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## **The Rhine/Meuse Delta: four studies on its prehistoric occupation and holocene geology**

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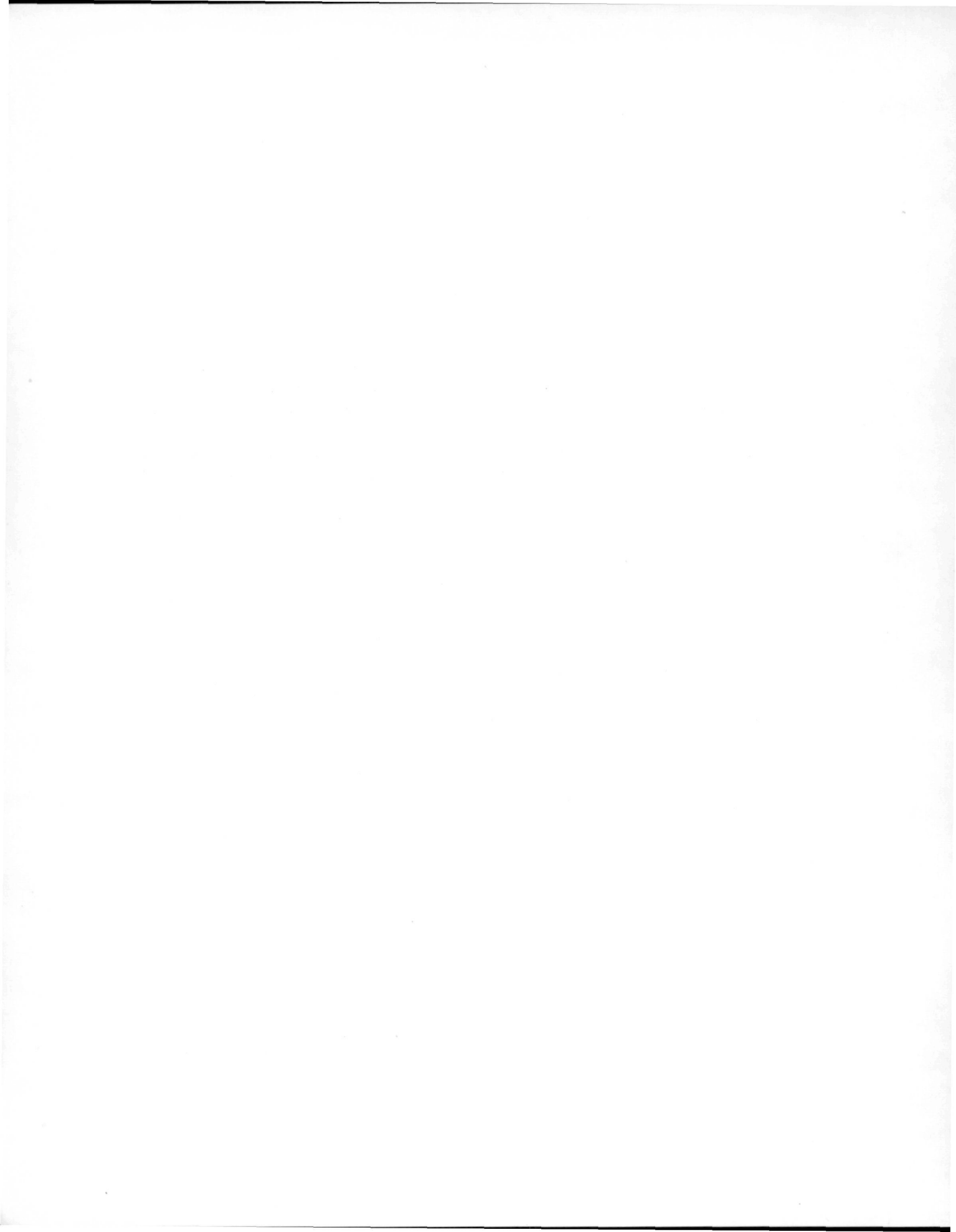
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4. A LATE BELL BEAKER/BARBED WIRE BEAKER SETTLEMENT AND  
CEMETERY ON THE SCHOONREWOERD STREAM RIDGE AT  
MOLENAARSGRAAF, CIRCA 1700 B.C.

*On the sand body of an important fossil river course and at a break-through gully, a small settlement dating from the transition period Neolithic/Bronze Age (VBB/BWB) has been excavated. The settlement is one of a number of comparable occupation units on this stream ridge, which together formed a small elongated hamlet. In the settlement two subsequent house plans were recognized. Three graves and an ox burial contained well-preserved skeletons: an extraordinary phenomenon in the Netherlands. The investigation of the gully filling yielded much information about the subsistence economy and environment. It was possible to construct a detailed chronological diagram of the settlement. The transition from Neolithic to Bronze Age seems to be marked by a great measure of (cultural) continuity. The cultural background of the house-plans, finds and graves are discussed in a separate paragraph.*



## 4.1. INTRODUCTION

### 4.1.1. DISCOVERY AND EXCAVATION

In the south-east of the Molenaarsgraaf polder the members of the AWN work-group "Lek en Merwestreek" discovered in June 1966 a small Late Neolithic settlement lying on the sand body of the Schoonrewoerd stream ridge. It appeared soon that an unusual geological situation distinguished this site from find places which had already been discovered some years previously. For this reason the settlement was selected for excavation<sup>1</sup>. The elevation on which the find place lay was accentuated by an adjoining depression, formed by a gully cutting right across the ridge, filled with peat. This small water course apparently provided an attraction to the prehistoric inhabitants. At the time of the excavation three other compar-



Fig. 56. Situation of Molenaarsgraaf.

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<sup>1</sup> This site was named "Molenaarsgraaf". The Hazendonk, although also situated in the municipality of Molenaarsgraaf was named "Hazendonk", or "Hazendonk-Molenaarsgraaf". Preliminary notes on the excavation: Louwe Kooijmans 1966<sup>b</sup>, 1967<sup>c</sup>, Leeuwis 1966.

able settlements were known at similar gullies<sup>2</sup>. The motives for especially selecting the Molenaarsgraaf site for excavation were fairly insignificant. One was its proximity to the Hazendonk, with which Molenaarsgraaf could be linked by a geological section. Another — not the least — was the friendly cooperation and interest of the owner of the land, Mr A. Boon, and his willingness to give permission for the investigation.

The excavation was carried out in two operations: 15th August to 30th September 1966 and 17th July to 18th August 1967<sup>3</sup>. Except for the digging of a cross-section over the gully (pit C8) all the work was done by hand, in pits of 5 by 20 meters indicated by a letter-number combination<sup>4</sup>. These excavation pits were made at right angles to the ditches, approximately parallel to the axis of the ridge and approximately at right angles to the gully. Although the pits were of maximum size for efficient work, it seems nevertheless that they were too narrow to provide a good general view. At later excavations of similar sites we worked therefore in pits of much larger dimensions<sup>5</sup>. The area of the excavated terrain is 1200 m<sup>2</sup>.

#### 4.1.2. THE GEOLOGICAL AND ARCHAEOLOGICAL SITUATION

The geology and inhabitation history of the region where Molenaarsgraaf is situated were fully dealt with in Part II of these studies. As to the geological situation of the excavated terrain the paragraphs 2.4.5.1-3, dealing with the Schoonrewoerd stream ridge and the break-through channels are relevant. These paragraphs may be read as an introduction to the following account of the geological situation of the immediate surroundings of the excavation.

The archaeological environment, discussed in paragraph 2.5.3.4. is of extreme importance for a good understanding of the excavated settlement, discussed in the following pages. We demonstrated that "Molenaarsgraaf" is part of a long ribbon-like VBB/BWB settlement, consisting of about seven "occupation centres", of which "Molenaarsgraaf" itself is the westernmost. Starting from an estimate of the available surface of arable land, we could calculate that every occupation centre consisted of only one and at most of two farmer's households. The total number of inhabitants of the entire long settlement amounted 30-50 persons. The situation of this hamlet was about half-way a route which connected the Veluwe district with the coastal regions.

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<sup>2</sup> For the Schoonrewoerd stream ridge see p. 97 f., for the break-through channels see p. 100 f., for the AWN work-group "Lek en Merwestreek" see p. 82.

<sup>3</sup> During both operations the drawings were made by Mr J. P. Boogerd, draughtsman of the Institute for Prehistory, Leiden. Miss E. J. Brinkman (now Mrs E. J. Schreve-Brinkman) assisted during the second operation and the work on the finds. The digging was done with workmen of the Koninklijke Nederlandsche Heide Maatschappij (Royal Dutch Reclamation Company).

<sup>4</sup> *E.g.* B8, A6. The pits are indicated at fig. 76. They were excavated in the following sequence:  
1966 : B8, B6, A10, A8, C8, A9, B7;  
1967 : B9, Z9, Z10, Z8, Z11.

<sup>5</sup> *Viz.* at Ottoland-Oosteind two pits of 10 × 40 m. (together 20 × 40 m.) and at Ottoland-Kromme Elleboog one pit of 8 × 150 m. (the stretch of a road under construction) were laid out. But this could only be done because of our experiences at Molenaarsgraaf, where we became aware that the sections did not yield much information.



Fig. 57. Molenaarsgraaf. Contour map of the surroundings of the excavation. Scale 1:10,000. Based on measurements of the *Cultuurtechnische Dienst* (Governments Service for Land and Water Use).

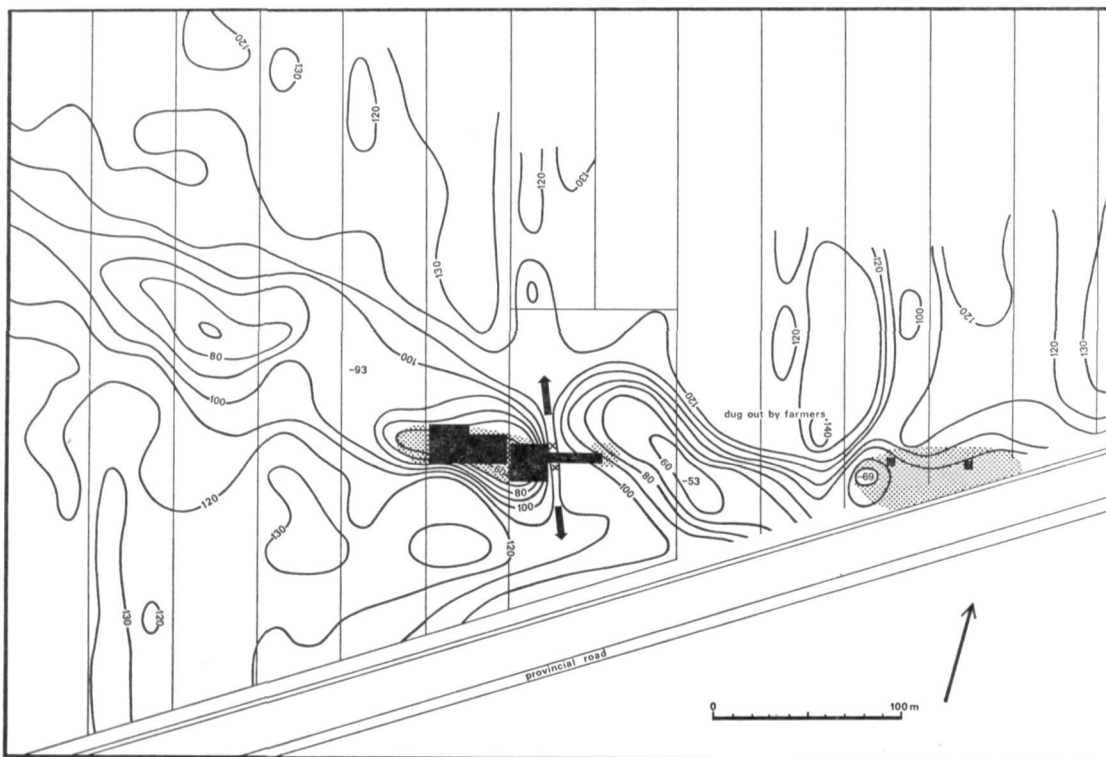


Fig. 58. Molenaarsgraaf. Contour map of the direct environs of the excavation based on measurements in a system of 20 m. squares. Excavated area in black. At the right the site no. 27/28. Legend : see fig. 27. Scale 1:4000.

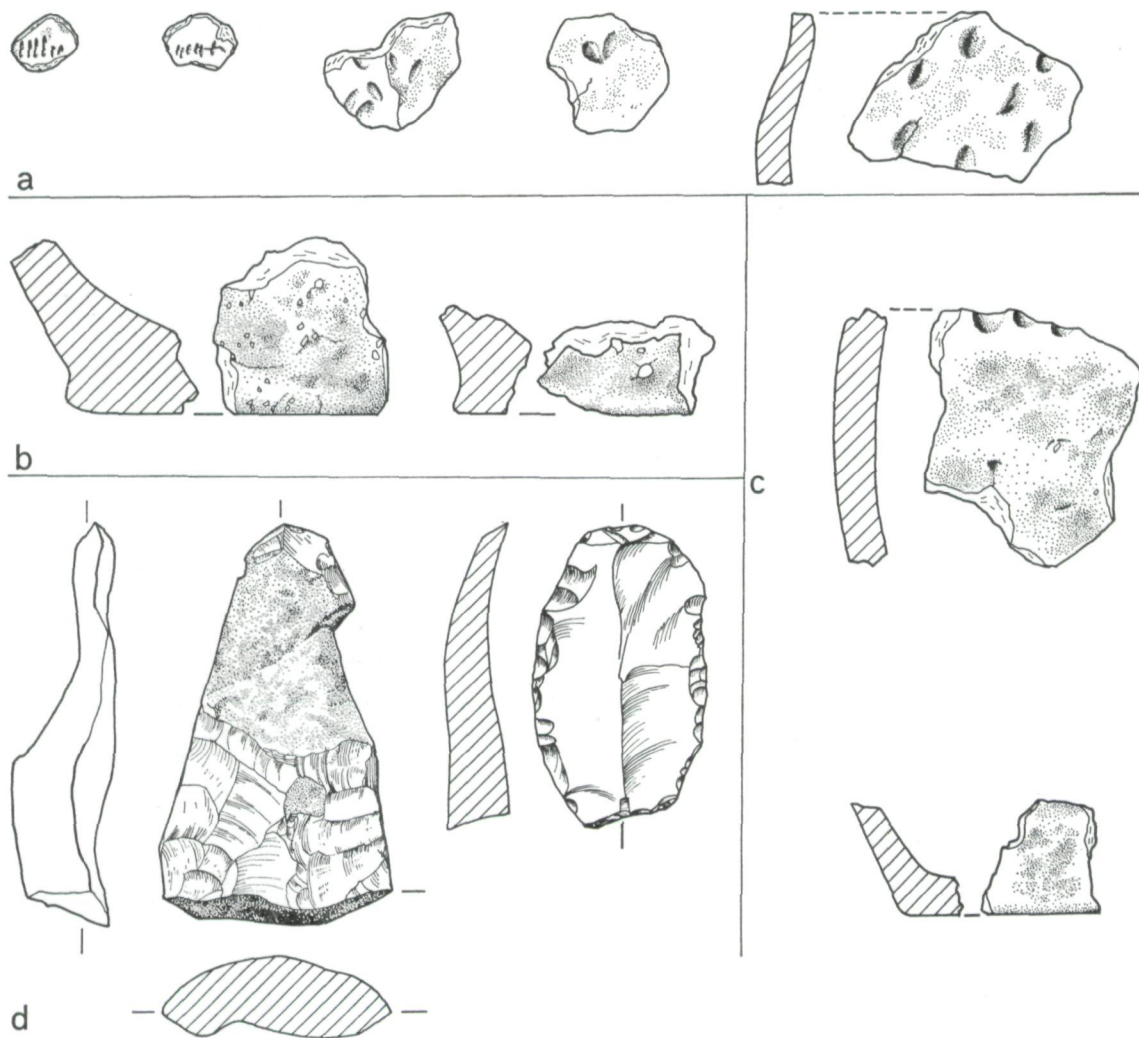


Fig. 59. Alblasserwaard, site no. 27/28 (Cf. fig. 19 and 58), situated c. 200 m. to the east of "Molenaarsgraaf".

a) Barbed Wire Beaker pottery. Scale 1:2.  
b) Middle Bronze Age pottery. Scale 1:2.

c) Late Bronze Age pottery. Scale 1:2.  
d) Flint scraper and dagger grip. Scale 1:1.

Some results of the excavation discussed in the following pages were used to reach these conclusions. It is not allowed, therefore, to adduce these facts as evidence for any statement, made below, to avoid circular reasoning.

We will name some features in the immediate surroundings, which might have had their influences in the excavated terrain. First, there is the settlement no. 27/28 (figs. 19, 58), dated

by Late Beaker (esp. BWB), MBA and LBA pottery (fig. 59) <sup>6</sup>. A particular find is the haft of a flint dagger, which is dated here provisionally to the Early Bronze Age (= BWB) or later; earlier occupation of the site might be unnoticed! Apart from this, we can say that the later phases of the occupation at Molenaarsgraaf are contemporaneous with the start of the occupation at site 27/28, but the occupation there was, apparently, continued until a moment in the Late Bronze Age. The presence of this settlement gives an explanation of some features in the excavated terrain (*viz.* the hearth no. 29, p. 193), in the gully filling (p. 185), and in the pollen diagram II (p. 190). We considered this site 27/28 to be the next "occupation centre" of the ribbon settlement. The very short distance of only 200 m. is refound only at the other end of the settlement between Ottoland-Oosteind and Goudriaan (fig. 19, nos. 42 and 43: 400 m.). In this we might find an indication that the arable land of Molenaarsgraaf extended especially to the west of the site.

Second, some observations were made in pit C8 on the eastern bank of the gully. A small undated hearth pit was attested in the east section, but only a very modest amount of domestic refuse was found. Although there are, therefore, some traces of human activity, no settlement was situated on the other bank of the gully. Some test pits there confirmed this conclusion: they yielded no finds.

Third, we must mention that the Schoonrewoerd stream ridge is low, with only one or two elevations, to the west of "Molenaarsgraaf". On two relatively high terrains some finds were made. One site (no. 25) is largely disturbed and might have been another "occupation centre". On the other terrain (no. 24<sup>a</sup>) the rest of a peculiar grave, probably of Beaker Age, was discovered. Some scarce finds point to human activity. A settlement might have been situated in the immediate vicinity.

The Hazendonk at last is situated 1300 m. west of the site. It is the westernmost point with VBB/BWB occupation in the river district. The high water clay of the Schoonrewoerd stream is dated there between c. 2100 and 1700 B.C. (*cf.* p. 143).

## 4.2. GEOLOGICAL CONDITIONS <sup>7</sup>

### 4.2.1. MAPPING

Directly after the discovery of the terrain the immediate surroundings were mapped, as far as the deposits were concerned, which were later than those of the Schoonrewoerd ridge. Depending upon the detail required the distances between the borings varied from 10 to 40 m. When the excavation was finished a few supplementary sections were bored, particularly a section along the longitudinal axis of the gully and through the terrain near both mouths

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<sup>6</sup> This site was discovered as early as 1954 during the soil survey, but it was not registered and so forgotten until 1964, when the terrain was explored by amateur archaeologists. About 1969 the original finds were rediscovered in the ROB store rooms. We thank Ir J. van der Linde for his information, which made it possible to determine the exact find spot.

<sup>7</sup> Here only the immediate surroundings of the excavation are discussed. For the geology of the Alblasserwaard in a more general sense see p. 79 f.

(fig. 61). The filling of the gully could be studied in detail in the two sections of pit C8 (figs. 63, 64). Because the finds there were at a greater depth than was anticipated <sup>8</sup> and because of the unexpectedly large seepage neither of the sections of the pit could be dug so deep as was desirable. As the south section seemed to be the most representative, maximum attention was devoted to this section, so that it could be fully drawn. As for the north section, its lowest levels were investigated by means of incidental observations. Both sections were linked together, as far as the deepest deposits are concerned, by two transverse sections.

#### 4.2.2. THE GEOLOGICAL STRUCTURE OF THE SITE

With the help of the map and the above-mentioned sections we will describe the structure of the terrain. The code numbers in the text correspond with those in the figures.

(0) A central place is occupied by the sand body of the Schoonrewoerd ridge. It consists of fine sand, with little or no clay content. Locally thin clay layers or some coarser sand layers occur. Laterally the sand gives way fairly abruptly to the clay mantle and the clay wedge, both consisting of sandy clay. As its distance from the ridge increases, the clay wedge becomes less and less sandy and consists finally of heavy clay. At a fairly long distance from the ridge the clay wedge can, however, sometimes be locally very sandy, which indicates that the clay must have been deposited from small creeks. The erosion of the underlying peat at some points supports this. This also seems to have been the case in our section A-B (fig. 61). The difference in height from the top of the sand body and the surface of the clay wedge in the immediate vicinity of the ridge (a maximum of 170 cm.) gives the maximum compaction. As the clay must have lain somewhat lower originally than the sand body now lies, compaction has, in fact, not been as great as this. A maximum of 130 cm. appears to be acceptable and concurs with the Hazendonk data (*cf.* p. 133).

At the base of section A-B another clay deposit is visible. With the aid of the section by itself it cannot be decided whether this deposit represents another phase of the Schoonrewoerd ridge. This we do not consider likely. We think that it belongs to another and older system. Its age can be estimated after comparison with the Hazendonk data (p. 143) and using the height of the surface and an estimate of possible compaction. It appears then that the age is the same as deposit (2) at the Hazendonk or slightly older, *i.e.* Calais IV<sup>a</sup> or (less probable) Calais III <sup>9</sup>.

(1) The following phase in the development of the landscape is the formation of the transverse gully, a break-through channel, which has earlier been discussed in detail <sup>10</sup>.

Directly after its formation the sand body lay in the form of a low natural dike in the landscape, so blocking the water circulation. At places where this water was dammed up against the

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<sup>8</sup> When mapping, the borings were stopped when the sand 2 was reached, on the assumption that these were the bottom layers of the gully.

<sup>9</sup> This deposit belongs consequently to a younger system than deposit 1 at the Hazendonk.

<sup>10</sup> *Cf.* p. 100 f.

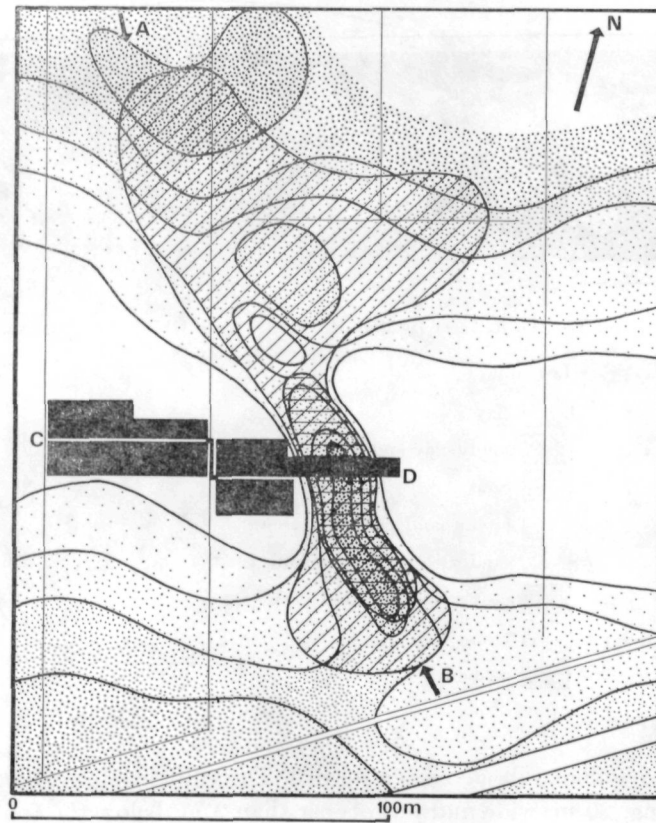
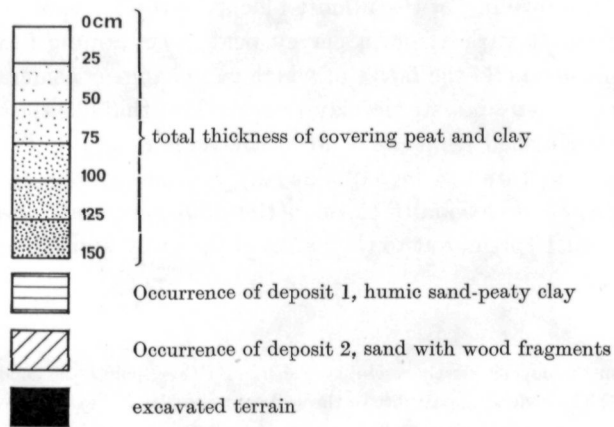


Fig. 60. Molenaarsgraaf. Physiographic map of the deposits which cover the Schoonrewoerd ridge and its clay wedges. Based on 83 borings of 1.20-3.20 m. Scale 1:2000.

Legend :



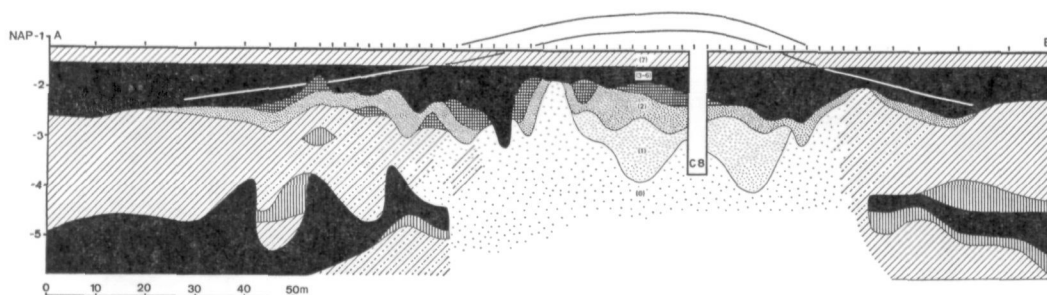


Fig. 61. Molenaarsgraaf. Section A-B (see fig. 60). Horizontal scale 1:1500. Vertical exaggeration : 10×.

Legend :

	clay
	sandy clay and clay with sand lenses
	sand
	humic sand - peaty clay
	sand with wood fragments
	peat with some sand
	humic clay
	peat

ridge a few transverse gullies will have been formed. The gully at Molenaarsgraaf was of small size: about 90 m. long, 20 m. wide and not deeper than 3 m. below the top of the ridge. The water current caused erosion of the surface at both mouths. The sand that was thus washed away has not been identified during the mapping. It must have been spread over a large area. The gully did not exist for any length of time and was quickly blocked by the formation of sandbanks near the northern mouth. It seems to us that the break-through came from the south, mainly because of the greater erosion at the northern mouth and the subsequent piling-up of sand there.

The beginning of the infilling of the almost blocked gully is represented by a deposit of widely different material. It varies from a clayey peat <sup>11</sup> containing little (1<sup>d</sup>) or much (1<sup>c</sup>) sand to a slightly humic sand (1<sup>b</sup>) the facies of which can change considerably over very short distances. Locally there is even some sterile, clay-less sand (1<sup>a</sup>), that like the original gully bottom deposits cannot be distinguished from the sand of the ridge itself (0). The south section does show this very well. The picture can be explained by assuming that during the formation of a *gyttja* some water passed occasionally through the gully, especially through its centre.

Laterally this deposit 1 spread out to the banks of the gully and changed to a weathered,

<sup>11</sup> In its extreme form the deposit closely resembles a *gyttja*. At these points the conditions for sedimentation might have been very quiet. The general appearance of the sediment complex indicates, however, that running water was present.

MOLENAARSGRAAF 1966-'67

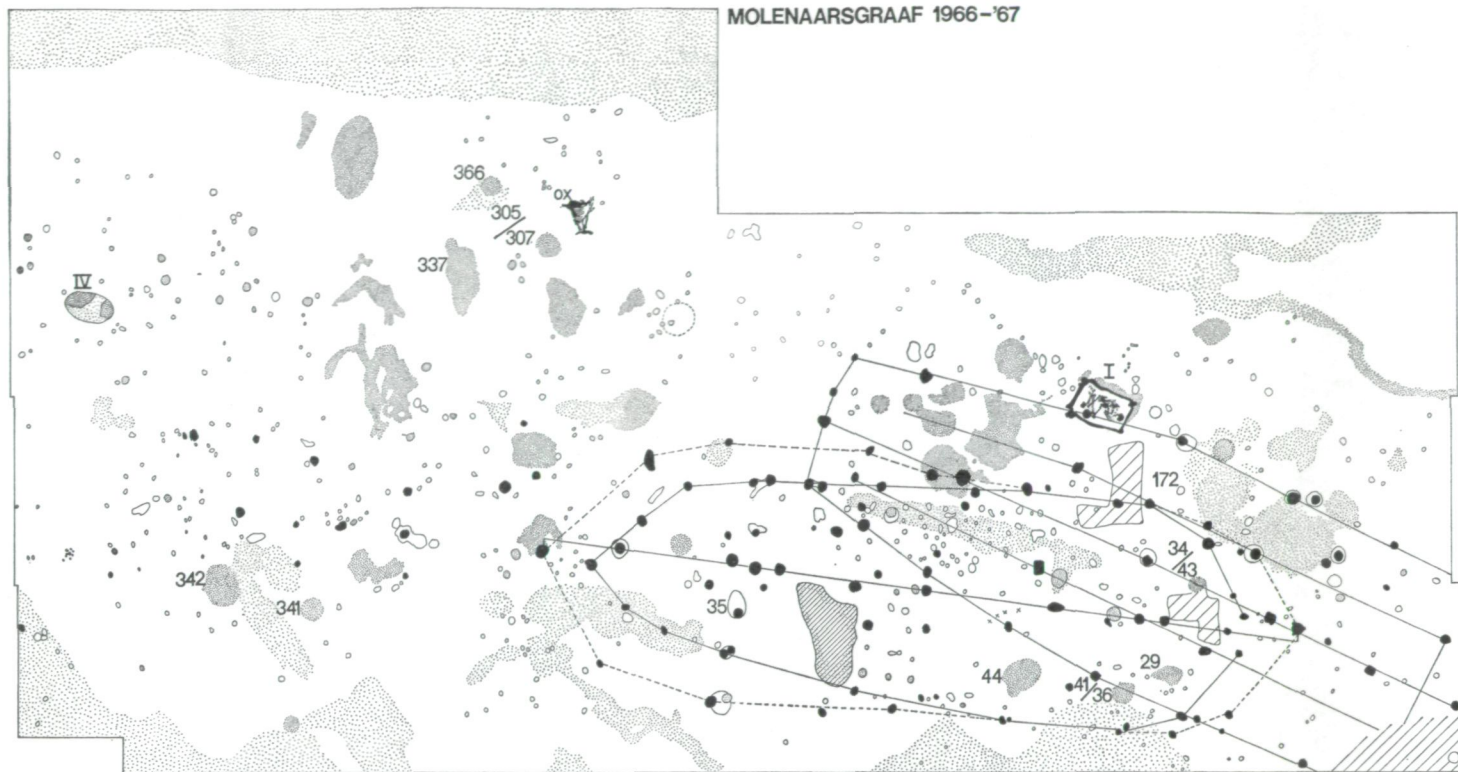


Fig. 68. Molenaarsgraaf. Excavation plan. Scale 1:200.

- (dark) grey post holes
- light grey post holes
- other small discolourations
- ▨ prehistoric pits, trenches etc.
- ▨ 16th century sand digging pits
- ▨ recently disturbed (test pits)

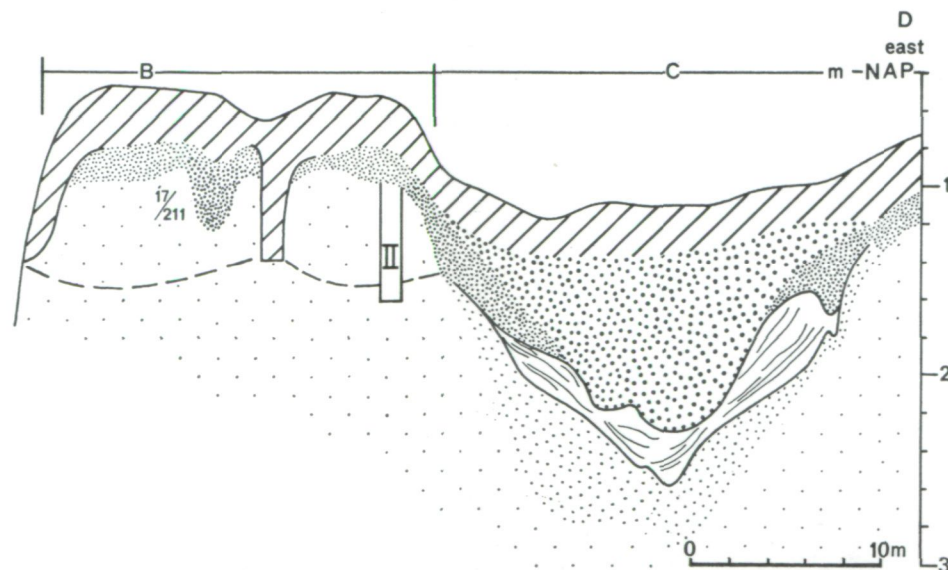
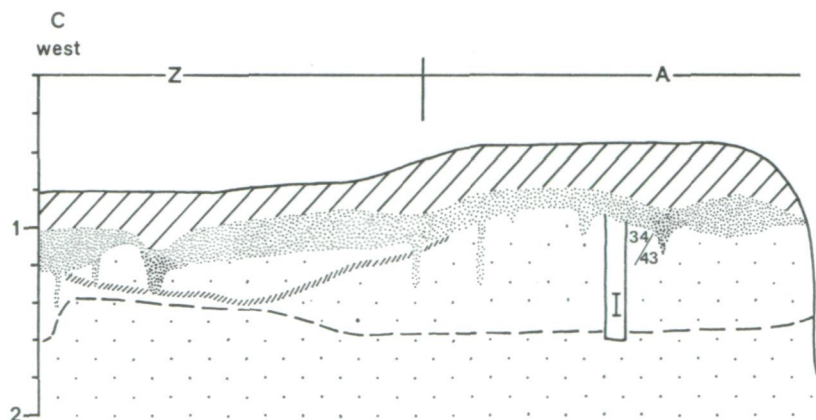
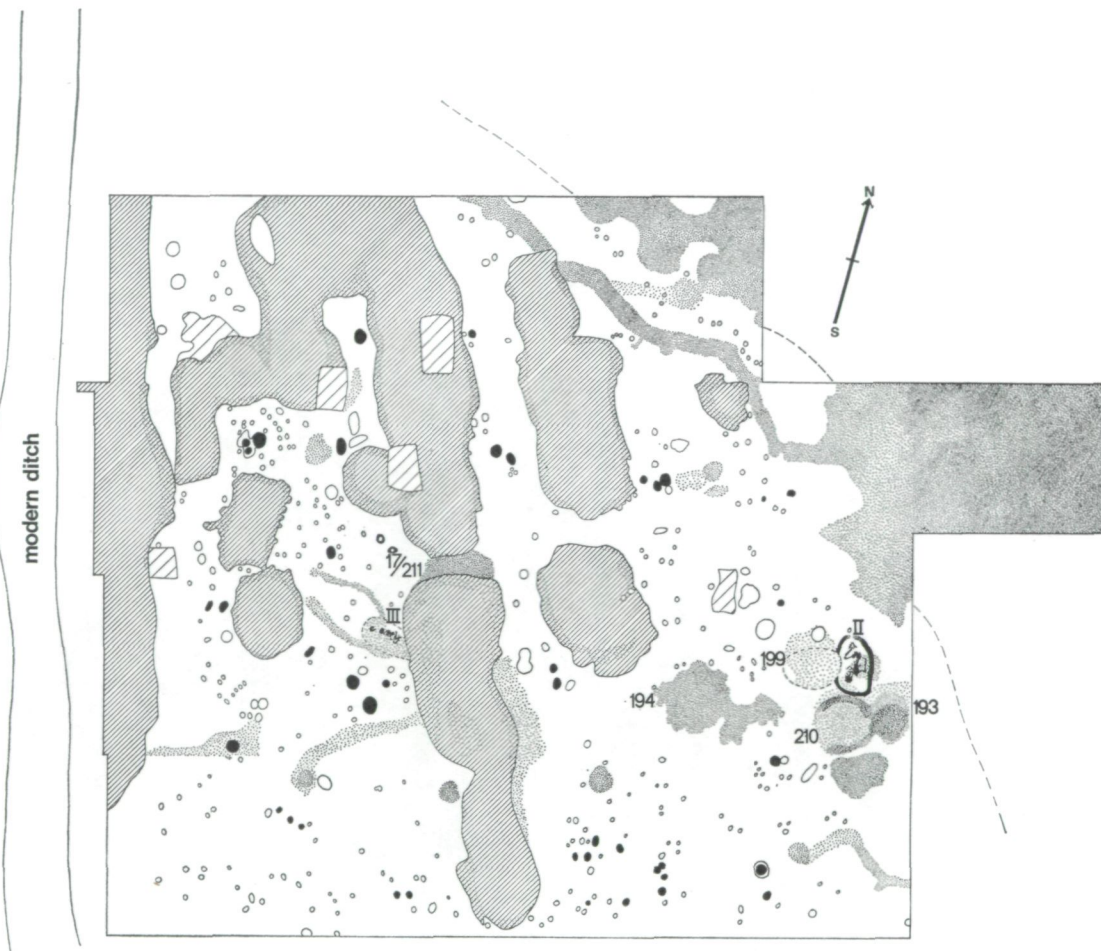


Fig. 62. Molenaarsgraaf. Section C-D (see fig. 60).  
Composed with sections of the excavation.  
Horizontal scale 1:400. Vertical exaggeration : 10x.

Legend :

- ▨ top clay with 16th century pits
- ▨ gully deposits (4-6). Mainly peat.
- ▨ gully deposits (3). Peat.
- ▨ gully deposits (2). Sand with wood fragments.
- ▨ gully deposits (1). Humic sand - peaty clay.
- ▨ sand of the Schoonrewoerd ridge with thin clay layer.
- ▨ "occupation layer" with post holes and pits.
- graves
- present mean water table.
- ┌-B-┐ excavation pit.



structureless reed/sedge peat containing sand, and then to very humic sand, reflecting a vegetation of reed and sedges along the gully banks. This last deposit occurs up to a level of about  $-1.70$  m. NAP, which must have been about the ground water table or MHW level of that time <sup>12</sup>. Before the sedimentation started the water in the gully must have been between 130 cm. deep at the relatively shallow point where the excavation-trench C8 was dug: the point where the settlement bordered the gully. On both sides of this, however, depths to  $-3.70$  m. NAP (*i.e.* a water depth of 2 m.) occurred at that time. At the end of the formation of deposit 1 the whole of the gully was filled and changed into a damp depression. The present low position of the top of deposit 1, at that time rather soft and wet, can be explained easily by compaction as a result of the later covering <sup>13</sup>, especially with the sand 2.

The forming of the deposit 1 is contemporaneous with the settlement next to the gully, as is shown by the pollen diagram and the position of the finds in this deposit.

(2) The infilling of the gully, started with the *gyttja* formation (1), was suddenly interrupted by renewed flowing through. This is proved by a 30-40 cm. thick layer of clayless sand (2) covering (1). The sand shows a finely laminated structure, dipping to the centre of the gully, and it also shows an alteration with thin layers of redeposited peat and wood fragments. The dip may be partly an original one, but will be mainly the result of compaction of the underlying clayey peat. Locally, especially in the bank zones, the preceding deposit was eroded. Also the formation of peat along the banks was restricted to a narrow zone and the growth of reed and sedges might even have been temporarily interrupted as may be concluded from a division line (a change in colour only) in the peat there in the sections of the trench C8, especially visible when dried out. During the second phase of activity the gully was about 14 m. wide. As a result of the subsequent compaction the original depth cannot be fixed accurately, but we can say the gully certainly was very shallow in this phase. At a ground water table of about  $-1.50$  m. NAP the water depth was less than 1 m.

When we discuss the finds it will be seen that a date of about 1500 B.C. is the most probable for this second phase of activity.

(1/2) In front of the northern mouth and to a less extent also in front of the southern mouth, two lobate sand deposits of washed-out material were mapped. The material consists of greyish clay-less sand with wood fragments and peat-remains. The maximum thickness is 50 cm. These sandlobes lie on the eroded parts of the clay wedge and are only locally separated from it by a somewhat sandy peat. As the top of the sandlobes, now between  $-2.00$  and  $-2.50$  m. NAP, may have lain originally much higher than the corresponding deposit in the gully, its compaction cannot be calculated. It is, moreover, difficult to determine the correct correlation with the gully deposits. It seems logical that the sand is in the first instance the washed-out sand from the times, when the gully came into existence about 1800 B.C. The

<sup>12</sup> The decomposed state of the peat is one argument for a ground water table at this level. The bad condition of the bones at find places situated higher is another. *Cf.* also the discussion of the pollen diagrams at p. 188.

<sup>13</sup> *Cf.* the pollen evidence (p. 188): the deposit was formed up to about the ground water table. A compaction of 100 cm. (c. 50%) is a very acceptable amount,

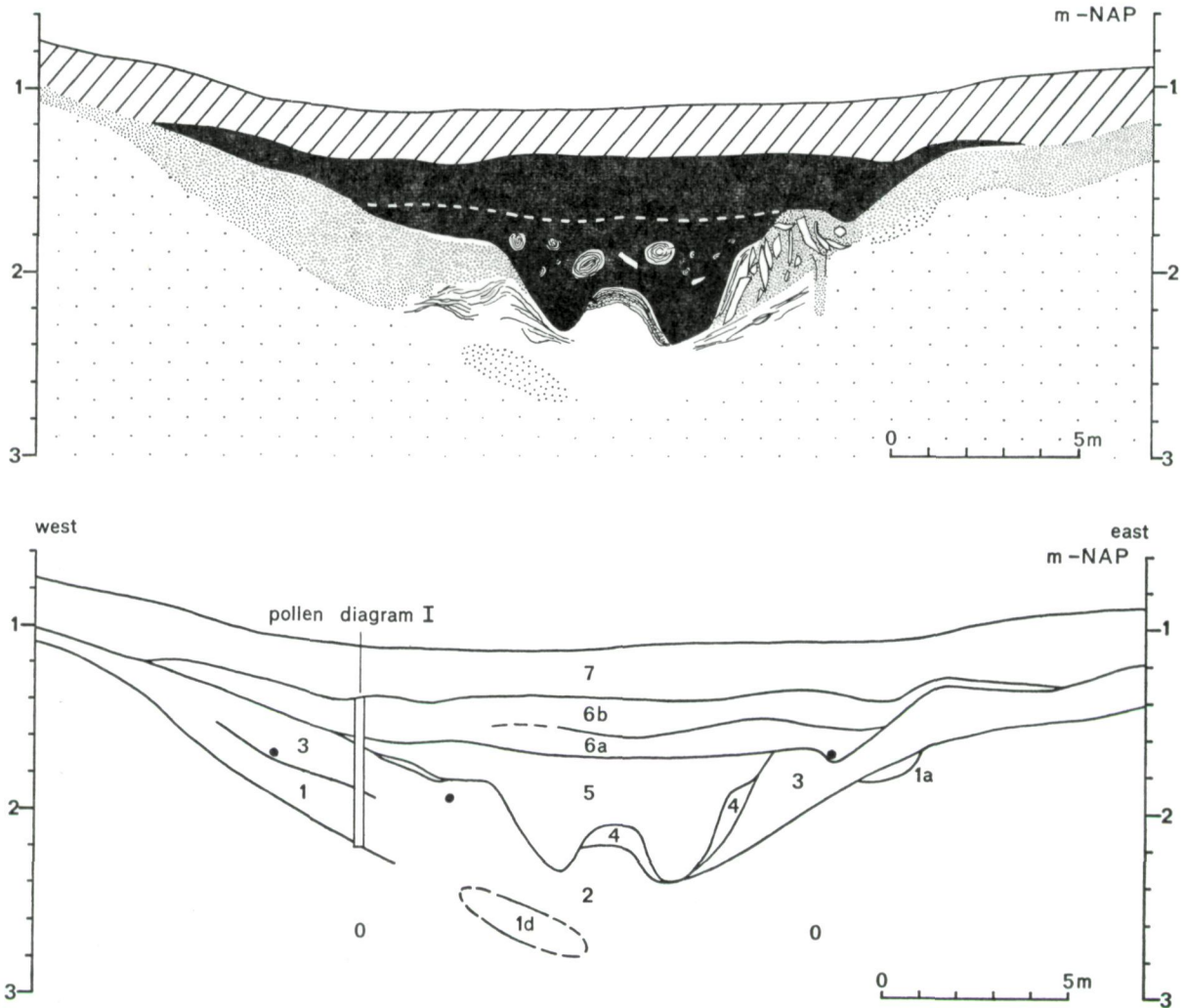


Fig. 63. Molenaarsgraaf. Pit CS, north section. Horizontal scale 1:200. Vertical exaggeration : 5 × .

- a) Section.  
 b) Scheme, with the position of three finds above deposit 1.

composition of the sandlobe is, however, very similar to that of gully-deposit 2. This makes it very likely that the original sandlobe was reworked in the second activity phase, which is quite plausible.

At this point in the peat district the inundation water will not have transported any sand. After flowing through the gully the current will have diminished suddenly in strength, so the washed-out sand was not transported far from its mouth. That this really was the case appears from the calculated volumes of the sandlobes and of the "missing sand" of the ridge. Both are in the same order of magnitude: about 1200 m<sup>3</sup>.

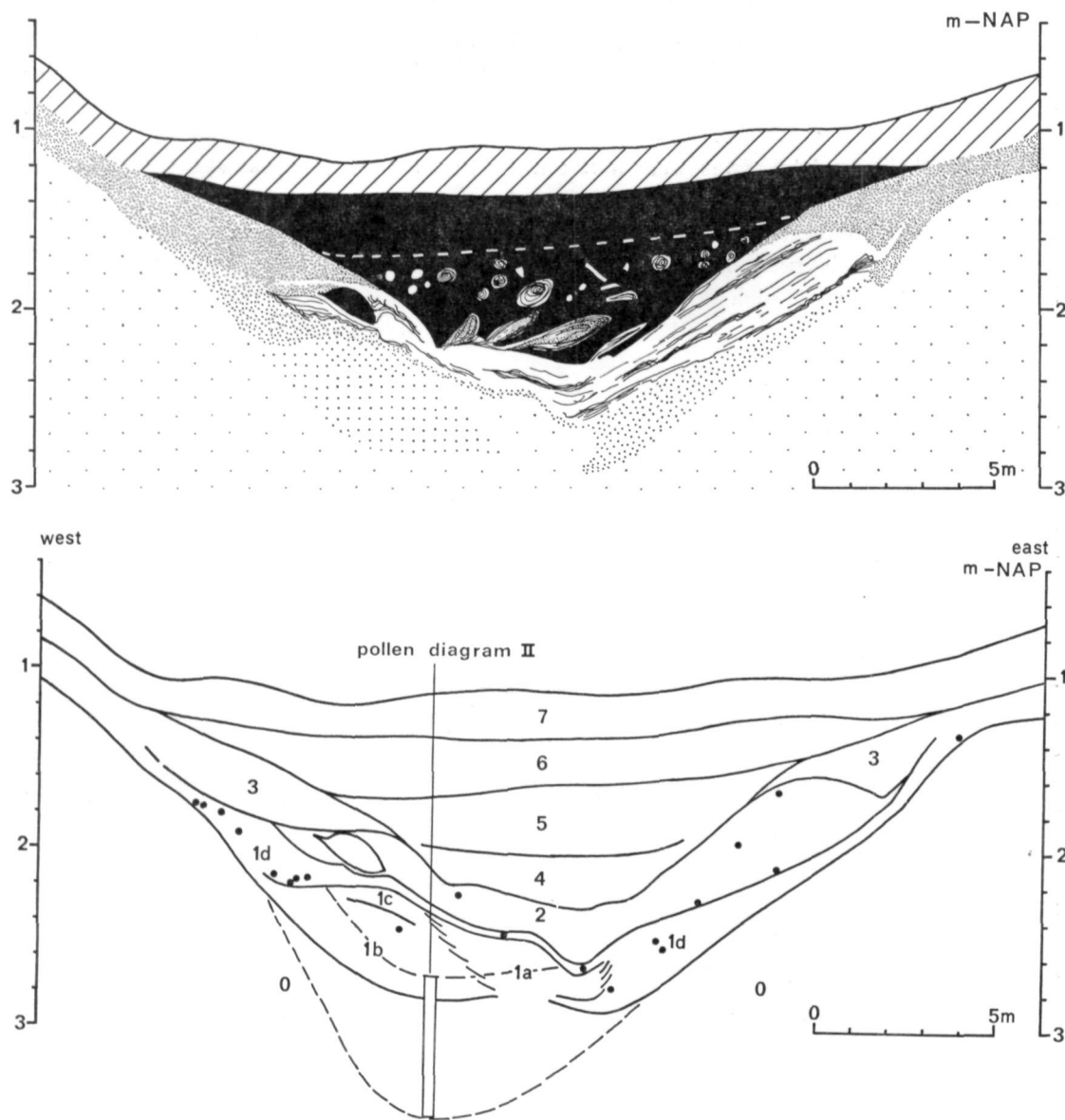












Fig. 64. Molenaarsgraaf. Pit CS, south section. Horizontal scale 1:200. Vertical exaggeration : 5x.

a) Section.

b) Scheme, with the position of some finds.

The boring of pollen diagram II is projected on the section.

Legend of figs. 63/64. All numbers correspond with those used in the text.

- |                |   |                                |        |   |   |
|----------------|---|--------------------------------|--------|---|---|
| 7              |  | clay                           | 2      |  | finely bedded sand with thin layers of washed wood and peat |
| 6 <sup>b</sup> |  | wood peat, not clayey          | 1d     |  | clayey peat - peaty clay                                    |
| 5              |  | peat with much wood and trunks | 1c     |  | clayey peat with some sand - humic sand                     |
| 4              |  | sand with wood fragments       | 1b     |  | slightly humic sand   |
| 3              |  | weathered peat                 | 0 & 1a |  | fine sand   |

(3-5) All deposits after the second activity phase indicate a slow filling up of the gully with peat. The growth of reed and sedges, resulting in a continuation of the weathered reed/sedge peat (3), spread over a wide zone along the banks. As a result of the compaction of the soft sediments (1) in the central part of the gully a narrow central channel came into existence. In the north section of C8 (fig. 64) especially this little gully of 5-10 m. width can be clearly distinguished. The peaty banks were overgrown with alder as the preserved root systems show (Pl. III B). The current seems to have flowed at a slow rate, judging by the sand mixed up with wood fragments on the bottom and along the banks (4). Finally, what was left of the gully became filled with clayless wood peat and even more with the debris of the bank overgrowth, including heavy alders which tumbled from the banks into the marsh (5). At a higher level oaks were also found.

(6) With the increasing rise of the ground water table the depression, which remained of the former gully, was also filled with peat: the extension of the general peat cover of the clay wedges outside the ridge. At the lowest parts this peat growth began shortly after the clay wedge was formed as was shown at the Hazendonk (p. 142). Gradually the higher parts will have been grown over too. At Molenaarsgraaf a few centuries will have elapsed between the deposition of the clay wedge and the start of the peat cover. In that period the lobate sand deposits were formed: they rest directly on the clay wedges, with the exception only of some eroded places in front of the northern mouth of the gully.

The peat outside the gully has a maximum thickness of 110 cm. The difference between the height where the peat wedges out on the ridge ( $-1.00$  m. NAP) and the height in the peat area ( $-1.40/-1.60$  m. NAP) gives a compaction of at least 40-60 cm. The occurrence of a dark soil profile in the whole settlement site (up to  $-0.80$  m. NAP) gives reason to think that originally the entire ridge was overgrown and that the compaction is in reality certainly *c.* 20 cm. more.

(7) The "Alblasserwaard cover" lies over all deposits and has a uniform thickness of 30-40 cm. It is clear that the ridge at the time of the sedimentation was not, or hardly, visible. Even when a clay is deposited during an inundation a somewhat thinner covering may be expected on relatively high points. Later compaction caused a difference in height of a maximum of 70-80 cm. between the clay on the ridge and that in the peat area.

#### 4.2.3. COMPACTION

The data given above about compaction are embodied in table 14. They closely agree with the data applicable to the Hazendonk, especially when we take into account the differences of the geological structure at both sites.

TABLE 14

*Molenaarsgraaf. Height of the deposits*

Deposit	Height (m. below NAP) at :			Compaction (cms.)
	Ridge	Boundary ridge/clay wedge	Clay wedge	
Clay 4 (top)	— 0.50	— 0.90	— 1.20/1.30	70/80
Peat (top)	— 0.80*	— 1.10	— 1.40/1.60	60/80
Sand lobe (top)	—	— 1.70	— 2.00/2.50	>30/80
Clay/sand 3 (top)	— 0.80	— 1.20	— 2.50	c. 130
Clay 3 (top)		— 3.50	— 5.00	>150

\* Top of grey "occupation layer".

## 4.2.4. THE "OCCUPATION LAYER"

The top of the sand body of the Schoonrewoerd ridge has been discoloured to a dirty grey to a depth of 20-30 cm. Such a grey layer at the top of the sand was determined during our prospections and investigations almost everywhere in the stretch between Noordeloos and Molenaarsgraaf. But especially on the settlement sites the layer is much darker, while in between it is coloured to a light grey. Factually it is one of the features by which a former settlement was recognized. This was also the case at Molenaarsgraaf: in the centre of the settlement the layer was much darker than at the rims. According to usage we will name this fossil soil "occupation layer" in the following pages.

The discolouration of the top of the sand that has formed the surface for so many centuries need not surprise us, although it is difficult to indicate the processes involved in its formation. The long section at Ottoland-Kromme Elleboog was most informative for this problem. The section ran from the bank of a transverse gully, via an unhabited terrain to a settlement. The clayey top of the sand generally was light grey, the normal reduction colour of moist clay. But below the peat cover in the gully bank zone the top few cms. were very dark. During our investigations we found that such a dark coloured top is a common characteristic of mineral deposits, where they are covered by peat. Within the reach of the settlement (defined by soil traces and finds) the clayey top of the sand has been reworked, an admixture of sand had taken place, and the limitation of the under side of this layer had become irregular. But the most conspicuous was the change to the same colour as below the peat on the gully bank. We assume that the change in structure is the result of the prehistoric occupation and that the change in colour is a soil formation below a (now disappeared) covering peat; this was more intensive, where the soil structure was disturbed.

The same could be observed at Ottoland-Oosteind, and at Molenaarsgraaf the fossil soil in the centre of the settlement was also the most sandy and the darkest in colour, while outside it and certainly on the clayey sides of the ridge, the colour did not differ from that of reduced clay.

Primary differences, particularly a high humus content on the site of the prehistoric settlement, will in the course of time have entirely disappeared, especially as inhabitation took place on the highest points, which were most subject to oxydation and animal activities. The absence of any discolouration of the sand on the highest points at Ottoland-Oosteind and Noordeloos and also upon the *donken*, supports this explanation. These points were probably never covered with peat. Where the discolouration reached only a shallow depth at Ottoland-Oosteind, the surface was almost completely disturbed by animal holes. At Molenaarsgraaf the animals (moles, mice) made their holes, however, under this layer, since in dry conditions the 20-30 cm. thick layer became, because of its texture (a sand-clay mixture), as hard as concrete. These disturbances at the depth of the highest level where soil traces could be preserved, were a constant handicap to our enquiry.

This version of the course of events to explain the existence of the "occupation layer" here cannot, however, be applied to the Roman and later occupation sites in the river clay area. The dark colour there must be primary<sup>14</sup>.

The highest point at which such a grey level occurs may therefore be accepted as a measurement of the original height of the peat. On the Hazendonk this was -1.00 m., at Molenaarsgraaf -0.80 m., at Ottoland-Oosteind -0.60 m. NAP.

### 4.3. THE POSITION OF THE FINDS IN THE BREAK-THROUGH CHANNEL

#### 4.3.1. VERTICAL DISTRIBUTION (figs. 63-64)

The south section of pit C8 was cut off to some extent, during which all finds were measured. With the aid of this information and observations made during the collection of finds in the excavation pit — which gave similar results — the following comments on the vertical distribution may be made.

Nearly all finds were made in deposit 1, namely the unstructured peat on the western bank, in the thick clayey peat deposit in the eastern part and in the thin clayey peat in the western part and the centre of the gully. The sand 1<sup>a</sup> yielded no finds, nor were there many in the sand 1<sup>b</sup>. The latter can be the result of the short period during which this deposit was formed. The finds occur at all depths in this layer. We believe, however, that because of homogenizing processes, and because of subsidence in the clayey peat, the level at which a find was made does not necessarily indicate that it belonged to that particular level. As an illustration may be mentioned the occurrence of charcoal and the sherds of the large pot with reed impressions (fig. 88) found on the western bank. Both concentrations lie together and are clearly the result of the same action: charcoal and pot were together thrown away at

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<sup>14</sup> Cf. Pons 1957, 45 and fig. 31.

this point. Both charcoal and sherds are chiefly found in the lower part of the deposit 1; a number of sherds even lay at the basis of the peat on the sand lying underneath it. In small quantities the sherds and especially the smaller charcoal pieces were found higher up, as far as the bottom of deposit 3. It is probable, however, that these sherds and also the charcoal (which was found nowhere else) originally lay at the same level, and, in view of the distribution, this was most likely to have been at the bottom of the peat. These conclusions will be of importance when estimating the relative chronology within the settlement. The pot with reed impressions will then be related to grave II, as is confirmed by  $^{14}\text{C}$  dates. This means that the grave directly precedes the finds from the gully in time. The small BB sherds (from one beaker?) both lay on the western bank at the base of the peat layer and so come from the surface on which pot and charcoal were thrown. We cannot directly include these among the finds from the gully filling.

After the mechanical removal of the highest deposit (6 and 7) a level was made in the gully filling, where some finds were made, all in the western bank zone and lying in the top of the deposit 1. These finds (fig. 89) were kept apart and will be later correlated with the last phase of the occupation of the settlement site.

The sand 2 contained a small number of finds. These probably consist mainly of material from places where deposit 1 was eroded. On the bottom of the remaining gully also — that is, directly under 4 — there were a few finds which had certainly been washed up there. We do not imagine that inhabitation continued until this phase.

From the bottom of the peat 3 came three finds which cannot be closely dated: two jaw bones and a piece of burnt wood. They are indicated in the north section. As digging from this level was done by hand the small number of finds cannot be attributed to carelessness. The finds occur at a level, where the pollen diagram shows a slight revival of human activity in the surroundings (zone 3), which we attributed to the Middle (and Late) Bronze Age occupation, documented by some finds in the vicinity (site no. 27/28, *cf.* p. 174) and at the site itself (hearth, find no. 29, *cf.* p. 193). In this way deposit 2 and the phase of renewed activity in the gully is dated before or in the beginning of the Middle Bronze Age, or in other words to the transgression phase Dunkirk 0.

#### 4.3.2. HORIZONTAL DISTRIBUTION PATTERNS (fig. 65)

Nearly all finds come from deposit 1. The various groups of finds reveal somewhat divergent distribution pictures. The pottery occurs chiefly on the western bank near the settlement, the bones on both sides of the central channel and the wood for the most part in the centre of the gully. These differences are not differences in age. The few sherds from the centre of the gully or from the eastern bank were found in the same deposit as the bones and belong to the same find-complex as the finds on the western bank. A small concentration on this bank was found with both the bones and the pottery. The differences almost surely arise from the way in which the finds reached their present position and from variations in their reaction to unfavourable conditions for preservation.

The pottery must have reached the bank zones mostly by chance. Because of the good conditions most of it has been well preserved there. It is clear that it originated from the western

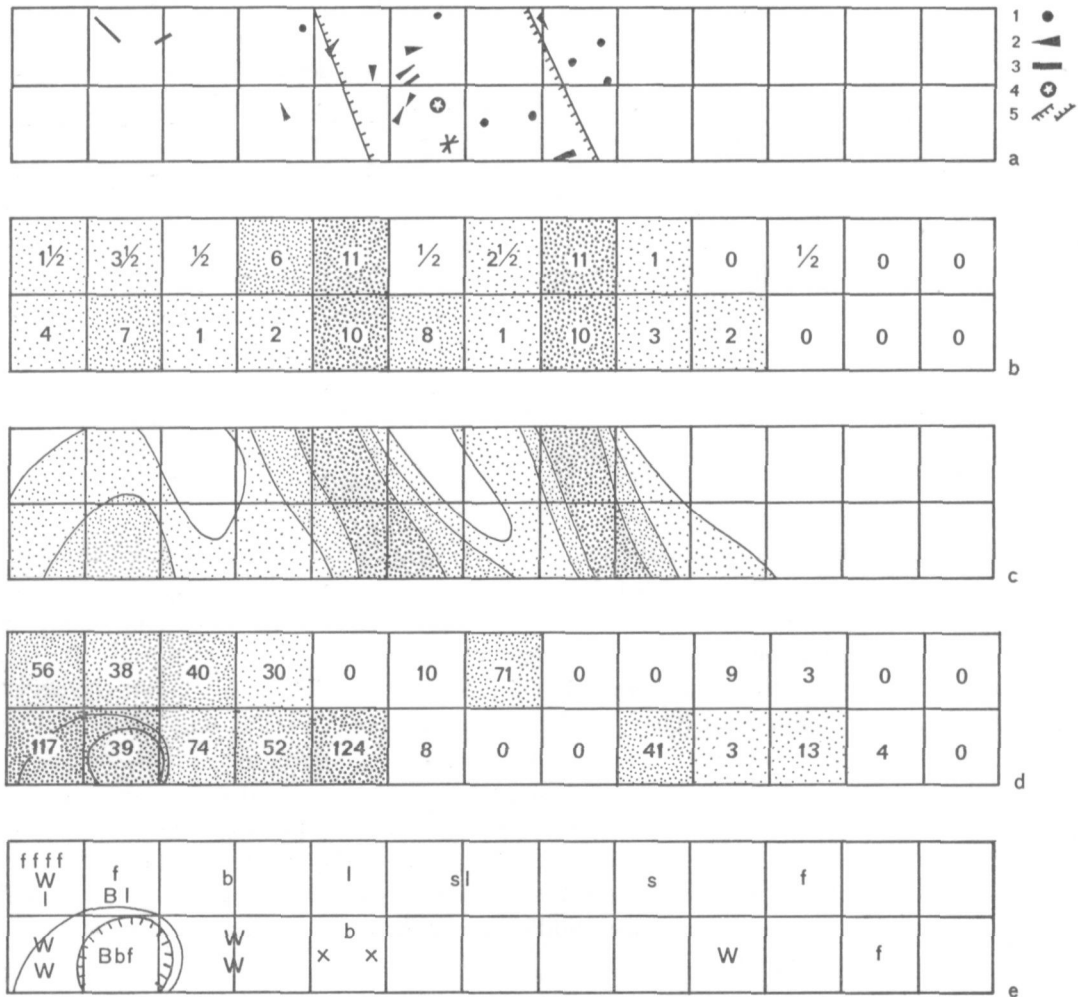


Fig. 65. Molenaarsgraaf. Distribution of various find groups in Pit CS. Scale 1:200.

a) Worked wood

1. pointed post, vertical
2. pointed post, oblique or horizontal
3. other worked wood, horizontal
4. fragment of a tenon
5. limitation of central part of the channel

b) Bone. The numbers give an estimation of the found volume. Boundaries of the signature (dots) at 1, 5 and 10 units.

c) As b) but interpreted according to the observations in the field.

d) Pottery, weight in grammes by 5 m<sup>2</sup>. Boundaries of the signature at 10, 25 and 75 grammes.

e) Various finds

B = BB sherd

b = to BB related sherd

W = BWB sherd

l = loam

f = flint

s = worked stone

x = bottom and sherd of pot with reed impressions (fig. 88).

= concentration of sherds of pot with reed impressions

= concentration of charcoal

# MOLENAARSGRAAF I

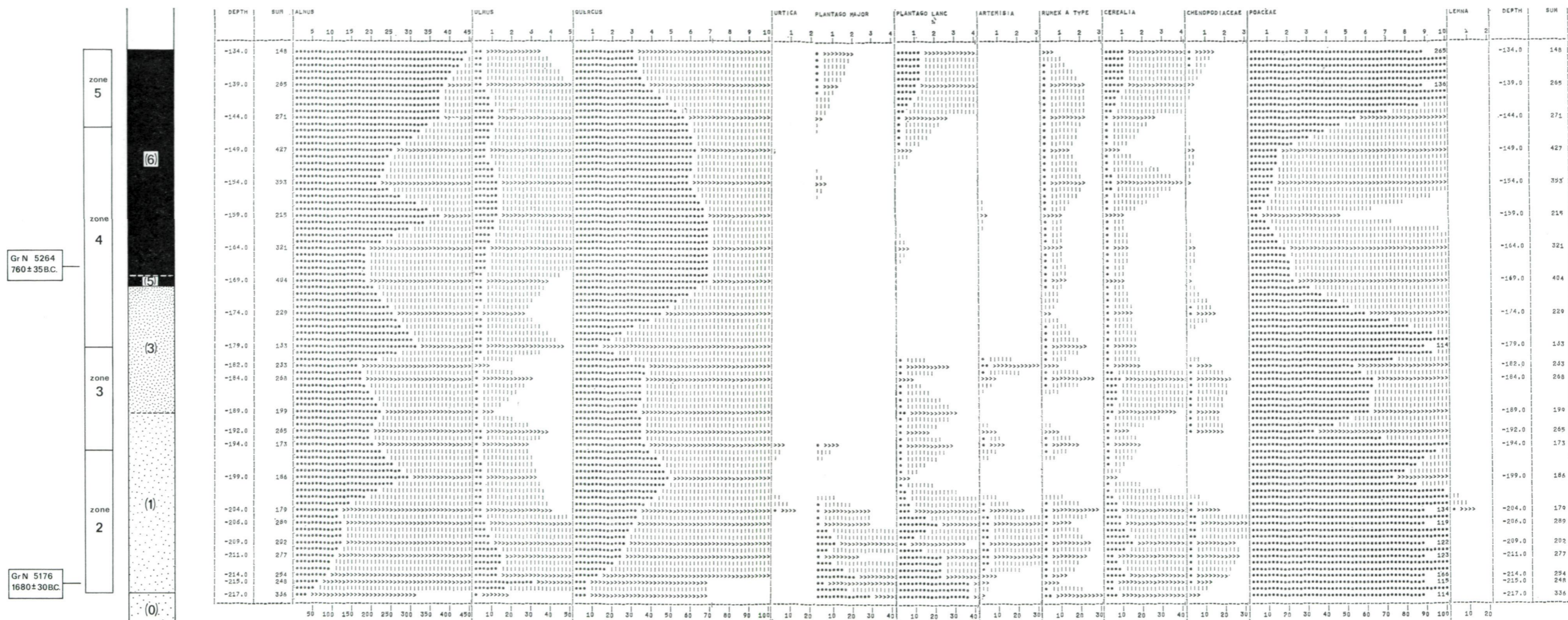


Fig. 66. Molenaarsgraaf. Pollen diagram I. Pit C8, north section. See fig. 63 for the position of the samples and for the legend of the lithology.



# MOLENAARSGRAAF II

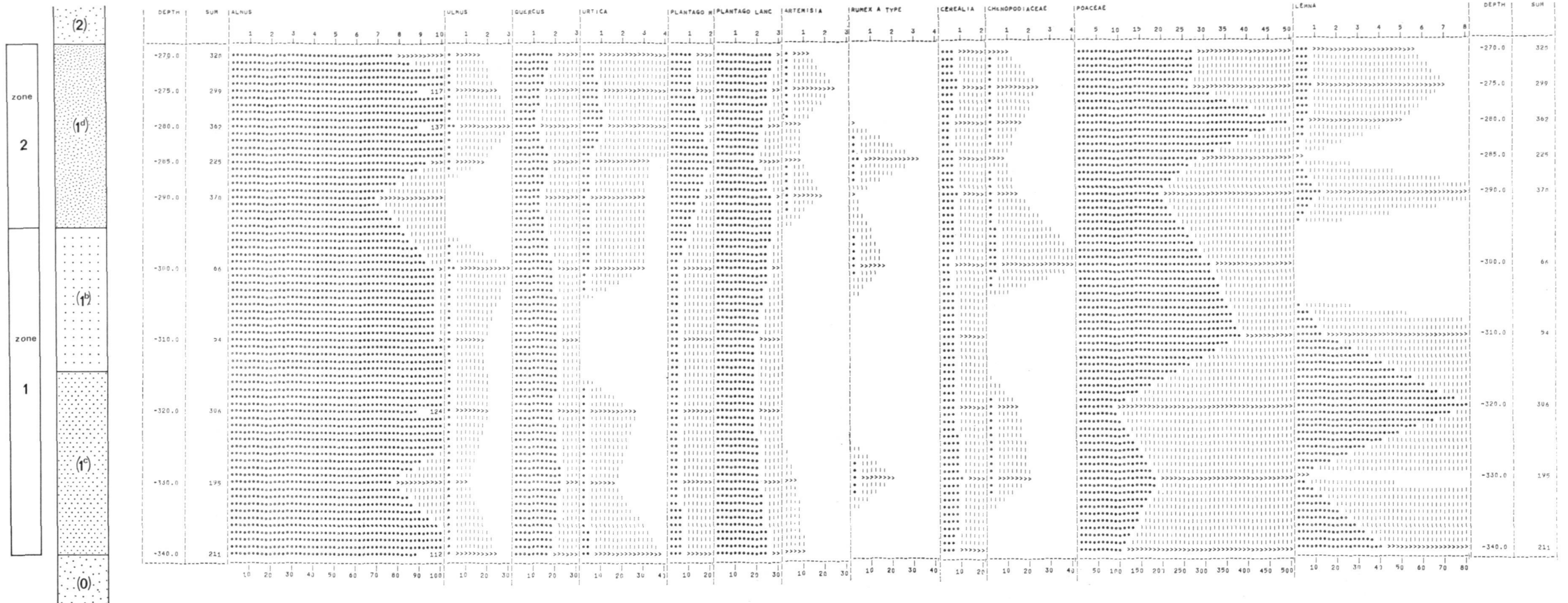
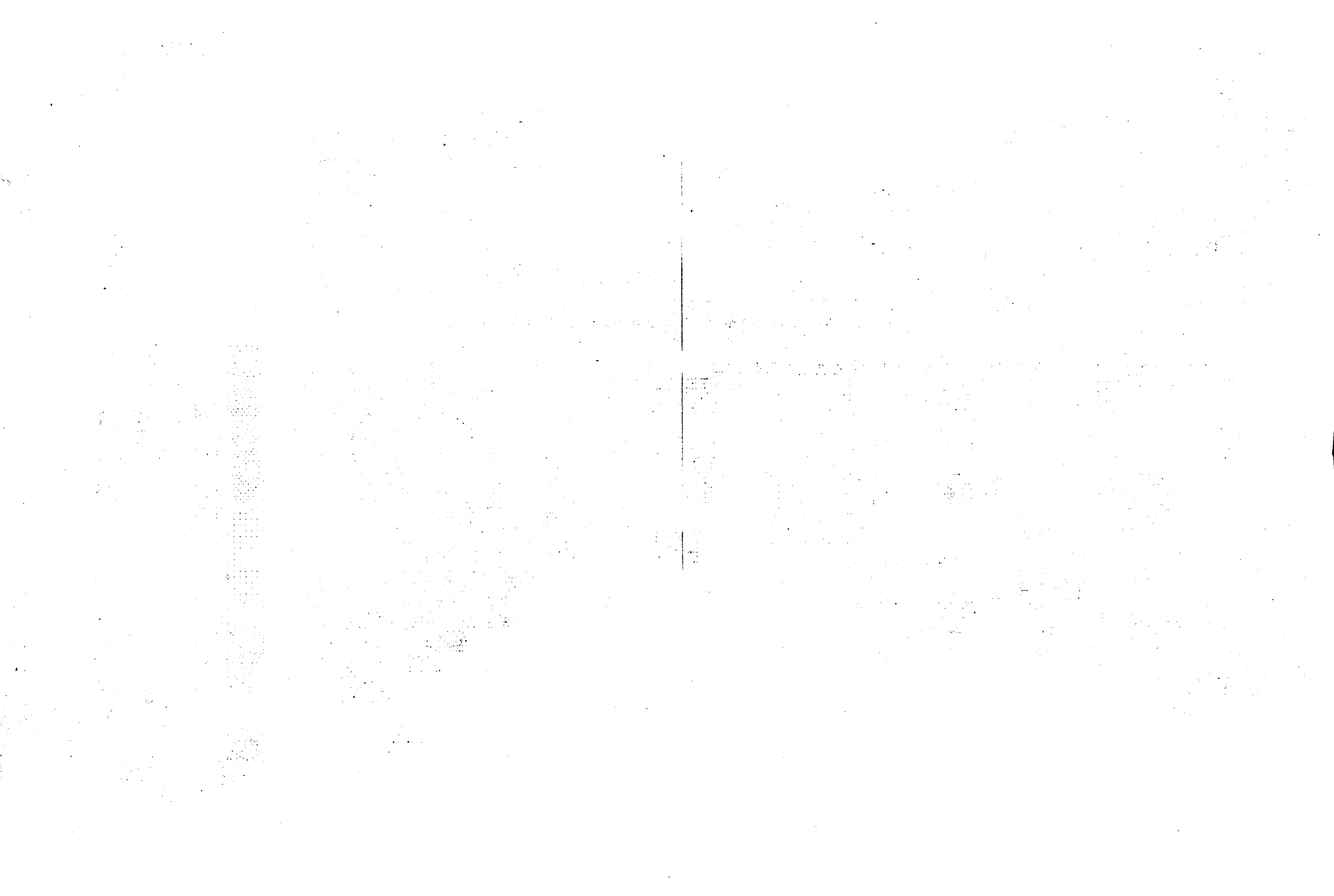


Fig. 67. Molenaarsgraaf. Pollen diagram II. See fig. 64 for the position of the boring and for the legend of the lithology.



side of the gully. The same will partly apply to the bone material, especially to the small concentration on the western bank. Most of the bones, however, were probably thrown in the gully itself and were washed away in the central part, where the strongest current will have occurred. We can say so that the archaeological material in the gully is derived from and associated with the settlement to the west of it. On the east bank of the gully (east end of trench C8) we did find, moreover, only a few pieces of flint and no other soil traces than a small undated fire place, proving that no settlement was situated there.

It is noticeable that the bones and the wooden objects have a different distribution. Although the circumstances were perhaps worse for wood preservation in the bank zones than in the centre of the gully, this had no influence on the distribution picture. In the bank zones also, a few pieces of wood and the roots of a somewhat later growth of alder vegetation remained very well preserved. All pointed wooden poles were therefore knocked into the ground expressly in the centre of the gully. A number were washed out of the vertical but remained in position and were preserved by being covered with sand. Other poles, however, must have been washed away during the second activity phase. The special placing of the poles must have been connected with their function. When we discuss the wooden objects we shall assume that they were used for fishing. Probably nets or traps were fixed to them <sup>15</sup>.

#### 4.4. PALYNOLOGICAL INVESTIGATION OF THE GULLY FILLING

##### 4.4.1. THE POLLEN DIAGRAMS

The palynological research was also conducted in the Molenaarsgraaf excavation by Mr A. Voorrips. The counts were made (as in the Hazendonk diagram) by him and Mrs. J. Mekelte Riet. The diagrams were completed in the same way as the Hazendonk diagram <sup>16</sup>. Both the following paragraphs were written in close collaboration with Mr Voorrips; the interpretation of the diagrams is his work, while the archaeological commentary is largely the work of the author.

The peaty gully filling lying directly next to the settlement offered ideal opportunities to determine the effects of human presence on the vegetation. For this purpose two profiles were pollen-analytically investigated:

	Profile I, monolith from the north section of pit C8 ( <i>cf.</i> fig. 63 b).
	cms below NAP
	— 110 surface
	— 134 clay
c.	— 170 wood peat
	— 217 weathered reed/sedge peat

<sup>15</sup> Cf. p. 236 and 300. An important find, not discussed here, is the *radius* of the skeleton of grave II, found in square b4. It comes from the humic layer (deposit 1) there. The find is very important for the chronological relationship of the graves and the settlement. Cf. the discussion at p. 253.

<sup>16</sup> We refer to our remarks at p. 137-138, notes 13-15.

Profile II, boring c. 10 m. south of the south section of pit C8 (cf. fig. 64 b).  
cms below NAP

— 270	clayey, weathered peat
— 295	sand
— 315	humic sand
— 340	

Both pollen diagrams show perhaps a slight overlap, so that the uppermost centimeters of Profile II are isochronous with the lowest centimeters of Profile I. The rise of *Quercus* and *Corylus* in the lowest part of Profile I can be identical with that in the uppermost part of Profile II, especially as these are the only places in both diagrams where curves for both types show the same direction and amplitude.

From a stratigraphic point of view there is not the slightest objection to this correlation; in fact, such a correlation was assumed, although it was also anticipated that Profile II as a whole could synchronize with the basis of Profile I. This appears, therefore, not to be so. The number of spectra from Profile II, especially from the lower half, is too small to permit drawing any important conclusions.

What we said in 3.3. (p. 137) about the vegetation on the *donken* applies, *mutatis mutandis*, equally to the natural vegetation on the stream ridge. In this river forest the oak dominates, while elm and ash occupy an important place. Extending down from the stream ridge, the forest changes, via a zone with ash and alder (the breadth of which is dependent upon the development and elevation of the clay wedges on both sides of the ridge) to the alder carr of the surrounding peat.

By combining both pollen diagrams five zones can be distinguished.

#### zone 1

This zone, a clear underwater deposit in view of the high values for *Lemna* (duckweed), is further characterized by high values for *Plantago lanceolata* (ribwort plantain) and constant quantities of *Cerealia* (cereals). On this account there is no doubt about occupation of the settlement terrain from the beginning of the formation of deposit 1. The low values — in comparison with zone 4 (Profile I) — for *Quercus* and *Ulmus* at the base of this diagram, show that the stream ridge at that time was already (partly) deforested. We can therefore conclude that the settlement already existed before the sedimentation began.

#### zone 2

In Profile II zone 2 shows great similarities to zone 1; as for the differences, more *Plantago major* (great plantain), *Artemisia* (mugwort), *Rumex acetosa/acetosella* (sorrel) and *Urtica* (stinging nettle) indicate that the plant growth had acquired more the character of a track vegetation. The general picture shows indeed that the deposit was formed at the height of the then average groundwater level. The gully, in other words, got filled up with sediment, at least at the site of the diagram. The site of the profile may have been used as marshy meadowland.

The decline of *Quercus* in this zone, although small, may indicate some expansion of the occupation of the stream ridge and a consequent continuation of the deforestation.

In Profile I a gradual lessening of the occupation intensity is apparent, together with a regeneration of the forest on the stream ridge.

#### zone 3

Zone 3, at the base of deposit 3, comprises a renewed occupation of the stream ridge near the gully. The intensity is lower than in zone 2, while the lack of *Plantago major* and the relatively low values for *Plantago lanceolata* and *Poaceae* (grasses) suggest that the bank zone of the gully was not in use during this phase.

#### zone 4

This zone comprises the upper part of deposit 3 up to and including the base of deposit 6. A thorough regeneration of the stream ridge vegetation takes place, which is complete at — 167 cm. At the site proper there is no occupation in this zone, but the continuous curves of *Cerealia* and *Rumex a-types* indicate that there was in fact a continuation of the inhabitation in the surroundings or in the region as a whole.

At — 154 cm. a slight increase in *Cerealia* and a corresponding decrease in *Quercus* indicates a period of intenser inhabitation of the district.

#### zone 5

Zone 5 comprises the upper part of deposit 6. It shows the picture characteristic of the general reclamation of the 11th and 12th centuries: a rapid increase of *Cerealia*, *Poaceae* and all herbs to high values, and a general decrease in all trees (particularly *Quercus*), with the exception of *Alnus* and *Salix*, as a consequence of the deforestation. Disturbance is here unlikely in view of the locally (and generally) present clay covering of (here) 30 cm. thickness. Some erosion of the peat surface during the deposition of this clay is possible, but it is not very probable, in view of the quiet circumstances in which the clay was deposited (*cf.* p. 192).

#### 4.4.2. ARCHAEOLOGICAL COMMENTARY

In our discussion of the find material and particularly of the pottery, we shall distinguish three phases in the occupation of the settlement beside the gully (see p. 226). In the following archaeological commentary on the pollen diagram we shall employ these divisions and correlate these occupation phases with the pollen zones.

#### zone 1

Zone 1 is dated by the  $^{14}\text{C}$  date at the base of zone 2 in Profile I, and by the *archaeologica* found in deposit 1 of pit C8. This gives an age before 1680  $\pm$  30 and before phase 2 of the settlement. We may thus propose that with zone 1 the existence of phase 1 of the settlement is also demonstrated palynologically. The beginning of this first occupation phase occurs, however, before the beginning of the diagram.

*zone 2*

Zone 2 is dated by the archaeological remains found in the relevant deposit, which are representative for phase 2 of the settlement. The  $^{14}\text{C}$  date: GrN 5176,  $1680 \pm 30$  B.C. dates the base of this zone and forms a *terminus post quem* for the archaeological material.

Phase 3 of the settlement took place, in view of the position of the archaeological finds (*cf.* p. 184) in the uppermost part of deposit 1, at the end of zone 2.

The absence of any recognizable reduction of the anthropogenous influence in the pollen diagram in zones 1 and 2 indicates that there can be no question of a break in occupation of any duration. Brief pauses would not, however, be recognizable in the diagram. The considerable deforestation on the stream ridge in this period concurs with the cultivation of a strip of many kilometers long, as discussed on p. 109.

*zone 3*

Since, in phase 3 of the settlement, the bank of the gully formed part of the settlement terrain, zone 3 can hardly give evidence of (the end of) phase 3. The resumption of human activity can, on the other hand, be related to the occupation in the Middle (and Late) Bronze Age, which took place a few hundred meters east of the gully, and which left traces in the settlement terrain also and in the gully filling itself (*cf.* p. 185 and 193).

By dating this zone in the (Middle) Bronze Age, the second activity phase of the gully (deposit 4) is dated to the transgression phase D 0.

*zone 4*

The complete recovery of natural vegetation at — 167 cm. is dated: GrN 5264,  $760 \pm 35$  B.C. This accords with the inhabitation history of the Alblasserwaard: many Middle Bronze Age settlements are known, but only a few in the Late Bronze Age and we know only one find place from the Iron Age. For the slight revival of human activity at — 154 cm. only Roman times can be considered.

*zone 5*

The dating of the top clay after the mediaeval reclamations was confirmed during the excavation by the find of 16th century pottery on the bottom of a pit which was filled with this clay (p. 192).

## 4.4.3. SUMMARY

In both successive pollen diagrams I and II five zones were distinguished. The occupation of the settlement beside the gully is documented in the zones 1 and 2. Zone 1, an initial filling up of the open gully, began during the first occupation phase. Zone 2 represents the phases 2 and 3. The forest vegetation on the stream ridge appears to have been largely cleared in order to lay out fields (for grain cultivation). No lengthy breaks in occupation can be evidenced. The Middle Bronze Age occupation is clear in zone 3. In zone 4 we see a complete revival of natural vegetation and an end to all inhabitation about 760 B.C. In zone 5 the (slight) reaction

of Roman inhabitation further away, and, on the top, the mediaeval reclamation. Fig. 120 (p. 272) gives the correlation between pollen zones, gully deposits, occupation phases, and <sup>14</sup>C dates.

#### 4.5. SOIL TRACES

##### 4.5.1. SHORT SURVEY

On the excavation map the following features can be distinguished:

- a number of (very) recent (test) pits,
- a number of large 16th century sand digging locations,
- a hearth with clay lumps from the Middle Bronze Age,
- a number of older pits,
- a large number of post holes (post traces), chiefly from two houses, and a very large number of very small or very shallow discolourations,
- a few small trenches,
- a concentration of (rolling) stones,
- three graves with interments and a cenotaph,
- an ox's skeleton,
- the bank zone of the break-through channel.

##### 4.5.2. TEST PITS

The five or six small, rectangular or L-shaped pits, dug by members of the work-group "Lek en Merwestreek" of the AWN, are all indicated on the excavation plan<sup>17</sup>. Their small extent (about 1×2 m.) caused hardly any loss, which would certainly have happened with bigger pits. On the bottom of one of the pits post holes were still preserved.

##### 4.5.3. 16TH CENTURY SAND PITS

The eastern part of the settlement site immediately bordering the gully was seriously disturbed by a large number of more or less rectangular pits measuring 1-2.5 m. wide and 2-10 m. long. The largest clearly consisted of several smaller pits. The smallest pits were carefully rectangular and had vertical or even receding walls, undermined by washing. The lay-out of the pits is clearly parallel to the gully in the east, but in the west more at right angles to the ridge. West of the present day ditch there is only one such pit. The pits were mostly filled with very heavy clay, which contained a large admixture of sand on the highest parts of the site, and in the lowest parts had become peaty, especially at the base. Along the edges, but also sometimes on the bottom, a primary filling of a dirty-grey to dark grey loamy

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<sup>17</sup> It is necessary to dig test pits everywhere in the Alblasserwaard, because of the 30-40 cm. thick clay cover.

sand occurred in nearly all cases; in our view, this consisted chiefly of material of the grey "occupation layer", tumbled down when the fresh sides of the pits were subjected to erosion. Here (as will appear below: in secondary position) there were a number of BB and BWB sherds. Often large and small clods of clay were recognizable in the base of the filling, and also traces of the holes of fairly large animals (rats?).



Fig. 69. Molenaarsgraaf. Glazed brown pottery, dated in the 16th century A.D., from the bottom and the fillings of the subrecent farmer's sand pits. Scale 1:2.

The total impression was that we had to do with very young pits. This, however, was not confirmed until the second operation, when on the floor of one of the pits in excavation pit B9 a few sherds with a pinched-out footring and a greenish-brown glaze were found (fig. 69). Also in the filling there were a few small sherds of this pottery, apparently originating from the 16th century<sup>18</sup>. Bones which must originate from one cow also lay in and under the filling of this pit; they were not in any anatomical relationship, so we must assume that the animal was slaughtered on the spot. The state of preservation of the bones differed considerably from that of the bones in the settlement site and in the gully.

A former owner of the land on which the pits B6-9 were situated apparently profited from the presence of sand on the rear part of his land. Until the end of the 19th century very little care was taken of this land and it was not especially drained. The cubic capacity of the pits is approximately that of a cartload of sand, which could be transported via the "rear quay" of the polder. Fortunately his western neighbour was not so enterprising.

During a survey for a reallocation road being constructed over this ridge in the Goudriaan polder many such pits were found in numerous parcels of land. We must, moreover, realize that farmers up to about 50 years ago were in the habit of burying cattle that died in the countryside on the spot where they were found. This place very often was the high and dry sand ridge where cows prefer to rest. A few such fairly recent pits were also found during both excavations at Ottoland. In both cases one of the pits also contained the remains of an animal that had died there and was buried on the spot. Large parts of the skeletons were undisturbed, but others were detached, from which the (well-known) fact must be assumed that in those times such corpses were partly used for consumption.

It must finally be observed that the ditch cutting through the excavation site, judging by the pit distribution, existed already in the 16th century, when it was most likely a boundary between properties.

<sup>18</sup> Mr C. Hoek, Rotterdam, stated that the sherds could not be older than the end of the 15th century A.D. Mr H. Sarfatij, Amersfoort, thought that they might be as late as the 17th century. Since the date of the sherds forms a *terminus post quem* for the clay cover, it is most reliable to take the oldest age. The pottery itself has a light red (2.5 YR 6/8) colour, dark yellowish brown (10 YR 4/4) where it is glazed.

## 4.5.4. MIDDLE BRONZE AGE REMAINS

In the eastern part of excavation pit A8, within both house plans, a concentration of charcoal showed up in the top of the grey occupation layer. The charcoal appeared to come from a shallow pit (no. 29) which could still be made out in the occupation layer and must therefore have been dug relatively late in the history of the settlement. Most of the charcoal clearly came from large blocks and branches. In between was a large quantity of lumps of lightly baked loam, at least some of them fragments of weights, judging by the shape and traces of perforations.

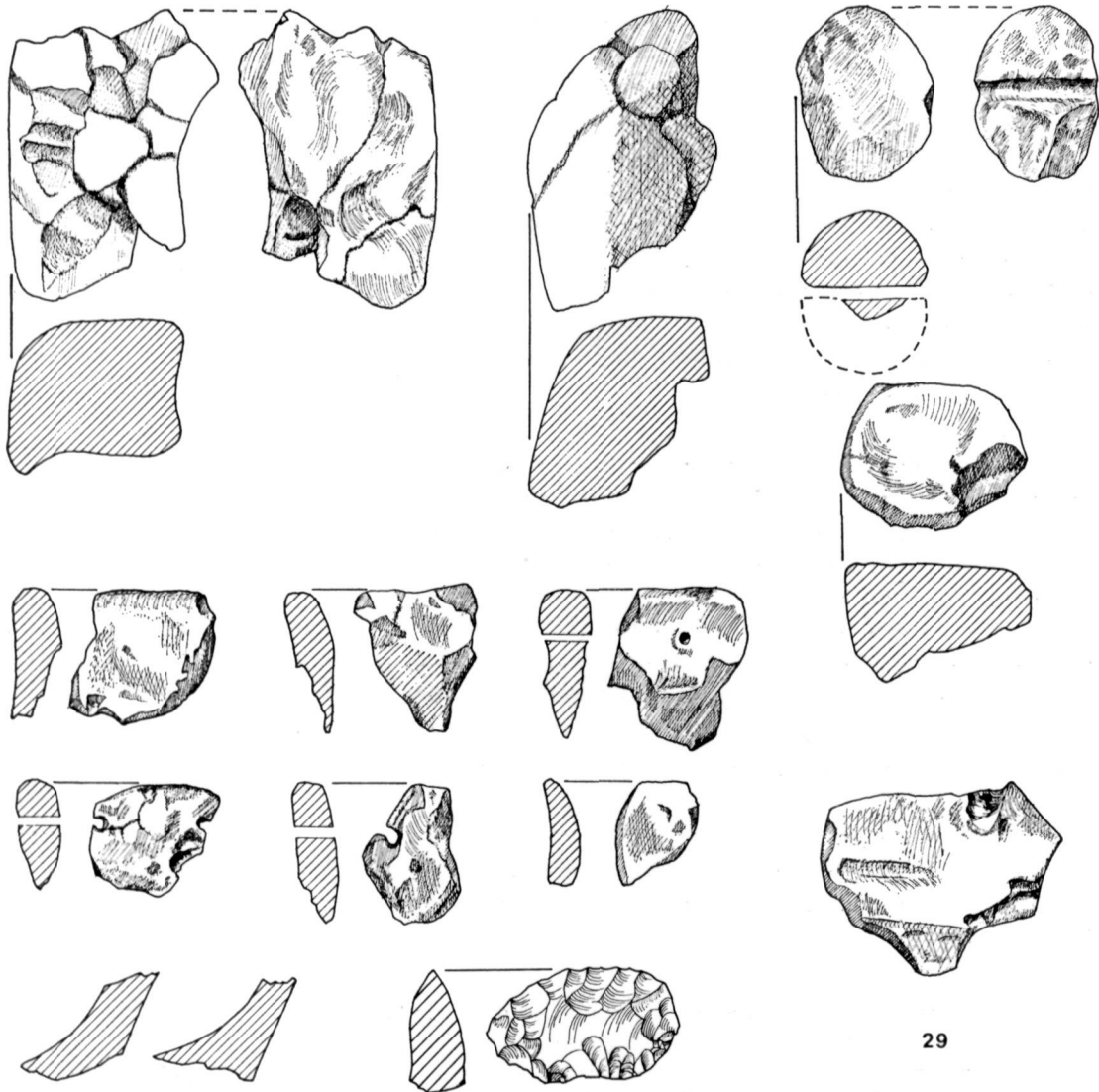


Fig. 70. Molenaarsgraaf. Fragments of loam weights, sherds and a flint scraper from the small Middle Bronze Age hearth place no. 29. Scale 1:2, scraper 1:1.

A few sherds from the hearth give an archaeological date. They are very pale brown (10 YR 8/3)<sup>19</sup> to reddish yellow (5 YR 7/6) in colour, with sometimes a dark gray (7.5 YR 4/0) coloured centre. They are badly fired, untempered or only slightly tempered with pounded pottery or broken quartz, and fairly thick (8.5-16.0 mm.). A number of thick round rims with small perforations and a somewhat thinner, outward-bent rim are illustrated in fig. 70, as well as a few base sherds. All sherds are undecorated, except for two, on which a few coarse, shallow impressions are to be seen. Among the settlement pottery there are indeed a few sherds which are comparable for technical reasons, but the rim shapes and the decorations do not occur here. A flint scraper, white in colour and crackled by firing, differs by its flat retouches from the scrapers from the settlement, and is situated in a marginal position in the diagrams of the scrapers (figs. 96-97). Although neither the sherds nor the scraper are very characteristic, a Middle Bronze Age dating seems most likely, chiefly because of the similarity of the sherds to DKS pottery. A <sup>14</sup>C date gives a confirmation of this supposition:

Molenaarsgraaf no. 29 GrN 5177 3350 ± 35 B.P. (charcoal) (1400 ± 35 B.C.).

Since the charcoal generally came from rather large blocks this value might be some decades older than the moment the pit was dug. The small hearth is, at any rate, a later (MBA) element in the former VBB/BWB settlement site.

We pointed out in Part II (p. 113) that apparently the break-through channels lost their attraction and that no settlements were founded along their banks in the Middle Bronze Age. But the hearth no. 29 proves that the channels were visited incidentally, perhaps by a fisherman who merely fired a few weights near his fishing ground. The find tallies with a number of other indications of Middle Bronze Age occupation in the immediate neighbourhood (*cf.* p. 174).

#### 4.5.5. SMALL DISCOLOURATIONS AND POST HOLES (Pl. II A, B)

Numerous small discolourations are partly traces of poles, but partly old holes of moles and mice. We are dealing with all soil traces which cannot be regarded as pits, and which are clearly to be distinguished from them in spite of their great variations in measurement, form and colour. The diameters vary from 34 × 34 and 24 × 48 cm. to smaller than 4 cm. The shape was generally circular; only the largest traces were sometimes oval or rectangular. Animal and root activity have generally made bulges and other irregularities in the biggest traces. The depth beneath the highest level, where soil traces were preserved, was small: in one case 50 cm., otherwise less than 35 cm. The original depth reckoned from the former surface (the top of the grey layer), was about 30 cm. more, or 65-40 cm. In vertical section the traces were mostly rectangular with flat and round bases. A sloping direction was noted only in the smallest traces. We can therefore state that the majority of the discolourations took the form of long or short cylinders, if they went deep enough to make their shape observable. The colour varied from very dark grey to very light grey. In general the large traces were fairly dark in colour and the traces in the centre of the settlement were darker than those at its perimeter.

<sup>19</sup> Colour Code of the Munsell Soil Color Charts.

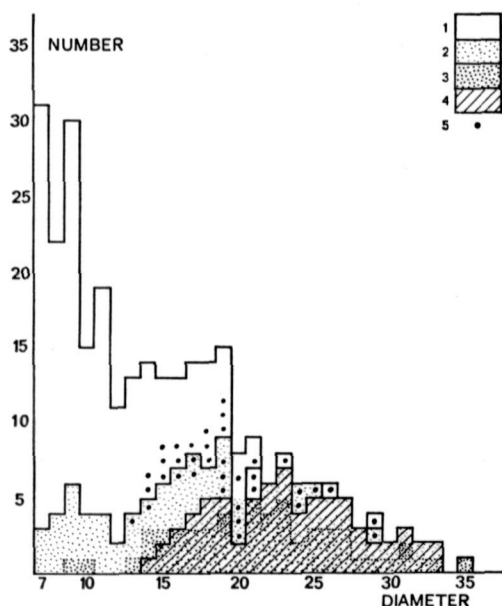


Fig. 71<sup>a</sup>. Molenaarsgraaf.

Diagram, showing the relation between diameter (in cms) and number of all "small discolourations" in the Pits A 8-9 and Z 8-11. For each diameter the mean has been plotted of the number of post holes of the value itself plus the numbers of both adjoining values, in order to reduce fluctuations.

For example : diam. 14 cm. : 11, 15 cm. : 19, 16 cm. : 8 postholes listed.

Plotted at 15 cm. is  $\frac{11 + 19 + 8}{3} = 13$ .

Legend :

1. depth 0-10 cm.
2. depth 11-19 cm.
3. depth 20 cm. or more
4. post holes of houses I and II
5. discolourations in the Pits Z 8-11, comparable to the postholes of the houses

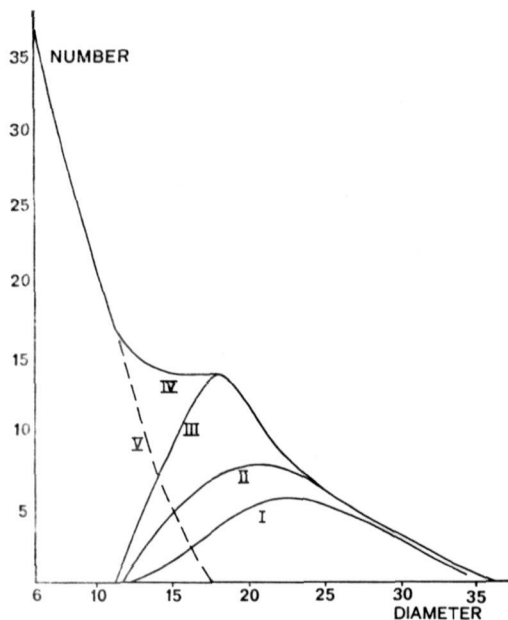


Fig. 71<sup>b</sup>. Molenaarsgraaf.

Graph, generalization of the diagram fig. 71<sup>a</sup>.

- I : post holes houses I and II
- II : I plus the comparable discolourations in Z 8-11
- III : all post holes (group a)
- IV : all "small discolourations" (a + b)
- V : all very small plots (animal holes, group b)

The colour of the post holes did not differ from that of the occupation layer at the same place. The post holes probably had acquired their colour in the same way as the occupation layer. A small number of traces, scattered around the settlement, were very light in colour.

All small discolourations have been sectioned, measured (diameter and depth) and registered in lists, with annotations on peculiarities. With the help of this a work-map was made at the end of the first operation. After the second phase the map was completed with new data.

An over-all view of these soil traces is given in the diagram (fig. 71<sup>a</sup>). All the soil traces

from the excavation pits A 8-9 and Z 8-11 are contained therein. Data from pit A 10 are not included, as only a very large number of very small soil traces occur there. Pits B 6-9 were unsuitable for inclusion because of the great disturbance to which they had been subjected. Traces smaller than 6 cm. were ignored as they are very numerous, often very shallow, difficult to measure and only listed as "little spots". For each diameter the mean value has been plotted of the number of post holes of the value itself plus the numbers of both adjoining values. In this way we have largely eliminated the excessive fluctuations in the diagram used earlier<sup>20</sup>, which originated mainly from a preference for certain values when measuring, especially *e.g.* 6, 8, 10, 12, 15, 18 and 20 cm. as diameter. Within the columns a division has been made according to depth ( $\leq 10$ , 11-19,  $\geq 20$  cm.). The diagram has been generalized into a graph (fig. 71<sup>b</sup>).

The diagram shows clearly what was already suspected during the excavation, namely that we are concerned with two groups of soil traces of different character. The curve for the total number of soil traces may be seen as an addition curve of

- a) a group of soil traces roughly distributed according to a curve of probability with extreme values at about 13 and 35 cm. and a top at a diameter of about 23 cm.
- b) a group with mainly very small diameters and small numbers with larger diameters with a maximum of about 17 cm.

The existence of these groups appears to be confirmed by the depth division. This also expresses an obvious relationship between diameter and depth.

In the work-map mentioned the plans of two houses were determined. The soil traces used for this are also given in the diagram. The distribution of these post holes is the same as that of the soil traces of the above group a. This group as a whole may therefore be said to be formed by post holes.

A number of soil traces in group a, *i.e.* post holes, does not belong to the house plans. A part of this number, mainly of relatively small measurements, is located within the site of the house plans. A larger part, however, is scattered over the western part of the excavation (Z 8-11), but can hardly be combined in any plan. Perhaps we are here concerned with the remains of a third construction. These post holes are also indicated in the diagram.

As for the small soil traces of group b, we can be brief. In view of the sloping or even irregular section of several of them they are almost certainly not post holes but the holes of animals, although one cannot exclude the possibility that a few of them are in fact traces of posts. However, as there is a total lack of any regular configuration of these discolourations this is unlikely.

#### 4.5.6. HOUSE PLANS.

##### 4.5.6.1. *Construction of the plans*

In the concentration of post holes in the western part of the excavation (pits A 8-9 and the east of Z 8-9) there is at first sight little connection to be found. It is clear that we are concerned

<sup>20</sup> This diagram is not illustrated here. See also the explanation of fig. 71<sup>a</sup>.

neither with rectangular nor round dwellings; even after an intensive study of the work-maps no plans of such houses can be made. The post holes have, however, the same dimensions as the post holes, which have been found generally in the Western Netherlands and also elsewhere in similar cases in house plans. There are, moreover, various lines (rows of post holes) visible on the map, which were also noticed in the field. The fairly small excavation pits provided, however, too small an overall picture to enable our ideas about them to be worked out fully in the field. Finally, the regular distance of about 3 m. between the post holes is noticeable.

Without much difficulty the majority of the post holes can be grouped as parts of the plans of two large houses of similar shape. Starting from both axis lines of these houses and the easily recognizable slightly curved southern walls, we can recognize the northern walls easily by symmetrization. A number of remaining, heavy posts stood regularly spaced out in the aisles of house II and, in this wider house, will have been a part of an extra roof support. Finally there remain only a few post holes, and of these only one or two have a larger diameter than 20 cm.

The measurements of the post holes appearing in both house plans are recorded in two diagrammatical sections (fig. 74), in which at the same time an occupation layer of 30 cm. is drawn in order to indicate generally the original surface and the original depth of the post holes. The thickness of this occupation layer is the reason why only traces of the heavy posts which supported the roof have been found. The wall construction apparently descended to too shallow a depth.

The dimensions of both houses are listed in table 15.

