

Archaeology and Geology of the Western Netherlands

Excursion Guide

Thursday, 6 May 1982

Excursion of the congress on
PREHISTORIC SETTLEMENT PATTERNS
AROUND THE
SOUTHERN NORTH SEA

held in honour of Prof. Dr. P.J.R. MODDERMAN

Leiden, 3-7 May 1982

Institute for Prehistory
National Museum of Antiquities

GENERAL INTRODUCTION

The landscape

The Western Netherlands are built up during the Holocene as the combined delta of the Rhine, Meuse, Scheldt and some minor rivers and brooks. In this point of view the concept "delta" is used in its widest sense as the totality of all deposits at the mouth of the river, marine, estuarine, lagoonal and aeolic deposits as well as fluvial. Delta-sediments in strict sense, being subaquatic fluvial deposits, are almost absent.

The facies of most deposits indicate that they were formed at a height around the then water level. The thickness of the sediments that can reach 25 m is a direct result of the sea-level rise, with which the sedimentation could keep pace.

Within the delta various landscapes can be made out, that existed throughout the Holocene, but shifted in position and varied in extent through the ages. These are from west to east:

- the coastal district with sandy barriers and strand flats, beaches and dunes. This is a zone of sedimentation of sand by wave action and wind.
- the tidal flat district with laminated sandy deposits in a marine environment.
- salt marshes, formed to some decimeters above Mean High Water during floods. The sedimentation is marine, but natural salt marshes that are rarely flooded may become fresh.
- a zone of estuarine creek systems with gully-, bank- and backswamp-deposits, of sandy to clayey texture; this zone might have considerable overlaps with the preceding and next district. The salinity is strongly to slightly brackish.
- a zone of fresh water peat bogs, in parts crossed by rivers with clayey high water deposits and slightly sandy banks and with side creeks extending into the peat bogs. The environment varies from eutrophic to oligotrophic far from the rivers.
- a zone of fluvial clastic sedimentation, the "river clay area", with sandy river bed sediments in meander belts, sandy to clayey levee deposits and clayey backswamp sedimentation that may be even humic or peaty in places. From east to west there is a decrease of the amount of sand and an increase in clay content of all deposits.

The vast area of sedimentation between the coastal barrier belt and the pleistocene hinterland is generally described as the intracoastal area or intracoastal sedimentation district.

A "perimarine area" has been described between the marine and fluvial sedimentation district. It is the region where fresh water sedimentation took place, but at levels that were determined by the sea, its tides and level changes. Like all other landscapes this area has shifted to the east and will have been of varying extent. It mainly coincided with the district of peat formation, but major problems are to assess where the marine influence on sedimentation levels and rates ended to the east and to separate fluvial and marine effects on the levels of deposition. The concept "perimarine" cannot be used as a mapping distinction, but is an interesting concept from a processional point of view.

The geological history of the Western Netherlands - and in direct relationship with it the history of prehistoric and early historic occupation - is not uniform from the north to the south. Variations in Pleistocene morphology, in tidal amplitude, in coastal marine current patterns and the amount of sediment available and above all the positions of the inlets in the coastal barriers and of the lower river courses are all responsible for variations in a N-S direction of the zonation, sketched above. The following districts can be made out:

- the island district in the south-west, consisting of mediaeval and post-mediaeval sediments with relics of "Old Land".
- the Meuse-estuary and the peat district to the east of it, characterized by a sequence of creek systems and river deposits.
- the region between the Hook of Holland and Alkmaar, consisting of peat bogs with lake bottom reclamations behind coastal barriers.
- the northern part of Holland with Westfrisia, dominated by the fossil inlet at Egmond and the tidal deposits behind and by the young sediments that replace the destructed pre-mediaeval landscape.

Transgressive and regressive intervals

The sedimentation sequence shows a succession of periods with marked marine influence in the intracoastal area, named transgressive phases, interrupted by periods of restricted marine ingression, named regressive phases. This sequence is reflected in a east-west shift of the environments, named above. So a transgression can be identifiable as an estuarine creek system that extended into the peat, tidal flat sediments overlying and eroding a salt marsh deposit and so on. One total cycle consists of a marine erosion phase, subsequent sedimentation and a phase in which gullies were filled up and/or peat formation extended. The transgressive phases got the names Calais I-IV and Dunkirk 0-III, some with a number of subphases (esp. C IV, D I and D III). The start and end dates of the transgressive phases are not equal in all districts. Those in Friesland and Groningen differ especially in the D 0 - D I period. We will not discuss here the complex origin of this phenomenon. Increased storm flood frequency and minor fluctuations in the sea-level rise will play a role as did increased river discharge in some cases. Not all transgressive phases must necessarily be explained in the same way, but since a number of factors play a role - some of them only of local value - an explanation of all transgression phases can be given only in very general sense.

Sea-level changes

The over-all determining factor of geology and occupation in the Dutch delta is the rise of sea-level. The general trend of it was first established by Bennema (1954) and subsequently approved by Jelgersma (1961, 1966, 1979). An archaeological contribution to this phenomenon was given by the author of this guidebook (Louwe Kooijmans 1974, 1976). Recently a new and very detailed approximation was made by Van de Plassche (1982) in his thesis, presented to the Free University of Amsterdam.

Apart of fixing as exact as possible the trend of the curve, a major point of discussion is whether fluctuations in Mean Sea-Level rise took place and, if so, whether these can be calculated from field observations. Van de Plassche demonstrated that fluctuations, coinciding with some transgressive phases occurred.

The calculation of dated former sea-levels and the evaluation of field observations in this respect are of relevance for the establishment of the environments of archaeological sites. Another point is the explanation of trend and fluctuations. There are many factors that played a part. These are not only the increase in water volume after the melting of the ice caps (that explains the trend) but also factors like changes in ocean basin volume, in the form of the geo-ellipsoid, various types of isostasy and tectonics.

Fluctuations in Mean Sea-Level might contribute to the transgression/regression cycles, but other types of fluctuations like changes in tidal amplitude or storm flood frequency are not reflected in the MSL-curve.

Prehistoric and early historic occupation

In no other region did environmental factors fix the possibilities for occupation and prescribe the way of life to such a degree, as in this ever changing area soaked with water. It offers ideal opportunities for the combination of environmental, ecological and cultural studies. In most places organic remains are preserved of both the natural vegetation and fauna and of the occupational refuse. There is a natural stratigraphy on a macro-scale that links all archaeological observations throughout the delta, but also on many places micro-stratigraphies are available, as will appear in this guide book.

But there certainly are restrictions. Distribution patterns are notoriously imperfect as a result of erosion and deposition. Another major point is the general value of the results. These cannot be applied to situations outside the delta district and even results in one region, especially data on subsistence economy and way of life can only be used outside it with restriction.

The study of human occupation in relation to environment and environmental change may in summary be illustrated by a simple chrono-geographical scheme and an indication of sedimentation cycles. We must, however, realize that nothing is shown on the quality of occupation, that is the way of life and environmental adaptations. Every region had and still has its own possibilities for human life and so its own occupational sequence. But for our overall view the scheme illustrated here in fig. 10 may suffice. It is a picture of this moment that will be supplemented when new finds will come to light and by results of future excavations. It is already markedly better filled than earlier schemes, made not so long ago. Major contributions to it are made by Professor Modderman (river clay district), Van Regteren Altena (coastal district and West-Frisia), the Biological-Archaeological Institute of Groningen (northern salt marsh district) and the author of this guide (peat district).

It appears that there is some relationship to the transgression/regression cyclicality, but not so strict as formerly suggested. In fact man settled where and when possible, that is on places above Mean High Water, on a relatively well-drained subsoil, and - in the case of agrarian communities - with enough arable land in the vicinity.

5.

We must realize that settlement sites, used during the transgressive intervals were very vulnerable for the erosion that occurred in these phases and had a smaller chance to be preserved than those from the end phase of sedimentation. The lack of occupation data from these periods can be accounted for largely in this way and this need not to signify absence of human occupation. We also can question whether people will have been seriously troubled by the processes going on in a transgressive phase. The wide-spread peat formation in a regressive maximum was perhaps more preventive. But there existed always the possibilities to displace settlements to less unfit parts of the same region or even to another district within the delta.

A problem is, that it is very difficult for theoretical reasons, and also in view of the imperfections of archaeological dating, to prove the absence of archaeological remains in a certain period.

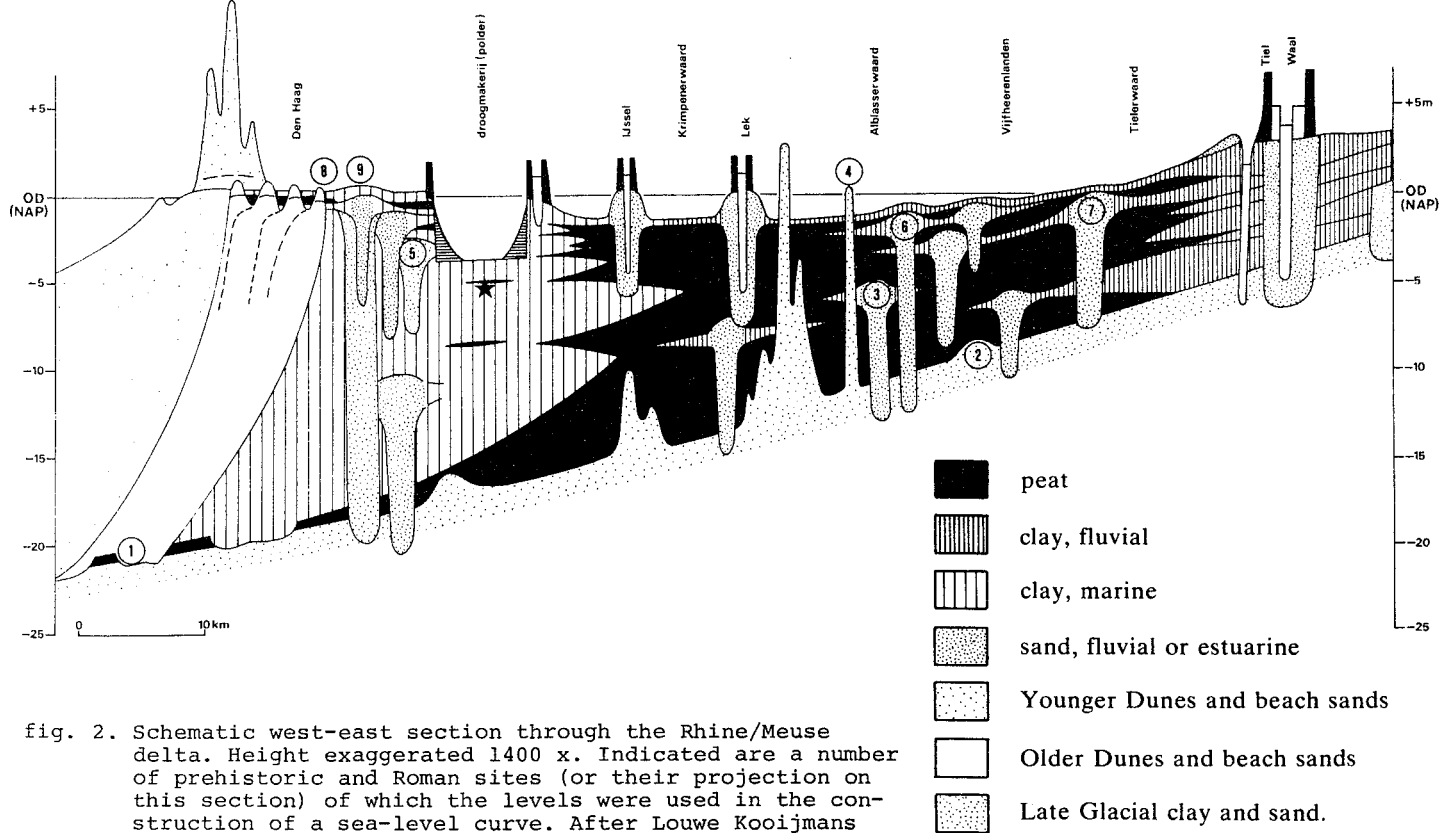


fig. 2. Schematic west-east section through the Rhine/Meuse delta. Height exaggerated 1400 x. Indicated are a number of prehistoric and Roman sites (or their projection on this section) of which the levels were used in the construction of a sea-level curve. After Louwe Kooijmans 1976.

Indicated sites: 1 Europoort. 2 Willemsstad. 3 Swifterbant-S3 (projected). 4 Hazendonk. 5 Vlaardingen, Hekeelingen. 6 Molenaarsgraaf, Ottoland. 7 Zijderveld. 8 Voorschoten, Loosduinen, Artentsburg. 9 Valkenburg, Rijswijk. ★ Bergschenhoek (added).

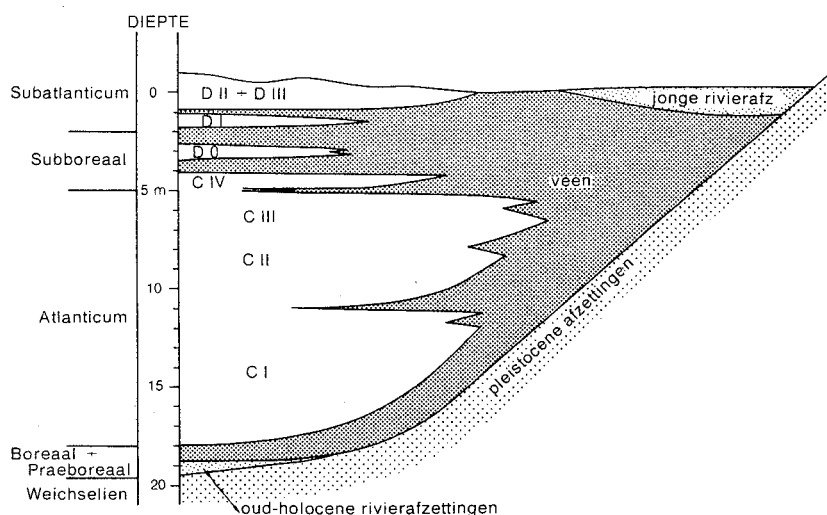
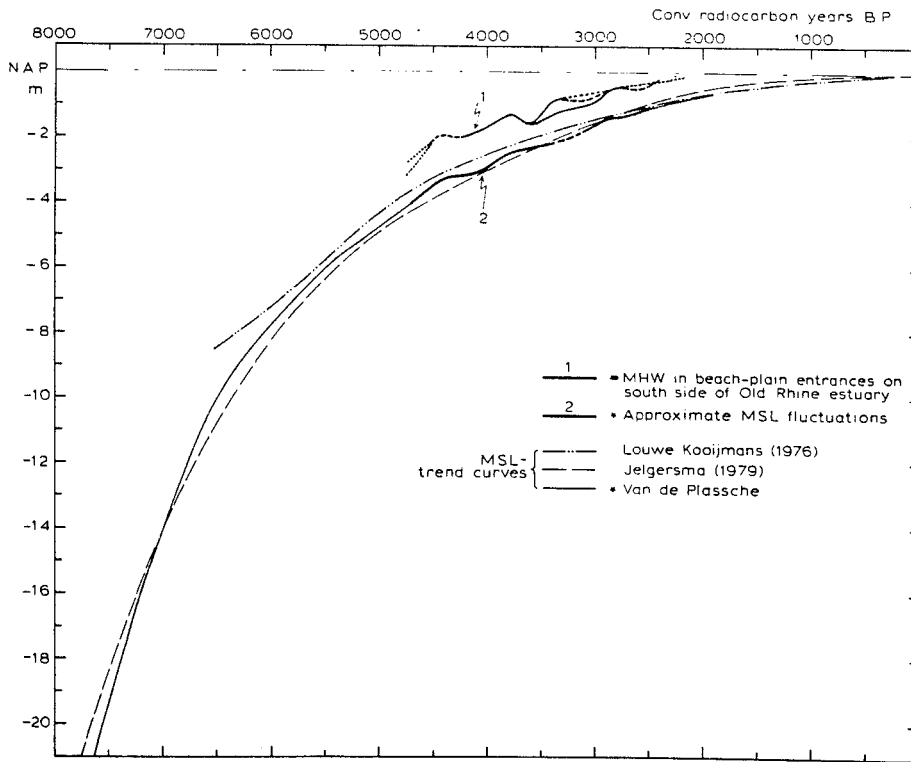


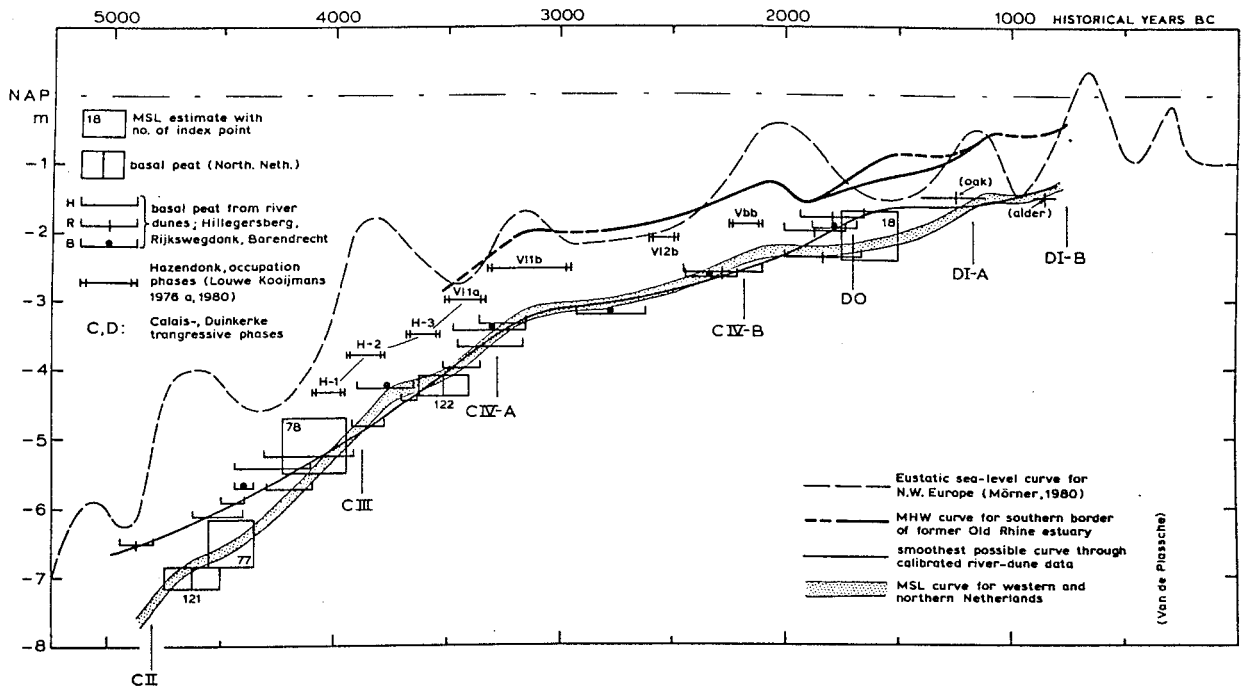
fig. 3. Diagram showing depth and extent of the deposits of the various transgressive phases. After Van Staaldin 1979.

- Duinkerke III (800 n. Chr. en later)
- Duinkerke II (250-600 n. Chr.)
- Duinkerke I (500-200 v. Chr.)
- Duinkerke 0 (1500-1000 v. Chr.)
- Calais IV (2700-1800 v. Chr.)
- Calais III (3300-2700 v. Chr.)
- Calais II (4300-3300 v. Chr.)
- Calais I (6000-4300 v. Chr.)

fig. 4. Current dating of the major transgressive phases. After Zagwijn/Van Staaldin 1975.



Trends of relative MSL rise for The Netherlands as established by LOUWE KOOIJMANS (1976) and JELGERSMA (1979), and by the present study. Analysis of data from the areas near Molenaarsgraaf and around Rotterdam and from the Old Rhine estuary in the 4600 - 2750 BP interval shows that rate of MSL rise varied considerably.



Graph of relative MSL rise for the western and northern Netherlands between 5000 and 750 BC compared with the eustatic sea-level curve for N.W. Europe by MÖRNER (1980). Fluctuations in the MSL graph correspond almost exactly in time with oscillations in the eustatic curve. Separation of the two curves back in time points to subsidence of The Netherlands with c. 3.5 cm / 100 years.

Fluctuations in the MSL graph correspond with transgressive and regressive intervals in The Netherlands, except for the end of the Calais-II transgressive period (around 4000 BC, not indicated in figure) and the Duinkerke-0 phase. The first discrepancy is explained as the result of peat growth in response to shallowing and freshening of the landward part of the lagoonal area in the western Netherlands due to tidal amplitude reduction (caused by coastal barrier development) and river-water supply. The Duinkerke-0 transgression may be explained in terms of wet climatic conditions and increased storm activity.

The MSL curve helps explaining coastal progradation in the western Netherlands beginning at about 3750 BC.

fig. 6. Curves of the relative rise of Mean Sea Level after Van de Plassche (1982).

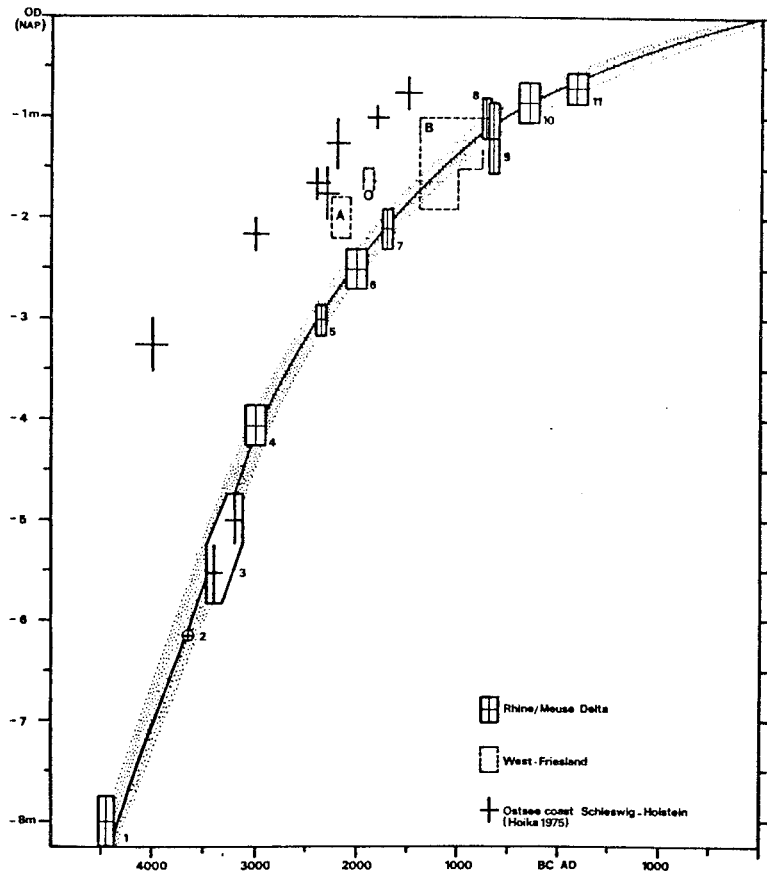


fig. 7. Time/depth diagram of dated MHW-levels in the Rhine/Meuse delta, derived from the depths of archaeological sites, and the curve for the rise of mean sea-level that is obtained in this way. The dotted zones give an indication of the variation due to locally or regionally varying conditions.

Also indicated (but not taken into account) are some data from Westfrisia, where sedimentation during the Calais IV phase reached very high levels.

The curve of the eustatic rise of sea-level must lie somewhere between the data from the area of tectonic depression at the mouth of the river Rhine and the area of glacio-isostatic upheaval of the east coast of Schleswig-Holstein. After Louwe Kooijmans 1976, 1980.

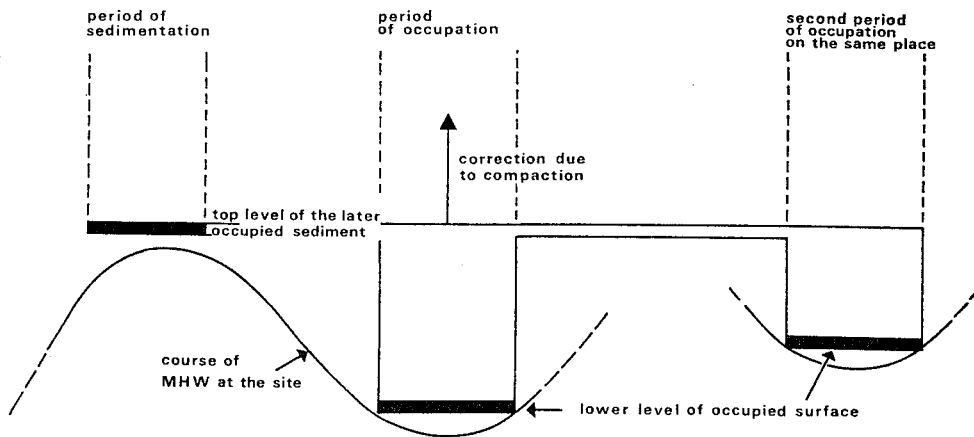


fig. 8. Diagram explaining the occupation on fresh deposits, laid down at about Mean High Water level, by the local drop of this level after the maximum of a local or regional transgression. After Louwe Kooijmans 1974.

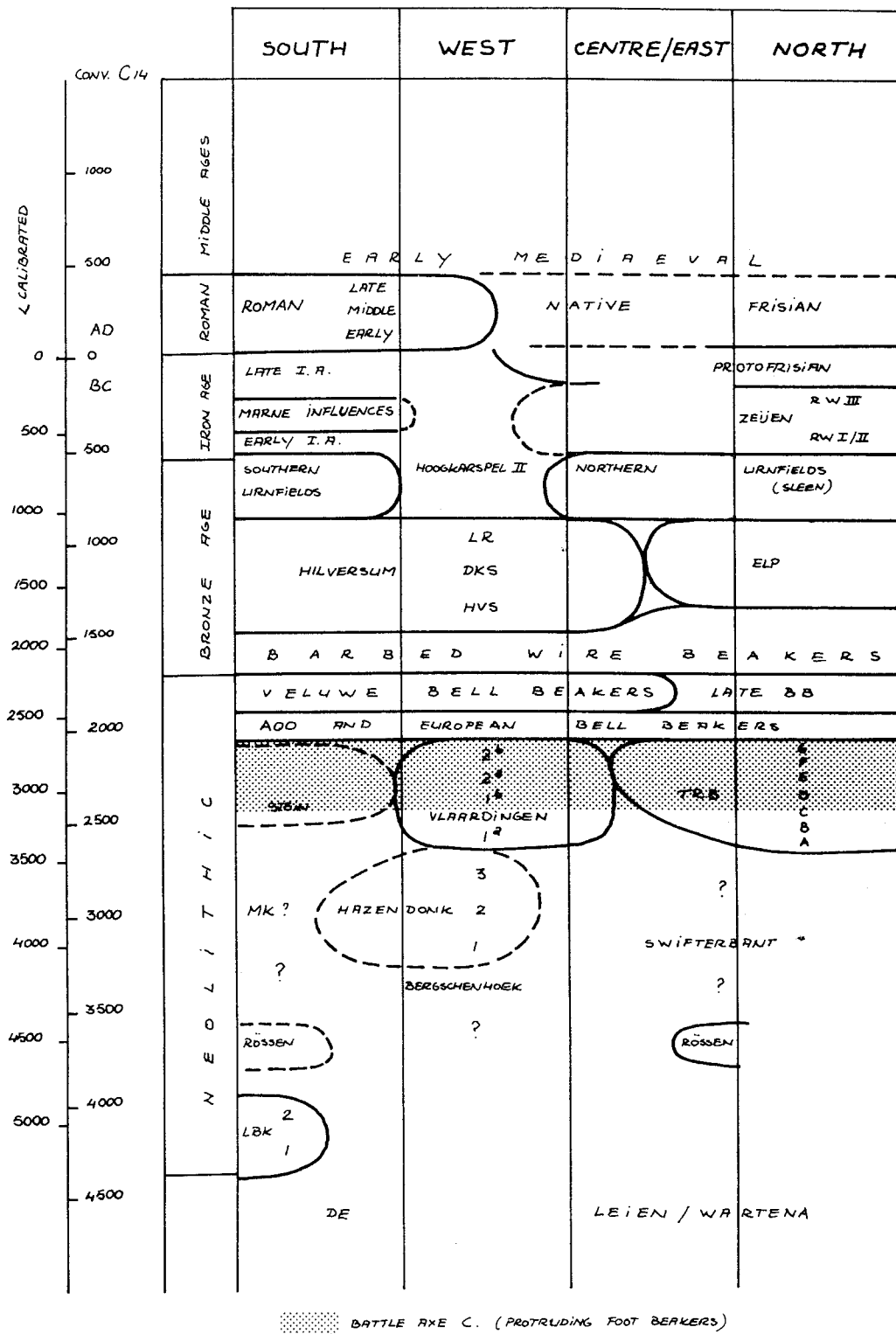


fig. 9. Chrono-geographical scheme of the pre- and protohistory of the Netherlands.

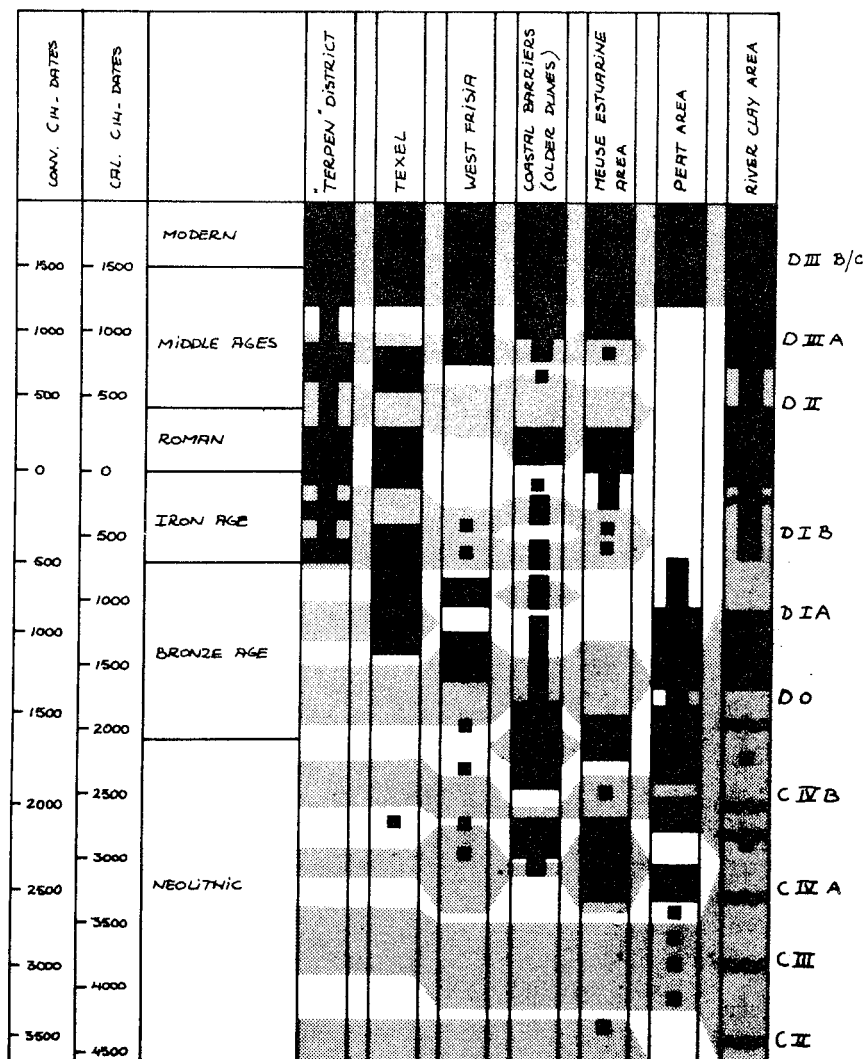


fig. 10. Diagram illustrating the occurrence of archaeological remains in the main Holocene sedimentation districts of the Netherlands in relation to the local sequence of wet and dry phases.

Black: occupation according various sources

Shaded: wet phases

Terpen district and Texes: transgressive phases cf. Roeleveld 19

Westfrisia and Meuse estuary: transgressive phases cf. Zagwijn/Van Staalduinen 1975

Coastal barriers: peaty layers cf. Jelgersma a.o. 1970

Peat district: sedimentation cf. Van der Woude 1982

River clay area: sedimentation and periods of stream bed displacements cf. Berendsen 1982

Preliminary draft.

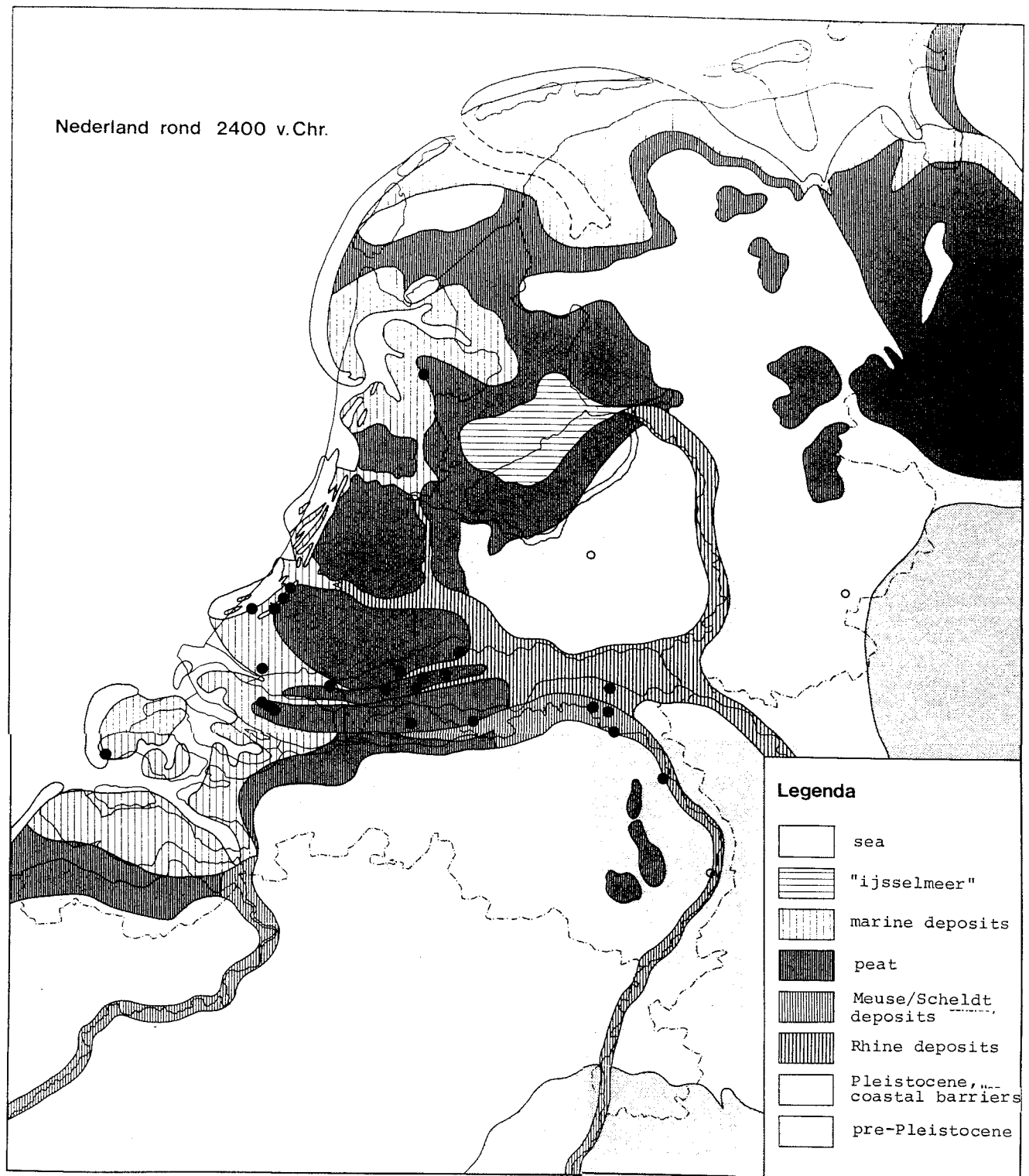


fig. 11. Palaeogeographic map of the Netherlands during the transgressive phase Calais-IVa with the Vlaardingenculture occupation sites. Geography after Zagwijn 1975.

THE COASTAL DISTRICT

Geology

The coastal district consists of a 7 km wide belt of beach and dune sands, arranged in long ridges, roughly parallel to the present-day coast. The low ridges or coastal barriers, covered by the relatively low Older Dunes, are separated by shallow depressions or strand flats, that are filled with peat and clay.

The innermost barrier ridge is the oldest, dated to c. 3000 B.C. or the transgressive phase Calais-III. It marks the end of the eastward shift of the coast during the earlier part of the Holocene, caused by the quick (but gradually diminishing) sea-level rise. The lost coastal barriers of the period of coastal progradation must have been narrow, low and broken into sections and so not very suitable for human habitation.

The easternmost coastal barrier marks the start of a rapid aggradation, that lasted the Subboreal and probably also the Early Subatlantic period. The pattern of coastal barriers and strand flats that originated in this period might be linked to some extent to the sequence of the transgressive and regressive phases Calais-III to Dunkirk-I and their subphases. The marked reversal of coastal shift around 3000 B.C. has no simple explanation. The diminished rate of sea-level rise, a surplus of coastal sands - mainly derived from the North Sea bottom - and perhaps changed current patterns along the coast all might have played a part.

The barrier belt reached its largest extent in Roman times, when the actual coastline was situated one to many (e.g. near the Meuse estuary) kms west of the present one. But in or shortly before the 12th century a period of coastal erosion started, that resulted in the loss of land, a smoothing of the coastline and the formation of the high Younger Dunes. These are in fact blown up from the sand of the eroded coastal barriers. The Younger Dunes are separated from the Older Dunes by a well-developed soil formation or humic layer, dated to the 1st - 12th century A.D.

Dune formation on the coastal barriers took place immediately after the formation of the individual barriers and came to an end when peat formation started in the strand flats to the west of these. This happened generally after a few centuries, when the ground water was risen as high as the strand flat surface. So there roughly is a similar age difference in the Older Dunes as in the barriers below them, but with an age difference of some centuries.

