W. GLASBERGEN

BARROW EXCAVATIONS IN THE EIGHT BEATITUDES

THE BRONZE AGE CEMETERY BETWEEN TOTERFOUT & HALVE MIJL, NORTH BRABANT

I

THE EXCAVATIONS

PREFACE

The present study is devoted to the excavations undertaken in the years 1948–51 in the barrow cemetery situated between the hamlets of Toterfout and Halve Mijl in the municipality of Veldhoven, Province of North Brabant, Netherlands.

Many indeed are the names of those who, by their direct or indirect support, have contributed to the success of the several campaigns, undertaken under the direction of Professor Dr A. E. van Giffen, Director of the Institute for Biological Archaeology in the State University of Groningen, Netherlands. The present writer was in charge of the fieldwork.

In the first place our thanks are due to Father W. J. C. Binck, the parish priest of Alphen (N.Br.) and enthusiastic chairman of 'Brabants Heem', who has, for many years past, been most active in fostering interest in the antiquities of North Brabant. With him we must mention Mr G. Beex, the secretary of 'Brabants Heem', without whose fieldwork and timely warnings a considerable part of the cemetery would doubtless have disappeared without a trace.

Our investigations were carried out under the auspices of the 'Provinciaal Genootschap van Kunsten en Wetenschappen in Noord-Brabant' at 's-Hertogenbosch (Bois-le-Duc). Its financial support provided the indispensable basis for success. The 'Dienst Uitvoering Werken' and the 'Nederlandsche Heidemaatschappij' also made important contributions towards this end. In particular we would express our appreciation of the whole-hearted co-operation of the latter society's representatives, Mr J. Kropman, Superintendent, Mr S. den Engelsen, Surveyor, and Messrs W. van den Donk, G. de Jong and J. van der Waal, foremen.

The late Mr A. J. van Hooff, Burgomaster of Veldhoven, greatly furthered the work by kindly helping to obtain permission for the several excavations, and by constant interest in its progress. Mr M. J. Klijn, Forester in the State Afforestation Service, has laid us under a similar debt of gratitude. Thanks are also due to Messrs W. J. C. Intven and Th. H. van de Ven, respectively Head and Administrator of the Public Works office at Veldhoven, who kindly obliged us with cadastral maps and other materials. In reducing our levellings to NAP * we were greatly assisted by the presence of a provisional datum, furnished by

* Amsterdam Ordnance Datum (*Normaal Amsterdams Peil*).

Mr A. Poot, topographer in the Ordnance Survey at Delft. Messrs C. J. Bolck, of Toterfout, F. Das, of Zandoerle, C. Sanders, of Halve Mijl, and Mrs H. van der Vondervoort, of Halve Mijl, are also entitled to our gratitude for the kind permission given by them to excavate on their land.

For the actual fieldwork we had the assistance of Messrs H. Praamstra, draughtsman, J. Lanting, C. van Duyn and A. Meyer, technical foremen attached to the Institute for Biological Archaeology. Mr J. Dijkstra, technician 1st class of the same Institute, admirably handled the financial side and the photographic laboratory work. The soil samples were in part taken by Mr H. Tj. Waterbolk, biol. drs, until 1950 Assistant attached to the Institute. We thank these friends most cordially for their help also in many previous excavations.

We gratefully remember the co-operation in the field of Mrs G. E. G. Duyvis van Giffen, Dr G. A. Bontekoe, secretary and treasurer of the 'Drentsch Praehistorische Vereeniging' and Dr R. Lagaay of Leiden. In one week in April, 1948, the excavations were visited by five Belgian archaeologists, Professors Dr S. J. L. de Laet, of Ghent, and Hélène Danthine, of Liege, Dr Elisabeth Saccasyn-della Santa and Dr M. E. Mariën, both attached to the Musées Royaux d'Art et d'Histoire at Brussels, and Dr H. Roosens, attached to the Service des Fouilles de l'Etat at Brussels. We shall always retain pleasant memories of their whole-hearted and enthusiastic co-operation, and of the many instructive hours spent together.

The soil samples were submitted to Mr H. Tj. Waterbolk, biol. drs (Voorburg), to whom our warmest thanks are due for the report appended to this publication. For assistance in preparing the analyses we are no less obliged to Mrs W. van Rooijen Waterbolk. For the analysis of soil samples from tumulus 12 we have to thank Dr Jac. van der Spek (Groningen), whose report has also been printed here. An equal debt of gratitude is due to Dr Med. C. Krumbein (Nordhorn, Germany), who carried out the osteological examination of the cremated burials. We sincerely appreciate his efforts to complete his report in time for inclusion within these covers when circumstances over which we had no control had almost prevented this.

Four charcoal samples were submitted to Professor Dr Hl. de Vries (Physics Laboratory, University of Groningen) for absolute dating by means of radioactive carbon (^{14}C) measurements. We welcome this opportunity to thank him and his assistant, Mr G. W. Barendsen, phys. drs, once again for a contribution which, only a few years ago, would have seemed as impossible as it was desirable.

Generous assistance was received from many quarters. The Director and Staff of the Rijksmuseum van Oudheden at Leiden, the Centraal Noordbrabants Museum van het Provinciaal Genootschap van Kunsten en Wetenschappen in Noord-Brabant, at 's-Hertogenbosch, the Centraal Museum der Gemeente

Utrecht, at Utrecht, the Provinciaal Museum van Drenthe, at Assen, the Museum Flehite at Amersfoort, the Oudheidkamer Wijchen, at Wijchen, the Jan Cunen Museum, Streekmuseum voor Oss en Omgeving, at Oss, the Museum voor het Gooi en Omstreken, at Hilversum, the Musées Royaux d'Art et d'Histoire at Brussels, the Museum Taxandria at Turnhout, the Musée Communal Archéologique at Mons, the British Museum at London and the Public Library and Museum at Grantham greatly facilitated our task by courteous and unfailing co-operation. Among private individuals who contributed valuable information, both written and oral, we must mention G. Beex (Hoogeloon), the late F. J. G. H. Bloemen (Wijchen), Dr A. Bohmers (Groningen), W. J. de Boone, litt. drs (Amsterdam), Dr W. C. Braat (Leiden), J. W. Brailsford (London), Dr H. Brunsting (Leiden), J. Butler (London), H. J. Case (Oxford), G. C. Dunning (London), Professor R. J. Forbes (Amsterdam), M. A. van de Griendt ('s-Hertogenbosch), H. Halbertsma, litt. drs (Amersfoort), Professor Dr H. Jankuhn (Kiel), D. H. Huygen (Amersfoort), Dr G. Jacob-Friesen (Hannover), Dr G. Kossack (München), G. Kunwald (Copenhagen), Professor Dr S. J. L. de Laet (Ghent), S. C. H. Leenheer (Rijnsburg), Dr M. E. Mariën (Brussels), R. Peeters (Turnhout), W. Piepers (Bonn), Mrs C. M. Piggott (Rockbourne), Dr J. Röder (Koblenz), Miss A. J. B. Roosenburg (Wijchen), Dr H. Roosens (Brussels), W. J. Rust (Middelburg), Dr H. N. Savory (Cardiff), Dr G. Smolla (Tübingen), Miss C. van de Velde (Leiden), J. D. van der Waals (Amsterdam), H. Tj. Waterbolk, biol. drs (Voorburg), G. Webster (Chester), A. de Werd (Oss) and Dr W. D. van Wijngaarden (Leiden). To all these our thanks are due for a co-operation that was always welcome and often invaluable. If any names have been omitted from this list, it is certainly not due to want of sincere appreciation.

To Professor C. F. C. Hawkes (Oxford) we are under a very heavy obligation for his warm interest in and welcome advice on the question of the origin of the Dutch cordoned cinerary urns of the Middle and Late Bronze Age. We have pleasant recollections of discussions at Oxford (3–4 March 1952) and Namur (17 April 1952), and we are greatly indebted to him for an extensive retrospect *Deverel-Rimbury pottery in Britain and its implications*, containing many novel points of view.

For line drawings reproduced in this report we have to thank Mr P. C. A. van der Kamp (Haren, Gr.) (figs 47, 48*a*, 48*b*, 54, 68 and 72), Mr G. C. Dunning (London) (fig. 61), Miss L. Glasbergen (Amsterdam) (figs 70–1), Dr L. B. B. Haspels (Groningen) (figs 63–4), Dr A. Bohmers (Groningen) (fig. 4) and Dr H. J. Eshuis (Markelo) (fig. 44).

Finally we wish to express our deep gratitude to Professor Van Giffen for having consented to accept this excavation report for *Palaeohistoria*, published by

the Institute for Biological Archaeology. The English translation was prepared by Dr J. Gerritsen (The Hague) who has also greatly contributed to the clarification of the text.

The work was read in proof by H. J. Case (Oxford) and J. Butler (London), who greatly contributed by their remarks to the ironing out of imperfections in the text. In expressing our gratitude it is only fair to add that none but ourselves should be held responsible for those blemishes that remain.

TABLE OF CONTENTS

The BIBLIOGRAPHY and the LIST OF ABBREVIATIONS
will be found in Part II (= PALAEOHISTORIA, vol. III)

LIST OF ILLUSTRATIONS

FIGURES

PLATES

2. Tumulus 6, *with single widely spaced postcircle.*
The slightly mottled yellow subsoil and the podsolized old surface consisting of a grey layer of leached sand, with infiltration veins below it, the indistinct humus layer having been almost obliterated by the infiltrations just lying on it. The mound itself shows a light sod structure, shot through with many infiltration veins, interspersed with patches of brownish-yellow soil.

XII: 1. Tumulus 10, *with circle of close-set stakes.*
Small bucket-shaped vessel (no 52; fig. 42*b*: 52) from the primary grave.

2. Burnt bone artifacts from cremated burials. 1*a*, two fragments of a bone pin from the primary cremation burial under tumulus 1. — 43*a* and 43*b*, two fragments of bone ornaments, damaged at either end, from the primary grave under tumulus 5. Both are decorated with transversely incised grooves, and one (no 43*a*) has been perforated on one side. — 61*b* and 61*c*, fragments of two bone pins, made from a split hollow bone. Found between the cremated bones in a secondary cinerary urn (no 61, Pl. VIII: 1) from tumulus 1^{B}.

XIII: 1. Tumulus 8, *two-period barrow, with temporary single circle of close-set stakes, definitive single widely spaced postcircle (Period 1), and with double closely spaced postcircle, surrounded by a circle of close-set stakes (Period 2).*
Temporary mortuary house — seen after the removal of the cremation burial —, temporary circle of stakes and definitive postcircle (Period 1) all marked by white pegs. Outside these the more darkly showing, closely sited postholes of the secondary postcircle (Period 2), with heavy iron pan precipitation. On the E side, between the temporary and definitive circles some recent disturbances reaching deep into the subsoil. In the background the replaced tumuli 6 and 5 on the '*Groote Aard*', the postcircle of tumulus 6 already marked out. Seen from the SW.

2. Tumulus 8. The central grave, one half still in position. The definitive single widely spaced postcircle has not yet been marked with pegs. Seen from the S.

XIV. Tumulus 8. Section of one of the NW postholes of the secondary, double closely spaced postcircle (Period 2), under the edge of the barrow, showing deep secondary iron pan precipitation and infiltrations in and below the posthole. The posthole itself is indicated by a dotted line. Seen from the N.

XV: 1. Tumulus 15, *with single widely spaced postcircle.*
The W half of the W–E baulk (section B), with very fine structure of humous inverted sods on an uneven, well-podsolized subsoil, showing deeper patches of leached sand, of natural origin. The barrow has been smoothed over with brownish-yellow sand. At the centre a large recent disturbance. Seen from the S.

2. Tumulus 15. The centre of the barrow, in the SW quadrant, with partly destroyed central, primary grave with sod filling. On the right, on the S side of the N–S crossbaulk (section A), the smoothing of the slope of the sod core with brownish-yellow sand. Seen from the SW.

XVI: 1. Tumulus 15. The W part of the W–E crossbaulk again. In the left foreground two postholes of the postcircle, with secondary iron pan precipitation. Seen from the S.

2. Tumulus 15. The S part of the N–S baulk (fig. 24, section A, squares 6–7), at the edge of the barrow. The strongly podsolized old surface shows secondary iron pan precipitation below it. Above the old surface the brownish-yellow

Tumbis istis plena est Hasbania, item & Taxandria, præsertim circa Turnholtum.
G. Wendelinus, *Leges Salicæ Illustratæ*, Antverpiæ, 1649, p. 194.

INTRODUCTION

The visitor leaving the industrial centre of Eindhoven in a South-Westerly direction will soon find himself in a region commonly referred to by the punning Brabantine as *de Acht Zaligheden*,[1] literally *the Eight Beatitudes* (fig. 1). Sturdy, solitary brick towers symbolize the past, but likewise the present. When in the present century the building of a new church was undertaken, the old one would always be worth a few hundred guilders in old materials, and this is the reason why so many of the once picturesque Gothic churches were eventually demolished. The towers, however, had been municipal property since Napoleonic times, which without doubt prevented them from contributing in their own way to this novel method of glorifying the Creator. Nowhere in the Netherlands is there a sharper contrast between old and new, the modern miniature cathedrals and the solitary medieval towers, than in the 'Eight Beatitudes'!

In this region, too, half a century ago, fertilizers brought about an agricultural revolution, and the era of the vast moorland reclamations began. The consequent increase of prosperity resulted in a correspondingly large increase in population which is still in progress. This, in its turn, calls for new large-scale reclamations which have already transformed a large area of the waste diluvial soils throughout the country into extensive complexes of arable land, while the areas unsuitable for agricultural purposes are being planted by the State Afforestation Service. In the course of a few decades the landscape and the sociological environment which had gradually taken shape in the course of millennia have been totally altered. Rarely do we find scenery now, where the hand of man cannot yet be discovered, where the moorland still stretches away as far as the eye can rove. At best a far-off bark will show the direction of the nearest homestead — more generally the honking of a nearby motor-horn breaks the illusion.

The reclamation of the waste ground means bread for many, and this forms the inexorable motive for the destruction of so much that is amongst the most beautiful that we possess. The cyclist following a narrow track along a fen, on a clear September evening, will not find a trace of either, the next spring. The fen has been drained, and in a few years' time the cows will lie chewing the cud in the new pasture.

With the old landscape countless remains of the ancient past have fallen victim to the plough. Of these, groups of barrows, generally placed on the higher ridges, are the most conspicuous.

For centuries these small regular mounds have drawn the attention: they play a part in many ghost stories and were the favourite haunts of the white women and other charming denizens of the world of magic and sorcery. Urnfields, settlements and flint workings hardly attract the attention on the earth's surface and many have been wiped out, unnoticed by archaeology. Everywhere the stories can be heard of large series of urns turned up by the plough in reclamations. Sherds, charcoal and cremations are left on the surface to attract attention at some later time, when all that could have been learnt from the soil itself has been destroyed by the plough, and all that is left to be done is to record yet another destroyed urnfield on the distribution map .....

* * *

A century ago, when the 'Eight Beatitudes' were still largely covered by moorland, it was the Westerhoven schoolmaster P. N. Panken,[2] who applied himself with much enthusiasm to the study of the antiquities to be found on the surrounding moors. His archaeological investigations derive much importance, nowadays, from the fact that the barrows recorded by him have often disappeared meanwhile, or are now hidden away in dense pine-woods. As he has told us himself,[3] he was greatly interested from his youth in the antiquities of his native soil. Reading an essay on the Campine[4] in September, 1839, and Dr C. R. Hermans' communications in the 'Provinciaal Dagblad van Noord-Braband' greatly increased this interest, and gave him the idea that the numerous regular hillocks on the Berger Heath, near Bergeik, might well contain 'funeral urns, etc.', so that he 'was overcome by the desire to have the same dug through'. His temporary — later permanent — appointment as schoolmaster at Westerhoven, in September, 1840, gave Panken the opportunity to fulfil this desire, as this village is at only half an hour's distance from Bergeik, where his parents lived. *Out of* school hours — his 'unearthings' were always done in his 'holidays or Saturday afternoons'! — Panken would tramp the countryside for hours, in order to locate the 'pre-Christian burial places', as he calls them. It is worth while to follow his descriptions, and to accompany him on his walks through the Brabant fields of former times. Our schoolmaster's curiosity, however, went farther than the simple reconnaissance of barrow sites. Often he tried to reveal the secret of such a mound by means of the spade, and now and then his labour was rewarded by a broken or sometimes an intact urn (probably a secondary interment!). In most cases, however, the spoils consisted of fragments of charcoal, ashes, and cremations, and it can be ascertained from his descriptions that he was then almost invariably concerned with a Bronze Age barrow. Only once, for the '*Zwartenberg*' at Hoogeloon, this dating can be corroborated by means


GRONINGEN
FRIES-
LAND
DRENTE
NORTH
HOL-
LAND
OVER-
YSSEL
VELUWE
UTRECHT
GELDER-
LAND
SOUTH
HOLLAND
ZEELAND
NORTH BRABANT
EINDHOVEN
CAMPINE
LIMBURG
BELGIUM
GERMANY
WGL

Fig. 1

of tangible proof, in the shape of a bronze palstave chisel (Part II, fig. 72).[5] A couple of copper rings, iron nails and hooks associated with a number of pottery vessels, much charcoal and cremated bone in a tumulus at Bergeik,[6] and a small iron pin[7] found with an urn from the cemetery between Veldhoven and Steensel — very probably a ringditch urnfield — comprise all the metal found besides. Panken's excavations, covering the years 1840–6, extended over some ten villages in the neighbourhood. They were mainly concerned with barrows; sometimes it is clear that he was dealing with an urnfield.[8]

It must be reckoned Panken's great merit that he kept careful notes of all his 'unearthings', and recorded his discoveries in successive reports. Dr Hermans accepted these latter for his '*Bijdragen voor Noord-Braband*', thus making them known generally.[9] The North Brabant Society for Arts and Sciences praised Panken as its most industrious member and honoured him with a gold medal. A large part of the objects excavated were made over by him to the Society, conscious as he was, apparently, that a private collection is sooner or later doomed to dispersal. The Westerhoven schoolmaster has a right to the deep gratitude of all present-day workers in the field of Brabant's prehistory. It is only from his descriptions that an idea can still be gained of the extraordinarily wide distribution and unusual density of the burial mounds in this part of the Campine. Panken's work constitutes one of the earliest attempts at an investigation and description, of the fullest possible nature, of the prehistoric phenomena of a circumscribed region. Hermans speaks highly of the fullness of Panken's descriptions:[10] 'Many a reader will think this fullness superfluous, but to me it seems of the highest necessity, as this will occasion the elucidation of matters, customs and practices of our pagan forbears that have not yet been noticed elsewhere, or, if they have been recorded before, are here confirmed'.

As has been said, the North Brabant scenery has been drastically altered, nearly everywhere, in the course of the past hundred years. Fields and fir plantations have replaced the vast moors. Although the barrows and urnfields, lying as they did on the higher ridges, less suitable for cultivation, were often the last to be touched, yet much of what Panken knew has since disappeared. For all this, the richness in prehistoric remains shown by the 'Eight Beatitudes' is still extraordinary. It is only here in North Brabant that a rounded and proportioned picture can still be obtained of the development of the successive cultures, starting with the Late Palaeolithic. Panken recorded the density and distribution of the barrows and already undertook many excavations; in the present century it was Dr J. H. Holwerda, Dr M. A. Evelein, Dr A. E. van Giffen, Dr W. J. A. and J. Willems and Dr W. C. Braat who carried out a series of systematic excavations on modern lines, backed by modern ideas, enabling them to collect many data on the structure and stratigraphy of the barrows and, es-

specially, of the urnfields. Concerning the structure of the mounds not much can be found in Panken, though he remarked upon the fact when occasionally a tumulus did not consist of dark tilled soil, but of yellow or red sand. [11] He also occasionally noticed, but did not interpret as such, the characteristic structure of the majority of barrows, consisting of piled-up inverted heather sods. Of postholes, occurring in many, if not in most of these barrows, we never hear a word. He never acquired a more or less systematic method of excavation; his expressions 'dig through', 'spade through' and 'have turned over' leave no doubt as to the method followed in these 'unearthings'. In his term 'spade through crosswise', derived from Heylen, [4] we need not see a precursor of the quadrant method! On the other hand his attention was twice attracted by a ditch round a barrow, observable on the surface: possibly the first recorded instance in this country of a ditched barrow. More importance still is to be attached to his minute description of the '*Galgenbergje*' (Gallows mound) near Bergeik: [12] doubtless a good instance of a barrow surrounded by a ditch with internal bank, and the sixth of this rare barrow type in North Brabant. The other specimens are a barrow on the Rechte Heide near Goirle, [13] three at Toterfout-Halve Mijl, [14] and the '*Zwartenberg*' at Hoogeloon. [15] For the study of the relations between England and the Continent during the Bronze Age these monuments are of the greatest importance.

Where Panken could only speak of 'pre-Christian burial places' it is now possible at least to assign rough dates to these monuments and to make comparisons with analogous phenomena elsewhere. Here the study of the structure of the monuments and that of the pottery form the principal aids to knowledge. The modern prehistorian seeks contact with other branches of science. Cremations are carefully examined and can provide data on the age of the cremated. Remains of more than one person in a single cremated burial throw light on contemporary customs and put him on the look-out for ethnological parallels. The examination of pollen grains from the old surface under the barrows — one of the few places where it is at the present time possible to identify with certainty the natural ground level belonging to a prehistoric culture — conjure up before our eyes flora and climate, and enable us to see prehistoric man in his natural environment. Where technique is concerned prehistory has very recently made quite considerable advances. Yet it is legitimate to ask whether, in principle, the problems we set ourselves differ so greatly from those of Panken and Hermans. At the investigation of a tumulus near Riethoven on August 18, 1844, a medical student examined a cremated burial. [16] And from the fact that Hermans admitted into the Noordbrabants Genootschap's collection specimens of charcoal from Panken's excavations 'from which a dendrologist may find occasion to arrive at some conclusion concerning the kinds of wood growing in North Brabant in

the pre-Christian era' [17] we may conclude that these antiquaries were well aware of the problems. A number of charcoal samples from urns were later submitted to Professor Suringar, of Leiden. With the exception of only a few fragments they were found to be oak. [18] Though the examination of these specimens did therefore little to substantiate it, the speculation that it would thus be possible to gain an insight into the natural environment of prehistoric man remains remarkable.

It is to be regretted that we are no longer in possession of the map on which the position of the groups of tumuli near Bergeik, Riethoven, Veldhoven, Steensel, Knegsel, Oerle, Wintelre, Eersel, Hapert and Luiksgestel had been recorded. Originally it had been intended to have this map published, but on the appearance of the 'Map of the Roman, Germanic and Gaulish antiquities found in the Netherlands, Belgium and adjacent territories' by Reuvens, Leemans and Janssen, this was judged unnecessary by Hermans. [19]

Panken first investigated the cemeteries in the immediate vicinity of Bergeik and Riethoven, where we respectively find his groups I–III and IV–V. [20] After these had been dealt with between 1840 and 1844, Panken immediately proceeded to explore his wider surroundings, beginning with groups VI–VII, between Veldhoven and Steensel (fig. 2). This he completed even before the year 1844 was out. Then he turned his attention on Oerle, where 'also a multitude of grave mounds was to be found' (fig. 2). On behalf of the 'Provinciaal Genootschap van Kunsten en Wetenschappen' Hermans requested Panken to continue his 'unearthings' and to forward the objects uncovered to Bois-le-Duc, the expenses to be borne by the Society. [21] The Society can therefore look back on a tradition of a century in support of archaeological investigation, to which the last few decades have again borne ample testimony! In 1845 there followed the investigation of group VIII, near Oerle, between Zandoerle and Halve Mijl (figs 2 and 3) — the group with which this publication is concerned —, and groups IX–X, between Oerle and Wintelre (fig. 2). Group XI, near Oerle, was not investigated, as was the case with group XII, near Wintelre. Of groups XIII–XV, near Knegsel, Panken excavated a number of barrows; group XVI and group XVII, near the Oerle mill, were left alone. With groups XVIII, between Eersel and Hapert, and XIX–XXI, near Luiksgestel, we approach the end of Panken's activities. In the autumn of 1846 some work was still done on the mounds of groups I and III–IV near Bergeik and Riethoven, and finally, on September 16, 1846, he dug a big hole in the '*Zwartenberg*' near Hoogeloon (fig. 2 and Part II, fig. 72).

Panken was certain, moreover, that 'if the fir-woods etc. of the country surrounding Oerle and of other places were carefully observed' more tumuli could be found. [22]

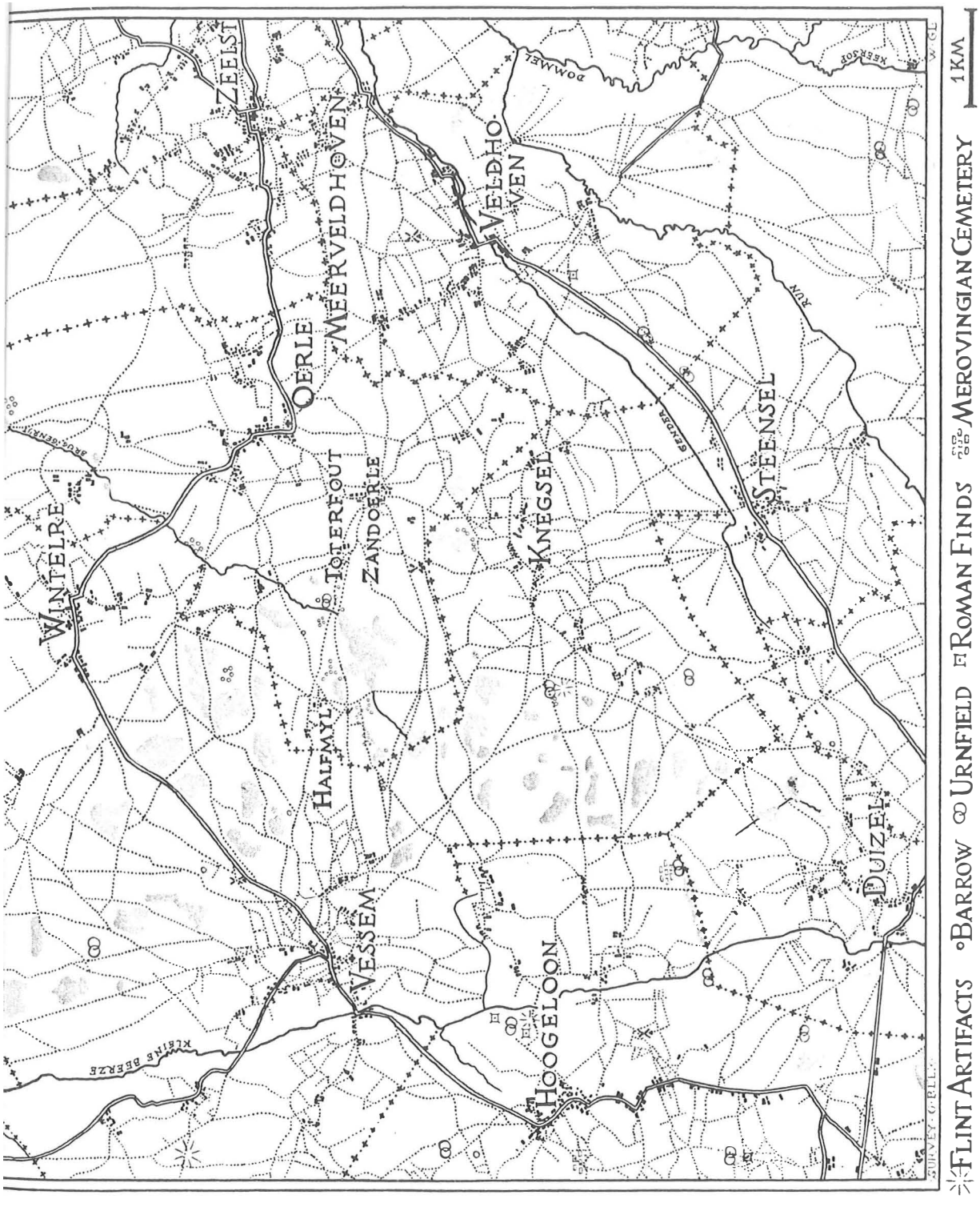

ZEELST
OERLE
MEERVELDHOVEN
VELDHOVEN
WINTELRE
HALFMYL
TOTERFOUT
ZANDOERLE
KNEGSEL
STEENSEL
VESSEM
HOOGELOON
DUIZEL
KLEINE BEERZE
DOMMEL
RUN
1KM
FLINT ARTIFACTS
BARROW
URNFIELD
ROMAN FINDS
MEROVINGIAN CEMETERY

Fig. 2

The numbers of barrows in the cemeteries surveyed and investigated by Panken may therefore be summed up as follows. For convenience we have numbered his groups from I to XXI, a practice for which Panken had not yet felt the need.

Locality	Group	Number of tumuli	Investigated by Panken	Remarks
Bergeik	I	c. 20	18	barrows and urnfield
	II	7	4	barrows
	III	upwards of 50	45	barrows and urnfield
Riethoven	IV	13	7	barrows
	V	4	4	barrows
Steensel-Veldhoven . . .	VI	13 and a few smaller ones	13	barrows and urnfield
	VII	5	5	barrows
Oerle	VIII	38 and a few smaller ones	21	barrows
	IX	11	10	barrows
	X	6 and a few scattered ones	6	barrows
	XI	7	—	barrows
Wintelre	XII	8	—	barrows
Knegsel	XIII	4	4	barrows
	XIV	6	6	barrows
	XV	5	2	barrows
	XVI	2	—	barrows
	XVII	a few barrows	—	barrows
Eersel-Hapert . .	XVIII	4	4	barrows
Luiksgestel	XIX	many, mostly very irregular mounds	a few small mounds	urnfield
	XX	3	3	barrows
	XXI	6	6	barrows
Hoogeloon		1	1	The 'Zwartenberg'
Total		upwards of 213	upwards of 159	

The total number of tumuli recorded will therefore doubtless have been around 250, though it must at once be added that many are no more than the small mounds of an urnfield. No less than 159 of the barrows were dug by Panken.

The following remarks on the several groups may serve to illustrate the tabular survey. [23]

Group I, about ten minutes' walk NW of Bergeik, near the hamlet 'de Hooge Berkt'. As early as 1835 or 1836 Captain Baron F. van Voorst tot Voorst had one of the tumuli 'thrown over' by some troopers belonging to the 6th Hussars, which resulted in the discovery of an urn. [24] Panken's investigations [25] (26. VIII. 1840, 3. VII. 1841, 25. VIII. 1843, 31. VIII. 1843, 16. IX. 1843, 13. IX. 1844 and 8. XI. 1845) yielded six urns and a sherd, private excavations by the farmers bringing two further urns to light. One of the tumuli consisted of yellow sand. — In a barrow lying 160 ells distant from this group, Panken, on 13. IX. 1844, found quite a collection of pottery fragments, viz. a brown jar-shaped urn with an intact saucer near its mouth, and another such urn, also with saucer. Both urns showed a decoration of regularly placed notches on the wall. Sherds of an undecorated urn and fragments of a third saucer were found with them, also pieces of a further, very delicate, small plain urn. At the bottom of the deposit lay seven rusty nails, five iron hooks, two very brittle copper rings, and finally cremated bones. The whole was surrounded by a large amount of charcoal. — A barrow situated between groups I and II consisted of yellow and reddish sand; the isolated '*Kattenberg*', some distance away, also consisted of reddish soil, in which were found many fragments of a coarse urn of very gritty texture — the coarsest Panken had even seen. Some — apparently secondary — cremations are further to be mentioned. — In 1845, during road-building operations, four urns were found below the level heath near this group. Apparently a (ringditch ?) urnfield was here contiguous with the group of barrows, a situation repeatedly met with in later excavations in North Brabant.

Group II, about ten minutes' walk from Group I, to the left of the road from Bergeik to Eersel. This cemetery had already been noticed by a clergyman from Gelderland on 2. VIII. 1837. Two of these barrows he caused to be dug, resulting in the discovery of some bone and charcoal fragments. [26] Panken dug here on 29. VIII. 1840 and 13. IX. 1844. [27] — In the vicinity of this group lay the '*Galgenbergje*' ('Gallows mound'). 'It is not quite an ell in height and has 30 ells in circumference. Around the same, at a few paces distance, is a small dyke or ditch, containing some 80 ells in circumference, and the earth from which has been thrown towards the mound'. On 29. VIII. 1840 Panken dug through this striking monument 'crosswise' and nothing remarkable was found, which he 'as being no barrow, had suspected beforehand' (*sic*). Panken's description does not seem to leave any room for doubt that he had before him a barrow surrounded by a ditch with internal bank. In spite of several reconnaissances in this neighbourhood, it has so far been impossible to locate the 'Galgenbergje'.

Group III, to the right of the road from Bergeik to Eersel, near the farmstead 'De Paal'. The cemetery was composed of several smaller groups. Panken's successive excavations (8. X. 1842, 21. X. 1843, 3. XII. 1843, 17. XII. 1843, 23. III. 1844, 25. V. 1844, 16. X. 1844 and 18. X. 1845) yielded 17 urns, [28] farmers contributing three more. A shepherd found a pot here in level ground, and several more seem to have thus been found hereabouts at earlier dates. Doubtless they indicate an urnfield, arranged round a nucleus of older barrows. After Panken had finished his excavations here on 17. II. 1850, thirteen more pottery vessels came successively to light at a spot only a few minutes' walk away. [29]

Group IV. Here Panken (22. VI. 1844, 26. VIII. 1844 and 18. X. 1845) [30] found two urns and several sherds. One of the mounds consisted of red sand. The description of an isolated barrow lying near the 'Broodven', at some distance from the group, is of special interest. [31] On its top lay a separate small elevation. The tumulus proper consisted of 'red', the tump on its top of black soil. In the top an almost wholly disintegrated coarse urn was found, filled as usual with cremated bone.

Group V. Only a few sherds came to light (26. VIII. 1844). [32] It was here that a medical student examined a cremated burial.

Group VI (fig. 2). The finds consisted of eleven urns, one of which contained a smaller accessory vessel (28. IX. 1844). [33] On one of the cremation-filled urns was found a thin,

oblong iron pin. [34] The majority of the mounds consisted in whole or in part of yellow soil. The urns found in the large tumuli invariably derived, it would appear, from secondary interments; those from the smaller mounds doubtless formed the central interments of ringditch tumps. More than 15 pieces of pottery, amongst them a small dish, were subsequently excavated by inquisitive people from the neighbourhood. We are here on the site opposite the brickworks 'De Heibloem', where Drs J. H. Holwerda and M. A. Evelein carried out a cursory and fruitless excavation in 1909. [35] What remained of the cemetery was investigated by the writer in two campaigns in 1948, under the direction of Professor Van Giffen. Besides some 'ridges' (raised beds enclosed by sub-rectangular ditches, probably prehistoric arable fields) a number of circular ditches were uncovered. As a result of intensive 'urn delving', which continued into very recent times, nearly all interments had been robbed.