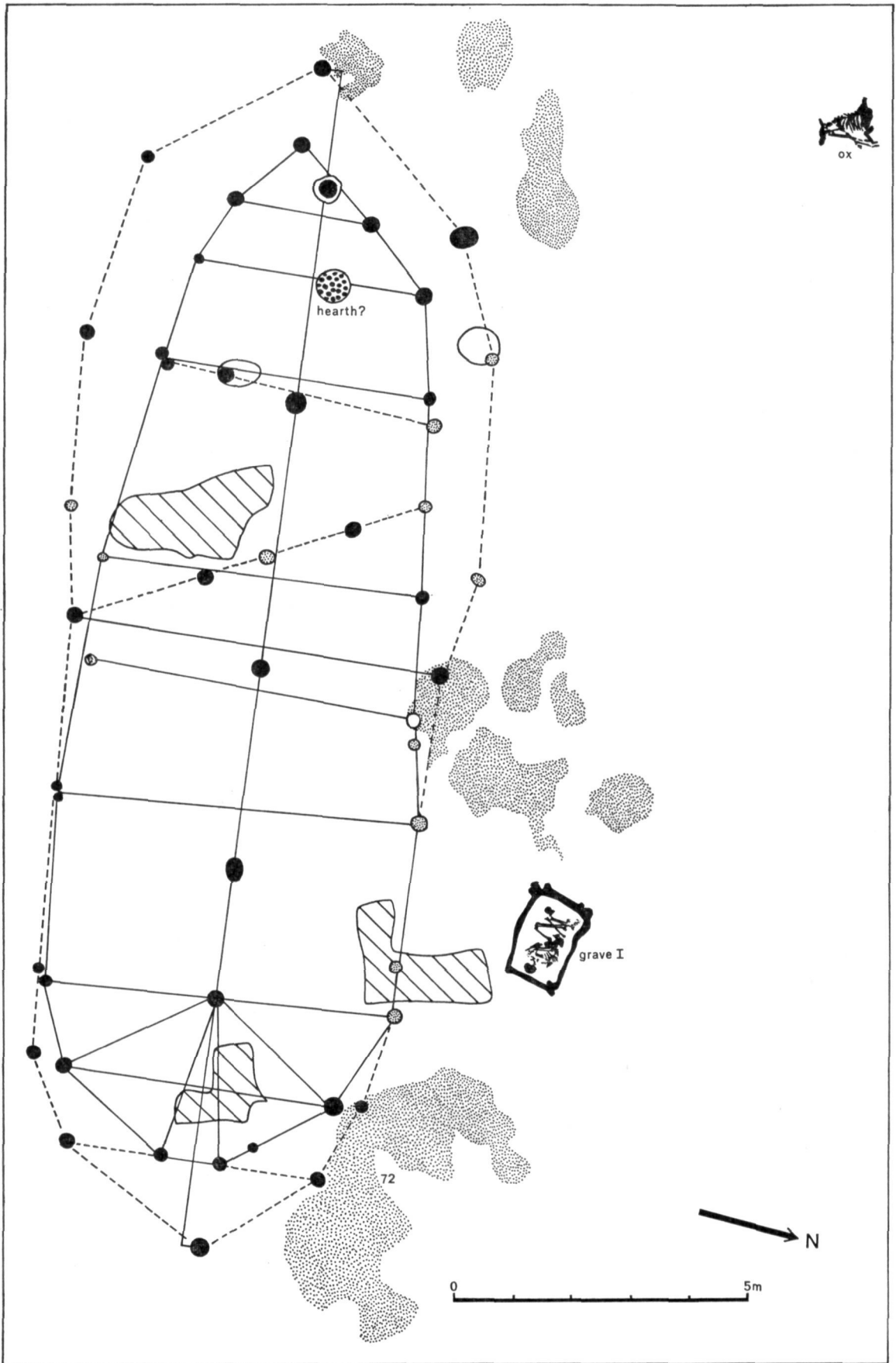
TABLE 15

*Molenaarsgraaf. Houses, dimensions*

	Length	Max. width
House I (A)	17.40 m.	6.00 m.
(B)	20.50	6.20
House II	> 18.80 (c. 23 m.)	6.80

4.5.6.2. *House I* (fig. 72)

House I is almost exactly orientated in an east-west direction, it has two aisles and is oval in shape, with a broad round end in the east and a narrowing western extremity. In the middle the heavy supporting posts of the ridge-pole stood in an exactly straight line, 3.20-4.60 m. from each other. Outside the ends, in both cases 1.40 m. away from them, there stood another heavy pole not in, but 20 cm. alongside the axis line. The wall posts were all placed opposite each other, but not opposite the central poles. They were probably also supporting the roof construction. In both walls the poles near the extremities of the house were much closer together (to a minimum of 1.00 m.) than in the middle (to a maximum of 3.20 m.). The eastern end



takes the form of an exact semi-circle. The situation of two posts on either side of the axis line suggests an entrance here of about 80 cm. width. The western extremity is clearly asymmetrical; no entrance can be pointed out here. Around both extremities the traces of a ring of poles was found, but its function is not clear. At the eastern end the regular placing of the posts of this ring follows fairly closely the semi-circular extremity. In the west the ring of posts is much wider and its relationship with the wall posts, although present, is less clear. It cannot be decided whether this is a case of a later extension of the house, or a construction forming part of the original house. In the latter event one imagines the poles may have been placed at an angle outside the house to support the roof. Such a construction can, however, have been added later. It is even possible that these posts mark the real wall and the rows of posts described above as the wall were in fact posts within the house.

#### 4.5.6.3. *House II* (fig. 73)

House II has been only partly preserved. It is orientated in a WNW-ESE direction and like house I has an oval, or more accurately a spool-shaped, plan. The south-east end was lost during the digging of the ditch running through the middle of the settlement, while near the north-west end the soil traces are very vague, apparently because the sediment here becomes somewhat clayey. The supporting posts in the axis line of the house stood in an almost perfect straight line but the distances between them vary considerably (2.00-5.40 m.) In this house too the wall posts were opposite each other. The distance between posts in one wall gradually increases from 1.80 m. at the north-west end to a maximum of 3.20 m. in the middle of the house. In both aisles there were a few posts which also must have had a load-bearing function. These stood in pairs at 1.00-1.50 m. on both sides of the central axis and approximately in one line with a pair of opposite wall posts. The pairs stand very far from each other: 5.00-5.60 m. By reason of these rows of posts the house may be said to have had four aisles, with a central aisle (divided into two) of a maximum of  $2 \times 1.50$  m. = 3.00 m. in width, and side aisles of a maximum of 1.80 m. in width.

The house plan can be made out over a length of 18.80 m. The original length was certainly not more than 26 m. and probably about 23 m. as the following arguments show.

— The house is a somewhat bigger and in particular more regularly built version of house I. It must have resembled house I also in the missing parts.

— In view of the course of the walls and the shape of the western end of house I, the corresponding (north-west) end of house II must have lain within a distance of 2 m. from the westernmost mapped posts.

— At the east of the ditch we have insufficient evidence of the continuation of the house, although an occasional post indeed lies in line with a row of poles. An extremity of the house cannot in any case be identified in pit B 8, so that we must assume that it must have been situated where the ditch now lies. In that case the house must have been at most 5 m. longer in a south-west direction. The soil traces in pit B 6-9 must have been caused by other structures which are difficult to make out because of the 16th century diggings.

— The south east end was possibly semi-circular, as it was in house I. It is noticeable that both south-east load-bearers of the roof-pole stand relatively close together, as they do in house I.

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Fig. 72. Molenaarsgraaf. House I and surrounding features, preceding house II.  
Dark grey postholes in black, grey ones dotted. Scale 1:100.

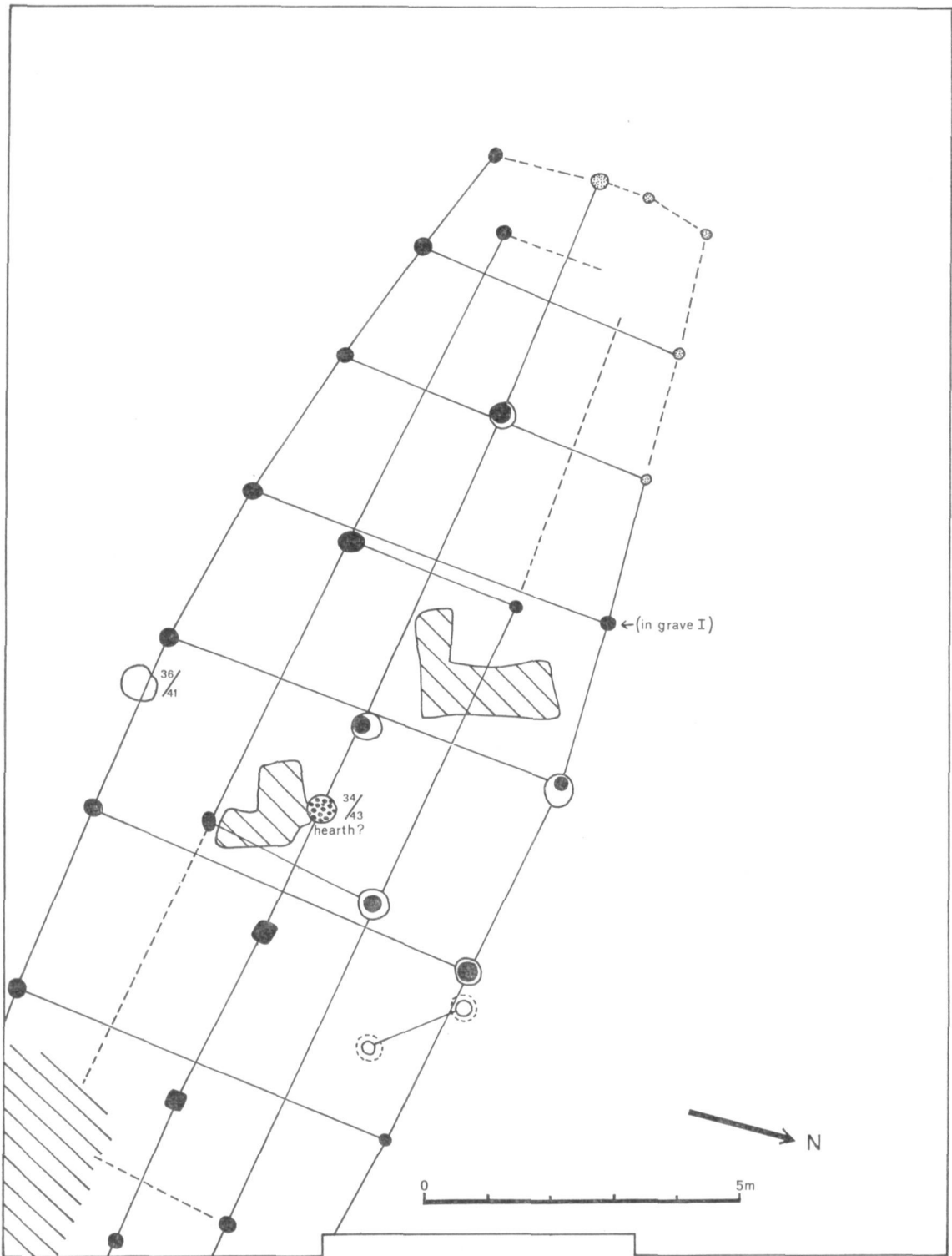


Fig. 73. Molenaarsgraaf. House II. Two big post holes with unknown function are also indicated. Scale 1:100.

#### 4.5.6.4. Comparison, construction and sequence of both houses

In spite of some differences the similarities of both houses are so great that we may speak of two variations of one type, and of a typological development from house I to house II. For they correspond in dimensions, in the oval (spool-shaped) plan and in the measurements and position of the posts. These similarities become particularly clear if transparent paper plans of the two houses are laid one over the other.

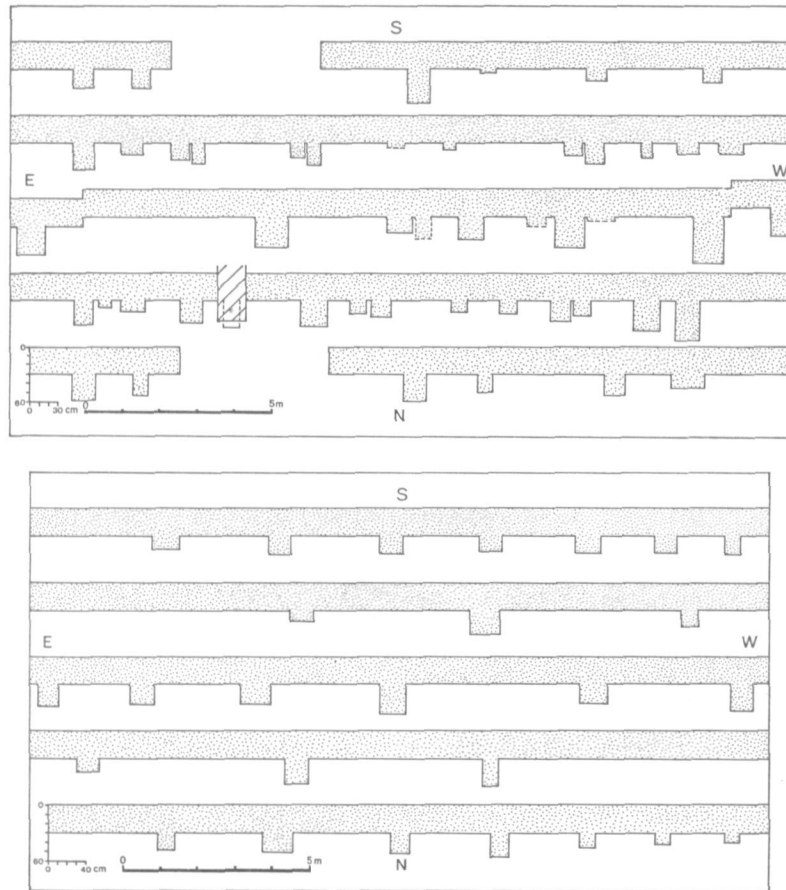


Fig. 74. Molenaarsgraaf. Sections through the post holes of house I (above) and house II (below).

The top of the grey occupation layer of about 30 cm. gives approximately the former occupation surface. The long scale (1:200) refers to the distance between the post holes, the small scale to the post holes themselves.

Something can be said about the construction of the houses. Since the wall posts were placed in pairs a crosswise connection of them seems likely, but there is no obvious relationship to the central posts. When the wall posts (like certainly was the case with the central posts) were covered lengthwise by horizontal poles, then the rafters needed not to correspond to any of the verticals, although there might have been a relationship to the wall posts. The extra posts in house II were certainly connected crosswise, since they were placed in pairs. They were

probably also connected with the wall posts, that were in one line with them. When these extra pairs were also covered by horizontal poles in the lengthwise direction of the house, this would yield maximum profit of their presence. Although the houses are not directly dated by finds in the post holes, we will demonstrate below that house I is older than house II. The development was in the first place a constructional change by the placing of load-bearing poles in the side aisles necessitated by the greater breadth. Second, a more regular placing of the poles, and third, a greater length.

As the ground plans of both houses are largely superimposed on each other it is impossible that the houses existed at the same time. This makes it even unlikely that the one house is the direct successor of the other, unless we suppose that the first house was broken down. It is more likely that they are separated by a (short) hiatus, during which a house might have been built elsewhere on the site (for instance more near the gully, in the disturbed part) or the site might have been abandoned.

There are a number of indications that make it apparent that house II was built later than house I.

— The north wall of house I forms a southern boundary for the series of pits b. Furthermore, the situation of grave I between these pits is such that we must assume contemporaneity. There are no arguments which contradict the assumption that these three elements—house I, grave I and pits b. form a chronological unit. The diggers of grave I took in account the situation of the pits, or the diggers of the pits respected the grave. As far as the relationship with house I is concerned, it is most probable that the pits were dug next to the house. The exact sequence unfortunately cannot be determined. Yet it would be interesting to learn whether the grave was dug next to the house and during its occupation or after it was abandoned, or the other way about, so that the house was built in the cemetery next to the grave. The first alternative seems to be more likely. In this view house I is contemporaneous with, or slightly older than grave I.

— Post holes of house II can be made out in the filling of the pits of group b. One of the posts of this house was even placed into the filling of grave pit I. It is therefore probable that the builders of house II were not aware of the (exact) location of grave I. There must accordingly have elapsed some time between the burial in grave I and the building of house II.

— One post hole from house I, in the middle of the north wall, showed up under the pit filling. Two other posts, however, belonging to the outside circle, appeared in the edge of the pit filling. What significance such traces in the edge of a pit filling have at our site, however, we are unable to judge. We do not regard these observations as being of much importance.

#### 4.5.6.5. *Other post holes*

First, we draw attention to a pair of large posts at the north wall of house II and indicated at fig. 73. After the construction of the house plans both post holes were the most conspicuous of the few post holes that could not be fit into the plans. They are perhaps the traces of a special construction, of which we only can say that it cannot be contemporaneous with house II <sup>21</sup>.

<sup>21</sup> A similar pair of large posts was found outside the house at Gwithian, belonging to Layer VIII, and dated by sherds of European Bell Beakers. The author suggests: "it may well be the supports for a corndrying rack". Simpson in Simpson (ed.) 1971, 138.

In the pits B 6-9 much has been lost because of serious disturbances and considerable activity by moles in the preserved intermediate sections. Together with a large number of unimportant traces a limited number of big post holes can be seen. Most of them seem to lie in a few straight, or slightly curved, lines which cross each other at right angles. The distances of 3-4 m. between them are common, as with the house plans. Although it is therefore clear that considerable structures must have stood here too, it is difficult to say anything of their nature. We said above that no continuation of house II was recognizable southwards, although a few poles are correctly aligned. Apparently there is some question of one or more (smaller?) buildings and perhaps an occasional fence. We cannot exclude that in a certain phase of the settlement even the main house was built here.

Outside both house plans the number of post holes in the western part of the excavation is fairly small. Only to the west of house I did we find a small group. It is, however, impossible to make out a house plan with any certainty there. But some traces might be missing and this post hole concentration might indicate a former house site or an additional building to house I or II.

This post hole concentration is of special interest since we will demonstrate that they might have to do something with the earliest phase of the occupation of the settlement, when we discuss the finds. First, the post hole group is situated in a pit-free zone: to the north we find the pit group a, to the south a few small round pits. It is likely that we have to do with generally contemporaneous phenomena. The pits of group a are dated by their (few) finds as an early group. Second, we will demonstrate by means of the distribution of the decorated sherds, that the oldest (VBB) occupation concentrated more in the west than was the case in the later phases.

#### 4.5.7. PITS

All the pits indicated on the map are drawn as they appear in the highest level in which soil traces were preserved, about 5 cm. below the base of the grey occupation layer, *i.e.* about 35 cm. below the former surface. The pits therefore appear to be smaller on the map than they were during the inhabitation and the less steep the inward slope is, the more is this the case.

The pits are irregularly distributed over the settlement site, but occur especially on the highest parts of the ridge. They only seem to avoid the site of house I. It is possible to distinguish a few groups of pits having similar characteristics, namely:

(a) A few generally oval pits near the ox skeleton and the western end of house I. The dimensions vary from 80 × 160 cm. to 120 × 220 cm. Two pits have been considerably disturbed by recent root activity, so that they are very irregular in shape. Most pits have, moreover, a humic centre, in which they differ from the majority of other pits. They can clearly be distinguished, however, from the 16th century sand digging places: on the highest parts of the terrain the filling of the last is very sandy, while their outline is much sharper. We believe that in the pits dealt with here there was considerable biological activity (roots, animals) above and in the somewhat loamy and wet pit fillings, in the midst of an occupation layer that had dried out as hard as cement. Above we made some remarks on the relation of these pits to the concentration of post holes in the western part of the excavation.

(b) A few irregular and shallow depressions in a 13 m. long and 5 m. broad strip near grave I. The diameter of these pits is at most 2 m. We discussed above the relation of these pits to the houses I and II and to grave I.

(c) A few large round pits near the bank of the gully and grave II. The diameter is 160-180 cm., the inward slope is steep and they are deep. Pit 210 is especially unusual because of its steep slope, its flat base and the abundant traces of burning. The pit was certainly dug as a part of the burial ritual (*cf.* p. 257). The other pits are more irregular. In view of the whole situation and the concentration around the grave a contemporaneity in a general sense with this grave seems probable. This is supported by the finds from these pits (p. 218).

(d) More than 20 small round pits spread over the whole terrain. The diameter is 45-100 cm. ; the inward slope is fairly steep. A few occur among the above-named groups a and b. The position of these pits is such that we cannot attribute them to any particular phase of the occupation. We can only say that they must belong at least to the house I phase.

(e) Four pits within the plan of house I (36/41, 34/43, 44 and a small pit in the west of the plan) require some special remarks.

— Pit 34/43, a small round pit with a diameter of about 50 cm., appeared already high in the section, the finely dispersed charcoal colouring the filling black. As such this small pit is identical with the much larger pit 27/211. The situation on the axis line of house II and presumably fairly in the middle of the house makes it probable that the small pit was dug in the vicinity of the hearth of this house, or even was part of it.

— Pit 36/41 was not exactly round and contained no charcoal, yet was very dark in colour. The pit adjoins the house II wall.

— Pit 44, a perfectly round pit with a diameter of 100 cm. and a light grey filling, contained no finds other than some fragments of the large loam weight no. 44 shown at fig. 94. The pit lies within both house plans but cannot be attributed to either. Although the loam weight suggests this strongly it is not likely that this pit can be grouped with hearth no. 29, the weights of which are of a totally different type, and in no. 44 there was neither any trace whatsoever of charcoal nor any other find.

— The small pit west of house I, where no finds were made, strongly resembles no. 34/43. The filling is blackened by finely dispersed charcoal. Because of its unusual situation we may think here too of a proximity to the hearth of house I. The finds derived from the pit fillings and their dating consequences are discussed below (p. 218).

#### 4.5.8. TRENCHES

At the perimeters of the small settlement site a number of small trenches can be distinguished. In view of their irregular course it is not certain whether they were dug by men or came into existence through natural circumstances.

The long trench running along the northern limit of the settlement site (a part has not been excavated) drained the stagnant water from an area with clay lenses at its beginning into the gully and certainly not along the shortest route. Also during the occupation the water on the place in question will have drained away more slowly; it is possible that the inhabitants were inconvenienced by this and so dug a drainage trench.

Along the southern boundary the terrain has a much steeper slope and the draining away of surplus water there will have been much easier. Here also a few, much smaller trenches drained the site.

We have no explanation for the remarkable little trenches near grave III. Did the water gather along them, to a place where the 16th century pit is lying now?

The nature of the trench fillings and the occurrence of a few small sherds in them indicate in any case that they were contemporaneous with the inhabitation.

#### 4.6. THE FINDS <sup>22</sup>

##### 4.6.1. GENERAL REMARKS

The following groups of finds may be distinguished according to the find circumstances.

— Finds from the grey occupation layer of the settlement site, named below "settlement finds" <sup>23</sup>.

— Finds from the pit fillings in the settlement site.

— Finds from the filling of the break-through channel.

— Finds from the graves.

These groups may be characterized as follows.

— The settlement finds consist of material from the whole settlement period. In view of the dating of the stream ridge (about 2000 B.C.) pollution by older material can be ruled out. As for later pollution we have no evidence other than the Middle Bronze Age hearth no. 29. Among the settlement finds, however, there is no material directly comparable to no. 29. Furthermore, we know that the area was no longer inhabited after about 800 B.C. <sup>24</sup>. Later pollution can also be excluded, therefore, so that we may accept this as a true domestic assemblage from the transition period between the Neolithic and Bronze Age, with, as its only datable elements, sherds of Veluwe Bell Beakers and Barbed Wire Beakers. Sherds from the opening phase of the occupation will have largely been lost during its continuation but the closing phase will be relatively well represented by the pottery.

— In the pit finds we are concerned with a small number of very small sherds distributed at random throughout the pit fillings. These, in our view, did not lie in their primary position, but must have reached their position as a part of the sand that makes up the pit fillings.

— The gully finds might represent a part or the whole period of the occupation. They nearly all come from deposit 1 <sup>25</sup>. There is no later pollution.

— The grave finds are closed finds. As the whole cemetery occupies a fairly short time in the occupation period <sup>26</sup>, the finds in the graves are broadly speaking contemporaneous.

<sup>22</sup> The finds are registered in the RMO, nos. h 1967/1.1-368.

<sup>23</sup> The finds from the pits and from the gully of course are domestic refuse too, but these are excluded when we speak of "settlement finds".

<sup>24</sup> See p. 190, and the pollen diagram Molenaarsgraaf I, fig. 66. Description of the finds no. 29 at p. 193.

<sup>25</sup> Description at p. 220.

<sup>26</sup> See p. 270 for this question.

The quantity of material is exceedingly small, and comprises, with the exception of the grave finds:

- 9450 grams of pottery
- 64 lumps of loam (baked clay)
- 477 pieces of flint
- 55 pieces of worked stone
- a quantity of natural stone
- 338 pieces of bone
- 23 pieces of worked wood.

#### 4.6.2. DISTRIBUTION OF THE FINDS OVER THE SETTLEMENT TERRAIN

All settlement finds came from the occupation layer or from the primary filling of the 16th century sand digging pits. They were collected by digging away the occupation layer very carefully, so that very small objects could also be recovered. During the first part of the first operation the finds were kept together according to the excavation pit, while notes were made of the distribution within each pit. Later we changed over to collecting according to squares of  $2 \times 2\frac{1}{2}$  m.

The poverty of finds is partly explained by the long time that the old occupation level formed the surface, while circumstances were unfavourable for the conservation of pottery: alternately more or less damp. Less perishable material such as stone is, however, also sparse, so that the poor number of finds must also be partly primary. Even under more favourable circumstances elsewhere a scarcity of finds is common in Beaker settlements.

The distribution maps (figs. 77-80) all show the same general picture: a concentration of finds over a strip of about 60 m. long by 9-15 m. wide, lying in an east-west direction, and coinciding with the highest and most sandy part of the ridge. This crest lies somewhat south of the ridge centre. Northwards the slope drops gradually and clayey layers are intercalated in the sand; southwards the slope is fairly steep. Eastwards the find strip ends against the break-through gully. Only in the west do the changes in the site occur gradually, like those of the finds. The site is in its most westerly part a little lower than in the centre of the settlement. It is only at the other side of the ditch limiting the excavation site that the ridge becomes significantly lower. The find distribution follows therefore the natural conditions of the site very closely.

The distribution patterns of the finds and the soil traces also correspond closely. The effects of later erosion can be left out of account. For the occupation layer is of regular thickness over the whole site, and the present very slight relief is mainly the result of the recent compaction in the surroundings. The extent of the settlement is therefore correctly shown on the maps. If we take the amount of find-material to be a measure of the intensity of the occupation, the western—the least favourable—part of the site was less intensively occupied (or for a shorter period) than the highest part. As both houses also stood there we may call this the centre of the settlement, which in the absolute sense was very small.

Although it is the correspondences in the distribution maps which are the most striking, there are nevertheless important differences, particularly in the extent of concentration. The

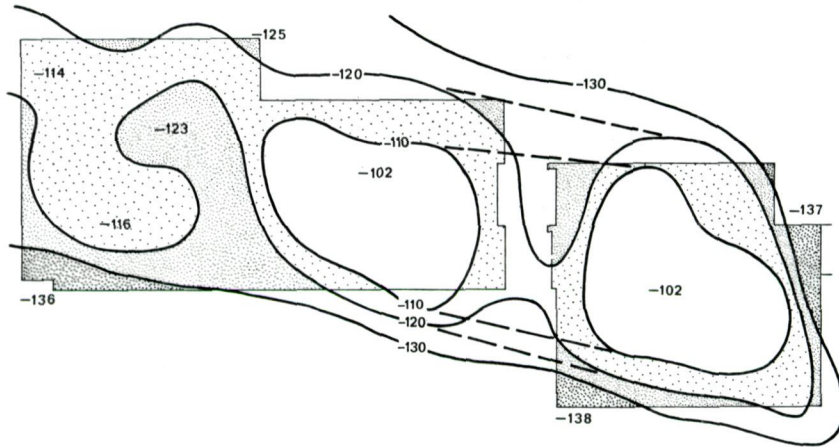


Fig. 75. Molenaarsgraaf. Contour map of the highest excavation level, situated 5-10 cm. below the base, 30-40 cm below the top of the "occupation layer" and 60-70 cm. below the present ground surface. Height in cm. below NAP. The broken lines represent the contour lines before the digging of the modern ditch. The core of the settlement corresponds with the terrain above  $-110$  cm., which corresponds in its turn approximately with that above  $-60$  cm. in fig. 58 and above  $-50$  cm. in fig. 57. Scale 1:300.

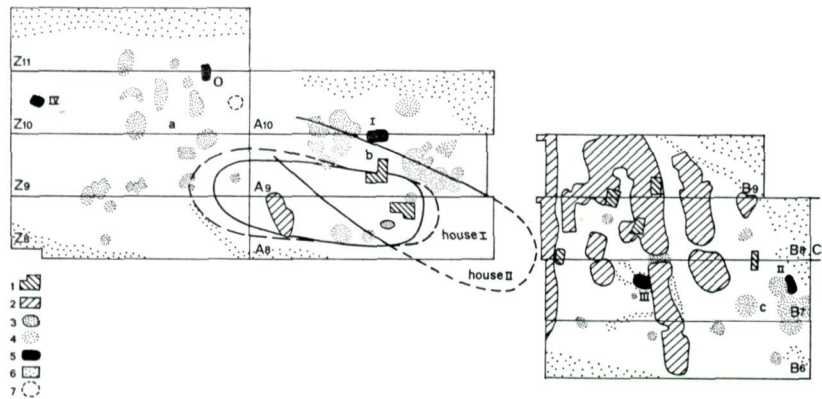


Fig. 76. Molenaarsgraaf. Outline of the most important features in the excavation.

- |   |   |
|---|---|
| 1. test pits, recent                        | 5. graves   |
| 2. farmer's sand-diggings 16th century A.D. | 6. lower part of the ridge with thin clay layers in the sand, the break-through channel and ditches |
| 3. hearth no. 29, Middle Bronze Age         | 7. concentration of stones no. 308  |
| 4. other prehistoric pits                   |   |

pottery is strongly concentrated in a narrow zone having both house plans as its centre. The same applies to the large pieces of worked stone. The small pieces, however, are much more widely distributed. In the case of the flint there is hardly any question of a concentration. The loam occurs for the most part in the western part. These variations may be the result of differences in the method and/or place of use, but also of differences in age. We shall be reverting to this in more detail when we have discussed the distribution of the various types of deco-

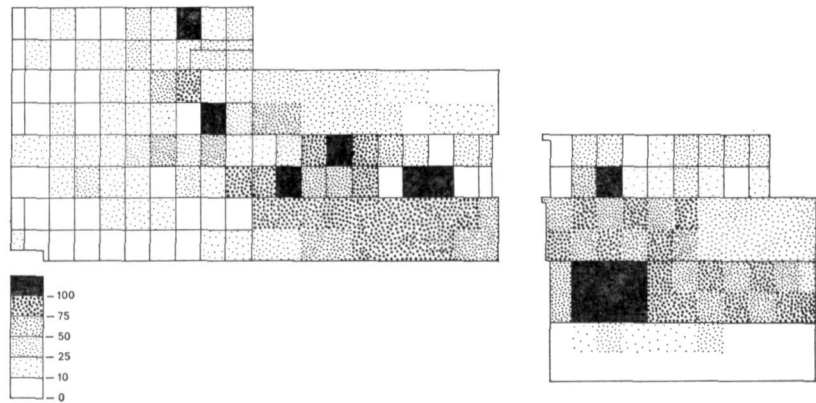


Fig. 77. Molenaarsgraaf. Distribution of the pottery. Weight of the sherds by squares and in grammes. Where the finds were not collected by squares, the total is divided according to the observations in the field. In that case the squares are not separated by solid lines.



Fig. 78. Molenaarsgraaf. Distribution of lumps of loam, with the exception of very small fragments.  
 1. lump of potter's clay no. 365  
 2. relatively small lumps  
 3. relatively big lumps

rated pottery. That the differences cannot be explained by a difference in reaction to later replacement due to animal activity is clear from the variations in distribution of the loam and the pottery. A factor which was probably of importance was the influence of later occupation on the remains of a preceding occupation phase. If the part used as yard remained the same, the older refuse must have been considerably crushed, in so far as it is liable to damage (*e.g.* loam and pottery).

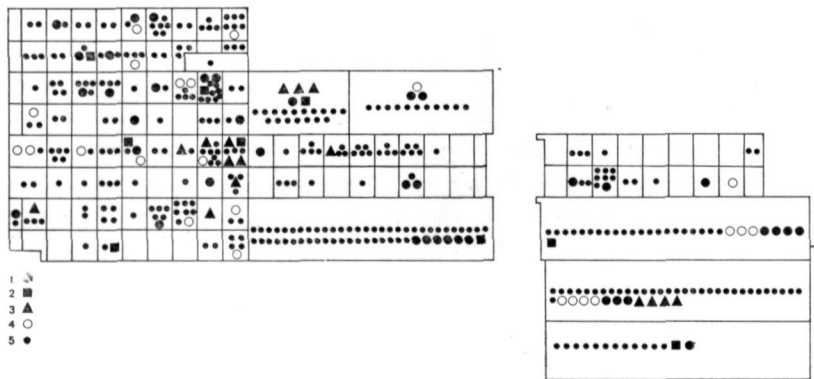


Fig. 79. Molenaarsgraaf. Distribution of the flint.

- |                      |                                |
|----------------------|--------------------------------|
| 1. scrapers          | 4. cores and irregular pieces  |
| 2. borers            | 5. flakes and retouched flakes |
| 3. various artifacts |                                |

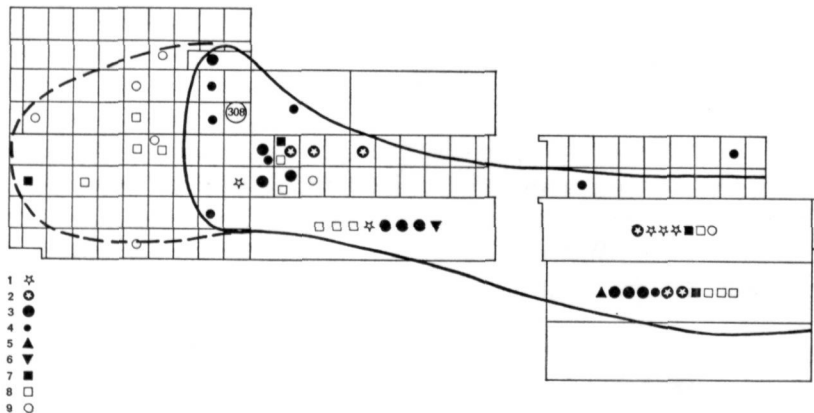


Fig. 80. Molenaarsgraaf. Distribution of the worked stone.

- |                               |   |
|-------------------------------|---|
| 1. retouchoirs                | 6. fragment of arrow-shaft straightener |
| 2. quern stone fragments      | 7. grinding stone fragments (big)       |
| 3. ball-shaped polyhedrons    | 8. grinding stone fragments (small)     |
| 4. as 3, fragments            | 9. various pieces of worked stone       |
| 5. fragment of perforated axe |   |

### 4.6.3. POTTERY

#### 4.6.3.1. General remarks

In the pottery occur two archaeological elements which are datable:

- sherds of Bell beakers (BB)
- sherds of Barbed Wire Beakers (BWB)

BB pottery is the youngest Neolithic pottery in this country, dated between about 2000

and 1700 B.C. BWB pottery is the oldest Bronze Age pottery, less closely dated, but in any case used between about 1700 and 1500 B.C. We must, however, reckon with the possibility that there was a phase in which both types of pottery were used together although this could not be proved until now<sup>27</sup>. After the description the most important consideration will be the problem of the chronological differentiation of the pottery on the ground of its typology, associations and distribution. A differentiation into consecutive phases will then be compared with the chronology that we determined with the soil traces.

#### 4.6.3.2. *Pottery from the settlement terrain*

Of the 8300 grams of pottery from the settlement site, 25.5% by weight is decorated. When counting the sherds, limited to the rim and base sherds, we reached a somewhat higher percentage (33%), which may be attributed to the average greater thickness and thus to the larger size of the undecorated sherds.

The fragmentary material yields little information about the forms. In general we are dealing with slightly S-shaped pottery without an accentuated bend at the neck or at the body. Only once do we find a sharply bent neck, in one of five sherds found together, tempered with quartz grit and decorated clumsily with rows of coarse impressions (fig. 84, upper row, middle). Although thicker, rougher and more clumsy than this, the profile strongly resembles that of the Necked Pot Beaker. At the bases we find both the true Bell Beaker base and the pinched-out protruding foot. Although all transitional forms occur, the first form seems to be limited to the finer pottery, while the last occurs in the thick pottery as well. The cordoned rim and a row of perforations below the rim are fairly common. Sometimes both occur in combination. We estimated that they occurred in about 20% of the rim sherds, of which about 35% were decorated, particularly with BWB impressions. The percentage of sherds with stone tempering was remarkably high (about 50%) in this group with cordoned rims and/or perforations. Impressions on top of the rim occur three times. Repair holes (made after the firing) are rare.

About the mean distribution of the decoration over the surface of the vessels the material gives no information. The occurrence of decorated base sherds shows, however, that also the lowest part of the pottery was sometimes decorated as well.

#### 4.6.3.3. *Decorated pottery; decoration types* (figs. 81-85)

The decorated pottery was sufficient to demonstrate a number of decoration techniques and motifs, and to construct a table (table 16) giving a quantitative survey of these. On the other hand the number of sherds is so small that it was possible to give drawings of most of them. The decorated pottery is fairly varied, from thin, fine pottery to very thick-walled and coarse pots. The thickness varies from 4.5-13 mm. (generally 6-11 mm.), the colour is mostly pale yellow or light orange. The tempering, where it can be identified, consists in most cases of pounded pottery. In about 20% of the sherds, and occurring with all the decoration types, small stones were present, but in only about 10% we may really speak of tempering with fine gravel or quartz grit. The lack of stone in the area certainly influenced the material used for tempering.

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<sup>27</sup> This problem is discussed in detail in paragraph 4.9.3.2, p. 288 f.

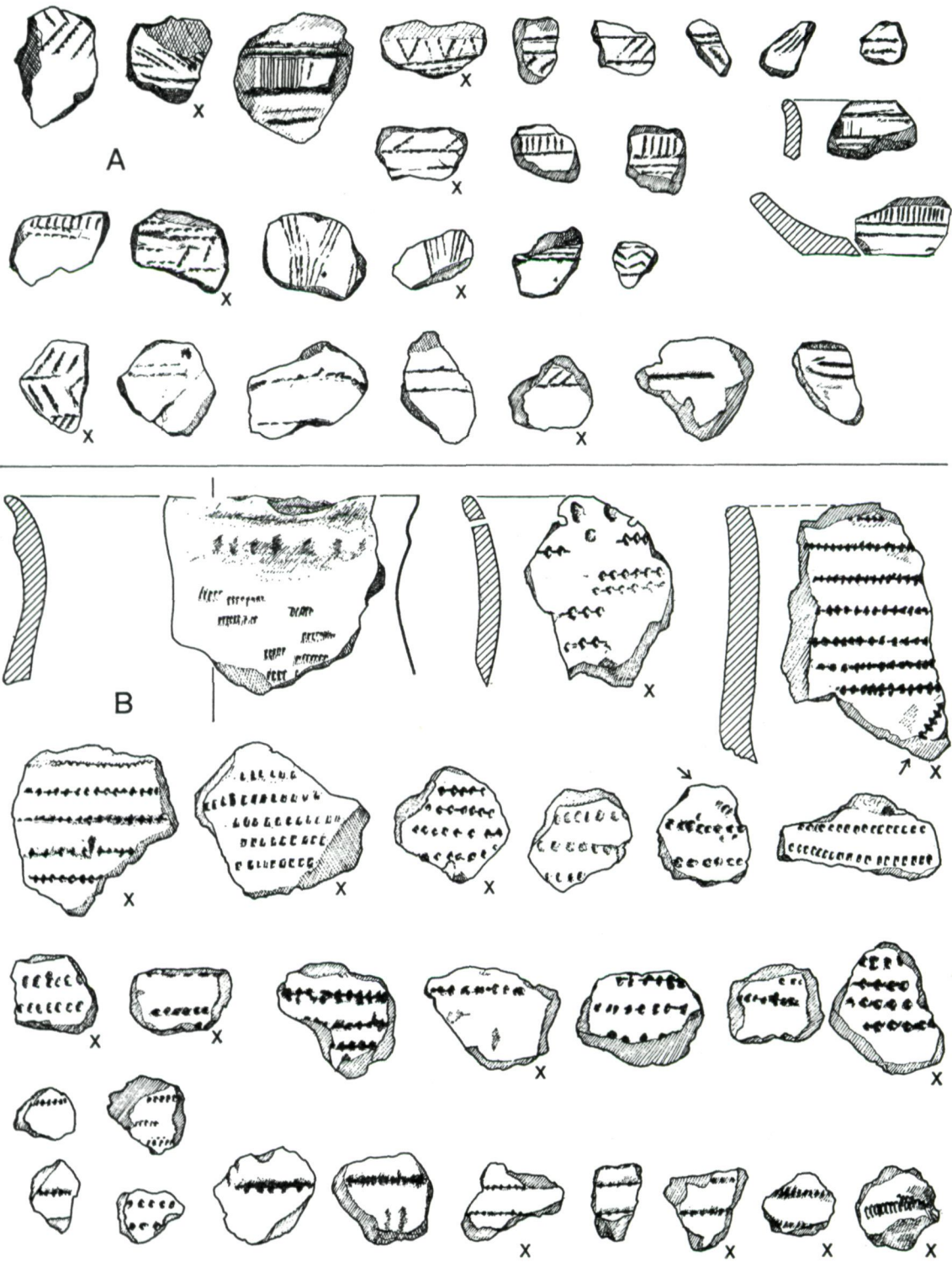


Fig. 81. Molenaarsgraaf. Pottery from the settlement terrain.  
 Sherds tempered partly or exclusively with stone grit are indicated with a x. Scale 1:2.  
 A : BB pottery. B : BWB pottery.



Fig. 82. Molenaarsgraaf. Pottery from the settlement terrain. Decoration types C-H. Scale 1:2.



Fig. 83. Molenaarsgraaf. Pottery from the settlement terrain. Decoration type I. Scale 1:2.



Fig. 84. Molenaarsgraaf. Pottery from the settlement terrain. Decoration types J-M. Scale 1:2.

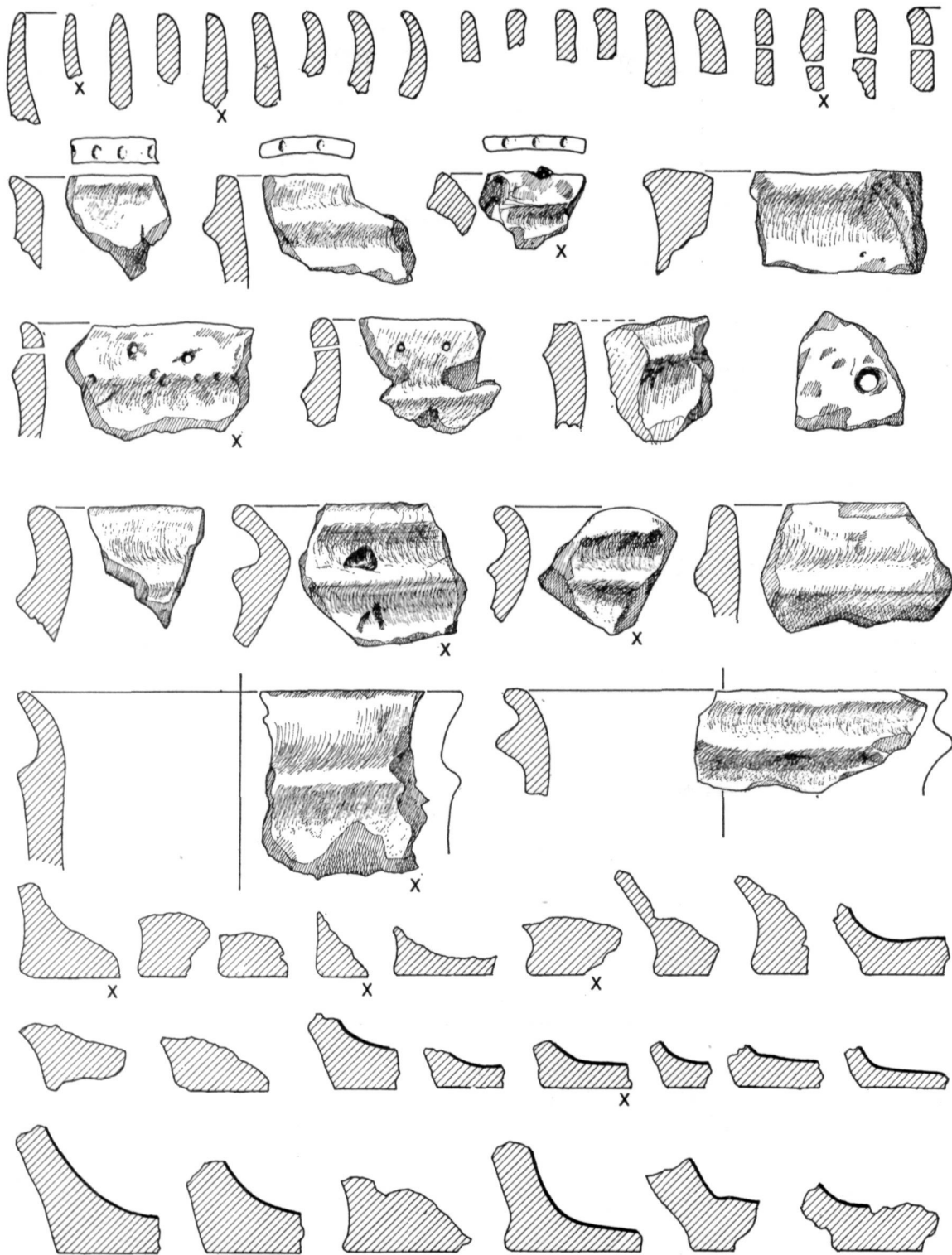


Fig. 85. Molenaarsgraaf. Undecorated pottery from the settlement terrain. Inner side of all rim sherds is at right. The heavy lines with the bottom sherds indicate preserved inner surfaces. Scale 1:2.

TABLE 16

*Molenaarsgraaf. Decorated pottery (sherds) from the settlement terrain*

Decoration	Weight		Numbers		Tempering*		Wall thickness (mm)
	grammes	%	number	%	stone grit	pounded pottery	
A Bell Beaker	95	4.5	30	9.1	4	26	4.5- 6.5
B Barbed Wire Beaker	266	12.6	31	9.4	13	18	8-11
C stabs	92	4.4	21	6.4	3	18	6-11
D channelling	74	3.5	20	6.1	1	19	5- 8
E plastic decoration	219	10.4	27	8.2	3	24	7-11
F grooves with fine impr.	38	1.8	6	1.8	0	6	—
G deep grooves	34	1.6	3	0.9	0	3	—
H bumps	8	0.4	1	0.3	0	1	—
I fingertip, V-motif	412	19.5	52	15.8	7	45	6-11
J — vert.; rows	357	17.0	40	12.0	10†	30	6-13
K — horiz.; lines	253	12.0	41	12.4	6	35	7.5-11
L — obl.; rows	34	1.6	4	1.2	1	3	8-10
M nail impressions	38	1.8	3	0.9	0	3	5-10
N reed impressions	—	—	—	—	—	—	—
O impressions of?	—	—	—	—	—	—	—
— unclassified fingertip	186	8.8	51	15.4		**	5-12
Total	2,106	99.9	330	99.9	48	231	4.5-13

\* Every sherd showing some stone grit or fine gravel is included in the column "stone grit". The percentage of true stone-gritted pottery is therefore smaller (about half the value according this table).

† Four of these 10 sherds belong to one pot.

\*\* The unclassified fingertip impressions are not divided according to the material used for tempering, since the smallness of the sherds might be a cause of error.

TABLE 17

*Molenaarsgraaf. Decorated pottery from the settlement terrain*

Decoration	Weight		Numbers	
	Grammes	%	Number	%
A Bell Beaker	95	4.5	30	9.1
B Barbed Wire Beaker	266	12.6	31	9.4
C-E stabs, channelling, plastic decoration	385	18.3	68	20.7
I-M fingertip and nail impr. (unclass. incl.)	1280	60.7	191	57.7
F-H other	80	3.9	10	3.1
N-O				
Total	2106	100.0	330	100.0

We can distinguish the decoration types on account of their techniques and motifs.

A — *Bell-Beaker*. Fine designs, cut or impressed with a dentated spatula. Thin and badly preserved small sherds. A few sherds are recognizable as deriving from the Veluwe type of Bell Beaker. Typological Early (Maritime) Bell Beakers cannot be identified with certainty. This, however, may be because of the very fragmentary character of the pottery.

B — *Barbed Wire*. Impressions arranged in horizontal lines, occasionally combined with obliquely placed impressions, carried out with a thread-wound stamp. In general the threads are wound wide apart, but occasionally closely or very closely<sup>28</sup>. The thickness varies from thin beaker-like pottery (5-6 mm.) to thick, fairly coarse pottery (about 10 mm.). Two beaker-type rims, one with a weak cordon, the other with a row of perforations and a sherd from a large, thick-walled pot are the most characteristic. Noteworthy is the relatively high percentage with quartz tempering (13 of the 31 illustrated sherds). A number of sherds is included in the BWB pottery purely on account of the general appearance of the decoration. It is generally difficult, especially in view of the state of preservation of the pottery, to prove the use of the true thread-wound (BW) stamp<sup>29</sup>.

C — *Stabs*. Impressions, irregularly placed or sometimes arranged in rows, executed with a sharp object such as a pointed stick or a quill of a feather.

D — *Channelling*. Average to very fine grooves running round the pot, applied with an instrument similar to those mentioned under C.

E — *Plastic decoration*. By the application of a spatula and/or fingertip impressions a relief effect is achieved, running usually in mutually right angular directions (*i.e.* horizontal and vertical). In some cases the sherds may originate from Pot Beakers, as those of fig. 82 on the second row, at the left.

F — *Grooves with closely spaced impressions*, as if with a very crude BW stamp. The motifs C-F occur mainly on fairly fine pottery that is seldom tempered with stone grit or fine gravel. On one sherd C/D and C/I occur in combination.

G — *Deep grooves*. Similar to D, but much heavier in execution. Part or all of them may be judged to be fragments of cordoned rims.

H — *Small bumps*. Only on one sherd, on which the technique used cannot be ascertained because of weathering. Possibly a badly weathered pot beaker sherd.

I — *Fingertip impressions in V-motif*. Fingertip or nail impressions placed in pairs in V or inverted V motifs, only rarely arranged in any kind of regular pattern. Twice on one sherd combined with D.

J — *Fingertip impressions in rows*. Vertically placed fingertip or nail impressions arranged in horizontal rows. Sometimes they change to I. One sherd appears to come from a Necked Pot Beaker.

The motifs I-J occur on fine, beaker-like to crude pottery, in the latter case often with stone tempering.

<sup>28</sup> Closely wound: fig. 81 B, first row left, and last row right.

<sup>29</sup> One type of decoration was erroneously included in the type B. This is the decoration of horizontal lines, executed with a dentated spatula. Since we realized this error only at the end of our study, we could not change fig. 81 in this respect. We verified that this did not influence our conclusions. Two sherds show this decoration: fig. 81 B, 2nd row, the 2nd and 6th sherd from the left.

K — *Fingertip impressions on lines*. Horizontally placed fingertip or nail impressions arranged on lines running round the pot, only on fairly fine pottery. A few of the sherds may have formed part of motifs which, we suggested under E, resemble Pot Beaker decoration.

L — *Oblique fingertip impressions*, in rows.

M — *Fingernail impressions*. Once, combined with I.

Two decoration techniques do not occur in the pottery from the settlement terrain, yet they are to be found in the other find groups.

N — *Reed impressions*. Once in a pit filling and once among the gully finds.

O — *Impressions made by an irregular object*. Once in the gully filling.

*Unclassified fingertip impressions*. Quite a number of sherds with fingertip impressions cannot be attributed to any of the named types because of their small size. These are small sherds with one or two impressions, of which the motif cannot be identified.

The tables 16 and 17 give a quantitative survey of the various decoration motifs. The differences between the weight and number percentages are not big. What is remarkable, is the large number of sherds decorated with fingertip impressions (about 60%) and the small number of BB and BWB sherds. The differences between numbers and weights in both types demonstrate clearly that BW decoration also occurs on crude pottery, and at the same time that the BB sherds are of small size.

In the decoration motifs, lines, rows or bands of impressions running round the pot play a predominating role. In nearly all cases it is possible to distinguish some clear arrangement but there are exceptions to this in the stabs (C) and in the finger impressions of the V motif (I). Sometimes oblique lines are to be seen, parts of a horizontal zig-zag motif, in combination with lines running round the pot. This is one of the (few) motifs of the BWB pottery and occurs here also in the channelling technique (D).

#### 4.6.3.4. *Pottery from the pit fillings* (fig. 86)

The quantity of pottery from the pit fillings is remarkably small. Of 282 grams of pottery 51% by weight is decorated. These are 23 small sherds distributed over 12 pits. No 258/301 (182 gram) has not been included here.

In five pits there are 6 BB sherds, two of them clearly belonging to a Veluwe Bell Beaker and the other four to a type which cannot be identified. Early (Maritime) Bell beakers cannot be identified, but this is not of much significance in such a small number of sherds. The BB sherds in the pit fillings are associated with channelling as decoration (D, 6x) and fingertip impressions (I-L, 2x). One sherd with channelling shows the motif of the zig-zag line running round (no. 305/307).

Two pits each contain a BWB sherd, once as the only find, together with a few undecorated sherds tempered with granite grit. The other pit (no. 27/211) contained examples of finger impressions (I-L, 2x), a base sherd with heavy protruding foot and a cordoned rim.

The pits with BB sherds yielded, in comparison with the settlement material, a remarkable number of sherds with channelling and especially a small number of sherds with fingertip impressions. The percentage of BB sherds is also relatively high, and three base sherds of the BB type are noteworthy. The contrast of this group with the finds from pit 27/211 and the

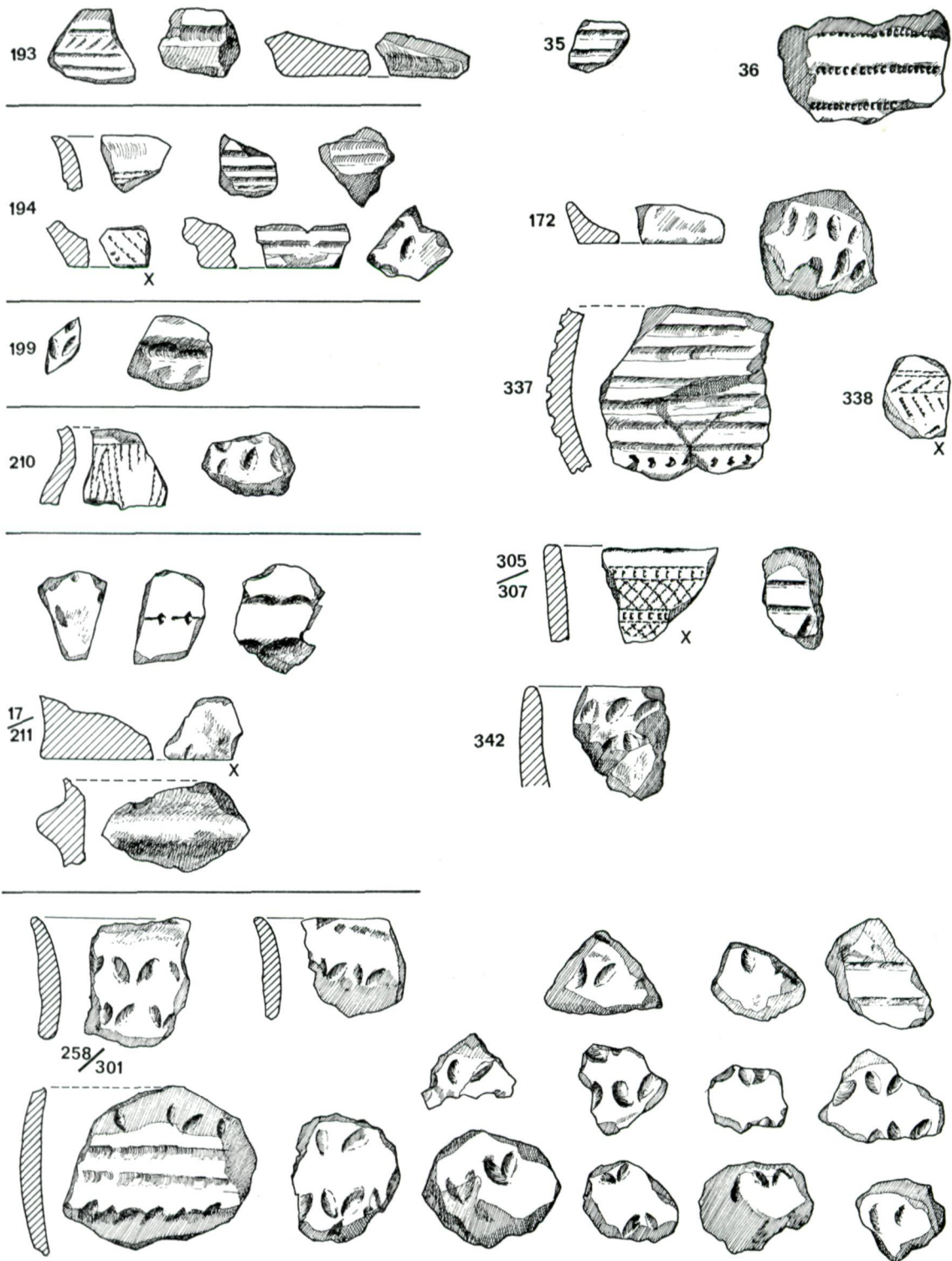


Fig. 86. Molenaarsgraaf. Pottery from the fillings of prehistoric pits. The find numbers are also indicated on the excavation plan. Scale 1:2.

differences from the settlement material are a strong indication of the existence of an older (Veluwe) BB association and a later BWB association on the site, with a few common elements, such as the occurrence of fingertip impressions on the pottery. That BB and BWB sherds do not occur together in one pit filling points also to a difference in age. We can indeed state that most of the pits were dug during the early part of the occupation and were largely filled up before BWB pottery was present among the refuse on the settlement site<sup>30</sup>. Pit 27/211 is one of the elements belonging to this later occupation. Some of the pits are not dated, however, because of a lack of finds (as for instance group b), which lack at the same time supports a relatively early dating: little or no refuse was present on the surface, when they became filled up.

#### 4.6.3.5. Pottery from the filling of the break-through gully (figs. 87-89)

The gully filling yielded 729 grams of pottery, mainly (92% by weight) decorated. There were 39 sherds of large dimensions, compared with the settlement finds. A larger number of sherds from a pot with reed impressions and a number of sherds from the uppermost find-level are left out of consideration here<sup>31</sup>. The BW element predominates. Only two small pieces were true Bell Beaker sherds: they were found on the western bank of the gully at the base of the peat layer, and we may consider both of them as older refuse, not necessarily belonging to the finds in the deeper parts of the gully filling<sup>32</sup>. Perhaps three other sherds found in the peat are possibly from Bell Beaker-like pottery<sup>33</sup>, although the most characteristic signs are missing: they are thick-walled and not decorated with a dentated spatula. Six BWB sherds (exclusively of the widely wound type) were found spread over the gully filling (deposit 1). The finds from the gully thus form a BWB association, with possibly slight reminiscences of the Bell Beaker ware in a few sherds. This is a marked difference to the finds from most of the pits. All the common decoration types from the settlement are represented. The complex is further characterized as follows:

- occurrence of BW decoration,
- very high percentage of decorated pottery,
- preponderance of fingertip impressions (22 pieces, 56%), especially the V motif,
- occurrence of channelling as decoration and BB-like material in insignificant amounts,
- occurrence of perforations under the rim (twice), of a cordoned rim (once) and of heavy bases with protruding foot, while sherds of bases of the BB type are absent,
- the occurrence of rims which are fairly markedly bent outwards, a type not occurring in the settlement finds.

A number of unusual finds form part of it:

- The fragment of a flat oval weight with eccentric perforation, entirely decorated with finger impressions. In view of the find-place this may be interpreted as a fishing-net weight.

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<sup>30</sup> The period when BW decorated pottery was in use might be included in this period. It was *during* the use of a certain type of pottery that its remains became intermingled with the domestic refuse, which was already present on the surface. So there was a small chance for these sherds to occupy a secondary position in the filling of a pit.

<sup>31</sup> The vertical and horizontal distribution of the finds is discussed at p. 184 f.

<sup>32</sup> When the sherds were thrown into the gully, older refuse (*e.g.* the BB sherds) might have lain on the gully banks.

<sup>33</sup> Fig. 87, top left.

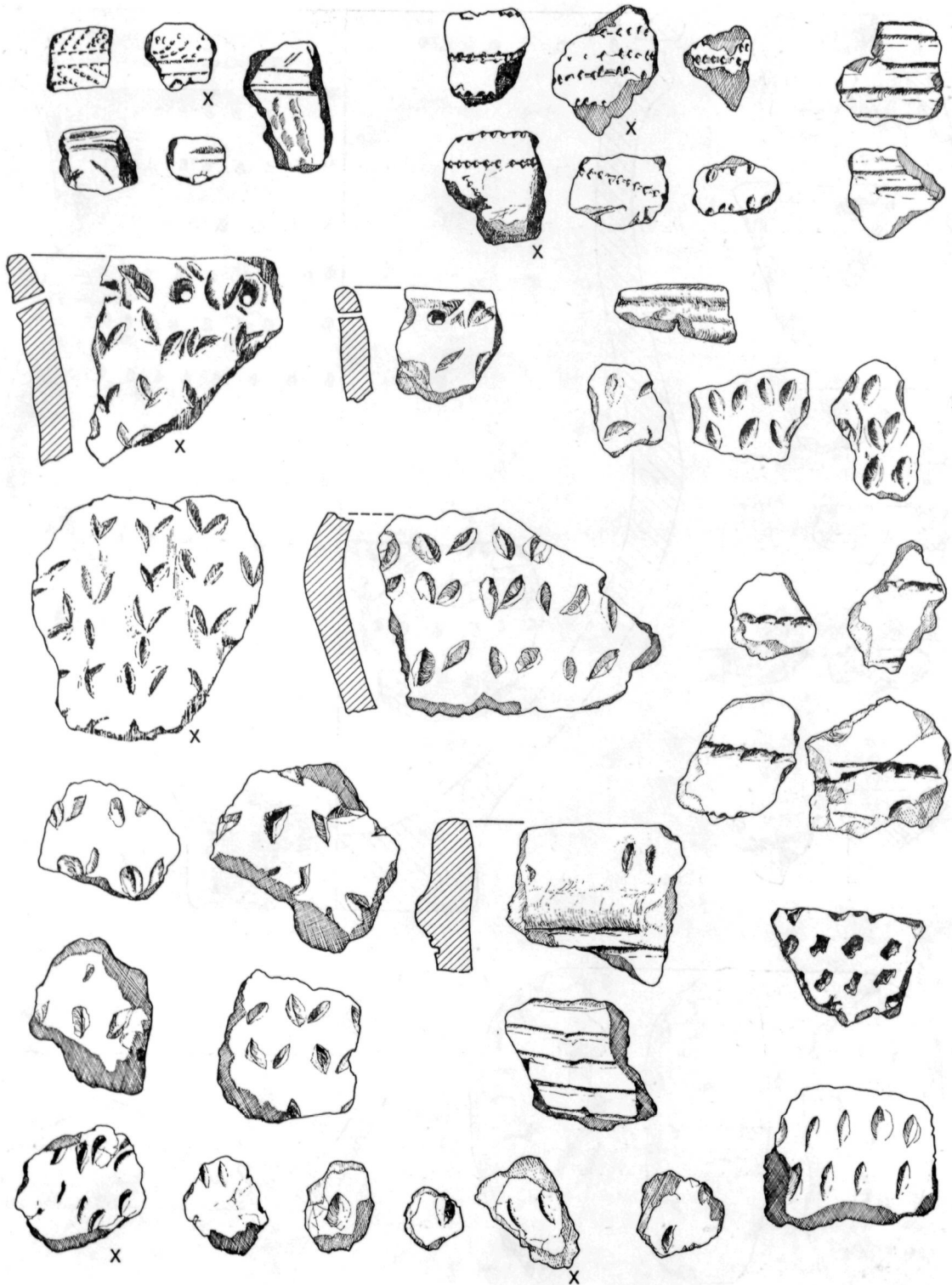


Fig. 87. Molenaarsgraaf. Pottery from deposit I of the break-through gully. Scale 1:2.

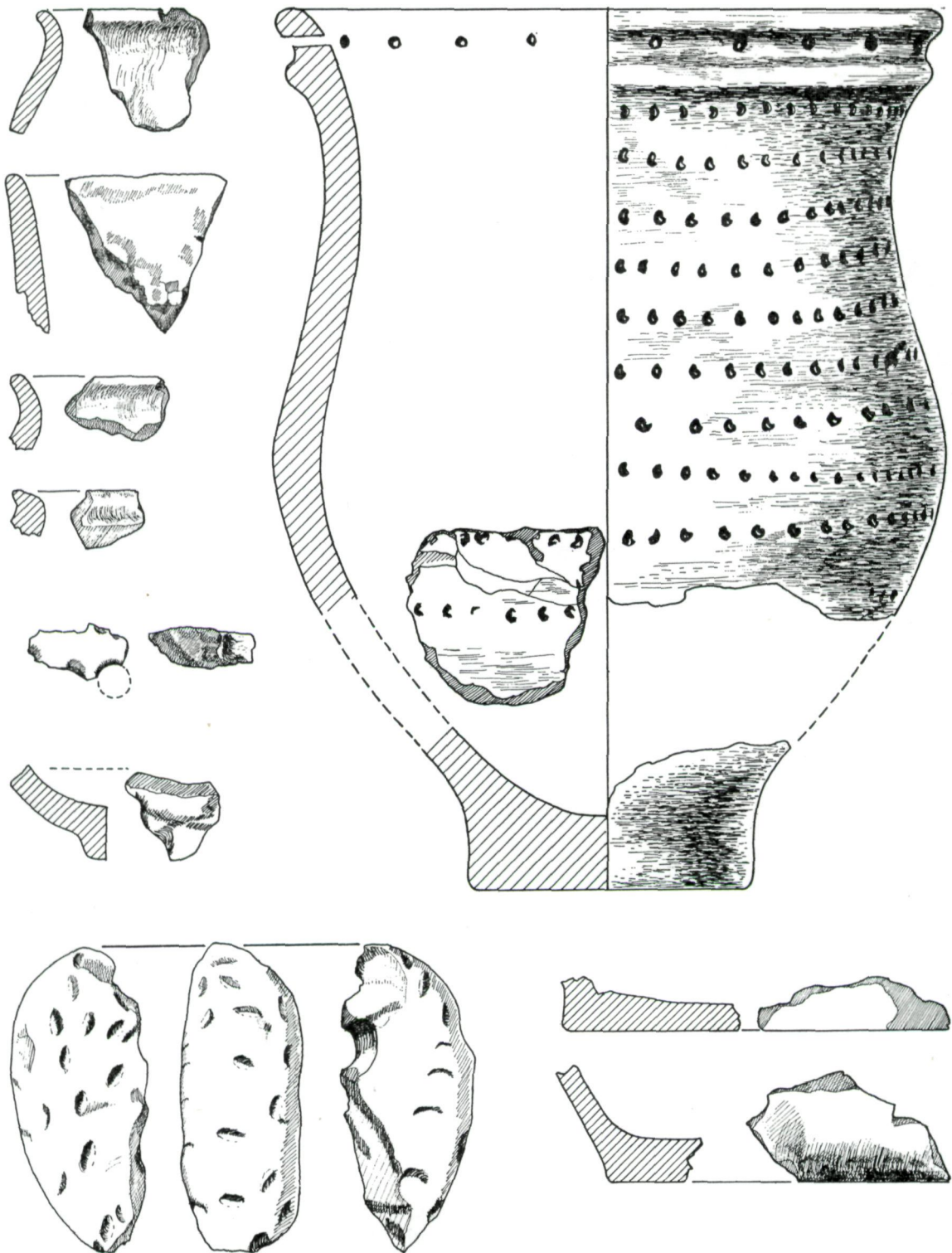


Fig. 88. Molenaarsgraaf. Pottery and loam weight from deposit 1 of the break-through gully. Scale 1:2.

— One flat sherd, showing part of a perforation, made before firing, might be a clay disc (“backing plate”) fragment.

— One sherd has a type of impression not seen anywhere else on the site: impressions made with an irregular pointed object, possibly a broken bone or stick (type 0),

— Very important is the large fragment of a pot, reconstructed from a large number of sherds found close together. These lay within a charcoal concentration, especially at the base of the peat layer in the western bank area (square b1). A large number of the characteristics, described above, of the pottery from the gully filling are represented in this pot: perforations and a cordon under the rim, a heavy base, everted rim and a decoration, clearly related to the BWB motifs, consisting of almost horizontal lines encircling the pot. We have associated this find with grave II and discuss it more fully under that heading (p. 258).

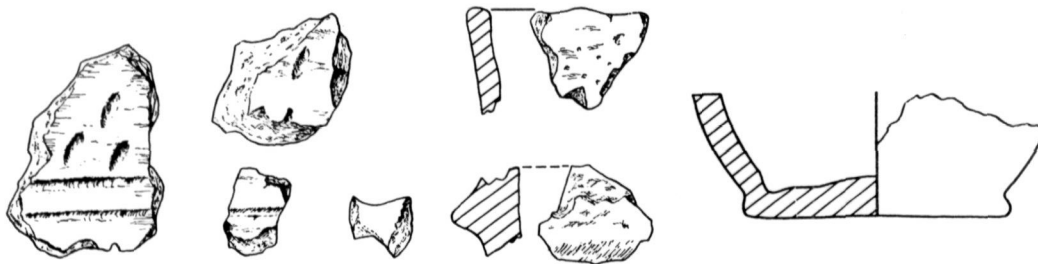


Fig. 89. Molenaarsgraaf. Pottery from the top of deposit 1 of the break-through gully. Scale 1:2.

The finds already reported, which were made in the highest part of the find-layer (deposit 1), totalled 210 grams of pottery, of which only a small part (three pieces, 20% by weight) is decorated (fig. 89). These pieces consist of a badly weathered sherd with shallow grooves and impressions, and two sherds, one with a roughly grooved line and the other with impressions in rows. The undecorated pottery is characterized by a straight outstanding rim, a fragment of a cordoned rim, the pin used for fixing a handle in the wall of the pot, and the base of a round pot with a pinched-out foot. With the exception of the low percentage of decorated pieces the material is very similar to the pottery from the gully filling described above. It seems that at the end of the occupation, after a period of abundant decoration, pottery having the same forms, but mainly undecorated, was in use.

#### 4.6.3.6. *Distribution patterns of the decorated pottery (figs. 90-93)*

The distribution of the decoration types confirms the above distinction of three consecutive associations, namely:

- (1) a BB association,
- (2) a BWB association,
- (3) a group of mainly undecorated pottery.

The numbers of BB and BWB sherds are roughly equal, so that both distribution pictures may easily be compared (fig. 90). Both types occur in exactly the same area. The only difference is a difference in concentration: in the case of the BWB sherds there is an accent on the eastern

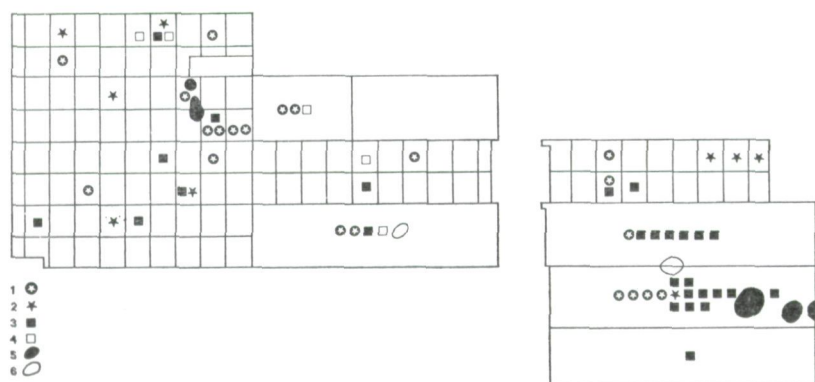


Fig. 90. Molenaarsgraaf. Distribution of BB and BWB pottery.

- |               |                          |
|---------------|--------------------------|
| 1. BB sherd   | 4. BWB ? sherd           |
| 2. BB ? sherd | 5. pit with BB sherd(s)  |
| 3. BWB sherd  | 6. pit with BWB sherd(s) |

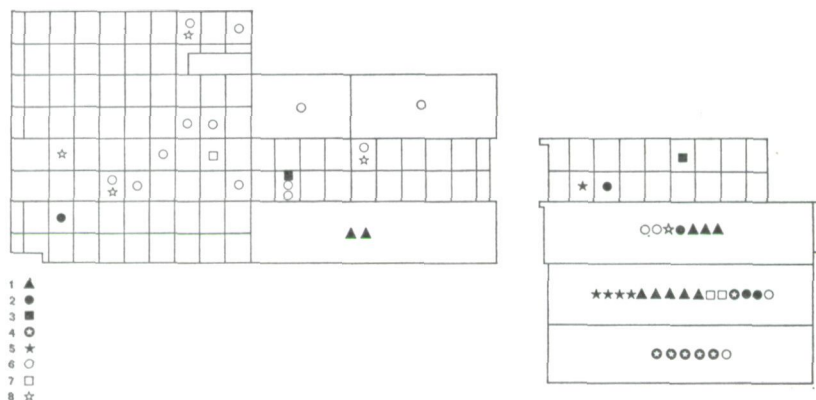


Fig. 91. Molenaarsgraaf. Distribution of decoration types, or peculiarities which show some association with either BB or BWB.

Association with BWB :

1. Cordon below rim
2. Perforations below rim
3. 1 and 2 on one sherd
4. decoration type F
5. decoration type G

Association with BB :

6. decoration type D
7. decoration type C/D
8. decoration type I/D

part and the area near the gully; in that of the BB sherds the distribution is fairly even. It is remarkable that there are so few sherds of both groups in the central part of the settlement itself.

The channelling (D, fig. 91) follows the BB pattern, with a slight preponderance in the west of the site. Cordoned rims and perforations under the rim are obviously concentrated in the gully bank area. The decoration types F and G are also found there. These associated finds conform therefore, even in a somewhat greater measure, to the differences between BB and BWB pottery (fig. 91).

The types of decoration which cannot be attributed directly to any given phase show no

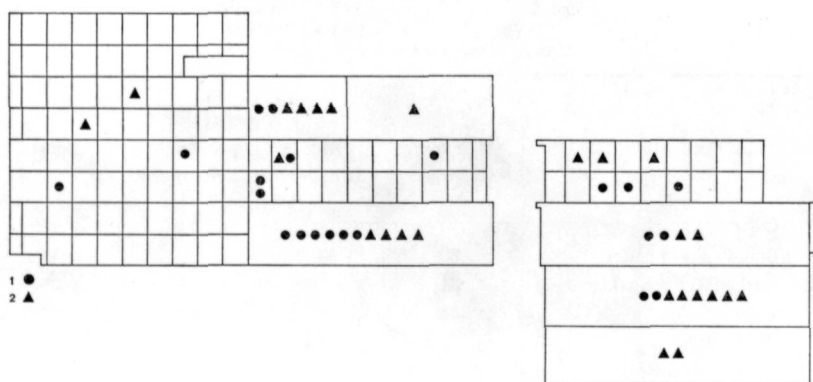


Fig. 92. Molenaarsgraaf. Distribution of decoration types C and E.  
 1. type C                      2. type E

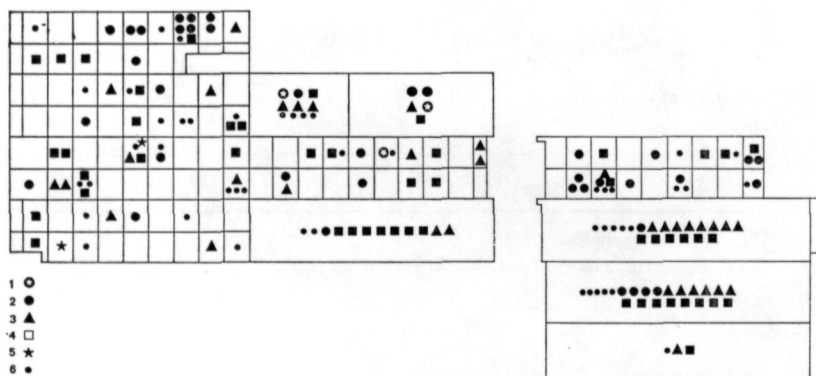


Fig. 93. Molenaarsgraaf. Distribution of decoration of fingertip and nail imprints.  
 1. type L                      4. type I  
 2. type K                      5. type M  
 3. type J                      6. unclassified

significant distribution picture. Stabs (C) and plastic decoration (E) appear to be absent to some extent from the western area of the site (fig. 92). Finger tip impressions are distributed very evenly (fig. 93). The widespread distribution in the western part is noteworthy.

None of the distribution maps illustrate the distinct concentration near the house plans, as the total quantity of pottery, expressed by weight, showed so clearly (fig. 77). The western area, which is so poor in finds, has a relatively large number of decorated sherds. It can only be the undecorated element that forms the accumulation around the house plans. Of the total amount of settlement material, spanning the whole period of occupation, the undecorated material therefore occupies a special place by the concentration round both house

TABLE 18

*Molenaarsgraaf. Decorated pottery. Numbers of sherds*

Decoration	Settlement terrain	Pit fillings*	Break-** through channel	Total
A Bell Beaker (& deriv.)	30	6	5	41
B Barbed Wire Beaker	31	2	6	39
C stabs	21	0	0	21
D channelling	20	6½	5	31½
E plastic decoration	27	1	0	28
F grooves with fine impr.	6	0	0	6
G deep grooves	3	0	0	3
H bumps	1	0	0	1
I fingertip, V-motif	52	2	11	65
J — vert.; rows	40	2	3	45
K — horiz.; lines	41	1	4	46
L — obl.; rows	4	0	1	5
M nail impressions	3	0	0	3
N reed impressions	0	½	(pot)	(pot)½
O impressions of?	0	0	1	1
— unclassified fingertip	51	2	3	56
Total	330	23	39	392

\* No 258/301 excluded.

\*\* The sherds from the highest part of the filling (fig. 89) are not included.

TABLE 19

*Molenaarsgraaf. Decorated and undecorated pottery. Weight in grammes*

	Settlement terrain	Pit fillings*	Break-through channel**		Total
			Deposit 1	Top of deposit 1	
Decorated	2106	326	672	20	3124
Undecorated	6181	138	57	190	6566
Total	8287	464	729	210	9690
Ratio					
Decor. : undecor.	1:3	2:1	10:1	1:10	1:2

\* No. 258/301 (fig. 86) (182 gms) included. If we exclude this find the values are 144:138 = 1:1, total weight 282 gms.

\*\* The big pot with reed impressions and the loam weight fragment excluded.

plans and next to the gully. In view of the fairly high percentage of decoration of the BB association in the pits and the very high percentage of decoration of the BWB-association in the gully filling, it was already clear that the total settlement material must include a phase with comparatively little decorated pottery. This must be correlated with the finds in the uppermost part of the deposit 1 in the gully, where the percentage of decoration was also low. So the largest part of the undecorated pottery, which is similar in form to the BWB pottery must have originated from the closing stages of the inhabitation. During this last phase the characteristic decorated pottery (BB and BWB) of the preceding phases will have been largely crushed in the centre of the settlement, which explains the small quantities of these types found there.

#### 4.6.3.7. *Conclusions: the occupation phases.*

To recapitulate, we may say that in the Molenaarsgraaf settlement the pottery used there underwent changes, which can be divided into three consecutive stages, covering the whole period of the occupation.

*Phase 1*) is distinguished by the occurrence of genuine Bell Beakers, some of Veluwe type, decorated with a dentated spatula. The rest of the pottery shows mostly channelling as decoration, some in the form of horizontal zig-zag lines, and, to a smaller extent, fingertip impressions. Heavy pinched-out feet apparently do not occur. About 50% of the pottery is decorated. Typical of this phase are the finds of most of the pits.

*Phase 2*) is distinguished by the occurrence of BW decoration especially of the widely wound type. Most of the pottery is decorated with fingertip impressions, the V-motif dominating. Relatively little channelling occurs, and is carelessly executed. Cordoned rims, perforations under the rim, and heavy, often pinched-out bases occur for the first time. There is relatively frequent (although it is still not a high percentage) tempering with quartz and granite grit. About 90% of the pottery is decorated. Typical of this phase are the finds from deposit 1 of the break-through gully.

*Phase 3*) is distinguished by a small percentage of decorated pottery (10-20%). The forms have not changed and include cordoned rims, perforations and heavy, pinched-out bases. Typical of this phase are the finds from the top of the find-layer in the gully and apparently the largest part of the undecorated pottery from the settlement terrain.

During phase 1 it is probable that the whole excavated terrain was occupied. In phase 2 the occupation moved to some extent towards the gully, and in phase 3 it seems that the occupation was limited to the highest part of the terrain and the bank of the gully. The western part of the site was then apparently no longer in use as a yard.

A number of elements cannot be attributed to any one of the phases, or if they can, only with great reserve; or they may have belonged to more than one phase.

Finally we must emphasize that the phases defined above are in reality only the recognizable stadia of an either continuous or discontinuous occupation. By means of the pottery and its find circumstances alone neither real continuity nor the existence of short time interruptions can be demonstrated. Continuity seems, however, very likely at least from phase 2 to phase 3.

In phase 2, however, so many new elements are introduced that in our opinion there may have been an hiatus between the phases 1 and 2, or a not recognizable intermediate phase.

#### 4.6.4. LOAM (fig. 94)

Lumps of fired loam were found scattered over the whole settlement. These were all shapeless, small, and very small pieces. The distribution of the somewhat larger lumps is denser in the western part of the settlement, which could mean a dating mainly in the first part of the occupation. The distribution (fig. 78) is such that any connection with the Middle Bronze Age hearth no. 29 is unlikely.

Three objects of fired loam merit special attention.

— In pit 44, which otherwise did not contain any finds, some pieces of a large, disc-shaped loam weight were found. The weight has a diameter of about 14 cm. and is about 6½ cm. thick.

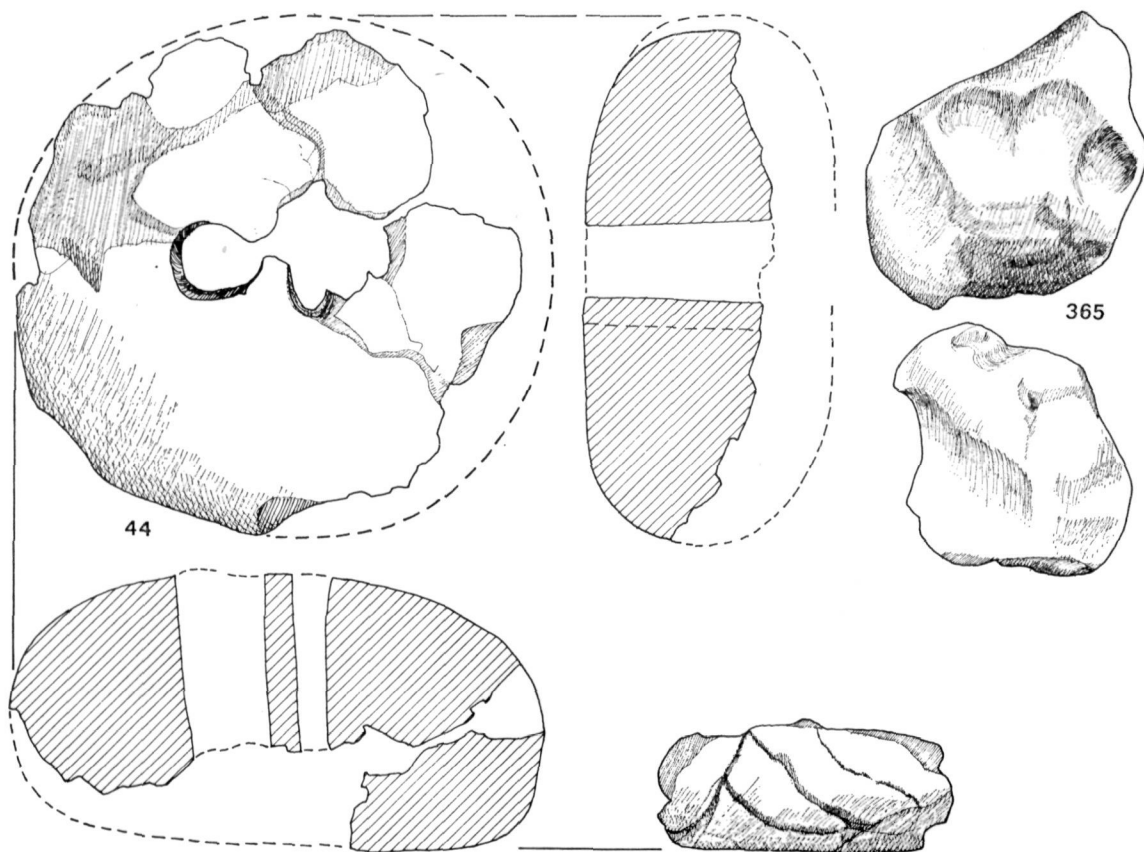


Fig. 94. Molenaarsgraaf. Loam weight and lump of potter's clay. Scale 1:2.

The two fragments which were preserved weighed 400 and 150 grams, from which it may be deduced that the original weight of the complete object was about 1 kg. In the middle there are two holes, made before firing. The rough inner surfaces of these show that the weight was kneaded around two sticks or branches. As such it can have formed part of a number of implements: a digging stick, a fish-trap, etc. A large number of points of difference between the pieces of loam from the hearth and the weight described here, make contemporaneity unlikely. The find should be included in the settlement material.

— We have already described the fragment of a second disc-shaped weight from the filling of the gully <sup>34</sup>. The fragment weighs about 130 grams, which means an original weight of about 400 grams.

— From the occupation layer to the east of pit Z 11 comes a piece of fired loam (no. 365) which is much bigger than the other pieces found scattered about. Moreover, tempering material (pounded pottery and burnt bone) is visible in the clay, as are the clear impressions of the five fingers of a right hand. The colour varies from red (7.5 R 5/8-10 R 5/6) to very pale yellow (10 YR 7/3) and dark gray (7.5 YR 4/0). The measurements are 8.7 × 6.8 × 5.6 cm. This must be a piece of potter's clay that fell (by chance?) in the fire and was fired there in a mainly oxidizing environment. This proves that pottery was made on the site <sup>35</sup>.

#### 4.6.5. FLINT (figs. 95-98)

Scattered over the whole settlement site 477 pieces of flint were found. The high density of finds in the west proves that the flint belonged mainly to the first or the first two occupation phases. It originates partly, however, from the last phase, since in the level corresponding to this phase in the gully we found one flake of grey granular flint. Even the finds from the hearth no. 29 include a scraper (*cf.* p. 193).

Fairly small pebbles were used as raw material; they were apparently collected from among the Meuse shingle. We must make an exception here only for the largest implements and retouched flakes (fig. 97 a-e). Since no raw material of comparable dimensions occurs, we must assume that they were imported as such into the settlement. The flint that was used is of highly inconsistent quality and varies from glassy to coarsely granular. The colour is also variable: from light grey to black and from pale yellow to orange and brown. The sources of these flints were likely to have been those nearest to hand, which were the North Brabant sand grounds or the then active course of the Meuse on the one hand, and on the other the ice pushed ridges of the Utrecht hills. The first lay at a distance of at least 30 km. through the peat area and at right angles to the main river arms. The second involved a distance of at least 40 km. along the Schoonrewoerd stream ridge.

Of this material 70% does not show traces of working or use, 15% is slightly retouched and 15% (69 pieces) has been worked into some kind of artifact. This fairly high percentage does not, however, mean a maximum use of the flint, for among the flakes there are many

<sup>34</sup> See p. 220 and fig. 88.

<sup>35</sup> We realize that the tempering is unusual and that the lump might originate from the later MBA visit to the terrain.

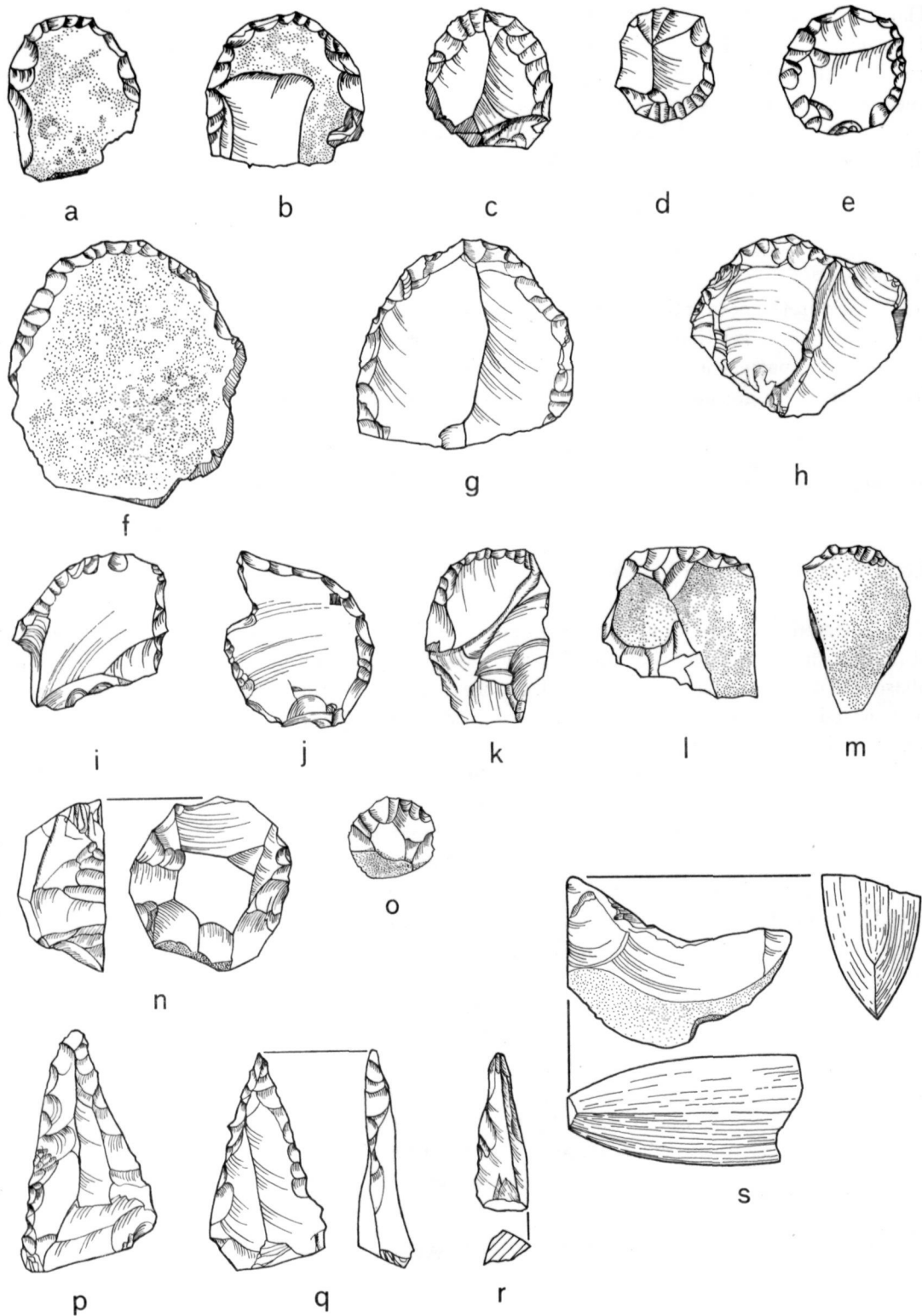


Fig. 95. Molenaarsgraaf. Flint. Scrapers, borers and the cutting-edge of a flint axe. Scale 1:1.

TABLE 20

*Molenaarsgraaf. Flint*

	Numbers	
Scrapers	52	
Borers	8	
Various artifacts	9	
Artifacts, total	69	( 14.8 %)
Retouched flakes	74	( 15.2 %)
Cores	5	
Irregular pieces	20	
Flakes	309	
Unworked flint, total	334	( 70.0 %)
Total	477	(100.0 %)

suitable for further treatment. These may, however, have been used for some unknown purpose. Most of the implements are scrapers (52 pieces, including fragments). We possess 8 bores and 9 other artifacts of various kinds. The absence of any arrow-heads is remarkable. Five core stones (*cf.* fig. 97 i) are irregular in shape. Among the flakes we have separated a group of irregular "pieces", of which it cannot be determined that they are the result of flint working. The true flakes are irregular in shape and generally as wide as they are long. There are no blades. Cores, flakes and retouchoirs<sup>36</sup> provide convincing proof that flint working took place in the settlement itself. If the flakes are plainly bad, the cause of this lies largely in the bad quality of the raw material. The retouche of the artifacts is often of much better quality.

The scrapers are small (12-33 mm. long,  $1 \times 42$  mm.) and more or less round in shape ( $\frac{1}{2}b < l < 2b$ ). The thickness is 4.0-11.0 mm., with a few exceptions, such as some very small thin scrapers and a thick core scraper (fig. 95 n). Where the scraper end is made on the flake seems to depend largely on the shape of the flake. In 14 of the 34 scrapers, where it was possible to ascertain the pressure bulb, the scraperhead was not made opposite it against 20 "normal" pieces. Occasionally a double scraper occurs, or a flake is retouched all round. The angle of retouche depends on the thickness of the flake and varies from about 45° in thin scrapers to about 70° in thick examples.

Two diagrams show the measurements and variations of 42 measurable scrapers. Fig. 96 a gives the shape (l:b ratio) and the size, fig. 96 b gives the relative thickness<sup>37</sup> and the shape. In both figures core scrapers and scrapers with superficial retouche (among others the scraper from hearth no. 29) are separately indicated. Among the remaining scrapers a division into two

<sup>36</sup> See fig. 97 h, i.

<sup>37</sup> We mean here the largest dimension divided by the thickness.

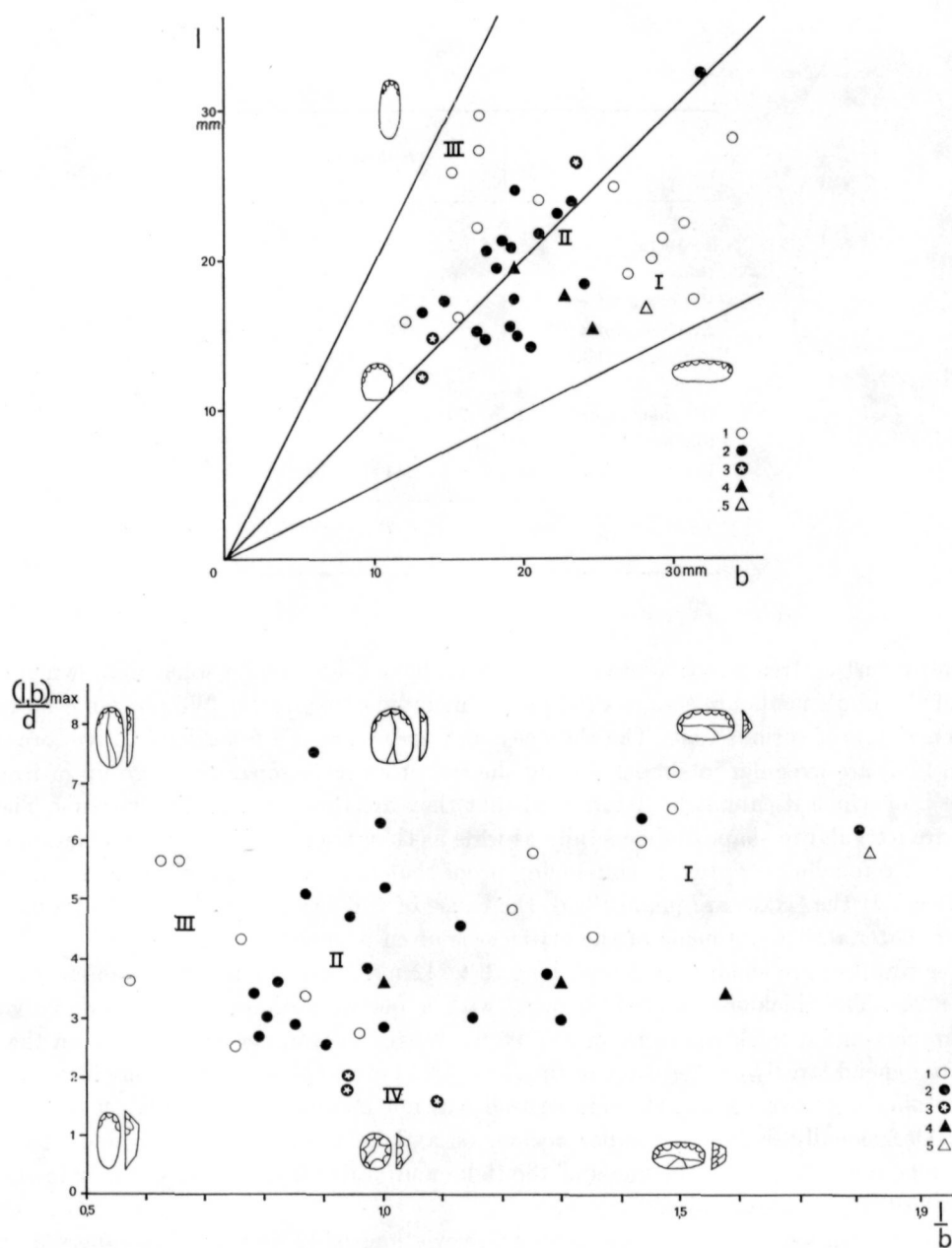


Fig. 96a, b. Molenaarsgraaf. Two graphs showing the relation between length (l), width (b) and thickness (d) of the flint scrapers.

- |   |  |
|---|--|
| 1 scraper arc $< 180^\circ$                 | I wide, scraper arc $< 180^\circ$      |
| 2 scraper arc $\geq 180^\circ$              | II round, scraper arc $\geq 180^\circ$ |
| 3 scraper arc = $360^\circ$ (core scrapers) | III long, scraper arc $< 180^\circ$    |
| 4 scrapers with superficial retouche        | IV core scrapers                       |
| 5 no. 29                                    |  |

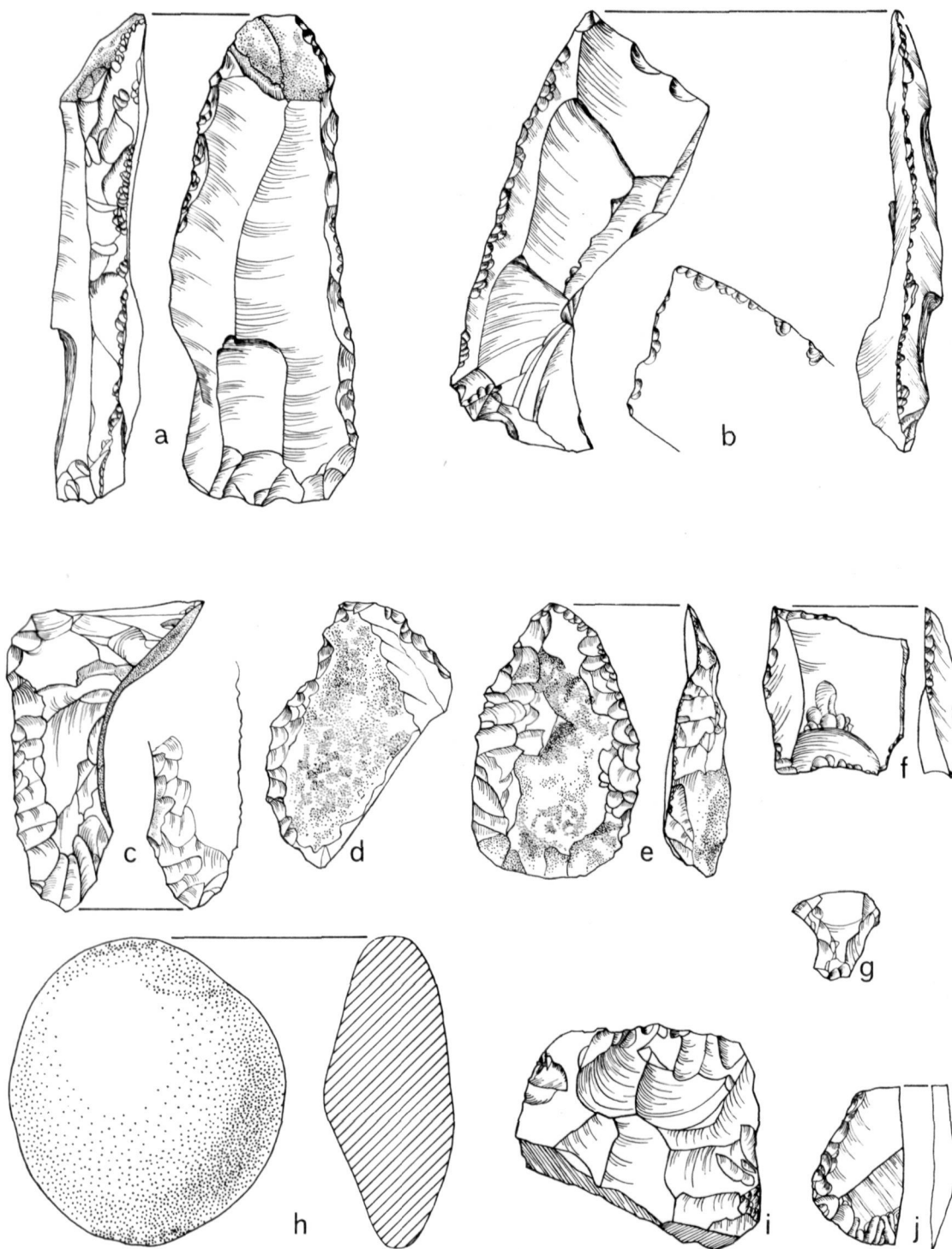


Fig. 97. Molenaarsgraaf. Various flint artifacts, a core and a quartz pebble used as retouchoir. Scale 1:1.

groups has been made, according to the size of the scraper arc <sup>38</sup>. A central place is occupied by round, 12-25 mm. large scrapers with a wide scraper arc ( $> 180^\circ$ ) and a fairly large variety in thickness. Two other groups are formed according to relative width and length, both with a small scraper arc. The size of the scraper arc will have been determined mainly by the shape of the flake. We can assume that the small round scraper (fig. 95 a-e), with a few core scrapers (fig. 95 n, o) as an extreme form, constitutes the only clear type, and that less suitable flakes were worked to a group of less carefully made scrapers of wide variety. Two large, round and relatively thin scrapers (fig. 95 f,g.) are exceptional by reason of their size. The scrapers with superficial retouche correspond in shape to the other material. The marginal position of scraper no. 29 provides a confirmation of the dating after the VBB/BWB occupation.

