Abb.* 60: 8[127] = Mb. fig. 25: 1; Brühl-Eckdorf, *Abb.* 5: 8[128] = Mb. fig. 26: 27; Frankfurt 242, 258, 254, 252, 251[129] = Mb. 23, 15, 34, 27, 30, respectively. Mineralogical analysis has shown that an important part of this pottery comes from Mayen.[130] However, the kiln finds of Walberberg and Eckdorf also produced this type, with, moreover, very hard fabrics.[131] All types present in Medemblik (W III A, B, D) occur in periods I and II.

W IV *Miniature pot*

Small pots are less well represented in the available literature. Naturally, all Medemblik types appear in Dorestad.[132] Some good parallels are a small pot from Birka grave 457, dated by a coin from the end of the eighth century,[133] comparable with Medemblik fig. 27: 13, including wheelmarks, and a pot from a Walberberg kiln, dated *c.* 800–875,[134] with Medemblik fig. 27: 3. Apart from the rim, type W IV presents a wide variety. Folded and especially broad everted rims predominate, and occur in periods I-II and I, respectively. Angular profiles and cover grooves, only in period II, are more rare. These observations also apply to types W II and III. The body shape varies from bulbous to very steep. Fig. 27: 13 must have even been biconical. Some rim-fragments have a short neck.

Atypical is fig. 27: 12, with a club rim, and very thick wall. The last also applies to fig. 27: 16, with a temper containing mica.

The usual fabrics are 1 and 2, the typical Badorf fabric. For the dating we call attention to the above-mentioned parallels, which are dated in the ninth century,[135] and to the customary dating of Badorf pottery in the second half of the eighth and the ninth century.

W V *Medium-sized pot with flat base*

The two fragments found at Medemblik come from Oude Haven. The rim was found in the most recent, still surviving Carolingian layer. On illustrations, the pottery is difficult to distinguish from W VI, to which it is related in shape and fabric.

W VI *Large to medium-sized pot with flat base*

Pots of this type with characteristic fabric 14 belong to a group which is well represented in the Netherlands. In Dorestad this group comprises 40% of the pottery excavated up to 1954.[136] Type W VI corresponds with the fragments shown by Hübener. The often somewhat thickened rims are rounded, the bases are flat. Complete specimens are known from Godlinze,[137] Birka,[138] and Janum (Fr.).[139] The Godlinze example is discussed in detail by Hübener and dated in the eighth century.[140] Medemblik fragment fig. 29: 4, with identical band-shaped handle and rouletted grill pattern as decoration corresponds with the Birka and Janum pots. We may assume that the Medemblik fragment also comes from a pot with a trefoil spout. The very wide pot, Medemblik fig. 29: 3, with a neck diameter of 20 cm and a fairly horizontal everted rim has its parallel in Dorestad.[141]

The distribution of this pottery with fabric 14 has its focal point in the Low Countries.[142] As also may be seen from the recent Dorestad excavations, the excavation on the island of Texel (ROB), the IPP excavations in the Kootwijkerzand 40 km NE of Dorestad, and also abroad, *e.g.*, the town centre investigation at Ribe on the Danish coast in the north, and Waulsort in Belgium in the south, it is an integral part of early medieval pottery.[143] The origin of the material cannot be determined; in any case, according to the mineralogical analysis, it does not come from the Rhineland.[144] The fabric corresponds with that of the

126 Hussong 1936.
127 Hussong/Cüppers 1972.
128 Janssen 1970.
129 Stamm 1962.
130 Stamm 1962, 151.
131 See above p.
132 Van Es 1969b, fig. 20.
133 Arbman 1940, I, 129, grave 457 and II, *Tafel* 223:3.
134 Böhner 1955–6, *Abb.* 4.
135 Arbman 1940, 129; Böhner 1955–6, 379.
136 Hübener 1954, 179.
137 Van Giffen 1919–20, *plaat* III: 1 and V: 1.
138 Arbman 1940, II, 222: 1 a, b.
139 Boeles 1951, 432.
140 Hübener 1959, 84–5.
141 Hübener 1954, 180, *Abb.* 1: 1.
142 See distribution map in Weidemann 1964, *Karte* 11, 12, in which other pottery types of material which he calls 'East-Anglian' also are incorporated. Weidemann 1964, 132 calls 80% of the 8th-century pottery from Dorestad and 25% of that from Rijnsburg, and even 20% of the 9th-century pottery from Antwerp 'East-Anglian'.
143 Mr M. Bencard showed us sherds which were comparable to the Medemblik W VI fragments. See also Bencard 1973, 41. Sherd of Waulsort published in Arbman 1937, *Tafel* 18: 2.
144 Hübener 1954, 184.

pottery which Hübener describes as group I of Dorestad pottery.[145] Weidemann calls the same material 'East Anglian' and proposes that the English origin of this fabric is confirmed by kiln finds from Thetford, St Niots, and Stamford.[146] Dunning associated the beginning of production in these pottery-making centres with the finds of Thetford ware together with sherds of Badorf and painted Rhineland pottery.[147] At that time he dated it in the late ninth century at the earliest, thus after the Carolingian period. Although Weidemann touches on the possibility that East Anglian pottery branches on the continent made products using the East Anglian formula,[148] he assumes that these products were made in East Anglia since the first half of the seventh century.[149] He presents the three post-Carolingian English pottery-making centres on his distribution maps as the production centres for pre-Carolingian and Carolingian pottery of his 'Stufe' V and VI (late seventh–late ninth centuries).[150] The East Anglian origin is therefore quite disputable, also because not a single sherd of this pottery from England is known.

We can connect the date with that of the Godlinze pot of the eighth century.[151] Form elements such as the flat base, the trefoil spout, and the reduction-fired fabric are also reminiscent of the Merovingian period. In Medemblik, however, only two sherds with fabric 14 have been found in period II.

W VII *Bulbous pot with high neck*

The first fragment in fig. 30 is from a narrowmouthed pot, a kind of bottle shape, with high rim clearly defined from the body. It has been rather arbitrarily classified here. The fragment also shows similarity to the W II rim in fig. 24: 6 and has the soft Badorf fabric. It originates in period I.

The fragment decorated with the indentations shows the gently biconical form which characterize the last phase of the Merovingian biconical pot. The very lightly reduced fabric is also a characteristic of the transition to the Carolingian pottery. The dating in the eighth century is therefore the most probable. The vertically indented decoration at first glance reminds one of the *Buckelurn* and is rarely found in post-Roman wheelthrown pottery (*c.f.* the Badorf spouted pitcher, fig. 24. 11). Somewhat comparable finds are known from Monster (prov. South Holland) regarding as well the bulbous shape and the light fabric as the indentations.[151a]

W VIII *Tating jug*

This pottery group has received considerable attention in the literature.[152] The dating of it to the ninth century,[153] particularly in the first half,[154] is usually accepted[155] but its origin is debated. Mention has been successively made of Birka, Dorestad, Friesland, the north Rhineland area, the Alemanic-Frankish region, north France, or unknown place of origin.[156] Mineralogical analysis has shown that it does not in any case come from Rhineland potteries.[157] The pottery is principally found in the North Sea area and Scandinavia.[158] It has also been noted in England,[159] and recently Cologne and Westfalen were added to the area of distribution.[160] The special shape and decoration with a cross is associated with a function in church liturgy, where the jugs served as a substitute for metal vessels.[161]

Besides the spout found at Medemblik, other sherds of a similar fabric were also found. They were all badly weathered, so that the surface treatment, to say nothing of the possible tin-foil decoration, could not be seen. The fairly short sharp-cut spout with incised connection

145 Hübener 1954, 179 and 184.
146 Weidemann 1964, 11.
147 Dunning 1959, 54.
148 Weidemann 1964, 132.
149 Weidemann 1964, 131.
150 Weidemann 1964, *Karte* 11, 12.
151 Hübener 1959, 84–5.
151a Braat 1956, *afb.* 21: IX and 22: 9 and 12.
152 Jankuhn 1937, 288–92; Selling 1955, 44–59; for survey and summary especially: Hübener 1959, 133–8; add to this Lobbedey 1968, 81 and Winkelmann 1972.
153 Hübener 1959, 136.
154 Selling 1955, 57, 59.
155 Only in Paderborn were they able to be dated in the last quarter of the eighth century (Winkelmann 1972, 46).
156 See the literature mentioned in note 152.
157 Hübener 1959, 135.
158 Map of distribution in Winkelmann 1972, 41.
159 Dunning 1959, 52. The Old Windsor find has the same surface treatment and method of decoration – although the tin foil was removed – as the Tating pottery, but the shape has little in common with the Tating jug. The find was dated in the ninth-tenth centuries on stratigraphical grounds (Wilson/Hurst 1958, 184).
160 Winkelmann 1972, 44.
161 Selling 1955, 59; Winkelmann 1972, 45.

resembles a specimen from Dorestad.[162] The upper edge is cut off straight.

W IX *Steep-walled pot*

This group consists of very wide pots with steep, at times somewhat rounded walls. The shape of the pot cannot be clearly established because we only have small fragments on hand. There is even a possibility that some fragments come from shallow bowls. Medemblik fig. 32: 7 is, for instance, comparable to Trier type 7a.[163] The fabric is heavily tempered with fine to slightly coarser (0.5–1 mm) filler, often with equal-sized particles. The temper appears on the surface and gives the pottery a rough exterior (pl. XIII: 1). The ware varies from soft to hard. The technique is that of the rough-surfaced Frankish pottery in the literature,[164] and at times approaches fabrics 3 and 4. The mineralogical examination indicates Mayen especially as place of origin, but also Trier, Dieburg, and unknown *niederrheinische* production centres.[165] Medemblik fig. 32: 5, 12, and 13 do not quite belong to this group because of their shape, and the first two also because of scantier tempering. Good parallels for the other rim-fragments may be found in Wageningen[166] for Mb. fig. 32: 2, 3, and 9; Frankfurt[167] for Mb. fig. 32: 3, 4; Krefeld-Gellep[168] for Mb. fig. 32: 2; Bargen (Kr. Suisheim)[169] for Mb. fig. 32: 8, and 11; Trier[170] for Mb. fig. 32: 6; Wageningen[171] for Mb. fig. 32: 8; and Walsum[172] for Mb. fig. 32: 11, 3, 1. In Wageningen this pottery, known to us principally from cemeteries, was dated to the seventh and eighth centuries.[173] Comparable finds from Krefeld-Gellep are dated in the end of the eighth century,[174] those from Walsum between *c.* 725 and the second half of the eighth century.[175] The settlement finds from Frankfurt illustrate the development of Merovingian, rough-surfaced pottery, in which folded-over and rolled-up rims occur are maintained till in the ninth century.[176] These folded-over and rolled-up rims are characteristic of Medemblik type W X. In Frankfurt the find comparable to Mb. fig. 32: 8 has been placed in the Carolingian period.[177] The Frankfurt finds have added importance because settlement finds from the early Middle Ages are so scarce. The rough-surfaced ceramics continue there much longer than in the cemeteries, which usually are not later than the eighth century. Merovingian-Carolingian rough-surfaced pottery occurs in Frankfurt from the end of the sixth century, reaches a peak close to the ninth century, and then rapidly disappears.[178] We can therefore place the Medemblik group in the eighth century without hesitation. The fragment fig. 32: 12 even comes from period II.

W X *Shallow bowls*

This group can be divided into two by fabric and shape: W X B, rough-surfaced, flaring shallow bowls with carination; W X D, convex-sided bowls with folded-over or sharply everted rim, and fabrics 1, 2.

In fabric, W X B is related to W IX. Comparable finds have been made in the Krefeld-Gellep cemetery, dated to the seventh century,[179] Cologne-Müngersdorf, dated *c.* 700,[180] Gladbach (Kr. Neuwied), provisionally dated in the sixth-ninth centuries with emphasis on the seventh and eighth centuries,[181] Walsum, dated by coin *c.* 725,[182] and Junkerdorf near Cologne.[183] What applies to settlement finds in Frankfurt for pots of the W IX type can perhaps also be true for W X with the same fabric. The grave gifts probably do not furnish the terminal dating. The appearance of these shallow bowls together with globular pots with lenticular bases (W III)[184] in the Gladbach settlement do not exclude a Carolingian dating.

In fabric the W IX D type bowls are connected to Badorf pottery (fabrics 1, 2). Comparable material was difficult to find in the publications. For the time being, we main-

162 Van Es 1969b, fig. 23.
163 Hussong/Cüppers 1972, *Tafel* 21:7a.
164 Böhner 1958, 49.
165 J. Frechen in: Böhner 1958, 63-8, in: Hübener 1969, 145–6, in: Stamm 1962, 161–2, and in: La Baume 1967, 70–3.
166 Van Es 1964, 265, fig. 89: 6, 10, and 3.
167 Stamm 1962, *Tafel* 12: 155.
168 Pirling 1966, *Tafel* 13: 158.
169 Hübener 1969, *Tafel* 6: 12 and 8.
170 Hussong/Cüppers 1972, *Tafel* 22: 10c.
171 Holwerda 1928, 98, *pl.* 18: 58.
172 Stampfuss 1939, *Abb.* 25: 1, 2, and 4 resp.
173 Van Es 1964, 268-9.
174 Pirling 1966, 142.
175 Stampfuss 1939, 52.
176 Stamm 1962, 125.
177 See note 174.
178 Stamm 1962, 127.
179 Pirling, *Tafel* 13: 169 and p. 145.
180 Fremersdorf 1955, *Tafel* 6 grave 21, and p. 102.
181 Hussong 1938, *Tafel* 34: 6 and p. 185–6.
182 Stampfuss 1939, *Tafel* 15: 2 and p. 56.
183 La Baume 1967, *Tafel* 8, grave 142 and p. 66–7.
184 Hussong 1938, *Tafel* 34: 12, 13, 16, 17, 18.

tain a dating between the second half of the eighth and the ninth centuries, as for the other Badorf pottery.

W XI *Small 'Tating' bowl*
There are no known parallels for the two small bowls with fabric 15 ('Tating') and decorated with tin foil (pl. XIII:2). The design of the tin-foil decoration, triangles in horizontal rows and scantier decoration on the lower part, as well as the fabric, unmistakably indicate a relationship to the Tating jug. For the dating and origin, we therefore refer to type W VIII and assume that the dating is in the end of the eighth century and the first half of the ninth.

Unusual shapes, decorations, fabrics
For the remarkable bottle with the perforated base, fig. 35: 1a, b, we have no parallel. Because the neck is missing, we can only compare the body, which has no particular features.[185] The corrugated lower body extending into the polished shoulder is more notable. On the basis of fabric 13 and the flat heavy base, it is perhaps related to type W V pottery. We cannot say more than that.
The fabric of sherd, fig. 35: 2 greatly resembles that of fabric 14, though it is somewhat more rough-surfaced, has deep grooves, and presents no other points of reference. It comes from the Carolingian layer i at Oude Haven. The fragments fig. 35: 3 and 4 come from later layers at Oude Haven. On further examination, the age did not appear to be Carolingian. Comparable pottery, as to fabric, shape, and decoration, is known from Büderich, where it is dated to the late tenth and early eleventh centuries.[186]
The fragment fig. 35: 5 with its fairly horizontal rim, straight shoulder, small rouletted decoration, and fabric 15, is reminiscent of Merovingian biconical pots; decoration, profile, and fabric of fig. 35: 7 to rough-surfaced, barrel-shaped pots (W IX); those of fig. 35: 8 to type W VI.

GLASS

The fragments of two funnel-shaped beakers – in view of the later development of design, this term is better than bell-shaped tumbler – were found at Oude Haven in Carolingian layer i, together with the somewhat unusual fragment W IX fig. 32: 5, and body sherds with fabrics 1, 2, 6, 9, and 13. The body sherds with fabric 2 were *c.* 1 cm thick and may have come from a reliefband amphora. Comparable finds of this glass type have been made at Junkersdorf near Cologne, *i.e.*, two undecorated and one with swags in coloured glass thread, both from the final cemetery phase of the seventh century,[187] Cologne (find site uncertain) with interlacing swags, [188] especially Pingjum (Friesland) terp find, a specimen with four adjoining swags,[189] Putten grave find with colourless adjoining swags.[190] The undecorated Medemblik beaker is also comparable to the two mould-blown beakers from the cemetery near Katwijk.[191] The twisted, slightly ribbed wall of the first example, in particular, corresponds with that of Medemblik. Furthermore, an identical example is known from the Rhenen cemetery.[192]
These funnel-shaped beakers were probably made in the Rhineland and seem to be a typical Dutch shape in the eighth century.[193] A later development of this glass type is seen in the funnel beakers found in Birka, with test-tube-like base.[194] They include some with and others without swags.[195] There are even fragments with glass-thread spirals under the rim,[196] like the decorated Medemblik fragment, the base shape of which is unknown. Base-fragments, rims, also with yellow spiral threads, and body fragments with swags are known from Helgö as well.[197] Arbman dates the Birka glasses to in the ninth-tenth centuries.[198] In view of the other finds from layer h, we prefer a ninth rather than an eighth-century dating for the Medemblik glass fragments.

185 The bulbous bottle-type with flat base, high-positioned horizontal shoulder is not uncommon. See *e.g.* Hübener 1969, *Tafel* 169: 2, 4 and 166: 2 and Evison 1974, fig. 3d.
186 Janssen/Knörzer 1971, 90-2.
187 La Baume 1967, *Tafel* 46: 7, 8 and 47: 1 and p. 82–3.
188 Arbman 1937, *Tafel* 7: 1.
189 Stein 1967, *Tafel* 70: 1; Boeles 1951, fig. 49: 2; Arbman 1937, *Tafel* 7:4.
190 Stein 1967, *Tafel* 70:4.
191 Stein 1967, *Tafel* 68: 8, 16.
192 Nijmegen Rijksmuseum Kam, no. 275.
193 Stein 1969, 38-9.
194 Arbman 1940, II, *Tafel* 189, 191: 1–3, 192: 1; Arbman 1937, *Tafel* 3–5.
195 Arbman 1940, II *Tafel* 189: 1–2; Arbman 1937, *Tafel* 5: 1–2.
196 Arbman 1937, *Tafel* 6: 8.
197 Homquist 1961, bases, pl. 52: 11–14, rims of funnel beakers, pl. 52 all except 10, the same with yellow spiral thread pl. 52: 6–7, wall-fragments with swags pl. 53: 1–2.
198 Arbman 1937, 82.

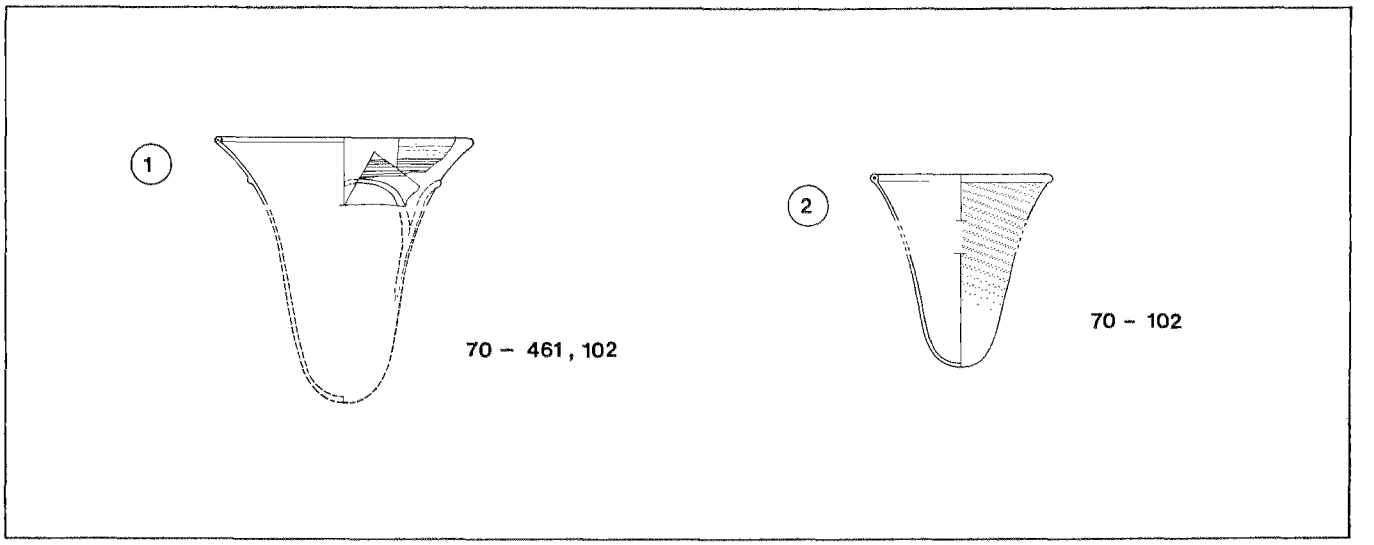


Fig. 36 Medemblik, glass funnel beakers.

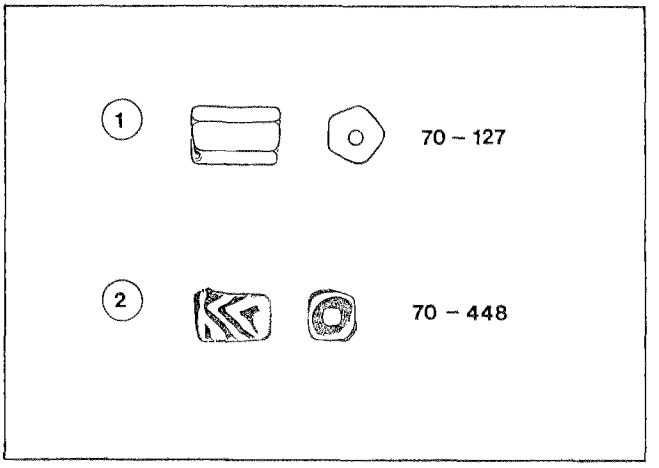


Fig. 37 Medemblik, glass beads (1:1).

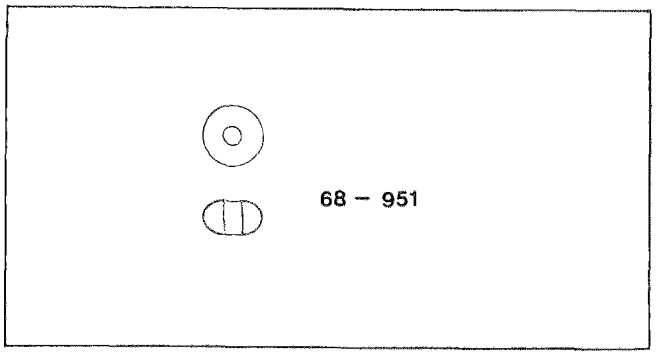


Fig. 38 Medemblik, spindle-whorl.

BEADS

Glass beads like those of Medemblik have always been popular (fig. 37). Red pentagonal prismatic oblong beads are known from Birka,[199] tetragonal prismatic oblong beads with yellow zigzag decorations, from Minden.[200] A dating cannot be given for the Medemblik beads.

OTHER FINDS

Further information still cannot be given on the other finds. The spindle-whorl is common in this shape (fig. 38). The fragments of basalt lava from millstones were too small. Whetstones also occur, as does an oval board of tree bark with a small hole, possibly used as a float. A small amount of bone is still being studied. A shoe fragment is discussed in appendix 1.

SUMMARY

After the resettlement of the Dutch dune-region, settlement also returned to Westfriesland in the eighth century and concentrated mainly around Lake Wervershoof. Large, almost unreclaimed areas of fen to the east of the dune-region drained mainly east- and westwards via fen rivers.

199 Arbman 1940, II, *Tafel* 120: 19
200 Böhner 1958, *Tafel* 8: 42.

Two of these, the Kromme Leek and the *Medemelacha*, the Middenleek, flow into Lake Wervershoof. This lake was openly connected with the Almere and the Vlie, and because of this the drainage in the region around the lake was rather better than in the peat moors situated further away. The better drainage of the region round Lake Wervershoof may have contributed to the fact that the inhabitants showed a preference for this area. The south bank of the Middenleek presented a particularly favourable place to live, near the mouth where the creek ridge of Abbekerk ends. Medemblik, named after the *Medemelacha*, originated here in the early Middle Ages. This settlement was identified, during the excavation in the town, by heightening-layers of at least 80 cm with traces of habitation. Because of her favourable situation on waterways which were directly connected with the great trade route from Dorestad to Friesland and Scandinavia via the Almere and Vlie, Medemblik benefited from this trade. but only the resistant sherds of imported Carolingian pottery and glass remain to testify to her importance. The existence of royal estates since the middle of the eighth century encouraged this trade by its need for certain articles and by the protection which the royal authority offered. In this way, we see Medemblik as a centre of regional government and trade and also as an ecclesiastical centre. For the bishop of Utrecht, since the middle of the eighth century, owned one-tenth of the royal possessions and the tax-revenues in Medemblik and also founded in the Carolingian period the church dedicated to St Martin, the mother-church of Westfriesland. Because the church of Utrecht and all its possessions had been granted immunity, there existed in Medemblik the possibility of avoiding the royal tax-officials by settling on that tenth part of the royal estates which had been granted to the church of Utrecht. Thus a situation arose in Medemblik which, although on a much smaller scale, is comparable to that in Dorestad. Borings and field-observations lead us to suppose that early medieval Medemblik extended along the raised south bank of the *Medemelacha*, which is now visible, partly also by later heightenings, as an oblong *terp*.

The excavations at Schuitenvoerderslaan are especially important because of the large quantity of early medieval pottery. Although few settlement-traces have been preserved, the pottery undoubtedly comes from an intensive habitation on a southerly spur of the Abbekerk creek ridge on the shore of Lake Wervershoof. Two periods can be observed in the habitation there; the first ended when the area gradually flooded and a layer of compact grey clay *(kiekklei)* was deposited. Not much later, there was again habitation for a short time but this ended fairly abruptly because of new inundations and deposition of *kiekklei*. On account of the existence of a Carolingian habitation-layer in the *kiekklei* we can date its sedimentation in the Carolingian period, one of the few Dunkirk III A deposits. The pollen analyses of sections at Oude Haven and Schuitenvoerderslaan make it probable that this transgressional influence in the Carolingian period did not result in the salinization of water round Medemblik, even though it is quite possible that the depositions were the result of changes in the mouth of the Vlie. A storm of the violence of that mentioned in 838 can have contributed to the changes.

We expected to find, with the help of the *kiekklei* stratigraphy at Schuitenvoederslaan in Medemblik, two different groups of finds which would present new information for the dating of Carolingian pottery, but this did not prove to be the case. In the first place, the possibility of the single find from period I turning up in period II could not be completely eliminated. Apart from this, the number of finds which we could, with certainty, link to the *kiekklei* stratigraphy was too small to represent the Carolingian pottery. There is no definite dating for the pottery unless one wants to count the year 838.

In order to date the pottery and the traces of habitation connected with it we are dependent on finds from elsewhere. The majority of the pottery can be dated in the second half of the eighth century and in the ninth. A small group of finds (type H III, W VII, IX, and X) can very well be dated in the Merovingian period. The absence of 'painted Badorf' or 'Hunnenschans' pottery and Pingsdorf pottery rules out a dating as late as the last quarter of the ninth century. We may therefore propose two interpretations as to the date of the settlement:

1 An activity of rather long duration modestly started in the Merovingian period, and with intensive habitation in the late eighth century and the first half of the ninth.

2 A shorter but very intensive period of habitation in the late eighth and first half of the ninth centuries. In this last case we must assume that the older type of Merovingian pottery may occur up till the end of the eighth century. We point out the discrepancy between the generally early datings from the Frankish cemeteries and the dating up to the beginning of the ninth century from the settlement in Frankfurt am Main. For the present, however, we maintain both proposals, because this older pottery

rarely occurs in closer-situated groups of Carolingian finds. The fact that more or less flat-based hand-made pottery is scarcely found, yet still occurs elsewhere until into the ninth century, may indicate that the *Kugeltopf* pottery was usual even before the ninth century and perhaps even earlier in Medemblik and the western coastal region.
The habitation at Schuitenvoerderslaan came to an end with the renewed inundations about the middle of the ninth century. The settlement in Medemblik itself was located higher and was spared the flooding. Nevertheless, we are still in the dark as to the post-Carolingian settlement. These and many other questions, which mostly arose from the excavations published here, can still be solved in Medemblik, because parts of the *walterp*, the dwelling-mound on the bank along the *Oude Haven*, the former *Medemelacha*, are yet to be uncovered (pl. v). This report of the excavations in Medemblik is thus intended as an interim, not a definite, publication. Although several important archaeological sites along the Oude Haven must now be regarded lost due to building, at the time of writing some smaller archaeological investigations are beginning which may lead to a clearer picture of early medieval Medemblik.

POSTSCRIPTUM

In the meantime a further investigation in different places in the towncentre of Medemblik has been concluded. Our assumptions as regards a prehistoric settlement and the early medieval habitation to the south of Oude Haven were confirmed. In two places at 400 m east and especially 60 m west of the 1970 excavation we found numerous settlement traces with amongst other things a well-preserved wooden structure dated by much pottery from the late Bronze Age and also traces of the early Middle Ages. The majority of the finds from these traces argue for an eighth-century dating. To the north of Oude Haven we could not determine any habitation before the late Middle Ages. After the great floods of the twelfth to fourteenth centuries under which the land north of the Middenleek was submerged, it was not until the late Middle Ages that a dike of seaweed was constructed in the water to the north of the long *terp* of Medemblik so that there was again a safe harbour. The building of a second dike of seaweed and a third, the present dike, followed even later. The space between the dikes was heightened and houses were built on it.

APPENDIX I

A Carolingian Shoe from Medemblik
by W. Groenman-van Waateringe (IPP, Amsterdam)

Amongst the meagre leather finds which came to light in the excavations at Medemblik, one fragment of calf leather (find number 102/103) may be interpreted as part of a shoe. No information is available concerning the stratigraphical position of these find numbers (102/103) but the pottery in them is all Carolingian. We have here a *Bundschuh*, *i.e.* a shoe made from a single piece of leather. The sole part is severely worn, the upper part to a lesser degree. The shoe was fastened by means of a leather strap, laced through vertical slits cut immediately below the upper edge. The slits must have occurred all round the instep. The original length could not be established, but it is certain that the slits for the strap must have continued well over the forefoot, almost to the toes. In this, the shoe resembles one from Dorestad and *Bundschuhe* from Haithabu.[201] Closely placed slits on the vamp also occur on a shoe from the Petersberg, Basel. The shoes from Medemblik and Dorestad are, in fact, still strongly reminiscent of the footwear at the beginning of our era.[202] The fragment, as discovered however, is open to more interpretations and both the offered reconstructions are possible, concerning the available data. Reconstruction 1 (by the author) is inspired by a similar shoe from Dorestad, and by Iron Age footwear, while reconstruction 2 is the work of the draughtswoman, Miss E.H. Thöenes, and is chiefly based on the place of the folds in the leather. Reconstruction 1 assumes a seam at the heel only, reconstruction 2 a seam at both the heel and up the middle of the vamp, the latter occurring frequently in the Haithabu footwear.

APPENDIX II

The Palynological Investigation of the Section at Oude Haven
by J. Barelds (Geologisches Landesamt Schleswig-Holstein)

1 *Introduction*
During the excavation in the centre of the town of Medemblik samples were taken from two sections for palynological analysis. The samples were taken by Mr A. Voorrips (Albert Egges van Giffen Instituut voor Prae- en Protohistorie, University of

201 Groenman-van Waateringe, in preparation.

202 Groenman-van Waateringe 1975.

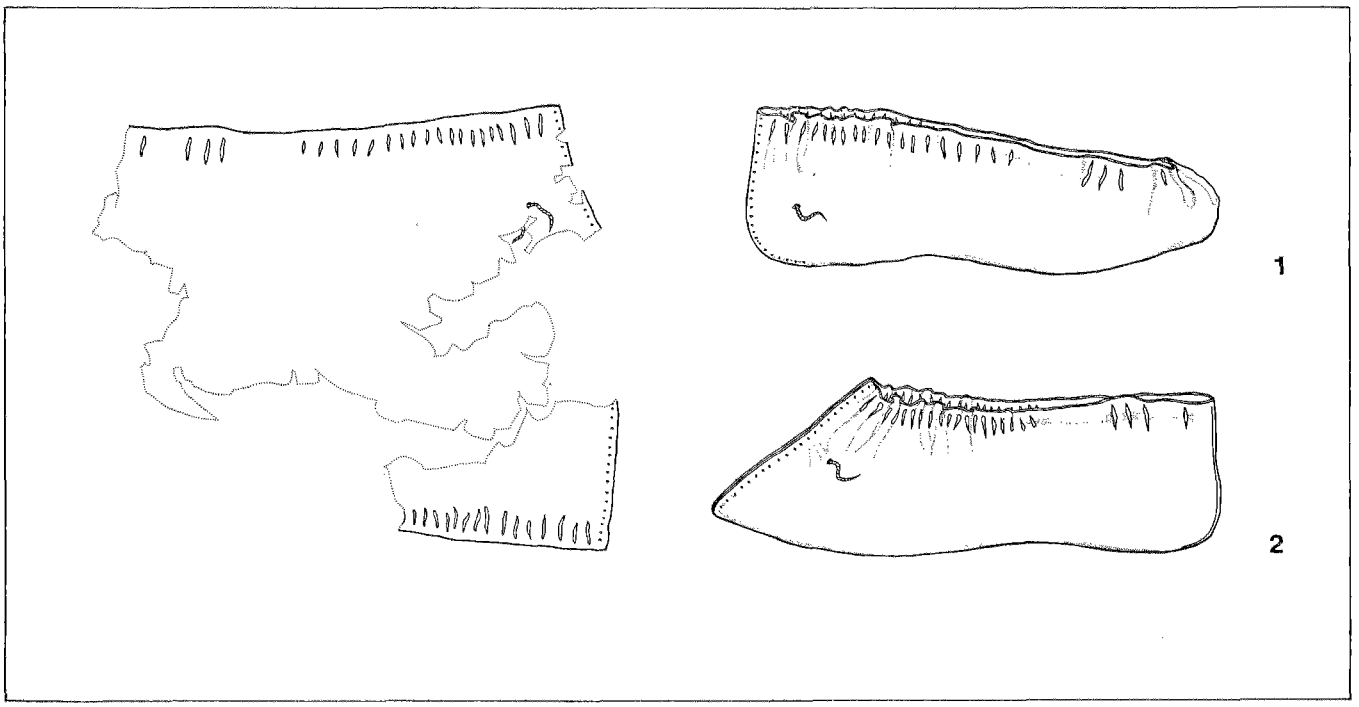


Fig. 39 Medemblik, Schuitenvoerderslaan: Shoe fragment (1:4) and two possible reconstructions.

Amsterdam) on 4 December 1970. The situation of the sections is shown is figs. 11 and 13.
The section Medemblik I (M I) is at 1.15–1.70 m –NAP. The base of the section is at the same time the border with a Calais IV B deposit. From 1.70–1.55 m the section consists of light sandy clay. From 1.55 m –NAP the section consists of peaty clay, which, going upwards, becomes less peaty and *c.* 1.40 m –NAP changes into light clay. In this top clay layer a sherd was found of early medieval hand-made pottery, which cannot be dated exactly. From the layers directly above the section we have finds from the eighth–ninth centuries. The section Medemblik II (M II) is situated at about 20 m from the section M I in the infilling of a creek. The section is at 3.00–3.38 m –NAP. From 3.28–3.15 m the section consists of light clay, from 3.15–3.10 m of peaty clay, and from 3.10 m of dark clay. From the lowest layer of 3.28–3.15 m we have early medieval finds. The stratigraphy is indicated in front of the diagrams (see figs. 40 and 41).
All trees, including *Corylus*, are included in the pollen-total. In the diagram, the elements of the pollen-total are given first, then the herbs, spores, and other micro-fossils. Some (as yet) unknown micro-fossils are indicated by a type-number. The numbering of these types follows Van Geel (types 1, 2, 10, 12, and 14, Van Geel 1972), and Barelds (type 201, Barelds, in preparation). Of these types and several other micro-fossils only the presence is indicated and no percentages determined.
In figs. 42 and 43 the diagrams are reproduced with the elements of *Quercetum mixtum* and *Fagus* and *Carpinus* in the sum.

2 *Discussion of the diagrams*

2.1 Zonation and development of the landscape.

In the diagram M I three zones are distinguished. Zone 1 runs from 170–155 cm, zone 2 from 155–145 cm, and zone 3 from 145 cm.
In zone 1 the percentages of *Pinus* are high. For the herbs, there are maxima for *Chenopodiaceae*, *Gramineae*, *Cyperaceae*, *Compositae liguliflorae*, and *Cruciferae*. Zone 2 is characterized by a maximum for *Alnus* and a fall in practically all curves for the herbs. *Salix* is relatively high in zones 1 and 2. In zone 3 the percentages for *Ulmus*, *Fagus*, and *Carpinus* increase. Of the herbs, the percentages for *Chenopodiaceae*, *Gramineae*, *Artemisia*, and *Compositae liguliflorae* increase again. At the base of the zone there is a small maximum for *Filipendula* and *Rubiaceae* of the *Galium* type. *Plantago maritima*, the high percentages for *Chenopodiaceae* and the occurrence of *Hystrichosphaeridae* point to the resedimentation of material of marine origin with pollen from a marine type of vegetation.

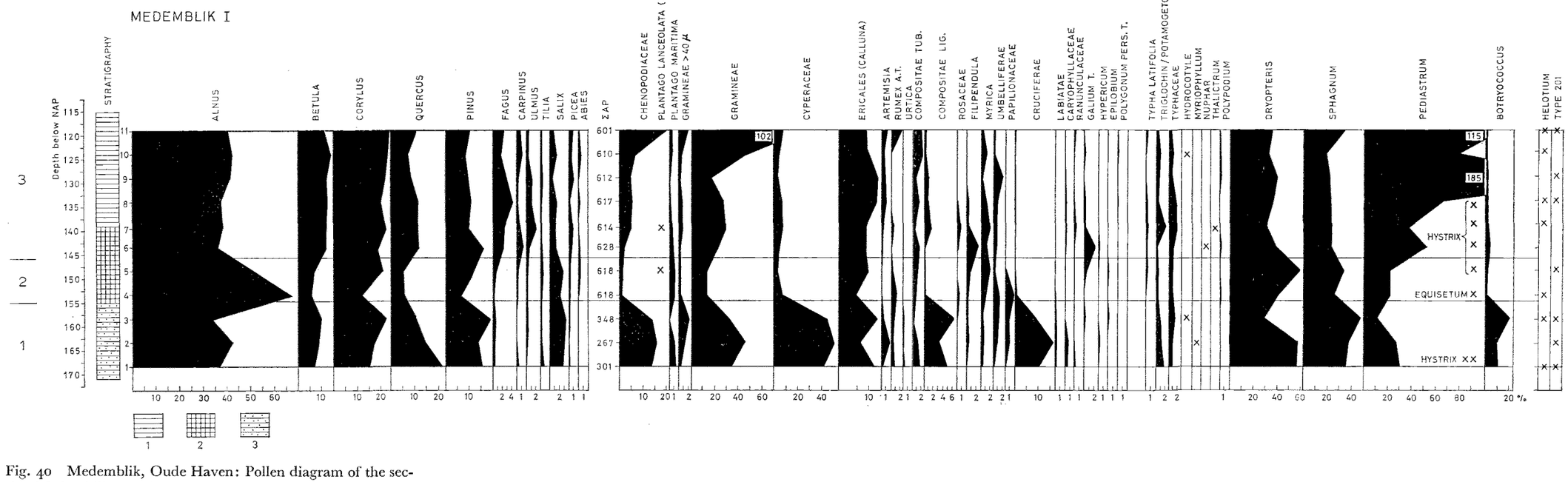


Fig. 40 Medemblik, Oude Haven: Pollen diagram of the section Medemblik I. 1. clay; 2. clay with peat; 3. sandy clay.

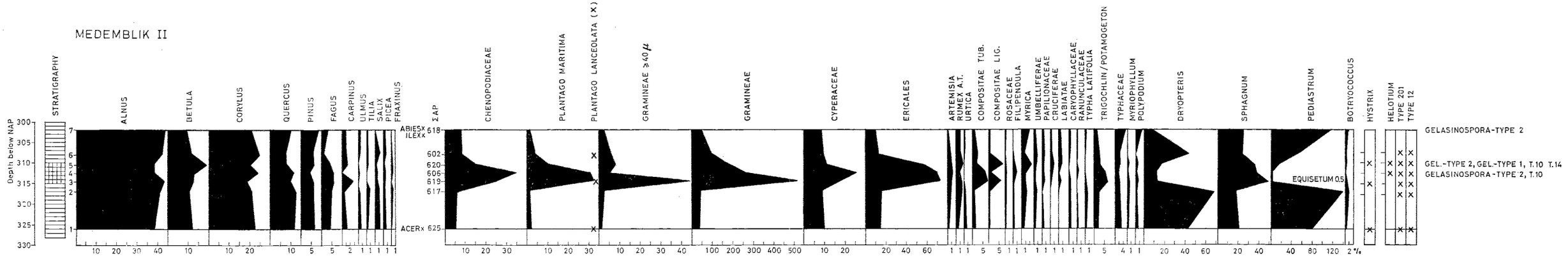


Fig. 41 Medemblik, Oude Haven: Pollen diagram of the section Medemblik II. 1. clay; 2. clay with peat; 3. sandy clay.

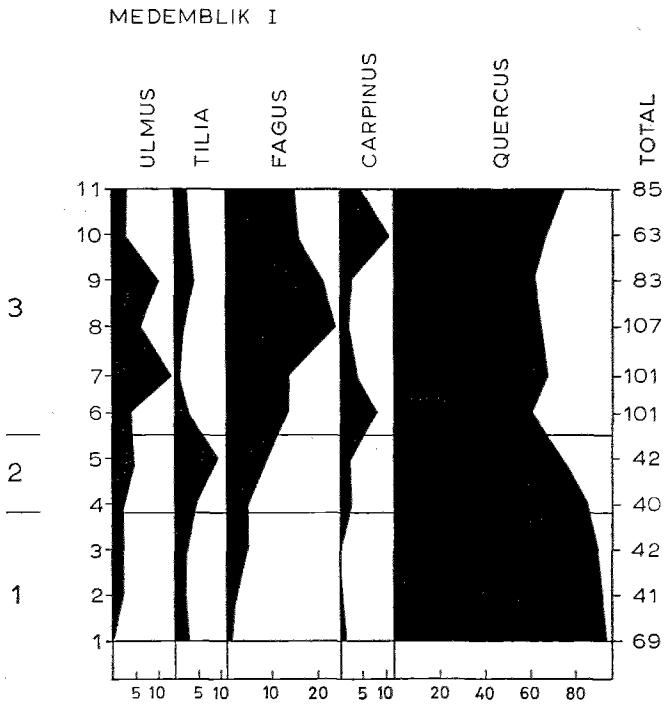


Fig. 42 Medemblik, Oude Haven: Diagram of the section Medemblik I with the elements of the *Quercetum mixtum* and *Fagus* and *Carpinus* as sum.

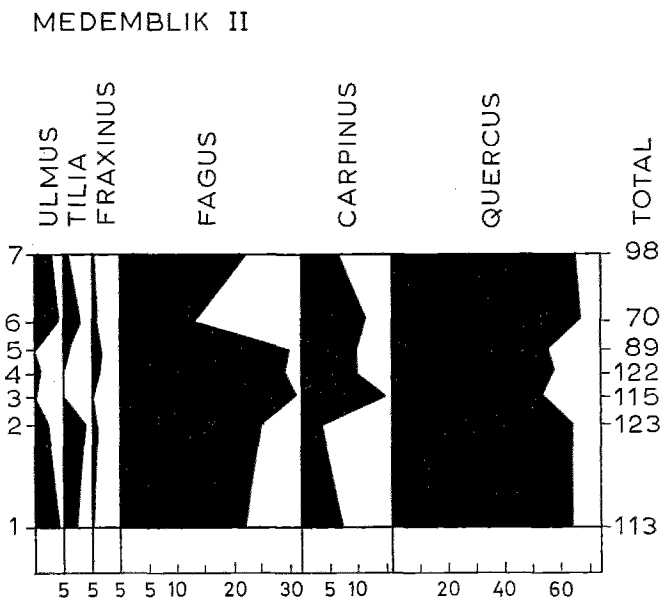


Fig. 43 Medemblik, Oude Haven: Diagram of the section Medemblik II with the elements of the *Quercetum mixtum* and *Fagus* and *Carpinus* as sum.

During the deposition of zone 1 the landscape was open with *Alnus* and *Salix* locally. The relatively high percentage for *Pinus* and the low density of pollen point to the fact that, as far the trees are concerned, we have here to do with a long distance transportation.

During the deposition of zone 2 there is an increase in *Alnus* and a decrease in the herb curves. The deposit which becomes more peaty, the drop in the percentage *Botryococcus*, and the low values of *Pediastrum* indicate drier conditions. In the immediate environs, an alder carr develops, and *Salix* occurs locally.

During the deposition of zone 3, the conditions have become wetter again. *Salix* and *Alnus* decrease, and the landscape again has a more open character. The elements of the higher sandy ground, respectively the dune-region, in the pollen-total increase. Remarkable is the increase of *Fagus*, *Carpinus*, and *Ulmus*, and the decrease of *Tilia*.

The mixing of pollen transported by water makes it impossible to draw far-reaching conclusions as to the local ecology. The regularity of the curves, however, especially that of *Fagus*, within the group *Quercetum mixtum* plus *Fagus* and *Ulmus*, indicates little secondary pollen transportation of the types within this group.

The section M II gives a very mixed picture with regard to the origin of the pollen and spores. On the one hand we have the group of a marine type of vegetation with *Chenopodiaceae*, *Plantago Maritima*, *Artimesia* ,and pollen of the *Triglochin/Potamogeton* type, in this case probably *Triglochin maritima;* on the other hand we are concerned with the representatives of a more oligotrophical type of vegetation, the *Ericales*, mostly of the *Calluna* type, and *Sphagnum*.

Throughout the whole section we find spores of types 12 and 201, and in the peaty clay zone *Gelasinospora*, types 10 and 14. In the section Weerdinger Erfscheidenveen (Barelds, in preparation) the type 201 only occurs in the eutrophic to mesotrophic part of the section, whereas the other types only occur in the oligotrophic part. The occurrence of type 201 together with the other types indicates a secondary deposit of detritus from peatmoor under eutrophic conditions.

2.2 Chronological division

The subsoil under the section M I is a Calais IV B deposit. From the layers directly above the section we have finds from the eighth and ninth centuries. From the upper clay layer of the section there is a sherd of early medieval hand-made pottery which cannot be dated precisely. The deposition of the material from the section therefore occurs after the Calais IV B (*c.* 1800 B.C.) deposition and before or in the eighth century.

In zone 3 *Carpinus* occurs in a continuous curve and *Fagus* is relatively high. This zone was then probably deposited in the

second half of the *Subatlantic*, during the Dunkirk II phase. After the Roman period an increase in *Fagus* takes place in the calcareous dunes.[203] The increase in *Fagus* from Spectrum 6 possibly reflects this *Fagus* increase in the post-Roman period. The drier phase of zone 2 precedes this and takes place in the beginning of the era. From the lowest clay layer of the section M II there are early medieval finds. The mixed origin of the pollen makes a palynological dating impossible.

3 Summary and conclusion

Besides the pollen deposition of the vegetation at the time of the deposit there is also the question water-transportation of pollen and resedimentation of older material. In the section M II detritus from oligotrophic peat is redeposited under relatively nutritious conditions. We can only come to rough conclusions, and then only with some reservations. The chronological development, as it is given for section M I, rests partly on the archaeological data. The zones 1 and 2 can coincide with the phases 1 and 2 in the diagram of Lake Wervershoof.[204] Here also, an open landscape (phase 1) is followed by an increase in *Alnus* in phase 2. We cannot conclude from diagram M I that this increase in *Alnus* could have been caused by a change in agrarian methods. The mixing of pollen of a marine vegetation type makes it practically impossible to distinguish the influences of cultivation on the vegetation. Many types of pollen, for instance, *Chenopodiaceae*, *Artemisia* and other *Compositae* which count as companions to cultivation, are also considered as representative of a halophile type of beach-vegetation. The pollen of the *Cerealia*-type can originate from the halophytes such as *Elymus*, *Elytrigia*, and *Hordeum marinum*. The *Gramineae* pollen $> 40\,\mu$ distinguished here lies almost completely between $40\,\mu$ and $45\,\mu$. The size of the pollen from the beach grasses with large pollen grains is mostly found within this range, whereas that of the *Cerealia* type is usually larger. Of the other indicators of cultivation only *Plantago lanceolata* occasionally occurs.

Acknowledgements

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203 Jelgersma *et al.* 1970.

204 Voorrips/Jansma 1974.

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J. BUURMAN AND J.P. PALS

Some Remarks on Prehistoric Flax in the Netherlands

figs. 1–2

The earliest indications of the cultivation of flax (*Linum usitatissimum* L.) in the Netherlands go back as far as the Middle Neolithic. From this period two imprints in pottery from a megalithic tomb near Drouwen are reported by Helbaek and Jessen,[1] probably from hunebed D19.[2] This pottery belongs to the Drouwen phase of the Funnel Beaker Culture and is dated at about 2500 B.C. So far, there is no evidence for the cultivation of flax between the Middle Neolithic and the Early Iron Age. From about 500 B.C. onwards, *Linum usitatissimum* is reported frequently, especially from coastal settlement sites (table 1).

Already during the earliest investigations of the terps, seeds and capsules of *Linum usitatissimum* were found in the Kloosterwierde and the Wadwerder Wierde near Usquert by Acker Stratingh[3] and Westerhoff.[4] In 1929, Beijerinck[5] reports linseeds in the terps of Ezinge, Ferwerd, and Eenum. Linseeds are further reported by Van Zeist[6] from Vlaardingen-Broekpolder and from Schiedam-Kethel, both situated in a fresh-water environment, and from Paddepoel, Leeuwarden, and Tritsum, where the environment is brackish to salt.

Flax stems were collected by Van Giffen in 1908 in the terps of Marssum and Britsum,[7] and braked stem fragments are known from the settlement at Wijster, where they were found in a well.[8]

The absence of flax in northwestern Germany, Denmark,

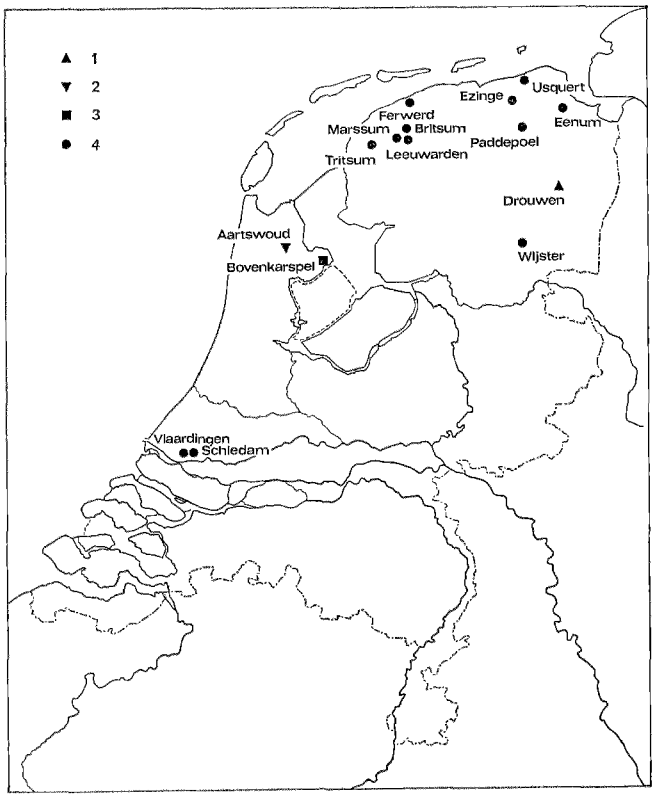

Fig. 1 Finds of *Linum usitatissimum* in the Netherlands;
1. Middle Neolithic (Funnel Beaker Culture);
2. Late Neolithic (Protruding Foot Beaker Culture);
3. Late Bronze Age;
4. Iron Age and later

1 Jessen/Helbaek 1944, 57; Helbaek 1959, 112.
2 *Cf.* Van Zeist (1968) 1970, 163.
3 Acker Stratingh 1849, 217.
4 Westerhoff 1871, 324–6.
5 Beijerinck 1929, 50.
6 Van Zeist 1974, 361–2.
7 Van Zeist (1968) 1970, 162.
8 Van Zeist (1968) 1970, 129.