Group VIII (figs 2 and 3), where Panken carried out an investigation on 19. X. 1845, [36] was excavated by the writer in the years 1948–51. It is to these excavations that the present study is dedicated, and Panken's observations will therefore be dealt with at length on pp. 14–16.

Group IX, investigated on 23. XI. 1845, [37] yielded three urns, doubtless from secondary interments. One of these was of gritty texture ('Deverel' urn ?). Some sherds were also recovered.

Group XII yielded two urns. [38]

Group XIII. From each of the four barrows an urn had been dug up by country lads. Panken was still able to record (30. XI. 1845) [39] that one of the barrows consisted of yellow soil.

Group XIV. Here Panken found a very coarse urn (30. XI. 1845). [40]

Group XVIII, between Eersel and Hapert. It was found here (26. IV. 1846) that for the lower part the mounds consisted of 'reddish' soil. Only a single sherd came to light. [41] In 1950 the group was systematically excavated by Dr H. Brunsting, Conservator of the Rijksmuseum van Oudheden at Leiden. *Tumulus I*, showing a faint sod structure, was surrounded by an irregular double circle of small closely spaced posts (diameter: 12.50 metres). Of the central interment all but a small portion had been destroyed. *Tumulus II* was surrounded by a penannular ditch (diameter: 8.00 metres), showing a gap on the NE side. *Tumulus III*, which had been completely ploughed over, was probably a two-period barrow, the primary mound being surrounded by a ringditch (diameter: 7.50 metres). The second phase was enclosed by a postcircle (diameter: c. 10 metres). *Tumulus IV* turned out to have been built from grey sods. NNW of the centre lay the remains of a secondary funeral pile from below which an urn (Early Iron Age) came to light containing the cremated bones of an adult man or woman. In a hollow beneath the urn lay the cremated bones of a child. Fragments of calcined bone were also recovered from among the remains of the pyre. [42]

Group XIX. An urn and several sherds were excavated by Panken (29. III. 1845). [43] Very shortly afterwards four or five more urns were dug up by farmers.

Group XX. These three tumuli turned out to have been thrown up from 'reddish' sand (17. V. 1845). [44] One urn found probably represented a secondary interment.

Group XXI. All tumuli here were composed of 'reddish' soil. Panken found four urns (17. V. 1845). [45] They were probably secondary interments; one of them was perhaps a 'Deverel' urn.

The '*Zwartenberg*' at Hoogeloon (fig. 2). This isolated tumulus is certainly the most imposing grave mound in the whole province of North Brabant. On 15. IX. 1846 Panken dug a large hole in it. [46] 'The soil consisted mostly of black and whitish layers, which still enabled one to observe that after the erection of the mound the soil had not, or not to any depth, been disturbed'. This stratification, of which Panken also makes passing mention for other barrows, represents the lines of the inverted heather

sods, here showing with extraordinary clearness. From about the centre of the barrow 'at the depth of the level heath' — apparently, therefore, the old surface — an oxidized bronze palstave chisel [47] (Part II, fig. 72) came to light (Early Bronze Age). Between the Eastern edge and the centre of the barrow a scrap of bone was found. — The pit dug by Panken had disfigured the 'Zwartenberg' for more than a century, and was, moreover, used as a point of attack for much irresponsible digging. In 1949 the writer caused it to be filled in. — In the summer of 1950, under the direction of Dr H. Brunsting, a systematic excavation was undertaken. [48] This showed that the barrow (height: 1.40, diameter: c. 18) had indeed been built from finely preserved inverted sods on a clearly podsolized old surface (in places stripped), on which a thin layer of wind-blown sand could be seen at some places in the sections. Besides sods agreeing in composition with the old surface and which must therefore have been cut in the immediate neighbourhood, other sods had been used, with a black, peaty humus layer and clear white layer of leached sand, which must have been cut elsewhere, on a lower-lying site. The pit dug by Panken showed as an enormous recent disturbance in the centre. At the edge of the barrow three secondary cremation burials were discovered. The barrow was surrounded by a bank (width: c. 4 m) thrown up from a wide external ringditch (width: c. 3; overall diameter: c. 40 m). In the ringditch — which must soon have been filled with material from the bank — a secondary single widely spaced postcircle [49] had been placed, showing a large gap on the NE side. At the Eastern periphery of the barrow a further small two-period timber monument came to light, consisting of a small single closely spaced postcircle and a segment of another similar circle. [50] Encircling the top of the barrow a secondary ringditch was observed.

The 'Zwartenberg' is the most monumental example of a barrow with enclosing bank and ditch in the Netherlands, where some seven such barrows have so far been recorded. The postcircle in the ringditch is also the most monumental example of its kind. The 'Zwartenberg' further derives its great importance from the datable bronze find which, in all probability, came from the primary grave.

Judging from Panken's remarks the majority of the tumuli investigated by him must have been built from inverted heather sods; when he speaks of yellow or reddish sand this has invariably been mentioned by us in the above survey. Probably in the latter cases we are concerned either with tumuli dating from the time before the heather podsol formation, Neolithic or Aeneolithic monuments therefore, or with (Bronze Age) barrows raised from and on prehistoric arable soil.

In many instances Panken observed charcoal and cremations, and occasionally a broken or even a whole urn could be taken home in his bag. There can hardly be doubt that the urns are generally secondary interments, unless it is the central urn from a small mound of a ringditch urnfield. Apart from one or two 'Deverel' urns the majority of the pottery found must have belonged to Urnfield times (mainly Iron Age).

We may finally mention that Panken drew attention several times to barrows lying in a row (groups VI, XI and XXI). Presumably we are here concerned with tumuli built along a prehistoric road, a phenomenon already frequently observed elsewhere.

[1] Actually the 'Acht *Sel*ligheden', from the termination '*sel*' (= sala) common to the names of eight villages here, viz. Duizel, Eersel, Hulsel, Knegsel, Netersel, Reusel, Steensel and Wintersel (= Wintelre). The area between and around these villages is thus called the 'Eight Beatitudes'.

[2] Petrus Norbertus Panken, b. Duizel, 6 Sept. 1819, d. Bergeik, 20 July 1904, son of Joannes Baptista, head teacher and later burgomaster of Duizel (d. there 7 July 1823, 39) and Antonia Willems of Bergeik. Studied to be a teacher. Head teacher at Westerhoven; retired on pension 1861 to become postmaster there. Continued as such for many years. After superannuation removed to Bergeik to stay with brother's children. H. N. Ouwerling in *Nieuw Nederlandsch Biografisch Woordenboek*, vol. 4, 1918, columns 1065–66.

[3] Panken I, p. 537.

[4] A. Heylen, *Historische Verhandeling over de Kempen*, Turnhout, 1837.

[5] Cf. p. 11.

[6] Panken I, pp. 551–2.

[7] *Ibid.*, p. 562.

[8] As in Groups I, III, VI and XIX, to be summarized below.

[9] Cf. Part II, Bibliography (Abbreviated References), sub *Panken*. Later, in 1865, Hermans summarized Panken's excavations in his *Noordbrabants Oudheden*, where a number of the urns found were first reproduced.

[10] Panken II, p. 282 ('*Aanteekeningen*', by Dr C. R. Hermans).

[11] Cf. *infra* Group I (two barrows), Group III (one barrow?), Group VI (tumuli 4, 8 and 9), Group XIII (tumulus 4), the earth of which was yellow, and Group I (one barrow), Group IV (two barrows), Group XVIII (tumuli 1–3?), Group XX (tumuli 1–3), Group XXI (tumuli 1–6), the earth of which was 'reddish'. Concerning the structure of a tumulus Hermans (*NO*, 1865, p. 81) says in summarizing Panken's excavations at Luiksgestel: 'Mr Panken observes that he saw the bottom of the urns stand at a level with the heath. From this it may be concluded that they were placed on the ground and then surrounded by a heap of earth'.

[12] Panken I, p. 539 and pp. 540–1.

[13] Van Giffen, *Brab. Oergesch.*, 1937, pp. 8–22 and *PPS* 1938, pp. 258–71.

[14] Cf. *infra*, tumuli 1, 1^{B} and 9.

[15] Cf. *infra*, pp. 10–11.

[16] Panken I, p. 550.

[17] Panken II, p. 266 (footnote by Hermans).

[18] Hermans, *NO*, 1865, p. 60, note 1.

[19] Panken II, p. 283 ('*Aanteekeningen*', by C. R. Hermans).

[20] Of these, Groups I–IV lie almost in a straight line from NE to SW.

[21] Panken I, p. 565; Hermans, *NO*, 1865, pp. 74–5.

[22] Panken II, p. 267.

[23] Apart from Hermans, *NO*, 1865, the urns etc. found have been described and partly reproduced in Holwerda & Smit, *Cat.* 1917.

[24] Panken I, p. 566 (note by C. R. Hermans), II, pp. 278–9.

[25] Panken I, pp. 538–9, p. 540, p. 541, p. 542, p. 543, pp. 551–3, pp. 553–4, II, pp. 276–8; Hermans, *NO*, 1865, pp. 75, 76.

[26] Panken II, p. 279.

[27] Panken I, p. 539, pp. 540–1, 553; Hermans, *NO*, 1865, pp. 75, 76; A. J. van der Aa, *Aardrijkskundig Woordenboek der Nederlanden* II, 1840, p. 318.

[28] Panken I, pp. 539–40, p. 542, pp. 543–7, pp. 554–5, II, pp. 275–6; Hermans, *NO*, 1865, pp. 75–80.

[29] Description by Panken, in Hermans, *NO*, 1865, pp. 78–80, Pl. III: 6, 9, 11, 12 and 13. 'In all these pots nothing but sand has been found, except in the largest, in which some

burnt human bones were present. Around this urn had been placed all the other pots, some of which had sagged towards the East'.

[30] Panken I, p. 540, pp. 547–8, p. 550, II, pp. 274–5; Hermans, *NO*, 1865, p. 80.

[31] Panken II, p. 275.

[32] Panken I, pp. 549–50.

[33] Panken I, pp. 556–65; Hermans, *NO*, 1865, pp. 82–5. For the pottery cf. also Holwerda & Smit, *Cat.* 1917, p. 29, nos 77–87, Pl. 2: 77 & 78, Pl. 3 (*read:* Pl. 4): 79, Pl. 4: 81 & 87.

[34] Found on the W side of tumulus VIII. Panken I, pp. 561–2. For the urn cf. Hermans, *NO*, 1865, p. 84, Pl. VI: 3; Holwerda & Smit, *Cat.* 1917, p. 29, nos 78 and 87*a* (= 78*a*?!), Pl. 2: 78.

[35] 'After some digs in the vicinity of the Heibloem brickworks had first made us find indeed the remains of a single tumulus and a few urn fragments of a Germanic population, but had also given us the conviction that there could be no question here of a true unified necropolis and that, in so far as any such small barrows might still have lain together here in a complex, these had yet been disturbed too much to raise any expectations of success for a more extensive investigation', etc. J. H. Holwerda & M. A. Evelein, *OM Leiden*, OR IV, 1910, p. 43. For the finds made by the teacher C. Rijken in 1910 cf. Holwerda & Smit, *Cat.* 1917, pp. 29–32. Cf. also below, pp. 115, 119 (palynological examination by H. Tj. Waterbolk).

[36] Panken II, pp. 259–62; Hermans, *NO*, 1865, pp. 85–6.

[37] Panken II, pp. 262–4.

[38] Panken II, pp. 265–6; Hermans, *NO*, 1865, p. 86, Pl. VI: 7; Holwerda & Smit, *Cat.* 1917, p. 40.

[39] Panken II, pp. 266–7; Hermans, *NO*, 1865, p. 85.

[40] Panken II, p. 267.

[41] Panken II, pp. 268–9; Hermans, *NO*, 1865, p. 82.

[42] *BH* II, 1950, p. 93. Cf. Part II, postcircle type 6, North Brabant, no 18.

[43] Panken II, pp. 269–70; Hermans, *NO*, 1865, pp. 80–1.

[44] Panken II, pp. 270–1; Hermans, *NO*, 1865, pp. 80–1, Pl. VI: 9.

[45] Panken II, pp. 271–3; Hermans, *NO*, 1865, p. 81, Pl. VI: 8.

[46] Panken II, pp. 280–1; Hermans, *NO*, 1865, pp. 86–7.

[47] Panken II, p. 280; Hermans, *NO*, 1865, Pl. XXI: 12; Holwerda & Smit, *Cat.* 1917, p. 20, no 21. Hermans, in a footnote to Panken II, p. 280, would prefer a Germanic to a Roman origin for the implement. See further P. Felix, *Niederl. Bronzezeit*, 1945, p. 65 (*sub* 'Absatzmeissel'), Fundkatalog no 218 (p. 208).

[48] *BH* II, 1950, p. 93.

[49] Cf. Part II, postcircle type 3, North Brabant, no 15.

[50] Cf. Part II, postcircle type 5, North Brabant, nos 5–6.

THE SITE

On October 19, 1845, Panken went on foot to the site near Oerle (Group VIII) where, just over a century later, the Institute for Biological Archaeology of the State University of Groningen was to carry his excavations yet further. He found 'the moors in many places as if sown with barrows'. [1]

At about a quarter of an hour's walk West of Zandoerle (figs 2 and 3) six large, regular tumuli formed the beginning of a considerable group, stretching along a line from East to West which ended just South of the hamlet of Halve Mijl. Altogether Panken counted over 36 barrows. [2] The first six barrows mentioned lay spread out over a distance of some five minutes' walk from East to West, the first two slightly from South-East to North-West. Their heights varied between 1 and 1.2 ells, [3] their circumferences between 40 and 50 ells. Around the second barrow 'a ring or shallow ditch' could be observed. Probably this barrow is identical with tumulus 2 (fig. 10) at Toterfout, excavated in March, 1950, a full report on which will be found below. In the fourth a farmer from Zandoerle had dug a central hole on October 11, 1845, from which he had recovered 'a lot of bones'. Panken found some remains of these, and dug a little further into the barrow. In some places much charcoal and ashes were met. The fifth mound, too, was largely dug through. A heap of bones with some charcoal was observed, ashes and charcoal being also in evidence elsewhere in the barrow. In three of the small mounds lying around this tumulus the farmer had found a medium-sized urn. [4] From a sense of piety he had replaced the pots, which were filled with bones and ashes, but afterwards some shepherds had dug them up once more for further study, and subsequently buried them again. It turned out that the urns had not stood up too well to these manipulations. Panken took the largest fragments home with him. He had several other small mounds 'attempted', but they yielded nothing but a sherd, some charcoal, and bones. Another farmer afterwards did some work on the first barrow of the group, [5] but found only some charcoal. Panken also heard that, some thirty years before, two large tumuli had here been levelled when part of the moors was made into pasture. One or two pots were said to have been found then.

Next, at about a quarter of an hour's walk East of the hamlet '*de Halve Mijl*', on the Oerle-Vessem road, seven regular barrows were found, the largest of which was 1.5 ells high and 43 ells in circumference. Like the former they lay 'fairly scattered, generally from East to West'. Only the two smallest, on the West side (height: 0.8 ells) were investigated. Both contained a large amount of charcoal and bone.


HALVE MUL – TOTERFOUT
GEM. VELDHOVEN · KAD. GEM. OERLE · SECTIE C · TUMULI 1-30
DE KLEINE HALVE MUL
de Groote Aard
Hallmijls Ven
TOTERFOUT
Horst- or
Donker Ven
Pastoise Weier
Bruggenrijt

Fig. 3

A few minutes further West Panken now came to a group of '19 handsome funeral mounds', three minutes South of 'de halve Mijl'. From East to West this cemetery extended over a distance of some two minutes' walk. Panken did not, apparently, bestow much time on this group — which is undoubtedly of great importance for our recent excavations — and confined himself to a few soundings. 'Forasmuch as here, also, my results in the barrows dug through were very unfavourable, I have not attempted them all'. [6] From his tabular summary — it is the only time that Panken gives his results in this form — we borrow the following. Where possible the number has been added by which the tumulus is designated on the plan of the cemetery (fig. 3), surveyed in 1948–50. Panken numbers from West to East.

Tumulus		Height	Circumference	Remarks
Panken	Fig. 3			
1	?	0.50 ells	28 ells	some charcoal
2	?	0.50	19	in the centre a heap of bones with some charcoal
3	?	0.35	12	some charcoal
4	26	0.70	25	some charcoal
5	25	0.40	17	charcoal and bones
6	24	0.30	13	charcoal
7	23	0.40	20	nothing (slightly dug)
8	22	1.00	32	nothing (completely dug)
9	21	0.80	35	charcoal and some bones 'Around this barrow is found a ring or shallow ditch'
10	?	—	—	practically level with the surface
11	?	—	—	practically level with the surface
12	?	0.75	35	some charcoal
13	?	1.00	38	not investigated
14	?	0.45	13	some charcoal
15	?	0.80	28	only slightly dug; nothing found
16	16	0.80	28	only slightly dug; nothing found
17	15	0.90	32	much charcoal
18	14	1.00	37	charcoal and ashes
19	13	0.60	30	not investigated

Between tumuli 1–9 and 10–19 there is a lower stretch of 100 paces in length.

A twentieth regular mound (fig. 3: 30) (height: 0.90, circumference: 32 ells), two minutes' walk West from the first and South of a fen, was not investigated.

* * *

On the occasion of a field trip in the Southern parts of the country, made at the instance of Professor Dr A. E. van Giffen, we visited, on February 3, 1948, several prehistorically important sites in the 'Eight Beatitudes'. The motive was a report by Mr G. Beex of Hoogeloon. After extensive explorations he had succeeded in locating several of the tumuli groups described by Panken. The chief of these was Panken's Group VIII, on the sandy road from Zandoerle to Vessem.

Between the hamlets of Toterfout and Halve Mijl the road runs along a sandy ridge, rising from 25 to 26 metres above NAP,* and with a general Westerly course. To the South this ridge falls away to a long depression in which there used to be several large fens, such as the Postelsche Weier, finding a partial outlet in a small brook, the Bruggenrijt, draining towards the North-East. It was on this ridge that Mr Beex had found the majority of the tumuli of group VIII recorded by Panken.

Much had changed here since the nineteenth day of October, 1845, when Panken cut his first sod. The fens had been completely drained by way of the deepened and canalized Bruggenrijt, and the low-lying areas, once teeming with every kind of wild life, both on land and water, had been transformed into an extensive tract of pasture land. Where on the higher ridge from Zandoerle to Halve Mijl heath had once predominated, nearly all waste land West of Toterfout — a hamlet not yet mentioned by Panken [2] — had been broken up, whilst the heath West of the Bruggenrijt had been afforested by the municipality of Veldhoven. Only South-West of Halve Mijl did the Knegsel Heath still stretch as far as the eye could see, at the time of our visit; but the reclamation scheme delayed by the war was about to be put into effect, and in the course of 1948 and 1949 plough and bulldozer made a flat expanse of arable land where the magnificent undulating heath had been.

It was at once clear that Mr Beex's notice had come at a crucial moment, no less than 18 of the 28 tumuli then identified being in immediate danger. As six more were subsequently discovered at the time of the excavations, 34 out of a total of some 38 tumuli recorded by Panken have been found again.

The danger was most imminent for the imposing, heather-covered tumulus 1, West of Toterfout and South of the road. This is almost certainly the first of the barrows mentioned by Panken. A year earlier Mr C. J. Bolck, a farmer living by the monument, had bought the site (municipality of Veldhoven, cadastral municipality of Oerle, section C, no 1864), which was then waste, from the municipality of Veldhoven, and ploughed it up. The new owner would be only too glad to see the tumulus go so that this plot, also, might be converted to arable

* Amsterdam Ordnance Datum (*Normaal Amsterdams Peil*).

A few minutes further West Panken now came to a group of '19 handsome funeral mounds', three minutes South of 'de halve Mijl'. From East to West this cemetery extended over a distance of some two minutes' walk. Panken did not, apparently, bestow much time on this group — which is undoubtedly of great importance for our recent excavations — and confined himself to a few soundings. 'Forasmuch as here, also, my results in the barrows dug through were very unfavourable, I have not attempted them all'. [6] From his tabular summary — it is the only time that Panken gives his results in this form — we borrow the following. Where possible the number has been added by which the tumulus is designated on the plan of the cemetery (fig. 3), surveyed in 1948–50. Panken numbers from West to East.

Tumulus		Height	Circumference	Remarks
Panken	Fig. 3			
1	?	0.50 ells	28 ells	some charcoal
2	?	0.50	19	in the centre a heap of bones with some charcoal
3	?	0.35	12	some charcoal
4	26	0.70	25	some charcoal
5	25	0.40	17	charcoal and bones
6	24	0.30	13	charcoal
7	23	0.40	20	nothing (slightly dug)
8	22	1.00	32	nothing (completely dug)
9	21	0.80	35	charcoal and some bones 'Around this barrow is found a ring or shallow ditch'
10	?	—	—	practically level with the surface
11	?	—	—	practically level with the surface
12	?	0.75	35	some charcoal
13	?	1.00	38	not investigated
14	?	0.45	13	some charcoal
15	?	0.80	28	only slightly dug; nothing found
16	16	0.80	28	only slightly dug; nothing found
17	15	0.90	32	much charcoal
18	14	1.00	37	charcoal and ashes
19	13	0.60	30	not investigated

Between tumuli 1–9 and 10–19 there is a lower stretch of 100 paces in length.

A twentieth regular mound (fig. 3: 30) (height: 0.90, circumference: 32 ells), two minutes' walk West from the first and South of a fen, was not investigated.

* * *

On the occasion of a field trip in the Southern parts of the country, made at the instance of Professor Dr A. E. van Giffen, we visited, on February 3, 1948, several prehistorically important sites in the 'Eight Beatitudes'. The motive was a report by Mr G. Beex of Hoogeloon. After extensive explorations he had succeeded in locating several of the tumuli groups described by Panken. The chief of these was Panken's Group VIII, on the sandy road from Zandoerle to Vessem.

Between the hamlets of Toterfout and Halve Mijl the road runs along a sandy ridge, rising from 25 to 26 metres above NAP,* and with a general Westerly course. To the South this ridge falls away to a long depression in which there used to be several large fens, such as the Postelsche Weier, finding a partial outlet in a small brook, the Bruggenrijt, draining towards the North-East. It was on this ridge that Mr Beex had found the majority of the tumuli of group VIII recorded by Panken.

Much had changed here since the nineteenth day of October, 1845, when Panken cut his first sod. The fens had been completely drained by way of the deepened and canalized Bruggenrijt, and the low-lying areas, once teeming with every kind of wild life, both on land and water, had been transformed into an extensive tract of pasture land. Where on the higher ridge from Zandoerle to Halve Mijl heath had once predominated, nearly all waste land West of Toterfout — a hamlet not yet mentioned by Panken [2] — had been broken up, whilst the heath West of the Bruggenrijt had been afforested by the municipality of Veldhoven. Only South-West of Halve Mijl did the Knegsel Heath still stretch as far as the eye could see, at the time of our visit; but the reclamation scheme delayed by the war was about to be put into effect, and in the course of 1948 and 1949 plough and bulldozer made a flat expanse of arable land where the magnificent undulating heath had been.

It was at once clear that Mr Beex's notice had come at a crucial moment, no less than 18 of the 28 tumuli then identified being in immediate danger. As six more were subsequently discovered at the time of the excavations, 34 out of a total of some 38 tumuli recorded by Panken have been found again.

The danger was most imminent for the imposing, heather-covered tumulus 1, West of Toterfout and South of the road. This is almost certainly the first of the barrows mentioned by Panken. A year earlier Mr C. J. Bolck, a farmer living by the monument, had bought the site (municipality of Veldhoven, cadastral municipality of Oerle, section C, no 1864), which was then waste, from the municipality of Veldhoven, and ploughed it up. The new owner would be only too glad to see the tumulus go so that this plot, also, might be converted to arable

* Amsterdam Ordnance Datum (*Normaal Amsterdams Peil*).

land. Neighbouring farmers used to dig sand regularly from its North side, facing the road, and this had resulted in the destruction of about a quarter of the mound. A long air raid shelter penetrating almost to the centre of the barrow from the West formed a second major disturbance.

The sections provided by the yawning hole on the North side exhibited a very fine structure. The mound proved to have been piled up from very clearly delineated inverted heather sods on a well-podsolized old surface such as is characteristic for Bronze Age and later tumuli in the Netherlands. In one place an accumulation of bright yellow sand was observed on the old ground level, evidently the upcast from a pit dug in the subsoil before the construction of the tumulus.

As the farmers were busily excavating their daily quota of sand, quick action was called for if the still remaining scientific data of this monumental barrow were to be recorded.

The meadow West of Mr Bolck's house was probably the site of the two large tumuli levelled some thirty years before Panken's visit of 1845, in the course of earlier moorland reclamation.

Along the North side of the road a narrow strip of unreclaimed ground (plot no 1302) stretched from tumulus 1 down to the Bruggenrijt. This had still remained municipal property. Covered with grass and heather this wild site was afterwards found to contain a ringditch urnfield. Later sand-drifts had, however, obliterated the former low mounds. In a piece of land (plot no 1551) belonging to Mr F. Das, a farmer of Zandoerle, which bordered the municipal plot on its North-West side, the original site of another tumulus (no 2) was shown by a patch of slightly lighter colour in the terrain. Mr Das could tell us that in the course of reclamation, some 25 years earlier, a large mound, some 1.20 metres high, had been levelled at this spot. Nothing at all remarkable, he said, had been found on that occasion. An evident ringditch had, however, been visible before the barrow was razed, and in his youth his playmates and he had been in the habit of playing in it. There is thus hardly room for doubt that this was the tumulus around which Panken observed 'a ring or shallow ditch'. Scraps of cremated bone could still be found on the surface.

South of the road, opposite tumulus 2, we found a small plot of moorland (no 1861), the property of the municipality of Veldhoven, grown over with small firs and oak scrub. A now disused cart track running across it from East to West had in course of time caused considerable damage to two low, heather-grown tumuli (nos 1^{A} and 1^{B}). In the South-West corner of the same plot lies the fine, regular tumulus 3, a small heather-grown round barrow.

Proceeding in the direction of Halve Mijl, across the Bruggenrijt, we come to the forest reserves of the municipality of Veldhoven, stretching on either

side of the road. On the plot North of the road, grown with American oak, three or four small tumuli had been levelled, according to woodsmen, in 1938 or 1939, in the course of afforestation. Apart from central cremations these had furnished several very brittle, coarse pots of gritty texture, found in the periphery. From the descriptions given we deduced that the pots might well have been 'Deverel' urns and this surmise was later to some extent confirmed by showing the men sherds of this pottery class. On account of the dense vegetation it is now impossible to locate the sites of these small tumuli. Probably these were the mounds in which farmers and shepherds of Zandoerle had tried their luck, a week before Panken's visit in 1845.

On a side-road, 260 metres North of the Zandoerle-Vessem road, Mr Beex had discovered the isolated tumulus 4 (plot no 1731), which had not apparently been noticed by Panken. On this barrow, popularly known as the '*Lambertsbergje*', the Corporation of Veldhoven had had an acacia planted in 1909, to commemorate the birth, in that year, of Her Majesty Queen Juliana. Unfortunately, the tree is being slowly hammered to death by woodpeckers. The low, flat mound is easily distinguished among the surrounding fir woods by being planted with beech, chestnut, birch and Douglas fir.

Further West to the left of the Vessem road lay a plot of woodland (no 1665), recently cut and grubbed, which until its fresh planting with oak and fir (autumn 1949) was used for growing grass seed for sports grounds. On this plot, forming part of a larger area West of Halve Mijl known as the '*Groote Aard*',[7] four sizable round barrows were found. Three of these, nos 5, 6 and 7, lie almost in one line, from East to West, the fourth, no 8, lying slightly aside to the South-West. Without doubt they mark the course of the prehistoric road that used to follow the Southern slope of the high ridge North of the fens. These barrows had been severely damaged several years before as a result of ploughing up the site for afforestation and they suffered further serious injury from Allied tank practice in 1944. The top of the largest tumulus, no 5, moreover, was conspicuous by a yawning hole made, we were told, by poachers, some 40 years ago, in digging out a couple of badgers. The walls of this hole once more showed the characteristic structure of inverted heather sods, though not quite so dark and clear as in tumulus 1. Near the denuded, wind-swept slope of tumulus 8 we had the good fortune to find a delicately worked Late Mesolithic artifact of grey, opaque flint (fig. 4). The four tumuli, which made a very unusual sight under grass, are doubtless identical with the first four of the seven regular tumuli described by Panken as lying a quarter of an hour's walk East of Halve Mijl.

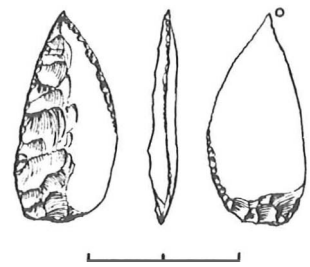


Fig. 4

In the autumn of 1949 the grass of the 'Groote Aard' was ploughed under with a view to re-afforestation and a large number of sherds of coarse, quartz-tempered pottery (fig. 41) were turned up North-East of tumulus 5. Evidently dating from pre-Urnfield times they can only derive from a settlement. Cremations were not found; the sherds probably did not belong to urns properly so called. Fire-cracked pebbles — some probably from hearths — also argued for a settlement. A few flakes of polished flint axes might point to a population of Neolithic tradition.

The ploughing up of the 'Groote Aard' further led to the discovery on 25 October 1949 of the completely levelled small tumulus 8A, situated some 50 metres North-North-West of no 7.

In the dense fir wood West of plot no 1665 on the 'Groote Aard' Mr Beex had found the fir-grown tumulus no 9 (plot no 1666), which had already been heavily damaged when the wood was being planted. It was situated some 150 metres North-West of tumulus 7. Some 240 metres South of tumulus 9 lay two small, low tumuli, nos 10 and 11 (plot no 1749), planted with fir trees, and equally damaged by the plough. The four large tumuli on the 'Groote Aard' and the three more Westerly barrows are doubtless identical with the seven regular mounds mentioned by Panken as lying a quarter of an hour East of the hamlet of Halve Mijl. Panken only tried the two smallest, on the West side (nos 10 and 11, on plot no 1749), and found large quantities of charcoal and bones in them. A fairly irregularly shaped hillock North of tumuli 10 and 11 was at first taken by Mr Beex for another, but proved on investigation to be natural.

Proceeding some 250 metres to the West-South-West we next reached the group of '19 handsome funeral mounds' found by Panken on the heath South of Halve Mijl. Eighteen of these were still in existence (tumuli 12–29). All but two of them were situated on a strip of moorland (plot no 1465) hemmed in between the arable land of Halve Mijl and the pasture land that was once the Postelsche Weier. To the South-West it ran into Knegsel Heath. Four of the tumuli, nos 13–16, lay East to West on the high North bank of the former Postelsche Weier. No 14 was a monumental barrow, about the size of nos 5–8 on the 'Groote Aard' (diameter: c. 15, height: c. 1 m), the other three — like the other barrows at Halve Mijl — belonged to the smaller type to which nos 10 and 11 must also have belonged (diameter: c. 9, height: c. 0.50 m).

North of a depression separating them from nos 13–16 we came first to tumulus 12, lying more or less by itself (plot no 1468), then, proceeding Westwards, to a group of four, nos 17–20. Further West again and in one line with nos 17 and 19, we found nos 21 and 22, two fairly large barrows. Round no 21 a ringditch was clearly visible, the more so as it was grown over with withered

yellow grass, showing up sharply against the dark heather. This must be the barrow numbered 9 by Panken around which 'a ring or shallow ditch' was visible.

Further West, finally, we located tumuli 23–29, scattered about without any observable pattern. They were all low mounds, often hardly recognizable as such owing to the grasses that had sprung up among the heather — a process of moorland degeneration to be observed throughout the country.

Some 300 metres South-West of tumulus 28 we found our last barrow, no 30, situated quite picturesquely on the raised South bank of the Horst- or Donker Ven. [8]

* * *

The tumuli South of Halve Mijl had suffered many further onslaughts since Panken dug about in them on October 19, 1845. One of the mounds, no 22, had been almost entirely flattened shortly before its rediscovery by Mr Beex; one half of another, no 20 (on plots nos 1165 and 1465), had been put under cultivation a considerable time ago, the remaining Southern half being used as a greenstuff silo. No 26, also on a boundary between two cadastral plots (nos 1465 and 1168), was cut across by a deep trench, whilst during the war the impressive tumulus no 14, so we were told, had — by way of secondary central interment — welcomed a cow to its last resting-place. Nos 17 and 19 afterwards turned out to have become much lower on the West side as a result of sod cutting in modern times.

The most serious threat of all, however, lay in the fact that, a week earlier, a part of plot no 1465 had been sold to Mr C. Sanders, a farmer of Halve Mijl, by the municipality of Veldhoven. In the course of 1948 Mr Sanders intended to put this land under cultivation. On it lay ten tumuli, nos 13–22, whilst nos 23–30, or no less than eight, were affected by the reclamation scheme for the Knegsel Heath, to be carried out in 1949. The only tumulus not in danger at the time was no 12. This was situated on a strip of ground (plot no 1468) belonging to Mrs H. van der Vondervoort of Halve Mijl, planted with firs. The strip in question forms part of the '*voorpoting*' or screening plantation of the hamlet of Halve Mijl: a narrow zone planted with trees such as had been laid out around moorland reclamations since Medieval times, a practice encouraged by the authorities. The destroyed North half of no 20 was situated in a part of this '*voorpoting*' that had been brought under cultivation, farther to the West (plot no 1165, belonging to Mr C. Sanders), and on the next plot, still farther West (plot no 1166, the property of Mrs H. van der Vondervoort) a fairly large tumulus (no 22^{A}) is said to have been levelled when part of the 'voorpoting' was first broken up. Counting this lost monument in we arrive at a total of 19 tumuli for Halve Mijl, in accordance with the figure given by Panken.

In view of the imminent reclamations it was impossible to wait much longer. Thanks to the kind co-operation of the new owner, Mr Sanders, and the invaluable support given by the Burgomaster of Veldhoven, Mr A. J. van Hooff, a systematic excavation of the most seriously endangered monuments could be undertaken at short notice, whilst a provisional excavation had already been carried out, a few weeks earlier, in the permanently threatened tumulus 1 near Toterfout. Through the intercession of Mr van Hooff it proved possible, eventually, for the uncommonly fine tumuli nos 13–16 to be bought back from Mr Sanders by the municipality of Veldhoven, and to be preserved on a rectangular plot of moorland. Situated on the high shore of the former Postelsche Weier they now provide a last melancholy memento to the attractive Brabant scenery of earlier days. It must be said, though, in extenuation, that the rest of the site had to a great extent lost its original character on account of the strong intrusion of grasses among the heather, which often made it impossible to recognize as such many of the smaller tumuli, even from a short distance. None the less we were sadly moved by the doom of the isolated tumulus, no 30, West of the cemetery proper, by the picturesque Donker Ven. At the time of writing it is no more than a patch of sandy arable.