In addition to the scrapers there is a minority of other artifacts. Of 8 borers 5 are irregular in shape. The three others (fig. 95 p-r) include two characteristic pieces of triangular shape, made by retouching a long flake along both sides. The last example is very small and is made from the cutting edge of a flint axe.

The other implements are:

- A large flake, with retouche and much damage by use along both sides (fig. 97 a).
- A fragment of a large flake, intensively retouched along the sides. Possibly half of an originally triangular artifact. In view of the condition of the retouched edges the piece was apparently used as a scraping implement (fig. 97 b).
- A large flake of which the shape was chiefly determined by a big piece of cortex. It is retouched along one side and at the point, where the pressure bulb has been removed by superficial retouche (fig. 97 c).
- An irregular flake, intensively retouched all round. A part has been broken off (fig. 97 d).
- An almond-shaped artifact or knife, made by superficial retouche at one side. Large parts of the cortex are still present (fig. 97 e).
- A small, rectangular flake, retouched and damaged by use (fig. 97 f).
- The tang of an arrow-head (?) (fig. 97 g.).
- Half of a leaf-shaped artifact, broken (unfinished?) after retouching (fig. 97 i).

Of interest is a fragment of the cutting edge of a flint axe (fig. 95 s) calcined and fire-cracked. The fragment comes from the direct vicinity of pit 27/211, together with various similar pieces of calcined and fire-cracked flint, possibly from the same axe. In view of the traces of fire in this pit a connection with this and thus a dating in phase 2 is probable. The axe has an oval section, with flattened sides, and its cutting edge was about 5 cm. in width. A second very small fragment of a flint axe is the already mentioned small borer. This is, however, too small to permit any comment on its shape. Among the flakes there are no fragments of axes.

#### 4.6.6. WORKED STONE <sup>39</sup> (fig. 98)

Stone bearing traces of having been worked (55 pieces) was scattered all over the settlement site. The large and characteristic pieces are, however, limited to the area in which the pottery

<sup>38</sup> By scraper arc we mean the angle of the circle segment that shows retouche.

<sup>39</sup> We thank Mr C. J. Overweel, Leiden, who gave us his opinion on the used stone and who made a petrographic report on the small axe fragment.

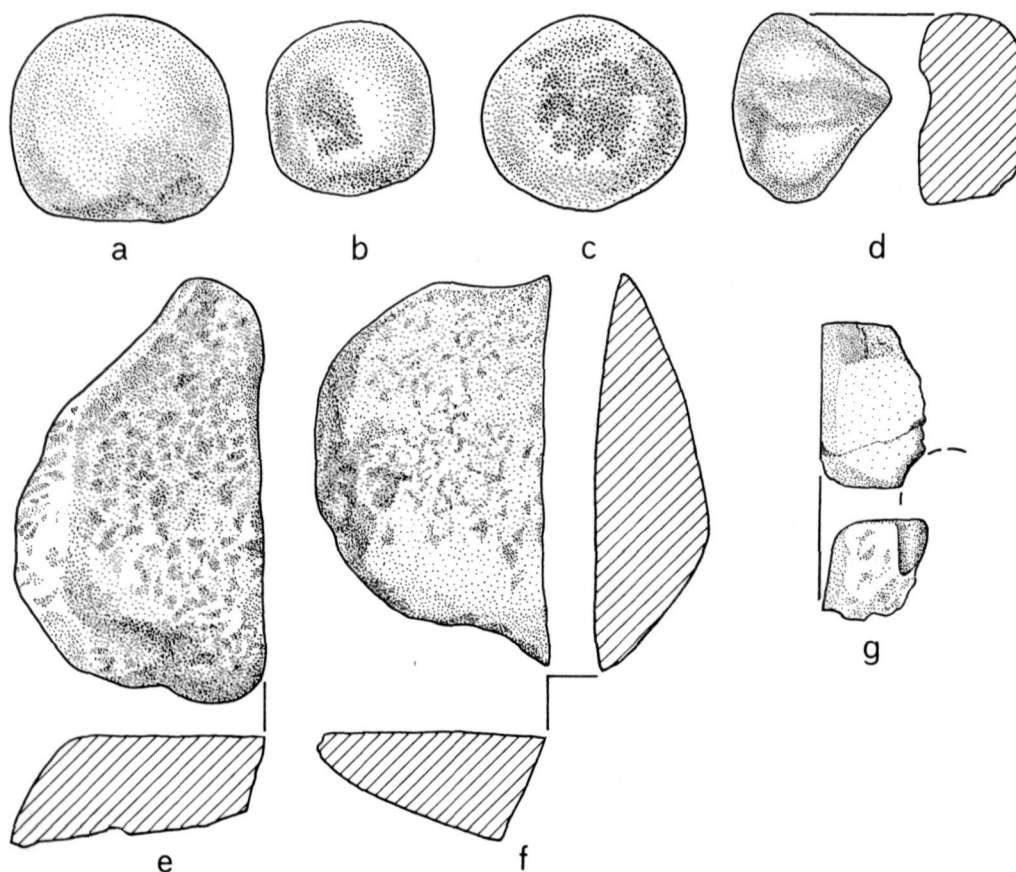


Fig. 98. Molenaarsgraaf. Worked stone. Scale 1:2.

a-c ball-shaped polyhedrons  
 d fragment of arrow-shaft straightener  
 e-f quern stone fragments  
 g fragment of perforated axe

is concentrated. This seems to us, however, to be an insufficient reason for allotting this part of the material exclusively to the last occupation phase.

The following pieces and types are to be distinguished:

— A fragment of a socketed axe (fig. 98 g). The small size of the fragment makes any reconstruction impossible. A flat upper surface, in which a shaft hole was bored vertically, and a flat side making an obtuse angle with the upper surface, are recognizable. The stone used is an amphibolite of unknown source.

— A stone with a shallow groove is undoubtedly the fragment of arrow-shaft smoothener (fig. 98 d). The stone is a sandstone consisting of sand unusually rich in feldspar.

— A group of objects may be included under the heading of ball-shaped polyhedrons (fig. 98 a-c), all made from a carefully selected massive quartzite consisting of cemented clean sand. Only one is made of quartz showing a strong resemblance to the above-named quartzite.

A total of 18 ball-shaped polyhedrons, and fragments of them, are limited to the highest part of the site and the bank of the gully (fig. 80). In the western part they do not appear at all. Because of this distribution we believe that the first occupation phase at least must be excluded for dating. The occurrence of two fragments at the bank of the gully might indicate that they were probably used during the second (BWB) phase. It cannot, however, be determined whether the pieces of stone in question lay here on the appropriate surface, or dropped through the loose peat deposit to a lower level.

— A number of pieces of granite and sandstone we interpret as fragments of quernstones. They all have one whetted (or worn) surface and are relatively thin. One piece (fig. 98 f) is undoubtedly half of the runner of a hand quern, which has become so thin by protracted use that it has broken. These quernstone fragments also are only found in the central part of the settlement. All the types of granite used are not very characteristic and may be from northern or southern sources. One piece, found in the gully filling is, however, fairly certainly of northern origin.

— A number of pieces of quartzite with one whetted facet and clearly not fragments of a ball-shaped polyhedron are interpreted as pieces of whetstones. The quartzite used is fairly variable and never the kind used to make the ball-shaped polyhedrons.

— A number of quartz pebbles, possibly used as retouchoirs, in view of the traces of damage. One of them is a characteristic piece and there is no doubt that this was used as a retouchoir (fig. 97 h).

Within the settlement-terrain there was a dense concentration of a large number (79 pieces) of large and small pebbles at a depth of about 40 cm. under the former surface (fig. 80 no. 308). There was no evidence of any pit here, but as there was no such trace at the ox burial either, and as burial pits generally were only distinguishable with great difficulty, not much importance need be attached to this. We can think of a depot of stones for some domestic use in the settlement, such as for example the tempering of pottery. But it is also possible that the stones were brought at this spot by a natural cause, for example frozen in an ice-floe during the formation of the ridge. In that case we would, however, expect more of such concentrations. Moreover, there seems to have been some selection, not of the dimensions, but of the kind of stones: the material consists almost exclusively of quartz and quartzite, with only one pebble of a soft clay-stone.

#### 4.6.7. WORKED WOOD <sup>40</sup> (fig. 99)

In the gully 28 pieces of wood bearing more or less clear traces of having been worked were found. Of these 26 were recovered, but later five were rejected, as they showed no signs of working after closer study. All the worked pieces of wood were found beneath —180 cm. NAP under or at the base of sand 2; they are therefore clearly associated with the other archaeological remains. We give now a description of the pieces.

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<sup>40</sup> We thank here Mr A. Voorrips, Amsterdam, who made the determinations of the wood species used.

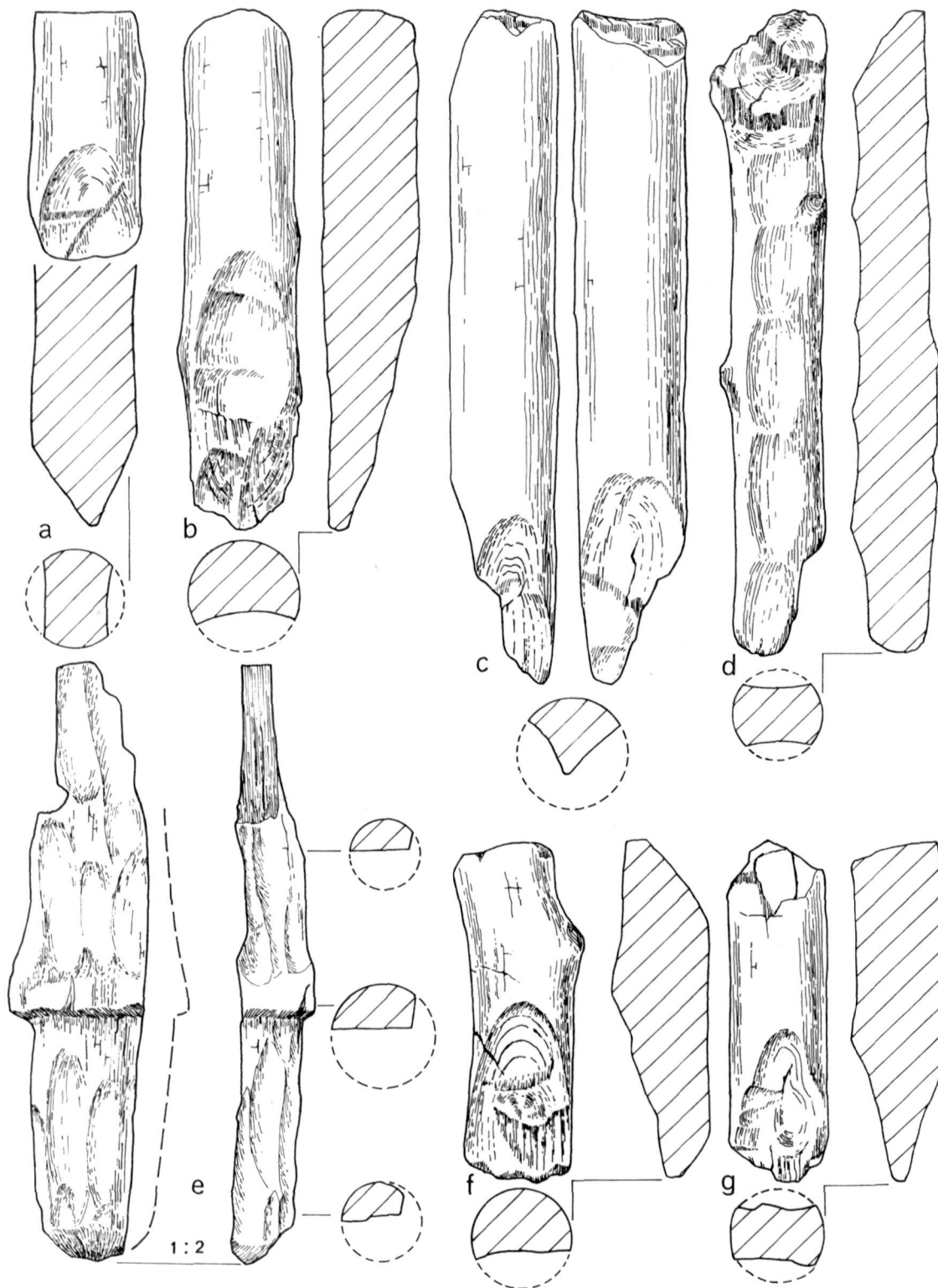


Fig. 99. Molenaarsgraaf. Worked wood. Scale 1:4, except e.  
 a-c, f-g pointed posts.  
 d beam, worked with an adze on two opposite sides.  
 e fragment of tenon.

— A segment of the pin of a pin-hole construction shows a carefully trimmed blunt point and projecting flange. It is made of wood from the purging buckthorn (*Rhamnus cathartica* L.), a tree which must have grown rarely in the surrounding vegetation (see p. 188) and was carefully selected in order to make this pin (fig. 99 e).

— An alder-wood post about 6 cm. thick, of which 41 cm. have been preserved, was flattened with an adze on two opposite sides to a thickness of 3.3-4.3 cm. One end was cut at an angle with a few powerful axe blows (fig. 99 d).

— Ten poles were cut to a point (fig. 99 a, b, c, f, g). These ten pieces comprise all poles found in a vertical position, plus five sloping (washed over) poles and one lying horizontally. They were all round thin tree-trunks with a diameter of 4½-7 cm. preserved to a length of 13½-60 cm. The pointing was done on one side (five poles), on two opposite sides (two poles) or on two adjoining sides (one pole). Trimming to a point on all sides was done on two poles. The area trimmed generally shows no more than the traces of four or five blows with a breadth of up to 6 cm. This means, in our view, efficient work with an average-size axe. It cannot be determined whether this was a flint, stone or bronze axe. The type of flint axe, found in the settlement terrain fits the scars well, however. The wood used was again alder (*Alnus glutinosa*), with one exception (ash, *Fraxinus*).

— The other pieces are five triangular, two flat pieces of split wood and two pieces of burnt wood, one of which, pointed and 12 cm. in length, was found in vertical position.

Examination of the species of wood chosen for the worked pieces shows that alder, which was in plentiful supply, was nearly always used (table 21). The only exceptions are the thinnest vertically placed pointed pole (ash) and the fragment of the wooden pin (purging buckthorn).

TABLE 21

*Molenaarsgraaf. Worked wood*

		All pieces collected	Worked pieces only
<i>Quercus</i> sp.	oak	1	—
<i>Fraxinus excelsior</i> L.	ash	1	1
<i>Alnus glutinosa</i> (L.)	alder	22	19
<i>Rhamnus cathartica</i> L.	buckthorn	1	1
Unknown	—	1	—
Total		26	21

One can only guess what the function of the poles knocked into the former gully bottom was. The situation of the vertical posts and those washed sideways shows no regularity of any kind. The slenderness of the poles would seem to rule out the possibility of any heavy construction such as a bridge. In our view the most acceptable supposition is that they formed

some part of the fishing equipment of the inhabitants: we have other proofs that they practised fishing. We imagine that nets and traps were fastened to the poles. In the beginning of the second phase of activity (sand 2) of the gully most of the poles were washed over to a sloping or horizontal position, but they were not carried away because they were covered with sand 2 or still firmly embedded.

Two characteristic pieces and the pin have been preserved with Agrical-C.

#### 4.6.8. THE FAUNAL REMAINS <sup>41</sup> (table 22)

A number of bones, badly or very badly preserved, were found scattered in the gully filling and the settlement terrain, 289 of which have been identified <sup>42</sup>. The most and least badly preserved bones came from deposit 1 of the gully filling and belong therefore to the second (BWB) occupation phase of the settlement. In the distribution <sup>43</sup> we found concentrations on both sides of the central part of the gully and on the western bank. In the central part of the gully a few bones were found on the sand 2. They are all cattle bones. These have not been included in the count lists as they must perhaps be connected with the Middle Bronze Age inhabitation in the immediate vicinity. The same applies to two jaw bones found at a higher level near the north section, indicated in fig. 64. In the grey occupation layer of the settlement site the conditions were much less favourable for preservation. The finds consisted chiefly of molar teeth. Bones from the 16th century sand digging site have not been included in our report, although they will be largely prehistoric. As there appeared to be no essential differences between the composition of the finds in the gully and in the settlement terrain, as there is hardly any time difference, and since the numbers are very small no distinction has been made between both find-groups and all bone material has been treated as a whole.

The large majority of bones comes from domestic animals (92%). Hunting large and small wild animals and birds probably was of limited importance as a source of food in Molenaarsgraaf.

Cattle (*Bos taurus*) were the most important domestic animals. Only a few bones could be measured, but the measurements that could be taken fit in the sequence found for Hekelingen and Vlaardingen. The cattle were slaughtered at all ages (table 23). The remarkable find of the complete skeleton of a young animal of about 1½ year old will be discussed later in connection with the graves. Of little importance were the pigs (*Sus domesticus*), which again were slaughtered at all ages (table 23). In the third place came the small ruminants (sheep/goat, *Ovis aries*/*Capra hircus*). Osteologically it is difficult to separate these two species, but in Hekelingen as well as in Vlaardingen the horn-cores or skulls of both species were found, so it is reasonable to assume, that both were known in Molenaarsgraaf. As the dog (*Canis*

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<sup>41</sup> Miss Dr A. T. Clason did the time-devouring work of identifying the bones. She made a report which we used in writing this paragraph. The results of her investigation will be published by her in more detail.

<sup>42</sup> In this number the human *radius* (cf. p. 253) is not included. Antler fragments were left out of consideration. No attempt was made to identify the fragmentary ribs and *vertebrae*.

<sup>43</sup> See p. 187 and fig. 65.

TABLE 22

*Molenaarsgraaf. Animal bones*

		Number	%
<i>Bos taurus</i>	cattle	218	81.7
<i>Sus domesticus</i>	pig	33	12.4
<i>Ovis aries</i> / <i>Capra hircus</i>	sheep/goat	14	5.2
<i>Equus caballus</i>	horse	2	0.7
Domestic animals total		267 ( 92.4 %)	100.0
<i>Castor fiber</i>	beaver	8	
<i>Cervus elaphus</i>	red deer	4	
<i>Alces alces</i>	elk	3	
<i>Ursus arctos</i>	brown bear	1	
<i>Sus scrofa</i>	wild boar	1	
Wild animals total		17 ( 5.9 %)	
<i>Avis sp.</i>	birds	3	
<i>Acipenser sturio</i>	sturgeon	1	
<i>Piscis sp.</i>	fishes	1	
Miscellaneous total		5 ( 1.7 %)	
Total		289 (100.0 %)	

TABLE 23

*Molenaarsgraaf. Mandibles classified by the age*

Cattle	1-6 months	2
	28-34 months	3
	> 3 years	4
Pig	c. 6 months	2
	c. 2 years	3
	> 2 years	2
Total		16

*familiaris*) was not a meat animal, the absence of this species among the bones does not imply there were no dogs at Molenaarsgraaf. Interesting are two fragments of horse (*Equus caballus*) bones: the proximal end of a *radius* and the proximal end of the right *tibia* of a young animal. As they were too fragmentary to take measurements of them it is impossible to say whether they are from wild or domesticated animals. There are some facts, however, that may suggest that they are from early domesticated animals. In the first place, the marshy environment was not very suitable for horses; secondly, also in later settlements, as for instance Culemborg<sup>44</sup>, where many horse-bones were found, no wild animals occurred; and thirdly, in the transition period from Neolithic to Bronze Age the domesticated horse spread over Europe. The horse bones were both found in the western bank zone in the gully deposit (1). They undoubtedly belong to the domestic refuse of the settlement, and the possibility that they belong to a later period than the second occupation phase can be excluded. These belong to the oldest remains of the domesticated horse in this country<sup>45</sup>.

The wild animals that were hunted were those that could be expected in the vicinity of the settlement site. Of the red deer (*Cervus elaphus*) a few long bones and two antler fragments were found. Interesting is the finding of elk (*Alces alces*). This species was not found in any of the VL Culture sites, which had, contrarily to Molenaarsgraaf, no direct connection with the sand area in the east<sup>46</sup>. Also the wild boar (*Sus scrofa*) and the brown bear (*Ursus arctos*) were present. The relatively numerous bones of beaver (*Castor fiber*) are characteristic of the marshy environment with its many fresh water creeks.

Fishing can have been much more important than appears from the table, and might have been of similar importance as fishing was elsewhere in similar environments in the western Netherlands<sup>47</sup> as a source of supply for animal proteins. This is suggested by other finds especially from the graves and it seems that fishing partly compensated for the small interest of hunting at Molenaarsgraaf. The absence of fish waste may be the result of the rather poor conditions for preservation. Moreover, fish waste other than the big sturgeon bone plates thrown in the gully was probably carried away much more readily by the current than heavy animal bones. It seems to us that it is unjustifiable to draw conclusions from the table 22 about the importance of fishing as compared with hunting and cattle breeding. We prefer to rely on other evidence, such as the poles in the bed of the gully, the loam weight fragment from the gully filling and the data provided by the graves, especially grave II.

The emphasis on cattle raising and the very small interest in hunting must find their cause in the environment. As we know (*cf.* p. 137 and 188), the clay wedges of the stream ridge offered plentiful grazable land. The landscape and the economy of Molenaarsgraaf resemble the Vlaardingens Culture settlements on the coastal barriers to a large extent and contrast to those along the estuarine creeks (*cf.* p. 332).

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<sup>44</sup> Louwe Kooijmans 1966<sup>a</sup>.

<sup>45</sup> *Cf.* p. 330.

<sup>46</sup> But Mr G. Kortebout van der Sluijs informed me that there are two elk bones from the Western Netherlands in the collection of the National Museum of Geology at Leiden: an antler from Stompwijk and a skull fragment with the antlers sawn off from Heusden. Both pieces are, however, undated.

<sup>47</sup> For example at Vlaardingens and Hekelingen and during the earliest phase of Voorschoten.

## 4.7. THE GRAVES

## 4.7.1. INTRODUCTION; THE CEMETERY.

In the settlement terrain five flat graves were found. Three of them were human inhumations, one contained the skeleton of an ox and one was a pit without skeletal remains or grave goods, yet having all the characteristics peculiar to burial pits in Molenaarsgraaf and in general. The graves were documented by vertical photographs taken with the aid of a rod on a tripod <sup>48</sup>. From these photographs (Pls IV, VIII, X, XII), from subsidiary measurements taken in the field and by reference to the skeletal material, the drawings in this publication were made. The anthropological discussion of the skeletons was written by Miss A. Knip <sup>49</sup>. Her report is added as Appendix V to this paper. The anthropological data in the description of the graves were taken from this report.

The good state of preservation of the skeletons and of the bone grave goods is caused firstly by their position below the ground water table, since shortly after the inhumation until recent times. The bottoms of the graves lie now about the present ground water table, but some decades ago the drainage of the parcels near the low "rear dyke" of the polder was much worse and consequently the skeletons were well under water. A high lime content might be a second factor. But the sand of the ridge is only very locally rich in lime and this generally was not the case in the excavated part: only near grave I a fairly high lime content could be demonstrated. It seems, as if there the unusually thickly developed occupation layer (*i.e.* the pit filling above the grave) had considerably hindered percolation and so had prevented the removal of lime from the sand.

Because the bone had been preserved at Molenaarsgraaf, some new elements were added to the VBB grave good assemblage: the bone fish-hooks and the antler hook.

The five graves all lie in a row approximately along the top of the sand ridge (the line linking the highest points) and the axis line of the find concentration. The intervening distances show great regularity:

grave II	—	grave III	8.0 m.
grave III	—	grave I	15.5 m.
grave I	—	ox burial	9.5 m.
ox burial	—	grave IV	8.8 m.

It is noteworthy that the distance between grave III and grave I is almost twice that of the other distances. It is possible that between both graves there was a sixth grave which disappeared when the modern ditch was being dug. This regularity convinces us that we have not

<sup>48</sup> We heartily thank the staff-members and the technicians of the Institute for Prehistory, Leiden, for their help during the excavation of the graves and for the making of the vertical photographs.

<sup>49</sup> We are much indebted to Prof Dr J. Huizinga, Institute of Human Biology, Utrecht. He visited the excavation when the graves I and II were discovered and gave his comments on the skeletons, while they were *in situ*. To Miss A. S. Knip we are indebted for the exhaustive anthropological report she made of the skeletons.

overlooked any graves. There seemed to be some possibility of this when three graves were discovered one after the other at the end of our first operation; they were mostly hardly recognizable in the levels of the excavation pits. During the second operation none of them can have escaped observation, however, because we took a great deal of care and trouble not to miss any.

It seems to us to be important that, in view of the above mentioned regularity, we are justified in talking of a cemetery. This is not a case of a number of isolated burials, but of the repeated use of the site by a group of people who were at least familiar with the general situation and apparently with the exact situation of the other graves, the location of which in all probability was not, however, marked by a barrow but might have been visible by another mark. On the basis of these considerations it is difficult to conceive that this little cemetery existed for long; it is more likely that we are here concerned with a fairly short phase in the occupation period. It is even possible that the cemetery represents a short period when the site was not occupied. If this is the case, then these were not interments in the settlement itself, but a former settlement site was being used for burial purposes. After discussing the individual graves, we shall examine what contribution to the solution of these problems is made by the facts which emerge.

#### 4.7.2. GRAVE I (figs. 100-104, Pls. IV-VII, XIII)

Grave I was the first grave to be discovered (by chance) in the fifth week of the first operation, during the digging of sections on what was thought to be a refuse pit in the middle of pit A9, next to the north wall of house I. The pit differed somewhat in its regular oval shape and its darker filling from the neighbouring pits, so that more attention than usual was paid to it. The examination of a vague discolouration under the filling of the pit led to the skull being damaged by a spade and the discovery of the grave. The section pit was filled up, and we began to excavate by means of levelling off.

Five of the plans drawn of eight levels are illustrated here (figs. 100, 101). In the lowest level an irregular, rectangular, violet-grey trace could be made out: the remains of a timber casing of the burial pit. A thickening of the trace at the corners indicated that they had been reinforced by vertical poles, of which the traces show a diameter of 14-20 cm. In each corner apparently stood two poles. As traces below ground water level had completely disappeared, it cannot be determined how deep the poles were knocked into the ground. Only at one place was a faint trace to be seen of the outline of the pit itself in which the casing was made. The large oval "refuse pit" (70 × 130 cm.), visible in the highest level, in which unfortunately no finds were made, must have come into being during the collapse of this burial chamber. In the intermediate levels the burial pit could be seen as a rounded rectangle of slightly dirty sand, in which the rust formation was different in character from that outside it. The causal relationship of "refuse pit" and burial chamber is illustrated best by the superposition of the most characteristic levels, as shown in fig. 102. Starting from the plans it was possible to construct two cross-sections through the grave which also permit a better insight in its structure (fig. 103).

The burial chamber lay almost exactly in an E-W orientation and its interior measurements were 130/135 × 80/95 cm. The soil traces of the casing were 7-10 cm. wide, which indicates

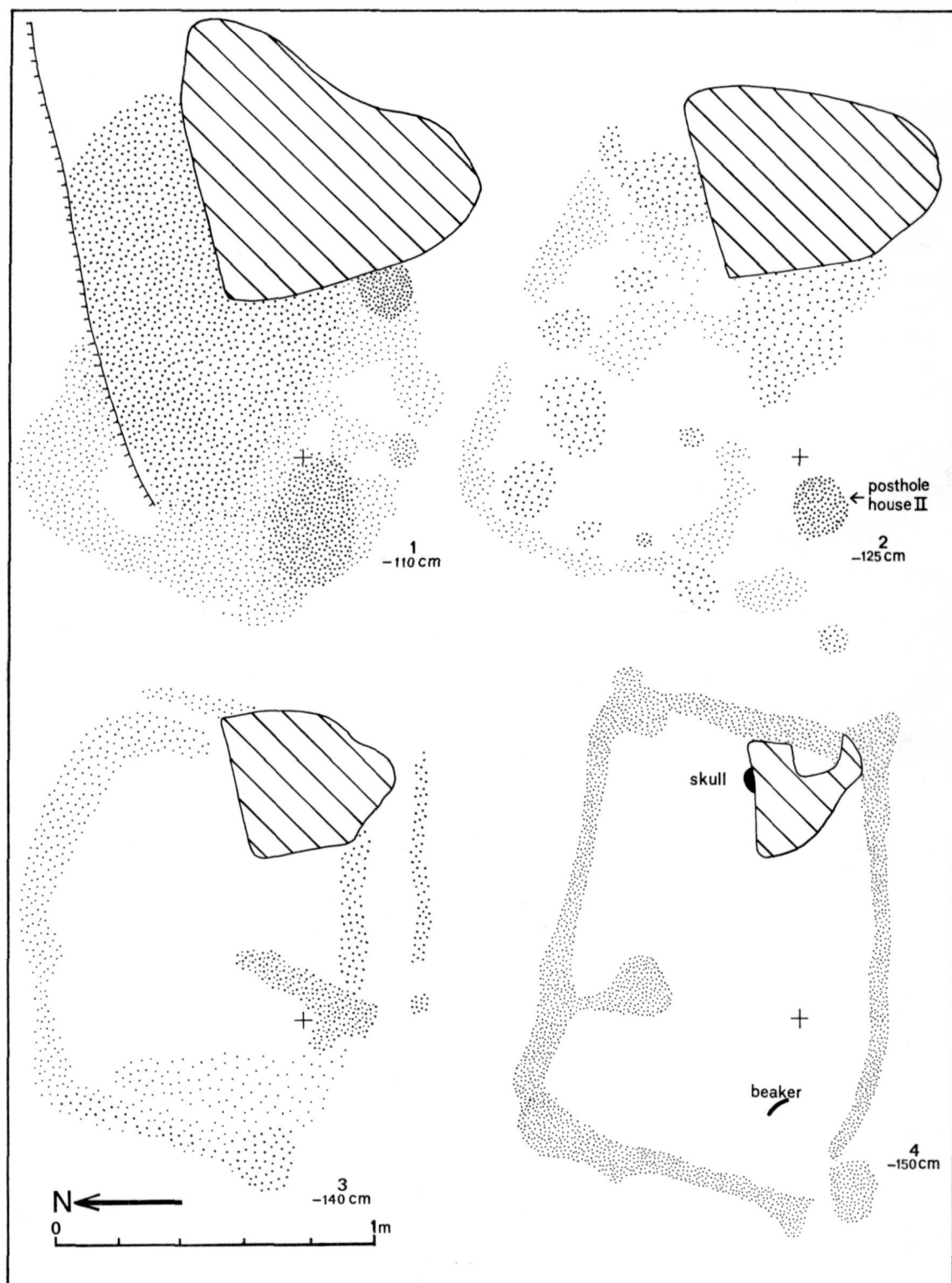
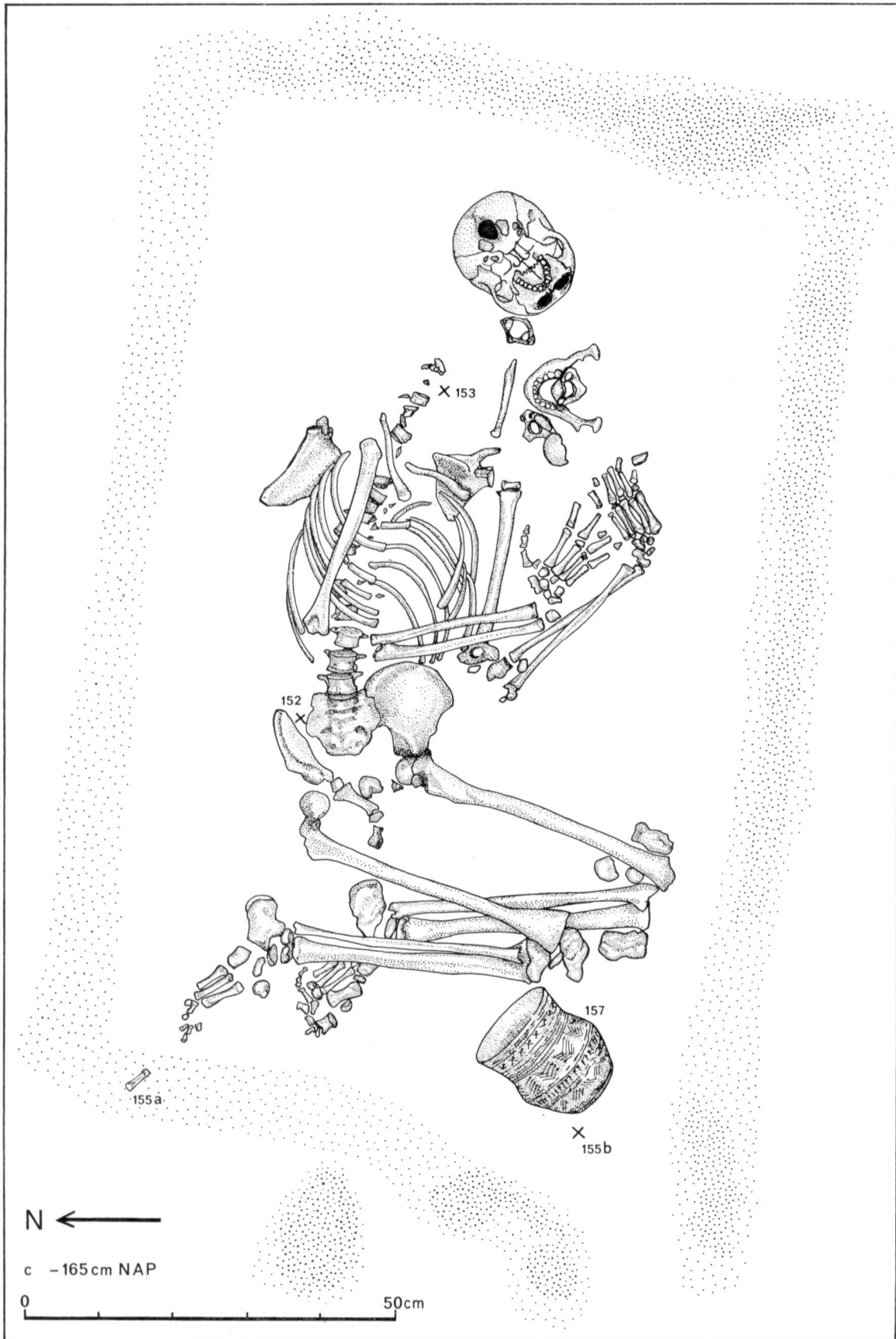


Fig. 100. Molenaarsgraaf. Grave I. Plan of the grave at various levels. Depth below NAP. Scale 1:20.

Fig. 101. Molenaarsgraaf. Grave I. Scale 1:8. 152 : some small sherds. 153 : fin-ray of pike. 155a : phalange of right foot. 155b : small piece of bone. 157 : Veluwe Bell Beaker.



N ←

c -165 cm NAP

0 50cm

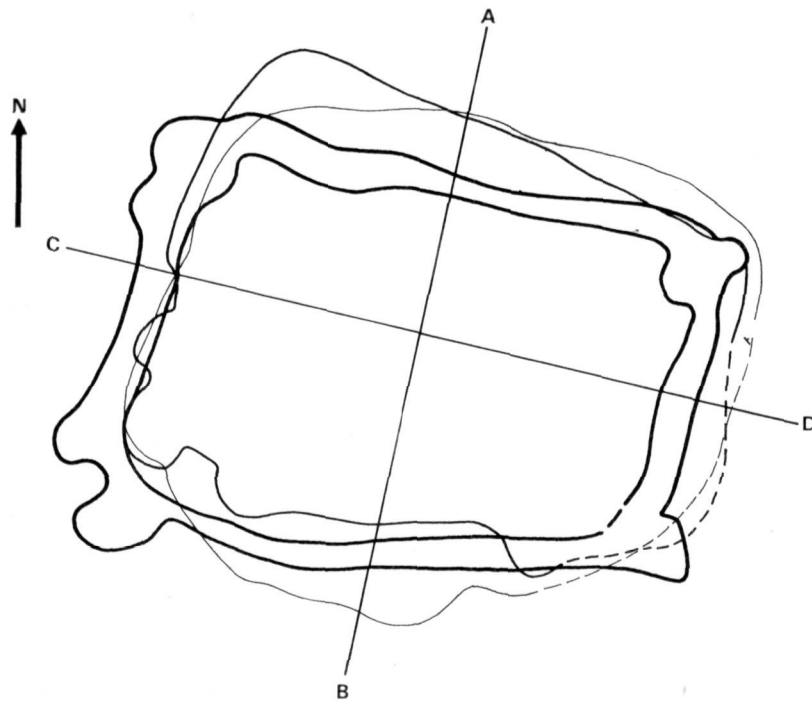


Fig. 102. Molenaarsgraaf. Grave I.

Superposition of the plans of three characteristic levels :

thin line = -110, medium line = -125, heavy line = -150 cm. Scale 1:20.

the use of heavy planks of possibly about 4 cm. thickness. The height of the chamber will not have been more than about 50 cm. The distance between the floor and level 3, in which a part of the roof construction was recognizable as a violet-grey trace, was 28 cm., while the refuse pit was a good 20 cm. deep. Various observations mentioned below show that the casing was a solid construction which could have remained standing for at least a few decades. The floor of the grave lay at -165 cm. NAP.

The crouched skeleton (fig. 101, Pl. IV) lay not exactly on its left side, but turned somewhat on its back, with the head to the east and facing south. The hands were folded before the chest, the hand of the left arm (the lower one) on the right hand, and both palms downwards. The wrist joint of the left arm was therefore completely turned round, so that *radius* and *ulna* crossed each other. As the body decomposed the arm bones must have twisted further as the skeleton settled down. Both legs were bent to an angle of about 90° between the *femur* and the spine. The knees were sharply bent to an angle of 20-30° between the *femur* and the *tibia*. The pelvis had become somewhat displaced. The right underarm was no longer connected with the *humerus*, but had rolled or slipped slightly out of place. The ribs under the right *humerus* were splintered. The skull, lower jaw and a number of *cervical vertebrae* were also no longer

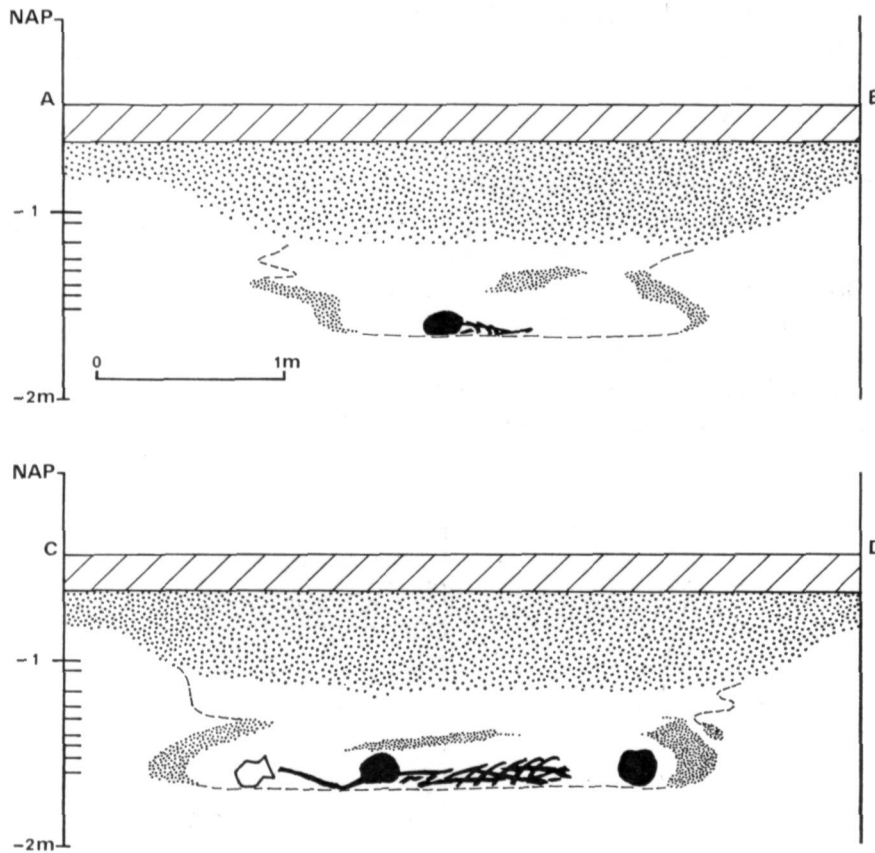


Fig. 103. Molenaarsgraaf. Grave I. Schematic sections (cf. fig. 102) derived from the drawn plans. Scale 1:20.

connected anatomically. After the complete decomposition of the body, including the sinews, the skull apparently tumbled aside until the *foramen magnum* lay uppermost. The lower jaw and some *cervical vertebrae* consequently fell aside<sup>50</sup>. This can only have been possible because an underground hollow space must have been preserved for some decades, due to the strong construction of the burial chamber.

That one metatarsal and half of the phalanges of the feet are missing and that one of these is displaced over about 20 cms will be mainly the work of animals.

The skull (Pl. XIII) is markedly *brachycranic* and unusually broad (an *index cranicus* of 94.6) and shows a very clear *planoccipitaly*. All the cranial sutures are still open. In the lower jaw both  $M_3$ 's have not grown through. In the upper jaw the right  $M^3$  has almost grown through and the left  $M^3$  is present but loose. The articular ends (*epiphyses*) have not yet grown fixed to the long bones. The skeleton is that of an adolescent, very probably male, of about 15 years of age. The long bones are not very robust. The anthropological length of the body, estimated from measurements of the long bones, is 162-163 cm. Measurements from the vertical

<sup>50</sup> This is according to the comments of Prof Dr J. Huizinga.

photograph (Pl. IV) gave 164 cm., and thus the two estimates correspond very well. The individual would certainly have become taller in maturity. The teeth show no reduction. Only a few molars are slightly worn <sup>51</sup>.

At the throat side of the *cervical vertebrae* a fragment of a fish bone was found (fig. 101 no. 153; Pl. VII B). It is the 2.16 cm. long fragment with articular end of a fin-ray of an unpaired fin (the belly- or the back-fin) of a pike (*Esox lucius* L.). The position (exact find spot) of the fin-ray fragment suggests strongly that the boy had originally this tiny bone in his throat. Although an ordinary fish bone hardly can have caused death, we must assume the contrary of this relative large object. It is likely that the fin-ray, when stuck in the boy's throat caused a serious infection and an abscess, which ultimately might have caused death <sup>52</sup>. We hardly could get a more dramatic proof of the consumption of fish.

Near the pelvis lay a few small, undecorated beaker sherds which had apparently come here from the filling of the burial pit (fig. 101, no. 152).

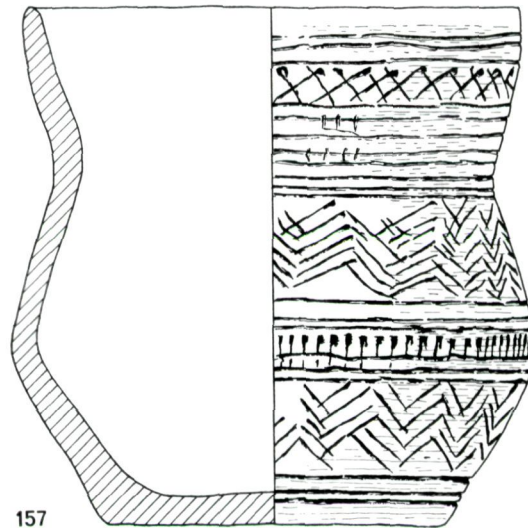


Fig. 104. Molenaarsgraaf. Bell Beaker of Veluwe type from grave I. Scale 1:2.

A Bell Beaker had been placed as a gift in the grave near the knees (fig. 101, no. 157). As the timber casing of the pit decayed sand fell into this corner, as appears from an interruption in the soil trace and a vague pale discolouration inside the grave there. This caused the beaker to fall against the right knee of the skeleton. The Bell Beaker (fig. 104, Pl. VII A) is 13.7 cm. high, the external diameter of the rim is 13.1-13.5 cm. and of the belly 13.8 cm. A clear neck

<sup>51</sup> These anthropological remarks are derived from the report of Miss Knip, Appendix V.

<sup>52</sup> This small fin-ray has been examined and identified by Dr Johannes Lipsikaar, Museum for Natural History, Gothenburg, Sweden, through the kind intermediary of Miss Dr A. T. Clason, Groningen.

and belly bend divide the beaker into three approximately equal parts, a division accentuated by the decoration. Starting from the top we can distinguish:

- three horizontal lines under the rim,
- a band of small lines crossing each other obliquely,
- a band of 8-9 horizontal lines, reaching as far as the neck bend,
- a band of 6-8 (in general 7) zigzag lines on the shoulder,
- a row of vertical lines on the belly bend limited on both sides by three surrounding lines,
- a row of 4-6 zigzag lines,
- 2-4 (in general 3) horizontal lines at the base.

If the design of the decoration is carefully chosen, as usual in Bell Beakers, the execution is rather crude, and not done with a dentated spatula or a sharp object, but with a fairly broad plain spatula. The other characteristics also show that this is not one of the best examples of a Bell Beaker. The rim is simply rounded, the base is flat, the walls are rather thick (6-8 mm.). The surface, which is not particularly smooth was not polished. The pale colour varies from very pale yellow to light yellowish brown (10 YR 7/3-6/4) with some greyish marks. There is hardly any sign of tempering except a few small pebbles and a little pounded pottery. The pottery is not especially hard. As it lay on its side the opening has become slightly deformed, causing a small crack.

The beaker certainly does not belong to the best beaker pottery used in the settlement. A few sherds were found in the pits which were similar in quality to the best beaker pottery known in this country. Many of the BB sherds from the occupation layer are of better quality pottery. As the burial gifts in the Beaker Cultures were generally selected from the best pottery, we must assume that this is an exception to the rule or that the grave belongs to a phase in the settlement when no better pottery was in use. The most likely dating in this case is the end of the first (VBB) occupation phase, with the possibility of a somewhat earlier or later dating.

For a  $^{14}\text{C}$  determination use was made of the middle section of the left femur with the result:

GrN 5131 3635  $\pm$  40 (1685 BC) bone.

This date corresponds very well with the known data and confirms the above-discussed archaeological-typological dating.

### *Recapitulation*

About 1700 B.C., at about the end of the first occupation phase, a boy of about 15 years of age and about 163 cm. tall was buried in a crouched position on his left side and with his head to the east, in a burial chamber lying accurately in an East-West orientation. The chamber, measuring about 90  $\times$  130 cm. and with the bottom at -165 cm. NAP, was solidly constructed and lay immediately against the northern wall of a contemporaneous house. As a burial gift a Veluwe Bell Beaker of comparatively careless execution was placed near the knees. The skull is planoccipital-brachyranic.

## 4.7.3. GRAVE II (figs. 105-109, Pls. VIII-IX, XIV-XVI)

Grave II was found on Saturday, 24th September, 1966, when a few boys began digging in an open excavation pit. Fortunately they were caught in the act, so that the disturbance was limited to a small area around the neck and skull of the skeleton.

The presence of a grave was indicated in this case only by a few irregular grey marks in the yellow sand between the large round pits in the western part of B7. Nor was any clearly marked pit revealed during the subsequent levelling off. Only between about —150 cm. NAP and the bottom of the burial pit (—159 cm. NAP) did a faint but unmistakable trace, about 5-10 cm. wide, oval and light violet in colour, become apparent round the skeleton (fig. 106). As with grave I, we consider this to be the trace of a shoring up of the burial pit, for which, in view of the shape, wickerwork will have been used, rather than planks. The interior measurements are 80 × 145 cm. The axis is roughly orientated SSE-NNW, parallel to the gully, against which the grave directly lies. The height of the burial chamber could not be determined. The reinforcement of the grave pit was less solid than that of grave I: no parts of the skeleton had rolled or slipped out of place.

The skeleton lay in a crouched position on its left side with the head to the south, facing west. The most noteworthy feature was the absence of a number of bones, which must have disappeared during the digging of a pit (no. 199) which cuts through the grave on the western side (fig. 105, 107, Pl. IX A). In the filling of this pit one of the missing parts of the skeleton, the 15.5 cm. long proximal part of the left *radius* (Pl. XIV), was found. There was no sign, however, of all the other missing parts, which consisted of almost all the left leg, except for the upper end of the *femur* (the pelvic joint), and the lower end of the *tibia* with the foot. The same applies to the left arm: only the top of the shoulder-joint of the *humerus* and the left hand with the wrist-joints of the *ulna* and *radius* remain. The whole of the right hand with the wrist and most of the *radius* is also missing. It is curious that the parts named are not broken off at the point where pit no. 199 was dug, but some distance behind this in the undisturbed sand. Where the pit was dug it seems that only the parts of the skeleton that projected most were touched during the digging: the left knee, the left elbow and the right hand. That the fracture did not occur where the digging took place, but in the sand behind it, seems to be normal. The bone joints which are still preserved had not at all, or only slightly, been forced out of their correct anatomical positions, which proves that the tendons of the dead person had not yet seriously rotted<sup>53</sup>. The appearance of the separate *radius* fragment in the pit 199 filling, on the other hand, supports the assumption that the body was in an advanced state of decomposition. All this implies a time difference of two or three decades between the grave and pit 199. The disturbing pit was intentionally refilled immediately after the digging with the soil that had been removed; this is apparent from the nature of the filling, which consisted entirely of the same loose sand, with a small clay content, as the ground in the vicinity, and which only differentiated itself by the somewhat dissimilar soil processes caused by the disturbed structure of the sand. It was only at a much higher level that a smaller, irregular pit was seen, with a "normal" filling (*cf.*

<sup>53</sup> This is according to the comments of Prof Dr J. Huizinga.

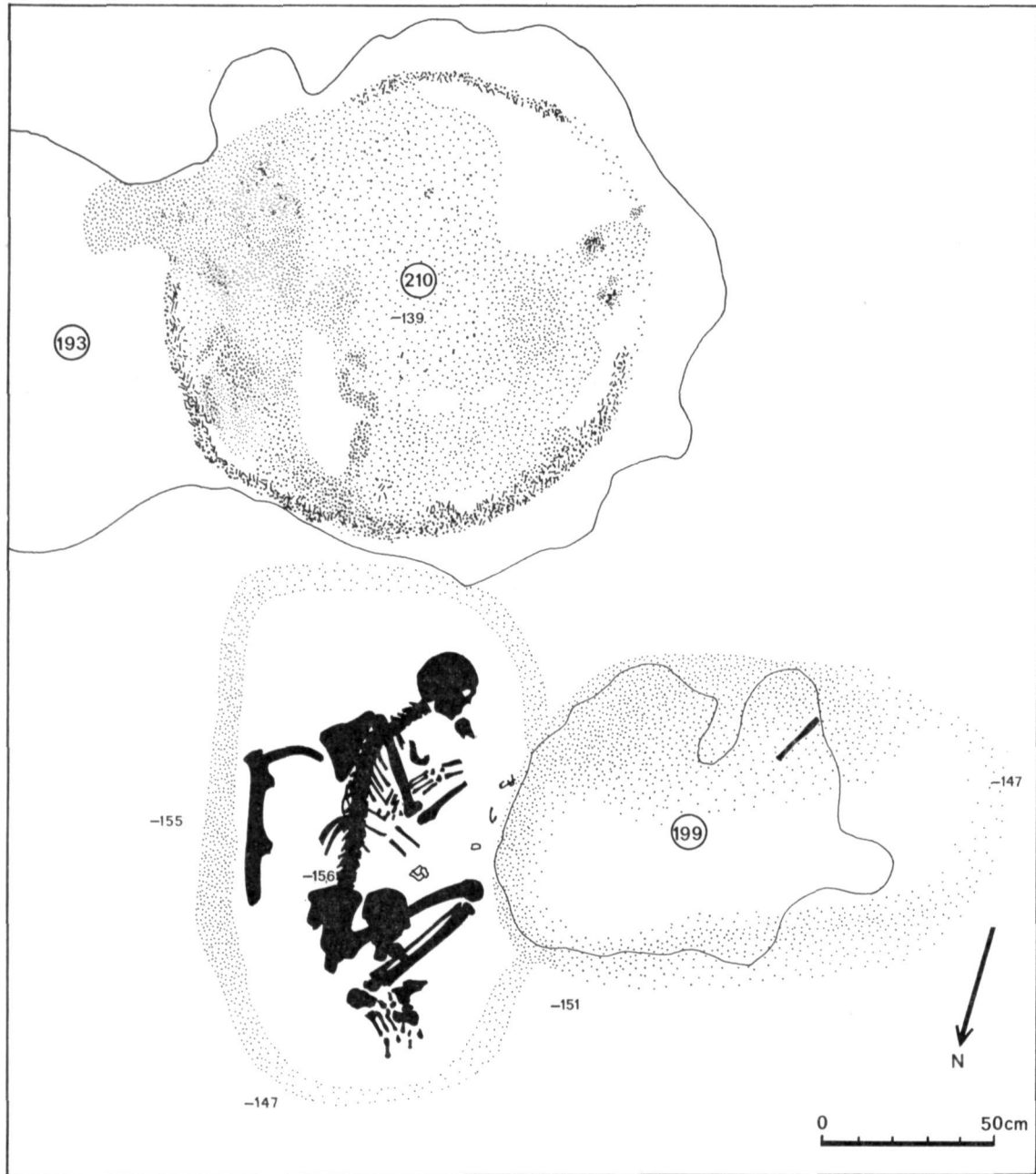


Fig. 105. Molenaarsgraaf. Grave II and surroundings. Extent of pits at a higher level indicated with a thin line. Find numbers encircled. Depth in cm. below NAP. Scale 1:20.

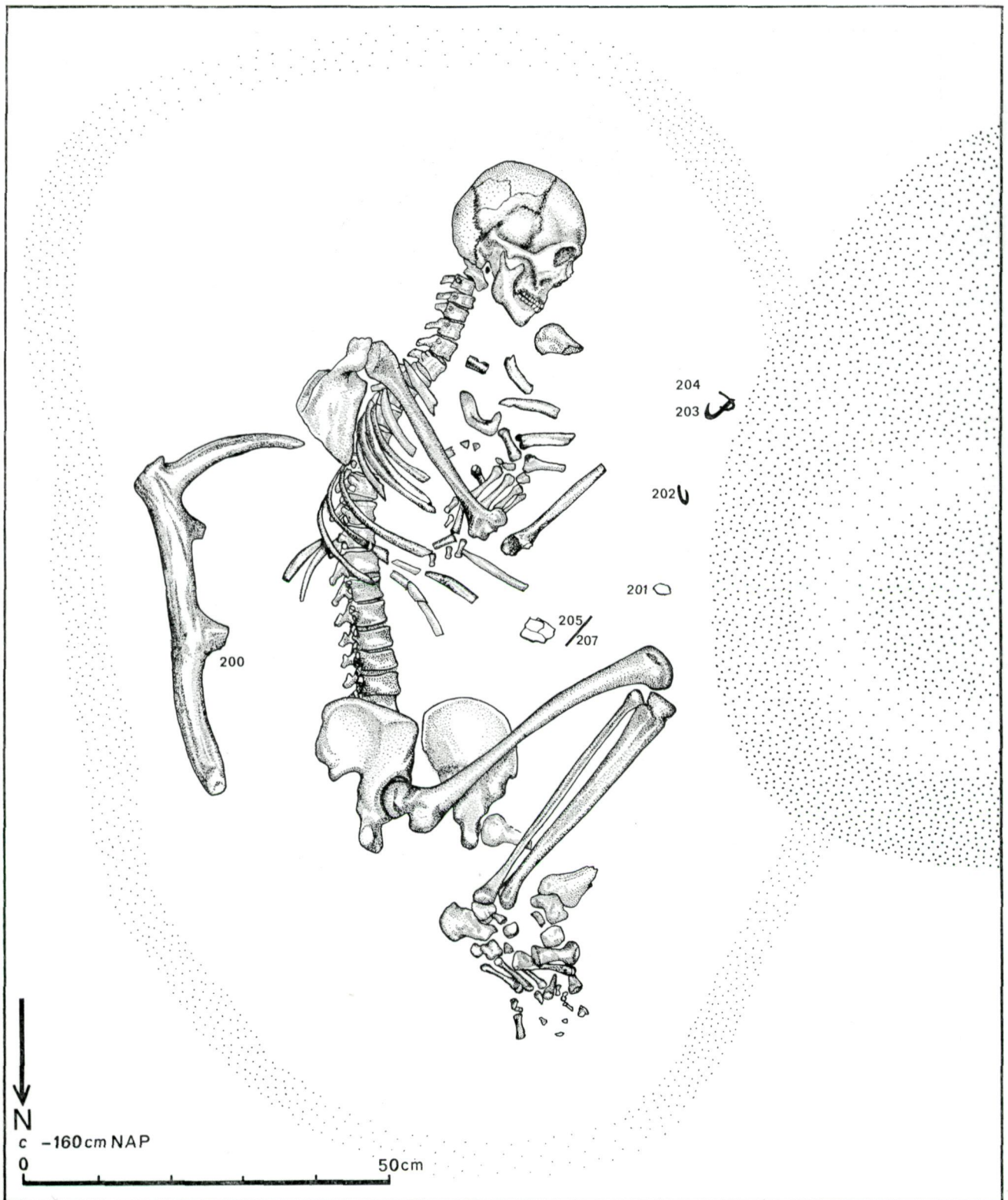


Fig. 106. Molenaarsgraaf. Grave II. Scale 1:8. Cf also note 55.

fig. 105). This depression will have been caused by the settlement of the sand which had been thrown back. In addition to the above-named *radius* a few very small sherds were found in the pit; two of them were decorated with fingertip impressions, on one in a V-motif and on the other arranged in lines (fig. 86 no. 199). Scattered about in the otherwise clean filling there were small pieces of charcoal, sufficient to form a  $^{14}\text{C}$  sample. In view of their occurrence, both the charcoal and the sherds are in secondary position. They must have been lying at the surface and became mixed up with the sand when it was thrown back <sup>54</sup>.

It is very astonishing that we recovered another missing bone from the gully filling. It is the 18.5 cm. long part of the other (right) *radius* (Pl. XIV), that fits well to the distal articular end that was preserved in the grave <sup>55</sup>. It was found in the "humic band" (*i.e.* deposit (1)) in the fifth square from the west, southern row (*cf.* fig. 65) during the 5th week of the first operation, so about two weeks before grave II was discovered and excavated. The bone was not recognized in the field but later by Miss Clason, during her study of the animal remains. The bone is important for two reasons. First, we can say now that the people who dug pit 199 did not do this for the human remains and that they threw them away in the gully. It is reasonable to assume that the other missing bones lie in the not excavated parts of the gully filling. Second, it is a very important chronological key. The find situation of this bone proves that the disturbance (pit 199) of grave II occurred in the second occupation phase. So pit 199 is contemporaneous with the gully finds and grave II slightly older: it is dated just before or in the beginning of the occupation phase 2.

The question whether the grave was disturbed intentionally or by accident is especially interesting. We can only offer a few ideas by way of answer. It is noteworthy that the direction, shape and measurements of pit 199 conform to those of a burial pit: oval, deep, with fairly steep sides, and 110 × 160 cm. in size. Possibly the digging of a second burial pit disturbed the earlier grave. The emerging human remains were thrown away in the gully, the intention to bury a person was abandoned and the pit was immediately refilled. It is equally possible that the situation of the grave was unknown and that the course of events was an accident and yet that somebody wished to bury near the earlier grave a person who had died later. Since we refound some of the removed bones we can say that the object was not the parts of the body themselves. So we can exclude reason of magic or religion for the disturbance of the grave. A more profane purpose seems more likely, namely an ordinary grave robbery. Costly grave goods such as a copper dagger or a wrist guard might very well have lain in the disturbed area. Moreover, these are the type of burial gifts of a grown man. The fact that a big part of the wickerwork was disturbed and then the skeleton, in two places, confirms in our opinion this last assumption of intentional disturbance of the grave. All we can say with any certainty, however, is that not much respect was shown to the dead person and that the disturbance took place shortly after the burial. Finally, we must mention the possibility that the disturbance might have been the work of dogs. The refilling of the pit and the recovery of some of the bones makes this, however, very unlikely.

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<sup>54</sup> For the charcoal see p. 259, for the sherds see p. 218.

<sup>55</sup> The articular end is not shown on the plan (fig. 106) because its true position is not certain: it was slightly displaced when the skeleton was cleaned. Its approximate position is visible on the photograph Pl. VIII.

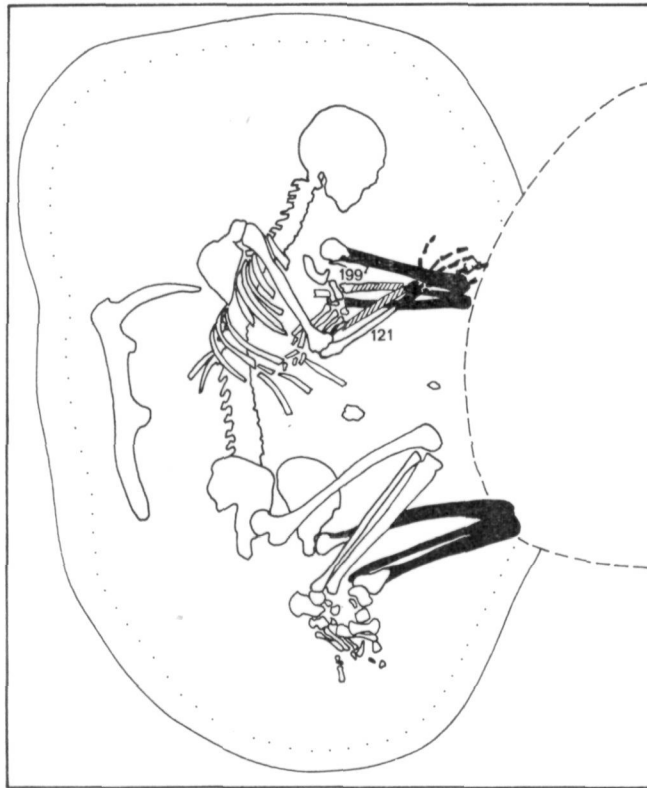


Fig. 107. Molenaarsgraaf. Grave II. Reconstruction of the original position of the missing skeletal parts. Bones recovered outside the grave are hatched, the other missing bones are black. Scale 1:20.

In spite of the absence of important skeleton parts, the position of the dead person could be exactly determined (figs. 106, 107). The crouched skeleton lay on its left side, with the head to the south, facing west. The arms lay folded before the breast. The left arm pointed from the body and was bent strongly at the elbow, so that the hand lay before the breast with its back uppermost. The right arm lay over the left and was slightly bent at the elbow, so that the (missing) right hand must have rested on the (missing) left elbow. Both legs were bent strongly, the right one to an angle of  $70^{\circ}$  to the spine, the (missing) left leg to about  $100^{\circ}$ . Both knees were bent at a sharp angle. Only the pelvis was somewhat displaced by the pressure of the sand filling of the burial pit. The other dislocations were caused by disturbance during the digging of pit 199. Only four phalanges of the hands and five of the feet are missing. This might be the result of various causes: the prehistoric and recent disturbance, the work of animals, decay and perhaps a slight carelessness during the excavation.

Although the skull was somewhat deformed after death, reliable measurements were possible. The skull (Pl. XIV-XVI) was clearly *brachycranial* with an *index cranicus* of 84.5 and shows a clear *planoccipitaly*. From the pattern of the skull sutures and the wear of the teeth it appears that the person died at about 30 years of age. All the teeth had come through, but a number, especially from the lower jaw, are missing as a result of the damage caused during

the weekend mentioned above. The teeth show clear traces of wear, both in the upper and the lower jaw. The skull gives the impression of belonging to a male person. Measurements of the right *femur*, *tibia* and *humerus* would seem to indicate a body height of 163 cm. Measurements from the vertical photograph showed about 162 cm. The long bones are not very robust. The left *os coxae* was clearly pathologically deformed (Pl. XV). Yet no manifest irregularities were found in the *femur* and *tibia* which can be linked with the above mentioned deformation<sup>56</sup>. The *corpus sterni* of the skeleton consists of three parts which have not yet grown together, which should have been the case at an age above 25 years<sup>57</sup>.

The grave goods (fig. 108) consisted of a pick-shaped antler implement, three bone fish-hooks and an awl, and four pieces of flint (a scraper, two retouched flakes, and one unworked flake).

The pick-shaped implement had been placed at the back of the body. It had been broken into three pieces in the recent damage; fortunately one of them remained in position, so that the original place could be exactly fixed. The pick is 45 cm. long and made from a naturally thrown right antler tine of a red deer, by breaking off the crown and the second and third tines. The break was done crudely without first weakening the place of fracture by carving or any other technique. The broken end of the main branch has, however, been trimmed to some extent. The branch seems to have been worn somewhat smooth at the place where the grip must have been. The only tine left (the eye tine) has a small worn surface at its point and longitudinal scratches, which were certainly caused by wear. The small facet at the tip could even have been made intentionally<sup>58</sup>. A great part of the rose at the rear side of the antler has disappeared by some form of use. It was used either to beat on or with it. In paragraph 4.9.4.5 we will discuss its possible use (p. 304). These possibilities comprise an agricultural hoe or a fish trap lifter. In the last case the instrument might also have been used to knock the poles, on which the nets and traps were tied, into the bed of the gully.

The three bone fish-hooks (fig. 108, Pl. IX B) lay in front of the body near the missing right hand. They are 4.3, 3.1, and 2.7 cm. long and fashioned from a flat or curved piece of bone. Clearly the piece of bone was first bored to make the bend of the hooks and then cut to shape. There are no barbs and no eyes. The largest hook has two notches round the top for the firmer attachment of the line. In cooperation with Dr R. Boddeke we made some experiments to determine the possible way of use and the fishes that might have been caught<sup>59</sup>.

The flint lay near the right knee, the small, carefully worked scraper separately, the three flakes touching each other. It cannot be determined whether they are the remains of one composite implement or whether they were placed there as separate gifts. It is noteworthy, however, that the retouched side of one flake and the side, with damage by use, of a second flake were

<sup>56</sup> But the left leg is almost completely missing!

<sup>57</sup> According to Miss A. S. Knip, the *corpus sterni* possibly belongs to a third individual. This is, however, impossible for archaeological reasons. Between the skeletal remains from grave II also one epiphysic disc was found, that must belong to another individual, but not to the boy of grave I. The anthropological data of grave II are also derived from Appendix V.

<sup>58</sup> We discussed this question with Mr G. Kortenbout van der Sluijs, Leiden, whom we thank for his valuable advice.

<sup>59</sup> The experiments are discussed in paragraph 4.9.8.7 at p. 333. We thank Dr Boddeke for his enthusiastic help and for his advice. Dr Boddeke is one of the most outstanding fishery experts in the Netherlands. He is a staff-member of the National Institute for Fishery Research at IJmuiden.

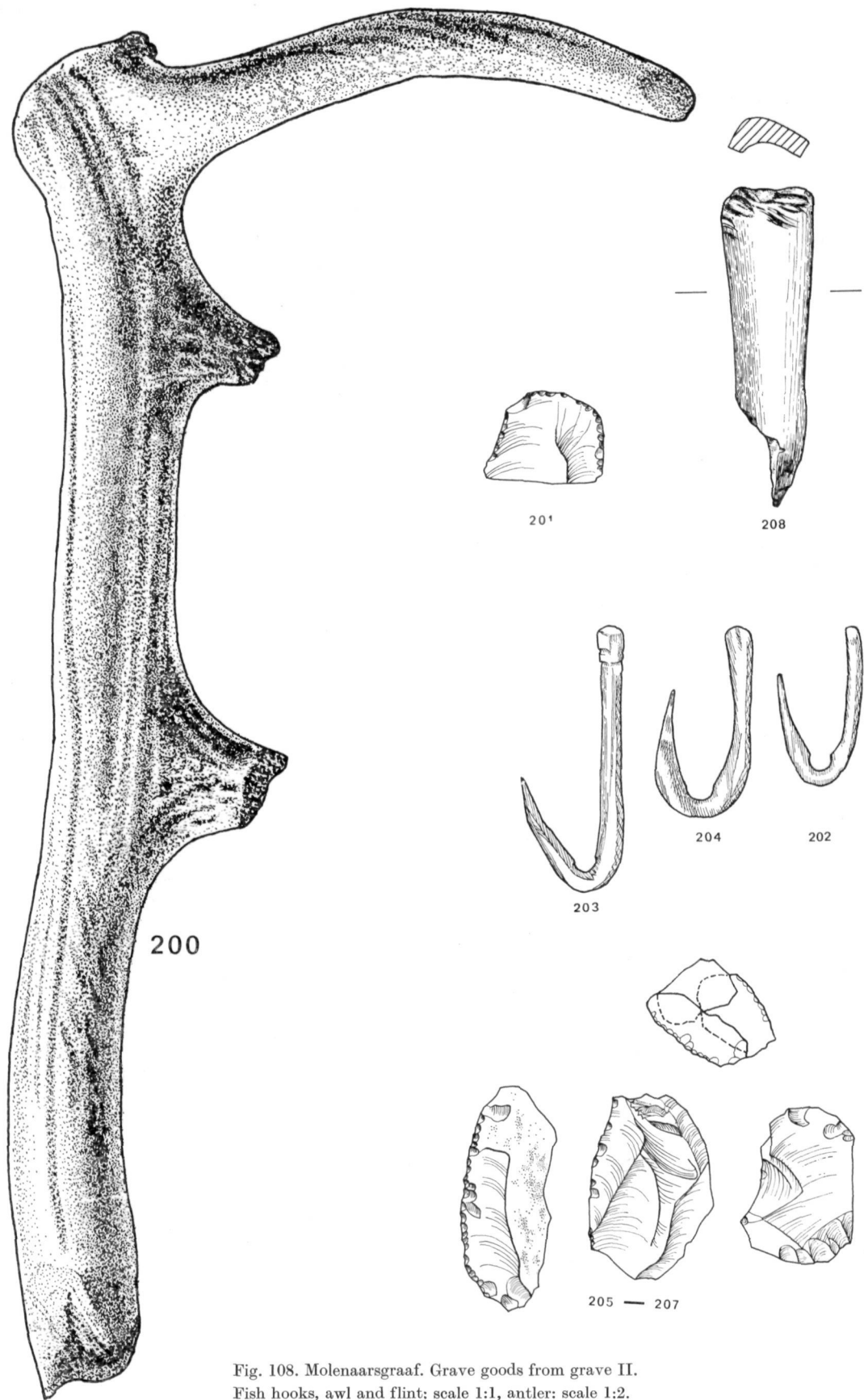


Fig. 108. Molenaarsgraaf. Grave goods from grave II.  
 Fish hooks, awl and flint: scale 1:1, antler: scale 1:2.

directed outwards. The third flake is unworked. It is possible that, when pit 199 was dug, some more pieces of flint and some fish-hooks were lost already in prehistoric times.

It is attractive to view all the grave gifts as associated with fishing. This is undoubtedly the case with the fish-hooks. The flints might have been used for scraping scales off the fish, and the hook we have already interpreted as a fish-trap lifter. The grave's situation alongside the gully also inclines us to consider it as the grave of a fisherman.

When the skeletal remains were studied in the Institute for Human Biology, Utrecht, some fragmentary animal bones in a variable state of preservation were found among the human remains. These are the second milk-molar of an ox, a fragmentary left *ulna* of a sheep or goat and three bone splinters. Moreover an implement was found: a fragmentary awl, with a highly polished surface (which points to a long use), probably made out of a metapodal. The point was recently broken off (fig. 108, no 208). This can be said of the relations of these finds with the interment: they must have been mixed up with the skeletal parts that were not collected one by one, but collectively, *i.e.* between the bones from the recently disturbed area near the skull and breast or between the ribs. The first possibility seems most probable. In view of the fact that no worked bones were found at all among the collected bone material from the site, it is highly probable that the awl once formed part of the grave inventory. The other bones, however, are ordinary refuse that got either in prehistoric times or recently mixed up with the sand of the grave filling.

Near the head end of the grave and on its axis line, but without cutting across it, there was a large pit (no. 210) with abundant traces of fire along its walls and floor (fig. 105). The pit is perfectly round (diameter about 140 cm.), has steep sides and a fairly flat floor. The peculiar situation of this remarkable pit can only be explained by an exact contemporaneity with grave II, which is confirmed by the  $^{14}\text{C}$  date (p. 259). The very scanty finds from pit 210 consist only of two decorated sherds, one of which plainly comes from the neck of a Veluwe Bell Beaker (fig. 86). As these sherds are very probably in a secondary position we must take this dating as a *terminus post quem* for the pit and accordingly for the grave too<sup>60</sup>. This implies its placing at the end of phase I or later. We interpret the pit as the remains of a large fire which burned as an element in the burial ceremony. With the contents of the pit a small mound was perhaps thrown up over the grave. No traces of this were found, however. The other pits in the group around grave II contain hardly any charcoal, yet they are of similar shape, and the finds in their fillings indicate a dating in the same occupation phase. It is possible that they also played a part in the burial ceremony.

We will at last mention a find, that on various grounds (the situation, some stratigraphic arguments,  $^{14}\text{C}$  dates, its extraordinary character and comparable finds at other excavations), must be brought in connection with grave II. On the western bank of the gully at about 5 m. distance to the north-east of grave II a concentration of charcoal and sherds from one pot was found. By their similar extension and concentration it was clear that both, charcoal and sherds, belonged together. Only a half of the concentration was situated in the excavation pit. We argued above (p. 185) that the finds originate from a phase when the part of the bank

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<sup>60</sup> When we convert the line of reasoning, the well-founded dates of grave II prove that the sherds are indeed in secondary position.

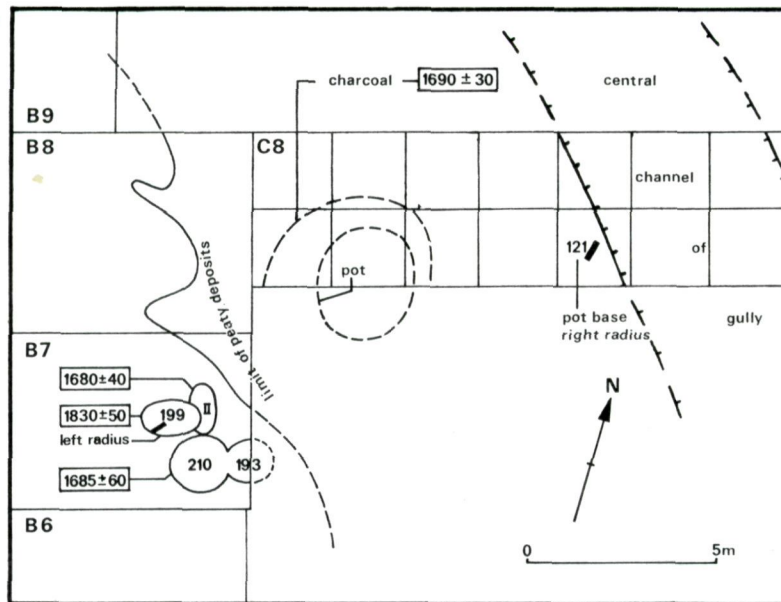


Fig. 109. Molenaarsgraaf. Grave II, surrounding features and finds that are brought into connection with it. Scale 1:200.

concerned was not, or only slightly, covered with peat and so may be placed before, or contemporaneously with the oldest finds in the gully filling. This means before or at the beginning of the occupation phase 2. That both concentrations partly coincide with a slight concentration of domestic refuse (*cf.* fig. 65 c, d) can be the result of the local topographical situation.

That this is an unusual find emerges clearly from the fact that these are almost the only sherds found during the whole excavation which fit each other and made out in this case almost half of the upper part of a pot. An occasional sherd which does not fit fills in the picture that is completed by a base sherd found some distance away in square b4, which is undoubtedly a part of the pot in view of its workmanship, colour, form and size, and also by a sherd found in the direct vicinity bearing the same red impressions as this pot<sup>61</sup>. The rest of the pot probably lies for the most part still in the ground.

The pot (fig. 88) is preserved to a height of 18 cm. which is increased to 20 cm. by the sherd which does not fit. The original height was probably about 27.5 cm. The outer diameter of the rim is about 21 cm, of the belly about 20 cm., which measurements cannot, however, be exactly fixed because of the fragmentary character of the pot. It has an S-shaped profile. The rim is turned outwards, the belly (at about half the height) is somewhat accentuated, the accentuated foot is massive. Directly under the thick, round rim and separated from it by a deep groove, runs a pronounced cordon. In the groove there are a large number of fairly small perforations at distances of 1½-3 cm. Most of the pot under the cordon is decorated with

<sup>61</sup> That this is the same square in which the *radius* was found, might be purely accidental.

impressions from a thin, hollow stick, probably a reed, at distances of 3-8 mm. in somewhat sloping lines, 11 in number and mutually separated by about 1.5 cm. The lowest part (10 cm.) of the pot is undecorated. The reed impressions only appear in a few places as pure circles; usually the reed was held at an angle and it seems as if it was frequently blocked with clay. The colour of the pot is grayish brown (2.5 Y 5/2) to black (5 Y 2/1), like all the sherds from the peaty gully filling. The thickness of the walls is generally 11-12.5 mm. although at some points at the belly it is as much as 16.5 mm. The foot is internally bowl-shaped and in the middle 25 mm. thick. The somewhat sandy clay is sparsely tempered with some pounded pottery and stone grit. The horizontal break below the belly lies at 1/3 of the total height and is situated at a point where two clay coils or bands were kneaded together. Apparently the pot was built up in three stages: first the bottom up to 9 cm. and subsequently two equally wide clay bands. The surface is somewhat uneven, yet it has been smoothly polished. On the inside, especially at the belly, and along the outside around the neck there is a charcoal crust, so that we may say this pot was used for cooking. It was finally thrown into the damp bank zone of the gully, with part of the fire. Typologically the pot fits very well to the other finds from the gully, and must undoubtedly be attributed to the BWB Culture.

The reasons why we connect this find with grave II are first, the very similar <sup>14</sup>C dates of both features. Second, the stratigraphical position of the pot, which implies an equal or slightly older age than the *radius* fragment found in the gully filling. Third, the extraordinary character of the find and its position at a very short distance from grave II. Fourth, the connection is supported by parallel finds, as we will point out in paragraph 4.9.3.2 (p. 288).

The <sup>14</sup>C dates of grave II and the features connected with grave II are:

GrN 5566	3630 ± 40	(1680 B.C.)	bone, right <i>femur</i> skeleton II
GrN 5132	3780 ± 50	(1830 B.C.)	charcoal, from pit 199
GrN 5705	3635 ± 60	(1685 B.C.)	charcoal, from pit 210
GrN 5176	3640 ± 30	(1690 B.C.)	charcoal, concentration near pot on the gully bank

As already stated, these <sup>14</sup>C dates confirm the situation suggested by archaeological considerations. Yet the remarkable correspondence of three out of the four dates does not prove in itself exact contemporaneity. The <sup>14</sup>C dates by their margin of error permit a fairly substantial time difference between the dated objects. The same applies to the equally remarkable similarity to the date of grave I. Both graves may very well vary in age by a few decades, although bearing all data in mind, a fairly close contemporaneity seems most likely. The only divergent element is the date of pit 199. But we argued already above (p. 253) that the charcoal is in secondary position and does not necessarily date the moment when the pit was dug. Before the <sup>14</sup>C dates were known we imagined that the charcoal in the pit 199 filling came originally from the fire in the somewhat older pit 210. The extent of the difference between both dates now renders this improbable. The charcoal is more likely to have been already present on the site before the laying out of the cemetery. It may be that the site was burnt out when it was taken into use or that a small, older fire place was disturbed during the digging of pit 199. The dating represents, in our view, phase 1 and perhaps its beginning.

### *Recapitulation*

About 1700 B.C., shortly before or at the beginning of the second occupation phase, in

the immediate vicinity of the gully, a 30-year old man, 163/164 cm. tall, was buried in a crouched position upon his left side in a burial pit situated at  $-160$  cm. NAP and with a SSE-NNW orientation, with his head to the SSE and facing west. The oval burial pit was  $80 \times 145$  cm. and reinforced with wickerwork. The man was given burial gifts of an antler hook, three small bone fish-hooks and four pieces of flint, from which we may assume that he was a fisherman. His skull was clearly planoccipital-brachycranic. At the head end of the grave a large fire was burnt in a pit as a part of the funeral ceremony. A large pot, attributable to the BWB Culture and in every respect resembling the material of the occupation phase 2, was used in this ceremony and thrown into the bank zone of the gully together with the remains of a fire. Shortly (about 20 years) after the interment a pit was dug, partly disturbing the grave and resulting in the loss of some of the skeletal parts. The pit was filled up immediately after the digging and the removed human remains were partly left in the pit and partly thrown in the gully. The position of the *radius* in the gully demonstrates that the disturbance took place during phase 2.

#### 4.7.4. GRAVE III (figs. 110-113, Pls. X-XI A)

Grave III, in the middle of B7, was only visible in the excavation by a few irregular grey marks. Only after digging to some depth did an E-W orientated, rectangular pit with rounded corners of  $80 \times 120$  cm. reveal itself, mainly by a different colouring of the natural rust (fig. 110). In comparison with the other graves the pit was very shallow, only reaching  $-123$  cm. NAP. There was no evidence of reinforcement of the pit by some way of casing. A curious phenomenon, for which we have no explanation, was the presence of two ditch-like traces connecting with the western end of the grave pit. The extreme eastern end of the grave had been disturbed during the 16th century sand-digging operations.

The skeleton of a small child (fig. 112, Pl. X) lay, somewhat to the east of the middle, in the pit, which was far too big for its occupant. It was not lying exactly on its right side, but was turned a little on its back, with its head to the west and facing south. The left arm rested on the ribs and was bent to about  $90^\circ$  at the elbow so that the hand lay in front of the belly. The lower (right) arm will also have lain in this position, although this arm was not observed *in situ*. The legs were drawn up to angles of  $80^\circ$  and  $90^\circ$  between the *femur* and spine. The knees were well bent. The upper part of the paper-thin skull had been pressed into the cranial cavity by the ground lying on top of it. A number of small holes were made with measuring pegs between and through the parts of the skeleton by the same people who disturbed grave II, without their being aware of this skeleton. Near the knees a few loose skeletal parts were found, namely the right *scapula* and *clavicle*, and a few rib fragments. These must have been displaced by digging animals.

The skeletal remains are probably those of a female child of about  $1\frac{1}{2}$  years of age. The state of preservation made it impossible to take reliable measurements for a comparative enquiry. The length of the body, determined in the excavation photograph, is 75-76 cm.<sup>62</sup>

In the western part of the grave pit, near the head, lay a small beaker as the sole burial

<sup>62</sup> The anthropological data of grave III are derived from Appendix V.

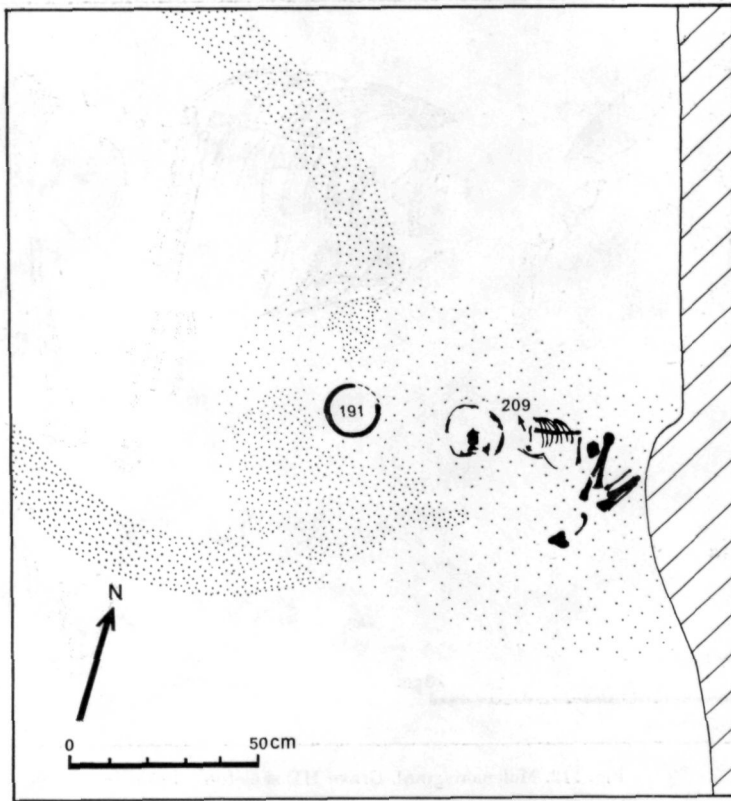


Fig. 110. Molenaarsgraaf. Grave III and surroundings. Scale 1:20.

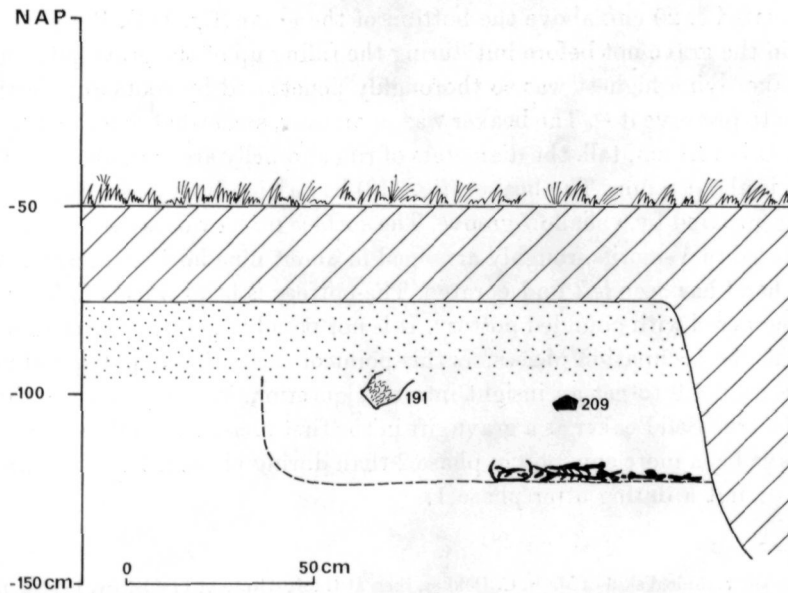


Fig. 111. Molenaarsgraaf. Grave III. Schematic west-east section. Scale 1:20.

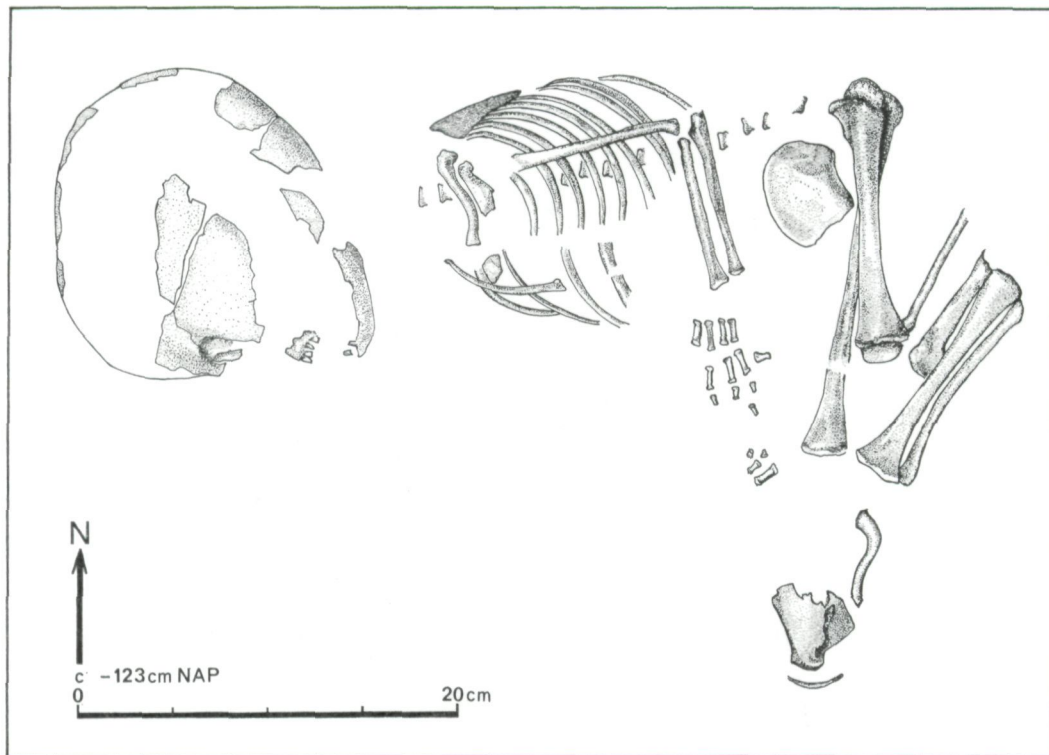


Fig. 112. Molenaarsgraaf. Grave III, skeleton. Scale 1:4.

gift. It lay at a somewhat higher level than the skeleton, to be exact the lowest point of the beaker was situated c. 20 cm. above the bottom of the grave (fig. 111). We must assume that it was placed in the grave not before but during the filling up of the grave pit. The part of the wall of the beaker lying highest was so thoroughly penetrated by roots and destroyed that it was impossible to preserve it<sup>63</sup>. The beaker was, moreover, somewhat deformed by the pressure of the ground. It is 13.1 cm. tall, the diameters of rim and belly are both about 12.6 cm., and the wall thickness is about 6 mm. The beaker (fig. 113) has a high belly and a funnel-shaped neck. The neck is accentuated by a shallow groove. The surface under this is decorated with fingertip impressions placed in V-motifs, roughly arranged in about nine horizontal rows. At the widest part a narrow band has been left undecorated. The pottery is black with a light gray (2.5 Y 7/2) surface; it is tempered with pounded pottery. It is not possible to attribute the simple domestic beaker to one of the occupation phases, at this point of the discussion. We will need the data presented in section 4.9 to get an insight into this question. We only can say that we should have expected a true Bell Beaker as a grave gift in the first phase and that fingertip impressions, appeared to have been more common in phase 2 than during phase 1. But these are not enough arguments to permit a dating after phase 1.

<sup>63</sup> Thanks to the technical skill of Mr B. C. Dekker, then at the Institute of Prehistory, Leiden, the greater part of this small pot has been preserved.

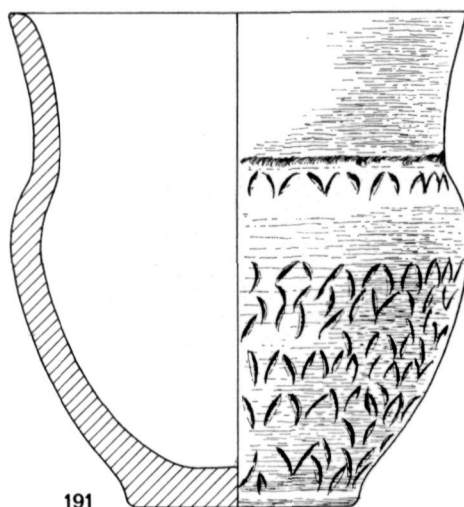


Fig. 113. Molenaarsgraaf. Beaker from grave III. Scale 1:2.

Also in the pit filling, about 20 cm. above the shoulders of the skeleton, lay a very badly weathered piece of granite (figs. 110, 111 no. 209) which might be a grave gift or came there accidentally during the filling of the pit.

Owing to the lack of suitable material no  $^{14}\text{C}$  determination could be carried out.

The child skeleton was removed in its entirety. To do this the surrounding sand was excavated until a block of sand, as small as possible yet fairly high, remained under the skeleton. A sharpened steel plate was pressed under it by using spades as a lever and, on the other side of the block of sand, using a wooden board to give counter-pressure. Around the block of sand and on the steel plate a wooden frame was built, after which the cavities were filled up with sand and the skeleton was covered with sheet plastic and sand. The whole, weighing about 70 kg., was lifted by two men and, completely intact, was sent by car to the Institute of Human Biology in Utrecht.

#### 4.7.5. GRAVE IV (fig. 114)

In the west of pit Z10 grave IV became visible with the same characteristics as grave I (level 2) and grave III, as such burial pits elsewhere also generally are revealed. The fairly small pit ( $60 \times 105$  cm.) was orientated in an E-W direction and was rectangular in shape with rounded corners. The sides were practically vertical. The bottom of the pit lay at or below  $-150$  cm. NAP, the present ground water level. The filling was pale yellow with a few marks of "dirty soil" in the upper levels, and was distinguished from the undisturbed soil especially by a different colouring of the natural rust. Very careful search revealed, however, neither a skeleton nor grave goods, so that we must conclude that the pit, from every point of view a grave pit, was never used as such and is, in fact, a cenotaph.

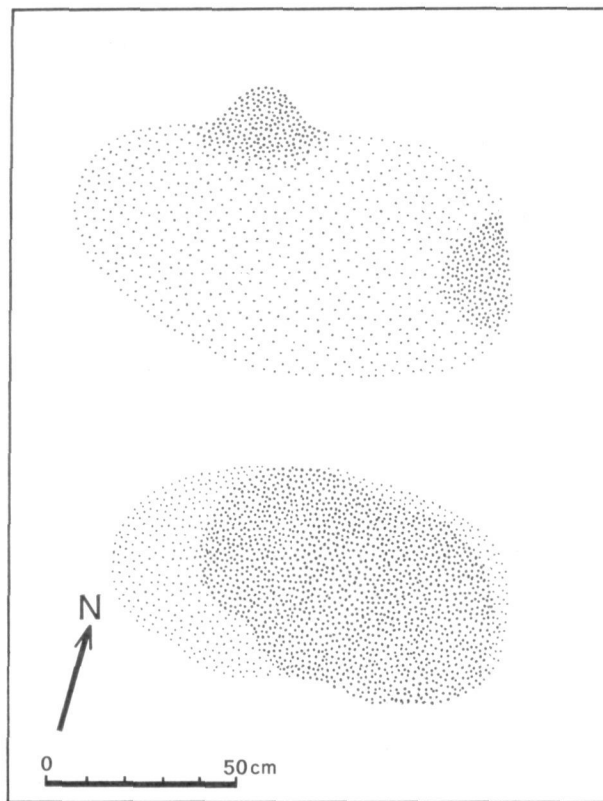


Fig. 114. Molenaarsgraaf. Plan of grave IV at two levels. Scale 1:20.

#### 4.7.6. OX GRAVE (figs. 115-116, Pls. XI B-XII)

In the fourth week of the second operation a bovine animal's skeleton was found near the north section of pit Z10 when sections were cut across a number of small irregular discolourations. To examine adequately all the soil traces in the surroundings the pit was enlarged northwards by means of a small extension.

No trace was found of any pit whatsoever, although it was clear from the skeleton's position that the animal had been buried in a pit. The animal lay at ground water level (about -150 cm. NAP), a depth at which soil traces have completely disappeared. But no pit was observed at a higher level either. All this indicates an especially clean filling of the pit, which may mean a dating early in the occupation period. The pit is located, however, somewhat marginally in the settlement terrain and in an area where the "occupation layer" has not been very strongly developed.

All observations, namely those relating to the position of the skeleton, the situation in comparison with the human graves, and the situation in the settlement, refute any idea that the animal got buried accidentally and by natural forces, for example during the sanding-up of the river as washed-up carrion.

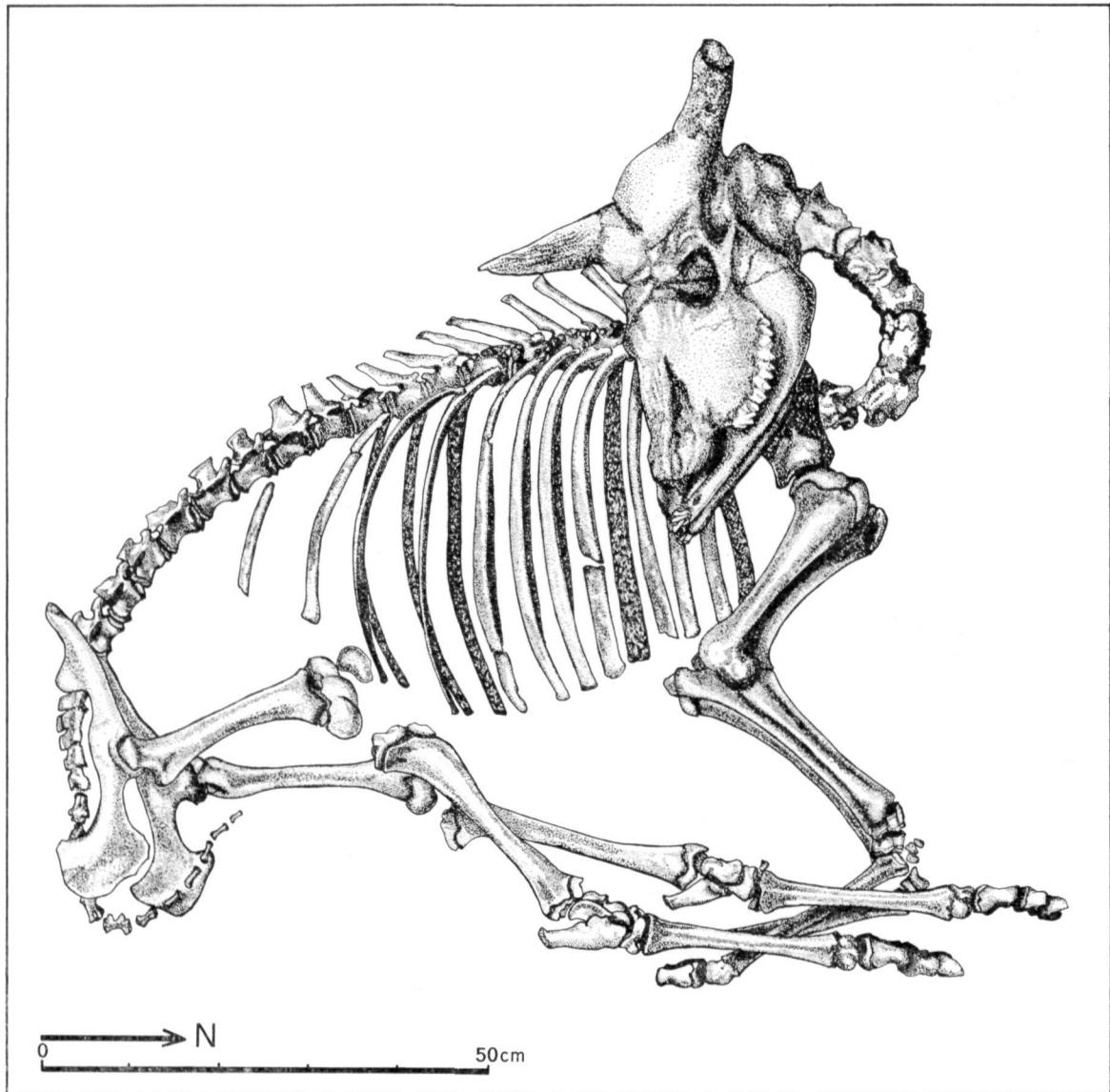


Fig. 115. Molenaarsgraaf. Skeleton of a young domestic ox. Scale 1:8.

The ox was about  $1\frac{1}{2}$  years old, and its sex cannot be determined. It was fairly sturdy and short-horned <sup>64</sup>.

The animal lay on its left side, in a N-S direction, with its head to the north. The neck was folded back, so that the skull rested on the right shoulder-blade. The rear legs were

<sup>64</sup> Identified by Miss Dr A. T. Clason, Groningen.

stretched out along the belly over the *metacarpals* of the front legs, which were folded right back. The tail lay between the legs and along the underbelly. It was noteworthy that most of the *phalanges* were missing from both forefeet (cf. fig. 116). The two last *phalanges* on the left and right were missing from the right forefoot, as were all three *phalanges*, left and right, from the left forefoot, and also the distal articular ends of the *metacarpal*, which had been broken off at the growing-zone.

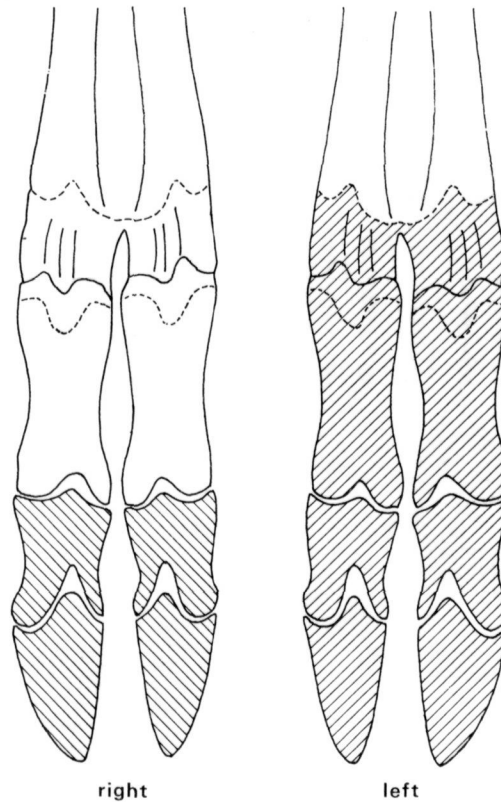


Fig. 116. Molenaarsgraaf. Ox skeleton. Forefeet, missing *phalanges* hatched. Scale 1:4.

It is important that the frontal legs were bent below the rear legs, and that they lay on a depth where preservation conditions were very good. So the fact that the *phalanges* were missing is certainly not the result of poor conservation. Only the uppermost skeletal parts were in a bad or even very bad condition: the skull, the *cervical vertebrae* and the right transverse projections of the other *vertebrae*. The *phalanges* of the rear legs were also in a poor state, but it was attested that all were present, although the hoof *phalanges* of the uppermost (right) leg could not be preserved. For the interpretation of the lack of the mentioned *phalanges* carelessness during the excavation can be excluded. It might be the work of digging animals, but we do not think this very likely. Most probable seems to us that the forefeet of the ox were cut off

when it was buried. This might have been the case when the animal was skinned before the burial<sup>65</sup>. But why the rear *phalanges* are still present then?