TABLE 1 Finds of *Linum usitatissimum* L. in the Netherlands

Period	Locality, dating	Author(s)	ip	cs	us	cp	st*
Middle Neolithic (Funnel Beaker Culture)	Drouwen (*c.* 2500 B.C.)	Jessen/Helbaek 1944, 57	+	–	–	–	–
	Drouwen (*c.* 2500 B.C.)	Helbaek 1959, 112	+	–	–	–	–
Late Neolithic (Protruding Foot Beaker Culture)	Aartswoud (*c.* 2000 B.C.)	Buurman/Pals	–	+	+	–	–
Late Bronze Age	Bovenkarspel (*c.* 800 B.C.)	Buurman/Pals	–	+	–	–	–
Early Iron Age and later	Leeuwarden (600–400 B.C.)	Van Zeist 1974, 361–2	–	–	+	–	–
	Vlaardingen-Broekpolder (370 ± 70 B.C.)	ibid.	–	–	+	–	–
	Ezinge (300 B.C.–100 A.D.)	ibid.	–	–	+	–	–
	Tritsum (500 B.C.–200 A.D.)	ibid.	–	–	+	–	–
	Paddepoel (200 B.C.–250 A.D.)	ibid.	–	–	+	+	–
	Schiedam-Kethel (100–250 A.D.)	ibid.	–	–	+	+	–
	Wijster (150–425 A.D.)	Van Zeist 1970,129	–	–	–	–	+
	Eenum (500 B.C.–1000 A.D.)	Beijerinck 1929, 50	–	–	+	–	–
	Ezinge (500 B.C.–1000 A.D.)	ibid.	–	–	+	–	–
	Ferwerd (500 B.C.–1000 A.D.)	ibid.	–	–	+	–	–
	Marssum (200 B.C.–800 A.D.)	Van Zeist 1970, 162	–	–	–	–	+
	Britsum (200 B.C.–800 A.D.)	ibid.	–	–	–	–	+
	Usquert (Early Middle Ages)	Acker Stratingh 1849, 217	–	–	+	–	–
	Usquert (Early Middle Ages)	Westerhoff 1871, 324–6	–	–	+	–	–

* ip = imprints; cs = carbonized seeds; us = uncarbonized seeds; cp = capsules; st = stem fragments

and Sweden[9] up to *c.* 500 B.C. would imply that during the period between *c.* 2500 and *c.* 500 B.C. this crop plant was not grown in the Netherlands either. Van Zeist suggested that, when flax cultivation was introduced in the above-mentioned areas in about 500 B.C., it was re-introduced in the Netherlands at the same time.[10] However, since the evidence in the British Isles covers the period from the Neolithic up to at least the Late Bronze Age, and even probably up to Romano-British times,[11] continuous flax cultivation in the Netherlands should also be considered a possibility.

In this context the discovery of seeds of *Linum usitatissimum* in a Late Neolithic (Protruding Foot Beaker Culture) settlement at Aartswoud and in a Middle and Late Bronze Age settlement at Bovenkarspel is of special interest and merits a preliminary report, even though only a small part of the samples from both sites has been analysed.

AARTSWOUD (Municipality of Hoogwoud)

Excavations of a Protruding Foot Beaker Culture settlement carried out by the IPP have been in progress since 1972 and will be continued for some years. On the basis of the evidence provided by the pottery, the site is dated *c.* 2000 B.C.[12] Extensive occupation layers are being found,

9 Denmark: Helbaek 1954, 257. Sweden: Hjelmqvist 1955, 145–7. Summaries of north and central European finds of flax are given by Körber-Grohne (1967, table 31, 150–3) and Willerding (1970, 356–7), who also gives a distribution map. Recently, carbonized linseeds were reported by Knörzer in western and central Germany in Early Neolithic (Knörzer 1967, 15–6; 1974a, 179) and Iron Age contexts (Knörzer 1971, 46; 1973, 307; 1974b, 409).

10 Van Zeist (1968) 1970, 163.

11 Helbaek 1952, 224–8.

12 Lanting/Mook/Van der Waals 1973, 51–3.

TABLE 2 Average dimensions in mm and indices for seeds of *Linum usitatissimum* from Aartswoud

sample no.	carbonized L	B	100L/B	uncarbonized L	B	100L/B	n
75/31/7	2,85	1,54	179	—	—	—	3
75/31/4	3,21	2,06	156	—	—	—	1
72/100	3,43	1,71	200	—	—	—	1
72/93	2,71	—	—	3,84	2,37	162	2
72/104	—	—	—	3,71	2,11	176	10
72/106	—	—	—	3,81	2,18	174	1

containing pottery, bones, mollusc shells, coprolites, and uncarbonized and carbonized plant remains. These layers are being sampled in detail for palaeobotanical investigation, for which J.P. Pals is responsible. Conditions for preservation of organic remains are very good, because the occupation layers are partly under the water table.
In samples from this site, twenty linseeds were found of which eight are carbonized and twelve uncarbonized. The seeds could all be measured except for one damaged uncarbonized, and two grossly deformed carbonized specimens.
The dimensions of the seeds are given in table 2.
Some authors have already given percentages of shrinking caused by carbonization. According to Helbaek,[13] length decreases by 25% and breadth by 30%, while Van Zeist[14] calculated 13 and 21%, respectively. The differences between the average dimensions of the uncarbonized and carbonized linseeds of Aartswoud suggest a shrinkage of 19 and 18%.

BOVENKARSPEL

In 1974, the ROB started large-scale excavations of a Middle and Late Bronze Age settlement which will be continued until 1976. Pottery, bones, stone, flint, coprolites, and charred plant remains are found in the settlement-traces such as ditches surrounding the houses, other ditches, pits, post-holes. These are being systematically sampled for palaeobotanical investigation by J. Buurman. In sample no. 8-1-7, taken from a ditch containing pottery from the youngest Late Bronze Age occupation phase of the site, one carbonized seed of *Linum usitatissimum* was found.

13 Helbaek 1959, 112.

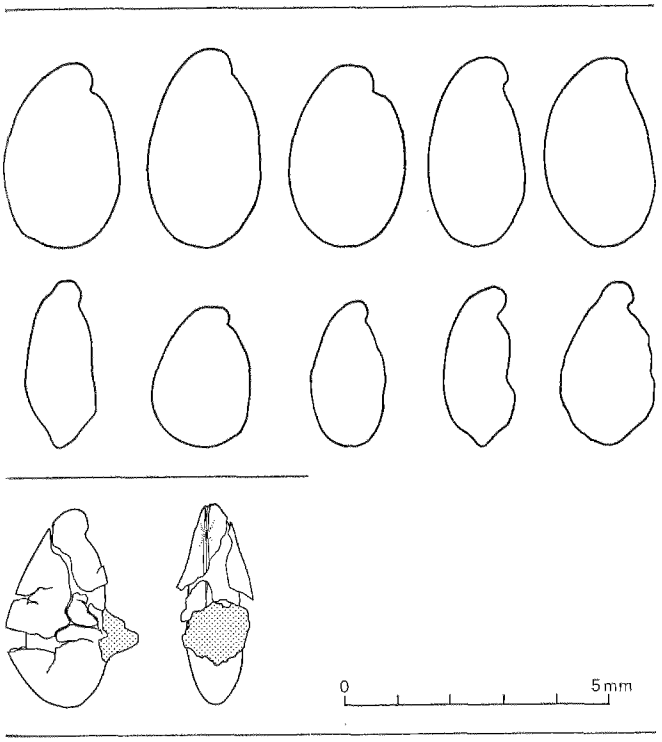

Fig. 2 Seeds of *Linum usitatissimum* L.
Upper row: Uncarbonized seeds from Aartswoud, sample no. 72/104
Middle row: Carbonized seeds from Aartswoud, sample no. 75/42/7
Lower row: Carbonized seed from Bovenkarspel, sample no. 8-1-7

For this ditch a radiocarbon date, measured on charcoal, will be available soon.[13a]
The charred linseed, recovered from Bovenkarspel, is badly damaged (fig. 2), the measurements are therefore not given. The testa is ruptured and is only held together in the middle part of the seed by a piece of dirt that became stuck to it during carbonization. The characteristic hexagonal cell structure on the surface can not be seen. Nevertheless, there can be no doubt about the identity of the flat seed with the pronounced beak being *Linum usitatissimum*. The discovery of only one linseed in Bovenkarspel in the Late Bronze Age is certainly indicative of

13a Shortly before printing Mr W.G. Mook of the Groningen C14 Laboratory kindly provided us with this date: 2740 ± 40 BP (GrN 7508).
14 Van Zeist 1972, 5.

cultivation at this site in this period, because survival as a weed is impossible in the northwestern European area.[15]

The cultivation of flax in the Netherlands, so far only known from the Middle Neolithic period and from the Iron Age onwards, would now also seem to have been practised by the people of the Protruding Foot Beaker Culture in the Late Neolithic, and by the people who occupied the West Frisian area in the late Bronze Age.
However, we cannot be certain about the continuous cultivation of flax in prehistoric times in the Netherlands, since there are no finds between *c.* 2000 and *c.* 800 B.C.
Some authors have already studied the significance of the finds of crop-plant seeds in relation to the quality in which they occur. As Willerding[16] points out, charred seeds and seed-imprints of flax are not often found, as opposed to uncarbonized seeds, which occur quite frequently when conditions for preservation are favourable. The reason for this is that oleaginous seeds (*e.g. Linum usitatissimum, Papaver somniferum* L. [opium poppy], and *Camelina sativa* (L.) Crantz [gold-of-pleasure]) have much smaller chance to be carbonized because they are not roasted like cereal grains. Cereal grains need this treatment to facilitate threshing and to prevent sprouting. So oleaginous seeds are not normally found in settlements on dry mineral soils where only carbonized plant material is preserved; only when carbonized accidentally (*e.g.* broken cooking-pots, house- or barnfires, *etc.*) do they occur as isolated finds. This probably is the reason why linseeds have not been reported from upland settlement sites which are contemporaneous with the coastal settlement sites, where seeds, capsules, and stems of flax are present as uncarbonized finds, preserved under the water table.[17] The find of braked stem fragments in a well at Wijster[18] proves that cultivation of flax on upland sites is possible.
Systematic sampling in excavations of Neolithic and Bronze Age settlements together with the study of seed imprints in pottery, as a continuation of the work of Jessen and Helbaek in the Netherlands, will certainly reveal more traces of this fascinating crop plant.
The authors wish to express their gratitude to Mrs S.M. van Gelder-Otway and Mr D.A. den Bakker, who corrected the English text.
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15 Kroll 1975, 121–2.
16 Willerding 1971, 187–90.
17 *Cf.* Van Zeist (1968) 1970, 162.
18 *Cf.* Van Zeist (1968) 1970, 162–3.

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A.D. VERLINDE

A Mesolithic Settlement with Cremation at Dalfsen

figs. 1–2

INTRODUCTION

During preparatory work for a new graveyard (to be installed) 2 km northeast of Dalfsen, situated between Oosterdalfsersteeg and Welsumer Maan, a 40–50 cm layer of arable was removed from a coversand ridge. The iron-infiltrated yellow sand (underneath) contained traces of a number of (Mesolithic) fire-pits. Mr A. Goutbeek, Dalfsen, an amateur archaeologist who discovered the traces, also found a small number of flints (in isolated positions), as well as skeletal remains in one of the pits. He immediately notified the ROB, which subsequently carried out a small-scale emergency excavation with the assistance of Mr Goutbeek and a number of amateur

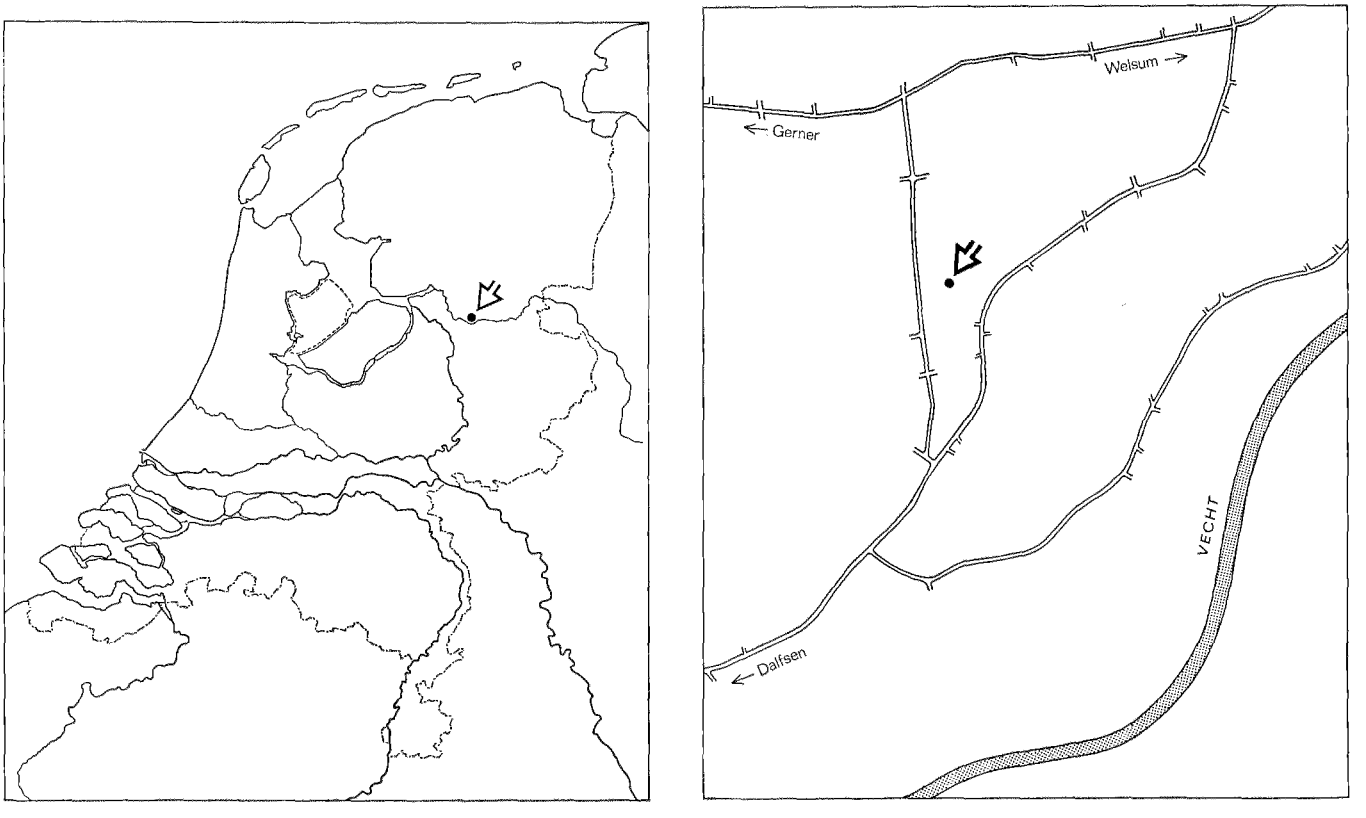

Fig. 1 Geographic location of the Mesolithic settlement at Dalfsen

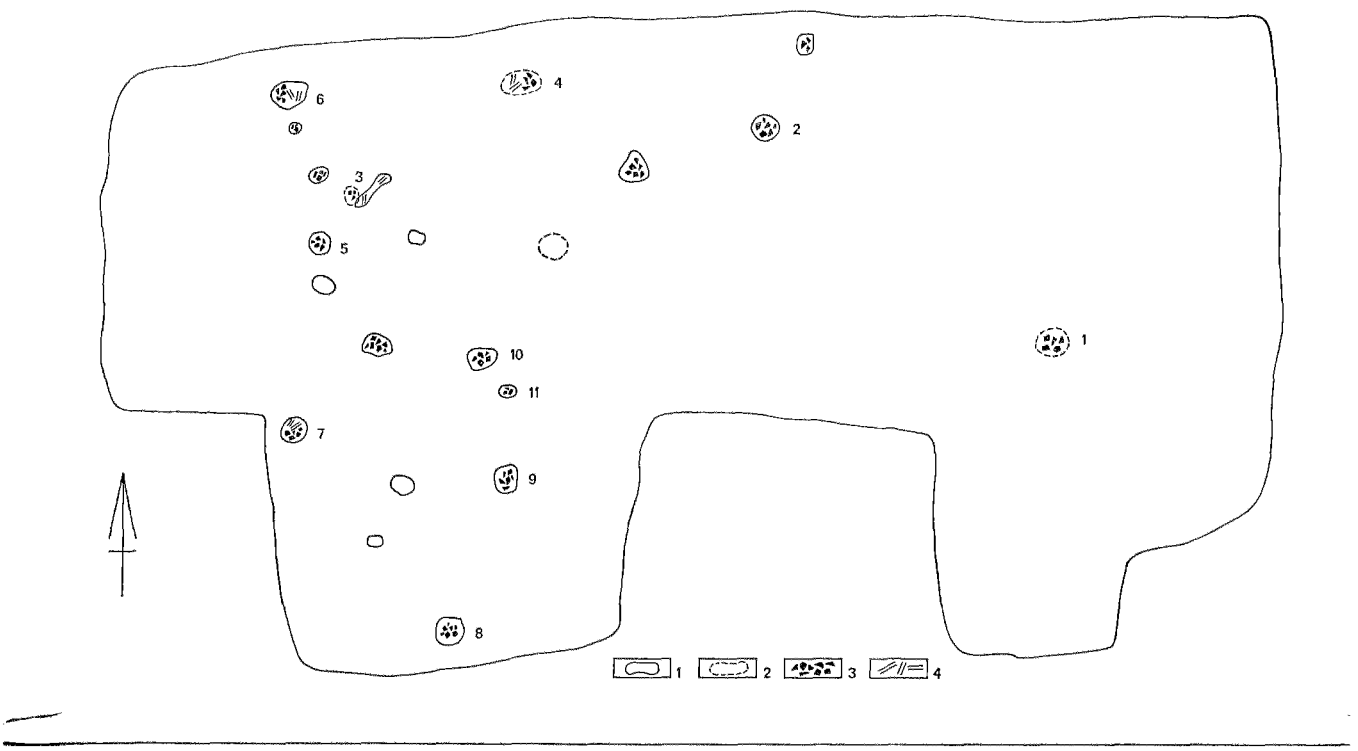

Fig. 2 Dalfsen: plan of the Mesolithic settlement (scale 1:300); 1 Fire-pit; 2 Idem, not exactly drawn; 3 Charcoal; 4 Bone remains

archaeologists. On this occasion an area of *c.* 400 m² (30 m × 15 m, less one section) was examined.

The findspot (*c.* 3 m+NAP) is situated in the north of a *c.* 1 km-wide strip that runs along the north of the valley of the river Vecht. This strip (from Dalfsen to the east) consists of an alternately high and low relief of coversand and dusty sands; the relief is accentuated by many thick arables (*essen*). The strip of land was found to contain much pre- and proto-historical material, including remains from the Mesolithic period.

According to the Dutch Soil Map, the findspot is situated on/below high, old arable level, with very poor, sometimes slightly loamy, fine sand (legend no. 114).

The level of excavation lay – as a consequence of the fact that work by the construction company was already in progress – approximately 10 cm below the base of the nearly 50 cm-thick layer of arable. In view of the iron infiltration and the profile in this section, the field (undoubtedly medieval) was laid on top of the podsol soil that existed at the time. If the depth of ploughing customary at the time is assumed to be 15 cm, the level of excavation lies *c.* 25 cm below the medieval surface, which – according to the soil-traces, at least in the excavated area – can hardly have deviated from the mesolithic surface. The depth of the excavation level therefore excludes shallow traces, while also virtually all potential finds must be regarded as lost.

THE EXCAVATION[1]

The extent of the excavation was limited to the terrain that had been levelled by machine. The fire-pits, of which more than twenty were found, occurred mainly in a strip

1 Coordinates: 21 H – 215.54/503.84.

running from north to south along the western edge of the coversand ridge. The distribution of the fire-pits could be established in the east by excavation; in the west the geographical relief formed a natural boundary. The series of fire-pits undoubtedly continued along the north and south sides, so that in these areas there were hiatuses of indeterminate extent (fig. 2).

The complex of fire-pits accorded well with Newell's settlement types A or D.[2] Both represent a so-called 'base camp.' Type A is roughly trapezoidal in shape, measuring between 20×13 m and 40×26 m. This type can occur throughout the entire Mesolithic period. Type D is more or less elliptical in shape and measures between *c.* 66×27 m and *c.* 92×40 m. This type is attributed to the De Leien-Wartena complex from the late Mesolithic. In the case of the Dalfsen finds it is impossible in typological respect to distinguish between base camps A and D, since the fire-pits there constitute a part of a settlement, of which neither the form nor the size can be determined. Unfortunately, the number of flintstone finds is too small to permit typological classification. Only on the base of C-14 datings (p. 116), which indicate a boreal age for the settlement, our part of the settlement can be attributed to type A.

The pits are all more or less oval in shape, with a section of 40 to 90 cm. In cross section they are usually seen to have a rounded, sometimes slightly flattened bottom and fairly steep sides. The depth of the pits under the excavation-level varied from 1 to 30 cm, so their original depth must have been greater by *c.* 25 cm (see introduction).

Of the twenty-one or twenty-two pits, two were found to contain some flintstone waste, notably a core made on a pebble, a core rejuvenation flake, and a 'craquelé' chip. Seventeen pits contained (still) charcoal fragments or particles, while four pits were found to contain a few traces of skeletal remains. The bone structure could be determined in one of the excavation levels. Only pit 4 yielded collectable bone material. The greater or lesser degree of conservation of the bones seems to depend primarily on the degree of iron infiltration of the soil and of the fire-pits themselves.

The charcoal fragments found in seven pits were suitable for wood determination. Mr A. Voorrips undertook this analysis by taking a maximum of thirty random samples from each pit. The samples were examined under the microscope and the remaining fragments by the naked eye. The following results were obtained:

Pit 1 *Pinus* cf. *sylvestris*
1 specimen *Quercus* sp.
Pit 2 *Pinus* cf. *sylvestris*
Pit 3 *Quercus* cf. robur
Pit 5 *Pinus* cf. *sylvestris*
Pit 9 *Pinus* cf. *sylvestris*
1 specimen *Quercus sp.*
Pit 10 *Pinus* cf. *sylvestris*
Pit 11 *Pinus* cf. *sylvestris*

The results are remarkably similar, both as a whole and in each pit. All the pits contained remains of pine, with the exception of pit 3 where only traces of oak were found. The contents of two pits included a fragment of oak.

It was also possible to determine that the charcoal fragments came from fairly thin branches, with diameters up to *c.* 6 cm.

The predominant use of branches of pine for the fires in or next to the pits can be understood in consideration of the clearly dominant pine growth in the Boreal period. The surroundings of the settlement, however, may have offered undoubtedly more species of wood, the more so as the settlement was situated along the boundary of two physical environments. The demonstrable use of pine branches and oak branches for the fires exclusively gives rise to suppose here a preference for these species of wood.

The colour of the pits was grey or black, mostly with striking, green overtones. This greenish tint, which is often to be seen in (Mesolithic) fire-pits in the higher-level sandy soils, may possibly be caused by contemporary bone deposits. However, the phosphates generated in the ground by these deposits are seldom green. Only manganese phosphate has a greenish-grey colour. The slight proportion of protein in bones (and possibly flesh remains) may have led to an iron sulphate, or, less probably, to the yellowish green iron sulphide, both which substances are green.[3] Chemical analysis, however, has not yet been undertaken.

The few flint finds were all – with the exception of three fragments from two pits – found in isolated positions, although a slight concentration occurred round pit 4.

These isolated finds, no more than forty-seven in total, consist of:

4 artefacts	3 cores
4 blades	1 core rejuvenation flake
34 flakes	1 piece with hammering-traces

2 Newell 1973.

3 Oral communication, J.A. Brongers, Amersfoort.

The four artefacts may be specified as two scrapers on flake, a steep retouched blade, and a blade with an oblique end-retouch. Approximately 10% of the flint material is burnt (craquelé).

THE CREMATION

The skeletal remains found in pit 4 were presumed to represent waste from the slaughter of the animals. They were given for determination to Dr. A.T. Clason, who identified the poorly conserved, burnt bones – wherever identification was possible – as not animal. Dr G.N. van Vark recognized some bone remains as human. The specification is as follows:

1 A small number of skull fragments, which are not divided along the sutures and which are chalky in structure. They appear to belong to an elderly person rather than a young one. The processus mastoideus is very small, and thus makes a feminine impression. The structure above the meatus acusticus externus appears to be pathologically or artificially distorted.

2 Scapula, fragment collum, female appearance

3 Humerus, diaphysum, female appearance.

4 The numerous small fragments appear human, but no certainty has been obtained on this point. It is certain, however, that they are from a different younger human or animal.

The conclusion is that part of the cremation remains is from a human – probably female – individual. In addition there are skeletal remains of a younger, possibly human individual. Although there is no proof, it is not inconceivable that the bone remains are of a woman and child. The possibility that the cremation remains include non-identifiable animal remains must not be excluded.

DATING AND INTERPRETATION

The excavation ground-plan and the few flint finds indicate an archaeological dating to the Mesolithic period. Three C-14 datings can specify this as follows.[4]

Bone sample pit 4	– GrN 7283 A	– 5465 ± 70 B.P.
Charcoal pit 4	– GrN 7283 B	– 7685 ± 130 B.P.
Charcoal pit 7	– GrN 7431	– 8830 ± 45 B.P.

The datings from the samples of charcoal can be considered as of Boreal age (*c.* 6800 – 5600 B.C.). The relatively long plus-minus of GrN 7283 B has its cause in the small number of fragments of charcoal available, which were collected near the bone fragments. The dating of the bone sample stands out. The bone fragments were poor, although an almost sufficient quantity of collagen was obtained. The C-13/C-12 result ($\delta^{13}C = -27{,}98\ ^0/_{00}$) differs considerably from the normal value ($\delta^{13}C \simeq -19\ ^0/_{00}$) and points to the presence of other organic material. Not much value, therefore, has to be attached to the dating of the bones.

The cremation remains from pit 4 at Dalfsen should certainly not be interpreted as a burial. Direct indications of this are lacking – such as grave goods, ochre discolorations. Moreover, Mesolithic burials in Europe usually consist of inhumations, the deceased being stretched out on his back, in a sleeping position ('Hocker') or in a sitting position.[5] In addition, burials of one or more skulls are known. A number of Mesolithic cremations in Europe are mentioned in the literature, but these are contestable either on the grounds of dating or interpretation.[6] In this connection the discovery of the cremation in a distinct settlement context should be re-emphasized.

In Mesolithic settlements of which skeletal remains have survived, more or less isolated finds of human remains are not exceptional.[7] These remains are generally considered 'food waste,' in which case they imply the existence of some form of cannibalism. The cremation at Dalfsen could thus easily accord with this hypothesis. However, this is not the only possible explanation of the find: it is conceivable that we are faced here with a practice unknown to us (*e.g.* sacrifice) or with an exceptional situation.

ACKNOWLEDGEMENTS

The author is grateful to Mr A. Goutbeek and the other amateur archaeologists of Dalfsen, and to Mr R. van Beek, for their assistance in the field.

Mr H. ter Schegget (ROB) provided the field drawings. Thanks are due to Dr R.R. Newell for a number of corrections and additions to the text. Thanks are also due to Mrs I. Rike-Mulder, Amsterdam, for the English translation.

4 Personal communication, W.G. Mook, Groningen.

5 Constandse-Westermann 1974.

6 Oral communication, R.R. Newell, Groningen.

7 Brinch Petersen 1973, among others.

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A.T. CLASON

The Antler, Bone, and Tooth Objects from Velzen: A Short Description

figs. 1–8; pl. xv

INTRODUCTION

In the course of works to broaden the North Sea Canal in 1969, traces of prehistoric habitation were discovered near Velzen, Province of North Holland (figs. 1, 2). During the excavation[1] that followed this discovery, a number of bone, antler, and tooth objects were found in association with sherds of Barbed Wire and Hilversum pottery, which makes it likely that the objects date to the Early Bronze Age in the first half of the second millennium B.C. This is further confirmed by C^{14} dates. In a slight depression three successive humic layers were found between sand layers. In the two upper humic layers the bone and antler objects were found. The beginning and

1 The excavation was conducted by the 'Werkgroep AWN Velzen-Zuid' under the supervision of Mr P. Vons (AWN) and Mr J.F. van Regteren Altena (ROB).

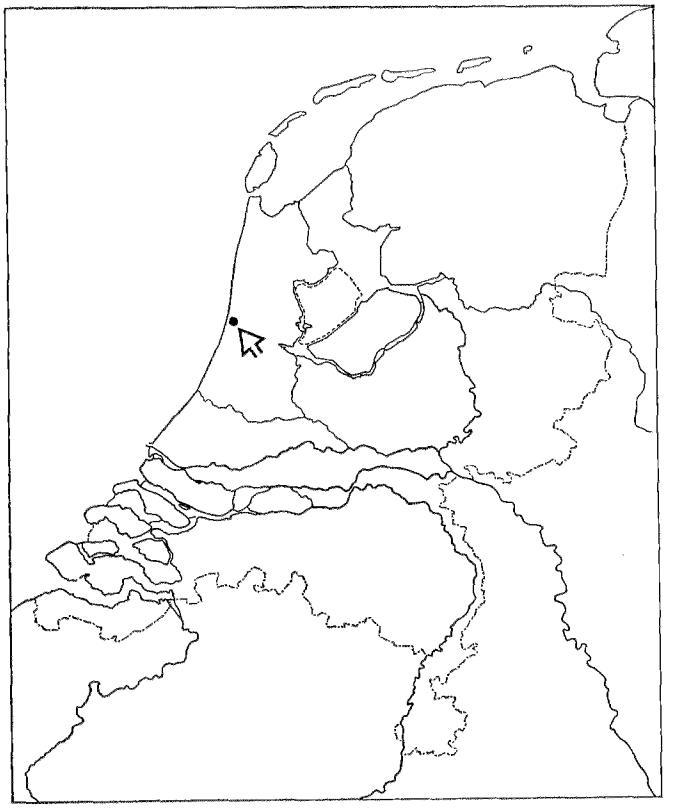


Fig. 1 The situation of Velzen

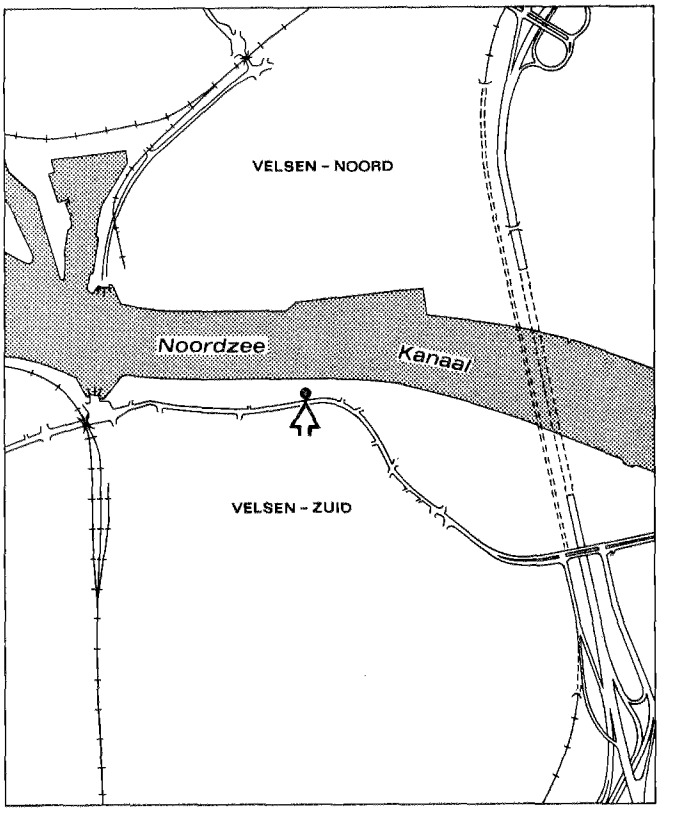


Fig. 2 The situation of the excavation in Velzen

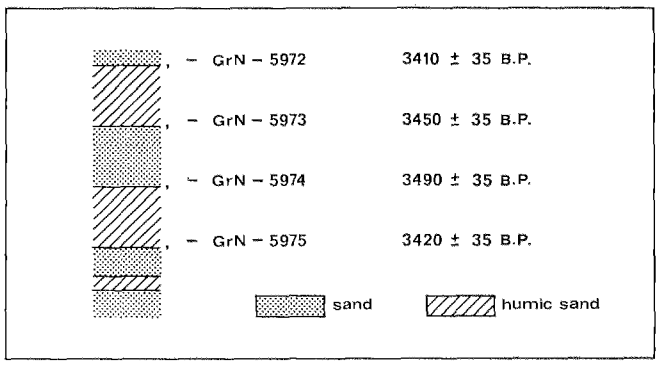


Fig. 3 The C14 dates

end of each humic layer was dated by C^{14} (fig. 3). The finds from Velzen come from the period *c.* 1670 B.C. – 1460 B.C. in conventional C^{14} chronology (fig. 3).
The objects were collected in trenches 13, 14, 15, and 18 of the excavation. The first part of the number of each object refers to the trench in which it was found, the second part is a serial number of the trench.

THE RAW MATERIAL

As raw material the long bones and ribs of sheep/goat and domestic cattle, antler of red deer and roe deer, and canines of pigs were used. Antlers are grown annually in July or August by male deer and shed in the late spring of the next year. The antlers used in Velzen thus could have been naturally shed specimens that were collected by man. The bones and teeth could only have been obtained after the killing of the animal. Since the long bones and ribs were of domestic animals, the objects and tools can be considered to be by-products of animal husbandry. The pig canines are probably of wild, and consequently hunted, animals. In table 1 is indicated which part of the skeleton was used. The tibiae and metapodiae of the small ruminants (sheep/goat) seem to have been used in the first place, next to the long bones and ribs of domestic cattle. The preference for the bones of sheep/goat is in accordance with the presumed age of the finds. In the Early Bronze Age the remains of the small ruminants are found in larger numbers than in the preceding periods.[2]

TABLE 1 The species of which the antlers, bones and teeth were used for the 'bone industry' of Velzen.

	Number of objects
Bos taurus L. – domestic ox	
Vertebrae	2
Tibia	2
?	2
Ovis aries L./*Capra hircus* L. – sheep/goat	
Tibia	9 (1)
Metatarsus	6
Metapodium (metacarpus or metatarsus)	1
Sus cf *scrofa* L. – boar cf wild	
C (mandibula) ♂	2
Cervus elaphus L. – red deer	
Antler naturally shedded	1
Antler fragments	4
Capreolus capreolus L. – roe deer	
Antler fragment	1
Not identified bones of an animal with the stature of an ox	2
Not identified bones of an animal with the stature of sheep/goat	16

( ) identification is not certain.

FABRICATION

The first step in the fabrication of a tool was to reduce the antler, bone, or tooth to a workable size by cutting, carving, sawing, and/or breaking it into parts. The carving was probably done with a flint 'knife' or burin. After the groove was deep enough the remaining part of the bone or antler was broken.[3] On tools thus prepared the longitudinal or circular scratches made by the flint are often still visible to the naked eye. This method was used especially on antlers and the metapodiae of the small ruminants and cattle. In antlers the hard cortex was sawn through, after which the much softer spongiosa could easily be broken. In the metapodiae the natural anterior and posterior grooves were used for the longitudinal cuts. The other long bones were more often merely broken. The procedure of cutting as well as breaking leaves traces in many cases.

2 Clason 1967; 1975b (in print).

3 Semenov 1964.

If possible the method of manufacture of each object will be indicated in the following description.

After the basic form was obtained the objects were mostly ground or polished. Whereas stone objects acquire a smooth surface by polishing, on bone objects the scratches that are left by the polishing agents are always clearly visible. For grinding, a small, soft, fine-grained stone can be used while the object is held in the hand. Larger stones can also be employed on which the objects are ground. The orientation of the grinding scratches enables us to see how the grinding was done. The scratches gradually disappear when the object is used. The surface then becomes smooth and shiny, which makes it possible to see which parts were much used or often handled and which were not.

Bones and parts of bones that are not intentionally shaped into tools, but are frequently handled and used for some purpose or other, also eventually acquire smooth and shiny surfaces and rounded edges. Good examples are 'secondary or improvised tools,' which, unlike primary tools, are not made to a preconceived plan, but are handy bones or part of bones that were used for some purpose. In many cases the breaking of long bones to obtain marrow results also in the forming of pointed pieces. Such bone splinters are often used for various purposes, which are indicated by the traces of wear; they are then to be considered as secondary tools. If no traces of wear can be seen, they are just splinters.

THE OBJECTS

Although the number of objects is small, at least seventeen different types can be distinguished, aside apart fragments which are industrial waste or parts of damaged tools.

I Antler objects.

a Antler spatulae. From the beam or a tine of red deer antler a long flat rod was cut from the cortex and from the spongiosa. The ends were rounded and roughly fashioned and polished. Two such rods, both damaged, were found at Velzen.

No. 18–156, fragment of spatula (fig. 4g).

No. 18–?, fragment of spatula; both edges broken off; one end is missing (fig. 4e).

b. No. 18–?, completely polished antler tine of red deer. The tine was separated from the antler by sawing through the cortex and breaking the spongiosa. The object had been in contact with fire (fig. 4h, pl. xv:2).

c No. 18–157, the base of a naturally shed red-deer antler which was fashioned into a tool. The rose was completely removed and the base became smooth and shiny through much use. A round hole was bored parallel to the base, the first tine was probably cut off. The inside of the hole is smooth. The object was broken lengthwise and only the smallest part was recovered. The working edge is missing. Consequently, we can only guess that the object probably was used as an axe. The smooth surface of the base excludes the possibility that the object was a combination tool, used both as hammer and axe (fig. 4a).

d No. 18–158, another damaged tool made of the beam of a red deer antler is probably part of an axe. The working edge of the axe is partly preserved; a square hole has been cut at a distance of *c.* 7 cm from the edge (fig. 4c).

e No. 18–162, tine of a roe-deer antler, seems to be polished (fig. 4f).

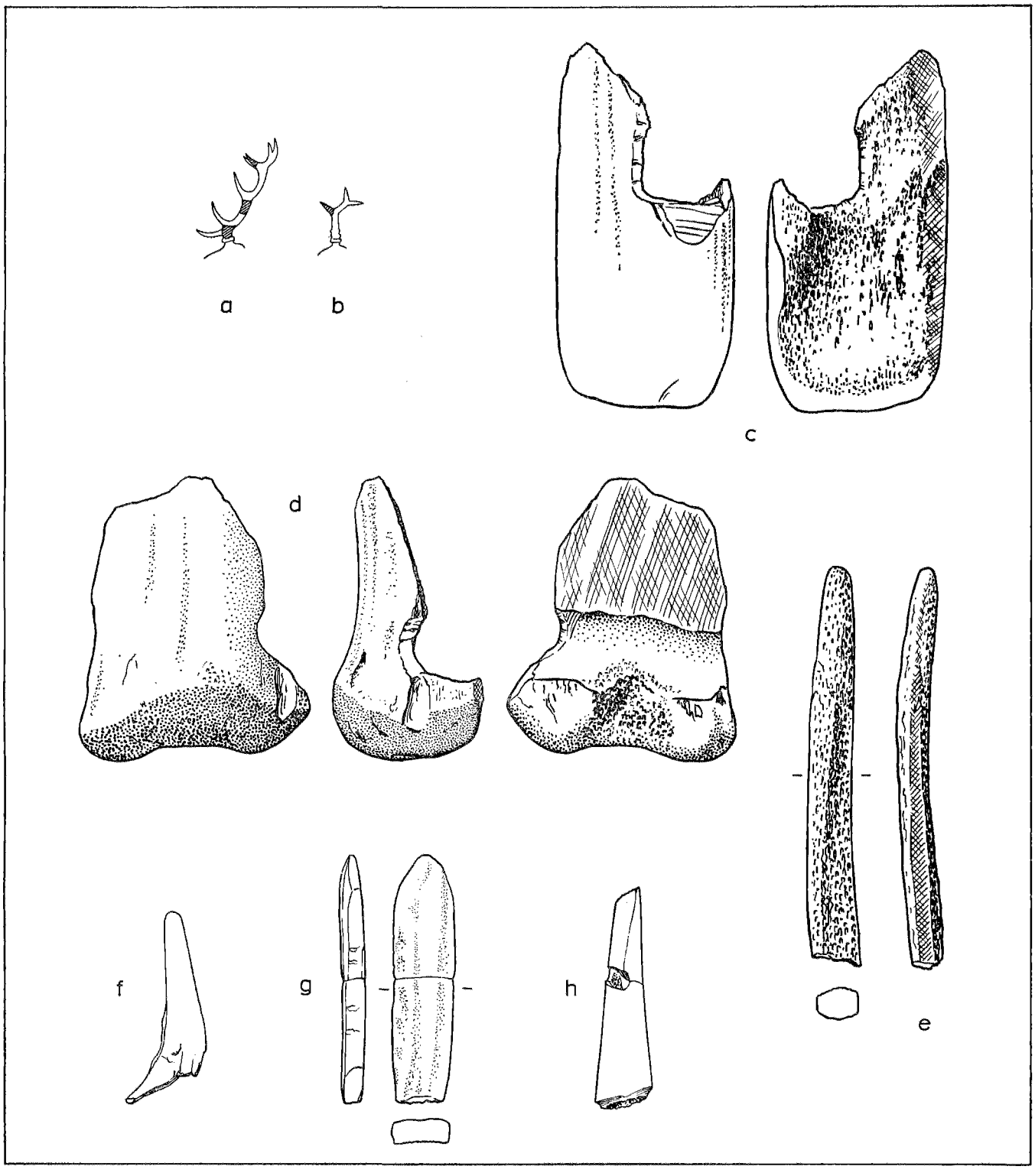
II Bone tools and objects.

f The most numerous objects are small cylinders, made of the shafts of tibiae and metapodiae of small ruminants (fig. 5b–c, f–i, k–o). Whether these pieces are waste products of the bone industry or are the final products is not quite clear to me. Most of them have spiral incisions on the surface, which may have been made by wires. Moreover it seems that at some places the 'wire' penetrated so deep into the bone that at last it broke. The surface of the objects is smooth and shiny from much use. In at least one case (no. 18–109, fig. 5h) the shaft was first polished, indicated by the lengthwise polishing stripes that are still clearly visible; the spiral marks overlie the polishing scratches. It is thus possible that the shafts are parts of larger, broken, tools. In that case, however, it could be expected that a few of the proximal and distal ends should also have been found during the excavation. As it is, only two distal parts of a tibia were collected; these are likewise smooth, and one of them seems to be the handle of an awl (of bronze?) (fig. 5b, c).

No. 18–151, is the distal part of a left tibia of sheep/goat. The distal epiphysis is rounded. The other end has been conically fashioned, so that a narrow hole is preserved in which a (bronze?) awl could be inserted (fig. 5 c, pl. xv: 1).

No. 18–107 is the distal part of a right tibia of sheep/goat. The suture was not yet closed and the distal epiphysis is missing. The animal was 2½ years of age when killed. The shaft shows a smooth cutting surface (fig. 5b). Fig. 5e shows part of the tibia from which the object was made. Length: 44.5 cm.

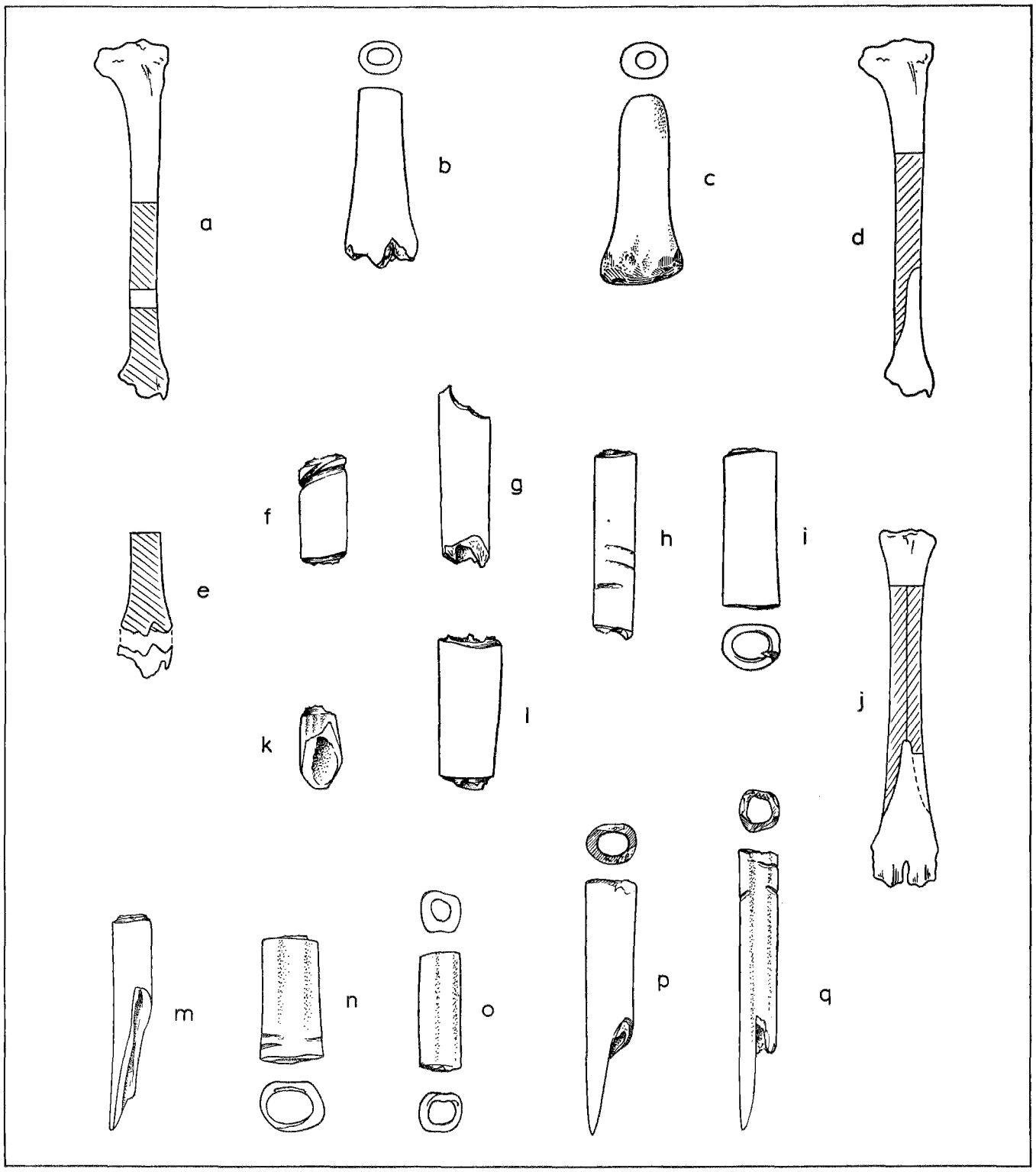
Fig. 4 Velzen: *a–b* the parts of red-deer and roe-deer antler that were used for the tools and objects; *c* part of an antler axe; *d* damaged antler tool; *e*, *g* antler rods of red-deer antler; *f* polished part of roe-deer antler; *h* polished tine of red-deer antler

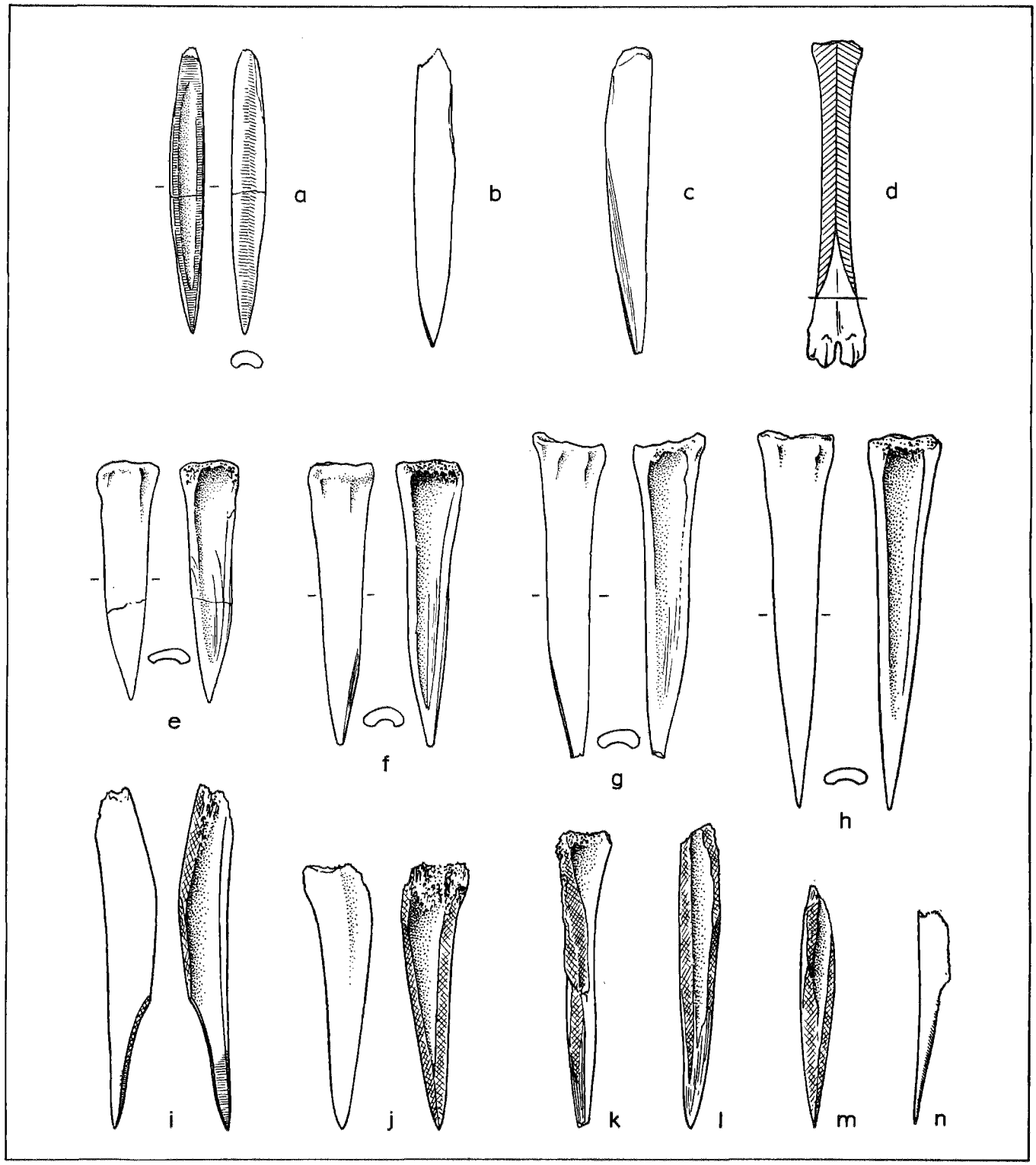


1 2 3

Legends to figs. 4–8: 1. polish marks; 2. parts where the object was broken in prehistory; 3. spongiosa of the bone or antler showing

Fig. 5 Velzen: *a*, *e* tibiae showing which parts were used for the objects *b*, *c*, and *f*, *g*, *i*, *k*, *l*, *m*, *n*, and *o*; *b*, *c* pin handles *d*, *j* tibiae showing the parts used for the hollow awls *p* and *q*; *p* *q* hollow awls

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◀ Fig. 6 Velzen: *a*, *b*, *c* half spindle awls; *d* metatarsus showing the part used for the tools *e–l*; *e–l* points; *i–n* secondary points

The following objects are made of the middle part of the shaft.