Thin peaty or humic layers or fossil soils in the Older Dune deposits indicate periods of rest with a vegetation cover and a relatively high ground water table, that separate various phases of aeolic sand deposition, destructed vegetation and a lower ground water table. This stratigraphy has been studied in most detail in the Velsen area and for the later prehistory, but appears to be of a general significance for the coastal district. Data for the Neolithic and Early Bronze Age are still very scarce.

There is a relation of the periods of soil formation and higher ground water level with the transgressive phases. One wonders whether both cyclic processes have one common cause - climatic variations - or that the interrelationships are more complex. To what extent, for instance, will dune sand have blocked coastal inlets and have influenced marine ingression into the intra-coastal area? In the unstable dune district man may also have played a significant role by destruction of vegetation covers, especially in later prehistory and after.

Archaeology

The conditions for archaeological research are widely different within the coastal district. Much land has been destroyed, since the dense present-day occupation is concentrated on the same dune ridges where prehistoric man must have settled. The famous bulb fields were made on them; this meant a levelling of the Older Dunes. Only a modest number of finds, done during these works, are preserved. But there still are parts more or less untouched in old estates and parks. The coastal barriers along the present coast are completely hidden by the Younger Dunes. So archaeology is very dependent of chance finds during agricultural and construction works and the archaeological picture will always remain fragmentary. The good conditions for preservation in some places might, however, compensate for this.

The coastal district and the coast itself must always have attracted people. Although the barriers were broken by wide inlets, all coastal sections could be reached from the hinterland via the main rivers or the levee deposits along them, that made it possible to cross the inhospitable peat marshes.

Only one isolated axe might belong to the period before 2400 B.C. The recovered occupation starts with some Vlaardingen settlements on the innermost barrier and one findspot on the inner side of the second one. This seems to be characteristic for all prehistoric occupation: there are no settlements known from the actual coastlines in the different times. Nor are they to be expected there, in the very unprotected situations and - if they were even present - there is little chance that their remains were preserved in that unstable environment. For information about coastal activities like fishing, collecting on the beach and - in later times - salt production, we must rely on indirect evidence from more inland sites. The recovered settlement sites lay in fresh water environments, on fossil barriers, covered with deciduous forests, where all conditions for a fully agrarian economy and permanent settlements were fulfilled; enough space for arable land, fresh water and a safe level above the local high waters. There is no question of cultural isolation or backwardness nor of marked adaptations in subsistence economy. Traces of arid ploughing were found a.o. at Zandwerven (VL), Velsen-Noordzeekanaal (BWB and later) and Monster (HVS and later). Domestic animals dominate the VL-culture bone-spectra, but red deer, roe deer, aurochs and brown bear were hunted as were beaver, grey seal and birds. The sturgeon was fished at Voorschoten (or at least brought to the site), shell fish collected at Zandwerven and the tooth of a sperm-whale at Voorschoten will have been taken from a dead specimen at the beach. So a wide range of activities was carried out in addition to agriculture on or from the VL-sites on the Older Dunes.

The sparse finds document an almost continuous occupation: Vlaardingen, Bell Beaker, Barbed Wire Beakers, the three phases of the Hilversum-culture and the Later Bronze Age. It is remarkable that a not insignificant number of bronzes, including a few hoards, are found. Most prominent is the Voorhout-hoard, the possession of a Middle Bronze Age smith from Wales. The findspot is an argument for a direct overseas contact of the coast with the British Isles. Very recently a Late Bronze Age fibula of Scandinavian type, found in the thirties near Noordwijkerhout, became known. The Hallstatt-A pins from Veenenburg are of south German origin.

The Iron Age occupation is especially well-documented by Professor Modderman's excavations at Spanjaardsberg, where seven occupation levels, the lower three with plough traces, were identified, and by the Velsen area investigation of Van Regteren Altena.

The prehistoric remains are practically always found in the humic layers. But this does not necessarily mean that the dune district was completely uninhabited during the periods of sand deposition. The conclusion for the later prehistory of the Velsen area is, that there must have been local sand displacements that hindered but did not prevent occupation, and more widespread dune formation that will have forced settlement displacements. But it is unlikely that the dune district was completely left during some periods. This will also be true for the other parts of the district and for the earlier prehistory. We must moreover realize that the dune sand layers dominate the sections but represent only restricted periods of time, and that the reverse generally is the case for the humic bands.

There are differences in the distribution of the remains of various ages over the barrier sections. VL-remains are found especially south of the Rhine, Beaker finds between Rhine and Haarlem, Bronze Age objects in both sections. This might relate to the age of the barriers and differences in geography, but also be a result of the period and type of the digging activities in the various regions.

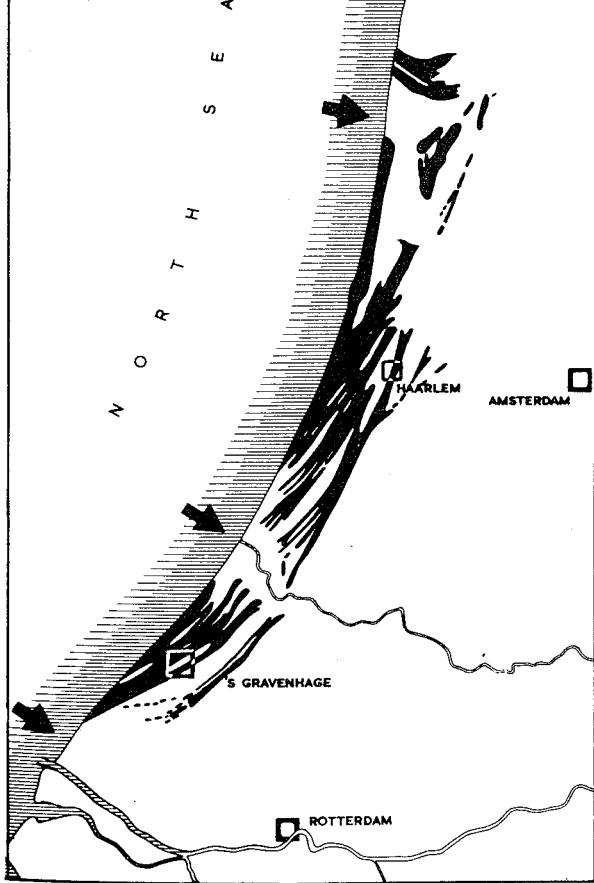


fig. 12. Outline map of the Older Dune landscape with the Meuse and Rhine mouths and the inlet near Egmond, connected with the Utrecht-Vecht. After Jelgersma/Van Regteren Altena 1969.

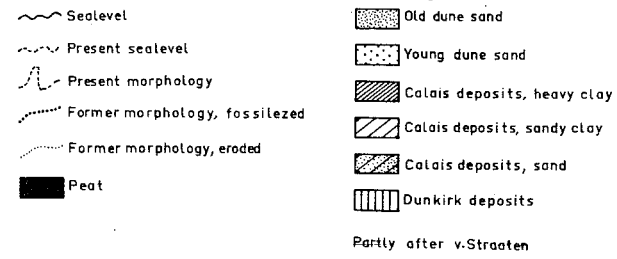
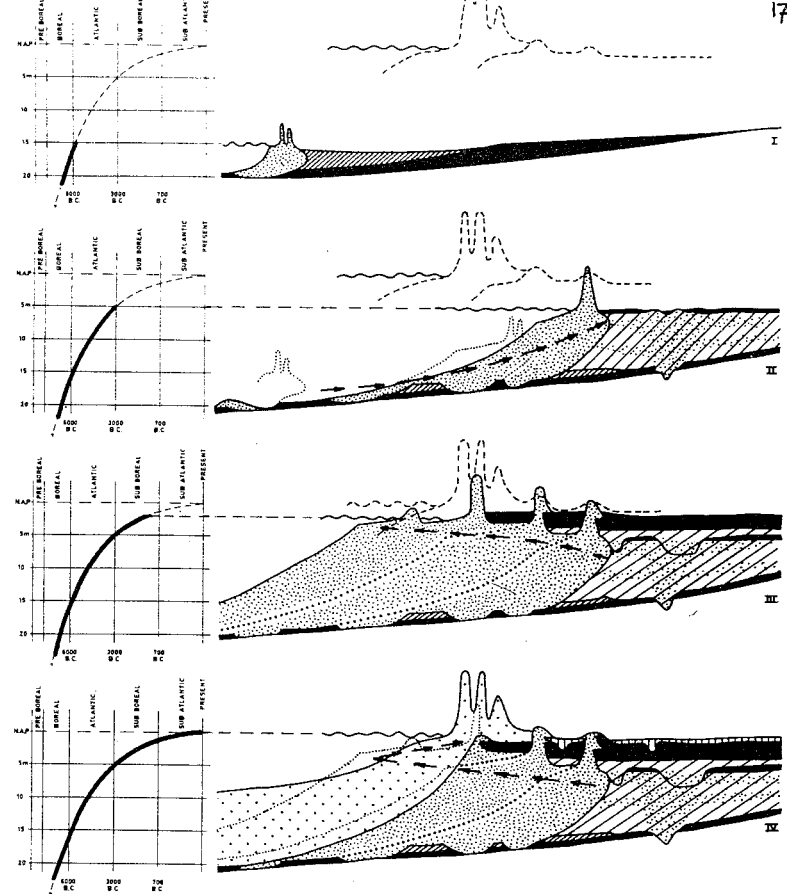


fig. 13. Stages of development of the coastal barrier system in relation to the curve of relative sea-level rise After Hageman 1969.

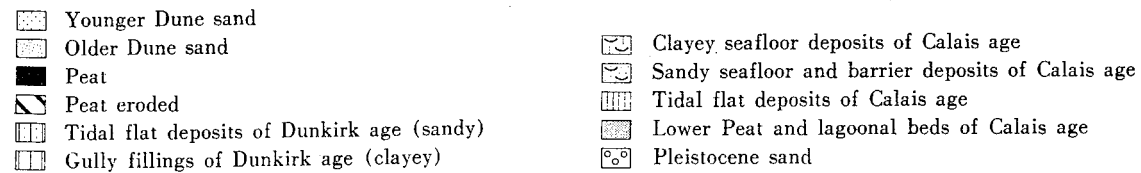
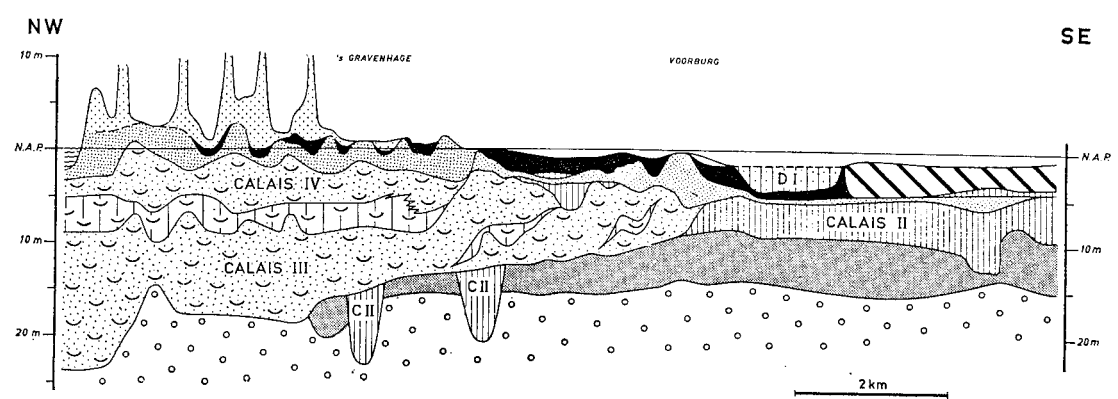


fig. 14. Section across the coastal barrier complex near The Hague. After Jelgersma a.o. 1970.

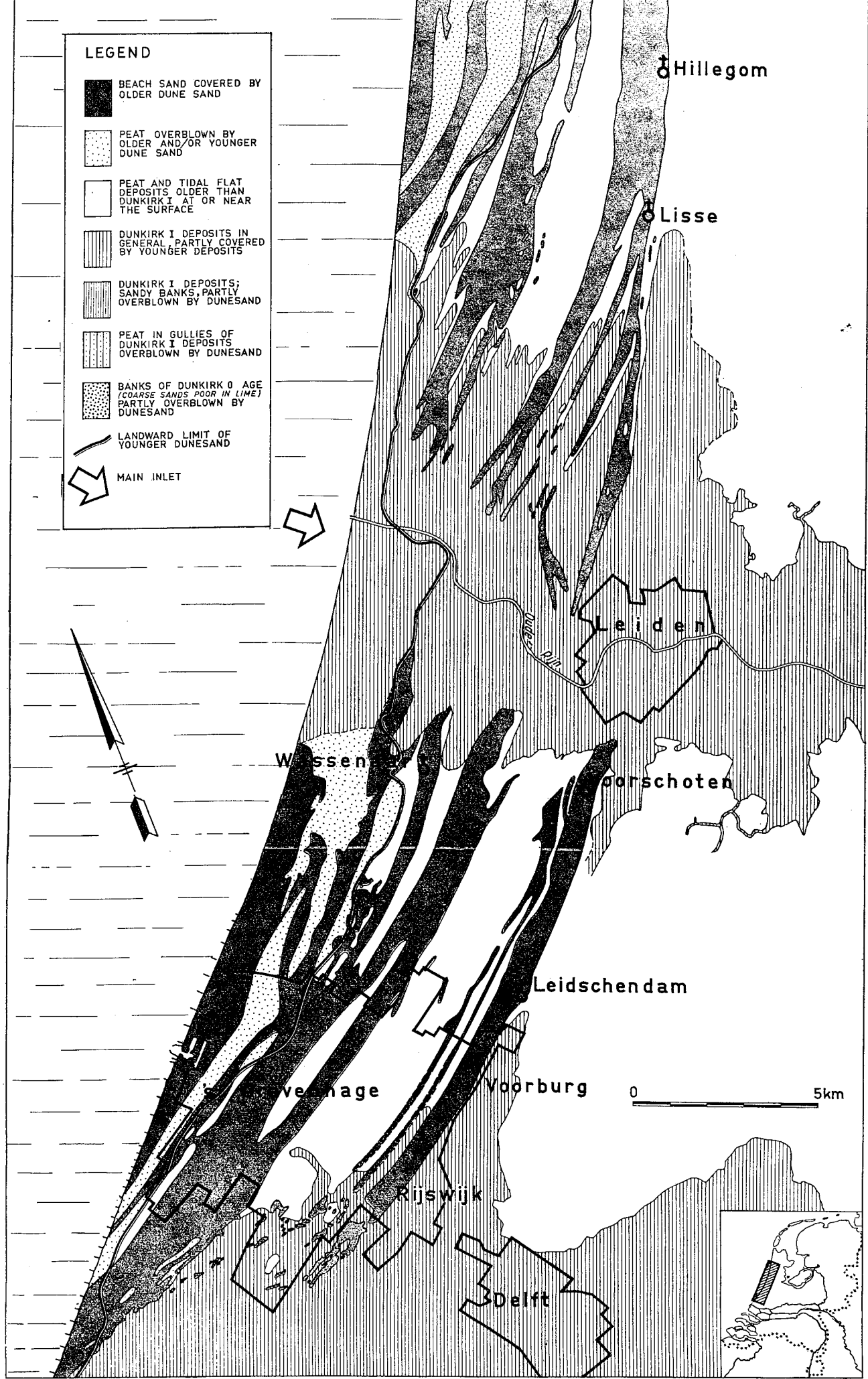


fig. 15. Detail map of the barrier section between The Hague ('s-Gravenhage) and Hillegom. After Jelgersma a.o. 1970.

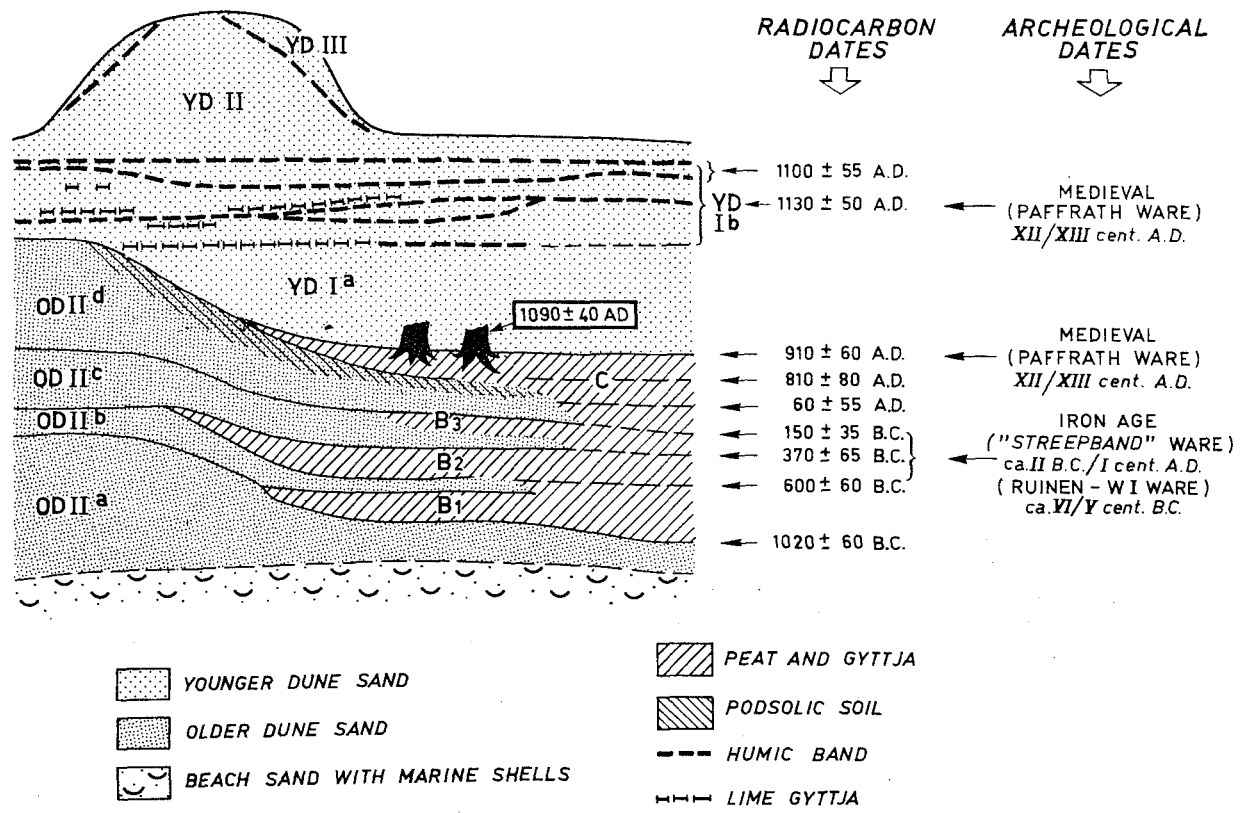


Fig. 16. Schematic section of the Older and Younger Dunes with fossil soils, peat and gyttja layers and with archaeological remains and C14-dates correlated with these. Amsterdam municipal water work Dunes, SW of Haarlem. After Jelgersma/Van Regteren Altena 1969.

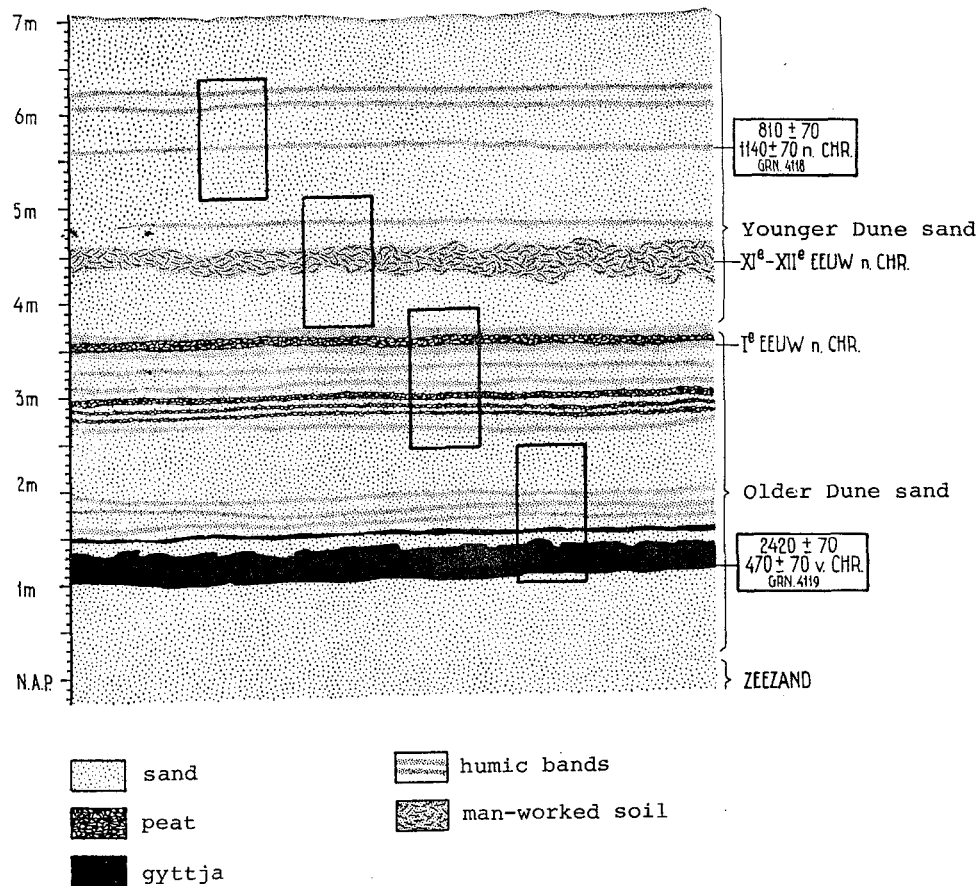


fig. 17. Stratified dune deposits with archaeological remains in the blast-furnaces industrial area at Velsen (Velsen-Hoogovens). After Annual Report of the Geological Foundation of the Netherlands 1963.

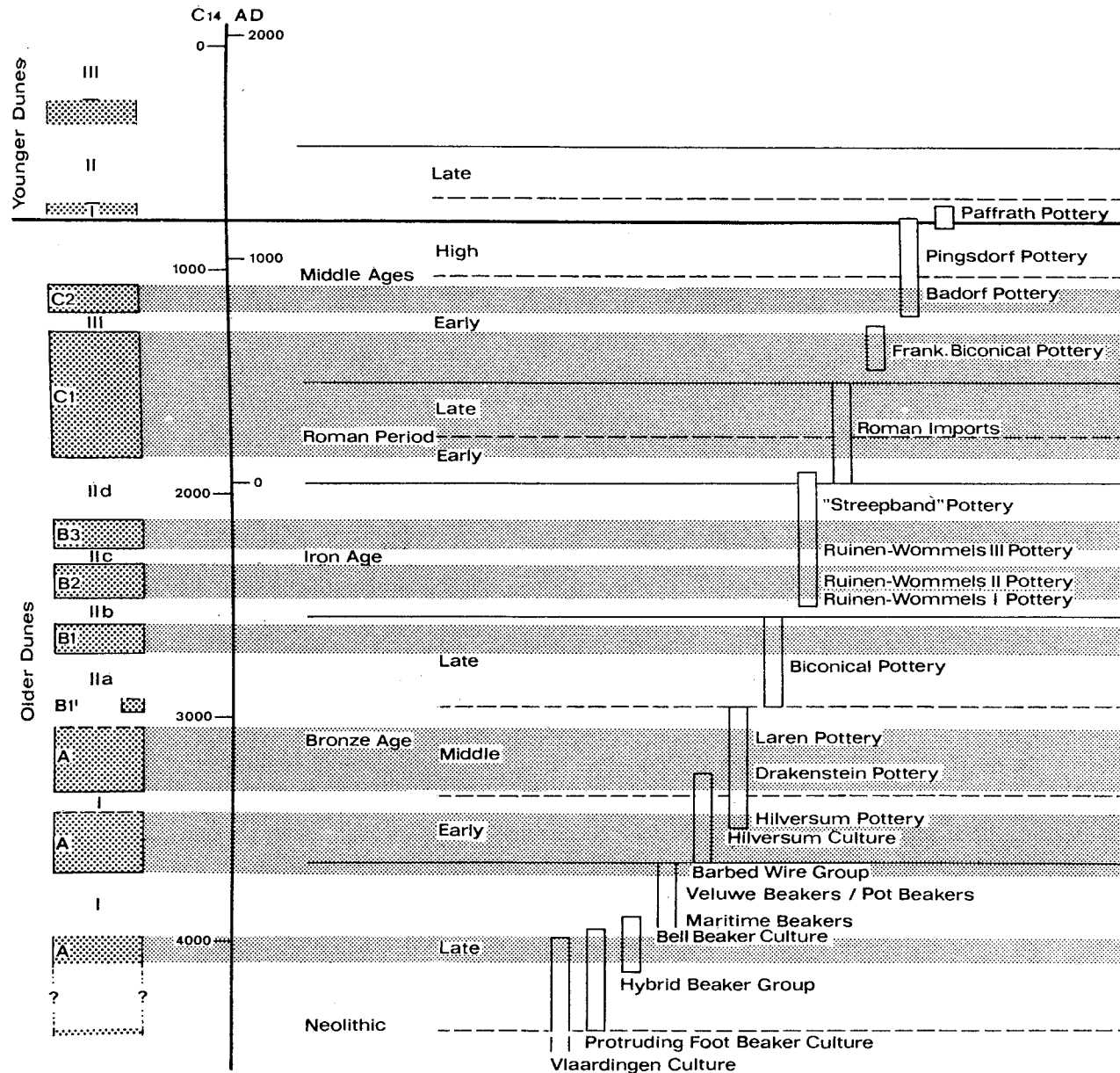
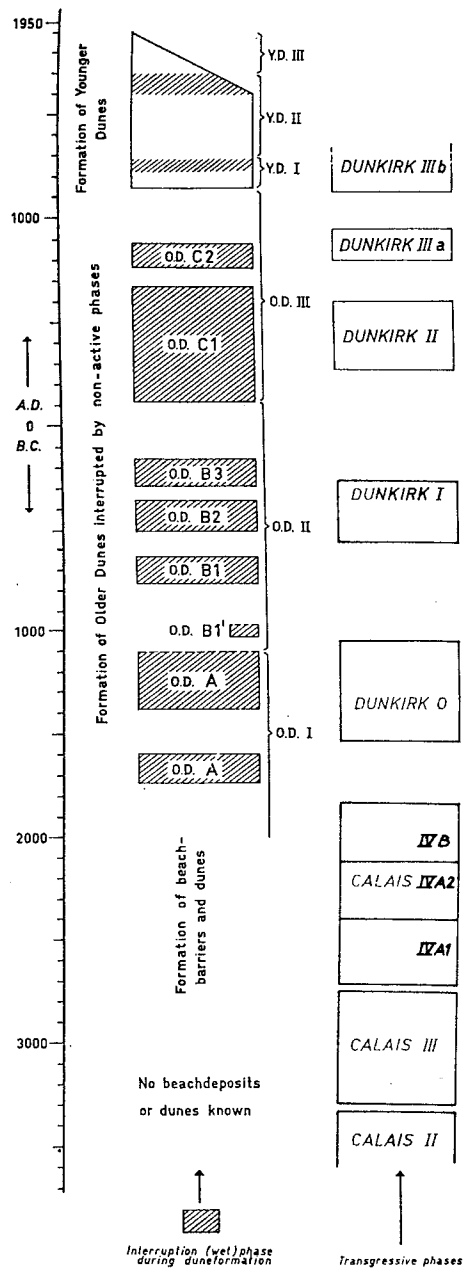


fig. 18/19.

Two diagrams comparing the wet phases in the dunes with the transgressive phases and with the archaeological cultural/chronological system. After Jelgersma a.o. 1970. (The transgression-chronology has been revised according to fig. 4)

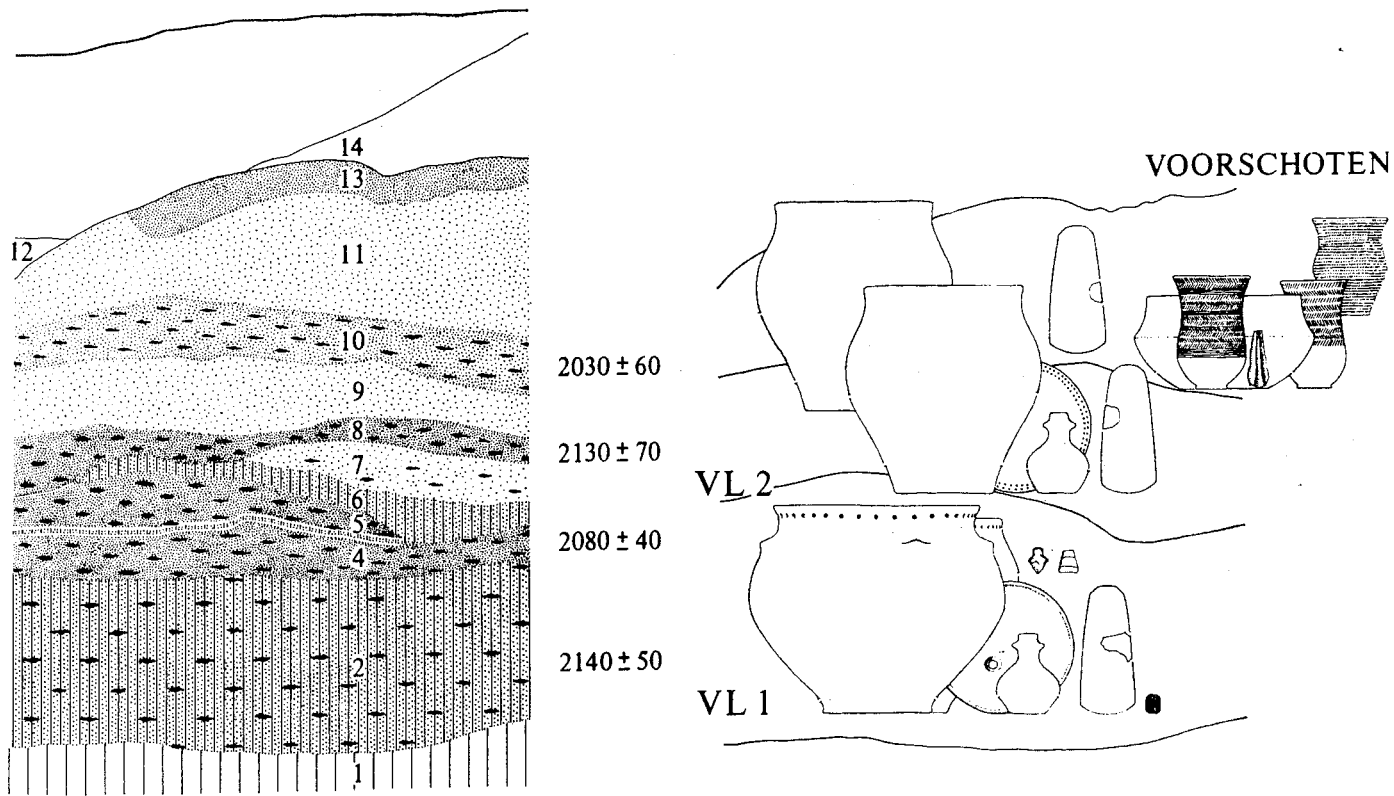


fig. 20. Section of a peat-filled depression with stratified Vlaardingen-culture remains at Voorschoten. After Glasbergen a.o. 1967. (Later evidence suggests that both lower C14-dates are too young by two or three centuries)

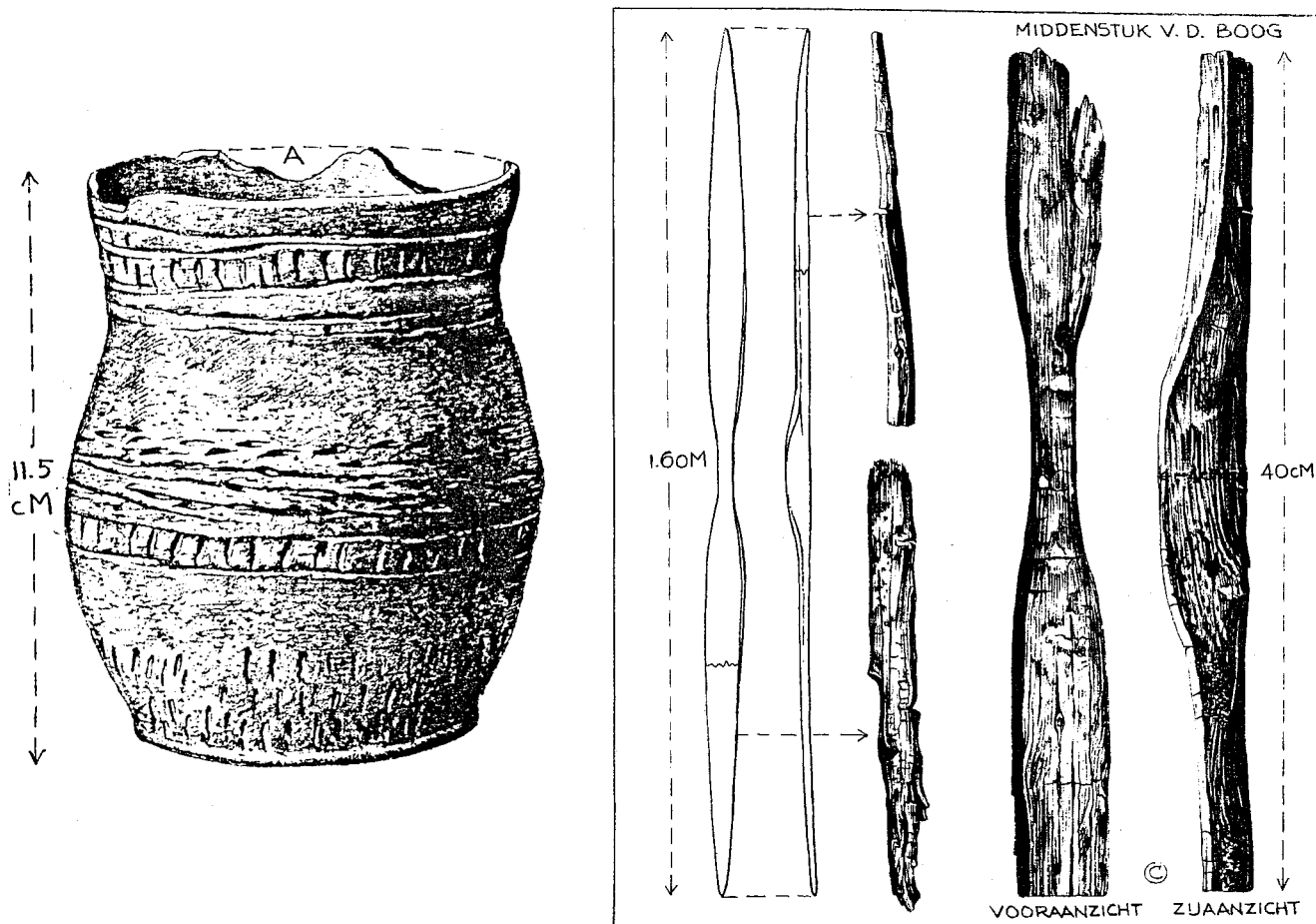


Fig. 21/22. Bell Beaker and Early Bronze Age bow found at the Veenenburg estate between Lisse and Hillegom. After Van der Wal 1952.

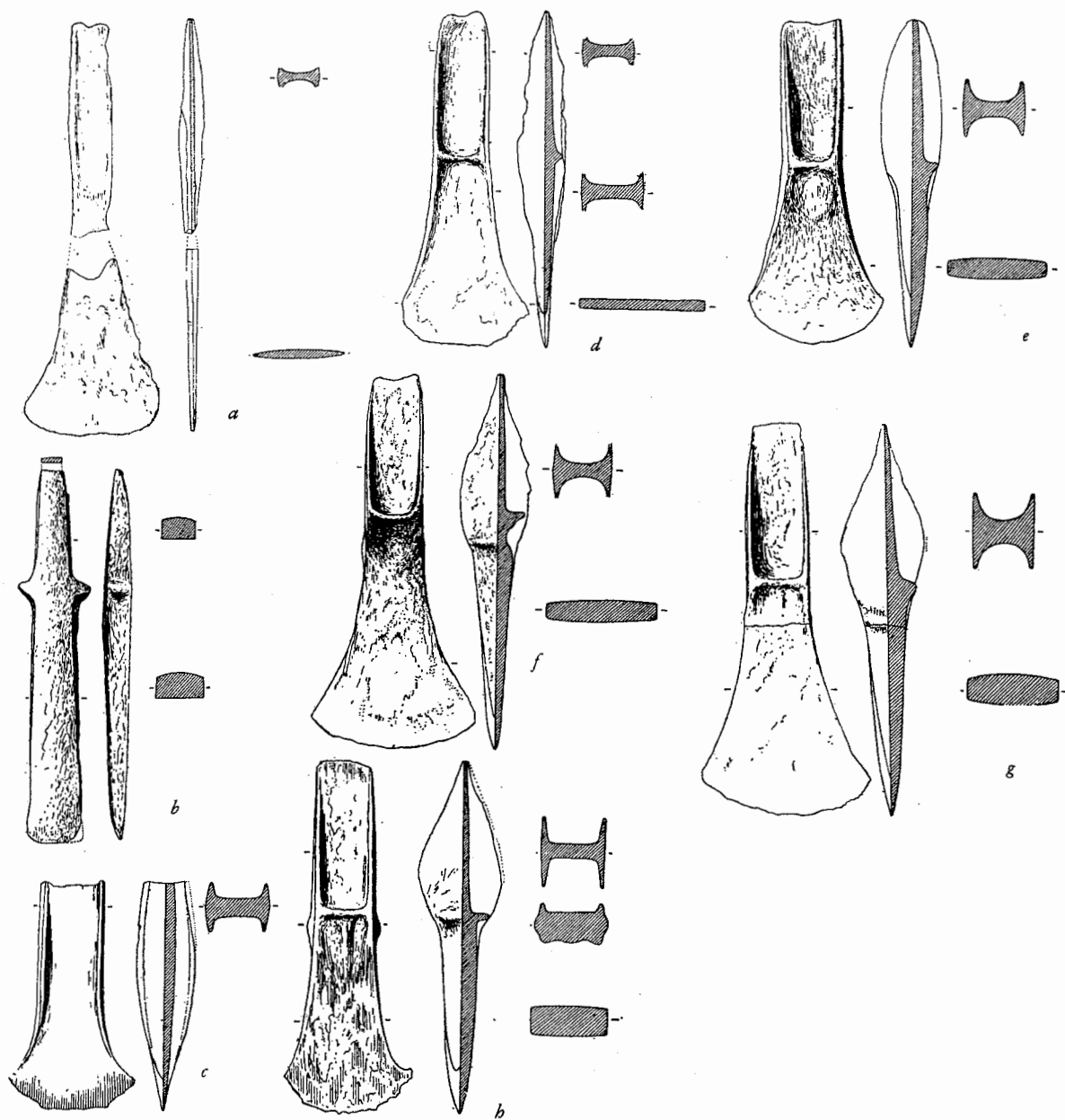


Fig. 23. Eight of the nineteen bronze axes comprising the Voorhout hoard, found in the spring of 1907. The eleven axes that are not illustrated are similar to g and h. Scale 1:3. After Butler 1959.