As to the dating of the ox grave we name the following arguments. First, the situation demonstrates a relation to the other graves: the ox burial seems to be part of the cemetery, which means an age about 1700 B.C. Second, we might use the lack of a visible pit filling as an argument in favour of a very early date, a moment when the occupation layer was not yet formed. One thinks in this case of an initiation sacrifice. But we said already that the marginal position of the grave must have played also a role. Moreover, the other grave pits (esp. grave II) were likewise hardly discernable. To bring some clarity into this problem, a metapodal was <sup>14</sup>C dated, but with a disappointing result:

GrN 6218 4385 ± 105 B.P. (2435 B.C.) (bone)

This date must be at least 3 centuries too old, in view of all the geological and archaeological evidence. So we will leave this <sup>14</sup>C date out of consideration. It is not possible to explain the discrepancy at the moment.

The question why the ox was buried cannot be answered, since the excavation itself gives us hardly any information on this problem. We only can say that a connection with the cemetery seems more probable than one with the settlement at this point of the discussion. But this theory is seriously undermined by the situation in another "occupation centre" on the Schoonrewoerd stream ridge (Ottoland-Oosteind), where only one grave, containing a pig, was found in an area of 20 × 40 m. But we must refer to section 4.9.7. for further comment.

#### 4.7.7. COMPARISON OF THE GRAVES

The data about the individual graves are here summarized to facilitate comparison.

The orientation of the graves was E-W or about N-S. A factor in the orientation could be either a possible cultural tradition or the direction of the ridge and gully.

The measurements of the pits are fairly uniform; the large pit for the small child is remarkable in this respect.

The depth of the pits provided us with a reliable, closely dated ground water table, for they could not have been dug deeper than the ground water table of that time as they would immediately have filled up by seepage. The bottoms of the grave pits all lie between —165 and —150 cm. NAP, while the depth of the pit is dependent upon the height of the place (fig. 117). Only grave III (the child's) diverges markedly from this. The floors lie in two graves directly below the present ground water level, except for grave II. There the ground water table is now relatively high due to the direct proximity of the moist gully filling. But when the gully was open, the phreatic surface here must have sloped more steeply towards the open water. The floor of grave IV also lay below the present ground water level; the pit left traces down to

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<sup>65</sup> Cf. Groenman-van Waateringe 1970, 5.

TABLE 24

*Molenaarsgraaf. Survey of the data from the graves*

	Grave I	Grave II	Grave III	Grave IV	Ox	
Grave pit	orientation approx. orientation exact measurements (cm) depth (cm) bottom at ...cm NAP structures	E-W 10° S. of E. 130/135 × 80/95 89 — 165 rectangular chamber	NNW-SSE 20° E. of S. 145 × 80 63 — 159 oval chamber	E-W 10° S. of E. 120 × 80 39 — 122 none	E-W 5° N. of E. 105 × 60 62 — 150 none	N-S 15° E. of S. c. 63 c. — 150 none
Skeleton	on the... side details position  head in the... looking... angle at pelvis angle at the knees arms, hands sex age length (cm) skull, index skull, type	left turned on the back  east south 90° sharp before breast male c. 15 yrs. 162-163 94.6 brachymorphic planoccipital	left strictly  south west 70° & 100° sharp before breast male c. 30 yrs. 163-164 84.5 brachymorphic planoccipital	right somewhat turned on the back west south 80° & 90° sharp before breast female 1½ yrs. 75-76 — —	— — — — — — — — — — —	left —  north — — — — 1½ years — — —
	grave gifts  <sup>14</sup> C dates, bone <sup>14</sup> C dates, other	Veluwe B.B.  1685 ± 40 B.C. —	antler hook, awl 3 fish hooks 4 flints 1680 ± 40 B.C. 1685 ± 40 B.C.	domestic beaker  — —	none  — —	none  2435 ± 105 B.C. —

this level, but the lack of finds made it impossible to determine the depth of the floor itself. There must have been a ground water table of about —160 cm. NAP or slightly lower at the time of the cemetery, about 1690-1680 B.C. We obtained the same result based on the sediments and finds in the gully.

The structure of the graves varies. In two instances reinforcement of the burial chamber occurs, yet these two graves are of rather different character. There are no indications of surrounding structures or barrows.

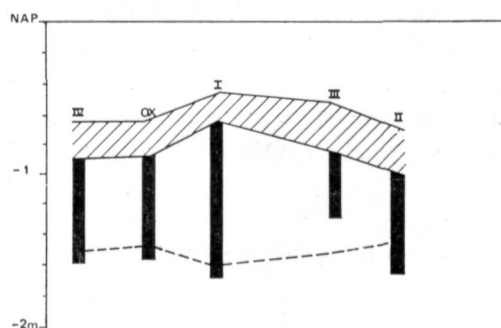


Fig. 117. Molenaarsgraaf. Depths of the graves and the present ground water table.

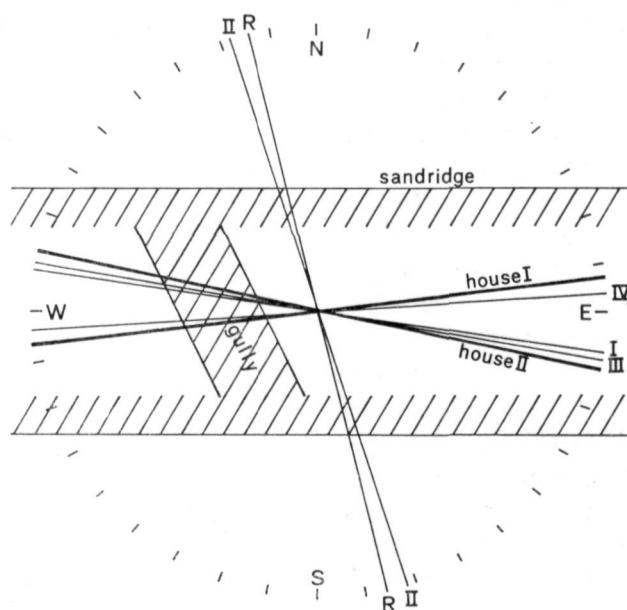


Fig. 118. Molenaarsgraaf. Schematic representation of the directions of various features. R = ox burial.

The dead in all cases lie in a crouched position, although there is a fairly considerable variation in details. The position of the arms in particular varies widely, even though the hands were always laid in front of the breast. The backward turn in graves I and III as against the skeleton lying exactly on its side in grave II is an important difference. Both men were buried on their left sides, with their heads in a comparable direction in the grave. We can say that grave II shows a clockwise rotation of about  $70^{\circ}$  in relation to grave I. The little girl lies on her right side, with her head in the other direction facing south, which direction again is similar to that of the other two. Three skeletons provide naturally insufficient evidence to deduce any rule.

Anthropologically the only two measurable skeletons (I and II) are very similar. Both

skulls are clearly brachycranial and planoccipital. The body length corresponds well (but the boy was not yet full-grown!), as does the limited robustness of the bones.

— Grave-goods were encountered with each skeleton. The variation is fairly considerable: the child having a simple little pot, the boy a better piece of pottery and the man some equipment, used to obtain food. Also the position of the grave goods in relation to the skeleton varied.

#### 4.7.8. THE CEMETERY: DATING AND RELATION TO THE SETTLEMENT.

The interpretation of the data provided by the graves requires the proposal of a number of more or less likely alternatives, which increase in number the more one goes into detail. It is indisputable that the occupation and the cemetery coincide both in space and time, although the cemetery was in use for only a part of the occupation period.

The absolute duration of the cemetery is difficult to determine. Here it is mainly the interpretation of the data concerning each of the graves which is of importance. By emphasizing the differences and using the margin of error of the  $^{14}\text{C}$  dates we can form a sequence of the longest possible duration of the cemetery, although even so this can have lasted no longer than about two centuries. The sequence in this model is as follows: ox (initiation sacrifice about 1800 B.C.), grave I (1750 B.C.), grave II (1675 B.C.), grave III (1600 B.C.). The cemetery thus occupies almost the entire phases 1 and 2, as we defined these when discussing the pottery. So in this model the burials took place certainly in the occupied settlement. This "long chronology" has to our opinion, however, a rather artificial character. We prefer to reject this model in favour of the alternative interpretation, which stresses the contemporaneity of events: all graves may have been dug in a short period about 1690/1680 B.C. Supporting this interpretation are the corresponding  $^{14}\text{C}$  dates and the positions of the graves I and II in the relative chronology of the occupation. The regular lay-out of the cemetery and the small number of graves are also more in accordance with a short period of use. The "short chronology" appears to make more sense and it seems best to assume a period of some decennia for the cemetery. This view implies a very small chronological distance of the Bell Beaker from grave I and the large, typical BWB Culture pot from the gully bank. So we can say that the cemetery has the characteristic: "transition from VBB to BWB". In section 4.9.5 (p. 305 f.) we will concentrate on this problem and demonstrate that the "outside evidence"<sup>66</sup> confirms that during the period in which the cemetery was in use, the change took place from the late BB Culture to a complex of finds that may be classified as Barbed Wire Beaker Culture.

The relation between the cemetery and the settlement is the second point for discussion. It is a complex problem, since so many sequences and relationships, factually the complete internal chronology of the site, are involved. The cemetery has a key position in the construction of a chronological model of the site. The most important relationships are shown in the scheme at fig. 118. The large scheme at fig. 119 is a correlation table of the various chronologies of the settlement and forms a schematic representation of the geological and archaeological events at the site. We have the sequences:

<sup>66</sup> Cf. p. 279.

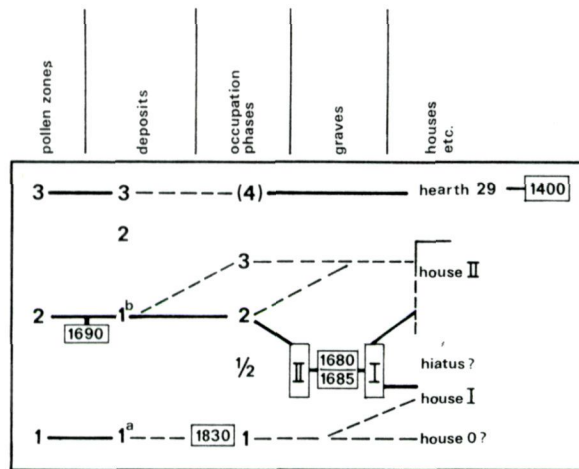


Fig. 119. Molenaarsgraaf. Chronological relationship of the most important features.

- of the gully deposits (0, 1, 2, 3 *etc.*),
- of the pollen zones (1, 2, 3 *etc.*),
- of the occupation phases, based on the archaeological material (pottery) (1, 2, 3, (4)),
- of the soil traces (house I, hiatus (?), house II),
- of the  $^{14}\text{C}$  dates (1830, *c.* 1685, 1400 B.C.).

The pollen zones and the gully deposits are self-evidently firmly linked together. By means of the gully finds the occupation phases could be easily linked to this system too. The cemetery is of much aid when we want to attribute the houses to a special phase. We established the following sequence of relationships:

- house I belongs to the early soil traces,
- grave I is contemporaneous or slightly later than house I,
- grave II is contemporaneous ( $^{14}\text{C}$  dates) with grave I,
- the beginning of occupation phase 2 is contemporaneous or slightly later than grave II.

Following this line of reasoning, house I is dated to occupation phase 1 or to the last part of it. House II is later and must belong to phase 2 and/or phase 3. The distribution patterns of the pottery informed us that the house at least belongs to phase 3, since the undecorated element concentrates in the zone, precisely covered by house II. In this model there is room for a "house 0", that might have existed in the western part of the excavation, during the beginning of phase 1. There is also room for the supposed hiatus between the houses I and II during (the first part of) phase 2.

In this model, which fits all data best, the grave field itself is fixed in between the phases 1 and 2 in a transitional phase 1/2. We must conclude that it is not possible to make out whether the settlement was occupied or not. The phase 1/2 will have been short and might be simply the end of phase 1. House I still might have been inhabited. Moreover the gully finds do not necessarily include the moment when the new find complex of phase 2 was introduced for the

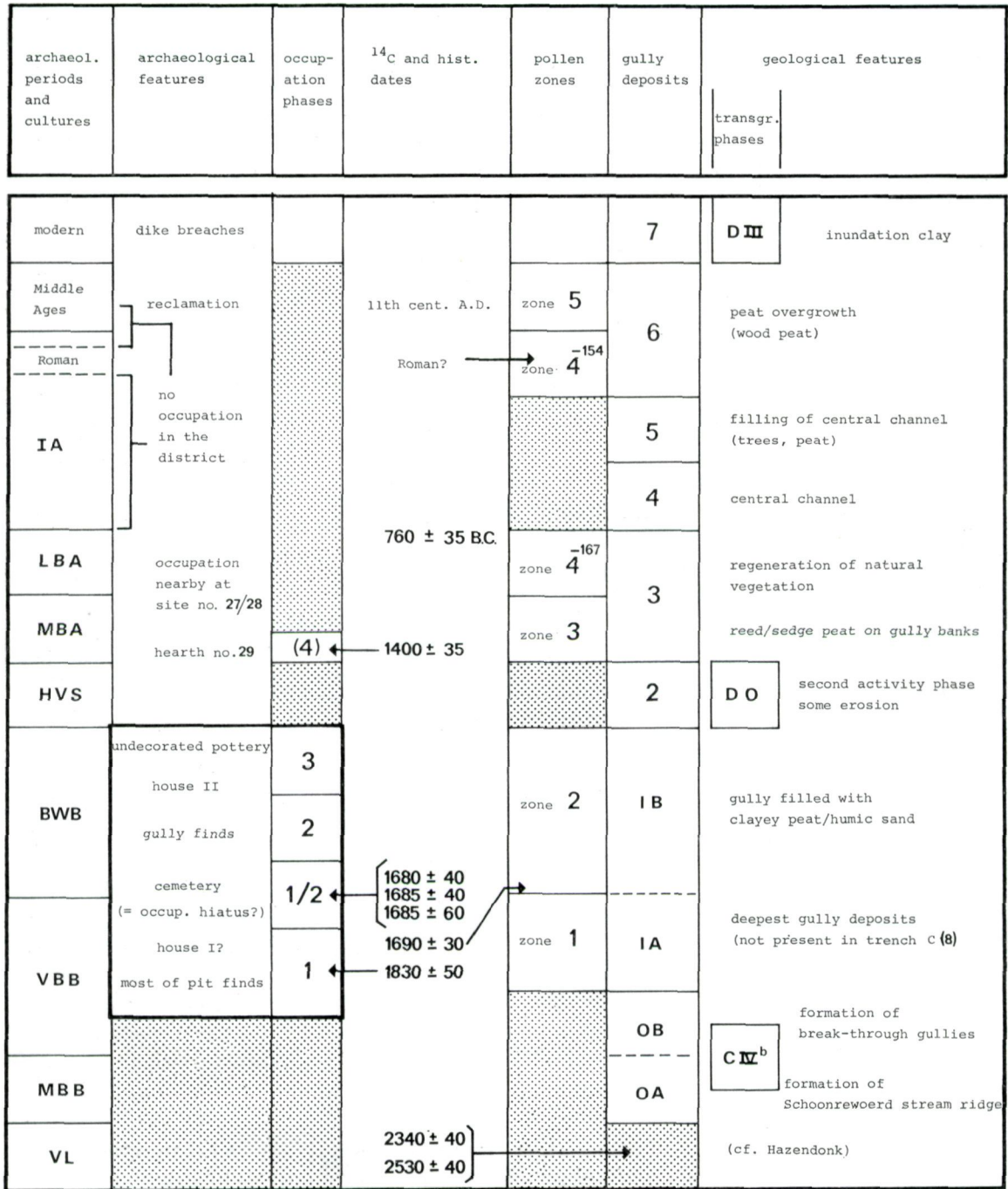


Fig. 120. Molenaarsgraaf. Schematic chronological representation of the settlement.

first time. They might comprise only a (the later) part of it. So a seeming occupation hiatus, which might be concluded from the sudden change in the pottery between the phases 1 and 2 might merely originate from a lack in our information.

Must we leave now the question: "burial in the settlement or during a hiatus?" unanswered? We do not think so. There are arguments that plead for the last-named possibility. First, the chronological position itself in between the two well recognized occupation phases. Second, why no people were buried before and after this short phase 1/2, in the time we know that the terrain certainly was occupied? Third, we know two other graves on the Schoonrewoerd stream ridge and both were certainly not situated in a settlement. At Ottoland-Oosteind no human graves were found in the  $40 \times 20$  m. large area which we excavated and which certainly comprised the centre of the Beaker settlement there. So burial in the settlement certainly was not common practice. To our opinion it's certainly allowed to consider the habits observed at these sites appropriate also to Molenaarsgraaf, since all VBB/BWB occupation centres ("settlements") on the Schoonrewoerd stream ridge factually formed together a whole. *i.e.* a long settlement consisting of single farms, of which "Molenaarsgraaf" is one, as we explained at p. 106 f.

After the foregoing considerations it is interesting to make an approximation of the time the cemetery was in use. For this purpose we must start from the following presumptions:

— The cemetery was in continuous use by the inhabitants of one of the farm sites on the Schoonrewoerd stream ridge. Above (p. 109) we demonstrated that a number of 7 inhabitants appears to be the most likely.

— The mortality rate in such a farm site was about  $50\text{‰}$  per year (babies of less than one year old included) or about  $40\text{‰}$  per year, when we exclude these <sup>67</sup>.

Reasoning from these starting points we arrive at one burial every 4 year, which means a duration of about 20 years for a cemetery consisting of 5 graves. A duration of a few decennia concurs well with the data mentioned earlier in this paragraph and the model we worked out for the Molenaarsgraaf settlement. It would mean that the short hiatus between the phases 1 and 2 (*i.e.* phase 1/2) might have had a similar short duration.

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<sup>67</sup> Modderman (1970, 206) used slightly lower values in establishing the number of inhabitants of the Linear Bandceramic settlement of Elsloo: a mortality rate of  $30\text{--}40\text{‰}$  of which  $\frac{1}{2}\text{--}\frac{1}{3}$  was formed by children of less than 10 years old, who were generally not buried in the Bandceramic cemeteries. The best demographic data for a Late Neolithic community are given by Buchvaldek & Koutecký 1970, 272 f. In the *Schnurkeramik* cemetery of Vlkletice 33.8% of the individuals were not fully grown (*i.e. infans* or *juvenil*). The very low rate of *infans I* (1 individual without grave goods in a small pit grave 3/1964, p. 265) against the high percentage of *infans II* (21 individuals or 17.9%) means in our opinion that the very young children were not buried in the cemetery. The mean age of the individuals found is 26.3, which gives a mortality rate of about  $40\text{‰}$ . When we take the *infans I* mortality into account this value must have been about  $50\text{‰}$  for the entire community. We must remark here that apparently *Infans I* are the children of less than 1 year, *Infans II* 1-6 years and *Infans III* about 7-14 years old (see the description of the graves). Feust *et al.* 1966 established for a group of *Schnurkeramik* people that 46% were *Jugendlich*; when older finds were considered too this percentage was 38%. But they argued that the predominance of male over female finds implied that there must also have been a selection of adults over juveniles as a result of the way of collecting. In the Early Bronze Age cemetery of Singen-Hohentwiel (Gerhardt (1964)) 33% of the total of 36 individuals were not fully grown. Of the 40 individuals in the Bell Beaker cemetery at Nähermemmingen (Breitinger 1939) 17 persons (or 42.5%) were younger than 14 years, and 3 persons (7.5%) between 15 and 20 years old. All these data agree that the percentage of not fully grown individuals is very high (38-46%) and that a mortality rate of about  $40\text{‰}$  (or  $50\text{‰}$ , *infans I* included) is very likely.

## 4.8. SUMMARY AND CONCLUSIONS

### 4.8.1. ENVIRONMENT

#### *Situation*

During the transition from Neolithic to Bronze Age in this country, between 1800 and 1500 B.C., a small settlement lay in the heart of the South Holland peat area, in the present polder Molenaarsgraaf. In the settlement Veluwe Bell Beakers and Barbed Wire Beakers were used. It was one of a series of similar occupation centres, lying on the so-called Schoonrewoerd stream ridge, and together forming a long ribbon settlement with widely separated farmer's households.

#### *The Schoonrewoerd stream ridge*

The more than 35 km. long Schoonrewoerd stream ridge is formed by the sandy bed deposits of a former river course, which for a short period (about 2100-1850 B.C.: transgression phase C IV<sup>b</sup>), directly preceding the inhabitation, traversed the peat region. The river flowed through from the river clay area to the estuarine area near Rotterdam, and was active in a period when the river-clay suffered heavier and freakish sedimentation. At high water large areas of the peat on both sides of the river were flooded, resulting in an extensive clay deposition. Right after the active phase the sandy bed deposits formed a fairly evident ridge, restricting the north-south water circulation. Flooding took place and at some points break-through gullies were formed.

#### *Vegetation and fauna*

The sand ridge bore a lofty timber vegetation with oak, elm, ash and alder. Outside this narrow strip of gallery forest was a rather open alder brushwood vegetation with an abundant growth of herbs. As hunting played a very minor role in subsistence our knowledge of the wild animals living near the settlement is deficient. Beaver, red deer, boar and bear were among them, as is proved from carcass refuse. For the first time in the prehistory of the Western Netherlands the elk also appears. This animal, like man, will have made use of the sandy stream ridge. The other animals too probably lived there most of the time.

#### *The VBB|BWB hamlet*

About 1850 B.C., shortly after the formation of the sand ridge and of the transverse gullies through it, people using Veluwe Bell Beakers established themselves on an about 4 km. long stretch in the present polders Molenaarsgraaf, Ottoland and Goudriaan. In this period the sand ridge may have formed an important dry east-west communication route between the coast and the sand region of the central Netherlands (the Veluwe) where the centre of the VBB Culture was situated. The settlement lay about half way this route. It consisted of several units or occupation centres, separated by distances of 300 to 1000 m. and preferably founded on the bank of a transverse gully or on a relatively high point of the ridge. Each of the occupa-

tion units, of which "Molenaarsgraaf" is the most westerly, consisted of one or at most two families or farmer's households. The total number of inhabitants of the entire settlement was estimated at 30-60 persons, children included.

The narrow strip of sandy and well-drained soil of the stream ridge itself (c. 100 m. wide) was the only landscape unit, suited for agriculture. As the pollen diagram shows many trees on the ridge were cut down: we can say that this stretch of the ridge was seriously deforested. The fields were lain out there, in between the houses and beyond the outermost to the east and to the west. The clay wedges at both sides offered grazable land to a distance of some hundreds of metres. Going farther away from the ridge the landscape became more and more marshy and gradually changed into a peat swamp.

#### 4.8.2. THE SITE "MOLENAARSGRAAF"

##### *Character*

The excavation report of the site "Molenaarsgraaf" provides a closer view of one of the "occupation units" and thus also provides a better insight in the structure of the entire settlement.

At Molenaarsgraaf two oval houses, each more than 20 m. long, were built consecutively. Other post holes might be the remains of one or two other buildings or structures like sheds and fences. The both houses and the varying ages at which cattle and pigs were slaughtered are arguments in favour of a continuity in the occupation of the terrain. Further neither the pollen diagram nor the archaeological material gives reason to assume one or more breaks in the occupation of any length. Only in the short period when the terrain was used as a cemetery the site probably was uninhabited.

##### *Chronology*

It was possible to divide the total occupation period into four phases.

##### *Phase 1*

The first people to establish themselves were the users of pure VBB pottery, shortly after the formation of the ridge and of the transverse gully. The process of silting up had not yet started in the gully, so that we must assume that open flowing water occurred in it. A relatively large part of the excavated site and especially also the somewhat lower western part was taken into use. Only a small number of the finds originate from this phase: representative are the finds from most of the pit fillings, characterized by an association of VBB pottery with pots decorated by channeling and less frequently with fingertip impressions. The pits themselves may, however, be partly of a somewhat later date. House I is dated to this phase, especially the end of it. Possibly the post holes in the western part of the excavation are the traces of another (earlier or supplementary ?) building. A  $^{14}\text{C}$  date of  $1830 \pm 50$  B.C. might date the beginning of the occupation.

*Phase 1/2*

In the cemetery and associated with it, we find elements of both the preceding VBB and the subsequent BWB associations. The cemetery thus has the characteristic: transition from VBB to BWB, and so can be said to constitute a phase 1/2. This phase must have been short and restricted to the decennia around 1680 B.C.

The cemetery consists of 3 or 4 flat graves, plus the grave of an ox, lying in a row on the crest of the ridge. It is exceptional for the Netherlands and the result of the wet conditions that well-preserved skeletal material was found. Primarily because of this it was possible to give a detailed picture of the burial ritual of each interment. The cemetery includes the graves of a man of about 30 years, a boy of 15, a little girl of 1½, a 1½ year old domestic ox and a cenotaph. Both men had skulls of the planoccipital brachycranial type.

The house plan I is slightly older or contemporaneous to grave I. This relationship, however, gives no explanation of the problem whether the terrain was actually occupied during its use as a cemetery, or had been temporarily abandoned. But there are some arguments in favour of the assumption of a short hiatus of the site between the phases 1 and 2, when it was in use as a cemetery, perhaps by the inhabitants of the nearby settlement no. 27/28.

With the help of the graves an average ground water level of about -160 cm. NAP. at about 1700 B.C. can be determined.

*Phase 2*

The second occupation phase is characterized by the use of Barbed Wire Beakers. Other features of the pottery are: a very high percentage of decoration (90%), the predominance of fingertip impressions (especially in V-motifs), the occurrence of cordoned rims, perforations under the rim, heavy bases and a somewhat higher percentage of stone tempering than formerly. Representative are the finds in the first silting-up deposits of the gully: during phase 2 the gully was gradually filled up with humic sand and clayey peat up to about the mean ground water level.

In the settlement the activity was moved more towards the gully. We cannot attribute a house with certainty to this phase: house I was abandoned at this time, perhaps house II was already built or a not recognizable house in the disturbed gully bank zone.

The account of the economy of the community, described below, rests mainly on the finds in the gully and primarily concerns this phase 2. It is, however, unlikely that the subsistence of the earlier and later inhabitants showed significant differences.

*Phase 3*

At the end of the occupation pottery was only slightly decorated. In shape and other characteristics it does not, however, differ from that of phase 2. House II was inhabited in this phase. The somewhat lower western part of the terrain was abandoned. The finds are concentrated in a narrow strip at the highest point and on the bank of the gully. Possibly these are the first indications of the water becoming troublesome, which may have been the reason why the settlement was ultimately abandoned. This took place well before 1400 B.C., let us say about 1500 B.C. The renewed flow of water through the transverse gully, which followed, as we know, may be connected with the Dunkirk 0 transgression phase.

## 4.8.3. SUBSISTENCE ECONOMY

*Crop farming*

That agriculture was practised is apparent from the occurrence of millstone fragments, a single impression of grain (Einkorn ?) <sup>68</sup> in a sherd and especially from the pollen diagram. The unusually high values for *Cerealia* and track weeds indicate that the fields lay in the direct vicinity of the settlement: certainly on the eastern bank of the gully but probably also on the stream ridge to the west of the settlement. The total area of arable land (productive and bare), belonging to the Molenaarsgraaf "occupation unit" amounted 4-7 ha.

*Cattle farming*

Cattle farming was of supreme importance for the meat supply of the community at Molenaarsgraaf, in comparison to hunting: 92% of the carcass refuse came from domestic

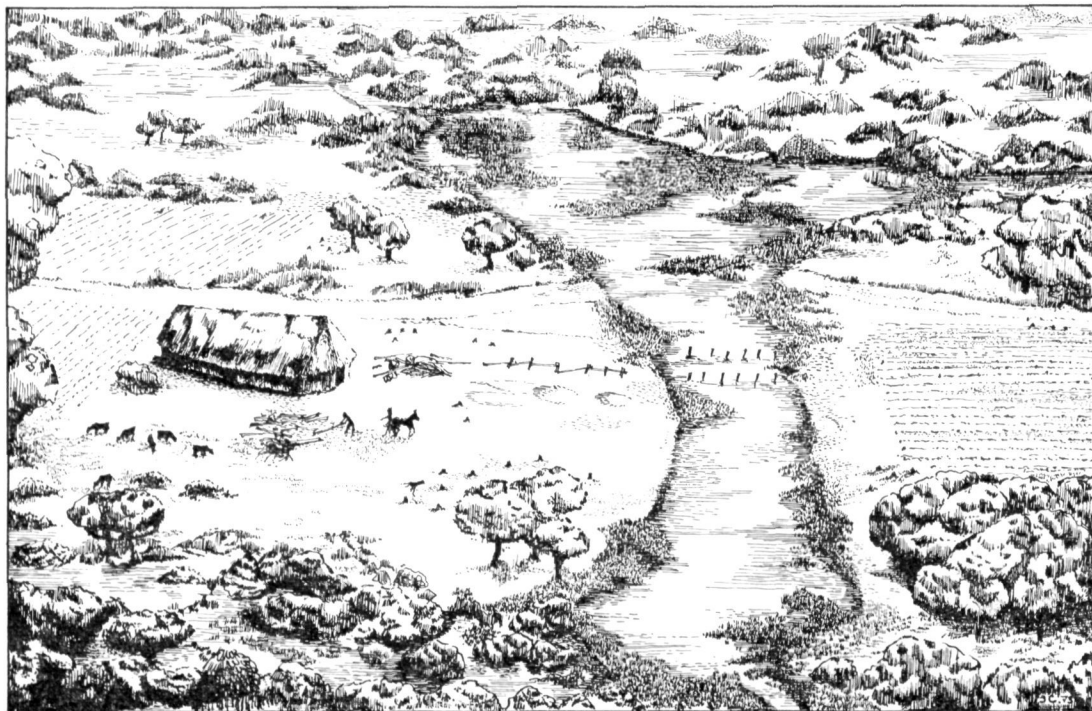


Fig. 121. Molenaarsgraaf. Tentative reconstruction of the settlement and its surroundings.

<sup>68</sup> Dr van Zeist examined the impression but he could not identify it with certainty, because of the lack of clear characteristics. Einkorn grain (*Triticum monococcum*) seemed the most likely. (Letter of Dr van Zeist to the RMO 9-4-1968).

animals, of which cattle formed by far the greatest part (81½%). From an economical point of view this predominance, because of the large size of the animals, is even greater. The importance of cattle breeding is emphasized by the animal which, in any case a sacrifice, had been buried. In the second and third place come pigs and sheep or goats. Two bones certainly of the domesticated horse are among the oldest dated in this country.

By their accent on cattle farming, the inhabitants took advantage of the broad stretches of grazable land, offered by the clay wedges at both sides of the sand ridge.

### *Hunting and fishing*

While hunting was of modest importance this probably was not the case with fishing. Proof of this is seen, not in animal refuse, but in the graves (the fish-hooks in grave II and the fin ray in grave I) and in the gully in the form of pointed wooden poles and the loam weight fragment. The choice of terrain also appears to indicate this. The fairly numerous small scrapers would be especially useful in this fishing activity. In view of the presence of only a single bone plate of the sturgeon, the catching of this fish was probably not of importance as was the case at some of the more westerly Vlaardingen Culture sites. More probably the catches consisted of pike, eel, roach and perch <sup>68a</sup>, which inhabit the still or sluggish water of the peat regions. Hunting made only a small contribution therefore, as we have said, to the subsistence economy; it will have been also skins and furs that were the objective, as will appear from the list of wild animals.

It appears that the VBB/BWB people at Molenaarsgraaf took advantage of their environment and made the best use of it.

#### 4.8.4. LATER FEATURES

After the abandonment of the terrain as a settlement it was occasionally used about 1400 B.C. by the inhabitants of a nearby settlement, possibly to go fishing in the gully, which in the meantime must have undergone a second activity phase.

The end of the inhabitation within a wide radius came about 800 B.C., when nearly all inhabitable deposits were covered with peat. Only in the 12th century A.D. did colonization and parcelling out of the central peat region of the Alblasserwaard take place. In the 16th century the owner used the terrain for digging sand pits. During heavy floods caused by dike breaches since that time the sand pits filled up with clay and the prehistoric settlement terrain and the surrounding countryside over a wide area became covered with a 30-40 cm. thick layer of clay. As a result of compaction, consequent upon intensive artificial drainage, the prehistoric contours of the land have again become visible during recent centuries.

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<sup>68a</sup> Cf. also the experiments carried out by Dr R. Boddeke, discussed at p. 333.

## 4.9. CULTURAL PREHISTORIC CONTEXT

### 4.9.1. INTRODUCTION

Especially in an excavation, where many interrelations are involved (as that at Molenaarsgraaf is), the "inside evidence" should be separated from the "outside evidence". With the first, the observations and analyses and the conclusions based exclusively on these are meant; with the later the comparable results of other investigations and the generalizations based on these.

Separating both groups of information, we avoid reasoning from the one group to the other to reach a preconceived theory. We think induction (to draw conclusions from data) is the more proper way of archaeological reasoning. A second reason to separate both groups of evidence is the preference to describe the results of the excavation from a neutral point of view, not influenced by the current theories, so that these can be used every time as basic data in general studies and for comparison.

We tried to give the "inside evidence" on the foregoing pages but we realized that it is hardly possible to follow the above principle consequently and to keep the publication readable at the same time. One has to use some well established facts, for instance in chronological respect, in that stage.

After the descriptions and the conclusions the results must be checked to the outside information. These considerations might led to a more detailed insight in the investigated object or reversibly it might appear that the Molenaarsgraaf evidence contributes to a better general understanding of the period concerned. Assumptions made on the foregoing pages might be contradicted or affirmed.

At Molenaarsgraaf information on two different fields of research has come to light. First, the purely prehistoric data, relevant to our knowledge of the Beaker Cultures. Second, data of geologic-geographical character, relevant to the development and occupation history of the region, in which the site is situated. The first two parts (especially part II) of this book give the context of these geologic-geographical data. So in this section only the cultural prehistoric context of Molenaarsgraaf need to be discussed.

One of the major problems in the following discussion is the notorious lack of information on other aspects of the Bell Beaker Culture than the beakers themselves. The material from many regions, factually covering almost the entire distribution area, has been described monographically. But everywhere the available material permitted not much more than working out a beaker typology<sup>69</sup>.

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<sup>69</sup> We list here the most important regional surveys:

Netherlands	— Bursch 1933, Van der Waals & Glasbergen 1954, 1959, Van der Waals 1964 <sup>a</sup> .
Belgium	— Marien 1948, 1952, De Laet 1963.
Northern Germany	— Stegen 1942, Struve 1955.
Rheinland	— Stampfuss 1929, Albrecht 1934, Hofmann 1938, Gatermann 1943.
Hessen	— Sangmeister 1951.
Upper Rhine	— Sangmeister 1964 <sup>a</sup> , Köster 1965/'66.

## 4.9.2. SOIL TRACES

4.9.2.1. *Post holes*

A comparison of the post holes at Molenaarsgraaf with those of the unmistakable house plans of the few centuries older VL Culture and the some centuries younger Elp Culture shows much similarity.

At Haamstede (VL) the heaviest post holes were 30 cm. in diameter. At Deventer (ELP) the diameters were 20-30 cm., and at Elp the same; exact measurements, however, were not given <sup>70</sup>. The depths were a maximum of 45 cm. at Haamstede, 50-80 cm. at Elp and more than 10-20 cm. (most probably originally about 60-70 cm.) at Deventer. The posts themselves at Vlaardingen seem to be somewhat thinner (10-16 cm.) <sup>71</sup> than the post holes. The different soil conditions of the different terrains seem to have had a fairly small influence on the measurements of the post holes. At Vlaardingen it is thought that the post holes indicate places where a post was pulled out of the ground. Otherwise the wood would have remained <sup>72</sup>. At Molenaarsgraaf it is more likely that the places where the posts had decayed were gradually filled with topsoil. At Elp strong podzolisation occurred in the loose fillings.

The similarities are so great, however, that we may say that the measurements of the post-holes at Molenaarsgraaf are indeed those that may be expected in a house of considerable size.

4.9.2.2. *The house plans**Early and Middle Neolithic*

Since Van Giffen <sup>73</sup> dealt at length with prehistoric house plans in the Netherlands the material has been considerably increased. From the Early and Middle Neolithic we only know the house of the Linear Bandceramic Culture although this is remarkably well-documented with 197 house plans <sup>74</sup>. For the TRB the Dümmer See houses are the nearest house plans <sup>75</sup>.

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Saxony-Thuringia	— Neumann 1928.
Bohemia	— Stocký 1928, Hajek 1962.
Great Britain	— Piggott 1963, Clarke 1966, 1970; Lanting & Van der Waals 1972.
Wales	— Griffiths 1957.
France	— Arnal & Blance 1959, Riquet <i>et al.</i> 1963, l'Helgouach 1963, Guilaine 1967.
Spain	— Castillo 1928, M.A. Smith 1953, Blance 1961, Sangmeister 1966, Blance 1971, Leisner 1943-'65.
Sardinia	— Bray 1964.
General	— Sangmeister 1963, Gersbach 1957, Sangmeister 1964 <sup>b</sup> .

<sup>70</sup> Haamstede-De Brabers: Trimpe Burger 1960/'61, Van Regteren Altena *et al.* 1962/'63 esp. 1962, 20-21, Van Giffen 1958, 40; Deventer-Margijnen Enk: Modderman 1955<sup>a</sup>; Elp: Waterbolk 1964<sup>a</sup>.

<sup>71</sup> Glasbergen *et al.* 1966, 56.

<sup>72</sup> As note 71, 55-56.

<sup>73</sup> Van Giffen 1954<sup>c</sup>, 1958.

<sup>74</sup> Modderman 1968.

<sup>75</sup> Reinert 1939.

### *The Vlaardingen Culture*

In their situation and dating the Vlaardingen Culture house plans are the closest to those of Molenaarsgraaf. They could be their direct predecessors, if considerable cultural changes had not occurred in the intervening centuries, which will certainly not have left building traditions undisturbed. The VL Culture was followed by the Protruding Foot Beaker Culture, which in its turn was followed by the Bell Beaker Culture. In the period of the early Bell Beaker Culture moreover, a hiatus in inhabitation in the Western Netherlands could be established <sup>76</sup>. But to what extent do all these cultural changes signify also ethnic or anthropological changes? To what extent were elements such as building traditions also replaced by new ones?

The VL Culture houses are of the two-aisled type with central ridge-pole, from small to average size, common in Europe north of the Alps at this time. There is, however, a fair amount of variation.

Three house plans at Haamstede <sup>77</sup> are two-aisled and  $3.5 \times 8$  m. in size. The ridge-pole was supported by four posts, the wall construction was situated within the outermost row of roof supporting posts. The post-holes have already been discussed.

At Hekelingen <sup>78</sup> and Leidschendam <sup>79</sup> it was possible to determine only that the houses were rectangular, but house plans could not be retraced in the confusion of post holes.

At Vlaardingen three house plans are known, measuring  $3.5 \times 7.2$ ,  $5 \times 10$  and  $5.5 \times 10$  m. The measurements of the first house (cutting 13) <sup>80</sup> conform to those of Haamstede. The second house (cutting 15) <sup>81</sup> had a central row of 4 posts, on each side of which, 1.5 m. distant, a row of roof supports, and 1 m. outside that the walls, formed of small posts. The house plan of the third house (cutting 10) <sup>82</sup> has been published. It must have been the last of a number of houses which were built one after the other on the same site. The ridge-pole was supported by 6 uprights at regular distances (1.80-2.10 m.). The walls show themselves to be slightly curved rows of somewhat thinner posts, between which wattle work will have formed the original wall. The NE end was somewhat broader (5.80 m.) than the SW end (5.30 m.). Both aisles were covered by a single span from the ridge-pole. The rows of supporting posts and the walls thus coincided. The sequence used here may have a chronological value, for while Haamstede has a very early dating, the last described house in Vlaardingen must be considered as being very late. First, the Vlaardingen Culture houses show that the building material available in the Western Netherlands permitted the construction of houses such as those we envisage in Molenaarsgraaf, and that this was in fact carried out some centuries earlier. Second, the development of the house as sketched above may be regarded as a model for house 1 at Molenaarsgraaf. The occurrence of slightly curved walls in the house in cutting 10 is all the more remarkable. Moreover, the construction and the shape of both ends of this house cannot easily be determined. The

<sup>76</sup> See p. 27 and 47, There are four centuries between the end of Vlaardingen and the beginning of Molenaarsgraaf.

<sup>77</sup> Cf. note 70.

<sup>78</sup> Modderman 1953<sup>a</sup>, Van Regteren Altena *et al.* 1962/63 esp. 1962, 13-19.

<sup>79</sup> Glasbergen *et al.* 1967 esp. 99-101.

<sup>80</sup> Van Regteren Altena *et al.* 1966, 56.

<sup>81</sup> Glasbergen *et al.* 1967, 100 and fig. 26.

<sup>82</sup> Glasbergen *et al.* 1966, 55-59, plan at fig. 31.

question arises as to what extent the builders of this house already had contacts with the PFB Culture.

### *The Beaker Cultures*

Data about the housing of the Beaker Cultures themselves are scarce in this country. The almost complete absence of post holes in combination with the assumed (although nowadays not generally accepted) nomadic character of the Battle Axe Culture (PFB Culture) led indeed to the supposition that these people lived in tents or other similar light constructions. It seems to us that we must give this serious consideration. It agrees with the great mobility of the users of the various beakers which emerges from the typological studies. Why are the traces of the palissade clear at Anlo, while traces of houses are completely lacking<sup>83</sup>?

The circumstances in which the Maritime Bell Beakers were found at Vlaardingen also indicate that the existence of their users was not very static. All observations indicate a very short stay of a few days or weeks dated about 1940 B.C. The finds consisted of two very small find concentrations and the traces of small huts built of thin posts. One of these measures about  $3 \times 7$  m.<sup>84</sup> The difference between this find and that of Molenaarsgraaf seems to us to be characteristic of the difference between the earliest phase and the end of the Bell Beaker Culture in this country. If in the first phase we are concerned with non-settled people who stay only a short time in one place where they erect only provisional shelters, in the later (Veluwe) phase we are concerned with an established farming community.

To complete this picture it can be mentioned that post-holes are known on a number of Bell Beaker sites in this country, but no house plans. This was the case in Ottoland-Oosteind, Ottoland-Kromme Elleboog<sup>85</sup>, Oostwoud<sup>86</sup>, Meerlo Heath<sup>87</sup>, Arnhem-Gulden Bodem<sup>88</sup>. At Dodewaard<sup>89</sup>, where moreover the conditions were favourable, as will appear from the excellent house plans from the Middle Bronze Age, unfortunately no soil traces could be attributed to the VBB occupation.

### *The Elp and DKS Cultures*

The Middle Bronze Age house plans (Elp Culture and DKS Culture), found at Deventer, Elp, Angelsloo, Zijderveld, Dodewaard, Nijnsel, and Medemblik and the similar Late Bronze Age house plans at Hoogkarspel<sup>90</sup>, are as near as those of the VL Culture in location, but a

<sup>83</sup> Waterbolk 1960. See also for example R. R. Clarke 1960, 62 and 65; Simpson (ed.) 1971, 132.

<sup>84</sup> Glasbergen *et al.* 1966, esp. 62-65; Van Regteren Altena *et al.* 1962/'63 esp. 1962, 29 and 232-235. I thank Dr J. A. Bakker, Amsterdam, for showing me the maps and for allowing me to refer to them here. The three posts on the axis line and the 13 posts of the walls had a diameter of only about 8 cm.

<sup>85</sup> Louwe Kooijmans 1969<sup>b</sup>.

<sup>86</sup> Van Giffen 1961, 1962, 1966, De Weerd 1966, also 1967, Van Regteren Altena *et al.* 1962/'63 esp. 1962, 233-234.

<sup>87</sup> Verlinde 1971.

<sup>88</sup> Van Giffen 1958, esp. 39-40; Modderman 1955<sup>a</sup>, esp. 31; Annual Report RMO 1939, 5 and documentation RMO. To us, however, the sherds do not seem to be beaker ware nor the post hole configurations to be house plans.

<sup>89</sup> Hulst 1967 and pers. comm.

<sup>90</sup> Deventer: Modderman 1955<sup>a</sup>.

Elp: Waterbolk 1964<sup>a</sup>.

Angelsloo: Van der Waals 1961, 1965<sup>b</sup>, 1966, 1967.

few centuries later in time. There are two very different types. Fairly big round huts with a diameter up to 8 m. form a typical Southern Netherlands element, which fits entirely in the pattern of the cultural relations of the DKS Culture in that area with Southern England<sup>91</sup>. The second type is that of the long three-aisled farms of the Elp type, a typical northern element. In the river region (Dodewaard, Zijderveld; but also Nijnsel!) both types occur alongside each other. The Elp type is the oldest form of the three-aisled hall house, characteristic of the regions along the Netherlands- German North Sea coast. It is possible in our country to follow the development of this type of house from the beginning of the Middle Bronze Age to historical times.

The Elp type of house is three-aisled and long to very long: at Elp 12.0 - 41.3 m., at Angelsloo 18 - 65 m. (77.5 m. in more than one building phase). The large houses at Elp are 5.4 - 4.4 m. wide, the smaller ones 4.8 - 3.7 m. Round ends with the entrance there seem to be the most common. Rectangular ends also occur, however. The entrance can often be distinguished by two posts on each side of the axis, but at Angelsloo they may occur in the long sides as well. Especially at Elp, and less frequently at Angelsloo, a two-roomed division can be noted. In a stall part boxes for the cattle were made by placing less heavy posts between the roof supports. The other part was the living area. The wall posts and the somewhat heavier roof supports are generally in one line, although it is not very straight. These units generally stand 2 - 3 m. apart, although smaller and larger distances also occur.

In our view it can be assumed that house II at Molenaarsgraaf corresponds in many respects to the Elp type, although there are clear differences. It is possible in fact to regard the Elp type as a sequence to the development which we have already mentioned in connection with the sequence of house I and house II. The asymmetrical oval form of house I develops into the regular spool form of house II, and then into the Elp type with its two parallel walls. There is a development from two-aisled (house I) to three-aisled (ELP), with house II occupying an intermediate position. The occurrence of extra posts in the axis line, mostly in small groups of about 3, in the Elp type, supports this reasoning<sup>92</sup>. The abandonment of the heavy middle posts resulted automatically in a narrower width in the Elp type. Subsequently there is a clear tendency towards ever longer houses.

Some further details may be mentioned. The internal division into stall and living part is not known in Molenaarsgraaf. This might be original or might be caused by the disappearance of all shallow soil traces. The general appearance of the settlement also shows remarkable similarities. There are always a few large farms with outbuildings, which are continually rebuilt on almost the same spot. The graves lie in the immediate vicinity of the settlement. Although the morphology of the terrain probably plays a part in this, there exists a certain regularity in the

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Zijderveld:	Hulst 1965, 1966.
Dodewaard:	Hulst 1967.
Nijnsel:	Beex & Hulst 1968.
Hoogkarspel:	<i>Cf.</i> p. 42 note 98, esp. Bakker <i>et al.</i> 1968.
Medemblik:	H. H. van Regteren Altena <i>et al.</i> 1968, — & Bakker 1968.

<sup>91</sup> See Glasbergen 1954, 1969, I. F. Smith 1961.

<sup>92</sup> Waterbolk 1964<sup>a</sup>, 100; the houses 4.6, 7 and 9.

orientation of the houses: between WNW-ESE and NNW-SSE <sup>93</sup>. Finally we draw attention to the occurrence of somewhat curved walls (house 5 at Elp, the oldest house at Emmerhout <sup>94</sup>, and of posts on the axis line but outside the house (Elp).

*European context* <sup>95</sup>

The oval construction is exceptional in wooden houses in most of Europe. It does, however, occur occasionally in the Neolithic. Technically such a construction seems to have been among the possibilities <sup>96</sup>. We must assume, however, that the oval forms, not very suited to wood constructions, were borrowed from a building technique in other materials, such as stone and sods (or tents?).

As we have already said, Beaker Culture houses and Early Bronze Age houses are extremely rare. A few round huts were reported at Ørnekul and Klein Meinsdorf, an oval *Wohngrube* (pit dwelling) of 6 × 15 m. with posts placed alongside one side at Schelditz and a few small rectangular huts with sunken floors at Mayen, Eifel; Mühlheim, Kr. Koblenz; Haffen-Mehr, Kr. Rees <sup>97</sup>. All are connected with the Battle Axe Culture. At Olfen, Kr. Lüdinghausen <sup>98</sup>, post holes were found in a BWB settlement. With a little good will some round or oval structures might be distinguished.

The few house plans from the Early Bronze Age, such as at Postoloprty, Czechoslovakia, and Crestaulta, Switzerland <sup>99</sup>, indicate a continuation of the rectangular Late Neolithic

<sup>93</sup> NNE — SSW : Elp.

NNW — SSE : Deventer.

NW — SE : Dodewaard, Angelsloo.

WNW — ESE : Hoogkarspel, Elp, Molenaarsgraaf.

<sup>94</sup> Emmerhout is the northward extension of the Angelsloo excavation. Van der Waals defined the type, dated about 1400 B.C., at the Bronze Age—Iron Age symposium at Assen 25/26-5-1972.

<sup>95</sup> In the following only a general outline is given. No attempt is made to give a complete review of the Neolithic and Early Bronze Age houses. General information on Neolithic and Bronze Age houses in: Radig 1930, Stieren 1934, Butler 1938, Childe 1949, Bailloud & Mieg de Boofzheim 1955, Arnal & Burnez 1956, Schlette 1958, Clark 1965, Piggott 1965, Müller Karpe 1968, Simpson (ed.) 1971.

<sup>96</sup> We name some Neolithic oval houses or houses with round ends. Bylany (Lengyel Culture): Müller Karpe 1968, no. 250, esp. *Taf.* 194 H. Zengövarkony (Lengyel Culture): Müller Karpe 1968 no. 244, *Taf.* 188. Vučedol: Schmidt 1945, Schlette 1958, 137 and *Taf.* 89. Hurbanova (?) (*Zselizer Gruppe*, contemporaneous with *Stichbandkeramik*): Müller Karpe 1968, no. 257, *Taf.* 196. Curved walls are well-known characteristics of some *Stichbandkeramik* and Rössen houses (Müller Karpe 1968, *Taf.* 213, 234). A remarkable oval house plan was found at Wittenwater, Kr. Uelzen, East Niedersachsen (Voss 1964). The 16 × 6 m. two-aisled house was divided into three by two transverse walls. The house is dated by means of the pottery to a late phase of the TRB Culture. A few sherds with cordon decoration show, however, the presence of another, unknown element.

<sup>97</sup> Klein Meinsdorf: Schwantes 1939, 211.

Ørnekul: Brøndsted 1960, 173-174; Becker 1952.

Schelditz: Amende & Frauendorf 1926.

Mayen: Wagner 1938.

Mühlheim: Wagner 1938/'39.

Haffen-Mehr: Stuckmann 1914.

<sup>98</sup> Stieren 1950, no. 164.

<sup>99</sup> Postoloprty: Soudský 1953, Piggott 1965, fig. 63. Crestaulta: Burkart 1946.

house of modest dimensions in Central Europe. Along the North Sea coast Elp houses were then built, however <sup>100</sup>.

Real parallels for both the Molenaarsgraaf plans must be sought on widely separated points in Western Europe. In view of the scarcity of material, the wide distribution of the Bell Beaker Culture and the clear cultural contacts over long distances, this has not to be considered as a difficulty.

In Great Britain in recent years a few houses have been found. At Northon, Isle of Harris, the Hebrides <sup>101</sup>, an oval house plan of 9 × 5 m. was found in 1965 in dune deposits between a Neolithic and an Iron Age level; it was dated by means of some Necked Beaker sherds. The wall was formed of loosely piled stones, originally about 2 m. high, shoring up the sand outside the dug-out dwelling. The roof was supported by a number of posts placed about 1 m. from the wall. The oval type of house is a foreign element in Great Britain also, although round houses occur there beside rectangular ones in the Neolithic <sup>102</sup>. Although about 100 domestic sites are known, further data about houses are remarkably few <sup>103</sup>. At Easton Down, Wiltshire <sup>104</sup>, there are some pits, surrounded by post holes, possibly seasonal or temporary dwellings of the miners, of the flint mines there. At Belle Tout, Sussex <sup>105</sup>, small round huts (diam. 3 m.) appear to have been built.

Rather large oval houses occur in the Southern French Chalcolithic, especially in the Courronnien of Provence and the contemporary Pasteurs des Plateaux (Fontbuxien and Ferrerien II) of Languedoc. They are built of loosely piled stones, the typical Mediterranean tradition, with roof constructions of different kinds: made by dry corbelling or constructed from wood or wattle. The houses are free-standing or are built-on. Particularly for the technique of loosely piled stones, the round and oval form is the most suited. It is of importance here that these Chalcolithic groups had cultural contacts with the Bell Beaker Culture. In addition to these large oval houses, small round and rectangular huts were built <sup>106</sup>.

<sup>100</sup> For instance: Ristoft, West Jutland, esp. house III, 20 × 6 m., Late Bronze Age (Becker 1968); Norddorf, Amrum, 10 × 4 m., Early or Middle Bronze Age (Struve 1954).

<sup>101</sup> Simpson 1966. Professor A. C. Thomas, Leicester, kindly informed me about both round Bell Beaker houses, excavated by him at Gwithian. After this part of the manuscript was completed the book of Simpson (ed.) 1971 appeared in which he gives a complete account of all Beaker houses in the British Isles. The occurrence of round huts with diameters of up to 6 m. seems well established now for the Bell Beaker Culture.

<sup>102</sup> Clark 1965, 131-133; Simpson (ed.) 1971, 137.

<sup>103</sup> Clarke 1966, 181; Clarke 1970, 258.

<sup>104</sup> Stone 1958, 66; Simpson (ed.) 1971, 135 f., fig. 25 B.

<sup>105</sup> Bradley 1970.

<sup>106</sup> At Tourelles, Vailhauquès, Hérault: two complete oval houses measuring 10 × 5 and 13 × 5 m., Arnal & Burnez 1956/57, 88 and fig. 37.3. At Cante Perdrix, Calvisson, Gard: two oval or rectangular (with rounded corners) plans of about 15 × 5 m., Escalon de Fonton 1963, 266-269. At Coquette, St. Martin-de-Londres, Hérault: seven complete or partially preserved plans with dimensions within the walls: 3-5 by 7-13 m., Escalon de Fonton 1963, 247-249; 1966, 560-564. Other sites seem to give less detailed or less reliable information, such as Gagnière 1963 (esp. 349-353), 1966 (esp. 607) on Martigues. Small round huts at Fontbousse: Louis *et al.* 1947. The fortifications, re-used or made by the Bell Beaker Culture such as Lebous (Arnal & Granel 1961, Arnal & Sangmeister 1963), Villa Nova de São Pedro (do Paço & Sangmeister 1956), Zambujal (Sangmeister & Schubart 1971) are left out of consideration here. They form a separate chapter in building traditions. It is difficult to establish whether they influenced the common building traditions, and if so to what degree.

### *Conclusion*

When we venture to summarize these scanty data, the first noteworthy point is the lack of houses during the whole Beaker period in North-western Europe. At the end fairly large round oval houses appear to occur at various places, in addition to the scattered finds of small huts. Does this form develop from suggested tents of the preceding Beaker groups, or has it developed from the small round huts of the Mediterranean area?

In our country the large Elp type, much better suited to wood construction, developed quickly, but it is limited to the districts along the North Sea coast of Holland to Denmark. In Great Britain the development took an entirely different course, towards a type of round hut<sup>107</sup>, which also came to be used in the Southern Netherlands during the Middle Bronze Age. In Central Europe the small, rectangular, two-aisled house of the Late Neolithic remained in use during the Early Bronze Age.

#### 4.9.2.3. *The pits*

The small round pits are a common feature of (Late) Beaker settlement sites, although they are not restricted to settlements of this period. Pits of this type were found for instance at Anlo and Schipborg (BWB)<sup>108</sup>. At Elp (MBA)<sup>109</sup> similar pits occur inside the houses. Although these pits seem to have played a certain role in the settlement, their function is unclear.

A second type of pit, associated with beaker settlements (but also not restricted to these) are the wide horseshoe-shaped depressions. These were found at Anlo, Angelsloo, Schipborg, Eeserveld and Haps<sup>110</sup>, but also in the Bandceramic cemetery of Elsloo<sup>111</sup>. About function and origin of these pits there is still much discussion. Modderman suggested that they might mark the places of uprooted trees.

### 4.9.3. THE SETTLEMENT FINDS

#### 4.9.3.1. *The Bell Beaker pottery*

The typology and the relations of the Bell Beaker Culture in this country have already been described several times and *in extenso*, particularly by Van der Waals<sup>112</sup>. Here we propose to make only a few remarks and for the rest to refer the reader to these publications.

Between about 2000 and 1700 B.C. the important local group of Veluwe Bell Beakers developed and flourished in the central Netherlands. Elsewhere, especially in the province of Drenthe, the evolution was less spectacular and led to another local group with forms and decoration of a more simple appearance.

<sup>107</sup> For example: Itford Hill (Burstow & Holleyman 1957), Thorny Down (Stone 1941); Fox 1964, 86 f.

<sup>108</sup> Waterbolk 1960, 72-74; Van der Waals 1962, figs. 16, 30.

<sup>109</sup> Waterbolk 1964, for instance the houses 5 and 12.

<sup>110</sup> Waterbolk 1960, 89; Van der Waals 1965<sup>a, b</sup>, 1962, 242 f.; Van Zeist 1968, 60; Verwers 1972, 11-12.

<sup>111</sup> Modderman 1970, 72-73.

<sup>112</sup> Bursch 1933, Van der Waals & Glasbergen 1955, 1959, Van der Waals 1964<sup>a</sup>, Butler & Van der Waals 1966.

Thin- and thick-walled BB pottery can be distinguished. Verlinde <sup>113</sup> fixed the dividing line at about 5 mm. Most grave pottery is thin-walled. Thick-walled pottery is rarely found in more or less complete pieces. It probably comes from larger beakers (*e.g.* the Drouwen beaker) <sup>114</sup>. In settlements such as at Meerlo Heath it is much more common. We have not made this distinction, but both sorts occur at Molenaarsgraaf <sup>115</sup>.

A group of "Hybrid Beakers" combines the characteristics of Bell Beakers and the older Protruding Foot Beakers (PFB). Although they were originally considered to be a mixed form and were placed later than the Maritime Bell Beakers, <sup>14</sup>C-dates now prove an older age. The idea that they are forerunners of the Maritime Bell Beakers and even intermediate between these and Protruding Foot Beakers seems now to have much reason.

Sherds of Protruding Foot Beakers are entirely lacking in the find group at Molenaarsgraaf, as is the case with the All Over Cord Beaker (Van der Waals type 2<sup>IIb</sup>). There are, however, a few sherds which may come from 2<sup>IIa</sup> beakers and from Maritime Bell Beakers <sup>116</sup>. The fragmentary character of the material, however, does not permit of any certainty in such an attribution. The sherds could just as well have formed part of the decorative motifs of later Bell Beakers. Moreover, the presence of a few typologically early sherds does not prove an early occupation, since some archaic elements can always occur in later domestic assemblages <sup>117</sup>. Although occupation in Molenaarsgraaf in the said period (about 2100-1900 B.C. in <sup>14</sup>C-years) is unlikely for geological reasons, we cannot entirely exclude this in view of the fragmentary character of the pottery <sup>118</sup>.

It is clear from the variety of motifs used that the material is chiefly from late Bell Beakers. We can point out a few sherds that must have come from real Veluwe Bell Beakers, both among the settlement terrain finds and those from the pit fillings <sup>119</sup>, so that the designation "Veluwe Bell Beaker association" is justified. This is confirmed by two facts.

First, the Veluwe Bell Beakers are distributed over a wider area than merely the Veluwe district. In any case we must include in it the "Rijk van Nijmegen" hills (Nijmegen, Wijchen, St.-Walrick), North Limburg (Meerlo), the northern part of North Brabant (Cuyk, Haps, Oss), the Utrecht hills (Rhenen, Leersum, Maarsbergen, Het Gooi) and the coastal area (Monster, Mijnsheerenland) <sup>120</sup>. The geographical position therefore justifies our assumption of a VBB association. Second, the beaker from grave I is a genuine Veluwe Bell Beaker (*cf.* p. 301).

<sup>113</sup> Verlinde 1971.

<sup>114</sup> Modderman 1971.

<sup>115</sup> For instance fig. 77, no. 305/307 (thick), no. 210 (thin-walled).

<sup>116</sup> For instance fig. 81, 1st row nos. 2 and 6 from the left, 3rd row nos. 1 and 5 from the left. Fig. 86, base sherd no. 194 and no. 338.

<sup>117</sup> Clarke 1966, 181, 183.

<sup>118</sup> At any rate the settlement has a *terminus post quem* of about 2000 B.C. for geological reasons (*cf.* p. 97).

<sup>119</sup> For instance fig. 81, 1st row the third from the left and the rim and base sherd in the 2nd row. Fig. 86 nos. 210 and 305/307.

<sup>120</sup> *Cf.* map in Van der Waals 1964<sup>a</sup> (fig. 13).

Nijmegen	Louwe Kooijmans 1973.
Wijchen	Bursch 1933, <i>Taf.</i> II-2, III-12, 13, 15, 16.
St.-Walrick	Groenman-van Waateringe 1966 <sup>a</sup> .
Meerlo	Verwers 1964.
Cuyk	Bogaers 1967.

To summarize, we propose that the Bell Beaker pottery at Molenaarsgraaf may be called a Veluwe Bell Beaker association and that early Bell Beaker elements cannot be demonstrated on account of the fragmentary character of the material.

#### 4.9.3.2. *Barbed Wire Beaker pottery*

The Barbed Wire Beaker pottery was first comprehensively described by Modderman<sup>121</sup>, after his finds on the Margijnen Enk near Deventer. In recent years it has aroused especial interest, as can be seen from the publications of Waterbolk, Bloemers, Lanting and Verlinde<sup>122</sup>. In view of these studies there is no point in dealing at length with BWB pottery here. We confine ourselves to a résumé and a few additions to points discussed in the above-mentioned publications.

Considerable confusion prevails about the correct terminology of the various decorative techniques which led to BW ornamentation. Unfortunately the original and most accurate description by Modderman (*viz.*: thread-wound stamp decorated beaker pottery) has never been taken into general use, but has been replaced by a simpler, but less sharply defined designation.

The most important characteristics of the BWB pottery are here described:

— Decoration with a thread-wound stamp, predominantly with a rigid core, sometimes combined with fingertip impressions (in V-motif, vertical or horizontal), rarely with cord impressions, grooves or impressions of a dentated spatula.

— The dominating motif is the horizontal or slightly oblique line running round the pot. Surrounding bands of one or a few zigzag lines, sometimes with vertical impressions, are common. Two-thirds or the whole of the pot is decorated.

— Peculiarities which occur are: cordoned rims, perforations below the rim and very rarely a big ear (only with small beakers) or decoration on the innerside of the rim. A number of beakers have channeled decoration instead of BW impressions, although in all other respects they are identical, particularly in the motifs used, the combination with fingertip impressions, the workmanship and the variation in forms.

— A distinction must be made between small beakers and large pots. The latter often have a heavy foot with a bowl-shaped (concave) inner profile. The large pots often have a high belly and an accentuated neck bend.

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Haps	Verwers 1972.
Oss	Bursch 1937.
Rhenen	Van der Waals & Glasbergen 1959, fig. 20; Lanting & Van der Waals 1971, note 16.
Leersum	Reusink 1963, 1967.
Maarsbergen	Lanting & Van der Waals 1971.
Het Gooi (Hilversum)	Remouchamps 1928, Bursch 1935.
Monster	Stuurman 1965, Glasbergen & Addink Samplonius 1965.
Mijnsherenland	Verwers 1968.

In Germany Veluwe Bell Beakers are found as far as the Neuwied Basin. *Cf.* W. Kersten 1938, note 11. An additional find: Piepers 1972 (Bornheim).

<sup>121</sup> Modderman 1955<sup>b</sup>; see also Modderman 1954, 1959<sup>b</sup>, 1959<sup>c</sup>.

<sup>122</sup> Waterbolk 1959, 1960, 73-74; 1964<sup>a</sup>; Bloemers 1968, Lanting 1969<sup>a</sup>, Verlinde 1971; see also I. F. Smith 1955 esp. 9-10; Van der Waals 1962, Clarke 1970, esp. map fig. X at p. 136.

— The workmanship is significantly inferior to that of the preceding beaker types. For tempering stone grit (pounded granite) is most often used.

— It is possible to distinguish a typological sequence in which carefully decorated pieces, with closely wound stamps, are the oldest, and carelessly decorated pottery, with widely wound stamps, the latest. The youngest appears to be the group of horizontal or oblique stamp impressions in vertical rows.

The BWB pottery was dated by Modderman to the Early Bronze Age as a direct successor of the pottery of the "true Beaker Cultures" (*i.e.* the Protruding Foot Beaker and Bell Beaker Cultures). This dating was confirmed by new evidence, published by Waterbolk. Lanting recently summarized the available dating information and claimed that it showed a dating between 1800 and 1400 B.C. <sup>123</sup>. This implies an overlapping of the Bell Beaker Culture on the one hand and the Early Hilversum Culture on the other. The lack of closed finds and find-associations is a formidable handicap for a good dating.

The best argument for the contact with the Bell Beakers is the existence of a group of small beakers occupying an intermediate position by their form and the decoration techniques employed <sup>124</sup>. The contact with the Hilversum pots is illustrated best by the pot from Vorstenbosch, dated by a bronze pin to the beginning of the Middle Bronze Age <sup>125</sup>.

In connection with his excavations on the Meerlo Heath, Verlinde examined 13 domestic assemblages in which Bell Beaker sherds occur. Only in two cases do BWB sherds appear to be "structurally" missing (*i.e.* in spite of sufficient sherds). He concluded from this that closely wound BWB pottery (of which his finds appeared in the main to consist) and the Late Bell Beakers were contemporary <sup>126</sup>. Some caution appears to be necessary here, however, for more than half of the studied find-groups are old amateur collections. It is precisely the most recent, carefully excavated find-groups that indicate that the BB and BWB elements do not generally go together <sup>127</sup>.

A small find-group at Vlaardingen consisted exclusively of early (M)BB material. At Oostwoud MBB and VBB occurred together, Dodewaard and Haps revealed only VBB sherds, a deposit at Velsen and a group of round pits at Anlo only BWB sherds <sup>128</sup>. It is obvious that in any case we are concerned with both a pure VBB period and a period in which widely wound barbed wire was used exclusively. Both might be separated by a period in which late Bell Beakers and closely wound Barbed Wire decoration go together. In this respect we agree with Verlinde that the identical distribution patterns of the BB, BWB (all closely wound, with one exception) and Pot Beaker sherds in the excavation on the Meerlo Heath supports

<sup>123</sup> Modderman 1955<sup>b</sup>, esp. 42; Waterbolk 1960, J. N. Lanting 1969.

<sup>124</sup> We name the beakers from Diever, Emmen, Drijber (Modderman 1955<sup>a</sup>, PL II), Querenstede, Kr. Ammerland (Zoller 1963), Heek, Kr. Ahaus (Voss 1967, *Taf.* 17.10; Albrecht 1934, 135, *Taf.* 19.2), Obereinzingen, Kr. Fallingbostal (Asmus 1954).

<sup>125</sup> Modderman 1959<sup>c</sup>. Other finds of BW-decoration on HVS pots are: Wijchen (Glasbergen 1954, fig. 63.3), Vogelenzang (Groenman-van Waateringe 1966<sup>b</sup> and own observations).

<sup>126</sup> Verlinde 1971, 40-41.

<sup>127</sup> We must realize that the old amateur collections are insufficiently documented, especially as far as the find spot is concerned. One "site" might include material from various settlements.

<sup>128</sup> *Cf.* p. 293 and the lit. cited there.

the contemporaneity of these three groups of pottery there. But to what extent have preservation conditions influenced the present distribution?

What is the typological and chronological position of the BWB pottery of Molenaarsgraaf?

In the settlement site widely wound stamps predominate, although closely wound stamps are occasionally found<sup>129</sup>, but there is no trace of the vertical rows of horizontal impressions. The last BWB phase is therefore absent and the middle phase dominates. The closely wound impressions represent either an occupation between phase 1 and phase 2, contemporary with the cemetery (!), or they form an archaic element during phase 2.

The BWB sherds from the gully all have impressions from widely wound stamps. The BWB association forming phase 2 is therefore contemporary with the BWB layer at Velsen and the small round pits at Anlo. Certainly, when we add a number of BWB sherds from the settlement site, it appears to be a characteristic find-group of this period in which all typological elements are present.

#### 4.8.3.3. *Pot Beakers*

Pot Beakers are up to 50 cm. in height, relatively thin-walled (7-11 mm.), richly decorated pots, with a characteristically more or less pronounced zoning of the decoration<sup>130</sup>. Two form-types can be distinguished: the Necked Pot Beaker with a pronounced neck bend and a type with an S-profile, which Lehmann divides into two types on decorative grounds: the Trumpet Pot Beaker and the Belted Pot Beaker. The dating of the Pot Beakers must be determined by typological arguments and by open associations, as closed finds with Pot Beakers are very rare<sup>131</sup>. Verlinde<sup>132</sup> recently and justifiably disputed Lehmann's datings; producing ample arguments he proposed that we should assign all Pot Beakers to the period of the Veluwe Bell Beaker. The relationship between the Necked Pot Beaker and the Veluwe Bell Beaker cannot be denied. The S-profiled Pot Beaker shows, however, a number of points of similarity to the large BWB pots: the form, the small foot, the holes under the rim and the decoration pattern. We would draw attention to the vague boundary between Necked and S-profiled Pot Beakers. In fact, a continuous typological series can be proposed, of which the Pot Beakers of Velp and Huinen on the one hand, and those of Driesche Berg and Ede on the other, are the extremes<sup>133</sup>.

<sup>129</sup> Cf. note 28.

<sup>130</sup> Lehmann 1965 gave a review of the Dutch Pot Beakers; later finds are published by Lehmann 1964, 1967<sup>a</sup>, <sup>b</sup>, <sup>c</sup>, Hulst 1965/'66, 1970, Louwe Kooijmans 1967, 1973. For a detailed characteristic of Pot Beakers see Lehmann 1965, further Modderman 1955<sup>b</sup>, Verlinde 1971 and the literature cited there.

<sup>131</sup> One closed find is the Nijmegen Pot Beaker (Louwe Kooijmans 1973). All other associations are less closed, with the exception of the central grave of a barrow at Ede. The Pot Beaker (Lehmann 1965, no. 3; Bursch 1933, 58) found there lay outside the barrow, but the Veluwe Bell Beaker in the central grave contained a sherd from another Pot Beaker. The Pot Beaker found below the barrow at Hanendorp near Vaassen (Lehmann 1965, no. 1; Holwerda & Evelein 1911, 22, *afb.* 27-28) has no direct association with the clumsy beaker (with BW impressions!) found in the centre. This beaker most probably belongs to a secondary grave and so forms a *terminus ante quem*.

<sup>132</sup> Verlinde 1971, 38.

<sup>133</sup> Velp: Hulst 1965/'66, 1970; Huinen: Lehmann 1965, no. 10; Driesche Berg: Lehmann 1967<sup>c</sup>; Ede: Lehmann 1965, no. 3. Intermediate forms between the Necked and the S-profiled Pot Beakers are in our opinion the Pot Beakers Lehmann 1965 nos. 4, 5 and 17 and the specimen from Speulde (Lehmann 1964).

Pot Beakers are the show pieces of the domestic pottery. That we possess such a large number (about 15) of more or less complete examples of these large pots is because they were deliberately buried. If the find circumstances are well documented, they appear to have been buried reverted. The frequent absence of bottoms agrees with this<sup>134</sup>. Moreover, whole pots or large pieces of pots are regularly found in or near burial mounds or graves<sup>135</sup>. Not only by their external appearance or form, but also because of these find circumstances<sup>136</sup>, Pot Beakers, *Riesenebecher*, and large BWB pots form one group, which we can name together "Beaker Pots"<sup>137</sup>. By their concentration on the Veluwe the Pot Beakers form a regional group which can be linked with the Veluwe Bell Beakers. As is the case with the Veluwe Bell Beakers, they occur, however, in small numbers (also as sherds in domestic assemblages) in a much larger area<sup>138</sup>.

The purpose of the first type of burial (with reverted pots) is illustrated by the find of

<sup>134</sup> This is the case with the Pot Beakers from the Uddelermeer (Holwerda 1909, p. 39 and *afb.* XIV, *in situ* photograph in the RMO archive), Driesche Berg (Lehmann 1967<sup>c</sup>, Hulst 1970), Ermelo (Louwe Kooijmans 1967<sup>a</sup>, Hulst 1970) and Velp (Hulst 1965/66, 1970).

<sup>135</sup> Pot Beakers near, under or in barrows:

Ede	(Bursch 1933, 56, Pl. V. 6; Lehmann 1965, no. 3).
Hanendorp	(Holwerda & Evelein 1911, 22, <i>afb.</i> 28; Lehmann 1965, no. 1).
Uddelermeer	(Holwerda 1909, 39, <i>afb.</i> XIV; Lehmann 1965, no. 11).
Driesche Berg	(Lehmann 1967).
Nijmegen	(Louwe Kooijmans 1973).

<sup>136</sup> Large BW pots buried upside down:

De Vledders:	Waterbolk 1959, 199-210.
Übach-Palenberg:	Bonner Jahrbücher 167, 1967, 418-419.
Large BW pots associated with barrows:	
Stegerense Veld, Ommen:	Bursch 1933, 50, <i>Taf.</i> V. 2; Modderman 1955, fig. 1.
Ermelose Heide, barrow II (also V and XVI):	Modderman 1954, 39.

*Riesenebecher* buried upside down:

Leusder Hei:	Modderman 1955 <sup>c</sup> , 40.
Aalden:	Modderman 1957.
Echt:	Bloemers 1971.

See also the notes 139, 142, 144.

<sup>137</sup> We must also include in this group of "Beaker Pots": the English large "rusticated" Beaker vessels (Clarke 1970, figs. 113, 123-126, 129, 230, 366, 367, 915, 916); the large Early Bronze Age pots from Denmark (Glob 1952, nos 566-573; Magnusson 1948/49) and the large beakers from the Rhine district (Sangmeister 1951, 80 and *Taf.* I. 16; Köster 1965/66, *Taf.* 16.2, 16.4; Riquet *et al.* 1963, fig. 19.4, 20.3; Zumstein 1966, 132 (sherds only). The Dutch Pot Beakers form a (remarkable) part of this group.

<sup>138</sup> We must stress here that the map by Lehmann (1965) only gives the distribution of the more or less complete Pot Beakers and so of the habit to bury these for a special reason. But this habit has had a wider distribution: outside this country a few complete true Pot Beakers were found: in Belgium, along the Lower Rhine and in East England: Lommel: Marien 1952, fig. 134.7.

Winnekendonk, Geldern: Geschwent 1960, *Taf.* 9 & frontispiece; also Bonner Jahrbuch 145, 1940, 218 and *Taf.* 47.2.  
Bebra: Uenze 1961, no. 1, *Taf.* 1.

Neustadt, Kr. Frizlar: Uenze 1961, *Abb.* 1, *Taf.* 3<sup>a/b</sup>.

Preist, Kr. Bitburg: Nachrichtenblatt für Deutsche Vorzeit 15, 1939, 254, *Taf.* 65.1.

Gütersloh: Lange 1959.

Erle, Kr. Recklinghausen: Günther 1960, *Bild* 36.

England: Lehmann 1967<sup>a</sup>, Clarke 1970.

a large undecorated pot at Metzendorf/Woxdorf<sup>139</sup>. The pot, in its form identical with the large BWB pots, was placed over a dish with BW decoration<sup>140</sup>. The enclosed room was intact as a cavity, in which a skull lying on the dish was perfectly preserved. A comparable interment of a skull with a large pot related to the BWB pottery is known to us from the other extremity of the distribution area (Llancaichisaf, Glamorgan, Wales)<sup>141</sup>. We do not know, however, whether the pot was placed beside or over the skull. In a flint mine shaft at Findon, Sussex, a large pot with cordoned rim and BWB impressions in zones was inverted over a cremation<sup>142</sup>. This appears to occur more frequently in England. Soon afterwards it became a very common type of interment<sup>143</sup>. A burial comparable with those at Findon and Woxdorf is the cremation in a late *Schnurkeramik* beaker, protected by an inverted undecorated *Riesenbecher*, from the "Neolithic urnfield" at Sande<sup>144</sup>. Pot Beakers, therefore, might have been buried upside-down as a protection of partial interments, *e.g.* only the skull or other parts of the body (see also p. 312).

As Pot Beakers may bear over much of their surface a fairly loose and unzoned decoration, it is not easy to make a percentage estimate of the proportion of Pot Beakers in domestic assemblages. The dimensions of the sherds also play a part in this.

Only a few sherds from Molenaarsgraaf can be attributed to Pot Beakers by reason of their decoration. These are some sherds bearing decoration type E<sup>145</sup>. That Pot Beaker sherds also occur in K, G and I seems likely, but cannot be proved. Only one sherd<sup>146</sup>, found together with a few others from the same pot, shows a Necked Pot Beaker-like profile. The decoration, however, is too careless and the wall too thick for a genuine Pot Beaker. The finds from the pits are so scanty that the lack of Pot Beakers need not arouse surprise, but their absence in the gully filling seems to us to be significant. Pot Beakers apparently do not (any longer) belong to this BWB association. The small number of Pot Beaker sherds at Molenaarsgraaf is probably the result of the preponderance of material from phases 2 and 3.

#### 4.9.3.4. Domestic pottery

The largest part of the Molenaarsgraaf pottery does not belong to any of the previously described groups. The sherds are those of pots which we know, in their complete forms, as *Riesenbecher* and small rusticated beakers, but mainly as sherds from domestic assemblages. Much less attention has been devoted to the latter than to grave pottery. In recent years, however, this attitude has changed and a few find-groups, accounts of some of which are published, have become available for comparative study. We have utilized some of these findings in our discussion above.

<sup>139</sup> Wegewitz 1960.

<sup>140</sup> Not recognized as such by the excavator, but clearly recognizable from the drawings.

<sup>141</sup> Griffiths 1957, fig. 7.1, with literature; Clarke 1970 fig. 359 (cat. no. 1857).

<sup>142</sup> Jessup 1970, 79; Clark 1970, cat. no. 993.

<sup>143</sup> I. F. Smith 1961, 117 for Wessex biconical and collared urns.

<sup>144</sup> Schwantes 1936, Struve 1955, 53, *Taf.* 18, also I. F. Smith 1955, 12; comparable finds are those from Mannheim (Kersten 1966) and Oldesloe-Blumendorf (Schwantes 1936, 82, *Taf.* 4.1). Clarke 1966, 191 stated: "Some of these larger (*viz.* Barbed Wire) vessels have been found inverted over cremation burials in Britain and on the continent."

<sup>145</sup> Fig. 82 type E, esp. 2nd. row, both sherds at the left.

<sup>146</sup> Fig. 84, esp. upper row, the central sherd.

— At Oostwoud (North Holland) <sup>147</sup> sherds of Maritime and Veluwe Bell Beakers occur together with pottery decorated with channelling and finger-tip impressions in V-motifs. Genuine Pot Beaker sherds are not included in the small find-group.

— At Haps (North Brabant) <sup>148</sup> two small concentrations of sherds were found, dated by sherds of Veluwe Bell Beakers. In one concentration lay a burial pit and the remains of the grave inventory, namely a Veluwe Bell Beaker with fingertip impressions on the lower part. 70 sherds (61%) are decorated. Of these, 20% are decorated with a dentated spatula, the others for the most part with fingertip impressions, particularly in V-motifs. Spatula impressions and groove lines occur on occasional sherds. At least one (rim) sherd belongs to a genuine Pot Beaker.

— At Dodewaard (Gelderland) <sup>149</sup> a concentration of Bell Beaker pottery was found in a Middle Bronze Age settlement. Of 359 sherds 103 (about 30%) are decorated, of which 31 came from (Veluwe) Bell Beakers. There are no Maritime Bell Beakers. In the remainder of the decorated pottery fingertip impressions in various motifs comparable with those of Molenaarsgraaf predominated. The V-motif is rare, however, as is channeled decoration. Genuine Pot Beakers are certainly represented.

— At Schipborg (Drenthe) <sup>150</sup> BWB pottery was almost the only datable element: widely wound stamps were mostly used. Sherds from undecorated pots and with fingertip, nail and spatula impressions as a decoration are of somewhat different workmanship, but have the same distribution. All the facts support the contemporaneity of both types of pottery. A third type, decorated with channeling is poorly represented. A large pot with spatula impressions in horizontal rows and a cordoned rim was found in the immediate vicinity and is certainly contemporaneous with the settlement finds. The pot shows great similarity to the large pot from Molenaarsgraaf. Only in the shape of the bottom there is a considerable difference.

— At Monster (South Holland) <sup>151</sup> domestic Beaker pottery included MBB (?), VBB and BWB sherds. The rest of the pottery shows channelling, fingertip and nail impressions (also in V-motif). Genuine Pot Beakers are well represented.

— The settlement on the Meerlo Heath <sup>152</sup> also yielded BB sherds (no MBB, some VBB) and (closely wound) BWB sherds, which are here probably contemporaneous. Of about 435 sherds about 30% is decorated. Of these BB (10%) and BWB (14%) are about equally represented. The remaining 76% shows mainly fingertip impressions, but also channelling. A few sherds come from genuine Pot Beakers. The BB pottery is primarily thin-walled. The BWB and especially the remainder of the decorated pottery is predominantly thick-walled.

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<sup>147</sup> Van Giffen 1961, 1962, 1966, De Weerd 1966; see also Verlinde 1971, 39.

<sup>148</sup> Verwers 1973, 9, *Abb.* 8.

<sup>149</sup> We thank Mr R. S. Hulst, Amersfoort, for the information on the Bell Beaker finds of Dodewaard. In the numbers 150 undecorated sherds are not taken into consideration; although they are different from the HVS/DKS ware their attribution to the BB material is not certain.

<sup>150</sup> Van der Waals 1962.

<sup>151</sup> Glasbergen & Addink Samplonius 1965, Stuurman 1965.

<sup>152</sup> Verlinde 1971.

	type elements	Molenaars graaf	other sites
1400	HVS		Velsen (2nd layer)
1500	HVS BWB2	(3)	Vogelenzang, Wijchen, (Vorstenbosch)
1600	BWB2	2	Velsen (1st layer), Anlo (pits)
1700	BWB1 VBB	1/2	Meerlo Heath
1800	VBB	1	Dodewaard, Haps
1900	VBB MBB	?	Oostwoud
2000	MBB		Vlaardingen

Fig. 122. Schematic representation of the chronological relationships of some well-documented settlement sites of the period 2000-1400 B.C. in the Netherlands.

If we compare these data, and refer to those of Molenaarsgraaf, it appears that only a few very general conclusions may be drawn. In fact beaker settlements do not yield enough pottery and the find material is not homogeneous enough.

— The percentage of decorated pottery varies from 30% (Dodewaard, Meerlo Heath) to 60% (Haps). Together with the Molenaarsgraaf finds (table 19) it seems that a great variation in the ratio of decorated to undecorated pottery occurs. Moreover, there is no regularity nor evolution to be recognized.

— The percentage of genuine BB sherds of the total of decorated sherds is low: 30% (Dodewaard), 20% (Haps), 10% (Meerlo Heath). The relatively high percentages at Dodewaard and Haps correspond with phase I at Molenaarsgraaf, for, reckoned over the total quantity from the settlement terrain, it is about 10%. For phase I it must, therefore, be some times higher.

— VBB and BWB pottery both appear to be associated almost exclusively with pottery decorated with fingertip impressions. The V-motif predominates; channeled decoration occurs in both in small quantities. As far as BWB pottery is concerned this agrees with the existence of complete beakers, with channeled decoration, which are closely related to the real BW beakers. The association BB-channelling in phase I at Molenaarsgraaf is to some extent exceptional.

— Molenaarsgraaf reveals a number of elements not to be found in any recorded find-group: the frequent cordoned rims, the perforations under the rim, the impressions on the rim and the heavy feet. These are all elements characteristic of BWB pottery and at Molenaarsgraaf are found in this group and on undecorated pottery, which we placed in phase 3. The absence of these elements in the named find-groups supports this dating.

— There is a remarkable similarity between the percentage division of the pottery into the various categories at Molenaarsgraaf and at Meerlo Heath. Is this fortuitous? Does it mean that Meerlo Heath covers the same period, or is it the consequence of the chronological position of Meerlo Heath, "half-way" to Molenaarsgraaf? We do not know.

— Finally, we repeat that real Pot Beakers are very poorly represented at Molenaarsgraaf. This cannot be the result of regional factors, in view of their occurrence at Monster and also

at Ottoland<sup>153</sup>, nor can it be caused by too little material. The real cause is likely to be the preponderance of pottery from phases 2 and 3 in the settlement terrain.

Our final conclusion must be that the domestic assemblage (in fact the domestic assemblages) at Molenaarsgraaf corresponds reasonably well with the discoveries at a few other well documented terrains of the same period.

#### 4.9.3.5. *Some final remarks on the pottery*

The largest part of the settlement pottery at Molenaarsgraaf probably originates from *Riesenbecher* and related smaller pottery. The *Riesenbecher* are typologically the continuation of the series which we named when discussing the Pot Beakers<sup>154</sup>. As a residual group they are in the first place defined by negative characteristics, the absence of dentated spatula or BW impressions and of zoned decoration. They have a loosely arranged decoration of simple impressions carried out with the fingertip (often V-motif), nail, plain spatula or a broken-off pointed object such as a twig or a bone. The pot may be entirely or only two-thirds decorated. Sometimes they are wholly undecorated. They have an S-profile of divergent forms, seldom is it angular. The bottom can be small and heavy and concave inside, or broad and flat. Cordoned rims occur frequently; much less common is a row of perforations below the rim<sup>155</sup>.

The dating of these pots rests mainly on typological arguments supported by a few (open) associations: the Drouwen pot<sup>156</sup> might belong to the Bell Beaker sherds there, that of Schalkholz<sup>157</sup> to a small Bell Beaker, the undecorated Metzendorf pot<sup>158</sup> belongs to a BW-decorated dish, and the Aalden pot<sup>159</sup> to the Early Bronze Age.

<sup>153</sup> Cf. note 151 (Monster); Ottoland: data of the author.

<sup>154</sup> Cf. Verlinde 1971, 37. Pot Beakers were also seen as a regional group of the *Riesenbecher* by Stampfuss 1929, 89 and Gatermann 1943. BW pots were included in the *Riesenbecher* by Struve 1955, 43, 131-132. Remarkably the few Dutch *Riesenbecher* are all found outside the Veluwe. To us the following more or less complete *Riesenbecher* are known: Schipborg (Van der Waals 1962), Drouwen (Modderman 1971), Aalden (Modderman 1957), Rhenen (pers. comm. Mr J. Ypey, Amersfoort), Echt (pers. comm. Mr J. H. F. Bloemers, Amersfoort). The fragmentary Rhenen pot (height c. 40 cm.) was found together with sherds of HVS/DKS pots in "grave 519" of the Merovingian cemetery there. It is over all decorated with  $\Delta$ -fingertip impressions and has a profile like most large BW pots: everted rim, high belly and small heavy bottom with protruding foot. The Echt pot (Bloemers 1971, now in the Maastricht museum) is 51.5 cm. high and shows a close similarity to some BW pots (esp. Modderman 1955, fig. 1, no. 4) in profile and arrangement of decoration. It has an everted rim with a row of perforations and a cordon below, and a narrow, heavy base. The decoration consists of slightly oblique long grooves, alternating with rows of vertical fingertip impressions. Both are *Riesenbecher* that on typological grounds must be dated to the BWB Culture. Especially the Echt pot shows a strong relationship to the Molenaarsgraaf pot with reed impressions and might be called a *Riesenbecher* of Bentheim type.

<sup>155</sup> The principal literature on *Riesenbecher* (and sherds in domestic assemblages): Stampfuss 1929 (esp. *Taf.* XII), 1940; W. Kersten 1938, Stieren 1950 (no. 956), Stegen 1954, Struve 1955 (esp. 43, 131-132 and *Taf.* 24), Wegewitz 1960, Uenze 1961, Voelkel 1963, 1968. Lehmann (1965, 27) argues against the differentiation of the *Riesenbecher* in the Bentheim and "Moislingen" type. In our opinion the Bentheim type is well defined, while the Moislingen type is merely a heterogeneous residual group.

<sup>156</sup> Modderman 1971.

<sup>157</sup> K. Kersten 1951, Struve 1955, *Taf.* 21.10 & 11, also *Taf.* 15 (Kat. nos. 372-373). The upper part is decorated with a two-toothed spatula. The profile is angular like some Pot Beakers. The association with a small Bell Beaker is not entirely certain.

<sup>158</sup> Cf. notes 139, 140.

<sup>159</sup> Modderman 1957.

It seems to us that the careful analysis of domestic assemblages may also contribute considerably to dating. *Riesenbecher* of the "Bentheim type" are in this way dated by the BWB association from the gully filling at Molenaarsgraaf, where all the characteristics of this type occur. Also the pot with reed impressions, which typologically accords perfectly with the sherds from the gully, may be called a *Riesenbecher* of the Bentheim type. It forms a good parallel to the well-known pot from Esperke, Kr. Neustadt<sup>160</sup>. Only the decoration with reed impressions is exceptional. Comparable impressions by means of a reed, broken bone or other cylindrical object are known, however, on beakers of very divergent form<sup>161</sup>, which at least partly originate from the same period. As we have already suggested the pot shows a strong relationship to the large BW pots not only by its form but also by the arrangement of its decoration.

The undecorated pottery from the gully filling includes two interesting elements. First, in the little pin an indication of the presence of handled beakers. Handled beakers are very rare in this country and are exclusively known from the BWB phase. Second, the outward bent rim (fig. 88, upper left) and a bottom sherd (fig. 89, right) demonstrate the presence of beakers with the form of the "intermediate BB-BWB type", like those mentioned in note 124.

Finally, a comment on phase 3 at Molenaarsgraaf and on the preponderance of undecorated pottery there. In the Central and Southern Netherlands the first Hilversum urns occur in the course of the Early Bronze Age. The lack of Hilversum pot sherds indicates that phase 3 must have ended earlier, certainly, therefore, before 1500 B.C. The <sup>14</sup>C date 1400 B.C. of the hearth no. 29 and the evidence of the pollen diagram confirms this. On the other hand we know that BW decoration occurs certainly up to the occurrence of the first Hilversum pots. In fact we find that nearly all the decorative motifs of the Molenaarsgraaf BWB association (phase 2) recur on Hilversum pots. It is one of the reasons why we think the HVS Culture cannot represent a pure immigration as Glasbergen suggests, but bears a strong autochthonous stamp<sup>162</sup>. The HVS Culture is the logical successor of the BWB Culture around the southern North Sea, but with a much more regional character. In both cultures, however, intensive contacts across the North Sea must have existed.

So at Molenaarsgraaf the HVS phase was not attained; only an impoverishment of decoration occurs. This can be a local phenomenon or the characteristic of the phase directly before the HVS urns. In any case we must assume that some of the decorated pottery, including that with BW decoration, from the settlement site belongs to this last phase. The disappearance of the decoration in the course of the Early Bronze Age, moreover, conforms logically to the general tendency in this country which develops into the completely undecorated pottery of the Middle Bronze Age: in the north the *Kümmerkeramik* of the Elp Culture, in the south the Drakenstein urns.

<sup>160</sup> Jacob Friesen 1959, *Abb.* 151; Struve 1955, *Taf.* 24.4.

<sup>161</sup> Beakers with impressions of reeds or comparable cylindrical objects: see Elzinga 1964, Louwe Kooijmans 1973. Further: Waterbolk 1958, fig. 6.2; Van der Waals & Glasbergen 1954, Pl II.2, VIII.23; Clarke 1970, fig. 56. Outside the Netherlands: Sangmeister 1951, 80, *Taf.* I.16; Köster 1965/'66, *Taf.* 25.5; Riquet *et al.* 1963, fig. 4.4, 9.4, 20.3; Struve 1955, *Abb.* 12; Clarke 1970 figs. 57, 263, 909, 912, 1086.

<sup>162</sup> Glasbergen 1969.

4.9.3.6. *The flint*

Unfortunately much less attention has been paid to neolithic flint than to the pottery or the Palaeo- and Mesolithic flint. Meerlo Heath is, in fact, the only more or less fully documented flint complex of the Beaker Cultures in this country and its surroundings<sup>163</sup>.

The divergences from Meerlo Heath find an explanation in the different geographical situation. Meerlo lies on the river Meuse, with natural flint supplies in the form of gravel in its direct environs. Molenaarsgraaf lies in the middle of a peat region, about 30 km. away from the nearest natural flint supplies (river gravel and erratics). On both sites local flint-working took place. The differences in the quality of treatment are not noticeable. On both sites a few large artifacts were found, in addition to the products of the somewhat poor local flint industry. We must assume that the large blades were not made at the sites, but imported into the settlement, so that the presence elsewhere of specialized flint workers must be considered. Such large blades do not appear to occur at Schipborg.

The most important difference between Molenaarsgraaf and Meerlo Heath is the absence of arrow-heads, *Pfrieme* (awls) and *Dolchspitze* (dagger points) at Molenaarsgraaf. This can be related to the small importance attached to hunting as was proved by the bone refuse. At Ottoland-Oosteind and Ottoland-Kromme Elleboog also only one damaged arrow-head was found on both places<sup>164</sup>. Arrow-heads are, however, not typical settlement finds, and it seems to us characteristic that most arrow heads at Meerlo were found by amateurs in the topsoil before the excavation.

At Molenaarsgraaf the piece shown at fig. 90 c is related to the *Pfrieme*. The *Dolchspitze* seem to me related to the blades with retouche.

The percentage of artifacts confirms that of Meerlo (19%). A high percentage of scrapers is found there also (60%), as at Schipborg. In both places core scrapers occur<sup>165</sup>, and a few scrapers with superficial retouche. Scrapers at Schipborg attributed to the TRB Culture accord, however, also very well with the Molenaarsgraaf typology, as well as the few scrapers found at Monster. Two of them can be directly correlated to the BB Culture. The same applies to the scrapers from Velsen (BWB) and Vogelenzang (HVS). The simple, non-typical forms therefore appear to have had a long life. Various kinds of arrow-heads, if of less carefully shaped forms, also occur at Vogelenzang (HVS)<sup>166</sup>.

The almond-shaped artifacts (fig. 90 e) appear to be characteristic of this period. A specimen with retouche on one side was among the grave goods of the VBB grave at the Mottenkuil. A few with retouche on both sides were found at Schipborg among BWB domestic refuse. From a barrow at the Weekromse Zand comes an almond-shaped artifact with retouche on both sides

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<sup>163</sup> Verlinde 1971, 33, 43 (Meerlo Heath), Van der Waals 1962, 230, 242 (Schipborg). We will not try to compare with Beaker flint complexes outside the Netherlands, such as Belle Tout, Sussex (Radley 1970). This seems not very significant in this state of research.

<sup>164</sup> Cf. App. I, nos. III-11 and III-26 (= App. III, nos. 36 and 42). Type as Verlinde 1971, fig. 6, 2nd row, 4th from the left and Van der Waals 1962, fig. 28, no. 50.

<sup>165</sup> For instance Van der Waals 1962, fig. 29, no. 68.

<sup>166</sup> Groenman-van Waateringe 1966<sup>b</sup>, fig. 46, Glasbergen 1969, fig. 13 (Vogelenzang), own observations (Velsen), Glasbergen & Addink Samplonius 1965, fig. 13.4 (Monster).

and a handled groove-decorated beaker. Their possible association is, however, not established <sup>168</sup>.

A parallel for the triangular borers was found by us at Goudriaan <sup>169</sup>. It has, on the same geological grounds as are valid for Molenaarsgraaf, a *terminus post quem* of 2000 B.C.

Sickle fragments were not found at Molenaarsgraaf, nor at Ottoland, Schipborg or Meerlo Heath. They also appear to be absent in Middle Bronze Age settlements. In the Alblasserwaard, on the other hand, we know of a few Late Bronze Age and/or Early Iron Age terrains, where sickle fragments occur. All this confirms such a late dating of sickles in this country, as opposed to that made, for example, in Denmark <sup>170</sup>.

The fragment of the flint axe (fig. 87 s) forms one of the few indications of the type of flint axe used in our country during the BB Culture and the Early Bronze Age. We know only the grave finds at Lunteren <sup>171</sup>, among which were two flint axes. They are of the type of rough workmanship (if not even rougher) which is generally found in PFB Culture graves <sup>172</sup>. Our axe fragment is, however, a part of one of a much more carefully made type.

The flint material is in clear contrast to that of the Vlaardingen Culture by the absence of axe-flakes and transverse arrow-heads. The scrapers from Molenaarsgraaf appear to be of finer workmanship and to possess other *l/b/h* ratios. Large blades with *retouche* have not been recorded at VL Culture sites <sup>173</sup>.

#### 4.9.3.7. *The worked stone*

Recently J. N. Lanting distinguished two related types of perforated axes (the types "Emmen" and "Zuidvelde"), that are found in Bell Beaker and Early Bronze Age graves. Both have a long lozenge shaped outline <sup>174</sup>. But in general we can say that only very rarely do perforated axes or fragments of them occur in Late Bell Beaker or Early Bronze Age context <sup>175</sup>. The Molenaarsgraaf fragment with its straight sides and modest size gives only very little information. We only can say that it is not impossible that it is the fragment of a perforated stone axe of Emmen type.

<sup>168</sup> Mottenkuil: Van der Waals 1964<sup>a</sup>, fig. 12; Schipborg: Van der Waals 1962, fig. 28, nos. 68, 40; Weekromse Zand: RMO e 1936/1.26 and 24, Modderman 1955<sup>b</sup>, fig. 4. 11.

<sup>169</sup> RMO inv. no. h 1971/1. 32; App. III, no. 46.

<sup>170</sup> Cf. for instance Groenman-van Waateringe 1966<sup>b</sup>,— & Van Regteren Altena 1961. The bronze sickle in the Heiloo depot, commented on exhaustively by Brunsting (1962), can be preferably considered in our opinion as a product of the Dutch Late Bronze Age bronze industry.

<sup>171</sup> Butler & Van der Waals 1966, 125f., figs. 13<sup>b</sup>, 45, 46. From Great Britain, Clarke (1970, 448) mentions only 4 flint axes. Since stone axes are also unknown as grave goods in Bell Beaker graves, we are very ill-informed about all Bell Beaker axes. A domestic pit at Schipborg (Van der Waals 1962, 235, 250) gives the single association in this country.

<sup>172</sup> Van der Waals 1964<sup>a</sup>, 22, 49.

<sup>173</sup> Cf. Van Regteren Altena *et al.* 1962/'63, 1962 30, fig. 8; Glasbergen *et al.* 1966, fig. 26; Glasbergen *et al.* 1967, 23.

<sup>174</sup> Pers. comm. J. N. Lanting, Groningen.

<sup>175</sup> See for example: Van der Waals 1962, fig. 29, Bloemers 1968, figs. 4 and 5, Bell and Hoffmann 1940, *Taf* 16, no. 7.

The arrow-straightener <sup>176</sup> is a very characteristic implement for this period. These implements were frequently discovered in graves and form a characteristic item of Bell Beaker Culture archery equipment that probably remained in use in the Early Bronze Age. We mention here the finds at Meerlo (VBB) <sup>177</sup>, Haps (VBB) <sup>178</sup>, Uddelermeer (late VBB or BWB) <sup>179</sup> and Toterfout (HVS) <sup>180</sup> in this country. In Northern Germany <sup>181</sup>, England <sup>182</sup> and especially in Southern Scandinavia <sup>183</sup> they occur commonly in the Beaker milieu and in the Early Bronze Age. They are also known, however, in other periods: in our country specimens were found in Bandceramic settlements at Sittard and Caberg <sup>184</sup>, and in the Baltic area in the Pitted Ware Culture <sup>185</sup>.

The ball-shaped polyhedrons are a much more common type of artifact than would appear from publications. They are not very spectacular and consequently only incidentally reported. One example was found in a barrow at Vaassen <sup>186</sup>, possibly belonging to Middle Bronze Age pottery. At Zwaagdijk <sup>187</sup> (Middle Bronze Age) fragments of similar stones were found, as also at Elst <sup>188</sup> (end of Middle Bronze Age). We know of three examples from the Veenburg estate between Lisse and Hillegom <sup>189</sup>, where BB Culture, Early and Middle Bronze Age finds were made. Another specimen was found, together with an undecorated Hilversum urn, at Wijchen <sup>190</sup>. In the IJsselmeer polders <sup>191</sup> a few examples are known. The relatively late dating on grounds of distribution at Molenaarsgraaf (phase 2/3, *cf.* p. 236) is confirmed by these finds. The function of the ball-shaped polyhedrons is, however, still unclarified. They are certainly not stones used for beating <sup>192</sup>, but rather for some kind of rubbing or smoothing work. Are they perhaps whetstones for bronze implements?

<sup>176</sup> Arrow shaft smoother or straightener; German: *Pfeil(schaft)strecker (glätter)*.

<sup>177</sup> Verwers 1964, fig. 4; a pair forming part of a grave inventory with Veluwe Bell Beaker.

<sup>178</sup> Verwers 1972, *Abb.* 9, fragment, part of domestic refuse.

<sup>179</sup> Holwerda 1911<sup>a</sup>, *afb.* 4 a single piece forming part of a grave inventory with a small to BW Beakers related beaker (*cf.* note 242).

<sup>180</sup> Glasbergen 1954, fig. 42<sup>e</sup>, a single piece.

<sup>181</sup> For instance: Radberg near Hülsten (Kroll 1938, a pair in Early Bronze Age (BWB) association); Marbeck Kr. Borken (Stieren 1950, no. 98, isolated find near BB and BWB sherds); Hohenhorster Bergen, Kr. Bocholt (Stieren 1950, no. 44, isolated find in urnfield, late beaker finds nearby); Stieren 1950, no. 334 (isolated find) and no. 1286 (fragment with Neolithic refuse); Voss 1967, *Taf.* 17.6: fragment, isolated find; Struve 1955: two pieces in Early Middle Bronze Age milieu at Norddorf.