No. 18–112a, tibia broken lengthwise. Length 26.5 mm.

No. 14–53, tibia (fig. 5k).

No. 13–01 is possibly part of a tibia of sheep/goat; one side was broken in recent times. Length: left 28.0 mm (fig. 5f).

No. 18–108, tibia, both ends are broken irregularly (recently?). Length: 46.8 mm left over (fig. 5g).

No. 18–109, tibia. Length: 48.0 mm (fig. 5h).

No. 18–106, tibia. Length: 32.0 mm (fig. 5n).

No. 18–111, tibia. Length: 32.0 mm.

No. A.W. 18–108, tibia, one end is broken irregularly. Length: 57.0 mm left over (fig. 5m).

No. 18–108, tibia. Length: 40.0 mm.

No. 18–112, tibia, has been in touch with fire. Length: 39.0 mm (fig. 5i).

No. 18–110, metatarsus. Length: 29.0 mm (fig. 5o). Fig. 5a indicates which part of the tibia was used.

g Socketed awls, made of the shaft of a tibia or a metatarsus of sheep/goat (fig. 6e–h).

No. 18–129, both the proximal and distal end of a metatarsus were severed, part of the shaft was removed, the remaining part shaped into an awl. At the upper end, which was used as a handle, similar grooves were found as on the pieces discussed under *f*. Polishing scratches are still partly visible, showing that the surface was polished transversely to the length. The object may have had two points, one of which was broken off (fig. 5g). In that case it is a different type. Length: 71.0 mm. Fig. 5j shows which part of the metatarsus was used.

No. 18–128, the proximal and distal ends of a tibia were removed. The shaft was partly broken lengthwise and shaped into an awl. The whole surface of this awl is smooth and shiny from much use. On the cut surface of the upper part of the tool the polishing scratches are still visible (fig. 5p). Length: 65.0 mm. Fig. 5d indicates which part of the tibia was used.

h Awls made from the shaft of a long bone.

No. 18–121, awl shaped like a spindle. The marrow cavity is still visible. The sides and outer face are polished transversely on the length of the object (fig. 6a).

No. 18–122, part of an awl shaped like the half of a spindle. The piece was formed by breaking. The marrow cavity was retained, the outer face was polished. The polishing of the narrow sides is transverse (fig. 6b).

No. 18–124, awl; it is not possible to tell how it was fabricated. The outer face is polished lengthwise. The inner face is damaged. The upper side was flat but is also damaged. The point is missing. The awl seems to have been part of a larger object, made secondarily into an awl (fig. 6c).

	No. 18–121	18–124	18–122
Max. length	72.5	(78.0)	76 – still present
Thickness	4.0	–	–

(Measurements in mm)

i Awls made from a metatarsus of sheep/goat which was split lengthwise, posteriolly-anteriolly. The proximal epiphyses was retained, the distal trochlea discarded (fig. 6d).

No. 18–116, left metatarsus, probably split by carving. Polished lengthwise and much used (fig. 6e).

No. 18–115, right metatarsus, probably split by carving. Polished transversely to the length. Much used object, point worn (fig. 6f).

No. 18–117, left metatarsus, split by carving lengthwise, polished lengthwise; much used object. The point is missing (fig. 6g).

No. 18–114, left metatarsus, split lengthwise probably by carving, polished lengthwise. Much used object (fig. 6h).

	No. 18–116	18–115	18–114	18–117
Max. length	61.5	73.0	95.5	–
Width proximal	16.0	18.0	21.0	20.0
Thickness proximal	8.2	8.5	9.5	11.0

(Measurements in mm)

j Improvised awls, not purposely fashioned pointed bone splinters which show use-polish.

No. 18–119, is part of a larger object that was broken, showing length-wise carving traces. The upper part is unfashioned (fig. 6k).

No. 18–118 is a much used splinter, not fashioned (fig. 6j).

No. 18–125 is part of another object, partly polished, perpendicular on the length. The upper part shows grooves like those on the objects discussed under *f* (fig. 6 m).

No. 18–126, part of another object, secondarily used as an awl. Partly polished transversely (fig. 6n).

No. 18–123, part of an object. Smooth and shiny by often use (fig. 6l).

	No. 18–126	18–125	18–118	18–119	18–123	18–180
Max. length	54.5	61.5	69.0	76.0	78.0	88.0

(Measurements in mm)

Fig. 7 Velzen: *a*, *b* rib points; *e* small gouge; *d*, *e*, *f* heavy gouges; *g* humerus of a domestic ox showing the part that was used for gouge *e*

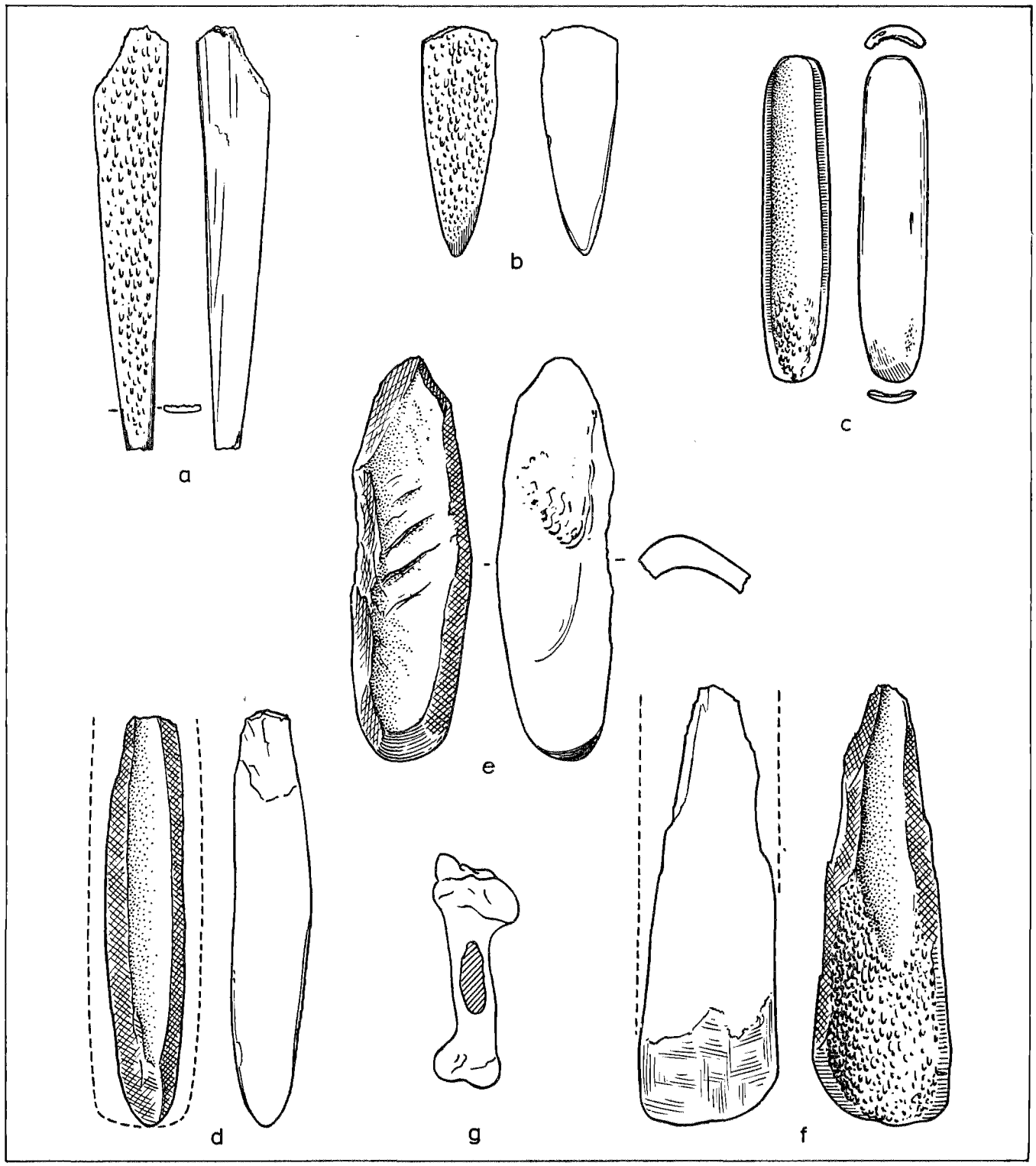
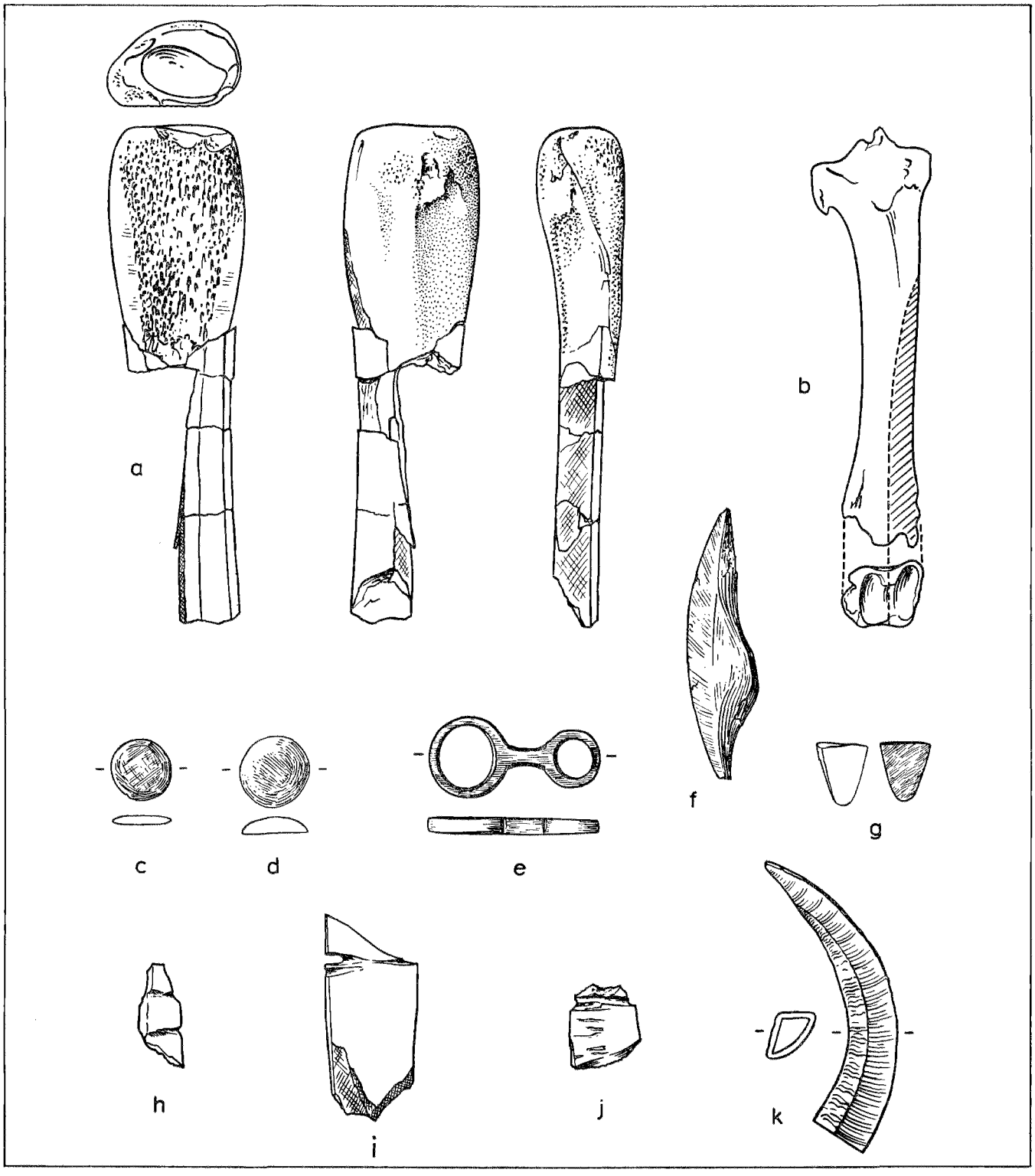


Fig. 8 Velzen: *a* fragment of a chisel (?) made out of a tibia; *b* tibia of a domestic ox showing which part was used for object *a*; *c*, *d* bone disks; *e* double ring; *f*, *g* fragments of the lammellae of the canine of a wild boar; *k* canine of a boar showing which part was used for tools *f* and *g*; *h*, *i*, *j* waste pieces or fragments of broken tools



k Large 'gouges' made of long bones of large mammals (whether they were actually used as gouges is uncertain).
No. 18–154, is part of a gouge of which both sides and upper end are broken off. The object was still used after it was damaged, as is shown by the use-polish on the broken surfaces of the sides (fig. 7d).
No. 18–153 is part of a gouge made out of a humerus of an ox. The object was badly damaged and probably not used afterwards. The working edge is shiny from use (fig. 7e). Fig. 7g shows which part of the humerus was used.
No. 18–152 is a damaged gouge. The spongiosa and the marrow hole of the bone was partly retained. The outer face and sides were polished transversely. The polishing marks are no longer very clear. The object is partly smooth and shiny from much use, partly damaged by the influence of the soil. The working edge is not straight but oblique (fig. 7f).

	No. HW18	HW18	HW18
Max. length	102.0	105.0	113.0

(Measurements in mm)

l Small gouge.
No. 18–130, is a well-made gouge from a femur of an ox. The sides were polished transversely, the outer face is smooth and shiny. The working-edge is oblique (fig. 7c).

Max. length	82.8
Breadth working-edge	11.2
Thickness in the middle	7.0

(Measurements in mm)

m No. 14–52, is a fragment of a large object made of a tibia, probably of an ox. The medial part of the bone was used, the distal epiphyses smoothed and part of the marrow cavity was retained as well as part of the spongiosa. The edges were polished transversely, the outer face lengthwise. The working-edge of the tool is broken off and was not retrieved during the excavation. The shaft is blackened by contact with fire (fig. 8a). Fig. 8b shows which part of the tibia was used.
n Rib points. Ribs of large mammals, probably oxen, were split lengthwise and one end made into a point.
No. H. 18 is a rib point, broken (fig. 7a).
No. 18–131 is part of a rib point (fig. 7b).
o Bone disc.
No. 14–51 is a small disc cut from the shaft of a long bone; one side is flat, the other convex. The disc is polished and shiny from use (fig. 8d).
No. 18–113 is a small disc, cut from the shaft of a long bone; both sides are flat. The object is smooth and shiny from use (fig. 8c).

	No. 14–51	18–113
Diameter	17.5	15.2–15.6
Thickness	4.5	2.5

(Measurements in mm)

p Double ring.
No. 15–100 is a double ring carved out of a long bone. At the end of the smaller ring a constriction can be observed. On both sides there are notches at the place where the central rod joins the rings (fig. 8e).

Max. length	45.1
Max. width	20.8
Max. thickness	4.8
Inner diameter smaller ring	9.8
Inner diameter larger ring	15.0

(Measurements in mm)
The previously described bone discs are too large to fit into either of the two rings.

Parts of broken objects.
No. 18–164 is the posterior part of a tibia, with deep grooves. The sides are polished transversely (fig. 8i).
No. 18–000 is a small part of an object, with grooves (fig. 8h).
No. 18–163, small part of an object with grooves on both sides (fig. 8j).

III Objects made of the canine of the lower jaw of pigs.
q No. 18–77 is part of an object showing carving grooves, made from the canine of a wild boar (fig. 8f).
No. 18–160, is a small fragment of a canine of a pig, probably wild (fig. 8g).
Not a bone implement.
No. H.W. 18–82, is the shaft of a right metatarsus of a small ruminant and shows the gnawing marks of teeth of a small rodent.

DISCUSSION

The conditions for the preservation of organic material in large parts of the Netherlands are unfavourable. Only in the northern and western coastal areas and in the valleys of the large and small rivers have conditions existed that made the preservation of bone material possible.
In the north animal remains were preserved in the clay and manure layers of the *terpen* (dwelling-mounds), in

the west and in the river valleys the organic material was preserved under water or in the chalk-rich dune area. A consequence of this restriction in the possibility of finding organic material is that we often have the impression that prehistoric cultures in the Netherlands were poor in bone and antler objects. That this impression is wrong is also indicated by the fact that elsewhere in Europe where the same cultures are found as in the Netherlands they can abound in bone and antler tools if the conditions for preservation were favourable. We have only to think of the tools collected during the excavations of the villages in small bogs and along the shores of the lakes in Switzerland,[4] southern Germany, and Austria which belong to the tradition of TRB cultures, just as those from the settlements in Schleswig-Holstein and Denmark. In the same way the graves and settlements of the Battle Axe culture in central Germany[5] and Czechoslovakia are rich in tools of organic material. In the Netherlands only two collections of bone and antler objects were the subject of a systematic study. The Late Palaeolithic and Mesolithic finds from the North Sea and Westerschelde in the west[6] and stray finds from the provinces Groningen, Friesland, and Drenthe[7] in the north. This makes it difficult to place the objects from Velzen in a sequence of local traditions, and we have to compare them with assemblages found elsewhere in Europe.

In the first place it is notable that a relatively large number of the bone objects are made from tibiae and metapodiae of the small ruminants, sheep/goat. This in contrast with the tools found in Vlaardingen[8] during the excavation campaigns of 1959/1960 which were made of long bones of ox and red deer. The two gouges made from long bones of domestic ox (fig. 7e, f) are the only tools that belong to a type that was also found in Vlaardingen. The fragment of the antler axe (fig. 4c) may have belonged to the same group of axes made from the base of naturally shed antlers of red deer with a square shaft hole, which were described by Walvius[9] for Vlaardingen, and Elzinga[10] for Zeeland and the Botlek area.

The antler spatulae and rib points are also known from the Pfyner culture (TRB group) in Switzerland from the first half of the third millennium B.C.[11] The first objects belonged to the inventory of several late Beaker graves in England. Smith and Simpson[12] mention that they were found in male graves and associate them with the processing of leather. Similar spatulae were considered by Semenov[13] to be tools for softening and burnishing hides. The last objects are often considered to be flax combs.

The hollow awls and the points made of metatarsus and tibia of sheep/goat are similar to those often found in connection with the Battle Axe Cultures in central and northwestern Europe.[14] Those awls and pins can have been used for such a variety of purposes that it is impossible to consider them all. The most obvious are those in which holes had to be made in hides, fabrics of wool and flax, or in which they were used to guide a thread or wire for basket weaving. Bone points were still used until recently in the fabrication of beehives[15] in the Netherlands.

Typical for Velzen are the cylindrical objects made out of tibia and metatarsus of sheep/goat. Similar obects were found in grave 63 of the cemetery of Västerbjers on Gotland, belonging to the Pitted Ware culture.[16] Srejović,[17] in his book about the Late Mesolithic and Early Neolithic site of Lepenski Vir in the Iron Gate in Yugoslavia depicts a bone object which may be very similar to the object of which the Velsen cylinders were a part. The object of Lepenski Vir consists of four cylinders (fig. 49), unluckily no dimensions are given. Objects like the 'handles' made out of the tibia are found during the Iron Age in the *terpen* of the northern Netherlands, where they were really used as handles for iron pins. Both bone discs also have parallels in the *terpen* (dwelling-mounds).

Much has already been written and speculated about the use and nature of the double ring.[18] That the object was a useful artefact, as suggested by Van Stein Callenfels,[19] seems more likely than the idea that it represents a female goddess[20] or a sun symbol.[21] Also in other and older cultures similar objects were found, as Childe[22] depicts one

4 Clason 1975a (in print).
5 Clason 1969.
6 Louwe Kooijmans 1970–1.
7 Elzinga 1962.
8 Unpublished report by M.R. Walvius.
9 Walvius 1966.
10 Elzinga 1959a; 1959b; 1960.
11 Clason 1975a (in print).
12 Smith/Simpson 1966.
13 Semenov 1964.
14 Clason 1969.
15 Plettenburg 1969.
16 Stenberger *et al.* 1943.
17 Srejović 1973.
18 Modderman 1972; IJzendoorn 1972; Van Stein Callenfels-Vossnack 1973.
19 Van Stein Callenfels-Vossnack 1973.
20 Modderman 1972.
21 IJzendoorn 1972.
22 Childe 1961, fig. 47.

for the Vinča (Tordos) culture (± 4000 B.C.). Van Stein Callenfels describes similar bone objects that were used by the Lapps in northern Sweden and Finland to fasten lassoes. It has to be stated however that those objects were larger. The slight constriction at the end of the smallest ring of Velzen also leaves the possibility open that it was worn as a pendant. The constriction is then the result of the wear on the object by the string with which it was fastened. Gold discs and rings made of shale that have a resemblance to the objects of Velzen were found in graves of the Wessex culture.[23] Piggott compared them with similar objects found in Scandinavia.

The double ring has also a certain similarity with a bone object found in England in the grave of a Bell Beaker warrior in Stanton Harcourt and described by Clark[24] as a girdle fastener, and by Grimes[25] as a ring pendant. This object however has only one ring, while the second 'ring' is more in the nature of a small round hole in the handle of the ring through which a string can be pulled. According to Grimes similar objects have a central and northern European distribution, while Clark states that they are part of the outfit of bowmen belonging to the tradition of the Bell Beaker cultures in Europe.

Also the lamellae of the canines of the wild boar were used in many cultures since the Late Palaeolithic for making objects. The canine of the lower jaw of the male pig is admirably suited for the purpose of obtaining lamellae which can be made into objects with sharp edges for cutting. The canine of the ♂ boar is a three-sided, curved, elongated pyramid, that can be easily divided into three lamellae (table Vk), this contrary to the canine of the ♀ which is more rounded resembling a pointed tube. Although the canines of the domestic boar can be used, those of the wild boar are more suitable because of their large dimensions. The object depicted in fig. 8f is made from a C of the wild boar, and although object g on the same figure is only a small fragment, it seems probably that it was also made from the C of a wild boar. Finally, the object depicted in fig. 8a has to be discussed. Although it is damaged, it is still visible that it was made out of a tibia of a domestic ox. Most probably it was a heavy chisel, and as such reminiscent of the radius and metapodia chisels found in the central and north-western European Eneolithic Beaker cultures.[26] From the Netherlands two more such objects are known. The first was found at the settlement of Zandwerven where remains of both the Vlaardingen and the Protruding Foot Beaker culture were found.[27] The other belongs to the collection of the Fries Museum in Leeuwarden and was found in the valley of the Tjonger near Prandingen. Becker has shown that those chisels were excellently suited for wood working. In general it can be said that the collection of Velzen can be placed in the Eneolithic and Early Bronze Age traditions of central and northwestern Europe.

I am indebted to Dr J.J. Butler for correcting the English.

23 Piggott 1938.
24 Clark 1963.
25 Grimes 1960.
26 Clason 1962; 1969; 1975a; Becker 1962.
27 Clason 1962.

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W.J. VAN TENT

A Cremation Cemetery at Colmschate, Municipality of Deventer, Province of Overijssel

figs. 1–3; pl. XVI

INTRODUCTION

In September 1927 a firm of contractors, N.V. De Geruischlooze Weg ('The Soundless Road, Ltd.'), started on the reconstruction of the main road running through the village of Colmschate. The sand necessary for the work was taken from the high-lying woodland southeast of the Dutch Reformed church of Colmschate. Soon the workmen engaged in digging away the sand hit upon an undamaged urn filled with cremated bones. They smashed it to pieces, hoping to find gold inside. When it appeared that the urn contained nothing but bones, the chagrined workmen threw the – to them – worthless sherds away.

Fortunately, Mr J. Butter, a Deventer schoolmaster and well-known amateur archaeologist, happened to hear of the incident. He hurried to the site, where in the mean time another complete urn (fig. 3, no. 2) and several

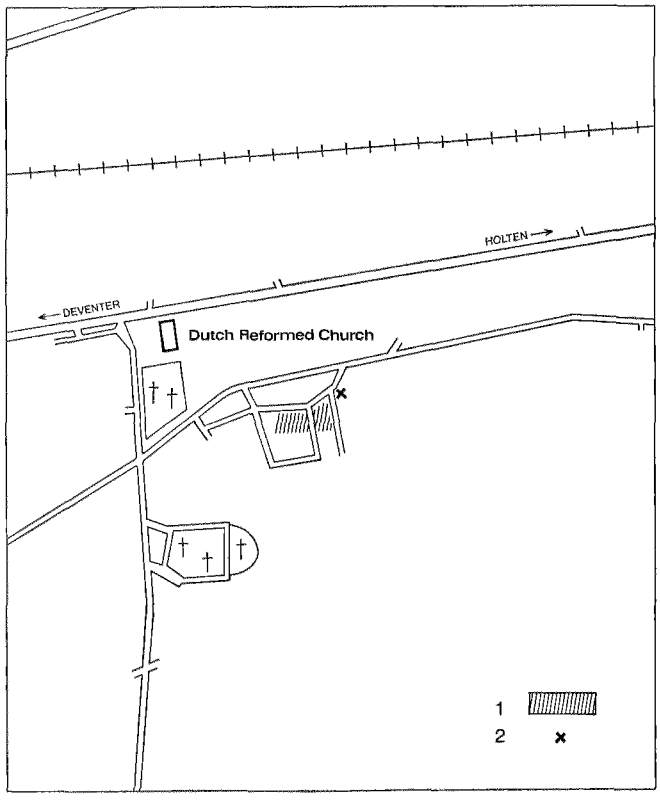

Fig. 1 Colmschate: situation; 1. Approximate position of the urnfield; 2. Find-spot of the decorated urn no. 42

sherds had been unearthed. He collected the sherds of the first urn and was able to reassemble it (fig. 3, no. 1). After that he tried to be present on the site as often as his other work permitted. This was not as often as he would have liked, or as would have been necessary: in his report Butter complains that many of the soil-marks that were gradually being uncovered were dug away in his absence, so that he could neither observe nor record them. However, what little remained was sufficient to prove beyond a doubt that a cremation cemetery had been discovered – a real urnfield, the first ever in the Deventer region. In the second half of October 1927 enough sand had been extracted and the digging was stopped. Further investigation then became impossible.

In 1960 the Colmschate urnfield again attracted attention. When a number of bungalows was being built in an area adjoining Butter's 1927 site on the east, a decorated urn came to light (fig. 3, no. 42, and pl. XVI:1). The State Service for Archaeological Investigations (ROB) at Amersfoort carried out a small excavation on the spot, but no significant features were observed.[1] Probably, therefore, the urn no. 42 lay on the edge of, or even outside, the actual urnfield. The find-spot is now marked by a concrete post (fig. 1, no. 2). The urn itself is preserved in the town hall of the municipality of Diepenveen, at Schalkhaar, because Colmschate formerly belonged to this municipality.

The finds from 1927 were deposited in the Waag Museum at Deventer. Until recently, however, no information was available as to their precise find-circumstances, neither did Butter publish the results of his observations, apart from a brief note in *De Levende Natuur*.[2] To all intents and purposes, therefore, the Colmschate urns and sherds in the Waag Museum had to be regarded as unstratified finds. Even so they were not without importance, as they formed one of the few indications of prehistoric occupation in a wide area east of Deventer. For this reason they became the subject of a *doctoraalscriptie* (final examination essay) written by the author of this article in 1969.

After Butter's death in 1970 copious field-notes, an excavation plan, a report, and a few photographs, all pertaining to the investigation in 1927, were discovered among his papers. Together they provide sufficient additional information to justify publication of the above-mentioned *doctoraalscriptie*, in the suitably abbreviated and amended form of this short article.[3]

THE SITUATION OF THE URNFIELD

The urnfield was situated about 200 m southeast of the Dutch Reformed church of Colmschate, in the so-called Banekaterveld, on a sandy ridge running approximately west–east (fig. 1). In all probability this ridge is to be regarded as a fossil river-dune of late-Pleistocene or early-Holocene date.[4] It is surrounded by a complex of sandy soils varying considerably in height. The lower areas are partly covered with clay, deposited during flooding of the river Schipbeek, which now runs about 1 km south of our site. The higher areas were – and are – suitable for cultivation. For this reason they are often covered by a fairly thick layer of old arable soil. The whole complex of high and low sandy and clayey soils is known as 'Achterhoek-association'.[5] Until recently, and certainly in prehistoric times, such a configuration of soils was an eminently suitable one for a people practising an agrarian economy. The presence of an urnfield in this area, as an indication of some sort of occupation in the neighbourhood, is therefore not to be wondered at.

In 1927 the Banekaterveld was predominantly a woodland area, but since then drastic changes have taken place. With the exception of a narrow strip to the north, the whole of the urnfield site is now covered with dwelling-houses. Nothing is known about any observations or finds made during the building of these houses, apart, of course, from the decorated urn (fig. 3, no. 42, and pl. XVI:1) found in 1960.

1 Modderman 1960.

2 Butter 1935

3 Professor W.A. van Es drew my attention to the Colmschate finds and stimulated the writing of the *doctoraalscriptie* and this article. Mr A.D. Verlinde, provincial archaeologist of Overijssel, helped me in collecting the scattered information about the urnfield. Mrs P.C. Wassenburg-Clarijs, director of the Waag Museum at Deventer, and Mr S. Crommelin, burgomaster of Diepenveen, were so kind as to put the Colmschate finds in their charge at my disposal for study. The drawings were made by members of the ROB drawing-office, especially Mr H.J. Bloklander. To all of them I am grateful for their assistance.
After having been studied, Mr Butter's papers will be deposited in the National Museum of Antiquities at Leiden.

4 *Soil Map of the Netherlands*, scale 1:200,000, sheet 4, soil-type 122.

5 *Soil Map of the Netherlands*, scale 1:200,000, sheet 4, soil-type 137.

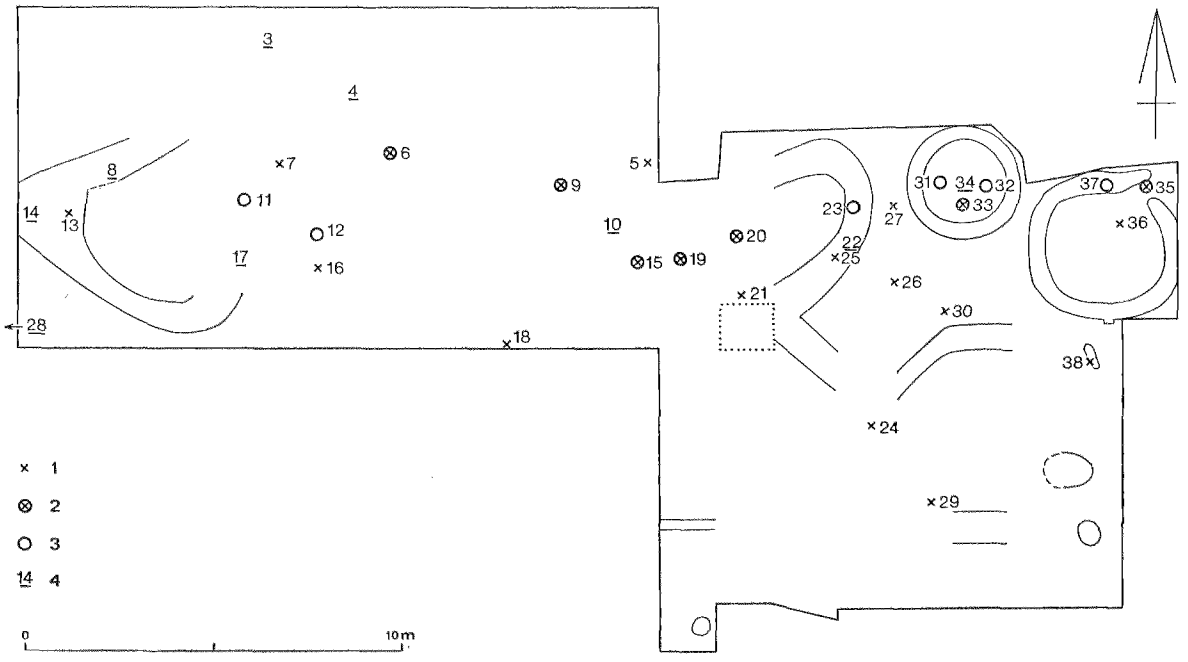

Fig. 2 Colmschate: area excavated in 1927; 1. Cremated bones buried without urn; 2. Cremated bones buried in, or together with an urn (or urn-sherds); 3. Urn, or urn-sherds, found without cremation; 4. Urn-sherd(s), not exactly localized

THE EXTENT OF THE URNFIELD

During the digging operations in 1927 an area of *c.* 320 sq. m was uncovered. It is certain that this area represents only part of the urnfield: in no direction does its boundary seem to have been reached at the time (fig. 2). The small excavation in 1960 (see above) elicited the fact that the urnfield evidently did not extend east of the find-spot of urn no. 42 (fig. 1, no. 2). This was confirmed by a survey of the adjacent arable field, carried out by A.D. Verlinde, provincial archaeologist of Overijssel, and the writer of this article in 1969, which yielded a completely negative result. Unfortunately, further information about the original size of the urnfield will not be forthcoming, as the site is now almost completely built over.

The total number of burials remains equally uncertain. There is a report from an old inhabitant of the village that in his youth some thirty low hillocks were visible in the area of the urnfield. However, even if this report is reliable, it does not take us much further, as there need not be any direct relationship between the number of tumuli and the number of burials. Besides, in his notes Butter mentions the fact that many of his finds were made at an extremely shallow level: no deeper than *c.* 10 cm below the surface. This makes it probable that at any rate part of the ridge has suffered erosion and that the original number of tumuli may have been larger.

As, therefore, our knowledge of the cemetery as a whole is inadequate, any conclusions as to dating or cultural affiliations arrived at in this article cannot but be extremely tentative.

THE FEATURES AND THE BURIALS

The 'excavation plan' (fig. 2), as drawn by Butter, is rather fragmentary. This is not to be wondered at, as Butter could attend the digging operations only now and then (see above). Many features may have been partially or completely destroyed in his absence. In fact, only two features, in the northeast of the excavation, are more or less complete and immediately recognizable: a ring-ditch

with a diameter of *c.* 3 m (pl. XVI:2) and a slightly larger squarish ditch with a gap in the northeast. The other structures shown in fig. 2 are a few pits and stretches of ditch, whose function and – sometimes – shape it is difficult to determine. With a lot of imagination one might perhaps regard some of the ditch-fragments as remnants of oval ditches or perhaps even of so-called long beds, but the gaps in the plan are too large for even a small degree of certainty to be possible on this point.

The area surrounded by the small ring-ditch (pl. XVI:2) produced two halves of different urns (fig. 2, nos. 31 and 32, both, unfortunately, stolen in the course of the excavation) and a cremation with some undatable urn-sherds (fig. 2, no. 33). None of these finds was situated in the centre of the ditch-circle. According to Verwers[6] 'empty' ring-ditches or (to a lesser degree?) those with an excentric cremation tend to occur more frequently in the late Bronze Age than in the Iron Age. The interrupted squarish ditch, on the other hand, is certainly an Iron Age phenomenon.[7] A gap in the northeast, instead of in the more usual southeast, is rare, but does occur, as for instance in the urnfield near Epe, *Kreis* Ahaus, in Germany.[8] The fill of the squarish ditch produced some undatable urn-sherds (fig. 2, no. 37), the area within it a cremation without urn (fig. 2, no. 36), situated near the gap. Just in front of the gap there was another cremation, with the sherds of a decorated urn (figs. 2 and 3, no. 35). Whether the latter has any connection with the squarish ditch is uncertain.

The number of cremations retrieved by Butter is twenty-two. The unstratified urn no. 2 (fig. 3) is now empty, but it may of course represent another cremation, bringing the 1927 total to twenty-three. Urn no. 42 (fig. 3, and pl. XVI:1), found in 1960, contains cremated bones. If they are the original contents of the urn, it follows that, in all, twenty-four cremations are known from the Colmschate urnfield. Thirteen of these (nos. 5, 7, 13, 16, 18, 21, 24–27, 29, 36, and 38), *i.e.* more than half the total number, were found without an urn: it must be assumed that they were buried in a container of organic material, which was not preserved in the soil. Four cremations (nos. 1, 6, 15, and 19) were certainly buried in an urn. In five cases (nos. 9, 20, 30, 33, and 35) the connection between urn, or urn-sherds, and cremated remains is not clear: either the cremation was buried inside the urn, or the urn was put in as an accessory vessel. Nothing is known about the function of the three unstratified urns, nos. 1, 2, and 42. It is probable that nos. 1 and 42 were real cremation urns, no. 2 may have been an accessory vessel. Three urns (nos. 23, 31, and 32 – the latter two stolen in the course of the excavation) seem to have been buried without any cremation at all.

The position of the cremation-burials in relation to the features is difficult to determine, as the plan is so fragmentary. In five cases a close connection between cremation and feature is certain, because the cremated remains were found either in the feature's fill (fig. 2, nos. 13, 25, and 38), or within its circumference (fig. 2, nos. 33 and 36). Three cremations (fig. 2, nos 26, 27, and 30), in the fairly well-observed northeastern part of the excavated area, seem to be unconnected with any feature. The same may hold good for the cremation just outside the gap in the squarish ditch (fig. 2, no. 35), though some kind of connection with the latter is certainly not out of the question. With regard to all the other cremations the position is doubtful: some of them may be unconnected (fig. 2, *e.g.* nos. 5 and 9), others almost certainly belong to features that have not been recorded in their entirety (fig. 2, *e.g.* nos. 11 and 20). At any rate it is clear that the ratio between 'connected' and 'unconnected' cremation-burials cannot be determined.

THE POTTERY

It is difficult to date the few, rather indifferently shaped Colmschate urns with any greather precision than late Bronze Age/early Iron Age.

On typological grounds it might be supposed that urns with a more or less pronounced carination and a cylindrical neck, such as nos. 1, 6, 23, and 35 (fig. 3), are relatively early, *i.e.* late Bronze Age. However, such urns also occur in Ha C/D contexts, *e.g.* in the urnfield of De Hamert near Venlo (prov. of Limburg)[9] and Holsloot (prov. of Drente).[10] Sub-biconical vessels with an everted rim, such as no. 42 (fig. 3, and pl. XVI:1), are regarded as late,

6 Verwers 1975, 32.
7 Hulst 1964, 81; Verwers 1972, 36.
8 Voss 1967, *Abb.* 22, ditch 18.
9 Holwerda (1914), *Abb.* 24: 78; for the dating of this cemetery see Verwers 1966, 50.
10 Van Giffen 1941, *afb.* 20. Urn no. 2, with a cylindrical neck, was found within an interrupted rectangular ditch. A similar feature in the same cemetery produced urn no. 3, of unmistakable Nienburg type.

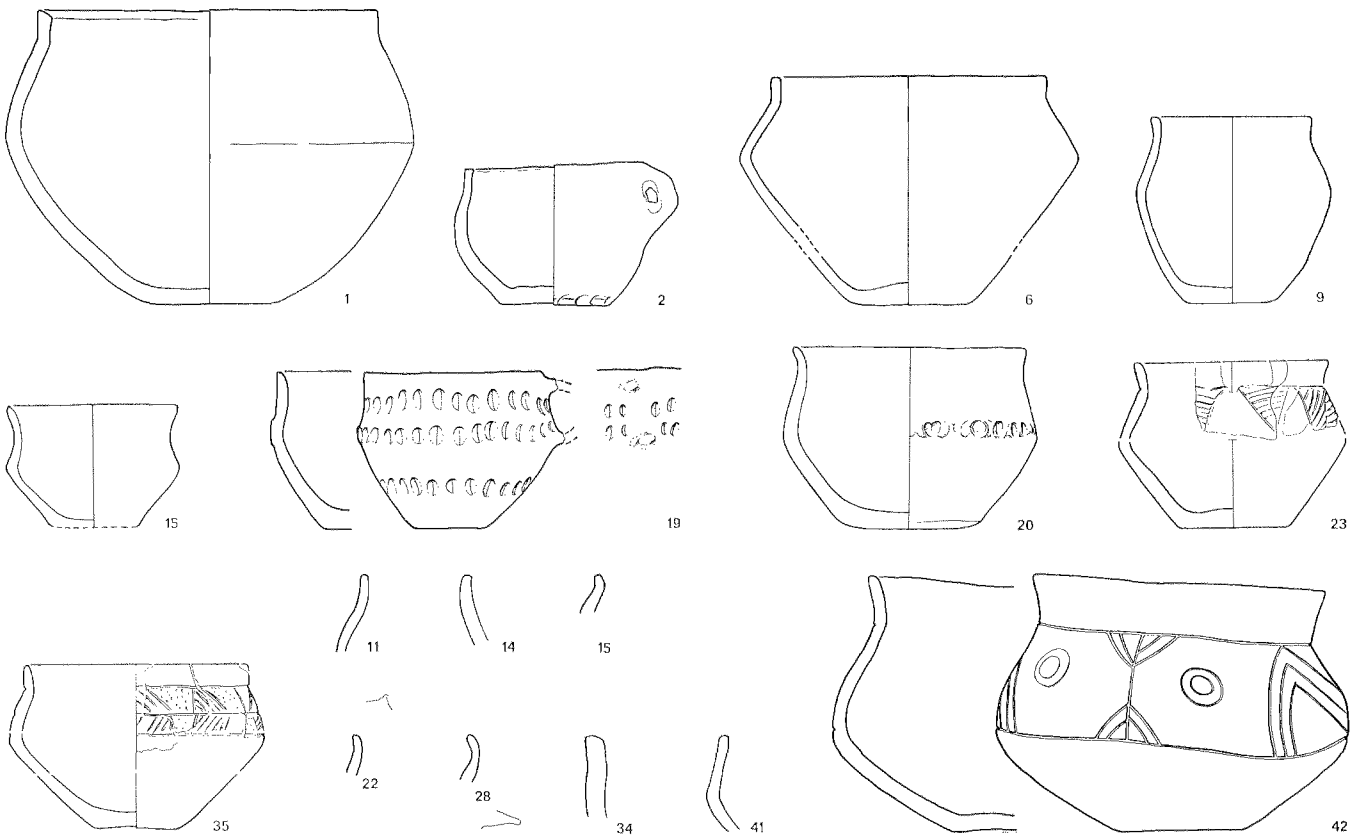

Fig. 3 Colmschate: the pottery from the urnfield. Scale 1:4

1 Colmschate: the decorated urn no. 42
2 Colmschate: the ring-ditch

i.e. early Iron Age. Indeed, the best form parallels for no. 42 are to be found in a late cemetery like De Hamert.[11] On the other hand, this late date hardly agrees with the decoration on the urn, which seems to be much more typical of a Bronze Age context (see below).
Nos. 2 and 19 (fig. 3) are representatives of the so-called *Henkeltasse* (handled cup). No. 20 (fig. 3) is very close to this type, though it does not possess a handle. About the dating of these *Henkeltassen*, especially the decorated ones, contradictory theories are current. According to Waterbolk[12] and Van Es,[13] these are to be dated in the early Iron Age, because their typical fingertip decoration is thought to be related to that of the Iron Age Harpstedt pottery. However, some urnfields in the northern Netherlands have produced *Henkeltassen* that can hardly be dated later than Ha B. A good example is Jipsinghuizen (prov. of Groningen), where sherds of a characteristic specimen were found in the fill of a keyhole-shaped ditch.[14] In others, such as Aalden and Garminge (prov. of Drente), *Henkeltassen* occurred in association with definitely early pot-

11 Holwerda (1914).
12 Waterbolk 1957, 59 and 62–3.
13 Van Es 1967, 118.

14 Van Giffen 1939, *afb.* 1:15. About the dating of the keyhole-shaped ditches see Waterbolk 1962, 18–9.

tery.[15] Evidently the genesis of this type lies in an earlier period than that of the Harpstedt style. Much more likely, therefore, is the view of Desittere and Verwers that the *Henkeltasse* is essentially a Ha B form, and that its decoration owes much to the so-called *Grobkeramik* of the urnfield culture.[16] It should be borne in mind, however, that the *Henkeltasse* does live on into the early Iron Age, sometimes with Kalenderberg decoration,[17] but sometimes also with the traditional fingertip patterns, as in Wijster (prov. of Drente) and Bennekom (prov. of Gederland).[18] For this reason more or less unstratified specimens of the type are difficult to date more exactly than Ha B/C (D).

The other urns (fig. 3, nos. 9 and 15) and the urn-sherds nos. 11, 14, 15, 22, 28, 34, and 41 (fig. 3) are so indeterminate or so small as to defy any attempt at closer dating.

A special element is introduced into the Colmschate material by the decoration on the urns nos. 23, 35 (fig. 3), and 42 (fig. 3, and pl. XVI:1), *i.e.* on three of the ten urns that have been preserved more or less complete – a rather high proportion! Similar patterns – not exactly parallel, but closely related in style and technique – seem to occur especially in German Westphalia, adjacent to the province of Overijssel, on urns both with a cylindrical neck and an everted one.[19] This decoration is, no doubt, derived from the *Kerbschnitt* of the lower Rhine area.[20] It cannot be denied, however, that it seems much more playful and varied than the rather stiff *Kerbschnitt* derivates that are also known in Westphalia.[21] Perhaps, then, we are justified in speaking of a local group within the wide *Kerbschnitt* tradition.[22] It is to this group that the decorated urns from Colmschate belong.

The decorated urns from Westphalia, both those with a cylindrical neck and with an everted one, are dated without exception to Ha B by Asschemeyer.[23] For some specimens such an early date is hard to believe. A subbiconical urn with sharply everted neck from Gladbeck,[24] for instance, which is also a good parallel for urn no. 42 from Colmschate, looks definitely late. However, as a later date cannot be proved, the question must remain undecided.[25]

As Overijssel lies in the border area between two spheres of influence, the 'northern' and the 'southern', it is important to know to which of them the Colmschate pottery belongs. The answer is easy to give: all the vessels with a recognizable shape – urns with a cylindrical neck, or an everted one, *Henkeltassen* – are derived from prototypes well-known along the lower Rhine.[26] The decoration, up to a point, tells the same story (see above).

Essentially, the Colmschate urnfield is a southern one, belonging to the large *niederrheinische Gruppe*.

CONCLUSION

Both the few completely excavated features and the pottery indicate that the Colmschate cemetery must have been in use in the transitional period between late Bronze Age and early Iron Age: late Ha B/Ha C(D). As we have seen, it is impossible to be more exact, both because the long-lived pottery types do not allow of precise dating and because the available material may represent only a limited, and perhaps one-sided, selection of what was originally present.

When we regard the Colmschate urnfield in its regional context, its similarity to the few other known urnfields in the southwest of Overijssel – only two are known: Markelo[27] and Rijssen[28] – is striking. All three of them have produced urns bearing the unconventional 'Westphalian' decorat-

15 Van Giffen 1940, *afb.* 31: 11 and 11a (Aalden); Van Giffen 1934, *afb.* 3: 1 and 1a (Garminge). In both cases the associated urn had the shape of a 'truncated pear' *(afgeknot peervormig)*. According to Waterbolk 1957, 60, urns of this shape are to be dated early: not infrequently they belong to burials within key-hole-shaped ditches – see Waterbolk 1962, *Abb.* 13: 4 and 5.

16 Desittere 1968, 38; Verwers 1975, 26.

17 See *e.g.* Verwers 1975, fig. 5: 142.

18 Van Giffen 1930, *Abb.* 24a: 12 and 12a (Wijster), and Bursch 1933, *afb.* 30: 10 (Bennekom). At Wijster the *Henkeltasse* was associated with a vessel that resembles some late urns from Elp-Noordenveld (*cf.* Waterbolk 1962, *Abb.* 24: 2). The urnfield of Bennekom has not produced any pottery of an earlier date than Ha C/D.

19 Aschemeyer 1966, especially *Taf.* 10, 11, 29, and 30.

20 See *e.g.* Aschemeyer 1966, 16–7.

21 *E.g.* Aschemeyer 1966, *Taf.* 12: 3 and 4.

22 See also Voss 1967, 46–7.

23 Aschemeyer 1966, 17–8 and 20–2.

24 Aschemeyer 1966, *Taf.* 30: 3.

25 It is perhaps significant that the decoration with horizontal grooves and suspended arches, which has a close resemblance to *Kerbschnitt*-prototypes and may therefore be early (*cf. e.g.* Aschemeyer 1966, *Taf.* 12: 3 and 4), occurs only on urns with a cylindrical neck, not on those with an everted one.

26 *Cf. e.g.* Desittere 1968.

27 Braat 1931.

28 Holwerda 1925.

ion and in all of them northern influence is insignificant or even absent. In the urnfields in the north and east of Overijssel – 'De Aust' (near De Lutte, mun. of Losser),[29] 'De Haar' (near Manderveen, mun. of Tubbergen),[30] Haarle (near Ootmarsum),[31] Hulzen (mun. of Hellendoorn),[32] 'De Tij' (near Oldenzaal)[33] – the 'Westphalian' type of decoration disappears and northern influence becomes strong. In the adjacent part of Westphalia, *Kreis* Ahaus, the typical decoration is again in evidence,[34] but northern influence is also strong, as is testified by the many *Doppelkoni* from, for instance, the cemeteries in the municipalities of Alstätte and Ammeloe.[35]

Summarizing the above, we may say that Colmschate, Markelo, and Rijssen, though possessing a strong local flavour, are the northernmost representatives of the *niederrheinische Gruppe*. There must have been close ties between south-Overijssel and neighbouring Westphalia, but also marked differences. Further research in the area will have to decide whether this view is right.

DESCRIPTION OF THE FINDS

With the exception of nos. 1, 2, and 39–42 all the numbers are shown in fig. 2. Depths, if known, are given in centimetres below the surface.

1 1927. Unstratified.
Sherds of biconical urn with short cylindrical neck, the rim is flattened and slants to the inside of the vessel. Smooth, grey-brown ware (fig. 3).
Filled with cremated bones.

2 1927. Unstratified.
Complete sub-biconical *Henkeltasse* with pinched base and flattened rim; the handle is oval in section. Smooth, reddish ware (fig. 3).
Nothing is known about the contents.

3 14/16-9-1927. Not exactly localized.
A few scattered urn-sherds.

4 20-9-1927. Not exactly localized.
1 urn-sherd (now lost).

5 20-9-1927.
Cremated bones.

6 20-9-1927. Depth: 20.
Sherds of rather sharply biconical vessel with short cylindrical neck and horizontally flattened rim. Smooth, reddish ware, with a rather coarse sandy tempering (fig. 3).
Filled with cremated bones; cremated bones were also lying around it (cremation now lost).

7 20-9-1927.
Cremated bones (now lost).

8 21-9-1927. From fill of soil-mark.
A few small urn-sherds.

9 21-9-1927. Depth: 35.
Sherds of small biconical urn with short neck and flattened rim. Coarse, reddish-brown to grey ware, rather coarsely tempered (fig. 3).
Cremated bones were lying around and under it, only a few in it.

10 21-9-1927. Perhaps from fill of pit with charcoal on the bottom (not shown in fig. 2).
A few urn-sherds.

11 23-9-1927. Depth: 10.
1 rim-sherd of rather smooth, grey-brown ware, coarsely tempered (fig. 3), and 1 body-sherd.

12 25-9-1927. Depth: 10.
A few urn-sherds.

13 26-9-1927. From fill of soil-mark. Depth: 30.
Cremated bones and 1 small urn-sherd.

14 26-9-1927. From fill of soil-mark. Depth: 20.
1 rim-sherd of coarse, grey-brown to grey ware, rather coarsely tempered (fig. 3), and 1 body-sherd.

15 26/27-9-1927. Perhaps from fill of pit with charcoal on the bottom (not shown in fig. 2). Depth: 5.
Sherds of small carinated urn with rounded rim. Rather smooth, reddish-brown ware, finely tempered (fig. 3).
Filled with cremated bones.
Probably from the same pit: 1 rim-sherd of smooth, greyish-brown ware, finely tempered (fig. 3), and a few body-sherds.