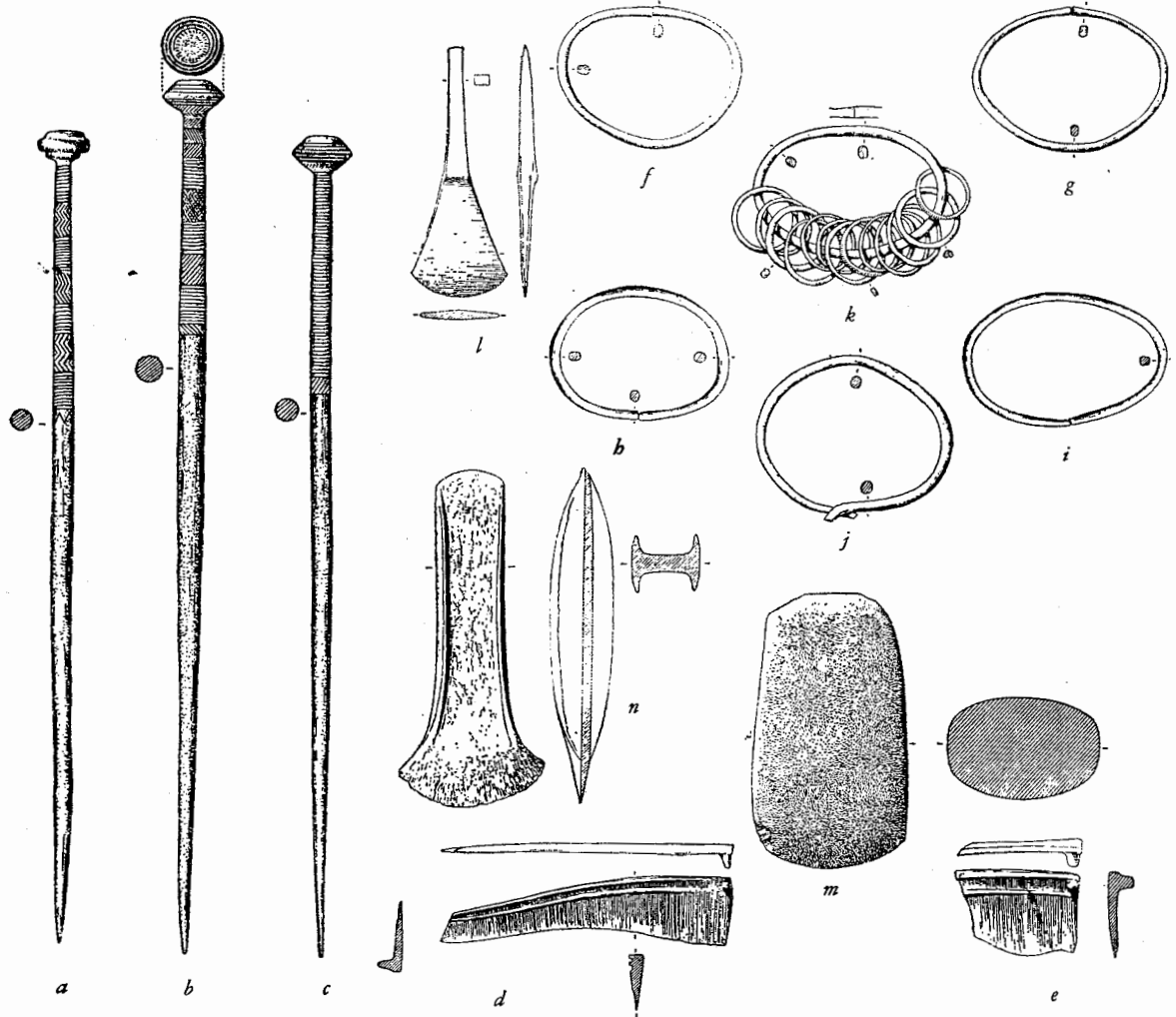


fig. 24. The Late Bronze Age Veenenburg hoard. Scale 1:3.
After Butler 1959.

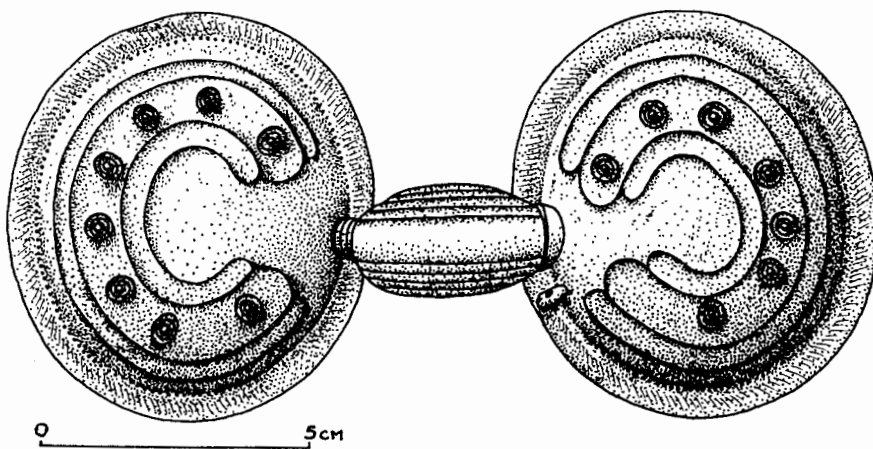
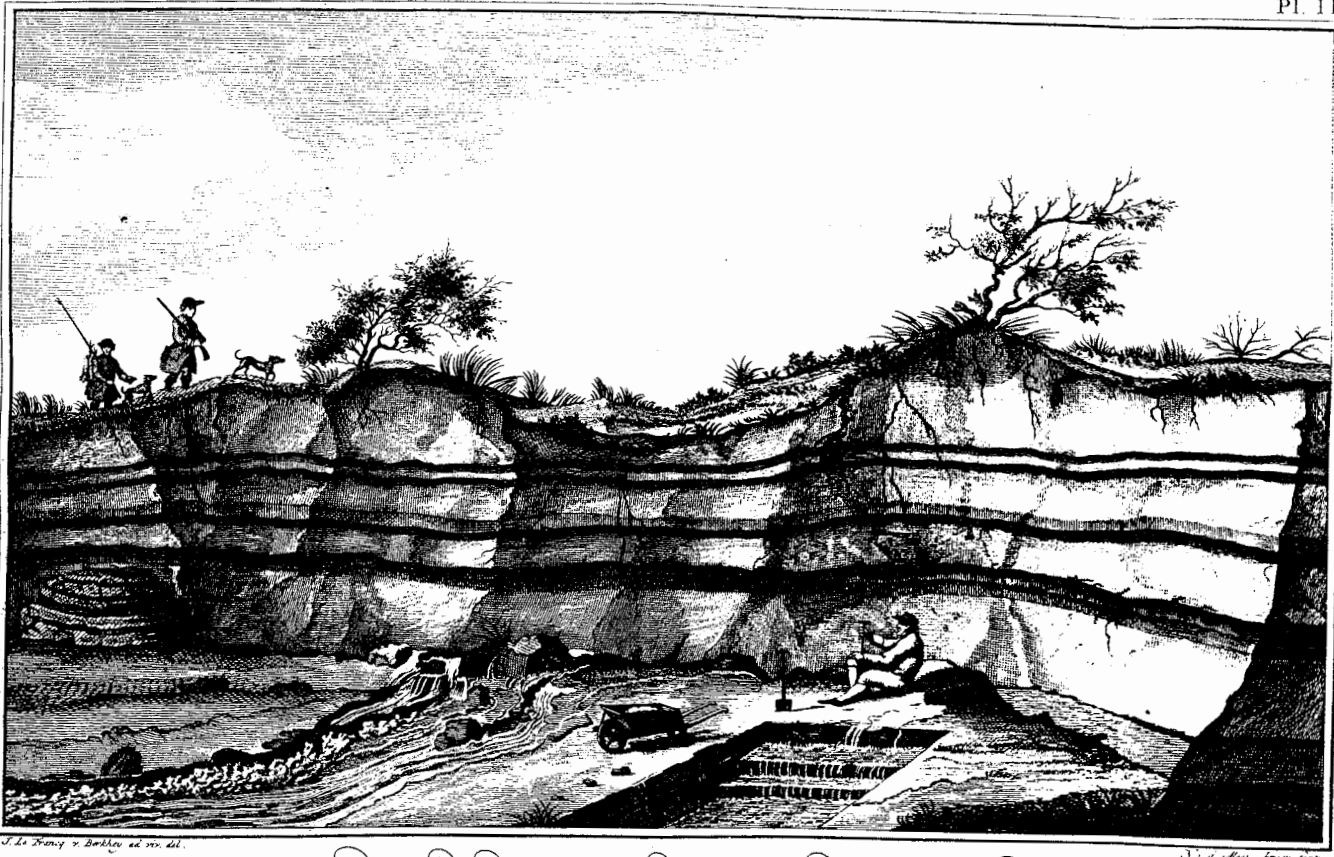


fig. 25. Late Bronze Age fibula of Scandinavian type found in the thirties in "deep digging" of bulb fields near Noordwijkerhout and only recently known to archaeologists.



J. de Francq v. Berkhey ad. inv. del.

V. d. Meer. Sculp. fecit.

*Afbeelding van de Zandbeddingen zo als dezelve zig in de Katwyker Landery vertoemen,
benevens de Duinwelling en Guhr of Oker-flyken.*

fig. 26. "Picture of the sand layers as they are to be seen in the Katwijk dunes and also the spring". The stratified dune deposits documented as early as 1771 by J. le Francq van Berkhey in his "Natural History of Holland" part II.

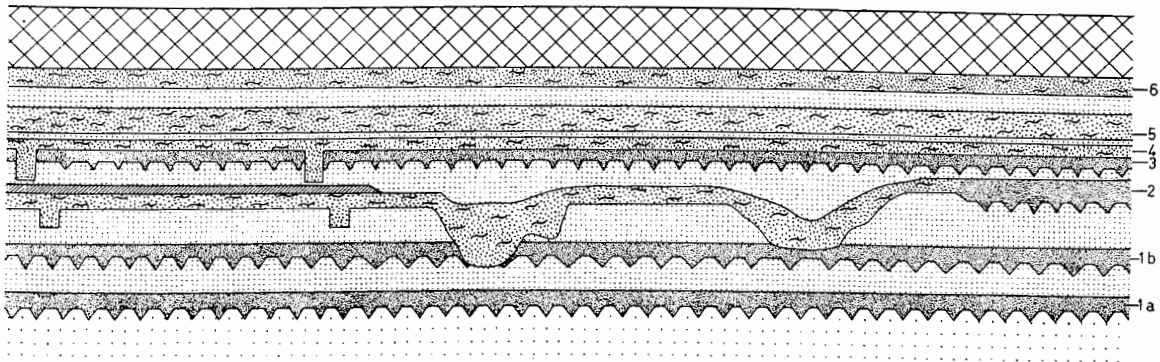


fig. 27. Ideal stratigraphy of the Spanjaardsberg, Vogelenzang, with its 7 occupation levels, dating from the 5th to the 1st century B.C.

Leiden

Leiden is not of Roman origin and certainly not equal to Lugdunum Batavorum, as was formerly believed, although it is situated on the south bank of the Rhine and the Roman Rhine-road passed through the old town centre. The town's origin lies around the shell-keep "De Burcht", a 9 m high artificial hill with a circular wall that measures 35 m in diameter. It was built in the middle of the 12th century by the counts of Holland in a strategic position, where two branches of the (Old) Rhine flow together. The tuff stone wall was damaged during a siege and repaired with large bricks in 1204. It lost its military function in the 14th century. Excavations took place in 1923 by J.H. Holwerda and in 1964-1970 by J.G.N. Renaud. A restoration has recently been completed.

Curved coastal barrier at Oegstgeest with an isolated Older Dune that has escaped levelling because of the Groene Kerkje (Green Church) built on it. Originally a church was founded here by the missionary Willebrord in the beginning of the 8th century. The present-day church was built after the siege of Leiden (when the church was broken down) in 1572.

Route along the levelled Older Dune ridges with the bulb fields and across the meadow lands on the strand flats. Roads and field systems are orientated parallel or at right angles to the ridges. Some minor Older Dune groups are preserved locally.

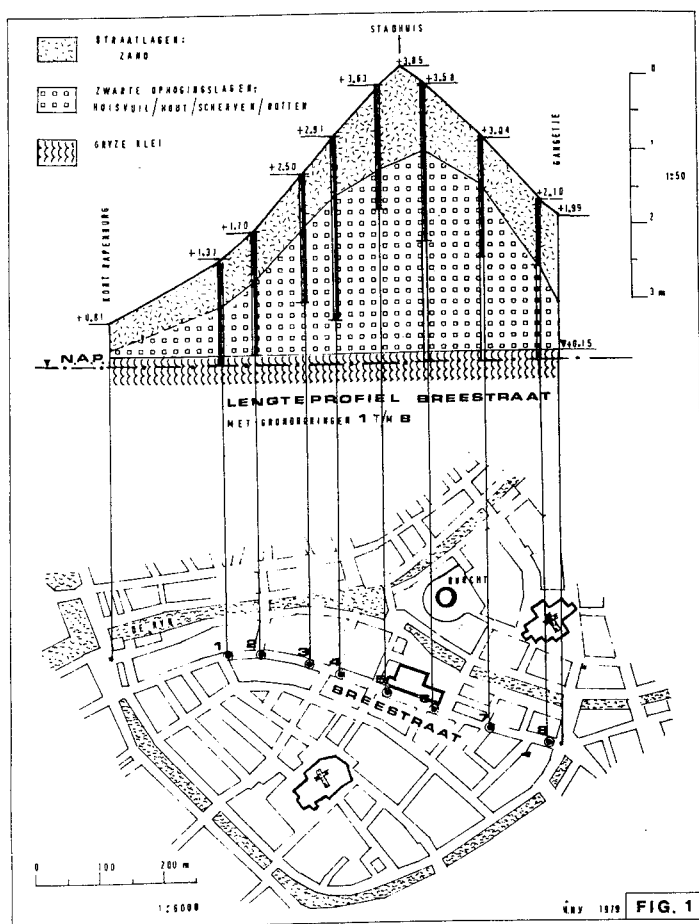


fig. 29. Section over the raised 13-14th century occupation on the left bank of the Rhine in the centre of Leiden. After Vos, 1979.

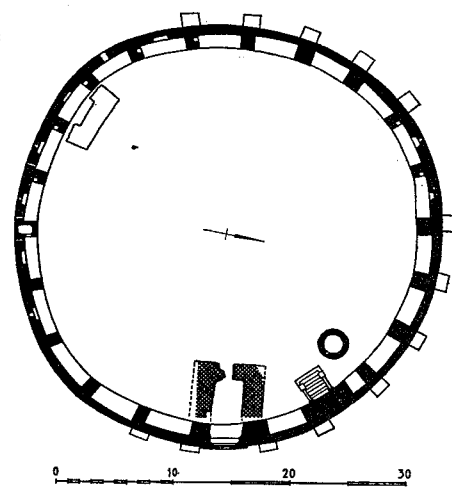


fig. 28. Plan of the Leiden "Burcht" After Van Reyen 1965.

Katwijk - sluice building pit

In the end of the 15th century stone foundations of a fortification, supported by numerous wooden posts, was washed free at the beach north of Katwijk. It was dated to the Roman period because of the large amount of Roman remains of the 2nd and 3rd century found next to it. Regularly to be seen in the 16th and 17th century it became a well-known attraction. The foundations were depicted many times from the late 16th century onward. With the further erosion of the coastline the "Brittenburg", as the building was called, disappeared into the sea, but regularly mention was made by fishermen of stones or stone walls, c. 500 m in sea, lastely in 1960. Diving operations that year had, however, no results.

The foundations show the outline of a late Roman fortification with round towers at the corners and with a large square building in the centre. There is still much discussion about the age and function of this building. A fourth century fortress at this place can only be explained with difficulty, since it is generally believed that the Roman frontier was displaced to the south around 270 A.D. There are, moreover, no late Roman finds on the site. The suggestion is made that the building might have been a Carolingian *burgus*, built of secondary used Roman tuff blocks.

The Roman finds made at the Brittenburg mark the end of the Roman road that followed the frontier along the south bank of the Rhine and that linked the fortifications along this line. In Roman and early mediaeval times the Rhine had its mouth north of its present position, as was revealed by the systematic soil mapping. The situation of the find spot north of the 16th century Rhine, as illustrated on the old engravings does not bear any contradiction, but might very well mark the true location.

The site of the Brittenburg has been identified as Lugdunum of the Tabula Peutingeriana.

In the early spring of 1982 an extensive layer with Roman refuse was found in the building pit for a new sluice - directly north of the present one - in the river Rhine, that still is a major drainage point of the Rijnland drainage district. The finds comprise a.o. fragments of tuff stone and of roof tiles with military stamps. It is practically certain that this site, originally obscured by more than 10 m of Younger Dune sand can be linked up with the Roman remains at Lugdunum-Brittenburg.

In view of the symbol on the Tabula Peutingeriana and in view of the marked geographical position an important Roman site is expected. The Roman coastal zone itself is, however, lost over one or some kilometers width.

The deep section at Katwijk shows an interesting sequence of marine and aeolic deposits.

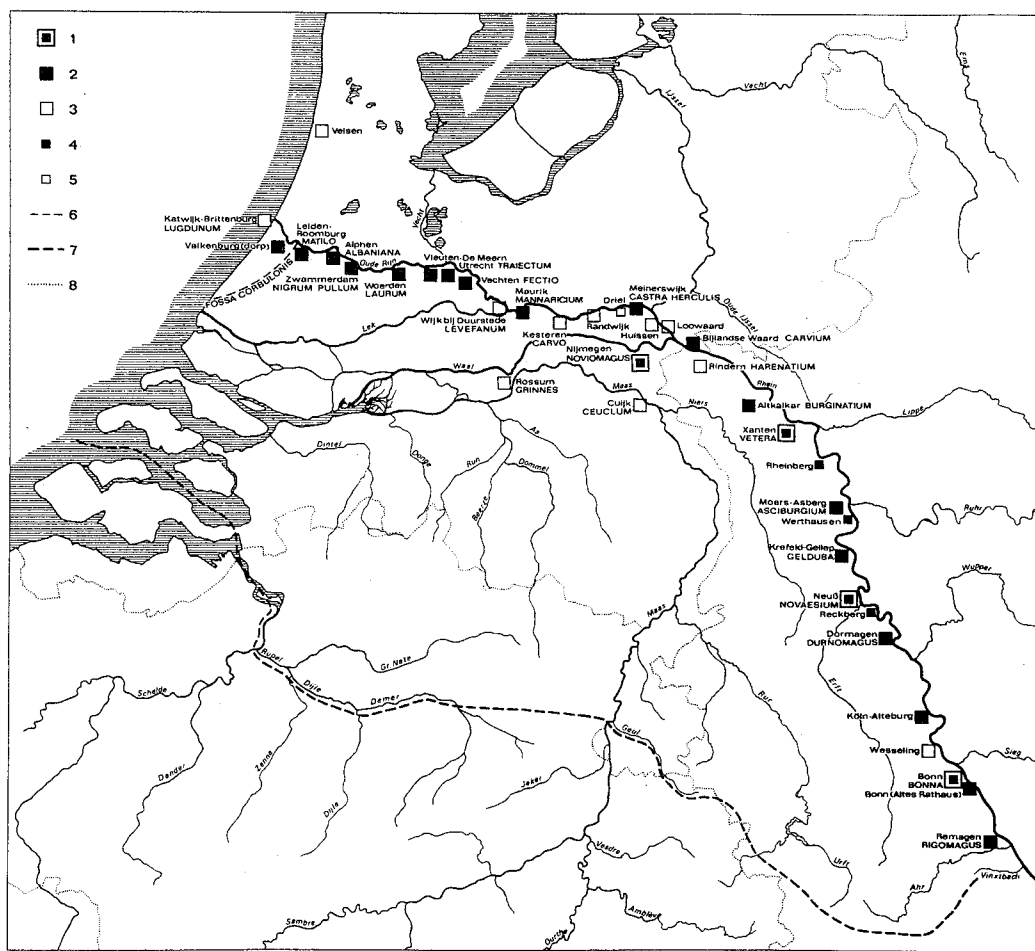


fig. 30. The frontier of the Roman province of Germania Inferior and its fortifications. After Willems 1980 (After Bogaers 1974 with additions.)

1. castra (legionary fortress)
2. castellum (fortress)
3. castellum?
4. minor castellum
5. minor castellum?
6. canal
7. probable southern frontier of Germania Inferior

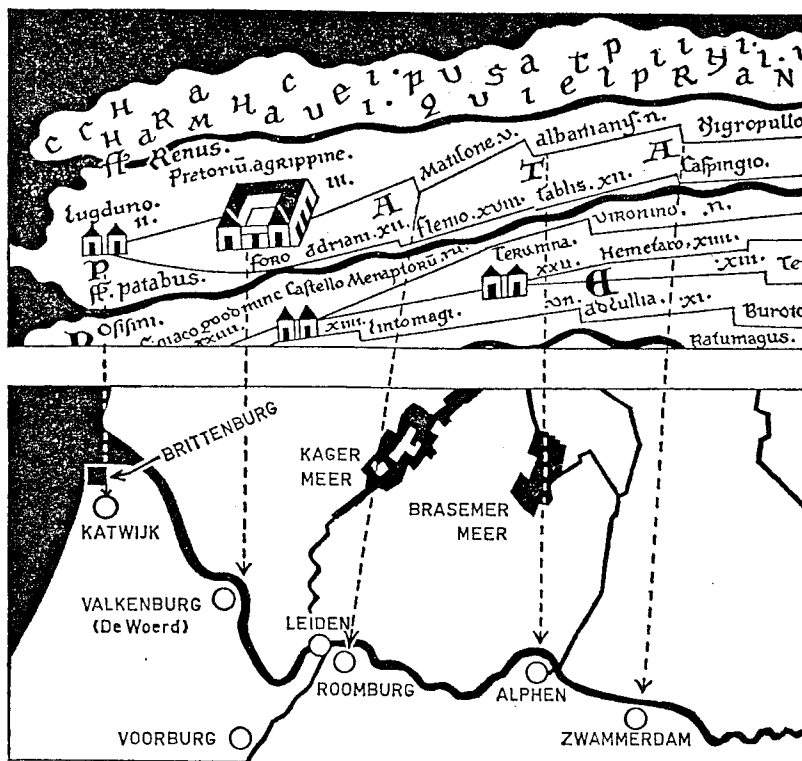


fig. 31. Identification of the major sites at the end of the Roman frontier, with the names on the Tabula Peutingeriana

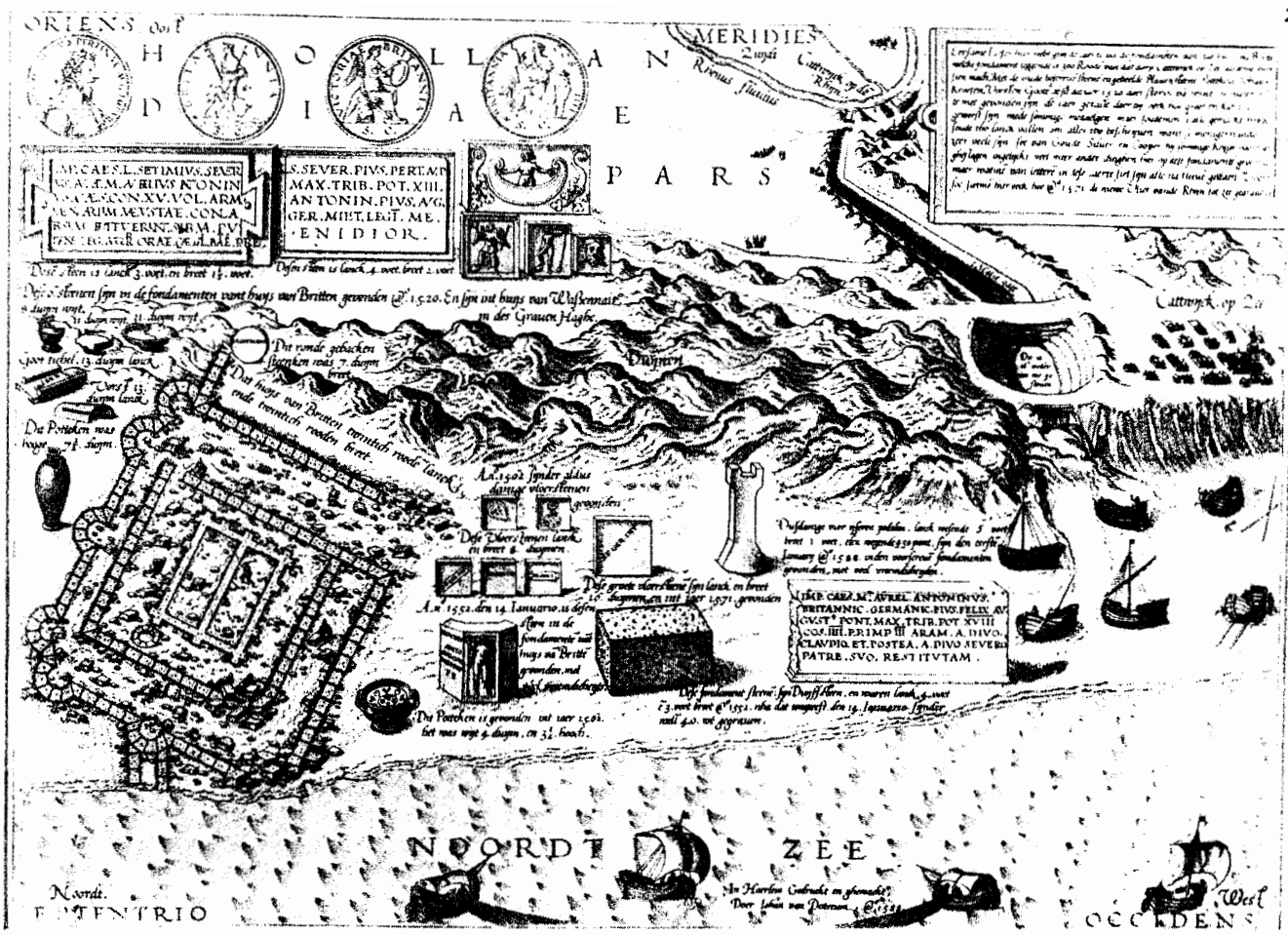
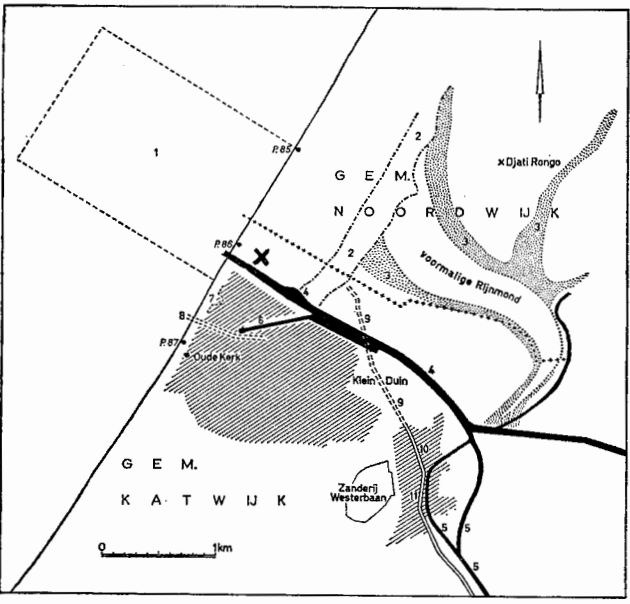


Fig. 32. The Brittenburg at Katwijk beach, drawn by J. van Deutekom, 1588. After Dijkstra/Ketelaar 1965.

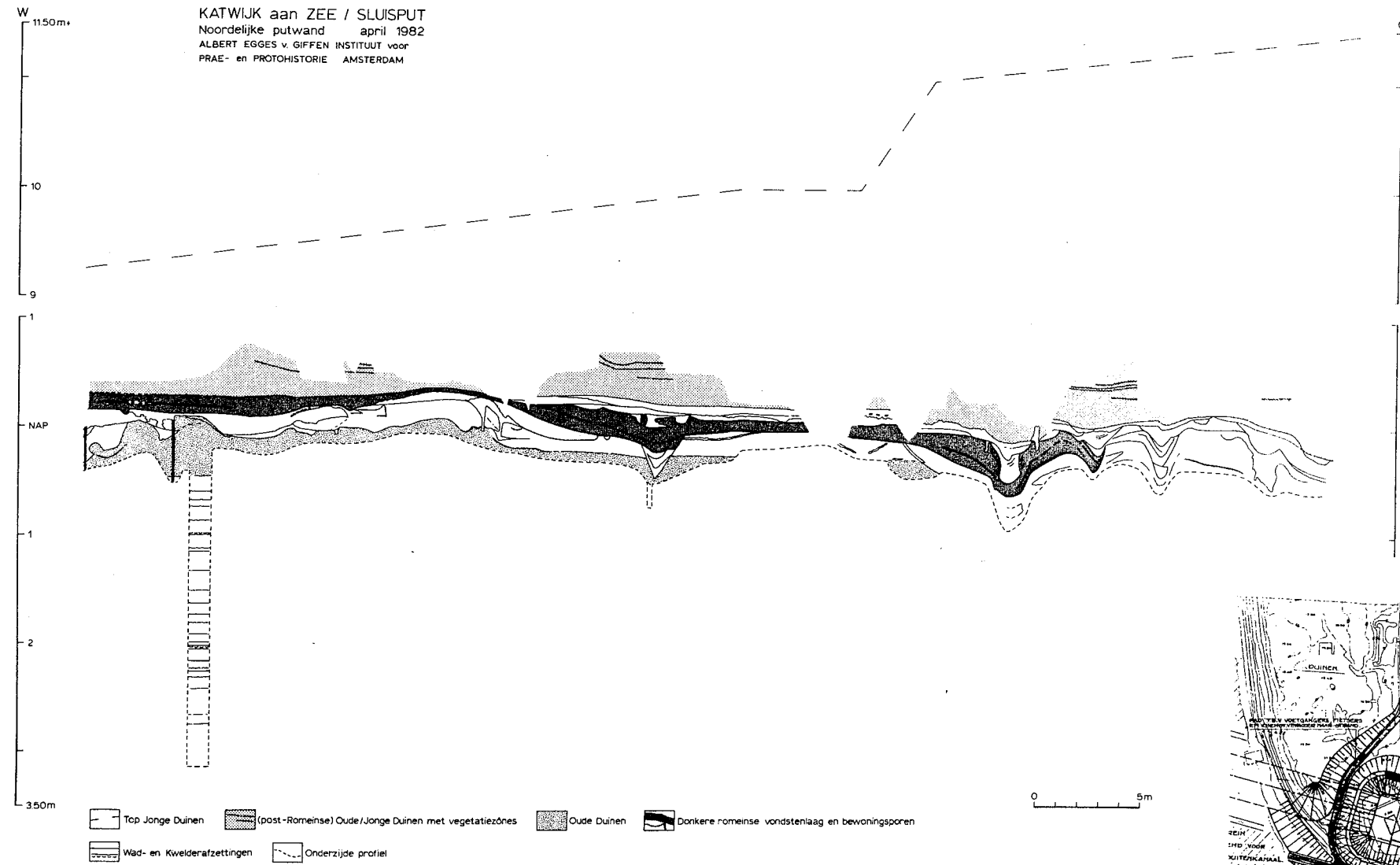
fig. 33. The situation of the Roman/early mediaeval Rhine mouth north of Katwijk. 1= within this square the Brittenburg must be situated somewhere. x = 1982 excavation.



figs. 31-34 After Dijkstra/Ketelaar.

fig. 34. "Don't betray my home to your friends!" a newspaper-cartoon of 8 September 1960.

KATWIJK aan ZEE / SLUISPUT
 Noordelijke putwand april 1982
 ALBERT EGGES v. GIFFEN INSTITUUT voor
 PRAE- en PROTOHISTORIE AMSTERDAM



[Symbol] Top Jonge Duinen
 [Symbol] (post-Romeinse) Oude/Jonge Duinen met vegetatiezones
 [Symbol] Oude Duinen
 [Symbol] Donkere romeinse vondstenlaag en bewoningsporen
 [Symbol] Wad- en Kwelderafzettingen
 [Symbol] Onderzijde profiel

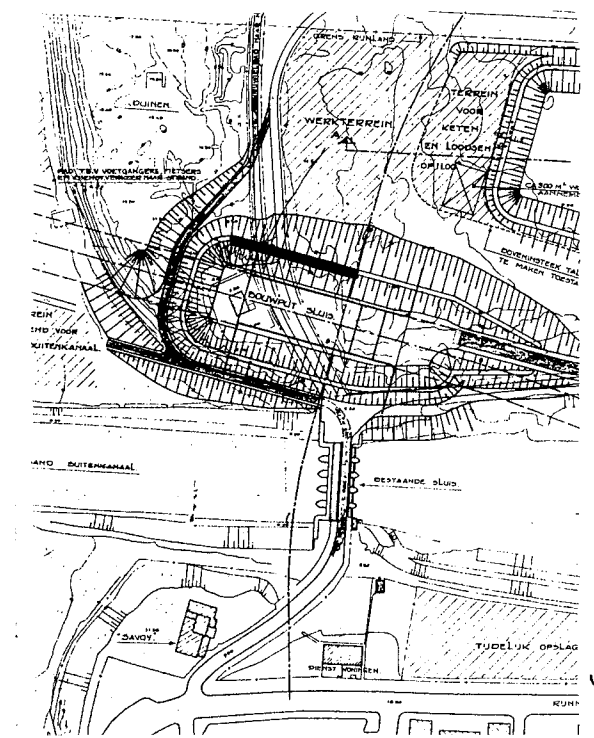


fig. 35. Situation of the sluce building pit and the section at Katwijk.

Valkenburg-village

Although there are incidental observations and remarks on Roman finds at Valkenburg since the 16th century and the site became known as a raised Roman occupation site by the observations of Van Giffen in 1914, it lasted till 1941 before excavations were carried out. The destruction of the centre of the village in the battle of May 1940 made large-scale excavation possible. Excavation campaigns under the direction of A.E. van Giffen and later W. Glasbergen resulted in the almost complete uncovering of six successive fortresses, dated between c. 40 and c. 270 A.D., all built of wood, with the exception of the wall and principia of the last one, that were made of tuff stone.

The position of the fortress was, unlike now, in the inner curve of a Rhine bend and at a short distance from the river. The first phase was built at a level of 0.00 to -0.30 m NAP. This very soon must have appeared to be too low. The terrain was raised artificially to get safe for flooding and the wooden substructures of the buildings were in this way perfectly preserved.

The 3rd (47-69 A.D.) fortress was built at +0.60 to +1.00 m, the 6th (first half of 2nd cent.) at +1.75 m NAP. The built-up area measured about 100 x 120 m and was surrounded by a wall and three V-sectioned ditches. The NE corner was eroded away in later times by a bend of the Rhine.

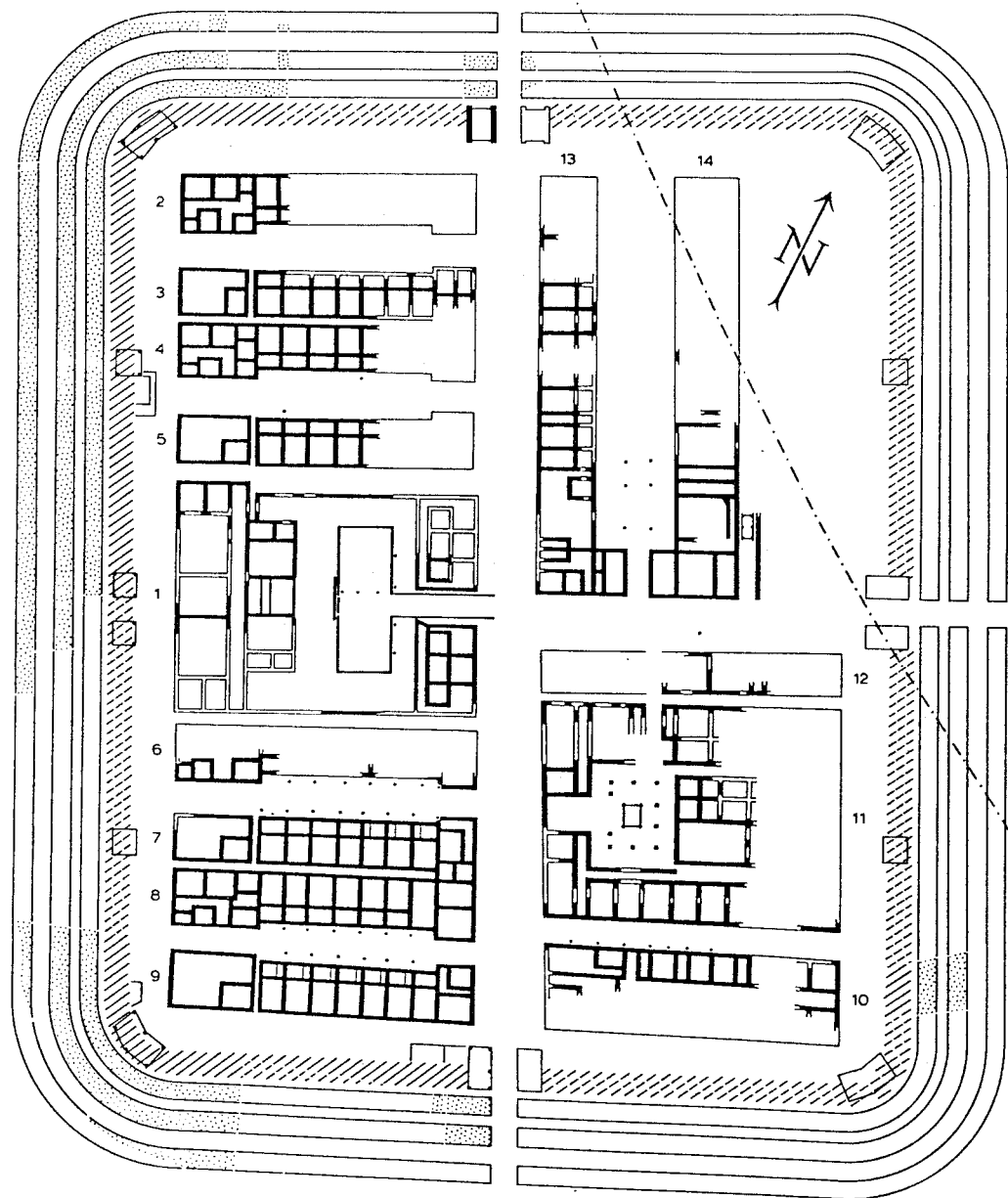
The outline of the stone wall and headquarters of the 6th period are marked in the pavement with coloured bricks.