<sup>182</sup> Grimes 1938, fig. 4.2; Clark 1963, fig. 16; Annable & Simpson 1964, nos. 285-290 (Roundway), nos. 211-218 (Wilsford), nos. 382-389 (Collingbourne), all grave groups dating from the beginning of the Bronze Age. No arrow shaft smoothers are mentioned by Clarke 1970 (*esp.* 448).

<sup>183</sup> Glob 1952, nos. 322, 539; Forssander 1933, *Abb.* 40, 42.

<sup>184</sup> Both unpublished: RMO 1 1937/4.43 (Caberg), 1 1959/12.192 & 250 (Sittard). A parallel to the Caberg specimen is illustrated by Bailloud & Mieg de Boofzheim 1955, PL. VIII. 16.

<sup>185</sup> *Cf.* note 183.

<sup>186</sup> Holwerda & Evelein 1911, *afb.* 24.

<sup>187</sup> Modderman 1964<sup>a</sup>, *esp.* 35.

<sup>188</sup> Hulst 1969, 277 and fig. 4.

<sup>189</sup> RMO h 1930/7.20-23.

<sup>190</sup> Museum Frans Bloemen, Wijchen, no. B1.0.67.

<sup>191</sup> Comm. Mr G. D. van der Heide, Schokland. North-east Polder, parcel P14; East Flevoland Polder, parcel G 42 (BB culture?).

<sup>192</sup> The ball-shaped polyhedrons show a superficial resemblance to the *Kornquetscher*, regularly found in Iron

As for the concentration of stones no. 308, we would mention for purposes of comparison the collection of small pebble deposited in a pit (no. 69) at Meerlo Heath. Verlinde thinks of raw material for the tempering of pottery. At Molenaarsgraaf no quartz was included in the concentration while stone (*i.e.* quartz) tempering was not frequent. The problem of the function of these stones remains unsolved.

#### 4.9.3.8. *The worked wood*

Both at Vlaardingen <sup>193</sup> and at Molenaarsgraaf oak, lime and elm are almost completely lacking in the determination lists. The alder is much more frequent at Molenaarsgraaf than was the case at Vlaardingen. This might be explained by the use and the measurements of the poles: at Vlaardingen these were heavier and were used for the building of houses.

The method of workmanship is fairly varied at Vlaardingen <sup>194</sup>. The house 10, on the western bank, had poles carefully trimmed all round to a point, with small facets. The poles on the eastern bank, often of split wood, were carelessly cut and usually after rough notching were broken through and not further treated. The way of cutting at Molenaarsgraaf differs from both these techniques. The poles there were pointed with a few powerful blows of an axe on one or two sides.

The fragment of the tenon, as used in a mortise and tenon construction, is well paralleled in the wooden temple at Bargerooosterveld <sup>195</sup>. The tenons there are bigger in all respects. They are thicker (10-15 cm.) and considerably longer (30-75 cm.) and have a wider flange. This small temple belongs to the Elp Culture. It is precisely this culture that may best be regarded as the continuation of what we have found at Molenaarsgraaf.

We know a few examples of poles knocked in the bottoms of gullies with shallow water on prehistoric sites in this country. In the bottom of the shallow gully at Culemborg <sup>196</sup> we did find a few poles, belonging to the adjoining Iron Age settlement. The gully, however, then had the character of a marshy depression rather than that of open water and the posts could easily be interpreted as the remains of fences. In the gully at Vlaardingen, besides the remains of nets and the famous osier weel (fish trap), a considerable number of enlined posts, closely set together were uncovered. The fishing expert Boddeke thought they were the remains of blockings, used in trapping the sturgeon, represented there with large quantities of its bone plates. Also the nets, with a mesh width of 13 cm. were probably used for sturgeon fishing <sup>197</sup>.

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Age milieu. Quartzites were also often used for these, but they have larger dimensions and show the beaten surfaces of pounding stones, the result of their use, *viz.* the beating and pounding of grain.

<sup>193</sup> Glasbergen *et al.* 1966, 61. Wood samples from the creek bank zone, trench 7:

alder	63	hawthorn	2
ash	38	elm	1
hazel	11	mountain-ash	1
maple	9	yew-tree	1

<sup>194</sup> Glasbergen *et al.* 1966, 56, 59.

<sup>195</sup> Waterbolck & van Zeist 1961; <sup>14</sup>C date: GrN 1552, 3240 ± 65 B.P. (1290 B.C.), Vogel & Waterbolck 1963.

<sup>196</sup> Data by the author.

<sup>197</sup> Boddeke 1971 and pers. comm. See also Glasbergen *et al.* 1966, 46; Van Regteren Altena *et al.* 1962/'63, 1963, 47-48.

In the Upper Rhine in some places poles have been found which were originally interpreted as *Flusspfahlbauten*, but which Clark <sup>198</sup> prefers to see as the remains of constructions for the catching of migratory fish as salmon. Since the sturgeon might have been present for ecological reasons on the Molenaarsgraaf gully (the salmon probably not), it is possible that the poles are the remains of similar structures as at Vlaardingen. They might have been used, however, for the setting up of traps (*e.g.* for eels) as is still done in the canals and waterways of the Netherlands. It is interesting that the osier weel, found at Vlaardingen, is of the same type as the Early Atlantic specimens from Denmark and the fish traps used until a few years ago in the Dutch Biesbosch area <sup>199</sup>.

#### 4.9.4. THE GRAVE GOODS

##### 4.9.4.1. *The Veluwe Bell Beaker from grave I*

We can name the beaker from grave I a Veluwe Bell Beaker because of its angular profile, its decoration, which accentuates the form, and the width-height ratio <sup>200</sup>.

We have already pointed out above (p. 249) that this beaker is not an outstanding specimen. A plain (not a dentated) spatula was used, the rim profile is very simple, the wall fairly thick, the surface not so well finished as with many other Bell Beakers, the decoration (especially the zigzag bands) rather careless and the form proportions not very balanced. As fine, first-rate Bell Beaker pottery does occur at Molenaarsgraaf <sup>201</sup> we must assume either that this is an exception to the rule of putting best-quality goods in the grave, or that the grave belongs to a period when this very fine Bell Beaker ware was no longer available in the settlement. We opt for this later possibility, as such a relatively late placing in the history of the settlement is supported by the <sup>14</sup>C date (1685 ± 35 B.C.) of the grave and by some typological considerations.

In the typological sequence of Van der Waals our beaker conforms most closely to the type 2<sup>le</sup>, which is not necessarily in conflict with the very late dating. The dating of the 2<sup>If</sup> beaker from St.-Walrick, well before 1710 ± 80 B.C. <sup>202</sup> combined with the Molenaarsgraaf beaker proves indeed that the end of the typological sequence might be of chronological value in only a very general sense or not at all.

The bands with surrounding zigzag lines form in our view an element that can be justifiably given a very late dating. We find the motif—but in a finer execution—on a large number of Veluwe Bell Beakers of various forms. We do not wish to speculate about the origin of this motif. It is a logical element among the various (Bell) Beaker motifs. It is, however, noticeable that the surrounding zigzag band, consisting of one to a maximum of four lines, is one of the few (and the most striking) decorative motifs of BWB pottery. This motif is also prominent in

<sup>198</sup> Clark 1948, 69.

<sup>199</sup> Clark 1948, 55 (Ertebølle Culture); Clark 1965, 43-44 and PL. II.

<sup>200</sup> Van der Waals & Glasbergen 1955, 24-25.

<sup>201</sup> For instance fig. 86, nos. 210, 338; fig. 81 first 3 rows, the sherds at the left.

<sup>202</sup> Groenman-van Waateringe 1966<sup>a</sup>, Butler & Van der Waals 1966, 54.

the small group of beakers which occupies an intermediate position between the Bell Beakers and the BW Beakers<sup>203</sup>. The decoration with bands of bold horizontal zigzag lines seems to be one of the few elements to survive the transition from the Neolithic to the Bronze Age. The typological intermediate form of the zigzag motif of our beaker, between that on Veluwe Bell Beakers and on the BW Beakers, may be explained by the chronological intermediate position.

#### 4.9.4.2. *The domestic beaker from grave III*

The small beaker from grave III has the slightly accentuated shoulder and the funnel-shaped neck (and also the foot) that most conforms with some very early Protruding Foot Beakers in this country, such as those of Hees and Schipborg<sup>204</sup>. On geological and archaeological grounds such a dating (2500-2400 B.C.) is impossible. Moreover, the beaker is only decorated on its lower part! A second choice is the BW Beakers, especially those which are carefully shaped, although they lack an accentuated shoulder. As domestic pottery was very rarely placed in beaker graves it is not surprising that we possess no exact counterparts, for complete pots of this kind are consequently rare. The fact that only the lower part of the Molenaarsgraaf beaker is decorated while the neck is undecorated, is remarkable for beaker ware.

The gift of a Bell Beaker of moderate quality in grave I at the end of the period covered by this culture, plus this simple domestic pot, given in grave III, suggest that the very late Bell Beaker graves are characterized by domestic or inferior pottery as grave gifts. It is the prelude to the complete disappearance of pottery in the graves and even of grave goods in general during the Early Bronze Age.

We will name here a few graves that have the same feature of a simple domestic pot as grave gift and that for various reasons might date from the same period. In a complicated barrow at Hülsten, Kr. Borken<sup>205</sup> a small round pit contained a small carelessly shaped beaker with S-profile, entirely decorated with fingertip impressions in V-motif. Only two bands were left blank (!). At Selm, Kr. Lüdighausen<sup>206</sup> a small beaker was found in a oval burial pit as a grave gift to a cremation. It is entirely decorated with  $\Delta$ -motifs, with the exception of a narrow strip under the rim. In the Netherlands we consider the beaker from the second grave of barrow E, Uddelermeer<sup>207</sup>, as belonging to the same group and phase, together with the small beaker with reed impressions from grave II in the Roman castra at Nijmegen<sup>208</sup>.

#### 4.9.4.3. *The large beaker with reed impressions*

The typological place and the dating of the pot with reed impressions has already been discussed above (p. 296). We also commented on the association of this pot with grave II and

<sup>203</sup> Cf. note 124.

<sup>204</sup> Waterbolk 1958, fig. 4; Van der Waals 1964<sup>a</sup>, fig. 6; Van der Waals 1962, fig. 20.

<sup>205</sup> Kroll 1938, Albrecht 1934, 129; Struve 1955, 130-131.

<sup>206</sup> Albrecht 1934, 139, *Abb.* 23.2; also I. F. Smith 1955<sup>a</sup>, 10-11 (dating the beaker to the BW Beaker ware); Struve 1955, *Taf.* 24.8.

<sup>207</sup> Holwerda 1911<sup>a</sup>, 5-9 and *afb.* 4-9, see also note 242.

<sup>208</sup> Louwe Kooijmans 1973.

on the find-circumstances of the "Beaker Pots" (*i.e.* the Pot Beaker-*Riesenbecher*-BW pots) in general (p. 291 f.).

#### 4.9.4.4. *The fish-hooks*

Three bone or antler fish-hooks have been found in this country. A 7.6 cm. long antler specimen was found in the IJssel near Olst<sup>209</sup>, a 9 cm. long hook in the North-east Polder<sup>210</sup> made of (elk?) antler, and a 11.5 cm. long whale bone hook also in the North-east Polder<sup>211</sup>. In material and shape, and because of their barbs, they are very different from the Molenaarsgraaf hooks. None of them are dated.

The oldest fish-hooks of Northern Europe, those of the Danish Maglemose Culture<sup>212</sup>, are of the same type and made with the same technique as those of Molenaarsgraaf. They are made of bone, V- or U-shaped and were often cut after a hole was bored in the bend of the hook. They have no barbs, but often a little knob or a notch to fasten a line. We know this type also from the Swiss bog settlements<sup>213</sup>, from the so-called *Huntedorf* on the Dümmersee (TRB Culture)<sup>214</sup> and from a few cemeteries of the Pitted Ware Culture: Tangermünde<sup>215</sup> and Ostdorf<sup>216</sup>. This type of fish-hook has therefore had a very long life and seems to be restricted to environments with still fresh-water. This agrees well with the special function Clark<sup>216</sup> attributes to them: to hook on a living bait for the catching of pike. But we must realize that the Molenaarsgraaf hooks are among the smallest of this type (the Maglemose hooks are mostly 5-10 large) and the youngest in date. They are not necessarily used in the same way and Boddeke's experiments point indeed to another type of fishery at Molenaarsgraaf<sup>217</sup>.

Fish-hooks, which are in any case rather uncommon, are rarely found in graves<sup>218</sup>. At Molenaarsgraaf the fish-hooks may best be regarded as the counterparts, the "wet version" of the customary archer's equipment<sup>219</sup> found in Bell Beaker graves on the sandy grounds. At Molenaarsgraaf hunting was unimportant: the fisherman's gear replaced hunting equipment.

#### 4.9.4.5. *The antler hook*

Large antler hooks or hoes, like the specimen from grave II are hardly known in Bell

<sup>209</sup> Unpublished: RMO d 1928/12.1, bought from Mr Dul Fortmond, Olst; with one barb and grooves around the top.

<sup>210</sup> Unpublished, found about 1950 and recently acquired by the Schokland museum. Round cross-section.

<sup>211</sup> Boeles 1951, 197, fig. 42; Van der Heide 1955<sup>c</sup>, 110.

<sup>212</sup> Clark 1948, 1936, 43; Clark 1965, 42-43, fig. 17, 18. Brøndsted 1960, 60-67, 84-85; Glob 1952, no. 533.

<sup>213</sup> Clark 1948, 64, fig. 11; 1965, fig. 18; Wyss 1969, *Abb.* 8.13-16, barbless hooks 6-12 cm.

<sup>214</sup> Jacob Friesen 1959, *Abb.* 126.

<sup>215</sup> Tangermünde: Preuss 1953/'54; Ostdorf: Bastian 1961, Schuldt 1961. The coastal settlements (and cemeteries) as Västerbjers have other types of hooks, probably more suited to sea-fishing and sea-fishes (Stenberger *et al.* 1943, esp. 86-87).

<sup>216</sup> Clark 1965, 42-43, fig. 17.

<sup>217</sup> Described at p. 333; see also note 59.

<sup>218</sup> Clark 1948, 66-67; *cf.* also note 215; Häusler names a few bone fish-hooks in graves of the Siberian Glazkovo Culture (Häusler 1962, 1155, *Taf.* IX.3 (Nockoj 3) and *Taf.* VIII.1 (Makarovo 2)). The Glazkovo Culture is dated to the 18-13th century B.C.

<sup>219</sup> *Viz.* arrow-heads of different types, wristguards, arrow shaft smoothers.

Beaker or Barbed Wire Beaker context. Only in Great Britain were a few hooks found in graves <sup>220</sup>.

For its original use we will name a few possibilities. First, the hook is very similar to the Neolithic flint miner's picks. These might have been used for cutting the chalk as well as for levering blocks of chalk out of the walls <sup>221</sup>. That they really are suited for heavy digging work was proved in the Overton Down experimental earth work <sup>222</sup>. The use as a miner's pick is, however, entirely out of the question at Molenaarsgraaf. There it might have been used as a ground working implement, while the rose might have been damaged in breaking up the clods <sup>223</sup>. For the much younger antler hooks from the *terp* mounds (after 600 B.C.) such a use is generally accepted. They show, however, an intensive polish on the working end, lacking on our hook.

Is it possible that the hook, like the fish-hooks, formed a part of the fisherman's equipment? It could have been a fishtrap lifter or dredge. Wooden hooks of very similar measurements and shape were until recently in use in Sweden to pull nets out of the water <sup>224</sup>. At Robenhausen certain wooden objects with short side-branches radiating at an oblique angle to the shafts were interpreted as such <sup>225</sup>. In the already mentioned cemeteries at Tangermünde and Ostdorf, used by a society with a comparable economy and living in a comparable environment, a few antler implements occur, if of another type <sup>226</sup>. They have a double point with a centrally bored hole in which was originally a shaft, thus making a kind of double pick axe. At Västerbjers <sup>227</sup>, a coastal settlement, other types of fish-hook occur and the comparable antler implement is also different. It is an antler tine bored through at the base, as was done in the Maglemose culture. One piece shows clearly that it was originally provided with a shaft. On the point traces of wear are visible in the shape of longitudinal scratches. But the function of the implement is not clear: digging implement, net lifter or weapon?

It does not seem possible to determine with any certainty the way in which the antler hook was used. If we had to choose we would give preference to its use as a net lifter from the fairly deep and sometimes chilly waters of the gully. This explains the small wear and the scratches on the point. The rose would then have been damaged by its use as a hammer to drive into the gully bed the poles on which the traps and nets were fixed.

<sup>220</sup> Clarke 1970, cat. nos. 221 (p. 440), 739 (p. 438), 817 (p. 441), 1083 (p. 446), 1366 (p. 441). Antler tine: no 135 (p. 441).

<sup>221</sup> Clark 1965, 175, also 48-49. Similar hooks were found at Spiennes and St. Geertruid in small numbers.

<sup>222</sup> Jewell 1963, esp. 51-52.

<sup>223</sup> In the Western Netherlands these implements are very scarce. One from Hillegom is reported (Van der Wal 1952, 108, PL. IIB). The implement is undated.

Dr H. H. Frese, Rockanje, informed me about the hoes, at present in use in Africa. These are rather primitive tools, unspecialized in form or function. The angle between blade and haft is always a sharp one, which is not the case with our antler hook. To us this seems not significant, however, since prehistoric people were not free to choose the most efficient angle, but had to work with a naturally grown form. For the African hoes see Baumann 1944.

<sup>224</sup> Such a wooden hook is in the Hamburgisches Museum für Völkerkunde, Cat. no. 27.102:22, length = 37.5 cm., length of hook = 20 cm. We thank Dr Wilhelm Bierhenke for his information on this implement.

<sup>225</sup> Clark 1948, 71.

<sup>226</sup> Bastian 1961, esp. 98-101 & *Abb.* 72<sup>a</sup>; Preuss 1953/54, Tangermünde grave 21 (*Taf.* XXV. 4). A similar implement was found at the Dümmersee (Deichmüller 1969, *Abb.* 2).

<sup>227</sup> Stenberger *et al.* 1943, 87-89 and *Taf.* 20.7, 25, 28.

## 4.9.5. THE GRAVES

4.9.5.1. *General remarks*

The Netherlands have a very rich tradition in the investigation of Beaker graves, especially barrows, but comparatively little order has been created among the large quantities of available data. A detailed survey lies, however, outside the range of this essay, and would only be possible after intensive study of field documentation and notes both of amateur and professional archaeologists<sup>228</sup>. Such a work is being undertaken by J. D. van der Waals, and J. N. and A. E. Lanting<sup>229</sup>. Here, however, we will confine ourselves to published data, which are not disputed in interpretation or dating, and data supplied by recent investigations. This is only a part of the available material, but it is the most important part and more than adequate for assessing the value of the Molenaarsgraaf data.

First, a few general remarks. Burial in cemeteries appears to have been common, but is mainly recognizable when barrows were raised over the graves. Large groups of barrows seem, in view of the grave goods, to have been in use for a long time. Bell Beaker graves join those of the Protruding Foot Beaker Culture. Small groups appear to represent shorter periods. But isolated barrows occur just as much<sup>230</sup>.

Flat graves are less commonly known, but they were certainly as numerous as the barrows<sup>231</sup>. Especially during the large scale excavation of prehistoric settlements, the last few years, many flat graves of the Beaker Cultures were discovered. During the execution of public works it is, however, only a striking burial gift that leads to its discovery and most of them will be disturbed unnoticed. We must assume that a relatively large number of dead were buried in flat graves without noteworthy grave goods.

Little attention has been paid to the relationship between graves and settlements. It appears that the graves often lie in the immediate vicinity of the settlements during a period extending from the Protruding Foot Beaker Culture to the urnfields of the Late Bronze Age. This was at least the case in a number of extensive excavations, such as Anlo (PFB), Elp and Angelsloo (ELP). Also at Oostwoud (BB), Haps (VBB), and Nijmegen (VBB)<sup>232</sup> settlement remains and graves were found on one and the same terrain. The frequent occurrence of some beaker sherds or domestic pottery in and under barrows also indicates an adjacent dwelling

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<sup>228</sup> *E.g.* Van Giffen, Modderman, Waterbolk, Bursch, Remouchamps and Holwerda and amateurs like Bellen and Bezaan.

<sup>229</sup> We thank Prof. van der Waals and especially Mr J. N. Lanting for their help and information relating to the problems discussed in the subsequent paragraphs.

<sup>230</sup> A large barrow group is, for instance, that of the Ermelose Heide (Modderman 1954); small ones: those at Anlo (Waterbolk 1960), Swalmen (Groenman-van Waateringe & Van der Waals 1961) and St.-Walrick (Groenman-van Waateringe 1966<sup>a</sup>). As isolated barrows we name Meerlo (Verwers 1964) and Mol (Beex and Roossens 1962, 1963).

<sup>231</sup> *Cf.* Waterbolk 1958; Van Giffen 1937: Sleen, discovered by the finding of one rich grave; the others appeared to be poor in grave gifts. Recently at Hijken a grave field of 7 PFB Culture flat graves was discovered accidentally during large scale excavations of a Bronze Age settlement by the BAI, Groningen.

<sup>232</sup> Waterbolk 1960, 1964<sup>a</sup>, Van der Waals 1965<sup>b</sup>, 1966, 1967, Van Giffen 1961, 1962, 1966, Verwers 1972, Louwe Kooijmans 1973.

place. This fact therefore leaves the possibility open that the dead were in fact buried in the settlement during its occupation at Molenaarsgraaf, as the landscape made no other choice available.

Ring ditches or intermediary ditches with palisading (under the barrow, between the grave and the barrow's edge), and reinforced grave pits were in use in both the PFB and BB Culture<sup>233</sup>. As far as the latter is concerned we must, however, be careful with former interpretations of soil traces.

After having stressed above the uniformity of a few general aspects of burial customs, in what follows we discuss mainly the position of the bodies themselves and point out some differences between the various Beaker Cultures in this respect.

#### 4.9.5.2. *Veluwe Bell Beaker graves*

In the phase of the Veluwe Bell Beaker Culture the graves are orientated predominantly in an E-W direction<sup>234</sup>. Of 26 graves dated predominantly by a beaker 21 appear to have an

<sup>233</sup> Ring-ditches: PFB Culture *cf.* A. E. Lanting 1969, BB Culture *cf.* Lanting & Van der Waals 1971, note 15, Louwe Kooijmans 1973, esp. notes 66-68. I list some reliable observations of reinforced grave pits of the BB Culture: — Mol (Beex & Roossens 1962, 1963), pit 330 × 200, reinforcement 220 × 100 cm. — Wehm (Schlicht 1958), pit 220 = 150, reinforcement 150 × 100 cm. — Schaaik (= Schayk) barrow 3 (Van Giffen 1949, 73), pit 278 × 245, reinforcement 195 × 95 cm. — Emst (Van Giffen 1930<sup>a</sup>, 75, *Abb.* 65), pit 350 × 175 with 250 × 70/45 cm. coffin. — Vaassen, barrow 3 (Lanting & Van der Waals 1971, fig. 9) pit 150 × 130, reinforcement 120/100 × 60 cm. Cremation. — Maarsbergen (Lanting & Van der Waals 1971, 118, fig. 13), pit 220 × 130, reinforcement 150 × 85 cm. — Molenaarsgraaf, grave I (this paper p. 250) reinforcement: 130/135 × 80/95 cm. — Cuyk (Bogaers 1967, 10), pit 160 × 110, reinforcement: 85 × 48 cm.

<sup>234</sup> The graves used are those mentioned in note 235 plus:

1. Wageningen, barrow 1, WSW-ENE, with one or two Bell Beakers. Remouchamps 1928.
2. Hilversum, barrow 10, E-W, with a copper dagger and flint arrow-heads. Remouchamps 1928.
3. Ede, E-W, with wristguard. Bursch 1933, *Abb.* 54.
4. Hilversum, barrow 1, WSW-ENE, with copper dagger (with one small rivet). Bursch 1935, 49, *afb.* 29, 39.
5. Oss, *c.* E-W, cremation with Veluwe Bell Beaker. Bursch 1937.
6. Dier, E-W, reinforced with stones, with very late Bell Beaker. Van Giffen 1930<sup>a</sup>, *Abb.* 7 e-f; *cf.* Modderman 1955<sup>b</sup>.
7. Emst, WSW-ENE, with wristguard. Van Giffen 1930<sup>a</sup>, *Abb.* 65.
8. Exloo-Odoorn, WNW-ESE, with early type of Bell Beaker, copper dagger and awl, golden ornaments, flint flakes. Van Giffen 1947, *afb.* 7, 8.
9. Lunteren (a), E-W, with two Veluwe Bell Beakers, a copper awl, 4 cushion stones, frag. wristguard, flint axe, 6 arrow heads. Butler & Van der Waals 1966, 123 f.
10. Lunteren (b), E-W, with wristguard, flint axe, 7 arrow-heads. Butler & Van der Waals 1966, 127 f.
11. Cuyk (a), E-W, with small Bell Beaker sherd. Small pit (160 × 110) with coffin (?) 85 × 48. Bogaers 1967<sup>a</sup>, \*10.
12. Cuyk (b), E-W, with 2<sup>id-e</sup> Bell Beaker. Bogaers 1967<sup>a</sup> \*10.
13. Wageningen, NE-SW, with 2<sup>id-e</sup> Bell Beaker. Van Es 1964, 197, 255, PL. XLVIII.
14. Haps, WSW-ENE, with (fragmentary) Veluwe Bell Beaker. Verwers 1972, 7 f.
15. E(e)nerschans, NNW-SSE, five foot VBB bowl. Van Giffen 1946, *afb.* 7.
16. Driesche Berg, Speulde, ESE-WNW, Bell Beaker, upside down in filling of burial pit. Lehmann 1967<sup>c</sup>.
17. Vaassen, barrow 2, NW-SE, with 2<sup>ic</sup> beaker. Lanting & Van der Waals 1971, 107, fig. 7, 8.
18. Vaassen, barrow 3, NNW-SSE, with 2<sup>ic</sup> beaker, copper knife, amber button and pendant. Lanting & Van der Waals 1971, 114, figs. 9 & 12.

For Early Bell Beaker graves see note 269. We realize, that there might be discussion why the Exloo-Odoorn grave is in

orientation between WNW-ESE and WSW-ENE. We know at the moment 8 more or less complete corpse-silhouettes and 4 cases in which only the position of the head is determined <sup>235</sup>. The silhouettes all show a crouched corpse, laid down on the left side with the head to the east and facing south. Five of them were defined as the graves of men because of the presence of wrist guards as grave goods. Of the presumed head-silhouettes two lie at the east end, but two at the west end of the grave pit. Both the latter observations are not, however, irrefutable proof that they are in fact head silhouettes, as no report was made about the enamel of the teeth. The find of amber beads and buttons near the neck of one of these two (Hilversum) forms no conclusive proof, for elsewhere (Harendermolen) these lay near the pelvis.

The child grave (III) at Molenaarsgraaf is the first indication that women were buried differently from men in the Dutch Bell Beaker province. That corpse-silhouettes on the right side have not yet been reported may be the result, for example, of a poverty of grave goods in the graves of women, or of the erection of barrows only (or predominantly) over the graves of men <sup>236</sup>.

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this list, while the Elp and the De Eese graves are in the other. The Exloo-Odoorn grave is dated by the awl to Reineke Al (Butler & Van der Waals 1966, 61) while the beaker is typologically rather early. So the (not associated) early beakers from both other graves might also have been in use in the same period.

<sup>235</sup> These are:

1. Heerde, barrow 3. Orientation ENE-WSW, on the left side, facing south. Veluwe Bell Beaker near head. Remouchamps 1928.
2. Harendermolen. Orientation E-W, facing south. Wristguard, amber buttons (V-perforated) and beads, some flint. Van Giffen 1930<sup>a</sup>, 40 f., *Abb.* 25-28.
3. Oostereng, Bennekom, barrow 12. Orientation E-W, on the left side, facing south. Veluwe Bell Beaker behind pelvis; arrow-heads, wristguard. Bursch 1933, *afb.* 50.
4. Schaaik (= Schayk) near Oss, barrow 3. Orientation E-W, on the left side, facing south. Bowl near forehead; two flint flakes. Van Giffen 1949, 71-74.
5. Elspeter Heide, barrow 5. Orientation E-W, on the left side, facing south. Veluwe Bell Beaker near lower legs; flint flake. Modderman 1954.
6. Maarsbergen. Orientation NE-SW, on the left side, facing SE. 2<sup>Ic</sup> Bell Beaker near the feet; wristguard, reinforced burial pit. Lanting & Van der Waals 1971, 118 f.
7. Lunteren. Orientation ENE-WSW (silhouette E-W), on the left side, facing south. Veluwe Bell Beaker behind the head; wristguard, copper dagger, 8 arrow-heads, piece of flint, reinforced burial pit. Hulst 1972.
8. Nijmegen, barrow V. Orientation E-W, on the left side, facing south. Early (2<sup>Ib-c</sup>) Bell Beaker before forehead; wristguard. Louwe Kooijmans 1973.
9. Speulde, barrow 9. Orientation E-W. "Head-silhouette" at the east end. Veluwe Bell Beaker in the west end. Bursch 1933, *Abb.* 45.
10. St.-Walrick, barrow 1, period 1. Orientation E-W. Head-silhouette with enamel of teeth at the east end. Veluwe Bell Beaker at the west end. Groenman-van Waateringe 1966<sup>a</sup>, 72-80; pers. comm. Mr J. N. Lanting, Groningen.
11. Bennekom. Orientation NW-SE. "Head-silhouette" (no enamel recorded) in the west end. 2 Veluwe Bell Beakers at the SE side of the pit. Van Giffen 1954<sup>a</sup>.
12. Hilversum, barrow 2. Orientation W-E. "Head-silhouette" (no enamel recorded) in the west end. 4 Amber beads at the presumed place of the neck. Remouchamps 1928.

Two graves of those listed above are relatively early (nos. 6 and 8, cf. note 270). Molenaarsgraaf grave I itself is not included in the list.

<sup>236</sup> In the Saale district men's graves are more frequent and richer in grave gifts than the women's graves. (Fischer 1956). The PFB Culture graves in the Netherlands show the same feature, men's corpse-silhouettes being much more frequent and accompanied by more grave goods of a higher quality (A. E. Lanting 1969).

The placing of grave goods seems to be fairly variable: the beaker stood five times near the legs (once near the feet, once behind the pelvis, once near the knees, twice not specified). Other grave goods lie behind the back (also wrist guards!) or in front of the chest.

#### 4.9.5.3. *Barbed Wire Beaker graves*

For the BW Beaker Culture we have already remarked that our knowledge of burial customs is slight, owing to the lack of grave goods. Yet the few data warrant some conclusions. We considered eight graves which are associated more or less strongly with BWB pottery<sup>237</sup>. They lie, with one exception, in a NW-SE to N-S orientation. In four cases a corpse silhouette was observed<sup>238</sup>, each with the head to the south, three of them on the left side, facing west and in one case with no details specified. What is very noticeable is the frequent occurrence of sherds or large pieces of BW decorated pots at the foot or on the surface of the barrow or on the former surface under the barrow, in the case of a primary grave. In most cases these sherds lead to attributing the mentioned graves to the BWB Culture. In only three cases there was a BW Beaker in the burial pit. A flint dagger of a Scandinavian type, a second undecorated beaker and a worked piece of flint are the few associated grave goods. The N-S orientated graves, not dated and without grave goods, might originate also from this period<sup>239</sup>. Otherwise, the first graves containing dead buried extended on their backs seem to occur during this time.

The barrow investigations at St.-Walrick provided particularly valuable data<sup>240</sup>. Within

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<sup>237</sup> The graves used are:

1. Gasteren. WNW-ESE, BW Beaker in filling of very shallow burial pit. Van Giffen 1941, *afb.* 31.
2. Emmerhout, barrow 3. NNE-SSW, with BW Beaker and flint dagger of Scandinavian type. J. N. Lanting 1969<sup>b</sup>.
3. Ermelose Heide, barrow 2, period 2. SE-NW, with crouched corpse-silhouette on left side, head in SE, facing SW. BWB sherds in the barrow belong to the 2nd period. Modderman 1954, 22 f., Pl. XXXIII.
4. Ommen, Stegerense Veld, barrow 1, period 2. S-N, with crouched corpse-silhouette on left side, head south, facing W. Big fragment of BW pot at the barrow foot, probably dating this period. Reinforced burial pit. Bursch 1933, *cf.* also Modderman 1955<sup>b</sup>.
5. Gasteren, barrow 43. N-S, BWB sherds in secondary position in the sand of the barrow. Harsema & De Ruiter 1966.
6. Emmerhout, barrow 1. NW-SE, some Neolithic sherds, the latest with BW decoration from the barrow and the surface below it. J. N. Lanting 1968, 164.
7. Oudemolen, barrow 12, period 1. SE-NW, with crouched corpse-silhouette, on the left side, facing SW, head south, and with one retouched flint flake. In the foot of the barrow, east of the grave, a concentration of many sherds of a big BW pot. Excavation BAI 1950, unpublished. Pers. comm. Mr J. N. Lanting, Groningen.
8. Querenstede, Kr. Ammerland. NNW-SSE, crouched corpse-silhouette on the left side, facing east, head south. In the north end two beakers, one with BW decoration, the other undecorated. Zoller 1963, 105-107.
9. Eext-Kerkweg, barrow 2. E-W, with small flint-knife. On the former surface and below the barrow the sherds of a BW Beaker. Lanting & Van der Waals 1971<sup>a</sup>.

As early as 1955 Modderman (1955<sup>b</sup>, 42) observed that the BWB graves in general deviate from the characteristic E-W Beaker orientation. The direction of the Hanendorp grave (Holwerda 1911, fig. 27, 28; *cf.* notes 131, 241) cannot be determined, (no north is indicated) while it is also dubious whether the BW beaker belongs to this grave. So this grave is not included in the list.

<sup>238</sup> The nos. 3, 4, 7, 8 in note 237.

<sup>239</sup> As for instance grave t<sup>21</sup> at St. Walrick (note 240).

<sup>240</sup> Groenman-van Waateringe 1966<sup>a</sup>. We can establish the following typological grave sequence:

1. t<sup>1</sup>. E-W grave, head silhouette (with enamel of teeth, facing south) in the east end. 2f. Veluwe Bell Beaker in the west end.

a short period 8 building phases of three barrows were dated there. In the five burial pits found, some of them with traces of the bodies, the change from E-W orientated pits with a crouched body to NW-SE orientated pits with bodies extended on their backs and head to the south (sic!) can be observed. The oldest grave is dated by a 2<sup>If</sup> Veluwe Bell Beaker, the youngest by a <sup>14</sup>C date 1710 ± 35 B.C. The typological grave sequence concurs largely with the palynologically determined sequence. Only grave 3<sup>1</sup> is typologically somewhat earlier than was supposed. The small cemetery at Molenaarsgraaf is contemporary with some of the graves at St.-Walrick, namely 3<sup>1</sup> and 1<sup>2</sup>.

#### 4.9.5.4. *The chronological-cultural position of the Molenaarsgraaf cemetery*

Grave I at Molenaarsgraaf appears to be a burial which is thoroughly in the tradition of the Veluwe Bell Beaker phase in this country, in spite of its very late dating.

Grave III conforms, by its E-W orientation and by the mere fact that a beaker was present, more to the VBB than to the BWB tradition. The burial on the right side might well be the typical manner of burying women. But the typological relationships of the beaker to the (early) BWB Culture gives the grave a transitional character. Only a few parallels for the placing of the pot in the filling of the burial pit are known <sup>241</sup>.

Grave II has the characteristic BWB orientation, while the man's position, moreover, agrees with that of the known corpse-silhouettes. Under worse preservation conditions not many grave goods would have survived, but it would still have contained 4 pieces of flint. Did some grave goods disappear, however, in the disturbance caused by pit 199? Would arrow-heads in place of fish-hooks have been given in the sandy regions? To what extent is the direction of the grave influenced by the adjoining gully? If we included in our reckoning a rotation of 90° with the clock the situation of the body is normal for the VBB Culture. The placing of the grave goods both behind the back and in front of the body is normal in VBB graves. A number of these arguments are, however, invalidated by the unmistakable connection with the reed-impressed pot. All the circumstances in which the sherd of this pot were found correspond, moreover, to similar finds in and near BWB barrows. In grave II, therefore, we may say that

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2. t<sup>31</sup>. E-W grave, crouched corpse-silhouette on the left side, head east, facing south. No grave goods.
  3. t<sup>21</sup>. NW-SE grave, crouched corpse-silhouette on the left side, head SE, facing south. No grave goods.
  4. t<sup>12</sup>. NW-SE grave, crouched corpse-silhouette on the left side, head SE, facing SW, *Schleifennadel* at the throat.
  5. t<sup>13</sup>. NW-SE grave, corpse-silhouette, length 1.80 m., stretched on the back, head SE. <sup>14</sup>C date GrN 2996 3660 ± 35 B.P. (1710 B.C.). In the publication (p. 74) erroneously: SW-NE.

The palynological investigations gave as the most probable sequence of these five graves: 1<sup>1</sup>, 2<sup>1</sup>, 1<sup>2</sup>, 3<sup>1</sup>, 1<sup>3</sup>. The typological sequence gives only an earlier position of 3<sup>1</sup>, but is not in conflict with the stratigraphy. It is remarkable that in the typological sequence all primary graves are older than the secondary graves. We thank Mrs Dr Groenman-van Waateringe for the opportunity to examine the field drawings of the St.-Walrick barrows.

<sup>241</sup> We found in the Dutch literature:

- Onnen, Van Giffen 1930<sup>a</sup>, *Abb.* 85: a "beeheve-grave" with late Protruding Foot Beaker.
- Driesche Berg, Lehmann 1967<sup>c</sup>: Bell Beaker upside down in top of filling of a grave pit.
- Hanendorp, Emst, barrow 6, Holwerda & Evelein 1911, 22, *afb.* 27, 28: a BW Beaker, in the filling of a grave pit. It is possible that the beaker lay on the floor of an unrecognized secondary grave pit. *Cf.* also note 131.
- In a small, but deep, rectangular pit of a barrow at Ermelo one BW beaker was found at the bottom, the other half way up the filling. This is, however, probably not a grave. Modderman 1959<sup>b</sup>.

the BWB elements dominate. Only the relatively richness of the grave goods might form a reminiscence of the VBB Culture.

In the three graves of the cemetery at Molenaarsgraaf we can see clearly exemplified the transition from VBB to BWB burial tradition. Grave I is still pure VBB, grave II has a modest BWB influence and grave III is a pure BWB grave. The spatial relationship between the graves and especially the almost identical <sup>14</sup>C dates of graves I and II indicate that the transition VBB-BWB came about very abruptly in burial ritual.

The phase occupied by these graves in the total Netherlands grave material locates the cemetery therefore in a transition period VBB-BWB. We showed above (p. 289) that the existence of a period in which VBB and (closely wound) BWB were in use together might have existed. This must have been exactly the period between phase 1 and phase 2 of Molenaarsgraaf, in which the cemetery already on other than typological grounds was placed. Within this period an abrupt change in burial ritual took place. This last fact is illustrated by the almost complete lack of transitional grave forms in our country <sup>242</sup>.

#### 4.9.5.5. *Beaker skeletons in the Netherlands*

For the information about the details of the body positions, provided by the skeletal material at Molenaarsgraaf, there is hardly any comparable material in the Netherlands. What there is has been preserved only in exceptional cases, as no bones remain preserved in the acid limeless sand on which most of the barrows lie. It has always been the low-lying parts of this country which have yielded bones and skeletal material <sup>243</sup>, as now for the Bell Beaker Culture, thanks to the damp conditions there. This applies to the whole of prehistory and to early history. Only three finds are available for comparison: a grave near Nierssen, excavated by Holwerda in 1907, a grave near Oostwoud (1964) and a grave at Ottoland (1969).

The Oostwoud grave <sup>244</sup> forms an excellent parallel for grave I. In a grave pit, orientated E-W, the traces of the reinforcement of the sides were still clearly to be seen. A man of about 40, of robust build, was buried on his left side with his head to the east, facing south. Pelvis and shoulder-girdle were twisted somewhat backwards. The lie of the legs was identical with

<sup>242</sup> As such E-W orientated BWB graves and N-S orientated (late) VBB graves might be considered. We name Eenerschans (note 234, no. 15) Gasteren and Eext (note 237, nos. 1 and 9). An interesting grave, in this respect, is the highest grave of barrow E, Uddelermeer. The orientation is E-W, a crouched silhouette on the left side, facing south was visible. The grave goods consisted of a simple beaker, an arrow-shaft smoother (*cf.* note 179) and some flint flakes. (Holwerda 1911<sup>a</sup>, *afb.* 3, 4, 7; 1912, *afb.* 1). For typological reasons the beaker can be placed in the early BWB phase and at any rate not earlier than the group of beakers named in note 125.

<sup>243</sup> A general review of the skeletal remains is given by Mrs Constandse-Westermann (1968) and earlier by Huizinga (1959). On the Mesolithic skulls see Huizinga 1959 and the literature cited there and in Louwe Kooijmans 1970/71. At Swifterbant Early Neolithic skeletons were found (see p. 163); at Oostwoud, Nierssen and Ottoland-Oosteind Bell Beaker skeletons (see notes 244-248). In West Frisia (Oostwoud, Grotebroek, Zwaagdijk) Middle Bronze Age remains were discovered (note 244, Van Giffen 1953, Modderman 1964<sup>a</sup>). At Rijswijk Roman skeletons (Bloemers 1969) at Katwijk a Merovingian cemetery (Sasse 1911). The finds in the *terpen* (Roman times and later) are discussed by Halbertsma 1954.

<sup>244</sup> De Weerd 1966, 1967; Glasbergen 1969 esp. photo fig. 1; see also Van Giffen 1961, 1962 (with excavation plan), 1966. We obtained more information from Prof. Van Giffen, Prof. Glasbergen and Miss Metz, all of whom I wish to thank for their friendly help.

that of Molenaarsgraaf grave I, the arms lay bent in front of the body, but in some details the position differed from that of grave I. The skull was round and broad, and perhaps is a planoccipital *Steilkopf*. The grave lay within the terrain of a BB settlement and below a barrow (barrow II), in which at least ten other graves, most of them with crouched skeletons, were found. The stratigraphic position was such that a BB age seemed acceptable for this grave, but could not be proved. But two flint flakes, found in the burial pit and perhaps grave goods, supported this supposition. The striking likeness to grave I at Molenaarsgraaf is a confirmation of this opinion <sup>245</sup>.

At Nierssen <sup>246</sup> remains were found of two persons in one grave pit, directed WNW-ESE. One of them lay in a crouched position and exactly on its left side, its head to the east and facing south. The incomplete remains of the second body, especially the long bones, lay close behind the back of the first body. There were no grave goods which could permit a dating, but allocation to the Bell Beaker Culture is the most probable <sup>247</sup>.

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<sup>245</sup> The stratigraphy at the site was: a grey occupation layer with Bell Beaker refuse, covered by a level with plough-marks, itself covered by the low barrow, which was thrown up in more than one phase. The grave discussed here was discovered during a rescue operation (1964) some years after the excavation (1956-'57) and was not observed at levels in or above the plough-marks. The presumed BB age of the grave was recently confirmed by a <sup>14</sup>C date: GrN 6650 1950 ± 55 B.C. The other graves were all dug in the barrow and situated above the plough marks. None of the graves contained datable grave gifts. Since cross-ploughed soils are dated to the Middle Bronze Age in a number of places in West Frisia the graves were generally considered to be Middle or Late Bronze Age in date, the more since crossed plough-marks also occurred below the nearby barrow I, which has a <sup>14</sup>C date: GrN 797 1075 ± 80 B.C. But the plough-marks below both barrows differ in appearance. Below barrow II we have one coarse crossed system and a system tangential to the barrow, below barrow I two crossed systems in different directions occurred. Van Giffen himself (letter of 29-7-1969) considered one of these systems to be of Bell Beaker age. We must conclude that we only can say that the ten graves are later than the (Early) Bell Beaker occupation layer.

Some archaeological arguments are in favour of a Middle or Late Bronze Age date: at Grotebroek (Van Giffen 1953) a crouched skeleton was found in a secondary grave in barrow I, of which the primary grave has a <sup>14</sup>C date GrN 160 975 ± 40. In the Middle Bronze Age cemetery at Zwaagdijk (Modderman 1964) one of the dead was buried in a flexed position on its back. Flexed burials occur in the *terpen* of Groningen and Friesland, where they are later than 600 B.C. and most probably date from Roman times and later. Other arguments, however, favour an older, Bell Beaker, age. The orientation of the ten graves is either E-W (6x) or N-S (3x). In the E-W graves all skeletons lie with the head east, 5 facing south, 1 facing north. In the N-S graves two skeletons lie on the right side, head in the north end, facing west, one skeleton lies with the head in the south end. The burial ritual conforms therefore good (although not in every detail) with the BB and BWB traditions (see p. 306 f.). We remark that north-facing inhumations are not found in the Netherlands until now, but some are known with AOC Beakers in Great Britain (*cf.* Lanting & Van der Waals 1972). An 11th grave (De Weerd 1967) contained a skeleton in not-anatomical position. This peculiar type of burial is demonstrated a few times for the Bell Beaker Culture in the Netherlands (see p. 312). One of the graves (no 222) at last contained the skull and other skeletal parts of a hare or rabbit, probably a grave gift. The solution of this problem of the age of the graves might ultimately be given by future <sup>14</sup>C determinations of the skeletal material from the graves. If it might appear that we have to do with a Bell Beaker cemetery, it can be considered as a good parallel of Molenaarsgraaf. The absence of grave goods together with the occurrence of N-S directed graves would be consistent with a very late Bell Beaker date, approximately contemporaneous with Molenaarsgraaf. The discussed Bell Beaker grave might be the primary grave of the barrow in that case. When the ten graves appear to be of later date, this would mean a considerable continuity of the burial traditions into the Bronze Age.

<sup>246</sup> Holwerda 1908. Nierssen barrow G4. The photographs of the skeletal remains *in situ* (Pl. I la, 3) show their true position. The skeletons are preserved in a plaster mantle: it is a mirror image of the true position but also the most detailed and most reliable. The drawing (Pl. I.2) is in conflict with the analysis of the photograph and need not be preferred in our opinion.

<sup>247</sup> Huizinga (1959, 51-52) discussed the anatomical report by Nieuwenhuis 1908 and stated that the undisturbed

A burial comparable in many respects to the Nierssen grave was found in 1969 at Ottoland, lying on the Schoonrewoerd stream ridge and so dated after about 2000 B.C. for geological reasons. The grave pit was orientated NE-SW and contained a recently partly disturbed skeleton in a crouched position, lying exactly on its left side, its head to the east and facing south. In the western part of the pit lay the bones of a second person, particularly the long bones, in a heap. The skull was missing although this spot had not been disturbed. The lower jaw was present. An allocation to the Bell Beaker culture was confirmed by a  $^{14}\text{C}$  date:

GrN 6384       $3820 \pm 45$  B.P.    (1870 B.C.)

Both the Nierssen and Ottoland graves <sup>248</sup> are the more interesting when we bring them in relation to the Pot Beaker burials. For there are indications that in that case we might have to do with the covers of burials of the skull only <sup>249</sup>. In our view we are concerned at Ottoland and Nierssen with an unusual type of grave goods: the bones (or part of them) of a second person. The named finds have in common the interest in and the practice of burying skeletal parts of fellow human beings in non-articulating positions with special attention to the skull. Must we attribute the disturbance of grave II at Molenaarsgraaf to this? It is one of the possible interpretations that there the removal of the remains of the dead person were indeed the purpose of the digging, although we have given some arguments against this <sup>250</sup>.

Both graves at Nierssen and Ottoland show further that the position of bodies, exactly on their sides, was also in use during the Bell Beaker Culture and that the difference between grave I and grave II in this connection is of comparatively small importance.

#### 4.9.6. THE BURIAL CUSTOMS OF THE NETHERLANDS BEAKER CULTURES IN A WIDER CONTEXT

##### 4.9.6.1. *The Bell Beaker Culture*

The systematic E-W orientation established in the Netherlands is characteristic of the Bell Beaker graves. The most detailed data for comparison, also for comparing the position of the

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skeleton very probable has a skull of the planoccipital *Steilkopf* type and that the long bones are just as robust as the postcranial skeletons of this "Bell Beaker people" mostly are. So there is no argument supporting the decision that these are the remains of a woman, as Nieuwenhuis suggested. In view of the rules in burial customs of the Bell Beaker Culture in this country, discussed below, it is more probable that the skeleton is that of a man.

<sup>248</sup> Publication in preparation by the author. Two more graves can probably be added: the grave described by de Weerd (1967) from barrow II at Oostwoud (*cf.* note 245) and a partly disturbed grave discovered in 1972 on the Schoonrewoerd stream ridge at Molenaarsgraaf (Appendix III no. 24<sup>a</sup>). In the not disturbed part some skeletal remains (upper jaw, part of pelvis and shoulder blade, some long bones) lay in great disorder. This grave is not dated but very probably is of Bell Beaker Age.

<sup>249</sup> *Cf.* the discussion at p. 292, esp. of the Metzendorf-Woxdorf grave.

<sup>250</sup> The burial types mentioned here belong to a vast complex of partial, inarticulated and/or unintentional burials, that show many variations and cover almost the whole of the prehistoric and early historic period. A systematic study of these "aberrant" burials might reveal interesting data on matters as prehistoric religion and cannibalism. I am intended to discuss these things in more detail in the report on the Ottoland settlements and graves. I will be very grateful to anyone who can inform me on skull burials, inarticulated burials *etc.* from the Beaker period and the Early Bronze Age. Some examples are named for instance by Benninger 1931, Jankuhn 1939, Stone 1934, Timpel 1966, Frickhinger 1939, Maringer 1942/'45.

dead, come from the Saale region. The cultural relations of the Veluwe Bell Beaker phase in this direction make this region, in spite of its great distance away, remarkably suitable for comparison.

In the Saale region <sup>251</sup> the Bell Beaker graves lie in a N-S direction. Men were buried on their left sides with their heads to the north and women on their right sides with their heads to the south, all facing east. This means therefore a rotation of 90° in relation to the Netherlands. The dead lie strictly on their sides and sometimes even half on their bellies, with the hands in front of their faces, their legs drawn up into a right or sharp angle, one leg often more than the other. Pottery was always placed behind the back. Graves are generally flat graves, sometimes stone cists. These are all points of difference from practice in the Netherlands. Especially as far as the cemetery at Molenaarsgraaf is concerned it is interesting, however, that the same rules apply for children's graves as for adult graves, namely that they lie among the adult graves and that in general only a very simple pot was given as grave good, very rarely a decorated beaker. Furthermore, the graves often lie in small cemeteries of 4-10 graves, which often lie lengthwise in the length direction of the cemetery. All this applies exactly to Molenaarsgraaf also.

In addition to these detailed data other regions provide only supplementary information. In the whole eastern group <sup>252</sup>, similar N-S directed flat graves, with the dead facing to the east, are the rule. In Bohemia and Moravia <sup>253</sup> there is, however, no differentiation between sexes: all the dead lie on their right sides with their heads to the south. Some N-S orientated BB graves are also known in Schleswig-Holstein and Northern Germany <sup>254</sup>. From the Lower Rhine region <sup>255</sup> and Hessen <sup>256</sup> we have no information. In the Upper Rhine region <sup>257</sup> there is a very great variety in the orientation of graves, but N-S and NE-SW appear to predominate. In Southern Bavaria <sup>258</sup> the direction is N-S, with a few exceptions (E-W).

The best information on (Bell) Beaker burial customs in Great Britain is given by Clarke<sup>259</sup>. After a first glance we get the impression of a complex tradition without strict rules. The best that can be said is that generally the orientation is NE-SW, with common variations to N-S and E-W and with a sex-bound differentiation: men have the head in the N to E and, women in the S to W end. But Clarke gives no information on the sides on which the dead were buried. When we study Clarke's data in more detail and plot them in compass-cards it becomes visible that the rules (or the absence of these) vary from group to group. The question arises, moreover, how reliable the sex determinations are and in which degree errors in these influence the patterns. The earliest beaker groups (AOC, E) show a preference for a N-S direction. The European beaker group has even a sex-bound differentiation in NW-SE male graves (head NW)

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<sup>251</sup> Fischer 1956, 161-169.

<sup>252</sup> Sangmeister 1964a.

<sup>253</sup> Neustupný & Neustupný 1961, 79.

<sup>254</sup> Struve 1955, 70-71.

<sup>255</sup> Gatermann 1943 only remarks that the *Schnurkeramik* Culture has barrows, the Bell Beaker Culture flat graves and that sometimes the dead are buried in a crouched position.

<sup>256</sup> Sangmeister 1951, 62 and *Taf.* XIX. 1-5 mentions only graves of the "*Westdeutsche Bechergruppe*".

<sup>257</sup> Köster 1965/'66, 45-47.

<sup>258</sup> Ruckdeschel 1968.

<sup>259</sup> Clarke 1970, esp. 257 f., 455-456.

and SE-NW female graves (head SE). The N-S male graves are continued in the W/MR group. The "general rule", given above is valid for some later groups (N3, S1, in lesser extent S2) and perhaps also for N/MR, N4 and S3, on which not much information is available. The group N2 shows a polarization to N-S (S-N) and E-W (W-E) directions. Other groups (N/NR, N1/D) demonstrate a peculiar NW-SE orientation (head NW) for the female graves.

Lanting and Van der Waals demonstrated in their review article of Clarke's work <sup>260</sup>, that after the first phase(s) of the Bell Beaker Culture (AOC, E) a regional differentiation of the grave orientation came into existence. This accounts to a large extent for the wide range of variation in the grave orientations. In Wessex the older N-S graves continue, the dead facing east (men on their left side, head N; women on their right side, head S). In Yorkshire and in the northern focus area the graves turn to a W-E direction, the dead facing south. At least in Yorkshire a sex-bound differentiation exists (men on their left side, head E; women on their right side, head W) and it seems that this might apply to the northern group as well.

When we try to summarize the mentioned data on the Bell Beaker burial ritual, especially the grave orientation, we can state first that two main traditions occur: the one of E-W graves (Yorkshire/Scotland, the Netherlands), the other with N-S graves (Saale region, Wessex, (Upper Rhine)). Sex-bound differences are the rule: the man on the left side, head N or E, the women on the right side, head S or W, both, therefore, facing in the same direction. The N-S orientation seems to be an older tradition, the E-W orientation seems to be introduced later in the regions involved. We will work this out further below.

#### 4.9.6.2. *The Battle Axe Culture*

For an explanation of these differences from Netherlands practice, especially the difference between the Netherlands and the Saale region, we must consider the burial customs of the preceding Battle Axe Culture (= *Schnurkeramik*, Single Grave Culture, Protruding Foot Beaker Culture). In these there is a considerable uniformity throughout NW Europe. The burial pit is always orientated in an E-W direction and mostly covered with a barrow. This applies to Denmark <sup>261</sup>, Northern Germany <sup>262</sup>, the Saale region <sup>263</sup>, Bohemia and Moravia <sup>264</sup>, the Upper Rhine region and Southern Bavaria <sup>265</sup>. The often reinforced burial pit contains a crouched body facing south. It is interesting to know that at least in the Saale region the crouched bodies are often twisted backwards. Men lie on the right side, women on the left side. This applies also to the Netherlands, where we know 12 corpse-silhouettes, all showing a crouched person, facing south, 10 of them lying on the right side and two on the left side <sup>266</sup>. The first

<sup>260</sup> Lanting & Van der Waals 1972.

<sup>261</sup> Glob 1944, 160 f. and fig. 97. Especially in the older phase the orientation is strictly E-W; later there is more variation until at last appear the first burials in which the dead are stretched on their back.

<sup>262</sup> Struve 1955, 68 f. Cf. also K. Kersten 1952, Henrich 1938, Deichmüller 1963.

<sup>263</sup> Fischer 1956, 109-110; Feustel *et al.* 1966. Fischer 1953 gives a short survey of the Neolithic grave orientations in the Saale district.

<sup>264</sup> As note 253; Buchvaldek & Koutecký 1970, esp. 190-193.

<sup>265</sup> As notes 257, 258.

<sup>266</sup> Since A. E. Lanting is preparing an exhaustive study on the burial practice of the Dutch PFB Culture,

have much richer grave goods; six have stone axes, and two also a battle axe, indicating that these are the graves of men. Beakers are usually placed near the knees (5 times) and sometimes near the pelvis (once) or the head (twice). Axes lie in front of the body (near the hands?; six times), or behind it (twice) The predominance of male graves can be explained in the same way as in the BB graves.

#### 4.9.6.3. *The transition of the Battle Axe to the Bell Beaker Culture*

Everywhere where it can be determined the difference in burial ritual between the Single Grave Culture and the Bell Beaker Culture is clear. Fischer<sup>267</sup> emphasizes this for the Saale region: in the sequence *Kugelamphorenkultur*—*Schnurkeramik*—*Glockenbecherkultur*—*Únětice Kultur* the change in burial ritual in the first and last transition is fairly small, but in the middle one drastic, as will appear from the data given above. In this country, however,

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based on about 100 graves, we do not think it relevant to give the list of 38 well-documented graves which we compiled in our general survey of the literature on the burial practice of the various Beaker Cultures. In the orientation there is a strong preference for E-W, but a deviation up to 45° is rather common (We think especially to a more SW-NE direction). Even N-S directed graves (as barrow 3, Noordse Veld, Zeijen, Van Giffen 1930<sup>a</sup>, *Abb.* 88) might occur in rare instances. Round pits are not unusual. *Cf.* A. E. Lanting 1969.

PFB graves with corpse-silhouettes are:

1. Eext-Ketenberg. Orientation WSW-ENE, on the right side, facing S. Early beaker near pelvis, battle axe, axe, flint knife. Van Giffen 1930<sup>a</sup>, *Abb.* 32-34.
2. Langedijk, barrow 3. Orientation WNW-ESE, on the right side, facing S. Beaker near the knees, axe, flint flakes, arrow-head. Van Giffen 1930<sup>a</sup>, *Abb.* 94-95.
3. Vredenheim, flat grave below barrow 3. Orientation SW-NE, on the left side, facing SE. Early beaker near the knees. Van Giffen 1942, *afb.* 19; A. E. Lanting 1969, fig. 3.
4. De Eese. Round pit with NW-SE(?) orientated silhouette facing S. Early beaker near the head, two flint axes, one flint knife. Waterbolk 1964<sup>b</sup>, 80 f., figs. 16, 20.
5. Anlo, barrow 1. Orientation W-E, on the right side facing S. Axe and flint flake. A. E. Lanting 1969, fig. 7.
6. Angelslo, "flat grave" (pit 10). Orientation SW-NE, on the right side, facing S. Axe and flint flake. A. E. Lanting 1969, fig. 6.
7. Angelslo, barrow 10. Orientation WSW-ENE, on the right side, facing S. Battle axe, flint axe, grinding stone. A. E. Lanting 1969, fig. 8.
8. Angelslo, flat grave pit 4. Orientation SW-NE, on the right side, facing SE. Battle axe, flint knife, arrow-head. Pers. comm. Mr J.N. Lanting, Groningen.
9. Eext, barrow Galgenveentje 1. Orientation E-W, on the left side, facing S. Beaker, flint knife. Lanting & Van der Waals 1971<sup>a</sup>.
10. Heerde, barrow 1. Orientation E-W, on the left side, facing S. Early beaker near the feet, two flint flakes. Remouchaps 1928.
11. Ermelose Heide, barrow 3. Orientation W-E, on the right side facing S. Two late beakers near the head, flint knife. Modderman 1954, 22, Pl. XXXII, Pl. VIII. 2.
12. Putten. Orientation W-E, on the right side, facing S. "Zigzag"-beaker, Grand Pressigny dagger, battle axe, flint axe, Van Giffen *et al.* 1971.
13. Mander. Orientation E-W, with silhouette (no details mentioned). Battle axe type A, flint knife. Hijzeler 1959.
14. Swalmen, barrow 6, period 1. Orientation WSW-ENE, on the right side, facing S. Late beaker near the knees. Groenman-van Waateringe & Van der Waals 1961, 48.
15. Swalmen, barrow 8, period 1. Orientation SW-NE, on the right side, facing S. Beaker type 1<sup>d</sup> near the knees. Pers. comm. J. N. Lanting.

<sup>267</sup> Fischer 1956, 109-185.















Saale District			Netherlands		
	♀	♂		♀	♂
Únětice			BWB		
Bell Beaker			VBB		
			MBB / AOC		
Schnurkeramik			PFB		

Fig. 123. Survey of the directions of the grave pits of the Beaker Cultures and the Early Bronze Age in the Saale district and the Netherlands.

the change consists only in a reversal of sexual differentiation and a greater liberty in the placing of grave goods, especially of the beaker. It is therefore all the more remarkable that in the comparatively small number of graves from the early phase of the Bell Beaker Culture in this country, which we have hitherto omitted to consider, a relatively frequent deviation of the E-W orientation occurs. This applies to the All Over Cord Beakers (2<sup>nb</sup>)<sup>268</sup>, the Maritime Bell Beakers (2<sup>1a, b</sup>)<sup>269</sup> and the forerunners of the Veluwe Bell Beaker (2<sup>1c</sup>)<sup>270</sup>. In some cases

<sup>268</sup> We listed with All Over Cord Beakers:

- Anlo, barrow B, NW-SE. Waterbolk 1960.  
 Anlo, barrow C, NW-SE. Waterbolk 1960.  
 Swalmen, barrow 6, period 2, NW-SE (silhouette on the left side facing SW). Groenman-van Waateringe & Van der Waals 1961.  
 Garderen, barrow 4, W-E. Bursch 1933.  
 Emmen, barrow 3, WSW-ESE (head east?). Bursch 1936 (with Grand Pressigny dagger only).  
 Aalden, barrow 3, N-S. Van Giffen 1940, 203 f., *afb.* 27.  
 Roden, barrow I, W-E. Van Giffen 1935, 117, *afb.* 10.

<sup>269</sup>

1. De Eese, barrow 4, c. E-W, with Early Bell Beaker. Van Giffen 1930<sup>a</sup>, *afb.* 100.
2. Elp, barrow I (A), WNW-ESE. Van Giffen 1934, 103, *afb.* 4.
3. Mol, NW-SE, with very vague corpse-silhouette, head NW (?), Maritime Bell Beaker, undecorated Beaker, bowl. Beex & Roossens 1962, 255; 1963.
4. Wehm, Kr. Aschendorf-Hümmling, WNW-ESE, with crouched corpse-silhouette on the right side, head west, facing south, Maritime Bell Beaker and undecorated beaker near the feet. Schlicht 1958.
5. Uddelermeer, barrow D, lower grave, NE-SW, probably belonging to the Maritime Bell Beaker. De Laet & Glasbergen 1959, Pl. 19; Holwerda 1911<sup>a</sup>, 7 f., *afb.* 9, 11.

<sup>270</sup> Maarsbergen NW-SE, Lanting & Van der Waals 1971, 41, fig. 13<sup>a</sup>, with reinforced grave pit. Emmen, barrow

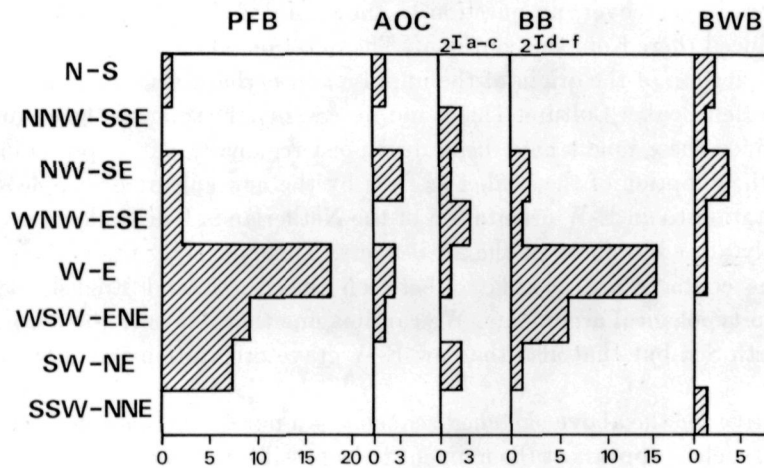


Fig. 124. Schematic representation of the directions of the grave pits of the various Beaker groups in the Netherlands. According to the data of notes 234, 235, 237, 266, 269.

a rotation of 90° seems to occur within one barrow or group of barrows<sup>271</sup>. With the exception of two 2I<sup>c</sup> Beaker men's graves (which both follow VBB practice) there is no comment that can be made on a possible difference between male and female graves.

The sequence in the Netherlands can be explained by assuming the introduction of different burial customs when the first Bell Beakers (*i.e.* the All Over Cord Beakers) came into use and subsequently the adoption of the PFB burial ritual by the BB Culture, although this was not complete and some original characteristics were retained. The burial ritual introduced most probably had a 90° different orientation, an exactly opposite manner of burial of men and women to that of the PFB Culture and perhaps a different placing of the grave goods. If we regard the backward turning of the *Schnurkeramik* skeletons as applicable to the whole of the Single Grave Cultures then the placing of the body exactly on its side might have been introduced at the same time. The BB burial ritual in the Saale region conforms to all these customs. Moreover, it is quite clear that it cannot have been an autochthonous development there, but was introduced there from elsewhere. This makes the same supposition for the Netherlands much more acceptable. We said above that the same burial tradition seems to be reflected by the earliest (AOC, E) Beaker graves in Great Britain, which also show a preference for a N-S orientation and a sex-bound differentiation, like the Saale region has<sup>272</sup>.

9, NNW-SSE, over E-W orientated grave. Bursch 1936, 64. Oudemolen, N-S, excavation BAI 1954, with 2I<sup>c</sup> beaker, pers. comm. Mr J. N. Lanting; unpublished. Nijmegen, barrow V, E-W. Louwe Kooijmans 1973, with early type of Bell Beaker. See also note 234, nos. 17 and 18.

<sup>271</sup> For instance: Swalmen: Groenman-van Waateringe & Van der Waals 1961. Anlo: Waterbolk 1960. Emmen, barrow 9: Bursch 1936, 64.

<sup>272</sup> But in Great Britain, only the position of the head is known to us, not the side on which the dead were laid in the grave (*cf.* note 259). The one AOC burial, with the man facing NW (Lanting & Van der Waals 1972, fig. 1, AOC 730), demonstrates that this is not necessary always E or S.

In England there is, moreover, no question to the origin of the (Bell) Beaker Culture: it was certainly introduced there from the continent. The question where this grave ritual came from is equal to the question of the origin of the impulse and perhaps also the group of people that gave rise to the Bell Beaker Culture. This is not necessarily the same as the origin of the oldest Bell Beakers, since these might have been developed regionally out of preceding PF Beaker groups during the adoption of the beaker as such by the new culture or people <sup>273</sup>.

The 90° rotation to an E-W orientation of the Netherlands Bell Beaker graves took place during or shortly after the phase of the 2<sup>nd</sup> beakers. This is exactly the period, during which intense overseas contacts are postulated between the Dutch and English Beaker groups, based mainly on typological arguments. We can imagine that not only the decoration pattern crossed the North Sea but that also the new E-W grave orientation was introduced, at least in Yorkshire.

An alternative for the above-sketched sequence is a purely autochthonous development of the grave ritual, such as appears at the moment to be possible the case for the typological development of the beakers in this period. However, such a hypothesis is difficult to maintain in view of the explanations of the grave ritual outside this country, especially in the Saale region and Great Britain. It is, moreover, clear that when Bell Beakers were first made in this country, more occurred than a mere typological change in the beakers. We have already referred to the changes in grave ritual. Later we shall deal in more detail with the well-known physical-anthropological arguments for this country. The changes in the grave gifts, and especially the introduction of copper implements, have only been determined for the later phases of the BB Culture. This can easily be explained by the scarcity of the older materials.

#### 4.9.6.4. *The transition of the Bell Beaker to the Early Bronze Age Cultures*

Changes in burial ritual were also confirmed in this country during the transition from the Veluwe Bell Beaker to the BW Beaker. Grave goods became scarce. The orientation of the burial pit was N-S instead of E-W and no particular structures are found below or around the barrows. Grave II at Molenaarsgraaf shows that this involves a clockwise rotation of 90° for male graves. No female graves are known.

Ruckdeschel <sup>274</sup> summarizes the grave ritual of the Early Bronze Age (Reinecke A phase) in Central Europe. The large area of the Únětice Culture has exclusively graves which are orientated in a N-S direction <sup>275</sup>. There is no sexual differentiation. Both men and women are buried on their right sides with the head to the south, facing east. These are the same rules that earlier applied in the Bell Beaker Culture in Bohemia and Moravia and in the Saale region only for the female graves. The sexual differentiation therefore disappears there. Outside the Únětice Culture we find other orientations and also sexual differentiation. In Moravia the graves are orientated NNW-SSE; the men lie on their right sides with their heads to the north, the

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<sup>273</sup> In our opinion uncertainty about the "Bell Beaker problem" has arisen by the confusion of these questions, which should be studied separately. We might even be concerned with beaker-less invaders adopting and subsequently developing this type of pottery. Professor Van der Waals in particular is developing very interesting and revolutionary ideas on the origin of the Bell Beaker; these ideas certainly influenced my thinking in this field of study.

<sup>274</sup> Ruckdeschel 1968.

<sup>275</sup> Fischer 1956. 170-185.

women on their left sides, with their heads to the south, both therefore facing west. In Southern Bavaria the graves are orientated NE-SW, the men lying on their left sides with their heads to the NE, and the women lying on their right sides with their heads to the SW, both therefore facing SE. In both regions there is accordingly a difference from the practice in the preceding period. In the Rhine region, as before, no rules can be determined. These seem to have varied in each cemetery <sup>276</sup>.

We think the BWB grave ritual can simply be traced back to the preceding VBB phase, in close conformity to the cultural continuity which we saw existed at Molenaarsgraaf. At most we would ascribe the transition to the N-S orientation to influences from the east (Únětice Culture) or we would relate it to the introduction or development of the burials with inhumations extended on the back (which show a preference for SE-NW directions).

#### 4.9.6.5. *The archaeological consequences of the anthropological data.*

The anthropological facts have always played an important part in interpreting the Bell Beaker Culture, especially after the detailed monograph devoted by Gerhardt to the skeletal material of the Bell Beaker Culture in Central and Western Germany <sup>277</sup>. He distinguished five main types of skulls:

— The *planoccipitale Steilkopf*, the most frequent type of skull. Before the Bell Beaker Culture it does not appear to have been found north of the Alps. People with such an unusual skull, hyperbrachycephal and with a flat *occiput* must be regarded as the core of the Bell Beaker people. Especially the men are fairly tall. Both male skeletons at Molenaarsgraaf conform well to the description given by Gerhardt of this type.

— An Alpine type (*curvo-occipitale Rundkopf*),

— A northern type (*dolichomorf*),

The alpine and the northern type form autochthonous elements. The last element may have originated from the Single Grave Culture <sup>278</sup>.

— A Mediterranean type (*grazil dolichomorf*),

— A *Klötze* type; unusual.

In the Early Bronze Age we find in the Adlerberg Culture a similar assortment of skull types as was formerly found in the Bell Beaker Culture. The new type, the planoccipital *Steilkopf* is also present (though in small numbers) in other Early Bronze Age groups (particularly the Únětice Culture) <sup>279</sup>. The Molenaarsgraaf skeletons show a similar late presence of the typical Bell Beaker skull in the Netherlands.

The Bell Beaker skull type contrasts strongly with that of the preceding Single Grave

<sup>276</sup> Ruckdeschel 1968, Köster 1965/'66.

<sup>277</sup> Gerhardt 1953, cf. also Gerhardt 1951, 1967; Bach 1965, 1966; Ulrich 1960. Older reports: Breitingen 1939, Otto 1950.

<sup>278</sup> Gerhardt 1953, 109.

<sup>279</sup> Köster 1965/'66, 61; Gerhardt 1953, 197; Gerhardt 1951<sup>a</sup>, (1964); Riquet 1970, 187-196. The planoccipital *Steilkopf* or big brachycranial skull forms an important element at Adlerberg itself and also at Singen and Nähermenningen. Less so at Straubing and in Austria (for instance Gemeinlebarn), but with some exceptions as at Hainburg-Teichtal, where the type is well represented. In the Únětice Culture the type occurs in very modest numbers. Riquet says that the type apparently spread more to the south and west than to the east; but from where did it spread?

Culture. The fairly small number of *Schnurkeramik* skulls from South-western Germany (17, of which 12 adults) all belong to one extreme dolichocephalic type, called by Gerhardt *Archaisch Stenodolichomorfe*<sup>280</sup>. In Bohemia also this type forms a significant, although not predominating, element in the *Schnurkeramik*<sup>281</sup>. In Central Germany the type is much more poorly represented although it can be recognized in a few older individuals. No *Schnurkeramik* skeletal material is known in the Netherlands. As far as the post-cranial skeleton is concerned, the *Schnurkeramik* skeletons, those with planoccipital *Steilkopf* and the Early Bronze Age skeletons from Singen/Hohentwill are all similar in their robustness.

The important differences in cultural remains and grave ritual between Single Grave and Bell Beaker Culture are therefore accompanied by a clear anthropological change from a fairly homogeneous dolichomorphic people to a varied population with the (hyper)brachymorphic planoccipital *Steilkopf* as a leading element. The transition from Bell Beaker Culture to the Early Bronze Age Cultures is very gradual in every respect. We must therefore consider the appearance of the Bell Beaker Culture as a real immigration: the penetration of entirely new population elements with their own material culture, just as centuries earlier the bearers of the Battle Axe Culture penetrated Western and Central Europe. In this connection Gerhardt made a number of interesting remarks<sup>282</sup> about the constitution of the BB population. It consists of the fusion of a number of "races" without any clear intermixing. Of the men particularly the majority have the typical planoccipital *Steilkopf*, while the women are mainly responsible for the heterogeneous character of the whole. It looks as if a group of male foreigners frequently recruited women from an existing population. In one cemetery, in addition to the planoccipital *Steilkopf*, one other type of skull is clearly present in large numbers. In the four double graves of Gerhardt's "Reine A" (pure BB) group people of the same skull type were buried. He concludes that they were a group of newcomers who rapidly increased in numbers and mingled with the existing population only to a limited extent.

The consequence of this anthropological model is not inevitably the assumption that the material culture of the Bell Beaker Culture as a whole was also imported from elsewhere. This might be the case with only a few (new) elements such as the wrist guard and the copper knife. We can imagine that the new people only imported and preserved a few recognizable cultural elements of their own and otherwise adopted many autochthonous elements. That is, we think a (partial) anthropological discontinuity might be combined with a largely continuous cultural development.

In this short study we will not deal with the origin of the planoccipital *Steilkopf* skull type (we refer the reader to Gerhardt<sup>283</sup>) although it might be the clue to the origin of the new elements in the Bell Beaker Culture. The above observations serve only to point out the consequences of the anthropological observations at Molenaarsgraaf, and to stress that the planoccipital *Steilkopf* has now also been established in the Veluwe Bell Beaker group<sup>284</sup>.

<sup>280</sup> Sangmeister & Gerhardt (1965), 197; Feustel *et al.* 1966, 117-146; Buchvaldek & Koutecký 1970, 275.

<sup>281</sup> Sangmeister & Gerhardt (1965), 112-113; Riquet 1970, 104 says that the extreme dolichocephalic skulls of the *Schnurkeramik* are demonstrated to be very characteristic. In combination with a certain skeletal gracility he sees some resemblances to the old Bandkeramik stock.

<sup>282</sup> Gerhardt 1953, 159 f.

<sup>283</sup> Gerhardt 1953, 163-182.

<sup>284</sup> I discovered the book of Riquet (1970) only after the writing of this section. The book gives a survey of the

## 4.9.7. THE OX BURIAL

4.9.7.1. *Neolithic animal burials in the Netherlands*

Apart from the *terp* finds, complete animal skeletons or their traces (corpse-silhouettes), from the pre-Roman period in the Netherlands are rare. For comparison with the ox burial at Molenaarsgraaf the following finds may be mentioned:

In the primary grave of a barrow at Emst (Veluwe)<sup>285</sup> were found—in addition to a 2<sup>nd</sup> (All Over Cord) Beaker, a second beaker and a Grand Pressigny flint dagger—the remains (teeth) of a “horse’s” head. They were all grave goods for a dead person whose silhouette was

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Neolithic and Early Bronze Age skeletal remains of France and surrounding countries. The systematic treatment of the huge quantities of this widely dispersed and (for archaeologists) not easily accessible material, makes this study of the utmost importance. Riquet confirms the lines of the European anthropological evolution, as they were known, and gives specifications on many points.

One of the major themes, if not the central problem is again the sudden appearance during the “Chalcolithic” (*i.e.* the Beaker Period) of the robust people with the big brachycranic skulls, sharply contrasting to the gracile and dolichoecranic “danubian complex” and the likewise dolichoecranic *Schnurkeramik* people, living in Central Europe. He says (p. 109). “We see here one of the deepest breaks in the continuity of the European anthropological history”. Riquet cannot see this as an immigration. At any rate this people came not from Spain, were brachycranic skulls are only very scarcely represented in and before the Chalcolithic. He believes (p. 184) that “we see in this the resurgence of the Mesolithic stock, which was temporarily eliminated mainly by the Early Neolithic and later by the Middle Neolithic colonists”. In this connection he stresses the occurrence of brachycranic skulls in the Mesolithic (principally those of Offnet), besides the predominantly dolichoecranic skulls (p. 34-35), that all differ considerably from the “danubian complex” (p. 55-56). He assumes a spontaneous “brachycranisation” or “dinarisation” of the original (Mesolithic) population in the two millennia before 2000 B.C. He rightly stress that our anthropological knowledge is restricted to relatively small areas and that data lack from long periods and vast countries.

We can, however, hardly accept Mesolithic survivals of considerable extent over a period of about 2000 year until 2000 B.C., unrecognized until now in archaeological and anthropological respect. The remarkable contemporaneity of the first occurrence of the planoccipital *Steilkopf* over a vast part of Europe (Czechoslovakia, Germany, Great Britain (Riquet p. 110, 196) and more sporadically in Spain and Southern France) is also difficult to explain in this theory. It is, however, interesting that brachycranic people occur in Northern France (SOM Culture) and along the Meuse in Belgium, although there are clear differences from the Bell Beaker people: their stature is smaller and the mean values of the *index cranicus* are considerably smaller (Riquet 1970, p. 143). Riquet gives also some references (p. 114, 183-184) to the Danish Neolithic skeletal remains, described in detail by Brøste and Jørgensen. Both the TRB people of the Danish Middle Neolithic and the people of the Dagger Period (Danish Late Neolithic, contemporaneous with the Bell Beaker Culture and the Dutch Early Bronze Age) had rather big mesocranic skulls (not brachycranic as Riquet says!) with a mean *index cranicus* of resp. 76.0 and 77.2 for the men. But there is a considerable variety and it is especially interesting in this context that there is quite a number of skulls with an *index cranicus* of over 79.0, and a rather flat occiput, Late Neolithic but also Middle Neolithic. We also note that there is a marked increase in mean body length of about 10 cm. between both periods, while the Neolithic TRB people was already tall and robust. The question of the possible anthropological relationship of all these brachycranic groups of is crucial archaeological importance. We are not competent to give an answer and just pose this question. Nor is this the place and moment to work out the consequences of the possible answers. One might led to a possible northerly origin of the BB people. This does, however not exclude that in the formation of the Bell Beaker Culture (*i.e.* the find association), contacts with remote countries, like the Iberian peninsula, played an essential role.

<sup>285</sup> Holwerda & Evelein 1911, 19 and *afb.* 20, 21. See also PZ 4 1912, 368-373; Behrens 1964, 48, 107; the grave (pit) itself is difficult to discern.

also visible. Van Giffen later declared that the jaws belonged to an ox <sup>286</sup>. It can no longer be determined whether a complete ox or only its head was buried in the grave.

In an eccentric position under barrow 3 on the Solsche Berg at Garderen the silhouette of a large animal was observed in a separate pit <sup>287</sup>. The barrow covered a bottom grave, which contained among other things a Grand Pressigny flint dagger. On the former surface lay a few sherds of a late Protruding Foot Beaker. The animal burial dates, therefore, from the same period as that of Emst.

In the WSW-ENE orientated primary grave of tumulus 1 at Zeijen <sup>288</sup> was found the silhouette of a large animal, apparently an ox, judging from the teeth which were preserved. The other grave goods were a thick-butted gneiss axe and a flint flake. No trace of any human interment was found, so that the ox may have been buried as a grave gift or simply as a primary burial. The date cannot be fixed more precisely than probably Protruding Foot Beaker Culture.

At Angelsloo <sup>289</sup> in the extensive excavation in 1966 an ox burial (silhouette with enamel of the teeth) was found close to a NE-SW orientated grave in which the dead person was buried in a crouched position on the left side with the head to the SW. In the grave a completely oxidized bronze or copper finger-ring was found. Even when we accept that the grave dates the ox burial, we can give no better date than Late Neolithic or Early Bronze Age.

In the centre of the settlement at Ottoland-Oosteind <sup>290</sup> (VBB to Late Bronze Age) the complete skeleton of a pig (a two year old domestic female) was found in an E-W orientated burial pit. For stratigraphic reasons the burial must be dated early in the occupation period (*i.e.* VBB/BWB). No human graves were found.

In the Vlaardingeng Culture settlement at Leidschendam <sup>291</sup> the fairly complete skeleton of a pig, about 5 months old, was found.

In one of the graves of barrow II at Oostwoud (containing a crouched skeleton, on the right side, head north and facing west) the skull and other remains of rabbit or hare were found. The grave is not dated <sup>292</sup>.

Finally, we must mention some finds in West Frisia: an ox skeleton from the Middle Bronze Age settlement at Zwaagdijk which, however, in view of the state of bone preservation,

<sup>286</sup> Van Giffen 1930<sup>a</sup>, 156-157. The "horse's head", RMO no. e 1911/8.8, could not be found in the museum to give it a re-examination.

<sup>287</sup> Bursch 1933, 69-71, *Abb.* 66, 77; see also Behrens 1964, 48, 107. Behrens doubted whether the original identification as a horse is right and suggests that it might also be an ox, as appeared to be the case in the Emst grave. Horse burials are very rare, while ox burials are the most common. Mr J. N. Lanting informed me that, according to a letter from Dr Bursch in 1971, a military veterinary surgeon from the nearby camp at Nieuw Millingen had identified the teeth as those of a horse. In our opinion this cannot remove the doubts.

<sup>288</sup> Van Giffen 1930<sup>a</sup>, 57-59, *Taf.* 47, 48; Behrens 1954, 64, 48, 107. Although the grave pit seems to be very small to contain a complete animal, this was doubtless the case. Van Giffen (1930<sup>a</sup>) stated: "*Es war wie ein grosser Schatten an der Ostseite des Grabes erkenntlich*" and (1925/'26, 244) "a complete animal was placed" (in the grave).

<sup>289</sup> Van der Waals 1966, pers. comm. Mr J. N. Lanting. The animal lay on its right side, head NE, legs directed to NW.

<sup>290</sup> Preliminary report: Louwe Kooijmans 1969<sup>b</sup>. The animal lay on the southern slope of the pit, head east and on its back, the legs stretched upward.

<sup>291</sup> Glasbergen *et al.* 1967, 114. Mrs Dr W. Groenman-van Waateringe informed me that in this case a burial with a ritual purpose is unlikely. An interpretation as normal carcass refuse seems most probable.

<sup>292</sup> *Cf.* note 245.

TABLE 25

*Survey of the Neolithic — Early Bronze Age animal burials in the Netherlands*

Site	Animal	Cultural association	Situation	Lit. in note
Hanendorp-Emst	ox	AOC beaker	in a grave	285,286
Garderen	(ox)	AOC beaker	in a grave	287
Zeijen	ox	Late Neol. — EBA	in a grave	288
Angelsloo	ox	Late Neol. — EBA	near a grave	289
Molenaarsgraaf	ox	VBB—BWB	separate grave in settl. + cemetery	
Ottoland	pig	VBB—BWB	in settlement	290
Leidschendam	pig	VL—SVB	in settlement (carcass refuse)	291

is apparently a (sub)recent burial, and an ox skeleton from tumulus I at Oostwoud, also possibly a recent burial. In view of the new data described above both finds, in our view, merit a fresh study <sup>293</sup>.

Animal burials are therefore a recurrent, but rare, phenomenon in the Beaker Cultures in the Netherlands. They are mostly related with human burials which may largely be explained by the excavation traditions. Only at Ottoland it is likely that a burial is related to a settlement. The find at Leidschendam seems to be a part of the normal domestic refuse rather than a ritual burial. The Molenaarsgraaf ox might, in view of these facts, form a part of the cemetery or, on the Ottoland analogy, belong to the settlement activities and might be interpreted then as an initiation sacrifice.

The lack of other animal burials (*e.g.* of the TRB Culture) is not significant, for in fact no Middle Neolithic skeletal material is known at all in this country. It is not permitted to state, therefore, that this custom was introduced by one of the Beaker Cultures.

#### 4.9.7.2. *Neolithic animal burials in a wider context*

The monograph of Behrens <sup>294</sup> permits us to make a comparison of Netherlands data with those of the whole of the Old World. He collected 268 finds, which involve 459 complete animal skeletons. Of these the majority (414; 90.2%) come from domestic animals. As far as distribution in space and time is concerned, the picture is very strongly influenced by the state of the archaeological research, the burial customs (*e.g.* cemeteries as opposed to collective burials in megalithic graves and inhumation opposed to cremation) and by the conditions for preservation of the bones. That 75% of the finds show some relationship to human graves might be mainly due to the fact that excavations have concentrated upon cemeteries. On the other hand the fact that human graves have not been found does not mean that they were not present

<sup>293</sup> Modderman 1964, 32; Van Giffen 1962, excavation plan.

<sup>294</sup> Behrens 1964.

in the vicinity. With the preponderance of domestic animals (especially ox) and the relation to graves the Dutch animal burials do not occupy an unusual position.

Most animal burials belong to the *Kugelamphorenkultur* and to a somewhat lesser extent, to the Baden (Pécel) Culture and some TRB groups (Baalberg, Walternienburg) of Central Europe and the Central Danube region. Fairly many and large cemeteries with good skeletal material from these cultures have been found. We find there in every large cemetery a few animal burials, often those of oxen in pairs. The dog also plays an important role. A few finds have been made in the *Schnurkeramik* Culture, but younger animal burials do not appear to occur<sup>295</sup>. The Western European finds form a separate and later group; they consist of about 20 items in which one or more dogs (about 50) are buried as a grave gift, a custom occurring from Southern Sweden to the Iberian Peninsula<sup>296</sup> but in the Netherlands, curiously, it has never been reported. Occasionally a dog is buried in a settlement, as at Easton Down<sup>297</sup>. A second group is formed by the oxen, of which we have already discussed the finds in the Netherlands. Other animals are not mentioned by Behrens. The Ottoland pig is therefore exceptional. Outside the Netherlands the following finds have been made.

At Engers (Kr. Neuwied)<sup>298</sup> the skeleton of a large animal was found near a Bell Beaker grave. It is most probably an ox. From a grave at Wiesbaden *am Hebenkies*<sup>299</sup> a "horse's" skull was reported, dated as *Schnurkeramik*. An ox skeleton at Skendleby, Lincolnshire<sup>300</sup> was among settlement finds which included A-Beaker sherds. Directly in front of the entrance of the megalithic grave of the Boyne Culture at Bryn Celly Ddu, Anglesey<sup>301</sup>, an ox was buried, and was either contemporary with or of later date than the monument. In the Tumulus St. Michel at Carnac, Brittany<sup>302</sup> (Early Bronze Age) alongside human burials two large ruminants (very probably oxen) were buried in stone cists. At Villa Nova São Pedro<sup>303</sup> an ox was carefully buried in a deep pit within the fortification. Halfway in the filling a large pot was found containing the bones of deer and pig. A second ox was buried in the immediate vicinity.

The strongly flexed position seems to be very exceptional. We found no example of it in Behrens' lists. The best parallels are both (Baalberg or Únětice) ox burials of Stemmer, but they lack the flexed neck. The certain establishment of the absence of the phalanges needs a careful excavation and a special attention to this phenomenon. A reliable example is the Early Bronze Age horse burial of Gleina, where all second and third phalanges were missing. But this too seems to be a rare practice<sup>303a</sup>.

It is difficult to draw any other conclusion from these few, widely scattered finds than that ox burial especially in the Bell Beaker Culture, was no unusual practice. We have no indication as to where this custom originated. The interpretation of the purpose of the burial

<sup>295</sup> Behrens 1964, 56.

<sup>296</sup> Behrens 1964, 71-74.

<sup>297</sup> Behrens 1964, 105; Stone 1958, photo 23.

<sup>298</sup> Gatermann 1943, 20, 40, 81 and *Abb.* 13, 31; Behrens 1964, 48, 98.

<sup>299</sup> Behrens 1964, 48 (note).

<sup>300</sup> Philips 1936, 67, 96 f. (= App. II); Behrens 1964, 106, 51-53.

<sup>301</sup> Hemp 1930, 194-196, 213 (= App. I); Behrens 1964, 105, 51-52; Piggott 1954, 200.

<sup>302</sup> Behrens 1964, 105, 51 and literature cited there.

<sup>303</sup> Do Paço & Sangmeister 1956, 219; Behrens 1964, 51-54, 113.

<sup>303a</sup> Behrens 1964, 102 (Stemmer), 99 (Gleina).

varies from find to find and is influenced by the find-circumstances. Behrens gives a full survey of all possibilities <sup>304</sup>. A very important distinction is the burial as a grave gift or the independent burial, sometimes itself even provided with grave goods. In this latter situation, which applies at Molenaarsgraaf, Behrens gives as the most important possibilities: a sacrifice, the burial of an animal that occupied a special place, a substitute for a dead person whose body was not available, or a profane purpose: the burial of a carrion. Only this last explanation do we consider inapplicable at Molenaarsgraaf.

#### 4.9.8. SITUATION AND SUBSISTENCE ECONOMY

##### 4.9.8.1. *The site*

We may wonder why the Bell Beaker people chose to make their settlements of all places on a small sand ridge in the middle of a peat region. There are a few indications that this was a deliberate choice and that there was a preference for low-lying (wet) sandy ground. Modderman <sup>305</sup> was able to show, by means of detailed data about the distribution of beakers in two important areas of the Veluwe, that the earliest (Protruding Foot) Beakers were closely connected with the courses of a few streams, and that in the course of the Beaker period (*i.e.* in the phase of the Veluwe Bell Beaker) the territory used was extended to drier and higher ground, possibly as a result of an increasing population. Although the distribution of the beakers (*i.e.* of the graves) does not necessarily correspond to that of the settlements, it does nevertheless indicate broadly the position of the settlements. Van Zeist and Verwers <sup>306</sup> also conclude that this preference for a wet milieu must have existed. The colonization of the Western Netherlands, and in particular the establishment of the settlement on the Schoonrewoerd stream ridge, may therefore be satisfactorily explained by the free choice of an attractive environment; we certainly do not need to assume that an emigration to "marginal milieus" took place as a result of increasing population pressure.

A second possible factor is of an economic-strategic nature. We have already indicated that one of the few possible contact routes between coast and hinterland may have followed the Schoonrewoerd stream ridge, and that the Molenaarsgraaf-Ottoland-Goudriaan settlement lay about half-way along this (mainly dry) communication road. This route was surely of regional importance. But we must realize that its importance may have been much greater in the light of the cultural ties and trade relations between the countries on both sides of the North Sea. Mainly typological arguments have been adduced in support of an expansion of the Netherlands Bell Beaker Culture in a relatively early phase (2Ic) to the British Isles, especially to the east coast area of Yorkshire. In a subsequent phase the BWB Culture (in England possibly introduced from the continent) extended over the North German plains, the Netherlands and Southern England. In the same area we find, a few centuries later, the culturally closely related groups of the Wessex Biconical Urns and the Hilversum urns on either side of the North

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<sup>304</sup> Behrens 1964, 59-67.

<sup>305</sup> Modderman 1962/'63.

<sup>306</sup> Van Zeist 1963, Verwers 1972, 143.

Sea <sup>307</sup>. Within these cultural regions there existed in the Early Bronze Age a lively trade, which has been described in detail by Butler <sup>308</sup>. Not only did bronzes (axes, halberds) find their way from Southern England and Ireland to the regions east of this country, but the smiths themselves also crossed the North Sea. The bronze hoard at Wageningen is the most striking proof of this <sup>309</sup>. Moreover, the mutual import finds indicate that there must have existed in this period a North Sea traffic operating with seaworthy ships between Yorkshire and East Anglia on the one side and Jutland on the other. A similar trade sea route linking the Rhine estuary directly with England is considered by Butler to be very probable. Routes such as that on the Schoonrewoerd stream ridge (it is likely that it was not the only one) were probably used by merchants who, after landing on the coast, travelled inland (and deeper into Europe). The Molenaarsgraaf settlement was therefore less isolated than at first sight might be imagined.

#### 4.9.8.2. Reclamation

Important information about reclamation techniques is yielded by the pollen spectra of the old surfaces under the burial monuments <sup>310</sup>. The pollen spectra under TRB burial monuments show a slight disturbance of the vegetation (*i.e.* of the timber) and low values for *Cerealia*, *Plantago lanceolata* and other track weeds. This type of spectrum may be explained by the type of *landnam*, according to Troels-Smith, in which only small clearings were deforested and the cattle were fed with foliage in enclosures or stalls near the settlement. The PFB barrows show spectra with very high *Plantago lanceolata* values, and higher values of *Gramineae* and other track weeds. The *Cerealia* values are, however, low. Such spectra indicate a *landnam* according to Iversen, in which large stretches of forest were cleared; these were subsequently only partly used for cultivation. Cattle grazed on the fallow fields.

These fundamental differences are also found in subsequent periods. Under the barrows of the Hybrid Beaker, Maritime and Veluwe Bell Beaker Cultures we find spectra like those under the TRB monuments. The BWB barrows show a continuation of the PFB tradition; the partly contemporaneous barrows with bank and ditch (HVS) in the Southern Netherlands have, on the other hand, spectra with low *Plantago lanceolata* values. These differences between the Northern Netherlands on the one hand and the Southern and Central Netherlands on the other continue, if in lesser degree, in the Middle Bronze Age.

The originally cultural (*i.e.* TRB-PFB) distinctions have therefore in the course of time acquired additionally a regional character. The data available to us are not sufficiently detailed to analyse this process more accurately. Almost certainly, however, it was connected with the concentration of the Late Bell Beaker Culture (VBB) in the Central Netherlands and its limited penetration into Drenthe, where PFB elements were long able to maintain themselves. The question whether and to what extent there existed any continuity of both traditions (PFB-BWB-ELP and TRB-Hybr.B-BB-HVS-DKS) will not be considered here.

That the above-named differences really were caused by agricultural techniques and were

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<sup>307</sup> Beakers: Clarke 1970, 159; BWB: *cf.* note 122 esp. Clarke 1970, 136.; HVS: Glasbergen 1969.

<sup>308</sup> Butler 1963<sup>a</sup>, 201-211.

<sup>309</sup> Butler & Van der Waals 1968, esp. 81.

<sup>310</sup> *Cf.* Van Zeist 1967, Waterbolk 1954, 1956.

not or only partly the result of the situation of the graves in respect to the fields or the settlements appears from the important diagram VI of the VL settlement at Voorschoten<sup>311</sup>. In the lower half of the diagram (pure Early VL occupation) only the alder carr of the shore flat was affected; the oak forest of the coastal barrier was disturbed only in very limited measure. After the coming of the PFB Culture we observe (in the upper part of the diagram) the great clearings, indicated by the decrease of *Quercus* and the increase of *Gramineae* which are characteristic of the PFB Culture. Both Waterbolk and Van Zeist<sup>312</sup> determined, moreover, that the barrow spectra closely correspond to the succession of human influence on the vegetation, which is visible in the raised bog diagrams.

The above fairly full account was necessary in order to assess correctly the Molenaarsgraaf data. From the beginning of zone I the diagram shows the picture of the PFB-BWB barrows and of the later (PFB/VL) phase of Voorschoten. This seems clearly to contradict our correlation of this zone with occupation phase I (VBB) of the settlement. We must, however, realize that the area of the stream ridge (and thus of the forest on it) was so limited that the clearing of a sufficiently large area of cultivable land (*cf.* p. 110) demanded the removal of a very considerable part of this forest. Moreover, natural pasture land was present on the clay wedges. In this situation the effect of both types of *landnam* on the pollen diagram will not, or will hardly, differ. The even more rigorous deforestation apparent in zone 2 (diagram II) is, however, perhaps the reflection of a difference in reclamation techniques during the VBB and BWB occupation phases.

Worthy of note are the very high values for *Cerealia* (up to 10%) and *Plantago lanceolata* (up to 25%) at Molenaarsgraaf. We find this also at Voorschoten (5% and 10% respectively) but not at Vlaardingen<sup>313</sup> (3% and 1% respectively), although both diagrams are fairly well situated in the settlement. We may conclude that the deforestation at Vlaardingen was much less rigorous and that the fields lay at some distance from the diagram and/or were of much less extent than at Voorschoten and Molenaarsgraaf. The latter conclusion would mean that the entire farming activity (cattle raising and land cultivation) at Vlaardingen was of less importance than in both the other settlements. The situation on the narrow, clayey, estuarine creek levee makes this in every way comprehensible.

#### 4.9.8.3. *The fields and their working*

At Molenaarsgraaf we possess no other information about the fields than that they must have lain on the ridge, some of them next to the gully. It is, however, problematic whether a full investigation of the presumed arable land could supply us with more information. For many centuries, between occupation and covering, the terrain was disturbed by animal and plant

<sup>311</sup> Groenman-van Waateringe *et al.* 1968.

<sup>312</sup> Waterbolk 1956, 48; Van Zeist 1967, 51.

<sup>313</sup> Voorschoten: Groenman-van Waateringe *et al.* 1968; Vlaardingen: Groenman-van Waateringe & Jansma 1969. We must take into account that *Alnus* is included in the pollen-sum of the Voorschoten diagram. Consequently the values for *Plantago lanceolata* and *Cerealia* are relatively lower (about two times) in this diagram in comparison to Molenaarsgraaf and Vlaardingen. This means a better correspondence of Voorschoten and Molenaarsgraaf. The low values in the Vlaardingen diagram must be partly caused by the slightly longer distance between the diagram and the fields, than was the case at Voorschoten and Molenaarsgraaf.

activity, so that all shallow traces have disappeared. At Kromme Elleboog the investigation extended far beyond the settlement itself, yet no traces of arable land were found. Nor were any plough marks of the *ard* found, although we kept a particular watch for these.

Nevertheless it may be assumed that the arable fields were worked with the *ard* as this was generally used in the Early Bronze Age, as appears from the now fairly large number of plough traces which have been dated to this period. A few older datings show that the *ard* goes back to (much?) earlier times. Observations of this in the Netherlands have been made, at Zandwerven (PFB), Bornwird (PFB), Oostwoud (BB (?), MBA), Velsen (BWB, HVS), Monster (HVS and later) and Gasteren 2× (both BWB). In West Frisia crossed systems of plough traces are a common feature in Middle Bronze Age settlements<sup>314</sup>.

If the antler hook from grave II was also used as an agricultural hoe, this would mean that it was a tool used side by side with the *ard*.

#### 4.9.8.4. *The cultivated crops*

The pollen diagrams tell us no more than that grain was cultivated. Fuller information about the nature of the cultivated crops is given by the impressions of seeds in pottery, or the finds of charred seeds. In spite of our special attention to these categories of finds the sole result of the excavation was the above-mentioned doubtful impression of *Einkorn* wheat (*Triticum monococcum*) in a sherd<sup>315</sup>.

Recently Van Zeist<sup>316</sup> published an exhaustive article on the Dutch charred seed finds. Neolithic material in this country appears to be still very scarce. An example from Vlaardingen (VL Culture) contains mainly Bread Wheat (*Triticum aestivum*), little *Emmer* Wheat (*Triticum dicoccum*) and only very little Hulled six-row Barley (*Hordeum vulgare*). In three PFB settlements of slightly later date the dominating grains are the Naked six-row Barley (*Hordeum vulgare*, var. *nudum*) with 50-100% over *Emmer* wheat (7-27%). In the Middle Bronze Age *Emmer* wheat and both above-named barley types occur together, but it cannot be said that one of the two predominates. Because of the frequently occurring great homogeneity of single examples, quantitative conclusions based on charred seed samples are, however,

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Zandwerven:	Van Regteren Altena & Bakker 1966, 37-38.
Bornwird:	Pers comm. Prof Dr J. D. van der Waals.
Oostwoud:	Van Giffen 1961, 1962, 1966 and pers. comm. One system of plough-marks might belong to the Bell Beaker occupation (cf. note 245).
Velsen:	Vons 1969 and pers. comm.
Monster:	Glasbergen & Addink-Samplonius 1965, Stuurman 1965.
Gasteren:	Van Giffen 1941, 29-31; Harsema & De Ruiter 1966.
Middle Bronze Age:	Van Giffen 1944, Modderman 1964 <sup>a</sup> , Bakker & Metz 1967, H. H. van Regteren Altena & Bakker 1968, 202.

From outside the Netherlands we name two recently published finds. The one of plough traces below a Mont. II barrow and over a flat grave of the late Single Grave Culture in Denmark (Thrane 1967, esp. 41, 57). The other, dated extraordinary early, below a long barrow at South Street, Wilts, and belonging to Neolithic occupation, <sup>14</sup>C dated BM 356 2810 ± 130 (Evans in Simpson (ed.) 1970, fig. 10).

<sup>315</sup> Cf. p. 277.

<sup>316</sup> Van Zeist 1968, esp. 153, tab. 63.

difficult to draw. More helpful in this respect are impressions in pottery. It is noteworthy that *Einkorn* wheat (*Triticum monococcum*) has only been identified in a few impressions on Neolithic pottery (Bandceramic, TRB Culture) but neither in later impressions nor from samples of charred grain.