---

[1] Panken I, p. 565, II, p. 259.

[2] Panken II, pp. 259–62; Hermans, *NO*, 1865, pp. 85–6. The name *Toterfout* or *Totefout* (= at the ford?) does not yet occur in Panken and Hermans as the present hamlet originated later.

[3] It is not known with certainty what measure is represented by Panken's ells: it is thought possible that they stand for metres.

[4] Perhaps these might be the low mounds of urn burials surrounded by a ringditch (Iron Age).

[5] Probably our tumulus 1. Cf. fig. 3: 1.

[6] Panken II, p. 261. And Hermans (*NO*, 1865, p. 85) summarizes: 'It has not been vouchsafed this zealous antiquary to wrest a complete urn from oblivion'. From the extent of the recent disturbances observed by us during the 1948–50 excavations we may also conclude that Panken, on 19. X. 1845, made only a very cursory examination in most cases.

[7] The cadastral map assigns the name '*Groote Aard*' to a large site East of Halve Mijl, comprising also, for instance, plots 1749 and 1666, so that tumuli 9, 10 and 11 are actually also situated on the 'Groote Aard'. For ease of reference the name is henceforward applied exclusively to plot 1665 with tumuli 5–8[A].

[8] Two small tumuli lying a few hundred metres farther W in the direction of Vessem (see fig. 2) were not noticed by Panken. They were discovered by Mr Beex in 1951 in a 'voorpoting', and have so far remained unexcavated.

THE EXCAVATIONS

The barrow cemetery stretching over more than 2 kilometres between Toterfout and Halve Mijl was investigated in the years 1948–51. The excavations took place in seven successive campaigns, viz.:

(1) 9–14 February	1948: tumulus 1.
(2) 30 March–24 April	1948: tumuli 1 (peripheral parts), 17, 18, 19, 20, 21, 22, 23 and 26.
(3) 2–5 May	1949: tumuli 24, 25, 27, 28, 29 and 30.
(4) 26–7 October and 15–6 November	1949: tumulus 8^{A}.
(5) 3–4 March	1950: tumulus 2.
(6) 4 September–11 November	1950: tumuli 1^{A}, 1^{B}, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, part of a ringditch urnfield and a disturbed settlement (trial trench).
(7) 27–8 August	1951: tumulus 22^{A}.

The first four, especially nos 1, 3 and 4, were emergency excavations, where quick action was called for to record the structural data of immediately threatened monuments. For the sixth and largest campaign we could ourselves fix the date. It was a great stroke of fortune that the latter was to include in a carefully prepared excavation the finest and most important of all these barrows.

In this way the emergency excavations of some endangered tumuli in the municipality of Veldhoven, in 1948 and 1949, led to an investigation as far as possible complete, of one of the largest barrow cemeteries in Brabant. Thirty four tumuli and a ringditch urnfield were systematically excavated. Together with the tumuli mentioned by Panken that had already disappeared, the barrow cemetery of Toterfout-Halve Mijl must thus have comprised an original total of more than 43 barrows.

* * *

Method. The barrows were excavated by the so-called *quadrant method*,[1] first applied by Van Giffen, in 1916, when investigating a tumulus of the large barrow cemetery on the 'Noordsche Veld' near Zeijen, municipality of Vries, Province of Drente.[2] Of the three methods developed by Van Giffen for the

excavation of grave mounds the quadrant method (fig. 5) in particular has met with general acceptance as, more than any others, it offers the possibility of carefully observing and recording the various structural phenomena in both the horizontal and the vertical plane. Over the so-called *sector method*,[3] which offers better possibilities for the study of the stratigraphical position of secondary graves at the periphery of the barrow, etc., the quadrant method has the advantage of being less time-consuming and less costly — important factors in emergency excavations.

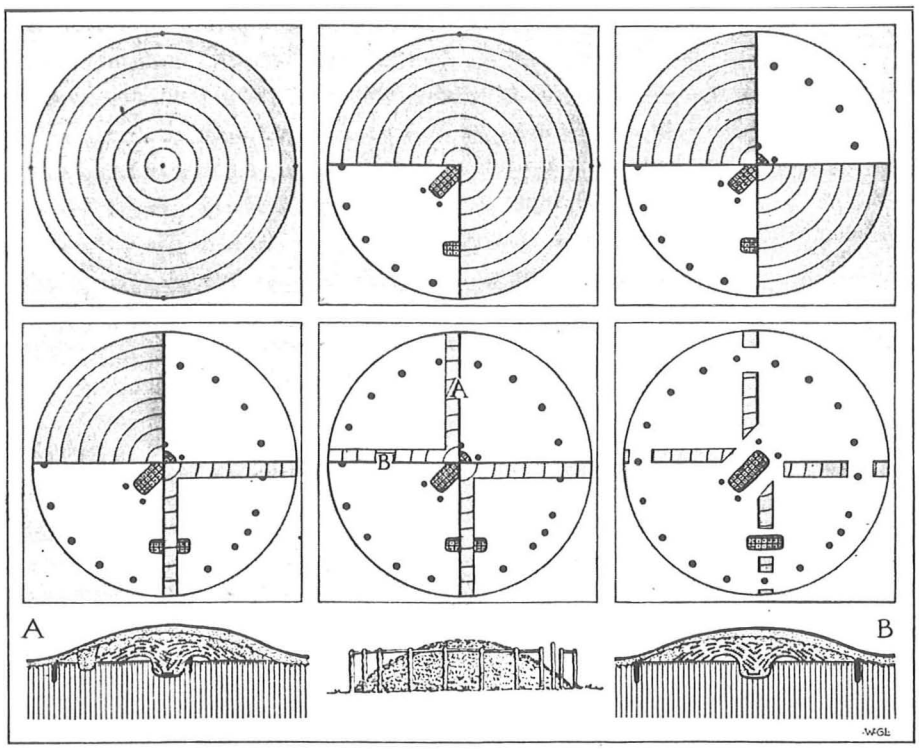


Fig. 5

When the apparent centre of the barrow has been fixed, the position of the crossbaulks, from N to S and from E to W, is determined by means of a compass. The SW quadrant is then excavated in which, on account of the slight NE displacement of the mound due to the prevailing S to SW winds, the true centre of the barrow is usually found. This means that, normally, all or part of the primary, central interment will also lie in this quadrant. At the same time with or after this quadrant the NE quadrant is also excavated, then the NW and SE quadrants, the latter two minus the N–S and E–W crossbaulks. These are not levelled until after the N–S (= N–centre + centre–S) and E–W (= E–centre +

centre–W) sections have been drawn. They may then be levelled partially in order to obtain a reasonably complete ground plan.

Wherever possible the Toterfout-Halve Mijl tumuli were excavated by the quadrant method in its orthodox form. For damaged tumuli like nos 1, 1[B], 20, 28 and 29 it had to be modified to suit the circumstances, as was also the case for nos 1[A], 2 and 22, which had been largely or entirely destroyed. No 4, the '*Lambertsbergje*', could only be investigated by means of two radial trial trenches and a central pit. Tumulus 12 was only partially excavated, as it was not possible to obtain permission to cut all the firs growing on it.

* * *

After the early campaigns of 1948 it became clear that we had to deal with a barrow group of great importance structurally, which might yield new data concerning the several barrow types in North Brabant, where only a comparatively small number of these monuments had so far been systematically excavated. The Toterfout-Halve Mijl cemetery afforded an opportunity to excavate as fully as possible a large group of barrows in the Southern part of the country and to study the correlations of a considerable number of these monuments. Structurally the group in question proved to be pre-eminently suitable for this purpose: by their peripheral structures — the most characteristic features — the tumuli can be divided into seven different types. As eight or nine of the 34 barrows excavated were two-period monuments (nos 5, 8, 8[A] (?), 11, 16, 17, 19, 22[A] and 26), each of the structural phases enclosed by its own peripheral construction, and as one barrow (no 22) even showed three or four similarly appointed periods, a total of 44 or 45 peripheral structures was recorded. By far the most numerous of these are the timber circles, no less than 33 or 34 examples of which were encountered, in 23 tumuli, viz.:

Single widely spaced postcircles, in nos 3, 5 (periods 1 and 2, one each), 6, 7, 8 (period 1), 11 (periods 1 and 2, one each), 14, 15, 16 (period 1), making a total of 11.

Single closely spaced postcircle, in no 12.

Double closely spaced postcircles, in nos 8 (period 2, and surrounded by a single circle of close-set stakes), 8[A] (period 1, and possibly 2?), 19 (one each for periods 1 and 2), 22 (one each for periods 1 and 2?), 22[A], 23, 24, 25, 26 (period 2), 27, 28, making a total from 10 to 13.

Triple closely spaced postcircles, in nos 8[A] (period 2?), 17 (one each for periods 1 and 2), 18, 22 (period 2 or 3), 26 (period 1), 30, making a total of 6.

Single circles of close-set stakes, in nos 10 and 16 (period 2), to which might be added a small temporary circle of slender close-set stakes in tumulus 8 (period 1). An external stakecircle occurred as an additional element to the double closely spaced postcircle in tumulus 8 (period 2).

The other types of peripheral construction are the following:

Ringditches with internal bank, in nos 1, 1[B] and 9, making a total of 3. Perhaps no 2, with ringditch, originally also had an internal bank.

Ringditches, in nos 1[A], 2, 4, 13, 20, 21, 22 (period 3 or 4) and 29, making a total of 8, though the 10 smaller ringditches of the urnfield could also be placed in this category.

That the five types of timber circles here enumerated are specially characteristic for the Bronze Age in the Netherlands is a fact that has been proved by Van Giffen's numerous excavations. [4]

Important for the burial ritual was the discovery of a number of temporary constructions that served for some time to protect the interment, but were pulled down when the construction of the actual tumulus was begun. The majority of these showed as a set of four stakeholes placed in a rectangle. This was the case in tumuli 1[B] (?), 5, 8, 10 (?), 11, 14, 15, 19 and 21. [5] In a few cases (tumuli 8[A], 16 and 22) we found a number of stakeholes arranged around the grave in an irregular pattern. A small single circle of closely spaced stakeholes surrounding the temporary mortuary house in tumulus 8, and pulled out before the mound was erected — a temporary precursor, therefore, of the definitive single widely spaced circle of posts at the edge of the barrow — is an important new feature which strongly emphasizes the magical character of the postcircle. The remains of funeral repasts (*e.g.* in tumuli 5 and 8), 'ritual pits' (very clear in tumulus 1), cremations deposited in postholes (in tumuli 8[A] and 11), entrances in timber circles, generally with entrance blocking (very clear in tumuli 3, 5, 8, 11, 14, 16, 17 and 19) are further evidence of the burial ritual and of the beliefs concerned.

The primary, central interments beneath the barrows were mostly cremated burials mixed with charcoal and ashes, the remains of the pyre. They were deposited in shallow pits or at the old ground level. The cremated bones were only occasionally placed in a trunk coffin, and then, remarkably enough, the interment was always a secondary, a pit having been dug into an existing mound (tumuli 1 and 1[B]). Secondary interments at the edge of the barrow were in any case very rare (only in nos 1, 1[B], 5, 7 (?) and 26 (?)), while those at the centre of the barrows showing more than one phase of construction had usually been destroyed by recent disturbances. In one case an oblong primary grave pit was found, containing a trunk coffin without any cremation (tumulus 3). In the absence of these a corpse silhouette might have been expected, but this was not found, either here or in the small coffin in the edge of tumulus 7, which must have been intended for a child. In both cases we must presume that an uncremated body was interred. In a number of instances no interment of any sort

could be found at the centre of the barrow: possibly these mounds were piled up over an uncremated body at surface level (*e.g.* nos 6, 7, 11 and 13) which went unnoticed at the time of excavation. Where large central disturbances occurred the interments may, of course, well have been destroyed. [6]

Finds other than cremations [7] and charcoal were scanty. Only twice in a primary burial had a piece of pottery been allowed to accompany the dead (tumuli 9 and 10); once a small vessel had been placed among the sods when the mound was being piled up (tumulus 16). Of great interest are the remains of two bone ornaments, found among the cremated bone in the primary grave of tumulus 5. In no 1[B] the primary interment consisted of a fine cremation-filled cordoned cinerary urn, with cord-impressed decoration between rim and cordon, while four cremation-filled 'Deverel' urns — one of them containing an arrow-straightener — had been deposited in the slope of its bank as secondary interments. Remains of a similar secondary cinerary urn came to light in tumulus 1. In the ringditch urnfield the finds were equally scanty: only a very little pottery was found. Among these was a vessel with finger-tip decoration all over the outside and on the lip. A number of nondescript sherds from the floor of some of the tumuli or from the mounds themselves, and the pottery from the settlement, make up the total.

The scarcity of finds, which is a general feature of Bronze Age tumuli in the Netherlands, [8] is once again demonstrated. If the Toterfout-Halve Mijl cemetery had suffered reclamation without a preceding systematic excavation, the best that could have been hoped for would have been the acquisition by some museum of a single, and probably damaged pottery specimen to represent the site. Such a specimen could not have raised a suspicion of the structural richness or the varied burial ritual.

The almost total lack of datable objects forces the archaeologist to find other ways of attaining a relative, and if possible an absolute, dating of the phenomena observed. Comparison with analogous barrow structures elsewhere, where archaeological or stratigraphical dating has in a number of cases been possible, as well as the investigation of the typological development of the several barrow types, are obvious means towards this end.

No less important, however, is the careful study of the old natural surface under barrows, which is closely bound up with the development of climate and flora. Except in those rare cases where a barrow rests on old arable, [9] and the natural surface has been disturbed by the activities of man (tumuli 12 and 18), the floor of a barrow can afford valuable data concerning the environment of prehistoric man. That in the majority of cases barrows were built on a natural old surface had already been noticed in the last century, and German and Danish biologists and archaeologists have turned their attention to these phenomena.

Independently of their investigations Van Giffen took up this problem in many barrow excavations carried out by him, since 1919, both in the Netherlands and elsewhere. [10] In a number of cases archaeological evidence could thus lead to a dating of these fossil surface structures. It appeared that Neolithic monuments, such as Passage Grave mounds, and tumuli of the Corded Beaker culture, normally consist of fairly pure yellow sand, and generally lie on an at most faintly podsolized surface. Bronze Age and Iron Age barrows, on the other hand, are characterized by a clear structure of sods in the mound, and a more or less clearly defined podsol tricolour below it. The latter, when complete, consists of a dark humus band, a greyish-white layer of leached sand, and a — usually secondary — iron pan formation between soil and subsoil. Some of these features may be lacking on account of special circumstances — at an early stage, iron pan precipitation need not to be developed, the humus band may have been removed by sod cutting, etc. — but the formation can be generally observed to appear by the beginning of the Bronze Age, and to continue thereafter. The wide moorlands, as distinct from isolated heather vegetation, must therefore be a post-Neolithic formation. Tumuli dating from the Aeneolithic period, *e.g.* barrows of the Bell Beaker culture, sometimes show fairly clear surface structures at the base, but no complete podsol band, while the mound may show an indistinct sod structure. Van Giffen deduced from these facts that in the Netherlands the heather podsol formation puts in an appearance in the Aeneolithic period, roughly about 1600 B.C., and develops fairly quickly in period II of the Bronze Age, c. 1400 B.C. Van Giffen is of the opinion that this change is closely bound up with the transition from the Atlantic to the Sub-boreal climatic phase.

Palynological analysis of the humus layer of the old natural surface offers unparalleled opportunities for ascertaining the floral environment of the barrow builders. Their interference with their natural surroundings is demonstrated by the occurrence of weeds (*plantago*, *rumex*) directly related to the type of '*landnam*' and by the pollen of the cereals they cultivated. The fluctuations of these cultivation-attending plants, as well as the gradual encroachments of the moors, also give valuable help in drawing up a relative chronology through scientific analysis. [11] Recently, new and wide perspectives have been opened for absolute chronology by Professor W. F. Libby, of Chicago, who has developed a method based on the amount of radioactive carbon (^{14}C) present in organic matter. This illustrates the importance of carefully collected and preserved samples of charcoal. [12]

Before taking up the question of the chronology of, and the relations between, the various observed phenomena, as well as the other problems touched upon, we propose first to undertake the description of the individual monuments of which the barrow cemetery is composed.

For this purpose some phenomena of regular recurrence in the descriptions may here be described.

The subsoil directly underlying the generally podsolized old ground surface on which the tumuli have been piled up, nearly always consists of more or less heavily mottled yellowish sand, indicating an oak scrub vegetation at some time before the moors encroached on the site. [13] That the natural, podsolized floor of the tumuli in a number of cases has since come to lie slightly above the level of the surrounding terrain must be the result of sod cutting. Some were needed to build the barrows, and many must since have been cut. Panken, at least, tells us that in his day the farmers were still in the habit of

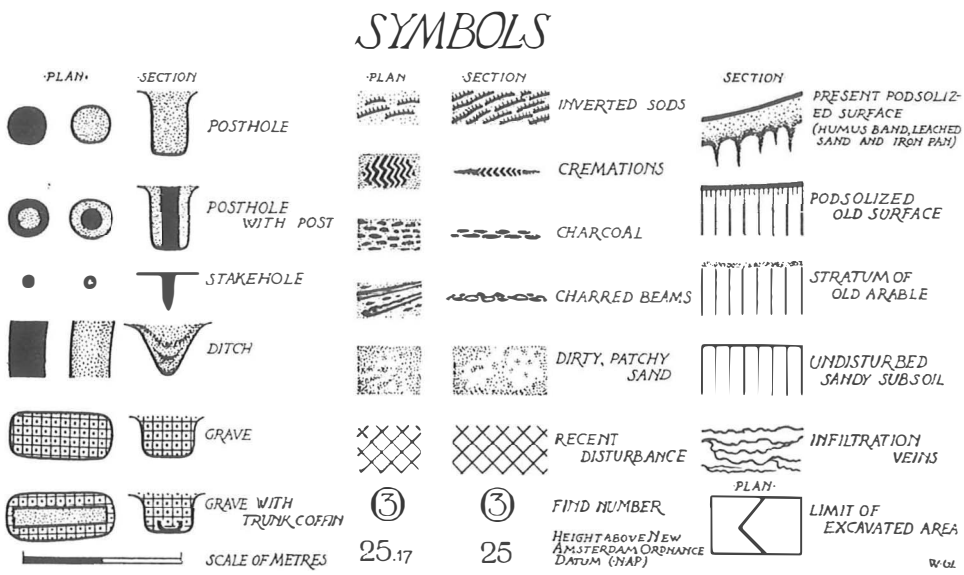


Fig. 6

cutting them. As a result the podsol bands running over a number of the more Westerly tumuli had been removed. It stands to reason that such sod cutting must in several cases have resulted in considerable deformation and flattening of barrows. [14]

While the material of which the barrow consists — sand and sods — has not yet set, percolating rain water will cause dark infiltrations (humic precipitates) to form, showing as freakish veins in the body of the mound. The first of these settle on the humus layer of the old ground level, or just below it, in the leaching layer. Then they begin to settle at ever higher levels until the formation of a new podsol over the barrow shall have been completed. Barrows piled up from sand (as nos 4 and 18) or from sods with a low humus content (as nos 5, 6 and 7) show this phenomenon very clearly, as is also the case in the outer slope of some sod-piled barrows that have been smoothed over with sand. Secondary precipitation of iron pan nearly always occurs in postholes and ringditches at the present edge of the barrow, where the iron pan of the podsol covering the mound dips down into the subsoil and often makes it difficult properly to read the soil at the periphery of the barrow. Secondary iron pan precipitation may cause postholes to show as dark brown

spots in the yellowish subsoil; their circumference has in that case been considerably enlarged, and the iron pan may have precipitated right down to the bottom of the post-hole, and even below it (Pl. XIV). At the periphery of the barrow, especially, percolating water may cause secondary iron pan precipitation under the leaching layer of the old surface.

Most tumuli show a thick accumulation of drift sand on the N and E sides. This can easily be distinguished in the sections and often shows one or more intermediate vegetation bands where the *status quo* had lasted long enough for the vegetation to cover the new formation. The fact that these accumulations usually take place at, roughly, the NE side reflects the prevalence since the barrow was constructed of S to SW winds, causing the wind-blown sand to settle on the lee side.

The symbols used to indicate the several structural phenomena on the excavation plans and sections here reproduced are explained in fig. 6.[15] Heights have always been converted to New Amsterdam Ordnance Datum (NAP).

---

[1] *Bauart*, 1930, p. 7.

[2] *NDV* 1918, pp. 151, 156.

[3] *Bauart*, 1930, p. 8. The sector method was first applied by Van Giffen in 1922 (not 1921) at the excavation of the Harenermolen tumulus (see Part II, postcircle type 3, Groningen, no 1).

[4] See Part II, p. 16 *sqq.* for a comprehensive discussion of the Bronze Age timber circles excavated so far in the Netherlands. The chronology will also be fully dealt with there.

[5] The large postholes within the postcircle of tumulus 27, also, may have formed part of a mortuary house.

[6] Remarkably enough Panken recorded charcoal and cremations from the Westernmost barrows. In all these cases there were probably cremation burials at ground level, excavated by Panken on October 19, 1845. In nearly all cases not a trace of these interments was found by us.

[7] The cremations were submitted to Dr C. Krumbein of Nordhorn, Grafschaft Bentheim, Germany. A summary of his examination will be found on pp. 126–8.

[8] L. J. F. Janssen (*NB* IV, 1844, pp. 86–7), at the end of the discussion of his excavations on the Uddel lake, Province of Gelderland, already lamented: 'Such were the results yielded by the excavations, among whose most peculiar characteristics is perhaps the great paucity of objects of skill; among the barrows particularly this, that the cremated bones were not contained in an urn'. And C. Dens, speaking of the barrows in the Limburg Campine, in Belgium (*Ann. SAB* XI, 1897, p. 249): 'La tombelle campinoise ne possède pour ainsi dire pas de mobilier funéraire: ainsi la grande tombe de l'*Ecksenberg*, citée plus haut (= p. 244), et qui, sans nul doute, avait été élevée à un personnage important, ne contenait aucun objet'. See also L. Stroobant, *Ann. ARAB* LIV, 5e Série, Tome IV, 1902, p. 376, and Part II, p. 188, note 65.

[9] Presumably connected with the rows of stakeholes beneath tumuli 14, 20 and 21, probably representing the remains of game fences protecting the agricultural land.

[10] See in particular his summary *De tijd van vorming van heidepodsolprofielen aan de hand van archaeologische waarnemingen*, in *Besprekingen over het Heidepodsolprofiel, gehouden op de bijeenkomst der Sectie Nederland van de Internationale Bodemkundige Vereeniging te Utrecht op 18 en 19 April 1941*, pp. 12–23.

[11] The palynological analysis of our cemetery, carried out by Mr H. Tj. Waterbolk, biol. drs, assisted by his wife, Mrs W. Van Rooijen Waterbolk, gave very important results; see pp. 105–22.

[12] Some of our charcoal samples were analysed by Professor Dr Hl. de Vries, of Groningen; cf. pp. 129–30.

[13] For the rest, it is remarkable that the silting of ringditches is sometimes also mottled, indicating that a temporary forest vegetation had been present on the barrow at some later time. This phenomenon was specially marked in the ringditches of tumuli 1^{B}, 21, 22, 22^{A} and 29, and of that at Knegsel (see p. 121, note 14, and Part II, pp. 58–61).

[14] For instance tumuli 17, 18 and 22.

[15] The term '*sods*' has been preferred to '*turves*', their origin being at least as often heather as turf.

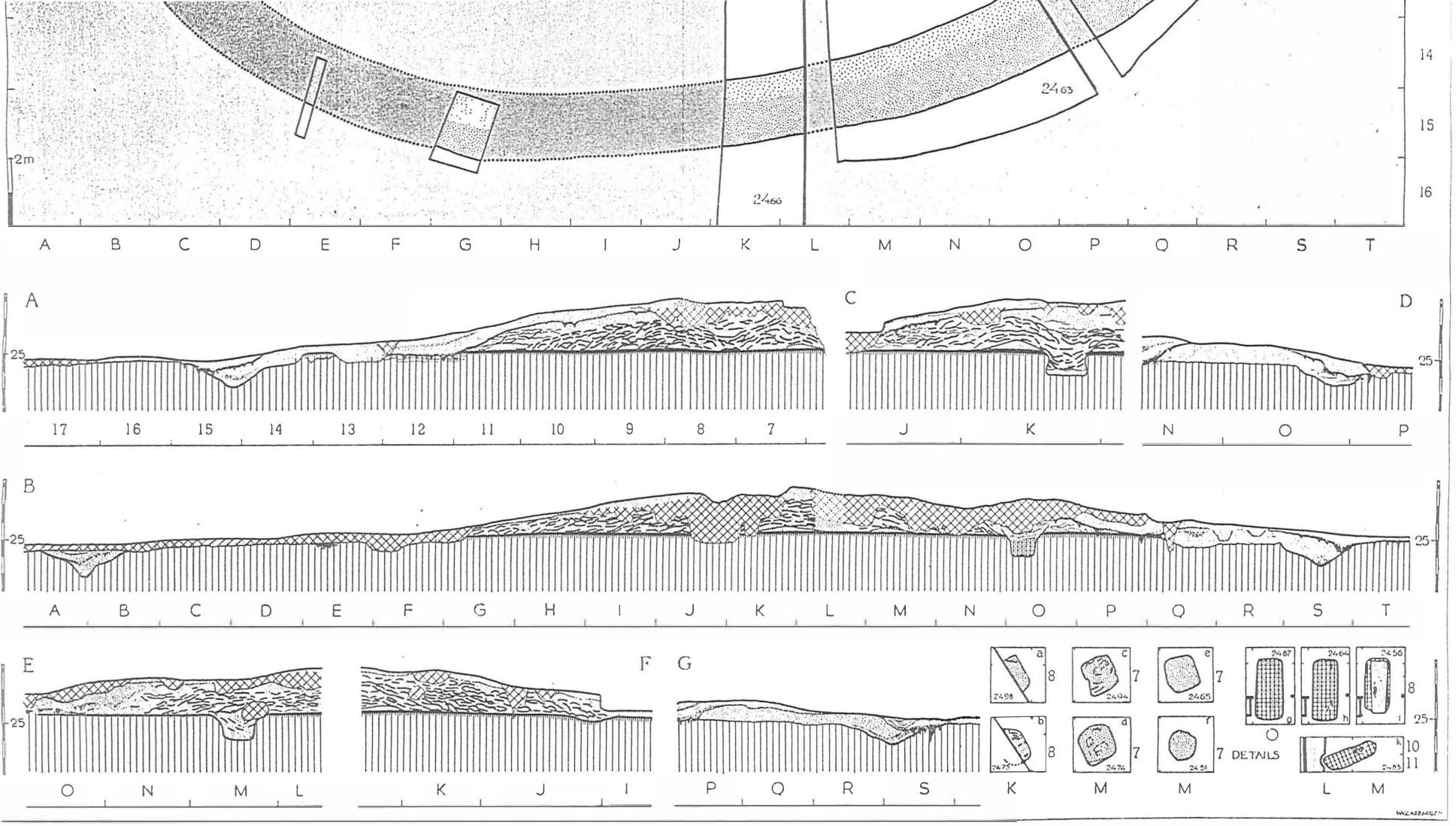
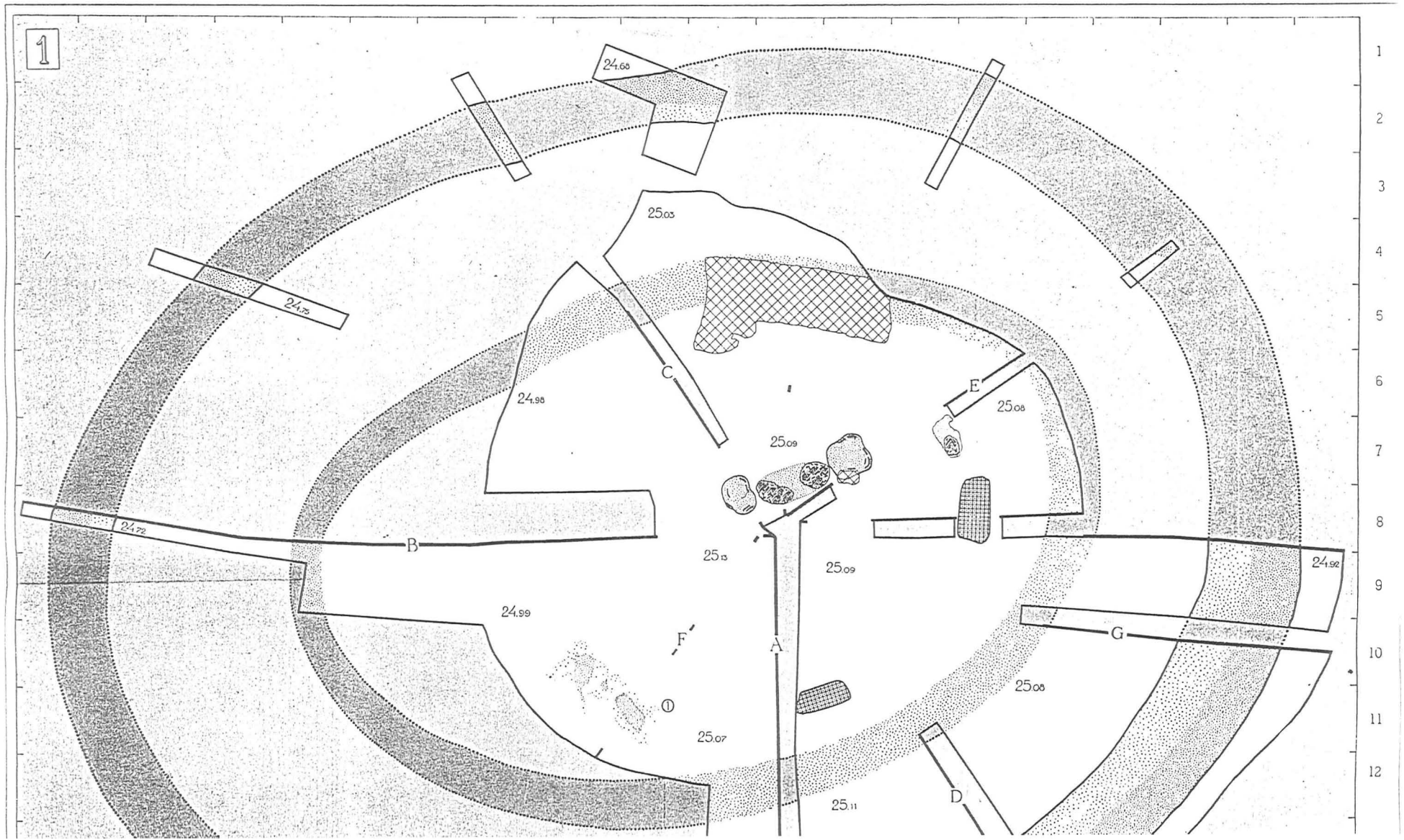

2m
2463
2466
14
15
16
A B C D E F G H I J K L M N O P Q R S T
A
25
17 16 15 14 13 12 11 10 9 8 7
C
J K
D
25
N O P
B
25
A B C D E F G H I J K L M N O P Q R S T
25
E
O N M L
F
K J I
G
P Q R S
a
2498
8
b
2478
8
c
2494
7
d
2474
7
e
2465
7
f
2451
7
K
M
M
2487
2464
2456
g
h
i
8
25
O
DETAILS
k
2483
10
11
L M

Fig. 7


1
24.65
24.75
25.03
C
24.98
E
25.08
25.09
24.72
B
25.13
25.09
24.92
24.99
F
A
G
①
25.08
25.07
25.11
D
1
2
3
4
5
6
7
8
9
10
11
12

THE BARROWS

TUMULUS I

with bank and ditch

Tumulus 1 (fig. 7, Pl. II–IV, Pl. XII: 2, 1*a*) was oval in shape, with a height of 1.46 metres (top: 26.73, floor: 25.27+). Along its longitudinal axis, directed WSW and ENE, it measured some 22 metres, the shorter axis measuring some 15 metres. Situated high on the Southern slope of the sandy ridge that must have carried a road since time immemorial, it made a most impressive sight.

The heavy damage to its Northern side, mentioned earlier, in the description of the site, made it impossible to obtain a complete N–S section. In excavating this barrow by the quadrant method intermediate crossbaulks (sections C, E and F) were accordingly left standing in the NW, NE and SW quadrants, in addition to the normal N–S and E–W crossbaulks (sections A and B). After having been drawn, these intermediate baulks were removed as quickly as possible, in order to obtain a better idea of the ground plan. As it turned out, these sections had been very felicitously chosen.

After the vegetation had been cleared and the quadrants excavated it soon became clear that the extant part of the monument had been damaged much less severely by recent disturbances than had been feared.[1] It is readily seen from the sections drawn that only the E–W section (section B) had suffered considerable disturbance. As parts of this disturbance had since been covered again by a leaching layer the damage must have been done a fairly long time ago. In the other sections some inconsiderable damage had been caused by digging or the burrowing of rabbits. A number of pits dug by children were found to be only superficial and to have done little more than disfigure the barrow's outward appearance before excavation.

The large, recent disturbance on the N side locally reached down into the virgin soil. Several of the recent pits, which cannot have touched anything of importance, even though going into the virgin soil, have not been marked on the ground plan reproduced, as they could only impair its clarity.

In the sections the texture of inverted heather sods was clearly visible and sharply defined, above a well-preserved and clearly podsolized old ground level (Pl. II: 1, Pl. III, Pl. IV: 1). In the mound numerous infiltration veins could be observed, a very distinct specimen lying just in the leaching layer of the old surface. The old surface itself had a well-developed humus layer (thickness: 0.05–0.10) and leaching layer (thickness: 0.10); on the SW side slight secondary iron pan formation was observed under the leaching layer (section F). The virgin soil consisted of bright yellow to orange mottled soil, pointing to scrub vegetation at some time before the construction of the barrow.

In the sections, especially on the S side, it can be seen that after the core of the barrow had been built from sods, the periphery had been smoothed over with brownish-yellow sand. Many clear infiltration bands showed up in this sand. In the sections on the N and E sides a secondary accretion of wind-blown sand could be seen on the barrow slope (section A, squares 11/12, section B, squares O/P). This must be the result of prevailing S–SW winds after the construction of the barrow.

Together, the bright yellow to orange mottled subsoil, the whitish-grey leaching layer, the dark humus band of the old surface, and the variegated sod structure of the mound itself, with its freakish infiltration veins, formed a remarkable and attractive colour contrast.