Valkenburg - De Woerd

In 1972 2 ha of a civil, non-agrarian settlement, 1200 m south-east of the fortress, was excavated by the ROB, under the direction of J.H.F. Bloemers and H. Sarfatij. The site was located, also unlike nowadays, on the bank of the Rhine, where a small brook joined this river. The occupation started around 50 A.D. in the corner between river and brook and consisted of a jetty and a shipwharf. These works must have had a connection with the reinforcement of the frontier around 47 A.D. and had a direct relation to the military centre at Valkenburg-village. This activity was followed by the construction of a low dike, built of sods and by the artificial raising of the lowland (-0.60 m NAP) behind it for the building of houses. The little dike was covered with shells and gravel and connected the settlement with a vicus near the south gate of the fortress. It was in fact a short stretch of the military Rhine road. Half way a cemetery is known to be present.

A high degree of Romanization is reflected in the archaeological remains: about 90% of the pottery is for instance Roman, against only 10% native ware, very different from, for instance, Rijswijk and Kethel. It must have been an administrative centre. About 230 A.D. the occupation came to an end.

The totality of both Valkenburg-village and "De Woerd" is identified as the place Praetorium Agrippinae, known from written sources.



0 50m

fig. 37. Generalized ground plan of the first fortress of Valkenburg, c. 40 A.D. After Glasbergen 1967.

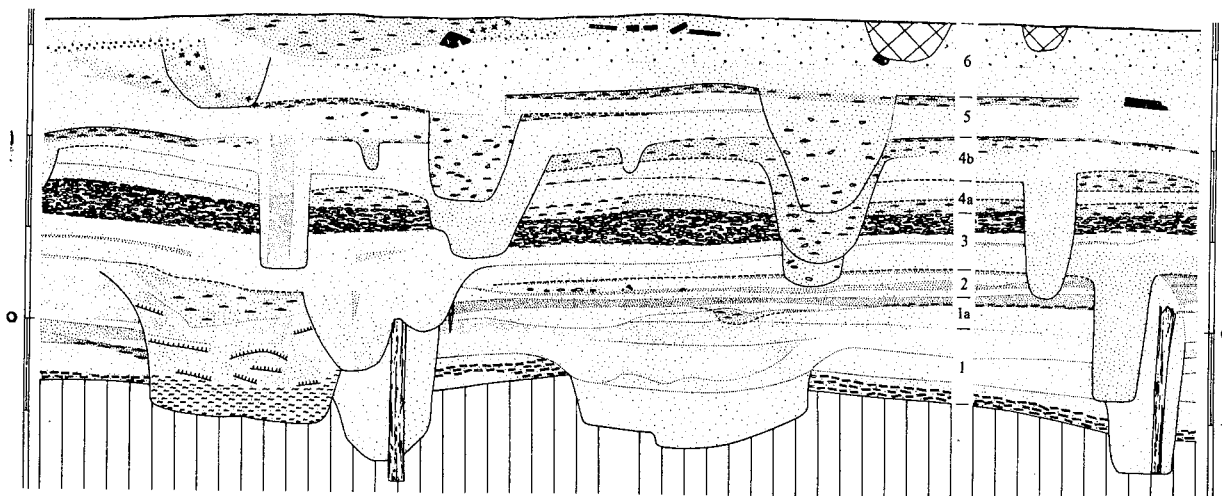


fig. 38. N-S section in the south-east corner of the Valkenburg fortress. After Glasbergen 1967.

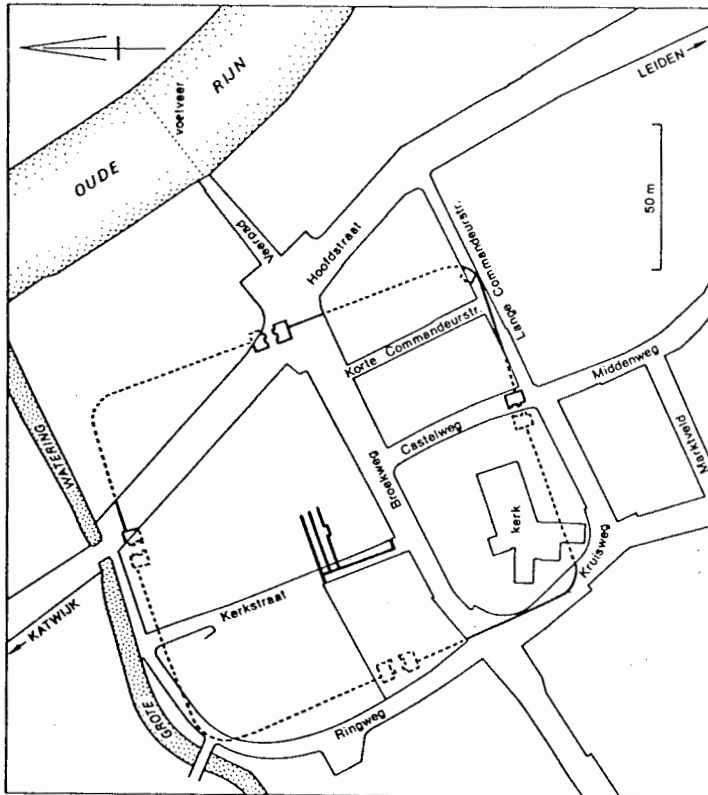


fig. 39. Situation of the marked parts of the ground plan of Valkenburg 6 in the pavement.

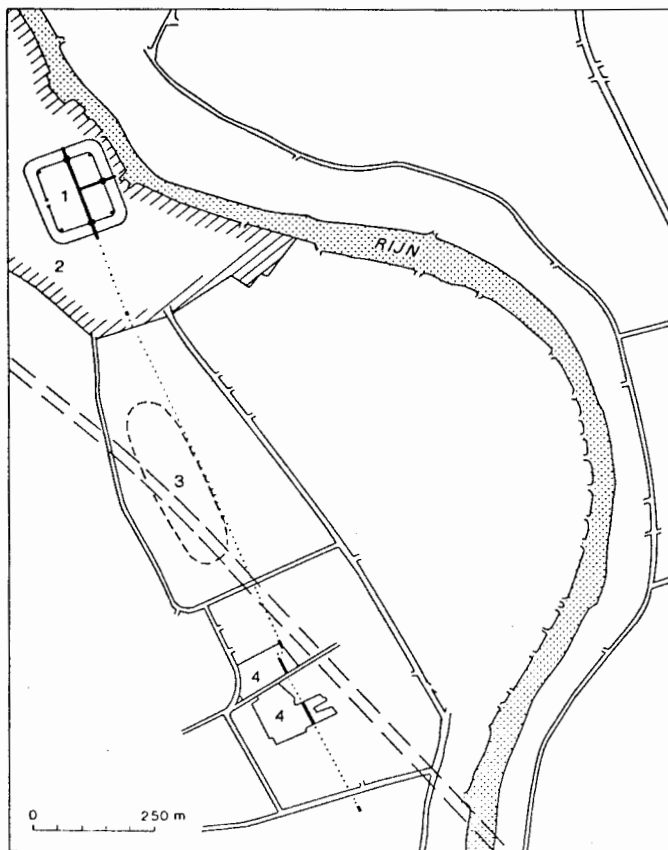


fig. 40. Roman sites at Valkenburg; 1. Castellum at Valkenburg (village); 2. Settlement on the Marktveld; 3. Cemetery along the Roman road; 4. Settlement at De Woerd, Valkenburg. After Bloemers/Sarfati 1976.

Older Dunes

The main road to Wassenaar and The Hague follows the centre of the second major coastal barrier, that formed the coastline in Vlaardingen-times (c. 2400 B.C., Calais IVa). In many estates of Wassenaar Older Dunes are well-preserved. At our left hand lies the Early Subboreal strand flat of Duivenvoorde.

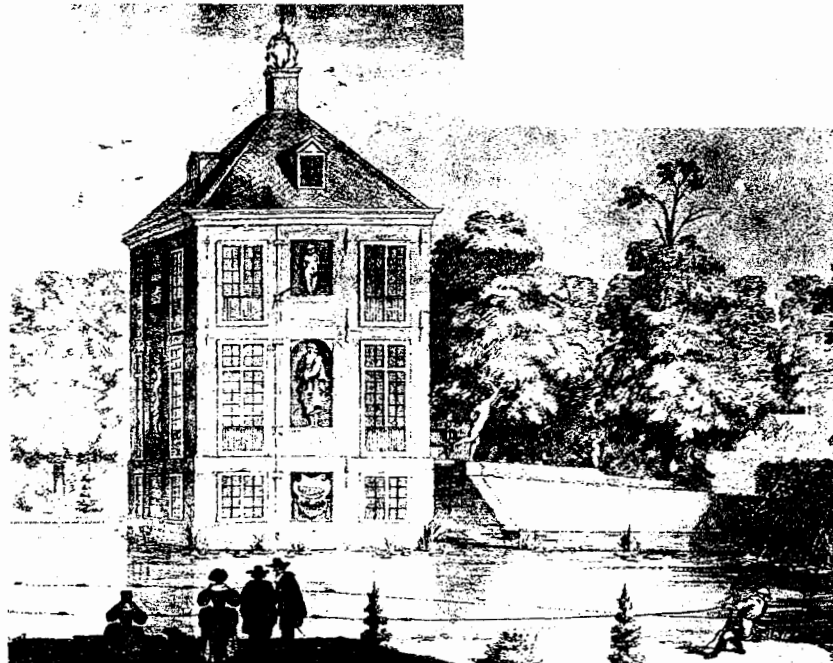
Fossa Corbulonis

The canal Vliet forms a connection between the Meuse- and Rhine estuary just behind the coastal barriers. This canal is identified as the Fossa Corbulonis, dug by the Roman general Corbulo around 47 A.D. for strategic purposes. Use was made of a natural drainage stream in the south (part of the Gantel system) and the Vliet in the north, that were connected with each other. Where the canal joins the Rhine east of Leiden a fortress and possibly a naval base (Matilo) are known at Roomburg.

Arentsburg

The house "Hofwijck" built in 1639-1641 by Constantine Huygens for himself and his family can be seen. To the south lies the estate Arentsburg. The capital town of the Roman tribe of the Cananefates, Forum Hadriani of the Tabula Peutingeriana, has been recovered here, situated on the inner slope of the oldest coastal barrier next to the Vliet. Roman remains from that site are mentioned already in the 16th century. Among the later finds we mention the huge bronze hand, found in 1771. The first director of the National Museum of Antiquities, C.J.C. Reuvens, undertook between 1827 and 1834 the first systematic archaeological excavation in the Netherlands on this site. His untimely death in 1835 prevented the publication, but the documents demonstrate the high standard of his work. He drew systematically: general and detail maps, sections, levelings and perspective sketches. J.H. Holwerda, curator and director of the museum in the period 1904-1935 excavated here from 1910 to 1915 and published his and Reuvens' results in 1923. He wrongly presumed that the site was a naval base and identical to either Praetorium Agrippinae or Lugdunum.

Today the site is almost completely disturbed.



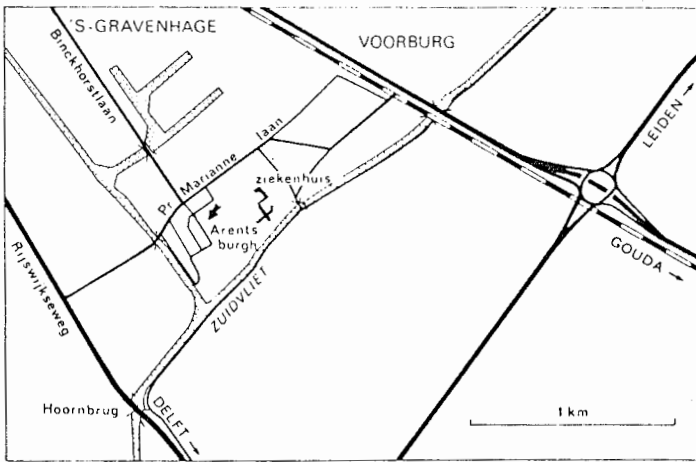


fig. 41. Situation of Arentsburg.

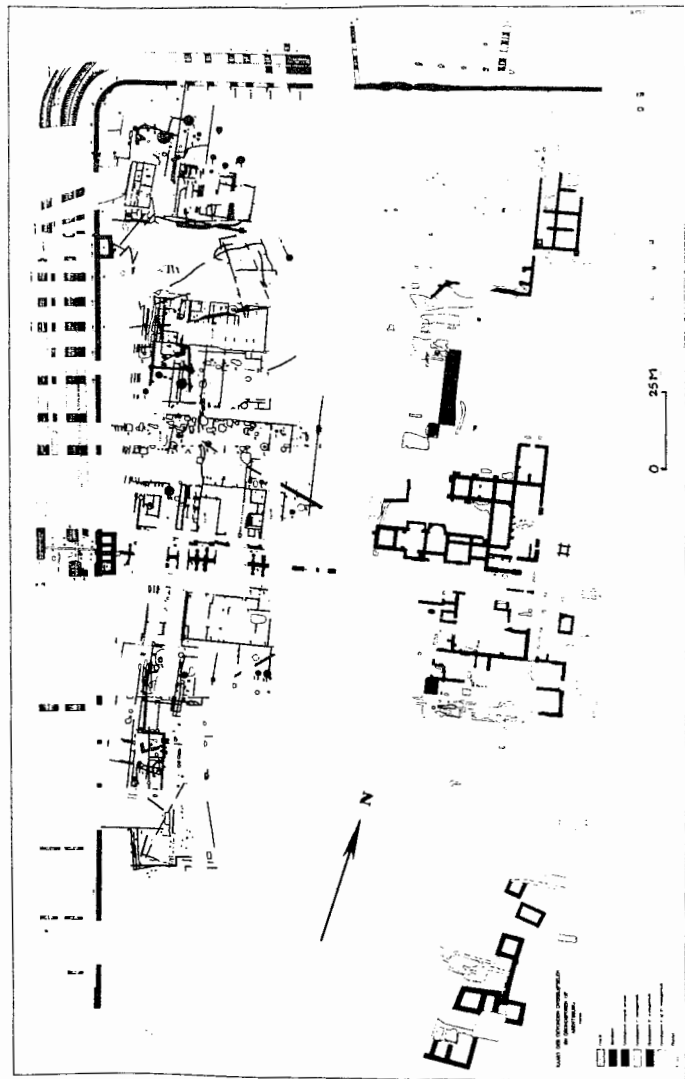


fig. 42. Outline map of documented remains at Arentsburg. After Bogaers 1972.

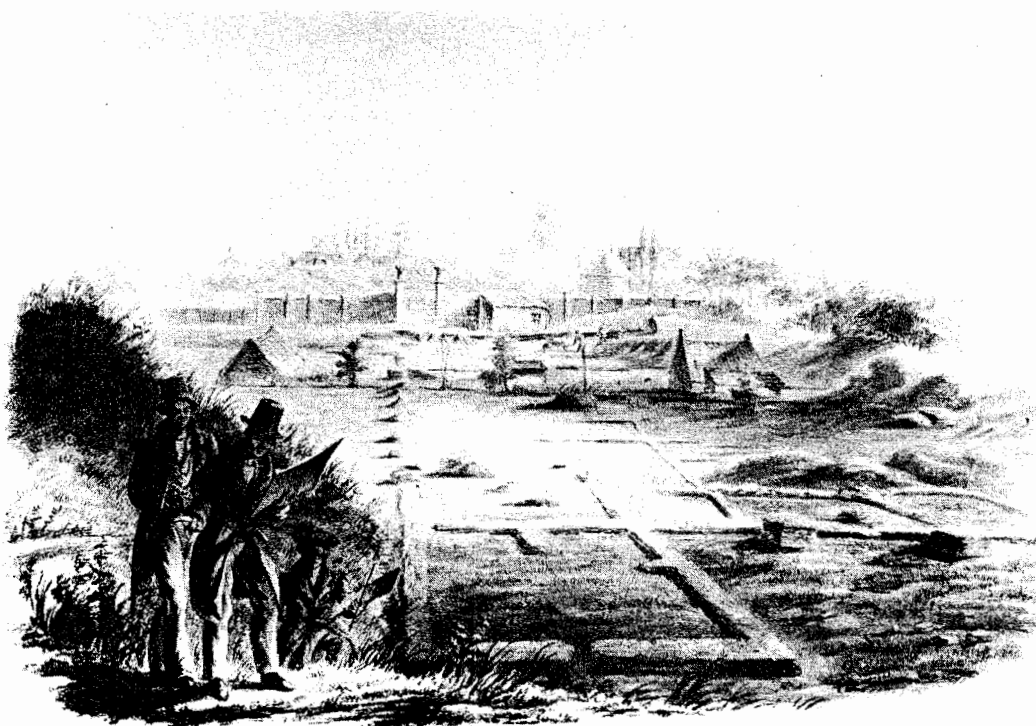


fig. 43. Excavation by Reuvens at Arentsburg, 1827-1834.

THE ESTUARINE DISTRICT

Geology

Marine deposition in the form of tidal flats and salt marshes was wide-spread in the intracoastal area during the earlier part of the Holocene. This is the period of quick sea-level rise, a prograding, narrow and broken coastal barrier, comprising the transgressive phases Calais-I to III. Only short periods of relative rest, with deposition of humic clay or the formation of thin peat layers interrupted the clastic sedimentation.

When the intracoastal district became more and more protected, after 3000 B.C., marine influence diminished gradually and became restricted to the region behind the inlets. Peat formation extended all over this area, with the exception of the zones that bordered the rivers, that crossed the peat in their way to the inlets and the sea. In the central parts of the peat bogs, where the inflow of river water was practically zero, huge Sphagnum bogs came into existence. They increased in extent in the course of time.

The transgressive phases manifested themselves from Calais-IVa onward as successive systems of tidal creeks extending into the peat. The formation of a new system caused erosion and covering of parts of silted older ones. It is not easy to separate and to date the complexes of channel-fills, bank deposits and covers of different ages.

The peat landscape extended in Roman times from Zeeland Flanders in the south to the present Wadden Islands in the north. Fossil creek systems with occupation remains of various ages still were preserved at that time behind the inlets that formed the mouths of Scheldt, Meuse, Rhine and Vecht. But a period of wide-spread erosion and destruction started in the Middle Ages, especially in the phase Dunkirk-IIIb, when marked changes in the coastal processes took place. The loss of the coastal barriers south of The Hague and north of Egmond resulted in the almost complete rejuvenation of the landscape there. Only in the interior of some islands of Zeeland are fragments of the pre-Mediaeval landscapes preserved. The land consists for the main part of Dunkirk-III deposits and the same is the case for the northern part of Holland. At the Meuse estuary older deposits are preserved in the Westland, behind the coastal barriers, and locally in the islands. Exceptional is the Calais-IV relic near Hekelingen with its VL-occupation that was undisturbed until recent building activities and "rescue"-excavations.

Behind the narrow estuary of the Rhine at Katwijk no extensive creek systems were ever formed, but post-Roman erosion was restricted too. Further north Westfrisia was formed in the phases Calais-IV - Dunkirk-0 behind the Egmond inlet and later creek systems came into existence more to the south. Large scale excavations demonstrate the rich archaeological potentialities of these regions; modern destruction does, however, the work what natural agents left.

The peat landscape of the IJsselmeer district was completely destructed by the gradual extension of lakes, that must have been present there at least in Roman times. In the peat district of Holland the same process took place, be it on a less catastrophic scale. The lakes had to be embanked and reclaimed for safety reasons. The old Calais deposits came again

to light in the lake bottom reclamations and offer the opportunity to study neolithic occupation as at Swifterbant and Bergschenhoek, 5 to 8 m below present-day sea-level.

Archaeology

The earliest archaeological documents from this district are the Early Mesolithic barbed points, dredged up from the subsoil of Europort. They number now over forty and only a few other implements are discovered. One wonders whether they are the remains of former camp sites, or that it is hunting/fishing equipment lost when it was used. At any rate human presence in the Rhine/Meuse valley during its initial drowning is proved.

A gap of several thousands of years separates the Europort finds from the oldest actual site, that of Bergschenhoek (3450 B.C.). It is a hunting/fishing station of very modest dimensions (c. 4 x 4 m) on a floating peat island, used c. 10 times in a period of c. 10 years. The presence of migratory birds - present-day winter guests - points to a use of the site during the colder season. The occupants were formally Neolithic in view of their use of polished axes and pottery. Their base camps are unknown, but might have been situated on the donken, riverbanks farther east, or even on the Pleistocene 20 kms or more away.

One thousand years later Vlaardingen people occupied levee deposits of Calais-IVa creeks in the Meuse estuary at Vlaardingen and Hekelingen. Hunting was important as was sturgeon fishing, but cattle was also present on the site and perhaps even cereals were grown. The evidence of Hekelingen-III makes permanent occupation unlikely: there are no heavy structures and the individual sites are of modest dimensions. There is much in common with 1000 years older Swifterbant. Most probable is a seasonal (summer) occupation of restricted duration.

Bell Beaker occupation is documented at Vlaardingen, Hekelingen-I and -III and by some isolated finds. The very modest traces of occupation does not permit any conclusion about the way of life. Middle- and Late Bronze Age remains are lacking completely. We can speculate for the reasons: occupied sediments may be lost or deeply covered or this occupation break can be primary i.e. that no attractive settlement situations for the Bronze Age living mode were present. This is true for instance for the extensive fully agrarian way of life documented for Westfrisia. A similar niche was not available in the Meuse estuary district.

Some tens of Iron Age sites are discovered in this district. They document occupation during the Early and Middle Iron Age. Some are situated on inversion ridges, formed by the fillings of Dunkirk-0 creeks, others lie on the peat surface, where this was well-drained by the new Dunkirk-I creeks. The maximum of the Dunkirk-I transgression, c. 250 - 50 B.C., mark a break of the occupation, that started again shortly before the Roman period.

Roman sites are discovered in large numbers. The remains are near the surface, covered by one clay cover only, the sherds are easy to identify as such and available in quantities over a large surface. These are all favourable conditions for discovery. All sites lie on Dunkirk-I sediment, especially on the slightly higher deposits, bordering the main gully of the Gantel-system.

Not Dunkirk-II caused the end of Roman occupation, since this transgression was of very restricted importance and 11 - 12th century remains were found in the same level as those from Roman times. A rising ground-water table together with economic and political factors must be the main reason for the sharp decrease of occupation to practical absence of it in the 5 - 7th century. Renewed colonization started in Carolingian times and was intensified in the 11 - 12th century. The severe Dunkirk-III landscape destruction that started in this time caused calamities on a large scale that were overwon by embankments. North of the estuary a continuous dike could be constructed as a defence, but south of it embankment started on small islands, that were silted up relatively high, between the wide Dunkirk-III erosion creeks.

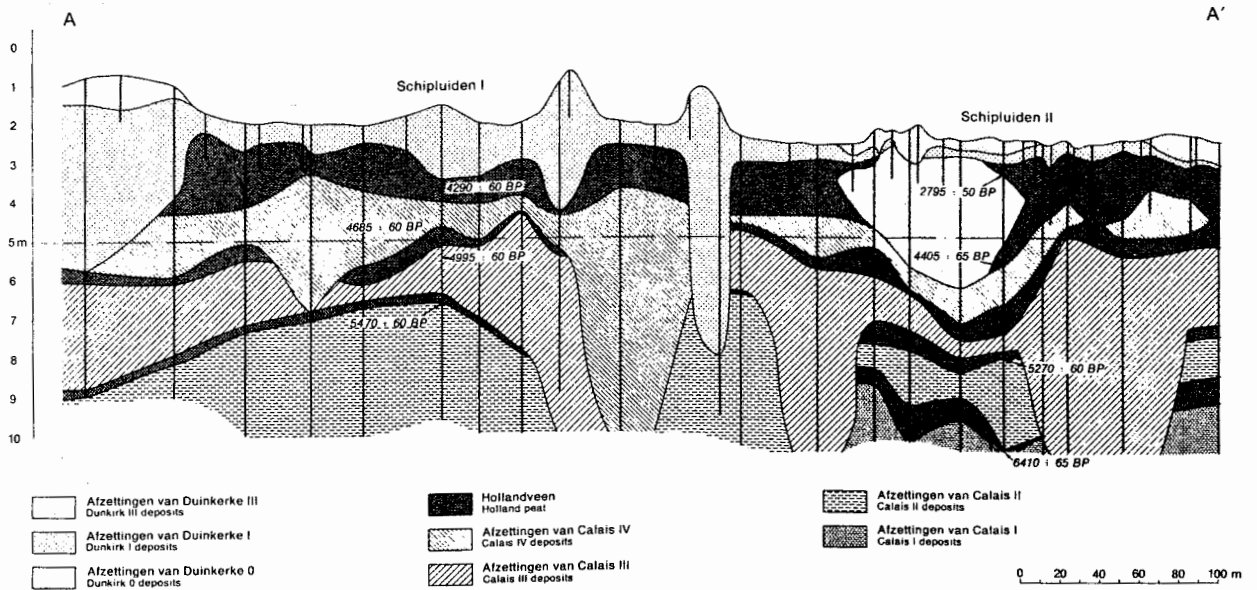


fig. 44. Section of Holocene deposits near Schipluiden, showing the various Calais tidal flat deposits and Dunkirk estuarine creek systems. After Van Staalduinen 1979.

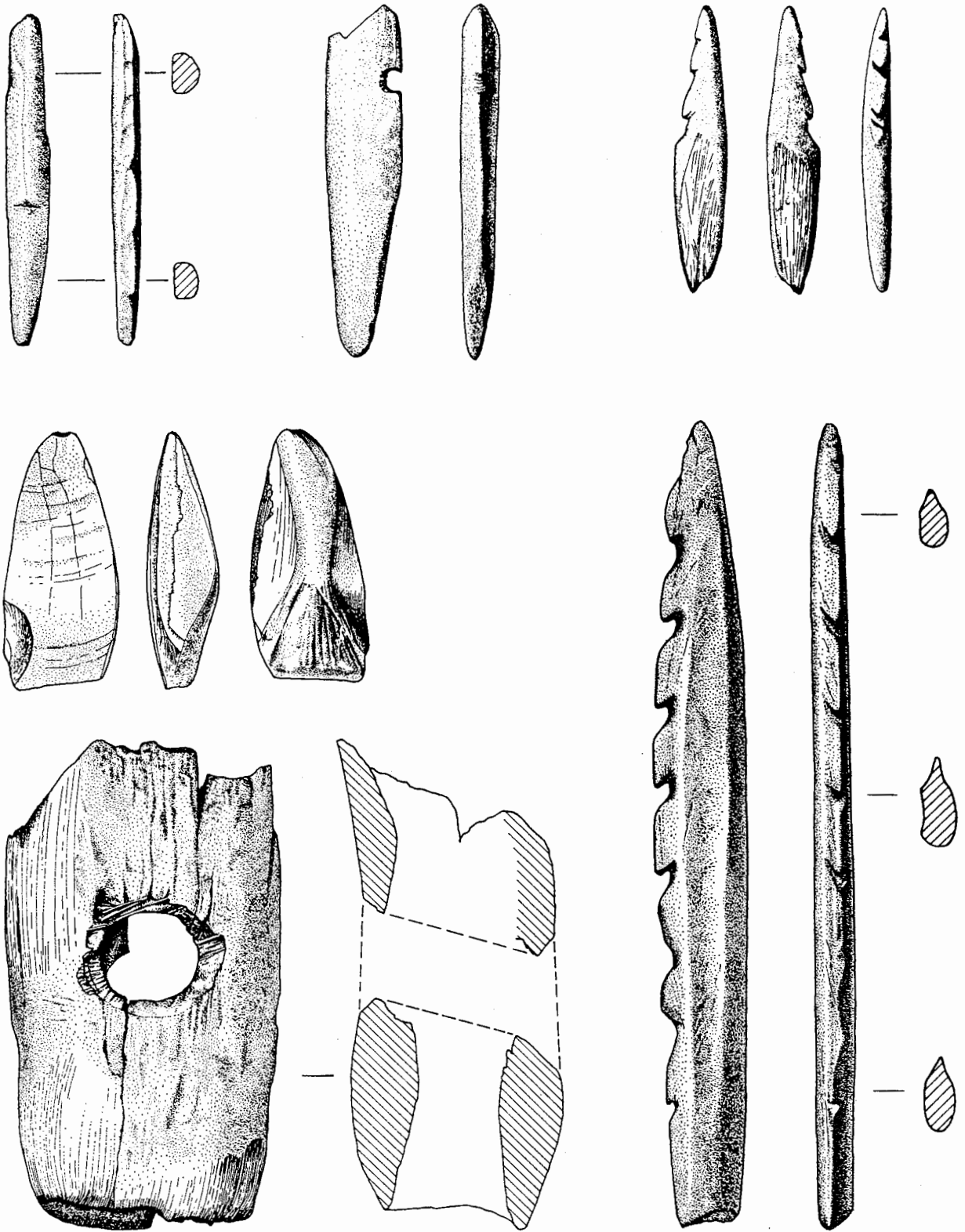
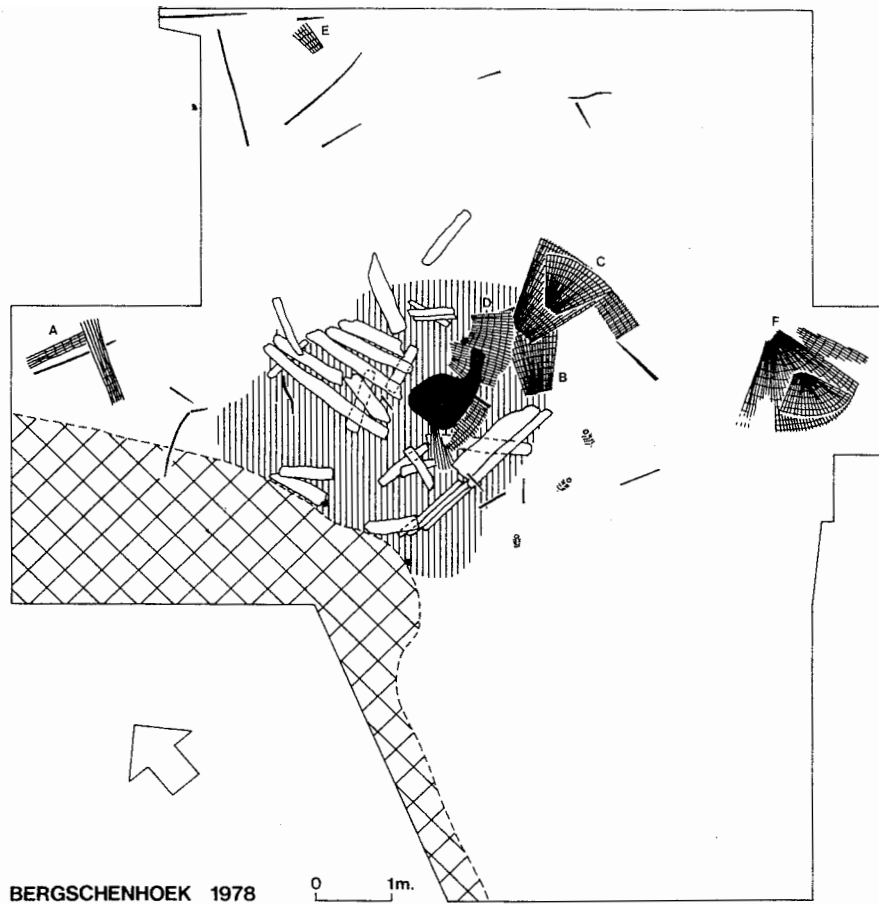


fig. 44a. Early Mesolithic bone and antler implements scale 1 : 1, Europoort.



BERGSCHENHOEK 1978

fig.44b. Schematic plan of the Early Neolithic fowling/fishing station at Bergschenhoek, 3450 B.C.

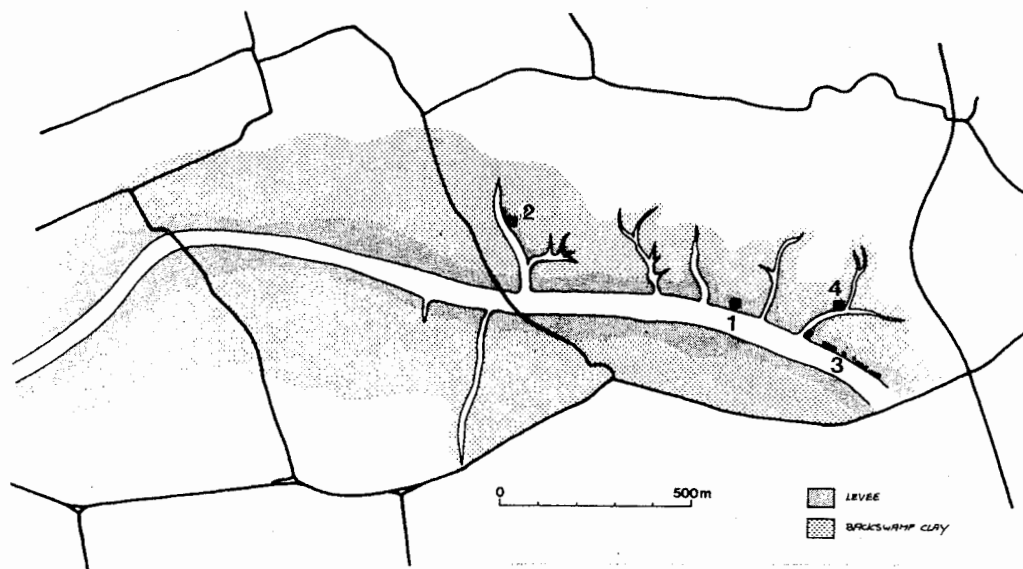


fig.44c. Physiographical map of the Calais-IV^a tidal creek and the Vlaardingen culture sites at Hekelingen.

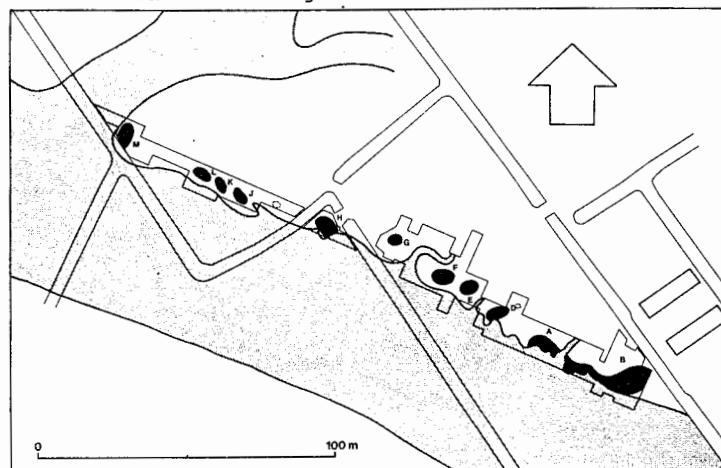
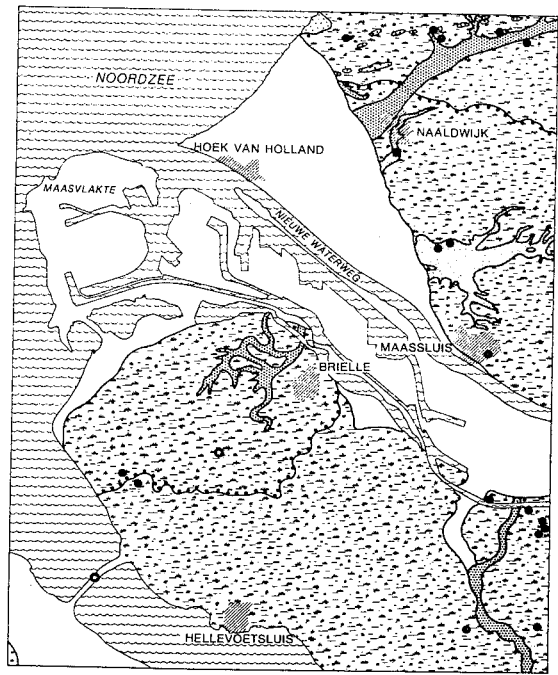
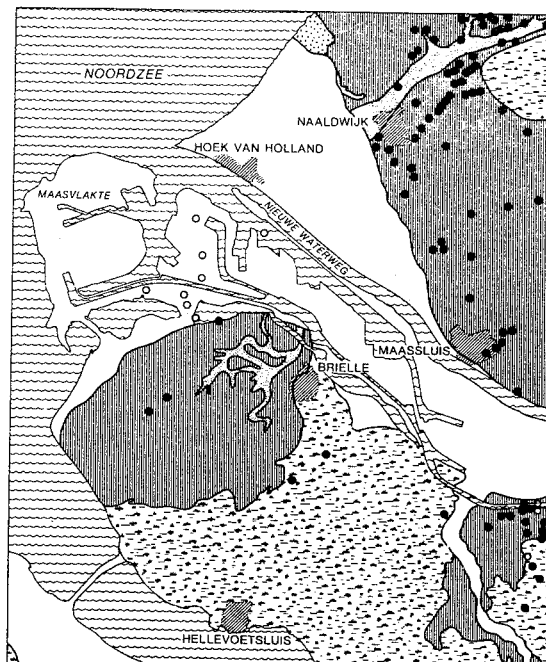


fig.44d. Hekelingen-III, situation of excavation trenches and occupation sites, 2500 - 2100 B.C.