We may briefly compare the data of the Netherlands with those of pottery impressions from a few other areas. Matthias and Schultze-Motel<sup>317</sup> studied grain impressions in Central Germany. On Bell Beakers they found only one impression (barley). *Schnurkeramik*, on the other hand, yielded plentiful data: of 173 impressions 46 were of barley, 82 of wheat (40 *Emmer*, 18 *Einkorn*, 24 unidentified), 2 of oats and 43 of unidentified grain. Únětice Culture impressions were much less numerous: 5 of barley, 7 of wheat (1 *Emmer*, 2 *Einkorn*, 4 unidentified) and 1 unidentified grain impression. For Denmark Helbaek<sup>318</sup> shows that in three important TRB settlements wheat (primarily *Emmer*) occurred much more frequently than barley (primarily Naked Barley). Jankuhn<sup>319</sup> came to the same conclusion. He shows, moreover, that in the Late Bronze Age the roles were reversed: 83 impressions of barley, 7 *Emmer* and one or two *Einkorn*. For Southern England Helbaek<sup>320</sup> determined that before the Bell Beaker Culture (particularly at Windmill Hill) wheat was the main crop, and that the Bell Beaker Culture introduced a notable change: the main crop then became barley. In the course of the Bronze Age the proportion of wheat increased somewhat (from 1:10 to 2:3). In the Late Bronze Age Hulled Barley gained predominance over Naked Barley: the proportions changed from 3:7 to 7:3.) He mentions that he also established a preponderance of Barley impressions on the Dutch beakers.

What can we deduce from these data? First, that after the cultivation of primarily wheat (mostly *Emmer*, also *Einkorn*) during the entire Neolithic a change occurred during the Protruding Foot Beaker Culture (*Schnurkeramik*) in favour of the (particularly Naked) six-row barley. During the Late PFB Culture in the Netherlands and also during the Bell Beaker Culture in England this change had already taken place. In the course of the Bronze Age this change appears to have been reduced to some extent (but not in Denmark), while at the end of the Bronze Age Hulled six-row Barley replaces Naked Barley. This means for Molenaarsgraaf that probably Naked six-row Barley was the main crop, with some *Emmer* and *Einkorn* wheat. Second, the occurrence of an impression of *Einkorn* wheat at Molenaarsgraaf seems to be less unusual than would appear from the Netherlands data alone. From the numerous impressions of flax seed in a beaker from Handley Down<sup>321</sup> it appears that the Bell Beaker people grew flax there too. In our view we may regard this as relevant to the Netherlands also.

#### 4.9.8.5. *The domestic animals*

No contemporaneous material is available in this country as a basis for comparison with the Molenaarsgraaf bone spectrum, but we know of material from various older and younger settlements, all in the Western Netherlands, especially Vlaardingingen and Hekelingen (VL

<sup>317</sup> Matthias & Schultze-Motel 1967, 1971.

<sup>318</sup> Helbaek 1952, 198.

<sup>319</sup> Jankuhn 1969, 147; see also Clark 1965, 108 on the wheat: barley ratio.

<sup>320</sup> Helbaek 1952.

<sup>321</sup> Helbaek 1952, 205; Clarke 1970, no. 191. Flax was grown since the Windmill Hill Culture.

TABLE 26

*Carcass refuse of Late Neolithic and Early Bronze Age sites in the Western Netherlands*

	VL-estuarine			VL-coastal barriers		VBB/BWB	HVS
	Vlaar- dingen <sup>1</sup>	Heke- lingen <sup>1</sup>	Zand- werven <sup>1</sup>	Voor- schoten <sup>2</sup>	Leidschen- dam <sup>2</sup>	Molenaars- graaf	Vogelen- zang <sup>1</sup>
<i>Bos taurus</i>	334	113	44	254 <sup>6</sup>	200	213	67
<i>Sus domesticus</i>	123 <sup>3</sup>	43 <sup>4</sup>	1	51	177	33	18
<i>Capra/Ovis</i>	16	8 <sup>5</sup>	2	30	32	14	6
<i>Equus caballus</i>	—	2	—	—	—	2	6
<i>Canis familiaris</i>	12	—	—	8	—	—	—
<i>Cervus elaphus</i>	788	162	—	40	28	4	—
<i>Capreolus capreolus</i>	25	30	—	24	22	—	—
<i>Sus scrofa</i>	218 <sup>3</sup>	23 <sup>4</sup>	—	5	—	1	—
<i>Alces alces</i>	—	—	—	—	—	3	—
<i>Bos primigenius</i>	—	—	—	4 <sup>6</sup>	—	—	—
<i>Ursus arctos</i>	4	1	—	1	—	1	—
<i>Castor fiber</i>	218	40	—	—	1	8	—
small predators	81	19	—	—	1	—	—
<i>Halichoerus gryphus</i>	3	—	—	1	2	—	5
Cetaceae	15	1	—	1	—	—	—
<i>Avis sp.</i>	129	4	14	5	9	3	—
<i>Acipenser sturio</i>	c. 2000	+	—	200	2	1	2
<i>Esox lucius</i>	+	+	—	—	—	+	—
<i>Piscis sp.</i>	+	+	—	—	—	1	1

<sup>1</sup> After Clason 1967.<sup>2</sup> After Groenman-van Waateringe *et al.* 1968.<sup>3</sup> *Sus scrofa/domesticus* : 532.<sup>4</sup> *Sus scrofa/domesticus* : 64.<sup>5</sup> *Canis familiaris/lupus* : 2.<sup>6</sup> *Bos taurus/primigenius* : 10.

Culture, estuarine region), Voorschoten and Leidschendam (VL Culture, coastal barriers) and Vogelenzang (HVS Culture *s.s.*, coastal barriers) <sup>322</sup>. In any comparison, therefore, variations in age, culture and environment must be borne in mind.

<sup>322</sup> Clason 1967.

The kinds of livestock showed no great variations in the settlements named. Cattle were everywhere in the majority, followed by pigs, but the ratio of both animals in the various settlements varied considerably. Sheep and goats came third, in limited numbers. In the Middle Bronze and Iron Age settlements in the Western Netherlands pigs were usually of less importance than sheep or goats <sup>323</sup>. That there are no traces of dogs at Molenaarsgraaf may be the consequence of the limited amount of bone material. Moreover, the dog, because of its nature (it is not a meat-producer), was probably treated differently from the stock kept for slaughter. The occurrence at Vlaardingen and the occurrence of dog-burials in the Beaker Cultures <sup>324</sup> make it very probable that there were also dogs at Molenaarsgraaf.

Of the greatest importance are the closely dated remains of the domestic horse at Molenaarsgraaf. They are among the oldest in this country. Mrs Van Wijngaarden-Bakker recently gave a summary of these <sup>325</sup>.

The oldest dated horsebones are a third phalanx and a molar found in the VL settlement at Hekelingen <sup>326</sup>. It was assumed that these were the remains of domestic horses because the marshy environment was not suited for the wild horse, but recently the possibility was considered that these might be the relics of wild animals shot elsewhere (in the sandy district) and brought to the settlement <sup>327</sup>. In the BB occupation layer under the Oostwoud barrow <sup>328</sup> one molar of a horse was found among other carcass refuse. The attribution to the BB Culture seems to be accurate, although the terrain was also used in the Middle Bronze Age. From a level with Bell Beaker sherds near Velsen three horse's jaws were recovered <sup>329</sup>. The dating of the comparatively abundant remains of horses at Langeveld <sup>330</sup> as "aeneolithic", or to the beginning of the Early Bronze Age, must be regarded as unreliable. The horse remains at Vogelenzang <sup>331</sup> can be confidently associated with HVS material from the second half of the Early Bronze Age (1600-1400 B.C.). All these finds, combined with the lack of the remains of horses in the VL settlements, indicate that the domestic horse was introduced into the Netherlands between about 2100 and 1800, *i.e.* during the Bell Beaker Culture.

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<sup>323</sup> Clason 1967, 14-21 (sites F-N), 203-204. Additional remarks in: Clason 1970, 302. In the river district new data have come available: at Zijderveld (MBA (+ Iron Age?)) pigs outnumbered the small ruminants, at Dodewaard (MBA) and Culemborg (Iron Age) the numbers of bones of both are about equal. In the European Neolithic (the Balkan excluded) either the pig or the sheep/goat are second on the list after the cattle. In fact the geographical position, the cultural tradition and the environment are determinating factors for the way of farming practised in a certain settlement.

<sup>324</sup> Behrens 1964.

<sup>325</sup> Van Wijngaarden-Bakker (in press).

<sup>326</sup> Modderman 1953<sup>a</sup>, 25; Clason 1967, 11. There has been some doubt to the reliability of the association of both horse bones. (the phalanx and molar) to the VL remains, since later BWB occupation occurred on the site. There is, however, no reason for this. BWB finds were made exclusively in excavation pit A. According to the excavation reports the molar (find no. 102) was found in pit C between level II and III, *i.e.* between -2.20 m. and c. -2.40 m. NAP., in the top of the VL refuse layer. The phalanx has no number, but is the same as illustrated in Modderman 1953, PL III. 7 and described by Mr van der Feen in no. 103. This number contains the finds from the same excavation pit, but from a slightly deeper level.

<sup>327</sup> Groenman-van Waateringe 1970, 6.

<sup>328</sup> Clason 1967, 16.

<sup>329</sup> Van Wijngaarden -Bakker (in press).

<sup>330</sup> Clason 1967, 13.

<sup>331</sup> Groenman-van Waateringe 1966<sup>b</sup>, Glasbergen 1969, Clason 1967, 13.

Apparently the horse was also domesticated in other parts of Europe at this time. Mrs van Wijngaarden-Bakker names as the oldest find phases Orce (Spain), Avignon (Southern France) and New Grange (Ireland), all Bell Beaker Culture <sup>332</sup>. In the Central German *Schnurkeramik* Culture the horse had not yet made its appearance <sup>333</sup>. In various general surveys similar datings are mentioned, as in works by Zeuner, Isaac and Jankuhn <sup>334</sup>. Behrens remarks that horse burials first occurred right at the end of the periods discussed by him, *i.e.* in the Early Bronze Age (Únětice Culture). It was much later that horse burials became more general, however <sup>335</sup>. Nobis <sup>336</sup> says that the wild and domestic horse are very difficult to distinguish, which must be borne in mind particularly when considering regions which were favoured by wild horses. From the Mesolithic and the Neolithic only the remains of wild horses are familiar to him. In Boessneck <sup>337</sup> we find, however, a report on the domestic horse in the settlements of the Altheimer Culture, Altenerding and Pestenacker, *i.e.* in the (Dutch) Middle Neolithic. At Altenerding there is possibly some pollution with Bronze Age material, however, and at Altheim itself the horse does not occur. The domestication characteristics are not clear. The author speaks of "horses in the process of domestication".

In a recent monograph Nobis discussed the problem of horse domestication anew <sup>338</sup>. He found in the measurements of the horse bones from the Dnjepr-Donetz settlement at Derejevska (or Dereivska) strong indications that horse domestication took place in the South Russian plains in the second half of the fourth millennium B.C. (the site is dated with some Tripolye pottery). An additional centre of domestication in Central Europe (*i.e.* at the river Dümmer) is still unproved. Nobis describes further the presence of domestic horses in the Early Bronze Age (Bell Beaker and Nagyrév Culture) settlement at Csepel Háros near Budapest.

We summarize that it appears that the horse was domesticated in the Ukraine before 3000 B.C. and that it seems that the domestic horse did not spread over Central and Western Europe until Bell Beaker times.

#### 4.9.8.6. *The hunt*

As we have already stated when discussing the material (p. 241) Molenaarsgraaf presents a contrast to the VL settlements along the estuarine creeks (Vaardingen, Hekelingen) and corresponds closely to those on the coastal barriers (Voorschoten, Leidschendam), as far as the proportion of livestock breeding to hunting is concerned, but at Molenaarsgraaf the hunt was of still less significance. We find the same at Vogelenzang, where the remains of hunted animals are even entirely absent. The difference in this respect might therefore not have been caused only by a difference in milieu, but also by a chronological/cultural difference. We should remem-

<sup>332</sup> Boessneck 1967, 100-101.

<sup>333</sup> Clason 1971.

<sup>334</sup> Nobis 1955, 223; Boessneck 1956, 25 f.; Zeuner 1963, 324 f.; Jankuhn 1969, 39, 252 f.; Drower 1969, Isaac 1970, 29 f. We must be on our guard that <sup>14</sup>C dates are not used together with historical dates, when data from pre-historic Europe and the Near East are compared.

<sup>335</sup> Behrens 1964, 58 and 48 note 27: two horse skulls found in a Bell Beaker grave in Czechoslovakia.

<sup>336</sup> Nobis 1955.

<sup>337</sup> Boessneck 1956, 27.

<sup>338</sup> Nobis 1971, esp. 68, 75-76.

ber that the abundance of wild animals on the broad coastal barriers must certainly have been greater than on the narrow Schoonrewoerd ridge, large areas of which were fully cultivated.

Clason has given a survey of the ratio of hunting and stockbreeding in the whole of Europe during the Neolithic <sup>339</sup>. She concluded that there is no overall geographical or cultural pattern to be distinguished. The most important factors were the physiographical situation and the environment of the site, which gave rise to remarkable variations in this respect (the source of animal protein) within certain prehistoric cultures. The above-mentioned variations in the Western Netherlands are a good example of this.

Among the remains of wild animals at Molenaarsgraaf the relatively large proportion of those of beavers is noteworthy. We find the same in Vlaardingen and Hekelingen. The elk bones are the earliest dated remains in the Western Netherlands. This may mean that the animal was very rare and only occasionally penetrated further west.

#### 4.9.8.7. *Fishing*

During our discussion of the pointed wooden poles and the fish hooks (pp. 300 and 303) we made a few comments on fishing methods at Molenaarsgraaf and on the fish caught. The following are some complementary observations.

The occurrence in widely differing quantities of sturgeon bone plates on various Neolithic sites in the Western Netherlands is remarkable: at Vlaardingen and Voorschoten (early phase) they are most abundant, while at Hekelingen and Molenaarsgraaf they are almost entirely absent <sup>340</sup>. We think that these differences are not necessarily of basic importance. They may be connected with the proximity of the fishing water and the place where the fish was cleaned. If this was not the case in the settlement, no fish remains are to be expected. The place used to throw fish remains must also be considered. At Molenaarsgraaf the environment was perhaps not ideal for sturgeon <sup>341</sup>.

Pike remains have been found at Vlaardingen, Hekelingen, Leidschendam and Vogelenzang, and are only absent at Voorschoten <sup>342</sup>. The pike is the most common fish in prehistoric find-places in fresh water environment. This may be partly the consequence of the dimensions of the remains and problems of determination. Remains of smaller fish quickly decay, are less easily found and are difficult to classify.

We discussed with Dr R. Boddeke <sup>343</sup> the various ways in which the Molenaarsgraaf fish hooks might have been used. There are three possibilities. First, the method named by Clark<sup>344</sup>, that the hooks were used for affixing the living bait in pike fishing. Although the larger Maglemose hooks might have been used in this way, this is unlikely for the small and more fragile

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<sup>339</sup> Clason 1967, 188-202.

<sup>340</sup> Clason 1967, 10-13; Groenman-van Waateringe 1968. But *cf.* Van der Feen and Kortebout van der Sluijs in Modderman 1953<sup>a</sup>, 25: "... and also many fragments of the bone skin plates of this species (*i.e.* the sturgeon)", in contradiction to Clason 1967, 11.

<sup>341</sup> The sturgeon needs flowing water with access to both the sea and the rivers. Until recently the sturgeon lived in the Dutch estuarine Biesbosch district.

<sup>342</sup> As note 339.

<sup>343</sup> *Cf.* note 59.

<sup>344</sup> As said earlier at p. 303; Clark 1965, 42-43 and fig. 17.

Molenaarsgraaf hooks. Dr Boddeke says that it is impossible to land a pike with them. Second, there is a well-known and old fishing technique for perch with a short rod from the bank of the water. This type of fishing was certainly in use, for instance, in the 17th century, as appears from a drawing by Rembrandt. Boddeke tested this way of fishing with bone copies of the hooks, but with a negative result: the perch managed to swim free before they could be lifted from the water. A third possibility is eel fishing with a long multi-hooked line (the "bob" or *peur* in Dutch). We must wait to test this type of eel fishing until the right season (the spring), but a better result than with the perch experiment is expected. This will not prove that the hooks were used for eel fishing, but only demonstrate that it is possible and very likely that this type of fishing was practised.

#### 4.9.8.8. *Conclusions*

When we come to summarize the foregoing observations, we must first draw attention to the remarkable correspondences between Molenaarsgraaf and the VL settlements on the coastal barriers. In a similar landscape situation (although different genetically) the subsistence economy was largely the same. The narrow sand ridge and narrow strip of pasture land on the clay wedges in the peat region had to be subjected, however, to maximum exploitation, while the coastal ridges and coastal flats offered much more room.

In such cases of very small landscape units it is difficult to distinguish the two types of *landnam*. Settlement in the wet milieu has a logical connection with a preference, determined elsewhere, for low, wet, sandy ground. It is certainly unnecessary to consider that there was any shift to a marginal environment due to, for example, increasing population pressure. On the contrary, it seems likely that there was a conscious choice of a very attractive situation, which means a settlement shortly after the Schoonrewoerd ridge became available—*i.e.* after it was formed.

The small importance of hunting may be due to the landscape situation and/or the cultural tradition. The nature of the live-stock was "normal" for a Neolithic settlement in this country. The domestic horse seems to have been introduced in this period (2100-1800) during (or by) the Bell Beaker Culture into the Netherlands and possibly throughout all Western Europe. By its accurate dating the Molenaarsgraaf find is therefore an important piece of evidence. We may supplement the picture of the settlement with the dog, the use of the *ard*, and the cultivated crops: mainly barley, followed by *Emmer* and some *Einkorn* wheat and perhaps also flax.

Needless to say, we got the picture of a settled community at Molenaarsgraaf and that, in our view, this picture is also applicable to the other VBB and BWB communities in the Netherlands. The unusual position of the settlement appeared to offer no worse (perhaps even better) facilities for a normal Neolithic economy, in which only fishing was allotted a supplementary role.

It has not yet been proved that these people were not tradesmen or prospectors, as the traditional view of the Bell Beaker Culture holds, or held until recently. For such activities are difficult to ascertain by settlement research. It is, moreover, logical that a culture (perhaps originally consisting of colonists), which in a later phase separates into clearly regional groups, possessed, during that phase, thoroughly agrarian settlements. All this, moreover, tells us nothing about the first phase of the Bell Beaker Culture. We again (*cf.* p. 282) draw attention

to the difference between the course of events at Molenaarsgraaf and the very brief stay of a group of MBB people at Vlaardingen. This remarkable difference may well be of fundamental importance, revealing a characteristic difference in the way of life between the first and the far advanced phase of the BB Culture. It is interesting in this respect to make a comparison with the Battle Axe Culture. The traditionally accepted nomadic character of this culture has been rightly refuted in recent years by various writers <sup>345</sup>, in favour of a settled farmers' culture. However, in spite of this, the character of the earliest phase, which spread so quickly over a large part of Europe, was not necessarily the same. This may be explained, in our view, by studying such an initial phase (if possible only in its first generation) separately from the later development. This is, however, a much more difficult task.

4.9.9. THE <sup>14</sup>C DATES

For comparison with the <sup>14</sup>C dates at Molenaarsgraaf we give the following dates for the BB and BWB Cultures in the Netherlands (table 27).

TABLE 27

*Bell Beaker and Barked Wire Beaker <sup>14</sup>C dates (B.C.)*

<i>MBB</i>				
Vlaardingen	— —	1940 ± 25		mean of 4 measurements. Refuse layer with sherds. Van Regteren Altena <i>et al.</i> 1962/'63, 1962, 233; Vogel & Waterbolk 1963, 178.
Mol	— —	1995 ± 40		mean of 2 measurements : GrN 6646 1945 ± 45 and GrN 3641 2055 ± 60. Pers. comm. Mr J. N. Lanting, Groningen.
<i>VBB</i>				
Bennekom	GrN 326	1915 ± 180		grave with two Veluwe Bell Beakers. Van Giffen 1954, Van der Waals 1964 <sup>a</sup> , 52; Vogel & Waterbolk 1963, 182.
—	GrN 6155	1870 ± 35		pers. comm. Mr J. N. Lanting, Groningen. new dating of the GrN 326 sample.
St. Walrick <i>t.a.g.</i>	GrN 2996	1755 ± 80		Groenman-van Waateringe 1966 ( <i>addenda</i> p. 158). Vogel & Waterbolk 1963, 182.
Haarlem	GrN 4635	1730 ± 40		<i>t.a.g.</i> of 2If Beaker. Short chronological distance. Jelgersma <i>et al.</i> 1970, 120, 138. peat layer with Pot Beaker sherds.
<i>BWB</i>				
Anlo	GrN 852	1670 ± 65	}	Waterbolk 1960, 74; 1964, 119; Vogel & Waterbolk 1963, 180. refuse pits with BWB sherds.
	GrN 1977	1645 ± 85		
Angelsloo	GrN 5187	1525 ± 35		Vogel & Waterbolk 1972, 90. refuse pit with BWB sherds.
Velsen	GrN 5975	1540 ± 35	}	pers. comm. Mr J. F. van Regteren Altena, Amersfoort. top and base of peat layer, to be correlated with BWB refuse.
	GrN 5974	1670 ± 35		
Noordsleen <i>t.a.g.</i>	GrN 3036	1310 ± 70		Waterbolk 1964, 119; Lanting 1969, 199; Vogel & Waterbolk 1963. <i>t.a.g.</i> of refuse layer with BWB sherds below barrow.

<sup>345</sup> Van Zeist 1967, 59; Feustel in Feustel *et al.* 1966, 111-117; Jankuhn 1969, 33-35.

The  $^{14}\text{C}$  dates at Molenaarsgraaf are in no respect in conflict with these dates. They provide valuable data for a more accurate marking of the boundary between the VBB and the BWB Cultures. The dating GrN 5132  $1830 \pm 50$  can without difficulty be connected with the VBB Culture.

There also appears to be no overlap in the  $^{14}\text{C}$  dates of both cultures, but there is a sharp division, just like we could determine this on various grounds in the Molenaarsgraaf data and could make this acceptable when we discussed the burial customs of these cultures in this country. What is noteworthy, however, is the absence of any  $^{14}\text{C}$  dates for Veluwe Bell Beakers in the 18th century. This may be because of the scanty data. Both datings in the 19th century (Bennekom, St.-Walrick) are however, those of fully developed Bell Beakers, while the  $^{14}\text{C}$  date of St. Walrick relates to a SE-NW grave with a corpse-silhouette, stretched on the back—a very early date for this type of burial<sup>346</sup>. A possible explanation is that we must postulate, between the pure VBB and BWB phases, a phase in the 18th century (or in a part of it) in which a devolution of the Veluwe Bell Beaker came about. The types of beakers occurring in the graves at Molenaarsgraaf, and the above-named parallels for them, might be placed in this intermediate phase, as might the above-named intermediate forms of BB and BWB pottery<sup>347</sup>. The BWB dates all fall in the 17th and 16th centuries.

The oldest dates for the HVS Culture *s.s.* do not extend far into the 16th century<sup>348</sup>. The lack of HVS pottery at Molenaarsgraaf means that these dates form a *terminus ante quem* for the settlement. It means a closer fixing of the *terminus ante quem* already afforded by the small hearth no. 29.

The earliest dates of the Elp Culture lie in the 15th and the beginning of the 14th centuries<sup>349</sup>. The  $^{14}\text{C}$  date of the hearth conforms to the oldest Middle Bronze Age dates.

<sup>346</sup> Cf. note 240. The  $^{14}\text{C}$  date might be rather early: the double standard deviation gives an upper margin about 1640, which is still an early date, but permits a date for the 2<sup>nd</sup> Veluwe Bell Beaker in the early 17th century,

<sup>347</sup> Cf. p. 289, 302 and the notes 124, 242.

<sup>348</sup> Early HVS dates are:

Toterfout	GrN 50	$1500 \pm 100$	B.C.
	GrN 1828	$1470 \pm 45$	
	GrN 1053	$1530 \pm 65$	
	GrN 1029	$1380 \pm 40$	
Eersel	GrN 5350	$1510 \pm 35$	

Vogel & Waterbolk 1963, 1972, 89; Waterbolk 1964, 119; Glasbergen 1969, 15.

It is a pity that the  $^{14}\text{C}$  datings of two settlements gave disappointing and unreliable results (*cf.* Groenman-van Waateringe 1966<sup>b</sup>, esp. 158):

Vogelzang	GrN 2997	$1190 \pm 70$	B.C.
Den Haag	GrN 2421	$2270 \pm 75$	

<sup>349</sup> Early DKS dates are:

Zijderveld	GrN 5376	$1420 \pm 80$
De Treek, barrow I	GrN 2968	$1380 \pm 70$

The earliest dates of some ELP settlements:

Elp	GrN 4171	$1280 \pm 80$
Emmerhout	GrN 5588	$1370 \pm 60$
Angelsloo	GrN 5183	$1455 \pm 35$

Vogel & Waterbolk 1963, 1967, 1972.

#### 4.10. REVIEW

In the foregoing we have reported our investigation of the VBB/BWB settlement at Molenaarsgraaf. A choice was then made for the separation of, on the one hand, the description of the enquiry itself (*i.e.* the finds, observations, analyses and the conclusions drawn from these), on the other hand, the definition of the geographical-geological and cultural-archaeological context of the community under investigation.

The descriptive part includes sections 4.1 to 4.7. In section 4.8 a synthesis is given and an attempt made to reconstruct as well as possible in words a picture of the settlement. The geographical-geological position of the settlement was sketched in Part II and in a more general sense in Part I. It is unnecessary to repeat a summary of all this. We must now only evaluate Molenaarsgraaf in the light of the cultural-prehistoric information about the most important aspects of the enquiry, which we assembled in 4.9.

In general it appears from the foregoing that the facts ascertained and the conclusions we formulated for Molenaarsgraaf were nowhere in conflict, and mostly agreed closely, with this information. Molenaarsgraaf often provided a confirmation, and in some cases a closer definition, of the existing knowledge. As such Molenaarsgraaf has therefore not only confirmed the picture we had of the relevant period, but also supplemented and enriched it. We summarize here what we consider the most important data.

Both the rather unusual house plans at Molenaarsgraaf may be considered as predecessors of the Elp type. Whether there is any relationship with the houses of the VL Culture, and if so what, is much less clear. The fairly large, oval type of house seems to have been built in various parts of Western Europe (Provence, the Hebrides) during the Bell Beaker time. In addition small, generally round huts also occur.

As far as the material remains are concerned, the pottery and the chronological sequence of VBB-BWB-undecorated ware seem to be representative of the period between Neolithic and Bronze Age in this country. The site lies within the VBB area which subsequently formed part of the BWB Culture area. The HVS Culture *s.s.* did not reach the site. The domestic assemblage, especially the BWB association, is very representative for the period and corresponds reasonably well with other domestic groups of this phase. The site gives a dating for the *Bentheimer Riesenbecher* in the very Early Bronze Age.

The flint contrasts with that of the VL Culture, and is very similar to the flint associated with BB, BWB and HVS pottery. The stone material seems representative for the phase. The dating of the ball-shaped polyhedrons to the end of the occupation gains credibility through other associations.

The grave ritual at Molenaarsgraaf is consistent with data known from this country. The transition from E-W to N-S oriented graves, both with the corpse in a crouching position, appears to be one of the characteristics of the transition from BB to BWB Cultures. This transition is very closely dated in Molenaarsgraaf. The BB grave ritual in the Netherlands seems to have been almost entirely borrowed from the PFB Culture. Only in the sex-bound differentiation has an inversion taken place. With this naturally the repertory of grave goods is largely different.

From a European point of view, the E-W orientation is peculiar. The occurrence of this

in England was either an insular development or was introduced from the Netherlands. Originally the BB people must have buried their dead in N-S oriented graves. In many parts of Europe a change in the grave orientation and/or burial ritual seems to have occurred in the beginning of the Bronze Age.

The skeletal material provides us with the first exact anthropological data for the Neolithic in the Netherlands. The presence of the typical Bell Beaker skull, the planoccipital *Steilkopf*, is now confirmed also for the Veluwe Bell Beaker group.

The ox burial conforms to a tradition (scarcely documented) of animal burials in the whole of Western Europe during the Beaker Cultures. The relatively large number in the Netherlands may be attributed to the intensity of research.

By means of the internal chronology of the settlement with the separate occupation phases, the position of the small cemetery, the pollen zones and <sup>14</sup>C dates, the prehistoric chronology of the period concerned, 1800-1500 B.C., is more closely defined. The results of the examination of the gully filling form an important basis for the study of the history of the inhabitation of the river clay/wood peat area.

The choice of the settlement terrain would appear to have been very deliberate. Together with landscape factors, apparently trade-strategic factors also played a part. The subsistence economy is very similar to that of the VL and HVS settlements on the coastal ridges. It implies an optimum use of the landscape, which offered similar opportunities. The live-stock was not different from that elsewhere in the Neolithic of the Western Netherlands. The well-dated remains of the domestic horse would appear to be of great importance.

The continuity of occupation in the Molenaarsgraaf-Ottoland-Goudriaan settlement during the transition from the VBB to the BWB Cultures (the crossing of the Neolithic-Bronze Age boundary) offers material for more general considerations on the concepts of continuity and discontinuity in prehistoric times. In our opinion we must make a clear distinction between anthropological, cultural and inhabitation continuity. Within a given culture this applies to its various aspects: aesthetic, technical, economic, religious and social traditions, at least in so far as they are capable of definition. In so doing we cannot escape a subjective choice of what we mean by continuous and discontinuous. An important reason for this is the imprecision of our datings, which puts our view of prehistoric events, as far as the time factor is concerned, out of focus. Neither can we avoid some subjectivity in our definition of a culture: for we must rate a large number of culture elements at their true value and esteem their relative importance. Traditionally, compelled to do so by the material, we have to use primarily flint/pottery/metal implements and ornaments as exponents of the technical and aesthetical traditions, and of burial customs as a religious exponent. That we can only have available a part (of the material part) of a culture, we leave out of consideration.

To what extent is the transition from VBB to the BWB Culture characterized by (dis)continuity? The frequent occurrence of VBB and BWB sherds on one terrain shows that the inhabitation continuity noticed by us is apparently fairly general. The cultural changes caused no changes in the settlement pattern. It is rather a change which is brought about within or by an established community. The few anthropological data do not permit any pronouncement on this subject. We only remarked that Gerhardt encountered all the elements of the preceding Bell Beaker Culture in the Early Bronze Age cemeteries in the Upper Rhine region and in

the Únětice Culture. In Molenaarsgraaf we found the planoccipital *Steilkopf* in grave II: we dated it to the beginning of the BWB Culture.

This continuity of inhabitation and (hypothetically) of skull types is in contradiction to the changes in the transition from the PFB to the BB Cultures. As far as we can make out it happens only rarely that PFB and BB sherds are found on one terrain. The skull types of both cultures are very different.

The fact that we distinguish two (VBB and BWB) Cultures indicates, however, that in fact a number of culture elements changed more or less at the same time. We have already discussed the burial ritual: it became more simple (no surrounding structures, no grave gifts) and the grave orientation was different. The absence of grave gifts in the BWB graves is one of the reasons for our very incomplete knowledge of the material culture. The absence of a number of elements such as the wrist-guard, the copper dagger, the V-perforated buttons and the tanged-and-barbed arrow-heads, does not indicate that these were (no longer) in use. Only minor changes occur in the flint. Arrow-shaft smoothers are known in the BB Culture as well as in the Early Bronze Age. Both houses at Molenaarsgraaf reveal the same tradition. As new elements may be named the flint dagger of Scandinavian type and the bone ring pendant which, associated with BWB sherds, was found at Velsen <sup>350</sup>. The most striking are the changes in the pottery, in workmanship, form and decoration. In order to understand its origins better it is necessary, however, to have fuller knowledge of the end of the BB Culture. We may mention further the difference in reclamation methods (*landnam*) as a part of the subsistence economy. The difference in food production was, however, not so great that farming at Molenaarsgraaf could not be continued in a similar manner.

There occur therefore a number of changes which are more or less contemporaneous during the transition from the Late Neolithic to the Early Bronze Age. Because an easily recognizable difference exists in comparison with the preceding phase it appears to us justifiable to speak of a new culture. The changes were probably the result of new cultural impulses and contacts in an area stretching from Wales to Southern Sweden. The trade in metal (bronze, gold, tin) from Great Britain to Denmark may have played a part in this process. On the other hand the flint dagger is a Scandinavian element forcing its way westwards. In the Netherlands the beginning of the BWB Culture are best explained by the assimilation of a number of new elements by the existing Late BB Culture. A deeper insight into this process is hindered by the lack of find associations.

We do not want to enlarge on this theme here. We merely wished to suggest that Molenaarsgraaf not only makes possible the reconstruction of a Late Beaker community, but also that data of the kind revealed by Molenaarsgraaf are indispensable for the unravelling of the relationships between the various Beaker Cultures.

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<sup>350</sup> App. I, no. III-34.



## APPENDIX I

### PREHISTORIC SITES AND FINDS IN THE WESTERN NETHERLANDS, MAPPED IN THE FIGS. 2, 5, 7, 8.

All terrains indicated on the maps are named and arranged according the map legends. The find-places are continuously numbered in each map. References are coded as II-81 (= map II, no. 18), IV-2 (= map IV, no. 2), etc.

Further, the mostly used place-names are given, The description includes as far as possible a short indication of the nature and age of the finds, of the find circumstances and relationships to the geology. The necessarily cursory treatment here means, however, that the descriptions cannot be complete.

In the bibliography reference is made as far as possible (with current periodicals) directly to the publication and page. Sometimes, however, it was shorter or simpler to refer to the bibliography via the author and year of publication. If no references are given the information is from the author's own documentation or observations. No attempt at completeness has been made in the literature mentioned. In particular publications in which an object has been illustrated are named. From "Archeologisch Nieuws" only a selection has been taken and announcements in the "Chronicles" of "Helinium" have generally not been used at all. As far as the terrains in the North-east Polder and the Flevoland Polder are concerned we have generally confined ourselves to a reference to Van der Heide 1965/66.

The find-places in the river clay/wood peat area are complete and fully documented in Appendix III. On the maps of the Western Netherlands, the maps I-IV, only the most important are given. For various reasons, however, a few important terrains could not be included, namely nos. 39, 43 (VBB, DKS) and 55, 56 (DKS) of App. III.

We have attempted completeness in the list of finds and find-places discovered before 1972, while recent finds have been included as much as possible. When the number of a site is given in brackets, this means that the site is not indicated on the map, but was inserted after the closing of this part of the manuscript.

Nearly all finds are reliable. If the find was made in a secondary position, or its report is unreliable, this is stated. We again draw attention to the fact that a large group of finds which have reached the museums via art dealers has been left out of account, as have most stone and antler axes. A commentary on the contents of the various maps is given in the text (p. 13 f.).

It was only after we finished this part of the investigation, that we got some ideas about

the Late Bronze Age domestic pottery. The sites which may have been occupied in the Late Bronze Age are therefore not indicated as such on the map.

These are:

Westfrisia:	Enkhuizen	— AN 1971 *116-117
	Hoogkarspel	no. IV—31
	Medemblik	no. IV —30
coastal barriers:	Schoorl	no. IV —29
	Velsen-Van Lenneplaan	— Jelgersma <i>et al.</i> 1970, 140
	Velsen-PEN, Noorderweg	— idem.
	Velsen-Noordzeekanaal	— idem.
	Langeveld	no. III—48
river clay/ wood peat area:	Molenaarsgraaf	— This publication, App. III, nos. 27-28
	Ottoland-Oosteind	no. III —11
	Noordeloos	no. III —20
	Schaik, Leerdam	— This publication, App. III, no. 93

#### I — PALAEO-LITHIC, MESOLITHIC, EARLY AND MIDDLE NEOLITHIC, BEFORE C. 2500 B.C.

Fig. 2

##### *Palaeolithic*

1. Cadzand Some flint artifacts, probably Mousterian and Tjongerian, found on the beach. AN 1965 \*85; Wh 18 1969 233; Wh 19 1970 118-119, 211-212; Wh 20 1971 111-117, 229-236.
2. Ellewoutdijk Levalloisian flake, fished up from the Western Scheldt sea arm. BROB 9 1960 284.
3. Ellewoutdijk Worked reindeer antler (Lyngby axe?), dredged up from the Western Scheldt sea arm. Wh 9 1960 102-107.
4. Ramspol Worked reindeer antler, perhaps unfinished Lyngby axe, dredged up north of Kampereiland. Wh 9 1960 105.
5. Schokland Tjongerian point and some other flint artifacts from outcropping boulder clay at the NW of the former island of Schokland. Van der Heide 1955<sup>c</sup> 12 and fig. 10.

##### *Mesolithic*

6. Brown Bank, North Sea Axes, one a perforated *Spitzhacke* (shaft-hole pick), made out of aurochs bones, fished up from a depth of c. 40 m. Early Mesolithic. BROB 20/21 1970/'71 27-45.
7. Cadzand Three worked flints, one an A-point, the others perhaps Late Palaeolithic. Wh 17 1968 78-79; Wh 19 1970 211-212.
8. Colijnsplaat Basal part of red deer antler showing working in the "groove and splinter" technique, fished up from the Eastern Scheldt sea arm. Early Mesolithic. BROB 20/21 1970/'71 46-50.
9. Maasvlakte, Europoort Barbed points (two complete specimens and a fragment), an antler sleeve, a wild boar's tusk chisel, a worked antler and a bone needle(?), found in dredged-up sands. From—25/22 m. NAP. Early Mesolithic. BROB 20/21 1970/'71 48-53.

10. Volkerak, Willemstad Small oakwood statuette, found during the building of a dock in the Volkerak at —8 m. NAP in a peat layer and on the underlying coversand. Van Es 1968; Van Es & Casparie 1968.
11. Schoonrewoerd Donk, Leerdam Some probably Mesolithic flint artifacts on the top of an outcropping Early Holocene dune. VL and DKS pottery. Wh 14 1965 119-123 (no. 12).
12. Vianen Skull with the characteristics of the Mesolithic Tévéc type. From the river Lek. Huizinga 1959 52-56.
13. Koegras, Julianadorp Some flint flakes on the top of an Early Holocene dune at —4.25 m. NAP, covered with younger sediments. Mesolithic or Early Neolithic. Du Burck 1959 63; Jelgersma 1961 29.
14. Texel Flint scraper, Early Mesolithic or Late Palaeolithic, on outcropping Pleistocene. Wh 19 1970 101.
15. Kuinre Elk antler shaft-hole adze found before 1957 during digging works. BROB 20/21 1970/'71 55-57.
16. Spoolde near Zwolle A very large number (c. 350) of antler axes and other worked antlers. One is the fragment of an elk antler adze (Mesolithic), another a red deer antler T-shaped axe. In the immediate neighbourhood some TRB, VBB and BWB sherds. One sherd of a Pot Beaker or of a pot, related to the Swifterbant ware. Van der Heide 1962; Hamming *et al.* 1965; BROB 20/21 1970/'71 57.
17. Koerhuisbeek, Deventer A number of bone and antler implements, found 1968 during dredging works. A socketed adze, made out of an aurochs radius, a fragmentary antler T-shaped axe, four antler axes and a number of pieces with traces of working. AN 1968 \*66, BROB 20/21 1970/'71 53-55.

*Early and Middle Neolithic settlements and pottery finds.*

18. Zijderveld Settlement site on the Late Atlantic river course named "Zijderveld stream ridge" beside the former stream channel with main occupation in the Middle Bronze Age (DKS) with numerous plans of round huts, and in the Iron Age with plans of rectangular houses. Some VL finds and indication of earlier occupation (c. 3000 B.C.) in the pollen diagram. AN 1965 \*107 \*138; AN 1966 \*93; BROB 18 1968 117-129; BROB 20/21 1970/'71 75-88; Vogel & Waterbolck 1972.
19. Hazendonk, Molenaarsgraaf Top of an Early Holocene dune with finds of the Middle Neolithic (c. 3000 B.C.), VL Culture and the PFB (?), Hybr. B, MBB, VBB and BWB groups. Indication in the pollen diagram of further occupation about 3400 and 4100 (?). Wh 1965 119-123 (no. 5); AN 1967 \*114; This paper part III.
- (19<sup>a</sup>.) Waardhuizen Cf. II-14.
20. Schiedam Early Neolithic sherd, the round bottom of a pot, tempered with organic material (plant remains), found during the construction of a dock at the shipyard Wilton Feyenoord at a depth of c. 8 m. Wh 1955 30; Hel 2 1962 19-20; RMO h 1969/1.1.
21. Swifterbant-parcel H 46 Early Neolithic settlement (hearth places, flint, pottery) and graves on the top of an Early Holocene dune between —5.00 and —5.75 m. NAP. Three comparable sites in the neighbourhood on parcels H 4, H 34 and H 128. Van der Heide 1965/'66 no. 8; Van der Waals 1972; Ente 1971.
22. Swifterbant-parcel G 41/42 Early Neolithic settlement and graves on the natural levees of a former river course between —5.50 and —5.75 m. NAP. Covered with circa 40 cm. clay upon which Bell Beaker sherds and a pointed-butted stone adze with oval cross-section (*cf.* Brandt T 24. 4 but somewhat smaller) in secondary position. A comparable Early Neolithic site on parcels G 39/44. Van der Heide 1965/'66 no. 10; Van der Waals 1972; Ente 1971.
23. De Gaste, Meppel Early Neolithic domestic refuse on the top of an Early Holocene dune. Van der Waals 1972; comm. Mr O. H. Harsema, Groningen.

*Perforated "Breitkeile"*

24. Megen Big perforated *Breitkeil* with conical shaft-hole, from the ground of a newly dug ditch.  
RMO k 1968/3.1; Van der Waals 1972, no. NBr 2.
25. Spijk Small, heavily worn, perforated *Breitkeil* with conical shaft-hole, found in 1964 at a big sandpit on the crossing of a Subatlantic former river course and a Gorkum II (= Calais II) stream ridge. Found when digging away the covering sediments.  
RMO e 1970/2.1; Van der Waals 1972, no. G. 8.
26. Gewande Characteristic perforated *Breitkeil*, found in 1837, now lost.  
Van der Waals 1972, no. NBr 3.

*Axes*

27. Schalkwijk, Heemstede Carefully formed, pointed-butted axe with straight sides and oval cross-section, sandstone containing feldspar, cf. Brandt T 24.3, but no angle between side and cutting-edge. Found on the oldest coastal barrier (of Spaarnwoude), under the overlying peat.  
AN 1969 \*112; RMO g 1968/12.1.

*Antler T-shaped axes.*

28. North-east Polder Antler T-shaped axe, found near the former island of Urk, during dredging work on behalf of the construction of the new polder.  
RMO g 1938/12.1.
29. Spoolde Cf. I-16.
30. Windesheim Two antler T-shaped axes among a number of antler implements, dredged up during construction works in 1968.  
AN 1968 \*67.
31. Zandweert, Deventer Big antler T-shaped axe, collected by the late Mr J. Butter, Deventer, 25 november 1939, together with a number of animal bones (some of these worked) from dredged-up sand.  
Geologie en Mijnbouw N.S. 3 267.
32. Koerhuisbeek, Deventer Cf. I-17
- (33.) North-east Polder Antler T-shaped axe.  
Jaarverslag 1970 van de Musea voor de IJsselmeerpolders gevestigd te Schokland en te Ketelhaven, Internal Report no. 299 of the Rijksdienst voor de IJsselmeerpolders, photo at p. 10.

## II — FIRST PART OF THE LATE NEOLITHIC, c. 2500-2000 B.C.

## Fig. 5

*VL Culture, settlements and pottery finds*

1. De Brabers, Haamstede VL settlement with house plans on a remnant of a coastal barrier.  
Trimpe Burger 1958, 1960, 1960/61; Hel 2 1962 20-22.
2. Hekelingen I VL settlement on the natural levee of a fresh water creek. After covering with Dunkirk O clay: BWB occupation.  
BROB 4 1953 1-26; Hel 2 1962 13-19; Palaeoh 13 1967 11.
- 2<sup>a</sup>. Hekelingen II VL settlement, discovered during the construction of a gas pipe line 1970, c. 500 m. to the west of Hekelingen I.  
pers. comm. Mr H. Sarfatij, Amersfoort.
3. Vlaardingen VL settlement on the natural levees of a brackish tidal creek (Calais IV<sup>a</sup>). Imported PFB pottery and an A-battle axe. After or during a change in the "régime" of the creek a very short MBB occupation.  
Wh 7 1958 107-111; Wh 8 1959 106-117; Wh 10 1961 117-123; Hel 2/3 1962/63; Voetspoor 41-65; Hel 9 1969 105-117; Palaeoh 13 1967 10.

4. Voorburg VL pottery on innermost (oldest) coastal barrier.  
Wh 14 1965 174-175; AN 1966 \*6, \*101.
5. Leidschendam VL/PFB settlement on the innermost (oldest) coastal barrier.  
Hel 7 1967 97-120; Hel 8 1968 105-130.
6. Voorschoten VL/PFB settlement with stratified deposits. Hybr. B and MBB pottery. On the innermost (oldest) coastal barrier.  
Hel 7 1967 3-31; Hel 8 1968 105-130.
7. Zandwerven VL/PFB settlement on remnant of coastal barrier.  
Butter 1935; Van Giffen 1930 160; Wh 5 1965 99-103; Hel 2 1962 7-13, 224-231; Voetspoor 33-40; Palaeoh. 13 1967 12.
8. Hazendonk Cf. I-19.
9. Goudriaan Flint (among others fragments of polished axes) and VL pottery on the top of an Early Holocene dune.  
Wh 14 1965 119-123 (no. 7).
10. Hoog Blokland-site I VL and to BWB related pottery on the top of an Early Holocene dune.  
Wh 14 1965 119-123 (no. 10).
11. Hoog Blokland-site II Flint and VL pottery on the top of an Early Holocene dune.  
Wh 10 1961 128 ("Sliedrecht"); Wh 14 1965 119-123 (no. 10).
12. Schoonrewoerd Donk Cf. I-11.
13. Zijderveld Cf. I-18.
14. Waardhuizen, Almkerk Top of an Early Holocene dune with finds of the VL Culture (pottery and flint, both phases), PFB (pottery and flint axe fragment), Hybr. B (?) and VBB Beaker groups. One or two sherds might belong to the "Swifterbant" and "Hazendonk" wares.  
AN 1968 \*124.
- (14<sup>a</sup>.) Bommelse Loo, Bommelerwaard Some (early) VL sherds, found during building activities in 1972.  
Pers. comm. Mr R. S. Hulst, Amersfoort. AN 1973 \*28.

*PFB and "Hybr. B". settlements and pottery finds*

15. Waardhuizen Cf. II-14.
16. Hazendonk Cf. I-19.
17. Vlaardingen Cf. II-3.
18. Leidschendam Cf. II-5.
19. Voorschoten Cf. II-6.
20. Voorschoten Sherds of a Hybr. B. (Zigzag Beaker) in disturbed situation, but in sand of local origin.  
AN 1967 \*36.
21. Zandwerven Cf. II-7.
22. Aartswoud PFB (and other Late Neolithic ?) pottery, on the "Old Land", near the SE corner of the Wieringermeer Polder.  
Pers. comm. Dr J. A. Bakker, Amsterdam.
23. Gawijsend Hybr. B., complete beaker found under a Mediaeval well.  
OML 13 1932 46; Wh 4 1955 58-72.
24. Westfriese Sluis PFB, complete beaker, early type, found in the filling of a prehistoric pit, measuring 40 × 100 cm, and on a depth of c. 1 m.  
Wh 4 1955 58-72; Voetspoor 38.

*Artifacts, other than axes*

25. The Hague, Congress Building Four-sided portable grinding stone, found on the slope of a coastal barrier and under the overlying peat in a building pit. Probably PFB Culture.  
Jelgersma *et al.* 1970 137.
26. Voorschoten Long scraper, Grand Pressigny flint, on the innermost (oldest) coastal barrier.  
Wh 2 1953 45-46; AN 1956 \*140.

27. Leiden-  
De Burcht Fragment of a *Spandolch* from the old surface under the Mediaeval *Motte*, probably in secondary position.  
AN 1969 \*5.

*Battle axes*

28. Linge Battle axe, type P-2, found in 1885.  
Hel 8 1968 233 (no. 9).
29. Oud Zuilen Facetted battle axe, found about 1923 in the natural levee deposits of the river Vecht.  
J. A. Bakker 1958; Hel 8 1968 226.
30. Katwijk aan de Rijn Battle axe, type P-1, found during sand dredging.  
Braat 1953.
31. Vogelenzang-Bekslaan During extensive sand digging in the Old Dunes between 1895 and 1900, the following objects were found in a restricted area. It is not very probable that they form a hoard or a closed find.  
a. battle axe, type K-6,  
b. flint dagger of Early Bronze Age type,  
c. bronze low-flanged axe,  
d. red deer antler beam,  
e. a globular and a disk-shaped stone (quartzite),  
f. two pieces of amber,  
g. sherd of DKS pottery.  
Wh 6 1957 95-98; Hel 3 1963 243; Palaeoh. 12 1966/67 108 (no. 43); Palaeoh. 9 1963 43; Voetspoor 89; BROB 18 1968 51 and 95 (no. F 6).
32. Hoogwoud Battle axe, type P-1, found in 1946 when cleaning a ditch.  
Wh 3 1954 94; Voetspoor 39 (note).
33. Koggenrandweg Battle axe, fragment, found on the surface.  
Wh 4 1955 102; Wh 5 1956 6 (no. 13).
34. Gawijsend Battle axe, fragment.  
Wh 5 1956 6 (no. 12).
- (34<sup>a</sup>). Wieringerwerf Battle axe, type H, fragment, found in 1966 in agricultural refuse.  
AN 1971 \*129.
35. Den Burg, Texel Battle axe, fragment, found on the Hoge Berg, a Pleistocene outcrop.  
BROB 8 1957/58 99.
36. North-east Polder parcel E 171 Cf. II-53 (c).

*Flint axes*

37. Terneuzen Thin-butted flint axe with oval cross-section, found in 1903 during the construction of a sluice in a peat layer at a depth of -2.50 m. NAP.  
Van der Feen 1952; Wh 1 1952 13; Trimpe Burger 1960 686-691.
38. Schonenburgse Heuvel, Nieuw Lekkerland Pointed-butted flint axe with oval cross-section, found on the top of an Early Holocene dune near the site of the former 14th cent. castle Schonenburg.  
Wh. 11 1962 33; Wh 14 1965 119-123 (no 1).
39. Buren Thin-butted flint axe with oval cross-section, found during drainage work at a depth of about 1 m.  
Hel 3 1963 24.
40. The Hague-centre Thin-butted flint axe with oval cross-section, found in the shore flat west of the oldest coastal barrier.  
Wh 9 1960 107-110; Wh 12 1963 62-64.
41. Vronestein, Voorburg Thin-butted flint axe with oval cross-section, found on the innermost (oldest) coastal barrier.  
Wh 9 1960 107-110
42. Rodenburg, Leiden Small, asymmetrical, roughly formed flint axe, said to be found on the site of the Roman castle.

- RMO h 1969/8.1.
- 42<sup>a</sup>. Voorhout Small flint adze found in 1954 on the eastern slope of the second coastal barrier.  
Data by the author.
43. Lisse Short flint axe of the "plump VL type". found on the innermost (oldest) coastal barrier, on the landward slope.  
Hel 3 1963 101 (note 51).
- 43<sup>a</sup>. Abbenes Small flint axe found in 1969 by a farmer when ploughing his field on the top of the Calais III sediments of the Haarlemmermeer Polder.  
Data by the author.
- (43<sup>b</sup>.) Haarlemmermeer The cutting edge of an axe of a coarse flint or quartzite. Found during the construction of the polder in 1853.  
RMO no. JvL 43.
44. Venhuizen Fragment (cutting-edge) of a flint axe, most probably in secondary position.  
AN 1961 \*4; Hel 3 1963 101 (note 53).
45. Hoornse burg Pointed-butted flint axe with oval cross-section and flattened sides.  
Wh 5 1956 4 (no. 1); WFO 5 1962 190.
46. Wieringermeer-parcel H 33 Asymmetrical, thin-butted flint axe with oval cross-section and flattened sides.  
Wh 5 1956 4 (no. 2); WFO 5 1962 190.
47. Wieringermeer-parcel H 42 Three axes, found near a small Pleistocene outcrop:  
a. small flint axe with roughly worked sides,  
b. broad-butted stone axe with oval cross-section,  
c. small stone axe with rectangular cross-section.  
Wh 5 1956 2-7 (nos. 3, 8, 9); WFO 5 1962 190.
48. Robbenoordse bos Somewhat asymmetrical, roughly formed small flint axe. Only cutting-edge polished.  
WFO 8 1965 169; AN 1965 \*52.
49. North-east Polder section E Thin-butted flint axe with oval cross-section, found on heavily eroded Early Holocene dunes, west of the former island of Schokland, near the small harbour, together with some pieces of loam and some flint.  
Van der Heide 1965/66 no. 2.
50. North-east Polder parcel 0 98 Thin-butted flint axe with oval cross-section, found near the Bomenweg.  
AN 1958 \*107.
- (51.) North-east Polder Thin-butted flint axe with oval cross-section and some Pot Beaker sherds, found (probably dredged up) before the construction of the North-east Polder.  
RMO d 1938/12.1-2.

*Finds attributable to the TRB Culture*

52. Wieringen Big fragment of a half finished *Knaufhammeraxt*, found on Pleistocene outcrop.  
AN 1969 \*113.
53. North-east Polder parcel E 171 Three axes found in 1969 on the surface of a Pleistocene outcrop:  
a. small, pointed-butted axe with round cross-section, cf. Brandt *Taf.* 23.9 but somewhat smaller,  
b. flint axe, thick-butted, rectangular cross-section, TRB Culture,  
c. battle axe, Glob type K-1.  
Pers. comm. Mr G. D. van der Heide, Schokland.
54. North-east Polder parcel P 14 Pleistocene outcrop near the NE corner of the former island of Schokland with the following finds:  
a. pointed-butted stone axe with oval cross-section,  
b. TRB sherd and a transverse arrow-head,  
c. typical VBB and BWB pottery and Beaker ware with channel-ornament, finger imprints in V-motif, rim cordon and protruding foot,

d. one sherd, richly tempered with pounded quartz showing the construction in broad clay bands; possibly Swifterbant ware,

e. plough marks.

Van der Heide 1965/66 no. 5.

55. Spoolde

*Cf.* I-16.

### III — SECOND PART OF THE LATE NEOLITHIC AND BEGINNING OF THE EARLY BRONZE AGE. c. 2000-1600 B.C.

Fig. 7

#### *MBB, settlements and pottery finds*

1. Hazendonk *Cf.* I-19.
2. Vlaardingen *Cf.* II-3.
3. Het Geestje, Monster  
Finds of MBB (?), VBB, BWB, HVS and Iron Age pottery, originally stratified, but almost completely disturbed. Plough marks on different levels.  
Hel 5 1965 97-117; Wh 14 1965 34-79.
4. Voorschoten *Cf.* II-6.
5. Oostwoud  
Bell Beaker settlement (MBB and VBB) and Middle Bronze Age barrows. At least one grave with well preserved skeleton attributable to the Bell Beaker Culture. Situated on Calais IV<sup>b</sup>-sediments.  
Hel 1 1961 223-228; WFO 5 1962 194-209; Voetspoor 174; AN 1967 \*31; Palaeoh 13 1967 16; Glasbergen 1969 fig. 1.

#### *VBB, settlements and pottery finds*

6. Dodewaard  
Concentration of VBB sherds within a MBA settlement with two types of houses: long, three-aisled houses and round huts. Situated on a "levee splay"-deposit. One of many comparable MBA sites, discovered during soil surveys.  
AN 1967 \*64; BROB 18 1968 117-129; Havinga 1969.
7. Rossum/Alem  
Some VBB sherds, dredged up from the river.  
AN 1958 \*134.
8. Kerkwijk  
Two small VBB sherds, isolated finds on the surface amidst Roman and later finds on a complex of different stream ridges.  
Modderman 1949<sup>c</sup> (no. 44).
9. Waardhuizen  
*Cf.* II-14.
10. Hoog Blokland-Nieuwvlietje  
Some settlement sites on branches of the former river course named Schaik stream ridge. One, near a break-through channel, with VBB pottery (now lost).  
TAG 1955 32; Wh 14 1965 119-123 (no. 12C).
11. Ottoland-Oosteind  
Settlement with VBB, BWB, DKS and LBA pottery on a high point of the Schoonrewoerd stream ridge. Fragmentary house plans. Skeleton of a pig (as an offer) buried in a pit (VBB/BWB).
12. Ottoland-De Put  
Two settlement sites. One beside a break-through channel through the Schoonrewoerd stream ridge. Some VBB sherds out of test pits.  
Wh 14 1965 119-123 (no. 6).
13. Molenaarsgraaf  
VBB/BWB settlement with two house plans, three graves and an ox burial. Situated besides a break-through channel through the Schoonrewoerd stream ridge. Another site, occupied until the LBA in the neighbourhood.  
AN 1966 \*123; AN 1967 \*114; This paper part IV.
14. Hazendonk *Cf.* I-19
15. Mijnsheerenland  
VBB sherd dredged up from the river Oude Maas.  
Wh 17 1968 80-85.
16. Het Geestje *Cf.* III-3

17. Veenenburg, Lisse/Hillegom Former state with extensive sand diggings in the years around 1930. Numerous finds
- a. Complete Bell Beaker.  
OML 10 1929 *Abb.* 9; OML 14 1933 *Taf.* IV:10; Wh 1 1952 106-107.
  - b. Flint tanged and barbed arrow-head, BB Culture.  
Wh 3 1954 65-68.
  - c. Flint dagger of Early Bronze Age type and some BWB sherds.  
OML 10 1929 8; BROB 18 1968 53 and 94 (no. F 5).
  - d. HVS sherds.  
Glasbergen 1954 fig. 62<sup>c</sup>; Byvanek 1942 *afb.* 16; OML 14 1933 *Taf.* V: 7.
  - e. Hoard consisting of Ha A 1 bronzes and possibly also a stone axe with oval cross-section and broad, thick butt. A high-flanged axe probably do not belong to the hoard.  
Pleyte 1877-1903, Westfriesland P1 VII and p. 19; Butler 1959 134-136.
  - f. Stone axe, pointed-butted and with oval cross-section, quartzite.
  - g. Half a perforated axe, gneiss, mapped as a hammer axe, but probably a late type battle axe.
  - h. A number of antler artifacts.
  - i. A number of stone artifacts: faceted globular stones, axe fragments used as hammer stones, axes.  
b-i. RMO h 1930/7.1-54.
  - j. Stone axe with rectangular cross-section and broad butt, faceted globular stone and bone awl.  
Wh 1 1952 106-107.
- (17<sup>a</sup>.) Haarlem-Schoterweg Some Pot Beaker sherds in a humic former surface in the Older Dune sands. <sup>14</sup>C date GrN 4635 1730 ± 40 B.C.  
Jelgersma *et al.* 1970 138.
- (17<sup>b</sup>.) Velsen Stratified dune deposits, including one layer with both BB and HVS sherds.  
Wh 19 1970 304.
18. Oostwoud *Cf.* III-5.
19. Swifterbant *Cf.* I-22.
20. North-east Polder VBB sherd, decorated with plain spatula, found in *detritus* deposits, which means a secondary parcel C 103 position.  
Van der Heide 1965/66 *afb.* 1 below, 1955<sup>a</sup> 15; 1955<sup>c</sup> 17.
- (20<sup>a</sup>.) North-east Polder *Cf.* II-51.
21. North-east Polder *Cf.* II-54.  
parcel P 14
22. Spoolde *Cf.* I-16.

*BWB settlements and pottery finds*

23. Culemborg-Den Heuvel Two BWB sherds and an Early Bronze Age flint artifact from the sandy filling of a break-through channel through the Schoonrewoerd stream ridge. Extensive Iron Age settlement, DKS pottery as isolated finds.  
AN 1966 \*61.
24. Hoog Blokland *Cf.* II-10.
25. Ottoland *Cf.* III-11
26. Ottoland-BWB settlement beside a break-through channel through the Schoonrewoerd stream ridge.  
Kromme Elleboog In a short distance a BB grave with the remains of two individuals.  
AN 1969 \*70.
27. Molenaarsgraaf *Cf.* III-13.
28. Hazendonk *Cf.* I-19.
29. Hekelingen I *Cf.* II-2.
30. Botlek BWB sherd in ground, originating from the 3rd petrol harbour.  
Hel 2 1962 18 (note 14).
31. Het Geestje *Cf.* III-3.

32. Veenenburg *Cf.* III-17 (c).
33. Vogelenzang- Tweede Doodweg HVS settlement on coastal barrier of De Zilk. One sherd bears BW impressions. Hel 3 1963 242; Voetspoor 81-92; Palaeoh 13 1967 13; Glasbergen 1969.
34. Velsen- Noordzeekanaal Finds of BWB, HVS, DKS and LBA or Iron Age pottery in stratification. Bone artifacts and plough marks, both BWB and later. Wh 18 1969 106; 19 1970 34-35, 109; 21 1972 19-22, 78; Jelgersma *et al.* 1970 138-139.
35. Spanbroek Some very small BWB sherds on Westfrisian I deposits (Calais IV<sup>b</sup>) and covered by Dunkirk O (?) deposits. AN 1969 \*63.
36. North-east Polder section H Big BWB sherd, found "in the Unio clay (= Calais IV<sup>b</sup>) near Tollebeek". Dating of clay, however, not certain. Van der Heide 1965/66 *afb.* 1, 1955<sup>a</sup> fig. 8.
37. North-east Polder parcels J 77/78 and J 110/111 Early Bronze Age settlement on levee of former river course near the Nageler Weg. Flint, antler, BWB pottery. Somewhat disturbed by later erosion. Van der Heide 1965/66 no. 3.
38. North-east Polder parcel P 14 *Cf.* II-54.
39. Spoolde *Cf.* I-16.

*Flint arrow-heads*

40. Cadzand Short-tanged arrow-head, found on the beach. AN 1962 \*166.
41. Haamstede, Schouwen Objects from the Old Dune Landscape, found by J. A. Hubregtse, now in the Middelburg Museum:  
a. Two flint arrow-heads, one leaf shaped, the other tanged.  
b. Bronze spearhead and a bronze socketed arrow-head. Not dated.  
c. Middle Bronze Age side-looped pin. Wh 7 1958 14-18; Palaeoh 5 1956 73-76.  
d. Late Bronze Age fibula. Trimpe Burger 1958, 1960/61; Van der Feen 1952 and Van der Feen in: Bennema & Van der Meer 1952.
42. Kesteren Hollow-based arrow-head and some flint flakes, found at a depth of more than 1 m. AN 1969 \*5.
43. Vechten Tanged and barbed arrow-head, found during the excavation of the Roman fortress. Wh 3 1954 65-68; RMO VF 866.
44. Scheveningen Tanged and barbed arrow-head, found in 1923 on the 4th coastal barrier. Wh 3 1954 65-68.
45. Katwijk Broad-tanged arrow-head found in 1951 during sand digging in the dunes. Wh 3 1954 65-68.
46. Katwijk Binnen Arrow-head with long tang and short barbs, found in 1854 in sand, containing shells. Pleyte 1877-1903, Batavia Pl. X 10; Wh 3 1954 65-68.
47. Veenenburg *Cf.* III-17 (b).
48. Langeveld, Noordwijkerhout Extensive sand digging on one of the younger coastal barriers with finds of different periods, originally partly in stratified deposits:  
a. Sögel type arrow-head. Wh 8 1959 25-29; Hel 3 1963 244.  
b. Bone material, Early Bronze Age? Palaeoh 13 1967 13.  
c. Perforated antler axe. Wh 8 1959 36-37.  
d. Flint sickle blade (fragment). Wh 7 1958 72-73.

- e. DKS, "Hoogkarspel", and Iron Age pottery.  
Wh 8 1959 25-29, 75-79; Wh 15 1966 30-49, *cf.* WFO 11 1966 214 (note 18).
49. Schalkwijk, Heemstede Tanged and barbed arrow-head. HVS Culture.  
Wh 15 1966 116.
50. Andijk Tanged arrow-head.  
Van Giffen 1944 188 (note); Wh 3 1954 65-68.
51. Medemblik Sögel type arrow-head, found in the neighbourhood of MBA settlement.  
AN 1968 \*138.
52. Zwaagdijk Sögel type arrow-head, surface find.  
AN 1970 \*44.
- Various artifacts*
53. Biesheuvel Late Neolithic (Bell Beaker?) flint artifacts and DKS pottery on the Babylonienbroek stream ridge.  
AN 1967 \*113.
- (54.) disposed
55. Voorhout Flint dagger of Early Bronze Age type.  
BROB 18 1968 (no. Ia 16).
- (56.) De Zilk *Cf.* IV-42 (a).
57. Lisse Wrist guard.  
Collection IPP, Amsterdam.
58. Veenenburg *Cf.* III-17 (c).
59. Vogelenzang *Cf.* II-31 (b).
- (59<sup>a</sup>.) Heemstede Oval flint knife, worked at two sides in a superficial retouche. Found in 1971 in ground of a small harbour at the east slope of the coastal barrier.  
Data of the author.
60. Andijk Flint dagger of Early Bronze Age type (?).  
BROB 18 1968 101 (no. Z1).
61. Opperdoes Flint dagger of Early Bronze Age type (?).  
BROB 18 1968 104 (no. Z 14).
62. North-east Polder Flint dagger together with some flint flakes on a Pleistocene outcrop.  
parcel M 131/132 Van der Heide 1965/66 (no. 1); BROB 18 1968 78 (no. II 10).

## IV — BRONZE AGE, WITH THE EXCEPTION OF THE BWB CULTURE. 1600-700 B.C.

Fig. 8

*HVS settlements and pottery finds*

1. Het Geestje *Cf.* III-3.
2. Kijkduin, The Hague Stratified occurrence of some HVS sherds below deposits with Iron Age remains on coastal barrier.  
Wh 5 1956 10-12; Hel 1 1961 141-146; Voetspoor 81-92.
3. Veenenburg *Cf.* III-17 (d).
4. Vogelenzang *Cf.* III-33.
- (4<sup>a</sup>.) Velsen *Cf.* III-17<sup>b</sup>.
5. Velsen *Cf.* III-34.

*MBA settlements and pottery finds*

- 5<sup>a</sup>. Ewijk Two MBA settlements on clay covered with natural levee deposits, at a depth of 50-60 cm.  
AN 1970 \*90-91: 1971 \*2.
6. Dodewaard *Cf.* III-6.

7. Opheusden MBA pottery on an old surface at a depth of 60-70 cm.  
AN 1960 \*267.
8. Kesteren MBA pottery on an old surface below a Roman settlement (*woerd*).  
A second site with MBA pottery at a depth of 75 cm.  
Modderman 1955<sup>d</sup> 31-32; AN 1971 \*36.
9. Maurik MBA occupation level at a depth of 50-55 cm.  
AN 1967 \*102.
10. Zoelen MBA pottery and later finds (La Tène glass armring fragments, Roman pottery) on the site  
Op de Beldert.  
AN 1969 \*122.
11. Meteren Some MBA sherds found on the Roman settlement site in the centre of the village.  
Data by the author.
12. Culemborg Cf. III-23.
13. Zijderveld Cf. I-18.
14. Overboeicop DKS and Iron Age pottery finds (settlement) on the Zijderveld stream ridge, beside the former  
channel.  
Data by the author.
15. Mariahoeve, DKS settlement on the Zijderveld stream ridge.  
Hei- en Boeicop Data by the author.
16. Hei- en Boeicop DKS settlement on the Zijderveld stream ridge beside two former stream-channels.  
AN 1964 \*310.
17. Schoonrewoerd Cf. I-11.  
Donk
18. Hoge Woerd- DKS settlement beside a small gully on the Babylonienbroek stream ridge.  
Genderen, Wijk AN 1967 \*103.  
en Aalburg
19. Biesheuvel Cf. III-53.
20. Noordeloos DKS, LBA and Iron Age settlement(s) on a high point of the Schoonrewoerd stream ridge.  
Data by the author.
21. Ottoland Cf. III-11.
22. Molenaarsgraaf Cf. III-13.
23. Benschop MBA occupation on the Blokland stream ridge beside a break-through channel.  
Data by the author.
24. Kijkduin, DKS pottery on coastal barrier.  
The Hague Wh 5 1956 10-12, 18-23, 34-39; Wh 10 1961 73-76.
25. Langeveld Cf. III-48 (e).
26. Vogelenzang Cf. II-31 (g).
27. Haarlem DKS sherds (?), flint, Iron Age pottery and iron slag in a building pit at the Jansstraat.  
Wh 11 1962 121-122; Hel 4 144 (no. 57).
28. Velsen Cf. III-34.
29. Schoorl Stone-gritted, probably MBA-LBA pottery on "*plek II*".  
Wh 6 1957 2-5; Wh 13 1964 42-46, 69-74, 149-150; pers. comm. Mr A. Schermer, Schoorl.
30. Medemblik MBA settlement with house plans, plough marks and a barrow.  
AN 1968 \*77 and \*137, 1970 \*4.
31. Hoogkarspel Extensive settlement area with house plans, plough marks and barrows. MBA until the begin-  
ning of the Iron Age.  
WFO 9 1966 168-224; WFO 10 1967 202-226; WFO 11 1968 193-199; Voetspoor 103-109.
32. Zwaagdijk, Settlement, barrows and flat graves, MBA.  
Wevershoof Van Giffen 1944; WFO 1961 52-96; Voetspoor 98-102 (barrows); WFO 7 1964 205-258; BROB  
14 1964 27-35; Palaeoh 13 1967 14-15 (settlement and flat graves).

*Middle Bronze Age barrows*

33. Oostwoud Cf. III-5.  
 34. Medemblik Cf. IV-30.  
 35. Hoogkarspel Cf. IV-31.  
 36. Zwaagdijk Cf. IV-32.  
 37. Grotebroek MBA barrows  
 WFO 2 1959 148-154; Van Giffen 1953.  
 38. Enkhuizen Two Bronze Age barrows.  
 WFO 6 1963 234.

*Bronzes, Early Bronze Age*

39. Loosduinen Bronze *Vollgriffdolch*, now in the Museum für Früh- und Vorgeschichte, Berlin, found in a peat layer under 3-4 m. sand.  
 Pers. comm. Dr W. H. Zimmermann, Wilhelmshaven.  
 40. Wassenaar High-flanged axe with low stop-ridge. Irish import.  
 OML 10 1929 6; Holwerda 1925 *afb.* 25.  
 41. Veenenburg Cf. III-17 (e).  
 42. De Zilk, Extensive sand digging on a relatively young coastal barrier, from where the following finds:  
 Noordwijkerhout a. Wooden bow, Early Bronze Age.  
 Wh 1 1952 74-77; BROB 3 1952 43; PPS 29 1963 50-98 esp. 68 and 92; Glasbergen 1969 29.  
 b. Bronze spearhead, Early Bronze Age.  
 Hel 3 1963 241-245.  
 c. Hoard consisting of a spearhead and a palstave, Late Middle Bronze Age.  
 OML 10 1929 16; Wh 1 1952 74-77; Hel 3 1963 241-245.  
 d. Perforated mace head (?), quern stone and perforated antler sleeve.  
 Wh 1 1952 106-109.  
 43. Vogelenzang Cf. II-31 (c).  
 44. North-east Flat axe, found on Pleistocene outcrop.  
 Polder Van der Heide 1955<sup>a</sup> 22, 1965/66 200-214.

*Bronzes, Middle Bronze Age*

45. Haamstede Cf. III-41.  
 46. Dreischor, Palstave, out of a collection old metal, collected by a farmer from his land.  
 Schouwen Wh 15 1966 54.  
 47. Augustapolder, Palstave, found during the digging of an anti-tank-ditch in 1943.  
 Bergen op Zoom Pers. comm. Dr J. J. Butler, Groningen.  
 48. Bodegraven Looped spearhead identical to the spearhead from Oudenaarde, English import, dredged up  
 from the river Oude Rijn during World War II.  
 Pers. comm. Prof Dr W. Glasbergen; see also Glasbergen & De Laet 1959 Pl. 31.  
 49. Liesbos, Ceremonial sword of type Ommerschans-Plougrescant, but smaller than these.  
 Jutphaas BROB 20/21 1970/'71. 301-309.  
 50. Eimeren, Palstave, found during deep-ploughing.  
 Elst (Gld.) AN 1968 \*53.  
 51. The Hague Palstave, found at the De Savorin Lohman Plantsoen.  
 Wh 16 1967 125; Wh 17 1968 203 and 211.  
 52. The Hague Palstave, found at the Nieboerweg.  
 Wh 13 1964 3; Wh 17 1968 212.  
 53. Scheveningen Palstave, found on the 4th. coastal barrier in or before 1926.  
 Wh 13 1964 2-7, fig. 1.

54. Voorhout Hoard, consisting of 17 palstaves, a high-flanged axe and a lugged chisel.  
OML OR 2 1908 45-46; OML 10 1929 17; Butler 1959 131-134; Palaeoh 9 1963 52.
55. Noordwijkerhout Pin with disc head from the sandpit Guldenmond.  
Hel 3 1963 244 (h) [N.B. h) and g) are interchanged on the map].
56. De Zilk Cf. IV-42 (c).
57. Veenenburg Cf. III-17 (e).
58. Heilo Hoard, consisting of one bronze and four flint sickle blades, found on the coastal barrier SW of Heilo. Dating uncertain.  
OML 43 1962 107-115.
59. Wieringermeer-parcel H 21 Palstave.  
Van der Heide 1955<sup>a</sup> 22; WFO 5 1962 192.
60. Marken Spearhead, probably MBA, dredged up 12 km. east of the island Marken.  
Modderman 1945 19; Van der Heide 1955<sup>a</sup> 22.
61. North-east Polder parcel F 39 Palstave, found near the village Bant.  
Pers. comm. Mr G. D. van der Heide, Schokland.

*Bronzes, Late Bronze Age.*

62. Elst Late Bronze Age pin (Ha A2), found at the excavation of the Roman temples under the church.  
Bogaers 1955 42 and Pl. 38.4.
63. Elst Socketed axe, found in 1949 in digging at the banks of the river Linge at a depth of 1.40 m.  
Bogaers 1955 42.
64. Elst Mid-winged axe.  
Mus. Arnhem BH 123; Pers. comm. Dr J. J. Butler, Groningen.
65. Bommel Socketed axe of the Hunze/Eems bronze industry, undecorated.  
NDV 79 1961 199-233. Mus. Arnhem GAS 35.
66. Herveld Socketed axe of the Hunze/Eems bronze industry and flint sickle blade.  
Pleyte 1877-1903, Batavia Pl V; Wh 6 1957 32; NDV 79 1961 199-233.
67. Opheusden At least two Ha A bronzes (razor and pin), found in 1911 in digging clay, together with Roman coins and two Merovingian pots.  
BROB 12/13 1962/'63 187-191.
- 67<sup>a</sup>. Diefdijk Socketed axe of the Hunze/Eems bronze industry, said to be found during ground work near the Diefdijk, west of Geldermalsen. Find-circumstances not very reliable.  
RMO e 1937/7.1.
- (67<sup>b</sup>.) Haringvliet Spearhead, found in 1972 during construction works.  
Pers. comm. Mr H. Sarfatij, Amersfoort.
68. Monster Socketed axe, western import, found near the watertower.  
Wh 3 1954 91; Palaeoh 9 1963 89; Wh 13 1964 4.
69. The Hague Socketed axe with *lappen*-decoration.  
Wh 13 1964 5
70. The Hague Socketed axe with *lappen*-decoration.  
Wh. 13 1964 5.
71. Scheveningen Socketed axe, found in 1884 when a channel was dug, "lying under a peat layer".  
Wh 8 1960 110.
72. Voorschoten Socketed knife, found on the oldest coastal barrier.  
Wh 13 1964 5.
- (72<sup>a</sup>.) Katwijk Small spearhead found in november 1972 on the beach, south of Katwijk.  
Data by the author.
73. Noordwijkerhout Small socketed axe of the Hunze/Eems bronze industry, found near the house Druivestein at the Zilk.  
RMO h 1956/6.1.
74. Velsen Socketed axe of the Hunze/Eems bronze industry, dredged up.  
Data of the author.

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75. Diemen Mid-winged axe, most probably dredged up in the IJsselmeer near Diemen.  
AN 1967 \*36.

*Bronzes, not dated*

76. Enkhuizen Spearhead, found in the polder Grootslag near the Mijndersloot.  
Wh 7 1958 74; WFO 2 1959 147.
77. Bovenkarspel Spearhead.  
Pers. comm. Dr J. J. Butler, Groningen.
78. Venhuizen Spearhead, found near the Kerkbuurt.  
Wh 12 1963 104.
79. North-east Polder parcel J Spearhead, found during the digging-up of potatoes, near the Nageler weg.  
AN 1958 \*183; Van der Heide 1965/66 200/214.  
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*Hammer axes*

80. St. Maartensdijk Hammer axe.  
Hel 4 1964 68 (no. 70).
81. Brouwershaven Hammer axe, "lydite-like" stone.  
AN 1962 \*163.
82. Rockanje Hammer axe, made of gabbro, originating from the Strijpse Dijk and there in secondary position.  
Wh 10 1961 55-59.
83. Noordwijkerhout Top fragment of a hammer axe (type Muntendam?), on coastal barrier near Ruigenhoek.  
Wh 13 1964 160-161.
84. Veenenburg Cf. III-17 (g).
85. Hillegom Hammer axe, made of "hornblend-diorite", found in 1910.  
Wh 4 1955 12-14.
86. Uitgeest Hammer axe.  
OML 10 1929 16.
- (86<sup>a</sup>.) Limmen Fragment of perforated stone axe.  
Cordfunke 1969.
87. Sijbekarspel Hammer axe, type Muntendam.  
WFO 3 1960 129-132; Hel 1 1961 132-134.
88. Wieringermeer Hammer axe, type Muntendam, exact findspot unknown.  
Wh 5 1956 6 (no. 11); WFO 5 1962 190.
89. Texel Fragment of perforated axe, found on a Pleistocene outcrop named De Hooge Berg.  
AN 1964 \*331.
90. Enkhuizen Hammer axe, found in secondary position, 400 m. west of Gelderse Hoek, north of Enkhuizen.  
AN 1970 \*45.
91. North-east Polder Half-finished, big hammer axe, found north of the former island Urk.  
Urk Van der Heide 1955<sup>a</sup> 14.
92. North-east Polder Fragment (cutting-edge) of a hammer axe, found north of the former island Urk.  
Urk Van der Heide 1955<sup>a</sup> 14, 1955<sup>c</sup> 15.
93. North-east Polder Hammer axe, type Muntendam.  
De Voorst Van der Heide 1955<sup>a</sup> 15, 1955<sup>c</sup> 14.

APPENDIX II

DATA USED IN THE DIAGRAM AT FIGURE II

No.	No. App. I	Site	Finds/Lit.	Dates	Underlying deposits	Meaning of the depths	Depths (m. below NAP)	Compaction (estimated, cms.)
1	I-10	Volkerak, Willemstad	Wooden statuette Van Es & Casparie 1968	GrN 4922 4450 ± 85	Pleistocene cover sands	depth of find	— 8	none
2	I-21	Swifterbant- parcel H46	1) Early Neolithic settle- ment and graves 2) peat sample  Van der Heide 1965/66. Ente 1971. Vogel & Waterbolk 1972	(before 3300)  GrN 5067 3660 ± 60	Early Holocene dune  slope of Early Holocene dune	top of dune and lower limit of settlement traces depth of sample	— 5.00/— 5.75  — 6.15	none  none
3	I-22	Swifterbant- parcel G41/42	Early Neolithic settle- ment and graves  Van der Heide 1965/66. Ente 1971. Vogel & Waterbolk 1972	GrN 5443 3350 ± 40 5606 3590 ± 65	estuarine creek levee (C II)	depth of occupation level	— 5.30	some
4	I-13	Koegras, Julianadorp	1) Some flint flakes  2) Peat sample  Du Burck 1959 Jelgersma 1961	(before 2800)  GrN 467 2975 ± 210	Early Holocene cover sand hill slope of Early Holocene cover sand hill	top of the hill  depth of sample	— 4.25  — 4.70	none  none
5	II-3	Vlaardingeng	1) VL Culture settlement, PFB finds  2) MBB occupation of very short duration  Van Registeren Altena <i>et al.</i> , 1962/63. Vogel & Waterbolk 1972	GrN 4948 2180 ± 40 2480 2240 ± 70 2304 2300 ± 75 2487 2330 ± 100 2303 2380 ± 60 2306 2460 ± 100 4114 2470 ± 120  — — 1940 ± 25 (mean of four measurements)	natural levees of estuarine creek (C IV <sup>a</sup> )  natural levees of estuarine creek (C IV <sup>b</sup> )	depth of occupation level: highest point and limit of peaty gully deposits wood preserved at house sites  occupation level wood preserved	— 3.00/— 3.20	likely (30)          likely (30)

No.	No. App. I	Site	Finds/Lit.	Dates	Underlying deposits	Meaning of the depths	Depths (m. below NAP)	Compaction (estimated, cms.)
6 <sup>a</sup>	II-2	Hekelingen	1) VL Culture settlement 2) BWB occupation Modderman 1953	GrN 254 2250 ± 120 684 2120 ± 85 (1700-1600)	natural levees of estuarine creek (C IV <sup>a</sup> ) clayey deposit overlying the VL settlement (C IV <sup>b</sup> )	depth of occupation level: highest point and limit of peaty gully deposits occupation level	— 2.10/— 2.80 — 1.90	likely (30) likely (30)
6 <sup>b</sup>	II-2 <sup>a</sup>	Hekelingen II	VL Culture settlement Pers. comm. Dr J. A. Bakker, Amsterdam	(2200)	natural levees of estuarine creek (C IV <sup>a</sup> )	occupation level	— 2.70/— 2.90	likely
7	II-5	Leidschendam	VL Culture settlement, PFB finds pollen diagram L3 Glasbergen <i>et al.</i> 1967 Groenman-van Waateringe <i>et al.</i> 1968	GrN 5027 1710 ± 60 5028 1860 ± 60 5029 1710 ± 80 (VL Culture)	Older Dunes on coastal barrier (C III) shore flat	occupation level	— 0.90/— 1.10	none
8	II-6	Voorschoten-cutting 17	Peat-filled depression with stratified VL Culture remains Glasbergen <i>et al.</i> 1967 Groenman-van Waateringe <i>et al.</i> 1968	GrN 4908 2030 ± 60 (a) 4907 2130 ± 70 (b) 5031 2080 ± 40 (c) 4906 2140 ± 50 (d)	Older dunes on coastal barrier (C III)	two depths with human influence on the vegetation ( <i>Cerealia</i> , <i>Plantago</i> ) charcoal } 10 (a) from } 8 (b) layer } 4 (c) no : } 2 (d)	— 0.90 — 1.10 — 1.40	none
9	II-7	Zandwerven	VL Culture settlement, PFB finds Van Giffen 1930 Van Regteren Altena <i>et al.</i> 1962/63	GrN 2221 2040 ± 65 1583 2710 ± 55	Sandy coastal barrier (top at — 2.50) covered with low dunes (C III)	occupation levels : — 1929 excavation — 1957/58 excavation	— 1.00/— 1.50 — 2.30 — 1.30/— 1.70	none
10	I-19	Hazendonk, Molenaarsgraaf	Weathered surface in the peat deposits; correlation with VL Culture This paper, part III	GrN 5175 2340 ± 40	slope of Early Holocene dune	depth of dated surface at "juncture" to the dune slope	— 2.90/— 3.10	none
11	II-37	Terneuzen	Flint axe of "Vlaardingen type", found 1903 Van der Feen 1952	(2400-2000)	in a peat layer	depth of find	— 2.50	some

No.	No. App. I	Site	Finds/Lit.	Dates	Underlying deposits	Meaning of the depths	Depths (m. below NAP)	Compaction (estimated, cms.)
12	—	Bornwird	Settlement with VL - like pottery and PFB sherds Pers. comm. Prof. Dr. Van der Waals, Groningen Vogel & Waterbolk 1972	(2300-2000) before GrN 5295 1980 ± 50	Late Glacial deposits	occupation level, plough marks	— 0.70/— 1.20	none
13	III-5	Oostwoud	1) BB settlement and grave 2) MBA barrows Van Giffen 1961, 1962, 1966	(1900-1700) GrN 797 1075 ± 80	sandy creek ridge, West-frisian deposits I (C IV <sup>b</sup> ) <i>id.</i>	occupation level  base level	— 1.50/— 1.70 — 1.50/— 1.70	about 80 about 80
14	III-12	Molenaarsgraaf	1) VBB/BWB settlement and graves  2) MBA occupation This paper : part IV	GrN 5132 1830 ± 50 5176 1690 ± 30 5705 1685 ± 60 5131 1685 ± 40 5566 1680 ± 40 GrN 5177 1400 ± 35	sandy stream ridge (C IV <sup>b</sup> )	occupation level : highest point and "juncture" to gully deposits  <i>id.</i>	— 0.80/— 1.60 — 0.80/— 1.40	none none
15	IV-23	Benschop	MBA occupation unpublished	GrN 5356 1010 ± 60	sandy stream ridge undated	highest point of occupation level	— 0.70	none
16	IV-20	Noordeloos	settlement site MBA - Iron Age unpublished	(at least 1200-600)	sandy stream ridge (C IV <sup>b</sup> )	highest point of occupation level	— 0.60	none
17	IV-53	Biesheuvel	BB and MBA settlement site unpublished	GrN 5357 1175 ± 40	sandy stream ridge undated	highest point of occupation level	+ 0.10	none
18	IV-18	Wijk en Aalburg	MBA refuse in small gully unpublished	(1400-1000)	sandy stream ridge undated	highest point of occupation level	+ 0.60	none
19	I-13	Zijderveid	1) MBA settlement  2) Iron Age settlement Pers. comm. Mr. R.S. Hulst, Amersfoort J. de Jong 1970/71 Vogel & Waterbolk 1972	GrN 5376 1420 ± 80 5220 1315 ± 60 5219 930 ± 35 GrN 5574 715 ± 80 5351 665 ± 100 5573 450 ± 65 5352 200 ± 90 5218 310 ± 30	sandy stream ridge (C III)	occupation level : highest point and "juncture" to gully deposits <i>id.</i>	+ 0.20/+ 0.75 + 0.15/+ 0.40	some ? some ?

No.	No. App. I	Site	Findings/Lit.	Dates	Underlying deposits	Meaning of the depths	Depths (m. below NAP)	Compaction (estimated, cms.)
20	III-16	Dodewaard	1) VBB domestic refuse 2) MBA settlement Pers. comm. Mr. R. S. Hulst, Amersfoort	(1800) (c. 1200)	"levee splay" deposit in back swamp. Probably C IV <sup>b</sup> <i>id.</i>	occupation level occupation level	+ 6.20/+ 6.30 + 6.30/+ 6.20	very little very little
21	IV-32	Zwaagdijk	MBA settlement and barrows Van Giffen 1944 Modderman 1964	GrN 4243 1250 ± 60 2359 1065 ± 35 2168 1015 ± 45	sandy creek ridge, West-frisian II deposits (D O)	base levels of barrows occupation level	- 1.60/- 1.75 - 1.40/- 1.60	about 80
22	IV-37	Grotebroek*	MBA barrows Van Giffen 1953	GrN 160 975 ± 40	sandy creek ridge, West-frisian II deposits (D O)	base level of barrows	- 1.50/- 1.70	about 80
23	IV-31	Hoogkarspel site D	1) MBA barrows nos. II, III** on ploughed soil 2) LBA-Iron Age settlement on the barrows Bakker & Brandt 1966	GrN 5050 1070 ± 40 GrN 5051 730 ± 50 5048 700 ± 45	sandy creek ridge, West-frisian II deposits (D O)	preh. ploughed soil (base) <i>id.</i> (top)	- 1.03/- 1.25 - 0.80/- 1.05	about 80
24	IV-31	Hoogkarspel - site F	LBA-Iron Age settlement Bakker & Metz 1967	(750-600)	Westfrisian II deposits (D O)	preh. ploughed soil (base) <i>id.</i> (top) present surface (top)	- 1.20/- 1.60 - 1.00/- 1.40 - 0.70	about 80
25	—	Ezinge	Artificial <i>terp</i> mound Early Iron Age till recent Van Giffen 1936, 1954, 229	(600 B.C./recent)	bank of tidal creek in salt marsh deposits	occupation level on salt marsh 600 B.C. top of first artif. mound	- 0.20 + 1.20	some (20) some
26	—	Escampolder, Loosduinen	Iron Age settlement (R-W III) Bennema 1954, 45 Modderman 1955	(400-200)	peat landscape with rests of coastal barriers	"juncture" of inhabited surface to sandy heights	- 0.75	none

No.	No. App. I	Site	Finds/Lit.	Dates	Underlying deposits	Meaning of the depths	Depths (m. below NAP)	Compaction (estimated, cms.)
27	—	Leiden, Bosch en Gasthuis Polder	Iron Age settlement (R-W II, III)  Bennema 1954, 45	(500-200)	deposits of small estuarine creeks	highest points of occupa- tion level	— 0.50	some (20)
28	III-23	Culemborg	Iron Age settlement  Unpublished	GrN 5001 260 ± 50 4945 650 ± 70 4946 670 ± 50 4947 410 ± 75	sandy stream ridge (C IV <sup>b</sup> )	highest point of occupa- tion level limit peaty gully deposits	+ 1.40  0.00/+ 0.20	none  none
29	—	Valkenburg	Roman fortress, 6 phases, artificial elevation  Van Giffen 1921, 1954, 1954 <sup>a</sup>	A.D. 32-240	natural levee of the river Rhine	occupation } 1:A.D. 42/ 44 level of } 3:A.D. 47/ 69 phase : } 6:A.D.210/240	— 0.30/ 0.00 + 0.60/+ 1.00 + 1.75	some
30	—	Arentsburg	Roman settlement  Van Giffen, 1921, 1954	A.D. 85 - middle 3rd cent.	coastal barrier	highest point occupation level	+ 1.00	none
31	—	Rijswijk	Roman settlement  Bloemers 1968, 1969, 1970	mid. 1st-begin 3rd cent.	thin clay deposit over a sandy height	top of synchronous clay wood preserved below	— 0.10 — 0.47	none
32	—	Tuinster Wierden, Leens	young artificial mound  Bennema 1954, 53-54 Van Giffen 1940	A.D. 650-recent	levee deposits in young salt marsh	base level artificial mound	+ 0.80/+ 1.00	some ?
33	—	Godlinze	cemetery  Bennema 1954, 53-54	begin 7th cent.	young salt marsh deposits, near a ridge	original surface level	+ 0.85/+ 1.05	none ?
34	IV-30	Medemblik	1) MBA barrow 2) Carolingian occupation  H. H. van Regteren Altena & J. A. Bakker 1968	(1200-1000) 8th-9th cent.	Westfrisian deposits peaty clay	base level height of 'juncture' of peaty clay to barrow	— 1.30 — 0.90	about 80 ? about 80 ?

\* Van Giffen (1954, 227) mentions erroneously 1.20 — N.N.

\*\* Tumulus I (Bakker 1959) has its base at — 1.50 (base of plough marks at — 1.74). This barrow is situated at some distance from the barrows II and III.

### APPENDIX III

#### LIST OF PREHISTORIC AND ROMAN SITES AND FINDS IN THE RIVER CLAY/WOOD PEAT AREA, MAPPED IN FIG. 18

In the following list all sites are briefly described under the following headings:

- a: municipality and name
- b: physiographic situation
- c: finds
- b: find circumstances
- e: literature

The list contains all sites and finds of the Roman Age and earlier. The observations and data of the author are supplemented by documentation of Stiboka, ROB and RMO and by some data of the Municipal Museum at Arnhem, the BAI and the Royal Coin Cabinet in The Hague. As will be seen most sites are discovered during soil surveys and by AWN members, that is by the work-group Lek en Merwestreek, lead by Mr. H. A. de Kok from Hardinxveld.

When the number of a site is given in brackets, this means that the site is not indicated on the map, because of the unreliable find report or because it was inserted in the list after closing of this part of the manuscript.

The finds are, with a few exceptions, in the RMO, Leiden.

#### ALBLASSERWAARD

- 1 a *Alblasserdam—Souburg*
  - b Natural levee of the Alblas stream.
  - c Among numerous sherds of mediaeval pottery (11th - 14th cent.) one small Roman sherd (grey varnished ware).
  - d Site of a former castle. Grassland. Collected by AWN-members about 1966.
- (1a) a *Alblasserdam—Souburg*
  - b Natural levee of the Alblas stream.
  - c Six roman coins covering the period from the birth of Christ till about 270 A.D. (Germanicus, Claudius, Hadrian, Gordian, Claudius Gothicus, Gallienus).
  - d According to a note in the BAI archives the coins were part of the collection of Mr G. van der Lee from Oudewater. They were said to have been found at this site in 1938. We owe this information to Mr G. J. van den Beemt. The find is considered by us as unreliable.
- 2 a *Oud Alblas—Noordzijde*
  - b Natural levee of the Alblas stream.
  - c One small Roman sherd (grey varnished ware) among sherds of mediaeval pottery (11th-14th cent.).
  - d Arable land beside a farm. Collected from the surface by Mr G. van den Beemt, Alblasserdam.

- 3 a *Oud Alblas—Kooiwijk*  
 b Natural levee of the Alblas stream.  
 c One small Roman sherd (grey varnished ware) among sherds of mediaeval pottery (11th-14th cent.).  
 d Small artificial mound. Collected by AWN-members during diggings on behalf of construction works in 1967.  
 e AN 1967, \*90-91.
- 4 a *Oud Alblas—village*  
 b Natural levee of the Alblas stream.  
 c Some small, possibly Roman, terra nigra-like sherds.  
 d Collected by AWN-members during diggings on behalf of house building in 1968.
- 5 a *Alblasserdam—site 2 (Cable Factory)*  
 b Alblasserdam creek ridge, below a c. 60 cm. clay cover.  
 c Roman settlement yielding numerous finds (2nd cent.).  
 d Discovered during the soil survey 1954. Small rescue excavation by AWN-members during construction works 1964.  
 e Wh 10, 1961, 125-126; Wh 11, 1962, 61, 123-124; Van den Beemt 1967.
- 6 a *Alblasserdam—site 1 (Cable Factory)*  
 b Alblasserdam creek ridge, below a c. 80 cm. clay cover.  
 c Roman settlement yielding numerous finds (late 1st-beginning 3rd cent.).  
 d Small rescue excavation by AWN-members during construction works 1962.  
 e See No. 5; Wh 13, 1964, 47-48.
- 7 a *Alblasserdam—site 3a*  
 b Alblasserdam creek ridge, below a c. 60 cm. clay cover.  
 c Roman settlement yielding many finds (2nd-3rd cent.).  
 d Discovered by AWN-members. Finds collected from the surface (arable land) and from a test pit 1965.  
 e Van den Beemt 1967.
- 8 a *Alblasserdam—site 3b*  
 b Alblasserdam creek ridge, below a 50-60 cm. clay cover.  
 c Roman settlement yielding numerous sherds.  
 d Collected by Mr G. van den Beemt from a trench, dug on behalf of the water works 1972.
- 9 a *Alblasserdam—site 4*  
 b Alblasserdam creek ridge, below a c. 40 cm. clay cover.  
 c Roman settlement site.  
 d Discovered by the late Mr H. Voogd, Giessen, and Mr H. A. de Kok, Hardinxveld, 1961. Finds also collected from the surface and from a test pit by Mr G. van den Beemt, Alblasserdam, 1966.  
 e Van den Beemt 1967.
- 10 a *Alblasserdam—site 5*  
 b Alblasserdam creek ridge.  
 c Some Roman sherds.  
 d Parcel disturbed by sand digging. Collected from the surface (arable land) by Mr G. van den Beemt, Alblasserdam, 1967.  
 e Van den Beemt 1967.
- 11 a *Oud Alblas—site 6*  
 b Alblasserdam creek ridge, below a c. 80 cm. clay cover.  
 c Roman settlement site.  
 d From the surface (arable land) and from a testpit by Mr G. van den Beemt 1966. This pit apparently touched a mediaeval (12th cent.) refuse pit.  
 e Van den Beemt 1967.

- 12 a *Oud Alblas—site 7*  
b Alblaserdam creek ridge.  
c Roman settlement site.  
d Discovered during the soil survey 1954 (only two sherds, now lost). Finds collected from the surface (arable land) by Mr G. van den Beemt 1971.
- 13 a *Oud Alblas—Zuidzijde*  
b Alblaserdam creek ridge.  
c sherds of Roman and mediaeval (12th-15th. cent.) pottery.  
d Found in ground, excavated from this parcel and used at road construction works at some distance. Discovered during the soil survey 1954. Now grassland. No finds made during field control by the author 1968. A small undisturbed part of this settlement has been discovered at the southern margin of the parcel by Mr G. van den Beemt, Alblaserdam, 1971.
- (13<sup>a</sup>) a *Oud Alblas*  
b High parcel of land.  
c Big bronze coin (*sestertius* ?) of Trajan.  
d Found in 1843 by a farmer.  
e Janssen 1846, 390
- 14 a *Papendrecht*  
b In the body of the modern dike.  
c Roman coin, an *as* of Vespasian.  
d Found during construction works, 1964.
- 15 a *Papendrecht*  
b Papendrecht creek ridge.  
c Roman coin, a *sestertius* of Commodus.  
d Found by Mr P. van der Sluis, Papendrecht, 1966.
- 16 a *Papendrecht—Bethlehem church*  
b Papendrecht creek ridge.  
c Two small Roman sherds among numerous sherds of mediaeval pottery (11th-12th cent.).  
d Site discovered during the soil survey 1954. Roman finds made by Mr G. van den Beemt, Alblaserdam, 1966.
- 17 a *Papendrecht*  
b Bank of the Merwede river.  
c Roman coin, a *denarius* of Quintus Metellus.  
d Found by Mr C. van der Esch, Papendrecht, 1965.
- 18 a *Papendrecht*  
b Bank of the Merwede river.  
c A rim sherd of a Roman pot.  
d Found by Mr G. van den Beemt, Alblaserdam, about 1970.
- 19 a *Papendrecht*  
b Small creek belonging to the Papendrecht creek ridge.  
c A Roman sherd.  
d Found by Mr G. van den Beemt, Alblaserdam, 1968.
- 20 a *Papendrecht—Swimming-pool*  
b Papendrecht creek ridge, below a c. 60 cm. clay cover.  
c Roman settlement yielding numerous finds (2nd half 1st-2nd cent.). Mediaeval pits (11th-14th cent.) had been dug from a higher level, very probably half-way the clay cover.  
d Found by AWN-members during road construction works and the construction of the swimming-pool 1967-1968.

- 21 a *Oud Abbas*  
 b Papendrecht creek ridge.  
 c Some Roman sherds.  
 d Found at the surface (arable land) by Mr G. van den Beemt, Alblasserdam, 1967.
- 22 a *Bleskensgraaf—Provincial road*  
 b Small creek belonging to the Alblasserdam-Papendrecht system, below a 30-60 cm. clay cover.  
 c Roman settlement yielding a moderate number of finds (3rd cent.).  
 d Grassland. Finds collected from a newly dug ditch by Mr G. van den Beemt, Alblasserdam, 1969.
- 23 a *Bleskensgraaf*  
 b Small creek belonging to the Alblasserdam-Papendrecht system, below a 30-60 cm. clay cover.  
 c Small flint flake.  
 d Grassland. From a depth of 60 cm., in a boring made by Mr M. J. de Haan, Bleskensgraaf, about 1968.
- 24 a *Molenaarsgraaf—Hazendonk*  
 b Isolated *donk*. Top not covered with clay.  
 c "Hazendonk-"; Vlaardingen- and Beaker pottery. Pollen diagram showing human occupation about 4100 (?), 3400, 3000, 2500/2300 and 1700 B.C.  
 d Grassland. Discovered (test pits) by AWN-members 1963. Test excavation by the author 1967.  
 e This paper part III.
- 24<sup>a</sup> a *Molenaarsgraaf*  
 b Schoonrewoerd stream ridge, below a c. 40 cm. clay cover.  
 c A partly disturbed grave pit, which contained the remains of a disarticulated skeleton. A few beaker-like sherds and flint flakes in the surroundings.  
 d Discovered by Mr S. Kooistra from Molenaarsgraaf in the side of a newly dug ditch, bordering the re-allotment road, 1972.
- 25 a *Molenaarsgraaf—parcel Mr A. L. Korevaar*  
 b Schoonrewoerd stream ridge, below a c. 40 cm. clay cover.  
 c A few beaker-like sherds, some flint flakes and a scraper.  
 d Grassland. From two test pits by AWN-members 1966. Site disturbed by extensive sand digging.
- 26 a *Molenaarsgraaf—parcel Mr A. Boon*  
 b Schoonrewoerd stream ridge. At the bank of a break-through channel, below a 30-40 cm. clay cover.  
 c VBB/BWB settlement and graves; some MBA finds (<sup>14</sup>C dates about 1830-1680, 1400 B.C.).  
 d Grassland. Discovered (test pits) by AWN-members 1966. Excavation by the author 1966-1967.  
 e This paper part IV.
- 27 a *Molenaarsgraaf—parcel Mr J. A. Baan*  
 b Schoonrewoerd stream ridge, below a 40 cm. clay cover.  
 c Sherds of domestic pottery of the VBB/BWB period, ; some flint.  
 d From three test pits by AWN-members 1967.  
 e This paper fig. 59. On the maps combined with No. 28.
- 28 a *Molenaarsgraaf*  
 b Schoonrewoerd stream ridge, below a 40 cm. clay cover. Grassland.  
 c/d— Sherds of DKS and LBA pottery, a retouched flint flake. From a shallow sand pit, during the soil survey 1954.  
 — The grip of a flint dagger, some sherds, one of them with a BW impression, some flint. From a test pit by AWN-members 1964.  
 e This paper fig. 59. On the maps combined with No. 27.
- 29 a *Ottoland—De Put, site 3*  
 b Schoonrewoerd stream ridge, below a clay cover.  
 c Five sherds, one decorated by channeling, probably beaker pottery.  
 d Grassland. From a test pit by AWN-members 1964.