In the centre of the barrow, at the old surface level, a large oval patch of charcoal was discovered, its long axis running ENE and WSW (length: 2.28, width: 1.00, at 25.29+, squares L/M–7/8, section A, squares 7/8). In it were found two heaps of cremated bone (nos *1a* and *1b*). Among the cremated bone (no *1a*) Dr Krumbein discovered two fragments of a burnt bone pin (Pl. XII: 2, *1a*), roughly circular in section (diameter: 0.002–0.003, length: 0.017 and 0.015 respectively). Immediately ENE and WSW of this interment were two pits showing as dark discolorations in the virgin soil (Pl. IV: 1). The ENE one was roughly square, with curved corners, the other irregularly oval. Both had been filled with sods and sand. The WSW pit (length: 1.10, width: 0.85, depth: 0.74, from 25.27–24.53+) can be seen in the section (section C, square K, Pl. III: 1–2, Pl. IV: 2). The sequence of events is clear. First the pit was dug and the soil thrown out on the surrounding surface. This circle of yellow soil on the old surface around the pit showed as a plano-convex yellow lenticle in the section (section A, squares 6/7 and 8/9, section B, squares K/L, section C, square K). On the N and NW sides (section A, squares 6/7, section B, squares K/L, section C, square K) the yellow lenticle did not rest immediately on the old surface, but on a thin greyish sand layer (thickness: c. 0.04) immediately above it. Possibly this grey sand was carried there by the wind, and could not be observed anywhere but under the yellow upcast from the pits, as normally it merged imperceptibly into the dark soil of the sods. Some of the yellow soil had slipped back into the pit, so that a layer of made soil, still a bright yellow (thickness: c 0.15), settled at its floor. During the construction of the barrow the pit was then filled in with sods and sand. In the section (section C, square K) this is clearly observable from the position of the sods thrown into the pit. As the Western half of the WSW pit had to be sacrificed in order to study the complete section, intermediate levels could only be prepared in the Eastern half, at 24.98, 24.73, and 24.58+ respectively; these gave a slightly more angular shape for the pit than could be observed at surface level (25.13+). The floor was at 24.53+. It was clear that the sides of the pit had been trimmed by the spade, and marked undercutting had taken place towards the bottom. It is out of the question that the pit should have lain open for any length of time: in that case its sides would have shown much stronger weathering.

The ENE pit, at c. 25.27+, roughly square with slightly incurving sides and rounded corners (length: 1.15, width: 1.06, depth: 0.78, from 25.27–24.49+), was excavated in planes, successive horizontal levels being prepared at 24.94, 24.74, 24.65 and 24.51+, until its disappearance at 24.49+. At the first three intermediate levels its outline remained roughly square, and at the first two the sods with which, like the WSW pit already described, it had been filled in, could clearly be seen. At the last level drawn its outline had become irregularly circular. At the third and fourth levels no more sods were observed: clearly part of the excavated soil had slipped back also into this pit. From the horizontal sections the vertical section was then reconstructed (section E, square M). It was the lenticle of yellow sand excavated from this pit (section B, square M) that had first been observed by us in the North face on the occasion of our first survey on 3 February 1948.

The assumption seems reasonable that the two pits here described must be directly connected with the large central cremation as both it and the two pits must have been covered with sods at the same time, when the barrow was piled up. They cannot have been graves, as in that case traces of an interment would certainly have been visible. That both pits must have served some function in the ritual observed at the burial would seem a necessary conclusion.

In the edge of the barrow several secondary interments were found, viz.:

(1) An irregular hole NE of the second pit (length: c. 1.20, width: c. 0.70) containing at its Southern end a cremation (no *1c*, length: 0.60, width: 0.42, at 25.12+, depth: down to 25.01+). The interment is shown to be a secondary by the fact that in the section

(not reproduced) the sides of the grave could be followed upwards as far as the modern podsol band over the tumulus.

(2) A roughly rectangular pit in the E edge (length: 1.78, width: 0.90, at 25.11+, depth: down to 24.53+) was excavated in planes. The section (section B, square O) again shows this to be a secondary interment. At 24.87+ the outline became a more regular rectangle, with curved corners, and it still preserved this shape at 24.64+ (length: 1.76, width: 0.76) when charcoal streaks became visible at the Eastern end. At 24.56+, finally, a trunk coffin (length: 1.52, width: 0.50) became visible in the grave pit. It had clearly been hollowed out by fire, and the charred parts had been preserved (no 1*e*). Just S of the coffin centre, against its E wall, lay a small pile of cremated bone (no 1*f*). The floor of both coffin and pit was found at 24.53+.

(3) In the SE quadrant, against the N–S crossbaulk, another irregular oblong pit was found (length: 1.68, width: 0.68, at 25.11+, depth: down to 24.74+), oriented WSW and ENE. At 24.83+ an intermediate plane was drawn. At this level the pit had decreased in size (1.56 by 0.50), and its main axis had shifted to the NE and SW. At the NE end a small patch of cremated bone was found (no 1*d*). The floor of this trough-shaped pit was at 24.74+.

(4) In the SW quadrant (square J–11) at 0.60 under the barrow slope (25.28+) some cremated bone (no 1′) was found and also a number of sherds forming almost a complete base (no 1). The sherds belonged to a large, coarse, hand-made, flat-bottomed urn (wall thickness: 0.015, base diameter: 0.14) with copious quartz grits (up to 0.009 in size). The surface, crackled by shrinking, is ochreous-brown on the outside, dark grey on the inside. The pot, a 'Deverel' urn, represented a secondary interment.

A very irregular hole in the SW quadrant, appearing as a patch of leached sand in the subsoil, was natural in origin. It represented a shallow, occasionally water-filled depression.

The peripheral parts of the barrow were investigated two months later, in April 1948. Before the excavation a shallow, curved depression had been observable round the edge of the barrow on the S side. The SE quadrant was therefore considerably extended. At a distance of some 13 metres from the centre of the barrow a ringditch was then observed as a band of some 2–3 metres wide (Pl. II: 1–2). A strong secondary iron pan occurred at its outer circumference. The ringditch was conspicuous by being situated far beyond the actual edge of the barrow, from which it is separated by an interval of some 4 metres. The edge of the barrow was marked as a dark brown ring by the iron pan of the covering podsol. In the interval between barrow and ringditch this pan rose to the surface and did not reappear until the ringditch (Pl. II: 2). Though lying in the virgin soil at the edge of the barrow, it must have lain at a higher level beyond. In the E–W section (section B, squares Q–R) and in two of the intermediate baulks (section D, squares N–O, section G, squares P–R, Pl. II: 1–2) a bank showed to a height of 0.64 metres. It was found that the podsolized old ground surface was no longer present under the bank: obviously the vicinity of the tumulus had been denuded by sod-stripping for its construction, before the ringditch was dug. In digging the latter the upcast was thrown inwards, causing the barrow to be eventually surrounded by a ditch with internal bank. Only in the N–S section (section A, squares 13/14) was a short band of old surface found under the bank. In the sections it is clearly seen how the iron pan of the modern podsol band covering the tumulus dips into the virgin soil at the edge of the barrow, rises again to the top of the bank, then dips down deep into the ringditch. The bottom of the V-shaped ringditch (down to 23.90+ in the W, to 24.11+ in the S, to 24.19+ in the E) must soon have been flattened out considerably by sand slipping down from the bank. By means of seven trial trenches — two beyond the NE quadrant, three beyond the NW quadrant (the three Northern-

most trenches in the Zandoerle-Vessem road) and two beyond the SW quadrant — and by extension of the E–W section into Mr Bolck's garden, the full course of the ringditch was established.[2] Like the tumulus itself (main axes: 22 and 15 metres) the ringditch was oval in form (internal diameter: from 24.50 to 33, overall diameter: from 28 to 37 metres) with its main axis, WSW and ENE, running through the central interment and its two attendant pits. The tumulus and the ringditch are not concentric, the centre of the former lying slightly ENE of that of the latter. Accordingly, the bank will have been somewhat broader on the W side (c. 5.50) than on the E side (c. 4 metres), but nothing could be established with certainty, as in Mr Bolck's garden the soil had been brought under cultivation long ago. Apart from the ringditch we could only recognize the edge of the barrow, which showed in the section (section B, square E) where the iron pan dipped down into the virgin soil (down to 24.70+). It is also possible that on the W side, between tumulus and bank, there was a narrow flat, or vestigial berm, which, however, was certainly absent on the E side. Unfortunately it must remain an open question whether the ringditch contained one or more interruptions in connexion with a possible entrance.

Tumulus 1 was thus an example of a barrow with ditch and internal bank.

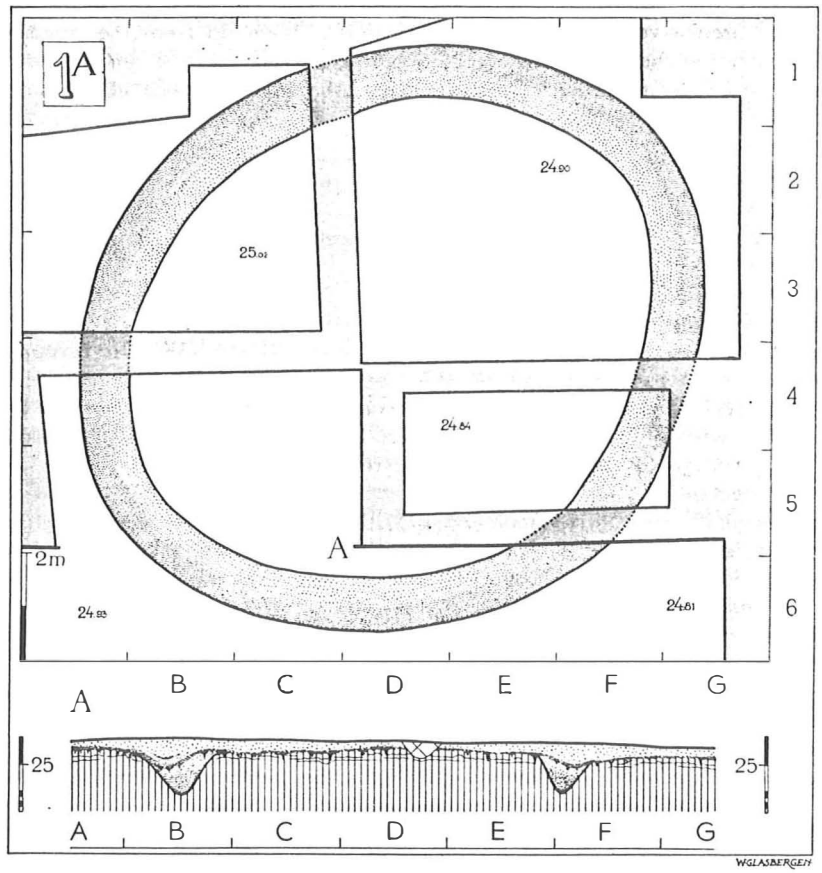


Fig. 8

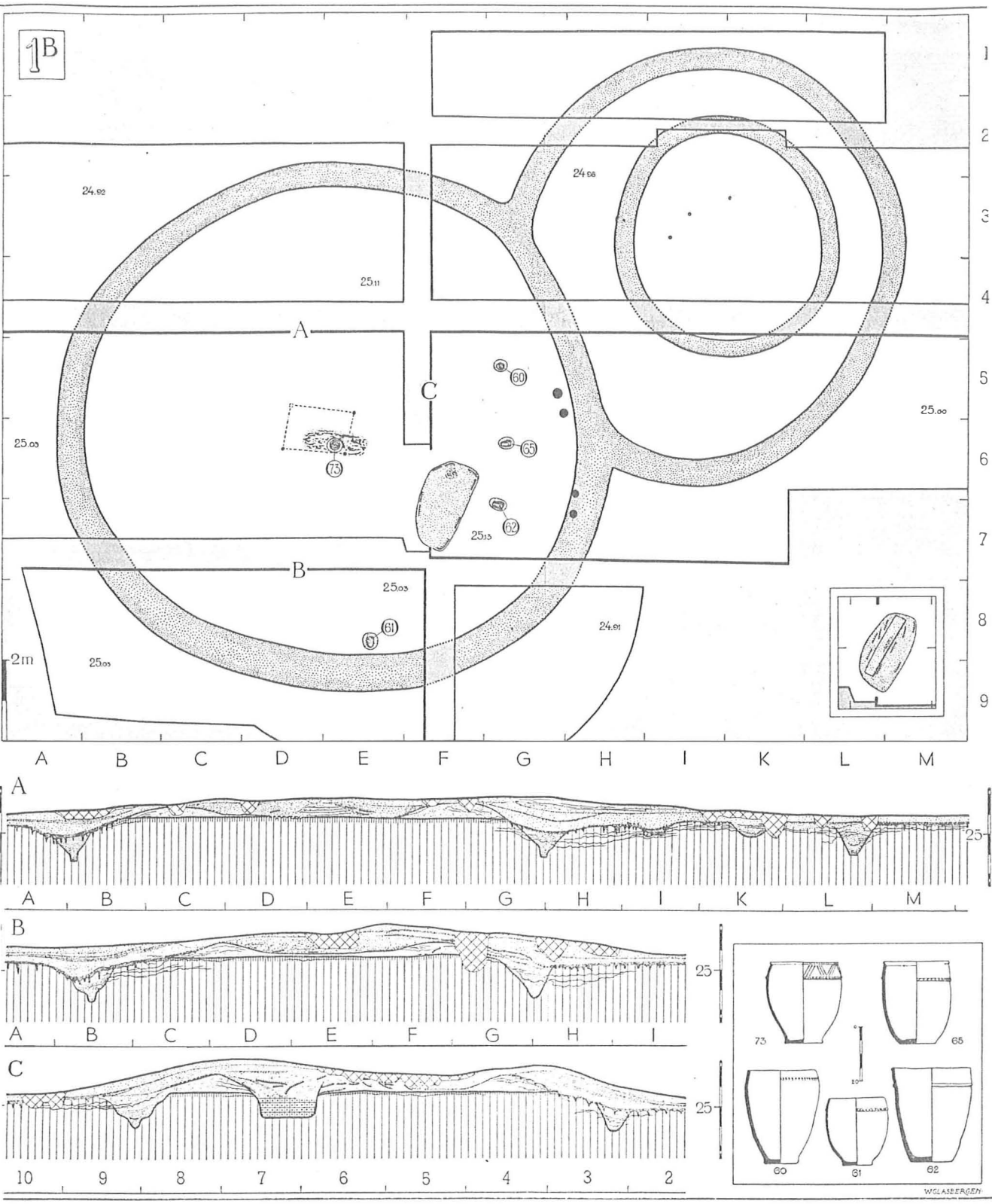

1B
24.92
25.11
24.08
25.00
25.03
25.13
24.91
25.03
25.03
2m
A
B
C
60
65
73
62
61
A B C D E F G H I K L M
25
10 9 8 7 6 5 4 3 2
73
65
60
61
62
WOLASBERGEN

Fig. 9

TUMULUS I[A]

with ringditch

Tumulus 1[A] (fig. 8) could not be outwardly recognized as such on account of sand drifts, probably caused by a disused cart-track meeting the Zandoerle-Vessem road W of Toterfout before the reclamations began. The tumulus was discovered in extending a long trial trench across cadastral plot no 1861. The nature of the site made it impossible to obtain any data concerning the old surface, the composition of the mound, and its original height. Above the very slightly mottled yellow virgin soil the level modern podsol could be observed.

An oval ringditch, V-shaped to semicircular in section (internal diameter: 8.70–10.40, width: 1.00 at c. 24.90+, depth: down to 24.44–24.27+), its longitudinal axis SW and NE, showed in the subsoil as a grey band with dark brown edges on account of the iron pan having precipitated to a greater depth there. No trace was found of an interment inside the ringditch.

Very probably this monument was not a ringditch tumulus of the type of nos 21 and 29, to be dealt with hereafter, but rather one of the largest ringditches of the ringditch urnfield N of the Zandoerle-Vessem road, also to be discussed hereafter.[3] Originally it will have been a very low, flat mound, mainly thrown up from the ringditch.

After excavation the monument was restored, a low flat mound being piled up from the upcast from the ringditch. The ringditch now marks the edge of the mound.

TUMULUS I[B]

with bank and ∞-shaped ringditch

Tumulus 1[B] (figs 9, 42*e*, 59: 1–5, Pl. V–VIII, XII: 2, 61*b* and 61*c*) turned out to have been damaged on the N side by the cart-track already mentioned which traversed the cadastral plot no 1861 as a deep gully from SE to NW. On account of the deformation of the barrow the centre taken for the quadrants turned out to have been set 3.70 metres too far W. By leaving a second E–W crossbaulk 5.60 metres farther N the worst effects of this could, however, be overcome. The N–S crossbaulk lay across a grave pit in the edge of the barrow, showing that this was a secondary interment (section C, squares 6/7). At the supposed centre the mound was still 0.86 metres high (top: 26.16, floor: 25.30+). It had been raised on a clearly podsolized old ground level showing as a grey layer of leached sand above which no clear humus band could be found. The subsoil consisted of brownish-yellow sand, slightly mottled in places, indicating a scrub vegetation at some time before the development of the podsol and the construction of the tumulus. In a number of places the crossbaulks passed over a ringditch. Its lowest part was a flat-bottomed trench with vertical sides, some 0.20 metres wide, but very soon the sides flared outwards and the upper part was roughly V-shaped to semicircular in section. The upcast from the ditch had been thrown inwards and formed a low bank of yellow sand (height: c. 0.40, width: c. 2.50) lying on the old surface. Some sods were found in this bank; and under it, on the E side. some charcoal occurred on the old surface (section B, square F). The iron pan of the podsol covering the mound, which had penetrated far into the silting of the ringditch, accentuated this still further. The bank showed in the sections as a plano-convex lenticle of brownish-yellow sand (Pl. V: 1) shot through by a number of infiltration veins. Within it occurred grey sand, in which some very clear black inverted sods could be observed. The rather more peaty composition of these sods, very different from the old

surface sod under the barrow, indicated that the sods were stripped off at a damper place, for instance on the lower ground to the S. The sections show that the barrow consisted of a small flattened mound, within a bank. [4] On the S and E sides (section C, square 8, section B, square G), where the yellow sand had slipped back into the ringditch, a layer of charcoal was found on the outer slope of the bank. A heavy layer of drift sand had been deposited nearly everywhere against the bank and over the ringditch and had reached a considerable thickness on the N and E sides. In several places one or more old vegetation layers could clearly be observed. At the periphery of the barrow, in and near the ringditch, infiltration veins reached deep into the virgin soil.

In a plane section the ringditch showed as a roughly oval, grey band with a dark brown outer fringe where iron pan had precipitated to a deeper level (internal diameter: 11.50–12.20, width: c. 1.00 at 25.00+, depth: down to 24.30–24.25+ on the W side, to 24.40+ on the N side, to 24.42–24.28+ on the E side, to 24.44+ on the S side). Its main axis lay SW and NE. On the NE side it ran straight where it was joined by an irregular annexe (internal diameter, NW–SE: c. 8.80, width: c. 0.70 at 25.00+, depth: down to 24.46+). Within the annexe lay a separate, oval, shallow ringditch (internal diameter: 4.60–5.10, width: c. 0.50, depth: down to 24.94+), semicircular in section (section A, square K), with a N–S main axis. No intersections were found on excavation; probably the system was laid out as a single whole. The outer ditch of the annexe had the same depth as that of the tumulus proper, and an open connexion with it. No trace remained of any small mound within the annexe. It is probable, however, that the upcast from the shallow oval ringditch within the annexe was used to raise a small central mound. The whole system, along its SW–NE main axis, had a length of 20.80 metres.

Somewhat to the S of the centre of the ringditch a large patch of charcoal (no 72), ash and burnt sand was found (length: 1.70, width: 0.66) oriented E–W. On removing the charcoal a large sod appeared, and under this again a round hole (diameter: 0.32) containing a cinerary urn (no 73, Pl. VI: 1–2). The urn (height: 0.295, maximum diameter: 0.295, wall thickness: c. 0.013) was standing upright. Its colour is ochreous brown, with patches of ochreous yellow and dark grey. It is of coarse and uneven texture, the paste being tempered with much pounded quartz grit (up to 0.013 in size) and fragments of pounded pottery. The surface is crackled and there are black incrustations low down on the inside. The somewhat oval, internally bevelled rim (diameters: 0.25 and 0.268) has been squeezed outwards and nicked pie-crust fashion at the top. At 0.05 below it is a squeezed-out, finger-tipped cordon, 0.008 wide. The zone above this cordon, where the urn narrows towards the nicked rim, is decorated with cord impressions, looped at one end, a piece of string having apparently been doubled and twisted. The cord impressions run obliquely downwards in parallel sets of three, alternately to left and right, dividing the upper zone into triangles each with sets of corded lines for two of its sides. The outer surface of the wall shows striations caused by the implement with which the surface was smoothed. A remarkable feature, finally, is the protruding foot, which has been slightly squeezed outwards (base diameter: 0.13). The urn was filled with exceptionally well-preserved cremated bones (no 74). It represents the primary, central interment of the monument.

About 0.20 SE of the interment was a stakehole (diameter: 0.08), which probably had some connexion with two similar charcoal-filled stakeholes, one to the N, the other W of it. Perhaps these are three of what were originally four stakeholes placed in a rectangle (1.52 by 1.06) and forming part of a (temporary?) mortuary house, oriented WNW and ESE. Examples of such houses were observed in a number of tumuli to be described.

Three secondary cinerary urns were found at the Western periphery, buried in the inner slope of the bank, at c. 25.10+.

The Northernmost of these (no 60, fig. 59: 5, Pl. VII: 2) stood upright in a small, round pit (diameter: 0.32). It is a large truncated egg-shape (height: 0.336, rim diameter: 0.25, greatest diameter: 0.275, base diameter: 0.116, wall thickness: c. 0.01). The ware is coarse and uneven, with quartz grits (up to 0.007 in size) and fragments of pottery, and shows crackle. Its colour is an ochreous orange-brown on the outside, ochreous-brown to dark grey on the inside. At 0.025 below the rim, which is flat at the top, is a row of finger tip impressions. Striations caused by the implement with which it had been smoothed show on the outer surface. The pressure of the soil had caused the urn to crack, and the upper portion had to a considerable extent been disintegrated by tree roots. The urn was filled with very well-preserved cremated bones (no 60*a*). On the cremated bones lay a burnt rectangular piece of sandstone (no 60*b*, fig. 42*e*), provided on one side with a lengthwise groove (probably an arrow straightener).

The central urn (no 65, fig. 59: 2, Pl. VII: 1) lay on one side in a small oval pit (diameters: 0.40 and 0.30), its oval mouth towards the E. It is of ovoid shape (height: 0.31, rim diameters: 0.225 and 0.248, greatest diameter: 0.26, base diameters: 0.13 and 0.145, wall thickness: c. 0.015), and ochreous to violet-brown in colour. The ware is very coarse and uneven, strongly tempered with quartz grits (up to 0.009 in size) and pottery fragments (up to 0.009 in size), and shows crackle. At 0.053 below the internally bevelled rim, which is squeezed to a point, is a squeezed-out cordon (width: 0.014) decorated with rather oblique and irregular nail impressions. On the outer surface of the urn are striations caused by the implement with which it was smoothed. As a result of soil pressure this urn, also, had cracked. It was filled with well-preserved cremated bones (no 65*a*).

The Southern urn (no 62, fig. 59: 4, Pl. V: 2, Pl. VIII: 2) also lay on one side in a small oval pit (diameters: 0.46 and 0.30), with its mouth towards the ESE. It is of bucket shape (height: 0.33, base diameter: 0.16, wall thickness: c. 0.01), in colour violet to ochreous-brown. The ware is coarse and uneven, strongly tempered with quartz grits (up to 0.009 in size) and fragments of pounded pottery, with local incrustations of black and ochreous yellow below the outer rim, and shows crackle. At c. 0.045 below the flat rim is a plain applied cordon, 0.008 wide. Soil pressure had flattened the urn considerably. The mouth was thus gradually deformed and now, after restoration, it is markedly oval (diameters: 0.26 and 0.345). This urn was also filled with well-preserved cremated bones (no 62*a*).

On the S side, in the outer slope of the bank, a fourth secondary cinerary urn was discovered (no 61, fig. 59: 3, Pl. VIII: 1). It lay on one side in a small oval pit (diameters: 0.40 and 0.36), with its mouth towards the N. It is a fairly small barrel shape (height: 0.245, rim diameter: c. 0.21, greatest diameter: c. 0.225, base diameter: c. 0.10, wall thickness: c. 0.008). Its colour is ochreous-brown to dark grey, the ware is coarse and uneven, strongly tempered with quartz grits (up to 0.008 in size) and fragments of pottery, and shows crackle. At 0.038 below the rim is a narrow squeezed-out cordon (width: 0.008) with vertical nail impressions. The outer surface of this urn again shows striations produced by a smoothing implement. The crushed uppermost side of this pot had been completely disintegrated by tree roots, so that only about half of it could be recovered. It was filled with well-preserved cremated bones (no 61*a*), among which Dr Krumbein discovered the fragments (length: 0.065 and 0.051 respectively, and originally perhaps c. 0.10 in both cases) of two burnt bone pins (Pl. XII: 2, 61*b* and 61*c*). They were made from a split hollow bone, according to Dr Krumbein possibly the *ulna* of a goose.

The cremations in each case about half filled the urn, and must have been carefully sifted before deposition. Hardly any charcoal was found among the cremated bone fragments.

On the SE side between the central primary interment and the ringditch was a grave.

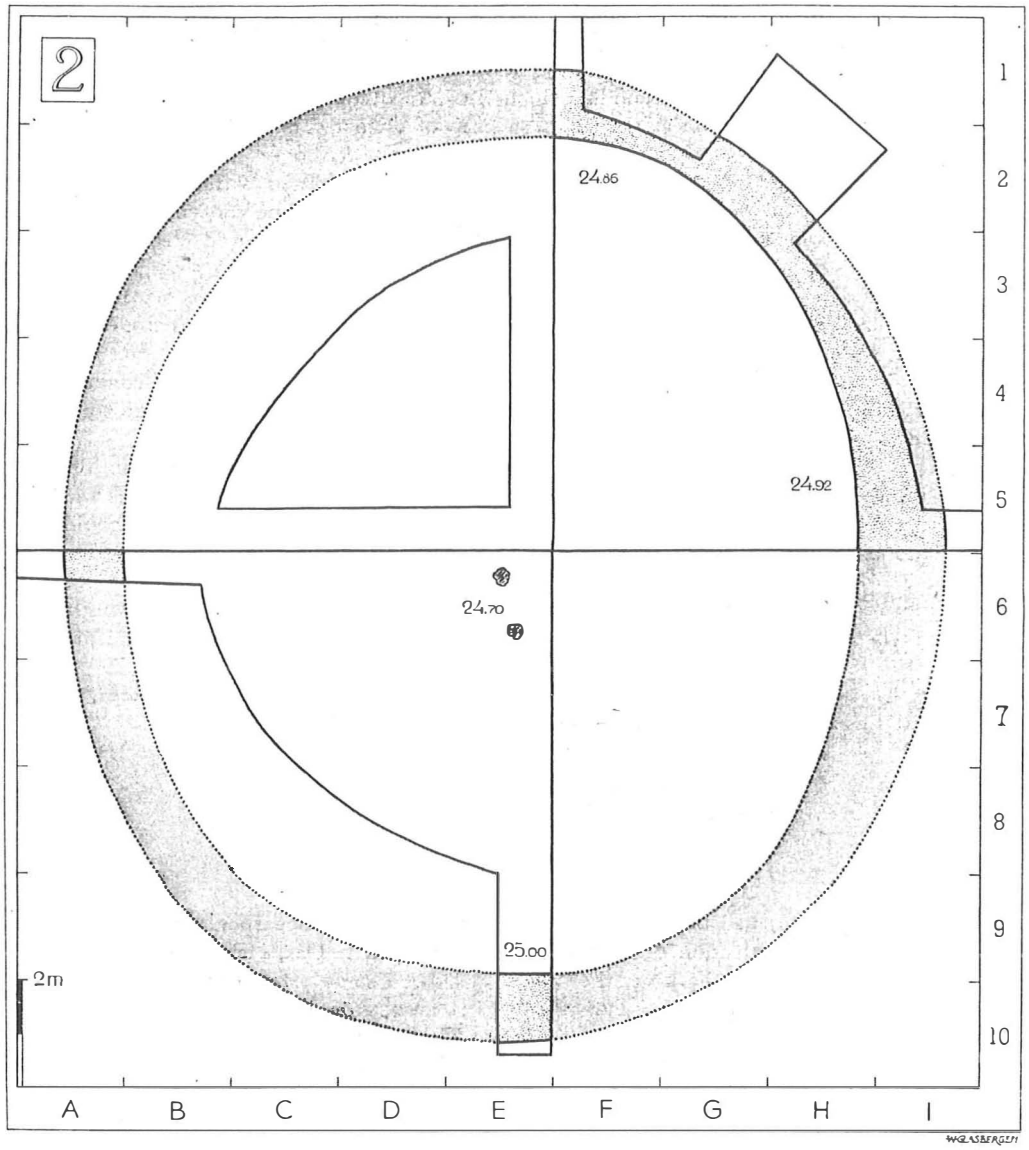

2
24.86
24.92
24.70
25.00
2m
1
2
3
4
5
6
7
8
9
10
A
B
C
D
E
F
G
H
I
W.GLASBERGEN

Fig. 10

In the N–S section (section C, squares 6/7) it was plainly visible how the pit had been sunk right through the mound. At 25.13+ this grave showed as an irregular rounded rectangular patch, oriented SSW–NNE (length: 2.20, width: 1.20). The pit had been filled in with grey sand in which sods were conspicuous, especially at the sides of the pit. In the filling at the N end a heap of cremated bone was found (no 63), at 25.13+. At a deeper level the patch diminished in size (2.00 by 1.10), and a long and narrow coffin (length: 1.70, width: 0.26) was sharply outlined within it. Centrally against the E wall of the coffin lay a small heap of cremated bone (no 76). The floor of the grave lay at 24.72+, and even there a number of sods showed clearly in the grey filling.

Four postholes, set in pairs, must still be mentioned (diameter: 0.20–0.23). Two, 0.28 apart, lay on the E side, just within the ringditch, two others (diameter: 0.20), equally 0.28 apart, lay in the ditch itself, some 2 metres farther S. Their meaning is not clear. Three further small stakeholes (diameter: 0.08), the two Westerly of which contained charcoal, showed within the ringditch of the annexe. No traces were found of an interment.

Eight pottery fragments (no 71*a*) were recovered from the floor of the barrow. They are: a rounded rim fragment and six wall fragments (thickness: 0.01) of ochreous ware, with crackle and an admixture of quartz grits (up to 0.009 in size); and a shoulder fragment of a fairly thin-walled (0.005) pot of ochreous-brown, smoothed ware, tempered with sparse fine grits. Also from the floor of the barrow came four fragments of flint (no 71*b*), one of them part of a core, which may be Mesolithic. A fragment of a quern (no 66) from the NE part of the mound may finally be mentioned.

After the excavation had been completed the whole monument was replaced, the ∞-shaped ringditch being dug out again to mark the edge of the barrow.

TUMULUS 2

with ringditch

Tumulus 2 (fig. 10) had been completely levelled some 25 years earlier, when plot 1551 was brought under cultivation. According to the owner, Mr F. Das, a farmer of Zandoerle, who had been present at the time, the barrow had been some 1.20 metres high, with a distinct ringditch around the foot. Doubtless this is the barrow around which Panken had observed 'a ring or shallow ditch'. According to Mr Das nothing remarkable had come to light. The 'grey soil' of which the mound consisted had been carried to a low-lying corner of the field. The site of the barrow was still clearly discernible as a large patch of a lighter colour showing in the darker arable.

In April 1948 soundings were made which yielded scraps of cremated bone from the centre of the patch. In March 1950 a partial excavation followed which made it possible at least to determine the nature of the original monument.

In the first place the ringditch was found, oval in shape, with its main axis N and S (internal diameter: 13.70–15.80, width: 1.20–1.60, depth: down to 24.16–24.02+). As no trace of the old ground level could be found anywhere, it was impossible to find out whether the barrow was of the ordinary ringditch type, or whether it also had a bank. In view of the fairly large diameter of the mound the latter may well have been the case.

In the centre two small piles of cremated bone (no 35*a*) and charcoal came to light (24.70+), doubtless the remains of the main grave. The latter, if the position of the cremations can be any guide, was probably oriented N and S.