16 26-9-1927. Depth: 10.
Cremated bones.

17 26-9-1927. Not exactly localized.
A few urn-sherds.

18 Date unknown. Depth: 10.
Cremated bones (now lost).

19 1/2-10-1927. Depth: 25.
Almost complete and undamaged *Henkeltasse* with rounded rim, decorated with three rows of fingernail impressions; the handle is broken off and has disappeared. Rather coarse, brown to greyish-brown ware (fig. 3).

29 Hijszeler 1962 and oral information by A.D. Verlinde, ROB, Amersfoort.
30 Hijszeler 1963.
31 Ter Kuile 1909; Holwerda 1918.
32 Hijszeler 1948.
33 Hijszeler 1951.
34 Voss 1967, *Taf.* 22: 5 (= Aschemeyer 1966, *Taf.* 13: 4) and others.
35 Voss 1967, 106–9 and 111–4.

Filled with cremated bones.
20 2-10-1927 (?) Depth: 10.
Sherds of small, more or less biconical urn with everted neck and rounded rim, decorated with a row of fingertip impressions on the carination. Rather smooth, greyish-brown ware, finely tempered (fig. 3).
Cremated bones were lying around it, not in it (only a few cremated bones are now preserved in the vessel).
21 2-10-1927. Depth: 10.
Cremated bones (now lost).
22 4-10-1927. From fill of soil-mark.
1 rim-sherd of rather smooth, greyish-brown ware, finely tempered (fig. 3), and 1 body-sherd.
23 5-10-1927. From fill of soil-mark.
Scattered sherds of small biconical urn with cylindrical neck and slightly flattened rim; the urn bears a carelessly executed decoration of incised triangles, some of them empty, some of them filled with horizontal or oblique grooves; the decorated zone is demarcated above (not below!) by a single groove (pattern reconstructed from sherds). Smooth orange-red ware, soft and finely tempered (fig. 3).
No cremated bones were observed in the neighbourhood.
24 5-10-1927. Depth: 20.
Cremated bones.
25 5-10-1927. From soil-mark. Depth: 30–35.
Cremated bones.
26 6-10-1927. Depth: 15.
Cremated bones (now lost).
27 6-10-1927.
Cremated bones.
28 6-10-1927. Collected by workman just outside SW corner of excavated area.
1 rim-sherd of smooth, brown to greyish-brown ware, finely tempered (fig. 3), and a few other urn-sherds.
29 8-10-1927. Depth: 10.
Cremated bones (now lost).
30 8-10-1927. Depth: 10–20.
Cremated bones and a few small urn-sherds.
31 10-10-1927 (?). In area surrounded by ring-ditch. Stolen in the course of excavation.
Half of a biconical urn; according to Butter's notes it resembled no. 1 in shape and colour.
No cremated bones were observed in the neighbourhood.
32 10-10-1927 (?). In area surrounded by ring-ditch. Stolen in the course of excavation.
Half of a biconical urn; according to Butter's notes it resembled no. 1 in shape and colour.
No cremated bones were observed in the neighbourhood.
N.B.: Nos. 31 and 32 seem to have belonged to different urns.
33 10-10-1927. In area surrounded by ring-ditch.
Cremated bones and a number of urn-sherds (of the latter only a few are left).
34 10-10-1927. 'From ring-ditch,' no further localization.
1 rim-sherd of coarse, reddish ware, coarsely tempered (fig. 3), and a few other urn-sherds.
35 10-10-1927. Just outside gap in squarish ditch.
Sherds of small biconical urn with short cylindrical neck and rather pointed rim; it bears an incised decoration, divided in two horizontal zones demarcated by single grooves, of groups of grooves and dots (pattern reconstructed from sherds). Black-burnished ware, tempered with fine stone-grit (fig. 3).
The sherds were found together with cremated bones and a few other urn-sherds.
36 12-10-1927 (?). In area surrounded by squarish ditch. Depth: 30.
Cremated bones (now lost).
37 12-10-1927. From fill of squarish ditch.
A few body-sherds of rather coarsely tempered ware.
38 14-10-1927. From fill of pit. Depth: up to 90.
Cremated bones.
39 30-9-1927. Unstratified.
A few urn-sherds.
40 Date unknown. Unstratified.
A few urn-sherds.
41 21-10-1927. Unstratified.
A few rim- and body-sherds of rather smooth, reddish ware, finely tempered (fig. 3).
42 1960. Unstratified.
Almost complete sub-biconical urn with everted neck and slightly flattened rim; it bears an incised decoration, demarcated above and below by a single groove, of alternating tree-like ornaments and three-line chevrons, each ornament being repeated three times; the intervening spaces are each filled with an ornament consisting of two concentric circles. Smooth, yellowish-brown to brown ware; the surface has flaked off in several places. (fig. 3 and pl. XVI:1).
The urn is filled with cremated bones, probably the original contents.

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A.D. VERLINDE

Ein Gräberfeld aus der frühen und mittleren Eisenzeit in Zelhem-Wolfersveen, Provinz Gelderland

Abb. 1–5

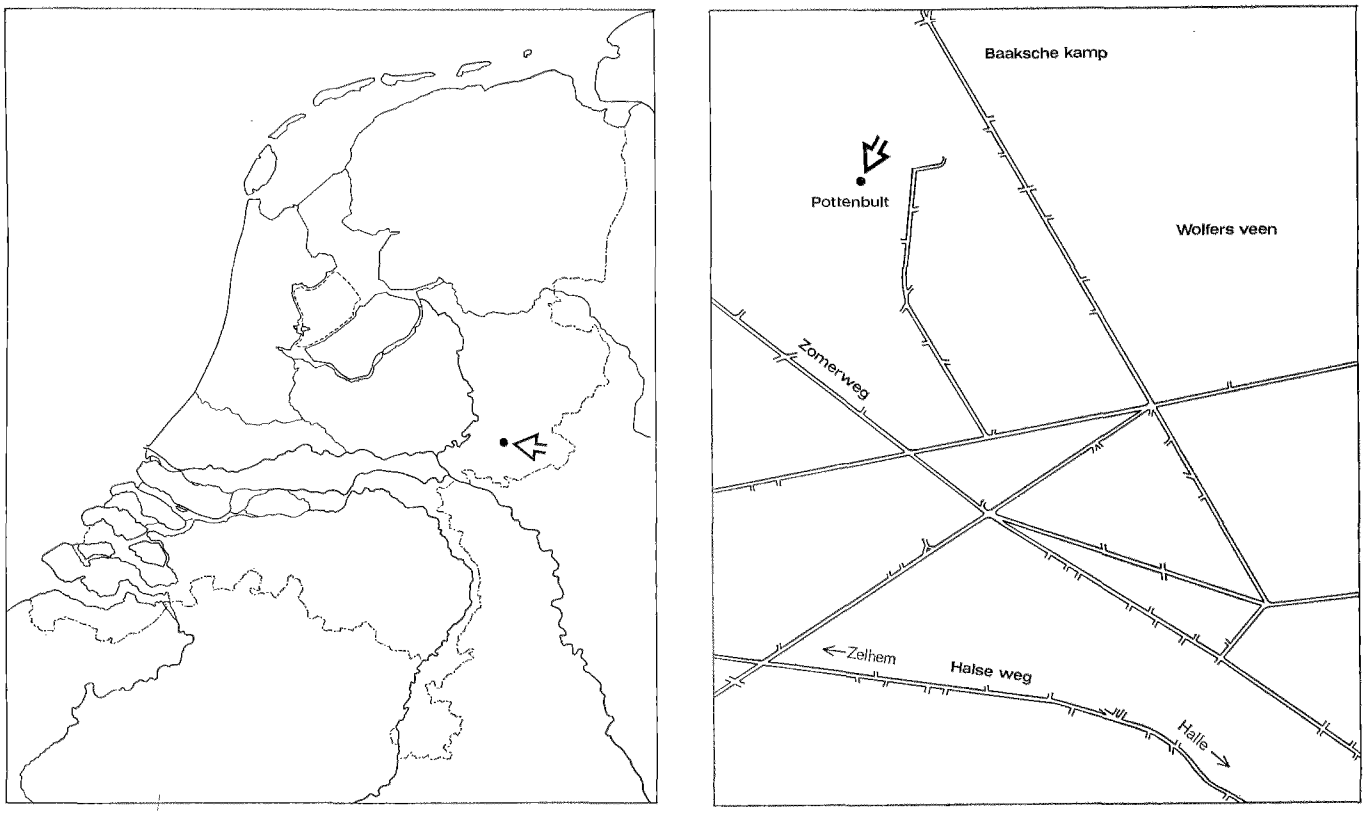

Abb. 1 Zelhem: die Lage des Gräberfeldes (M. 1 : 25.000)

EINLEITUNG

Im Jahre 1941 fand W.T.J. Buddendorf, Rektor der Dorfsschule in Wolfersveen, eine Urne (Abb. 2 Nr. 5; Abb. 3 Nr. 5) in einer Sandgewinnungsgrube in einem Gelände, das im Volksmund 'de Pottenbult' heißt. Über den Bürgermeister von Zelhem wurde das Rijksmuseum van Oudheden (Staatliches Altertumsmuseum) in Leiden über den Fund unterrichtet. Daraufhin unternahm Dr F.C. Bursch im Juni 1941 eine Grabung. Ein Teil des Grundrisses eines Urnenfeldes (Abb. 2) und das Auffinden einer Reihe von Urnen und Scherben (R.M.v.O. e.1942/1.1–8[1]; Abb. 3) waren das Ergebnis davon. Das Gelände wurde im Jahre 1944 urbar gemacht, wobei die Arbeiter,

1 Die Numerierung auf dem Grundriß stimmt mit den Nummern der Urnen auf Abb. 3 überein.

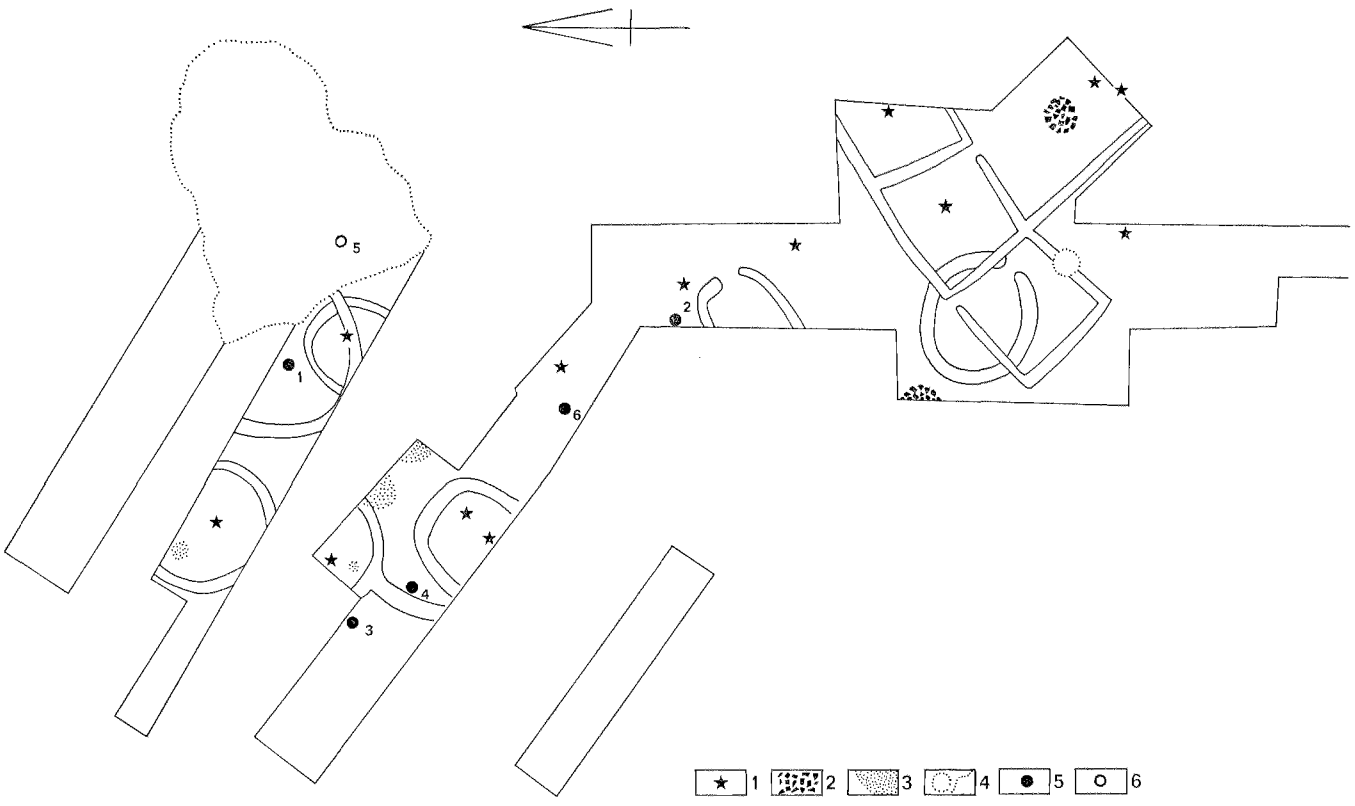

Abb. 2 Zelhem: Grundriss des Gräberfeldes; Grabung F.C. Bursch 1941; Nordrichtung exakt konstruiert (M. 1: 300); 1. Leichenbrand; 2. Holzkohlestelle; 3. Brandstelle; 4. Rezente Bodenstörung; 5. Fundstelle einer Urne; 6. Idem, nicht exakt

Herr Buddendorf und einige seiner Schüler weitere Urnen und Scherben fanden (Abb. 4 und 5).
Im Jahre 1947 wurden die meisten außerhalb der Grabung gefundenen Gegenstände zum Restaurieren an das Rijksmuseum Twenthe in Enschede gesandt, wo sie bis 1970 blieben. Nach der in jenem Jahr vom R.O.B. ausgeführten Restauration und Zeichnung schenkte Herr Buddendorf sämtliche Funde dem Rijksmuseum van Oudheden (mit Ausnahme der beiden Urnen, abgebildet in Abb. 3 Nr. 5 und Abb. 4 Nr. 2), wo sie eingetragen wurden mit den Nummern e. 1970/3.4 – 21.
'De Pottenbult' war ein hochgelegenes Heidegelände um die Höhenlinie von 17.5 m, bewachsen mit Birken und Kiefern. Geographisch gehörte es zu dem kilometerlangen, zwischen niedrigen Böden gelegenen Sandrücken von Aalten (in nordwestlicher Richtung) zu 'Het Zand' bei Zelhem. In prä- und frühhistorischen Zeiten wird dieser Rücken wohl eine wichtige Verkehrsverbindung durch die 'Achterhoek' gebildet haben. Die Bodenkarte der Niederlande (Legendenummer 116) gibt für die Stelle des Urnenfeldes einen hohen Podsol auf sehr armem, nicht lehmigem, feinem Sand an. Koordinate: 41 A – 223.80/448.05.

DER GRABUNGSGRUNDRISS

Die Kreisgräben

Bei der Grabung sind 7 (Teile von) Kreisgräben gefunden worden. Sie scheinen alle zu dem ovalen Typus zu gehö-

ren. Die Längsachse von vier dieser Ovale schwankt um die Richtung Nordost–Südwest, von zwei Ovalen um die Richtung Nordwest–Südost. Die Hauptorientierungen stehen also senkrecht aufeinander. Obschon besonders die Achsenrichtung Nordwest–Südost bei ovalförmigen Gräben öfters zu beobachten ist, etwa bei den Urnenfeldern in Stokkum (Gemeinde Markelo)[2] und Goor,[3] scheint namentlich in Drenthe eine Ost–West Richtung vorzuherrschen.
Der größte Durchmesser der Kreisgräben in Zelhem variiert von etwa 4–6 m. Bei den beiden südlichsten Kreisgräben wurde etwas neben der Längsachse eine Unterbrechung beobachtet, und zwar einmal im Südosten und einmal im Nordosten. Ein- oder zweimal überschneiden zwei Kreisgräben sich.

Die viereckigen Gräben
Der südliche Teil des Grundrisses weist eine Reihe von mindestens drei viereckigen Gräben auf. Der Durchmesser dieser Gräben an den nichtdiagonalen Symmetrieachsen entlang beträgt etwa 4.5 m. Diese Symmetrieachsen sind Nordost–Südwest und Nordwest–Südost ausgerichtet, was mit den Achsenrichtungen der ovalen Gräben übereinstimmt.
Wenn man die Achsenrichtungen von viereckigen Gräben in anderen Urnenfeldern zum Vergleich hinzuzieht, sieht man, daß daneben Nord–Süd- und Ost–West-Orientierungen häufig auftreten. Im Grunde kann dadurch von einer gezielten Orientierung der viereckigen Gräben nicht gesprochen werden. Bei zwei der viereckigen Gräben in Zelhem wurde eine Unterbrechung beobachtet. Sofern anderswo Unterbrechungen vorkommen, was im Norden weniger der Fall zu sein scheint als im Süden, sind sie auf verschiedenste Weise angebracht worden.

Bestattungen mit Urnen
Im nördlichen Teil der Grabung wurden fünf Leichenbrände in Urnen gefunden. Lediglich Nr. 1 lag beim Zentrum eines ovalen Grabens, was für einen Rauhtopf eine ziemlich große Ausnahme ist, weil diese in der Regel als Einzelbestattung oder als Nachbestattung vorgefunden werden. Die übrigen Urnen sind Einzelbestattungen.

Bestattungen ohne Urne
Es sind dreizehn Leichenbrände ohne Urne gefunden worden. Vier davon gehören zu den Einzelbestattungen. Vier Leichenbrände liegen in oder bei dem Zentrum eines Kreisgrabens. Der Leichenbrand im Graben um Bestattung Nr. 1 herum ist wahrscheinlich der umgegrabene, zentrale Leichenbrand innerhalb eines älteren Kreisgrabens. Ein Leichenbrand liegt exzentrisch innerhalb eines Kreisgrabens mit zentralem Leichenbrand. Hier handelt es sich also wahrscheinlich um eine Nachbestattung. Zwei Leichenbrände liegen zentral innerhalb eines viereckigen Grabens. Schließlich liegen zwei Leichenbrände dicht beisammen in einer undeutlichen Lage bei den viereckigen Gräben.
Innerhalb der beiden offenen Kreisgräben im Süden wurden keine Bestattungen gefunden; der Leichenbrand des südlichsten Grabens könnte durch den südwestlichsten viereckigen Graben vergraben sein oder, ebenso wie dies bei dem nördlichsten offenen Graben der Fall sein könnte, hoch in oder auf dem Boden bestattet worden sein. Die dritte, unseres Erachtens aber weniger wahrscheinliche Möglichkeit wäre, daß es gar keine Bestattungen gegeben hat.

Gruben.
Der Grundriß zeigt zwei Holzkohlestellen im Süden und vier Brandstellen im Norden, während nach Auskunft von Herrn Buddendorf Urne 5 direkt neben (oder in?) einer Grube mit Holzkohle und einigen Leichenbrandresten stand.

DIE MOBILIEN

Sowohl die Urnen und Beigefäße aus der Grabung (Abb. 3) wie die einzeln gefundenen Exemplare (Abb. 4) sind gängige Vertreter der Keramik aus der Frühen und Mittleren Eisenzeit. Die Nummern 2 und 4 (Abb. 3) und Nr. 2(Abb. 4) gehören zu den Schrägrand-Urnen. Nr. 3 (Abb. 4) kann wegen ihrer verkürzten Schulter als eine weiterentwickelte Form der Schrägrand-Urnen angesehen werden, während die Schalen Nr. 3 (Abb. 3) und Nr. 4 (Abb. 4) wahrscheinlich aus dieser Gruppe entwickelt worden sind.[4] Die Schulter von Urne 2 (Abb. 3) ist mit acht ziemlich regelmäßig verteilten Dellen verziert. Die Urnen sind glattwandig oder poliert, nur die Bäuche der Nummern 2 und 3 (Abb. 4) sind rauhwandig bis leicht gerauht, beziehungsweise gerauht, eine Erschei-

2 Braat 1931.
3 Verlinde 1975.
4 Verwers 1972.

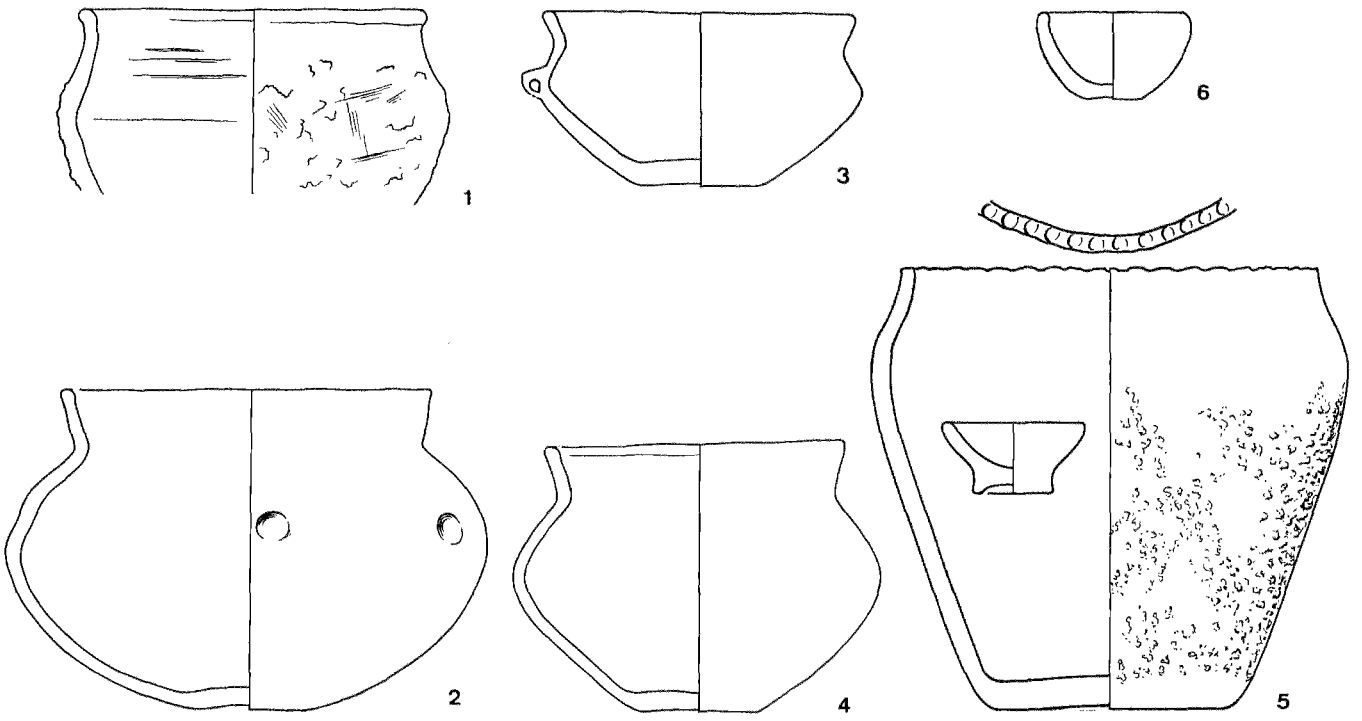

Abb. 3 Zelhem: Urnen aus der Grabung

nung, die häufiger auftritt. Ebenso wie viele Schrägrand-Urnen aus dem niederrheinischen Gebiet sind die Exemplare aus Zelhem mit einem etwas hohlen Boden versehen. Lediglich Urne Nr. 5 (Abb. 3) läßt sich im reinen Wortsinn zu den Harpstedt-Urnen zählen, dank dem Rand mit Fingerspitzeneindrücken. Urne Nr. 1 (Abb. 4), die im übrigen gleichartig ist, entgeht dieser Etikettierung nur durch den unbearbeiteten Rand.[5] Außer der Form und der Schlickung haben die beiden Urnen auch einen ein wenig hohlen Boden gemeinsam, ebenso wie eine nichtgerauhte bzw. glattgestrichene Zone über dem Boden. Der gekehlte Rauhtopf Nr. 1 (Abb. 3), der etwa 18 cm hoch sein mag, gehört zu einer Formvariante, die sowohl in der Frühen Eisenzeit[6] wie in der Mittleren und Späten Eisenzeit[7] auftritt. Aus dem Urnenfeld erwähnen wir schließlich den Eierbecher aus der Harpstedt-Urne, der in der Höhe des Randes gefunden wurde, sowie den einfachen Napf Nr. 6 (Abb. 3), der laut Feldzeichnung und Eintragung im Inventarbuch offensichtlich nicht bei einem Leichenbrand gefunden wurde.

In Abb. 5 sind einige Scherben abgebildet, die zum Teil bei der Grabung gefunden worden sind (e. 1942/1.7–8), zum Teil bei der Urbarmachung. Die Scherben gehören zu einer benachbarten Siedlung und sind auf Grund der Verzierung und der Profile in die mittlere und/oder späte Eisenzeit zu datieren.[8]

ALLGEMEINER ÜBERBLICK UND DATIERUNG

Aus der 'Gelderse Achterhoek' und den 'Liemers' sind heute etwa vierzig Urnenfelder bekannt. In sieben von

5 Voss 1967, S. 44; Verwers 1972.
6 Waterbolk 1957.
7 Verwers 1972, S. 81.
8 Siehe Haps, Verwers 1972.

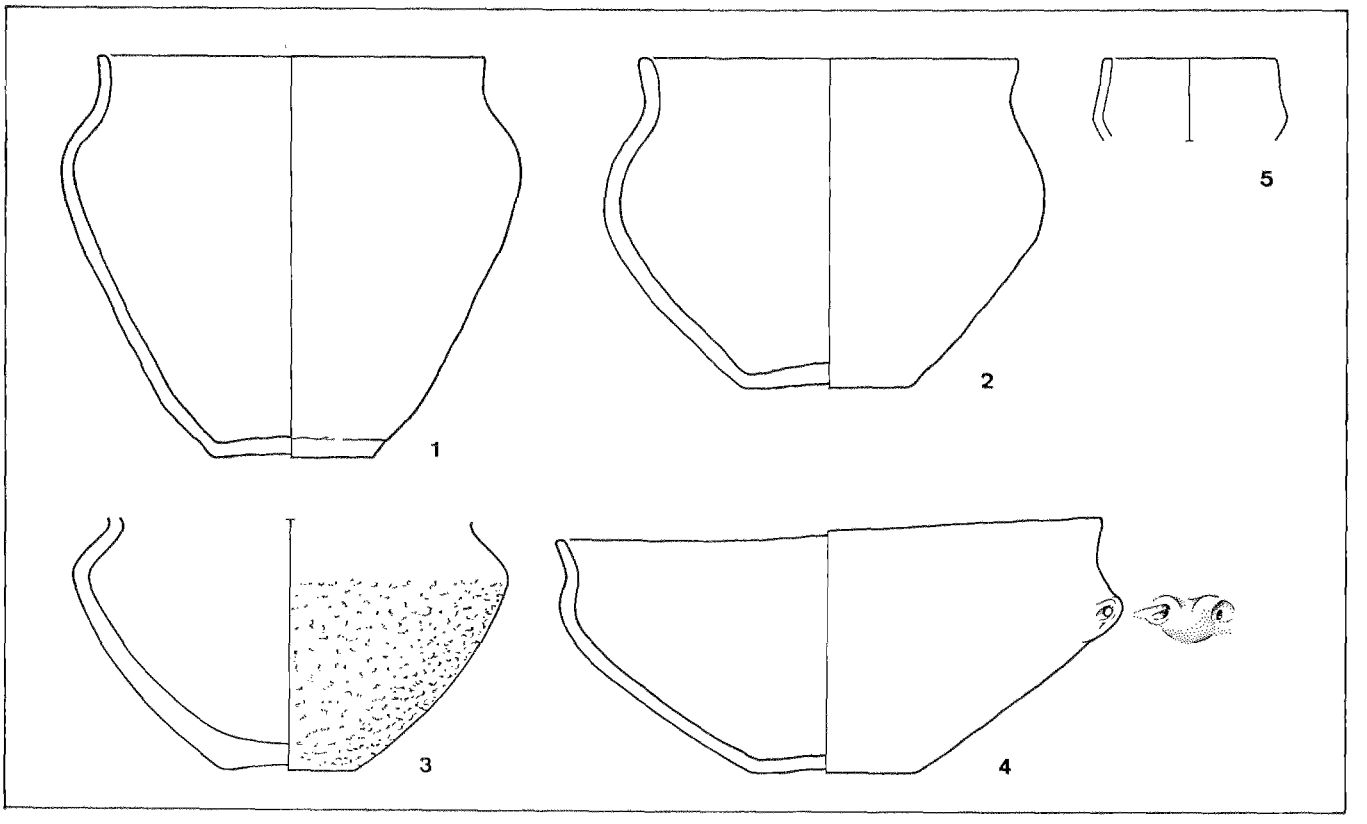

Abb. 4 Zelhem: Urnen von außerhalb der Grabung

diesen Urnenfeldern sind Fragmente ausgegraben worden deren Feldangaben wir hier kurz zusammenstellen.

1 Hupsel, Gem. Eibergen. Grabung F.C. Bursch 1935 und 1936 und A.D. Verlinde 1971.[9] Bodenspuren: ein 18 m langer Graben (vom Goirle-Typus) und etwa elf (Teile von) Kreisgräben.

2 Mallem, Gem. Eibergen. Grabung F.C. Bursch 1938. Bodenspuren: ein 17.5 m langer Graben (vom Goirle-Typus) und elf (Teile von) Kreisgräben, davon zwei mit einer Unterbrechung.

3 Wolfersveen, Gem. Zelhem. Grabung F.C. Bursch 1941. Siehe Abb. 2 dieser Arbeit.

4 'De Bataaf', Gem. Winterswijk. Grabung F.C. Bursch 1942. Bodenspuren: ein geschlossener und ein offener Kreisgraben.

5 Stokkum, Gem. Bergh. Grabung W.C. Braat 1949.[10] Bodenspuren: sechs (Teile von) Kreisgräben.

6 Barlo, Gem. Aalten. Grabung A. Bruijn 1959. Bodenspuren: vier (Teile von) Kreisgräben.

7 Nach Willems (1936) hat auch A.E. van Giffen im Jahre 1932 das Teil eines Urnenfeldes untersucht, und zwar bei 'De Kroon', Gem. Aalten.

Obwohl wir hier auf den Urnenbestand in Achterhoek und Liemers nicht eingehen können, scheint die Behauptung nicht zu gewagt, daß der Einfluß der niederrheinischen Kulturprovinz, die direkt an das hier zur Diskussion stehende Gebiet grenzt, dominiert. Auffällig ist das relativ bedeutend weniger häufige Auftreten von Schrägrandurnen und von Kreisgräben mit Unterbrechung in den Gebieten nördlich von der Achterhoek.

Die archäologische Datierung der in Zelhem gefundenen Strukturen läßt sich, kurz zusammengefaßt, wie folgt aufstellen:

9 Verlinde 1972.

10 Braat 1949.

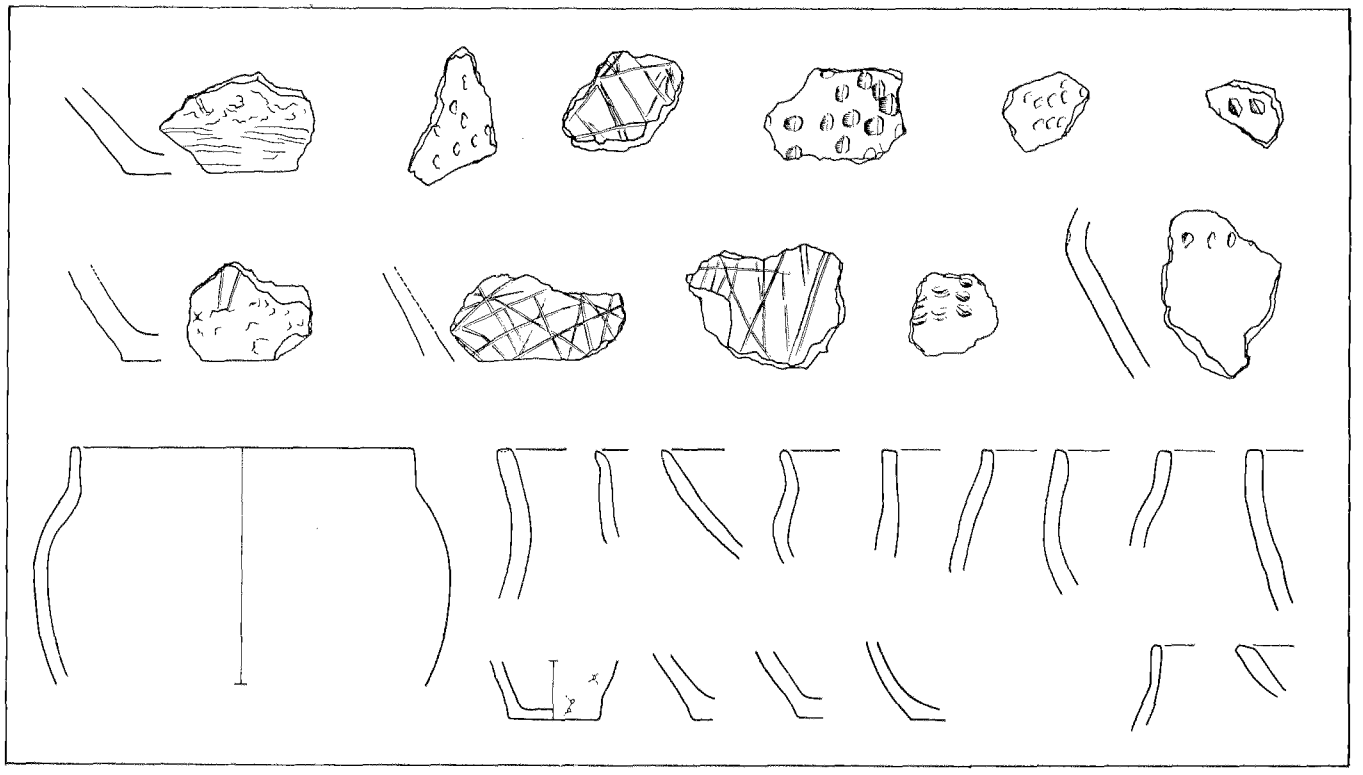

Abb. 5 Zelhem: Scherben einer benachbarten Eisenzeitsiedlung

1 Die kleinen, geschlossenen Kreisgräben treten auf von der späten Bronzezeit bis in die Römerzeit.
2 Die offenen Kreisgräben gibt es von der frühen Eisenzeit bis in die Römerzeit.
3 Die viereckigen Gräben, mit oder ohne Unterbrechung, sind von der mittleren Eisenzeit bis in die Römerzeit belegt.
Von diesen drei Strukturen ist ungewiß, ob sie Kontinuität bis in die Römerzeit besitzen, wobei besonders die späte Eisenzeit in den Niederlanden einen Unbekanntheitsfaktor darstellt.
Die Urnen (und Beigaben) sind für die Datierung in stärkerem Maße ausschlaggebend. Schrägrand-Urnen, von welchem Typ es in Zelhem drei Exemplare gibt, sind fast ausschließlich in die frühe Eisenzeit zu datieren. Der entwickelte Typus Nr. 3 (Abb. 4) kann in den weiteren Verlauf derselben Epoche eingeordnet werden. Die beiden Schalen von Abb. 3 und 4 sind wahrscheinlich aus den Schrägrand-Urnen entwickelt worden und müssen bereits in die mittlere Eisenzeit eingereiht werden.[11]) Die Harpstedt(ähnlichen) Rauhtöpfe werden in die frühe Eisenzeit bis in die mittlere Eisenzeit datiert. Das gleiche gilt für die öfters mit Harpstedt-Urnen assoziierten Eierbecher. Beide Formen scheinen ihre Hauptverbreitung nach dem Anfang der frühen Eisenzeit zu haben. Die relativ späte Datierung des Rauhtopffragments Nr. 1 (Abb. 3) wird durch die Überschneidung eines Grabens mit dem das Urnenfragment umgebenden Graben suggeriert. Der kleine Napf Nr. 6 (Abb. 3) besitzt sowohl in Haps[12] (frühe/mittlere Eisenzeit) wie in Nijnsel[13] (mittlere Eisenzeit) gute Parallelfälle.
Zusammenfassend finden wir in Zelhem Elemente aus der frühen und mittleren Eisenzeit, sowie eine Reihe von an sich schwerer zu datierenden Erscheinungen. Es ist

11 Verwers 1972.
12 Verwers 1972.
13 Hulst 1964.

möglich, daß das Gräberfeld einen Zeithiatus aufweist, weil eine oder zwei Strukturen, die zu der mittleren Eisenzeit gerechnet werden müssen (die viereckigen Gräben und möglicherweise der Graben um Urne Nr. 1) ältere Strukturen überschneiden. Die viereckigen oder rechteckigen Gräben sollten wahrscheinlich nicht mehr zu den Urnenfeldern gezählt werden. Sie umschließen ja nahezu ohne Ausnahme Leichenbrandbestattungen ohne Urnen oder sind völlig fundlos, während außerdem ihre Anfangsdatierung um 500 v.Chr. angesetzt wird. Man vergleiche hierzu auch die Bestattungsprozentsätze ohne Urne pro Periode für die südlichen Niederlande bei Verwers.[14]

14 Verwers 1972, S. 46.

DANKWORT

Der Verfasser stattet gerne Herrn W.T.J. Buddendorf, durch dessen Informationen und großzügige Mitarbeit das Urnenfeld so vollständig wie möglich beschrieben werden konnte und die Mobilien den ausgegrabenen Funden beigefügt werden konnten, seinen Dank ab. Wir danken dem Herrn Direktor des Rijksmuseum van Oudheden in Leiden für seine Erlaubnis, die Grabungsergebnisse von 1941 zu veröffentlichen, sowie den Konservatoren L.P. Louwe Kooymans und A. Peddemors für die im Museum erteilte Hilfe. Auch Herr R.S. Hulst gab zu verschiedenen Problemen Auskunft.

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H.K.J. COWAN

The Betuwe on the Tabula Peutingeriana

figs. 1–2

The identification of many Dutch place-names on the Tabula Peutingeriana is still highly uncertain, and among the most difficult areas in this connection are the Betuwe and surroundings. Only recently Stolte[1] has stated that 'the entire road from Vechten to Nijmegen is a problem which has not been satisfactorily solved yet,' and this applies both to the places themselves and to the distances. Now it is well known that distances on the Tabula have been marked carefully, but that geographical data have been indicated only schematically. There is no question of scale, hardly even of compass bearings. As a long-drawn 'strip' from Britain to Asia the map has been designed largely in one linear direction. It is, therefore, better not to speak of 'the north road' and 'the south road from the coast to Nijmegen' as Stolte does, but, *e.g.*, of the 'upper' and the 'lower' road.

A second important point is the fact that the Rhine has been indicated clearly enough, but that the Meuse (Maas) and the Waal are shown as one continuous river. Since, however, *Noviomagus* is shown just *above* ('north of') this river, it is probable that the maker has meant the Meuse rather than the Waal, at least in this area.[2]

Now when one considers the distances, it appears that from *Fictione*/Vechten[3] to *Noviomagus*/Nijmegen it is xvi + viii + xiii + viii = 45 miles. The question then arises which kind of miles these are, the Roman *milia (passuum)* of *c.* 1.5 km or the Gallic *leugae* of *c.* 2.25 km. Stolte[4] has argued that and why we must expect *leugae* in

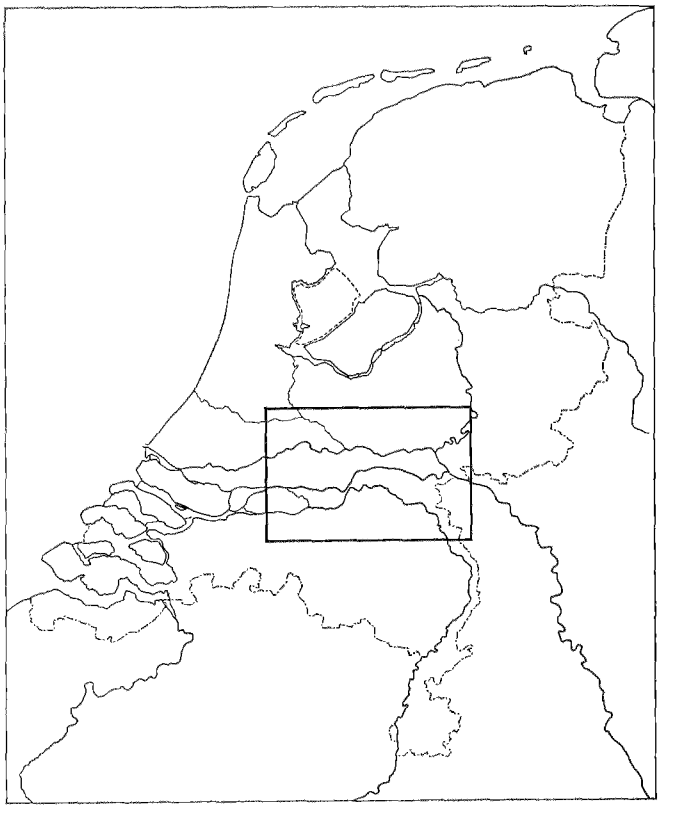

Fig. 1

1 Stolte 1963, 88.

2 At its mouth this river is named *Fln. Patabus*, but on its upper course the name *Mose* occurs twice, and this suggests that the Meuse is meant here.

3 The beautiful colour facsimile of the original map in the Oesterreichische Nationalbibliothek, published in Irwin Isenberg & Richard M. Haywood's 'Caesar' (Dutch version by P.C. Koolhoven) and already mentioned by me before (Cowan 1968, 192, n. 2), reads *Fictione* sufficiently clearly, and it is not necessary to write *Fletione* as the copies of the current editions do.

4 On the question of Gallic *leugae* as against Roman *milia passuum*, see Stolte 1938 and Stolte 1959.

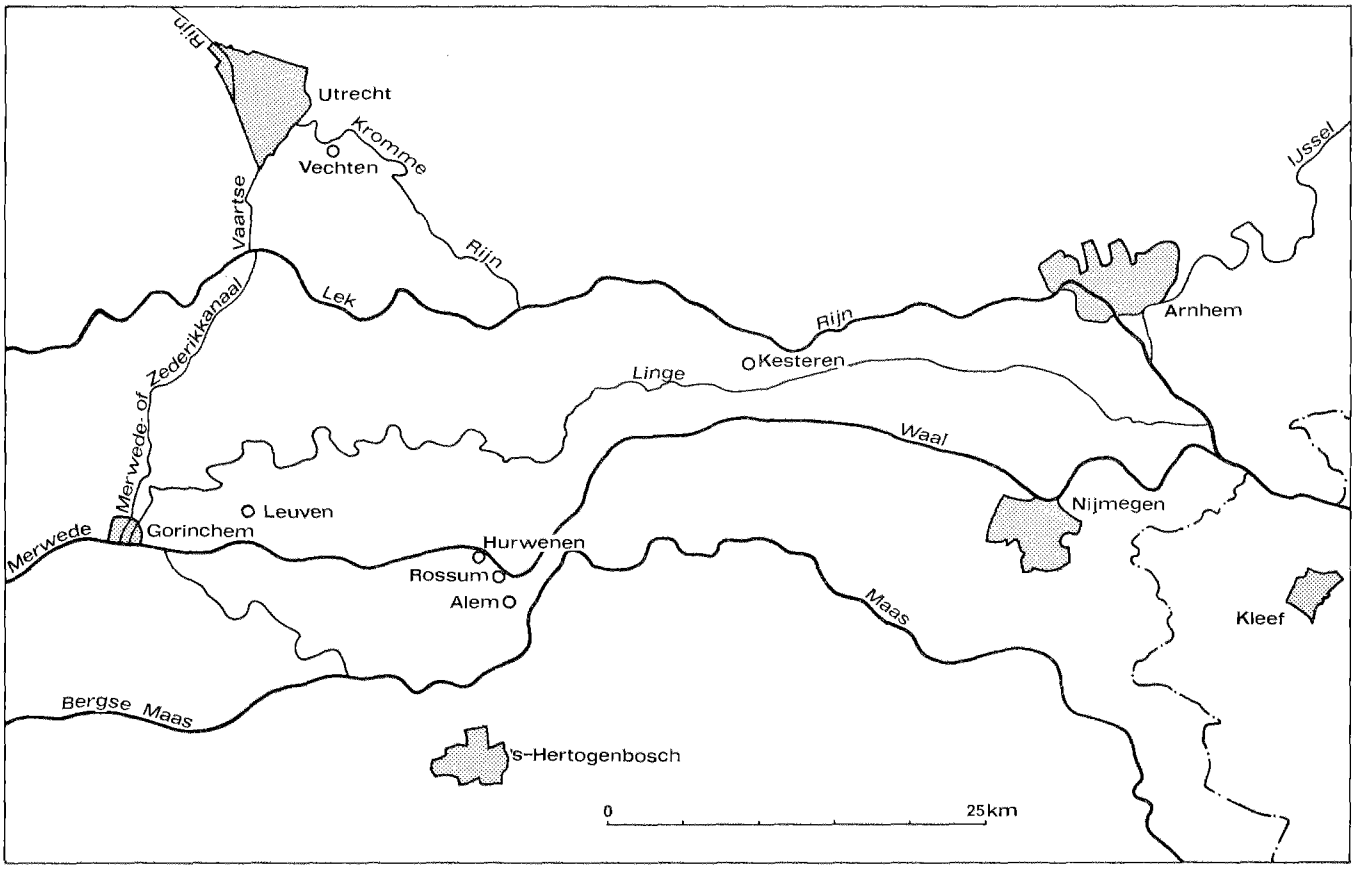

Fig. 2 The Betuwe in Roman times

these regions. Now 45 leugae = *c.* 101 km. The distance, as the crow flies, between Vechten and Nijmegen is, however, only *c.* 54 km, and even by the road along the Kromme Rijn ('Winding Rhine'), via Bunnik, Werkhoven, Cothen, Wijk-bij-Duurstede, Rijswijk (on the south bank of the Lower Rhine or Nederrijn), Maurik, Ingen, Lienden, Kesteren, Ochten (on the Waal), Dodewaard, Andelst, and Slijk-Ewijk the distance is hardly more than *c.* 68 km. Hence there is a difference of no less than c. 33 km or *c.* 33% to the disadvantage of the route along the Rhine. The difference is too great to explain it away by assuming for Roman times an even more winding road along this route than the one just described, which is not modern itself. It seems to me that there are then only two alternative possibilities to explain the difference: either the hypothesis of a *detour* which the upper road on the Tabula can have made through the Betuwe, or the application of Roman *milia* instead of Gaulish *leugae*. Let us consider the latter possibility first. 45 Roman *milia* would make 45 × *c.* 1.5 km = *c.* 67.5 km for the total distance from *Fictione* to *Noviomagus* and that fits very well with the *c.* 68 km of the road along the Kromme Rijn, the Lower Rhine, *etc.* In this connection it is striking that on the *lower* road of the Tabula *Ad duodecimum, i.e.*, 'at the 12th (milestone),' is shown at 18 miles from *Noviomagus*. Stolte[5] has solved this apparent contradiction by treating the figure xviii as a mistake and correcting it in xii. For, he says, 'if Ad duodecimum means: at the twelfth milestone, the figure should be viii; if it means: at the twelfth *leuga*-stone, it should be xii.' Although, after ample weighing of arguments pro and contra, he admits that 'on an average... the interpretation: at the twelfth *milestone* (is)more tempting,'[6] he chooses, not without hesitation therefore, 'in favour of the interpretation Ad duo-

5 Stolte 1938, 712; 1959, 60–2.

6 Stolte 1959, 62.

decimum = at the twelfth *leuga*stone.' The figure xviii should then be corrected in xii.

There is, however, a third alternative, which H. Hettema Jr. too has already put forward[7]: 'Ad duodecimum' can also mean that the mile*stones* in the *field* showed *leugae*, but that the *distances* on the *Tabula* are marked in *milia*. For 12 leugae = 27 km = 18 *milia*! It is not necessary then to assume an error, and according to a common rule of textual criticism an interpretation which can save a text is to be preferred to one which requires changing it. Besides, the Tabula is not limited to Gaul and adjacent countries only, and it seems plausible that it should have applied one system of measurement to the entire map, and then, of course, the Roman system.

The arguments which Stolte – who, as far as I know, has not commented on Hettema's interpretation – has produced in favour of measuring with *leugae* on the Tabula, seem rather strong, but they are not quite decisive. For it is very much a question whether the use of *leugae* has really been indicated explicitly on the Tabula itself, as he thinks[8]; the words 'usque hic legas' near *Lugduno*/Lyon may, in the forementioned context, very well mean: 'in the *field* the *stones* showing *leugae* end here.' *Mutatis mutandis* the same can be said of Ammianus Marcellinus' note, cited by Stolte: 'Ex indeque non millenis passibus sed leugis itinera metiuntur.' And as for Stolte's argument[9] concerning the distances between *Lugduno* and *Fletione (Fictione)* which do not fit with milia, but do with leugae, for Stolte's interpretation too it is necessary to assume errors in some places. Besides, *leugae*, as we have seen, do not fit for the road from *Fictione* to *Noviomagus* and for this too Stolte supposed errors in the Tabula.[10] It is certain that copying and/or other mistakes have been made, and the interpretation will, therefore, always be more or less subjective. Yet, I repeat, Stolte's argumentation in favour of *leugae* seems rather strong. Also the route along the Kromme Rijn, Lower Rhine, *etc.* offers few possibilities for an onomastically justified identification of places. For those reasons we shall now go into the other possibility suggested above for the explanation of the discrepancy on the route *Fictione*/Vechten to *Noviomagus*/Nijmegen, *viz.* the hypothesis of a *detour* based on Tabula distances in *leugae*. A detour, notably for the crossing of the Waal, has already been suggested before by Byvanck,[11] but this has been rejected by Stolte[12] who explains the discrepancy by mistakes in the map. The detour meant by me has, however, the advantage of permitting a reasonable identification, based on onomastic agreement, of the places concerned, although here too a small error must be assumed in one of the figures. This error is, however, very easily accounted for from a palaeographical point of view. Also it is not necessary to take the word 'detour' in this context too literally. For it is possible that the Tabula, which, for instance, does not even mention Utrecht (*Traiecto* in the Itinerarium Antonini), wanted for some reason or other to show only this route along a north–south connection and a road through the Betuwe along the Waal, and omitted the road on the Rhine frontier because this had perhaps become less important. In this connection it will be remembered that very recently Bogaers[13] has recalled the fact that at the time of the Tabula the Rhine was no longer the border of the Empire in Holland, but the Waal. With this fact my reconstruction agrees very well, at least partly. We shall return to this point later.

If one draws, with Vechten as centre, an arc of a circle with a radius of 16 leugae = *c.* 36 km for the distance *Fictione–Levefano* (the next station) in the direction of the Betuwe, then in a southerly direction the arc reaches Brabant. But in a somewhat south-south-westerly direction *within* that radius we find at *c.* 26 km, as the crow flies, from Vechten – and distances in a crow line are usually shorter than those by roads– a small place called Leuven situated in the extreme west of the Tielerwaard, just to the north of the Waal near Vuren. This Leuven is mentioned in the 8th century (in a copy of *c.* 1222) as *Loffna*, in the beginning of the 9th century (in a copy of *c.* 1170) as *Lefna*, and in the beginning of the 13th century as *Leofenun*.[14] Since *Levefano* is the ablative and the nomi-

7 Hettema 1938; *cf.* also Hettema 1936, 673. Hettema restricts his conclusion to the *lower* road and thinks that *leugae* have been used for the *upper* road of the Tabula Peutingeriana. His motives for this difference in treatment of the two roads in the same country are, however, insufficient in my opinion.