- 30 a *Ottoland—De Put, site 4*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some sherds, one with BW-decoration and a retouched flint flake.  
d Grassland. From three test pits by AWN-members 1967.
- 31 a *Ottoland—De Put, site 5*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some very small sherds and pieces of loam.  
d Grassland. From a test pit by AWN-members 1964.
- 32 a *Ottoland-De Put, site 7*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Sherds, decorated with grooves and fingertip impressions (V-motif), one VBB sherd, some flint.  
d Grassland. From a test pit by AWN-members 1964.
- 33 a *Ottoland-De Put, site 6*  
b Schoonrewoerd stream ridge, below a clay cover. At the bank of a break-through channel.  
c Seven small sherds, probably beaker pottery.  
d Grassland. From a test pit by AWN-members 1964.
- 34 a *Ottoland—De Put, site 8*  
b Schoonrewoerd stream ridge, below a clay cover. At the bank of a break-through channel.  
c Small sherds, probably beaker pottery; some flint.  
d Grassland. From two test pits by AWN-members and the author 1966.
- 35 a *Ottoland—De Put, site 9*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Small sherds, beaker pottery?, some flint.  
d Grassland. From a test pit by AWN-members and the author 1966.
- 36 a *Ottoland—Kromme Elleboog, No. 1*  
b Schoonrewoerd stream ridge. Near a complex break-through channel, below a 30 cm. clay cover.  
c Domestic beaker pottery; at least one sherd with BW-decoration; flint.  $^{14}\text{C}$  date  $1845 \pm 55$  B.C.  
d Discovered 1966 by AWN-members and the author. Rescue excavation by the author 1969, forced by road construction.  
e AN 1969, \*70-71.
- 37 a *Ottoland—Kromme Elleboog, No. 2*  
b Schoonrewoerd stream ridge, below a 40 cm. clay cover.  
c Grave with the remains of two persons: one normal inhumation, the other not in anatomical position and the skull missing.  $^{14}\text{C}$  date  $1870 \pm 45$  B.C. Nearby a small pit with charcoal ( $^{14}\text{C}$  date  $460 \pm 35$  B.C.; probably too young) and with a few small sherds, tempered with granite grit.  
d Found by AWN-members and the author during the survey of a newly dug ditch, bordering the new reallotment road 1970.
- 38 a *Ottoland*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some small sherds and pieces of loam.  
d Found by AWN-members and the author during the survey of a newly dug ditch, bordering the new re-allotment road 1969-1970.
- 39 a *Ottoland—“behind the church”*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Sherds, decorated with grooves, lines and fingertip impressions, Two VBB-sherds, MBA sherds, some flint.  
d Found by AWN-members, the author and Mr A. Verrips, Ottoland, during the survey of a newly dug ditch bordering the new re-allotment road 1969, 1970 and 1971.

- 40 a *Ottoland*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some sherds, beaker pottery?  
d Found by AWN-members and the author during the survey of a newly dug ditch, bordering the new re-allotment road 1969.
- 41 a *Ottoland—Oosteind, No. 2*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Sherds of MBA pottery, pieces of loam, some flint. Remains of a probably recent ox (?) skeleton at a depth of 50 cm.  
d From two test pits by AWN-members 1968.
- 42 a *Ottoland—Oosteind, No. 1*  
b Schoonrewoerd stream ridge. Very high elevation, below a 20-30 cm. clay cover.  
c Settlement site, dated by sherds of BB, BWB, DKS and LBA pottery. Skeleton of a domesticated pig (BB/BWB phase). Two <sup>14</sup>C dates: about 1700 and 850 B.C.  
d Discovered by AWN-members 1965. Excavation by the author 1969.  
e AN 1969, \*70-71.
- 43 a *Goudriaan—Smoutjesvliet*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some beaker-like sherds, DKS pottery, some flint.  
d Grassland. From two test pits by ANW-members 1968 and the survey of a newly dug ditch 1970.
- 44 a *Goudriaan*  
b Schoonrewoerd stream ridge, below a 40 cm. clay cover.  
c "Ancient settlement soil" with charcoal.  
d Grassland. Reported by AWN-members 1968.
- 45 a *Goudriaan*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some pieces of loam.  
d Found by AWN-members and the author during the survey of the dug-out stretch of a new re-allotment road 1969.
- 46 a *Goudriaan*  
b Schoonrewoerd stream ridge, below a clay cover.  
c A triangular flint artifact (*cf.* fig. 95 p) and some pieces of loam.  
d Found by AWN-members and the author during the survey of the dug-out stretch of a new re-allotment road 1969.
- 47 a *Goudriaan*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Some pieces of loam.  
d Grassland. From a test pit by AWN-members and the author 1968.
- 48 a *Goudriaan*  
b Schoonrewoerd stream ridge, below a clay cover.  
c One sherd tempered with quartz grit; one flint flake. Finds not preserved.  
d From a test pit by AWN-members and the author 1968.
- 49 a *Goudriaan—Nieuw Goudriaan*  
b Schoonrewoerd stream ridge, below a clay cover.  
c Many sherds of DKS and (probably) LBA pottery; some flint flakes.  
d Grassland. From various test pits by AWN-members 1963, 1964, 1968 and during the survey of a stretch of a new re-allotment road 1969, 1970,

- 50 a *Goudriaan*  
 b Schoonrewoerd stream ridge, below a clay cover.  
 c Some sherds, one decorated with grooves, probably beaker pottery; one flint flake.  
 d Grassland. From a test pit by AWN-members 1968 and during the survey of a stretch of a new re-allotment road 1969.
- 51 a *Goudriaan*  
 b Schoonrewoerd stream ridge, below a clay cover.  
 c Two sherds tempered with quartz grit, two flint flakes.  
 d Found by AWN-members 1963-1968 and by Mr H. Blikendaal, Molenaarsgraaf, 1967 in a small sandpit.
- 52 a *Noordeloos—terrain Mr K. Roozendaal*  
 b Schoonrewoerd stream ridge. Very high elevation, below a 20-30 cm. clay cover.  
 c Many sherds of DKS and LBA pottery; some deliberately roughened sherds (Iron Age I). Six flint flakes, one scraper, one sickle fragment. Probably also some beaker sherds, one showing BW-impressions.  
 d Arable land. Discovered during the soil survey 1954. Finds collected by AWN-members and the author from the surface and a test pit 1967-1969.
- 53 a *Noordeloos*  
 b Schoonrewoerd stream ridge, below a clay cover.  
 c Some small pieces of loam.  
 d Test pit by Mr H. A. de Kok, Hardinxveld, 1966.
- 54 a *Noordeloos*  
 b Schoonrewoerd stream ridge.  
 c/d Three sherds of DKS pottery. From the section of a newly dug ditch, during a survey by Mr H. A. de Kok, Hardinxveld, 1968. During the soil survey 1954 a few sites with "ancient settlement soil" were mapped in the stretch of the Schoonrewoerd stream ridge, east of this site.
- 55 a *Meerkerk—Tienhoven polder, no. 1*  
 b A small but clearly visible side creek of the Schoonrewoerd stream ridge, below a clay cover.  
 c Mainly sherds of DKS pottery, some undatable pottery, one flint flake.  
 d From the section of a newly cut ditch along a new re-allotment road, by AWN-members and the author 1968.
- 56 a *Meerkerk—Tienhoven polder, no. 2*  
 b A small but clearly visible side creek of the Schoonrewoerd stream ridge. A remarkably high elevation.  
 c Sherds of DKS pottery, some flint.  
 d Grassland. From the section of a newly cut ditch along a new re-allotment road, during a survey by AWN-members and the author 1969.
- 57 a *Nieuw Lekkerland—Schonenburgse Heuvel*  
 b Very high and extensive *donk*, not covered with clay. Grassland.  
 c/d — Flint axe.  
     Found in 1952 by the farmer's son Mr G. Terlouw in a shallow sand pit  
     — Big lump of flint.  
     Found by Mr G. van den Beemt, Alblasserdam, about 1966.  
     — Hearth places with some calcinated flint.  
     Observed by AWN-members 1967 in a small sand pit.  
     — Site of the former castle of Schonenburg. Some bricks and mediaeval pottery (13th-14th cent.) have been found.  
 e This paper fig. 22; Wh 11, 1962, 33; Wh 14, 1963, 119-123 (No. 1). All on the flint axe.
- 58 a *Brandwijk—Het Kerkhof*  
 b Small *donk*, covered with clay.  
 c One sherd, tempered with broken quartz, possibly VL Culture.  
 d Orchard. From a test pit by Mr H. Blikendaal, Molenaarsgraaf, 1966.

- 59 a *Goudriaan—Donk Goudriaan*  
 b Isolated *donk*.  
 c VL pottery and flint flakes, some of them showing polished facets (axe flakes).  
 d Grassland. From a small sand pit, found by AWN-members 1963-1965.
- 60 a *Hoog Blokland—Den Beemt, site I*  
 b Very small *donk*.  
 c Late VL pottery, sherds of a small beaker decorated with impressions of a broken bone or small stick, some flint.  
 d Grassland. From an extensive test pit by AWN-members 1963.  
 e This paper fig. 21.
- 61 a *Hoog Blokland—Nieuwlietje*  
 b Schaik stream ridge, near a break-through channel, below a 35-50 cm. clay cover.  
 c Bell Beaker settlement site.  
 d Discovered during the soil survey 1954. A test pit yielded Bell Beaker pottery, now lost. From some other points in the vicinity "ancient settlement soil" was reported by Stiboka. Ir. J. van der Linde personally pointed me out that this is the site where the test pit was dug and not one of the others, as was reported previously.  
 e This paper fig. 24 and p. 98 note 62.
- 62 a *Hoog Blokland—Den Beemt, site II*  
 b A *donk* belonging to a group of *donken*.  
 c One pot base tempered with quartz grit, VL Culture; three flint flakes, one scraper. Also mediaeval pottery (11th-12th cent.).  
 d Grassland. Found in a sand pit by AWN-members, 1963.
- 63 a *Arkel*  
 b An extensive *donk*, near the eastern end.  
 c Some small, probably DKS sherds.  
 d Found by AWN-members in ground, dredged out of a ditch, 1962.
- 64 a *Arkel*  
 b Unknown.  
 c Roman coin, an *as* of Trajan.  
 d Documentation Royal Dutch Coin Cabinet, The Hague.
- 65 a *Hoornaar*  
 b *Donk*.  
 c Some small Roman sherds, one of them grey varnished ware, many sherds of mediaeval pottery (13th-16th cent.), one flint flake.  
 d Gardens. Found at the surface by Mr M. J. de Haan, Bleskengraaf, 1967.
- 66 a *Hoornaar*  
 b *Donk*.  
 c A small prehistoric sherd and a flint flake.  
 d From a small pit, containing some charcoal, at the site of a demolished farm, by Mr H. A. de Kok, Hardinxveld, 1964.
- 67 a *Noordeloos—Slingeland Donk*  
 b *Donk*.  
 c Five small sherds, one tempered with quartz grit. Now lost.  
 d Grassland. Found in a sand pit by Mr H. A. de Kok, Hardinxveld, 1963.
- 68 a *Hoog Blokland—Kort Scheiwijk*  
 b Unknown.  
 c Some Roman sherds, now lost.  
 d Found during the soil survey 1954. Pers. comm. Ir. J. van der Linde.

- 69 a *Gorinchem—Land der Zes Molens*  
 b "At a depth of about 60 cm., below the clay cover and on the peat".  
 c Many sherds of Roman pottery, 82 rim and base sherds preserved.  
 d Found in 1941 during the construction of the four-way road. Reported by the late Mr H. van Hoogdalem. Controlled by Dr F. C. Bursch, Leiden. Field control by the author and AWN-members yielded no finds at all. The site might be completely destroyed or buried below the viaduct.
- (69<sup>a</sup>) a *Arkel—Onderweg*  
 b Natural levee of the river Linge  
 c A modest number of sherds of Roman and mediaeval pottery (11th-15th cent.).  
 d Collected from the surface 10-3-1973 by the author and a group of amateur archaeologists. The site is situated halfway Arkel and Gorinchem.
- 70 a *Giessenburg—Postkade*  
 b Unknown.  
 c Romain coin, *denarius* of Vespasian.  
 d Found at the Postkade by a certain Mr A. v. W., according to a newspaper of the period 1880-1905, preserved in the RMO.  
 e Verslagen Rijksverzamelingen van Geschiedenis en Kunst 21 (1889), 76.
- 71 a *Giessenburg—Duwelsheultje*  
 b Natural levee of the Giessen stream.  
 c Some Roman sherds, one of them the rim of a terra sigillata mortarium. Not preserved.  
 d Found in ground, dredged out of a ditch, during the soil survey 1954. Pers. comm. Ir. J. van der Linde; also mentioned in the documentation of the ROB.
- 72 a *Hardinxveld—Buldersteeg*  
 b Unknown  
 c Some Roman sherds, now lost.  
 d Found at the surface, during the soil survey 1954.
- 73 a *Hardinxveld—Buldersteeg*  
 b Unknown.  
 c A Roman coin, a *sestertius* of Livia.  
 d Found by Mr J. C. Coenrads on his terrain. Reported by the late Mr H. van Hoogdalem, 1952 to ROB and RMO.
- 74 a *Hardinxveld—Giessendam*  
 b Natural levee of the Giessen stream.  
 c A Roman sherd, terra sigillata, now lost.  
 d Found during the soil survey 1954. Pers. comm. Ir. J. van der Linde.
- 75 a *Sliedrecht—Ronduit Polder*  
 b In the so-called Sliedrecht Biesbosch. Pre-Roman deposits, covered by thick sub-recent sediments.  
 c Numerous sherds of Roman pottery and other domestic refuse. Only a few sherds of native pottery. (2nd-1st half of 3rd cent.).  
 d Collected by Mr C. van der Esch, Papendrecht, out of dredged-up ground, deposited around a new harbour under construction. The original position of the finds was below a 1.80-2.40 cm. thick clay layer.  
 e Van der Esch 1965.
- (75<sup>a</sup>) a *Papendrecht-Ketelhaven*  
 b In the river foreland of the river Merwede  
 c Fragment of a thin-walled Roman amphora, sherd of a thick-walled Roman amphora, rim-fragment of a Pingsdorf jug. Some undated bronze and iron objects.  
 d Found in 1960 during dredging operations during the construction of the harbour Ketelhaven east of Papendrecht at "Oosteind". Acquired by the RMO Leiden from the Rijkswaterstaat (Water Control and Public Works Department).  
 e Verslagen Rijksverzamelingen van Geschiedenis en Kunst 83, 1961, 176.

## VIJFHEERENLANDEN

- 76 a *Vianen-centre*  
 b Natural deposits of the river Lek.  
 c Some sherds of native and Roman pottery  
 d Collected by AWN-members in 1967 in ground used in a garden at Brandwijk and said to have been transported to there from the sports-fields near the church in the centre of Vianen. No finds were made during field control by the author at this site.
- 77 a *Vianen—Hagestein, barrage*  
 b River foreland of the Lek, crossing here the Hagestein stream ridge.  
 c — A 75 cm. high Roman amphora, with graffito GAP.  
 — Some native and Roman sherds and five net weights, made from Roman roof tiles.  
 d Dredged up during construction works on behalf of the barrage from a depth of about —3 m. NAP, 1955 and 1957.  
 e Verslagen Rijksverzamelingen van Geschiedenis en Kunst 78, 1956, 158 and 81, 1959, 185.
- 78 a *Vianen—De Loog*  
 b Hagestein stream ridge.  
 c Some sherds of Roman and native pottery. One *Badorf* (Carolingian) sherd.  
 d Collected by the author about 1967 in disturbed position from an extensive sand pit, made on behalf of the road construction works. Also found in sand from this site, transported to minor works some kms. to the south.
- 79 a *Vianen—Autena Donk*  
 b *Donk*, situated isolated. Grassland, osiers.  
 c/d — Sherds of Iron Age and mediaeval (13th-14th cent.) pottery. Collected during the soil survey 1950.  
 — Sherds of Iron Age and other prehistoric pottery. From a test pit by AWN-members 1964.  
 e Pons 1951, 1961, de Kok 1965.
- 80 a *Hei- en Boeicop—terrain Mr den Besten*  
 b Zijderveld stream ridge. Three slight elevations near the former stream channel. Below a c. 40 cm. clay cover.  
 c MBA settlement, yielding many sherds of DKS pottery and other domestic refuse.  
 d Grassland. From a number of test pits made by Mr H. den Besten and AWN-members 1964.  
 e AN 1964, \*310; this paper fig. 30.
- 81 a *Schoonrewoerd—Mariahoeve*  
 b At the side (clay-mantle) of the Zijderveld stream ridge. A flat terrain with three slight elevations, probably corresponding with occupation centres. Below a c. 50 cm. clay cover.  
 c MBA settlement, yielding many pieces of loam and some sherds of DKS pottery.  
 d Grassland. From a test pit by AWN-members and borings by the author 1965.
- 82 a *Schoonrewoerd—Overboeicop, terrain Mr Wink*  
 b Zijderveld stream ridge near some small rest gullies and on a relatively high and sandy point. Below a c. 50 cm. clay cover.  
 c Sherds of Iron Age pottery (at c. 45 cm.) above a level with sherds of DKS pottery at 45-85 cm. below the surface.  
 d Grassland. Collected during the soil survey and from test pits by AWN-members 1965.  
 e Pons 1951, 1961.
- 83 a *Everdingen—Zijderveld*  
 b Zijderveld stream ridge, near the former stream channel. Below a clay cover.  
 c Extensive MBA settlement and Iron Age settlement at a slightly higher level, both yielding numerous finds and house plans. Evidence of earlier occupation in a pollen diagram: slight before c. 2670 B.C., stronger between 2670 and c. 1550 B.C. (VL Culture?). Some probably VL Culture finds in the immediate vicinity.  
 d Discovered by AWN-members 1965. Extensive rescue excavation by Mr R. S. Hulst, Amersfoort. Now for the greater part destroyed by a sand dredging pit.  
 e AN 1965, \*107, \*138; AN 1966, \*93; Beex & Hulst 1968, J. de Jong 1970/'71, Vogel & Waterbolk 1972.

- 84 a *Everdingen—Zijderveld no. 2*  
 b Zijderveld stream ridge.  
 c "Ancient settlement soil" with some small pieces of loam.  
 d Grassland. Reported by Mr H. den Besten, Hei- en Boeicop and Mr G. van den Beemt, Alblasserdam, 1965. Established by means of some borings.
- 85 a *Schoonrewoerd—De Waai*  
 b Dike breach deposit (30-50 cm.) on a thin clay layer on one of the branches of the Schoonrewoerd stream ridge.  
 c Some sherds of Iron Age pottery.  
 d Orchard. From below the surface in a test pit made during the soil survey 1950 (now lost) and from the surface collected by Mr H. den Besten, Hei- en Boeicop, 1965.  
 e Modderman 1951, Pons 1951, 1961.
- 86 a *Schoonrewoerd—centre*  
 b Artificially raised elevation on the Schoonrewoerd stream ridge, on which the present village is situated.  
 c/d — A Roman coin of Nerva  
     Found during digging works on behalf of the water works, between the church and the churchyard about 1946. Reported by the late Mr H. van Hoogdalem, Gorinchem.  
     — Some sherds of "native" or Iron Age pottery, now lost.  
     At the fringes of the artificial elevation. Collected from the surface during the soil survey 1950.  
 e Modderman 1951, Pons 1951, 1961.
- 87 a *Leerdam—Overheicop*  
 b Schoonrewoerd stream ridge. Broad and high. Below a c. 40 cm. clay cover.  
 c Some sherds of Iron Age pottery.  
 d Orchard. Collected by AWN-members and the author during drainage works about 1966.
- 88 a *Leerdam—Hoogeind*  
 b Schoonrewoerd stream ridge.  
 c Some sherds of Iron Age pottery. Now lost.  
 d Collected during the soil survey 1950.  
 e Pons 1951, 1961.
- 89 a *Leerbroek—Kerkweg no. 1*  
 b Schoonrewoerd stream ridge. Very high elevation, not covered with clay.  
 c Sherds of Iron Age pottery.  
 d Collected during the soil survey 1950.  
 e Pons 1961.
- 90 a *Leerbroek—Kerkweg no. 2*  
 b Schoonrewoerd stream ridge. Very high and broad elevation. Not covered with clay.  
 c One Iron Age sherd.  
 d Orchard. Found at the surface by Mr H. den Besten, Hei- en Boeicop, 1964.
- 91 a *Leerbroek—Weverwijk, 't Hoog*  
 b Schoonrewoerd stream ridge, below a c. 35 cm. clay cover.  
 c Iron Age settlement yielding a moderate number of sherds.  
 d Grassland and arable land. Collected from a test pit during the soil survey 1950. Now lost. From borings, a test pit and from the surface by AWN-members and the author 1965.  
 e Modderman 1951, Pons 1951, 1961.
- 92 a *Leerdam—Schoonrewoerd donk*  
 b *Donk*, situated isolated.  
 c Sherds of VL, DKS and Iron Age pottery. Some flint, one probable a Mesolithic or Early Neolithic trapeze.

- d Grassland with farmer's sand pits. Collected by AWN-members from the sand pits and a small test pit 1964; by the author during a small test excavation 1965; by the owner of the land, Mr den Besten, Schoonrewoerd, from the sand pits 1967.
  - e De Kok 1965.
- 93 a *Leerdam—Schaik*
- b Schaik stream ridge, showing a small, relatively high elevation. Below a c. 40 cm. clay cover.
  - c Late Bronze Age settlement, yielding many sherds and two flint sickle fragments.
  - d Grassland. From a test pit by AWN-members 1965.
- 94 a *Leerdam—Uiterwaard*
- b River foreland of the Linge river.
  - c A Roman jug, 1st half 1st cent. A.D., and some sherds (now lost).
  - d Found by Mr J. Fledderus, Leerdam, during digging works on behalf of the deposition of glass refuse of the glass factory, about 1935.
- 95 a *Kedichem—Oosterwijk*
- b Natural levee of the Linge river.
  - c Two Roman sherds among numerous sherds of mediaeval pottery (11th-14th cent.).
  - d Collected during the soil survey 1950. The Roman sherds are probably not on their original place, but washed over a short distance from (a) site(s) farther upstream.
  - e Modderman 1951, Pons 1951, 1961.
- 96 a *Arkel—Rietveld donken*
- b One of a group of small *donken*. Below a c. 50 cm. clay cover.
  - c One flint flake, charcoal.
  - d Grassland. From a test pit by AWN-members 1965.

## LEK EN LINGE DISTRICT

- 97 a *Beesd—Acquoy, Kerkweg*
- b Natural levee of the Linge river.
  - c A few sherds of Roman pottery, one *Badorf* (Carolingian) sherd.
  - d Arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965.
- 98 a *Culemborg—Den Heuvel*
- b Schoonrewoerd stream ridge. An extensive and high elevation near a break-through channel. No or only a thin clay cover. Arable land (originally).
  - c Early—Late Iron Age settlement yielding numerous finds. Some sherds of BWB, DKS and Roman pottery. Mediaeval pottery (11th-12th cent.) and soil traces.
  - d Discovered by AWN-members 1965. Finds in the removed topsoil near a sand dredging pit. Rescue excavation of the undisturbed part by the author 1966.
  - e AN 1966, \*61-62.
- 99 a *Culemborg—De Bol*
- b River foreland of the Lek river.
  - c Two antler axes. One the base of an antler and perforated parallel to the cutting edge. The other has its cutting edge made from the main beam, the eye-time used as the handle.
  - d Found by Mr G. Abels, Utrecht, at an extension plan of the city of Utrecht in sand derived from this spot.
- 100 a *Culemborg—De Hond polder*
- b —
  - c A Roman jug.
  - d Arable land. Found during diggings on behalf of the water works at a depth of about 1 m. about 1951.

- 101 a *Culemborg*  
 b High terrain on a natural levee below a clay cover.  
 c Sherds of DKS pottery.  
 d From a prehistoric pit and a dark level, a former surface. Found during the work on behalf of the extension of Culemborg by Mr A. Molenaar, Culemborg, 1971.
- 102/ a *Culemborg*  
 103 b High terrain on a natural levee below a clay cover.  
 c Sherds of Iron Age pottery.  
 d From a dark level, a former surface. Found during the work on behalf of the extension of Culemborg by Mr A. Molenaar, Culemborg, 1971.
- 104 a *Culemborg*  
 b High terrain on a natural levee below a clay cover.  
 c Sherds of (predominantly) Roman and some native pottery.  
 d From a clearly visible dark level, containing phosphates.
- 105 a *Beusichem—Voorkoopstraat*  
 b Natural levee deposits covered by 60 cm. clay. Conspicuous elevation.  
 c A few sherds of Roman and native pottery among many sherds of mediaeval pottery (12th-15th cent.).  
 d Arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965.
- 106 a *Culemborg—Veldzicht*  
 b Natural levee of a former river course. A relatively high elevation, not or only slightly covered with clay.  
 c Roman settlement (2nd. cent.) yielding many sherds. Roman and native pottery represented equally. Some sherds of later (14th-17th cent.) pottery.  
 b Arable land. Collected from the surface by the author in 1967. Discovered during the soil survey 1965. Finds made by Mr. A. Molenaar, Culemborg 1968-1970, in the environment of this site.
- 107 a *Beusichem—Ringelpoel*  
 b Natural levee of a former river course. Below a c. 65 cm. clay cover. A slight elevation only.  
 c Roman settlement yielding only a few sherds. No sherds of native pottery.  
 d Grassland and arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965. More finds made by Mr R. S. Hulst, Amersfoort 3-12-1968 in a newly dug ditch.
- 108 a *Beusichem*  
 b Unknown.  
 c *As* of Caligula, "the third Roman coin found in Beusichem in a short time".  
 d Found during digging works on behalf of the illumination of the vanity fair by Mr D. van Alphen, 1953.
- 109 a *Beusichem—Engelrode*  
 b Natural levee of a former river course, only slightly covered with clay (less than 25 cm.).  
 c Roman settlement yielding many sherds, only a few of them of native pottery. A bronze fibula at a depth of 20 cm. in a boring. 2nd cent.  
 d Arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965. The site was known already in 1851 by the find of a jug and a small terra sigillata cup at or near this place by Mrs D. C. D. van Rijnbeek van der Veer, now in the collection of the Municipal Museum Arnhem.
- 110 a *Buren—Hofkamp*  
 b Natural levee of a former river course. Extensive elevation. Only slightly covered with clay (less than 40 cm.).  
 b Roman settlement yielding a modest number of sherds. The native pottery from a minority. 2nd-3rd cent.  
 c Orchard, grassland and arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965.

- 111 a *Buurmalsen—De Treef*  
 b Natural levee of a former river course. Extensive elevation. Not covered with clay.  
 c Roman settlement yielding many finds. Only a few sherds of native pottery. End of 1st till first half of 3rd cent.  
 d Arable land. Collected from the surface by the author 1967. Discovered during the soil survey 1965.
- 112 a *Buurmalsen—Huize Voorzorg*  
 b Natural levee of a former river course. Extensive elevation near a remarkable depression, probably a former stream channel.  
 c Some "native" or Iron Age sherds. No Roman import ware.  
 d Orchard, grassland. Collected from the surface by the author 1967. Discovered during the soil survey 1965.
- 113 a *Buurmalsen—Nieuwe Steeg*  
 b Two natural levee deposits, c. 50 cm. each, separated by a dark grey clay layer of 20 cm. and resting on peat.  
 c From the uppermost levee deposit: sherds of Roman pottery, 2nd cent. From the dark grey clay: sherds of "native" or Iron Age pottery.  
 d Discovered by the State Geological Service. Test excavation by A. du Saar, A. Verbraeck and J. Trimpe Burger 1960. Some Roman sherds collected from the surface during field control by the author 1967.
- 114 a *Buren—Den Hulster*  
 b Natural levee deposits. No elevation.  
 c Roman settlement yielding only a few sherds of both Roman and native pottery, c. 2nd cent.  
 d Grassland with a few parcels arable land. Collected from the surface during the soil survey 1947. Identification Prof Dr P. J. R. Modderman.  
 e Modderman 1949, no. 139.
- 115 a *Buren—De Woerd*  
 b Natural levee deposit. A slight elevation near a former stream channel.  
 c Roman settlement yielding only a few sherds of both Roman and native pottery, c. 2nd cent.  
 d Arable land. Collected from the surface during the soil survey 1947. Identification Prof Dr P. J. R. Modderman.  
 e Modderman 1949, no. 138.
- (115<sup>a</sup>)a *Beesd*  
 b River foreland.  
 c Bronze spearhead.  
 d Found about 1968 by Mr D. Rombout, Geldermalsen, dredged up from the river Linge. Exact find-spot unknown. Pers. comm. Mr R. S. Hulst, Amersfoort.
- (115<sup>b</sup>)a *Geldermalsen—Diefdijk*  
 b Unknown.  
 c Bronze socketed axe with *lappen* decoration.  
 d Acquired by the RMO, Leiden from an art-dealer in 1937. Said to be found during ground work for a new road near the Diefdijk. Exact find-spot unknown. Unreliable find.

## TIELERWAARD

- 116 a *Spijk—Spijkse Veld*  
 b Spijk stream ridge (Dunkirk I ?) crossing an older (the Calais II Gorkum stream ridge) in the deeper subsoil.  
 c Small and heavily worn perforated *Breitkeil* with conical shaft-hole.  
 d During the exploitation of an extensive sand dredging pit here, Mr H. Teeuw, Vuren, found the axe in the load of a truck, mainly carrying off the topsoil, 1964. Reported by Mr A. Verbraeck, State Geological Service, and Mr H. A. de Kok, Hardinxveld.  
 e This paper fig. 22.

- 117 a *Spijk—Spijkse Veld*  
b Spijk stream ridge  
c Some sherds of native pottery of the Roman period, among others an outward curved faceted rim sherd.  
d Found by Mr de Boer, Gorinchem, in the removed topsoil near the extensive sand dredging pit, about 1968.
- 118 a *Vuren—Heukelom*  
b Natural levee deposits of the Linge river, covered by a clay layer.  
c Some sherds of Roman (c. 2nd cent.) and late mediaeval (14th-15th cent.) pottery.  
d Collected from the surface during the soil survey 1955-'56. Identification Prof Dr P. J. R. Modderman.
- 119 a *Deil—Wordensteeg*  
b Natural levee deposits covered with clay.  
c Sherds of Roman and native pottery (c. 2nd cent.) both represented equally.  
d Collected from the surface during the soil survey 1955-'56 Identification Prof Dr P. J. R. Modderman.  
During field control by the author 1967 unfavourable find circumstances (grassland). Only a few sherds in ground, dredged out off a ditch.
- 120 a *Deil—Rumpt, Bouwerblok*  
b Natural levee deposit. Below a 40 cm. clay cover.  
c "Native" pottery.  
d Reported by Ir. J. N. B. Poelman to the ROB 1961. Identification Prof Dr P. J. R. Modderman.
- 121 a *Deil—Oudwijkse Blok*  
b Natural levee deposit. Below a c. 40 cm. clay cover, at some distance below two clay layers, both 60 cm. thick.  
c Roman settlement yielding many sherds of Roman and native (c. 25%) pottery. 1st-2nd cent.  
d Collected from the surface during the soil survey 1955-'56 (grassland) and during a field control by the author 1967 (arable land).
- 122 a *Deil—Enspijk*  
b In a black clay separating two natural levee deposits, the uppermost about 70 cm.  
c Many sherds of (probably Late) Iron Age pottery. One small sherd of Roman pottery (grey varnished ware) at the present surface.  
d Discovered by the State Geological Service. Finds collected also during a field control by the author 1967 from the banks of a lake that fills a former sand dredging pit.
- 123 a *Deil—Oude Wetering*  
b Natural levee of a former river course. Below a c. 50 cm. clay cover. A small but remarkable elevation.  
c Roman settlement yielding a modest number of sherds.  
d Orchard. Collected by the author 1967. Discovered during the soil survey 1955-'56.
- 124 a *Geldermalsen—Voetakker*  
b Natural levee of a former river course covered by clay, near a badly visible former stream channel.  
c A few sherds of Roman pottery.  
d Grassland, bad find circumstances. Collected by the author 1967. Discovered during the soil survey 1955-'56.
- 125 a *Geldermalsen—Meteren centre*  
b Natural levee deposit of a former river course, probably formerly covered by a clay layer. Topsoil now deeply disturbed. A remarkable NW-SE running ridge.  
c Sherds of Roman and native (the majority) pottery among the sherds of mediaeval pottery (from the 12th cent. onwards). Two DKS sherds.  
d Collected from the surface and from two test pits by AWN-members and the author, 1965.
- 126 a *Geldermalsen—Meteren, Middenblik*  
b On coarse sand with gravel, either a Pleistocene outcrop or a natural levee deposit. Below a 40-100 cm. clay cover.  
c (Probably Late) Iron Age settlement yielding many sherds and other domestic refuse.

- d Collected during the soil survey 1955-'56, during road construction works 1957, 1964 and during field control by the author 1967.
- e AN 1967, \*52, \*108; AN 1964, \*220,
- 127 a *Geldermalsen—Meteren, Bergakker*  
 b probably river levee deposits  
 c Sherds of Roman and native pottery (predominantly Roman import ware). 2nd half 1st-2nd cent.  
 d Found in the dug-out ground of a sand dredging pit by Mr R. S. Hulst, Amersfoort, 1968.
- 128 a *Waardenburg—Oud Snellenstein*  
 b Unknown  
 c Sherds of "native" pottery  
 d Discovered by the State Geological Service, 1958.
- 129 a *Waardenburg—De Vergt*  
 b Natural levee deposits of a former river course.  
 c Roman settlement yielding many sherds of native and Roman pottery. 2nd cent.  
 d Orchard and arable land. Collected from the surface during the soil survey 1955-'56. Identification Prof Dr P. J. R. Modderman.
- 130 a *Haafden—Twil, Nieuw Klingenberg*  
 b Natural levee deposits of the Waal river.  
 c A few possibly Roman sherds among sherds of Late Mediaeval pottery (14th-15th cent.).  
 d Orchard and a small field of arable land. Collected from the surface during the soil survey 1955-'56. Identification Prof Dr P. J. R. Modderman. No Roman sherds found during field control by the author 1967.
- 131 a *Waardenburg—uiterwaard*  
 b river foreland of the river Waal.  
 c Axe made of the base of a red deer antler beam.  
 d Found by Mr T. Zijlker, Waardenburg and reported by Mr G. Elzinga, Leeuwarden, to the ROB.
- 132 a *Geldermalsen—Mr Dr Kolffschool*  
 b natural levee of the river Linge.  
 c Sherds of "native" pottery.  
 d Arable land. Found by Dr W. C. Braat, Leiden, 1939, during a visit.
- 133 a *Geldermalsen—Bottesteyn*  
 b Natural levee deposits of the river Linge on older levees of the same river.  
 c The grave goods of some extraordinary rich Roman graves, from the 2nd half of the 1st century A. D., comprising 61 pieces of pottery, 11 bronzes and 15 glasses. Merovingian (6-7th), Carolingian, *Badorf, Kugeltopf* and *Pingsdorf* pottery sherds are said to have been found on the same terrain.  
 d Dug up by Mr G. Murman, then the inhabitant of the house Bottesteyn, in the orchard near his house in 1905 and the following years.  
 e Stuart 1968.
- (133<sup>a</sup>)a *Geldermalsen—Hangwaard I.*  
 b River levee deposits or out cropping Pleistocene sand.  
 c — Sherd with fine parallel cord impressions, part of an All Over Cord (2IIb) Beaker.  
 — Sherd with horizontal rows of herring-bone impressions, part of a (late) Protruding Foot Beaker.  
 — Triangular flint arrow-head.  
 — Two flint flakes.  
 d Discovered 5-8-1972 by the AWN work-group West-Betuwe in the sides of a newly dug ditch, bordering a road under construction about 750 m south of Bottesteyn (= no. 133).  
 e AN 1973, \*28.

- (133<sup>b</sup>)a *Geldermalsen—Hangwaard II*
- b River levee deposits or outcropping Pleistocene sand.
  - c Sherds of Roman and Iron Age pottery.
  - d Discovered 16-8-1972 by the AWN work-group West-Betuwe in the dug-out stretch of a road under construction, about 100 m. south-east of site 133<sup>a</sup>.
- 134 a *Geldermalsen—uiterwaard*
- b River foreland of the river Linge. On a local sand deposit.
  - c A polished stone axe.
  - d Found at the surface by Mr H. Th. Spit, Geldermalsen, 1958.

## APPENDIX IV

### RADIOCARBON DATES, ESTABLISHED ON BEHALF OF THIS PUBLICATION

List of <sup>14</sup>C dates of samples from archaeological sites in the river clay/wood peat area,  
determined on behalf on the present study

	sample	No.	B.P.	B.C.	
<i>Molenaarsgraaf-Hazendonk</i>					
Section A-B, boring 1967-3 — 330 cm. NAP	peat	GrN 5175	4290 ± 40	(2340)	*
Section H-J, boring 1969-1 — 250/260 cm. NAP	peat	GrN 6212	3630 ± 35	(1680)	
Section H-J, boring 1969-1 — 370/380 cm. NAP	peat	GrN 6213	4480 ± 40	(2530)	
Section H-J, boring 1969-1 — 465/475 cm. NAP	peat	GrN 6214	4935 ± 40	(2985)	
Section H-J, boring 1969-1 — 545/555 cm. NAP	peat	GrN 6215	5320 ± 40	(3370)	
<i>Molenaarsgraaf-Bell Beaker Settlement</i>					
Grave I, femur of skeleton	bone	GrN 5131	3635 ± 40	(1685)	*
Grave II, femur of skeleton	bone	GrN 5566	3630 ± 40	(1680)	*
Ox grave, metacarpals of skeleton	bone	GrN 6218	4385 ± 105	(2435)	
Pit 210, charcoal in primary position	charcoal	GrN 5705	3635 ± 60	(1685)	*
Pit 199, charcoal in secondary position	charcoal	GrN 5132	3780 ± 50	(1830)	*
No. 58, concentration of sherds and charcoal, gully bank	charcoal	GrN 5176	3640 ± 30	(1690)	*
No. 29, Middle Bronze Age hearth place	charcoal	GrN 5177	3350 ± 35	(1400)	*
Pollen diagram I, North Section C8, — 170 cm. NAP	peat	GrN 5264	2710 ± 35	( 760)	*
<i>Ottoland-Oosteind</i>					
Pit complex, poor in finds, no. 48	charcoal	GrN 6217	3655 ± 55	(1705)	
Small pit with Late Bronze Age sherds, no. 60	charcoal	GrN 6252	2815 ± 55	( 865)	
<i>Ottoland-Kromme Elleboog</i>					
Excavation, sample no. 1, from a small pit	charcoal	GrN 6216	3795 ± 55	(1845)	
Grave site, sample from a small pit	charcoal	GrN 6253	2410 ± 35	( 460)	
Grave site, long bone of non-articulated skeleton	bone	GrN 6384	3820 ± 45	(1870)	
<i>Benschop</i>					
Middle Bronze Age settlement site, from test pit	charcoal	GrN 5356	2960 ± 60	(1010)	*
<i>Biesheuvel</i>					
Middle Bronze Age settlement site, prehistoric pit	charcoal	GrN 5357	3125 ± 40	(1175)	*
<i>Culemborg-Den Heuvel</i>					
Small pit (no. 101) probably contemporary with GrN 4946	charcoal	GrN 4945	2600 ± 70	( 650)	*
Big pit (no. 93) with numerous finds; early in occupation	charcoal	GrN 4946	2620 ± 50	( 670)	*
Complex of pits (nos. 210-214) with Early Iron Age finds	charcoal	GrN 4947	2360 ± 75	( 410)	*
Refuse layer in gully, Late Iron Age finds	wood	GrN 5001	2210 ± 50	( 260)	*
<i>Avezaath-Roman ship</i>					
Wood from presumed Roman ship fragment	wood	GrN 5646	1820 ± 30	(A.D. 130)*	

\* Published in Vogel & Waterbolk 1972.

## APPENDIX V

### LATE NEOLITHIC SKELETON FINDS FROM MOLENAARSGRAAF (Z.H.)

by

AGATHA S. KNIP \*

#### *Contents*

1. Introduction
2. Description of finds
3. Comparisons and conclusions
4. Literature
5. Tables

#### *Introduction*

In October 1966 we received human skeletal parts, described later, which had come to light during investigations at Molenaarsgraaf, South Holland, conducted by the National Museum of Antiquities

At three different places, about 15 m from each other, human remains were found in the settlement terrain which originates from the transition period from Neolithic to Bronze Age. One of the graves contained a funeral gift consisting of a late Veluwe Bell Beaker. Two of the graves are dated by means of  $^{14}\text{C}$  dates at about 1700 B.C. In the thesis of Mr L. P. Louwe Kooijmans further particulars about the finds—circumstances, dating, etc.—are given.

The material consists of the following 'find numbers':

- Mgr. I 38: incomplete skeleton, including skull;
- Mgr. II 37: incomplete skeleton, including skull;
- Mgr. III 36: incomplete skeleton, including skull.

#### *Description of the finds*

A detailed description of each of the skeletal parts found may be omitted here. We shall only mention data (or resume them in tables) which may be of importance to any later comparative study.

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\* Institute of Human Biology, Utrecht, Director: Prof Dr J. Huizinga. This report was written in 1967. It is published here in a unrevised form.

a) *Skeleton Mgr. I 38.* (Plate XIII)

The skull is light brown in colour and slightly deformed on the left side after death. A part of the *os occipitale*, the left *os zygomaticum* and a great part of the face are missing. Both *ossa temporalia*, a part of the maxilla and various parts of the base of the skull are separate; because of the post mortem deformation, however, any reconstruction of the skull is unreliable.

*Norma facialis*: the forehead gives a moderately high and fairly broad impression. The tubera frontalia are pronounced; the transverse curvature is regular and flat. The face is moderately high and fairly broad. The naso-frontal suture is convex. The nose appears to be moderately high and fairly broad; at the right underside of the nasal aperture there is a sulcus prenasalis. The orbit gives a moderately high and fairly broad impression; the shape is practically rectangular with a transversal axis running from upper medial to lower lateral. Left and right a clear frontal notch is present in the orbital roof. The superciliary arches are hardly developed; the supraorbital trigonae are fairly flat.

*Norma lateralis*: the face gives a moderately long and fairly high impression in relation to the skull. The glabella is very weakly developed (Broca I); the superciliary arches are not very prominent either. The sagittal outline shows a fairly steep and pronounced vaulting of the frontal bone; a fairly pronounced curvature of the parietal bone; an almost flat curve 1.5 cm above lambda to 3 cm below lambda (planoccipitaly) and from there on a regular vaulting of the occipital bone. The external occipital protuberance is hardly visible. The temporal lines are little developed. The mastoid processes are fairly robust. A paramastoid process is present on the left.

The post auricular part of the skull consists of a little more than 1/3 of the total length. The external auditory meatus is elliptical with a longitudinal axis, which runs from the upper front to the lower rear. The nasion lies in the same flat area as the lower part of the frontal bone. The face is probably orthognathous. The mandible does not appear to be very robust. The ramus is fairly broad in relation to the height; the mandibular angle is not large; the coronoid process is somewhat higher than the condyloid process. The corners of the jaw are slightly turned inwards; the lower edge of the mandible is convex in shape. The square chin protrudes markedly. The mental protuberance and the mental tubercles are well developed. The two mental foramina to the right (the diameter of one is smaller than that of the other) lie at the height of P<sub>1</sub> 9 mm from the lower edge of the mandible; the left mental foramen lies 12.5 mm from the lower edge under P<sub>1</sub>.

*Norma verticalis*: the skull is sphenoid in form without any clear post orbital constriction. The greatest breadth lies somewhat behind the transition from the posterior to the middle third part of the length of the skull. The tubera parietalia are particularly well developed; the tubera frontalia are somewhat less clearly accentuated. A parietal foramen is present on both sides of the skull.

*Norma occipitalis*: The skull gives a moderately high and very broad impression. The transversal curvature is not very pronounced; both side walls of the *ossa parietalia* run fairly steep downwards from the tubera parietalia. Five wormian bones have been found in the suture between the *ossa parietalia* and the *os occipitale*. The bony ridges round the occipital foramen

are clearly accentuated. The eurya lie on the lowest part of the parietal bones. The palate is bordered by a parabolic dental arch. The right  $I^2$  and  $M^2$  were lost after death. The right  $M^3$  is nearly erupted; the left  $M^3$  is present but separately. The elements show no reduction. Wear is limited. The shape of the mandibular dental arch is paraboloid. Both  $M_3$ 's are not erupted. The right  $M_1$  shows a Y-pattern, Both  $M_1$ 's and the incisors show slight wear. Inside the lower jaw the attachment points for the chewing muscles are well developed; there is an indication of a mental spine.

Most probably we are dealing with an individual of the male sex. All skull sutures are still open; also the fusion of the sphenoccipital suture has not occurred. The apparent age of this person is 15 years.

The following parts of the post cranial skeleton are preserved:

*Extremitas superior*: both scapulae (damaged); right (damaged) and left clavicle; both humeri, ulnae and radii; 16 carpal bones (some damaged); 10 metacarpalia and 28 phalanges.

*Extremitas inferior*: both ossa coxae; both femora, tibiae, fibulae and patellae; 14 damaged tarsalia, 9 metatarsalia and 14 phalanges.

*Truncus*: damaged sternum, 23 costae, 21 vertebrae and 5 segments of the sacrum.

Most epiphyses are present.

Neither the right nor the left humerus is very robust. The left humerus has a somewhat rounder diaphysis cross-section than the right humerus. The deltoideal tuberositas in both humeri is not strongly developed. The left humerus shows a perforation of the humeral septum; in the right humerus a post mortem perforation of the humeral septum is visible. Both humeri show a clear torsion.

The radii and ulnae are gracile in shape.

The sciatic notches of the ossa coxae are J-shaped (a male feature). The maximum length and width of the ossa coxae correspond well with each other as do the measurements of the left and right acetabulum.

The femora show a clear flattening in antero-posterior direction. The robusticity index indicates that also these long bones are not very robust. The left femur shows a clearly developed pilaster; a trochanter tertius is present. The torsion of this femur is somewhat indefinite.

The tibiae are not very robust. They show no transverse flattening. The right tibia is slightly twisted. On the ventral side of both distal epiphyses a squatting facet is present. The fibulae appear to be somewhat gracile.

The astragali are fairly broad and not very high in relation to the length. The trochleae are broad and not very long in relation to the astragalus measurements. On the left and right collum tali there is a lateral squatting facet. The calcanei are fairly narrow and moderately high. The tubera calcanei are fairly broad in relation to the height.

The ventral wall of the left foramen transversarium of the atlas consists of two bone rings.

An estimation of the stature, based on the length of various long bones, according to both Manouvrier and Pearson (Martin, 1928), is as follows:

## Stature of skeleton Mgr. I 38 (♂)

<i>Calculated from:</i>	<i>Manouvrier</i>	<i>Paerson</i>
Femur d	161.2	—
” s	155.2	156.3
Tibia d	164.2	163.5
” s	164.8	163.9
Radius d	165.4	164.1
” s	166.6	165.4

The stature was approximately 162-163 cm.

b) *Skeleton Mgr. II 37.* (Plates XIV-XVI)

The skull is light to dark brown in colour and has considerable post mortem deformation on its right side. On the right side large parts of the os parietale, os frontale, os temporale and maxilla are missing. The zygomatic bone is also missing on the right side. The mandible has lost its right coronoid process and part of the chin on the right side.

*Norma facialis:* The forehead gives a moderately high and moderately broad impression. The transverse curvature is not marked and the tubera frontalia are moderately developed. The face is fairly tall and narrow. The nose is fairly high and moderately broad. The naso-frontal suture is convex. At the left inferior edge of the nasal aperture a sulcus praenasalis is present. The moderately large orbit is quadrilateral in shape with a transversal axis running from upper medial to lower lateral. In the left and right orbital roof a frontal notch has been found, above which, a small distance away laterally, a supraorbital foramen is visible. The superciliary arches are moderately developed; the supraorbital trigonae are fairly flat. The remnant of a metopic suture which is about 25 mm long is present above the naso-frontal suture.

*Norma lateralis:* The face gives a fairly tall and moderately long impression in relation to the posterior part of the skull. The glabella is weakly developed (Broca II), and the superciliary arches are also little accentuated. The median sagittal outline shows a fairly marked vaulting of the frontal bone, a less marked curvature of the parietal bone, an almost flat curvature 2 cm above lambda to 4 cm below lambda (planoccipitaly) and thence a regular vaulting of the occipital bone. The mastoid process is fairly robust and on both sides divided into three.

The post auricular part of the skull consists of somewhat less than 1/3 of the total length. The external auditory meatus is elliptical in shape with a longitudinal axis running from upper front to lower rear. The supra meatic spine is well pronounced. The course of the suture at the left pterion shows the picture of the stenokrotaphia. The bony ridges for the attachment of the musc. temporalis are well developed. The face is orthognathous.

The nasion is not deep; the nasal bones protrude.

The mandible gives a fairly robust impression. The mandibular ramus is broad and fairly tall; the mandible angle is not large; the condyloid process is lower than the coronoid process. The corners of the jaws are somewhat turned outwards; the lower edge of the mandible is

concave in shape. The square chin sticks out; to the left there is a mental tubercle. The muscle attachments are very clearly developed. The left mental foramen lies 12 mm from the lower edge of the mandible under  $P_2$ ; on the right it lies 11 mm from the lower edge under  $P_2$ .

*Norma verticalis*: The skull is sphenoid in shape without marked post orbital constriction. The greatest breadth lies somewhat in front of the transition from the posterior middle third part of the length of the skull. The tubera parietalia are more distinct than the tubera frontalia. A left foramen parietale is present.

*Norma occipitalis*: The skull gives a moderately tall and fairly broad impression. Both parietal bones meet under an obtuse angle (slight lophocephalia); the transverse curvature is not very pronounced and both sides fall almost vertically downwards and inwards. Seven wormian bones are present in the suture between the ossa parietalia and os occipitale. The external occipital protuberance is hardly visible; the external occipital crest is clearly developed. The muscle attachments round the occipital foramen are plainly accentuated. The eurya lie on the lowest part of the parietal bones.

*Norma basalis*: The occipital foramen is almost round in shape. The mastoid notches are fairly deep; the left and right glenoid fossa are fairly deep. The dental arch of the maxilla is paraboloid in shape. All dental elements are erupted; the right  $I^1$  was lost after death. The  $I^2$  is clearly reduced on both sides; the left C is fairly small. The elements show considerable wear, which is most pronounced in the  $M^1$ 's. The palate gives a high impression.

The form of the dental arch of the mandible is paraboloid. Of the elements  $P_1$ , C,  $I_1$  and  $I_2$  on the right and C and  $I_2$  on the left were lost after death. On the right  $M_2$  there is a Y-pattern. The elements clearly show wear, especially both  $M_1$ 's. However, the  $M_3$ 's also show wear in its early stages.

This skull appears to be that of a male person. In view of the fusion pattern of the skull sutures ( $S^3$  is closed) and the dental wear this man apparently died at the age of 30 years.

The following parts of the post cranial skeleton are preserved:

*Extremitas superior*: both scapulae (incomplete), both clavicles (damaged), both humeri (one incomplete), the right ulna (damaged), the right radius (incomplete), the 8 left carpalia (damaged), the five left metacarpalia, 10 left phalanges.

*Extremitas inferior*: both ossa coxae (incomplete), both femora (one incomplete), the right patella, both tibiae (one incomplete), both fibulae (one incomplete), the 14 tarsalia, the 10 metatarsalia, 23 phalanges.

*Truncus*: 24 damaged costae, 23 damaged vertebrae, 1 fragment of the sacrum, 3 parts of the sternum.

The right humerus does not give a very robust impression. It shows a clear torsion and is flattened off. The deltoideal tuberositas is moderately developed; the radial fossa is shallow. The radius and the ulna are not very robust in shape.

The left half of the pelvis is about 17 mm shorter than the right half. The left acetabulum

is markedly shorter and very shallow in comparison with the right acetabulum. The sciatic notches are J-shaped on both sides (a male feature).

The right femur shows a strong flattening in antero-posterior direction. The robusticity index indicates that this bone is not very robust. No trochanter tertius is present. The linea aspera is not pronounced. The left caput femoris gives a somewhat shorter impression than the right caput; it is not, however, flattened off.

The facies articularis medialis of the right patella shows a practically right-angled bend to the ventral.

The right tibia is moderately robust in shape. It shows no lateral flattening. The corpus in the proximal part makes a convex bend to the ventral. The distal part of the tibia is clearly positively twisted in relation to the proximal part. On the ventral side of the lower epiphyseal end there is a small articular surface. The right fibula makes a sharp concave bend in a lateral direction. It does not appear to be very robust.

The astragali are rather low and moderately broad in relation to the length; the trochleae are fairly broad and long in relation to the astragalus measurements. On the collum of the right astragalus a lateral squatting facet can be seen. The calcanei are moderately broad and moderately high. The tubera calcanei are moderately broad in relation to the height.

The sternum consists of three unossified parts

Stature of skeleton Mgr. II 37 (♂)

<i>Calculated from</i>	<i>Manouvrier</i>	<i>Pearson</i>
Femur d	165.4	164.9
Tibia d	166.6	165.8
Humerus d	159.5	159.4

The stature must have been about 163-164 cm.

c) *Skeleton Mgr. III 36*

These skeletal remains are very probably those of a female person of about 1½ years. The condition of preservation made it impossible to make reliable measurements for a comparative investigation of this material.

Amidst the skeletal remains of Mgr. II 37 a fragment of an epiphysis was found that did not belong to Mgr. I 38 or Mgr. III 36. Together with the unossified sternum of Mgr. II 37 this could indicate the presence of a fourth person.

*Comparisons and conclusions* (see tables 1 and 2)

The index cranicus gives for Mgr. I 38 a value of 95.6 and for Mgr. II 37 a value of 84.5. Both skulls are clearly brachycranic.

The difference between both indices is chiefly caused by the large skull breadth of Mgr. I 38.

Both from the relationship between the height and the length and from that between the height and the width it appears that Mgr. II 37 is clearly tall (hypsi-acrocrania); the indices

are 83.0 and 98.2, respectively. The length-auricular index (67.0) indicates a high (hypsi-crania) skull. The same indices\* show that Mgr. I 38 is averagely tall (orthocrania) in relation to the length (this is supported by the length-auricular index: 61.8) and fairly low in relation to the breadth (tapeinocrania); the indices are 72.6 and 75.9, respectively. The sagittal-frontal index is in both skulls smaller than 90, which supports the impression gained during inspection that the foreheads are clearly domed and fairly steep. The sagittal-parietal index of Mgr. II 37 has a value of 90.2 and of Mgr. I 38 a value of 87.5; from this it appears that Mgr. I 38 (see also figure 1) has a somewhat more pronounced parietal bend.

From the transversal fronto parietal indices it appears that Mgr. I 38 shows a slight stenometopia and that Mgr. II 37 must be included in the metriometopic class (indices 64.2 and 66.8 respectively). The orbits of Mgr. II 37 are moderately high (mesoconchia; orbital index: 81.2). Judging from the upper facial index and the facial index (67.2 and 115.2) Mgr. II 37 has a fairly narrow and fairly tall upper face (hyperleptenia) and face (hyperleptoprosopia). Apparently Mgr. I 38 has a narrow and tall upper face (leptenia) and face (leptoprosopia) the indices being 58.3 and 95.3\*, respectively.

The nose of Mgr. II 37 is fairly narrow and high (lephtorrhina; nasal index 45.7). From the gnathic index (89.5) it appears that Mgr. II 37 is clearly orthognathous.

Further similarities and differences may appear from tables 1 and 2. The great similarity in shape is chiefly expressed in the comparison of the median sagittal outlines; these are orientated in such a way that the lines along which the greatest length was measured and the points in the middle of these lines (M) coincide (see figure 1).

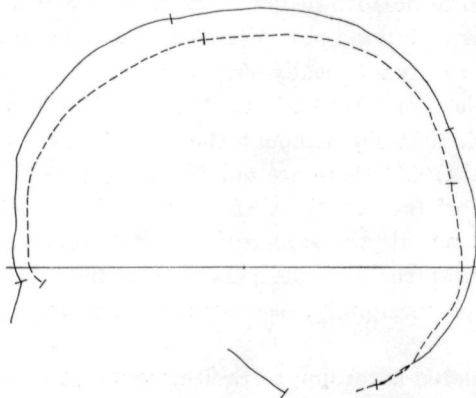


Fig. 1. The outline of Molenaarsgraaf I (— — —) compared with the outline of Molenaarsgraaf II (———).

The similarity of both skulls, particularly as far as the planoccipital region is concerned is striking; the small variations are the normal variations of morphological characteristics which occur within a group.

\* It must be noted that the indices have been calculated from inexact measurements.

The post-cranial skeleton (see table 3) of both persons does not give a very robust impression. The femora show a clear flattening (platymeria) as appears from the values of the platymeric index.

The tibiae show no flattening (eury- to mesocnemia). Both right humeri show platybrachia; the left humerus of Mgr. I 38 is rounder in shape. The perforation of the humeral septum is no rarity in Neolithic man (Martin, 1928; Schinz, 1922; Glanville, 1967).

The left os coxae of Mgr. II 37 is clearly pathologically deformed (see Plate XV); yet no obvious abnormalities which might be related to this were found in the femora and tibiae. Closer investigation showed that this os coxae certainly belongs to skeleton Mgr. II 37.

The sternum found amongst the remains of Mgr. II 37 consists of three parts not yet fused. According to Krogman (1962) the ossification of the sternum is completed after the 25th year. It cannot be ruled out that this sternum came from another individual.

Stature calculated according to Manouvrier and Pearson gives an average length of 163-164 cm for Mgr. II 37 and 162-163 for Mgr. I 38. The last mentioned person was not yet fully grown so that his length when adult, bearing in mind the late adolescent acceleration in growth, would certainly have been more than 163 cm.

The male 'planoccipitale Steilköpfe' from Middle and West Germany, described by Gerhardt (1953), have been chosen for comparison with these two planoccipital, brachymorphic skulls. The averages and ranges of this group have been tabulated by Bach (1964-65). From table 5 it appears that some measurements of Mgr. II 37 lie just on or immediately below the lowest variation limit. Namely the biauricular breadth, the length of the face, the condylar breadth and the bizygomatic breadth. The low value of the bizygomatic breadth of Mgr. II 37 is striking; it explains the values lying above the upper variation limit of the upper facial and the facial index. The length-height index, breadth-height index, nasal breadth and nasal height differ only slightly from the uppermost variation limit. A large individual variability should be taken into account, which in view of the typologically very heterogeneous make-up of the Bell Beaker people is not so remarkable (Bach 1964-65; Gerhardt, 1953). Mgr. II 37 strongly resembles the Mühlhausen skull (Bach 1964-65), although the face of Mgr. II 37 is higher and narrower.

In Gerhardt's material (1953) there are only 7 young persons. As comparative material for Mgr. I 38 only Braunsdorf (no. 41 \*), ♂, 18 years) and Kleinwahlberg B (no. 60 \*), ♂, 18 years) may serve. Table 6 reveals the similarities and differences between the three skulls. Gerhardt (1953) remarks that the juvenile persons are undoubtedly brachymorphous with a clear tendency towards planoccipitaly, in contrast to the very young persons who have a fairly long skull shape.

Average stature (calculated according to Breitingner) of all male Bell Beaker people of the series of Gerhardt (1953) is 169.4 cm (n = 20, min.-max. = 160-178 cm). The Bell Beaker people had a fairly long stature in comparison to other Neolithic groups (Bach, 1964-65; Grimm, 1959; Vallois, 1943).

The measurements and indices of Mühlhausen, Weimar 79, Weimar 81a and Weimar 82 (Bach 1964-65) may serve as a comparison for the measurements of the extremities of skeleton Mgr II 37 (see table 4).

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\* Numbering according to Gerhardt (1953).

Few human remains from the Neolithic period have been found in the Netherlands in association with the Bell Beaker Culture. The only human remains so far described come from Nierssen, near Vaassen on the Veluwe (Nieuwenhuis, 1908). The findings of this skull material—dolichoecrania, an abnormal forehead and heavy eyebrow arches—are questioned by Huizinga (1959). Basing his reasoning on the coarse character of the skeleton, Huizinga reaches the conclusion that these skeletal remains belong very probably to the 'planoccipitale Steilkopf', the typical central figure in the Bell Beaker people (Gerhardt, 1953).

In 1953 Gerhardt wrote a monograph on the Bell Beaker people in Central and West Germany. According to him this very heterogeneous people consist chiefly of alpine-dinaric types, in which the planoccipital brachymorphous type predominates, especially in the men. This observation is supported by Hemmer's allometric study (1967).

The important basic group of the Bell Beaker people: The 'planoccipitale Steilkopf' is characterized as follows by Gerhardt: the skeleton is very coarse and heavy; the occiput is especially flat and steep, the nose protrudes markedly.

In addition to Germany other countries have also yielded examples of 'planoccipitale Steilköpfe' in association with the Bell Beaker Culture; among others Italy (Graziosi, 1947), Poland (Wiercinsky, 1967) Roumania (Necrasov and Cristescu, 1965), Spain (Fusté, 1956, 1961, 1964) and Czechoslovakia (Jelinek, 1964 and 1967).

We still have no knowledge of the origin of this type. In earlier Neolithic periods the type has been encountered outside the Bell Beaker period (Alcobé et al., 1967). Apparently the Bell Beaker people entered our country via the east (Bohemia and Moravia), although an invasion from the south, namely the Spanish peninsula, cannot be discounted. (Childe, 1957, 1964; Constandse-Westermann, 1968; Fusté 1956, Jelinek, 1967; v.d. Waals 1964).

### *Summary*

During an excavation by the National Museum of Antiquities (Leiden, Netherlands) at Molenaarsgraaf (province South-Holland) human skeletal remains buried in graves were found belonging to people who lived there at the transition from the Neolithic to the Bronze Age, during the end phase of the Bell Beaker Culture (see Louwe Kooijmans 1974).

The skulls and long bones of two skeletons could be investigated after more or less successful reconstruction.

The two planoccipital brachycranic skulls show a close relationship to the main type of the Bell Beaker folk of Central- and West Germany as described by Gerhardt (1953).

### LITERATURE

- Alcobé, S et al. 1967. In : "Das Symposium "Anthropologie des Neolithikums", Mainz 16-23 Oktober 1966" by: I. Schwidetzky. *Homo*, 18, 3. 226-230.
- Bach, H. 1964-'65. Beitrag zur Anthropologie der Glockenbecherleute, *Alt-Thüringen*, 7, 208-227.
- . 1966. Die Skelette von zwei Glockenbecher-leuten aus Wundersleben, Kr. Sömmerda. *Ausgrabungen und Funde* XI, 243-247.
- Childe, V. G. 1957. *De prehistorie der Europese samenleving*. Prisma Serie, Het Spectrum, Utrecht/Antwerpen.
- . 1964. *The Dawn of European Civilization*. Cavarelle, New York.

- Constandse-Westermann, T. S. 1968 *Fysisch antropologische beschouwingen over de Nederlandse bevolking: een poging tot synthese*. Dissertatie, Utrecht.
- Fusté, M. 1956. El elemento racial dinárico-armenoide en el levante español durante el período Eneolítico. *Trab. Inst. "B. de Sahagun" de Antrop. y Etnol.*, Barcelona, XV, 1, 19 pag.
- . 1961. Anthropologie des populations néo-énéolithiques du levant Espagnol. Bericht über den V Internationale Kongress für Vor- und Frühgeschichte. Hamburg 1958. Gebr. Mann, Berlin, 297-300.
- . 1964. Algunas observaciones acerca de las poblaciones prehistoricas y protohistoricas del norte de Espana. *XXVII Congreso lusco-Espanol para el Progreso de las Ciencias*, Bilbao, 290-296.
- Gerhardt, K. 1953. Die Glockenbecher-leute in Mittel- und West Deutschland, Schweizerbart Verlag, Stuttgart.
- . 1965. Neue Schädel- und Skeletreste von Glockenbecherleuten aus dem Raume Basel. *Jahrbuch Schweiz. Gesell. f. Urgeschichte*, Band 52.
- . 1967. Die menschlichen Überreste eines Glockenbechergrabes von Gündlingen, Ldkr. Freiburg. *Badische Fundberichte*, Band 23.
- Giffen, A. E. van 1925. Over de oudste bevolkingselementen van ons land. *Mens en Maatschappij*, 1, 257-280.
- Glanville, E.V. 1967. Perforation of the coronoid-olecranon septum. *Humero-ulnar relationships in Netherlands and African populations*. *Amer. J. phys. Anthropol. N. S.*, 26, 1, 85-92.
- Grasiosi, P. 1947. Glinomini paleolitici della Grotta di S. Teodoro (Messina). *Riv. Seri. Preist. Firenze*, II, 2-3, 123-239.
- Grimm, H. 1959. Weitere Untersuchungen über vorgeschichtliche Menschenresten von Schafstätt. *Jahresschr. Mitteld. Vorg.*, Hall, band 43.
- Hemmer, H. 1967. Zur allometrische Charakterisierung von Populationen des europäischen Neolithicums. *Homo*, 18, 3, 211-220.
- Huizinga, J. 1959. De praehistorische mens in Nederland. *Nederlandnummer van Antiquity and Survival*, 2 (5-6).
- Jelinek, J. 1964. Anthropologie der jüngeren Steinzeit in Mähren. *Anthropos*, c. 16 (N.S. 8), 110 pag.
- . 1967. In: "Das Symposion "Anthropologie des Neolithikums", Mainz 16-23 Oktober 1966" by I. Schwidetzky, *Homo*, 18, 3, 226-230.
- Krogman, W.M. 1962. *The human skeleton in forensic medicine*, Thomas, Springfield I11.
- Louwe Kooijmans, L. P. 1974. *The Rhine/Meuse Delta. Four Studies on its Prehistoric Occupation and Holocene Geology*. Thesis Leiden, also: *Oudheidk. Meded. Rijksmuseum van Oudheden Leiden* 53-54, 1972-'73.
- Martin, R. 1928. *Lehrbuch der Anthropologie*, band II. Fischer Verlag, Jena.
- Necrasov, O. en Cristescu, M. 1965. *Données anthropologique sur les populations de l'âge de la pierre en Roumanie*. *Homo*, 16, 129-161.
- Nieuwenhuis, A. W. 1908. De menschenresten uit den praehistorischen grafbouw bij Nierssen. *Oudheidk. Meded. Rijksmuseum van Oudheden, Leiden*, O.R. 2, 18-24.
- Sangmeister, E. und Gerhardt, K. 1965. *Schnurkeramik und Schnurkeramiker in Süd-West Deutschland*. *Badische Fundberichte, Sonderheft* 8.
- Scheidt, W. 1924. *Die Rassen der jüngeren Steinzeit in Europa*. Lehmanns Verlag, München.
- Schinz, H. R. 1922. Das Foramen supratrochleare humeri. *Fortschritte auf dem Gebiete der Röntgenstrahlen*, Band XXIX.
- Vallois, H. V. 1943. *Les ossements humains de Koerhuisbeek, près Deventer, Holland*. *Versl. Kon. Ned. Akad. Wetensch.*, afd. Natuurk., 2e Sectie, 11, 3.
- Waals, J. D. van der 1964. *Prehistoric Disc Wheels in the Netherlands*. Thesis, Groningen.
- Wiercinski, A. 1967. In: "Das Symposion "Anthropologie des Neolithikums", Mainz 16-23 Oktober 1966" by I. Schwidetzky. *Homo*, 18, 3, 226-230.

TABLE I

MEASUREMENTS OF THE SKULL (ACCORDING TO MARTIN, 1928)

Measurement		Mgr. I 38		Mgr. II 37	
		♂		♂	
Greatest length	M. 1	161.0		171.5	
Glabella-lambda length	M. 3	159.0		168.0	
Nasion-basion length	M. 5	80.0*		105.0	
Greatest breadth	M. 8	154.0		145.0	
Frontal breadth (min.)	M. 9	99.0		97.0	
Frontal breadth (max.)	M. 10	127.0		—	
Biauricular breadth	M. 11	125.0*		121.0	
Asterion breadth	M. 12	118.0*		110.0	
Basion-bregma height	M. 17	117.0*		142.5	
Auricular-bregma height	M. 20	99.5*		115.0	
Sagittal frontal arc	M. 26	127.0		127.0	
Sagittal parietal arc	M. 27	120.0		123.0	
Sagittal occipital arc	M. 28	106.0*		111.0	
Sagittal frontal chord	M. 29	109.0		112.0	
Sagittal parietal chord	M. 30	105.0		111.0	
Sagittal occipital chord	M. 31	88.0*		98.0	
Frontal angle	M. 32 <sup>5</sup>	125°		131.5°	
Basion-prosthion distance	M. 40	93.0*		94.0	
Upper facial breadth	M. 43	102.0*		105.0	
Bizygomatic breadth	M. 45	108.0*		105.0*	
Maxillary breadth	M. 46	—		100.0*	
Nasion-gnathion distance	M. 47	103.0*		121.0*	
Nasion-prosthion distance	M. 48	63.0*		71.0	
Anterior interorbital breadth	M. 50	—		25.0	
Orbital breadth	M. 51	40.0*		40.0	
Orbital height	M. 52	33.0*		32.5	
Nasal breadth	M. 54	—		27.0*	
Nasal height	M. 55	—		59.0	
Palate breadth	M. 63	41.0*		37.0	
Maxillo alveolar breadth	M. 61	61.0*		59.0	
Bicondylar width	M. 65	116.0		118.0*	
Length of base	M. 68	73.0		90.0*	
Mandibular height	M. 69 <sup>2</sup>	L. 22.3	R. 22.0	L. 29.0	R. 30.0
Mandibular height	M. 69 <sup>3</sup>	L. 24.1	R. 23.5	L. 31.0	R. 32.5
Ramus length	M. 70	51.0		64.0*	
Ramus breadth	M. 71	L. 38.5	R. 39.0	L. 45.2	R. —
Min. breadth of mandibular ramus	M. 71 <sup>a</sup>	L. 30.2	R. 31.0	L. 34.0	R. —
Gonial angle	M. 79	124°		115°	
Length of premolar-molar row (mandible)	M. 80 <sup>2</sup>	L. 35.2	R. 35.0	L. 37.0	R. 37.2
Length of molar row (mandible)	M. 80 <sup>3</sup>	L. 20.6	R. 20.9	L. 30.0	R. 31.0
Length of premolar-molar row (maxilla)	M. 80 <sup>2</sup>	L. —	R. 33.0	L. 38.0	R. 38.0
Length of molar row (maxilla)	M. 80 <sup>3</sup>	L. —	R. 20.0	L. 27.0	R. 27.0

\* Approximate values.

TABLE 2

INDICES OF THE SKULL (ACCORDING TO MARTIN, 1928)

		Mgr. I 38 ♂	Mgr. II 37 ♂
Length-breadth index	M. 8: 1	95.6	84.5
Length-height index	M. 17: 1	72.6*	83.0
Breadth-height index	M. 17: 8	75.9*	98.2
Length-auricular index	M. 20: 1	61.8*	67.0
Transversal frontal index	M. 9:10	77.9	—
Transversal fronto-parietal index	M. 9:8	64.2	66.8
Sagittal fronto-parietal index	M. 27:26	94.4	96.8
Sagittal frontal index	M. 29:26	85.8	88.1
Sagittal parietal index	M. 30:27	87.5	90.2
Sagittal occipital index	M. 31:28	88.2	88.2
Orbital index	M. 52:51	—	81.2
Nasal index	M. 54:55	—	45.7*
Mandibular ramus index	M. 71:70	L. 75.4 R. 76.4	L. 70.6 R. —
Gnathic index	M. 40:5	—	89.5
Facial index	M. 47:45	95.3*	115.2*
Upper facial index	M. 48:45	58.3*	67.2*
Longitudinal cranio-facial index	M. 40:1	57.7*	54.8
Vertical cranio-facial index	M. 48:18	53.7*	49.6

\* Approximate values.

TABLE 3

MEASUREMENTS AND INDICES OF THE POST-CRANIAL SKELETON  
(ACCORDING TO MARTIN, 1928)

Measurement		Mgr. I 38 ♂		Mgr. II 37 ♂	
<i>Os coxae</i>					
Maximal length	M. 1	L. 190.0	R. 189.0	L. 198.0	R. 215.0
Maximal breadth	M. 2	L. 133.0	R. 133.0	L. —	R. —
Pubic length	M. 17	L. 67.0	R. 68.5	L. —	R. —
Ischial length	M. 16	L. 74.0	R. 78.0	L. —	R. —
Breadth of the sciatic notch	M. 31	L. —	R. —	L. —	R. —
Length of the sciatic notch	M. 32	L. —	R. —	L. —	R. —
Vertical diameter acetabulum	M. 22	L. 48.0	R. 51.5	L. —	R. 52.0
Horizontal diameter acetabulum	M. 22	L. 45.5	R. 47.0	L. —	R. —
Coxal index	M. 2:1	L. 70.0	R. 70.3	L. —	R. —
Ischium-pubis index	M. 17:16	L. 90.5	R. 87.8	L. —	R. —
<i>Femur</i>					
Maximal length	M. 1	L. 399.0	R. —	L. —	R. 445.0
Physiological length	M. 2	L. 398.0	R. 419.0	L. —	R. 440.0
Trochanter-condylus length	M. 3	L. —	R. —	L. —	R. 425.0
Physiological trochanter length	M. 4	L. —	R. —	L. —	R. 411.0
Sagittal diameter of middle of diaphysis	M. 6	L. 24.0	R. 23.0	L. —	R. 27.0
Transverse diameter of middle of diaphysis	M. 7	L. 21.0	R. 22.0	L. —	R. 25.0
Circumference of middle of diaphysis	M. 8	L. 70.0	R. 70.0	L. —	R. 81.0
Transverse diameter of upper part of diaphysis	M. 9	L. 29.0	R. 28.0	L. —	R. 31.0
Sagittal diameter of upper part of diaphysis	M. 10	L. 21.0	R. 21.0	L. —	R. 22.0
Length-thickness index	M. 8:2	L. 16.7	R. 17.5	L. —	R. 18.4
Robusticity index	M. 6+7:2	L. 10.7	R. 11.3	L. —	R. 11.8
Pilasteric index	M. 6:7	L. 104.5	R. 114.2	L. —	R. 108.0
Meric index	M. 10:9	L. 75.0	R. 72.4	L. —	R. 70.9
<i>Tibia</i>					
Maximal length	M. 1	L. 359.0	R. 356.0	L. —	R. 367.0
Length	M. 1 <sup>b</sup>	L. 353.0	R. 352.0	L. —	R. 362.0*
Maximal diameter at for nutr. (middle of diaphysis)	M. 8 <sup>a</sup>	L. 29.3	R. 31.4	L. —	R. 33.0
Transverse diameter at for nutr. (middle of diaphysis)	M. 9 <sup>a</sup>	L. 22.0	R. 21.2	L. —	R. 22.0
Minimal circumference of diaphysis	M. 10 <sup>b</sup>	L. 65.0	R. 67.0	L. —	R. 77.0*
Length-thickness index	M. 10 <sup>b</sup> :1	L. 18.1	R. 18.8	L. —	R. 20.9
Cnemic index	M. 9 <sup>a</sup> :8 <sup>a</sup>	L. 75.0	R. 67.5	L. —	R. 66.6
<i>Astragalus</i>					
Length	M. 1	L. 50.5	R. 51.0	L. 58.0	R. 56.3
Breadth	M. 2	L. 43.0	R. 41.0	L. 43.5	R. 43.8
Height	M. 3	L. 29.2	R. —	L. 32.3	R. 33.7
Trochlea length	M. 4	L. 30.0*	R. —	L. 35.8	R. 34.4
Trochlea breadth	M. 5	L. 31.0	R. 31.0	L. 33.4	R. 33.6

\* Approximate values.

TABLE 3 (CONTINUED)

Measurement		Mgr. I 38		Mgr. II 37	
		♂		♂	
Length-breadth index	M. 2:1	L. 85.1	R. 80.3	L. 75.0	R. 77.7
Length-height index	M. 3:1	L. 57.8	R. —	L. 55.6	R. 59.8
Trochlea length index	M. 4:1	L. 59.4	R. —	L. 61.7	R. 61.1
Talus-trochlea breadth index	M. 5:2	L. 72.3	R. 75.6	L. 76.7	R. 76.7
Trochlea index	M. 5:4	L. 103.3	R. —	L. 93.2	R. 97.6
<i>Calcaneus</i>					
Length	M. 1	L. 78.0*	R. 76.0*	L. 78.0*	R. 76.2
Breadth	M. 2	L. —	R. 37.0	L. 41.0	R. 42.5
Minimal breadth corpus	M. 3	L. —	R. 23.0	L. —	R. 24.0
Height	M. 4	L. 36.0	R. 36.0	L. 39.0	R. 41.0
Length	M. 5	L. 52.0*	R. 52.5	L. 49.0*	R. 51.8
Tuber height	M. 7	L. 42.0*	R. 43.0*	L. 52.5	R. 54.8
Tuber breadth	M. 8	L. 28.0*	R. 28.0*	L. 30.0*	R. 31.0
Length-breadth index	M. 2:1	L. —	R. 48.6*	L. 51.2*	R. 55.0
Corpus length index	M. 5:1	L. 66.6*	R. 69.0*	L. 62.8*	R. 67.9
Tuber index	M. 8:7	L. 66.6*	R. 65.1*	L. 57.1*	R. 56.5
Tuber index	M. 7:1	L. 53.8*	R. 56.5*	L. 67.3*	R. 71.9
<i>Humerus</i>					
Maximal length	M. 1	L. —	R. —	L. —	R. 307.0
Total length	M. 2	L. 296.0	R. 304.0	L. —	R. 301.0
Max. diameter of middle of diaphysis	M. 5	L. 18.2	R. 19.5	L. —	R. 22.0*
Min. diameter of middle of diaphysis	M. 6	L. 14.6	R. 15.0	L. —	R. 16.0
Min. circumference of diaphysis	M. 7	L. 50.0	R. 54.0	L. —	R. 59.0
Diaphysis cross-section index	M. 6:5	L. 80.2	R. 76.9	L. —	R. 72.7*
Robusticity index	M. 7:1	L. —	R. —	L. —	R. 19.2
<i>Ulna</i>					
Physiological length	M. 2	L. 230.0	R. 228.0	L. —	R. —
Circumference	M. 3	L. 31.0	R. 31.0	L. —	R. 37.0
Length-thickness index	M. 3:2	L. 13.4	R. 13.5	L. —	R. —
<i>Radius</i>					
Maximal length	M. 1	L. 243.0	R. 239.0	L. —	R. —
Physiological length	M. 2	L. 231.0	R. 228.0	L. —	R. —
Circumference	M. 3	L. 38.0	R. 38.0	L. —	R. —
Length-thickness index	M. 3:2	L. 16.4	R. 16.6	L. —	R. —

\* Approximate values.

TABLE 4

## COMPARATIVE DATA ON THE LONG BONE DIMENSIONS

Measurement		Mgr. II 37	Muhl-	W 79	W 81 <sup>a</sup>	W 82
		♂	hausen ♂	♂	♂	
<i>Humerus</i>						
		L/R	L/R	L/R	L/R	L/R
Maximal length	M. 1	—/307	—/347	—/—	—/(320)	345/—
Total length	M. 2	—/301	—/341	331/—	—/313	343/—
Min. circumference of diaphysis	M. 7	—/59	—/65	67/—	—/70	70/70
<i>Radius</i>						
Maximal length	M. 1	—/—	—/—	—/259	—/—	—/267
Physiological length	M. 2	—/—	—/—	—/242	—/—	253/253
Circumference	M. 3	—/—	42/—	—/43	—/—	45/44
<i>Ulna</i>						
Physiological length	M. 2	—/—	247/—	246/—	—/—	254/—
Circumference	M. 3	—/37	35/—	42/—	—/—	40/40
<i>Femur</i>						
Maximal length	M. 1	—/445	—/482	—/—	433/—	491/491
Physiological length	M. 2	—/440	—/479	—/—	432/—	490/489
Sagittal diameter of middle of diaphysis	M. 6	—/27	30/28	—/—	27/—	33/32
Transverse diameter of middle of diaphysis	M. 7	—/25	31/29	—/—	29/—	30/31
Circumference of middle of diaphysis	M. 8	—/81	92/—	—/—	85/—	108/108
Transverse diameter of upper part of diaphysis	M. 9	—/31	38/37	36/—	35/—	36/38
Sagittal diameter of upper part of diaphysis	M. 10	—/22	26/25	27/—	25/—	28/28
<i>Tibia</i>						
Maximal length	M. 1	—/367	386/(384)	—/—	—/—	415/—
Length	M. 1 <sup>b</sup>	—/362	384/(377)	—/—	350/—	411/—
Maximal diameter at for nutr. (middle of diaphysis)	M. 8 <sup>a</sup>	—/33	35/35	—/—	34/—	41/40
Transverse diameter at for nutr. (middle of diaphysis)	M. 9 <sup>a</sup>	—/22	23/24	—/—	23/—	25/25
Robusticity index humerus	M. 7:1	—/19	—/18.7	—/—	—/21.9	20.3/—
Length-thickness index radius	M. 3:2	—/—	—/—	—/17.8	—/—	17.4/17.8
Length-thickness index ulna	M. 3:2	—/—	—/14.2	17.1/—	—/—	15.7/—
Robusticity index femur	M. 6+7:2	—/11.8	—/11.9	—/—	13.0/—	12.9/12.9
Pilasteric index femur	M. 6:7	—/108	96.8/96.5	—/—	93.1/—	110.0/103.2
Meric index femur	M. 10:9	—/70.9	68.4/67.6	75.0/—	71.4/—	77.8/73.7
Length-thickness index femur	M. 8:2	—/18.4	19.2/—	—/—	19.7/—	22.0/22.1
Cnemic index tibia	M. 9 <sup>a</sup> :8 <sup>a</sup>	—/66	65.7/68.5	—/—	67.7/—	61.0/62.5

TABLE 5  
COMPARATIVE DATA ON THE SKULL DIMENSIONS

Measurement		Mgr. II 37		"Planoccipitale Steilkopf"	
		♂	n	x	♂ min.—max.
Greatest length	M. 1	171.5	12	176.7	170 — 183
Nasion-basion length	M. 5	105.0	2	—	105 —(112)
Greatest breadth	M. 8	145.0	11	148.5	140 — 156
Frontal breadth (min.)	M. 9	97.0	11	100.7	97 —(106)
Frontal breadth (max.)	M. 10	—	4	128.2	124 — 132
Biauricular breadth	M. 11	121.0	2	—	125 — 127
Asterion breadth	M. 12	110.0	2	—	106 — 115
Basion-bregma height	M. 17	142.5	3	140.3	137 —(144)
Auricular-bregma height	M. 20	115.0	9	120.9	(114) —(125)
Length-breadth index	M. 8:1	84.5	10	84.3	80.4 —(89.6)
Length-height index	M. 17: 1	83.0	3	78.0	75.7 — 79.7
Breadth-height index	M. 17: 8	98.2	3	94.6	93.8 — 95.2
Length-auricular index	M. 20: 1	67.0	8	68.1	65.4 — 72.7
Transversal-frontal index	M. 9:10	—	4	78.1	77.8 — 78.8
Transversal fronto-parietal index	M. 9:8	66.8	9	67.3	(63.2)— 71.2
Basion-prosthion distance	M. 40	94.0	3	96.3	(95) — 97
Upper facial breadth	M. 43	105.0	4	109.7	105 — 112
Bizygomatic breadth	M. 45	105.0*	2	—	122 —(135)
Nasion-gnathion distance	M. 47	121.0*	6	125.0	121 — 129
Nasion-prosthion distance	M. 48	71.0	5	73.3	70 — 76
Orbital breadth	M. 51	40.0	6	42.0	40 — 44
Orbital height	M. 52	32.5	6	33.7	31 — 36
Nasal breadth	M. 54	27.0*	4	24.7	22 — 26
Nasal height	M. 55	59.0	6	51.8	50 — 54
Bicondylar width	M. 65	118.0*	1	—	121 —
Mandibular symphysis height	M. 69	30.7	9	35.2	( 28 )— 40
Facial index	M. 47:45	115.2*	2	—	( 95.6)— 99.2
Upper facial index	M. 48:45	67.2*	2	—	( 56.3)— 57.3
Orbital index	M. 52:51	81.2	6	80.1	( 75.6 — 83.7
Nasal index	M. 54:55	45.7*	4	47.3	( 42.3)— 50.0

\* Approximate values.

TABLE 6

## COMPARATIVE DATA ON THE SKULL DIMENSIONS

		Mgr. I 38	Braunsdorf no. 41	Kleinvahlberg B no. 60
		♂	♂	♂
Greatest length	M. 1	161.0	—	184.0
Nasion-basion length	M. 5	80.0*	—	—
Greatest breadth	M. 8	154.0	—	157.0
Frontal breadth (min.)	M. 9	99.0	—	106.0
Frontal breadth (max.)	M. 10	127.0	—	—
Biauricular breadth	M. 11	125.0*	—	—
Asterion breadth	M. 12	118.0*	—	—
Basion-bregma height	M. 17	117.0*	—	—
Auricular-bregma height	M. 20	99.5*	120.0	120.0
Length-breadth index	M. 8:1	95.6	—	85.4
Length-height index	M. 17:1	72.6*	—	—
Breadth-height index	M. 17:8	75.9*	—	—
Length-auricular index	M. 20:1	61.8*	—	65.2
Transversal-frontal index	M. 9:10	77.9	—	—
Transversal fronto-parietal index	M. 9: 8	64.2	—	67.5
Basion-prosthion distance	M. 40	93.0*	—	—
Upper-facial breadth	M. 43	102.0*	106.0	108.0
Bizygomatic breadth	M. 45	108.0*	133.0	—
Nasion-gnathion distance	M. 47	103.0*	112.0	106.0
Nasion-prosthion distance	M. 48	63.0*	66.0	63.0
Orbital breadth	M. 51	40.0*	40.0	39.0
Orbital height	M. 52	33.0*	32.0	30.0
Nasal breadth	M. 54	—	24.0	23.0
Nasal height	M. 55	—	49.0	49.0
Bicondylar width	M. 65	116.0	—	—
Mandibular symphysis height	M. 69	23.1	32.0	(28.0)
Facial index	M. 47:45	95.3*	84.2	—
Upper facial index	M. 48:45	58.3*	49.5	—
Orbital index	M. 52:51	—	80.0	76.9
Nasal index	M. 54:55	—	48.9	47.1

\* Approximate values.

## SAMENVATTING

*(Dutch Summary)*

Vóór 1950 was het westelijke rivierengebied, het gebied tussen Tiel en Alblasserdam, in archeologisch opzicht terra incognita : een wit gebied op de verspreidingskaarten. In de volgende jaren werden vooral bij de bodemkarteringen wel enkele ontdekkingen gedaan, maar de oprichting van de AWN werkgroep "Lek en Merwestreek" in 1962 markeert pas het moment, waarop er van een systematische exploratie sprake gaat zijn. Onder de bezielende leiding van H. A. de Kok worden vele tientallen archeologische terreinen, daterende van de Vlaardingens-cultuur tot de Middeleeuwen, ontdekt. Zij zijn gelegen op de afzettingen van voormalige rivierlopen en kreeksystemen en op de toppen van Oudholocene duinen. Er vond over deze vondsten intensieve correspondentie plaats met Professor Modderman.

Verschillende oorzaken zijn er aan te voeren, waardoor de schrijver in 1965 haast onontkoombaar met deze materie werd geconfronteerd en zich daarin ging verdiepen: de noodzaak van een inventarisatie en waardering van deze vondsten, die het bewoningsbeeld van West-Nederland aanmerkelijk beïnvloedden; de dreiging van een ruilverkaveling, welke inmiddels in uitvoering is; de noodzakelijke begeleiding van de werkgroep en niet in het minst de interesse van de auteur voor de interrelatie van geologie en archeologie en de mogelijkheid de studie van het desbetreffende gebied als promotie-onderzoek te beginnen.

In de loop van de jaren heeft het onderwerp van de studie uitbreidingen ondergaan en heeft het accent zich enigszins verplaatst. Spoedig waren wij al tot de conclusie gekomen, dat voor de gestelde doeleinden een aantal opgravingen noodzakelijk was. In de gemeente Molenaarsgraaf werd in 1967 op de "Hazendonk" een oriënterend onderzoek ingesteld. Het terrein "Molenaarsgraaf" werd in 1966 en 1967 vrijwel volledig opgegraven. Drie andere opgravingen werden uitgevoerd wegens bedreiging door grondwerkzaamheden: in 1966 een ijzertijd-nederzetting nabij Culemborg en in 1969 twee terreinen in Ottoland: het terrain Oosteind (VBB-LBA) en Kromme Elleboog (VBB/BWB). Beide opgravingen in Molenaarsgraaf leverden zoveel informatie, dat het uitwerken daarvan een aanzienlijk deel van de tijd in beslag zou nemen. Over de drie andere onderzoeken zal later worden gerapporteerd.

Tegelijkertijd bleek het wenselijk de bijeen gebrachte gegevens in een wijder kader, dat van geheel West-Nederland, te plaatsen. Hieruit is Deel I van deze bundel voort gekomen. Daarin wordt een overzicht gegeven over de bewoningsgeschiedenis van West-Nederland, vooral wat betreft de periode voor 700 v. Chr. De relatie tot de geologische ontwikkeling van het gebied, gedomineerd door de transgressie/regressie-cycli staat daarbij centraal.

Wij werden tevens geboeid door de gegevens welke de archeologische terreinen leveren voor de constructie van een curve voor de zeespiegelstijging, temeer daar de Alblasserwaard

een bij uitstek geschikt gebied bleek te zijn voor waarnemingen betreffende voormalige water-niveaus.

Het oorspronkelijke onderwerp heeft zijn beslag gekregen in Deel II. Wij behandelen daarin de bewoningsgeschiedenis en de geologische ontwikkeling van het westelijke rivierengebied. De archeologie kan zonder de geologie niet begrepen worden. Anderzijds levert zij de dateringen voor verschillende afzettingen, met name voor de stroomruggen. Deel II vormt een eerste ontwerp van een archeologische diagram van de streek.

De beide laatste delen zijn de verslagen van de twee opgravingen in Molenaarsgraaf.

Op de Hazendonk (Deel III), de top van een Oud-Holoceen duin, werd bewoning vastgesteld omstreeks 4100 (?), 3400, 3000, 2400, en 1700 v.Chr. Een nieuwe groep aardewerk, voorlopig "Hazendonk aardewerk" genoemd, werd omstreeks 3000 v. Chr. gedateerd. De andere bewoningsfasen zijn te verbinden met "Swifterbant", de Vlaardingen-cultuur en de fase van late klokbekeercultuur en de cultuur van de wikkeldraadbekers. De bewoningsfasen vallen samen met de geologische regressiefasen en zijn gescheiden door perioden zonder bewoning.

Te Molenaarsgraaf (Deel IV) bevond zich op de Schoonrewoerdse stroomrug en gelegen aan een doorbraakgeul een kleine nederzetting uit de overgangperiode Neolithicum-Bronstijd (VBB/BWB, 1800-1500 v. Chr.). Het is één van een aantal vergelijkbare kernen op deze stroomrug, die tezamen een klein, langgerekt gehucht hebben gevormd. In de nederzetting werden twee opeenvolgende huisplattegronden vastgesteld. De geulvulling leverde informatie over de voedsel-economie en het milieu (slachtafval, pollendiagrammen, houten palen). Het boerenbedrijf steunde op akkerbouw (graan) en veeteelt (vooral rund). De jacht was onbelangrijk, in tegenstelling tot de visserij. Drie menselijke graven en een rundergraf bevatten goed geconserveerde skeletten, voor Nederland een zeer bijzondere situatie. Het was mogelijk een gedetailleerd chronologisch diagram van de nederzetting te ontwerpen. De overgang Neolithicum-Bronstijd blijkt te worden gekenmerkt door een grote mate van culturele continuïteit. De culturele relaties van huisplattegronden, vondsten en graven worden in een afzonderlijke paragraaf besproken.

De vier delen zijn zo geschreven, dat elk deel afzonderlijk gelezen kan worden. De gegevens van beide opgravingen (deel III en IV) zijn verwerkt in de overzichten (deel I en II). In deel I is tevens gebruik gemaakt van de conclusies van deel II.

## BIBLIOGRAPHY

- Ahorner, L., 1962: Untersuchungen zur quartären Bruchtektonik in der Niederrheinischen Bucht, *Eiszeitalter und Gegenwart* 13, 24-105.
- Albrecht, C., 1934: Die Hügelgräber der jüngeren Steinzeit in Westfalen, *Bodenaltertümer Westfalens* 3, 122-148.
- Amende, E. & E. Frauendorf, 1926: Eine schnurkeramische Wohngrube in der Flur Schelditz bei Rositz, *Jahresschrift für die Vorgeschichte der Sächsisch-Thüringischen Länder* 14, 27-35.
- Annable, F. K. & D. D. A. Simpson, 1964: Guide Catalogue of the Neolithic and Bronze Age Collections in Devizes Museum, Devizes.
- Appelboom, T. G., 1953: De bronstijd in westelijk Nederland, *Westerheem* 2, 34-40.
- , 1954: Vuurstenen pijlspten uit westelijk Nederland, *Westerheem* 3, 65-68.
- Arnal J. & C. Burnez, 1956: Die Struktur des französischen Neolithikums auf Grund neuesten stratigrafischer Beobachtungen, *Ber. RGK* 37/38, 1-90.
- , & M. Granel, 1961: Le château préhistorique du Lébous, *BSPF* 58, 571-582.
- , H. Martin-Granel & E. Sangmeister, 1963: Lébous, eine frühbronzezeitliche Befestigung in Südfrankreich, *Germania* 41, 229-242.
- Asmus, W. D., 1954: Gräber der nordwestdeutschen Einzelgrabkultur von Obereizingen, Kreis Fallingb., *Germania* 32, 337-338.
- Bach, H., 1965: Beitrag zur Anthropologie der Glockenbecherleute, *Alt-Thüringen* 7, 208-227.
- , 1966: Die Skelette von zwei Glockenbecherleuten aus Wundersleben, Kr. Sömmerda, *Ausgrabungen und Funde* 11, 243-247.
- Bailloud, G., 1964: *Le néolithique dans le bassin parisien*, (2e supplément à *Gallia Préhistoire*), Paris.
- , & P. Mieg de Boofzheim, 1955: *Les civilisations néolithiques de la France, dans leur contexte européen*, Paris.
- Bakker, J. A., 1958: Een gefacetteerde strijdhamer uit Oud-Zuilen, *Jaarboekje van "Oud Utrecht"*, 27-28.
- , 1959: Opgravingen te Hoogkarspel I. Het onderzoek van tumulus I en naaste omgeving, *WF Oudh.* 2, 158-191.
- , 1966<sup>a</sup>: Een grafheuvel en oud akkerland te Hoogkarspel (N.H.), in: *Voetspoor*, Groningen, 103-109.
- , 1966<sup>b</sup>: Opgravingen te Hoogkarspel II, *WF Oudh.* 9, 168-175.
- , & R. W. Brandt, 1966: Opgravingen te Hoogkarspel III, *WF Oudh.* 9, 176-224.
- , & W. H. Metz, 1967: opgravingen te Hoogkarspel IV, *WF Oudh.* 10, 202-228.
- , *et al.*, 1968: Opgravingen te Hoogkarspel (V), *WF Oudh.* 11, 193-199.
- , J. C. Vogel & T. Wiślański, 1969: TRB and other C14 Dates from Poland. Part A, *Helinium* 9, 3-27.
- Bakker, J. P., 1954: Relative sea-level changes in Northwest Friesland (Netherlands) since prehistoric times, *Geologie en Mijnbouw NS* 16, 232-246.
- , 1958: Küstenentwicklung und prähistorische Besiedlung in den Niederlanden, *Sitzungsberichte der physikalisch-medizinischen Sozietät zu Erlangen* 78, 102-127.
- Bantelmann, A., 1938: Die jungsteinzeitlichen Funde im nordfriesischen Wattenmeer und ihre Bedeutung für die Küstensenkung, *Nachrichtenblatt für Deutsche Vorzeit* 14, 15-17.
- , 1949: Ergebnisse der Marschenarchäologie in Schleswig-Holstein, *Offa* 8, 75-88.
- , 1955: Tofting, eine vorgeschichtliche Warft an der Eidermündung, (*Offa Bücher* 12), Neumünster.
- , 1967: Die Landschaftsentwicklung an der schleswig-holsteinischen Westküste, (*Offa Bücher* 21), Neumünster.
- Bastian, W., 1961: Das jungsteinzeitliche Flachgräberfeld von Ostorf, Kreis Schwerin, *Jahrbuch Bodendenkmalpflege in Mecklenburg*, 1961, 7-130.

- Baumann, H., 1944: Zur Morphologie des Afrikanischen Ackergerätes, *Koloniale Völkerkunde I* (= Wiener Beiträge zur Kulturgeschichte und Linguistik 6), 192-322.
- Becker, C. J., 1952: Ørnekul paa Nekselø. En sjaellandsk stenalderboplads med hustomter, *Aarbøger*, 60-107.
- , 1968: Bronzealderhuse i Vestjylland, *Fra Nationalmuseets Arbejdsmark*, 79-88.
- Beex, G. & R. S. Hulst, 1968: A Hilversum-Culture Settlement near Nijnsel, Municipality of St Oedenrode, North Brabant, *Ber. ROB* 18, 117-129.
- , & H. Roossens, 1962: Drieperiodenheuvel te Mol bij grenspaal 194, *Helinium* 2, 255-259.
- , & H. Roossens, 1963: Drieperiodenheuvel met klokbekers te Mol, (*Archaeologica Belgica* 72), Brussel.
- Beemt, G. J. van den, 1967: Iets over de Romeinse nederzetting te Alblasterdam, *Westerheem* 16, 137-143.
- Behrens, H., 1964: Die neolithisch-frühmetallzeitlichen Tierskelettfunde der Alten Welt, (*Veröffentlichungen des Landesmuseums für Vorgeschichte in Halle* 19), Berlin.
- Bell, H. & H. Hoffman, 1940: Ein neuartiger Kreisgrabenfriedhof bei Datteln, Kr. Recklinghausen (Westfalen), *Germania* 24, 85-96; also 179-194.
- Beninger, E., 1931: Die Leichenzerstückelung als vor- und frühgeschichtliche Bestattungssitte, *Anthropos* 26, 769-781.
- Bennema, J., 1950: Het oppervlakteveen in West Nederland, *Boor en Spade* 3, 139-149.
- , 1954: Bodem- en Zeespiegelbewegingen in het Nederlandse kustgebied, thesis Wageningen, also: *Boor en Spade* 7, 1-96.
- Bennema, J., 1954<sup>a</sup>: Holocene movements of land and sea-level in the coastal area of the Netherlands, *Geologie en Mijnbouw* 16, 254-264.
- , & K. van der Meer, 1952: De bodemkartering van Walcheren, (*Versl. Landb. Ond.* 58.4), 's-Gravenhage.
- , & L. J. Pons, 1952: Donken, fluviatiele Laagterras en Eemzee-afzettingen in het westelijk gebied van de grote rivieren, *Boor en Spade* 5, 126-137.
- Bennema, J. *et al.*, 1954: Soil compaction in relation to Quarternary movements of sea-level and subsidence of the land, especially in the Netherlands, *Geologie en Mijnbouw NS* 16, 173-178.
- Biesen, W. P. den, 1963: Het Oudheidkundig Museum "Frans Bloemen", *Numaga* 10, 41-76.
- Blance, B., 1961: Early Bronze Age Colonists in Iberia, *Antiquity* 35, 192-202.
- , 1971: Die Anfänge der Metallurgie auf der Iberischen Halbinsel, (*Studien zu den Anfängen der Metallurgie* 4), Berlin.
- Bloemers, J. H. F., 1968: Flintdolche vom skandinavischen Typus in den Niederlanden, *Ber. ROB* 18, 47-110.
- , 1969: Nederzetting uit de Romeinse tijd bij Rijswijk, *Spiegel Historiae* 4, 402-406.
- , 1970: Neer, AN, \*91.
- , 1971<sup>a</sup>: Echt, AN, \*40.
- , 1971<sup>b</sup>: Neer, AN, \*56.
- , 1971<sup>c</sup>: Neer, AN, \*104.
- , 1972: Drie Rössenscherven uit Nederlands Limburg, *Helinium* 12, 47-52.
- , 1973: Archeologische kroniek van Limburg over de Jaren 1969-1970, (reprint from: *Publications de la Société Historique et Archéologique dans le Limbourg* 107/108.)
- Boddeke, R., 1971: *Vissen en vissen*, Amsterdam.
- Boeles, P. C. J. A., 1951: *Friesland tot de elfde eeuw*, 's-Gravenhage.
- Boer, T. A. de, & L. J. Pons, 1960: *Bodem en grasland in de Vijfheerenlanden*, (*Versl. Landb. Ond.* 66.6), Wageningen.
- Boersma, J. W. (ed.), 1970: *Terpen - mens en milieu*, Haren-Gr.
- Boessneck, J., 1956: Tierknochen aus spatneolithischen Siedlungen Bayerns, (*Studien an vor- und frühgeschichtlichen Tierresten Bayerns* 1), München.
- , 1967: Vor- und frühgeschichtliche Tierknochenfunde aus zwei Siedlungshügeln in der Provinz Granada/Südspanien (Vorläufige Mitteilung), *Säugetierkundliche Mitteilungen* 15, 97-109.
- Bogaers, J. E., 1955: *De Gallo-Romeinse tempels te Elst in de Over-Betuwe*, thesis Nijmegen, 's-Gravenhage.
- , 1967<sup>a</sup>: Cuyk, AN, \*9-10.