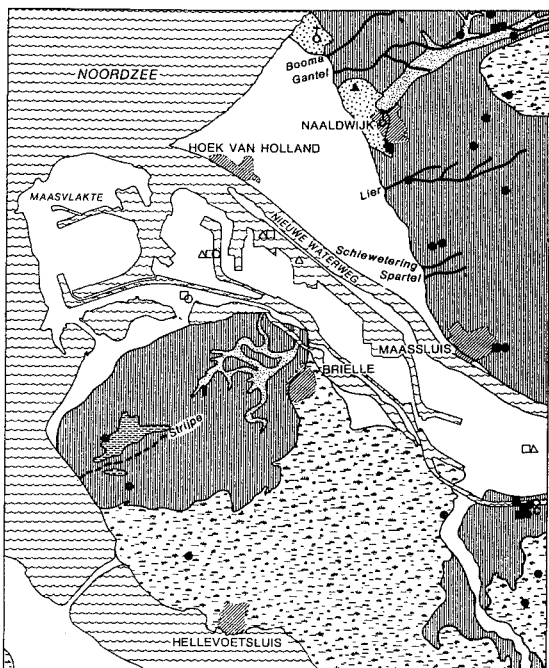
- Afz. v. Duinkerke 0, geulafz. Dunkirk 0 deposits, gully deposits
 - Duinkerke I-geulpatroon Dunkirk I - gully pattern
 - Hollandveen Holland peat
 - Oude Duin- en Strandzanden Older Dune and Beach Sands
 - Grens Duinkerke 0, dekafz. Boundary Dunkirk 0, mud flat deposits
 - Midden of Late IJzertijd Middle or Late Iron Age
 - Vroege of Midden IJzertijd Early or Middle Iron Age
 - Late Bronstijd, verplaatst Late Bronze Age, redeposited
- 0 1 2 3 4 5 km

Late Bronze Age and Iron Age findspots.



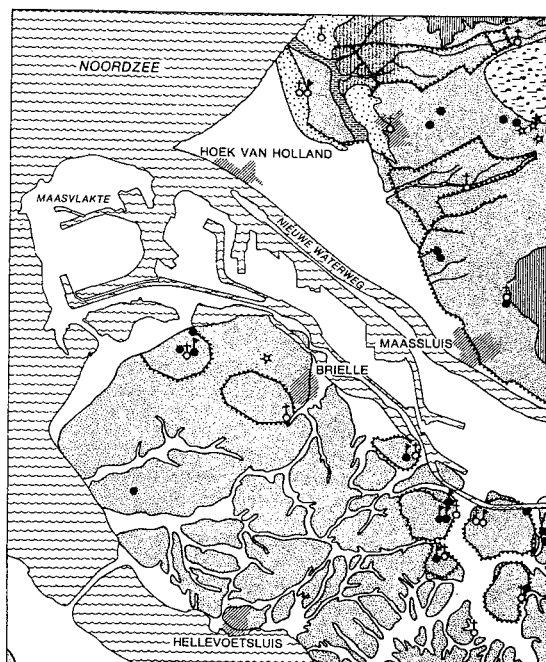
- Afz. v. Duinkerke I, dekafz. Dunkirk I deposits, mud flat deposits
 - Afz. v. Duinkerke I, geulafz. Dunkirk I deposits, gully deposits
 - Hollandveen Holland peat
 - Oude Duin- en Strandzanden Older Dune and Beach Sands
 - Romeinse tijd, verspoeld Roman period, redeposited
 - Romeinse tijd, in situ Roman period, in situ
- 0 1 2 3 4 5 km

Roman Period findspots.



- Afz. v. Duinkerke II, dekafz. Dunkirk II deposits, mud flat deposits
 - Afz. v. Duinkerke I, dekafz. Dunkirk I deposits, mud flat deposits
 - Afz. v. Duinkerke I, geulafz. Dunkirk I deposits, gully deposits
 - Hollandveen Holland peat
 - Oude Duin- en Strandzanden Older Dune and Beach Sands
 - verspoeld secondary place in situ 11*/12* eeuw 11th/12th century
 - Karolingisch Carolingian
 - Merovingisch Merovingian
 - Kerk Church
- 0 1 2 3 4 5 km

Mediaeval findspots up to and including the twelfth century.



- Afz. v. Duinkerke III, geulafz. Dunkirk III deposits, gully deposits
 - Afz. v. Duinkerke III, dekafz. Dunkirk III deposits, mud flat deposits
 - Afz. v. Duinkerke III, crevasse afz. Dunkirk III deposits, crevasse deposits
 - Afz. v. Duinkerke I, dekafz. Dunkirk I deposits, mud flat deposits
 - Hollandveen Holland peat
 - Jonge- en Oude Duin en Strandzanden Younger and Older Dune and Beach Sands
 - Vindplaats Findspot
 - Terpje, met vondsten Small terp, with finds
 - Terpje, geen vondsten Small terp, no finds
 - Kerk, niet onderzocht Church, not investigated
 - Kasteel, onderzocht Castle, investigated
 - Kasteel, niet onderzocht Castle, not investigated
 - Dijk Dike
- 0 1 2 3 4 5 km

Findspots, small terps, dikes, churches and castles from the thirteenth century.

fig. 45. Four stages of landscape evolution and human occupation of the Meuse estuary. Geological map sheet 37 W. After D.P. Hallewas/J.F. van Regteren Altena in: Van Staal-duinen 1979.

Rijswijk

The native Roman settlement site of Rijswijk-De Bult (= The Hill) was discovered by amateur-archaeologists in 1966. An excavation was carried out in the years 1967-1969 by the State Service for Archaeological Investigations under direction of J.H.F. Bloemers, in view of the planned extensions of Rijswijk, the layout of a park and the construction of a four-way road. The settlement itself was completely excavated (3.5 ha) and a field system was uncovered by means of trenches.

The settlement is one of many Roman sites found on the silted-up creek systems north of the Meuse estuary and behind the coastal barriers. They were situated in a fresh water environment outside the reach of the tides. The first occupants, in view of their pottery of northern (Frisian) origin, built a small, three-aisled farm on a slight elevation at the northern fringe of the major creek-filling that is still visible in the landscape. This moment is dated in the end of the first century B.C. A modest and very gradual growth of the settlement took place in the period till c. 150 A.D. The number of farms increased as did their dimensions. Also one of two granaries were built.

A major change took place between 130 and 150 A.D., when the settlement was surrounded by a ditch and divided into four parcels, on three of which a farm was built, while on the fourth a small wooden temple was erected. Around 200 A.D. the settlement was enlarged from 1 to 1.85 ha, new ditches were dug and a ditch system was laid out south of it over the hill of a broad creek. The settlement consisted of three farms with a number of barns and must have housed c. 20 persons and c. 70 head of cattle. The parcels, 1-2 ha each and in total 13 ha, were arable fields, where wheat, barley and rye was grown.

From period II onward a social differentiation of the settlement can be concluded from differences in house construction. One farm house - on the founder's parcel - had stone foundations and in period III three small stone walled rooms were added to one end. One of these even had painted wall decorations and a heating system in Roman style. This was without doubt the chief's house. In contrast to the other farm yards no barns were built on this parcel.

In the material remains the Romanization process of the native community can be followed: Roman import pottery increased as did roof tiles and luxury objects of glass and bronze. These will have been obtained at the market place of Forum Hadriani in exchange of agrarian products. The inhabitants, although of Frisian origin, will have been members of the tribe of the Cananefates, known by literary and epigraphic documents and of which Forum Hadriani was the capital town.

The settlement came to an end around 270 A.D., as so many other settlement sites in the western Netherlands. It is difficult to name a single cause. Political instability and economic collapse might be (interrelated) causes, but the raise of the ground water level might have caused serious agricultural problems too.

The plans of the six building phases of the "chief's house" are reconstructed in stone and wood in the park that covers the site.

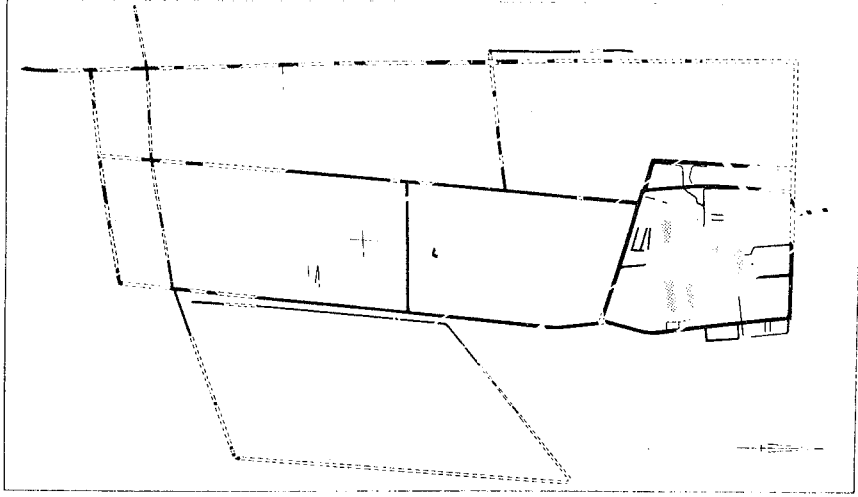


fig. 47. Rijswijk-De Bult. Settlement (period III) and field system. Scale 1 : 6000.

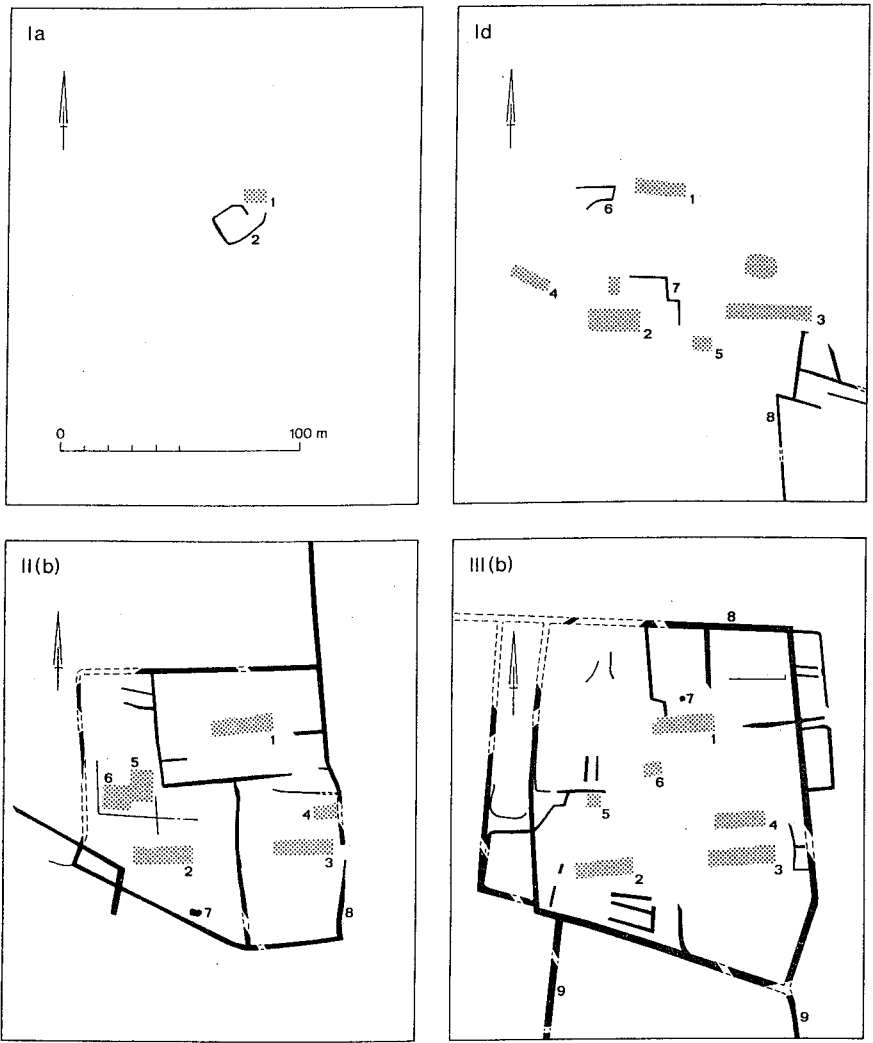


fig. 48. Four periods in the development of the native Roman settlement at Rijswijk.

- | | |
|--|---|
| <p>Period Ia</p> <p>1 house</p> <p>2 yard</p> <p>Period Id</p> <p>1 - 4 houses</p> <p>5 granary</p> <p>6 - 8 ditches</p> | <p>Period IIb</p> <p>1 - 4 houses</p> <p>5 temple?</p> <p>6 granary</p> <p>7 well</p> <p>8 ditches</p> <p>Period IIIb</p> <p>1 - 4 houses</p> <p>5 - 6 outhouses</p> <p>7 well</p> <p>8 - 9 ditches</p> |
|--|---|

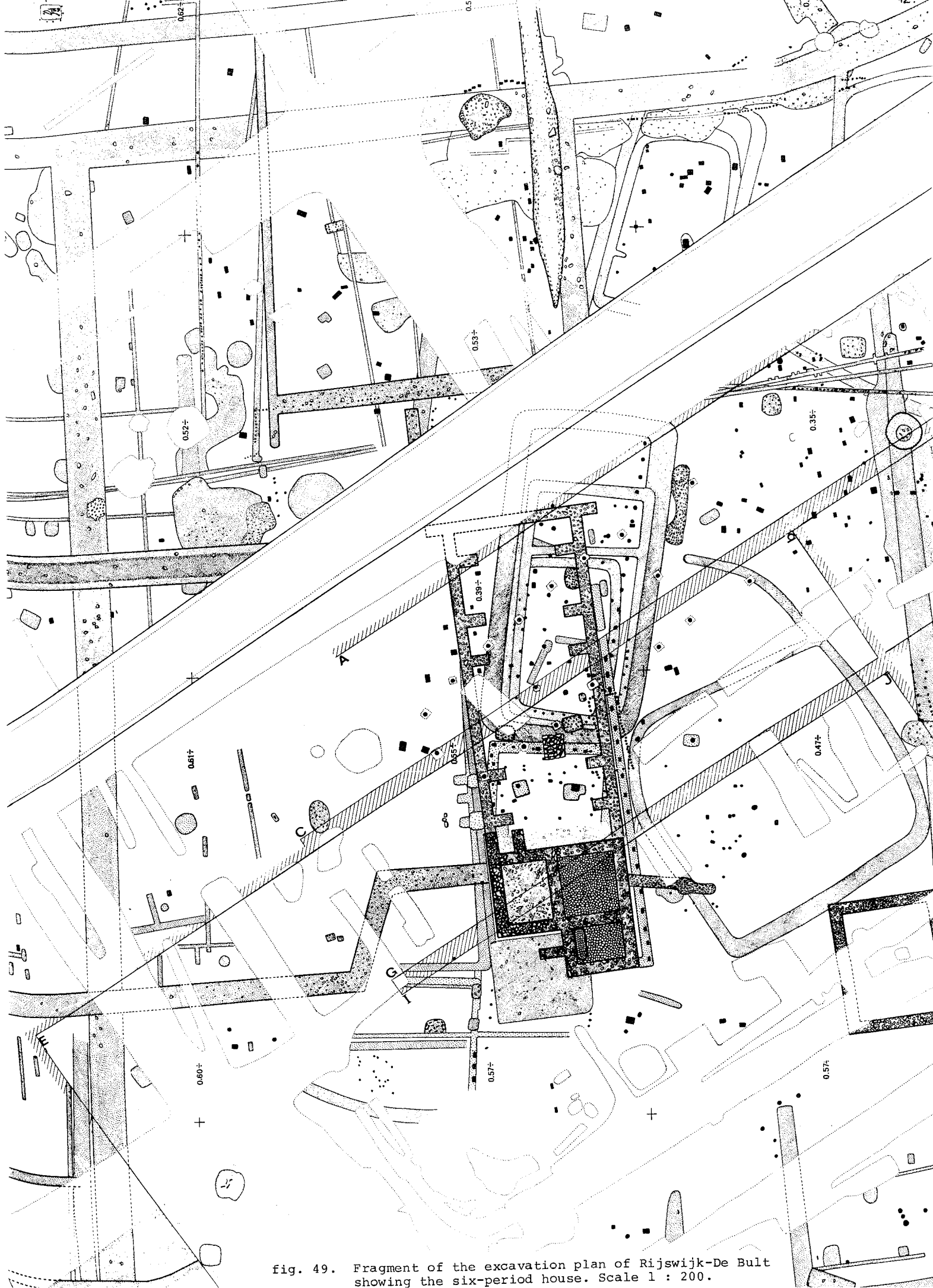


fig. 49. Fragment of the excavation plan of Rijswijk-De Bult showing the six-period house. Scale 1 : 200.

fig. 50. Rijswijk. The six phases of the house of fig. 49.

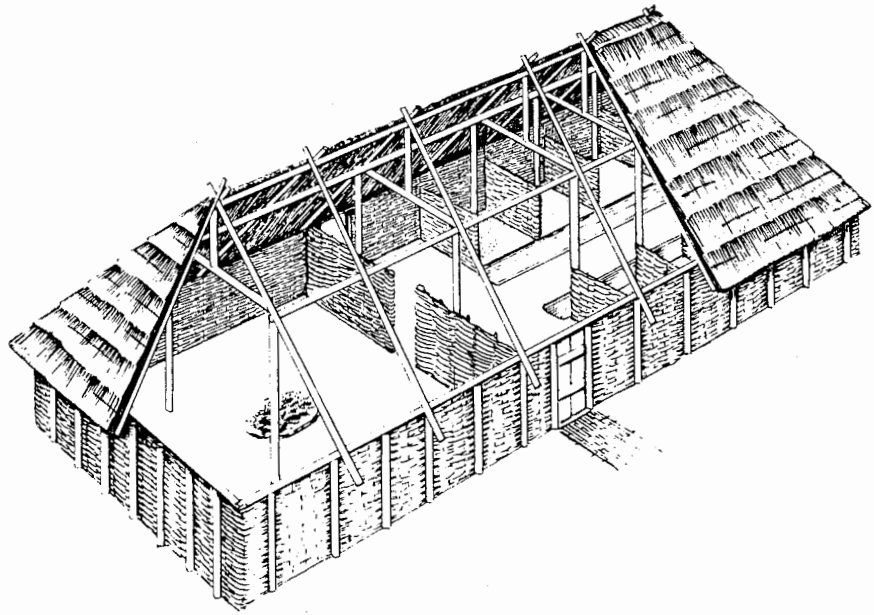
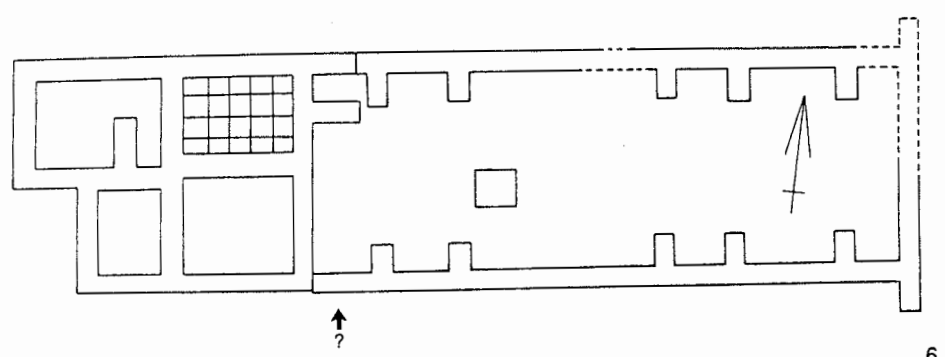
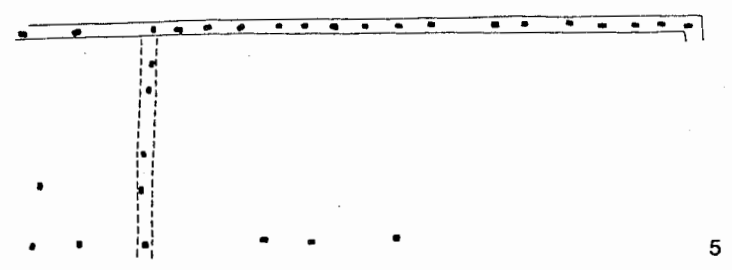
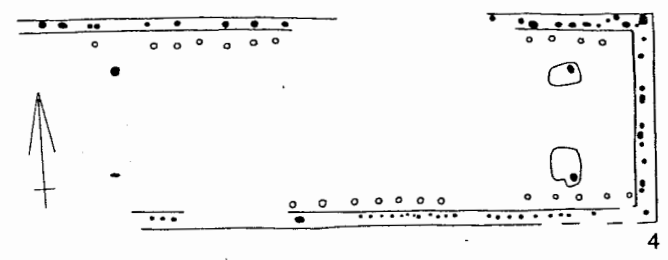
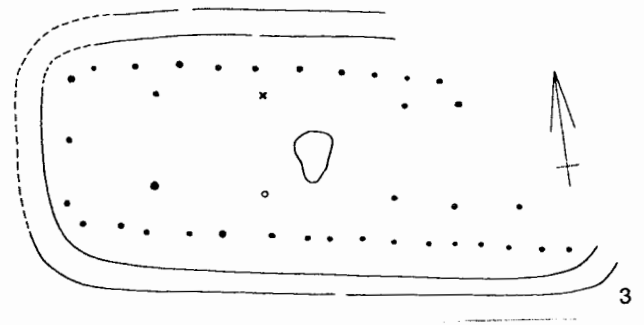
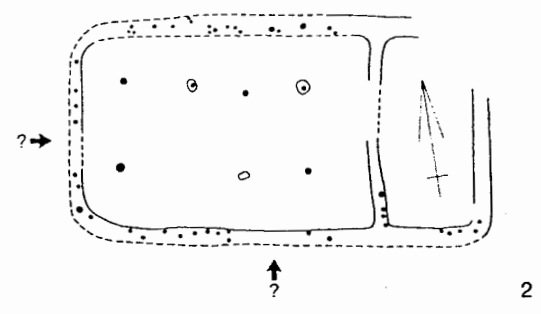
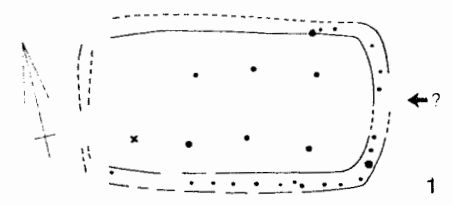


fig. 51. Reconstruction of a three-aisled house with stable and living quarter.



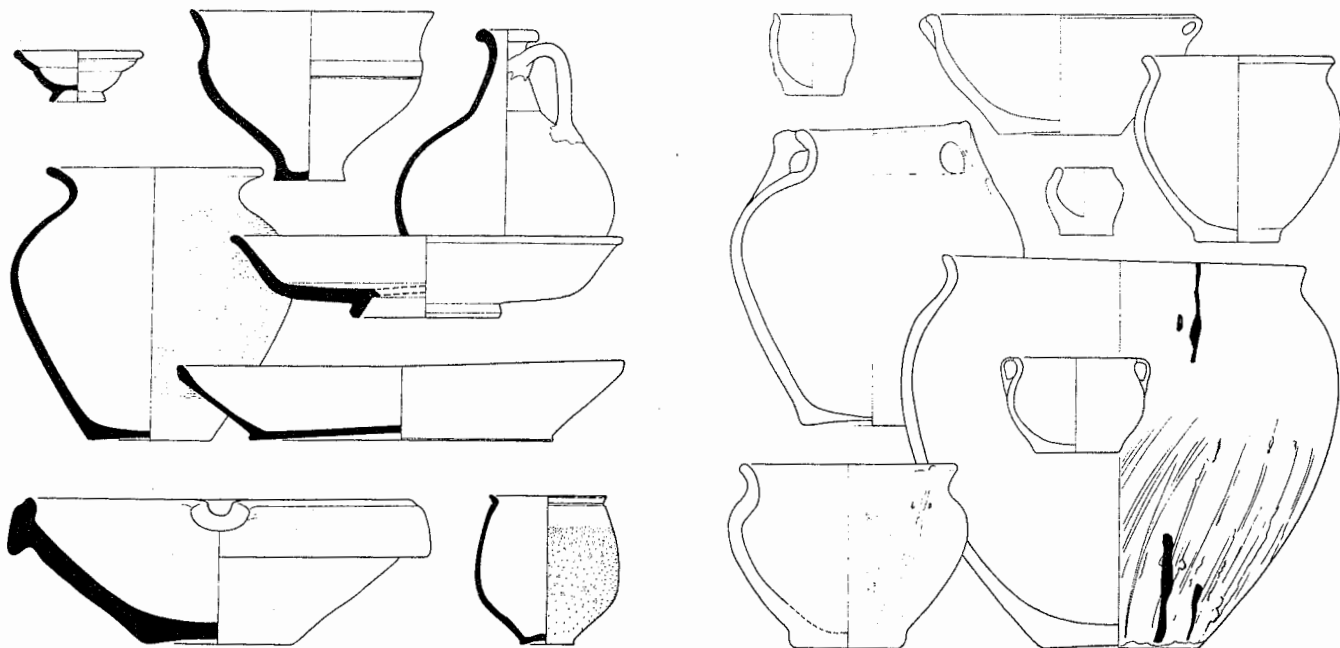
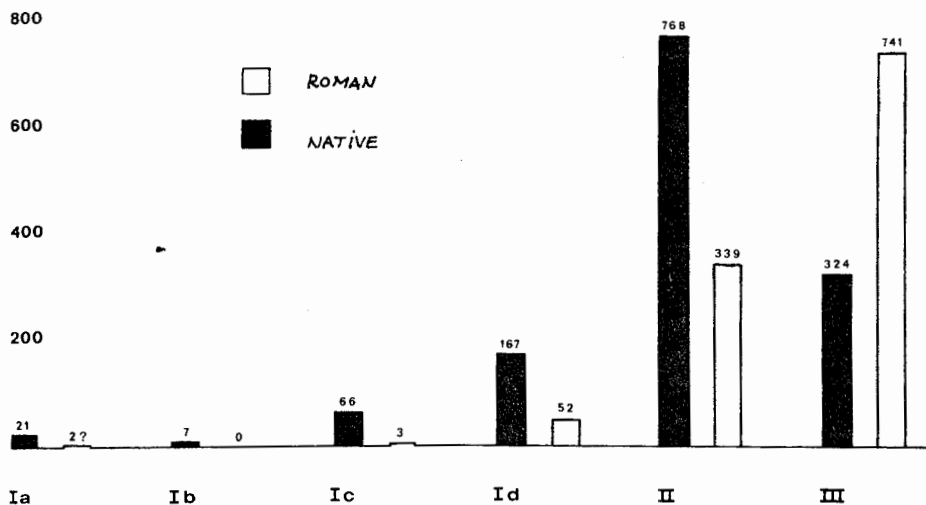


fig. 52. Roman wheel-turned pottery and native "Frisian" ware of Rijswijk.

Exemplare



Perioden

fig. 53. Ratio of native and wheel-turned Roman pottery in various phases of the settlement Rijswijk-De Bult, showing increased Romanization.

figs. 47-53. After Bloemers 1978.



fig. 54. Distribution of "streeband" (Frisian) pottery.

THE PEAT DISTRICT

Geology

East of the estuarine creek systems and direct marine influences and west of the river clay district quiet conditions prevailed throughout the Holocene. Extensive peat bogs came into existence in that region, that separated the coastal inhabitable area from the Pleistocene sands. The southern part of this intracoastal peat district stands out as a region with characteristics of its own, that favoured prehistoric occupation and explain the archaeological interest. First, tidal flats and salt marshes did not extend as far to the east as they did to the north of it during the earlier (I-III) Calais phases. Second, the peat bogs are crossed here by the lower courses of rivers that brought eutrophic water and mineral sediment (clay) in the area. High water clays, streambed and levee deposits form marked landscape units that were important for prehistoric settlement. The flow of eutrophic river water prevented the development of oligotrophic peat in this part of the peat district. Third, the pre-Atlantic river dunes are bound in their origin to the hidden Late Glacial Rhine/Meuse valley.

A greater part of this "riverclay/woodpeat area" has been preserved in the post-Roman erosion period. The "Grote Waard" south of the Merwede river, was lost in the storm surge of 1421, but the Alblasserwaard, to the north of it, just escaped this fate.

The "donken" are the outcropping tops of river dunes of Late Glacial - Early Holocene age. They have their bases on the Late Glacial surface that slopes from - 6 m in the east of the peat district to - 12 m in the west of the Alblasserwaard and attain there heights up till + 4 m NAP. The donken are arranged in WNW-ESE orientated rows or groups and are in fact only the highest tops of extensive dune systems of which the lower elevations are completely covered by younger sediments and hidden from the eye. Their steep slopes (up till 20%) are covered with peat and clay under the influence of the rising ground-water table. This process started in the beginning of the Atlantic, when the sea-level did reach this level. The increasing wetness of the river valley impeded further sand blowing and the river dunes became fossilized from then on.

Donken are only found in the former 20 - 30 kms wide valley of the Late Glacial Rhine and Meuse and lack in the coversand districts north and south of it. They are blown up from the river channel sands and rest on the top of a tough and sticky clay that marks the last activity phase of this river system. There are good (palynological) arguments to date this clay to the Late Weichselian (probably the very end) and the Preboreal and (Early) Boreal periods.

In the riverclay area to the east and the marine and estuarine areas to the west only a few donken are known. Many of them will have been eroded away, while in the west others will have been completely covered.

The post-Boreal sedimentation sequence is characterized by a succession of peat formation and alder carr and of clastic sedimentation in lakes and along numerous creeks.

The river sediments in the peat area show the same sedimentation pattern as those in the riverclay district but there are a number of important differences in texture and relative importance of the various sedimentation units. Of major importance are the sandy channel deposits of the main streams, that are the less coarse-textured counterparts of the wide "meanderbelts" in the Betuwe. The levee deposits are of a (very) restricted extent and consist of a clayey sand to a sandy clay. The back-swamp deposits have their counterparts in extensive high water clays, intercalated in the peat. The correlation of these clays with the channel deposits is not always easy, because of the compaction effects in the peat. There are numerous minor creeks that can only be made visible by very detailed mapping like that of J.D. van der Woude (1982), connected up with the main-streams.

The activity phases of the streams can be dated in various ways: with the oldest archaeological remains on the channel fills, C14-dates of rest gully fills or of the peat layers above and below the corresponding clay beds. Intersections of channels and stratification of the clay layers give relative ages.

Van der Woude identified four major phases of clastic deposition during the Atlantic/Subboreal period, in his 4 km² study area around the Hazendonk, in the centre of the Alblasserwaard. The sedimentation took place in a lagoonal, fluviatile and/or lacustrine environment and he stresses that open water must have dominated the landscape in these phases. The lakes and swamps communicated with the main stream by means of numerous small creeks and gullies. The clastic depositional phases are separated by periods of extensive reed swamps and swamp forest, peat formation and gyttja sedimentation.

A major question is, to what extent these changes are controlled by the sea, that is in how far these can be connected with the transgression/regression cycles. Only a restricted correlation of both processes can be made out. Clastic-1 is synchronous with the central part of Calais-I, clastic-3 is correlated with C III and clastic-4 with C IV b. But cl-2 is dated in the time of the C I/II interval, C IV a is missing (but not further east) and Dunkirk-0 is not present as a separate clay bed, although there are indications that flooding and clay sedimentation continued on a modest scale. It is true that in this area sedimentation level was directly or indirectly determined by the level of the sea - so we can call it "perimarine" - but the type of sedimentation certainly was the result of the regime of the major rivers, of the higher and lower discharges in them and the influx of river water and sediment from the east.

An interesting landscape element is the Schoonrewoerd stream ridge, a c. 100 m wide sandbody, deposited by a relatively strong current in this quiet environment. Its major activity phase is dated 2100-1800 B.C. and linked with the first stage of clastic bed 4. It appeared that already in the foregoing phase parts of this stream were present in a perhaps more modest form. It was suggested earlier (Louwe Kooijmans 1974) that this stream in fact acted as a high water spillway during a restricted period of water surplus in the river clay district and that it could have been formed by the connection of existing drainage creeks. Deposition of clastic-4b after the stream was sanded-up (around 1800 B.C.) must originate from other streams

that still persisted in the environs and that might have been parts of the same stream that were not yet silted-up or even rejuvenated. These inundations caused channels that cross the ridge, called "break-through channels" in contrast to crevasses, that are synchronous with the activity of the river and are spillways from the river through one of its levees into a backswamp.

After the formation of clastic bed 4 a swamp forest (mainly consisting of alder) spread over the whole region, with the exception of the Schoonrewoerd stream ridge and the donken. Dunkirk-0 deposits are very restricted and Dunkirk-I is absent. Estuarine creek systems reached the western part of the Alblasserwaard and river sediments were laid down not farther west than Vianen and Leerdam.

An interesting new contribution to the possible correlation of marine and fluvial sedimentation is given by Berendsen (1982) in his study on the river area in the southern part of Utrecht, where the transition can be made out between the riverclay district proper and the district of peat with stream ridges. He could conclude that there are two correlations. First between the beginning of the peat formation in residual gullies of river channels and regression phases and second between periods of avulsion (i.e. the natural diversion of river sections) and transgression phases. It appears that back-swamp stratigraphy is of local value only and that it is very hard or even impossible to give reliable estimations on sedimentation intensity in this area. Both peat formation and sedimentation seem to have continued in an ever varying pattern. But it might be possible to reach an estimation on a subjective way as done until now. The frequency of fluvial sedimentation in the peat district at some distance of the river clay area (like around the Hazendonk) might, moreover, be interpreted as a measure of river water and sediment surplus farther east.

Archaeology

The western part of the river area could form a contact zone between the coast and the Pleistocene hinterland by the occurrence of water courses, fossil stream deposits and donken, which made human settlement and traffic possible. We can expect traces of occupation on the donken from Late Boreal times onward and so from times from which the stream ridges are beyond reach. But no mesolithic remains are identified until now. The hunter-fishers will not have settled on the dune tops that are the only parts open for prospection, but more probable at their bases. But in later prehistory they formed dry refuges - be it of restricted space - in an otherwise wet environment, apt for permanent settlement as far as dimensions and natural resources made that possible. They are, however, in general too small for a fully agrarian subsistence economy. Pre-Vlaardingen remains are - with one exception of a few sherds - exclusively known from the Hazendonk. But this site might be considered as representative since no prospection programs on other potential sites have been carried out. Vlaardingen-culture remains are found on eight dune tops between Ridderkerk and Zaltbommel, but no sites on fluvial deposits are known in this region. It might be that these were lacking (it is in fact a period between two phases of deposition) but it is also true that sediments of this age are covered and below the reach of normal prospection.

From late Bell Beaker times onward occupation has been attested on the Schoonrewoerd stream ridge. The fragmentary condition of the remains makes it difficult to prove that occupation was continuous, but in view of the agrarian character of the settlements one can assume a permanent occupation of the ridge. There are no reasons to assume occupation breaks before the Late Bronze Age.

The wide-spread peat deposits gradually covered all inhabitable locations, with the exception of some donken. The district as a whole became unsuitable for a fully agricultural way of life, like the peat district farther north. Roman settlements lie on rows on the fillings of the main channels of Dunkirk-I estuarine creek systems in the western part of the Alblasserwaard. An unoccupied peat marsh separated these sites from the westernmost sites in the dense inhabited riverclay district. The contact between both occupation areas was formed by two major roads, the "north" and "south" road of the Tabula Peutingeriana. The former along the river Rhine to Leiden, the latter south of the Alblasserwaard, probably along the Meuse. Most of it is, however, lost. Some Roman sites along the Merwede river reflect the occupation in a zone along this road.

An even wider district was unoccupied in the Early Middle Ages. Occupation starts not earlier than the 11th century, when colonists settled along the main rivers and along the water courses that drained the peat. It are well-organized reclamations of the "wilderness", supported by the authorities, namely the Count of Holland and the Bishop of Utrecht. Rectangular "blocks" were drained, embanked and parcelled in long strips. Farmyards were built on artificially raised places as a protection against floods. The reclamation was completed in the 13th century and a collective Water Control Board (Hoogheemraadschap) was founded by the Count of Holland in 1277. This and similar Boards are still in function as autonomous bodies (with taxes of their own !) that control drainage, maintenance of embankments, waterpollution, etc.

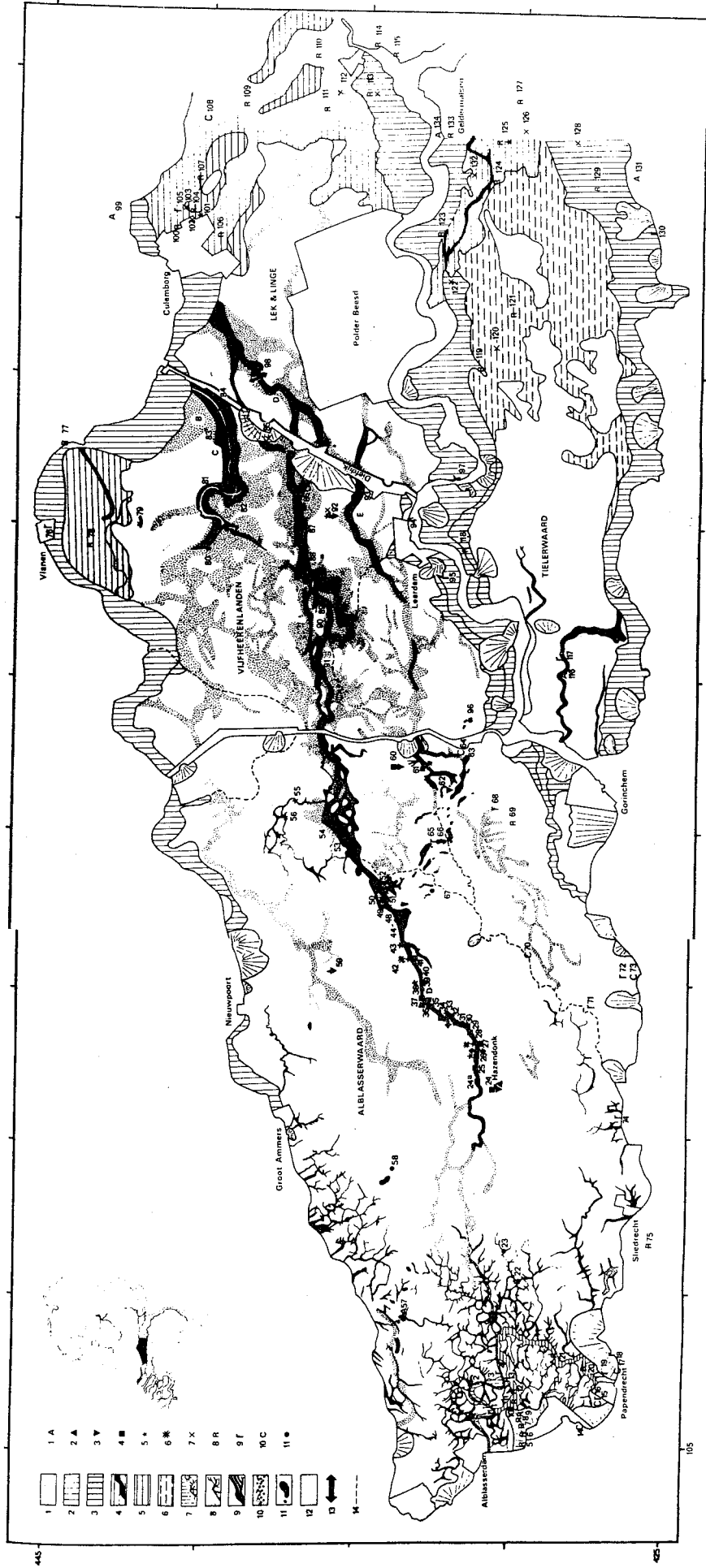


fig. 55. Map of the prehistoric and Roman find spots in the river clay/wood peat area, in relation to its geology. After Louwe Kooijmans 1974.