8 Stolte 1938, 703.

9 Stolte 1959, 58–9.

10 Stolte 1938, 713–4 and note 4.

11 Byvanck 1922.

12 Stolte 1938, 713–4.

13 Bogaers 1968, 156.

14 Gysseling 1960, *s.v.* Leuven (the second). *Cf.* also De Vries 1962, *s.v.* Leuven 2. Gysseling adds to 'Leuven': [Duiven: Gl.]. There is, however, another Duiven in the Lijmers, southeast of Arnhem. But we are concerned here with the Tielerwaard, as is shown by De Vries' addition to 'Leuven 2': 'near Duiven in the Tielerwaard'. Duiven in the Lijmers is called Dulven by De Vries (with *l* 'inserted later'), which is not mentioned by Gysseling.

native is probably *Levefanum*, identification of this name with Leuven seems phonetically justified in view of the medieval forms of the latter name. On account of these old names the *Λεύφανα* of Ptol. II, 12, also suggests itself, although its situation on the Rhine does not fit very well.[15] This Leuven lies, as I have said, at *c.* 26 km from Vechten as the crow flies, but by the road along the Vaartse Rijn, *via* Vreeswijk and Vianen, along the Merwede-canal (Zederik-canal, an ancient river, the *Zederik* or Zeerick, Seerick), and *via* Arkel and Kedichem, the distance is *c.* 37 km, and this agrees rather well with the 16 *leugae* = *c.* 36 km of the Tabula. It should be borne in mind in this connection that the route followed by me only serves as illustration and need not necessarily be *exactly* the road of the Tabula.

The remaining distance between *Levefano* and *Noviomagus* then is, according to the Tabula, 8+13+8=29, *i.e.*, counting with leugae, *c.* 65 km, and the distance in a crow line between Leuven and Nijmegen is *c.* 53.5 km. The intermediate stations on this road are *Carvone* at 8 leugae or *c.* 18 km from *Levefano*, and *Castra Herculis* at 13 leugae or *c.* 29 km from *Carvone*. For *Carvone* I suggest identification with *Hurwenen* which, it is true, is situated on the left (south) bank of the Waal, but amply above (north of) the Meuse, in which connection it should be remembered what has been said above about the representation of these rivers on the Tabula. *Hurwenen* lies about 20 km from Leuven measured by the winding road along the north bank of the Waal *via* Herwijnen, Haaften, Tuil, and Zaltbommel. This agrees well enough with the 18 km of the Tabula. Older forms of the name are *Huerwen* in 1244, *Horwen* in 1286, *Horwinen* in 1327, and *Herwynen* in 1414. The second component of the name has been derived from Gmc. **winjō*, 'meadow,' but concerning the first component J. de Vries[16] has observed that the varying vowel makes it uncertain whether it must be derived from Gmc. **harwa-*, 'flax,' or from *hore*, 'mud.' Since, however, his **Harwynen* of 1320 does not exist, **harwa-* can be left out of consideration. The first component of the oldest forms seems to point to an original long vowel *ō* > *uo* > *uə*. That would rule out *hore*, 'mud.' This long *ō* can derive from a Pre- and Proto-Germanic **ā*, so that *Carvone* would have had a long *ā*.[17] In that case the first component may be best derived from **kār-ŏ-*, 'dear, lovely' (*cf.* Lat. *cārus*, Goth. *hōrs*, Oldiceld. *hōra*, Oldeng. *hōre*, Oldhg. *huora*, Neth. *hoer*). As for the second component, the oldest forms seem to indicate that *-wijnen* in the younger forms is not original; possibly it is a popular reinterpretation in analogy to the near-by *Herwijnen*, with which it has been repeatedly confused already in the Middle Ages.[18] For this second component **winjō-* is, therefore, untenable as a basis, at least directly. I suggest a connection with **won-*~*wun-*, which is related to **winjō-*, and from which derives, *i.a.*, Neth. *wonen* (Oldlowfrank. *wonon*, Oldhg. *wonēn*, Oldeng. *wunian*, Oldsax. *wonian*, *wunon*). In our case we may have a derivation with the abstract suffix *-ī*, but more probably a formation like Oldhg. *wunn(i)a*, 'meadow'; *cf.* the Dutch hydronym *Wonne (wetering)* near Bodegraven.[19] The nominative of *Carvone* then would not be **Carvo* but *Carvoni-s* < **Kār(ŏ)-wŭn-jā-*, and it would mean something like 'Lovely Residence' or 'Lovely Meadow.' The Latin transcription can, moreover, have been influenced by a frequent Latin formation. Gysseling has derived *Carvone* from Gmc. **harwōn-*, 'the bitter one' (*cf.* **harwa-*, 'bitter, sour,' *i.e.*, with short *ă*), which would be formally acceptable if we should not have a long *ā*, but which seems semantically weak. The fact that for Hurwenen one must cross the Waal and back again need not be an objection. Thus between *Fictione* and *Noviomagus* one had to cross the Lek

15 For the identification of *Λεύφανα* with *Levefano*, see *i.a.* Stolte 1963, 89–90.

16 De Vries 1962, *s.v.* Hurwenen. Gysseling does not mention Hurwenen. For 1320 De Vries mentions a form with *a*, Harwynen; wrongly however. His apparent source (Anspach 1893, *s.v.* Hurwenen) is wrong on this point, for the sources cited there give *Herwynen*, whilst another copy of the same original document, which is kept at Zaltbommel, has *Horwijnen* (I owe this note to Dr D.P. Blok).

17 At least some names on the Tabula date from a time in which the Germanic sound-changes had not quite spent their force yet, as shown by, *e.g.*, *Coriovallium* > Heerlen. Notably as far as Gmc. *ō* < **ā* is concerned it is well known that this change has long been in a state of transition which even lasted until the time of the separate dialects, or at least until Gothic in which language it has, before vowels, stopped at *å* (*cf.* Boer 1924, paragraphs 41 and 57). As for the *C*, this is, perhaps, only a way of spelling *Ch*.

18 See Muller 1921, 418 *s.v.* Horwinen, Hurwenen. I owe this note to Dr D.P. Blok.

19 Unlikely is Middle Neth. *wonne*, *wunne* (Oldhg. *wunn(i)a*, Oldsax. *wunnia*, Hg. *Wonne*) meaning 'joy, pleasure', although this too is related. As for the possibility of a derivation with an abstract suffix it should be noted that *-ing/-ung*, with which Neth. *woning*, Hg. *Wohnung* are formed, has abstract function also, but this suffix did not exist in the oldest known Germanic, *i.e.* in Gothic.

and the Waal in any case, to say nothing of smaller rivers as, *e.g.*, the Linge. For *Ceuclum*/Cuyk one had to cross the Meuse and for *Coriovallium*/Heerlen back again across that river. Stolte[20] has rightly stressed 'the military means and the technical capacities of the Romans.' Moreover, as we shall see below, there are indications that there has been here an important junction with the 'lower' road of the Tabula. However that may be, it seems improbable to me that Carvone is Kesteren, as Gysseling has suggested as a possibility, but Stolte and Bogaers state positively.

The next station on the road to *Noviomagus* is *Castra Herculis* at 13 leugae or *c.* 29 km from *Carvone*. In our train of thought an identification is possible for this with *Kesteren*, which in the second half of the 8th century was called *Castre* and in *c.* 850 *Castra*. Although there have been many Roman *castra* along the *limes*, the fact of this place with this name in this direction cannot be ignored. The loss of the qualification *Herculis* is easily explained by abbreviation in daily use, whilst the elimination of pagan mythological names and symbols after christianization can also have played a part. Kesteren lies in a straight line at *c.* 22 km from Hurwenen, and by the very tortuous road along the north bank of the Waal by way of Varik, Ophemert, Tiel, and Ochten at *c.* 30 km, and this agrees with the *c.* 29 km according to the Tabula, if the figure 'xiii' means leugae.

The remaining stretch from *Castra Herculis* to *Noviomagus* is 8 leugae or *c.* 18 km. But the distance from Kesteren to Nijmegen is *c.* 21 km in a straight line, and by the road *via* Ochten, Dodewaard, Andelst, and Slijk-Ewijk it is even *c.* 28 km. This means that there is a proportionally important difference of *c.* 10 km as compared with the 18 km of the Tabula. And the alternative of the 'detour' would seem to fail here. But a solution is possible which can save it. To that end it is necessary to read xiii instead of viii leugae for the distance from *Castra Herculis* to *Noviomagus*, an emendation which can very easily be accounted for palaeographically; in a similar manner Byvanck, and at first Stolte too,[21] reduced the Tabula distance *Fictione–Levefano* from xvi to viii, *i.a.* by reading inversely, v instead of x. If one admits 13 leugae instead of 8, this would mean a difference of 5 leugae = *c.* 11 km more, and this would compensate the difference of about 10 km between Kesteren and Nijmegen, and the entire distance according to my 'detour' would agree with that between *Fictione* and *Noviomagus* on the Tabula. But, however plausible, this emendation is a hypothesis. In the Itinerarium Antonini one can find no support for it, because this travel-book does not mention *Castra Herculis* nor *Noviomagus*. For *Carvone* too, which Stolte and Bogaers identified with Kesteren, and which the Itinerarium Antonini does mention, this travel-book is of little help. For the distance from *Fictione* to *Carvone* according to the Tabula is xvi + viii = 24 leugae, or 16 leugae if one agrees with Byvanck and Stolte[22] in reading viii instead of xvi. But according to the Itinerarium from *Traiecto*/Utrecht to *Carvone* it is xv + xxii = 37 leugae, or 27 leugae if one reads xii instead of xxii.[23] The discrepancy between Tabula and Itinerarium – which is, even in the most favourable comparison, still 3 leugae or *c.* 7 km – cannot be explained by the distance between *Traiecto*/Utrecht and *Fictione*/Vechten. Moreover, the unknown intermediate station *Mannaricio* between *Traiecto* and *Carvone* mentioned in the Itinerarium which Stolte located in Lienden[24] but Gysseling in Maurik,[25] does not occur on the Tabula. Farther east of *Carvone* too the Itinerarium is of little use. To *Arenatio* the distance by the upper road in the Tabula is 31 leugae or *c.* 70 km, but applying my correction of xiii instead of viii leugae between *Castra Herculis* and *Noviomagus*, it is 36 leugae or *c.* 81 km .This latter figure corresponds to the distance Hurwenen – Kesteren – Nijmegen – Cleve (Kleef) or the near-by Rindern, which is about 80 km. But according to the Itinerarium Antonini the distance from *Carvone* to *Harenatio* is no more than 22 leugae. This does not fit any better if one does *not* apply my emendation of xiii instead of viii leugae after *Castra Herculis*. Rather it is nearer to the measures of the *lower* road of the Tabula, where the distance from *Grinnibus*/Rossem to *Arenatio*, applying Stolte's emendation of xii for xviii at 'Ad duodecimum', is shown as v + xii + x = 27 leugae

20 Stolte 1963, 84, note 5.

21 Stolte 1938, 713, note 4; *cf.* also Stolte 1963, 88.

22 Stolte 1938, 713.

23 Stolte 1938, 714.–Agreement between the figures on the Tabula and those in the Itinerarium Antonini can only be found with *milia passuum* for *the latter* (*cf.* Parthey/Pinder 1844, 176, who comment on the text, which reads in 'mpm', that '...ceterum pro milibus passuum *aliquoties* leugae ponendae videntur'; italics mine, C.). For 24 leugae (Tabula)= *c.* 53 km and 37 milia (Itin.) = *c.* 55.5 km, the difference of *c.* 2.5 km being accounted for by the distance *Traiecto–Fictione*. But this leads too far afield!

24 Stolte 1938, 713.

25 Gysseling's identification has been rejected by Schönfeld and Stolte, see Stolte 1963, 92.

or *c* 60.5 km (the distance between Rossem and Cleve/Rindern along the south bank of the Waal *via* Nijmegen = *c.* 62 km). However, since the Itinerarium here shows the figure xxii twice in succession, the chances are that an error has been made. Now, since Hurwenen lies in the immediate proximity of *Grinnibus*/Rossem (less than one leuga away), its identification with *Carvone* could suggest a southerly route for the road of the Itinerarium, possibly even the identical one of the *lower* road on the Tabula. But this leads to wild speculations. Rightly, therefore, in my opinion, Hettema[26] has concluded that there is no sense in comparing Tabula and Itinerarium east of *Traiecto* and *Fictione*, because it is very doubtful whether the two documents followed the same route there. Also, these problems need not, in my opinion, detract from the evaluation of my 'detour' alternative for the upper road of the Tabula, which requires only one very plausible emendation.

Some support *can* be found for this alternative in the view, recently put forward again by Bogaers,[27] that the Waal and no longer the Rhine was the Empire's military border. According to Bogaers the *upper* road of the Tabula skirted the south bank of the Waal to *Druten* (which he identifies with *Castra Herculis*), crossed the river at this point, and then went northward to *Carvone* (which he locates in Kesteren). The road from *Carvone* to *Harenatio* in the Itinerarium Antonini then had, in his opinion, a more northerly course along the Rhine. To that end, however, he must postulate that the figure xiii after *Carvone* on the Tabula does not bear on the distance to *Castra Herculis*, but, following the *limes* road of the Itinerarium, on some other important place farther away on the Rhine between *Carvone* and *Arenatio*. This hypothesis seems too farfetched to me. More rational appears to be what Bogaers says about military bases which in all probablity existed further west of Nijmegen on the Waal. In this connection he mentions not only Druten, but also Rossem (where he locates *Grinnibus*) and 'other as yet unknown places further west.'

On account of what has been said Bogaers then locates the *lower* Tabula road *farther south*, leading from Nijmegen *via* Wijchen to the Meuse and then skirting the north bank of this river.

Bogaers' construction thus deviates considerably from the almost generally accepted view that the lower road of the Tabula followed the south bank of the Waal and then led to Rossem *(Grinnes)*. His motives for this deviation are, in my opinion, not convincing. But his remarks on the Waal as military border are valuable enough. Such a line may have had strongholds on both sides of the river. Moreover, the country between the Rhine and the Waal was or had been Roman territory, and certainly not all strong positions there had been abandoned. The 'detour' reconstructed by me through the Betuwe would, then, have connected such positions; only *Carvone*/Hurwenen was situated behind the Waal-line, as, of course, was *Noviomagus*/Nijmegen. The lower road of the Tabula then connected positions behind the Waal. Near *Carvone*/Hurwenen and Rossem (or the close-by Alem) which is only 2 km away, there was, then, a place where the two roads came together, or at least neared each other. Many Roman finds have come to light here, and there can have been an important junction.

The foregoing can, perhaps, also explain why the Itinerarium Antonini does not mention the so-called 'south' road: the two roads on either side of the Waal were, on this section, not so very far apart. However, it does not explain why the section of the Rhine road west of *Fictione* and *Traiecto* was still important enough to be shown, and this is a weak point. But, I repeat, I do not see an alternative for a 'detour' other than by measuring with *milia passuum* unless one palters too much with the Peutinger map and the distances indicated on it. I do not make a decisive choice, but the dilemma deserves to be presented as such, so it seems to me.

26 Hettema 1936, 673.

27 Bogaers 1968, 155–6.

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PETER J.A. VAN MENSCH

A Roman Soup-Kitchen at Zwammerdam?

figs. 1–6; pls. XVII–XXII

During the years from 1968 to 1974 parts of the Roman castellum at Zwammerdam, province of South Holland, were excavated by the Instituut voor Prae- en Protohistorie (in 15-11-74 its name was changed to the Albert Egges van Giffen Instituut voor Prae- en Protohistorie) of the Universiteit van Amsterdam.[1] During the campaign of 1970, when part of the vicus was investigated, two ditches were found, filled with chopped bones (fig. 2). As was already concluded during the excavation, these were all fragmented ends of long bones belonging to cattle *Bos taurus L.*[2] This article deals with the description and significance of this find.

Fig. 1 Situation of Zwammerdam

TABLE 1 Frequency distribution of bone elements recovered from two ditches in the vicus near the castellum at Zwammerdam.

humerus	prox.	140		
	dist.	188		
			388	
radius	prox.	122		
	dist.	141		
			263	
ulna			61	
carpal			76	
				788
femur	prox.	86		
	dist.	264		
			350	
tibia	prox.	100		
	dist.	81		
			181	
os malleolare			5	
astragalus		172		
calcaneum		199		
other tarsals		124		
			495	
metatarsal			2	
				1033
pelvis				1
molar				1
shaft fragments				73
unindentified				119
total				2015

1 Haalebos 1973.
2 Van Wijngaarden-Bakker 1970.

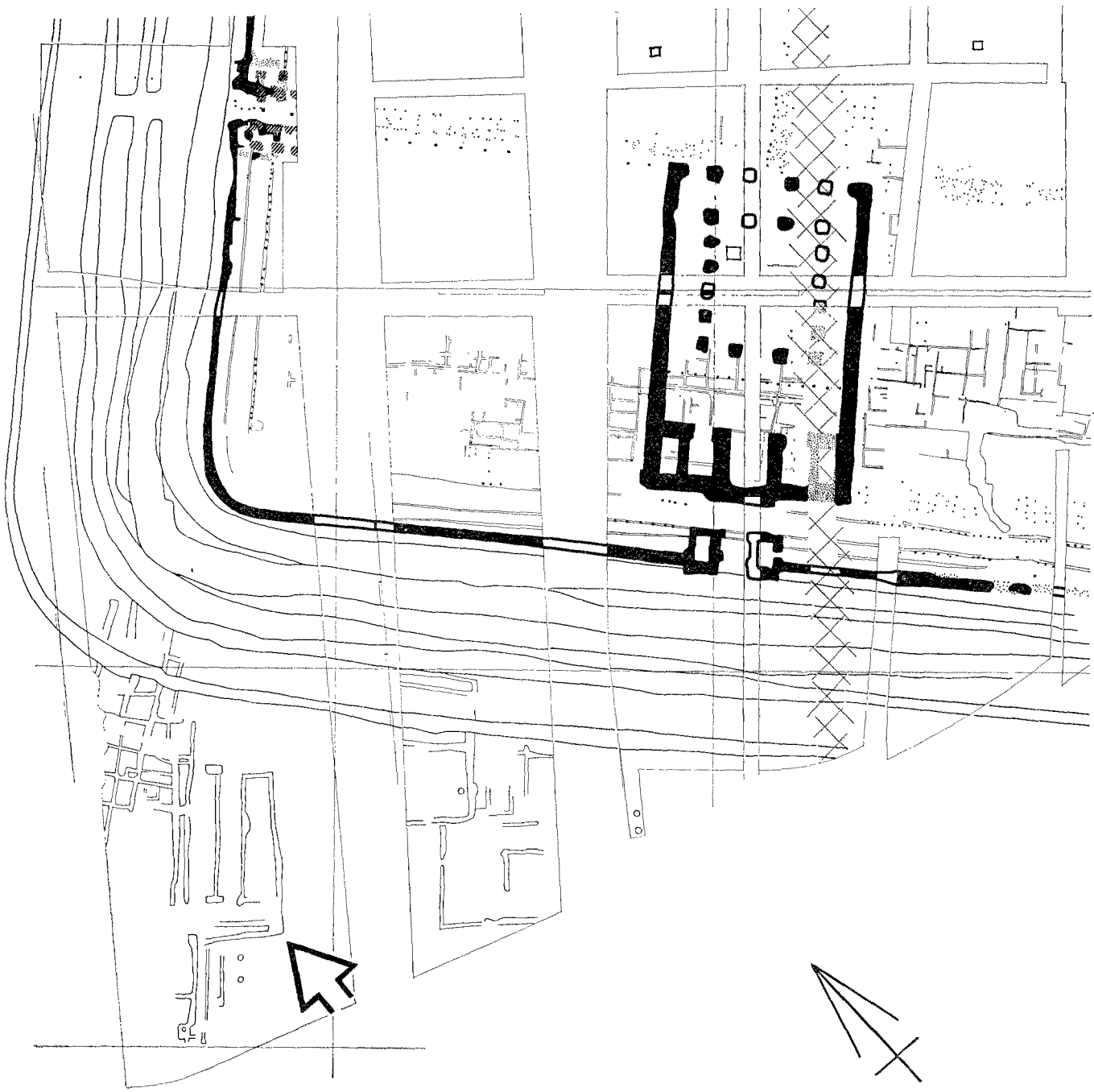

Fig. 2 Plan of the castellum at Zwammerdam and part of the vicus; the arrow indicates the two ditches whose contents are described

A total of 1955 fragments was recovered (table 1). Except for one molar and one pelvis fragment, the ditches contained only fragments of the leg-bones of cattle. Metapodials and phalanges however are absent. The minimum number of individuals is 75 (based on the calcaneum). All bones, except for a few carpal and tarsal bones have been chopped. Pls. XVII–XXII show the most typical fragments of respectively humerus, radius, ulna, femur, tibia, astragalus and calcaneum. Careful study of the damage to and fragmentation of the bones gives much evidence about the butchering technique.

Generally speaking, three types of damage can be observed: 1) damage inflicted while boning the legs, 2) damage inflicted while separating the bones, 3) damage inflicted during specialized working up after boning. This article will briefly describe the working method used for the legs, as can be deduced from the present material.

After slaughter, the animal was skinned; in the process the phalanges and possibly the metapodials were removed with the hide. The distal end of the radius and the proximal end of the metacarpal remained mostly undamaged. Thus, the foreleg was obviously chopped right at the wrist joint. Sometimes the distal end of the radius was damaged or even completely cut off, indicating variations in the cutting plane. The hind leg was chopped just below the angle joint, between the central tarsal bone and the metatarsus. The central tarsal bone often showed damage on the side, due to repeated chopping blows. In the preparation of the skinned animal for consumption, the legs were removed. When the scapula was separated, the tuber scapulae and the lateral tuberosity of the humerus were cut off (fig. 3). When the hind leg was dismembered, the head of the femur and the trochanter maior of the femur were cut off.

The bones were completely boned (= the flesh removed). This can be deduced from the superficial chop-marks on the bones. Many protruding parts, especially the distal end of the femur and the proximal end of the tibia, were damaged or cut off. The caudal border of the ulna was nearly always damaged (pl. XIX:1). While removing the tendon of the musculus gastrocnemius, the tuber calcis was partly cut off (fig. pl. XXII:2). During and after boning procedures, the bones were separated. When the humerus and radius were separated, the distal end of the humerus and the proximal end of the ulna were often damaged (fig. 3:2 and pl. XVIII:1).

Another method was to sever the medial and lateral tendons of the elbow joint. In that case the ulna remained undamaged. When femur and tibia were separated either

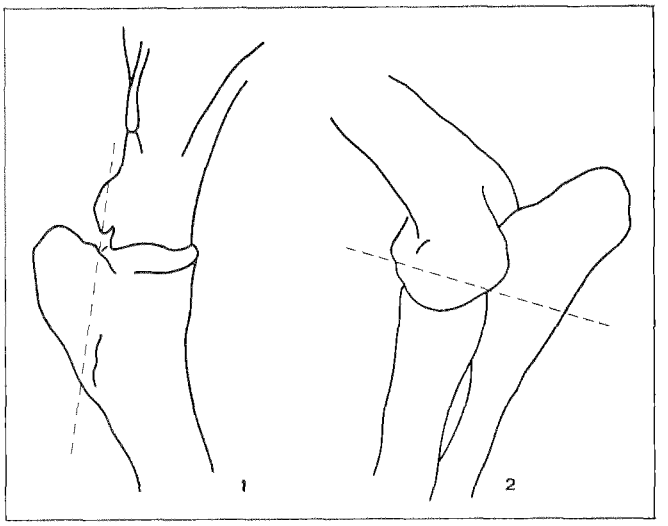

Fig. 3 1 Shoulder joint: damage inflicted while preparing the scapula; 2 Elbow joint: damage inflicted while separating humerus and radius + ulna

the trochlea and condyles of the femur or the protruding tubercles of the spine of the condylus of the tibia were crushed. Tibia and astragalus + calcaneum were separated at the joint. The plane of cutting varied greatly (pl. XXII:2).

The damage described above was found among material from the vicus as well as in material from the Rhine-bed. The characteristic fragmentation illustrated in pls. XVII–XXII and to be described below has only been observed in the vicus material. This could lead to the conclusion that the stripped bones were transported to the vicus for further use. In view of the disposal of the offal, the animals were probably slaughtered near the Rhine. Whether the marrow was extracted on the slaughter-site or in the vicus is uncertain. Due to the extreme haste on the day of the excavation, very few shaft fragments were recovered in the vicus ditches. Consequently, the following description will deal with the ends (epiphyses) of the leg-bones.

In the vicus the epiphyses were chopped according to a rather exact method. Most epiphyses were chopped into two pieces: humerus proximal (pl. XVII:1) and distal (pl. XVII:2); radius proximal (pl. XVIII:1) and distal (pl. XVIII:2) and tibia distal (pl. XXI:2). The fragmentation of the proximal end of the tibia is not yet clear. Sometimes half epiphyses were found, but more often the epiphyses seemed to be chopped in the way illustrated in pl. XXI:1, resulting in four fragments. Mostly two frag-

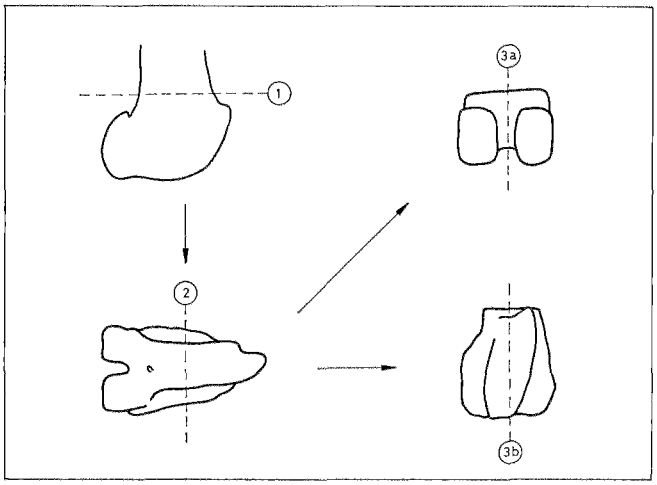

Fig. 4 Fragmentation of the distal epiphysis of the femur

ments of the proximal end of the femur can be found, but when the trochanter maior was not cut off previously, three fragments can be found (pl. XIX:2). The distal end of the femur was chopped in a very special way, as illustrated in fig. 4; each time the epiphysis was laid on the plane of the previous cutting. The chopping results generally in four fragments. But often more can be found. Due to rather haphazard chopping, the resulting fragments were often not exactly the fragments shown. The same can be said for the fragments in pls. XVII–XIX, XXI–XXII. Astragalus and calcaneum were chopped at random. In some cases astragalus, calcaneum, and central tarsal bone were found together and undamaged in anatomical context. Sometimes astragalus and calcaneum were chopped in a vertical plane (not illustrated). The typical fragments of the calcaneum are shown in pl. XII:1. A frequency distribution of bone elements is given in table I. The number of fragments for each bone as resulting from the above described technique is given in table III. This table, calculated for five animals, is graphically represented in fig. 6 C. Table I is graphically represented in fig. 6 A.

Fig. 5 Separation of the leg-bones (see text)

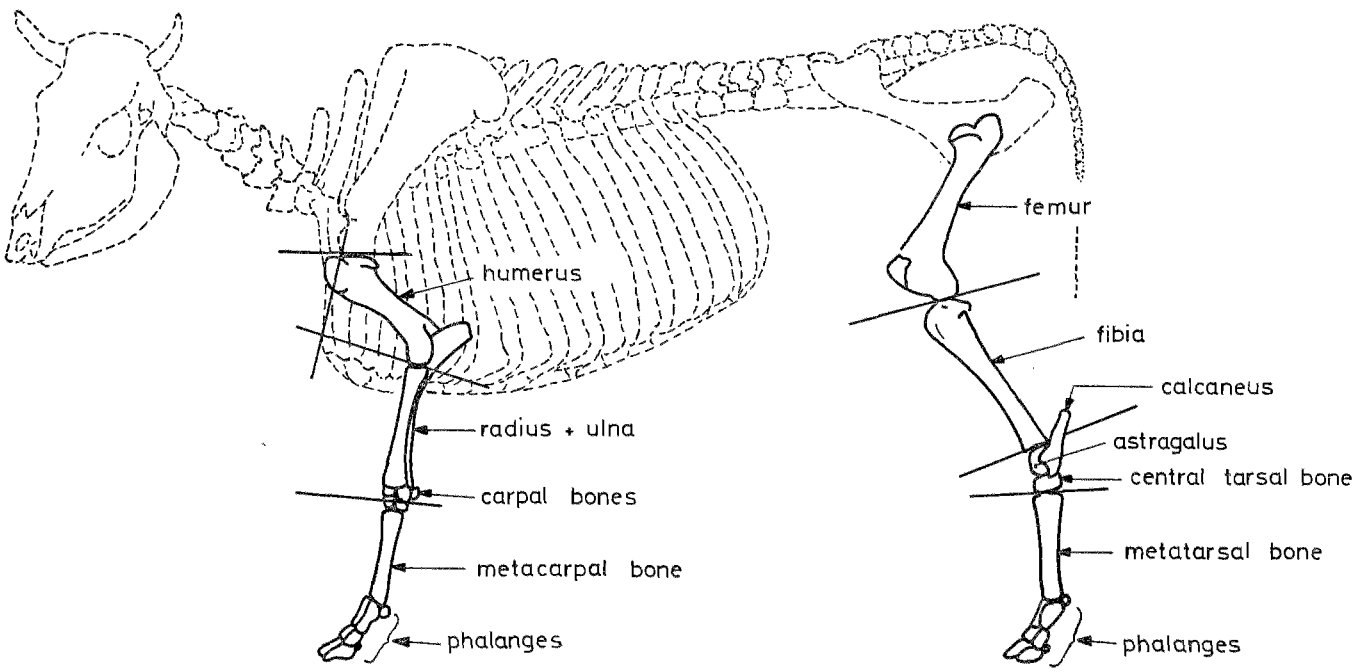

TABLE II Number of bone elements and the minimum number of individuals (MNI), calculated for each bone.

	numbers of fragments	MNI
humerus	388	50
radius	263	44
ulna	61	35
femur	350	48
tibia	181	27
calcaneum	199	75
astragalus	172	68

TABLE III Theoretic number of fragments for each bone and each animal compared with the number of fragments for each animal calculated from the found number of fragments and the minimum number of individuals.

		number of fragments divided by MNI	number of fragments for each bone	number of fragments for each animal
humerus	prox.	7.7	2 or 3	8 or 10
	dist.		2	
radius	prox.	6	2	8
	dist.		2	
ulna		1.7	1	2
femur	prox.	7.3	2 or 3	12 or 14
	dist.		4	
tibia	prox.	6.7	2 or 4	4 or 12
	dist.		2	
calcaneum		2.7	1–3	2–6
astragalus		2.5	1 or 2	2 or 4

The only comparable find is recorded by Waldmann[3] at Xanten (Colonia Ulpia Traiana), where three pits were excavated, filled with fragmented bones. These bones are not described in detail, only their numbers are given. The number of fragments given for pit 198 from Xanten agrees rather closely with the number of fragments known for Zwammerdam (fig. 6 B). Only the number of carpal and tarsal bones differs; as no description of the fragments is available, this difference remains unexplained.

3 Waldmann 1967.

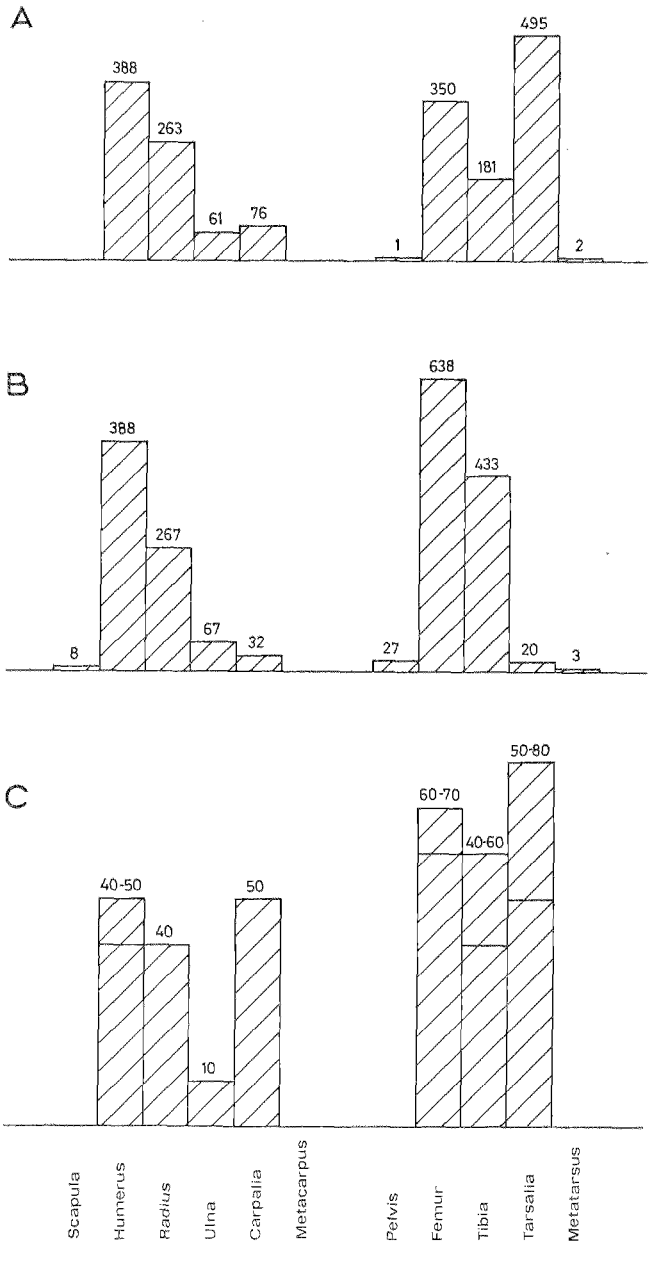

Fig. 6 Number of fragments: A Zwammerdam, vicus; B Xanten, pit 198 (after Waldmann 1967); C Theoretical number of fragments for five animals

What is the significance of the Zwammerdam find? The way in which the epiphyses are chopped is characteristic and indicates clearly that the bones were used for extracting broth. Many Dutch butchers use the same working-

method today. This technique is dictated by the structure of the bone. The epiphyses are chopped in such a way that splintering is prevented.

Broth means soup. Both the ditches with bones were found in front of the foundations of a block of three houses with a porch or porticus,[4] so one can suppose that these houses (or at least one of them) have something to do with the manufacture of soup: a soup-kitchen?

Soup is not mentioned by Davies[5] in his paper on the Roman military diet. The well-known first (or fourth?)-century cookery book by Apicius, *De re coquinaria*, mentions only *pultes* (Book v, 1 *De pultibus*), which was formerly a simple porridge of various kinds of cereals or vegetables (pulses), eaten by the Romans before bread came into use.[6] *Pultes* remained in use after the introduction of bread, but only as food for the poor. Broth, however, is also mentioned in Roman literature. Varro (116–27 BC), the writer on agriculture, in describing how to feed dogs, mentions *ius ex ossibus* (*De re rustica* II, ix, 10). In Apicius' cookery book the word *ius* is used for sauce.

Both finds (Zwammerdam and Xanten) have no strictly military context. The ditches at Zwammerdam were situated in the vicus just outside the castellum. The pits at Xanten were found in a civil settlement. So the context of the finds is not strictly Roman either. The use of soup based on broth seems to be not typically Roman. The word 'soup' itself is of Germanic origin. The original meaning was a 'piece of bread immersed in an eatable liquid.' Later on it came to mean a 'course composed of broth with pieces of bread, rice or farinaceous food.'[7] The Germanic word 'suppa' was taken over in vulgar Latin. Already in the sixth century 'suppa' (in the original meaning) was used in a translation of Oribassio, written in Ravenna.[8] The etymology of the word soup indicates that eating soup was a Germanic habit. Demyttenaere mentions the 'barbarous' German custom of starting the meal with soup.[9] It is possible, however, that this soup was based on broth from meat instead of from bone. Extraction of broth from bone needs several hours' constant boiling.

Another possible use of the spongy bone of the leg bones is described by Bonnichsen.[10] He studied the butchering techniques of the Calling Lake Cree (Alberta, Canada). Some moose-bones (especially the proximal end of the humerus, ribs, and vertebrae) were used for making bone-grease. The recipe calls for placing the greasy bone-fragments in a large pot containing water. As the bones are brought to a slow boil, the fat floats to the top where it is collected with a ladle and put into a storage container so that it can eventually be consumed.

As was stated above, a careful study of the damage and fragmentation reveals much of the butchering techniques. Detailed study of the bones, even small fragments, can lead to a better reconstruction of the use of the animal resources in prehistoric societies. Much valuable information is given by Schmid for Augusta Raurica[11] and by Bonnichsen for protohistoric American tribes.[12]

As to the material from Zwammerdam, the slaughtering and boning procedures could be reconstructed and much information could be obtained about the conservation of meat by smoking. An extensive treatment of the butchering techniques in Roman time is in preparation.

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SUMMARY

The find of two ditches filled with chopped fragments of leg-bones of cattle *Bos taurus* L., in the vicus of the castellum at Zwammerdam is described. By a study of the

4 Haalebos 1973.
5 Davies 1971.
6 Vehling 1936.
7 Monreal 1973.
8 Monreal 1973
9 Demyttenaere 1972.
10 Bonnichsen 1973.
11 Schmid 1969 and 1972.
12 Bonnichsen 1973.

damage to the fragments the working method during the boning procedure is reconstructed. The characteristic way in which the ends (epiphyses) of the leg bones are chopped, indicates that the bones were used for extracting broth. Obviously soup was eaten by the soldiers of the castellum or the inhabitants of the vicus. In Varro's *De re rustica*, evidence was found that broth from bone was known to the Romans.

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TORSTEN CAPELLE

Ein reliefverzierter Knochenbesatz aus Vlissingen

Abb. 1–2, Taf. XXIII

Vor etwa vierzig Jahren wurde in angefahrenem Baukies – also in sekundär verschleppter Lage – in Vlissingen auf Walcheren ein komplett bewahrter reliefverzierter Knochenbesatz entdeckt, der auf Grund seiner sorgfältig ausgeführten Zeichnung und der Tatsache, daß kunstvolle Knochenschnitzereien aus dem Mittelalter immer noch Raritäten sind, hier kurz vorgestellt werden soll.[1]

Das mit sicherer Hand geschnitzte Stück befindet sich heute in Privatbesitz in Vlissingen. Seine ursprüngliche Herkunft war nicht mehr zu ermitteln.

Es handelt sich um einen zylindrischen ausgehöhlten Rinder- (oder Pferde-) knochen[2] von 5,6 cm Länge mit einem maximalen Durchmesser von 3,2 cm. Die Färbung ist dunkelbraun. Nahe dem unteren Rand ist eine Durchbohrung angebracht. Hier muß ein heute verschollener Niet gesteckt haben, mit dessen Hilfe der Knochenbesatz an einem Stab oder Stock gehalten wurde. Weitere Befestigungsvorrichtungen sind nicht vorhanden.

Rundum sind auf der Außenseite des Zylinders zwei Tierfiguren eingeschnitten: als Hauptmotiv ein bandförmiger Vierfüßler in flachem Relief sowie weiterhin ein Eber, der vermutlich als Lückenbüßer senkrecht dazu angebracht wurde und für dessen Ausführung auch wesentlich weniger Sorgfalt aufgewandt worden ist; diese Figur ist nur in ihren Konturen und mit wenigen Details am Kopf eingraviert. Da zwei Eberfüße den rechten Hinterlauf des rechtwinklig dazu stehenden anderen Tieres überschneiden, muß bei dieser geradezu unorganisch hinzukomponierten Figur an eine sekundäre Ergänzung gedacht werden. Der S-förmig geschwungene Vierfüßler, der – vom oberen Rand ausgehend – nur etwa drei

Abb. 1 Die Lage von Vlissingen

Viertel der zur Verfügung stehenden Fläche bedeckt, hat einen in seinem gesamten Verlauf gleichbreiten Leib. Ein verhältnismäßig langer Schwanz ragt horizontal

1 Herrn Dr P.J. van der Feen, Domburg, bin ich dafür zu Dank verpflichtet, daß er mich während der vom Sonderforschungsbereich 7 – Mittelalterforschung, Münster, geförderten Aufnahme des karolingischen Fundmaterials von Domburg im Museum Middelburg auf den Knochenbesatz aufmerksam machte sowie die Aufnahme und Untersuchung durch seine Vermittlung ermöglichte.

2 Bestimmung durch P.J. van der Feen, Domburg.

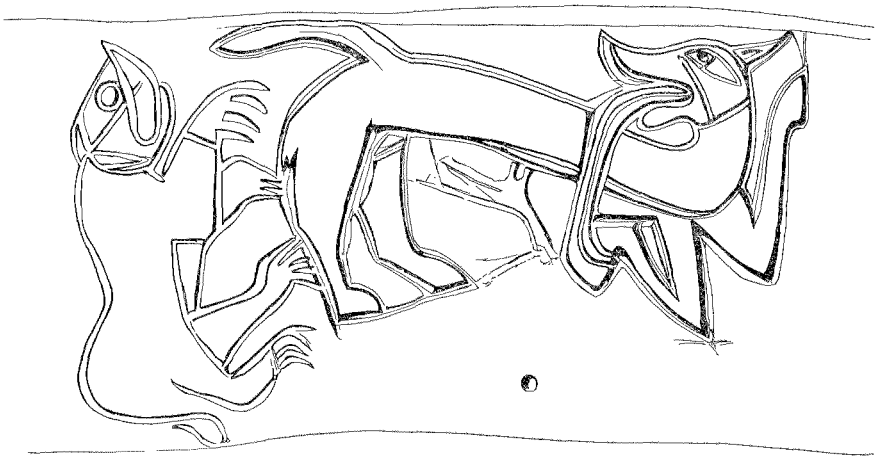

Abb. 2 Knochenbesatz von Vlissingen, Abrollung des Flachreliefs und der Gravur (M = 1:1)

nach hinten. Die Hinterläufe mit kräftig betonten Hufen stehen flach auf dem strichförmig angedeuteten Boden. Der eine Vorderlauf ist scharfwinklig kniend wiedergegeben, der andere senkrecht bis zur Kopfhöhe emporgewinkelt. Der durch eine Kerbe vom Hals betont abgesetzte Kopf ist rückwärts gewandt. Das Maul ist drohend weit aufgerissen, die lange schmale Zunge hängt bis zum Rand des Bildfeldes hinab. Das spitzovale Auge mit weit nach vorn verlagerter Pupille ist schräg angesetzt. Von den Ohren ist nur eines dargestellt. Es ragt spitz nach rechts oben.

Unterhalb des Rumpfes befindet sich ein kleines, nicht genau bestimmbares Motiv. Es scheint sich um den nach links aufwärts gewandten – vielleicht trinkenden – Kopf eines Jungtieres mit gespreizten Ohren zu handeln.

Im Gegensatz zu dem schlanken, geradezu grazil anmutenden Hauptmotiv, ist der Eber gedrungen und unbeholfen gezeichnet. Nur der betont eingeschnittene kräftige Hauer läßt ihn als solchen erkennen; die Kombination der übrigen Details spricht eher für ein Fabelwesen: das Rückgrat ist deutlich durchgedrückt, der Kopf nahezu kreisrund gestaltet und die Füße lassen an Bärentatzen denken. Diese vertikal gestellte Figur nimmt fast die ganze Höhe des Besatzes ein.

Zylindrische verzierte Knochenbesatzstücke oder gar Knäufe und Griffe von Stäben und Geräten hat es im Mittelalter verschiedentlich gegeben, belegt z.B. von der Prager Burg[3] oder aus Dorestad.[4] Diese sind jedoch durchweg mit rein geometrischen Ornamenten verziert, so daß sie keinen unmittelbaren Vergleich mit dem hier besprochenen Exemplar zulassen. Eine zeitliche Eingrenzung sowie eine eventuelle Herkunftsbestimmung sind daher nur mit Hilfe von anderen Denkmälergruppen durchzuführen. Doch ist eine direkte Entsprechung – auch in anderem Material – nicht aufzuweisen.

Auf zoomorph ausgeschmückten Steindenkmälern ist das Flachrelief im 10. und 11. Jahrhundert im angelsächsischen insularen Westen beheimatet – bis auf eine Ausnahme, den großen Runen- und Bildstein von Jelling auf Jütland, bei dem u.a. gerade auf Grund dieser Technik ein Niederschlag künstlerischer Beeinflussung von den Britischen Inseln angenommen wird.[5] Auf angelsächsischen Steinmonumenten aus der Zeit um die Jahrtausendwende findet sich aber nicht nur immer wieder das Flachrelief, sondern es lassen sich auch andere Einzelheiten aufzeigen, die Verbindungen mit unserem Besatz zulassen.

In erster Linie sei auf den allerdings auch stark skandinavisch geprägten Runenstein von St. Paul's in London aus dem 11. Jahrhundert verwiesen, der einen großen rückwärts blickenden Vierfüßler im Flachrelief mit einer sehr ähnlichen Schnauzenpartie zeigt.[6] Genannt werden kann auch der Kreuzsockel von St. Alkmund, Derby, dessen in gleicher Technik ausgeführter Vierfüßler den einen Vorderlauf ebenfalls senkrecht emporstreckt.[7] Dieses ist eine Darstellungsweise, die auch sonst oft begegnet, z.B.

3 Borkovský 1969, Abb. 60. Diesen Hinweis verdanke ich Herrn Dr H. Vierck, Münster.
4 Roes 1965, Taf. 25–26.
5 Capelle 1968, 58 mit Anm. 410.
6 Brøndsted 1924, 235 f., Fig. 170.
7 Wilson/Klindt-Jensen 1966, Taf. 38 b.

gleich mehrfach auf einem Kreuzsockel von Desborough, Northants.[8] Auf Metallarbeiten ist sie ebenfalls vertreten, wie es die durch Münzen in das 11. Jahrhundert datierte prunkvolle silberne Scheibenfibel von Sutton, Cambridgeshire, zeigt.[9]
Schließlich sei in diesem Zusammenhang noch das Fragment eines bronzenen Steigbügels von Stenåsa, Öland, erwähnt.[10] Bei diesem Fund handelt es sich wahrscheinlich um eine angelsächsische Arbeit des 11. Jahrhunderts. Auf dem Fragment ist ein auf den Vorderläufen offenbar kniender, rückwärts blickender S-förmig geschwungener Vierfüßler mit gleichbreitem Leib, weit herabhängender Zunge, ovalem Auge und spitzen Ohren dargestellt.

Die angeführten Beispiele mögen genügen, um zu verdeutlichen, daß der Knochenbesatz von Vlissingen nicht nur dem 11. Jahrhundert angehört, sondern mit großer Wahrscheinlichkeit auch ein zumindest angelsächsisch beeinflußtes Produkt darstellt. Diese Aussage gilt jedoch nur für das primäre Hauptmotiv, nicht aber für das vermutlich erst später hinzugefügte Eberbild, das chronologisch und regional nicht näher eingeordnet werden kann. Seiner Größe nach kann der Besatz eventuell an einem Handstock oder einem ähnlichen Gegenstand befestigt gewesen sein. Da er nur mit einem Niet gehalten wurde, ist aber vielleicht eher an einen standortgebundenen Träger zu denken.

8 Kendrick 1949, Taf. 52.
9 Wilson 1964, Nr. 83, Taf. 31 unten.
10 Holmqvist 1951, 51, Fig. 40.

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J.C. BESTEMAN

Frisian Salt and the Problem of Salt-Making in North Holland in the Carolingian Period

fig. 1; pl. XXIV

Long before the early Middle Ages salt was already being made in the Low Countries from seawater, as we know from written sources and archaeological finds.[1] After the Roman period we lose track of it. In the Carolingian period we again hear of salt-making in our environs. The salt-making was probably done after the method of *darinck bernen*: *i.e.* salt-peat burning, which was widespread in the later Middle Ages (pl. XXIV). By this method, salty peat was burned, the salty ash, so-called *zelas*, was mixed with seawater and boiled, the ash filtered out of the brine mixture and salt was obtained from the brine by evaporation. Salt from Friesland or even Westfriesland is often mentioned in studies concerned with salt extraction in the Carolingian period. Niermeyer was the first, in 1946,[2] although he later gave a more differentiated picture of this salt-making,[3] to write that *darinck delven*: *i.e.* peat-cutting for the salt-making in Friesland (= Kennemerland and Westfriesland) was practised as early as the eighth century with the use of slave-labour. After this, we see Friesland, and more especially Westfriesland, regularly recurring as one of the areas where this salt is made.[4] Halbertsma even thought that Medemblik owed her existence to the Westfrisian salt-extraction.[5]

Fig. 1 Places mentioned in the text situated in the western Netherlands, *i.e.*, Carolingian Friesland between Vlie and Zwin: 1. Schouwen; 2. Bergen op Zoom; 3. Duiveland; 4. Yerseke; 5. Rilland; 6. Medemblik; 7. Anna Paulowna-polder; 8. Wieringermeer Polder; 9. Balgzand; 10. Wieringen

1 Mentioned by Tacitus, Plinius (Nenquin 1961, 106). Finds among others in the Gasthuispolder near Leiden and Vlaardingen (Nenquin 1961, 95), Krommenie (Helderman 1967, 186–8) and Paddepoel (Gr.) (Van Es 1968, 257–8). Some finds which are difficult to interpret can perhaps, after closer study, also be connected with salt-making: *e.g.* finds from Serooskerke (Dumon Tak/Vanden Berg 1973, 242 and *afb.* 4); Grebpolder, Dorregeest, and Castricum (Schermer 1974, 335–40).

2 Niermeyer 1946, 19.

3 J.F. Niermeyer in Alberts/Jansen 1964, 33: salt from the Zeeland, South Holland and perhaps Westfrisian centres of production.

4 Harteveld 1968, 269: *Friesland;* Brugmans 1968, 55: *Zeeland and West Brabant and also in Westfriesland*; 57: *Westfrisian salt-production probably in decline because of the breaking up of the peat areas.*

5 Halbertsma 1971, 72.

There are a number of early written sources for this production of salt. In 776 the Abbey of Lorsch was granted, amongst other things, *XVII culinas ad sal faciendum*, 17 salterns where the process of brine-evaporation took place, situated between Schelde, Zonnemere, and Gusaha.[6] These estates were located in the coastal area of Schouwen.[7] In 877, a grant to the monastery of Nijvel by Charles the Bald gives a list of Nijvels' property which includes: *in Frisia terra et mancipia ad salem*, in Friesland land and slaves for the making of salt.[8] A charter of King Zwentibold of 897 refers to the same property of Nijvel and notes: *In Fresia terra ad sal acquirendum*: in Friesland land for the purpose of making salt, undoubtedly saltings.[9] Nijvels' property in Zeeland is located near the town of Bergen op Zoom (prov. of North Brabant), Yerseke, Duiveland, and Rilland (prov. of Zeeland) (see fig. 1).[10] The mention by Boeles of salt-extraction on the former island of Wieringen (prov. of North Holland)[11] is due to a wrong translation of the text. The *Goederenregister*: *i.e.* register of properties of the St. Maarten's Church in Utrecht dating from the first half of the tenth century, mentions the possession of *terra salaricia*,[12] associated by Boeles with salt-extraction.[13] *Salaricius* is, however, not derived from *sal*, salt, but from *sala*, domanial manor.[14] Thus, on Wieringen we are concerned with *saalland*, land belonging to the domanial manor, the demesne.