- , 1967<sup>b</sup>: Enige opmerkingen over het Nederlandse gedeelte van de limes van Germania Inferior (Germania Secunda), Ber. ROB 17, 99-114.
- , 1971: Voorburg-Arentsburg: Forum Hadriani, Oudh. Med. 52, 128-138.
- Bohmers, A. & A. Bruijn, 1957/'58: Das lithische Material aus den bandkeramischen Siedlungen in den Niederlanden, Palaeohistoria 6/7, 183-212.
- Braat, W. C., 1932: De archaeologie van de Wieringermeer. Een bijdrage tot de geschiedenis van het ontstaan der Zuiderzee, thesis Leiden, also: Oudh. Med. 13, 15-56.
- , 1949: Drie inheemse nederzettingen uit de Romeinse tijd, Oudh. Med. 30, 23-46.
- , 1953: Een stenen strijdhamer uit Katwijk a/d Rijn, Leids Jaarboekje 45, 103-106.
- Bradley, R., 1970: The Excavation of a Beaker Settlement at Belle Tout, East Sussex, England, PPS 36, 312-379.
- Brand, G. *et al.*, 1966: Die lithographische Unterteilung des Marinen Holozäns an der Nordseeküste, Geologisches Jahrbuch 82, 365-384.
- Brandt, K. H., 1967: Studien über steinerne Äxte und Beile der jüngeren Steinzeit und der Steinkupferzeit Nordwestdeutschlands, (Münstersche Beiträge zur Vorgeschichtsforschung), Hildesheim.
- Bray, W., 1964: Sardinian Beakers, PPS 30, 75-98.
- Breitinger, E., 1939: Die Schädel aus dem frühbronzezeitlichen Hockerfriedhof bei Nähermemmingen, Bez. Amt Nordlingen, Mannus 31, 484-537.
- Broek, J. M. M. van den & G. C. Maarleveld, 1963: The Late-Pleistocene terrace deposits of the Meuse, Med. Geol. Sticht. NS 16, 13-24.
- Brøndsted, J., 1960: Nordische Vorzeit I: Steinzeit in Dänemark, Neumünster.
- Brøste, K. & J. B. Jørgensen, 1956: Prehistoric Man in Denmark, Copenhagen.
- Brongers, J. A., in prep.: Photo Archaeology and Celtic Fields in the Netherlands, thesis Groningen, also: Nederlandse Oudheden 5, Bussum.
- Buchvaldek, N. & D. Koutecký, 1970: Vikletice, ein schnurkeramisches Gräberfeld, (Praehistorica 3), Praha.
- Burck, P. du, 1959: Over de opbouw en de vorming van het Laagterras en de oudere Holocene afzettingen in de kop van Noord-Holland, Boor en Spade 10, 58-73.
- Buring, P., 1949: Bodemkundige verschijnselen op de luchtfoto, Boor en Spade 3, 48-64.
- Burkart, W., 1946: *Crestaulta eine Bronzezeitliche Hügelsiedlung bei Sürin im Lugnez*, (Monographien zur Ur- und Frühgeschichte der Schwiez 5), Basel.
- Bursch, F. C., 1933: Die Becherkultur in den Niederlanden, thesis Marburg, also: Oudh. Med. 14, 39-123.
- , 1935: Oudheidkundige onderzoekingen te Hilversum, 1934, Oudh. Med. 16, 45-63.
- , 1936: Grafvormen van het Noorden (part I), Oudh. Med. 17, 53-72.
- , 1937: Grafheuvels te Oss, Oudh. Med. 18, 1-3.
- Burstow, G. P. & G. A. Holleyman, 1957: Late Bronze Age Settlement on Itford Hill, Sussex, PPS 23, 167-212.
- Butler, J. J., 1959: Vergeten schatvondsten uit de bronstijd, in: Honderd Eeuwen Nederland (= Antiquity and Survival 2, 5-6), 's-Gravenhage, 125-142.
- , 1963<sup>a</sup>: Bronze Age Connections across the North Sea, thesis Groningen, also: Palaeohistoria 11.
- , 1963<sup>b</sup>: An Early Bronze Spearhead from De Zilk (South Holland), Helinium 3, 241-245.
- , & J. D. van der Waals, 1966: Bell Beakers and Early Metal-working in the Netherlands, Palaeohistoria 12, 41-139.
- , & H. Sarfatij, 1970/'71: *Another Bronze Age Ceremonial Sword by the Plougrescant-Ommerschans Smith*, Ber. ROB 20/21, 301-309.
- Butter, J., 1935: Zandwerven, West-Friesland's Oud en Nieuw 9, 66-69.
- Byvanck, A. W., 1943: Nederland in den Romeinchen tijd, Leiden.
- Castillo Yurrita, A. del, 1928: *La Cultura del Vaso Campaniforme*, Barcelona.
- Childe, V. G., 1949: Neolithic House-Types in Temperate Europe. PPS 15, 77-86.
- Clark, J. G. D., 1932: The Mesolithic Age in Britain, Cambridge.
- , 1933: Report on an Early Bronze Age Site in the South-Eastern Fens, The Antiquaries Journal 13, 266-296.

- , 1936: *The Mesolithic Settlement of Northern Europe*, Cambridge.
- , 1938: A Neolithic House at Haldon, Devon, PPS 4, 222-223.
- , 1940: A Late Bronze Age Find near Stutney, Isle of Ely, *The Antiquaries Journal* 20, 52-71.
- , 1948: The Development of Fishing in Prehistoric Europe, *The Antiquaries Journal* 28, 45-85.
- , 1954: *Star Carr*, Cambridge.
- , 1955: A Microlithic Industry from the Cambridgeshire Fenland and other Industries with Sauveterrian Affinities from Britain, PPS 21, 3-20.
- , 1965: *Prehistoric Europe, the Economic Basis*, London, 2nd imp.
- , *et al.*, 1935: Report on recent excavations at Peacock's Farm, Shippea Hill, *The Antiquaries Journal* 15, 284-319.
- , & H. Godwin, 1956: A Maglemosian Site at Brandesburton, Holderness, Yorkshire, PPS 22, 6-22.
- , & H. Godwin, 1962: The Neolithic in the Cambridgeshire Fens, *Antiquity* 36, 10-23.
- Clarke, D. L., 1966: A Tentative Reclassification of British Beaker Pottery in the Light of Recent Research, *Palaeohistoria* 12, 180-198.
- , 1970: *Beaker Pottery of Great Britain and Ireland*, Cambridge.
- Clarke, R. R., 1960: *East Anglia*, London.
- Clason, A. T., 1967: *Animal and Man in Holland's Past*, thesis Groningen, also: *Palaeohistoria* 13.
- , 1970: Veeteelt in Pre-en Protohistorie, *Spiegel Historiae* 5, 297-303.
- , 1971: Die Jagd- und Haustiere der mitteldeutschen Schnurkeramik, *Jshr. mitteldt. Vorgesch.* 55, 105-112.
- Centrale Cultuurtechnische Commissie, 1964: *Alblasserwaard. Rapport voor de Ruilverkaveling*, Utrecht.
- Cock, J. H. de, 1969: *Veenontginningen in West-Friesland*, WF Oudh. 12, 154-171.
- Constandse-Westermann, T. S., 1968: *Fysisch anthropologische beschouwingen over de Nederlandse bevolking: een poging tot een synthese*, thesis Utrecht.
- Cordfunke, E. H. P., 1969: Limmen, bijdrage tot de oudste geschiedenis van het dorp, *Alkmaars Jaarboekje* 5, 49-66.
- Crommelin, R. D., 1938: Sediment-petrologische onderzoeken in Midden-Nederland, in het bijzonder van het Jong-Pleistoceen, (Mededelingen Landbouwhogeschool 42-2), Wageningen.
- Deichmüller, J., 1963: Ein Hügelgräberfeld bei Goldbeck Kr. Stade, *NNU* 32, 87-92.
- , 1963: Neue Untersuchungen am Dümmer, Kreis Grafschaft Diepholz, im Jahre 1961, *Neue Ausgrabungen und Forschungen in Niedersachsen* 1, 75-86.
- , 1965: Die neolithische Moorsiedlung Hüde I am Dümmer, Kreis Grafschaft Diepholz, *Neue Ausgrabungen und Forschungen in Niedersachsen* 2, 1-18.
- , 1969: Die neolithische Moorsiedlung Hüde I am Dümmer, Kreis Grafschaft Diepholz, *Vorläufiger Abschlussbericht, Neue Ausgrabungen und Forschungen in Niedersachsen* 4, 28-36.
- Desittere, M., 1967: Die Grobkeramik der Urnenfelderkultur in Belgien und den Niederlanden und der sogenannte Harpstedter Stil, *Helinium* 7, 260-271.
- Drower, M. S., 1969: The domestication of the horse, in: Ucko, P. J. & G. W. Dimbleby (ed.), *The Domestication and Exploitation of Plants and Animals*, London, 471-478.
- Dijkstra, H. & F. C. Ketelaar, 1965: *Brittenburg, raadsels rond een verdrongen ruïne*, Bussum.
- Edelman, C. H., 1947: *Over de Bodemgesteldheid van Midden-Nederland*, Utrecht.
- , 1953: De sub-atlantische transgressie langs de Nederlandse kust, *Geologie en Mijnbouw* NS 15, 351-364.
- , 1960: *Inleiding tot de Bodemkunde van Nederland*, Amsterdam, 2nd. ed.
- , & T. Vink, 1946: Over de wenselijkheid van het behoud der donken in de rivierstreek, *TAG* 63, 502-505.
- Edelman, T., 1954: Tectonic movements as resulting from the comparison of two precision levelings, *Geologie en Mijnbouw* 16, 209-213.
- Elzinga, G., 1964: Enkele laat-neolithische grafvondsten van de Veluwe, prov. Gelderland, *Ber. ROB* 14, 7-22.
- Ente, P. J., 1960: Enkele opmerkingen naar aanleiding van het artikel van J. J. Wensink, betreffende de bodemgesteldheid nabij de grafheuvels te Grootebroek, WF Oudh. 3, 120-124.
- , 1963: Een bodemkartering van het tuinbouwcentrum „De Streek”, thesis Wageningen, also: *Versl. Landb. Ond.* 68.16, 's-Gravenhage.
- , 1971: Sedimentary geology of the Holocene in Lake IJssel region, *Geologie en Mijnbouw* 50, 373-382.

- Es, W. A. van, 1964 : Het rijengrafveld van Wageningen, *Palaeohistoria* 10, 181-316.
- , 1968 : Mesolithisch houten beeldje, in het Volkerak gevonden, *Spiegel Historiaal* 3, 642;643.
- , & W. A. Casparie, 1968 : Mesolithic Wooden Statuette from the Volkerak near Willemstad, North Brabant, *Ber. ROB* 18, 111-116.
- Escalon de Fonton, M., 1963 : Circonscription de Montpellier, *Gallia Préhistoire* 6, 235-273.
- , 1966 : Circonscription de Languedoc-Roussillon, *Gallia Préhistoire* 9, 545-583.
- Esch, C. van der, 1965 : Romeinse en Middeleeuwse vondsten uit de Sliedrechtse Biesbosch, *Westerheem* 14, 158-164.
- Escher, B. G., 1940: Het vraagstuk van de daling van den bodem van Nederland, *Geologie en Mijnbouw NS* 2,173-195.
- Faber, F. J., 1947/'60 : Geologie van Nederland I-IV, Gorinchem.
- Feen P. J. van der, 1952 : Early populations in the delta of the river Scheldt, *Beaufortia* 9, 1-5.
- Feustel, R. *et al.*, 1966 : Beiträge zur Kultur und Anthropologie der mitteldeutschen Schnurkeramiker, *Alt-Thüringen* 8, 20-170.
- Fischer, U., 1953 : Die Orientierung der Toten in den neolithischen Kulturen des Saalegebietes, *Jshr. mitteldt. Vorgesch.* 37, 49-66.
- , 1956 : Die Gräber der Steinzeit im Saalegebiet, (*Vorgeschichtliche Forschungen* 15), Berlin.
- Floerschütz, F., 1944 : "Laagterras" en "Veen op Grootere Diepte" onder Velsen, *TAG* 61, 25-33.
- , & F. P. Jonker, 1939 : A botanical analysis of a late-pleistocene and holocene profile in the Rhinedelta, *Receuil des Travaux Botaniques Néerlandais* 36, 686-696, also : Mededelingen van het Botanisch Museum en Herbarium van de Rijksuniversiteit te Utrecht no. 72.
- Fockema Andreae, S. J., 1953 : Schets van Zuid-Hollandse watersneden in vroeger tijd, (*Zuid-Hollandse Studiën* 3), Voorburg.
- Forssander, J. E., 1933 : Die Schwedische Bootaxtkultur, Lund.
- Fowler, G., 1931/'32 : Fenland waterways, Past and Present I, *PCAS* 33, 108-132.
- , 1932 : Old Riverbeds in the Fenlands, *Geographical Journal* 79, 210-212.
- , 1933 : Shrinkage of peat covered Fenlands, *Geographical Journal* 81, 149-150.
- , 1933/'34 : Fenland Waterways, Past and Present II, *PCAS* 34,
- , 1934 : The extinct Waterways of the Fens, *Geographical Journal* 83, 30-39.
- Fox, A., 1964 : South West England, London.
- Frickhinger, E., 1937 : Glockenbechersiedlung und frühbronzezeitliche Hockergräber bei Nähermemmingen, B.A. Nördlingen, *Germania* 29, 6-9.
- , 1939 : Die Glockenbechersiedlung und der frühbronzezeitliche Hockerfriedhof bei Nähermemmingen, *Bez. Amt Nördlingen, Mannus* 31, 467-484.
- Frijtagg Drabbe, C. A. J. von, 1948 : Het lezen en interpreteren van verticale luchtfoto's, *TAG* 55, 452-462.
- Gagnière, S., 1963 : Circonscription d'Aix en Provence, *Gallia Préhistoire* 6, 338-369.
- , 1966 : Circonscription de Provence — Côte d'Azur — Corse, *Gallia Préhistoire* 9, 585-622.
- Gatermann, H., 1943 : Die Becherkultur in der Rheinprovinz, Würzburg.
- Gerhardt, K., 1951<sup>a</sup> : Zur Anthropologie des Endneolithikums und der frühen Bronzezeit im untermainisch-mittelrheinischen Gebiet, *Germania* 29, 17-21.
- , 1951<sup>b</sup> : Neue Untersuchungen zur Paläanthropologie Mitteleuropas, *Ber. RGK* 33, 1-24.
- , 1953 : Die Glockenbecherleute in Mittel- und Westdeutschland, Stuttgart.
- , (1964) : Schädel und Skeletreste der Frühen Bronzezeit von Singen/Hohentwiel, (*Badische Fundberichte, Sonderheft* 5).
- , 1967 : Die menschlichen Überreste eines Glockenbechergrabes von Gündlingen, *Ldkrs. Freiburg, Badische Fundberichte* 23, 185-189.
- Gersbach, E., 1957 : Schnur- und Häckelmaschenverzierung auf westeuropäischen Glockenbechern, *Jahrbuch der Schweizerischen Gesellschaft für Urgeschichte* 46, 1-12.
- Geschwent, F., 1960 : Kreis Geldern, (*Archäologische Funde und Denkmäler des Rheinlands* 1), Köln.

- Geyh, M. A., 1969 : Versuch einer chronologischen Gliederung des marinen Holozäns an der Nordseeküste mit Hilfe der statistischen Auswertung von <sup>14</sup>C-Daten, *Zeitschrift der Deutsche Geologischen Gesellschaft* 118, 1966, 351-360.
- , 1971 : Middle and young Holocene sea-level changes as global contemporary events, *Geologiska Föreningens i Stockholm Förhandlingar* 93, 679-692.
- Giffen, A. E. van, 1910 : Het dalingsvraagstuk der Alluviale Noordzeekusten in verband met de bestudeering der terpen, *Tijdschrift voor Geschiedenis, Land- en Volkenkunde* 25, 258-294.
- , 1916 : Bijdrage tot de kennis van enkele geologisch-archaeologische verkenmerken in verband met het vraagstuk der bodemdaling in historischen tijd, *Verslagen der Geologische Sectie van het Geologisch-Mijnbouwkundig Genootschap voor Nederland en Kolonien* 2, (1915-1919), 159-220, 's-Gravenhage (1921).
- , 1925 : Die Zuid-Limburgse voorhistorische vuursteenindustrie tussen Ryckholt en St-Geertruid, *TAG* 42, 481-503.
- , 1925/'26 : De Hunebedden in Nederland, Utrecht.
- , 1927/'28 : Naschrift over de prae- en proto-historische Hillegomsche duinvondsten, *De Levende Natuur* 32, 78-83.
- , 1930<sup>a</sup> : Die Bauart der Einzelgräber, (*Mannus-Bibliothek* 44/45), Leipzig.
- , 1930<sup>b</sup> : Archaeologische Verkenmerken, Groningen-Den Haag.
- , 1934 : Kringgrepernenveld en tumuli in het Elper Noorderveld, gem. Westerbork, *NDV* 52, 100-110.
- , 1936 : Der Warf in Ezinge, Provinz Groningen, Holland, und seine westgermanischen Häuser, *Germania* 20, 40-47.
- , 1937 : Twee grafvelden uit de hunebedden- en bekertijd in het Kruidhaarsveld bij Sleen, gem. Sleen, *NDV* 55, 74-77.
- , 1940 : Grafheuvels (I-IV) en kringgrafveld bij Aalden, gem. Zweeloo, *NDV* 58, 202-207.
- , 1941 : Tweeperioden-heuvel N. van Gasteren, gem. Anloo, *NDV* 59, 129-131.
- , 1942 : Drie grafheuvels (I-III), uit steen- (I) en bronstijd (II-III), met neolithisch "vlakgraf" onder III, N. van Vredenheim, gem. Rolde, *NDV* 60, 103-108.
- , 1944 : Grafheuvels te Zwaagdijk, gem. Wervershoof, (N.-H.), Verbeterde en vermeerderde overdruk uit : "West-Friesland's Oud en Nieuw" 17.
- , 1946 : Een twee- of drieperioden-heuvel met primairen subtumulus der Veluwsche klokbekercultuur, bij de Eenerschans, Gem. Norg, *NDV* 64, 75-83.
- , 1947 : De aeneolithische ringslootheuvel tussen Odoorn en Exloo, Gem. Odoorn, een bijenkorfgrafheuvel met ringsloot, intermediair en centraal standspoor, *NDV* 65, 79-126.
- , 1949 : Een vierperioden-tumulus met primaire klokbekerheuvel bij Schaaik, Gem. Oss, N. Br., *Brabants Heem* 1, 71-74.
- , 1953 : Onderzoek van drie bronstijdgrafheuvels bij Grootebroek, gem. Grootebroek, Noord-Holland, Verbeterde en vermeerderde overdruk uit "West-Friesland's Oud en Nieuw" 20, Hoorn.
- , 1954<sup>a</sup> : Archäologische Bemerkungen zur Frage der Niveauveränderungen im niederländischen Küstengebiet, *Geologie en Mijnbouw NS* 16, 226-231.
- , 1954<sup>b</sup> : Een meerperiodenheuvel, tumulus I te Bennekom, gem. Ede, *Bijdragen en Mededelingen der Vereniging "Gelre"*, 54, 9-29.
- , 1954<sup>c</sup> : Prehistorische huisvormen op de zandgronden, *Nederlands Kunsthistorisch Jaarboek* 5, 11-40.
- , 1958 : Prähistorische Hausformen auf Sandböden in den Niederlanden, *Germania* 36, 35-71.
- , 1961 : Settlement traces of the Early Bell Beaker Culture at Oostwoud (N.H.), *Helinium* 1, 223-228.
- , 1962 : Grafheuvels uit de midden-bronstijd met nederzettingssporen van de klokbekercultuur bij Oostwoud, *WF Oudh.* 5, 194-209.
- , 1966 : Nederzettingssporen van de vroege klokbekercultuur bij Oostwoud (N.H.), in : *Voetspoor*, Groningen, 66-71.
- , *et al.*, 1971 : Een grafheuvel te Putten (Gld.), *Helinium* 11, 105-123.
- Glasbergen, W., 1954 : Barrow Excavations in the Eight Beatitudes, thesis Groningen, also : *Palaeohistoria* 2, 1-134; 3, 1-204.
- , 1969 : Nogmaals HVS/DKS, (*Haarlemse Voordrachten* 28), Haarlem.
- , & M. Addink-Samplonius, 1965 : Laat Neolithicum en Bronstijd te Monster (Z.-H.), *Helinium* 5, 97-117.
- , *et al.*, 1966 : De neolithische nederzettingen te Vlaarding (Z.H.), in : *Voetspoor*, Groningen, 41-65.

- , *et al.*, 1967 : Settlements of the Vlaardingen Culture at Voorschoten and Leidschendam, *Helinium* 7, 3-31, 97-120.
- Glob, P. V., 1944 : Studier over den jyske Enkeltgravskultur, *Arbøger*.
- , 1952 : *Danske Oldsager II : Yngre Stenalder*, København.
- Godwin, H., 1938 : The origin of roddons, *Geographical Journal* 91, 241-250.
- , 1939/'41 : Studies of the postglacial History of British vegetation, III : Fenland/pollendiagrams; IV : Post-glacial changes of relative land- and sealevel in the English Fenland, *Philosophical Transactions of the Royal Society of London B* 230, 239-303.
- , & M. H. Clifford, 1939 : Studies of the postglacial History of British vegetation, II : Origin and stratigraphy of deposits in the Southern Fenland, *Philosophical Transactions of the Royal Society of London B* 229, 323-406.
- , and M. E. & F. H. Edmunds, 1953 : Pollenanalysis of Fenland peats at St. Germans near Kings Lynn, *Geological Magazine* 70, 168-182.
- Gottschalk, M. K. E., 1971 : Stormvloeden en rivieroverstromingen in Nederland, Deel I : de periode vóór 1400, Assen.
- Green, Ch., 1961 : East Anglian Coast-line Levels since Roman Times, *Antiquity* 35, 21-28.
- Griffiths, W. E., 1957 : The Typology and Origins of Beakers in Wales, *PPS* 23, 57-90.
- Grimes, W. F., 1938 : A barrow on Breach Farm, Llandbleddian, Glamorgan, *PPS* 4, 107-121.
- Groenman-van Waateringe, W., 1966<sup>a</sup> : Palynologisch onderzoek van drie laat-neolithische tumuli bij St. Walrick bij Overasselt (Gld.), in : Voetspoor, Groningen, 72-80.
- , 1966<sup>b</sup> : Nederzettingen van de Hilversumcultuur te Vogelenzang (N.H.) en Den Haag (Z.H.), in: Voetspoor, Groningen, 81-92.
- , 1970: *Ossa absentia*, Groningen.
- , & J. F. van Regteren Altena, 1961: Een vuurstenen sikkel uit de voor-Romeinse ijzertijd te Den Haag, *Helinium* 1, 141-146.
- , & J. D. van der Waals, 1961: The Late Neolithic Tumulus at Boundary Post 425 at Swalmen (Dutch Limburg), *Helinium* 1, 47-54.
- , *et al.*, 1968: Settlements of the Vlaardingen Culture at Voorschoten and Leidschendam (Ecology), *Helinium* 8, 105-130.
- , & M. J. Jansma, 1969: Diatom and Pollen Analysis of the Vlaardingen Creek. A Revised Interpretation, *Helinium* 9, 105-117.
- Guilaine, J., 1967: La Civilisation du Vase Campaniforme dans les Pyrénées Françaises, Carcassonne.
- Günther, K., 1970: Steinzeit und Ältere Bronzezeit im Landesmuseum für Vor- und Frühgeschichte, Münster, Münster.
- Haans, J. C. F. M., 1954: De bodemgesteldheid van de Haarlemmermeer, thesis Wageningen, also: Versl. Landb. Ond. 60.7, 's-Gravenhage.
- Haarnagel, W., 1940: Die Marschensiedlungen in Schleswig-Holstein und im linkselbischen Küstengebiet, *Probleme der Küstenforschung im südlichen Nordseegebiet* 1, 87-98.
- , 1950: Das Alluvium an der Deutschen Nordseeküste, (*Probleme der Küstenforschung im südlichen Nordseegebiet* 4), Hildesheim.
- , 1956: Die historische Entwicklung der Forschung, insbesondere der Wurten- oder Warfenforschung, im Küstengebiet der Nordsee, in: *Festschrift zum 70. Geburtstage von K. H. Jacob-Friesen*, Hildesheim, 243-252.
- , 1957: Die spätbronze-früheisenzeitliche Gehöftsiedlung Jemgum bei Leer, auf dem linken Ufer der Ems, *Die Kunde* 8, 2-43.
- , 1959: Meeresspiegelschwankungen an der Deutsche Nordseeküste in historischer und prähistorischer Zeit, *Tagungsbericht und wissenschaftliche Abhandlungen des Deutsche Geographentages Berlin 1959*, 32.
- , 1961: Probleme der Siedlungsforschung im Küstengebiet zwischen Elbe und Weser in der Spätlatènezeit, *Jahrbuch der Männer vom Morgenstern* 42, 74-85.
- , 1963: Die Niedersächsische Landesstelle für Marschen- und Wurtenforschung in Wilhelmshaven, *NNU* 32, 3-33.
- , 1968: Die prähistorischen Siedlungsformen im Küstengebiet der Nordsee, *Erdkundl.-Wissenschaftl. Schriftenreihe für Forschung und Praxis*, Wiesbaden, 67-84.
- , 1969: Rückschau auf die Forschungsergebnisse, in: *Vijftig Jaren Terpenonderzoek*, Groningen, 12-27.
- Hageman, B. P., 1961: Enkele facetten van de Alblasserwaard-kaartering, *Jaarverslag Geologische Stichting 1961*, 39-41.

- , 1969: The western part of the Netherlands during the Holocene, *Geologie en Mijnbouw* 48, 373-388.
- Hájek, L., 1962: Die Glockenbecherkultur in Böhmen und Mähren, (*Inventaria Archaeologica* Cs 11-20), Bonn.
- Halbertsma, H., 1954: Enkele oudheidkundige aantekeningen bij de oudste menselijke skeletten, in de friese terpen gevonden, *Ber. ROB* 5, 45-49.
- Hallam, S., 1961: Wash Coastline Levels since Roman Times, *Antiquity* 35, 152-156.
- Hallewas, D. P., 1971: Een huis uit de Vroege IJzertijd te Assendelft (N.H.), *Westerheem* 20, 19-35.
- Hamming, C., *et al.*, 1965: Afzettingen van de IJssel nabij Zwolle, *Boor en Spade* 14, 88-103.
- Harsema, O. H., 1965: Vondsten van de Hilversum-kultuur uit Neer (Ndl. L.), *Helinium* 5, 44-49.
- , & J. D. de Ruiter, 1966: Onderzoek van twee bronstijd-tumuli in Drenthe, *NDV* 84, 179-202.
- Häusler, A., 1962: Die Grabsitten der mesolithischen und neolithischen Jäger- und Fischergruppen auf dem Gebiet der U. d. S. S. R., *Wissenschaftliche Zeitschrift der Martin Luther-Universität Halle-Wittenberg; Ges. Sprachw.* XI/10, 1141-1206.
- Havelaar, L., 1970: Een huisplattegrond uit de vroege-IJzertijd te Vlaardingen, *Westerheem* 19, 120-127.
- Havinga, A. J., 1969: A Physiographic Analysis of a Part of the Betuwe, a Dutch River Clay Area, (*Mededelingen Landbouwhogeschool* 69-3), Wageningen.
- Heide, G. D. van der, 1955<sup>a</sup>: Aspecten van het archeologisch onderzoek in het Zuiderzeegebied, (*Van Zee tot Land* 13), Zwolle.
- , 1955<sup>b</sup>: Bewoningsfasen van het gebied van de latere Zuiderzee, *TAG* 72, 39-47.
- , 1955<sup>c</sup>: Archaeological Investigations on New Land, *Antiquity and Survival* 1, 93-122.
- , 1962: Over de wording en bewoning van Wieringen, *WF Oudh.* 5, 187-198.
- , 1964: Oostelijk Flevoland, *AN*, \*228 and \*316.
- , 1965: Oostelijk Flevoland, *AN*, \*16.
- , 1965/66: Enkele aantekeningen betreffende de prehistorische bewoning van het oostelijke deel van het Zuiderzeegebied, *Kamper Almanak*, 200-214.
- Heide, S. van der, & W. H. Zagwijn, 1967: Stratigraphical nomenclature of the Quarternary deposits in the Netherlands, *Med. Geol. Sticht.* 18, 23-29.
- Helbaek, J., 1952: Early Crops in South England, *PPS* 18, 194-233.
- Helderman, E. J., 1971: Enige resultaten van vijftien jaar archeologisch onderzoek in de Zaanstreek, *Westerheem* 20, 36-83.
- Helgouach, J. P., 1963: La céramique campaniforme en Armorique; Repartition-Formes-Décors, in: *Les Civilisations Atlantiques du Néolithique à l'âge du Fer*, Rennes.
- Hemp, W. J., 1930: The Chambered Cairn of Bryn Celli Ddu, *Archaeologia* 80, 179-214.
- Henrich, A., 1938: Die Untersuchung eines Einzelgrabhügels von Osterbrodt, *Kr. Meppen, NNU* 12, 44-51.
- Hoeksema, K. H., 1948: De bodemkartering in de Bommelerwaard, *Boor en Spade* 1, 26-29.
- Hoffmann, D., 1969: The Marine Holocene of Sylt. Discussion of the Age and Facies, *Geologie en Mijnbouw* 48, 343-347.
- Holwerda, J. H., 1907: Tumuli bij Nierssen, *Oudh. Med. OR* 2, 1-17.
- , 1909: Hunneschans bij het Uddelermeer, *Oudh. Med. OR* 3, 1-52.
- , 1910: Opgravingen in de Hertekamp bij Vaassen, *Oudh. Med. OR* 4, 1-30.
- , 1911: Praehistorische nederzettingen aan het Uddelermeer, *Oudh. Med. OR* 5, 5-17.
- , 1924: *Geschiedkundige Atlas van Nederland, Oudheidkundige Kaart van Nederland*, 's-Gravenhage.
- , 1925: *Nederlands vroegste geschiedenis*, Amsterdam.
- , & M. A. Evelein, 1911: Opgravingen bij het Hanendorp (Emst), *Oudh. Med. OR* 5, 18-22.
- Hondius-Crone, A., 1955: The Temple of Nehalennia at Domburg, Amsterdam.
- Hoorn, T. C. van, 1967: De bewoning van het Noord-Groninger kleigebied in verband met de niveauverandering. Jaarverslagen van de Vereniging voor Terpenonderzoek 38-50 (1953-1966), 1-15.
- Huizinga, J., 1959: De prehistorische mens in Nederland, in: *Honderd Eeuwen Nederland*, (= *Antiquity and Survival* 2, 5-6), 's-Gravenhage, 37-54.

- Huizinga, T. K., 1940: De bodemdaling van Nederland gezien van grondmechanisch standpunt, *Geologie en Mijnbouw* NS 2, 94-106.
- Hulst, R. S., 1962/'63. Bronstijdaardewerk uit Hatert, gem. Nijmegen, Ber. ROB 12/13, 575-576.
- , 1966: Zijderveld, AN, \*93.
- , 1965/'66: A Pot Beaker from Velp, Prov. of Gelderland, Ber. ROB 15/16, 231-232.
- , 1967: Hien, gem. Dodewaard, AN, \*64.
- , 1969: A Bronze Age Settlement at Elst, prov. Utrecht, Ber. ROB 19, 275-278.
- , 1970: Archeologische kroniek van Gelderland 1966-1967, *Bijdragen en Mededelingen der Vereniging "Gelre"* 64, 26-48.
- , 1972: Lunteren, AN, \*14.
- (Hijzeler, C. C. W. J.), 1959: Mander, gem. Tubbergen, AN, \*141.
- Isaac, E., 1970: *Geography of Domestication*, Englewood Cliffs, N. J.
- Jacob-Friesen, K. H., 1959: *Einführung in Niedersachsens Urgeschichte*. I. Teil, Steinzeit, Hildesheim.
- Jankuhn, H., 1939: Eine stein-bronzezeitliche Grabsitte und ihr Fortleben im spätere Brauchtum, *Offa* 4, 92-108.
- , 1969: *Deutsche Agrargeschichte I, Vor- und Frühgeschichte*, Stuttgart.
- Janssen, L. J. F., 1846: Oudheden te Oud-Alblas, *Oudheidkundige Verhandelingen en Mededeelingen* 4, 390-394.
- Jelgersma, S., 1961: *Holocene Sea Level Changes in the Netherlands*, thesis Leiden, also: *Med. Geol. Sticht. CVI-7*.
- , 1966: Sea-level changes during the last 10,000 years, in: *Royal Meteorological Society, Proceedings of the International Symposium on World Climate from 8000 to O B. C.*
- , & A. J. Pannekoek, 1960: Post-glacial rise of sea-level in the Netherlands (a preliminary report), *Geologie en Mijnbouw* 39, 201-207.
- , & J. F. van Regteren Altena, 1969: *An Outline of the Geological History of the Coastal Dunes in the Western Netherlands*, *Geologie en Mijnbouw* 48, 335-342.
- , *et al.*, 1970: The coastal dunes of the western Netherlands; geology, vegetational history and archeology, *Med. Rijks Geol. Dienst* NS 21, 93-167.
- Jessup, R., 1970: *South East England*, London.
- Jewell, P. A. (ed.), 1963: *The experimental earthwork on Overton Down Wiltshire 1960*, *Brit. Ass. Adv. Science*, London.
- Jong, J. de, 1970/'71: Pollen and C14 Analysis of Holocene Deposits in Zijderveld and Environs, Ber. ROB 20/21, 75-88.
- Jong, J. D. de, 1960: The morphological evolution of the Dutch coast, *Geologie en Mijnbouw* 39, 638-643.
- , 1967: The Quaternary of the Netherlands, in: *The Geological Systems, the Quaternary*, Vol. 2, New York, 301-426.
- , 1971: The Scenery of the Netherlands against the Background of Holocene Geology; a review of the recent literature, *Revue de géographie physique et de géologie dynamique* 13, 143-162.
- Kersten, K., 1951: Ein Steingrab mit Einzelgrabnachbestattung bei Schalkholz, *Offa* 9, 17-20.
- , 1952: Einzelgrabhügel bei Fockbek, Kreis Rendsburg, *Offa* 10, 9-14.
- , 1966: Ein spätneolithischer Riesenbecher aus Mannhagen, Kreis Herzogtum Lauenburg, *Offa* 23, 77-78.
- Kersten, W., 1938: Spuren der nordeurasiatischen Wohnplatzkultur am Niederrhein, *Germania* 22, 71-77.
- Koenigs, F. F. R., 1949: *Een bodemkartering van de omgeving van Azewijn*, (*Versl. Landb. Ond. 54.17*), 's-Gravenhage.
- Kok, H. A. de, 1964: Verslag over de opgraving op het uitbreidingssterrein van de N.V. Ned. Kabelfabrieken te Alblasserdam, coörd. 105-429, *Westerheem* 13, 47-49.
- , 1965: De prehistorie van de Alblasserwaard en de Vijfheerenlanden, *Westerheem* 14, 119-123.
- , 1966: *De begaanbaarheid van onze streek, Onze streekhistorie, Bijdragen over de historie van de Alblasserwaard en de Vijfheerenlanden* 2, 5-35.
- Köster, C., 1965/'66: Beiträge zum Endneolithikum und zur Frühen Bronzezeit am nördlichen Oberrhein, *PZ* 43/44, 2-95.
- Kroll, H., 1938: Der vorgeschichtliche Friedhof auf dem Radberg in Hülsten, *Germania* 22, 78-91 & 225-230.
- Kuenen, P. H., 1941: De relatieve en absolute daling van onze bodem, *Geologie en Mijnbouw* NS 3, 213-218.
- , 1945: Zeespiegelrijzing der laatste decennia, *TAG* 62, 159-169.
- Kwaad, F. J. P. M., 1961: Een onderzoek naar de morfogenese van Midden-West Friesland, *WF Oudh.* 4, 6-51.

- Laet, S. J. de, 1958: *The Low Countries*, London.
- , 1963: Un gobelet campaniforme à Huise (Flandre orientale) et la distribution des vases campaniformes en Belgique *Helinium* 3, 235-241.
- , 1966: Quelques problèmes du Néolithique Belge, *Palaeohistoria* 12, 335-361.
- , 1968: La civilisation de Michelsberg en Belgique, *Helinium* 8, 259-269.
- , & W. Glasbergen, 1959: *De Voorgeschiedenis der Lage Landen*, Groningen.
- Lambert, J. M. *et al.*, 1960: *The Making of the Broads*, Royal Geographical Society Research Series No. 3.
- Lange, W. R., 1959: Neue Becher aus Ostwestfalen, *Germania* 37, 260-263.
- Lanting, A. E., 1969: Iets over de grafgebruiken van de standvoetbekerkuultuur, *NDV* 87, 165-178.
- Lanting, J. N., 1968: Een grafheuvel uit de vroege bronstijd in Emmerhout, gem. Emmen, *NDV* 86, 159-168.
- , 1969<sup>a</sup>: Verspreiding en datering van wikkeldraadaardewerk, *NDV* 87, 191-209.
- , 1969<sup>b</sup>: Twee grafheuvels in de Emmerdennen, gem. Emmen, *NDV* 87, 179-189.
- , & J. D. van der Waals, 1971: Laat-neolithische grafheuvels bij Vaasen en Maarsbergen, *Oudh. Med.* 52, 93-127.
- , & J. D. van der Waals, 1971<sup>a</sup>: Eext, gem. Anloo, *AN* \*51-52.
- , & J. D. van der Waals, 1972: British Beakers as seen from the Continent, *Helinium* 12, 20-46.
- Leeuwis, L. J., 1966: Klokbeeknederzetting in de Alblasserwaard, *Oud Gorcum Varia* 1966, 77-80.
- Lehmann, L. T., 1964: Een potbeker uit Speulde (Gld), *Ber. ROB* 14, 23-26.
- , 1965: Placing the Pot Beaker, *Helinium* 5, 3-31.
- , 1967<sup>a</sup>: Pot Beaker News, *Helinium* 7, 65-69.
- , 1967<sup>b</sup>: Unusual beaker pottery from the Veluwe, *Ber. ROB* 17, 159-161.
- , 1967<sup>c</sup>: New pot beakers from the Veluwe, *Ber. ROB* 17, 162-166.
- Leisner, G. & V., 1943-'65: *Die Megalithgräber der Iberischen Halbinsel*, Berlin.
- Liere W. J. van, 1947: De Romeinse bewoning van het Westland, in: *Een kwart eeuw Oudheidkundig Bodemonderzoek in Nederland*, Meppel, 313-316.
- Linde, J. van der, (1955): *Korte toelichting bij de bodemkundige overzichtskaart van de Alblasserwaard*, typescript Stiboka.
- Linden, H. van der, 1955: *De Cope. Bijdrage tot de rechtsgeschiedenis van de openlegging der Hollands-Utrechtse laagvlakte*, thesis Utrecht, also: *Bijdragen van het Instituut voor Rechtsgewchiedenis der Rijksuniversiteit Utrecht I* (1956).
- Louis, M. *et al.*, 1947: Les fonds de cabanes éneolithiques de Fontbousse, *Gallia* 5, 235-257.
- Louwe Kooijmans, L. P., 1966<sup>a</sup>: Culemborg, *AN*, \*61-62.
- , 1966<sup>b</sup>: Molenaarsgraaf, *AN*, \*123.
- , 1967: Archeologische terreinen in het Lek- en Lingegebied, ontdekt bij de bodemkartering in 1965, typescript.
- , 1967<sup>a</sup>: Elspeet, gem. Ermelo, *AN*, \*35.
- , 1967<sup>b</sup>: Land van Heusden en Altena, *AN*, \*113.
- , 1967<sup>c</sup>: Molenaarsgraaf, *AN*, \*114.
- , 1967<sup>d</sup>: Molenaarsgraaf, Hazendonk, *AN*, \*114.
- , 1968<sup>a</sup>: Bruine Bank, *AN*, \*119.
- , 1968<sup>b</sup>: Almkerk, *AN*, \*124.
- , 1969<sup>a</sup>: Ottoland, *AN*, \*70-71.
- , 1969<sup>b</sup>: Heemstede, *AN*, \*112.
- , 1969<sup>c</sup>: Bruine Bank, Noordzee, *AN*, \*114.
- , 1970/71: Mesolithic Bone and Antler Implements from the North Sea and from the Netherlands, *Ber. ROB* 20/21, 27-73.
- , 1971: Oudheidkundige boomkorvisserij op de Oosterschelde, *Westerheem* 20, 151-188.
- , 1973: Een grafheuvelgroep uit het laat-neolithicum en de bronstijd in het terrein van de Romeinse castra te Nijmegen, in: *Archeologie en Historie*, Bussum, 87-125.
- , *et al.*, 1968: Kapel Avezaath, gem. Zoelen, *AN*, \*124.
- Lüning, J., 1967: *Die Michelsberger Kultur. Ihre Funde in zeitlicher und räumlicher Gliederung*, *Ber. RGK* 48.

- Maarleveld, G. C., 1960: Wind directions and coversands in the Netherlands, *Biuletyn Peryglacjalny* 8, 49-58.
- , & R. P. H. P. van der Schans, 1961: De dekzandmorfologie van de Gelderse Vallei, *TAG* 78, 22-24.
- Magnusson, M., 1948/'49: Wulstkeramik in skandinavischen Funde aus dem Spätneolithikum, *Meddelanden från Lunds Universitets Historiska Museum*, 269-278.
- Mariën, M. E., 1948: La civilisation des "gobelets" en Belgique, *Bulletin des Musées Royaux d'Art et d'Histoire*, 4<sup>me</sup> s. 25, 16-48.
- , 1952: Oud België, van de eerste landbouwers tot de komst van Caesar, Antwerpen.
- Maringer, J., 1942/'45: Menschenopfer im Bestattungsbrauch Alteuropas, *Anthropos* 37-40, 1-112.
- Matthias, W., & J. Schultze-Motel, 1967: Kulturpflanzenabdrücke an schnurkeramischen Gefäßen aus Mitteldeutschland. *Jshr. mitteldt. Vorgesch.* 51, 119-158.
- Matthias, W. & J. Schultze-Motel, 1971: Kulturpflanzenabdrücke an Gefäßen der Schnurkeramik und der Aunjetitzer Kultur aus Mitteldeutschland, *Jshr. mitteldt. Vorgesch.* 55, 113-134.
- Meer, K. van der, 1952: De Bloembollenstreek, thesis Wageningen, also: *Versl. Landb. Ond.* 58.2, 's-Gravenhage.
- Mezger, J., 1961: Nagel of spatel?, *Westerheem* 10, 26.
- Modderman, P. J. R., 1945: Over de wording en de betekenis van het Zuiderzeegebied, thesis Groningen.
- , 1947: De bewoningsgeschiedenis van de Bommelerwaard, in: *Een kwart eeuw Oudheidkundig Bodemonderzoek in Nederland*, Meppel, 317-326, also: *Boor en Spade* 2 (1948), 139-146.
- , 1949<sup>a</sup>: Enkele aantekeningen over de bewoningsgeschiedenis van het Westland, *Boor en Spade* 3, 201-212.
- , 1949<sup>b</sup>: Oude woongronden in de Over- en Neder-Betuwe, *Oudh. Med.* 30, 66-93.
- , 1949<sup>c</sup>: Het oudheidkundig onderzoek van de oude woongronden in de Bommelerwaard boven de Meidijk, *Bull. KNOB* 6<sup>e</sup> serie 2, 191-222.
- , 1950: *De bewoningsgeschiedenis van het Maaskantgebied*, *Brabants Jaarboek*, 92-107.
- , 1951<sup>a</sup>: Oude woongronden in de Vijfherenlanden, typescript RMO.
- , 1951<sup>b</sup>: Het oudheidkundig onderzoek van de woongronden in het Land van Maas en Waal, *Oudh. Med.* 32, 25-61.
- , 1952: *Nederzetting uit de vroege IJzertijd, 's-Gravenhage* (prov. Zuid-Holland), Hengelolaan, Escampolder, *Ber. ROB* 3, 2.
- , 1953<sup>a</sup>: Een neolithische woonplaats in de polder Vriesland onder Hekelingen (eiland Putten) (Zuid Holland), *Ber. ROB* 4, 1-26.
- , 1953<sup>b</sup>: Land van Heusden en Altena. Het oudheidkundig onderzoek van de oude woongronden, *Brabantia* 2, 3-12.
- , 1954: *Grafheuvelonderzoek in Midden-Nederland*, *Ber. ROB* 5, 7-44.
- , 1955<sup>a</sup>: Woonsporen uit de bronstijd en de ijzertijd op de Margijnen Enk onder Deventer, *Ber. ROB* 6, 22-31.
- , 1955<sup>b</sup>: Laat bekeeraardewerk versierd met indrukken van een wikkeldraadstempel, *Ber. ROB* 6, 32-43.
- , 1955<sup>c</sup>: Neolithische vondsten nabij Schiedam, *Westerheem* 4, 30.
- , 1955<sup>d</sup>: De bewoonbaarheid van het rivierkleigebied in de loop der eeuwen, *TAG* 72, 30-38.
- , 1957: Een dodenhuis op de Gelpenberg bij Aalden, *NDV* 75, Van Rendierjager tot Ontginer 2, 19-22.
- , 1959<sup>a</sup>: Twee Veluwe klokbekers van de Bijvanck, gem. Berg (Gelderland), *Ber. ROB* 9, 285
- , 1959<sup>b</sup>: Twee bekers met wikkeldraadstempel versierd uit een grafheuvel onder Ermelo (Gld), *Ber. ROB* 9, 286-287.
- , 1959<sup>c</sup>: Een "Hilversum"-pot met wikkeldraadstempel versierd en een bronzen naald uit Vorstenbosch (Noord-Brabant), *Ber. ROB* 9, 288-289.
- , 1960/'61: De Spanjaardsberg; voor- en vroeghistorische boerenbedrijven te Santpoort, *Ber. ROB* 10/11, 210-262.
- , 1962/'63: De verspreiding van de Bekerculturen op de Veluwe, *Ber. ROB* 12/13, 7-24.
- , 1964<sup>a</sup>: Middle Bronze Age Graves and Settlement Traces at Zwaagdijk, Gemeente Wervershoof, Prov. North Holland, *Ber. ROB* 14, 27-36.
- , 1964<sup>b</sup>: The neolithic burial vault at Stein *APL* 1, 3-16.
- , 1968: Die Hausbauten und Siedlungen der Linienbandkeramik in ihrem westlichen Bereich, *Fundamenta* A3 V, 1-7.
- , 1968<sup>a</sup>: Helden/Kessel, AN, \*67.
- , 1970: Linearbandkeramik aus Elsloo und Stein, (Nederlandse Oudheden 3), 's-Gravenhage, also: *APL* 3.
- , 1971: Beaker Pottery from Hunebed D19 near Drouwen, Prov. Drenthe, *APL* 4, 47-51.

- Mörner, N. A., 1969<sup>a</sup>: The Late Quaternary History of the Kattegat Sea and the Swedish West Coast, *Sveriges Geologiska Undersökning, Årsbok* 63, nr. 3, Stockholm.
- , 1969<sup>b</sup>: Climatic and eustatic changes during the last 15,000 years, *Geologie en Mijnbouw* 48, 389-399.
- , 1971: Eustatic changes during the last 20,000 years and a method of separating the isostatic and eustatic factors in an uplifted area, *Palaeography, Palaeoclimatology, Palaeoecology* 9, 143-181.
- Müller, W., 1962: Der Ablauf der holozänen Meerestransgression an der südlichen Nordseeküste und Folgerungen in Bezug auf eine geologische Holozängliederung, *Eiszeitalter und Gegenwart* 13, 197-226.
- Müller-Karpe, H., 1968: *Handbuch der Vorgeschichte II, Jungsteinzeit*, München.
- Neumann, G., 1929: Die Gliederung der Glockenbecherkultur in Mitteldeutschland, *PZ* 20, 3-69.
- Nieuwenhuis, A. W., 1908: De menschenresten uit den praehistorischen grafbouw bij Niessen, *Oudh. Med.* OR 2, 18-24.
- Neustupný, E. & J. Neustupný, 1961: *Chzechoslovakia*, London.
- Nobis, D., 1955: Beiträge zur Abstammung und Domestikation des Hauspferdes. Nach Studien an ur- und frühgeschichtlichen Funden Nordwest- und Mitteldeutschlands, *Zeitschrift für Tierzüchtung und Züchtungsbiologie* 64, 201-246.
- Nobis, G., 1971: Vom Wildpferd zum Hauspferd, *Fundamenta*, Reihe B. Band 6.
- Ontwerp Streekplan Alblasserwaard en Vijfheerenlanden, 1968, Editor: Provincial Planological Survey of South Holland.
- Oppenheim, R., 1927/'28, *Zwerftochten in Oer-Nederland II*. In *de Achterduinen (Zuid-Holland), De Levende Natuur* 32, 72-78.
- , 1929: *Vondsten bij Lisse*, *Oudh. Med.* 10, 8.
- Otto, K. H., 1950: Ein Glockenbechergräberfeld der sächsisch-thüringischen Mischgruppe von Schäfstädt, Kr. Merseburg, *Jshr. mitteldt. Vorgesch.* 34, 56-80.
- Paço, A. do & E. Sangmeister, 1956: Villa Nova de S. Pedro, eine befestigte Siedlung der Kupferzeit in Portugal, *Germania* 34, 211-230.
- Pannekoek, A. J. (ed.), 1956: *Geological History of the Netherlands, 's-Gravenhage*.
- Pannekoek van Rheden, J. J., 1936: River built levees in the Betuwe, *Verhandelingen Geologisch-Mijnbouwkundig Genootschap voor Nederland en Koloniën, Geologische Serie* 9, 337-360.
- Pätzold, J., 1955: Eine Siedlung der Grosssteingrableute unter Normal Null bei Oldenburg (Oldb.), *Oldenburger Jahrbuch* 55, 83-97.
- Peddemors, A., 1971: *Glazen La Tène armbanden in Nederland*, typescript IPL.
- Piepers, W., 1972: Glockenbecher aus Bornheim, *Das Rheinische Landesmuseum Bonn*, aus der Arbeit des Museums 4/72, 60.
- Phillips, C. W., 1936: The Excavations of the Giant's Hills Long Barrow, Skendleby, Lincolnshire, *Archaeologia* 85, 37-106.
- Phillips, C. W. (ed.), 1971: *The Fenland in Roman Times*, (The Geographical Society Research Papers 5), London.
- Piggott, S., 1954: *Neolithic Cultures of the British Isles*, Cambridge.
- Piggott, S., 1962: Heads and Hoofs, *Antiquity* 36, 110-118.
- , 1963: Abercromby and after. The Beaker Cultures of Great-Britain Re-examined, in: *Culture and Environment, Essays in Honour of Sir Cyril Fox*, London, 53-91.
- , 1965: *Ancient Europe, from the beginnings of Agriculture to Classical Antiquity*, Edinburgh.
- Pleyte, W., 1877/1903: *Nederlandsche Oudheden van de vroegste tijden tot op Karel den Groote*, Leiden.
- Poelman, J. N. B. & P. Harbers, 1966: Heeft Lathum altijd aan de rechter IJsseloever gelegen? *Boor en Spade* 15, 128-130.
- Polak, B., 1929: *Een onderzoek naar de botanische samenstelling van het Hollandsche veen*, thesis Amsterdam.
- Pons, L. J., 1951: *De Bodemgesteldheid van de Vijfheerenlanden*, Internal Report Stiboka no. 272.
- , 1954: *Het Fluviatiele Laagterras van Rijn en Maas*, *Boor en Spade* 7, 97-110.
- , 1957: *De geologie, de bodemvorming en de waterstaatkundige ontwikkeling van het Land van Maas en Waal en een gedeelte van het Rijk van Nijmegen*, thesis Wageningen, also: *Versl. Landb. Ond.* 63.11, 's-Gravenhage.

- , 1961; Vijfheerenlanden: oudheidkundige vondsten en bodemgesteldheid, *Westerheem* 10, 1-5.
- , 1966: De bodemkartering van het Land van Maas en Waal en een gedeelte van het Rijk van Nijmegen, (*Verl. Landb. Ond.* 64.6), Wageningen.
- , & P. J. R. Modderman, 1951: Iets over de bodem en bewoningsgeschiedenis van het rivierkleigebied, in het bijzonder van de Ooypolder, *Boor en Spade* 4, 191-197.
- , & J. Schelling, 1951: De laatglaciale afzettingen van de Rijn en de Maas, *Geologie en Mijnbouw* 13, 283-297.
- , & J. Bennema, 1958: De morfologie van het pleistocene oppervlak in westelijk Midden-Nederland, voor zover gelegen beneden gemiddeld zeeniveau (N. A. P.), *TAG* 75, 120-139.
- , & A. J. Wiggers, 1958: De morfologie van het pleistocene oppervlak in Noordholland en het Zuiderzeegebied, voor zover gelegen beneden gemiddeld zeeniveau (N. A. P.), *TAG* 75, 140-153.
- , & A. J. Wiggers 1959/'60: De Holocene wordingsgeschiedenis van Noordholland en het Zuiderzeegebied, *TAG* 76, 104-152; 77, 3-57.
- , & A. J. Wiggers, 1961: Enkele opmerkingen betreffende de Holocene zeespiegel- en bodembewegingen in Nederland, *Geografisch Tijdschrift* 14, 202-211.
- *et al.*, 1963: Evolution of the Netherlands coastal area during the Holocene, *Verhandelingen van het Koninklijk Nederlands Geologisch-Mijnbouwkundig Genootschap, Geologische Serie* 21-2, 197-208.
- Prange, W., 1963: Das Holozän und seine Datierung in den Marschen des Arlau-Gebietes, *Nord Friesland, Meyniana* 13, 47-76.
- , 1967: Geologie des Holozäns in den Marschen des Ostfriesischen Festlandes, *Meyniana* 17, 45-94.
- Preuss, J., 1953/'54: Das jungsteinzeitliche Körpergräberfeld von Tangermünde, Kr. Stendal, *Wissenschaftlichen Zeitschrift der Martin-Luther-Universität Halle-Wittenberg* 3, 415-482.
- Quitow, H. W., 1956: Die Terrassengliederung im Niederrheinischen Tieflande, *Geologie en Mijnbouw NS* 18, 357-373.
- , & J. I. S. Zonneveld, 1956: Vorläufiges Ergebnis der Terrassenuntersuchungen im Maas- und Niederrheingebiet, *Geologie en Mijnbouw NS* 18, 428.
- Raaf, H. K. de, 1959: Lichtflitsen over het Langeveld I-II, *Westerheem* 8, 25-29, 75-79.
- , 1966: Lichtflitsen over het Langeveld III, *Westerheem* 15, 30-49.
- Radig, W., 1930: *Der Wohnbau im jungsteinzeitlichen Deutschland*, (Mannus-Bibliothek 43), Leipzig.
- Ramaer, J. C., 1899: *Geographische geschiedenis van Holland bezuiden de Lek en Nieuwe Maas in de Middeleeuwen*, (Verhandelingen der Koninklijke Akademie van Wetenschappen te Amsterdam, Afdeling letterkunde NR deel 2, no. 3), Amsterdam.
- Regteren Altena, H. H. & J. A. Bakker, 1968: Opgravingen bij Medemblik, *WF Oudh.* 11, 201-210.
- , H. A. Heidinga & E. J. Harenberg, 1968: Medemblik, *AN*, \*137-139.
- RegterenAltena, J. F. van, 1969: Een Ruinen-Wommels I pot uit de gemeente Limmen, *Alkmaars Jaarboekje* 5, 60-63.
- , *et al.*, 1962/'63: The Vlaardingen Culture, I-V, *Helinium* 2 (1962), 3-35, 97-103, 215-243; 3 (1963), 39-54, 97-120.
- Regteren Altena, J. F. van & J. A. Bakker, 1966: De neolithische woonplaats te Zandwerven (N. H.), in: *Voetspoor*, Groningen, 33-40.
- Reinerth, H., 1939: Ein Dorf der Grosssteingräberleute, *Germanen Erbe* 4, 226-242.
- Remouchamps, A. E., 1928: Grafheuvelonderzoekingen, *Oudh. Med.* 9, 58-74.
- Reusink, H. J., 1963: Een Veluwe klokbeke uit Leersum, *Westerheem* 12, 87-92.
- Reusink, H. J., 1967: Een late Veluwe klokbeke uit de grafheuvel "Bankiva" te Leersum (U), *Westerheem* 16, 81-87.
- Riezebos, P. A. & A. du Saar, 1969: Een dwarsdoorsnede door de mariene holocene afzettingen tussen Vijfhuizen en Vinkeveen, *Med. Rijks Geol. Dienst* 20, 85-92.
- Riquet, R., 1970: *Anthropologie du Neolithique et du Bronze Ancien*, Poitiers.
- Riquet *et al.*, 1963: Les campaniformes français, *Gallia Préhistoire* 6, 63-128.
- Ruckdeschel, W., 1969: Geschlechtsdifferenzierte Bestattungssitten in frühbronzezeitlichen Gräbern Südbayerns, *Bayerische Vorgeschichtsblätter* 33, 18-44.
- Sangmeister, E., 1951: Die Glockenbecherkultur und die Becherkulturen, (Die Jungsteinzeit im nordmainischen Hessen 3), Melsungen.

- , 1963: La civilisation du vase campaniforme, in: *Les Civilisations Atlantiques du Néolithique à l'Age de la Fer*, Rennes, 25-56.
- , 1964<sup>a</sup>: Die Glockenbecher im Oberrheintal, *Jahrbuch RGZM* 11, 81-114.
- , 1964<sup>b</sup>: Die schmalen "Armschutzplatten", in: *Studien aus Alteuropa* 1, Köln/Graz, 93-122.
- , 1966: Die Datierung der Rückstroms der Glockenbecher und ihre Auswirkung auf die Chronologie der Kupferzeit in Portugal, *Palaeohistoria* 12, 395-407.
- , & K. Gerhardt, (1965): Schnurkeramik und Schnurkeramiker in Südwestdeutschland, (*Badische Fundberichte Sonderheft* 8), Freiburg i. Br.
- , & H. Schubart, 1971: Grabungen in der kupferzeitlichen Befestigung von Zambujal/Portugal in 1970, *Madriider Mitteilungen* 12, 11-45.
- Sarfati, H., 1971: Friezen-Romeinen-Cananefaten, *Holland* 3, 33-47, 89-105, 153-179.
- Sasse, J., 1911: *Anthropologies onderzoek, voorloopig alléén van de door Dr. Holwerda en later door Dr. Evelein opgegraven Katwijker schedels*, *Oudh. Med. OR* 5, 76-124.
- Schakel, W. M., 1954: De waterwolf slaat toe, *Noordeloos*.
- , 1963<sup>a</sup>: Onze streek in de strijd tegen het water, *Onze Streekhistorie, Bijdragen tot de Historie van de Alblasserwaard en de Vijfheerenlanden* 1, 22-23.
- Schakel, M. W., 1963<sup>b</sup>: Tien jaar gelegen sloeg de waterwolf weer toe, *Oud Gorcum Varia* 1963, 59-61.
- Schans, R. P. H. P. van der & W. van der Knaap, 1956: De Bodemgesteldheid van de Nootdorpse en de Driemanspolder, *Internal Report Stiboka no. 448*.
- Schelling, J., 1951: De bodemkartering van Noord-Limburg, thesis Wageningen, also: *Versl. Landb. Ond.* 57.17, 's-Gravenhage.
- Schindler, R., 1953/'55: Die Entdeckung zweier jungsteinzeitlicher Wohnplätze unter dem Marschenschlick im Vorgebiet der Boberger Dünen und ihre Bedeutung für die Steinzeitforschung Nordwestdeutschlands, *Hammaburg* 4, 1-17.
- , 1960: Die Bodenaltertümer der Freien und Hansestadt Hamburg, *Hamburg*.
- , 1961: Rössener Elemente im Frühneolithikum von Boberg, *Hammaburg* 7, 9-29.
- , 1962: Rössener Elemente im Boberger Neolithikum, *Germania* 40, 245-255.
- Schirrig, H., 1971: Funde und Fundstellen um Uelzen, *NNU* 40, 28-57.
- Schlette, J., 1958: Die ältesten Haus- und Siedlungsformen des Menschen auf Grund des steinzeitlichen Fundmaterials Europas und ethnologischen Vergleiche, *Ethnographisch-Archäologische Forschungen* 5.
- Schlicht, E., 1958: Die Untersuchung eines Grabhügels bei Wehm, Kreis Aschendorf-Hümmling, *Die Kunde* 9, 135-142.
- Schmidt, P., 1957: Die vorrömische Eisenzeit im nordwestdeutschen Küstengebiet, *Probleme der Küstenforschung im südlichen Nordseegebiet* 6, 49-120.
- Schmidt, R. R., 1945: Die Burg Vučedol, *Zagreb*.
- Schuldt, E., 1961: Abschliessende Ausgrabungen auf dem jungsteinzeitliche Flachgräberfeld von Ostorf, *Jahrbuch Bodendenkmalpflege in Mecklenburg* 1961, 131-178.
- Schumacher, K., 1921: Siedlungs- und Kulturgeschichte der Rheinlande 1, *Die Vorrömische Zeit*, Mainz.
- Schwabedissen, H., 1951: Zur Besiedlung des Nordseeraumes in der älteren und mittleren Steinzeit, in: *Festschrift für Gustav Schwantes*, Neumünster, 59-71.
- , 1958: Untersuchung mesolithischer-neolithischer Moorsiedlungen in Schleswig Holstein, in: *Neue Ausgrabungen in Deutschland*, Berlin, 26-42.
- , 1966: Ein horizontierter "Breitkeil" aus Satrup und die mannigfachen Kulturverbindungen des beginnenden Neolithikums im Norden und Nordwesten, *Palaeohistoria* 12, 409-468.
- Schwantes, G., 1936: Der neolithische Urnenfriedhof von Sande, in: *Festschrift zur Hunderdjahrfeier des Museums vorgeschichtlicher Altertümer in Kiel*, Neumünster, 79-92.
- , 1939: *Die Vorgeschichte Schleswig-holsteins (Stein- und Bronzezeit)*, Neumünster.
- Simpson, D. D. A., 1966: A Neolithic settlement in the Outer Hebrides, *Antiquity* 40, 137-139.
- , (ed.), 1971: *Economy and settlement in Neolithic and Early Bronze Age Britain and Europe*, Leicester.
- Sluys, P. van der, 1956: Rapport betreffende de bodemgesteldheid van Tielerswaard-West, *Internal Report Stiboka*, 436.

- , & G. C. Maarleveld, 1963: Dekzandruggen uit de Jonge Dryastijd in Zeeuws Vlaanderen, *Boor en Spade* 13, 21-26.
- Smith, A. G., 1958<sup>a</sup>: Postglacial deposits in South Yorkshire and North Lincolnshire, *New Phytologist* 57, 19-49.
- , 1958<sup>b</sup>: The Context of some Late Bronze Age and Early Iron Age Remains from Lincolnshire, *PPS* 24, 78-84.
- Smith, I. F., 1955: Late Beaker Pottery from the Lyonesse Surface and the Date of the Transgression, 11th Annual Report of the Institute of Archaeology, University of London, 1-14.
- , 1961: An Essay towards the Reformation of the British Bronze Age, *Helinium* 1, 97-118.
- , 1965: Windmill Hill and Avebury, Oxford.
- Smith, M. A., 1953: Iberian Beakers, *PPS* 19, 95-107.
- Sonneveld, F., 1958: Bodemkartering en daarop afgestemde landbouwkundige onderzoeken in het Land van Heusden en Altena, thesis Wageningen, also: *Versl. Landb. Ond. No. 64.4*, 's-Gravenhage.
- Soudský, B., 1953: *Untěická Osada v. Postoloprtech*, *Archeologické Rozhledy* 5, 308-318, 426-427.
- Sprockhoff, E., 1941: Niedersachsens Bedeutung für die Bronzezeit Westeuropas, *Ber. RGK* 31 II, 1-138.
- Stampfuss, R., 1929: Die Jungneolithischen Kulturen in Westdeutschland, (*Rheinische Siedlungsgeschichte* 2), Bonn.
- , 1940: Nordische Siedlungskeramik am Niederrhein, *Mannus* 32, 115-130.
- , & R. Schütrumpf, 1970: Harpunen aus der Allerödzeit aus Dinslaken, Niederrhein, *BJ* 170, 19-35.
- Staring, W. C. H., 1858-1867: *Geologische kaart I: 200.000*.
- , 1860: *De bodem van Nederland*, Haarlem.
- Steenhuis, J. F., 1941: Opduikingen tussen Over-Slingeland, Minkeloos en Hoog-Blokland in de Alblasserwaard, *TAG* 58, 942-944.
- Steenis, C. G. G. J. van, 1927: De donkenflora, relictten van een jong-pleistoceene flora in de Lekstreek, *TAG* 44, 467-481.
- Stegen, K., 1942: Die Glockenbecherkultur in Nordwestdeutschland, *NNU* 16, 46-56.
- , 1954: Der nordwestdeutsche Riesenbecher der jüngeren Steinzeit, *Germania* 32, 269-284.
- Stenberger, M., *et al.*, 1943: Das Grabfeld von Västerbjers auf Gotland, *Kungl. Vitterhets Historie och Antikvitets Akademien*, Lund.
- Steur, G. G. L. & I. Ovaa, 1960: Afzettingen uit de pre-Romeinse transgressie periode en hun verband met de loop van de Schelde in midden-Zeeland, *Geologie en Mijnbouw* 39, 671-678.
- Stichting voor Bodemkartering (ed.), 1965: *De bodem van Nederland*, Wageningen.
- Stieren, A., 1934: Vorgeschichtliche Bauten in Westfalen, *Bodenaltertümer Westfalens* 3, 97-121.
- , 1950: Fundchronik für Westfalen und Lippe über die Jahre 1937-1947, *Bodenaltertümer Westfalens* 7.
- Stocký, A., 1929: *La Bohème préhistorique*, I, *L'âge de la Pierre*, Prague.
- Stone, J. F. S., 1934: A Case of Bronze Age Cephalotaphy on Easton Down in Wiltshire, *Man* 34, No. 51.
- , 1941: The Deverel-Rimbury settlement on Thorny Down, Winterbourne Gunner, S. Wilts., *PPS* 7, 114-133.
- , 1958: *Wessex*, London.
- Straaten, L. M. J. U. van, 1954: Radiocarbon datings and changes of sea level at Velzen (Netherlands), *Geologie en Mijnbouw* NS 16, 247-253.
- , 1965: Coastal barrier deposits in South- and North-Holland, in particular in the areas around Scheveningen and IJmuiden, *Med. Geol. Sticht. NS* 17, 41-76.
- Struve, K. W., 1954: Der erste Grundriss eines bronzezeitlichen Hauses von Norddorf auf Amrum, *Offa* 13, 35-40.
- , 1955: Die Einzelgrabkultur in Schleswig-Holstein und ihre kontinentale Beziehungen, *Neumünster*.
- Stuart, P., 1968: Romeinse grafvondsten uit Geldermalsen in het Rijksmuseum van Oudheden te Leiden, *Oudh. Med.* 49, 61-82.
- , 1971: A New Temple of Nehalennia, *Oudh. Med.* 52, 76-78.
- , 1972: 130 römische Steindenkmäler aus dem Meer, *Archäologisches Korrespondenzblatt* 2, 299-302.
- Stuurman, P., 1965: Een archeologisch drama onder de (het) bedrijven door, *Westerheem* 14, 35-79.
- Stuckmann, A., 1914: Haffen-Mehr (Kreis Rees), *Römisch-germanisches Korrespondenzblatt* 7, 49-51.
- Suess, H. E., 1970: Bristlecone-pine Calibration of the Radiocarbon Time-scale. 5200 BC to present, in: *Radiocarbon Variations and Absolute Chronology*, *Nobel Symposium* 12, Stockholm, 303-311.

- Swinnerton, H. H., 1931: The postglacial deposits of the Lincolnshire coast, *Quarterly Journal of the Geological Society of London* 87, 360-375.
- Teixeira de Mattos, L. F., 1933: De waterkeringen, waterschappen en polders van Zuid-Holland, Deel 4.1, afd. II, Het land tussen Lek en Merwede, Den Haag.
- Tesch, P., 1940: In hoeverre is de recente niveauperandering aan de Noordzeekust van tektonischen aard, *Geologie en Mijnbouw NS* 2, 302-304.
- , 1947: De niveauperanderingen en de oudheidkundige verschijnselen, in: Een kwart eeuw Oudheidkundig Bodemonderzoek in Nederland, Meppel, 43-56.
- Teunissen, D. & H. G. C. M. van Oorschot, 1967: De laatglaciale geschiedenis van het verwilderde riviersysteem ten zuidwesten van Nijmegen, *Geologie en Mijnbouw* 46, 463-470.
- Timpel, W., 1966: Neolithische Gräber mit Steinabdeckung von Wilsdorf, Kr. Jena, *Alt-Thüringen* 8, 171-183.
- Thrane, H., 1967: Stenalders fladmarksgrave under en bronzealderhøj ved Gudbjerg, *Aarbøger* 27-90.
- Treinen, F., 1970: Les Poteries Campaniformes en France, *Gallia Préhistoire* 13, 53-108, 263-332.
- Trimpe Burger, J. A., 1958: Het oudheidkundig bodemonderzoek in Zeeland, *Zeeuws Tijdschrift* 8, 68-78, 117-128.
- , 1960: Geologie en archeologie in het Deltagebied, *Geologie en Mijnbouw* 39, 686-691.
- , 1960/'61: Beknopt overzicht van het oudheidkundig bodemonderzoek in het deltagebied, *Ber. ROB* 10/11, 159-200.
- Trump, B. A. V., 1968: Fenland rapiers, in: *Studies in Ancient Europe*, Leicester, 213-225.
- Uenze, O., 1961: Neue Riesenbecher aus Nordhessen, *Fundberichte aus Hessen* 1, 1-9.
- Ullrich, H., 1960: Schädel und Skelettreste des Glockenbecherfriedhofs von Schaftstädt, *Jshr. mitteldt. Vorgesch.* 44, 108-125.
- Umgrove, J. H. F., 1947: Origin of the Dutch Coast, *Kon. Ned. Akad. van Wetenschappen, Proc. of the Section of Sciences* 50, 227-236.
- Veen, J. van, 1940: Het vraagstuk van de daling van den bodem in Nederland, *Geologie en Mijnbouw NS* 2, 228-229.
- , 1945: Bestaat er een geologische bodemdaling te Amsterdam sedert 1700?, *TAG* 62, 2-36.
- , 1954: Tide-gauges, subsidence-gauges and floodstones in the Netherlands, *Geologie en Mijnbouw* 16, 214-222.
- Verbraeck, A., 1958: Veldonderzoek in de Tielerwaard, *Jaarverslag Geologische Stichting 1958*, 41-43.
- , 1961: Algemene resultaten van de kartering in het rivierengebied, *Jaarverslag Geologische Stichting 1961*, 54-56.
- , 1964: Een excursie door het westelijk deel van het rivierengebied, *Jaarverslag Geologische Stichting 1964*, 55-61.
- , 1970: Toelichting bij de geologische kaart van Nederland 1:50.000, blad Gorinchem (Gorkum) Oost, Haarlem.
- Verheylewegen, J., 1964: Potterie de type Peterborough découverte au "Camp à Cayaux" de Spiennes, *Helinium* 4, 235-241.
- Verlinde, A. D., 1971: Spätneolithische und frühbronzezeitliche Siedlungsspuren auf der Meerlo-er Heide, Gem. Meerlo, Prov. Limburg, und ihre Stellung, *APL* 4, 26-46.
- Verwers, G. J., 1964: A Veluvian Bell Beaker with remains of a cremation in a tumulus near Meerlo, *APL* 1, 17-24.
- , 1966: Tumuli at the Zevenbergen near Oss, Gem. Berghem, Prov. Noord-Brabant, *APL* 2, 27-32.
- , 1968: Het fragment van een Veluwe klokbeker uit Mijnsheerenland (Z.-H.), *Westerheem* 17, 80-85.
- , 1972: Das Kamps Veld in Haps in Neolithikum, Bronzezeit und Eisenzeit, thesis Leiden, also; *APL* 5.
- Vink, J., 1926: De Lekstreek, thesis Utrecht.
- Vink, J., 1954: De rivierstreek, Baarn.
- Voelkel, G., 1963: Riesenbecher aus dem Kreise Lüchow-Danneberg, *NNU* 32, 97-105.
- , 1968: Weitere Riesenbecher aus dem Kreis Lüchow-Danneberg, *NNU* 37, 128-130.
- Vogel, J. C. & H. T. Waterbolk, 1963: Groningen Radiocarbon Dates IV, *Radiocarbon* 5, 163-202.
- , & H. T. Waterbolk, 1967: Groningen Radiocarbon Dates VII, *Radiocarbon* 9, 107-155.
- , & H. T. Waterbolk, 1972: Groningen Radiocarbon Dates X, *Radiocarbon* 14, 4-110.
- Vons, P., 1969: Velsen (N.-H.), *Westerheem* 18, 106-107.
- Voogd, H., 1955: Romeinse woongronden in het Land van Heusden en Altena, *Westerheem* 4, 86-91.

- Voorde, P. K. J. van der, 1963: Gronden met een textuur B-horizont in het Utrechtse rivierkleigebied, Boor en Spade 13, 82-111.
- Voorrips, A., 1964: A pollenanalytical investigation of a boring made near a river dune in South-Holland, Acta Botanica Neerlandica 13, 237-245.
- , 1973: ALGOL-60 Program for Computation and Graphical Representation of Pollenanalytical Data, Acta Botanica Neerlandica, 22, 645-654.
- Voss K. L., 1964: Der Schwarzenberg bei Wittenwater, Kr. Uelzen, ein siebenperiodiger Fundplatz, NNU 33, 78-85.
- , 1967: Die Vor- und Frühgeschichte des Kreises Ahaus, (Bodemaltertümer Westfalens 10), Münster.
- Vries, H. de & G. W. Barendsen, 1954: Measurements of Age by the Carbon 14 Technique, Nature 174, 1138-1141.
- , G. W. Barendsen & H. T. Waterbolk, 1958: Groningen Radiocarbon Dates II, Science 127, 129-137.
- , & H. T. Waterbolk, 1958: Groningen Radiocarbon Dates III, Science 128, 1550-1556.
- Waaals, J. D. van der, 1961: Onderzoek van een tumulus uit de Vroege Bronstijd bij Noordsleen, NDV 79, 238-239.
- , 1961<sup>a</sup>: Angelsloo, gem. Emmen, AN, \*235.
- , 1962: Sporen van bewoning en begraving uit Neolithicum en Bronstijd bij hoeve "De Schipborg" gem. Anlo, NDV 80, 123-272.
- , 1964: Prehistoric Disc Wheels in the Netherlands, thesis Groningen.
- , 1965<sup>a</sup>: Early Ceramics in the Netherlands: two Problems, in: Matson (ed.), Ceramics and Man, (Viking Fund Publications in Anthropology 41), 124-140.
- , 1965<sup>b</sup>: Angelslo, Gem. Emmen, AN, \*50, \*105.
- , 1966: Angelslo(o), Gem. Emmen, AN, \*14-16, \*91.
- , 1967: Kroniek van opgravingen en vondsten in Drenthe in 1965, Graven en bewoningssporen uit Neolithicum en Bronstijd te Angelsloo, NDV 85, 209-214.
- , 1972: Die durchlochten Rössener Keile und das frühe Neolithikum in Belgien und in den Niederlanden, Fundamenta, Reihe A, Band 3, Teil Va, 153-184.
- , & W. Glasbergen, 1955: Beaker types and their distribution in the Netherlands, Palaeohistoria 4, 5-46.
- , & W. Glasbergen, 1959: De twee Bekerculturen, in: Honderd Eeuwen Nederland, (= Antiquity and Survival 2, 5-6), 's-Gravenhage, 100-114.
- Wagner, K. H., 1938: Steinzeitliche Pfostenhütten bei Mayen, in: Marburger Studien, Darmstadt, 254-258.
- , 1938/39: Mühlheim (Landkreis Koblenz), Bonner Jahrbücher 143/144, 355-357.
- Wal, W. A. van der, 1952: Interessante Archaeologica, Westerheem 1, 74-77, 106-107.
- Wallenburg, C. van, 1966: De Bodem van Zuid-Holland, Wageningen.
- Warren, S. H., *et al.*, 1936: Archaeology of the Submerged Landsurface of the Essex Coast, PPS 2, 178-210.
- Warren, S., Hazzledine & I. F. Smith, 1954: Neolithic Pottery from the Submerged Land-surface of the Essex Coast, 10th Annual Report of the Institute of Archaeology, University of London, 26-33.
- Waterbolk, H. T., 1954: De praehistorische mens en zijn milieu, thesis Groningen.
- , 1956: Pollen Spectra from Neolithic Grave Monuments in the Northern Netherlands, Palaeohistoria 5, 39-51.
- , 1958: Neolithische vlakgraven in Drenthe, NDV 76, Van Rendierjager tot Ontginer 3, 3-17.
- , 1959: Overzicht van het Praehistorisch Onderzoek in Drenthe in 1958, NDV 77, 187-206.
- , 1960: Preliminary Report on the Excavations at Anlo in 1957 and 1958, Palaeohistoria 8, 59-90.
- , 1962: Hauptzüge der eisenzeitlichen Besiedlung der nördlichen Niederlande, Offa 19, 9-46.
- , 1964<sup>a</sup>: The Bronze Age Settlement of Elp, Helinium 4, 97-131.
- , 1964<sup>b</sup>: Ein Grabhügel auf dem Gut de Eese, gem. Vledder, prov. Drenthe, Palaeohistoria 10, 71-86.
- , 1970: Die Datierung der Wurten in historischer Sicht, Probleme der Küstenforschung im südlichen Nordseegebiet 9, 1-12.
- , & W. van Zeist, 1961: A Bronze Age Sanctuary in the Raised Bog at Bargerooosterveld (Dr.), Helinium 1, 5-19.
- Weerd, M. D., 1966: Appendix at Van Giffen 1966, in: Voetspoor, Groningen, 174-175.
- , 1967: Medemblik, AN, \*31.
- Wegewitz, W., 1960: Ein Schädelbestattung der Einzelgrabkultur, NNU 29, 6-17.
- Wensink, J. J., 1959: Enkele opmerkingen over grafheuvels ten Z. van Grootebroek, voornamelijk in verband met de bodemgesteldheid, WF Oudh. 2, 148-154.

- Wheeler, R. E. M., 1923: A New Beaker from Wales, *The Antiquaries Journal* 3, 21-23.
- Wiese, W. F. G., 1956: De verspreiding van de archaeologische gegevens in West Friesland in verband met de morfogenese, *TAG* 73, 23-42.
- Willis, E. H., 1961: Marine transgression sequences in the English Fenlands, *Annual of the New York Academy of Science* 95, 368-376.
- Wijngaarden-Bakker, L. van, in press: Horses from the Dutch Neolithic (Polish translation), *Z. Otchłani Wieków*.
- Wyss, R., 1969: Wirtschaft und Technik, in: *Ur- und Frühgeschichtliche Archäologie der Schweiz, II, Die Jüngere Steinzeit*, 117-138.
- Zagwijn, W. H., 1965: Pollen-analytic correlations in the coastal-barrier deposits near The Hague (The Netherlands), *Med. Geol. Sticht.* 17, 83-88.
- , 1971: De ontwikkeling van het "Oer-IJ" estuarium en zijn omgeving, *Westerheem* 20, 11-18.
- Zeist, W. van 1955: Pollenanalytical investigations in the Northern Netherlands, with special reference to archaeology, thesis Utrecht, also: *Acta Botanica Neerlandica* 4, 1-81.
- , 1963: Het stuifmeelonderzoek van de grafheuvel te Mol, *Archaeologica Belgica* 72, 20-22.
- , 1967: Archaeology and Palynology in the Netherlands, *Review of Palaeobotany and Palynology* 4, 45-65: also: *Varia Bio-Archaeologica* 29.
- , 1968: Prehistoric and Early Historic Food Plants in the Netherlands, *Palaeohistoria* 14, 41-173.
- Zeuner, F. E., 1958: *Dating the Past*, London, 4th. ed.
- , 1963: *A History of Domesticated Animals*, London.
- Zoller, D. 1963: Das Kreisgrabengräberfeld Querenstede, Kr. Ammerland, *Die Kunde* 14, 98-111.
- Zonneveld, I. S., 1960<sup>a</sup>: De Brabantse Biesbosch. Een studie van bodem en vegetatie van een zoetwatergetijden delta, thesis Wageningen, also: *Bodemkundige Studies* 4, Wageningen.
- , 1960<sup>b</sup>: The Norfolk Broad, *Geographical Journal* 126, 341-342.
- Zumstein, H., 1966: *L'Age du Bronze dans le département du Haut-Rhin*, Bonn.
- Zwart, H. J., 1951: Postglaciale land- en zeeniveau-veranderingen, *Proc. Kon. Ned. Akad. van Wetenschappen*, Amsterdam, Section of Sciences. Series B, 54, 162-173.

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The site Molenaarsgraaf seen from the north. We are standing on the peat-covered clay wedge of the Schoonrewoerd stream ridge, within the reach of the "sand lobe". The ridge itself can be seen best, where it is crossed by the N-S running ditch in the centre of the picture. The ditch gets an irregular course where it crosses the loose sand of the ridge; the higher banks are also clearly visible. At the right the excavation is in progress in the pits Z8-II (the photo is made during the second operation in 1967). To the left of the ditch both sheds are situated on the place of the pits B6-8. To the left of the sheds one can see the depression where the break-through channel lies.

PLATE II



Molenaarsgraaf. The eastern part of pit A8, seen from the NW. Post holes, a round pit and disturbances by roots.



Molenaarsgraaf. Section through a post hole. Visible are the brown clay cover, the grey occupation layer and the post hole in the yellow sand below.



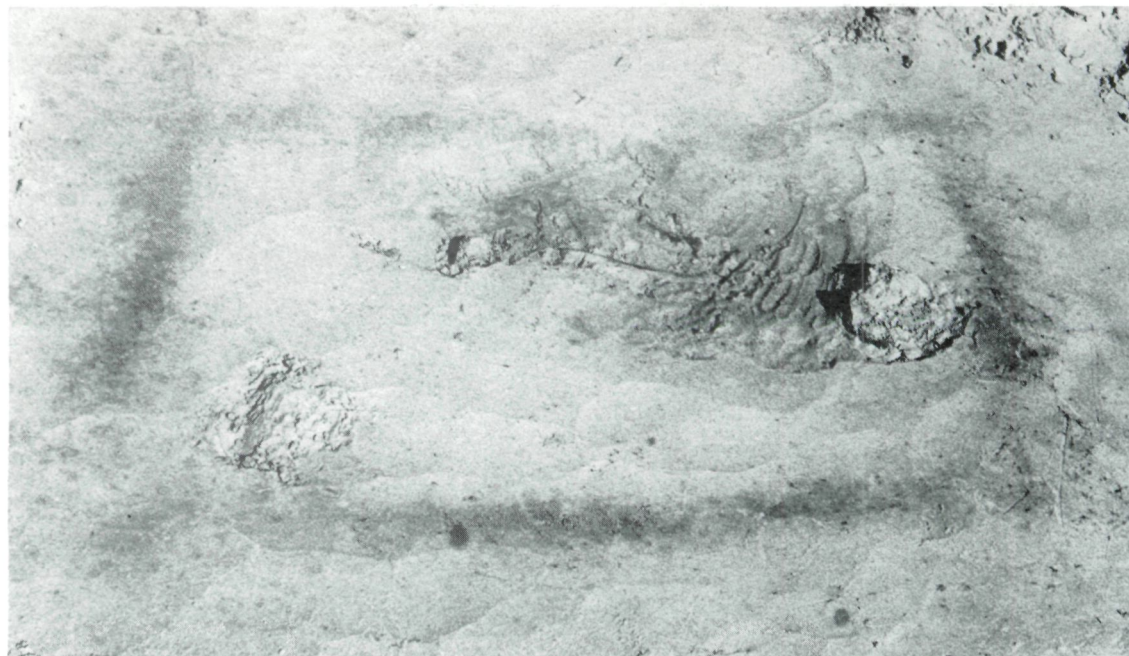
Molenaarsgraaf. General view of pit C8 during the excavation.



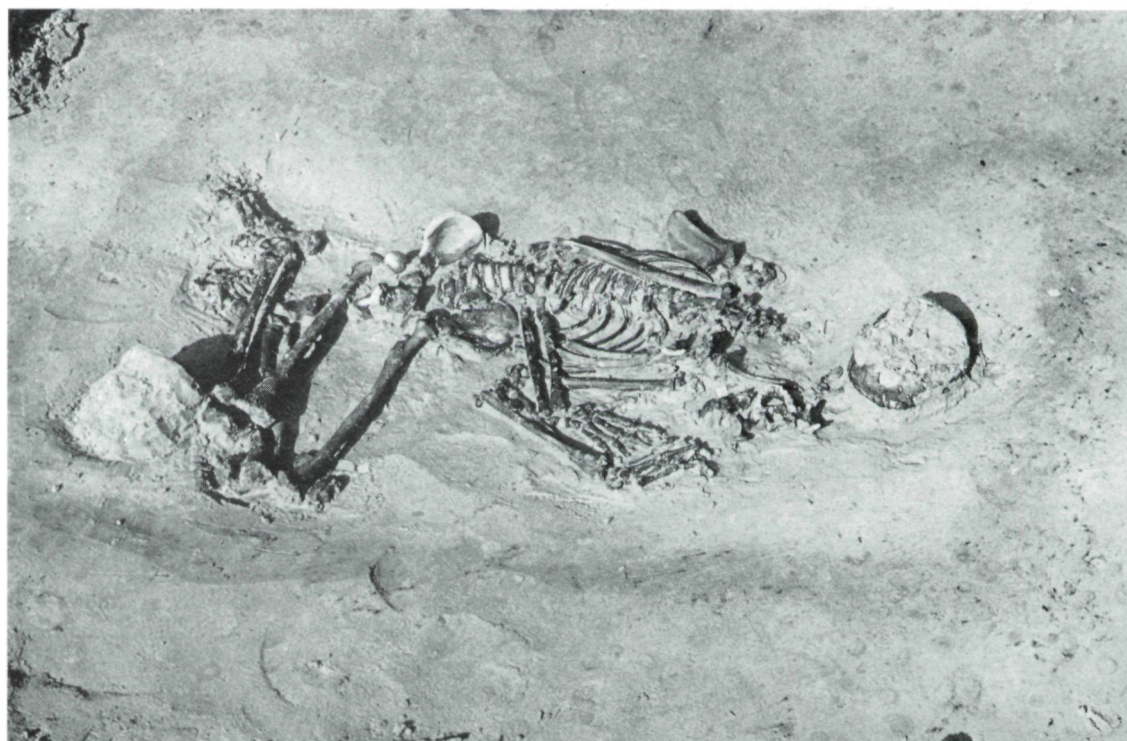
Molenaarsgraaf. Detail of the north section of pit C8, showing the roots of an alder carr on the east bank of the residual channel.



Molenaarsgraaf. Grave I, vertical photograph.



Molenaarsgraaf. Grave I at -1.50 m NAP, showing the traces of the timber casing and the position of the skull, pelvis and beaker.



Molenaarsgraaf. Grave I, oblique view from the south.



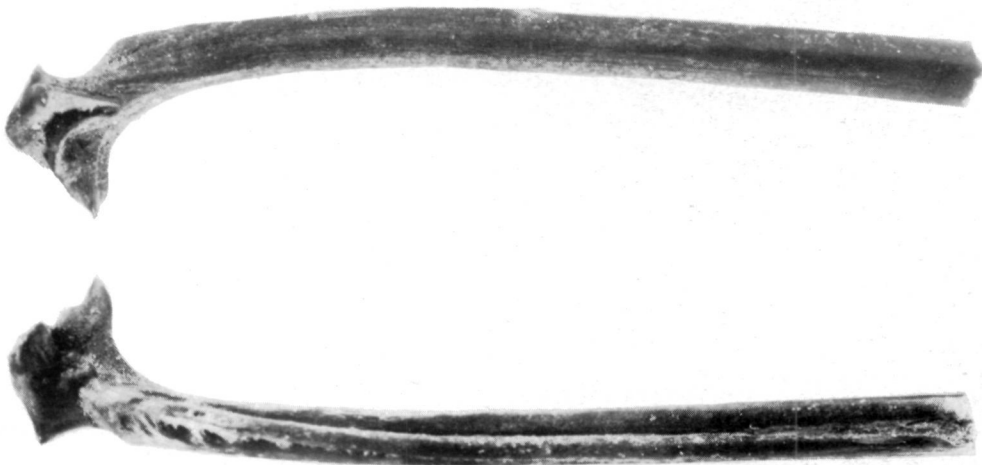
Molenaarsgraaf. Grave I, detail, showing the position of the skull, lower jaw and fin ray (indicated with a match).



Molenaarsgraaf. Grave I, detail showing the position of arms and hands.



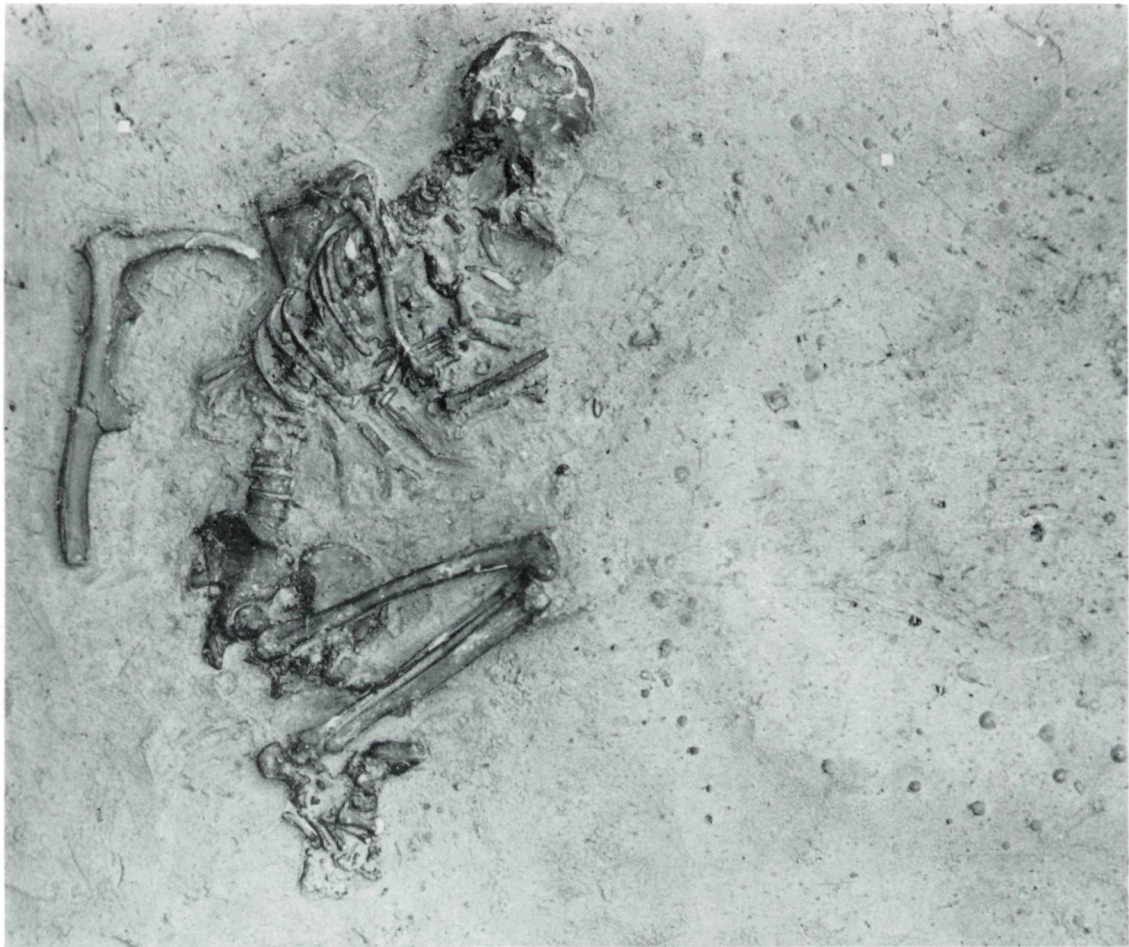
Molenaarsgraaf. Bell beaker from grave I.



Molenaarsgraaf. Fin ray from grave I, 6 × natural size.



Molenaarsgraaf. Grave II, vertical photograph.



Molenaarsgraaf. Grave II and surroundings, showing the pit no. 199, intersecting the grave. Vertical photograph.



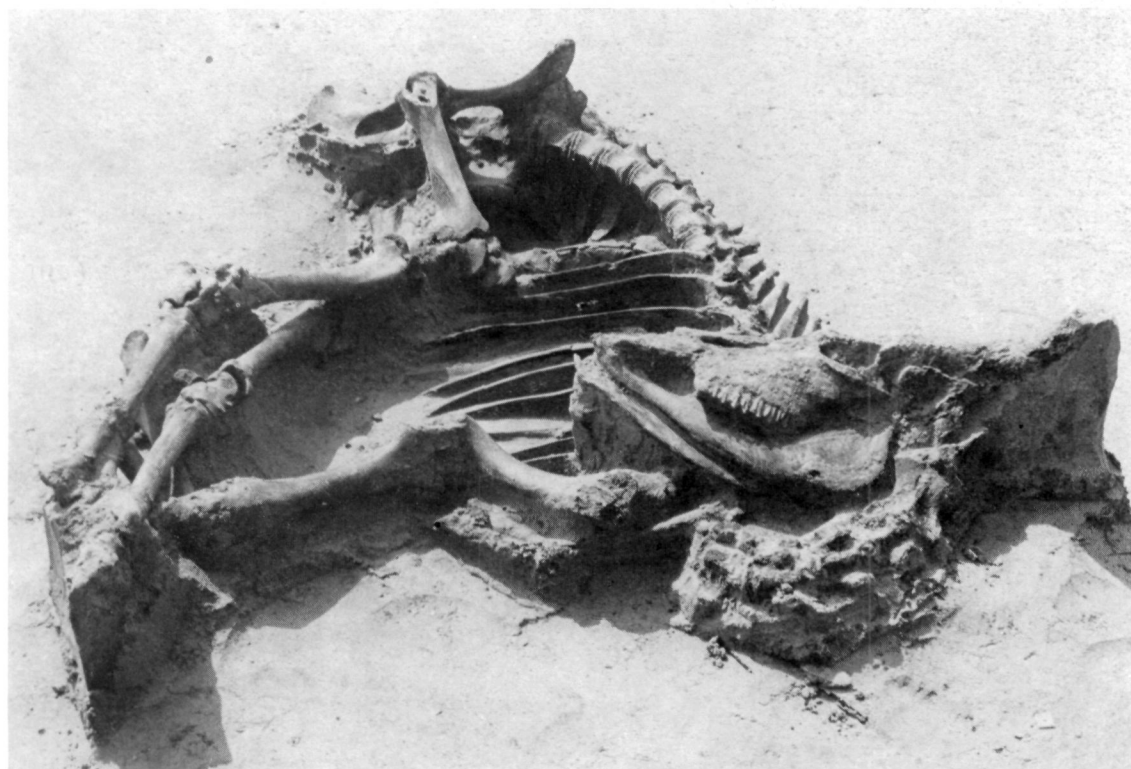
Molenaarsgraaf. The fish-hooks from grave II,  $3/2 \times$  natural size.



Molenaarsgraaf. Grave III, vertical photograph.



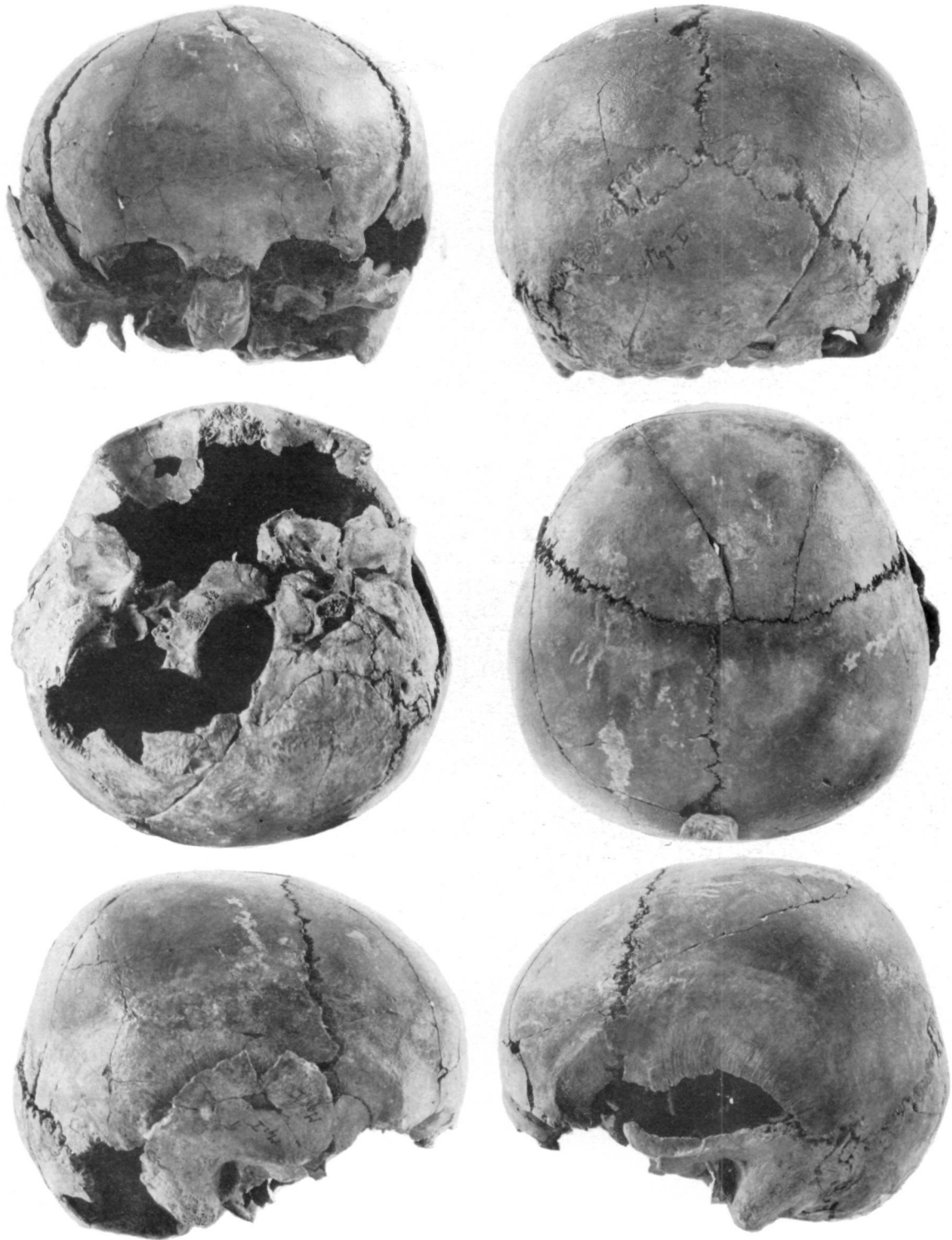
Molenaarsgraaf. Grave III, oblique view from the south, showing the deformation of the skull.



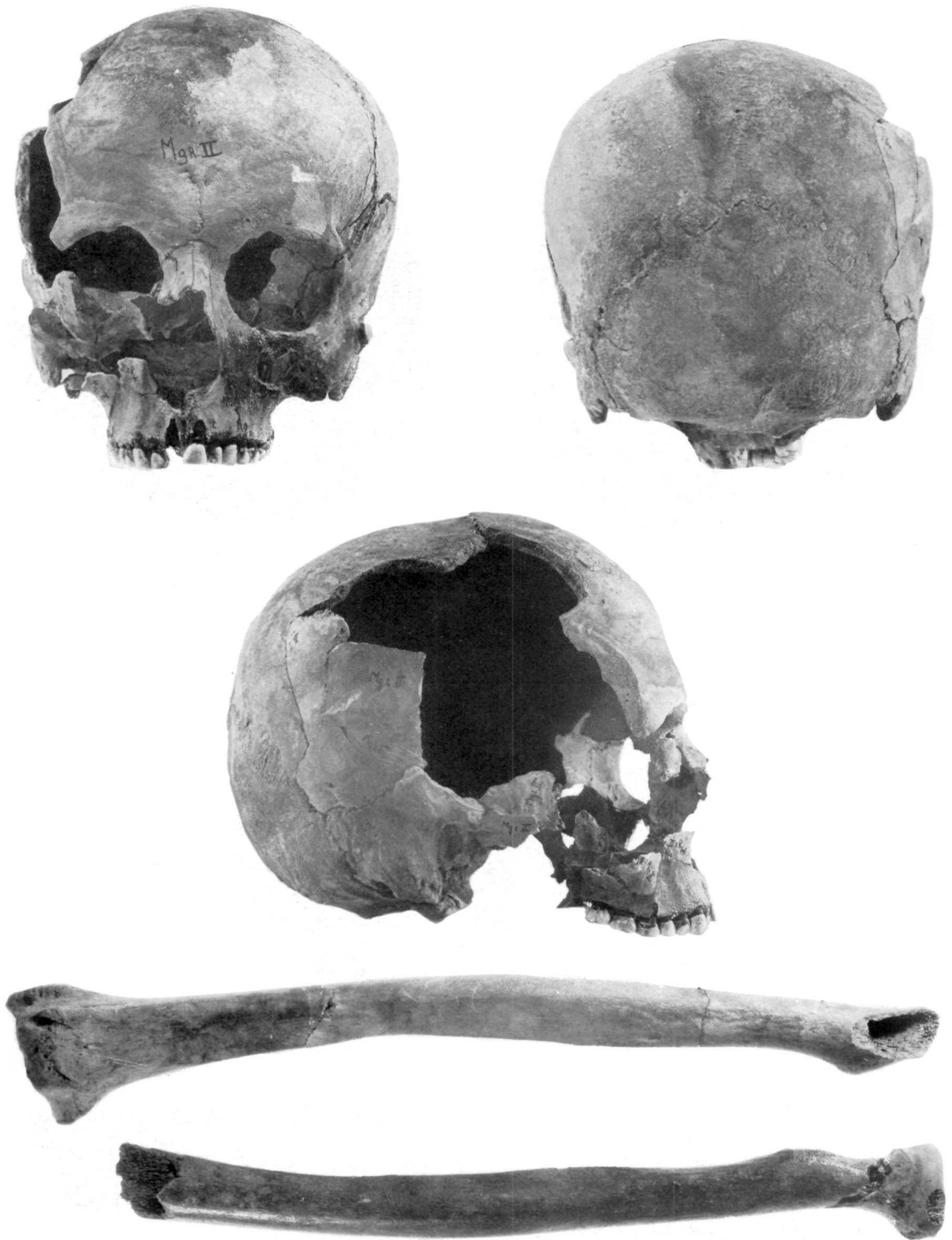
Molenaarsgraaf. Ox burial, oblique view from the north.



Molenaarsgraaf. Ox burial, vertical photograph.



Molenaarsgraaf. Grave I, skull.



Molenaarsgraaf. Grave II, skull and both *radii*. The diaphysis of the upper (left) *radius* was found in pit 199, the diaphysis of the lower (right) *radius* in the infilling of the gully (deposit 1). Both articular ends come from the grave. Skull and *radii* on different scales.



Molenaarsgraaf. Grave II, skull and both *ossa coxae*. The left *os coxae* (at the left) shows considerable deformation. Skull and *ossa coxae* on different scales.



Molenaarsgraaf. Grave II, skull.



Hazendonk, municipality Molenaarsgraaf. The *donk* during the excavation seen from the south.