Legend archaeology

1. various axes
2. older than VL Culture
3. VL Culture
4. VBB and/or BWB Culture
5. Middle Bronze Age (DKS)
6. Late Bronze Age
7. Iron Age
8. Roman : settlement
9. Roman : unreliable
10. Roman : coin
11. Prehistoric, indefinite

Legend geology

1. crevasse deposits (dike breach deposits), after A.D. 1200
2. fluvialite levee deposits, post-Roman
3. back swamp clay belonging to the same system as 2
4. levee deposits with Roman occupation (pre-Roman *sensu stricto*); old stream channels in black
5. back swamp clay belonging to the same system as 4
6. pre-Roman levee and back swamp deposits with small branches, post-Roman
7. estuarine creek levee deposits with small branches, post-Roman
8. estuarine creek levee deposits with small branches, with Roman occupation (pre-Roman *sensu stricto*)
9. stream ridges, Late Atlantic and Early Subboreal; old stream channels, if clearly present, in white
10. as 9, but covered with peat
11. *donken*, tops of Early Holocene dunes
12. peat
13. natural water-courses in the peat-district, the main drainage lines before the embankment
14. break-through channels through the Subboreal stream ridges

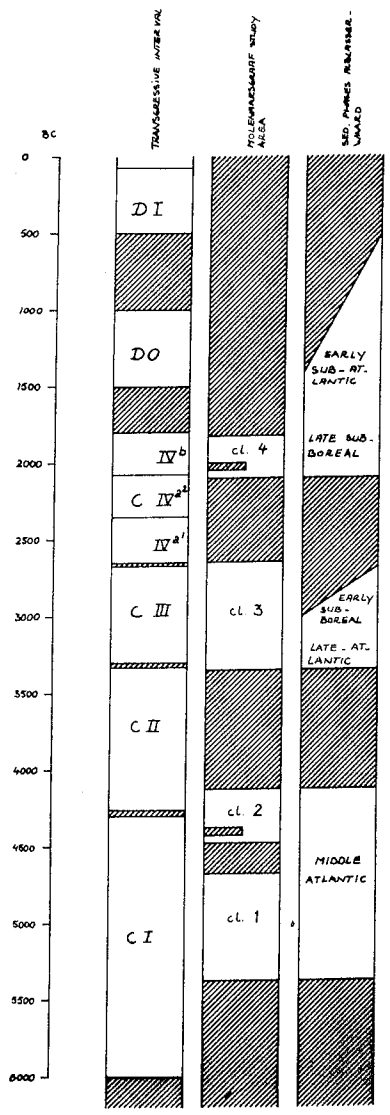
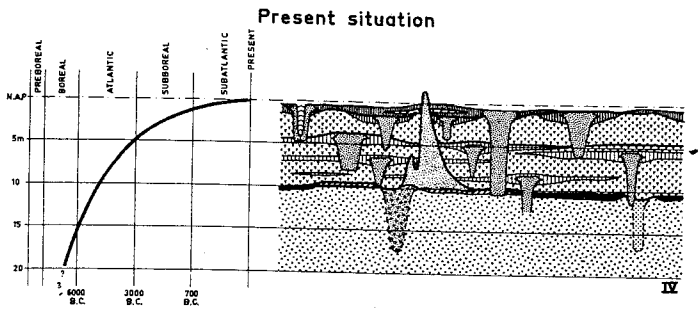
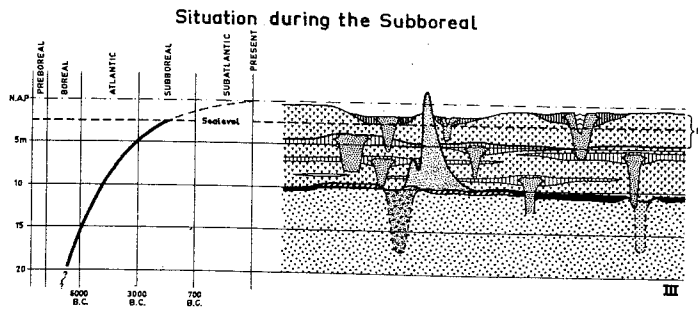
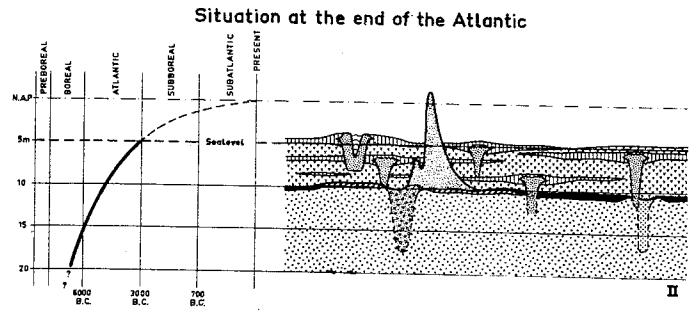
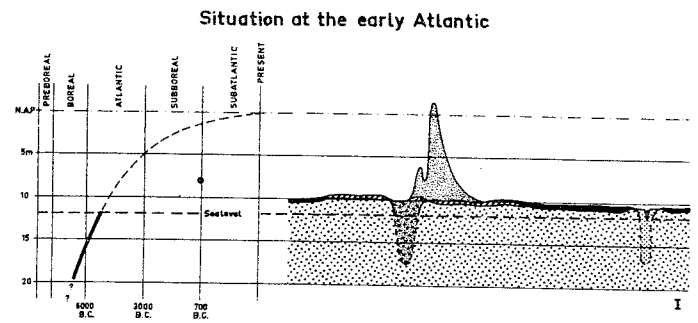
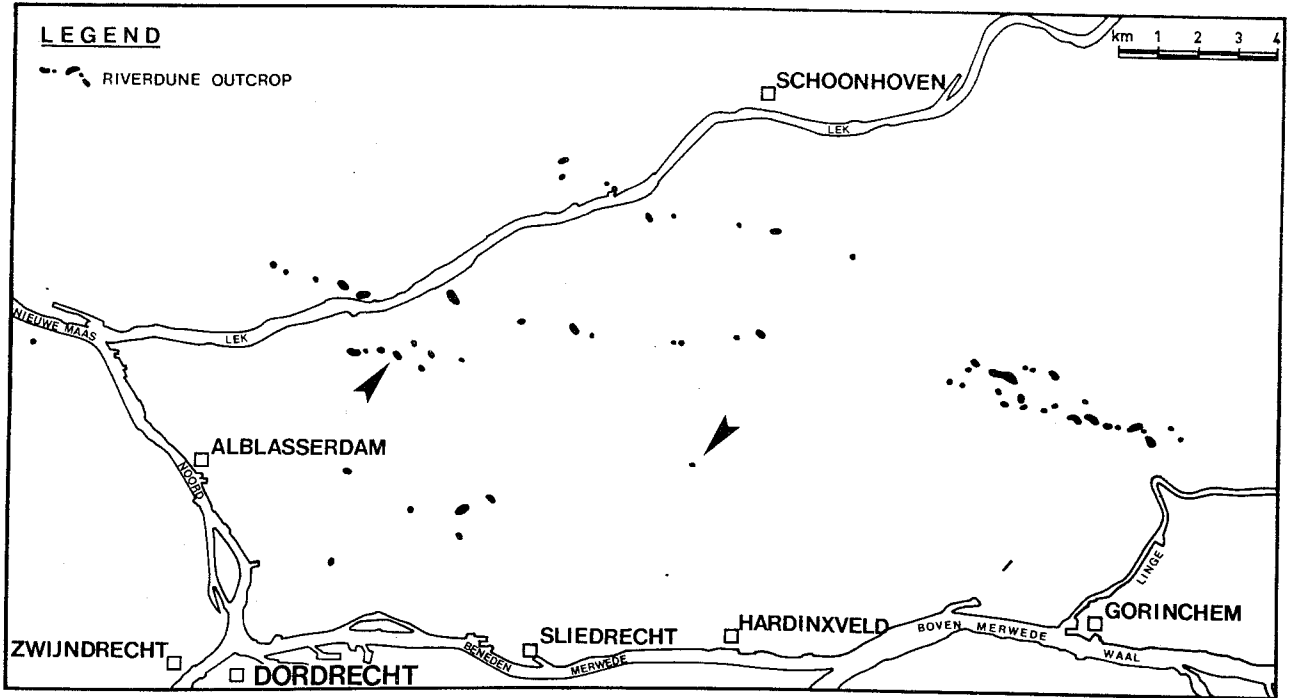
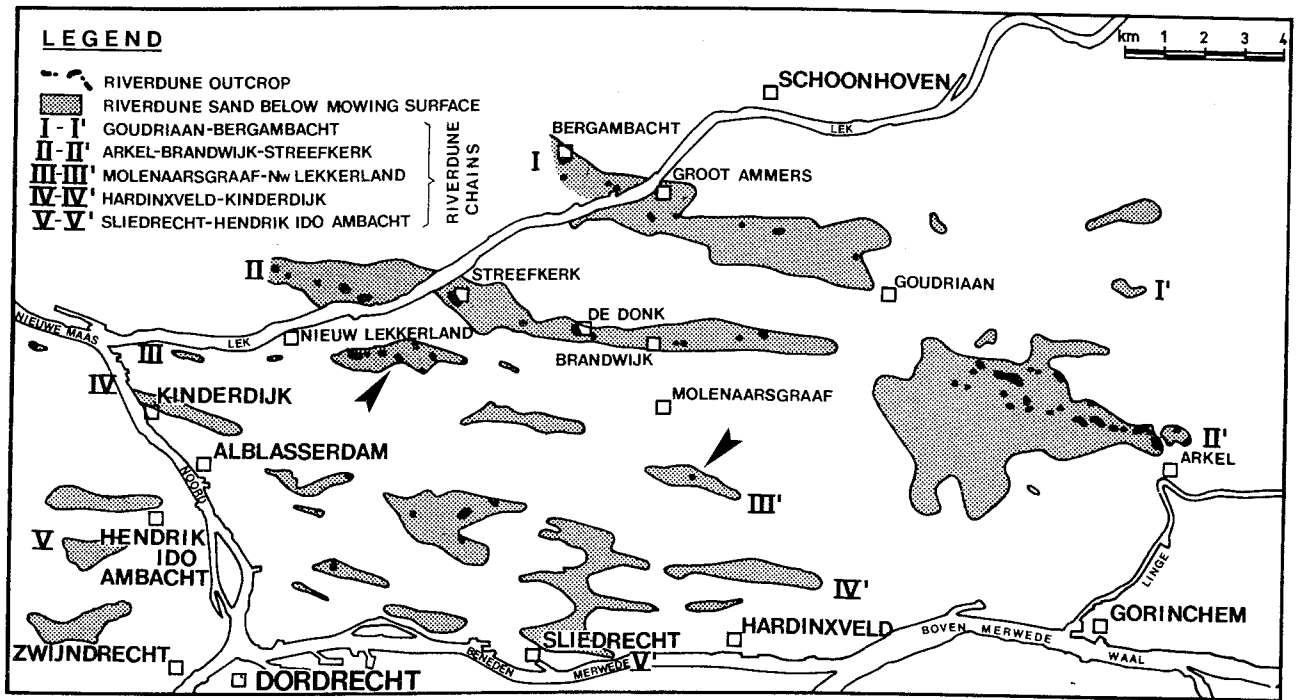


fig. 56. Stages of development of the river clay/wood peat area in relation to the curve of the relative sea-level rise. After Hageman 1969.

fig. 57. Chronostratigraphy of the Molenaarsgraaf study area compared with the marine transgressive phases (left) and a preliminary sequence of sedimentation phases in the river clay/wood peat area. Redrawn after Van der Woude 1981.



Outline map of the riverdune occurrence in the Alblasserwaard



Outline map of the riverdune chains in the Alblasserwaard

fig. 50. Distribution of the river dunes in the Alblasserwaard. After Verbraeck 1974.

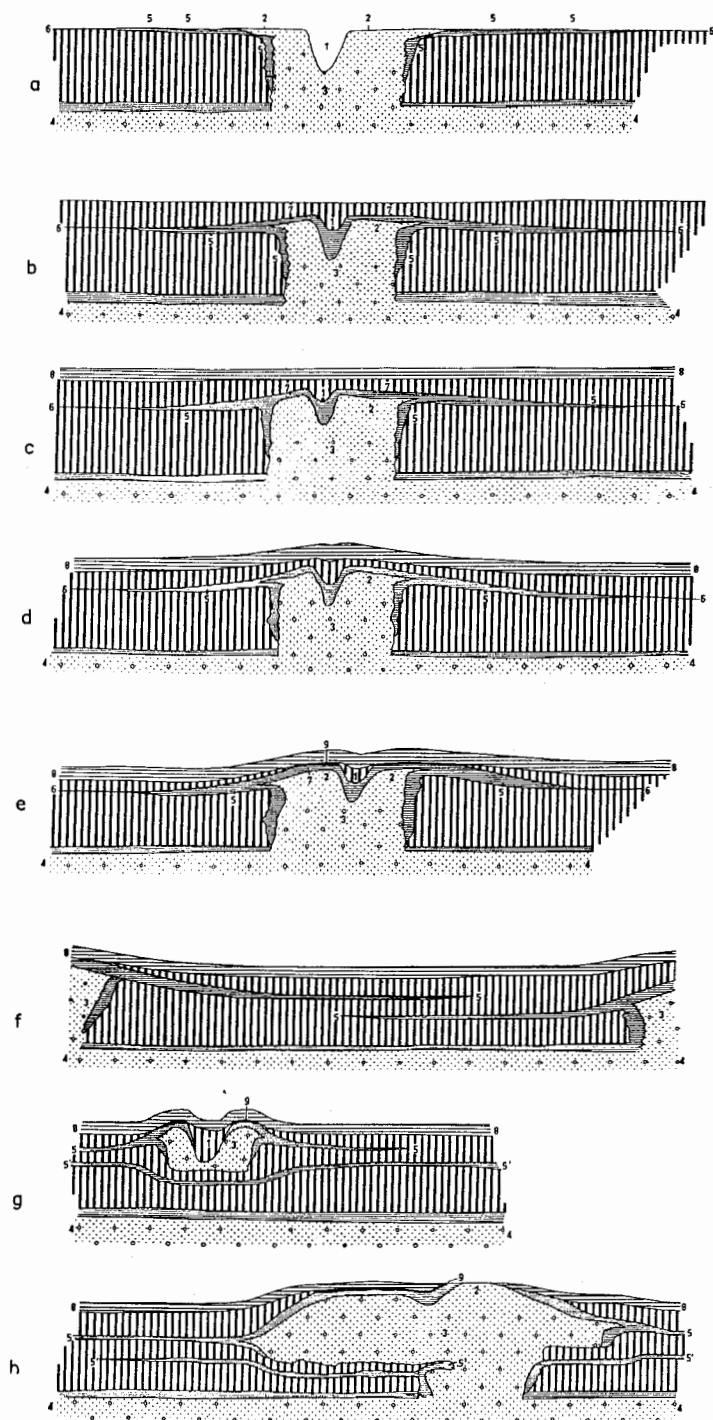


fig. 59. Stages of development of a stream ridge (a - e) and schematic cross-sections of various possible stratigraphies. After De Boer/Pons 1960.

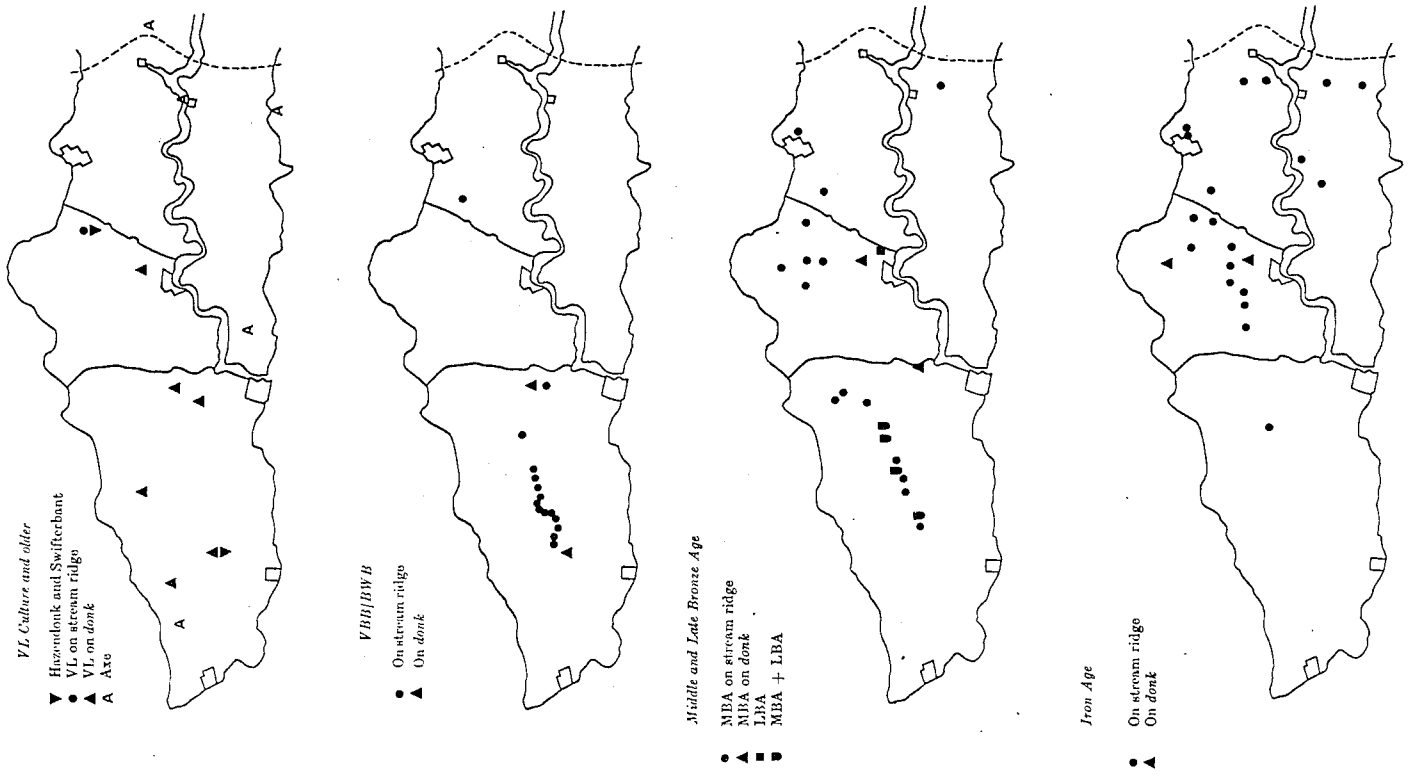


fig. 60. Prehistoric, Roman and Mediaeval finds in the river clay/wood peat area. After Louwe Kooijmans 1974.

Kinderdijk

The excursion route follows the narrow embankment of the Noord. River foreland is lacking completely and the dike has a little concrete wall at the water side against waves and water in the case of extreme high waters and storms. Two round ponds ("wielen") are the scars of former dike breaches.

Kinderdijk ("childrens dike") got its name by the story that a cradle with a baby was washed ashore in 1421 after the severe St. Elisabeth Flood, when great parts of Holland were destroyed and the Biesbos came into existence in a polder called Grote Waard, that could not be recovered. The cradle was kept in balance by a cat, that jumped from side to side ...

Kinderdijk is the main drainage point for the Alblasserwaard, that lies upstream of this place. This "waard" is divided in an upper (Overwaard) and a lower part (Nederwaard). Both have a lower storage basin for surplus water ("boezem") that leads to Kinderdijk where 19 large windmills of different types, built in 1738-1740, pumped the water into two storage basins with a higher water level. From these could the water be drained into the river at low tide. Today two electric pumping stations do the work, but the mills are kept in condition as stand-by. It is a remarkable situation that the Overwaard leads its surplus water to Kinderdijk via a long canal that crosses the total of the Nederwaard.

Lek Embankment

The Lek is a young lower course of the Rhine-system. The river came into existence after the Roman period but before 850 A.D., most probably as a peat drainage river that was used more and more by surplus river water in the Utrecht riverclay district. So far down-stream the river has lost most of its sediments. Hardly any forelands are formed and the river is closely locked up between the embankments. These were raised again and again to match up with rise of the river water level and are now vulnerable for erosion. We will pass a "dijkval" (dike fall), where a part of the embankment has sunken away into the river.

The increased drainage of the peat of the peat district during seven centuries has resulted here in a subsidence of the surface of circa 2 m. The result of this and of the raised sedimentation level along the embanked rivers is alarmingly visible along the lower Lek.

We have a good view from the high dike over the long strip-parcels, characteristic of the mediaeval reclamations of the Holland peat district.

Zijdedijk and Tiendweg

In contrast to the high embankment along the Lek stands the old Zijdedijk. This is the original western bank of the Alblasserwaard, dating from the time when Count Floris V of Holland founded the still existing Drainage Board for that district in 1277. The western part of the present Alblasserwaard was added in 1281. The Zijdedijk lost its function and never was raised since then. There are two embanked pothole ponds of 13th century dike breaches preserved, one where the bank crosses a "donk" and seepage easily could cause such a breach.

A narrow road, bordered by two ditches, crosses all narrow parcels. It is a so-called Tiendweg or a road for the 10% tax on hay and crops, that was removed directly from the fields along these roads. They saved the long ride over every parcel and the necessity to cross the yard of unfriendly farmers.

Schoonenburgse Heuvel

One of the highest and best preserved of the donken, named after the castle Schoonenburg that stood nearby. This donk has its top at + 4 m NAP and measures 100 x 250 m. It is part of a large group of high dunes of which more are well visible. In 1952 the farmer's son found a point-butted flint axe near the top. Professor Modderman documented the find and visited the site. Later the axe was bought by the National Museum of Antiquities for the price of a calf. Further prospections did not reveal traces of occupation of any importance.

Dunkirk-I creek ridges

Between the "lower storage canal" of the Overwaard and that of the Nederwaard the road crosses a number of small estuarine creek fillings that are visible as low ridges along both sides of the road. They are the easternmost extensions of the Dunkirk-I (and -II ?) systems of Alblasserdam and Oud Alblas. On the sandy fillings of the main channels a number of Roman settlement sites are known.

Alblas and Graafstroom

The winding river Alblas is one of the natural drainage rivers of the peat district from pre-embankment times. No Roman occupation has been found on its levees, so it must be dated in the Dunkirk-II transgressive phase. The first mediaeval colonists settled themselves along this stream in the 11th century. Up-stream, where the river became too narrow, it was widened and extended with a more or less straight canal called Graafstroom (The "Dug Stream").

Farms and Floods

Many farms were built on small artificial mounds. From some of these Pingsdorf but no Badorf pottery has been recovered. This proves the colonisation in the 11th century.

Originally four long parcels of generally 1.5 km in length belonged to one farm. So the old farms are separated by three parcels. These gaps were partly filled in the last century with labourers' houses and more recently by those of commuters, thus destroying the original village appearance.

Many leaning farms demonstrate that the subsoil of unsettled clay did not offer a good foundation, and so does the Molenaarsgraaf church.

Three stones in a Molenaarsgraaf farm are testimonies of the severe floods by which this district suffered. Between 1320 and 1820 no less than 36 dike bursts are documented, the most severe in up-stream locations, caused by ice dams in the rivers during severe winters. Especially when the Diefdijk - the eastern defence on the boundary with Guelders - gave way the consequences were catastrophic. Farmers often lost goods and chattles and were reduced to beggary. Sometimes a freedom of taxes was allowed for a couple of years to overcome the disaster.

The old farms were constructed with a heavy "flood attic", where the cattle could be stalled during floods and with a roof construction supported by the posts only. The free-standing walls could be washed away and replaced when the inundation was over. Some farms had "flood doors" halfway the frontal façade.

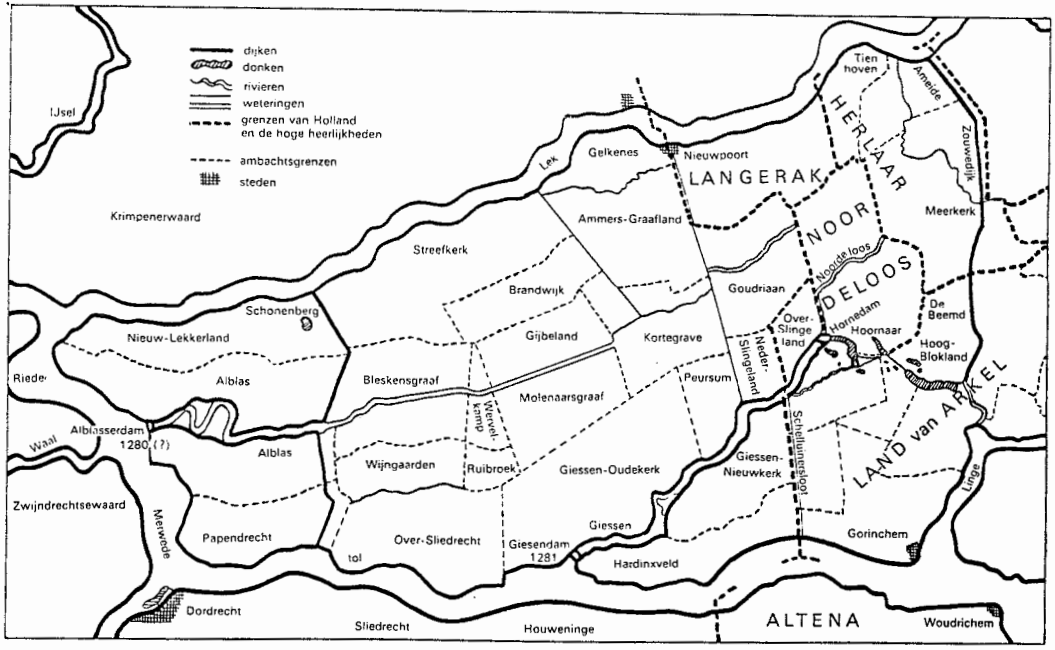


fig. 61. The Alblasserwaard and its reclamations. After Henderikx 1977.

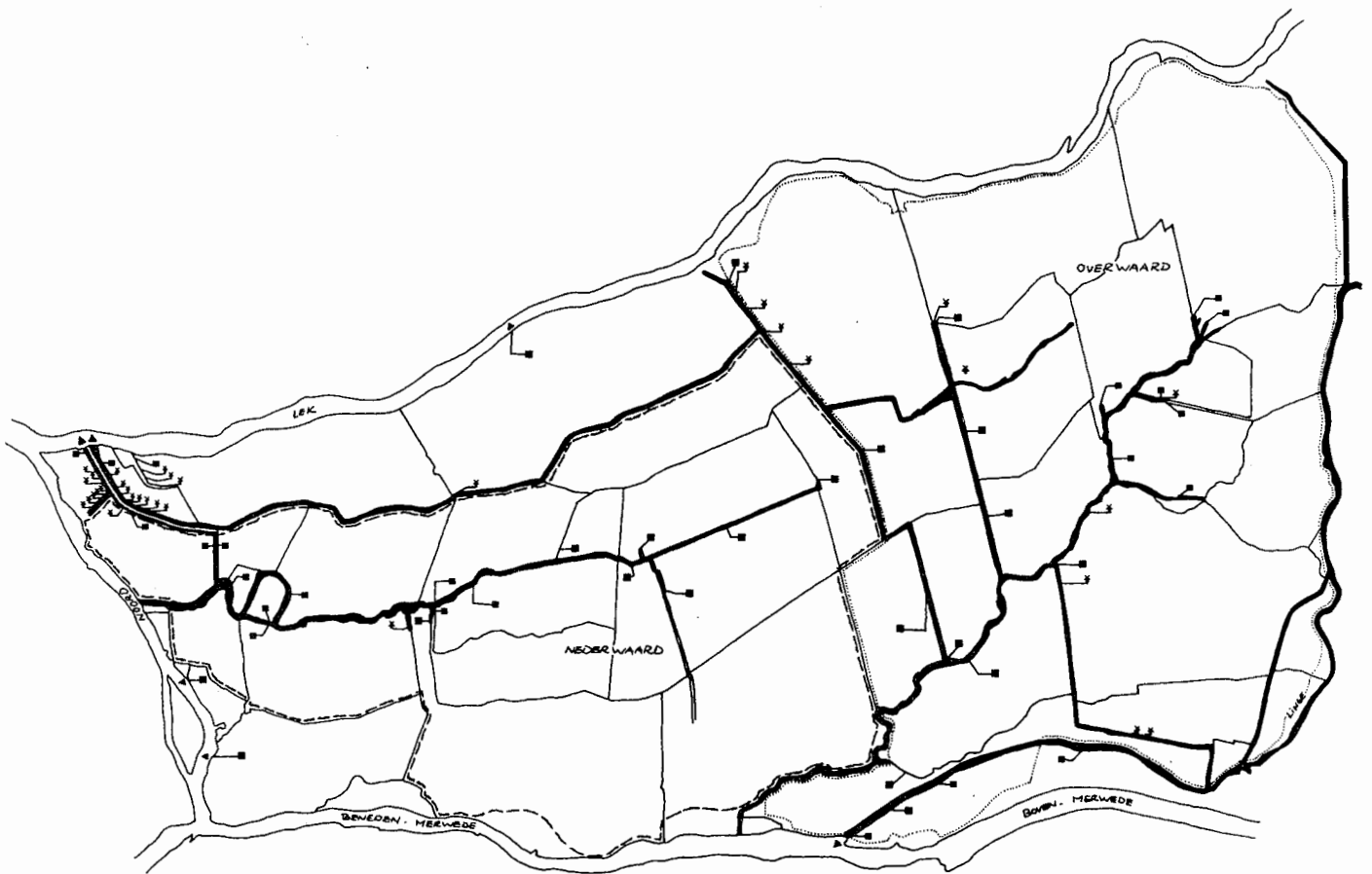


fig. 62. Drainage system of Overwaard and Nederwaard.

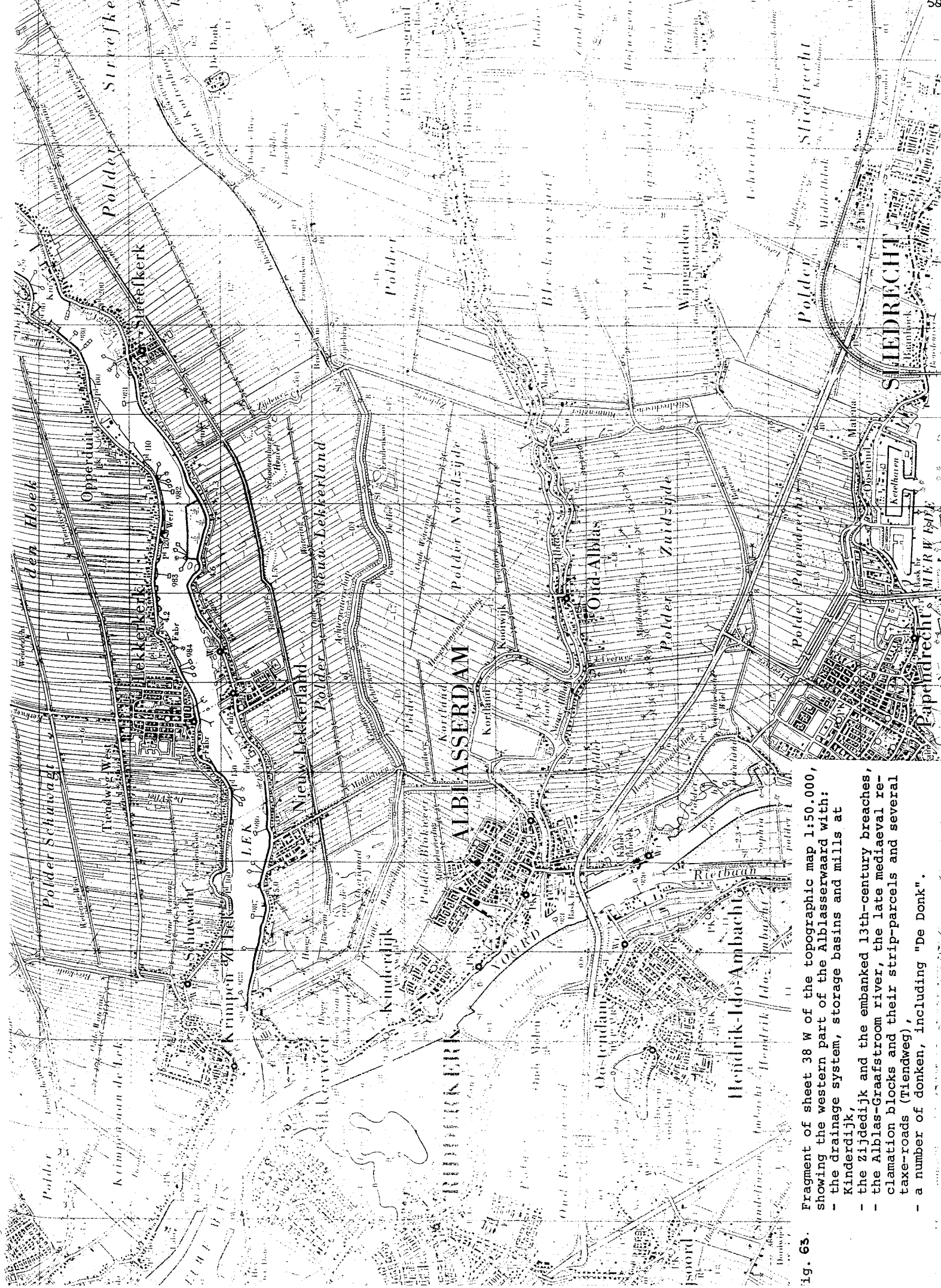
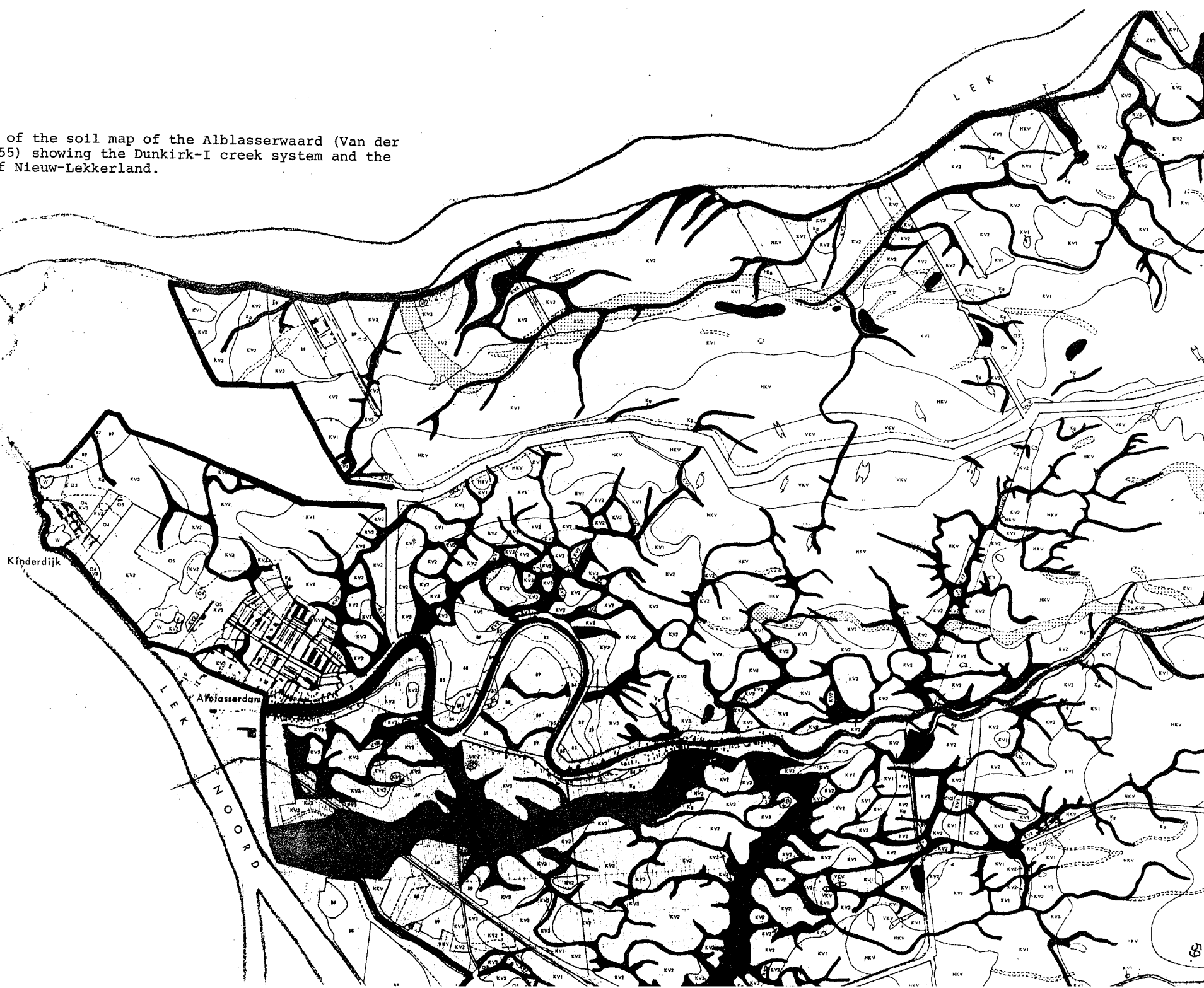


fig. 63. Fragment of sheet 38 W of the topographic map 1:50.000, showing the western part of the Alblasserdam with:

- the drainage system, storage basins and mills at Kinderdijk,
- the Zijgedijk and the embanked 13th-century breaches, the Alblas-Graafstroom river, the late mediaeval reclamations blocks and their strip-parcels and several tax-roads (Triendweg),
- a number of donken, including "De Donk".

fig. 64. Fragment of the soil map of the Alblasserwaard (Van der Linde 1955) showing the Dunkirk-I creek system and the donken of Nieuw-Lekkerland.