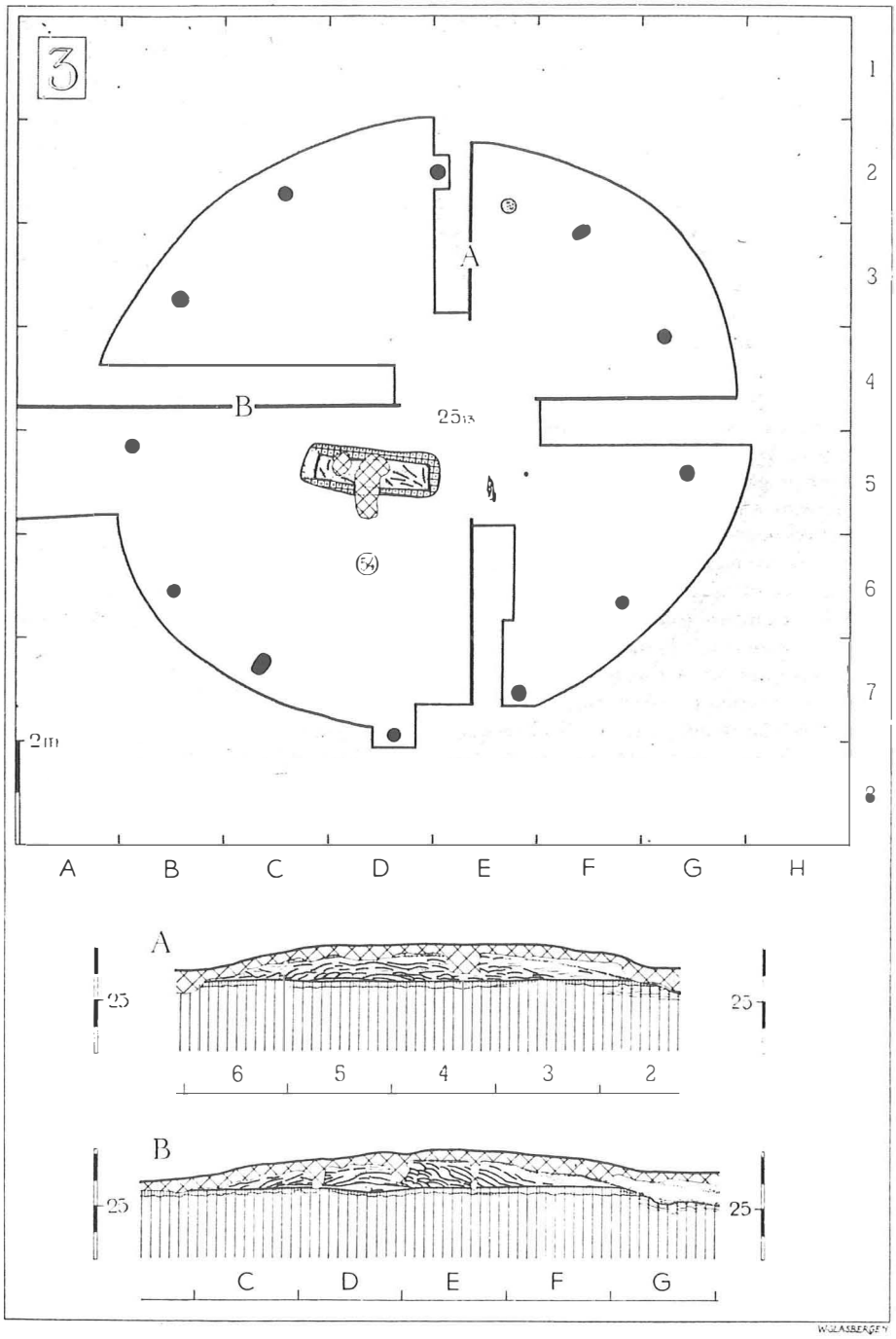


Fig. 11

TUMULUS 3

with single widely spaced postcircle

Tumulus 3 (fig. 11, Pl. IX: 1–2), which measured some 9 metres across, was 0.75 metres high (top: 26.11, floor: 25.36+). The mound had been piled up from clearly inverted sods, with black humus layers and brownish-grey leaching layers; at the periphery it had been made up with sand. The clearly podsolized old surface level showed up as a thick grey leaching layer with a clear secondary infiltration but not a very distinct dark grey humus band. The sods of the mound had a different, much more humous podsolization, and were probably not cut in the immediate vicinity, but perhaps more to the S, in the low-lying parts where the fens used to be. Below the old surface level was the mottled yellow subsoil, pointing to a scrub vegetation at some time before the construction of the barrow. It is clear from the sections that a thick accumulation of wind-blown sand was gradually formed on the NE slope as a result of the prevalent W to SW winds (section A, squares 2–3, section B, squares F–G). In the sections some recent disturbances were visible, which did not reach down to the subsoil.

The foot of the barrow turned out to be surrounded by a slightly oval, single widely spaced postcircle (main axis: WSW and ENE; diameter: 10.40–10.60) composed of 13 round to oval postholes (average diameter: 0.28, depth: down to 24.70-24.51+) with intervals of 2.20–3.00 metres. An exception is formed by an intermediate hole in the NNE, doubtless indicating an entrance blocking. Owing to iron pan precipitation in the holes none of them showed a soft core to represent the original post. Thus they appeared as dark brown patches, often with grey, leached cores, in the yellow subsoil. Only the intermediate hole, the entrance blocking, was filled with yellow sand, mixed with charcoal particles.

In the SW quadrant was an oblong grave pit (length: 2.62, width: 0.88, depth: down to 24.89+) with E–W orientation, into which the overlying sods had subsided, especially in the centre (Pl. IX: 2). A trunk coffin showed up clearly in the grave (length: 2.20, width: 0.48–0.54); it afforded neither an inhumation silhouette nor cremated bone. Part of the interment had been destroyed by a recent disturbance. As the sections show unmistakable accumulations of excavated yellow soil on the old surface (section A, square 5, Pl. IX: 1, section B, squares D–E, with clear inverted sod below, on the old surface), this trunk grave can be confidently accepted as the primary as it must have been dug before the barrow was built. In the SE quadrant (square E–5) a stakehole was found (diameter: 0.06), the meaning of which is obscure. A little below the mound's surface a small patch of charcoal (no 55; square E–5) occurred.
On the old surface in the SW quadrant a small, ochre-coloured wall sherd (wall thickness: c. 0.009) of gritty texture was discovered (no 54).

After the excavation the barrow was restored to the state in which it had been found.

TUMULUS 4

(the '*Lambertsbergje*')
with ringditch

Tumulus 4 (fig. 12, Pl. X: 1–2), a low, flat mound, measuring some 16 metres across, was 0.70 metres high (top: 26.45, floor: 25.75+). Its name comes from St Lambert, who was much honoured in these parts. As mentioned earlier, it differed from the surrounding fir wood in having been planted with other trees, among them the acacia

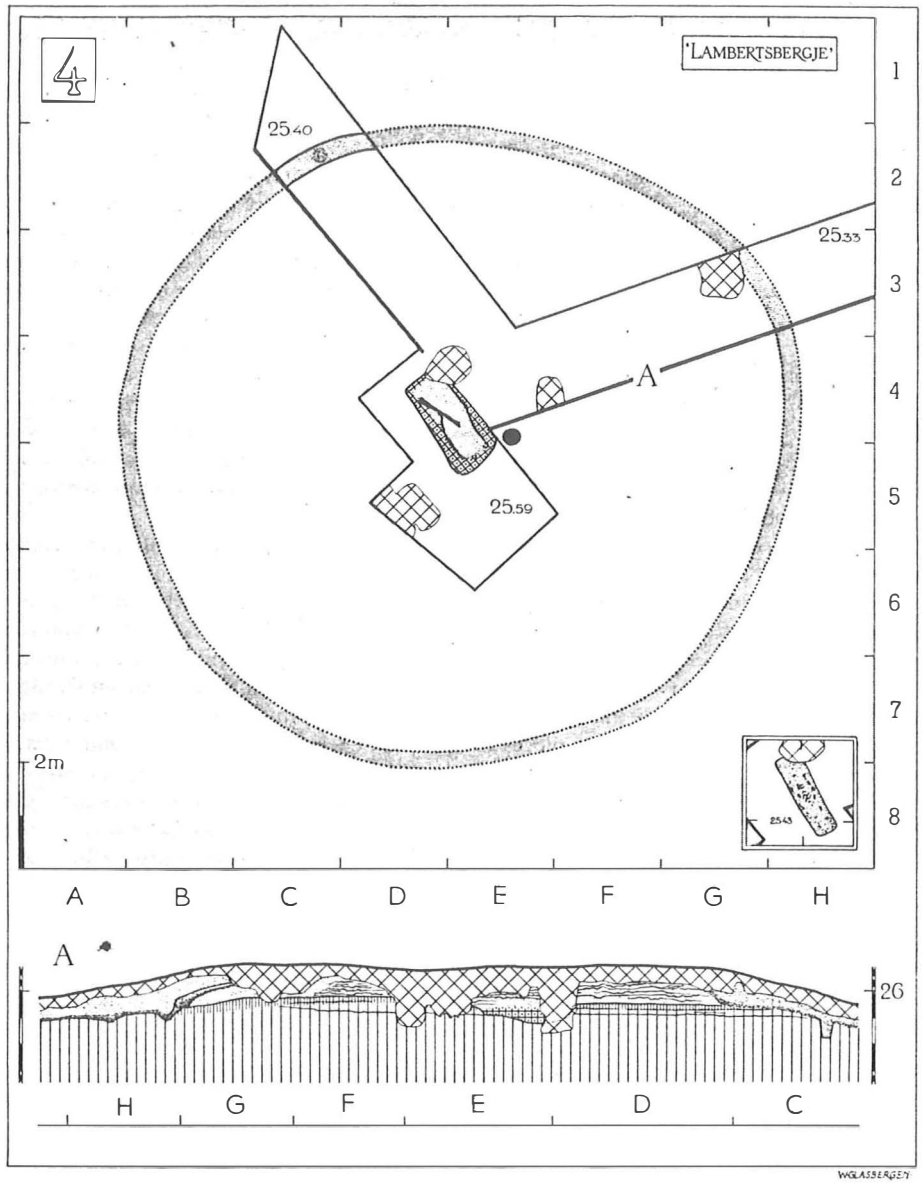

'LAMBERTSBERGJE'
25.40
25.33
25.59
A
2m
25.43
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
H G F E D C
W.GLASBERGEN

Fig. 12

commemorating the birth of H.M. Queen Juliana in 1909. As the trees had to be spared only two radial trenches could be dug into the mound, N of the centre, which was then excavated.

The mound consisted of grey sand, with local yellow to greyish patches, in which heavy, dark infiltrations showed everywhere (Pl. X: 1). Not the slightest trace of sod structure could be found. At the periphery the mound consisted of mottled woodland soil, indicating an earlier scrub vegetation. Above it, on the E side, a short stretch of the covering podsol band could still be observed. For the rest, the upper surface of the barrow had been completely dug, large recent disturbances occurring in several places, often to great depths. The old surface level on which the barrow lay consisted of a fairly even, light grey, scarcely podsolized layer, lacking any observable humus band. The old ground level could only be determined by means of scraps of charcoal (no 90) lying scattered in places on the grey band. The subsoil consisted of slightly mottled yellow sand, indicating scrub vegetation at some time before the construction of the barrow.

On the NW side a shallow sand-filled ditch (width: c. 0.36, depth: down to 25.09+) showed up as a grey band in the virgin soil. This band also seemed to occur in the second trench, lying WSW and ENE, but owing to the strong development of the iron pan at this spot it could not be identified with certainty. The original internal diameter of the ditch will probably have been some 12 metres.

The central, primary burial (Pl. X: 1–2) consisted of a roughly rectangular pit (length: 2.00, width: 0.80–1.00, at 25.59+, depth: down to 25.37+) with slightly curved corners, lying NW and SE. The NW corner turned out to have been destroyed by a deep recent disturbance. Within the grave two longitudinal charcoal shells (no 87) could be seen, the cores of which had filled with sand; they were probably piles from the funeral pyre, the unburnt cores of which had decayed. The Northern end of one had sunk inward when the grave pit was filled in. On the SE side two large chunks of charcoal were found between the two piles. The several pieces of charcoal enclosed an area of some 1.60 by 0.54 metres. It is clear that a trunk or pile coffin must be ruled out. Apparently the half-burnt piles were used to strengthen the sides of the grave pit and originally came from the pyre. At a deeper level (25.43+) the pit greatly diminished in size (0.44–0.52 by 1.65), and an oval patch of cremated bone (no 88) showed in the centre. A few scraps of charcoal lay scattered round it. On the old surface, close to the grave, a wall sherd (no 89) was found. It was of coarse, uneven, light ochreous hand-made ware (wall thickness: 0.01), admixed with sparse fine grits and fragments of pottery.

After excavation the tumulus was restored to the state in which it had been found.

TUMULUS 5

two-period barrow, with two single widely spaced postcircles

Tumulus 5 (figs 13, 66: 5, 67: 8, Pl. XI: 1, Pl. XII: 2, 43*a* and 43*b*, Pl. XXI: 2, Pl. XXII: 2), which measured about 15 metres across, was 1.15 metres high (top: 27.15, floor: 26.00+). Allied tank practice in 1944 had damaged it (Pl. XXI: 2), and poachers digging out a couple of badgers, some 40 years ago, had made a big hole in the centre. In order to obtain a complete N–S section it was necessary to divert the crossbaulk at the barrow centre (section A, square 4). The covering podsol band over the barrow had largely disappeared as a result of ploughing up for afforestation. The mound showed a very clear, though not sharply defined inverted sod structure, with streaks of reddish-brown sand scattered among the sods, and numerous heavy infiltration veins (Pl. XI: 1). The sod core had been smoothed over with brownish-yellow sand which

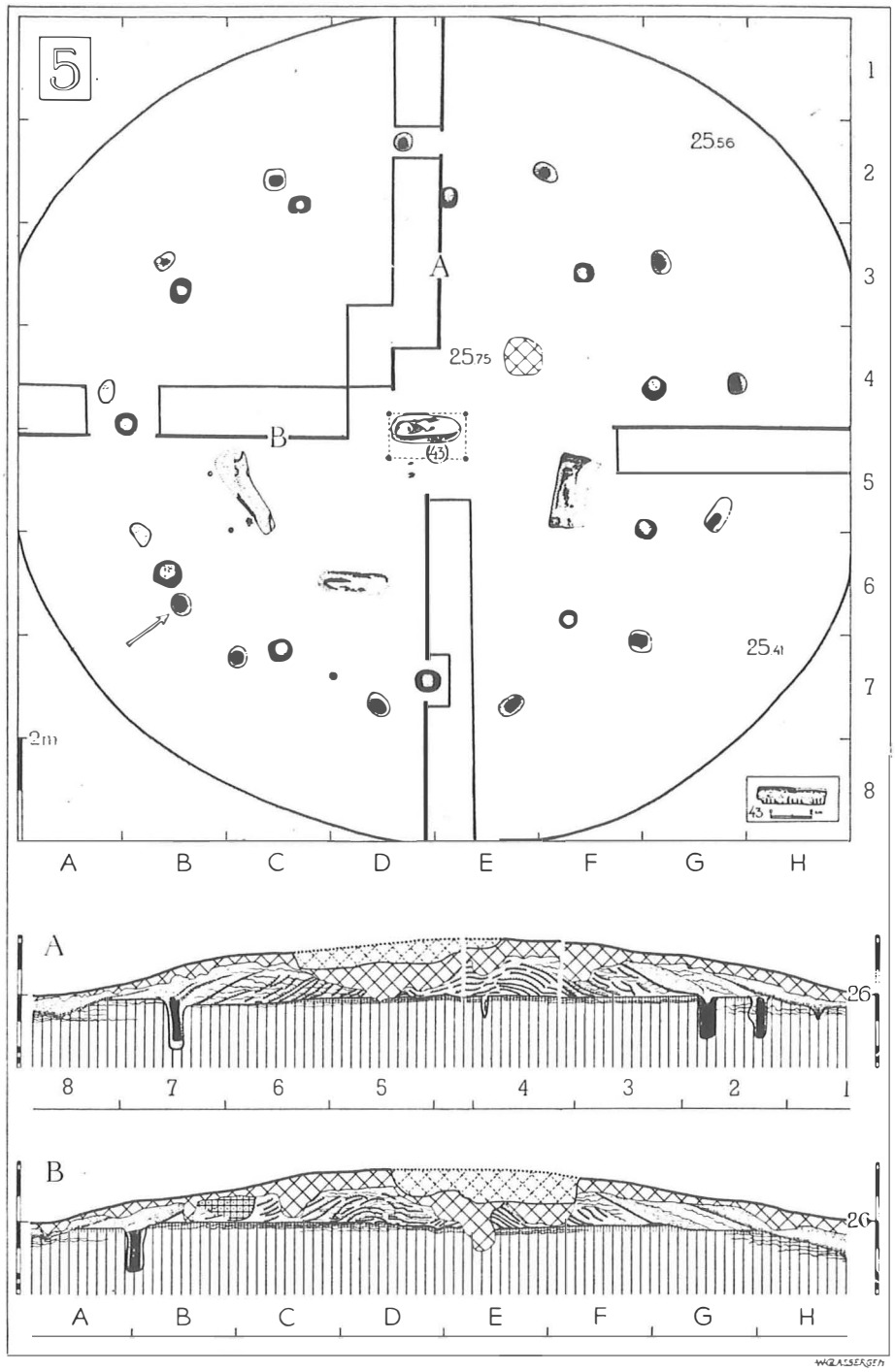

5
2556
2575
2541
A
B
(43)
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
8 7 6 5 4 3 2 1
B
26
A B C D E F G H

Fig. 13

was covered by a clearly primary vegetation layer, meeting the old surface level just within the inner primary postcircle. It could thus be shown that the latter had originally stood at the foot of the barrow (section A, square 2, section B, squares A/B). Over and against this primary slope lay a secondary extension, corresponding with the outer, secondary postcircle. The mound had been built on a clearly podsolized old surface in the form of a grey leaching layer, in which several heavy infiltrations occurred; the presence of a humus layer could not be definitely established. On the S side (section A, squares 6/7) the old surface had been removed; evidently sod-cutting for the primary tumulus had taken place here. In one spot (section B, squares F/G) lay a small accumulation of yellow sand, apparently the upcast from a posthole of the inner circle. In some places (section A, squares 6, 7, section B, square 3) some charcoal was lying on the old surface (Pl. XI: 1). The light yellowish-grey mottled subsoil indicated scrub vegetation at some time before the construction of the barrow. A thick wind-blown accretion on the N and E slopes was the result of the prevailing W-SW winds.

The edge of the barrow contained two non-concentric postcircles, the inner of which, as has been argued, must be the primary. This could be further confirmed from two postholes in the E–W section, on the W side. The outer, secondary postcircle showed a NE shift in relation to the inner. On account of the wind-blown accretions the apparent centre of the barrow must have shifted away from the true one, and at that time no primary postcircle would have remained to indicate the fact. On the SW side the two circles coincided.

The inner, nearly circular, single widely spaced postcircle (diameter: 9.50–10.20) was composed of 11 round, sometimes oval or roughly rectangular postholes of varying diameter (diameter: 0.35–0.52, depth: down to 25.21–24.84+), in the grey filling of which the posts invariably showed up as dark round, oval, triangular, sub-rectangular or — once — even pentagonal cores, the latter with much charcoal (diameter: 0.15–0.35). The intervals measured from 2.80 to 3.00 metres, except for one, on the SE side, of only 2.30 metres, which perhaps indicates an entrance. Where postholes of the inner circle were sectioned (section A, squares 2, 7, section B, squares A/B) it could be seen how in two cases the post stood on the floor of its hole, whereas in one case it did not quite reach it. In one of these postholes (section B, squares A/B) some charcoal was found: probably some posts had been charred at the lower end, for preservation.

The primary burial was at the centre of this circle. It was a shallow oval depression in the old surface, running E and W (length: 1.36, width: 0.54, depth: down to 25.85+), filled with burnt sand, ash, charcoal (no 42) and two heaps of cremated bone (no 44). More charcoal was found scattered on the old surface around the grave. The grave itself lay, with a slight Northward shift, in a rectangle (1.50 by 0.88) running E and W and consisting of four stakeholes (diameter: 0.07, depth: down to 25.60–25.40+). Three were round, the fourth, in the SW, was square. They were all filled with charcoal and did not continue into the mound, as may be seen from the section (section A, square 4), where the sod structure runs on uninterrupted over the NW stakehole. From this we may conclude that they represent a *temporary* mortuary house which served as a covering for the cremated dead, before the construction of the mound. From among the cremated bone two burnt bone ornaments were recovered (nos 43*a* and *b*, Pl. XII: 2, 43*a* and 43*b*). One of these, a small tubular bone, somewhat oval in section (0.008 by 0.007), damaged at either end, 0.032 in length, was decorated with three zones of transversely incised parallel grooves (distance between zones: 0.005, between grooves: 0.0015). These go round most of the bone, all being interrupted on the same side, where an oval hole (0.0045 by 0.0035) occurs opposite the middle zone of decoration. The other piece (length: 0.046), damaged at both ends, had to be reconstructed from 12 fragments. It is plano-convex in section (diameter: 0.0085). The decoration is only on the heavily damaged and incomplete convex side; it also consists of grooves, in this case in two zones of five

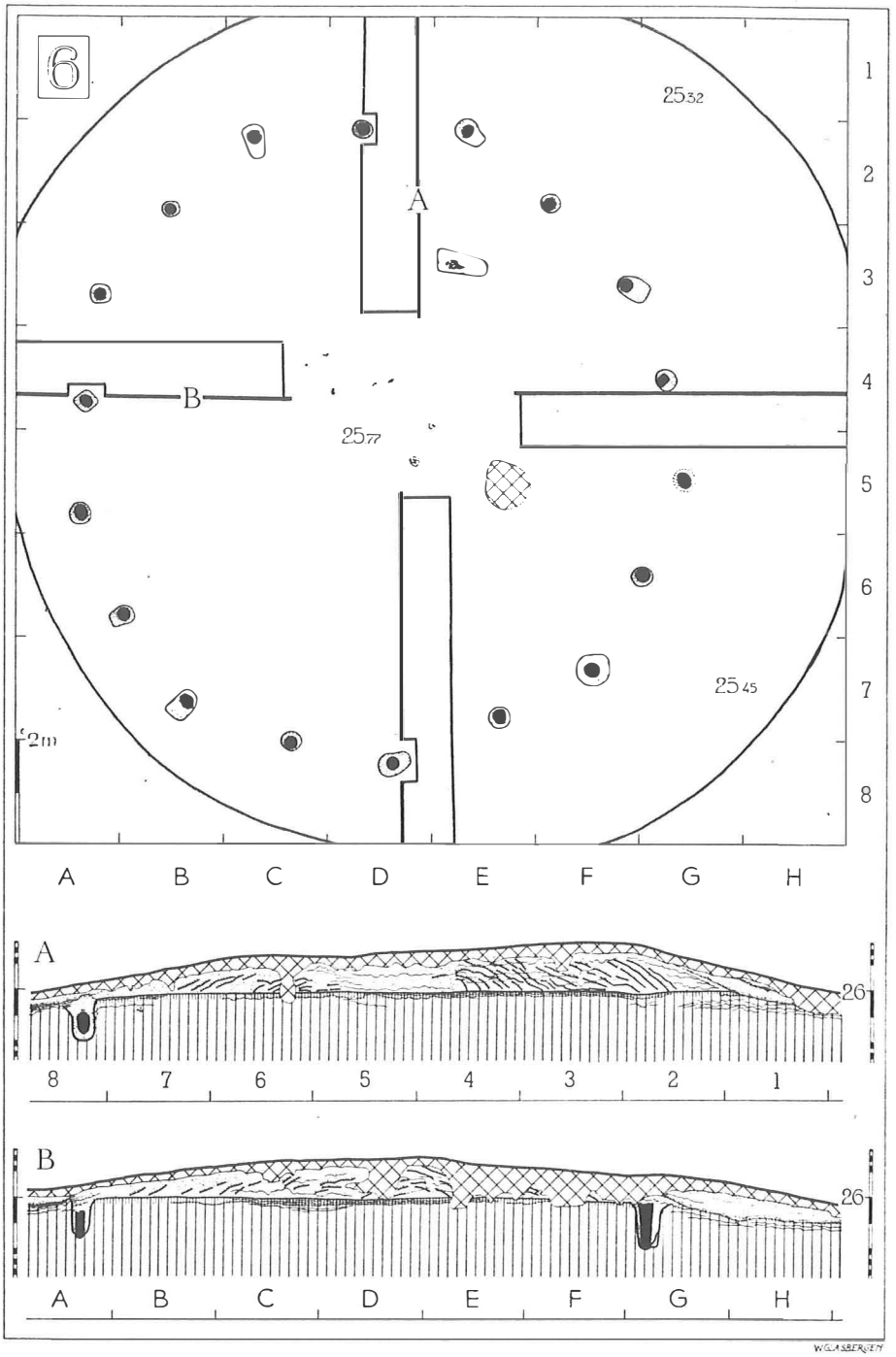

6
2532
A
B
2577
2545
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
8 7 6 5 4 3 2 1
B
26
A B C D E F G H
W.GLASBERGEN

Fig. 14

each (space between zones: 0.009, width of zones: 0.01–0.012, distance between grooves: c. 0.002). They were evidently worn as personal ornaments.

Between the obliquely piled sods on the E side (square F-5) was found a sloping patch (length: 2.44, down to 26.12+) of charcoal (no 46), ashes and cremated bone (no 47). A large patch (length: 1.20, down to 26.36+) of charcoal (no 41) in the SW quadrant (squares C/D–6), without cremated bone, may derive from a funeral repast. No grave pit had been dug in either case, and the remains must have been deposited while the barrow was being piled up. A sherd found among the sods above the central, primary grave (no 45, at 26.24+, wall fragment of very soft reddish-brown ware admixed with pottery fragments, thickness: c. 0.011; section A, square 4) may also be mentioned here.

The outer, single widely spaced circle, slightly oval, with its main axis running E and W (diameter: 11.20–12.00) consisted of 14 postholes (diameter: 0.36–0.68, depth: down to 25.36–24.89+) of greatly varying shape. In the majority of these holes the round or oval, or occasionally roughly rectangular cores showed up very clearly (diameter: 0.20–0.34). The intervals varied from 2.70 to 2.80 metres, except on the SW side, where a fine example occurred of an intermediate post (intervals: $1.40 = {}^1/_2 \times 2.80$). This is probably an entrance blocking. If the barrow centre contained a grave belonging to the second phase of construction it must have been destroyed by the recent disturbances.

In the SW quadrant the NE tip of a secondary grave could be seen in the E-W section (section B, squares B/C). As it was actually dug in from the upper surface itself the interment must have taken place after the covering secondary barrow had been completed. The grave, which we regret to say was partly spoiled in excavation, consisted of an irregular pit (length: c. 2.20, width: 0.66, depth: down to 26.04+) filled with charcoal (no 40), ashes and a heap of cremated bone (no 39). Beside it two small faint stakeholes (diameter: 0.10) were found.

After the excavation the barrow was completely restored, creosoted posts being placed in the postholes of both periods (Pl. XXII: 2).

TUMULUS 6

with single widely spaced postcircle

Tumulus 6 (fig. 14, Pl. XI: 2, Pl. XXI: 2, Pl. XXII: 2) measured some 14 metres across, and was 0.96 metres high (top: 26.92, floor: 25.96+). Tank practice had damaged it in 1944 (Pl. XXI: 2) and ploughing had largely removed the covering podsol. There were a number of other large recent disturbances, especially on the E side. The mound, shot through with many infiltration veins, showed a light but clear sod structure, interspersed with streaks of brownish-yellow soil. It rested on a clearly podsolized old ground level consisting of a grey layer of leached sand, again shot through by several heavy infiltrations; one of these, in most places, almost obliterated the humus layer (Pl. XI: 2). In one place a depression in the old surface could be seen in the section (section A, square 2). Below was a hole, filled with grey sand; possibly this was caused by an uprooted tree. The subsoil consisted of yellow sand, slightly mottled as a result of scrub vegetation at some time preceding the construction of the barrow. The usual wind-blown accretion on the NE slope was also to be observed.

The foot of the barrow was once more surrounded by a somewhat oval single widely spaced postcircle (main axes: SE and NW, diameters: 11.60–12.20) consisting of 18 postholes of widely varying shape and size (diameter: 0.30–0.66, depth: down to 25.25–24.85+) with clear cores that showed as dark, round to oval, in one case rectangular

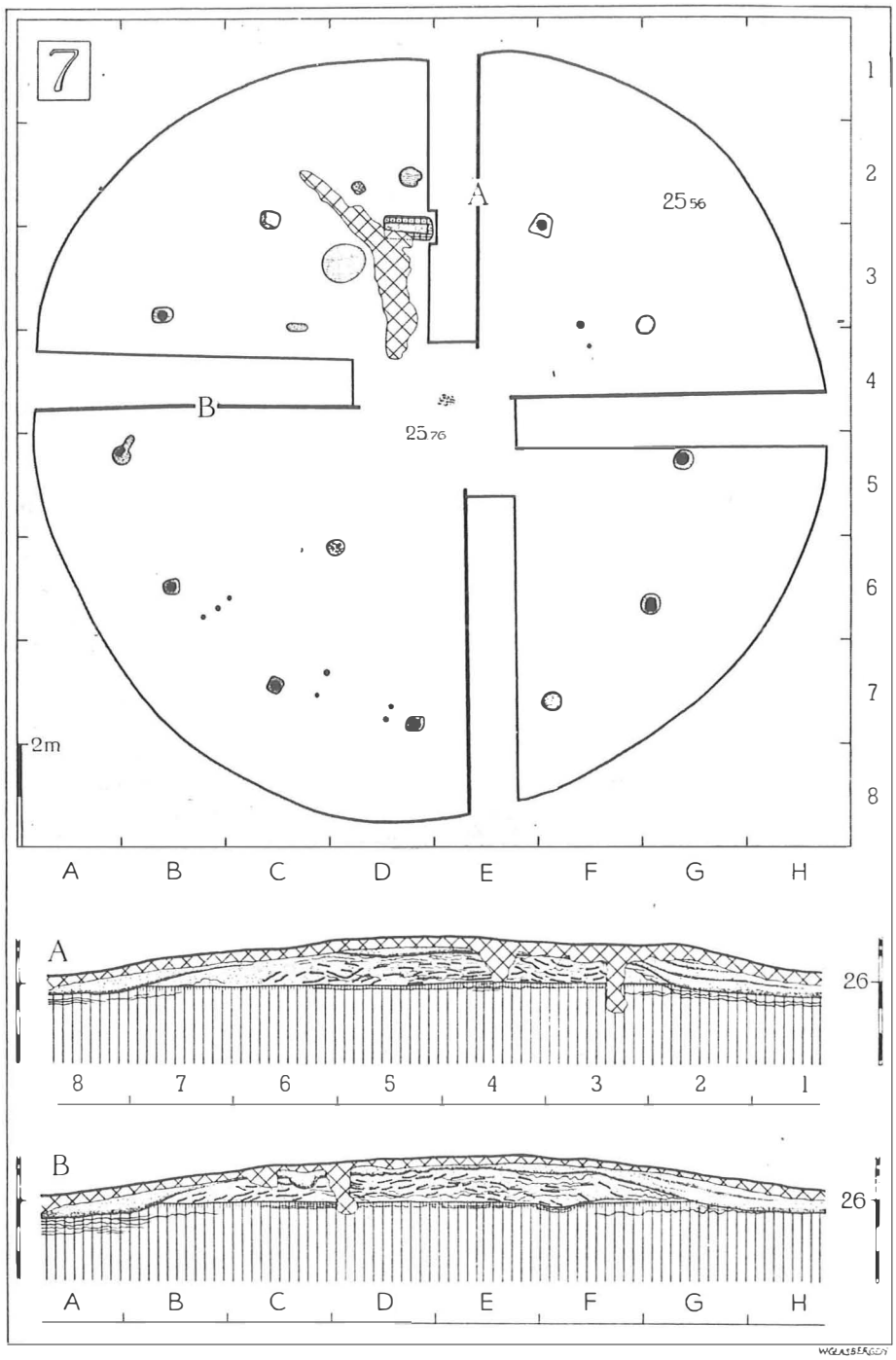

7
A
B
25.56
25.76
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
8 7 6 5 4 3 2 1
B
26
A B C D E F G H

Fig. 15

stains in the grey filling (diameter: 0.18–0.31, and 0.25 by 0.19). The intervals varied between 2.00 and 2.20 metres. From the sections it appeared that the posts had sometimes been rammed in deeper than the floors of their holes (section B, square A), sometimes almost stood on them (section B, square G, with a sod placed against the post), or sometimes did not reach them at all (section A, square 8).

The centre of the barrow showed only some charcoal fragments lying on the old surface; no trace was found of an interment. Probably, therefore, the barrow covered an inhumation on the old surface. A grey patch with some charcoal fragments, in the NE quadrant, was probably natural (square E–3).

After completion of the excavation the barrow was restored and creosoted posts were placed in the postholes (Pl. XIII: 1, Pl. XXII: 2).

TUMULUS 7

with single widely spaced postcircle

Tumulus 7 (fig. 15), which measured some 12 metres across, was 0.90 metres high (top: 26.86, floor: 25.96+). The Allied tank practice of 1944 had damaged it, but in spite of the plough the thick covering podsol had remained fairly intact, the thick leaching layer and iron pan being everywhere conspicuous. The mound, with its numerous infiltrations, showed a light but clear structure of inverted sods mixed with streaks of brownish-yellow sand. Its periphery had been smoothed over with the same material, especially in the S. The old surface showed as a grey leaching layer (thickness: 0.07–0.08) without a clear humus band, a thick infiltration vein having formed at exactly this level. In one place a small depression in the old surface was visible in the section (section B, square F), a small layer of yellow sand lying to the E of it on the old surface. The subsoil consisted of mottled yellowish-grey soil and contained local patches of thick iron pan. On the N and E sides the prevailing winds had caused drift deposits. On the E side these show a single, on the N no less than three vegetation levels (section B, squares F–H, section A, squares 1–3).

The edge of the barrow was surrounded by a very regular, circular, single widely spaced postcircle (diameter: 10.80) consisting of 12 round, sub-rectangular or trapezoidal postholes (mean diameter: 0.35, depth: down to 25.14–25.01+) at consistent intervals of 2.80 metres. In eight of the holes the post itself could clearly be seen as a dark round, occasionally roughly rectangular core (diameter: 0.18–0.22, and 0.20 × 0.24, 0.11 × 0.19) in the grey filling of the hole. The most Westerly posthole, with a fine rectangular post (0.11 × 0.19), had a narrow trench leading to it from the NE. Several stakeholes were observed in the SW, and two in the NE.

At the centre of the barrow nothing was found to indicate a burial, except a few scraps of charcoal on the old surface. Probably there was an inhumation at surface level. In the NW quadrant against the crossbaulk was a small (secondary?) grave pit (length: 0.93, width: 0.46) with a distinct coffin (length: 0.87, width: 0.20, depth: down to 25.61+), in which nothing was found. Its dimensions argue for its having been a child's grave; its SW part had been destroyed by one of the many rabbit burrows found in this tumulus.

Finally, mention must be made of a dubious patch of grey sand in the NW quadrant and a small charcoal-filled pit in the SW quadrant (no 38).

After completion of the excavation the barrow was restored and creosoted posts were placed in the postholes.