Thus the references to salt-making in the Carolingian period all point to the southwest Netherlands, traditionally the region of the salt industry and trade. As a result of the Dunkirk II transgression which was much more active in the south, great tidal inlets had developed and large areas of fen had been submerged by the encroaching sea.[15] The presence of eleventh–twelfth-century sedimentary deposits in some Zeeland peat cuttings testifies to a very early peat-cutting.[16]

It is not surprising that the Zeeland region of salt-extraction should be referred to as *Frisia* in the ninth century sources. In the Carolingian period, the western part of *Frisia* included the region between the Vlie estuary, between the islands of Vlieland and Terschelling, prov. of Friesland, in the north, and Zwin, a former sea-arm to the south of Zeeland (see fig. 1), and the whole coastal region of Holland and Zeeland. The inhabitants were Frisians.[17] Centuries after the Frankish conquest of this area it is still called *Frisia*.[18] Not until after 1100 do the names Holland and Westfriesland appear in the modern sense as a result of the controversy between the Count of Holland and the Westfrisians.[19] The rift in their combined development is increased by the more isolated situation of Westfriesland as a result of the formation or widening of the waters between Holland and Westfriesland during the Dunkirk III B transgression in the twelfth century.[20]

The absence of written sources for salt-making in more northerly parts of the coastal region of Holland, in particular Westfriesland, does not necessarily mean that it never existed there. We must then look for other, *e.g.* archaeological, starting-points. We believed that we had found a possibility for this in the areas of burnt clay found in the excavation published previous to this article[21] at Schuitenvoerderslaan in Medemblik, which ought to be considered as places where pieces of salt peat were burned to ashes on the shore of the early medieval Lake Wervershoof that had become salt as a result of marine transgression. We must, however, for several reasons drop this hypothesis. In the first place it is questionable whether there was sufficient peat either there or in the environs. Though the pollen analysis of the shore section of Lake Wervershoof give indications of the presence of peat nearby, the resedimented material shows that peat bogs situated elsewhere had been destroyed.[22] Lake Wervershoof was, however, a freshwater lake, in which the resedimentation of marine pollen and diatoms belonging to detritial marine deposits took place.[23] Even if peat had been present it would not have contained extractable salt.

6 Koch 1972, no. 5.
7 Dekker 1971, 66–7.
8 Koch 1972, no. 20.
9 Koch 1972, no. 22.
10 Dekker 1971, 73–6.
11 Boeles 1953, 420; also De Cock 1969, 156 mentions possible salt-making on Wieringen.
12 Muller/Bouman 1920, no. 49, p. 47.
13 Boeles took over this incorrect interprepation possibly from Du Cange (Du Cange 1883–7, VII, 279).
14 Niermeyer 1956–..., 932.
15 Pons/Jelgersma/Wiggers/De Jong 1963, 205.
16 Dekker 1971, 34.
17 Blok 1974, 38.
18 A letter, probably written between 1125 and 1137, tells of a merchant who travelled to Utrecht in Friesland (Muller/Bouman 1920, no. 362).
19 Blok 1969, 356.
20 De Cock 1965, 30.
21 Besteman 1974 (1976).
22 Voorrips/Jansma 1974, 432 § 3.2.4.
23 Voorrips/Jansma 1974, 432 § 3.2.4 en 434, § 4.3.

Moreover, the great variety of durable Carolingian pottery which was found in the burnt clay layer was not in accordance with the one-sided and primitive character of a salt-industry.

The possibility of salt-extraction early on in the Middle Ages to the north of Westfriesland in the 'Kop' of North Holland seemed to exist on account of a number of finds some of which are connected with salt-making.[24] Thus the calcareous substance resembling tuff which was found in the Wieringermeer- and Anna Paulowna polders was held by Braat to be the remains of an old dike built of seaweed,[25] but was interpreted by Du Burck as *zelas*, the waste product of the Westfrisian salt industry which he presumed to have ended in about 1200.[26] Westenberg has refuted this last hypothesis and has shown that the calcareous concretions originated after the vegetation in the fen had been burned away prior to heaping up material for a dike. In this way the new dike was better bonded to the soil and seepage was avoided. These finds are in fact from old seaweed-built dikes, constructed in the twelfth century when the widening of the tidal inlets made this necessary.[27] Moreover, the reclamation of the fens in the present Anna Paulowna polder and the finds in the Wieringermeer polder are at present dated after the Carolingian period, and, therefore, we can disregard them.[28] What is more, we may point out that salt extraction from these areas in the early Middle Ages was simply not possible, as there was no salt peat in the region at that time to begin with. The sea only gained access to this region with the twelfth-century floods of the Dunkirk III B transgression which caused an open tidal movement round the island of Wieringen, and the fen regions between Westfriesland and Wieringen were submerged.[29] Lastly, we still have the traces of peat-cutting found on the Balgzand between Den Helder and Wieringen, from which we have Carolingian finds.[30] These traces have also been connected with salt-making.[31] The existence of a complete freshwater well dated by twelfth-century sherds makes it impossible for the fen region to have been already salinized by seawater. Moreover, the peat cuttings have the regular pattern of a land extraction.[32] We must therefore conclude that neither the archaeological remains nor the written sources give us grounds to believe that there was salt-production in North Holland during the early Middle Ages. On the other hand, we may regard the coastal region of the southwest Netherlands, which, in the Carolingian period, belonged to Friesland, as the main production area of Frisian salt, on the strength of written as well as archaeological sources. Apart from this, salt was one of the important products of the extensive Frisian trade, irrespective of where it was produced, so that this salt can be called Frisian salt, as much on account of the Frisian merchants as for the centres of production. The mention, even at the beginning of the twelfth century, of Frisians who convey the salt to Utrecht indicates this.[33] This could form a good parallel, even if it has not been handed down as such in the written sources, to the famous Frisian cloth, of which the Frisian origin is just as much a matter for discussion, and of which it is said that it is partly a Frisian product, but in any case Frisian merchandise.[34]

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24 Summary by Elzinga 1967–1968, 106–8.
25 Braat 1932, 27–30; Braat 1947, 68.
26 Du Burck 1959, 98–102.
27 Westenberg 1961, 35.
28 Schoorl 1973, 114. Braat dated his finds too early with the data then available to him. The oldest datable sherd material was Pingsdorf pottery, whereas amongst the illustrated finds there are those even from the fourteenth century (*e.g.* Braat 1932, *plaat* VI, 1).
29 Schoorl 1973, 13–4 and 24.
30 Smit 1972.
31 Elzinga 1967–1968, 107–8.
32 Smit 1972, 16–7.
33 Muller/Bouman 1920, no. 309.
34 J.F. Niermeyer in Alberts/Jansen 1964, 33–4.

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HELEN CLARKE[1]

Medieval Pottery from Two Wells at Staveren, Friesland

figs. 1–5

The purpose of this paper is to describe two groups of pottery from wells excavated at Staveren (also spelled Stavoren) in 1964, to discuss their dating and their affinities. It is hoped that this will be the first of a series of papers on the pottery from Staveren which will be included in the final excavation report and which will also form part of my work on archaeological evidence for the economy of medieval ports.[2]

The site of Staveren was excavated by H. Halbertsma in 1963 and 1964;[3] the results are summarized briefly by H.H. van Regteren Altena[4] and more extensively by H. Sarfatij.[5] A complete excavation report is planned.

The excavations were concentrated on an area roughly 35 × 40 m in extent plus outlying trial trenches, and exposed remains of timber-built jetties lying to the west of a single row of rectangular wooden buildings. Most of the structures lay on made-up land and belonged to the period of Staveren's greatest affluence, the thirteenth to fifteenth centuries. Trial trenches east of the buildings (away from the waterfront) revealed five wells, E, L, M, R, and S, containing medieval pottery. The pottery from Wells L and R is the subject of this paper.

Well L lay about 11 m east of the eastern excavated edge of Plot 2, and Well R about 12 m east of the eastern excavated edge of Plot 4.[6] Each of these plots contained the foundation of rectangular timber buildings resting on land deliberately reclaimed through the deposition of clay sods and peat turves. As no other medieval wells were found within Plots 2 and 4, L and R may represent their source of water and have been in use at the same time as the buildings.

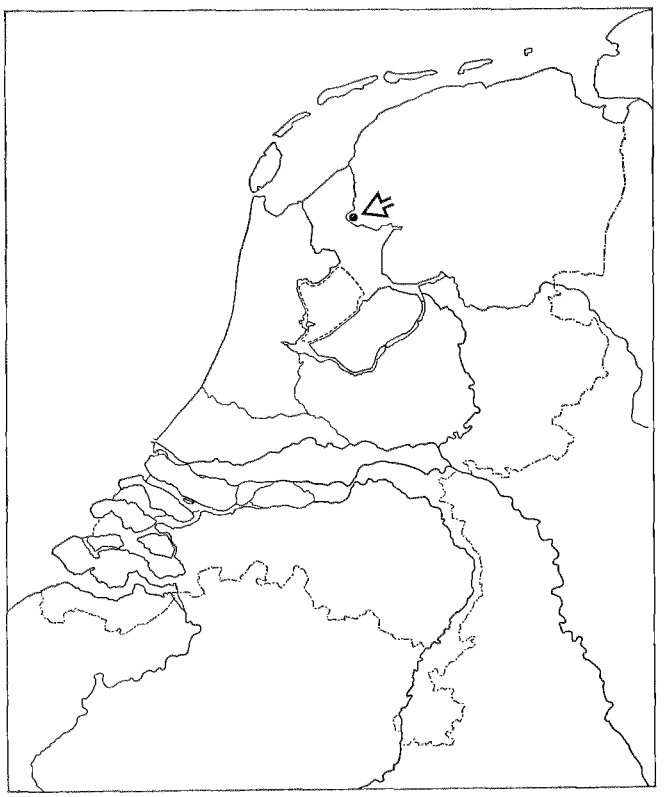

Fig. 1 Situation of Staveren

1 Department of Scandinavian Studies, University College, London.

2 I should like to express my gratitude to Professor W.A. van Es and Mr H. Halbertsma for allowing me access to the material and to the Society of Antiquaries of London whose grant from the Lambarde Fund enabled me to spend two weeks in Amersfoort in 1974.

3 Halbertsma 1963; 1964.

4 Van Regteren Altena 1970, 134–5.

5 Sarfatij 1973, 391–406.

6 Sarfatij 1973, fig. 11.

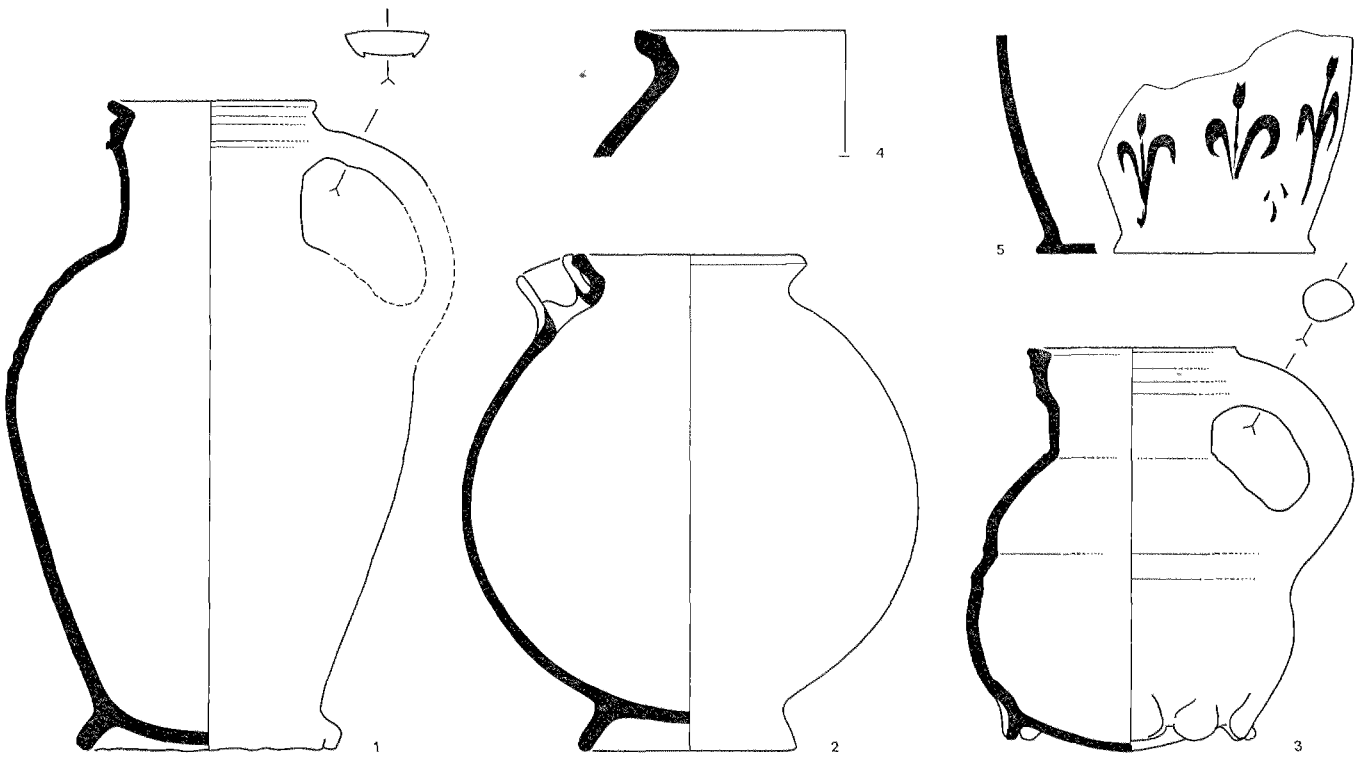

Fig. 2 Staveren: pottery from Well L

Well L Find no. 317

Imported Wares

1 Body and base of jug (fig. 2:5). Off-white ware with grits. Flat base, well-defined throwing rings internally, walls painted externally with black fleur-de-lis and groups of three short brush marks. Attribution: south-western France.[7]

2 Squat jug (fig. 2:3). Complete. Brick-red ware. Rim with internal hollowing and sharp external cordons; cordon at junction of neck and shoulder; bulbous body with pronounced cordons and groove around belly; sagging base with thumbing in groups of two; solid rod handle smoothed onto body. Patchy green glaze over white slip covering most of body externally; internal green glaze. Attribution: Aardenburg.

3 Tall jug (fig. 2:1). Complete except for part of shoulder and lower half of handle. Highly-fired dark-brown gritty ware (near stoneware), misshapen and discoloured by over-firing. Rim with internal hollowing, sharply cordoned externally; body with external and internal girth grooves; frilled foot; strap handle. Attribution: Schinveld (Pingsdorf type).

4 Base of tall jug. Ware and shape as no. 3. Attribution: Schinveld (Pingsdorf type).

Local blue-grey unglazed wares[8]

5 Spouted pitcher (fig. 2:2). Complete. Dark-grey gritty ware with many large grits appearing on surface. Everted rim with shallow lid-seating; small tubular spout; globular body; ring foot.

7 Dunning 1968, 46, fig. 22.

8 I am here following the accepted Dutch description 'blue-grey' *(blauwgrijs)* for local unglazed wares. What is generally understood from the term 'blue-grey' in English is here called Paffrath ware. See note 10.

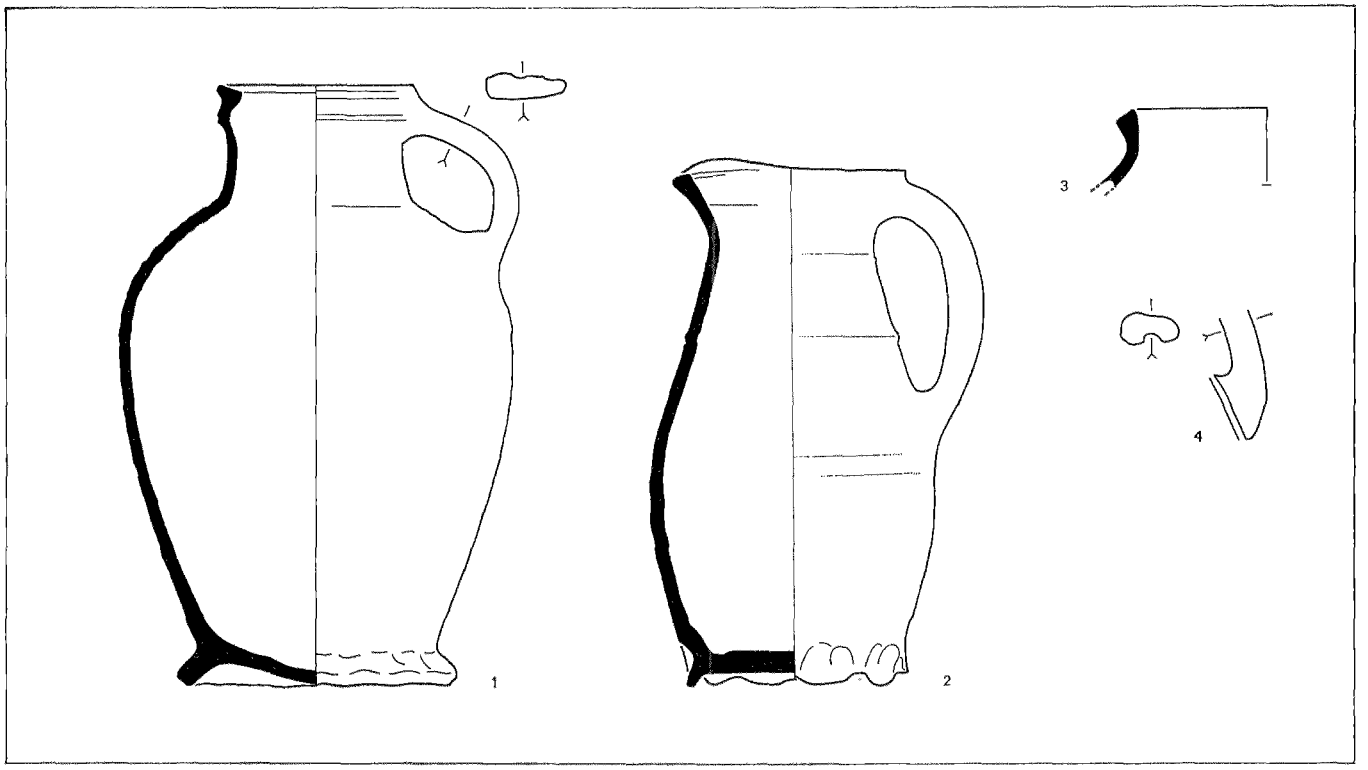

Fig. 3 Staveren: pottery Well R

6 Spouted pitcher. Rim, shoulder, and spout. Ware as no. 5. Everted rim with very slight internal hollowing, tubular spout.
7 Spouted pitcher. Rim and shoulder. As no. 6 but spout missing.
8 Spouted pitcher. Ring foot only.
9 Spouted pitcher. Ring foot only.
10 Cooking-pot. (fig. 2:4) Rim. Coarse, grey, gritty ware. Flat everted rim with slight internal hollowing, possibly lid-seating.
11 Cooking-pot. Base. Ware as no. 10 but over-fired. Thumbed.

Well R Find no. 329
Imported wares
1 Slender jug (fig. 3:2). Complete. Brick-red ware. Flattened rim; wide, pinched-out spout; cordon around neck and pronounced cordon at junction of neck and body; flat base thumbed in groups of two; solid rod handle smoothed onto body. Greenish-brown glaze with 'orange-peel' surface over most of exterior of body; irregular large scales of white slip. Attribution: Bergen op Zoom.[9]
2 Jug. Handle only. Brick-red ware. Solid rod section. Orange glaze. Attribution: as no. 1?
3 Jug. Handle only. Grey ware with red surface. Solid rod section. Green-brown glaze, streak of white slip in one place. Attribution: as no. 1?
4 Jug (fig. 3:4). Handle only. Grey sandy ware with lighter surfaces. Strap section with deep longitudinal groove beneath; shallow thumb impression for attachment. Olive to brown glaze. Attribution: unknown.
5 Tall jug (fig. 3:1). Complete. Highly-fired dark-brown gritty ware, warped at neck and shoulder. Rim with internal and external girth grooves; frilled foot; strap handle. Attribution: Schinveld (Pingsdorf type).
6 Tall jug. Complete. As no. 5.
7 Tall jug. Rim, handle, and upper part of body. As no. 5.

9 Dunning 1968, 49. But see p. 180, note 14.

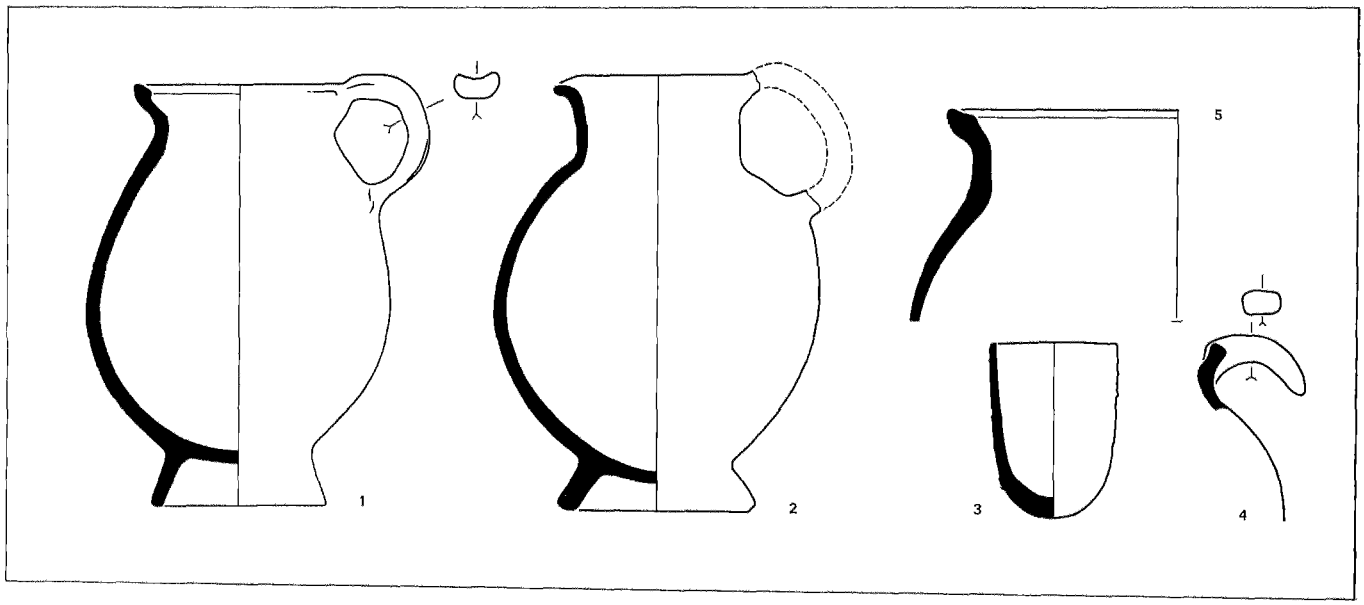

Fig. 4 Staveren: pottery from Well R

8 Cooking-pot (fig. 3:3). Rim. Light-grey ware with darker, lustrous surface. Upright rim with external cordon. Attribution: Paffrath.[10]

Local blue-grey unglazed wares

9 Globular jug (fig. 4:1). Complete. Dark-grey gritty ware with many grits on surface. Everted rim with slight internal hollowing; bulbous body; ring foot; narrow strap handle springing directly from rim and smoothed onto body.

10 Globular jug. Complete. As no. 9.

11 Globular jug (fig. 4:2). As no. 9 but with pinched spout.

12 Spouted pitcher (fig. 5:3). Complete. Dark-grey gritty ware with many large grits on surface. Everted rim with shallow lid-seating; small tubular spout; globular body; ring foot.

13 Spouted pitcher (fig. 5:4). As no. 12.

14 Spouted pitcher (fig. 5:1). As no. 12.

15 Spouted pitcher (fig. 5:2). As no. 12.

16 Spouted pitchers. Ring-footed bases of at least five pitchers.

17 Cooking-pot (fig. 5:5). Complete. Dark-grey gritty ware. Everted rim with slight internal hollowing. Round base.

18 Cooking-pot (fig. 5:6). As no. 17 but with horizontal scratch marks on body.

19 Cooking-pot (fig. 4:5). Rim and shoulder. Coarse grey ware with many large grits. Everted rim with internal hollowing. Surface crackled through firing.

20 Handled ladle (fig. 4:4). Handle and part of body. Dark-grey gritty ware with darker surfaces. Body with horizontal scratch marks. Short, pointed, lug handle.

21 Crucible (fig. 4:3). Complete. Upright, rounded rim; thin vertical walls; round base; outer surface vitrified and encrusted with many hard lumps.

The general date of thirteenth and fourteenth centuries given by Halbertsma to the excavated material from Staveren is borne out by these two pottery groups. Their dating must rely on the imported wares. Local unglazed pottery has not been the subject of sufficient research for use as dating evidence and is usually mentioned in relation to better-known, imported wares.[11]

The jug base from south-west France (Well L, no. 1) has already been published in Dunning 1968 with a reconstruction drawing (fig. 22) showing an ovoid jug with bridge spout. It is attributed to the polychrome group of Saintonge wares and dated (at least partly on the grounds of its excavation context) to the end of the thirteenth

10 Otherwise 'blue-grey' ware or 'Blaugraue Ware' in English and German, respectively.

11 *In kannen en kruiken*, Rotterdam 1963.

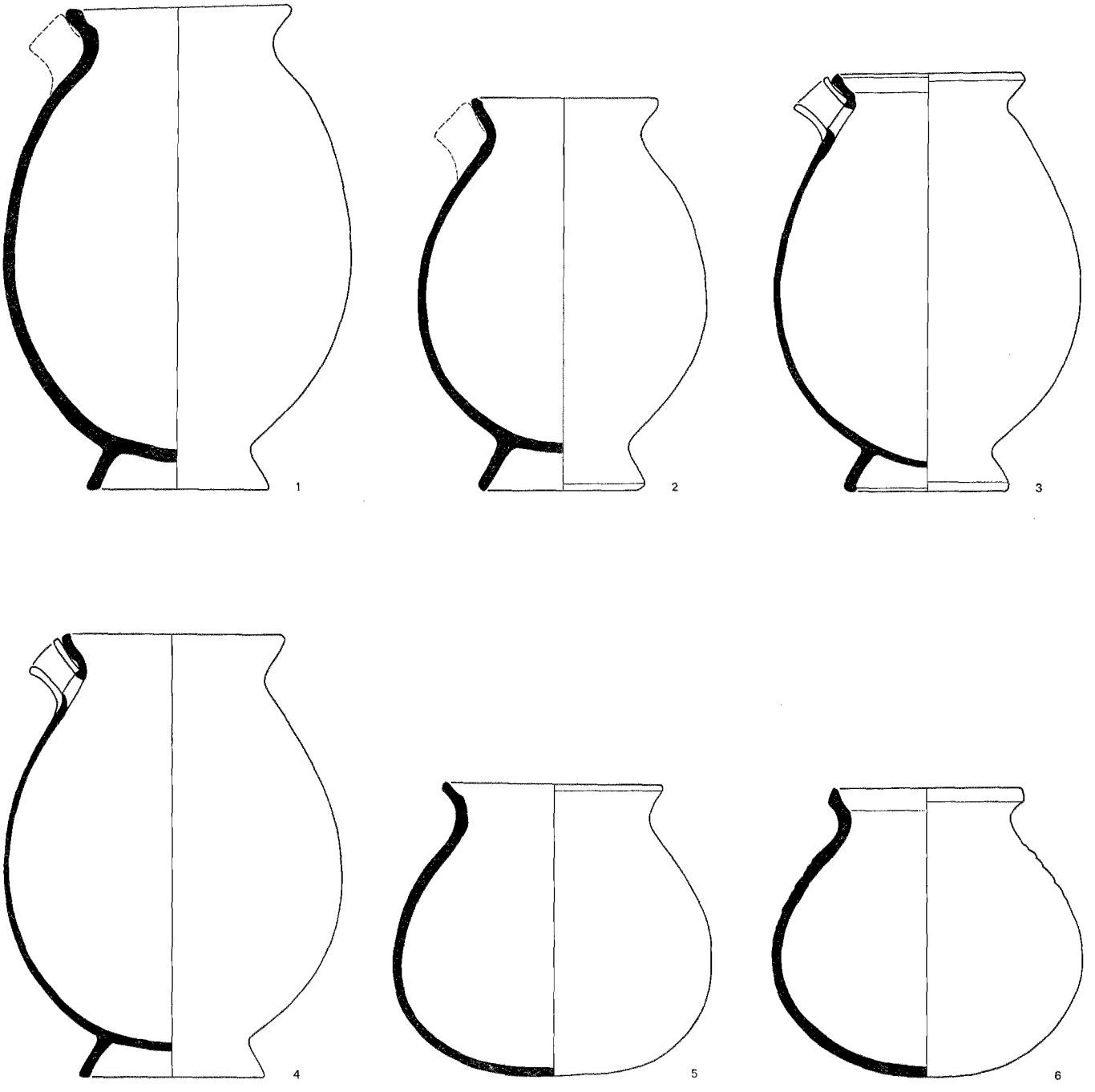

Fig. 5 Staveren: pottery from Well R

century. The painted decoration of fleur-de-lis is reminiscent of Saintonge polychrome wares although I have traced no exact parallels, and the jug base lacks the clear lead glaze which overlies the painted decoration of most of the Saintonge jugs so far discovered on the Continent or the British Isles. The late thirteenth- or fourteenth-century date is likely although the production of such pottery seems to have continued for a long time, perhaps to the end of the Middle Ages.[12]

The complete glazed jug (Well L, no. 2) appears to be of normal Aardenburg shape, ware and glaze although it does not have the characteristic decoration. It may also be attributed to the thirteenth or fourteenth centuries by comparison with finds from Aardenburg.[13] The slender jug from Well R (no. 1) is very similar in ware to the Aardenburg jug from Well L, and is most closely paralleled by another from Aardenburg,[14] although without the decoration.

The remaining imports in the groups consist of a single rim sherd of Paffrath ware cooking-pot (Well R, no. 8) whose shape may indicate a thirteenth-century date,[15] and a number of jugs of near stoneware (Well L, nos 3 and 4; Well R, nos 5, 6, and 7) which are closely paralleled at Schinveld[16] where similar jugs are placed at the end of Schinveld Period IV, that is, the first half of the fourteenth century. All the imported wares could comfortably fit into the bracket late thirteenth to fourteenth centuries, although a fourteenth- rather than a thirteenth-century date for their deposition seems more likely.

Little may be concluded from the local wares other than to note the forms which were current at this period. Spouted pitchers and globular jugs dominate the finds, and are supplemented by round-bottomed cooking-pots and a handled ladle (Well R, no. 20) whose shape appears to be a copy of Paffrath ware.

This brief survey of two groups of pottery from wells shows that Staveren's thirteenth- and fourteenth-century contacts were wide-ranging. Pottery from south-western France probably travelled as an adjunct to the wine trade but such pottery is not commonly found in the Low Countries.[17] Aardenburg ware is distributed more widely throughout the country and may have been traded in its own right. Contacts with the Rhineland are shown by the near stoneware and Paffrath ware. One very important type of pottery which is missing from the two groups is that from Andenne[18] which has been found in other contexts in the Staveren excavations. It is hoped that the Andenne ware will be among the next pottery from Staveren to be published.

12 Barton 1963, 209.
13 Trimpe Burger 1962–3, 501–3.
14 Trimpe Burger 1962–3, 510, fig. 19. Dunning 1968, 49, fig. 27 shows a jug of similar ware and shape but attributes it tentatively to Bergen op Zoom. This is now thought to be mistaken.
15 Herrnbrodt 1958, 94, fig. 50:2.
16 Bruijn 1962–3, 433, fig. 75: 5.
17 Dunning 1968, 45, fig. 21.
18 Borremans/Warginaire 1966.

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GERARD F. IJZEREEF

A Medieval Jaw-Sledge from Dordrecht

figs. 1–6; pls. XXV–XXVI

The excavation in the medieval town centre of Dordrecht, province of South Holland, were carried out by the Rijksdienst voor het Oudheidkundig Bodemonderzoek (ROB) between 1968 and 1971; the work was directed by H. Sarfatij. In the course of these excavations, 1013 identifiable animal bone remains dating from the fourteenth and fifteenth centuries were recovered.

A preliminary study of the bones was carried out in 1973 at the Institute voor Prae- en Protohistorie (IPP) (since 15 November 1974, the Albert Egges van Giffen Instituut voor Prae- en Protohistorie), University of Amsterdam A detailed analysis of the faunal remains will be published as a part of the report by Mr Sarfatij of the archaeological investigations in Dordrecht. One of the worked bones, however, is discussed here in advance. The author would like to thank Mrs van Wijngaarden-Bakker and Mr P.J.A. van Mensch for bringing to his attention most of the parallels found in paintings and drawings. The piece under discussion is the left half of a lower jaw (number given by author D 428/2) of a horse: total length 33.5 cm, with a polished bottom surface 22 cm long (fig. 2 and pl. XXV:1).

The right part of the jaw has been broken at the front side next to the alveolus of the medial incisor; at the rear end the vertical ramus has been removed behind the alveolus of M3. On the left side the medial incisor is in a primary state of development, while the lateral one is undeveloped. The three milk-premolars are well worn. The first molar is present; the alveoli indicate that the second molar has also erupted but not the third molar. According to Habermehl,[1] the age of the horse can be estimated at approximately two and a half years.

Because a piece of the bottom was removed and polished, the jaw can easily stand upright without support. At first

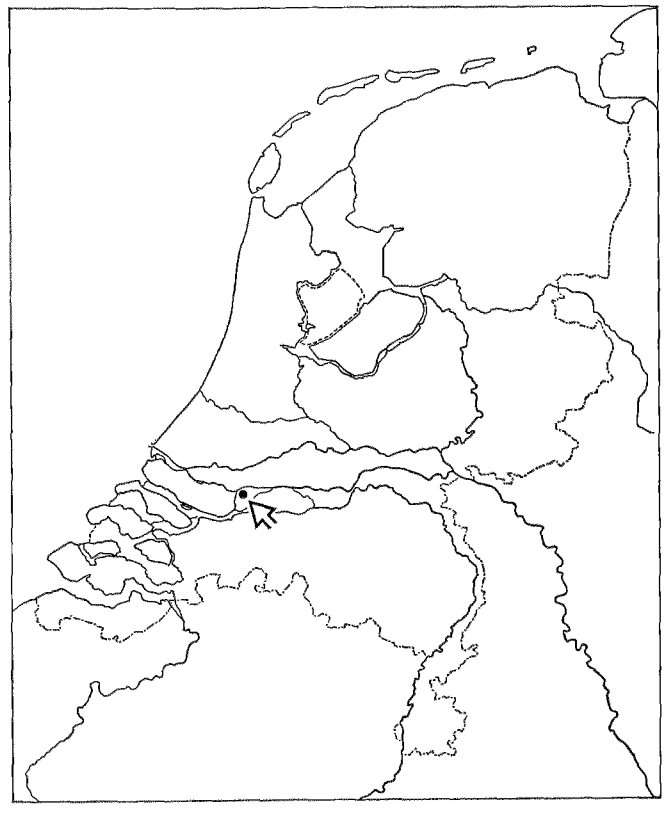


Fig. 1 Situation of Dordrecht

it was thought that the jaw has been polished for a certain purpose, for example for smoothing hides, but after a study of various parallels it became quite clear that the jaw was used as a sledge runner. The polishing must have been caused by the use of the jaw on a perfect plane surface, in other words on ice.

A find that is directly comparable with the Dordrecht find is the *Arnswalder Kieferschlitten* (a jaw-sledge from

1 Habermehl 1961, 32–4.

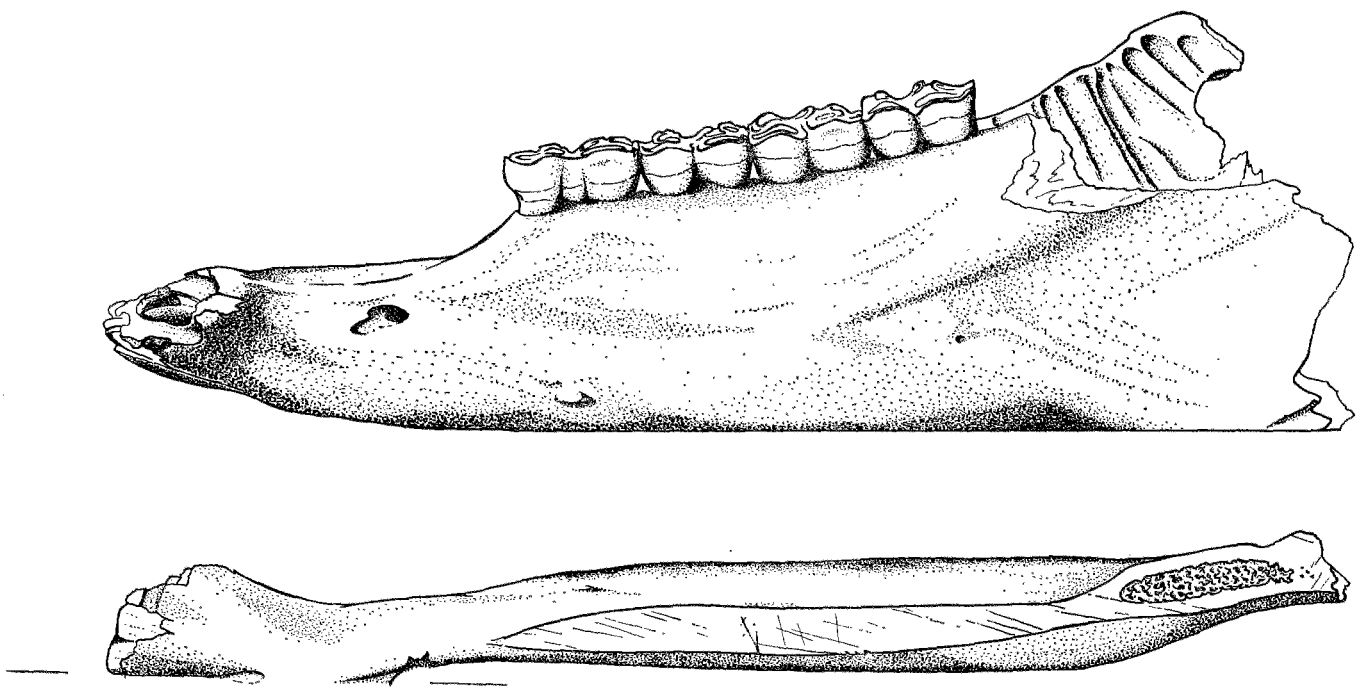
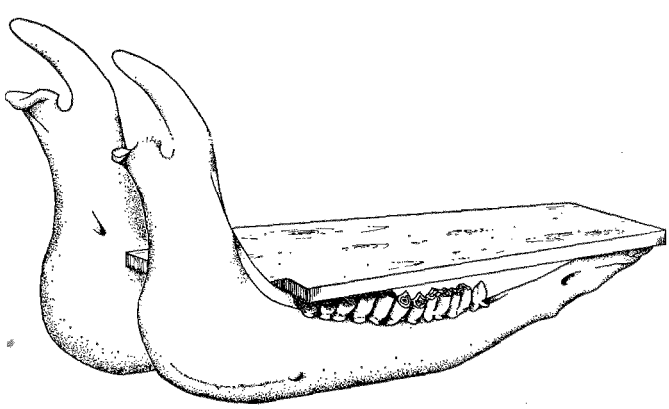


Fig. 2 Drawing of the mandible, lateral and ventral view (scale 1:2). Drawing, A.M. Numan, IPP

Fig. 3 The jaw-sledge from Arnswalde, Kreis Neumark, after Herman 1902. Drawing, A.M. Numan, IPP



Arnswald, Kreis Neumark in the former province of Brandenburg, Germany) in the collection of the former Museum für deutsche Volkstrachten und Erzeugnisse des Hausgewerbes, Berlin.[2] The *Arnswalder Kieferschlitten* (fig. 3) has a simple construction: a triangular piece of wood has been placed on the dentition of a complete cow mandible. According to Herman, both cattle and horse mandibles were used as jaw-sledges.

One of the earliest examples of a drawing of a jaw-sledge can be found in the margin of a Gothic manuscript: a calendar of Saint Peter of Blandigny, a Flemish manuscript dated to the first quarter of the fourteenth century.[3] It shows a child on a sledge holding two wooden prickers, presumably pointed with a metal end. From the small drawing it is difficult to say anything about the construction of the sledge, but it seems as if the wooden bench is supported by an additional piece of wood (pl. XXV:2).

Three examples are to be found on sixteenth and seventeenth-century paintings and drawings by Pieter Bruegel

2 Herman 1901–2.

3 Randall 1966, pl. XCVII: 471.

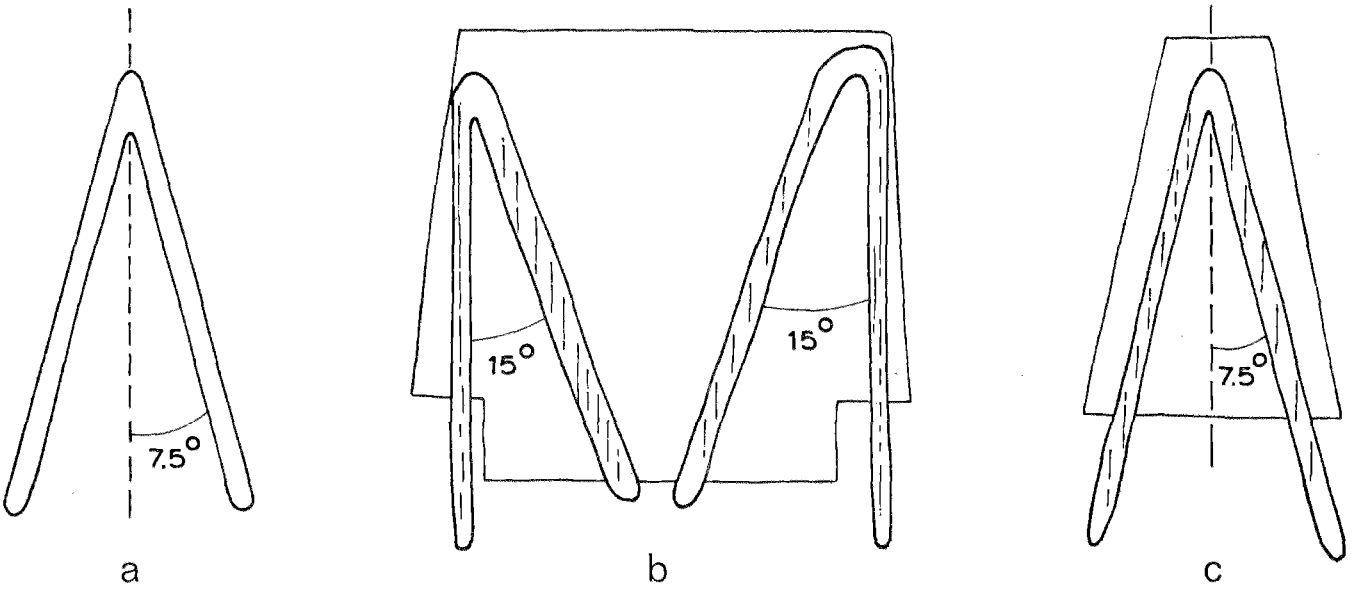


Fig. 4 a. Shows the angle between one half of a jaw of a horse and the centre-line (7.5°). b. When two jaws are placed under a piece of wood, the possibility exists that scratches on the jaws are up to 15°. c. If the Dordrecht sledge was of this single type, the scratches should have been at an angle of 7.5°. Drawing, J.P. de Wit, IPP

the Elder and Hendrik Avercamp. The boy on an engraving after Pieter Bruegel the Elder, *The St George Gate at Antwerp*, painted about 1555, must have been very small because his legs are resting on the front teeth of the jaw while his entire body is between the vertical parts of the jaw (pl. XXVI:2). In 1557 Pieter Bruegel the Elder painted *The Adoration of the Magi*. In the lower right corner of the painting we find the best parallel for the Dordrecht sledge form (pl. XXVI:1). Two complete jaws are used in this catamaran-type of sledge (fig. 6). It follows that the vertical parts of the two inner halves of the jaws must have been removed in order to make the insertion of a broader bench possible. There are two main arguments for supposing that the Dordrecht sledge was of this type. First, the vertical ramus of the jaw has been removed; and second, the scratches on the polished surface form an angle of 15° with the centre line between the jaw's two halves, which is double the natural angle between the two parts of a

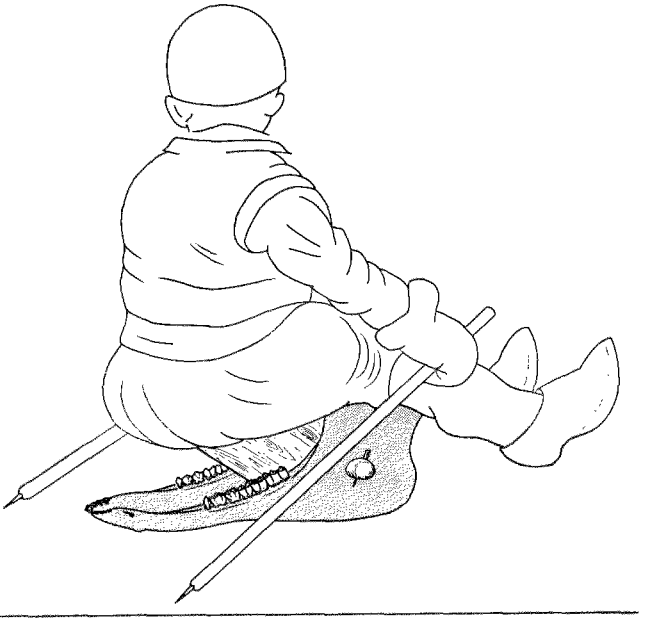


Fig. 5 The sledge drawn after Avercamp (by permission of the Rijksprentenkabinet, Amsterdam). Drawing, A.M. Numan, IPP

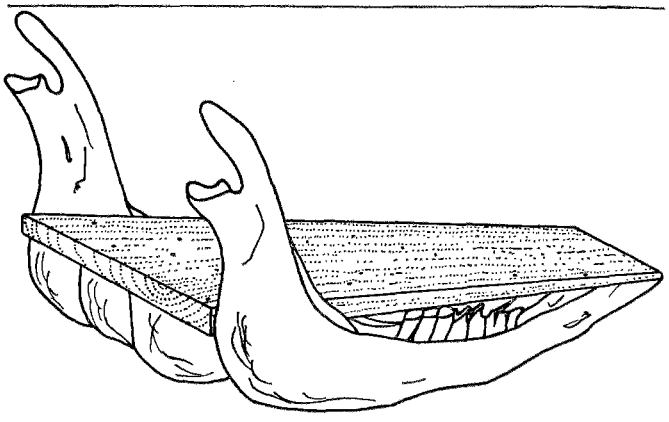


Fig. 6 The catamaran-type of sledge. Drawing, J.P. de Wit, IPP

complete horse mandible (as calculated by the author from three recent mandibles). Thus, the jaw in the sledge must have been placed with one runner parallel to the direction of movement and the other at 15° to this direction (see fig. 4). If the sledge was a catamaran-type, then the Dordrecht piece formed the inner part of the sledge's right runner.

The sledge drawn by Avercamp (*c.* 1620) differs from the other types because the boy in the drawing sits facing backwards (fig. 5). The construction of this type is hard to figure out. There seems to be a vertical piece of wood between the two parts of the jaw, but the way in which this is connected to the bone is not clear. The pictures show that all three jaw-sledge types were used on ice and not on snow. Finally, it is obvious that old-fashioned wooden sledges were imitations of the examples made of bone.

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JOHANNA HOLLESTELLE

Soil-Marks of Late Medieval Brick Clamps at Wijk bij Duurstede

figs. 1–3; pls. XXVII, XXVIII

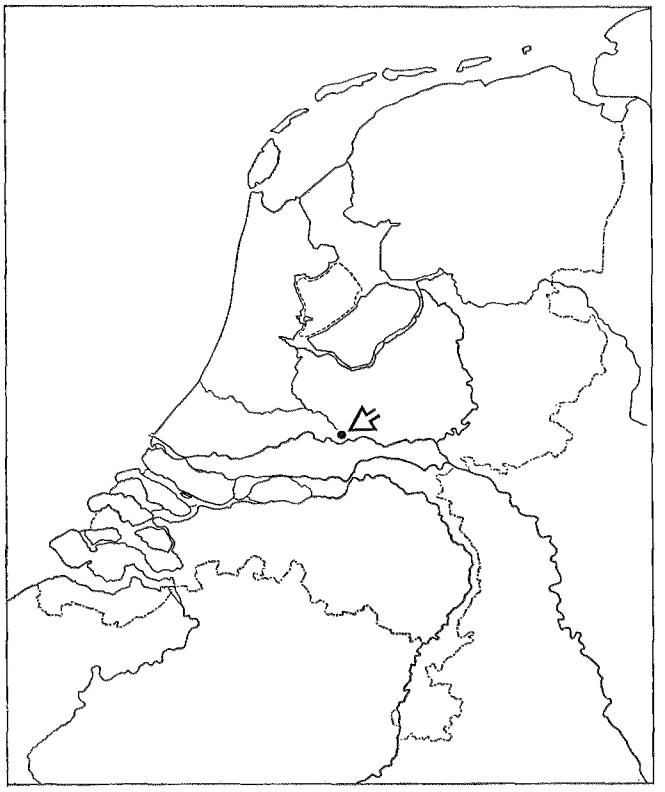

Fig. 1a Situation

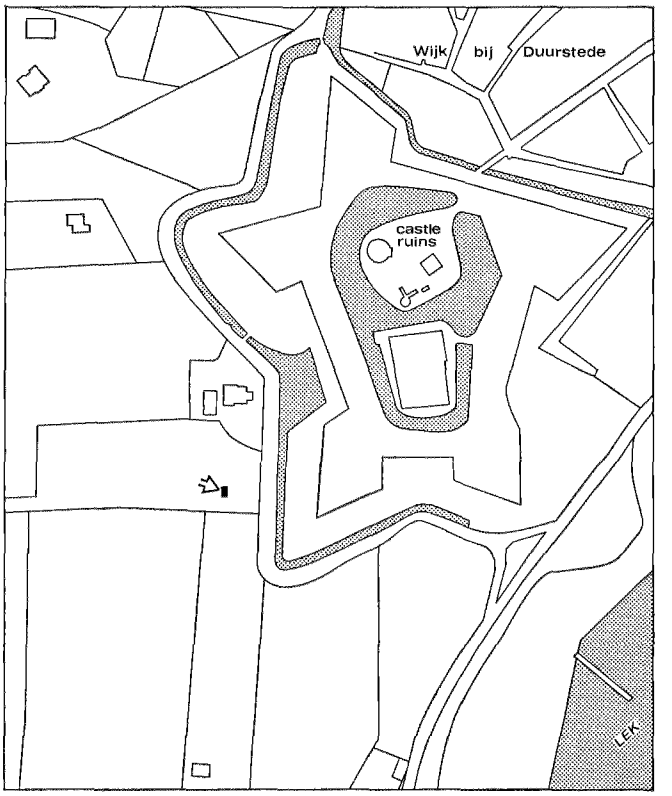

Fig. 1b

As a continuation of excavations that had already been in progress for several years at Wijk bij Duurstede, excavations were started in the meadows west of the castle grounds in February 1974 (fig. 1). In the late Middle Ages this castle was a stronghold of the bishops of Utrecht. After the removal of turf and a few centimetres of topsoil the attention of the excavators was attracted by some large black spots in the reddish-brown clay only a few metres from the side of the Lange Singel, a road leading to the river Rhine-Lek along the castle complex. Further excavation revealed several long black streaks in the ground and also red-brick debris (fig. 2). It soon became apparent that there must once have been a brickyard on this spot.[1] Instructions were given to excavate this area very care-

1 The leaders in the field, R. Lutter and H. ter Schegget made the suggestion, which was soon affirmed by Dr J.G.N. Renaud.