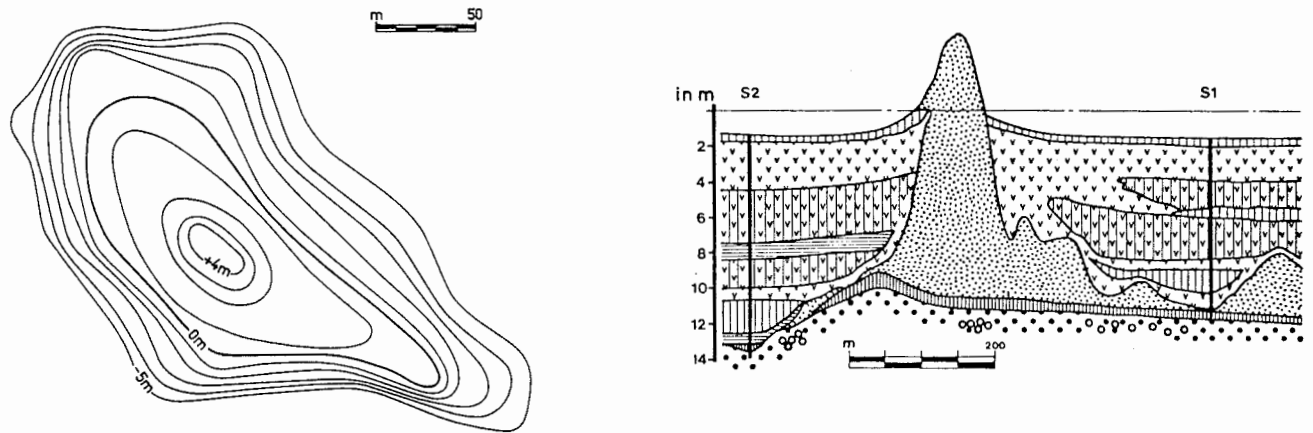


fig. 65. The "Schoonenburgse Heuvel", contour map of the sand surface and a simplified cross-section. After Verbraeck 1977.

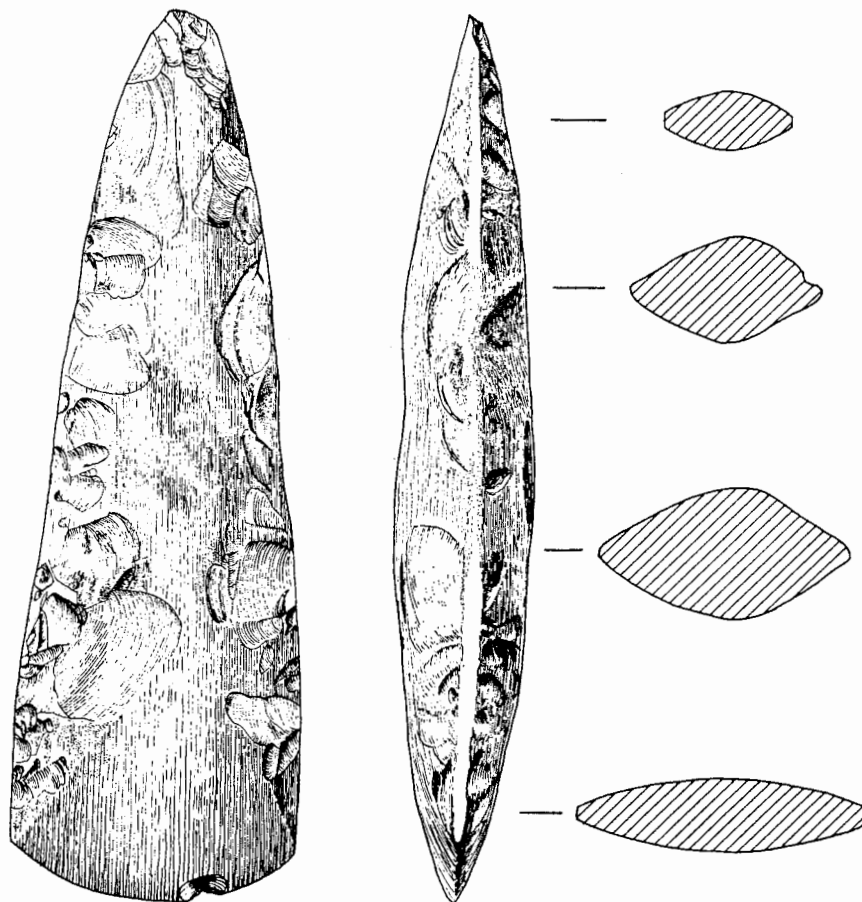


fig. 66. Point-butted flint axe, found on the Schoonenburgse Heuvel. Scale 1:2.

Ablasserwaard and Vijfheerenlanden. Dike breaches
 After Teixeira de Mattos 1933, Schakel 1954 (breaches after 1373) and Gottschalk 1971 (before 1400).

date	cause*	date	cause*
9th cent.		1-11-1570	s
1260	r	11/12- 2-1571	r D
years before 1281	r	14- 1-1573	i r D
28-10-1320		1574-1578/1581	M
1322 or 1323		19- 3-1593	r
24-12-1330	s	28- 3-1595	r
2- 2-1373	s	...-11-1599	s
9-10-1374	s	1- 1-1624	i
...- 3-1375?	r	27-12-1655	i
-1413	r	30-12-1658	i
10- 4-1446	r	20- 1-1663	i
21-10-1468	s	June 1672-end 1673	M
1-11-1470	s	19- 3-1709	i
16-12-1496	r	7- 2-1726	r
14- 1-1497	r D	24-12-1740	r
-1523	r D	3- 1-1741	r
5-11-1530	s	12- 3-1744	r
1-11-1532	s	29- 1-1809	r
14/15- 1-1552	r	25/26- 1-1820	r
14-11-1552	s	1- 2-1953	s
22- 3-1565	r D		

* i = ice dams in the rivers (esp. the Lek) causing high waters.
 r = high water in the rivers, not caused by ice dams.
 s = storm floods.
 D = breaches of the Diefdijk.
 M = military inundations.

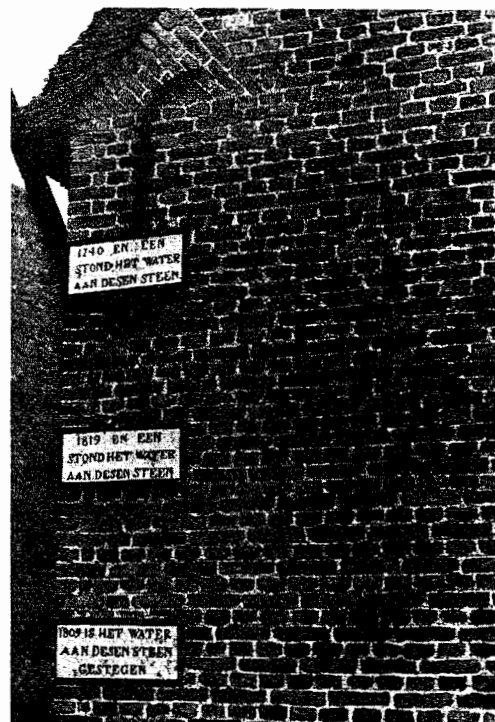


fig. 68. Flood stones in Molenaarsgraaf

fig. 67. List of dike breaches in Ablasserwaard and Vijfheerenlanden.



fig. 69. A "Tiendweg" in the Ablasserwaard.

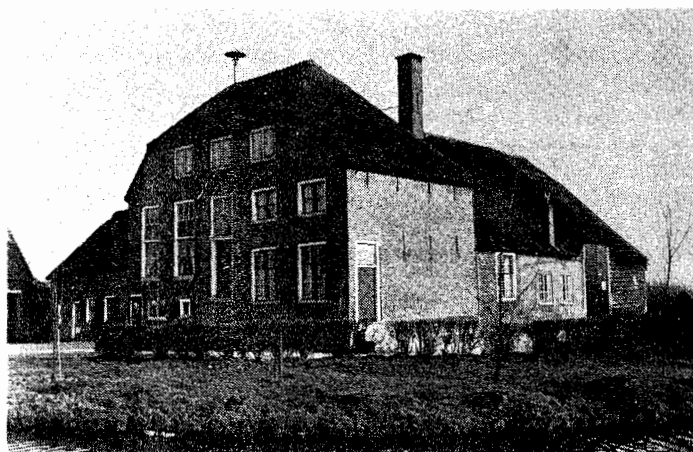


fig. 70. The "Hooge Huis" in Ottoland with its flood door.

Hazendonk

The Hazendonk is a rather small dune top of 50 x 120 m, rising about 1 m above the surrounding surface. Its top is at about NAP-level. To the west it has a covered extension that makes the total length c. 350 m. About 900 m to the north-west a similar, slightly lower dune was discovered recently. Both are rather isolated elevations of a minor dune area of c. 400 x 1500 m.

Amateur archaeologists discovered the first Neolithic remains in 1963, during the prospection of the site with some testpits. A first excavation was carried out in 1967 and the prospects appeared to be favourable for a larger scale investigation. This took place in 1974-1976. The dune slopes and their cover were tested for Neolithic refuse. These small testpits were extended on rich refuse points. A large trench was cut across the top of the donk.

The former settlement terrain itself, the dune top, was completely disturbed by later erosion, animal burrows and root activity. So all information preserved lies in the refuse layers on the slopes and intercalated in the peat and clay layers that cover these slopes. But this information is worth-while. The - for North European standard - very long stratigraphy covers the period 3300 - 1700 B.C. with seven occupation phases. So there is a good opportunity to study the human occupation with its material culture and subsistence (bones, fish-bones, seeds and pollen are preserved) in relation to environmental changes.

The National Geological Survey has just finished the relevant sheet 1 : 50.000 of the Geological Map. Dr. J.D. van der Woude presented this year his thesis on a detailed study of the Holocene evolution of the direct surroundings (4 km²) of the Hazendonk, which gives essential information to the more general picture of the geological map. The palaeobotanical study of Dr. Bakels will be finished in short-term. The C14-program of about 50 dates is completed. We met, however, serious problems in handling the 40.000 individually documented finds, because of our modest experience in computerwork and the complicated selection-problems that were to be solved. But the major problem - the attribution of finds to the occupation phases - has now been overcome in a manual procedure and we have good hope to finish the work according to our plans, be it slightly retarded.

The occupation starts at about 3300 B.C. This deepest level was only reached at one point, but the pollen evidence, borings made around the donk and a few finds higher on the slope in other pits indicate that the entire eastern part of the Hazendonk was used as settlement terrain and so was a minor part farther west. Both occupations are, however, not necessarily contemporaneous. Large quantities of charred grain and chaff were found of both wheat (einkorn) and barley and there is a distinct landnam phase in the pollen-diagram, with cereal pollen. So crop cultivation on the site is firmly proved. The cultural position of the material remains, esp. the pottery, is not perfectly clear. There are affinities but also distinct differences to Swifterbant on one hand and on the other hand certainly relationships with Bisheim.

The dune vegetation was not disturbed in the centuries before this occupation nor were distinct older surfaces before this phase discovered in borings. The first use of this site might indicate that the choice of terrain for settlement had undergone a change, since it is unlikely that prehistoric men were absent before this date in this district. This change in attitude can be brought in connection with the introduction of agriculture that put other requirements to the location of settlements.

The second phase of occupation (3100 B.C.) took place after a period of vegetational recovery. Two thin surfaces originate from this period. The pottery shows certain relationships to that of the later Rhineland Michelsberg-culture. A distinct form is the carinated bowl, that also appears to be a characteristic of other recently discovered MK-sites in the Netherlands. In this phase not only pebble flint (brought to the site over 40 km or more) but also mined flint from Rijckholt (at c. 150 km) was used.

After a second recovery of vegetation widespread occupation of the entire dune started. This phase "Hazendonk-3" has been dated to 2900 B.C. and might have lasted one or two centuries, in view of the distinct black layers in the sections and the large amount of refuse. The coarsely decorated Hazendonk-3 ware is considered as a late and regionally restricted Michelsberg offshoot. The import of Rijckholt flint continued as did some carinated pottery forms.

In the period between Hazendonk-3 and the next major occupation of Vlaardingen-1^b (c. 2500 B.C.), people were incidentally present on the site. This is documented in the pollen-diagram and by finds of an early phase of the Vlaardingen-culture that was not discovered before. There is a marked cultural change between 2900 and 2700 B.C. on the site, when the Late MK "Hazendonk-3" is succeeded by this Vlaardingen-1^a.

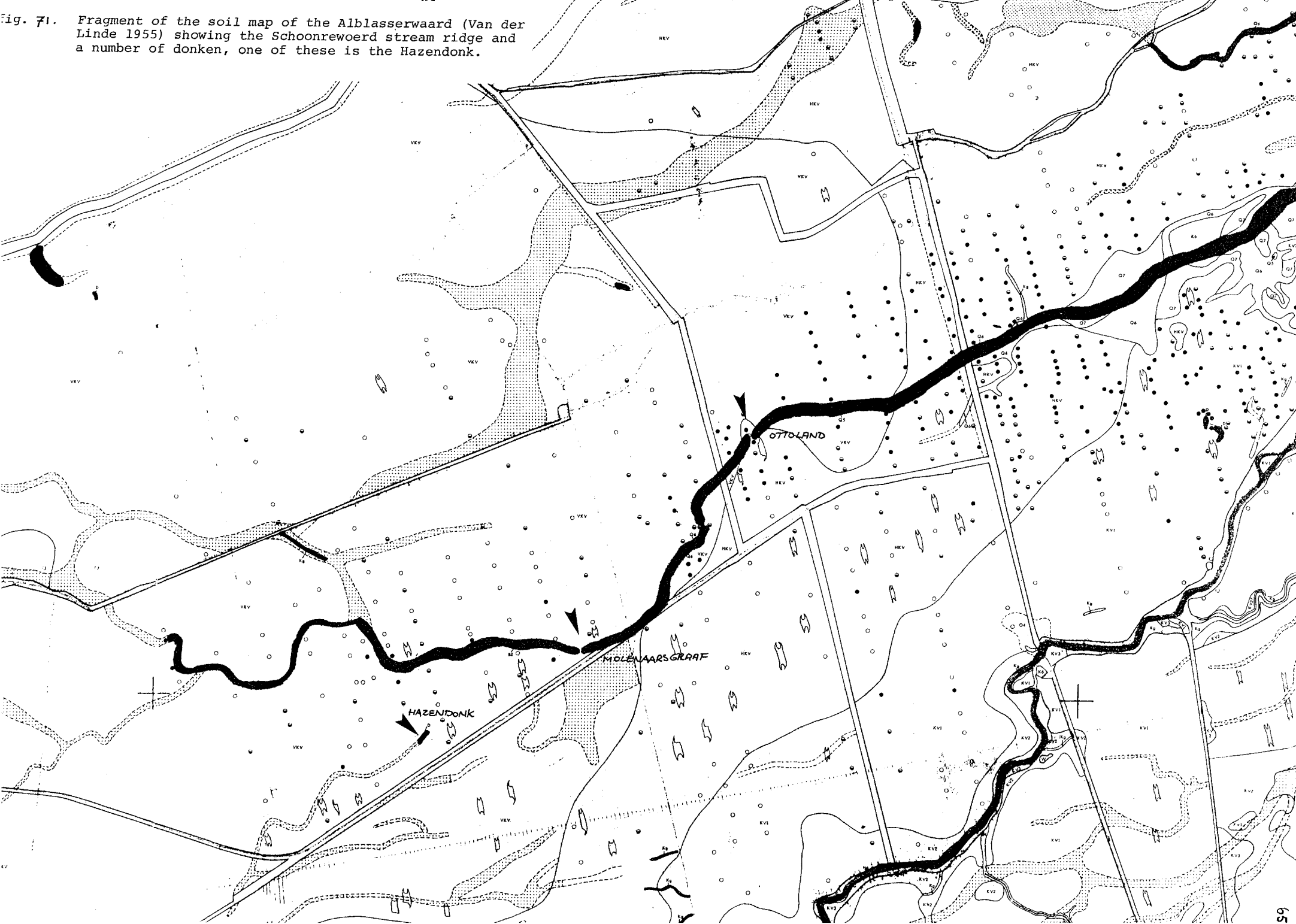
The Vlaardingen-1^b occupation lasted long, perhaps two centuries and was restricted to the western part of the donk and a minor area farther west. An area of about 40 m diameter was surrounded by a palissade and the surrounding peat was also cleared over a distance of 10 - 30 m, this in contrast to the earlier occupations. Among the finds are a wooden peddle and a 3 m long fragment of a dug-out canoe.

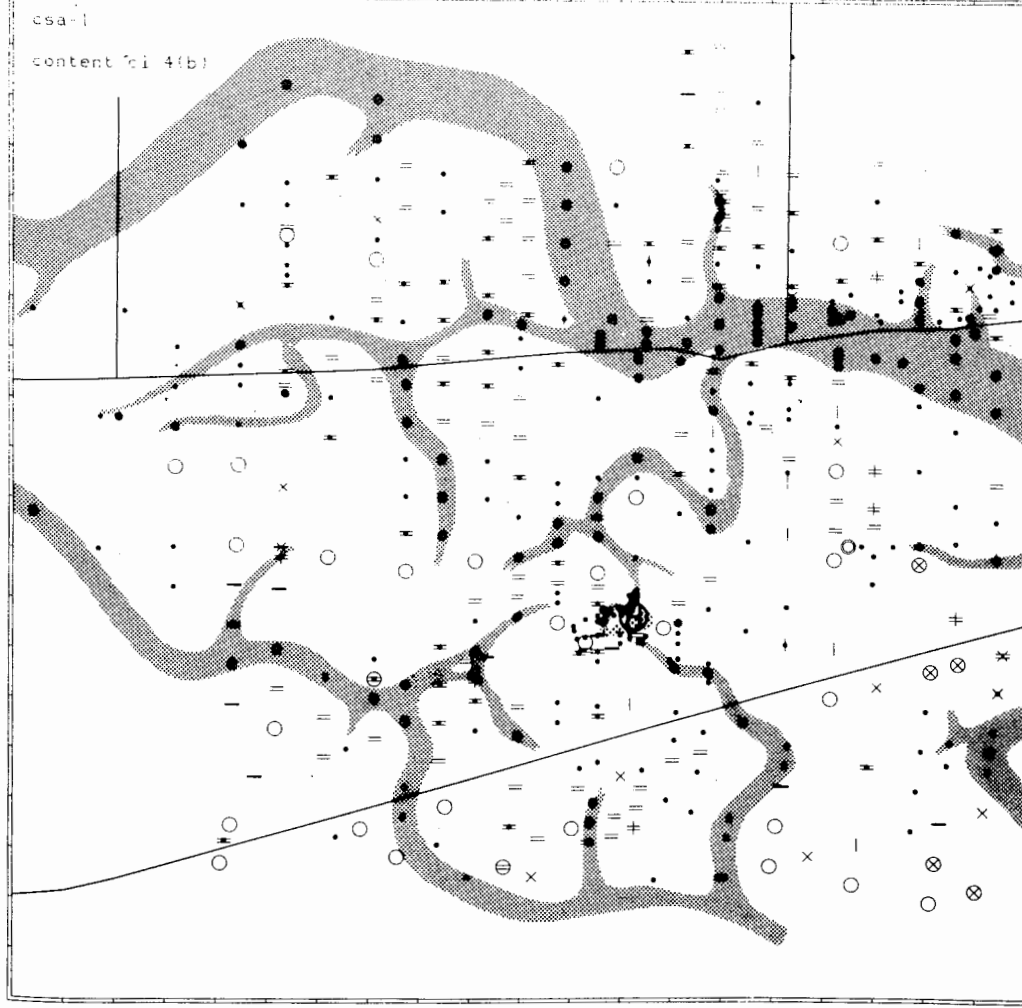
The donk was left during some centuries, but people returned to it in the activity phase of the Schoonrewoerd stream, around 2100 B.C. Side creeks of this water course extended to the site. A large amount of refuse, mainly animal bones and dated Vlaardingen-2^b (with some All-Over Cord Beaker sherds) was found on a few places at the base of the gully fillings. Preliminary identifications indicate that hunting and sturgeon fishing were of importance, like one can expect in this type of environment and in view of the Vlaardingen and Hekelingen evidence.

The small creeks were filled up soon, around 2000 B.C. and the main stream was sanded-up not long after, with certainty around 1800. This means the end of the use of the Hazendonk as a settlement terrain. The Bell Beaker people settled on the more attractive newly formed sand body and visited the Hazendonk only casually, as can be made out by some sherds found on still higher levels than VL-2^b.

The Hazendonk-program is not finished. Much work has to be done: a prospection of the surrounding donken, the identification of the animal bones and the completion of the computer work. Many conclusions must wait on the final report but we can make some remarks on a possible relation of occupation and palaeo-environment: Hazendonk-1 to -3 are connected to the fluvio-lacustrine landscape of clastic bed 3, Vlaardingen-1^a and 1^b to a period of swamp forests with perhaps some relic channels of the preceding period, and the Vlaardingen-2^b occupation took place in a fluvio-lagoonal environment, dominated by extensive lakes with fields of marsh herbs and by tree growth on the narrow levees of the creeks only. It is an important research question to detect in how far these widely different conditions are reflected in the subsistence economy.

Fig. 71. Fragment of the soil map of the Alblasserwaard (Van der Linde 1955) showing the Schoonrewoerd stream ridge and a number of donken, one of these is the Hazendonk.





LEGEND FOR ALL SYMBOL MAPS

For maps showing content of deposits:

- moderately to strongly beaty (in the case of clastic beds)
- gyttja
- moderately to strongly humic
- = with thin humic laminae
- | with a moderate to large quantity of remains of marsh plants
- | as above, but most likely of Phragmites
- with Phragmites remains at the base of the peat bed
- x with a large quantity of wood fragments
- || moderately to strongly clayey (in the case of peat beds)
- moderately to strongly sandy
- sand

General:

- ⊕ top of Hazendonk river dune

scale: divisions of 100 m in margin

fig. 72. Map of the Hazendonk area showing the lithology of clastic bed 4, around 2100 B.C. and contemporaneous with the Vlaardingen-2b occupation. After Van der Woude 1982.

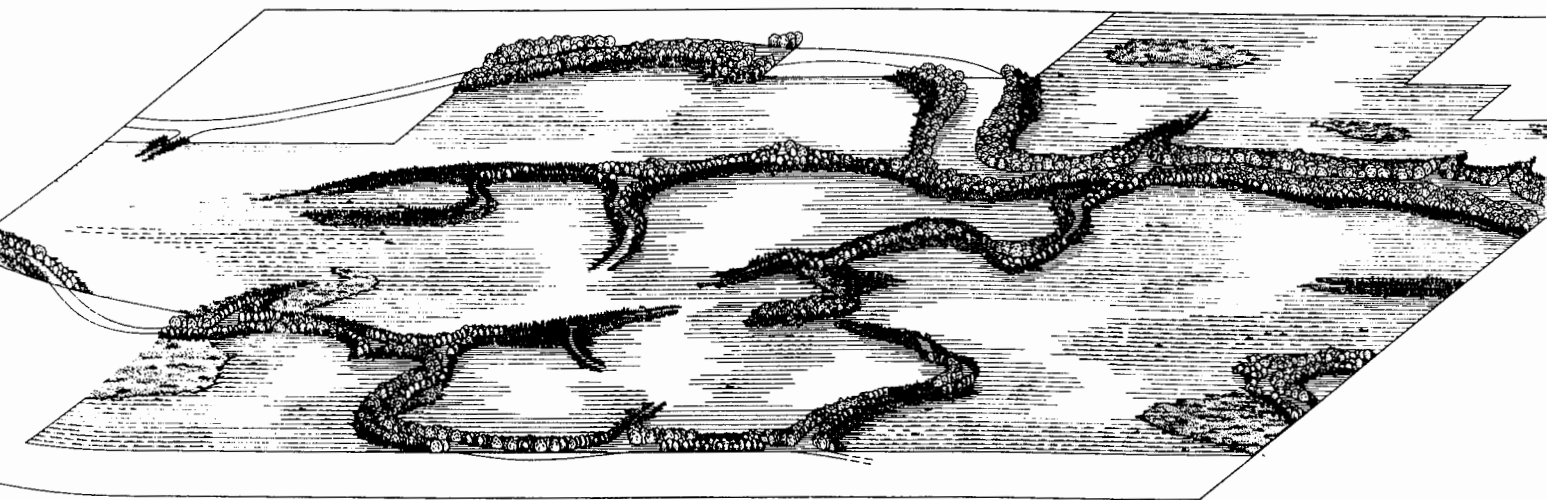
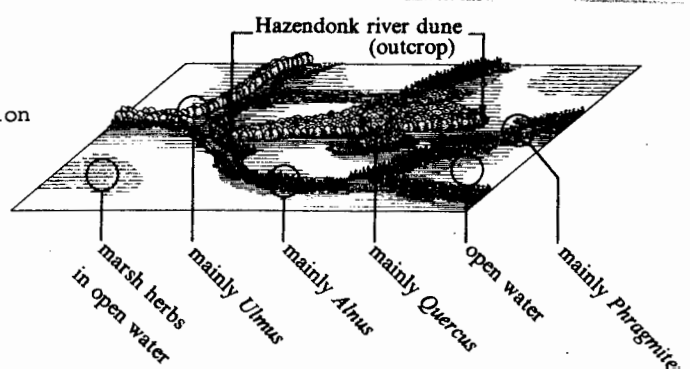


fig. 73. Landscape reconstruction based on the map of fig. 72. After Van der Woude 1982. Similar maps and reconstructions are available for all other occupation phases.



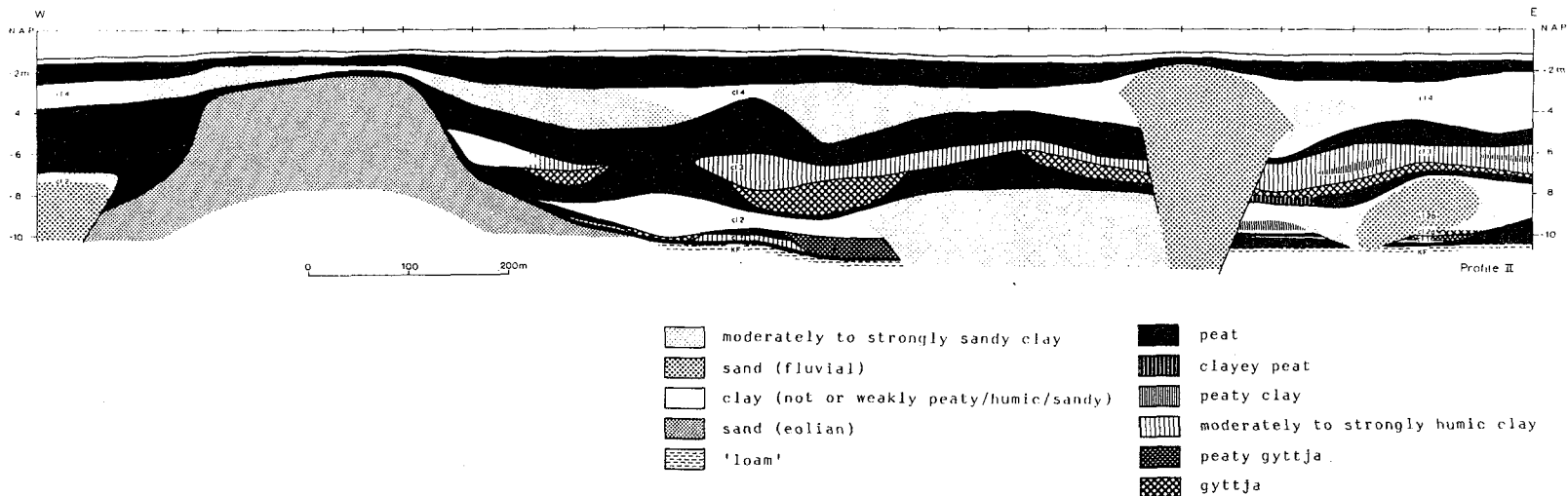
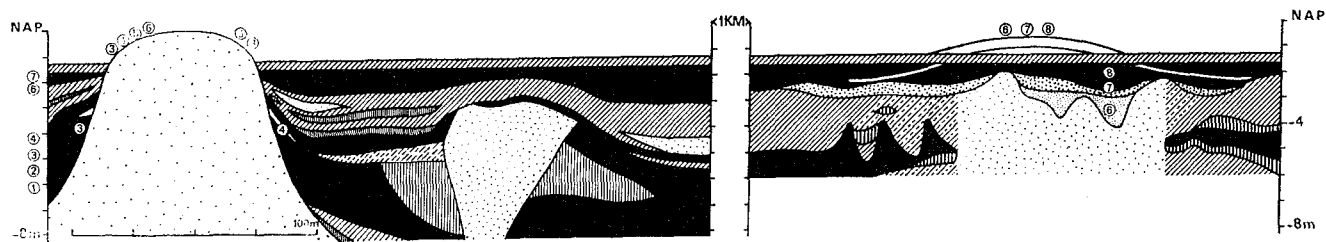


fig. 74. Section in the surroundings of the Hazendonk showing a buried donk (left) and the four clastic deposits. After Van der Woude 1982.



Indicated are data on prehistoric occupation :

1. Early Neolithic (?)	4100 B.C.	5. Hybrid Beaker, MBB	2200-1900 B..C
2. Early Neolithic	3400 B.C.	6. VBB/BWB	1900-1600 B.C.
3. Middle Neolithic	3000 B.C.	7. Middle Bronze Age (DKS)	1400-1000 B.C.
4. VL Culture, PFB	2500-2200 B.C.	8. Late Bronze Age and Early Iron Age	1000- 500 B.C.

fig. 75. Section over the Hazendonk and through the channel in the Schoonrewoerd stream ridge at Molenaarsgraaf.

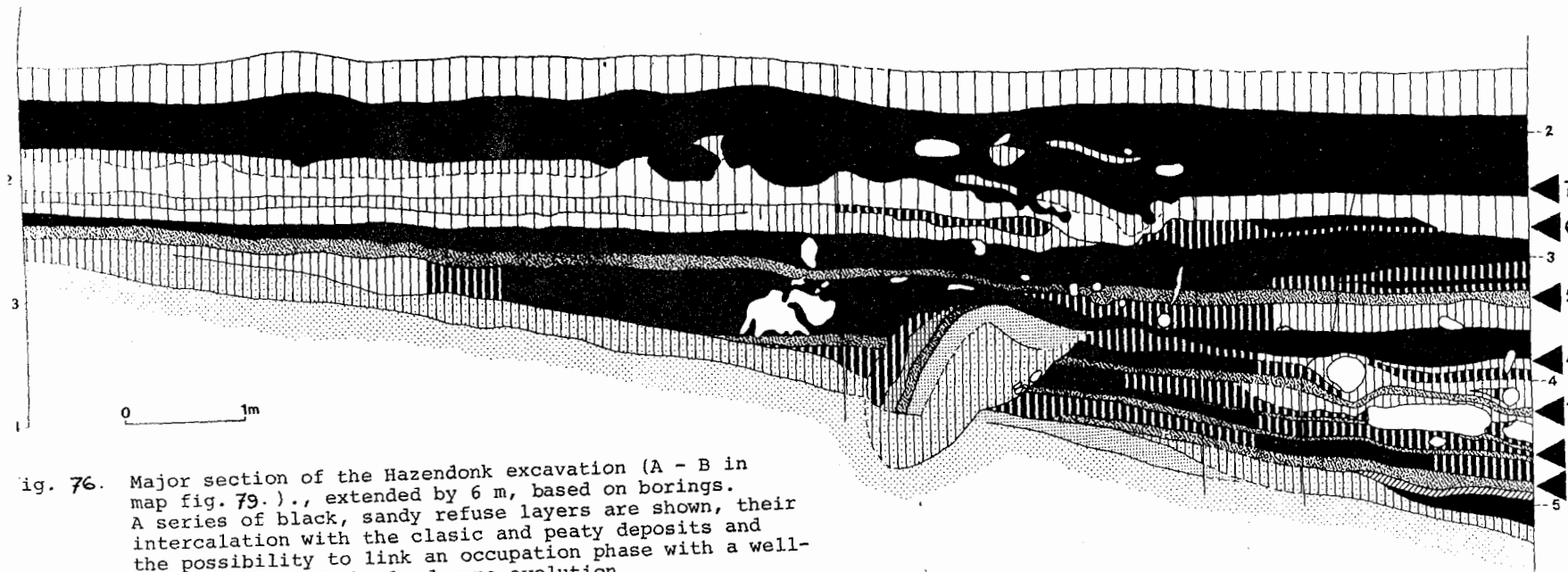











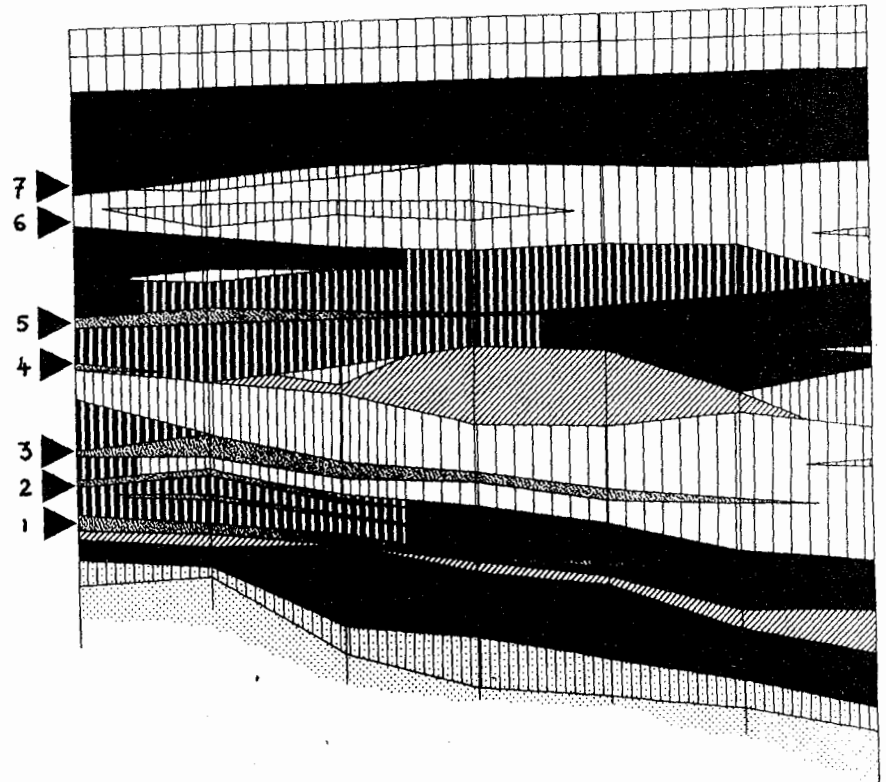


fig. 76. Major section of the Hazendonk excavation (A - B in map fig. 79.), extended by 6 m, based on borings. A series of black, sandy refuse layers are shown, their intercalation with the clasic and peaty deposits and the possibility to link an occupation phase with a well-defined phase of the landscape evolution.

-  clay
-  humic clay
-  peaty clay
-  (clayey) peat
-  humic donk sand
-  peaty donk sand
-  coloured donk sand
-  donk sand
-  refuse layer
-  wood
-  tree



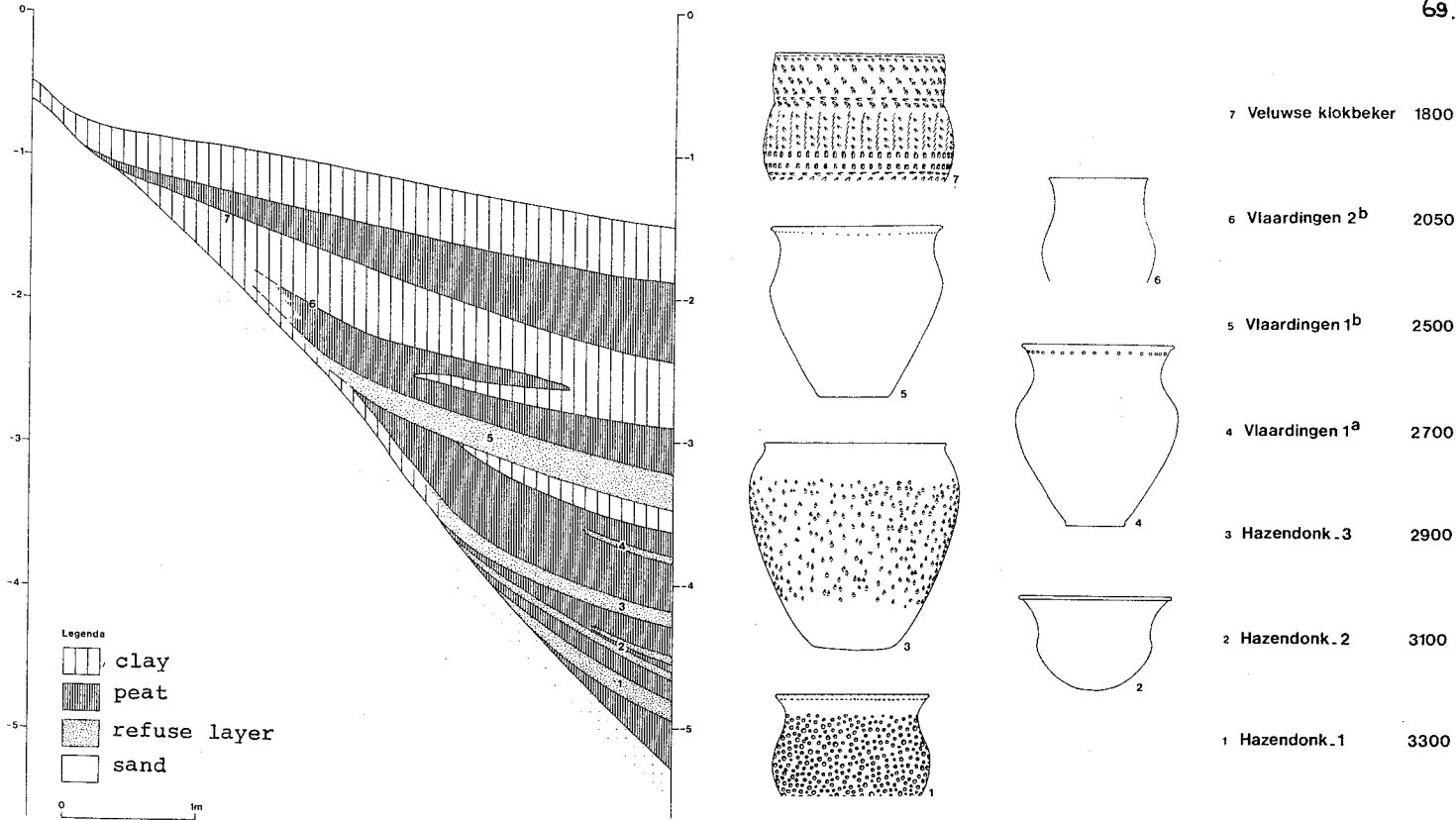


fig. 77. Schematic section, based on fig. 76. , with C14 age, culture name and a characteristic pot for each of the seven refuse layers or occupation phases. After Louwe Kooijmans 1980.