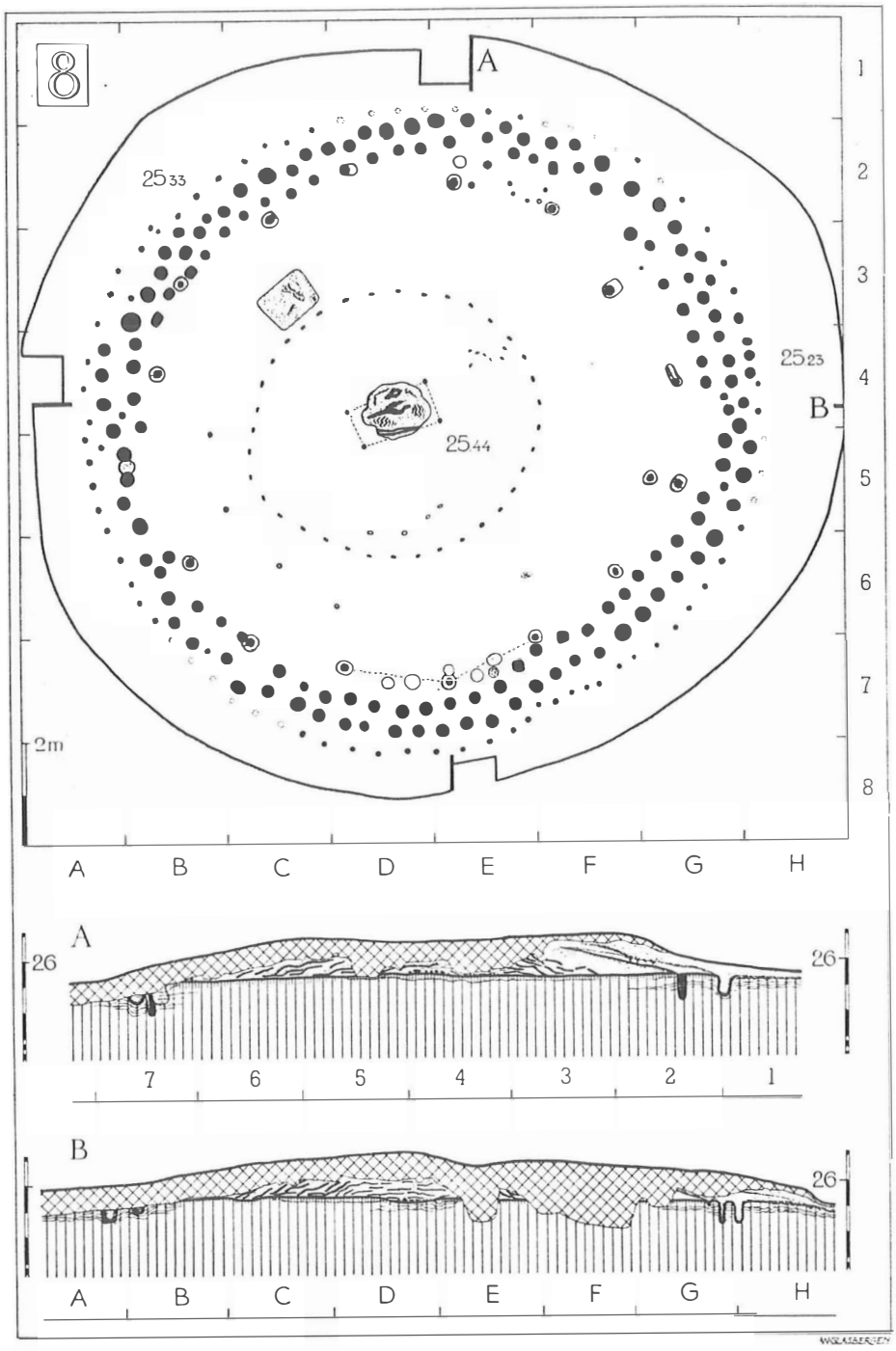


Fig. 16

TUMULUS 8

two-period barrow, with temporary single closely spaced stakecircle, definitive single widely spaced postcircle (Period 1), and with double closely spaced postcircle with external stakecircle (Period 2)

Tumulus 8 (figs 16, 66: 8, 70-1, Pl. XIII: 1–2, Pl. XIV), which measured some 13 metres across, was 0.86 metres high (top: 26.56, floor: 25.70+). Besides damage resulting from the 1944 tank practice it had been seriously damaged by deep ploughing for afforestation purposes. Nearly everywhere the mound had been turned over to a depth of some 0.50 metres below its surface. In several places, moreover, deep recent disturbances reached well into the subsoil. These have not been marked on the ground plan reproduced, as they could only impair its clarity.

The mound consisted of a core of clearly outlined inverted sods banked round with finely preserved sods with peaty humus layers coloured a deep black. Streaks of yellow soil occurred between sods. The primary mound had finally been smoothed over with yellowish-brown sand. On the N side the original slope was marked by a clear primary vegetation layer meeting the old surface level at the exact spot where a posthole of the primary circle was marked in the section (section A, square 2). Above this vegetation layer an extension of the mound was visible, the secondary, capping mound, corresponding to the second construction period (section A, squares 2–3). The tumulus was situated on a clearly podsolized old surface, showing as a distinct humus band and a leaching layer containing some heavy infiltrations, with secondary iron pan precipitation. This podsolization is thus seen to have been much heavier than for tumuli 5–7. In view of the difference between the sods of the core, which have the same podsolization as the old surface, and those of the periphery of the primary barrow the latter must have been cut in a different place, probably in the low-lying area S of the tumulus, where the fens used to be. [5] The subsoil consisted of slightly mottled orange-yellow soil, pointing to a vegetation of scrub at some time before the construction of the barrow.

The edge of the barrow clearly showed several rings of posts, corresponding with the two periods of construction deduced from the sections.

The primary barrow, *period 1*, was surrounded by an irregular single widely spaced postcircle (diameter: 10.00–10.90). It consisted of 16 postholes of round to roughly rectangular shape (diameter: 0.24–0.40, depth: down to 25.22–24.93+, with the exception of the two opposing postholes in squares A/B–5 and G–4, which both go down to 24.80+). In almost every case the round to oval post core was visible (mean diameter: 0.15). The intervals varied from 1.80 to 2.20 metres. A sod could be seen in the filling of the oblong posthole (square G-4, 0.18 by 0.46, down to 25.10+), which had its post in a still deeper part of the pit on the S side (down to 24.80+). It is evident that the two deeper postholes formed a peculiar feature. Possibly they carried correspondingly higher posts. On the E side an extra posthole (down to 24.99+) was found outside the circle, 0.36 from one of the posts (square G–5). The same phenomenon occurred on the N side (square E–2), and two further sets of two intermediate postholes each, and a single charcoal-filled hole occurred between the three Southern postholes of the circle itself (squares D/E–7). These intermediate postholes evidently indicated a blocked entrance. At some time another small hole had been dug through the Southernmost posthole (section A, square 7). Finally, mention may be made of some enigmatic irregularly placed stakeholes between two Northern postholes (diameter: 0.05–0.14, one of them filled with charcoal).

At the centre of the barrow was the primary grave. It was a shallow, somewhat basin-shaped depression in the old surface (length: 1.30, width: 1.10, depth: down to 25.43+), filled with charcoal (no 49), ashes and two heaps of cremated bone (no 48).

A striking feature were the large charcoal shells in the grave pit: remains of charred, half-burnt piles, the unburnt cores of which had decayed. Round about the grave charcoal fragments lay everywhere scattered over the old surface. The grave itself, as in tumulus 5, was situated within four stakeholes (diameter: 0.06–0.10, depth: down to 25.51–25.29+), placed almost in a rectangle (1.60 by 0.80). The South-Easterly of these stakeholes was filled with charcoal. None reached up into the mound itself. We may again think of a temporary construction, a mortuary house, pulled down before the mound was piled up. The mortuary house had its main axis WSW and ENE.

A quite unexpected phenomenon, underlining the magical nature of the timber circle, was the discovery of an oval stakecircle (diameter: 5.20–5.80), once again oriented WSW and ENE (Pl. XIII: 1–2). It consisted of a single row of small, fairly closely spaced, extended oval to sub-rectangular stakeholes (mean diameter: 0.04 × 0.08, depth: down to 25.43–25.32 +) in the space between the grave and the postcircle around the edge of the barrow. The intervals between these stakeholes were 0.50 metres. Here, too, it could be shown that they did not continue into the mound. They must, therefore, have formed a *temporary* stakecircle, perhaps carrying a wattled fence, which, before the construction of the mound, surrounded the mortuary house, and was removed together with it. Several of the stakeholes contained scraps of charcoal which probably slipped in after the fence had been removed. Within the stakecircle a number of irregularly placed small stakeholes occurred on the S and NE sides, whilst on the SW side four round, charcoal-filled stakeholes (diameter: 0.09, intervals: c. 1.50), arranged on a slight curve, came to light between the temporary and the definitive circles. In the NW, finally, just beyond the stakecircle, a large grey stain was found (length: 1.06, width: 0.76) containing some charcoal.

The secondary barrow, *period 2*, corresponding with the secondary enlargement of the mound visible in one place in the section (section A, squares 2–3), was surrounded by an irregular, oval, double closely spaced postcircle (internal diameter: 10.00–11.20) composed of more or less round, oval, or roughly rectangular postholes (mean diameter: 0.26, depth: down to 25.36–24.99+). On the W side this circle coincided with the primary one. In two cases a posthole of the secondary postcircle was found to intersect a posthole of the primary circle (squares A/B–5, C–6/7). The orientation is the same as for the primary monument (WSW and ENE) but the wind-caused North-Easterly shift of the apparent barrow centre has caused a similar shift in the position of the circle. The majority of postholes showed considerable iron pan precipitation (Pl. XIV) going deep down into the subsoil, and absent only in part of the inner row on the SE side. On the W side the circle was single instead of double over a distance of 2 metres, probably on account of an entrance blocking. The postcircle was surrounded by a closely spaced ring of stakeholes (mean diameter: 0.10, depth: down to 25.33–25.09+). As a result of the deep ploughing at the edge of the barrow a number of these stakeholes, on the SW, E and NE sides, could not be located.

A grave belonging to this period was not found, and could hardly be expected on account of the damage done by the plough.

After the excavation had been completed the barrow was replaced, creosoted posts being placed in the postholes of the primary, widely spaced postcircle.

TUMULUS 8A

two-period (?) barrow, with one double and one triple (?) closely spaced postcircle

Tumulus 8A (fig. 17), as has been observed, was not discovered until the autumn of 1949 when the ploughing up of the '*Groote Aard*' revealed a circular patch of dark soil at the surface, on the N edge of which cremated bone came to light. The barrow itself

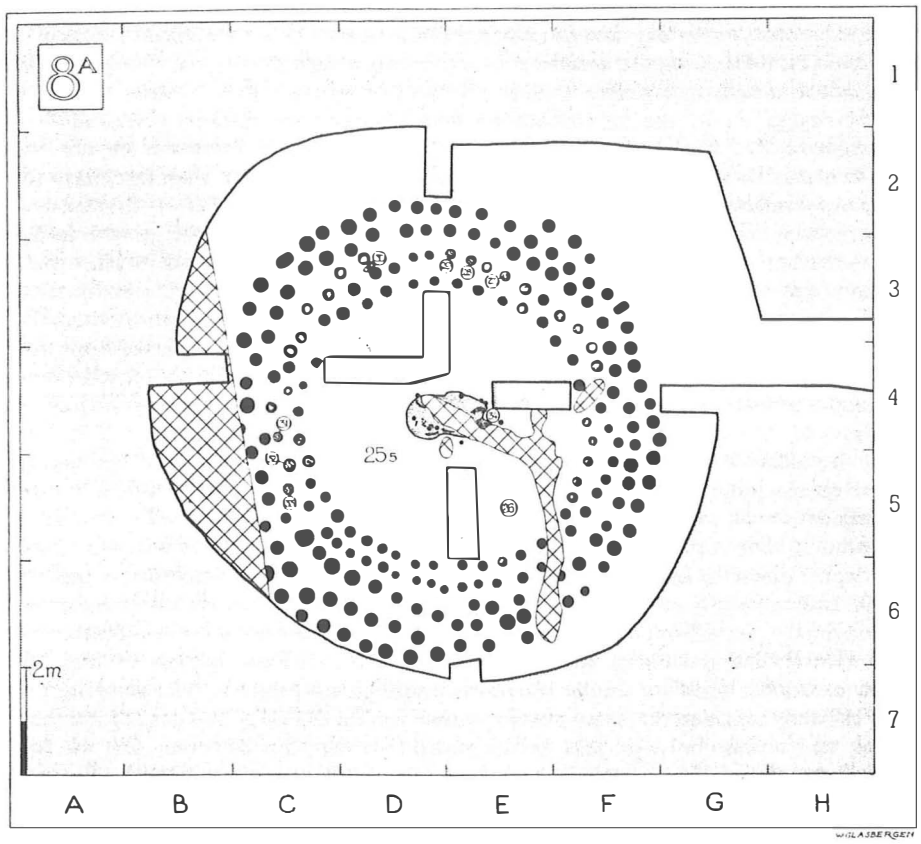


Fig. 17

had been completely levelled, so that nothing can now be known about its original height, which cannot, however, have been considerable. Only at a few points, *e.g.* on the N side, was it possible to determine that the barrow, which was probably a very low one, had been built from distinct sods on an old ground surface (c. 25.65+) of very clear podsolization, showing itself as a grey band of leached sand. This surface was further accentuated at one point on the S side by a thin layer of charcoal particles, presumably originating from the pyre. Such sections as could be made were, however, of too slight a value to be drawn.

A slightly oval, quadruple — in places, on the SW, NW and NE sides, even quintuple — postcircle with NW and SE orientation marked the original edge of the barrow. In

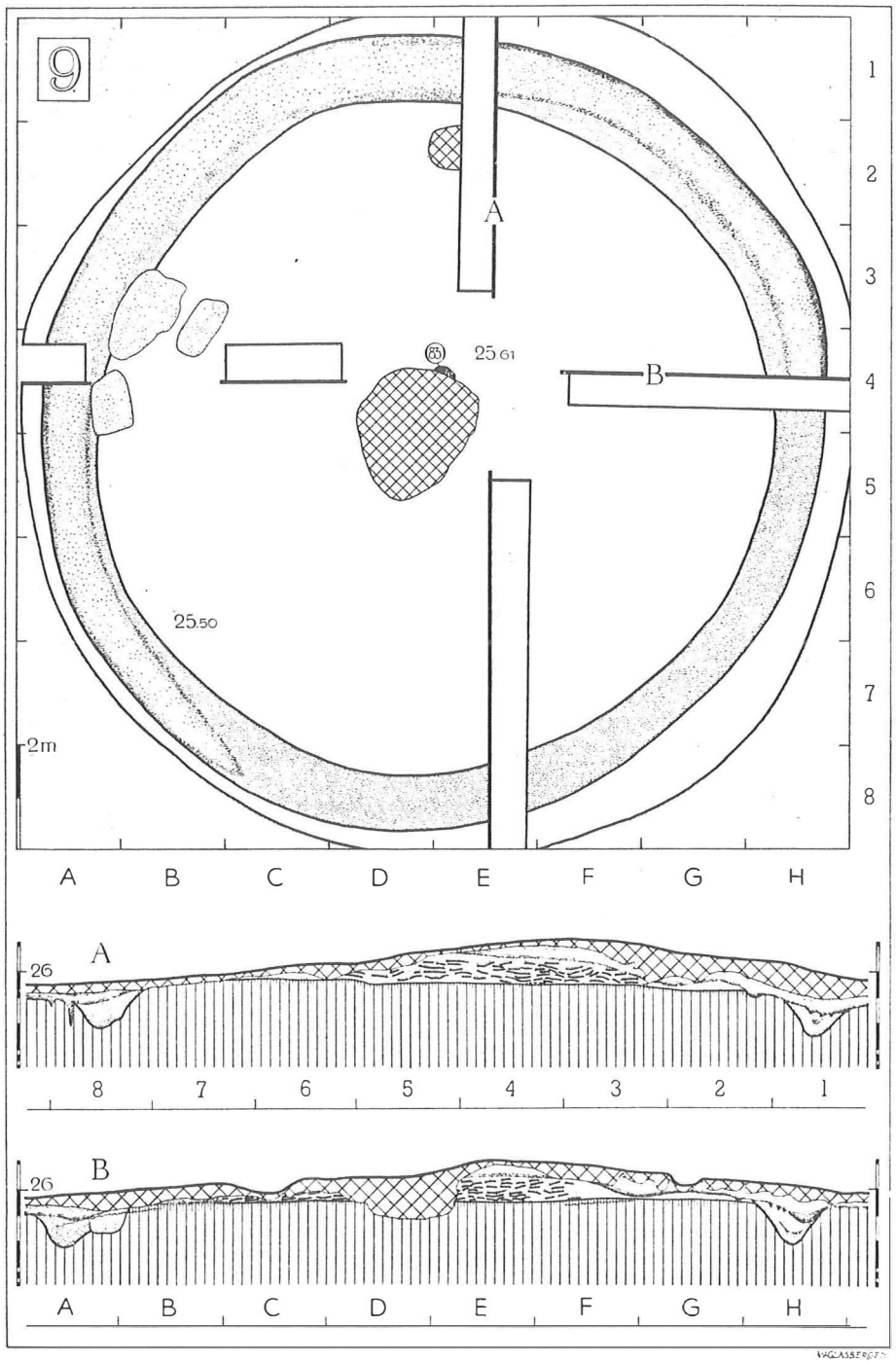

9
A
B
25.61
25.50
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
8 7 6 5 4 3 2 1
B
26
A B C D E F G H

Fig. 18

the postholes of the outer two or three rows (mean diameter of postholes: 0.24, depth: down to 25.30–24.97+) considerable iron pan precipitation occurred. The postholes showed up as round to more or less oval patches in the yellowish mottled subsoil; two were fairly rectangular. The two inner rows (mean diameter of postholes: 0.20, depth: down to 25.33–25.19+) contained a grey filling. In at least 25 of the round to oval postholes of these rows were found scraps of charcoal, showing that the posts may have been purposely charred, probably to make them last longer. In three of the postholes in the NE quadrant fragments of cremated bone (nos 27, 28 and 29) were found. The same was the case with three postholes lying in a row in the SW quadrant (nos 31, 32 and 33). These cremations may have been deposited in the postholes, against the posts.[6] Remnants of cremations (no 35) were already found dispersed over the surface of the NE quadrant before excavation. Finally a cremation (no 30) was found between two postholes in the NW quadrant, at one of the spots where the postcircle had the appearance of being quintuple.

At the centre of the postcircles the primary grave was found, showing as a grey, fairly oval, bowl-shaped E–W excavation in the old surface (depth: down to 25.44+). Unfortunately it was heavily damaged by a rabbit burrow which also destroyed several postholes in the SE quadrant. Fragments of charcoal belonging to the pyre lay scattered throughout the grave filling, and at its Eastern extremity a small heap of cremated bone (no 34) was found. Nine stakeholes were irregularly spaced in and on the edge of the grave. In two cases, two had been paired together. They do not show any regular plan; probably they formed part of a temporary protection of the interment, before the construction of the barrow was undertaken.

The postcircles may represent two constructional stages. In that case there would be a primary double closely spaced inner circle (internal diameter: 5.30–5.60) and a concentric secondary, triple outer circle (internal diameter: 6.80–7.40). The local duplications of the post rows, as in the outer circle in the NE quadrant and the straight stretch, 2.70 metres long, in the E side of the outer circle (squares F–3/4), may conceivably be due to an entrance blocking.

A grey stain found in the subsoil of the NW quadrant, against the E–W crossbaulk (squares C/D–3/4), was natural.

Apart from the rabbit burrow already mentioned, recent damage was caused by a wide and deep ditch on the W side, running N to S, which had destroyed a number of postholes of the outer postcircle.

A single sherd, find no 26, was recovered from the floor of the barrow (wall sherd of plain greyish-brown, very gritty ware, thickness: 0.008).

TUMULUS 9

with bank and ditch

Tumulus 9 (figs 18, 42*c*), which measured some 16 metres across, was 0.80 metres high (top: 26.55, floor: 25.75+). Its upper surface had been entirely ploughed up in afforestation, and the mound was especially damaged on the S and W sides. It had been built from clearly visible inverted heather sods on a fairly even, finely podsolized old surface with clear humus band and a leaching layer which contained a heavy infiltration vein and had begun to turn into a slight secondary iron pan. The mottled subsoil was dark orange in colour.

The barrow was surrounded by an irregularly circular ringditch of V-shaped profile (internal diameter: 11.75–12.00, width: 0.88–1.30, depth: c. 0.80, on the S,

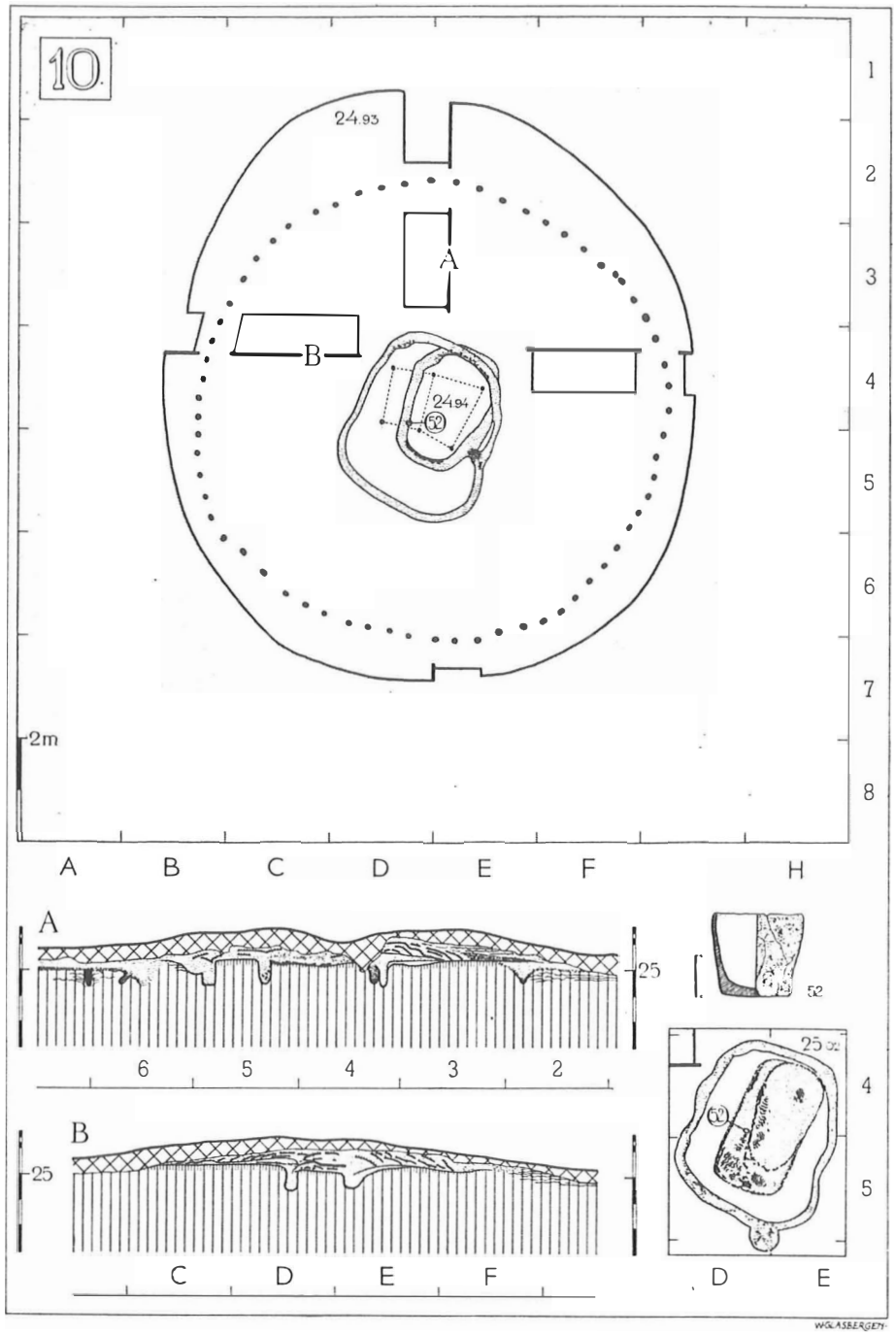

10
24.93
A
B
24.94
60
2m
1
2
3
4
5
6
7
8
A B C D E F H
A
25
6 5 4 3 2
52
B
25
C D E F
25.02
60
4
5
D E

Fig. 19

E and W sides down to 24.93–24.89+, on the N side — where the old surface shows a gentle slope — to 24.73+). On the SW, N and E sides especially, there was strong iron pan precipitation in the ditch. In the sections, particularly on the N and E sides, it could clearly be observed how the soil excavated from the ditch surrounded the edge of the actual tumulus (diameter: c. 7.50 metres) as a low bank (height: 0.20, width: c. 1.80). The iron pan of the modern podsol band gave added emphasis to this fact. A striking peculiarity was the presence under this bank of the podsolized old surface: sod cutting for the piling up of the barrow did not apparently take place here, as it did in other instances.

The central interment had been destroyed almost completely by a large and deep recent disturbance — only the Northernmost tip, a small patch of charcoal (no 84), had escaped. From it were recovered some fragments of a vessel (no 83, fig. 42*c*), most of which must have been destroyed and removed when the disturbance was dug. These sherds could be fitted together to form two sizable fragments of the base of a medium-sized pot (base diameter: c. 0.105, wall thickness: c. 0.01), two wall fragments and three shoulder fragments. Coarse, uneven, and of gritty texture, they were brownish-grey on the inside, a reddish brown on the outside, crackled on both sides. The shoulder fragments were decorated with one (or more?) horizontal rows of dotted circles (diameter: 0.006, intervals: c. 0.015) made with a small tube (reed or tubular bone?). Together with these pottery sherds were found some fragments of cremated bone (no 83*a*). Charcoal particles were found scattered on the old ground level at the centre of the barrow.

Three discolorations on the NW side, in and along the ringditch, probably represented very old disturbances in the monument. A further, recent hole on the N side must finally be mentioned.

After excavation the barrow was restored, complete with ringditch and bank.

TUMULUS 10

with circle of close-set stakes

Tumulus 10 (figs 19, 42*b*: 52, Pl. XII: 1), which measured some 9 metres across, was 0.60 metres high (top: 25.82, floor: 25.22+). The upper layers of the mound had been entirely ploughed up in afforestation; besides this only a few small recent disturbances were observed. The mound was composed of inverted sods, black in colour, piled on a podsolized old surface. The latter could be seen as a fairly uneven, dark brownish-grey layer of leached sand, above which ran a narrow band of faint grey humus. The subsoil once again consisted of dark brownish-yellow mottled sand. On the N side a secondary addition of brownish-yellow sand with infiltration veins lay against the original slope, marked by a clearly defined vegetation band. On the S and E sides a wind-blown accretion once again indicated the prevailing S to W winds.

The original foot of the barrow was marked by a not quite circular single closely spaced stakecircle (diameter: 8.90) consisting of 65 round, oval or rounded rectangular stakeholes (average diameter: 0.09, depth: down to 24.72–24.61+) with as a rule strong secondary iron pan precipitation. The intervals between the individual stakeholes averaged some 0.40 metres; on the E side two additional irregularly placed stakeholes occurred.

In the central area was a shallow bowl-shaped depression, rectangular in shape with rounded corners, and oriented SW and NE (length: 2.68, width: 1.40, depth: down to 25.06+). Lying in the old surface, it was filled with charcoal (no 51), ashes, orange-brown burnt sand, and cremated bone (no 50), the latter scattered at the W side except for some

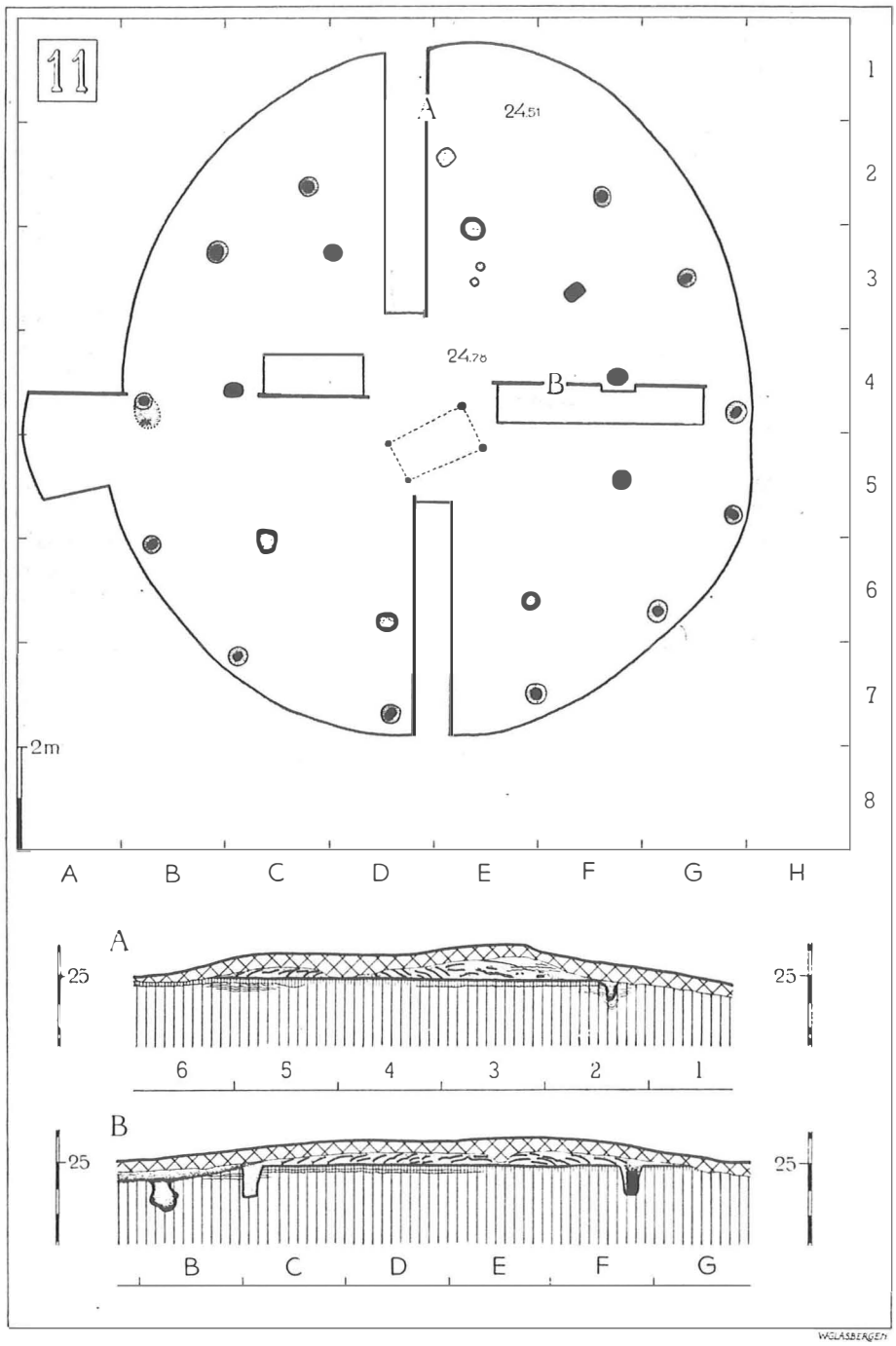

11
A
24.51
24.76
B
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
25
6 5 4 3 2 1
B
25
25
B C D E F G

Fig. 20

skull fragments (no 50*a*) found together in the SE corner. Not far W of the centre, among the charcoal, was recovered a crushed, fairly thin-walled (c. 0.007) bucket-shaped pot (height: 0.079) of very coarse, uneven, partly crackled, greyish to ochreous-brown ware tempered with sparse quartz grits (no 52, at 25.08+). Its rim and base were somewhat oval in section (0.088 by 0.08 and 0.063 by 0.058 respectively). Above the remains of the pyre a small mound of grey sand was thrown up, against which the sods were piled. The interment was surrounded by a fairly irregular, roughly trapezoidal, flat-bottomed narrow ditch (2.40–2.90 by 3.00–3.40, width: c. 0.20, depth: down to 24.71+), the yellow upcast having partly been thrown outwards over the old surface. Its filling consisted of greyish-yellow sand and sods. On the S side an adjacent pit showed clearly in the section (section A, squares 5/6, diameter: 0.56, depth: down to 24.90+).

After the removal of the interment a second surrounding ditch was found (2.04 by 1.44, width: c. 0.20, depth: down to 24.78–24.73+), which had until then been obscured. The shape of this ditch was a flattened ovoid; on the N side it seemed to be intersected by the larger surrounding ditch already described. Within the inner ditch four stakeholes appeared (diameters: 0.06, 0.05 by 0.08, 0.08, 0.06 by 0.09, depth: down to 24.85–24.69+), arranged more or less in a trapezoid (base: 1.30, height: 0.90). W of these, in the space between the two ditches, two further stakeholes were found (diameters: 0.08, 0.05 by 0.09, depth: down to 24.85–24.83+). It is possible that the two latter belonged to the same construction as the other four. It may be supposed that the features described are connected with the burial ritual. The stakeholes could then have contained supporting stakes of a pyre surrounded by ditches. The grey, sand-filled depression in the patch of charcoal and cremated bone approximately coincided with the inner ditch; on the Southern inner lip of this ditch, and also at its Northern side, quantities of charcoal were found to have slipped in.

In spite of the secondary addition on the N side the barrow does not appear to have been of two periods.

After the excavation the barrow was restored, creosoted stakes being placed in the stakeholes of the circle.

TUMULUS 11

two-period barrow, with two single widely spaced postcircles

Tumulus 11 (figs 20, 66: 11), which measured some 10 metres across, was 0.66 metres high (top: 25.62, floor: 24.96+). Its upper layer had been completely ploughed for afforestation purposes. The mound had been piled up from deep black inverted sods on a somewhat uneven but extraordinarily well-developed old ground surface with a thick deep black humus layer, grey leaching layer, and below this a band of secondary iron pan precipitation. On the N side the sod core had been smoothed over with brownish-yellow sand containing fragments of charcoal (section A, square 3): probably this was a secondary addition corresponding to the second construction period. The subsoil was strongly mottled.

The barrow was surrounded by two non-concentric single widely spaced postcircles, the outer of which showed a slight Eastward displacement owing to a wind-caused shift of the apparent barrow centre.