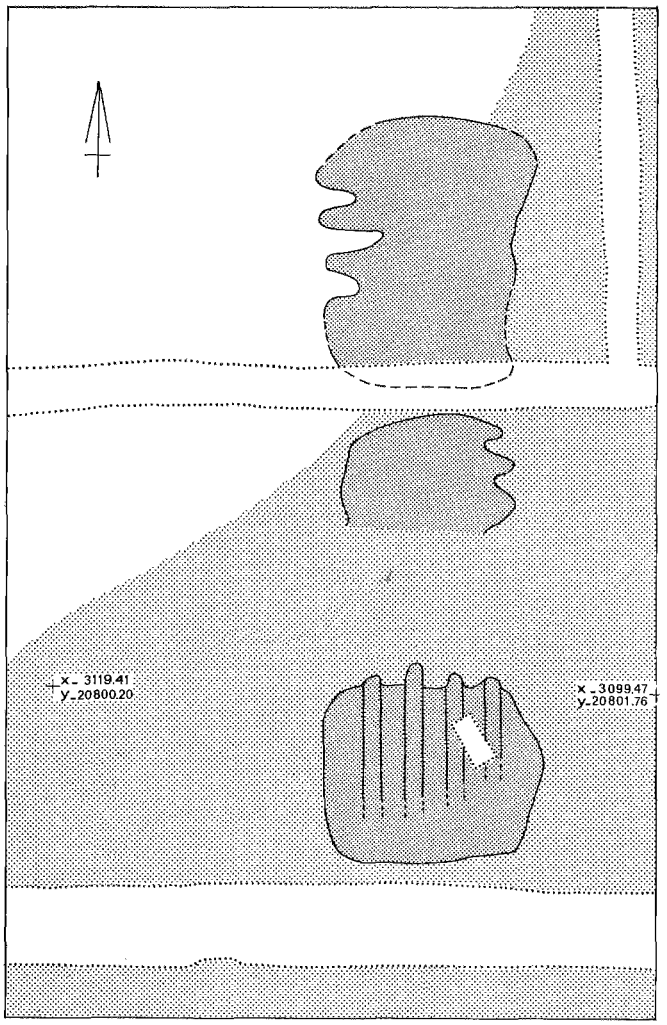

Fig. 2 The soil-marks of the three brick clamps: no. I, most southerly, with fire channels north–south, nos. II and III with fire channels west–east

fully and this proved worth while because clear marks of three brick clamps were found. I was invited to visit the excavation on 19 March with Professor W.A. van Es, the director of the ROB; I went there again on 30 May to look at the final results. My interpretation of these discoveries follows.

The most southerly clamp, no. I, had left the best remains (fig. 3; pl. XXVII). Four black tracks, each about 60 cm wide and 4.5–5 m long, running north–south, parallel to each other about 90 cm apart, were distinctly visible in the red-brown natural clay. The black colour was caused by charcoal and ashes, with some clear traces of faggot wood. These black tracks were evidently the bottom levels of the fire flues of a brick clamp. At the sides of the second track a number of partly baked, reddish bricks were standing on edge at right angles to the fire channel. Evidently the brickmaker had found that these were not sufficiently fired and had left them in place. For a length of 3 m between flues 1 and 2 there was a layer of completely unfired bricks, grey in colour, and there was also a smaller number of them between flues 2 and 3. All of these bricks were stacked between the fire channels, standing on their long edges in three rows. The sand used in moulding the bricks was still present between them and this made it possible to see each brick clearly as a separate entity. The dimensions of the unfired bricks were $7 \times 15 \times 30$ cm, but the partly baked bricks had shrunk to only $6 \times 14 \times 28$ cm.

No trace was found of brick walls at the edges of the clamp or of paving under it, but the clay of the subsoil was somewhat burnt to a reddish colour by the heat of the fire. This shows that the bricks were fired in open clamps, called in Dutch *windoven* or *loegenoven*. On our eastern borders the German word *meiler* is used and in Belgium the name is *klamp*.[2] The bricks were stacked in an open space in a big heap and the whole mass was covered with old fired bricks, sods, and clay. The stacking had to be done very carefully, with the bricks touching each other as little as possible, and for this reason they were always placed on their long narrow edge. In the first layer the bricks were placed parallel or at right angles to the fire channels; then the second layer either at right angles to the first or a bit oblique, the third layer as the first again, and so on. The fire flues at the bottom were made about 60 cm wide and 60–90 cm high and were filled with faggots. Over them the bricks were stacked in an arch to prevent the channels from collapsing during the firing. The stack could then be built up until it was about 2 m high. Some air-holes were left in the brick and earth covering of the clamp, especially over the ends of the fire channels. These draught-holes allowed the heat and moisture to escape and they could be opened or closed during the firing according to the demands of wind and weather. The entrances to the fire channels, the fire-holes or mouths, were usually reinforced with bricks, as is clearly visible in the photograph of a farmer's

2 Hollestelle 1961, 29.

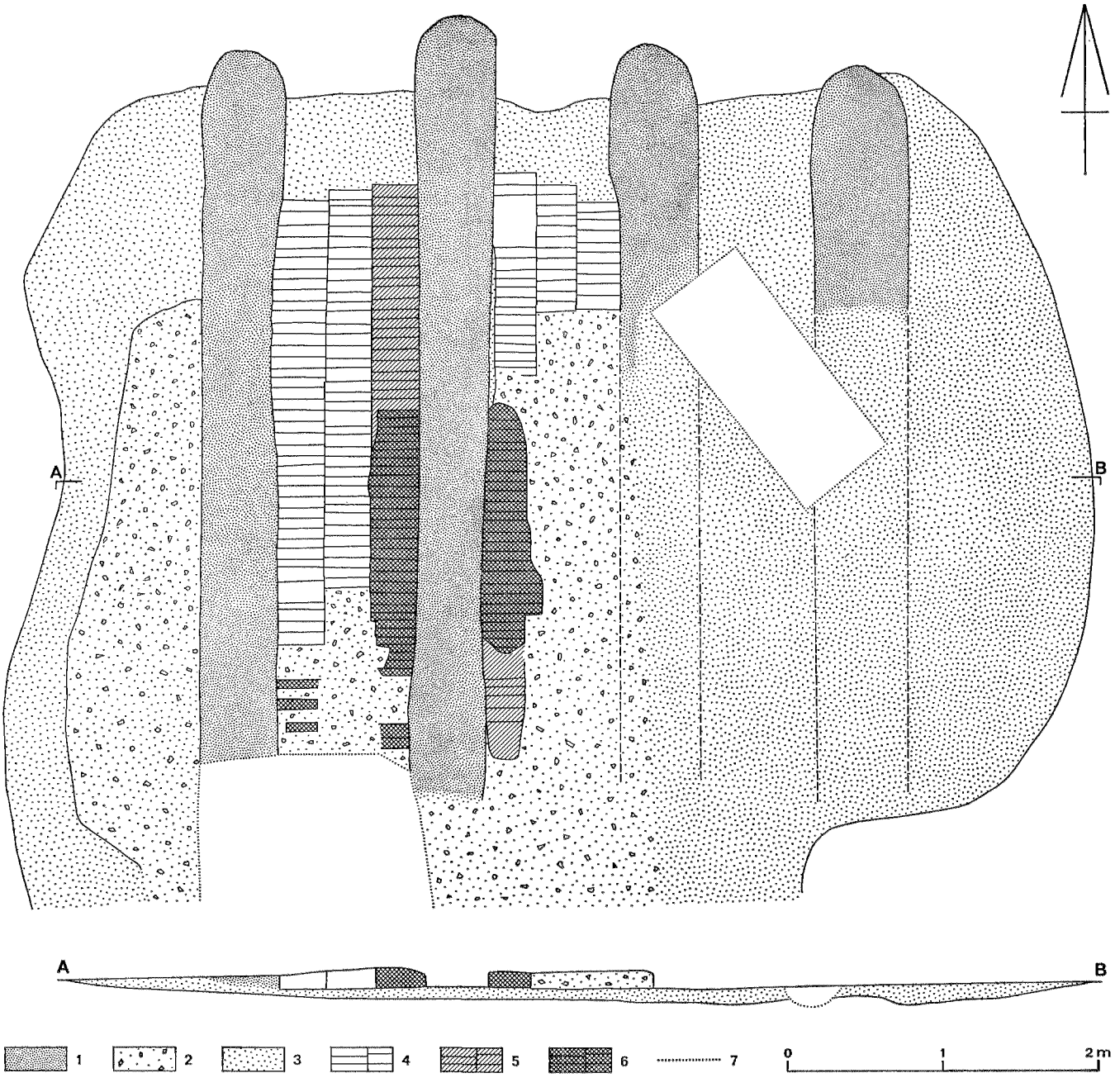

Fig. 3 Plan of the brick clamp no. 1: 1. black tracks with much charcoal and ashes; 2. subsoil clay, somewhat reddish by the fire, and with reddish brick debris; 3. subsoil; 4. grey, unfired bricks; 5. part-fired bricks; 6. fired bricks, red; 7. recent disturbance

brick clamp taken in 1924 (pl. XXVIII). [3] No trace of such brick walled fire-holes was found in these excavations.
North of clamp I two other areas with similar soil-marks were found, but these were not so clear and there was no unfired or partly fired material present. Evidently here the remains of the brickmaking had been cleared away more completely before the land was again laid down to grass. Clamp II showed marks of six fire channels but clamp III showed only three. All of these traces ran east–west so presumably the firing was done from the west end. I suppose that clamp III originally had more than three fire channels because three is a very small number. From the whole of this area only a very few pieces of brick were found, some of them were 14 cm wide and 6 cm thick but no complete length was recovered.
I suggest the following figures for the capacity of such a brick clamp. In clamp I, in each of the three spaces between pairs of fire channels, there was room for a row 70 bricks long and 3 bricks wide, and outside channels 1 and 4 there was probably room for a row 70 bricks long and 2 bricks wide. That makes 910 bricks in one layer and if this was repeated to a height of five bricks beside the fire channels this would make 4,550 bricks. Above this level an additional 560 bricks could be stacked over the top of the fire channels making a total of 1,470 in one layer. Ten such layers would contain 14,700 bricks, which makes a total content of 19,250. Probably 20,000 would be an acceptable number of bricks in this clamp. A clamp with six fire holes could probably produce 30,000 bricks. These figures are in no way too high.[4] From the 14th and 15th centuries there are many records of 50,000 or 60,000 bricks being fired in one kiln. At that time the kilns usually had brick walls and a paved floor, and neatly constructed brick fire-holes. However, until as late as 1900, brickmaking in open clamps holding 100,000 bricks was carried out on in the southern Netherlands[5] and Belgium. The brick kiln found in 1955 in Deersum, Friesland, had eight fire channels with neatly constructed brick fire-holes.[6] A brick kiln near Houten, only 10 km west of Wijk bij Duurstede, excavated in 1970,[7] also had eight fire channels with brick mouths at both ends and solid brick walls. The first one dated from about 1300. The second, more developed in construction, was dated by the excavators to the second half of the fourteenth century. A third one was found in 1971 at Poortugaal, SW of Rotterdam; with six fire channels, and dating to the first half of the 14th century.[8]
It is very difficult to date the brick clamps at Wijk bij Duurstede and I dare not make an exact decision about it. Dr J.G.N. Renaud assures me that bricks measuring $6 \times 14 \times 28$ cm were already being used in the square tower of the castle, the donjon, by about 1300. However, I am sure that in 1400 also, and even in 1500, bricks of this same large size could still be made.[9] It seems very likely that the bricks fired in these clamps were intended for the castle, but this very fact could give a brickmaker as late as 1500 the motive for making very big bricks despite the fact that at that time it was usual to make smaller bricks about 22–24 cm long.[10] Alas, no coins or potsherds with special characteristics usable for dating were found on the site. It must be noted the clamps are situated on a clay soil that silted up after *c.* 800; and about 80 m to the west, in plot 421.2, there are some oblong clay pits, filled with later material, where the clay for the bricks was dug. It took a long time for these pits to become refilled. All things considered, I suppose that the brick clamps date from the second half of the fifteenth century or from about 1500.
Finally, it is remarkable that on some maps of about 1800 the field name 'steenoven,' that is 'brick kiln,' is shown for this area, demonstrating that the local inhabitants had kept alive the memory of brickmaking here, and it is certain that there would have been more brick clamps than we have found and possibly brick kilns also.[11]

3 The photo is made near Vreden (Western Germany), a few km over the eastern border of the Netherlands. The Heimatverein Vreden kindly allowed the reproduction. See: Elling 1974.
4 Hollestelle 1961, 33.
5 Van der Ven 1954.
6 Halbertsma 1962–3
7 De Keyzer 1973.
8 Hoek 1972, 111–2.
9 Hollestelle 1961, 84.
10 In Wijk bij Duurstede about 1500 the town had its own brickworks, surely with a well-walled kiln. A contract with the master brickmaker gives nothing about the size of the bricks: see Hollestelle 1961, 287–8.
11 The English translation was kindly done by Mrs E. Eames, M.Litt., M.A.

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J.A. BRONGERS

An Early Nineteenth-Century Excavation in the Netherlands

fig. 1; pls. XXIX–XXXII

INTRODUCTION

This communication deals with some aspects of the excavation at the Arentsburg estate in Voorburg near The Hague executed by C.J.C. Reuvens from 1827 to 1834. Emphasis is laid upon the use of planes and sections in the excavations and the use of lithography as a means of reproduction in Reuvens' intended publication.

C.J.C. REUVENS (1793–1835)

Caspar Jacob Christiaan Reuvens was born in The Hague in 1793. Although he read law, his main interest was the classics, and in 1815 he became professor of Latin and Greek at the University of Harderwijk in the province Gelderland. In 1818 he was appointed to the University of Leiden, where he held the newly created chair in archaeology, which included Egyptology, numismatics, architectural history, classical and non-classical archaeology. Apart from this task he was the first director of the National Museum of Antiquities, founded on the instigation of King William I. In 1822 he became a member of the Koninklijk Nederlandsch Instituut van Wetenschappen, Letterkunde en Schoone Kunsten (after 1851: Koninklijke Academie van Wetenschappen = Royal Academy of Sciences) in Amsterdam.

From 1827–1834 Reuvens excavated part of a Roman site (Arentsburg) near The Hague. He published the first results of this investigation[1] and continued the excavation till about 1834, when the site specially procured for this purpose by the government had to be sold. This was the result of the deteriorating economic situation in the Netherlands after 1830, due to political difficulties and the subsequent secession of the southern provinces which formed the kingdom of Belgium. These troubles affected the Dutch government's cultural policy with regard to the museum and also to Reuvens's excavations.

In 1835, after attending an auction of Egyptian antiquities in London, he died suddenly on his way home, at the age of 42. And thus the final report on the Arents-

Fig. 1 Situation of Arentsburg

1 Reuvens 1828; 1829; 1830.

burg excavations and the methods used was never published.

THE SITE

As early as the sixteenth century an unspecified site was known to exist in Voorburg where Roman construction remains and coins were to be found. At the beginning of the seventeenth century, tuff was extracted from a site called De (Hooge) Burg in Voorburg. The material was used for building purposes by the surrounding inhabitants. In 1624 an inscription dedicated to Isis was found and in 1626 or 1628 a Roman coin hoard came to light.
In the second half of the seventeenth century the Arentsburg estate occupied part of the (Hooge) Burg. In 1771 the hand of a large bronze statue was found during work in the grounds. Prince Gallitzin, the Russian chargé d'affaires and guest of the Dutch philosopher and historian Frans Hemsterhuis (1721–1790) took the hand to St Petersburg. At present this hand is in the National Museum of Antiquities, Leiden. Reuvens met the son of the owner of Arentsburg in Harderwijk; both held their inaugural address in the university on 25 January 1816. In 1826 the Dutch government bought the Arentsburg estate to enable Reuvens to carry out excavations there. Reuvens lived here with his family during the campaigns, which lasted from 1827 to 1834. Reuvens thought he was investigating *Forum Hadriani*, known from the *Tabula Peutingeriana*.
In 1909 the Arentsburg Society (Vereniging Arentsburg) was founded; it asked J.H. Holwerda (1873–1951), the leading Dutch archaeologist of the day, to continue the excavations on the estate. These activities, which were carried out from 1910–1915, were financed by the Society. The report, in which Holwerda concluded he had excavated a Roman naval station, was published in 1923. He rejected the name *Forum Hadriani*, but considered it more likely that he was dealing with *Pretorium Agrippinae* or *Lugdunum Batavorum*.
Recently, serious doubts arose about Holwerda's opinions concerning the name and the interpretation as a naval station; further investigation, moreover, was difficult as the site had been almost completely covered by buildings. J.E. Bogaers came to the conclusion, based among other things on a milestone found in the neighbourhood, that the site was a Roman town called *Forum Hadriani*, or *Municipium Aelium* (or *Aurelium*) *Cananefatum*.[2]

DOCUMENTS IN THE REUVENS ARCHIVES RELATED TO THE EXCAVATION AT ARENTSBURG

a. A diary in two volumes started in 1827 by P.O. van der Chijs (1802–1867) and continued from 1828 onwards by C. Leemans (1809–1893). Both young men were pupils of and assistants to Reuvens. The recto pages are written by them, while Reuvens inserted comments on the verso pages. Both books contain text and little sketches of finds and situations. The second volume also contains fragmentary drafts of the final publication.
b. A large book containing sketches of finds, situations, and sections made by draughtsmen employed by Reuvens. The book also contains proofs of colour lithographs which were intended as illustrations for the final publication.
c. A set of larger drawings representing a general survey of the excavation, the levelling of the site, and excavated structures, and a general section through the site.
Apart from these documents there are Reuvens' preliminary publications in 1828, 1829, and 1830.

TECHNICAL ASPECTS OF THE EXCAVATION AND THE INTENDED PUBLICATION

The way in which Reuvens recorded the traces of the foundations of the various buildings, water-wells, and other constructions is remarkable. He drew systematically: drawings of the horizontal plane, vertical sections or profiles, and perspective elevations. He kept a diary, and also a complete levelling of the site was carried out. These are elements that are still basic to every modern excavation documentation. Holwerda[3] published several of these drawings, however, without indicating their fundamental significance in the history of archaeology.
From these documents it appears that Reuvens realized that brick-work should not be cut out from the surrounding soil, but that the profiles should remain in contact with the foundations. For this purpose he made small trenches perpendicular to these foundations. The location of the finds was established by two coupes perpendicular to each other; in the drawings of which the surrounding soil is often indicated, even though no details are visible. It is clear that Reuvens correctly interpreted certain traces in a profile as being spade-cuts which were the result of tuff extraction in the sixteenth and seventeenth centuries. Fragments can also be found in the diary of the future

2 Bogaers 1964.

3 Holwerda 1909.

publication. The page on which Reuvens entered some general rules concerning the execution of excavations is well worth reading; his advice to clean the sides of the trenches in order to observe the profile is unequivocal. Although how Reuvens discovered the significance of profiles is still an unsolved question, he was one of the first to use them in archaeology. The oldest known evidence so far is a section by Meadows Taylor in 1851 through a megalithic grave in Hyderabad State, India.[4] A painting in the City Art Museum of St Louis (USA) dates from about the same time; it represents an idealized section through a mound by Montroville Wilson Dickeson.[5]

A special group of draughtsmen, under supervision of W.J. Gordon (1811–?)[6] were employed at Arentsburg to help with these activities. One of them, T. Hooiberg (1809–?), who remained connected with the Leiden museum as draughtsman/lithographer also after Reuvens' death, mentions in an autobiography of 1893 how he was engaged at Arentsburg.

Reuvens chose lithography as illustrative method for the report. Senefelder's final text-book concerning this new method was not published until 1818, although he had already discovered this technique at the end of the eighteenth century. Reuvens was one of the first to use the method; it is conceivable that D.P.G. Humbert de Superville (1770–1849), whose lithographs are known to have been made in Leiden between 1820–1823,[7] advised him to choose this technique. Contacts between the two men are known: Humbert de Superville's brother, Jean Emile Humbert (1771–1839), collected antiquities for the Museum in the Mediterranean area, while Humbert de Superville himself was director (1825–1849) of the Prentenkabinet (collection of prints and drawings) of the Leiden University and a member of the Koninklijk Instituut van Wetenschappen, Amsterdam. De Superville offered Reuvens a sketchbook, which contained drawings made during his stay in Rome.[8] Apart from this, a letter has survived from Reuvens to de Superville (1822) as well as a letter from Reuvens' wife to him (1840).[9]

The archives contain water-colours of finds and proofs of two-colour lithographs, whereby experiments were made with colours and light-reflexes.[10] The illustrations of Samian ware are particularly remarkable; Reuvens saw the decoration as an iconographical source of information of Roman life. The Leiden Museum used the lithographical illustration technique throughout the nineteenth century, and maintained its own lithographical workshop for this purpose.

CONSEQUENCES OF THE EXCAVATIONS

The activities at Arentsburg decreased after the ten-day military campaign in 1830. The government finally sold the estate in 1834; the new owner, however, agreed to some further research. Reuvens used the opportunity for observations and smaller excavations. He perceived that no complete historical impression could be obtained from one excavation, and that especially the identification of findspots of antiquities with names known from the *Tabula Peutingeriana* could be obtained only when a complete ensemble of findspots and names were compared. He wished therefore to make a distribution map of antiquities. He wanted to record on maps the find-places of all antiquities – the distinction Roman/non-Roman still sometimes being a matter of argument. In fact the excavation at Arentsburg became the centre of a sequence of activities.

Consequently, in 1833 he travelled to Drenthe to record sites of interest cartographically, especially the *Romeinse legerplaatsen*. In Dutch archaeological literature these *legerplaatsen* are known since 1660 as *heidense* (pagan) *legerplaatsen*, the word *legerplaats* meaning dwelling-place. The name *Romeinse legerplaatsen* (*castra Romanorum*), *legerplaatsen* in the military sense of the word, came into existence under the influence of the eighteenth-century neo-classicism. On his arrival in Drenthe, Reuvens realized immediately that these sites could not have had any military significance, nor did he discover typically Roman finds. Although he did not reach a conclusion, he observed accurately the situation, shape, and size of these sites, which later on turned out to be Iron Age arable land (Celtic fields). He had plans made of the individual *legerplaatsen* and even worked out detailed distribution maps.[11]

4 Wheeler 1954, fig. 1.
5 Silverberg 1968, photograph 6.
6 Scheen 1969.
7 Moulijn 1927.
8 Scheller 1969.
9 De Haas 1941.
10 Twyman 1970, especially chapter 9 (1819–1825: the popularization of lithography and the growth of a technique) and chapter 10 (Improvements and the search for a tonal technique).
11 Brongers 1973.

The distribution map and list of ancient finds was published in 1845 by C. Leemans, and L.J.F. Janssen (1806–1869), respectively, Reuvens' successor as director of the museum and the curator of the Dutch section of the National Museum of Antiquities. Janssen, who had no formal training in archaeology, did not meet Reuvens until 1833. The other pupil, Van der Chijs, devoted himself entirely to numismatics. Leemans should be seen more as an Egyptologist and a museum organizer than a true archaeologist, as could be said of Janssen. The extension of Reuvens' direct influence on Janssen is still unclear because the Janssen archives have not been investigated with this in mind. He was a capable man, but probably not of Reuvens' stature.

As the director of a museum Reuvens had international contacts, which have still been examined insufficiently. The preliminary conclusion must be that the techniques developed at Arentsburg have been of little influence on his contemporaries, although Janssen was in a position to become acquainted with them. Since Reuvens, the making of lists and maps concerning archaeological finds has become a tradition, just as lithography was an illustrative method of the museum publications during the nineteenth century. Reference should also be made to Holwerda who, in his final publication, integrated Reuvens' survey drawings made at Arentsburg into his own.

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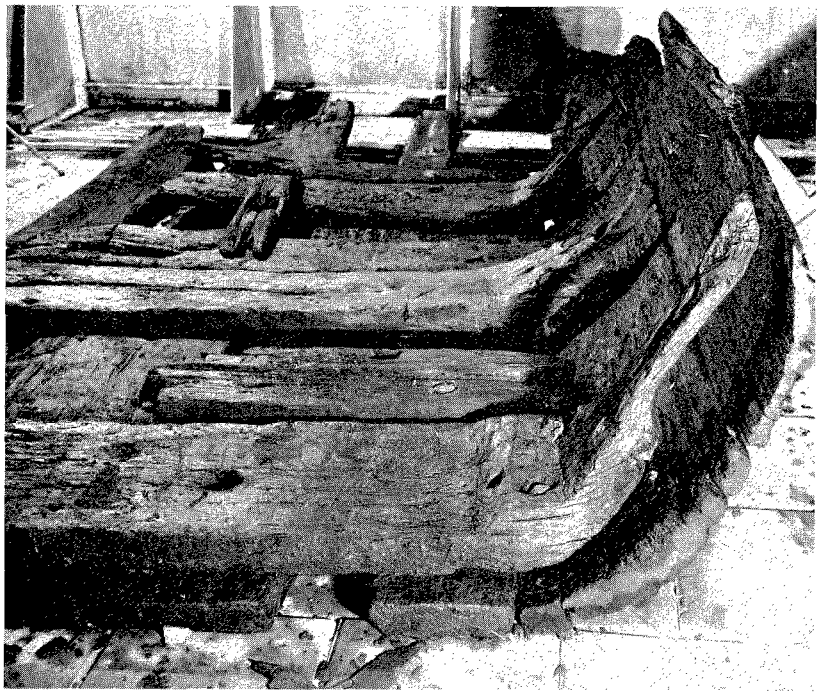
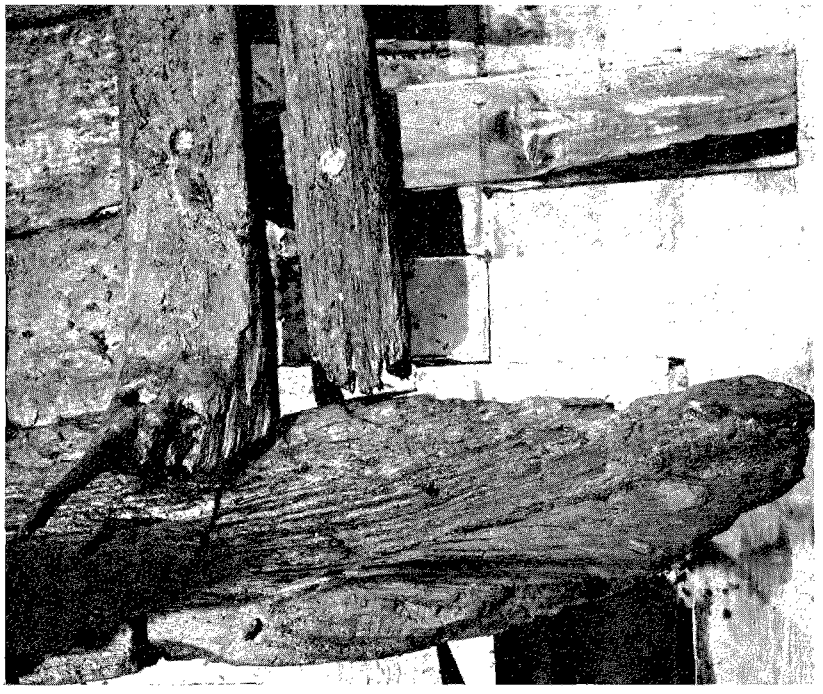
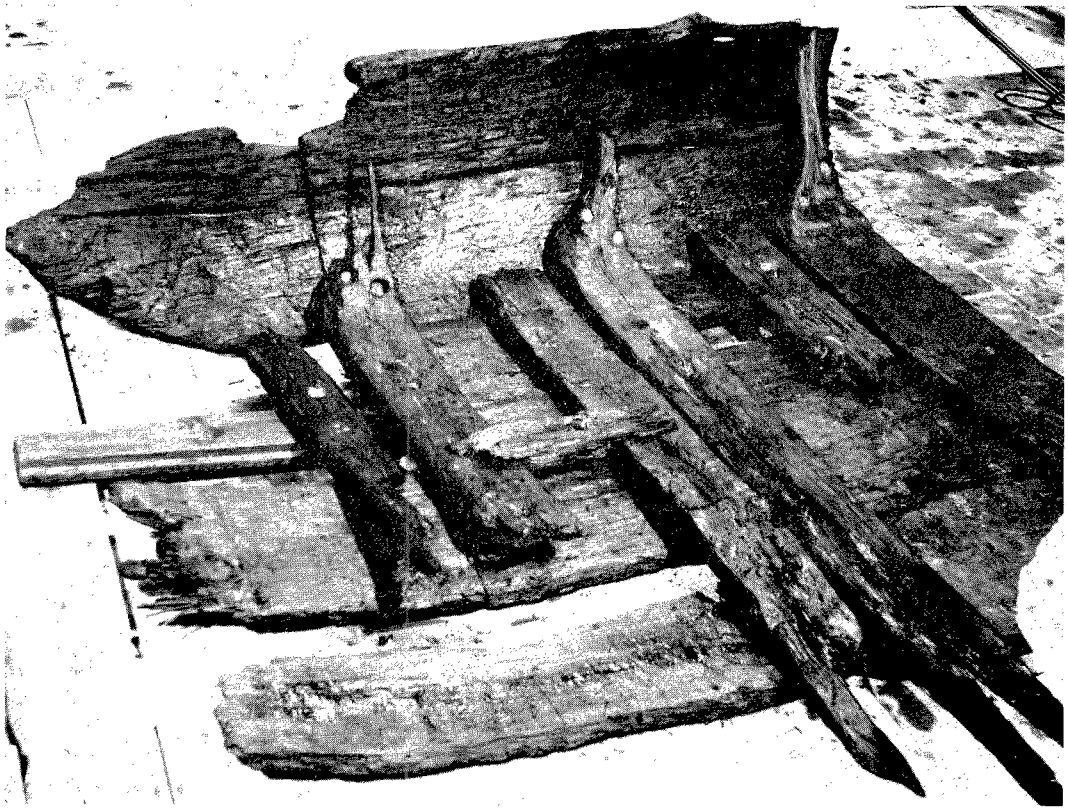
Druten: survey from the west



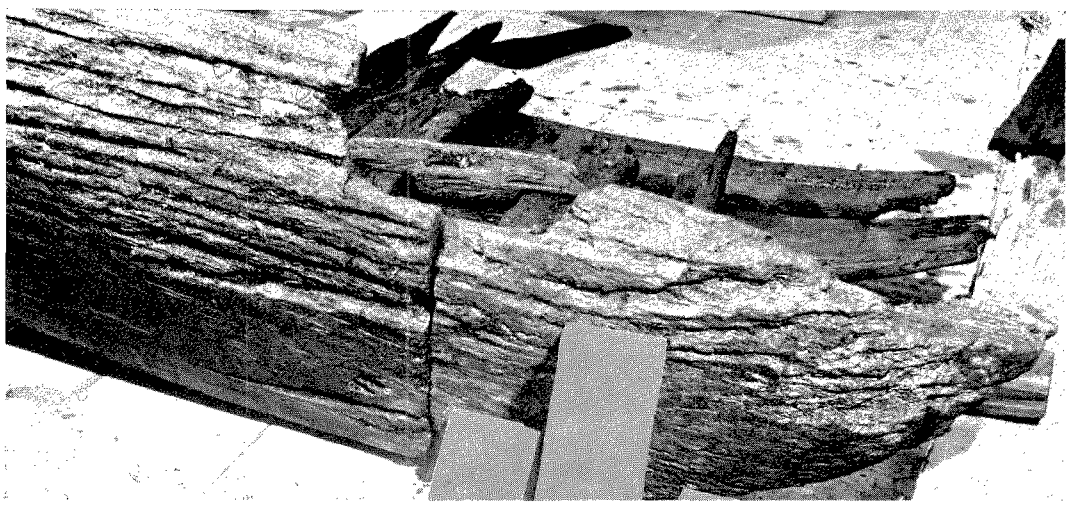
1 Druten: taken-out fragment of the northwestern part, seen from the east, showing the transition strake and floor-timber 8 (foreground)



2 Druten: idem, curved end of transition strake, seen from above

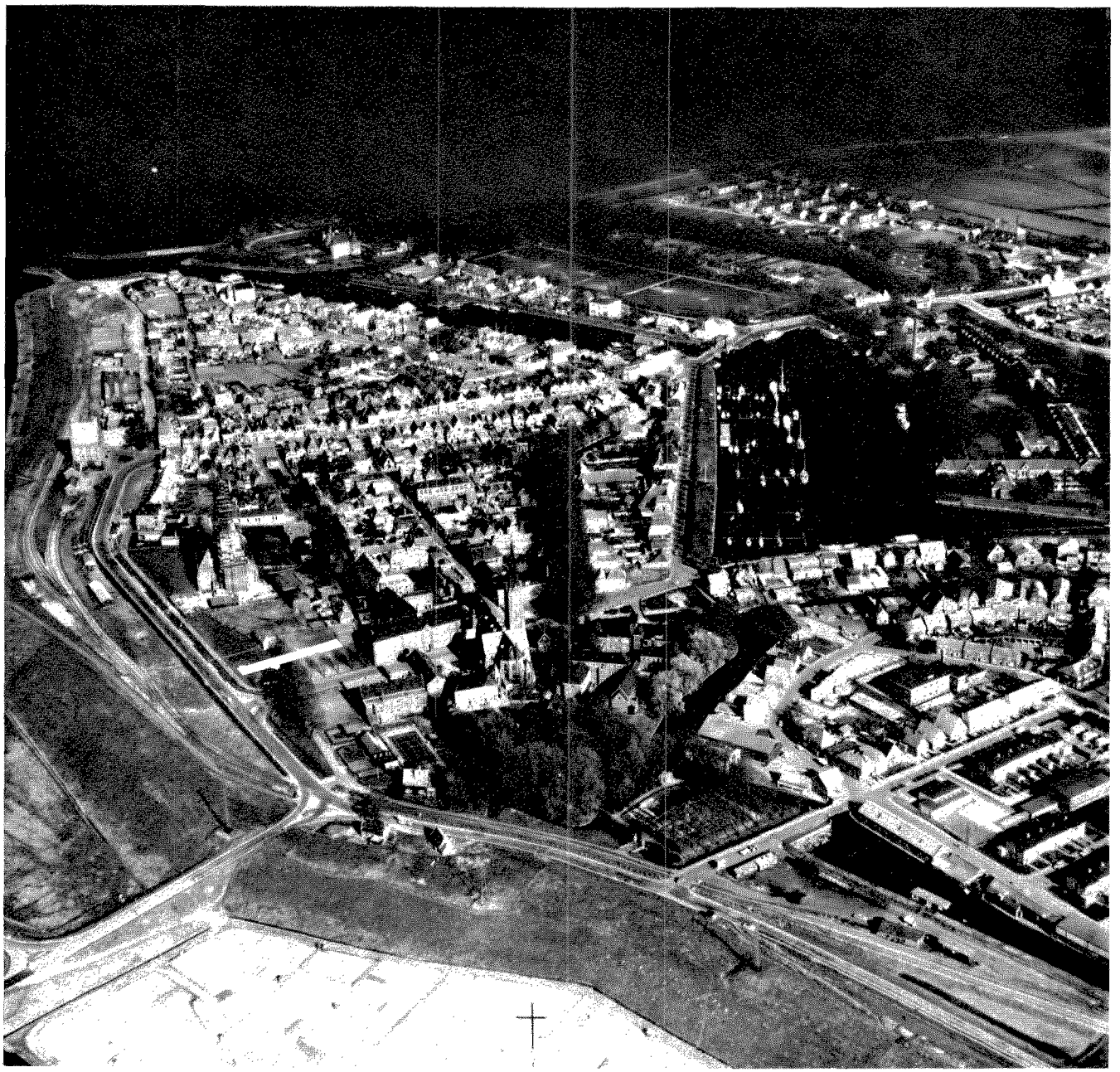


1 Druten: idem, seen from the south



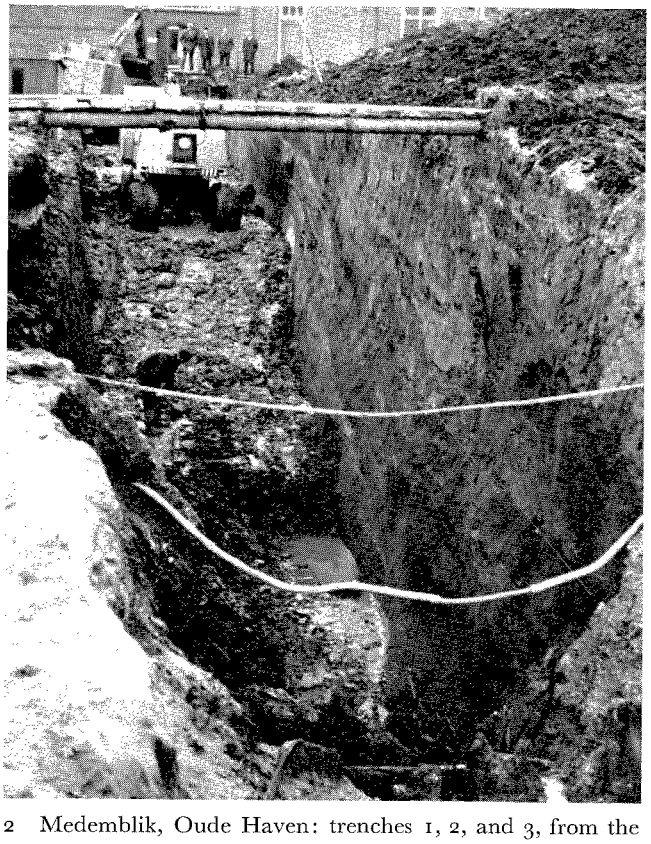
2 Druten: idem, seen from the north

Druten: stamp on amphora 1*f*, scale 2:1

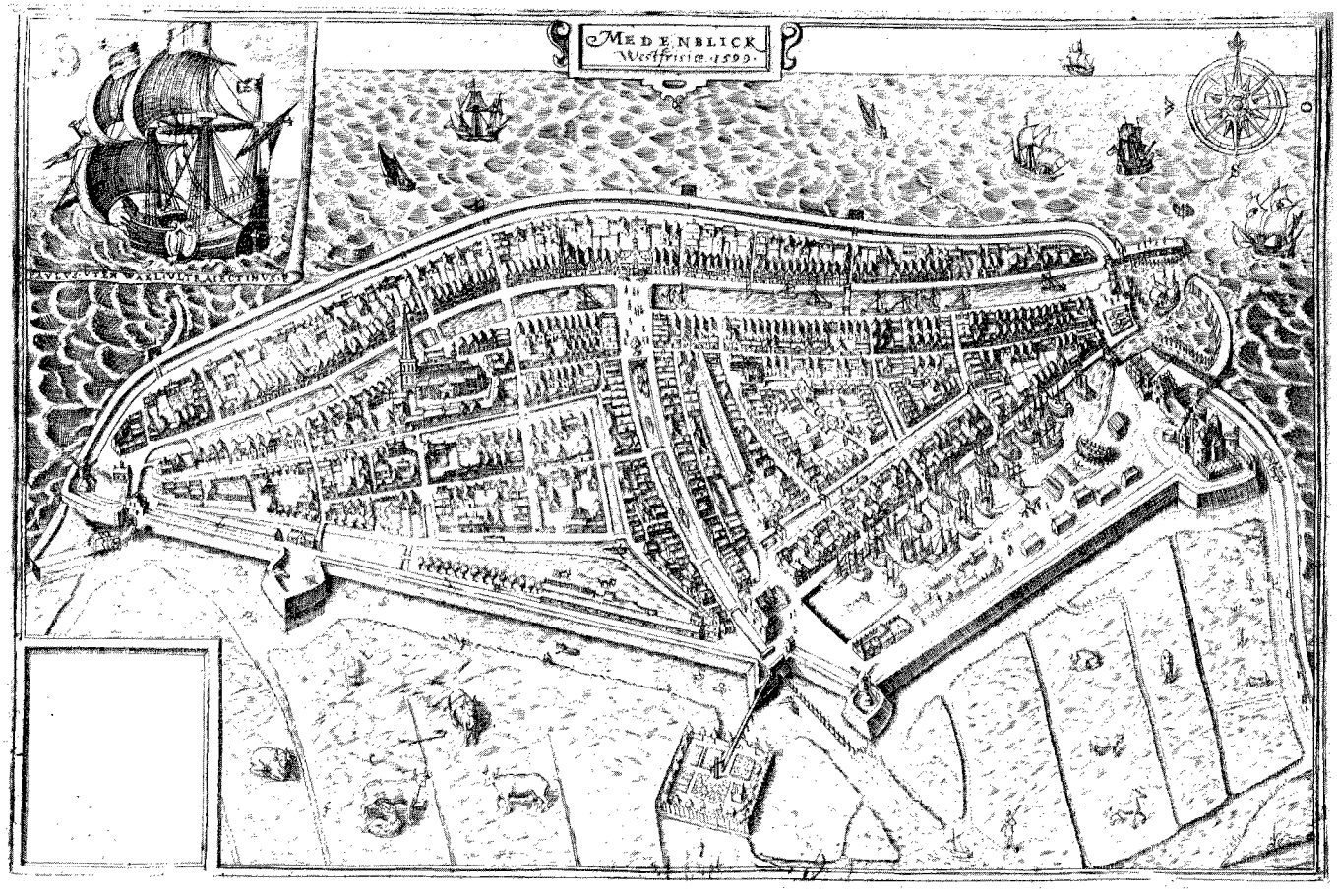


Medemblik from the air. Excavation trench in front of the church marked by white stripe. Oude Haven (at the left side in photograph) runs W–E (photograph by J.K.T. St Joseph of Cambridge)

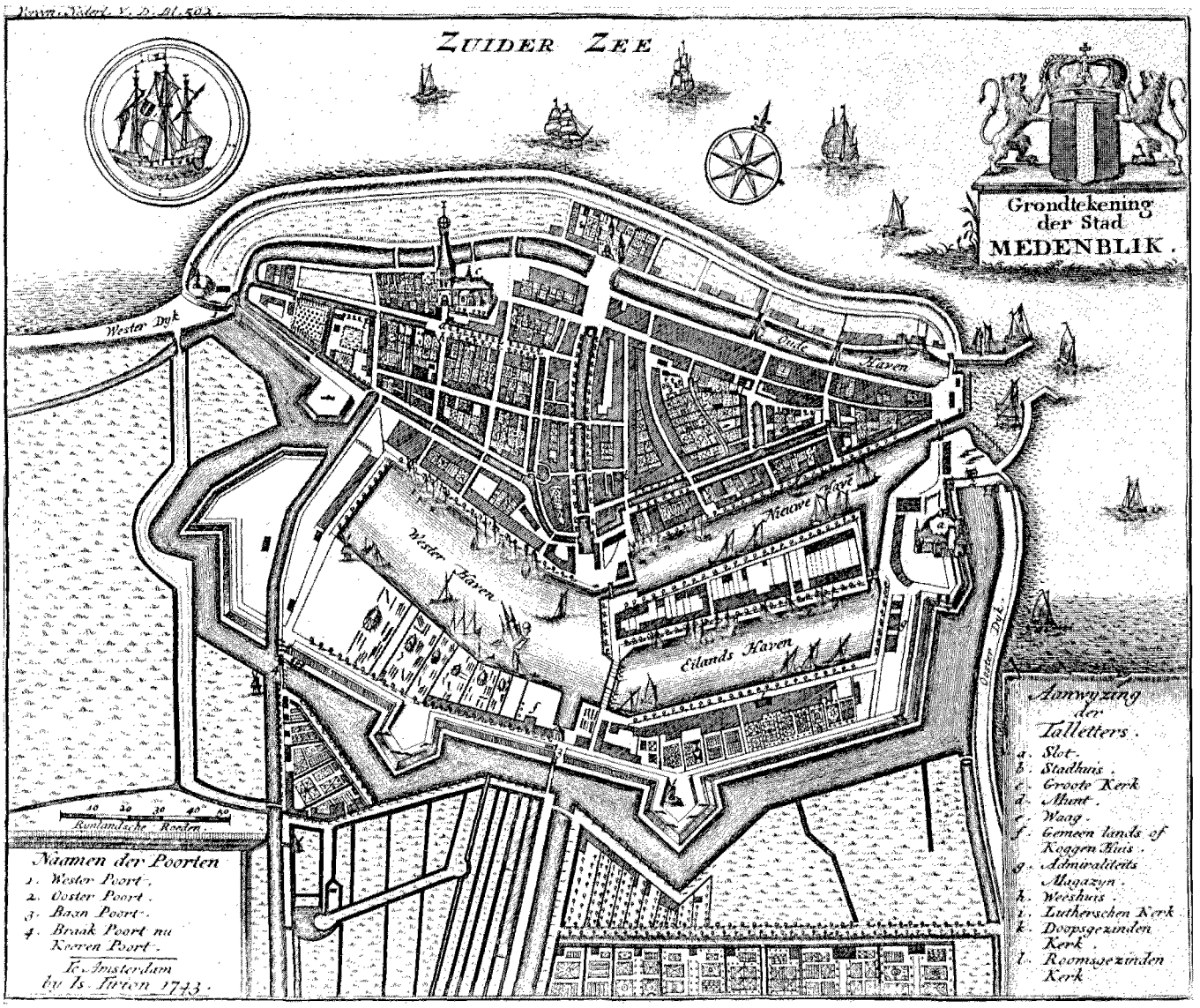
1 Medemblik, Schuitenvoerderslaan: trench tumulus II, square A 4, south section



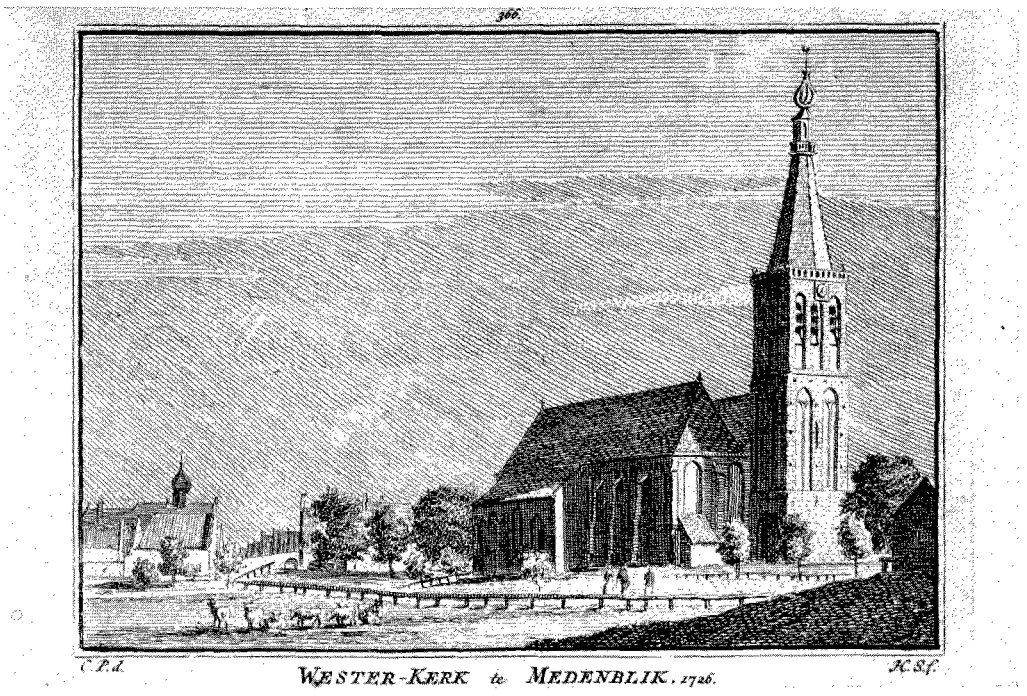
2 Medemblik, Oude Haven: trenches 1, 2, and 3, from the north



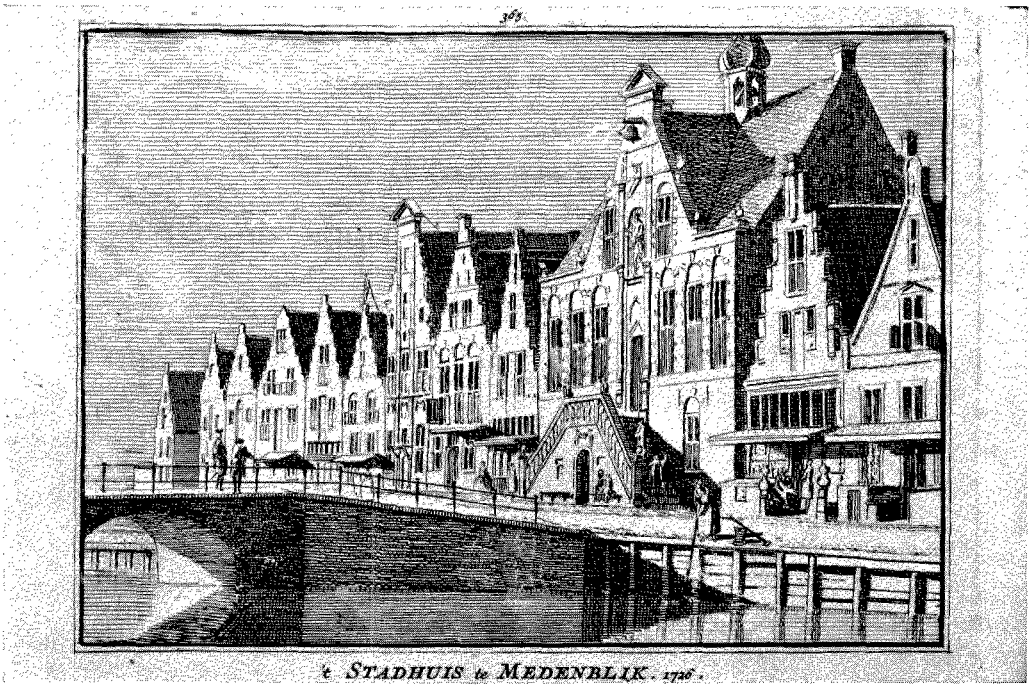
Plan of Medemblik in 1599. Etching by Paulus Utenwael (Westfries Museum, Hoorn)



Plan of Medemblik with unbuilt area at the west side of Oude Haven. Etching printed in 1743 in: Dirk Burger van Schoorel, *Chronyk van Medemblik*, Hoorn 1767



1 Oude Haven at Medemblik in 1726 from the northwest. Unbuilt terrain around the church. Townhall left on the picture. Etching after C. Pronck in: *Het verheerlijkt Nederland...*, Amsterdam 1745–1773



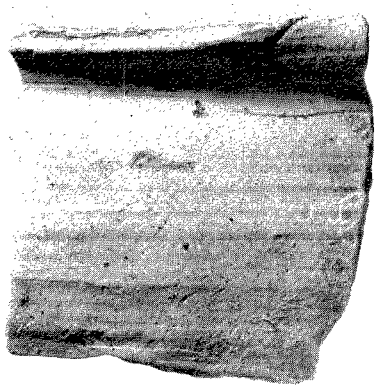
2 Oude Haven at Medemblik in 1726 in front of the town hall. Unbuilt area starts left. Etching after C. Pronck

1 Medemblik: *Kugeltopf*, fabric H 2 (handmade) with bone filler, scale 1:2

2 Medemblik: crucible (?), fabric H 1a, scale 1:2

3 Medemblik: small *Kugeltopf*, fabric H 1, scale 1:2

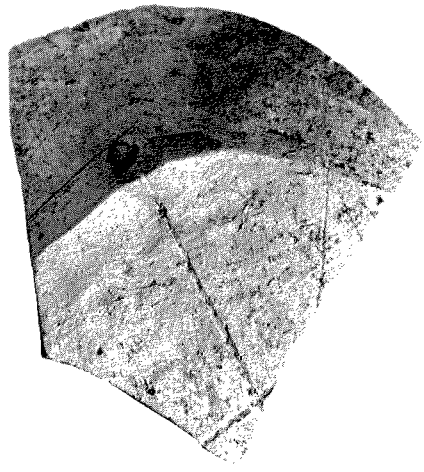
4 Medemblik, fabric H 2, four times enlarged, with visible bone fragment with spongeous texture



1 Medemblik: rim-fragment of a shallow bowl, fabric W 1 (wheelthrown), scale 1 : 1

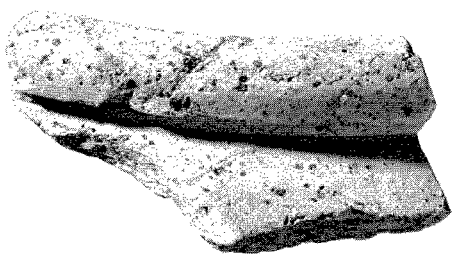
2 Medemblik: decorated fragment, fabric W 2, scale 1 : 1