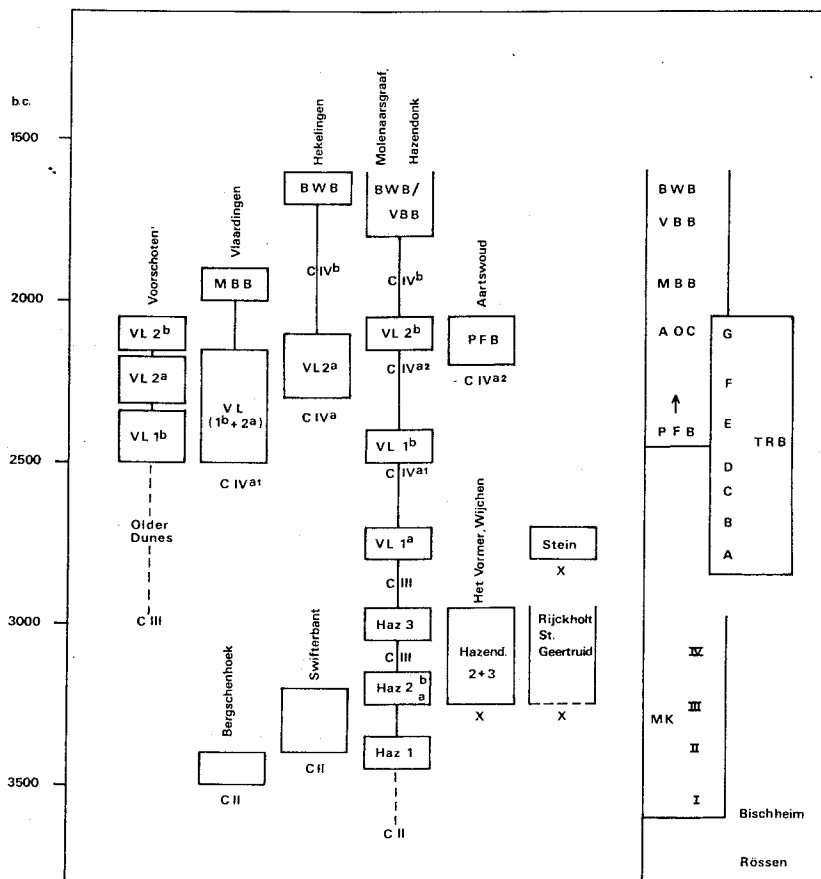


fig. 78. Graphical representation of the most important Neolithic sites in the Rhine/Meuse delta and their relationships to the sequence of Calais transgression phases (C II-IVb). The chronological positions of the squares are based on direct 14C-dates or typological relationships (viz. Aartswoud, Voorschoten). At the right the chronological position of MK and TRB and their phases and of the various beaker types. The scale is in conventional 14C-dates B.C. After Louwe Kooijmans 1976.

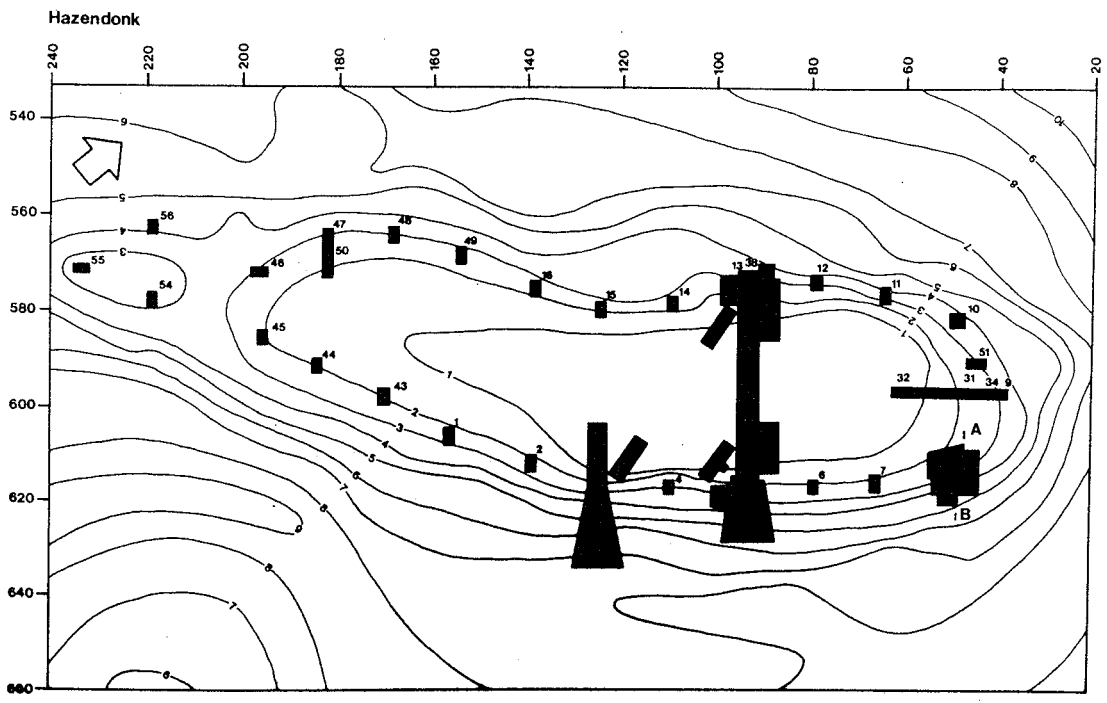
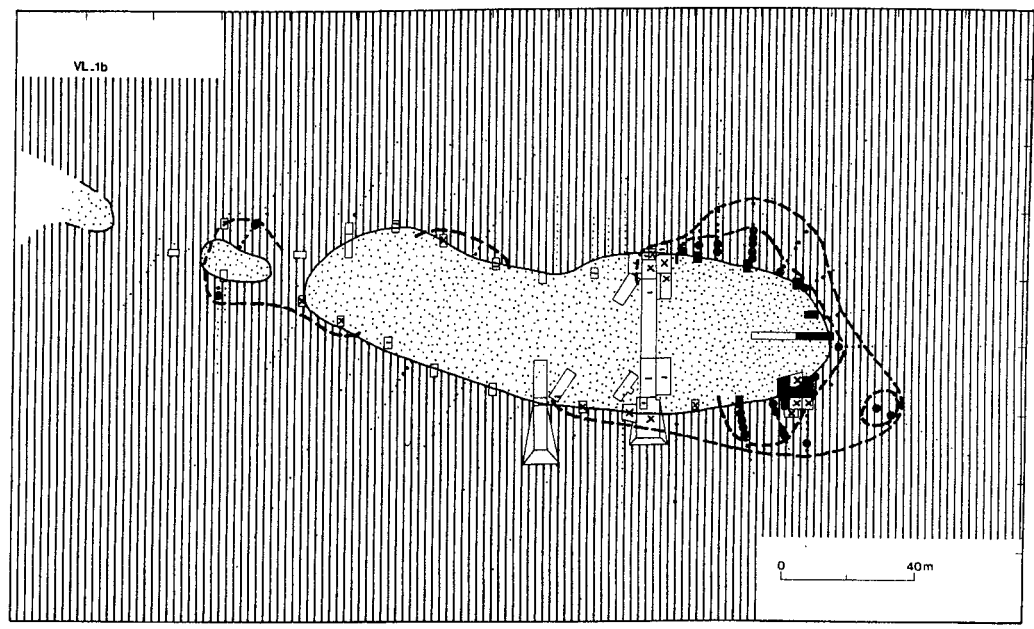
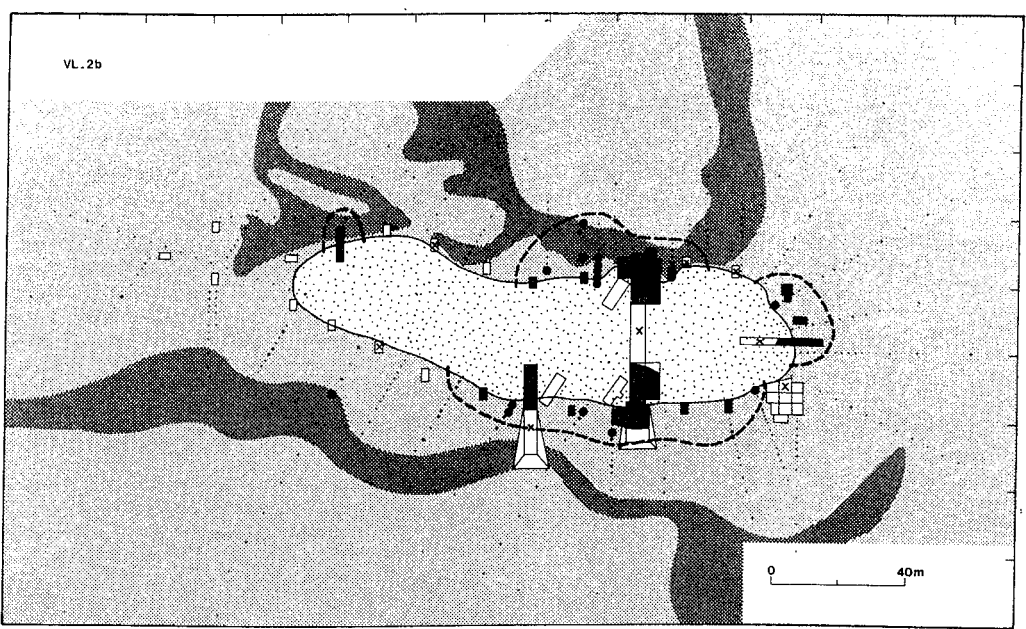
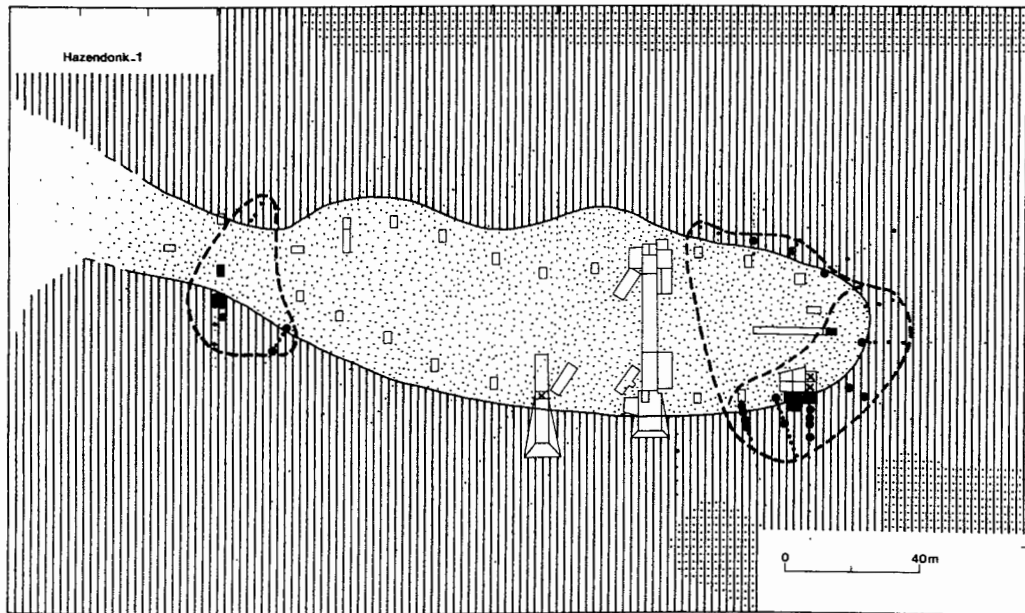
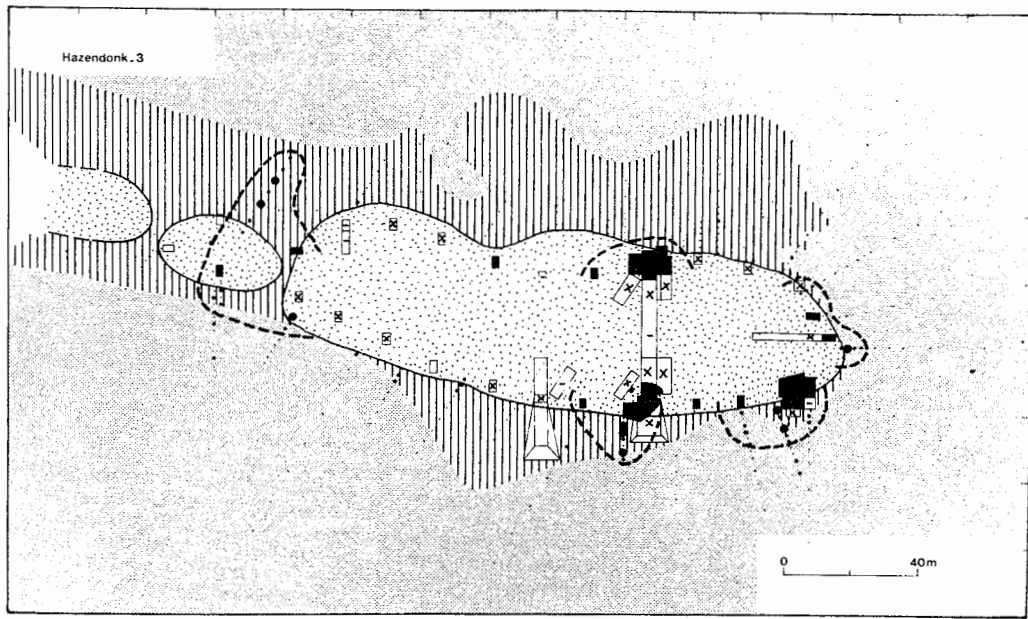


fig. 79. Contour map of the sand surface of the Hazendonk and the position of the excavation trenches. Depths in m below NAP. Present surface at about - 1.20 NAP.














- | | | | |
|---|-------------------------|---|-------------------------|
|  | peat |  | abundant refuse |
|  | gyttja |  | some refuse |
|  | clay |  | scarce evidence |
|  | sand (channel deposits) |  | refuse layer in boring |
|  | donk sand |  | some charcoal in boring |

fig. 80. Preliminary maps of the four main occupation phases of the Hazendonk, showing the physical landscape and distribution of archaeological remains.

Schoonrewoerd stream ridge, Ottoland

The Schoonrewoerd stream ridge can be followed from Culemborg at the Lek over 30 kms to Molenaarsgraaf in the west, where the sand body disappears below the peat. It is the sandfilling of an active river of the period 2100 - 1800 B.C., that formed a high water spill-way from the riverclay area through the peat district to the sea. It seems that the more eastern section remained active for longer and was rejuvenated in the Early Subatlantic. The sandy body hampered drainage shortly after its formation and as a result some small "break-through channels" were formed across it. Apparently the ground-water level had dropped and the wet deposits at both sides of the sand subsided because of compaction. So, already shortly after deposition, the sand formed a low ridge in the landscape.

The intensive prospection of the ridge offered a detailed pattern of the occupation on it, especially for the period around 1700 B.C. Over a distance of 5 kms, 8 certain and 5 additional probable occupation sites were discovered, 300 - 800 m apart. Three are situated next to the break-through gullies. The first impression is that of small settlements, consisting of single farms along a road, that followed the sand ridge. Three of the sites are partly excavated. A landnam and cereal pollen in two pollen-diagrams and twice a bone-spectrum with almost exclusively domestic animals are arguments in favour of a fully agrarian economy. Arable land was situated on the sand ridge, cattle grazed on natural pasture lands on both sides of it, on the higher parts of the high water clays. Hunting was of no value, but fishing might have been important, at least on some sites, in view of their location and of the three bone fish hooks found in one of the Molenaarsgraaf graves.

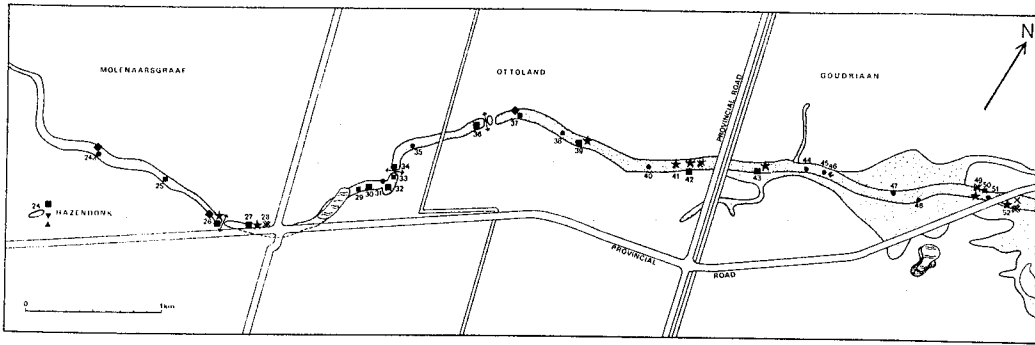
There are, however, serious problems in a more detailed interpretation. The sites are very poor in finds, pits are almost absent and post holes do not show any well-defined configurations. There are, moreover rather well-marked differences between the three partly excavated sites, while later occupation, after the Bell/Barbed Wire Beaker phase, obscures the older evidence.

At Molenaarsgraaf 1200 m² has been excavated (Louwe Kooijmans 1974), but it is clear now that only the later refuse is completely documented and that the BB/BWB remains extend beyond the pits. This settlement might cover an area of 2000 - 3000 m². The relative dense cluster of post holes is difficult to analyse, the more in view of the subrecent disturbances. The suggested house plans are still without good parallels, especially because of the negative evidence of the other sites. A reinterpretation of "Molenaarsgraaf" seems necessary in view of the other evidence. Are both house plans the best solutions and, if so, are both perhaps to be dated in the latest phase of occupation and were the BB-structures of more modest dimensions? The predominance of little scrapers and the absence of arrow-heads is a marked difference with the other sites.

At Ottoland-Oosteind 800 m² has been excavated. Occupation continued here into the Middle and Late Bronze Age and most of the numerous post holes belong probably to these phases. BB and BWB material clusters in an area of c. 200 m², with a very thin wider spread.

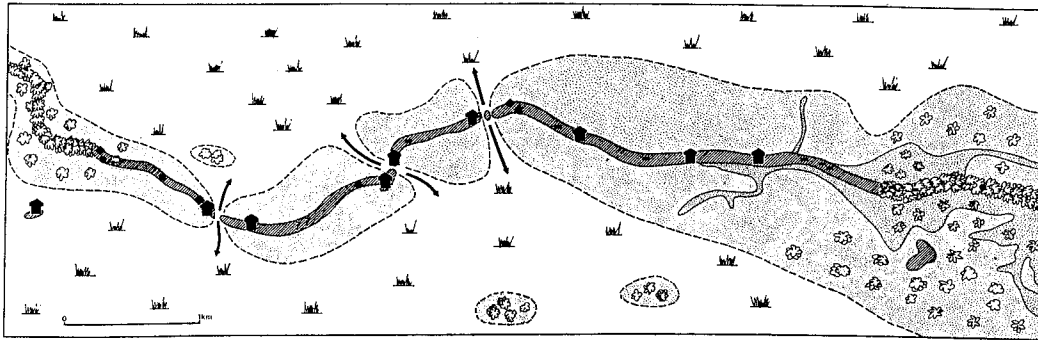
The settlement site of Ottoland-Kromme Elleboog was built over in 1979. It was excavated for the greater part: 2000 of 3000 m². A total find recovery by sieving the single culture layer has been applied here. A careful study of the find distribution shows a spread of BB and BWB remains over the entire site, with modest HVS finds in a more restricted area. A small 5 x 8 m two-aisled house could be made out, but for the rest no configurations can be identified in the widely spread post holes. There are eight arrow-heads and a modest number of scrapers.

A main preliminary conclusion must be that not all sites are alike. The occupation ends at different moments, the post hole patterning varies widely but site dimensions for the BB/BWB-phase seem rather similar: 2000 - 3000 m². Are all sites really contemporaneous, as was suggested, or must we account for regular settlement displacements? We have the impression that the overall picture does not need to be modified, but that the new evidence gives the possibility for a better qualification of the individual sites.



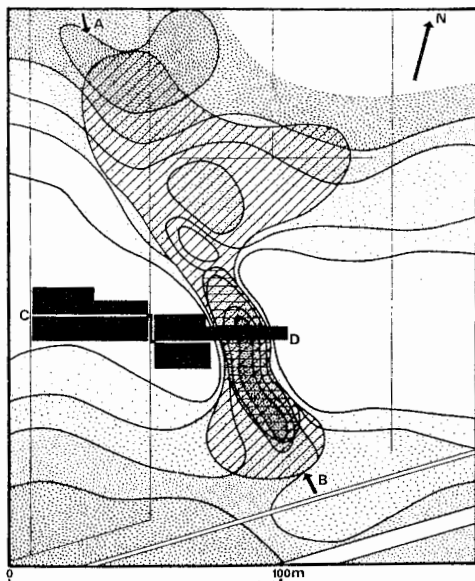
- | | | |
|----------------------|---|---------------------------|
| <i>donk</i> | × Iron Age | ● VBB/BWB-graves |
| stream ridge | * Late Bronze Age | ▼ VL Culture |
| other sandy deposits | ★ Middle Bronze Age (DKS) | ▲ older than VL Culture |
| water | ■ VBB/BWB-settlements (certain, probable) | ○ prehistoric, indefinite |

fig. 81. Prehistoric sites on the Schoonrewoerd stream ridge between Molenaarsgraaf and Noordeloos.



- | | |
|--|---|
| stream ridge or <i>donk</i> , deforested, arable land. | break-through channels with open flowing water. |
| clay wedge, perhaps suited for agriculture. | ▲ occupation centres (house sites). |
| clay wedge, pasture land. | ● occupation centres, dubious. |
| wooded stream ridge. | ■ modest, perhaps VBB/BWB, finds. |
| clay wedge with alder carr. | ◆ grave(s). |
| swampy marsh. | |

fig. 82. Tentative reconstruction of occupation and palaeo-environment of the Bell/Barbed Wire Beaker phase of fig.



Legend :

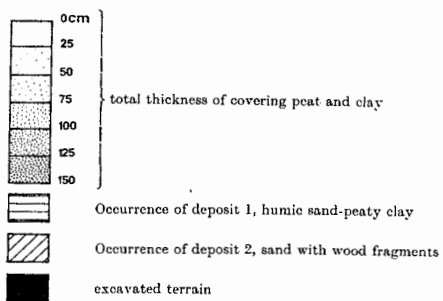


fig. 83. Physiographic map of the break-through gully at Molenaarsgraaf.

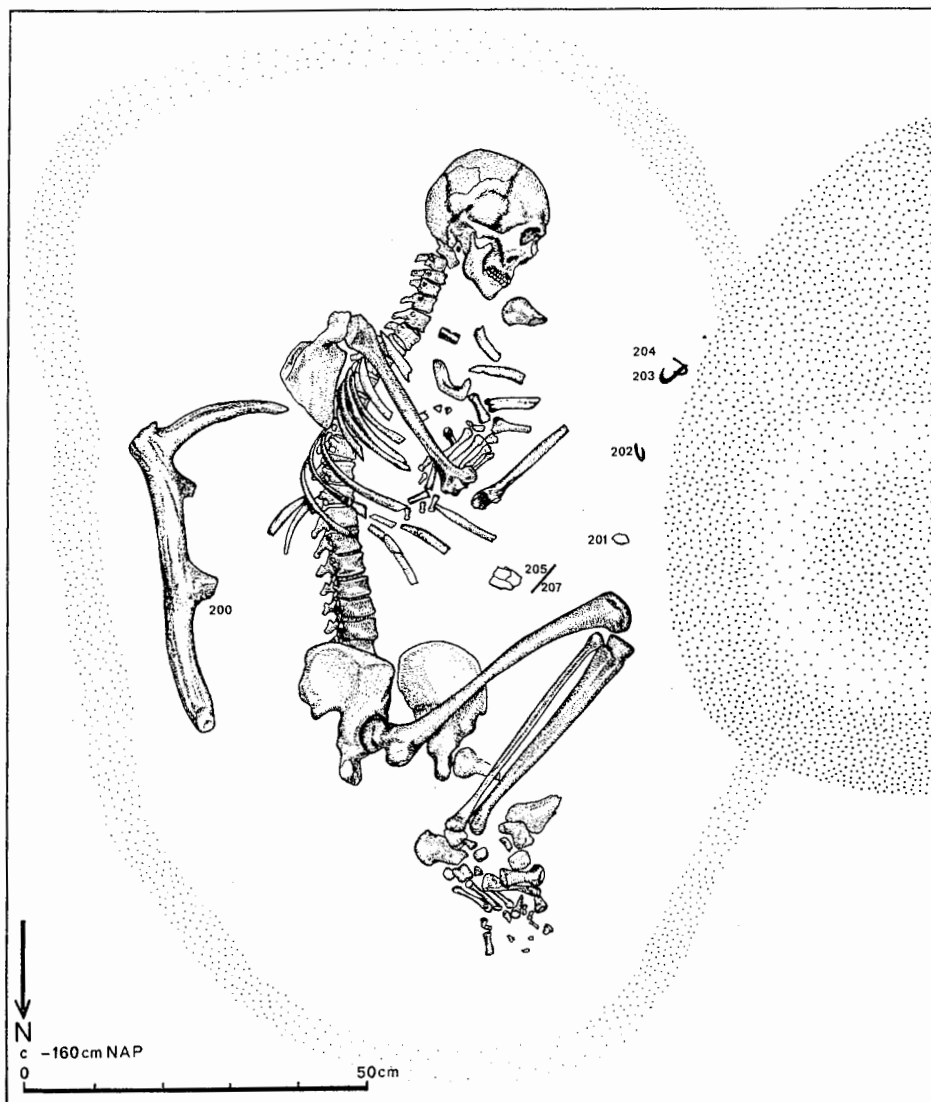


fig. 84. Grave II of Molenaarsgraaf and the fish hooks found in it as burial gifts (scale 1:1).

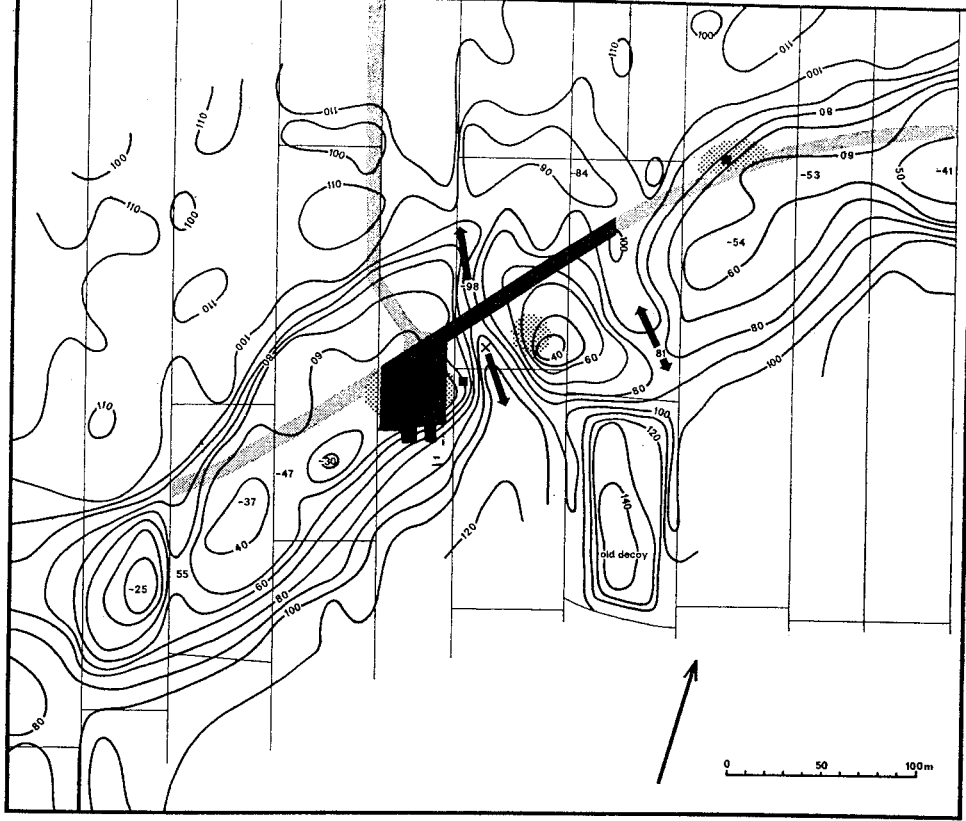
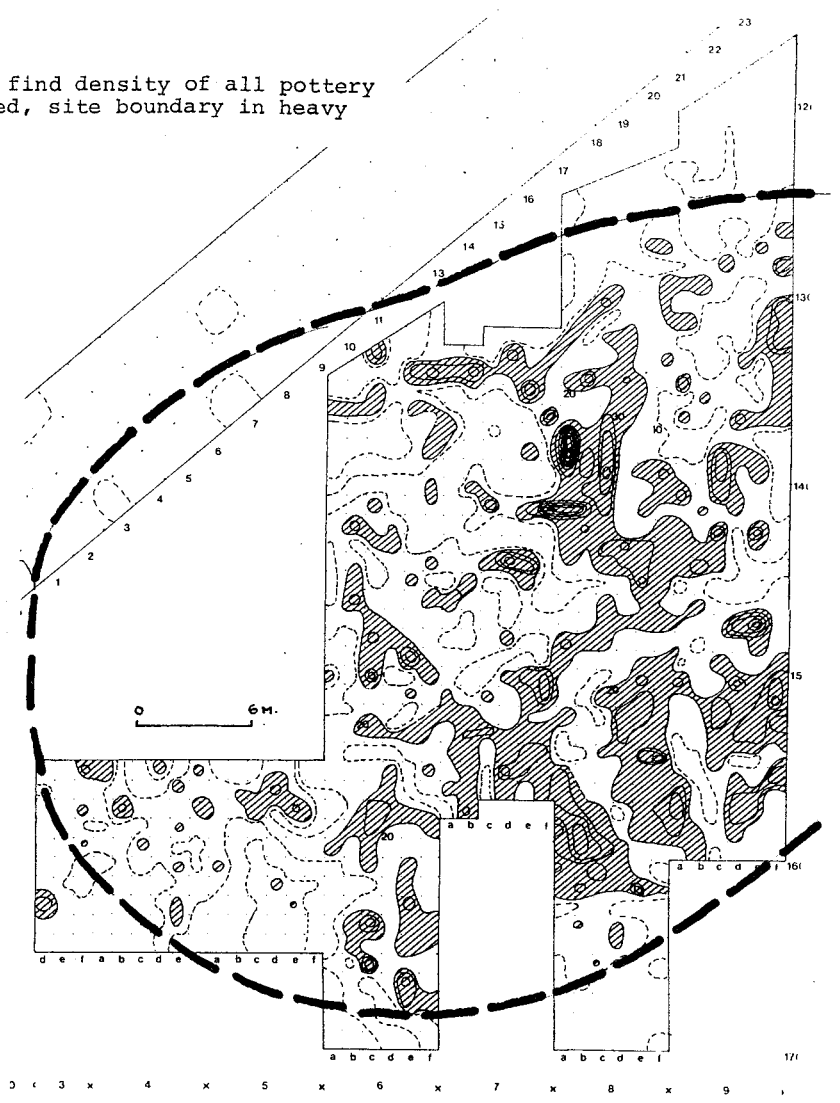
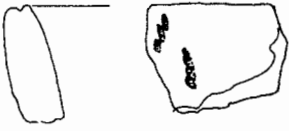
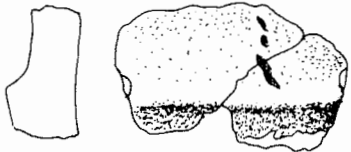


fig. 85. Contour map of the Schoonrewoerd stream ridge with break-through channels at "Ottoland - Kromme Elleboog". Excavations in black.

fig. 86. Ottoland-Kromme Elleboog, find density of all pottery (in grams), > 20 g/m² shaded, site boundary in heavy line.



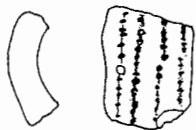
3 c 3 x 4 x 5 x 6 x 7 x 8 x 9 i



Hilversum



Barbed Wire Beaker



Bell Beaker

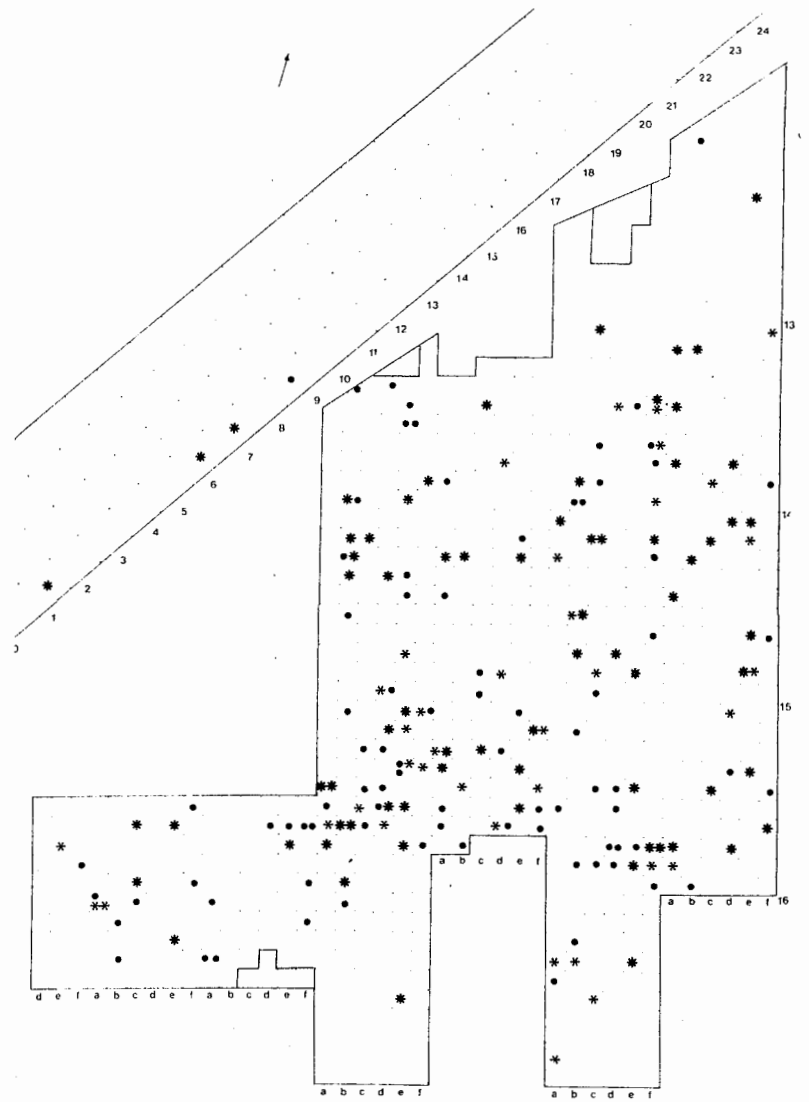
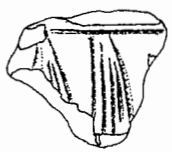


fig. 87. Ottoland-Kromme Elleboog, distribution of Bell Beaker (dots), early (heavy stars) and late (light stars) Barbed Wire Beaker sherds, reflecting use of the same terrain in successive periods and so suggesting continuity of occupation during two or three centuries.

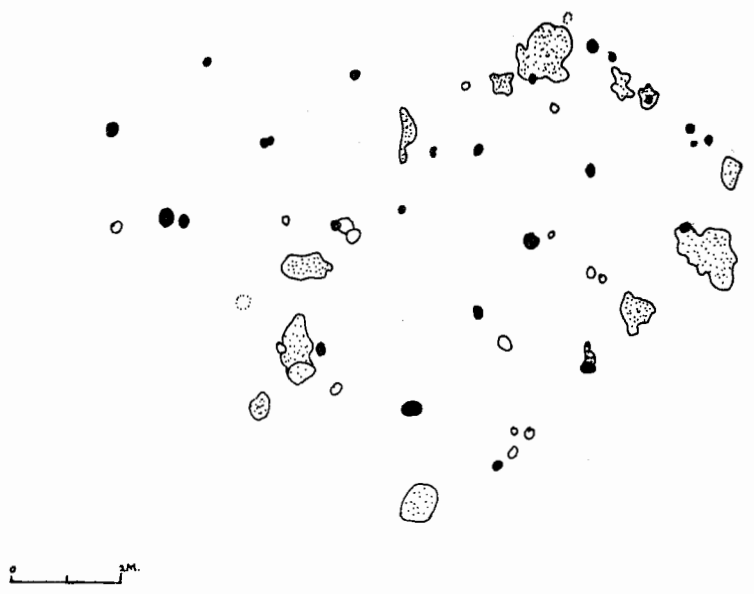


fig. 88. Two-aisled house plan of Ottoland - Kromme Elleboog.

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