The inner postcircle (diameter: 7.50) was composed of 9 round, oval or roughly rectangular postholes of widely varying size (diameter: 0.30–0.47, depth: down to 24.34–24.20+) in most of which iron pan had precipitated. Very occasionally an oval or sub-rectangular core (diameter: 0.22–0.38) was visible. The quite irregular intervals varied from 1.80–3.30; a closer spacing on the E side probably indicates an en-

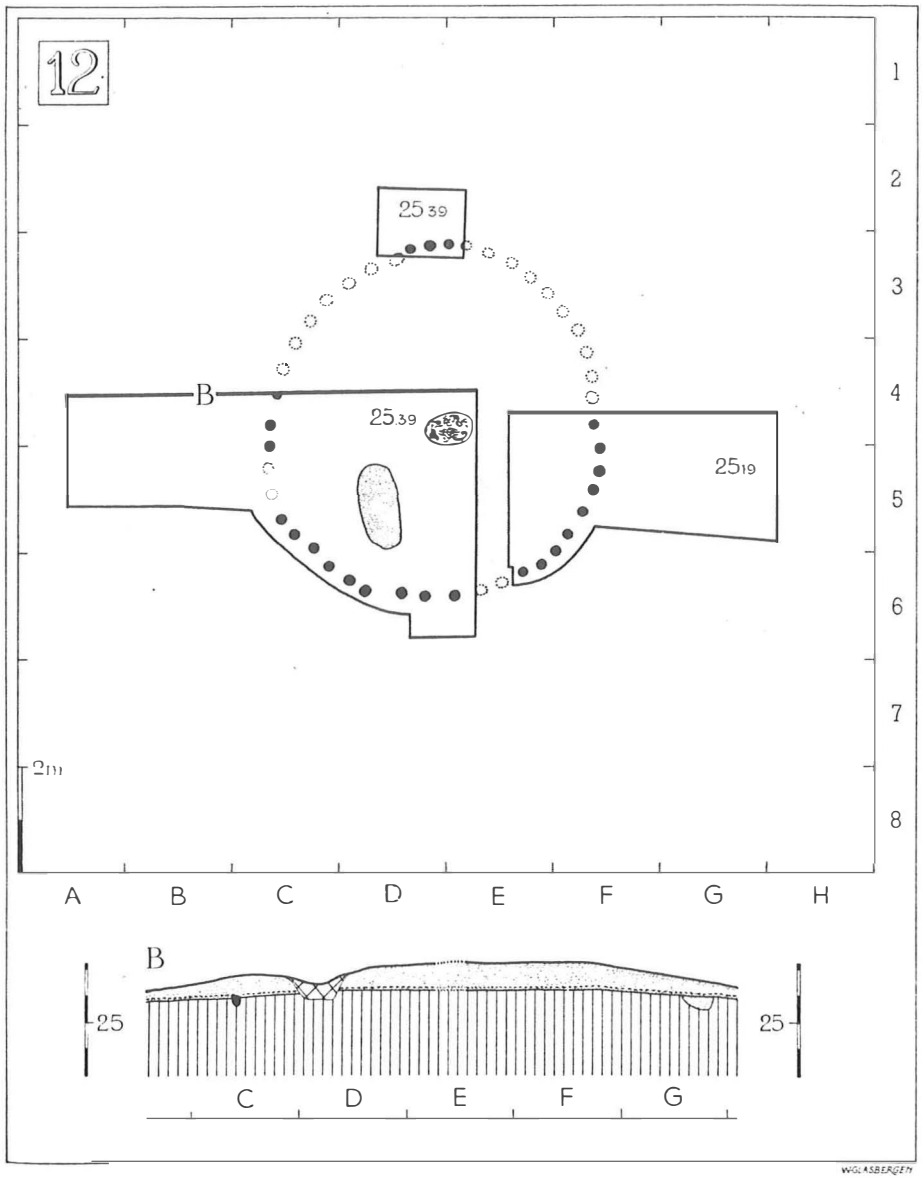

12
2539
B
2539
2519
211
1
2
3
4
5
6
7
8
A
B
C
D
E
F
G
H
B
25
25
C
D
E
F
G
WIGLASBERGEN

Fig. 21

trance. In a number of cases the postholes were found to have been filled in with sods.

At the centre was an approximate rectangle (1.60 by 0.82/0.90), lying SW and NE and consisting of four round stakeholes. The two Easterly holes were larger than the Westerly (0.16/0.17, depth: down to 24.45/24.36, and 0.12/0.13, depth: down to 24.47/24.50+ respectively). The Easterly stakeholes, moreover, had separate cores (0.05/0.06 and 0.08/0.09), the South-Easterly being filled with charcoal. As the stakehole under the E–W crossbaulk showed that the hole did not continue upwards into the mound, here, as in tumuli 5 and 8, we must have a temporary mortuary house, intended to shelter the remains of the deceased before the barrow was piled up. No trace was found of an interment, but an inhumation at surface level seems possible.

The outer postcircle (diameter: 11.00–11.60) consisted of 13 postholes, round to oval, and in one case roughly rectangular (diameter: 0.31–0.42, depth: down to 24.33–24.08+); they mostly contained distinct round, oval or sub-rectangular cores (diameter: 0.17–0.26), in spite of the fact that in the majority of cases iron pan had precipitated in the hole. Charcoal occurred in a number of postholes: probably the posts had been charred to prevent rotting. The intervals varied from 2.00 to 3.20 metres. The closer spacing on the E side again suggests an entrance. A grave belonging to this second period was not found.

Already from the start our attention had been drawn by the posthole in the E–W section (section B, square B). At c. 24.59+ this round hole had a diameter of 0.31, but at deeper levels it widened progressively. On removing the filling it was found that a large underground hole had been purposely excavated. As a result an oval hollow (0.72 by 0.46) must temporarily have existed underground, S of the posthole, which was filled again with grey sand before the post was placed in position. In this filling some fragments of cremated bone were found (no 53). Two small postholes on the N side, within the inner postcircle, may finally be mentioned.

After the excavation had been completed the barrow was restored, creosoted posts being placed in the postholes of the inner circle.

TUMULUS 12

with single closely spaced postcircle

Tumulus 12 (fig. 21), which measured some 11 metres across, was 0.50 metres high (top: 26.11, floor: 25.61+). As permission could not be obtained to cut all the firs on it, excavation was confined to the SW and SE quadrants, while the N edge was investigated by means of a test pit. The mound consisted of mottled grey and yellow sand with no trace of sods. No podsolized old surface was found under it anywhere; like tumulus 18, to be described hereafter, it was apparently situated on a plot of prehistoric arable. No plough markings were found in the subsoil. As no podsol was found over the barrow it may well have been covered with trees since time immemorial.

A single closely spaced postcircle (diameter: 6.20–6.60, diameter of postholes: c. 0.20, depth: down to 25.33–25.26+) showed faintly under the edge of the barrow. It probably marked the original edge of the monument. On the SW side a straight section possibly represented an entrance blocking. On the W side two postholes could no longer be found, the soil having been excavated too deeply in making a trial trench.

Near the centre was a small oval basin-shaped pit, oriented E and W (length: 0.92, width: 0.60, depth: down to 25.61+), filled with charcoal (no 85*a*) and cremated bone (no 85*b*). SW of this was found an oblong patch of grey sand (length: 1.58, width: 0.75, depth: down to 25.21+) the meaning of which was not clear.

After excavation the tumulus was restored to the shape in which it had been found.

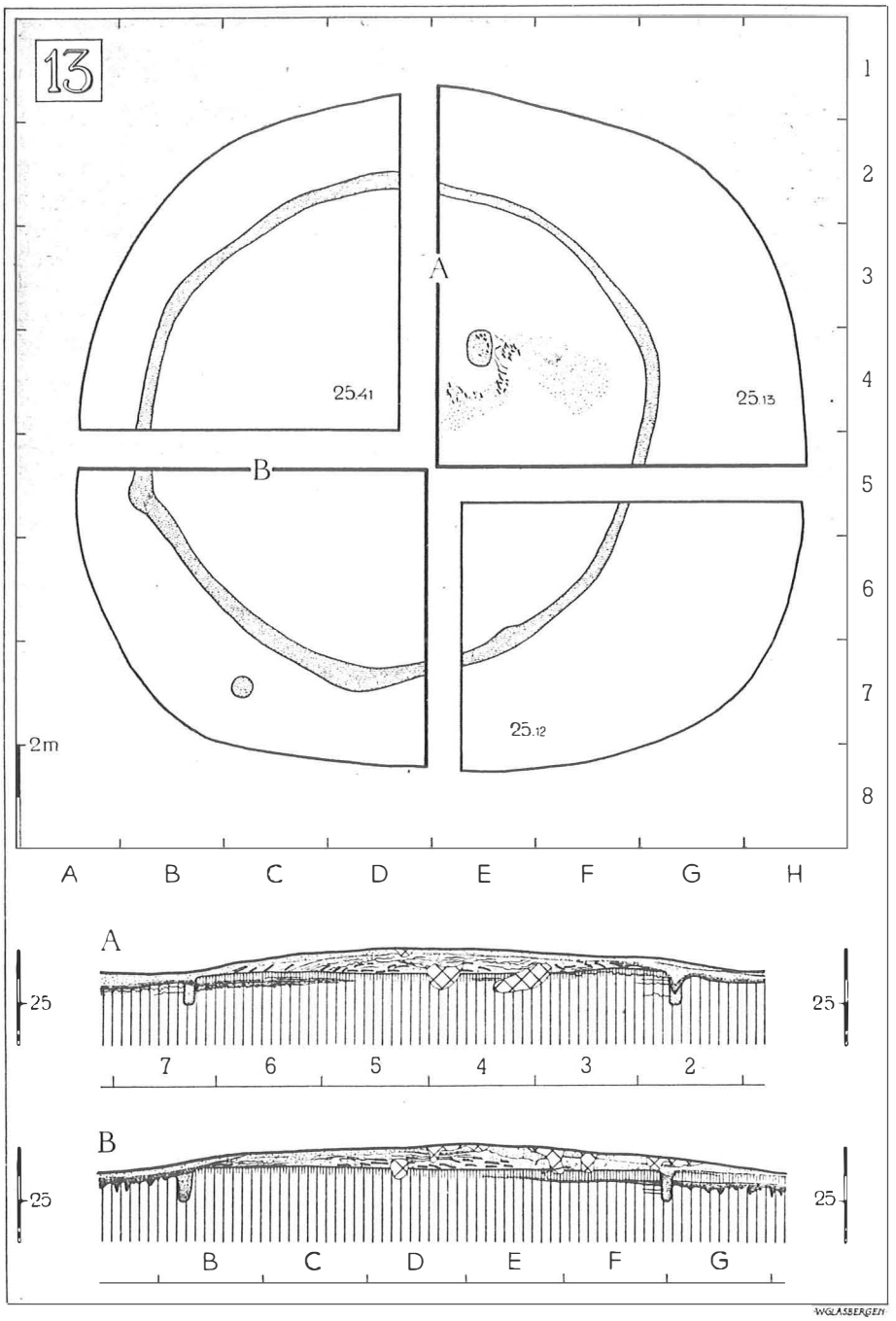

13
1
2
3
4
5
6
7
8
A
B
25.41
25.13
25.12
2m
A B C D E F G H
A
B
25
25
25
25
7 6 5 4 3 2
B C D E F G
W.GLASBERGEN

Fig. 22

TUMULUS 13

with ringditch

Tumulus 13 (fig. 22), which measured some 13 metres across, was 0.48 metres high (top: 26.04, floor: 25.56+). The mound mainly consisted of sand, with a few indistinct inverted sods, and was situated on a well-podsolized old surface. The latter consisted of a grey leaching layer, locally topped by a quite clear humus band. The mound itself contained numerous infiltration veins; it was mainly composed of yellow to greyish-brown mottled sand. Below the leaching layer of the old surface a secondary iron pan had precipitated on the S, E and N sides. The subsoil consisted of brownish-yellow sand, strongly mottled, indicating a scrub vegetation at some time before the tumulus was built. The mound had been damaged by a number of recent disturbances and by several rabbit burrows.

At its edge the barrow was surrounded by a narrow roughly circular ditch (internal diameter: c. 9.30, width: 0.16-0.48, depth: down to 24.98–24.96+). On the N side a lenticle of excavated yellow soil was found lying on its inner lip, on the old surface, as is shown in the section (section A, squares 2/3). Iron pan had precipitated right down to the flat bottom of the ditch.

No interment was found in this tumulus. Possibly a burial at surface level went unnoticed.

A large irregular stain of leached sand, containing charcoal particles, must date from before the construction of the barrow. Similar stains, of natural origin, also occurred beneath tumuli 15 and 16. In the present case the stain is intersected by a rounded rectangular pit (length: 0.68, width: 0.48, depth: down to 25.02+) filled with grey sand.

After the excavation the tumulus was restored and the ditch marked.

TUMULUS 14

with single widely spaced postcircle

Tumulus 14 (figs 23, 66: 14, Pl. XXII: 1), which measured some 15 metres across, was 0.72 metres high (top: 26.42, floor: 25.70+). It had been built from inverted sods,[7] which showed up very distinctly in the sections. In contrast with tumuli 13, 15 and 16, it lay on a fairly even well-podsolized old surface with dark humus band and thick greyish-white leaching layer, below which ran a heavy infiltration vein. The mound itself showed numerous very thin infiltration veins, especially where the sod core had been smoothed over with sand. The subsoil was a strongly mottled brown to bright yellow sand. On the N and E sides a heavy wind-blown accretion was found covering the original slope, and in it a secondary vegetation layer showed very clearly. Except for the oblong pit (2.80 by 2.50 metres) in the centre of the barrow, in which Mr C. Sanders had buried a cow during the war, the tumulus had suffered no damage worth mentioning.

The original edge of the barrow appeared to be surrounded by a nearly circular single widely spaced ring (diameter: 11.50–12.40) of 20 round, oval or sub-rectangular postholes (mean diameter: 0.30, depth: down to 25.00–24.78, average: 24.86+). In five of those on the W side the post could be seen as a distinct round core (diameter: c. 0.21). In the postholes on the N side secondary iron pan precipitation had invariably occurred. The intervals varied from 1.80–2.00 metres, except for two greater intervals on the SE side (2.60, 2.40) and two smaller ones on the NE side (1.50, 1.60); these last two flanked a very large interval (4.80) in which an intermediate posthole occurred, placed slightly outside the true curve of the circle. This seems to imply an entrance blocking.

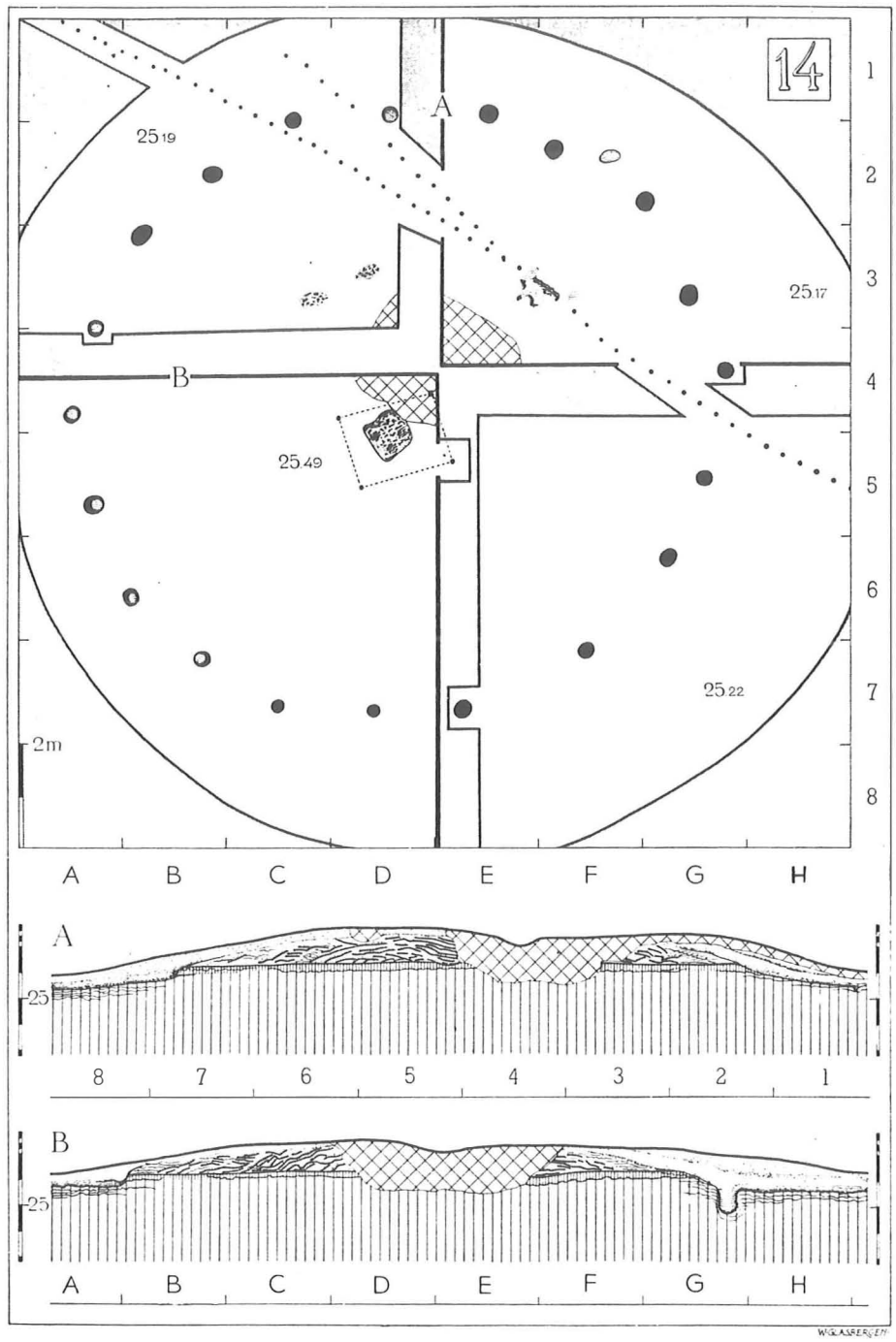

14
A
B
25.19
25.17
25.49
25.22
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
8 7 6 5 4 3 2 1
B
25
A B C D E F G H

Fig. 23

At the centre of the postcircle a roughly square depression, with curved corners, was found in the old surface (0.80 by 0.80, depth: down to 25.40+); the large recent pit just touched its NE side. It was filled with charcoal (no 69), ashes, red burnt sand, and cremated bone (no 70), the latter principally in three small heaps. The interment lay within a temporary mortuary house (1.80 by 1.40) of which only three of the four stakeholes could be located (diameters: 0.06, 0.06, 0.09, depth: down to c. 25.20+), that in the NE having been destroyed by the recent disturbance. Its orientation was WSW and ENE. Charcoal was scattered on the old surface round the cremation; some was found in the NW stakehole. The sod structure continued uninterrupted over the SE stakehole; this — as with tumuli 5, 8 and 11 — stresses the temporary character of the mortuary houses.

A slightly curved row of stakeholes (diameter: 0.05–0.06, intervals: 0.30–0.40, depth: down to c. 25.00+) was found running through the NE part of the tumulus in a direction from ESE to NW and having an additional branch to the NNW. The main row could be followed over a distance of 26 metres, on the NW side as far as 12 metres beyond the barrow. It was not possible to follow it far in a SE direction, or to trace the second row much beyond the junction, on account of the heavy iron pan precipitation of the podsol band of the modern heather vegetation beyond the barrow slope. The stakeholes must date from before the construction of the tumulus, as is shown by the fact that they do not continue in the mound itself and do not penetrate the old surface. Possibly they formed part of a prehistoric field boundary or game fence. Similar rows of stakeholes were also found beneath tumuli 20 and 21, to be described hereafter. Considering the direction of the rows and the situation of tumuli 14 and 21, it would seem fairly certain that both rows belong to one and the same system.

At the exact spot in the NE quadrant where the fence branches out was found an irregular patch of grey sand and charcoal (no 75), containing a small sherd (no 75*a*). This, too, must date from before the construction of the tumulus. Two oval depressions in the NW quadrant, filled with leached sand and charcoal particles, are possibly connected with these phenomena.

After excavation the tumulus was restored, creosoted posts being placed in the holes of the postcircle.

TUMULUS 15

with single widely spaced postcircle

Tumulus 15 (fig. 24, Pl. XV: 1–2, Pl. XVI: 1–2), which measured some 13 metres across, was 0.60–0.70 metres high (top: 26.00, floor: 25.30–25.40+). Part of the mound had been piled up from well-preserved inverted sods, [7] which, especially in the W half of the E–W section (section B, Pl. XV: 1, Pl. XVI: 1), [8] clearly showed the deep black humus layer and pure white leaching layer. It lay on a very uneven, strongly podsolized old surface. [9] On the W side, but especially in the S, secondary iron pan precipitation had occurred under the old surface at and beyond the edge of the barrow (Pl. XVI: 2). In some places natural depressions filled with leached sand and some charcoal particles were found in the subsoil, the humus band of the old surface continuing over them. The subsoil itself consisted of slightly mottled yellow sand. Streaks of yellow sand appeared in the centre among the sods, and the periphery had been smoothed over with brownish-yellow sand, especially on the E side. In this sand-covering many infiltration veins showed up. On the N and E sides a thick wind-blown accretion, containing a secondary vegetation layer, was the result of the prevailing South-Westerly winds. A number of recent disturbances had damaged the barrow, some penetrating to the subsoil.

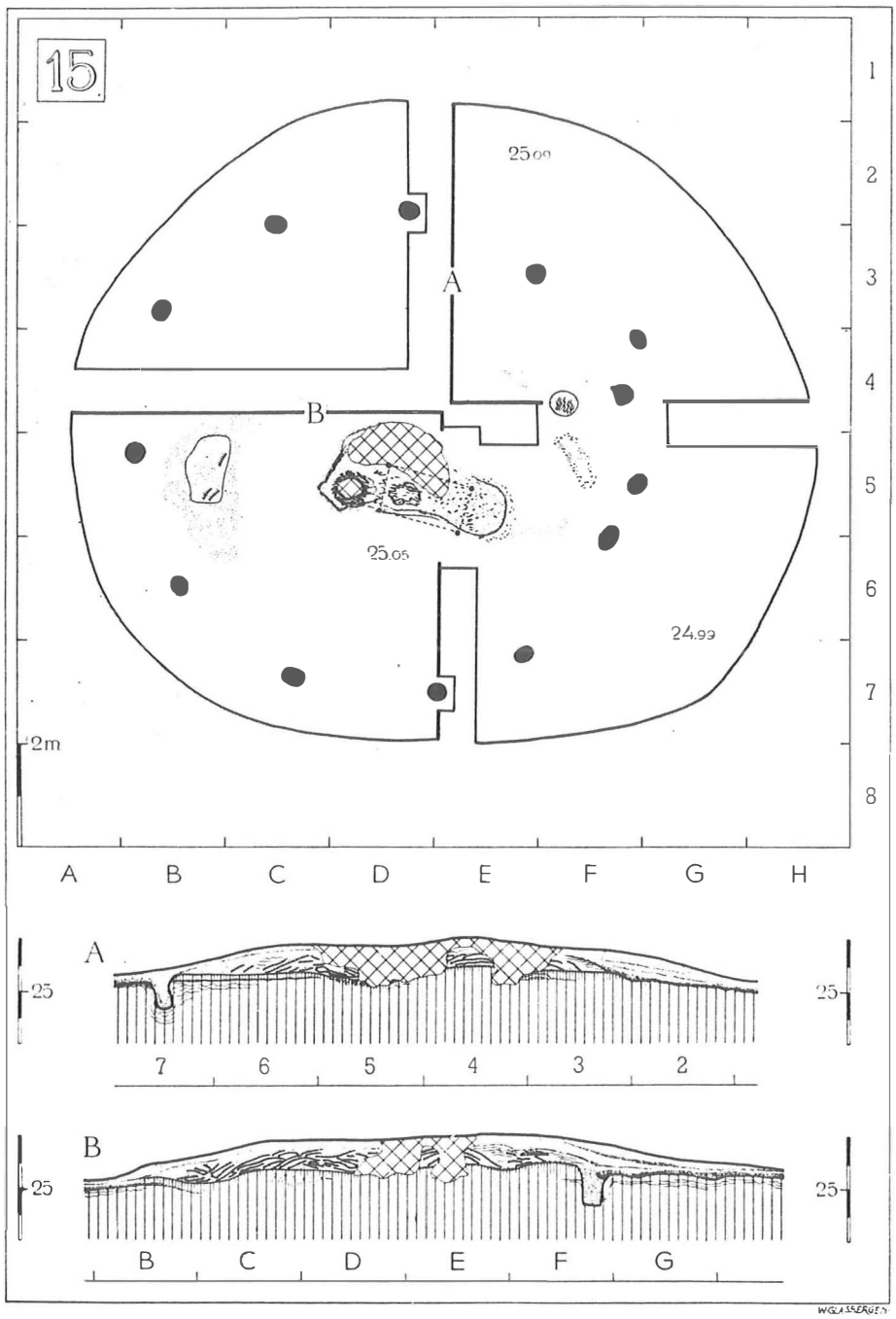

15
25.09
A
B
25.05
24.99
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
25
7 6 5 4 3 2
B
25
25
B C D E F G

Fig. 24

The original edge of the mound was surrounded by a single widely spaced postcircle (diameter: 9.20–9.90). This was oval in shape, with its main axis E and W, and consisted of 12 or 13 round, oval and sub-rectangular postholes (mean diameter: 0.40, depth: down to 24.65–24.39+). Iron pan had precipitated strongly in each of them, so that no separate cores could be distinguished (Pl. XVI: 1–2). The intervals were 2.80 on the W side, several irregularities occurring on the other sides. Apart from these, two postholes were apparently unconnected with the postcircle system. They may represent an entrance blocking on the E or SE side.

The primary grave showed as a large irregular patch of charcoal (no 64), situated somewhat to the S of the centre of the postcircle, and intersected by a large recent disturbance (Pl. XV: 2). The charcoal from the pyre seems to have been thrown into one of several irregular depressions filled with leached sand. In this charcoal filling (depth: down to 24.99+) was found a rectangle of four small stakeholes (1.56/1.64 by 0.90, diameter of stakeholes: 0.08–0.10), oriented WNW and ESE. A cremation was not found in or about this mortuary house; possibly it was destroyed and removed as a result of the recent disturbance.

In the E–W baulk (square F–4, section B, square F) an oval patch (0.46 by 0.56) containing much charcoal and some cremated bone (no 67) was found some 30 centimetres below the surface of the mound (25.70+). Probably this was a secondary interment. A large natural hollow on the W side, filled with leached sand and charcoal particles (no 68), and two similar but smaller depressions NE of the grave may further be mentioned.

After excavation the tumulus was restored, creosoted posts being placed in the postholes.

TUMULUS 16

two-period barrow, with one single widely spaced postcircle and one circle of close-set stakes

Tumulus 16 (figs 25, 42*b*, Pl. XVII: 1–2), which measured some 10 metres across, was 0.68 metres high (top: 25.92, floor: 25.24+). It had been built from clearly delineated inverted sods on a very uneven, well-podsolized old surface consisting of a black humus band, a greyish-white layer of leached sand, and a probably secondary iron pan.[10] Two phases of construction could be identified in the sections: (1) the central barrow, piled up from sods and smoothed over with sand, the original slope of the mound showing clearly, and (2) a secondary enlargement by means of sods, encasing the whole of the primary barrow. On the N side the secondary barrow rested on an intact old surface, the sods for the construction of the primary barrow having probably been obtained farther afield on this side. On the E and S sides the old surface was lacking under the barrow's edge, having apparently been cut away to pile up the primary barrow. The subsoil consisted of greyish-yellow to yellowish-brown mottled sand. Drift sand had collected on the N and E sides. As with tumuli 13 and 15, several depressions showed in the old surface under the barrow. They were filled with leached sand and charcoal particles, and were probably natural. The old surface continued unbroken over them.

Under the E–W crossbaulk (squares E/F–4/5, section B, square F) a large amount of charcoal (no 57) was found beneath the sand-covering of the primary barrow. On the S side (section A, square 5) among the sods under the talus of the primary barrow a small vessel was found (no 56, fig. 42*b*), at 25.44+, together with some cremated bone (no 56*a*). It had a fairly thin wall (c. 0.008), and consisted of coarse, copiously grit-tempered, ill-fired ware, crackled, and of a grey to brown colour (height: 0.082, base diameter: c. 0.075, rim diameter: c. 0.12). In many respects it resembled the small vessel (no 52) from tumulus 10.

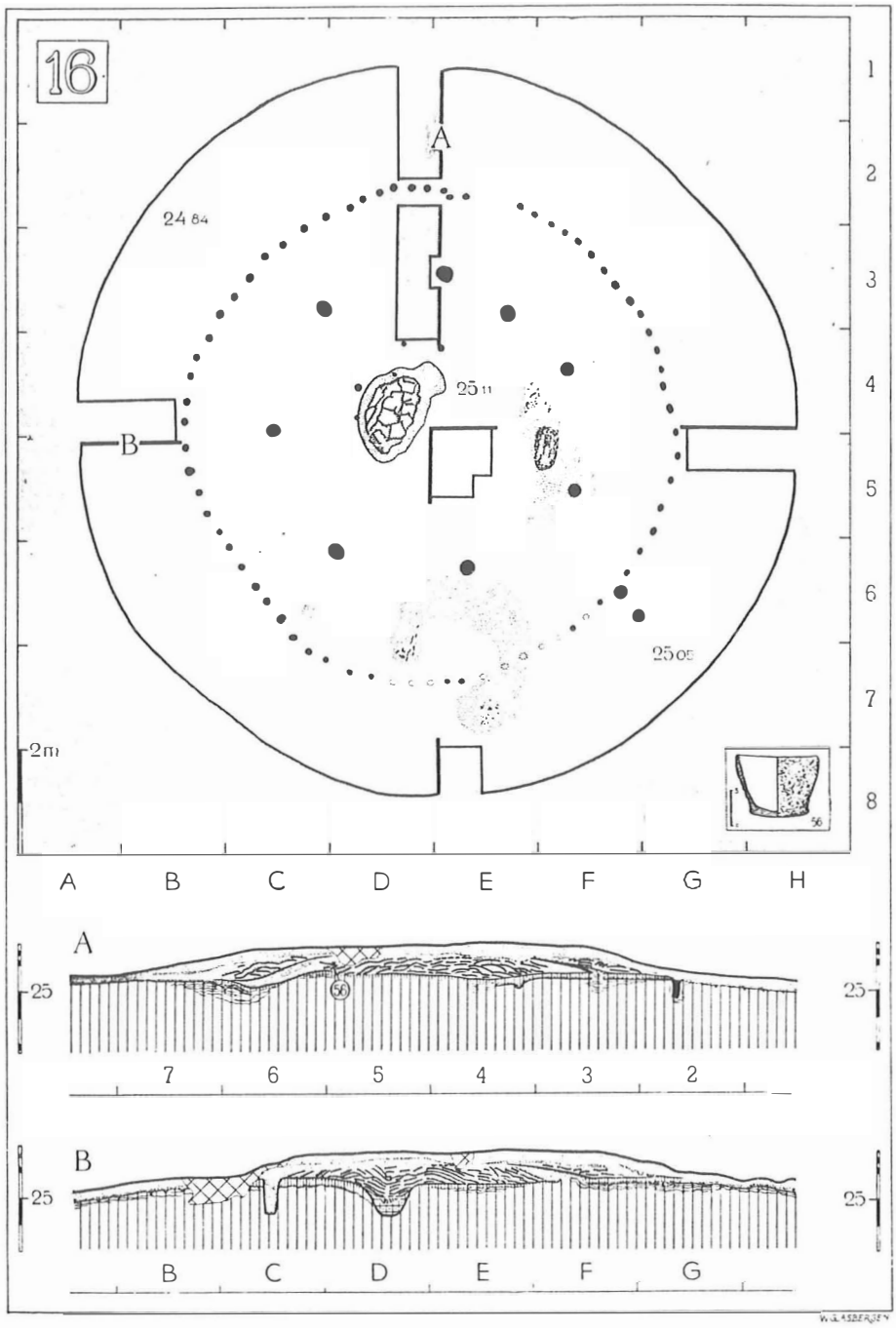

16
A
B
24 84
25 11
25 05
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
25
7 6 5 4 3 2
B
25
25
B C D E F G

Fig. 25

In the barrow two timber circles were found, viz.:

(1) A single, inner circle (diameter: 5.80) of eight widely spaced, round or oval to subrectangular postholes (mean diameter: 0.27, depth: down to 24.71–24.55+, except for an intermediate posthole on the NE side, going down to 24.86+) with only a single case of secondary iron pan precipitation. The intervals varied from 2.40 to 2.60, except for the shallower, intermediate posthole on the NE side. The latter is a good example of a blocking post.

(2) A single closely spaced outer ring (diameter: 9.20) of round or oval to roughly rectangular stakeholes (mean diameter: 0.12, depth: down to 24.94–24.80+), forming a fairly true circle except for a flattening on the SW side. Secondary iron pan precipitation was observed in nearly every hole. The intervals between the stakeholes varied from 0.40 to 0.50. On the N side a single stakehole lay slightly to the inside of the true line, and on the SE side outside the ring occurred two large postholes the meaning of which is not clear. As a result of the deep iron pan precipitation on the S and SE sides of the mound a number of stakeholes of the outer circle could not be identified.

The primary, inner postcircle was again placed immediately at the foot of the primary barrow slope. NW of its centre was an irregular oval grave pit (length: 1.55, width: 0.95, depth: down to 24.64+), oriented SSW and NNE, and surrounded by a mantle of leached sand, probably secondary and of natural origin. This grave pit had been filled in with deep black sods (Pl. XVII: 2). Subsidence of the sods in the pit is clearly in evidence (section B, square D and Pl. XVII: 1). Along the sides of the pit (at 25.24+) lay two completely carbonized boards (no 58, width: 0.23 and 0.25) with a few equally carbonized cross-boards between them (width: 0.10). Centrally below these the interment was found, in the shape of a small pile of cremated bone (no 59, 25.00–24.90+) with some charcoal (no 59*a*). The lower part of the grave pit was filled with grey sand (24.90–24.64+). On the NW side five small, irregularly spaced stakeholes were found (diameter: 0.07–0.14, depth: down to 24.83–24.80+). Possibly these indicate a temporary covering of the grave.

A charcoal band (length: c. 0.60, at 25.60+) at c. 0.30 centrally below the top of the barrow (section A, square 4, section B, square E) probably represented a secondary grave, belonging to the outer, secondary postcircle.

After the conclusion of the excavation the tumulus was restored, creosoted posts and stakes being placed in the postholes of both circles.

TUMULUS 17

two-period barrow, with two triple closely spaced postcircles

Tumulus 17 (fig. 26, Pl. XVIII: 1), an irregular mound, measuring some 13 metres across, was 0.66 metres high (top: 26.28, floor: 25.62+). It turned out to have been greatly reduced on the W side through sod-cutting, so that the original centre lay more than 2 metres W of that taken in pegging out the quadrants.

The tumulus appeared to have been built from inverted sods; it lay on an old surface level with clear podsolization. On the S and E sides (section A, square 6, section B, square F) a secondary addition to the original barrow could be observed lying against the sharply defined slope of the primary barrow. This must link up with the second period of construction, which apparently consisted of the addition of a new (larger) postcircle and an extension of the barrow itself towards the E.