3 Medemblik: fabric W 9, scale 1 : 1

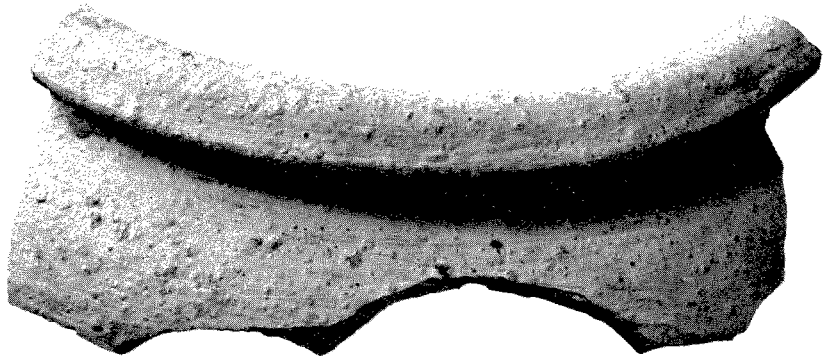


5 Medemblik: base with counting mark, fabric W 6, scale 1 : 1

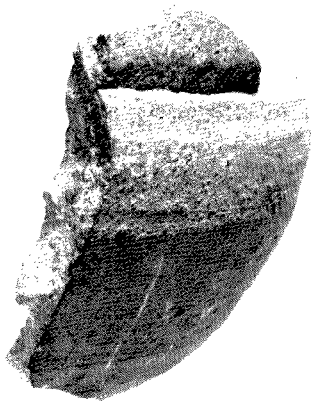
◁ 4 Medemblik: fabric W 12, scale 1 : 1



1 Medemblik: fabric w 3, scale 1 : 1

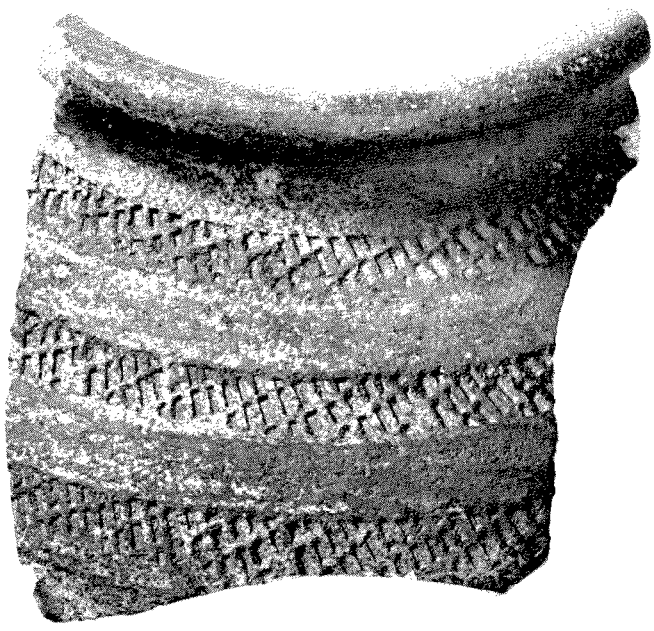


2 Medemblik: fabric w 8, scale 1 : 1



3 Medemblik: fabric w 4, scale 1 : 1

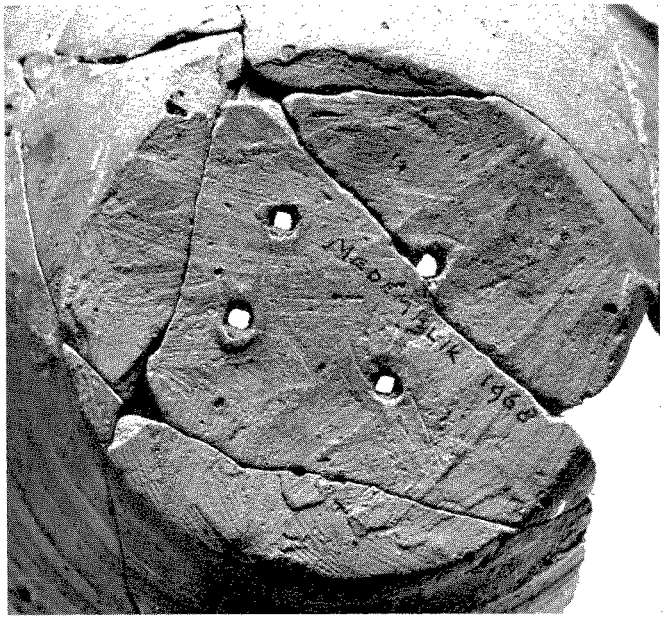
4 Medemblik: fabric w 13, scale 1 : 1



◁ 5 Medemblik: fabric w 14, scale 1 : 1

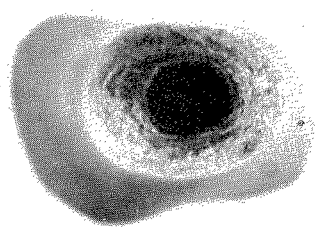
1 Medemblik: Merovingian *rauhwandige* wheel-thrown ware, scale 1 : 1

2 Medemblik: body fragment of a small bowl, fabric W 15, with remnants of tin-foil decoration, scale 1 : 1

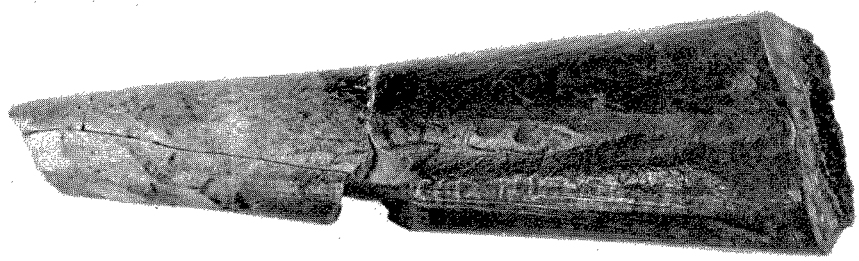


3 Medemblik: bulbous bottle (scale 1 : 2) with pierced base (scale 1 : 1)

Medemblik: unusual probably post-Carolingian fabric, scale 1 : 1



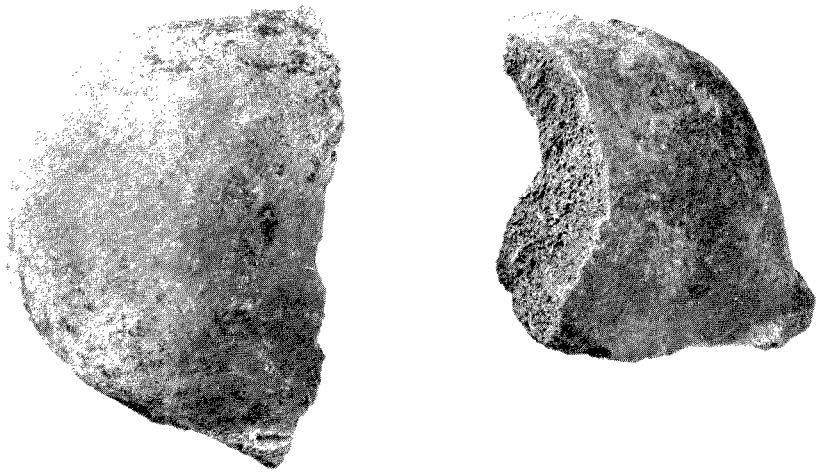
1 Velzen: no. 18–151 (*cf.* fig. 5c)



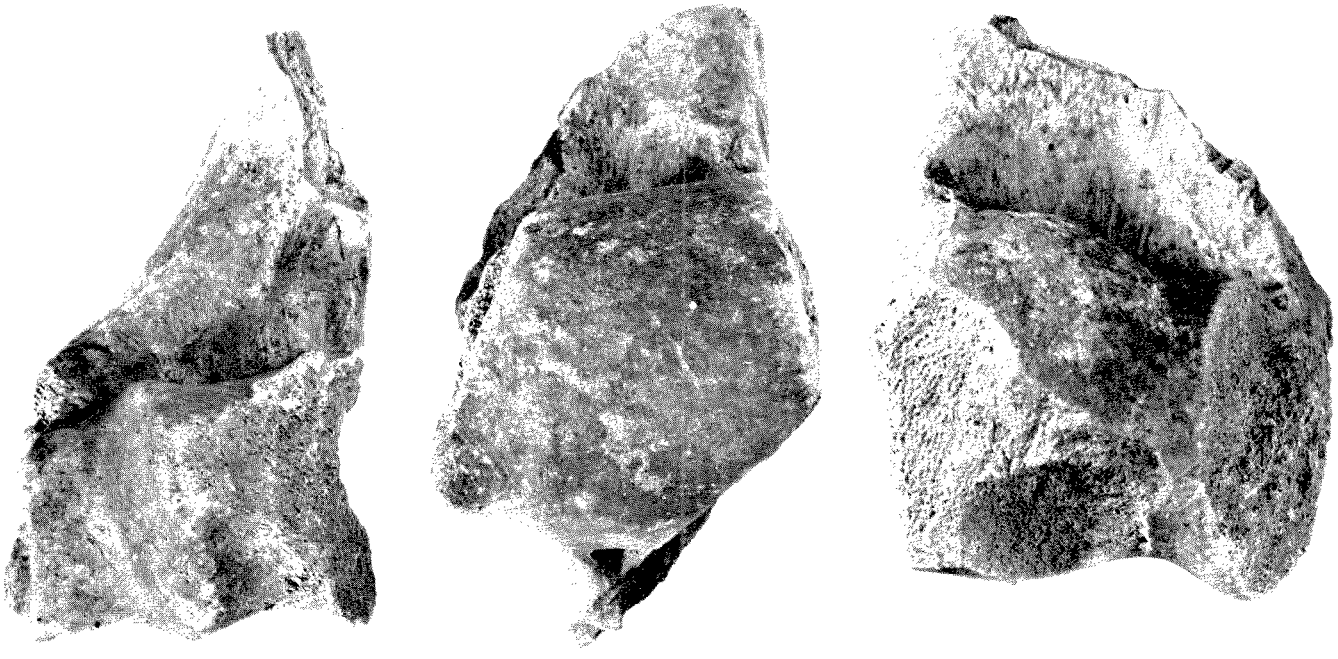
2 Velzen: no. 18–? (*cf.* fig. 4h)

1 Colmschate: the decorated urn no. 42

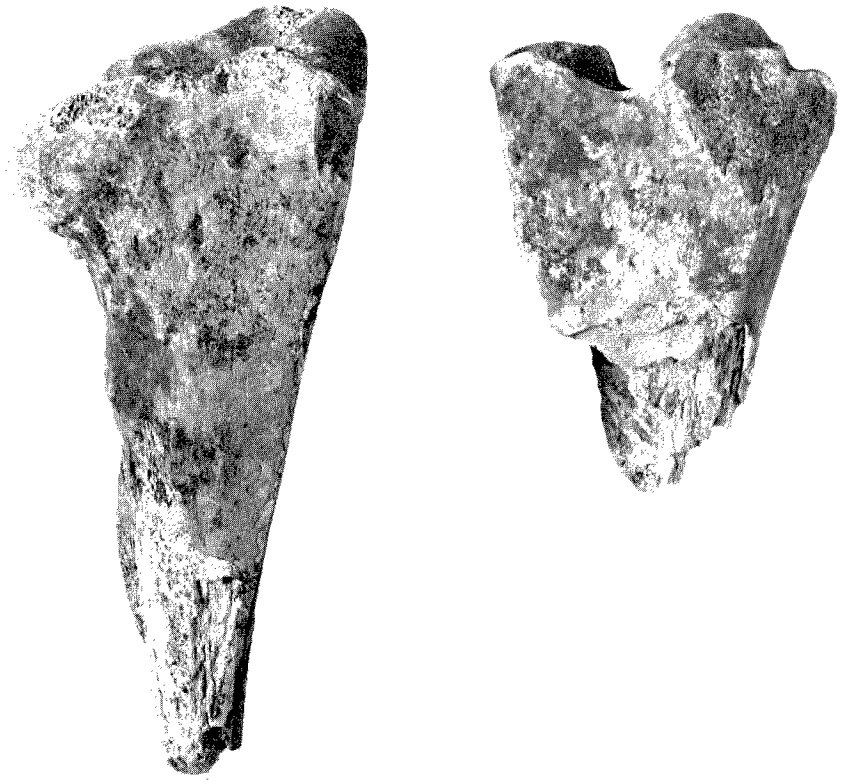
2 Colmschate: the ring-ditch



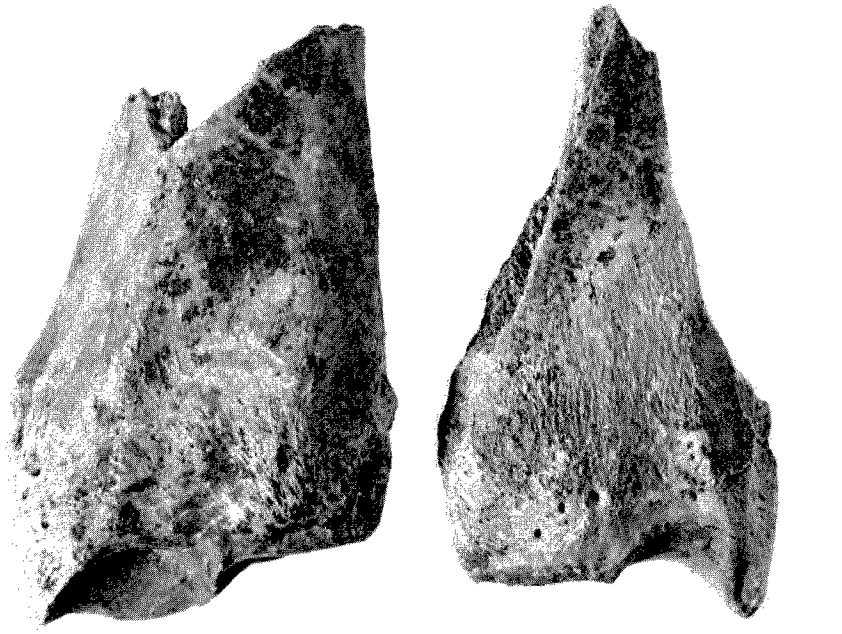
1 Zwammerdam: most typical fragments of the proximal end of the humerus



2 Zwammerdam: most typical fragments of the distal end of the humerus and a fragment showing damage inflicted while separating the humerus and the radius + ulna

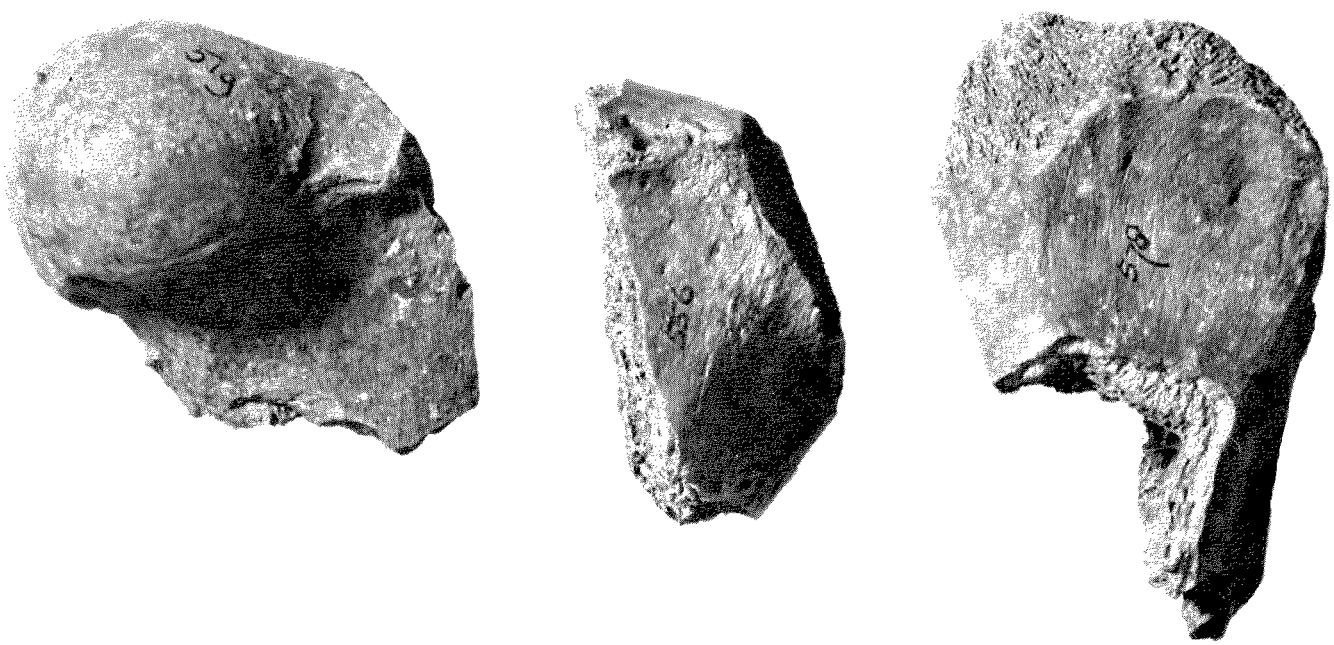


1 Zwammerdam: most typical fragments of the proximal end of the radius

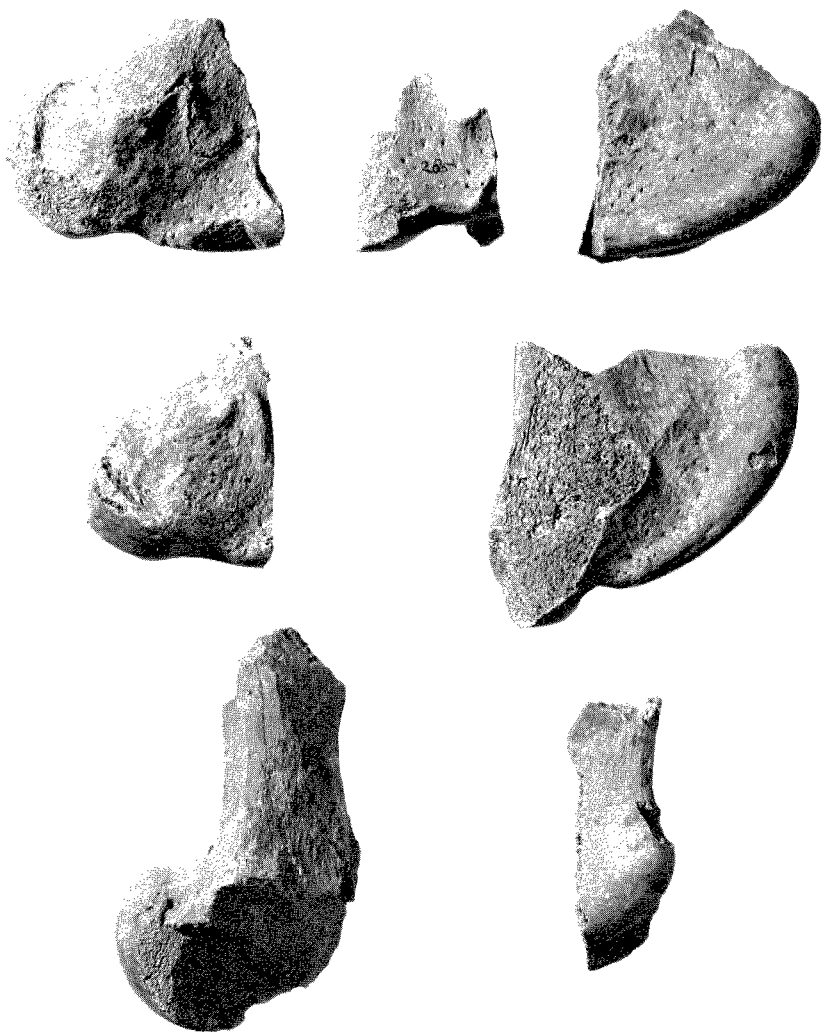


2 Zwammerdam: most typical fragments of the distal end of the radius

1 Zwammerdam: ulna fragment

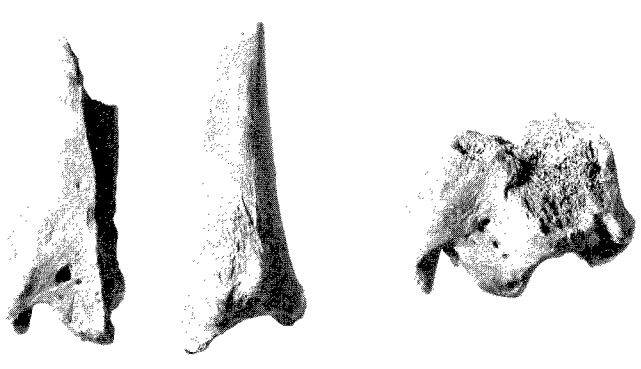


2 Zwammerdam: most typical fragments of the proximal end of the femur

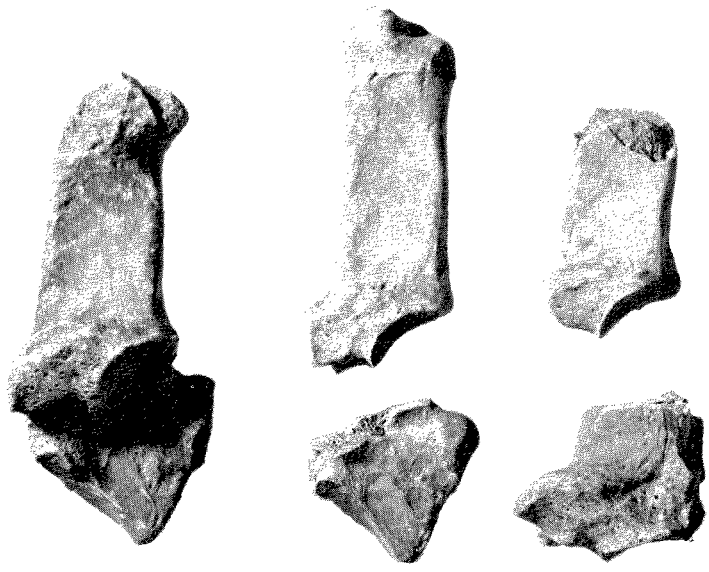


Zwammerdam: some typical fragments of the distal end of the femur

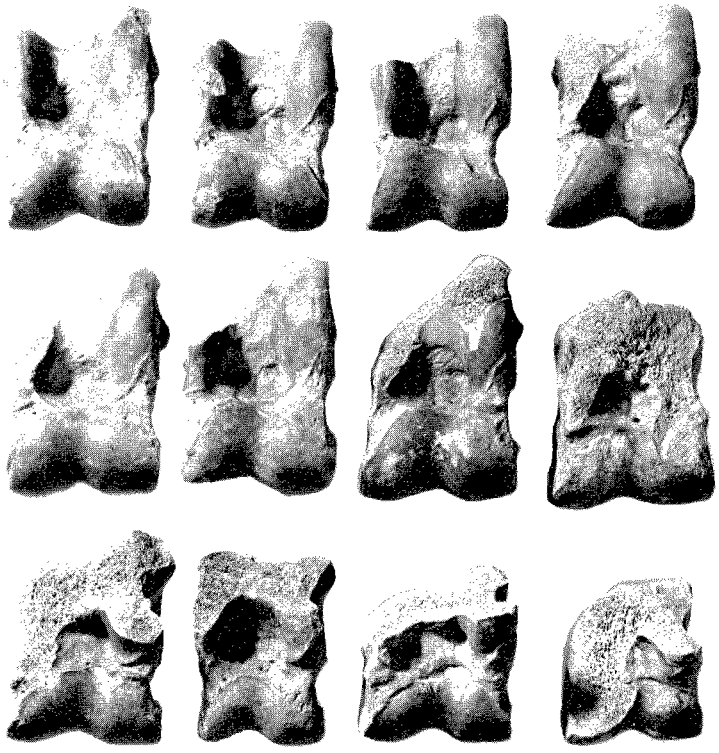
1 Zwammerdam: characteristic fragments of the proximal epiphysis of the tibia, compared with a recent epiphysis



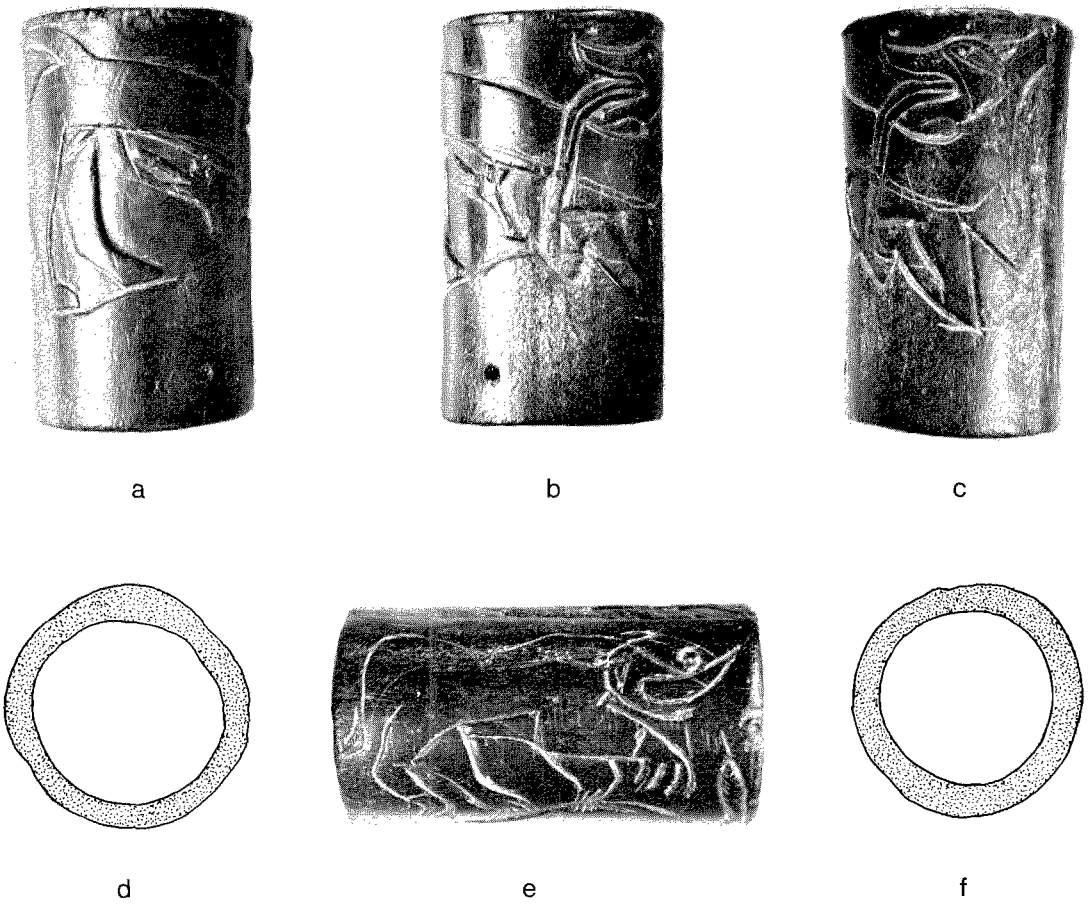
2 Zwammerdam: most typical fragments of the distal end of the tibia



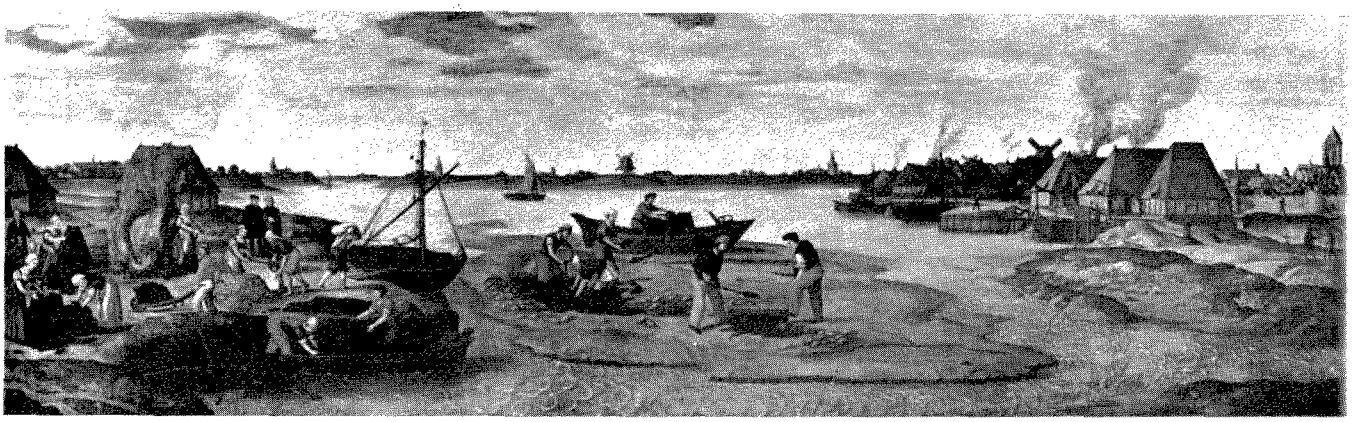
1 Zwammerdam: some typical fragments of the calcaneum



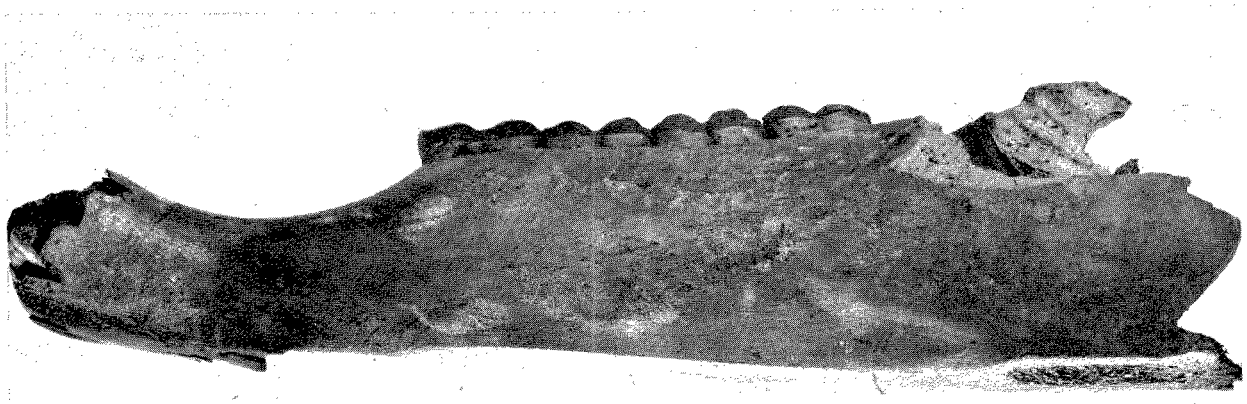
2 Zwammerdam: some typical fragments of the astragalus, showing the variation of the chopping



Knochenbesatz von Vlissingen; a–c. Teilansichten des Hauptmotives; d. Querschnitt oben; e. nachträgliches Eberbild; f. Querschnitt unten (alle M = 1:1)



The *daring delven*, *i.e.*, salt peat cutting for the salt-industry in the late-Middle Ages near Zierikzee (provincie of Zeeland) (Forbes 1968, *afb.* 9)

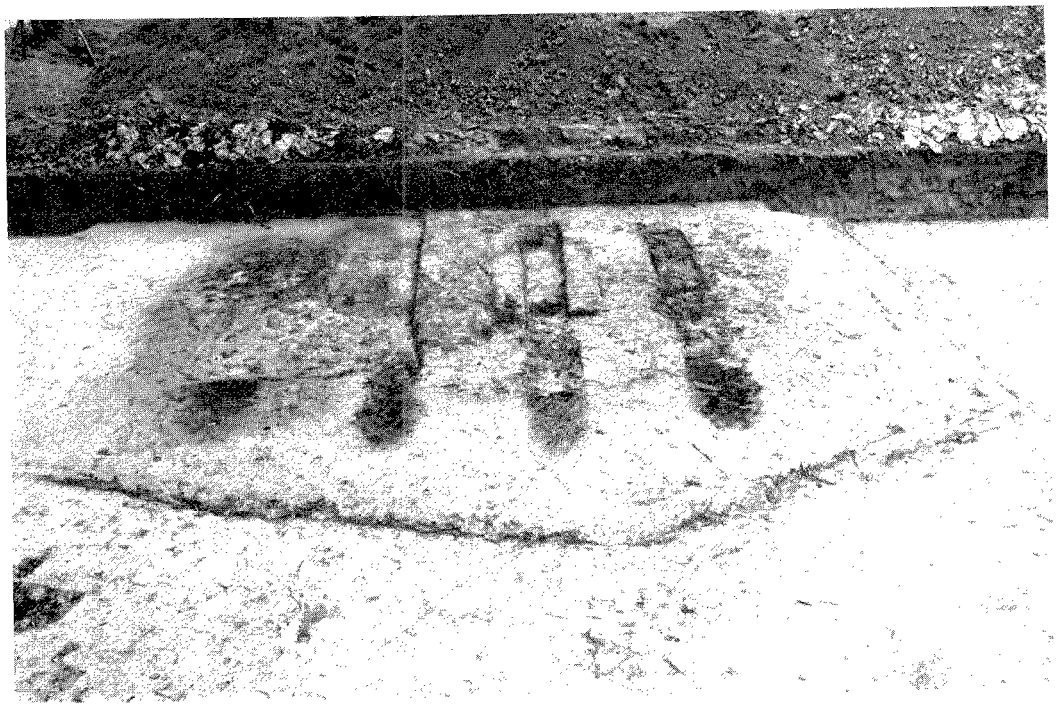


1 The mandible from Dordrecht (photo F. Gijbels, IPP, Amsterdam)

2 Man on a sledge, after Randall 1966, pl. XCVII: 471 (by permission of the Bodleian Library, Oxford)

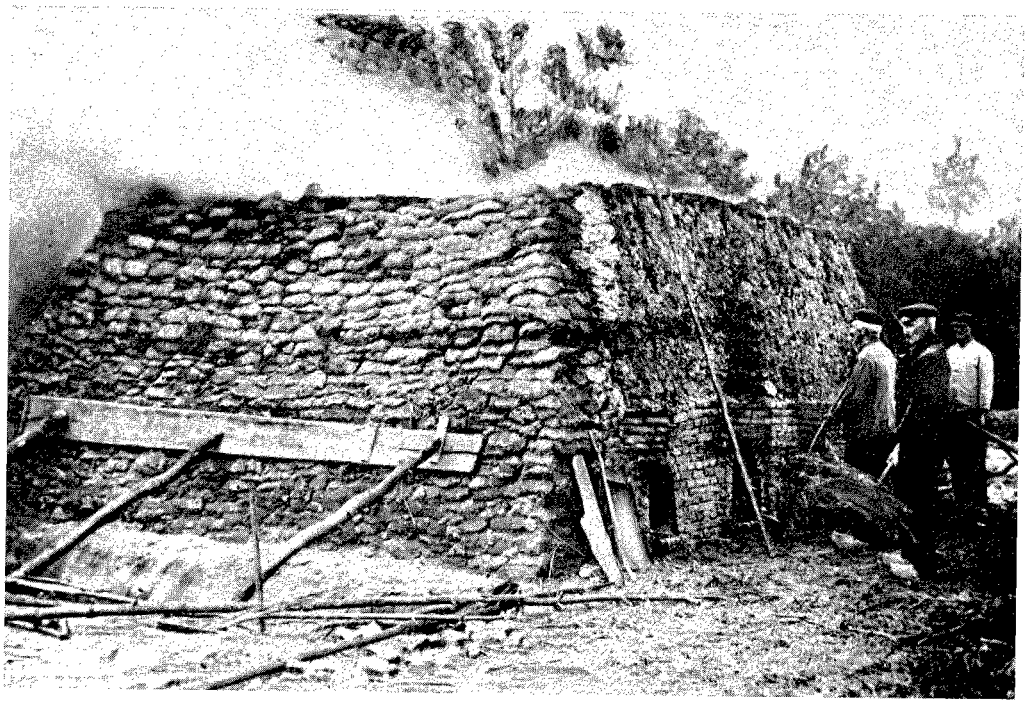
1 *The Adoration of the Magi*, by Pieter Bruegel, the Elder (by permission of the Rijksmuseum, Amsterdam)

2 *The St George Gate at Antwerp*, engraving by Fr. Huys and H. Cock, after Pieter Bruegel, the Elder; about 1555 (by permission of the Hamburg Kunsthalle)

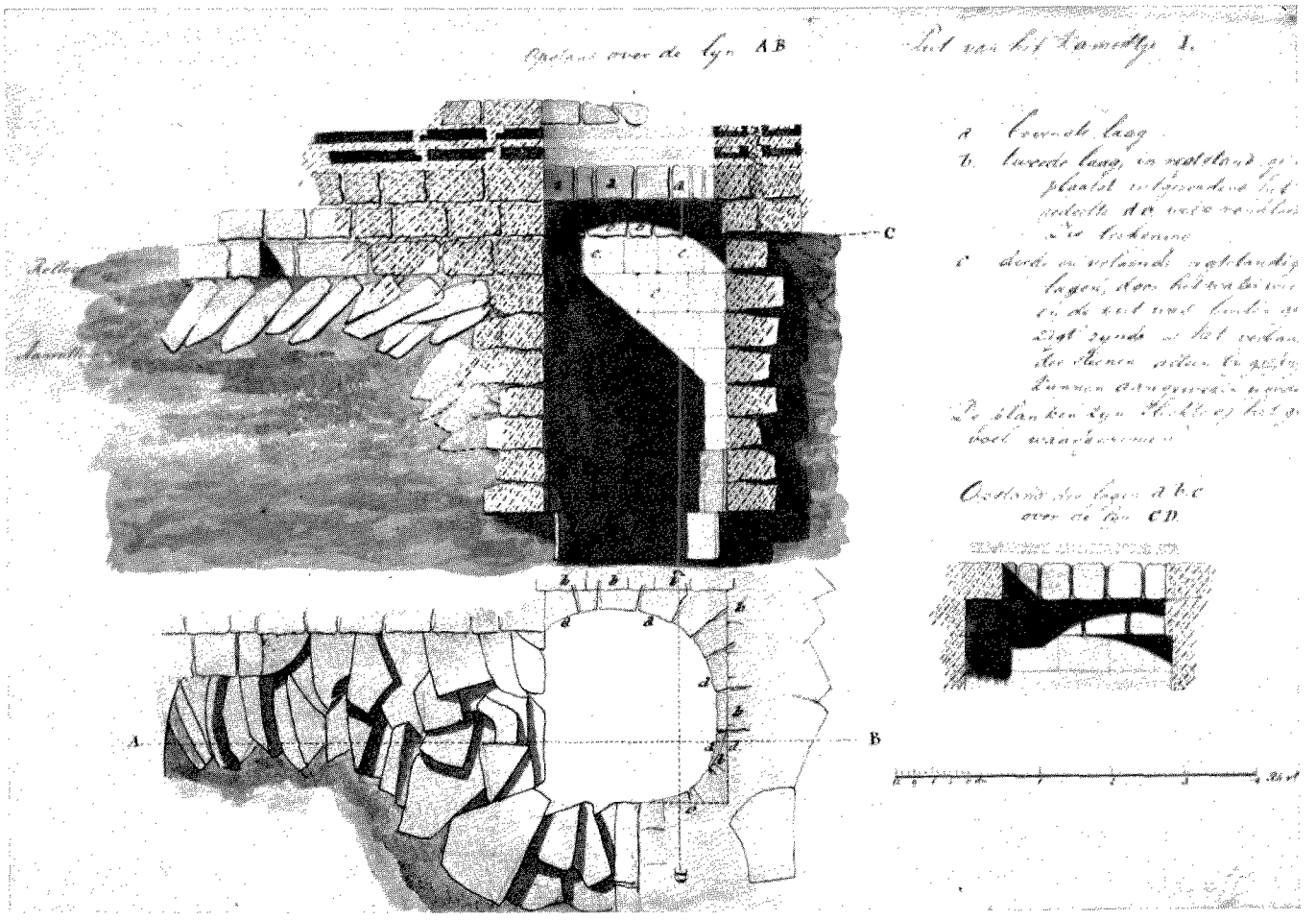


1 Wijk bij Duurstede: brick clamp 1, seen from the north

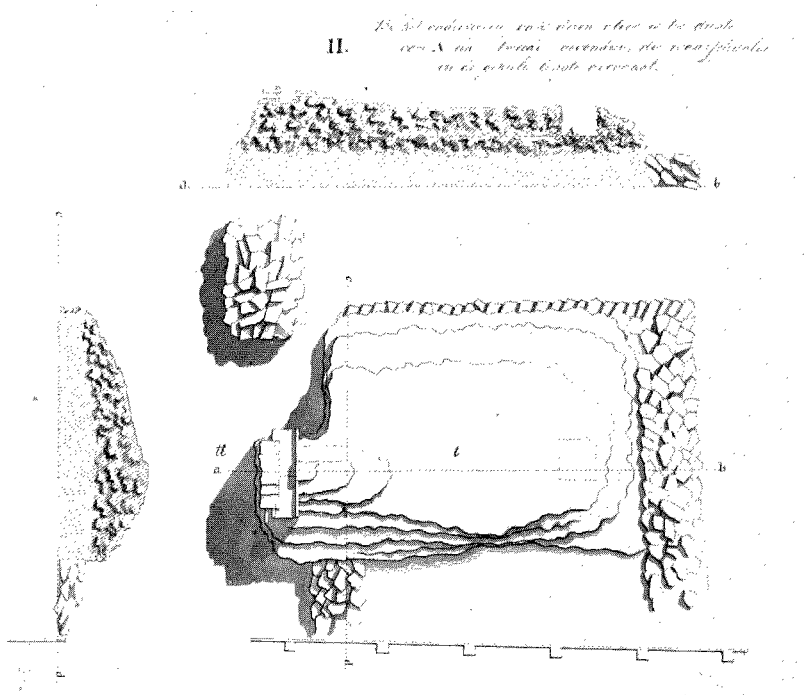
2 Wijk bij Duurstede: brick clamp 1, seen from the south

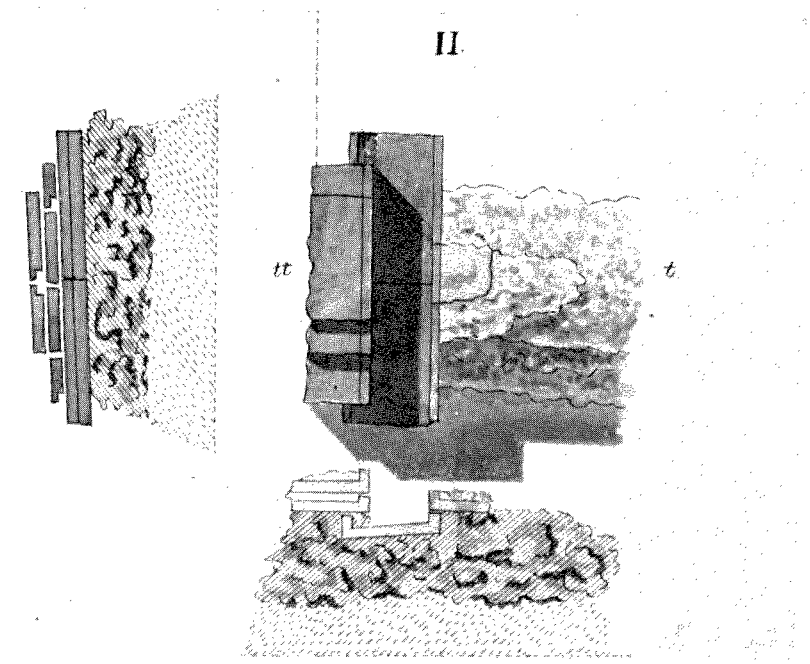


Farmer's brick clamp near Vreden, West Germany (1924). Copyright Heimatverein Vreden



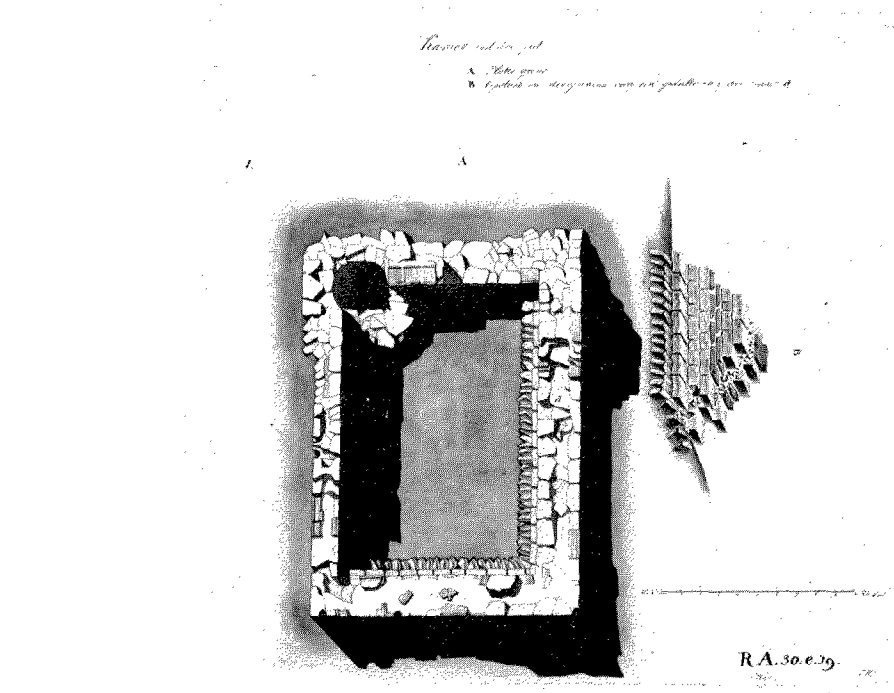
Arentsburg: drawings of a well (RA 30 e 18; courtesy of National Museum of Antiquities, Leiden)

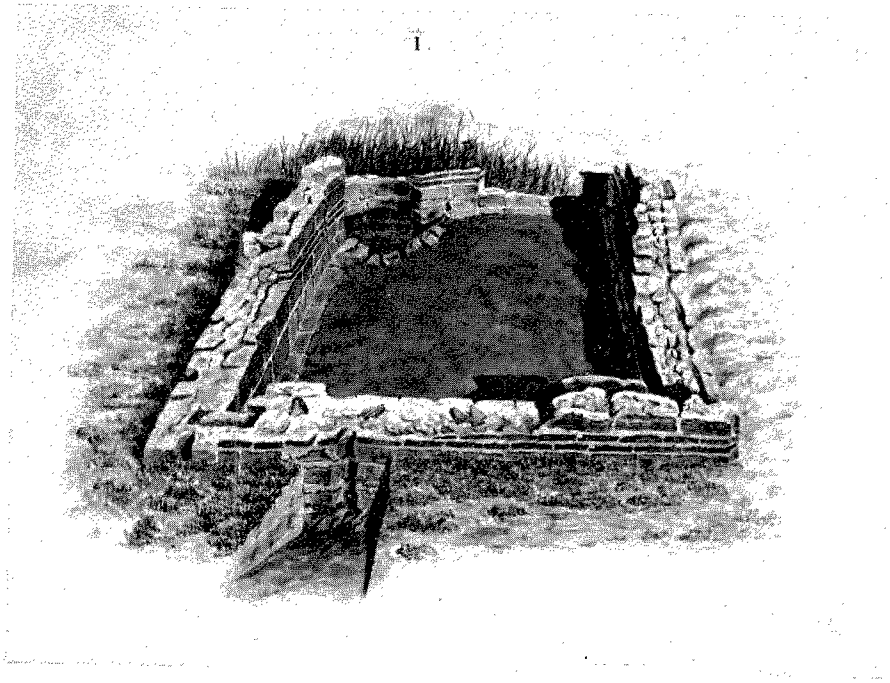




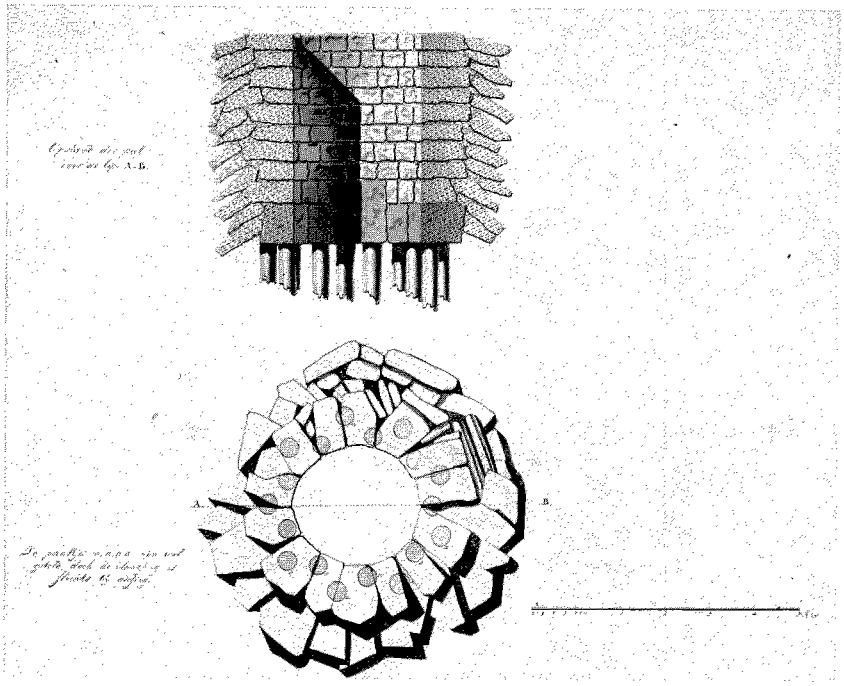
Arentsburg: set of drawings of a floor (RA 30 e 18; courtesy of National Museum of Antiquities, Leiden)

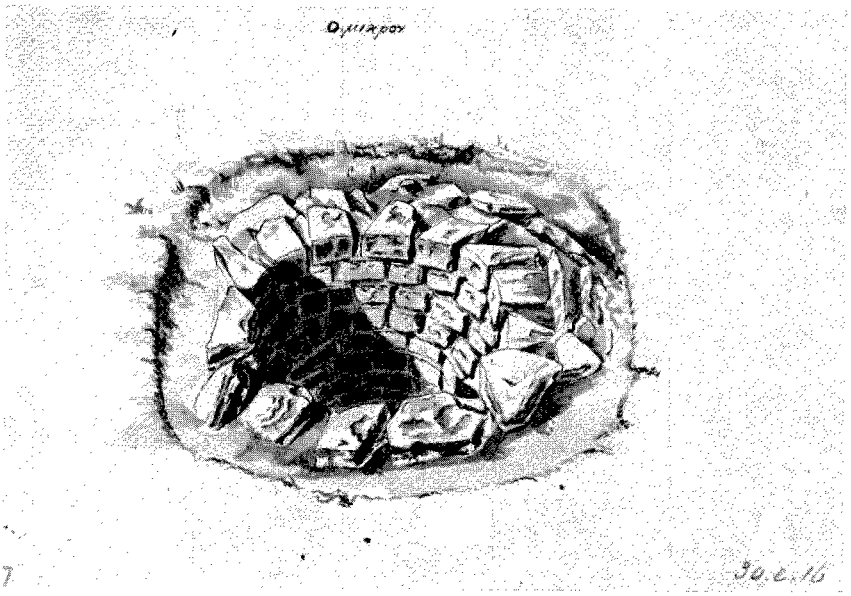
PLATE XXX





Arentsburg: set of drawings of the foundation of a room with a well in the corner; note in the lowest photo the section perpendicular to the wall (RA 30 e 19; courtesy of National Museum of Antiquities, Leiden)





Arentsburg: set of drawings of a well with a wooden post foundation (RA 30 e 16; courtesy of National Museum of Antiquities, Leiden)