Under the foot of the barrow two non-concentric triple closely spaced postcircles were found, intersecting on the W side. The outer circle is undoubtedly the later. The postholes of the roughly circular inner ring (internal diameter: 7.00, overall diameter: 8.60,

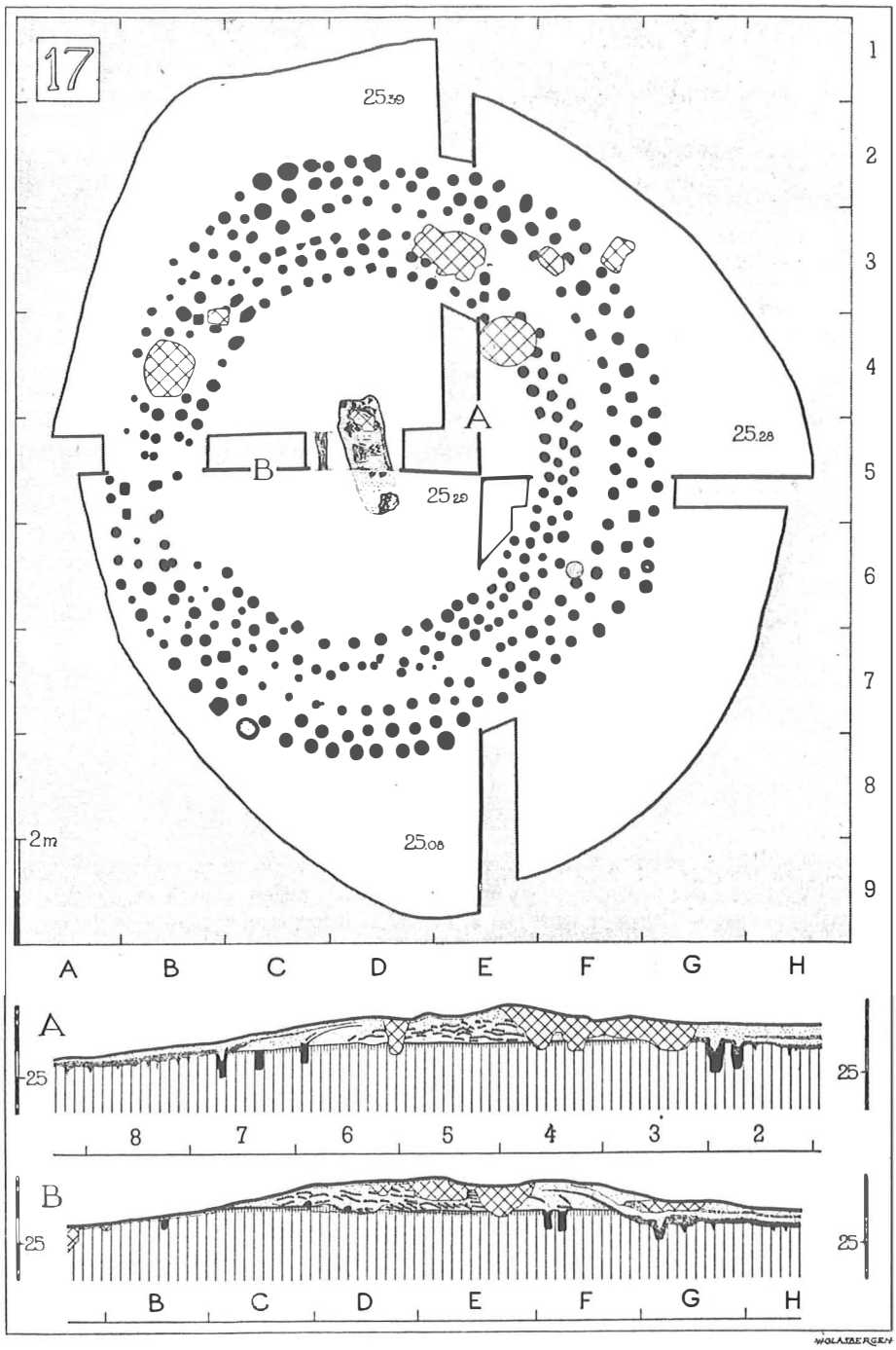

17
25.39
25.28
25.29
25.08
A
B
2m
1
2
3
4
5
6
7
8
9
A B C D E F G H
A
25
25
8 7 6 5 4 3 2
B
25
25
B C D E F G H

Fig. 26

mean diameter of postholes: 0.18, depth of postholes: down to 25.38–25.22+, on an average 25.28+) were generally round. Some were clearly square or rectangular, two had been cleft. On the W side, where the circles overlap, a number of posts belonging to either circle could not be identified, the subsoil being full of modern plant roots down to a great depth. The outer, slightly oval postcircle (internal diameter: 9.60, overall diameter: 11.50) consisted of round to oval postholes (mean diameter: 0.24, depth: down to 25.25–24.98+, on the average 25.08+). In four postholes cores could be distinguished (diameters: 0.09, 0.12, 0.14 and 0.32).

Several irregularities in the two postcircles may indicate entrance blockings, for instance on the W side of the inner circle, while in both circles there is an inward bend on the SE.

At the centre of the inner postcircle was found the primary grave, a sub-rectangular bowl-shaped excavation (NNW–SSE) in the old surface, filled with lumps of charcoal (no 14*a*) and light grey to bright orange-brown soil, in which were found two small patches of cremated bone (no 14). Somewhat to the S of this interment another small pile of cremated bone was found. It is to be regretted that the soil at the base of the cross-baulk had been removed to too great a depth at this spot to be quite certain whether this last interment formed part of the primary burial (if so, length: 2.24, width: 0.84, depth: down to 25.40+), or whether it formed a secondary interment — in this case the grave belonging to the outer postcircle. Slightly E of the grave, on the old surface level, lay a large charcoal shell, clearly showing in the section. Evidently it is the remains of a beam belonging to the pyre, the core of which, having remained untouched by the fire, rotted away completely. A number of recent disturbances were observed in several parts of the barrow, six of them going down to the virgin soil.

Apart from the cremated bone (no 14) no finds were recovered from this barrow.

TUMULUS 18

with triple closely spaced postcircle

Tumulus 18 (fig. 27, Pl. XIX: 2), which measured some 10 metres across, was 0.45 metres high (top: 26.07, floor: c. 25.62+). It turned out to consist of mottled bright yellowish-grey sand. Together with nos 4, 12 and 20 it forms an exception in the cemetery, where all other barrows have been built from inverted sods on a clearly podsolized old surface level. The old surface had been much disturbed and was very uneven; [11] its level could only occasionally be recognized, especially near the grave, from a streak of charcoal particles and burnt sand. The barrow was not built on a naturally podsolized subsoil but on a stratum of made soil, of a dirty grey colour (thickness: 0.10–0.14), probably old arable. [12] Plough markings were not observed, however.

In the edge of the barrow was found a not very regular, slightly oval, triple closely spaced postcircle (internal diameter: c. 6.20, overall diameter: c. 9.20, depth of postholes: down to 25.38–25.14+) with N–S orientation. Individual posts differed greatly in diameter (0.10–0.40), their shapes varying from round to oval. From the floor of one of the postholes, which is cut through by the E–W section (section B, square F), a large lump of charcoal was recovered; evidently the post had been charred at the lower end for better preservation.

At the centre of the barrow was found a shallow grave, sub-rectangular in shape, with curved corners (length: 2.08, width: 0.70, depth: down to 25.52+), oriented WNW and ESE. It contained a large quantity of charcoal and burnt sand of an orange colour, probably the remains of the pyre. In this were found three patches of cremated bone (no 13). This barrow showed only a few shallow recent disturbances.

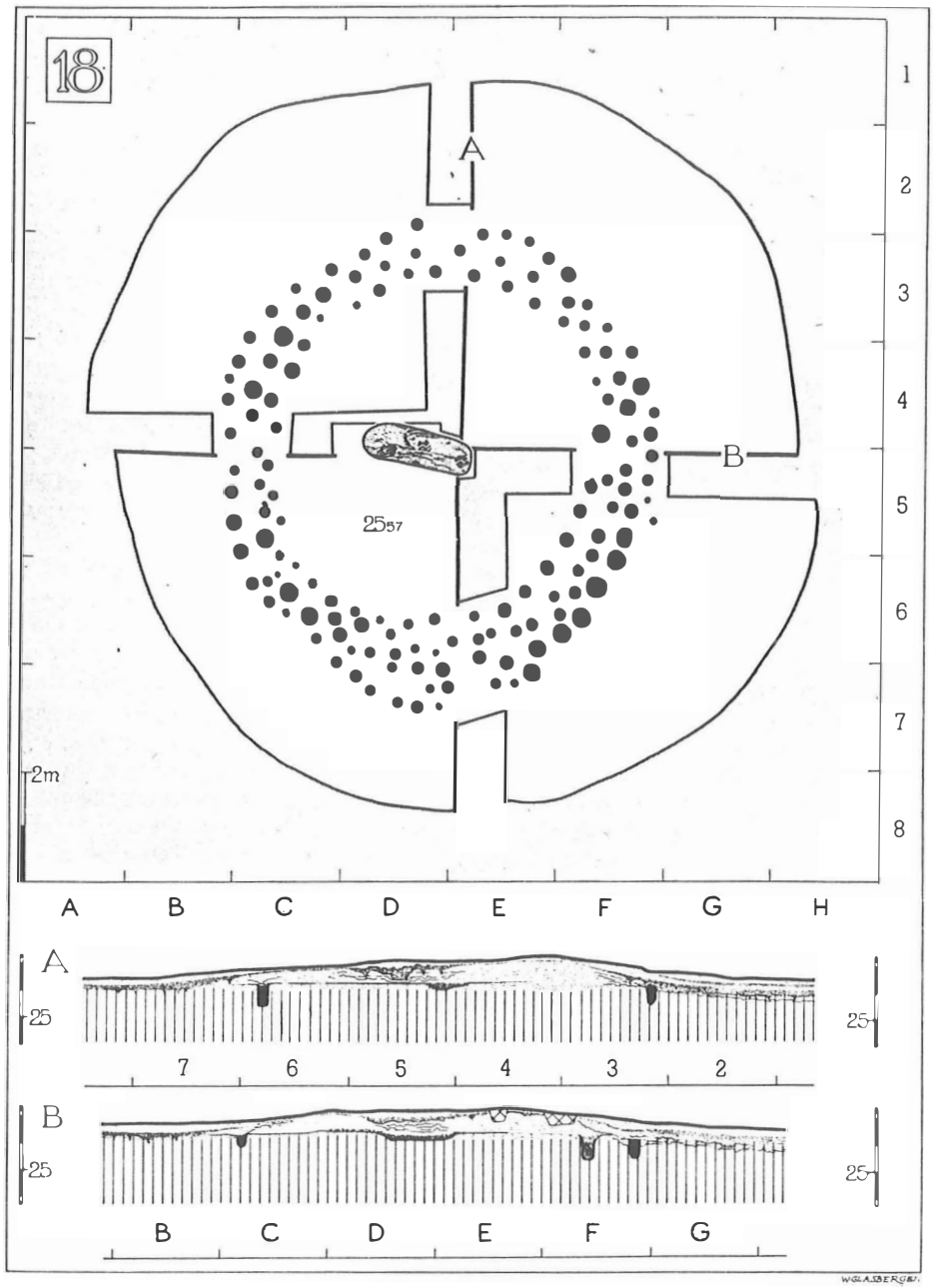


Fig. 27

TUMULUS 19

two-period barrow, with two double closely spaced postcircles

Tumulus 19 (figs 28, 66: 19, Pl. XVIII: 2), which measured some 10 to 11 metres across, was c. 0.62 metres high (top: 26.14, floor: 25.62–25.52+). Through sod-cutting its W side had been levelled down considerably, and as a result the centre of the quadrants proved to be some 1.50 metres too far E. The barrow had been built from inverted sods on a fairly uneven, podsolized old surface level. Occasional streaks of yellow appeared in the distinct light to dark grey sod structure visible in the sections: evidently yellow sand from the virgin soil under the old ground level had also been used in constructing the barrow. Large pieces of charcoal were met with at a fairly high level. In the E–W section, on the E side, a secondary addition to the barrow was clearly discernible (section B, squares E/F); it clearly corresponded to the second construction period, represented by the outer postcircle. It consisted of brownish-yellow sand with only a few sods, lying against the sharply defined slope of the primary barrow.

In the edge of the barrow two sub-circular non-concentric double closely spaced postcircles showed up with extraordinary clarity. The inner of these (internal diameter: 7.00, overall diameter: 8.70, depth of postholes: down to 24.92–24.77+ on the W side, and 25.11–25.02+ on the N and E sides), doubtless the oldest, consisted of round to oval, occasionally roughly square postholes of greatly varying size. On the W side, two of the inner row of postholes showed a distinct rectangular core (0.18 by 0.14, 0.15). On the SW side six or seven double postholes occurred; perhaps the posts were moved, or some decayed posts replaced. Also in the SW quadrant, two postholes were situated inside the postcircle and unrelated to it. The outer row of the inner postcircle consisted of similar postholes as the inner; on the SW side seven contained a distinct core, generally round (diameter: 0.16–0.20), in a single case triangular (0.28 by 0.18), doubtless a cleft post. In several of the postholes belonging to the inner circle a considerable quantity of charcoal was found; probably a number of posts had been charred at the lower end, for the sake of preservation. In the E–W section one of the postholes could be followed some distance up into the mound (section B, square F).

On the NE side, in an opening of some 2.60 metres in the inner postcircle, lay a sub-rectangular pit (length: 1.70, width: c. 0.70, depth: down to 25.06+), oriented NW–SE, damaged on the W side by a recent disturbance. Nothing suggested that it was a secondary grave; it might possibly be a 'ritual pit'. On the SE side were found two remarkable duplications in the inner circle, taking the form of small, irregularly interpolated rows of posts. Very likely these irregularities are due to an entrance blocking preceding the construction of the second ring of this circle, which avoids them.

The outer double closely spaced postcircle (internal diameter: 9.50, overall diameter: 10.90) consisted of large, round to oval, occasionally square to rectangular postholes (mean diameter: 0.35, depth: down to 24.88–24.72+). A single trapezoidal posthole occurred. In nearly all the holes of this postcircle there had been considerable precipitation of iron pan, causing them to show up clearly as dark brown patches in the mottled yellow subsoil (Pl. XVIII: 2). Doubtless this had also caused appreciable extension of the patches. [13] On the E side misalignments to the NE and SE very clearly indicated a blocked entrance some 7 metres wide (squares F–3, G–4, G–5, F/G–6).

At the barrow centre was a shallow, rounded, oblong depression filled with grey sand and lying in a NNW–SSE direction (original length: approximately 1.40, width: 0.72, depth: down to 25.21+). On its N side this discoloration was intersected by a grave of fairly irregular shape, situated eccentrically, and containing large lumps of charcoal (no 16*a*) representing the charred shells of half-burnt beams from the pyre. At a

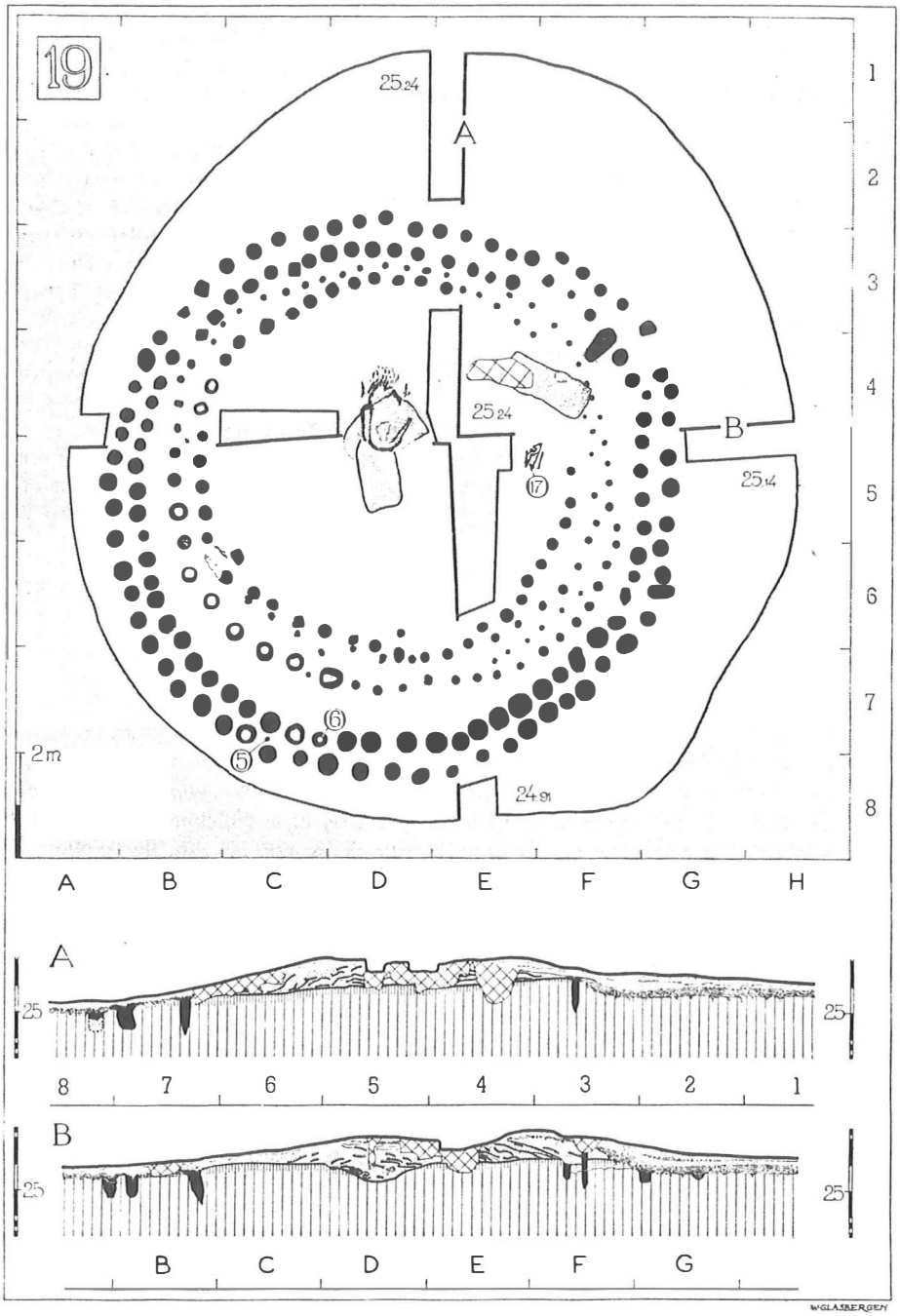

19
25.24
A
B
25.24
25.14
24.91
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
25
8 7 6 5 4 3 2 1
B
25
25
B C D E F G
W.GLASBERGEN

Fig. 28

deeper level (25.24+) this grave appeared as a more or less oval pit (length: 0.95, width: 0.60), oriented WSW–ENE, around which were found three out of what were originally four stakeholes (diameter: 0.08) placed in a rectangle (1.04 by 0.92; fig. 66 : 19) with N and S orientation: another case of a temporary mortuary house. A small pile of cremated bone (no 16) was found on the floor of the grave (25.02+), lying among the charcoal. This was the primary grave of the barrow. A central grave belonging to the second period was not found, but might conceivably have been destroyed by the recent disturbances in the barrow centre. On the E side was another small patch of charcoal accompanied by a cremation (25.25–25.18+). Probably this was a secondary interment. Besides the cremation some charcoal (no 17) was found in this burial. Other finds from this barrow consisted of the nos 5 (three wall sherds of externally slip-covered greyish-brown ware tempered with sparse grit, wall thickness: 0.01–0.014, and a fragment of a flat base, thickness: 0.015, of greyish-brown ware, admixed with fine quartz grit, found between postholes of the outer postcircle, in the SW) and 6 (rim fragment, rounded on top, of a slip-covered dark brown pot of fine-grained texture, with black core, wall thickness: 0.005, found in a posthole of the outer postcircle, not far from no 5). [14]

Apart from the sod-cutting on the W side, the barrow had been damaged by several later excavations; the majority did not, however, penetrate to the virgin soil. One of the holes in the N–S section (section A, square 4) must be fairly old, as a new podsol band had already formed over it.

TUMULUS 20

with ringditch

Tumulus 20 (fig. 29) had already disappeared to a large extent, as its Northern part was in a plot of arable land. The centre of the barrow was used by Mr C. Sanders as a greenstuff silo. Part of its Southern half could be systematically excavated. An old surface level showed in the sections, at 25.62+, as a grey layer (thickness: c. 0.08). It was probably old arable, as in the similar cases of tumuli 12 and 18. In the mound itself some sods could be distinguished, and in some places particles of charcoal were observed.

In the horizontal plane a narrow circular ditch was found (width: 0.24, depth: down to 25.30–25.26+), roughly semicircular in section. Its diameter was probably some 8 metres. Outside this ditch seven stakeholes (diameter: 0.07–0.08) were discovered in the SW quadrant, arranged in an arc directed approximately NW–SE. They resemble the rows of stakeholes found beneath tumuli 14 and 21, and possibly belonged to the same fencing system.

Only a small part of the original barrow could be systematically excavated. In the Southern part of the quadrants excavated an old cart track (width: c. 1.70) was found, with the so-called '*stallion's track*' ('*hengstenpaadje*') in its centre.

A trial trench in the field N of the barrow centre showed that all remains of the barrow, including any grave it may have contained, had there been destroyed.

Two pottery sherds (no 12) were found in the SW quadrant. One is a fragment of a pot (wall thickness: 0.012) of very gritty texture, ochreous-brown on the outside, with black incrustations on the inside. The second sherd belonged to a greyish-brown pot (wall thickness: 0.007), the ware of which is tempered with fine quartz grit.

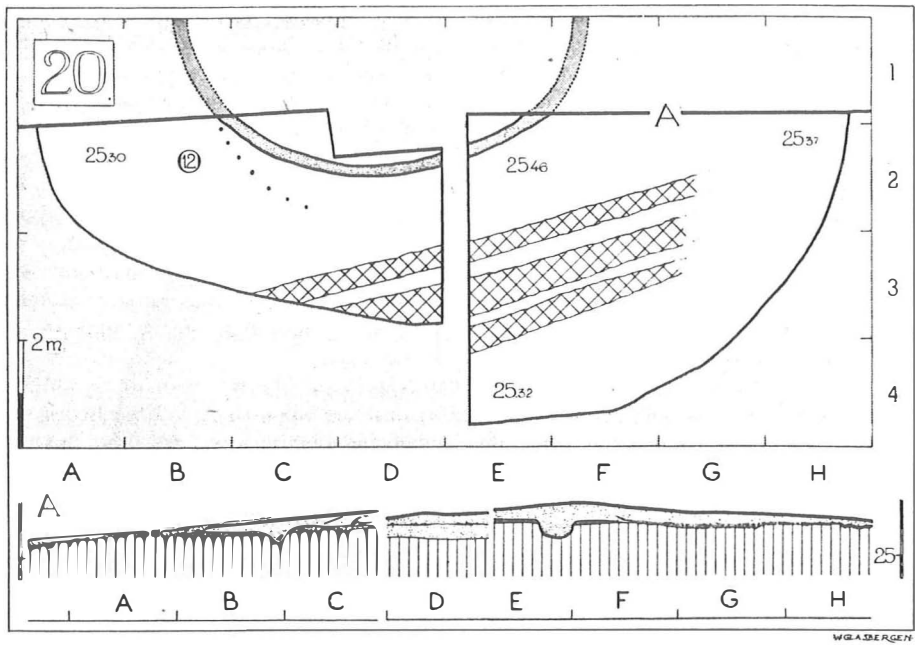


Fig. 29

TUMULUS 21

with ringditch

Tumulus 21 (figs 30, 66: 21, Pl. XIX: 1) measured some 13 metres across and was 0.60 metres high (top: 25.82, floor: 25.22+). The ringditch round its base was clearly visible before excavation, as had already been noticed by Panken. The yellowed grasses growing in it formed a lighter band round the otherwise heather-grown barrow. The mound had been built from inverted sods, one of which had a length of no less than 1.28 metres. The sod structure was exceptionally fine and dark. The barrow lay on a very uneven, partly podsolized subsoil; at several places the old surface was interrupted by shallow pits filled with sods. Like nos 12 and 18, this barrow was probably built on old arable.

The ringditch (internal diameter: c. 11.30, width: c. 1.00, depth: down to 24.52 on the W side, to 24.48 on the N, to 24.40 on the E, and to 24.26+ on the S side) was V-shaped in section on the N and E sides (section A, squares 1/2, section B, squares G/H). It showed strong iron pan precipitation, especially on the outside. On the E side the upcast could be observed lying on the old surface (section B, squares F/G).

A row of stakeholes (Pl. XIX: 1), lying E to W, ran across the barrow (mean diameter of stakeholes: 0.08, intervals: c. 0.30, depth: down to 24.89–24.86+). As in barrows 20 and 14 the holes probably contained stakes of a fence belonging to the old arable on which the barrow lay. Any relation to the barrow would again seem out of the question, as the stakeholes do not continue upwards in the barrow but stop at its base. This is clearly seen where the E–W section cuts through one of them (section B, square C).

At the exact centre of the barrow, N of this fence, were three out of what were probably

four stakeholes (diameter: 0.07–0.08, depth: down to 24.94–24.90+) placed in a rectangle (1.00 by 0.75). The orientation of this rectangle must have been NNW and SSE. Doubtless this was another mortuary house, one stakehole of which could not be located. No traces of an interment were found within it. The small recent disturbance just within the stakeholes (section B, squares D/E), which reached down a little below the old surface, must be the hole dug by Panken. Panken had found 'charcoal and some bones'; probably he had the good (or bad) fortune to hit the exact spot of the central burial, in the form of a small pile of cremated bone accompanied by some charcoal, in this case probably at old ground level. N of the mortuary house a further five stakeholes (diameter: 0.08, intervals: c. 0.40, depth: down to 25.03+) set in a NW–SE row were observed, which may be related to the fencing system described above. Two further pairs of stakeholes (diameter: 0.07–0.10, depth: down to 24.87–24.84+) occurred, one E and one S of the mortuary house, the purpose of which is not clear.

In the NE quadrant a small round pit (diameter: 0.40, depth: down to 24.98+) was found, filled with made soil. As it did not show until the old surface was reached it must, in any case, date from before the construction of the barrow. Possibly this is a 'ritual pit'. Another, similar pit, filled with sods, was found SW of the first (section A, square 4). N of the barrow centre some charcoal particles were found lying on the old surface.

There were a number of finds from positions on or in the old surface under this barrow.[15] They are: no 2 (four wall sherds of an externally slip-covered, brownish-orange pot of very gritty texture, wall thickness: 0.01), no 3 (wall fragment of somewhat coarser ware than the preceding, ochreous-grey in colour, thickness: 0.012), no 4 (wall sherd like no 2, brownish-red in colour, wall thickness: 0.01), no 7 (wall sherd like no 2, and probably of the same pot, wall thickness: 0.009), no 15 (a number of base (?) fragments of a coarse, thick-walled pot of gritty texture, greyish-brown on the outside but brownish-violet on the fracture), no 18 (wall sherd of similar ware as no 2, thickness: 0.007), no 19 (shoulder fragment (?) of grey ware, of gritty texture, with black core), no 24 (thin yellowish-brown wall fragment of gritty texture, thickness: 0.006). At the bottom of the ringditch was found no 23 (wall fragment of an externally slip-covered, brownish-grey pot of very gritty texture, wall thickness: 0.01). Another sherd, similar to no 2, found in a depression of the old surface in the N–S section (section A, square 6) was stolen by the public.

Several recent disturbances were observed besides that mentioned.

TUMULUS 22

three or four-period barrow, with two double, or possibly one quadruple, closely spaced postcircle(s), one triple closely spaced postcircle, and ringditch

Tumulus 22 (fig. 31, Pl. XX: 1–2) had been almost completely levelled not long before our first visit to the site, on 3 February 1948. Two small segments on the W and NE were all that remained. These offered only slight opportunities for a study of the mound itself.[16] Its original height will have been about 1 metre, its diameter some 13 metres.[17] It had been built from inverted sods on a very clearly podsolized old surface level. The sods could clearly be distinguished in the mottled soil of the original mound.

The ground plan of this tumulus turned out to be of a very complicated nature. Besides an oval ringditch it comprised a postcircle system (Pl. XX: 2) of some 520 postholes, making it the most complex postcircle monument investigated in the Netherlands so

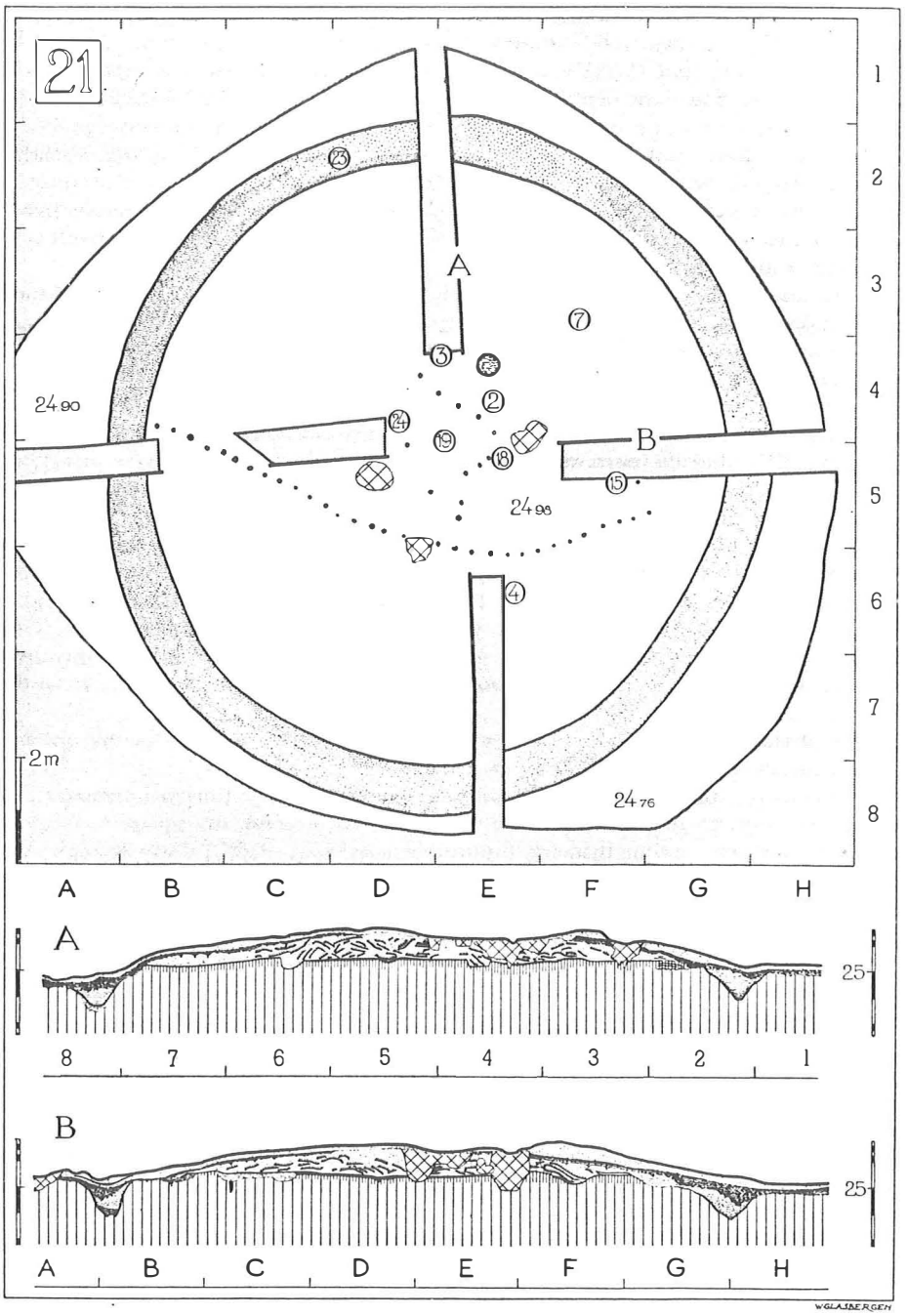

21
A
B
24.90
24.98
24.76
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
B
8 7 6 5 4 3 2 1
25
25
W.GLASBERGEN

Fig. 30

far. Several intersections made it clear that it was a three, possibly even four-period monument. The features were disposed around the barrow centre, thus:

(1) An oval ringditch (WNW–ESE, width: 0.24–0.52, internal diameter: 7.20–8.00, overall diameter: 7.90–9.00, depth: down to 24.83–24.76+), roughly V-shaped in section; as it intersected some of the postholes of the inner postcircle on the W side (squares B/C–3/5) it must have been more recent. The old surface level could be followed outside the ringditch for a distance of more than a metre. On the E side an isolated posthole was found in the bottom of the ditch (section B, square G); this posthole cannot have belonged to the postcircle. The ditch further intersected a number of soil discolorations that were natural.

(2) A quadruple closely spaced postcircle (internal diameter: 8.50, overall diameter: 11.20, stakes and posts of widely varying thickness: 0.08–c. 0.23, depth: down to 24.76–24.38, 24.67+ on the average, except on the N side, where the depth varies from 25.00–24.78, with an average of 24.89+). The inner row consisted, on the N and NE sides, of small closely spaced round stakeholes (mean diameter: 0.09, depth: down to 24.76–24.70, on the N side down to 24.97+); in one case a cleft stake was used. On the SE, S and SW sides the posts were of slightly larger size (mean diameter: 0.14); those on the N side could possibly have formed part of a (temporary?) wattled fence. The outer rows, in which triangular, rectangular and square holes were found among predominantly round and oval ones, showed several irregularities. In the SW the outermost row was intersected by the heavier posts of the outer, closely spaced triple postcircle to be discussed hereafter. Eight postholes to the N and NE had cores (mean diameter: 0.11); these are all among the slightly larger postholes of this quadruple postcircle. Over a distance of some five metres to the E only three rows of posts, very unevenly spaced, were to be found. This irregularity had every appearance of representing an entrance blocking.

It is possible that this complex represented two stages, *i.e.* two double instead of one quadruple closely spaced postcircle.

(3) The outer, almost circular, triple closely spaced postcircle (internal diameter: 11.00, overall diameter: 13.30) contained large, round to oval, occasionally square to rectangular postholes of greatly varying diameter (mean thickness: 0.23, depth: down to 24.74–24.49, average 24.65+, except on the N side: 24.84–24.77+). Their spacing was quite irregular. Five, in the NW, contained cores (mean diameter: 0.15). As posts of this circle intersected the outer row of the inner, quadruple circle, it must be a later addition. This circle also showed an irregularity in the E suggesting an entrance blocking. On the grass-grown W side the network of modern plant roots often caused great difficulty in identifying the postholes.

At the centre of the mound two irregular patches of light grey sand showed up in the mottled yellow subsoil. The more South-Easterly of these, at the exact barrow centre, formed an oblong (N–S, length: c. 1.80, width: c. 0.88) containing several dark stains in which some charcoal particles were observed; it was intersected by the other, more North-Westerly patch (NW–SE, length: 0.72, width: 0.70), in which a darker core could be discerned. S of the core some charcoal was found, and the extreme N end of the patch yielded a pottery sherd (no 22, wall sherd of slip-covered, whitish-ochreous ware of gritty texture, wall thickness: 0.009; showing on the inside a dark orange-brown charcoal-like incrustation). At a deeper level the Southern discoloration was more clearly defined than had been expected, showing as a roughly rectangular patch (N-S, down to 24.86+) containing a darker discoloration. N of the two patches there were two further stains with charcoal particles (down to 25.06+); N, W and S of the patches a further five problematical spots (stakeholes?) occurred. Possibly these represented the traces of a temporary protection of the Northern interment, as in barrows 8[A] and 16.

Probably the two patches can be explained as the bottom layers of the central graves

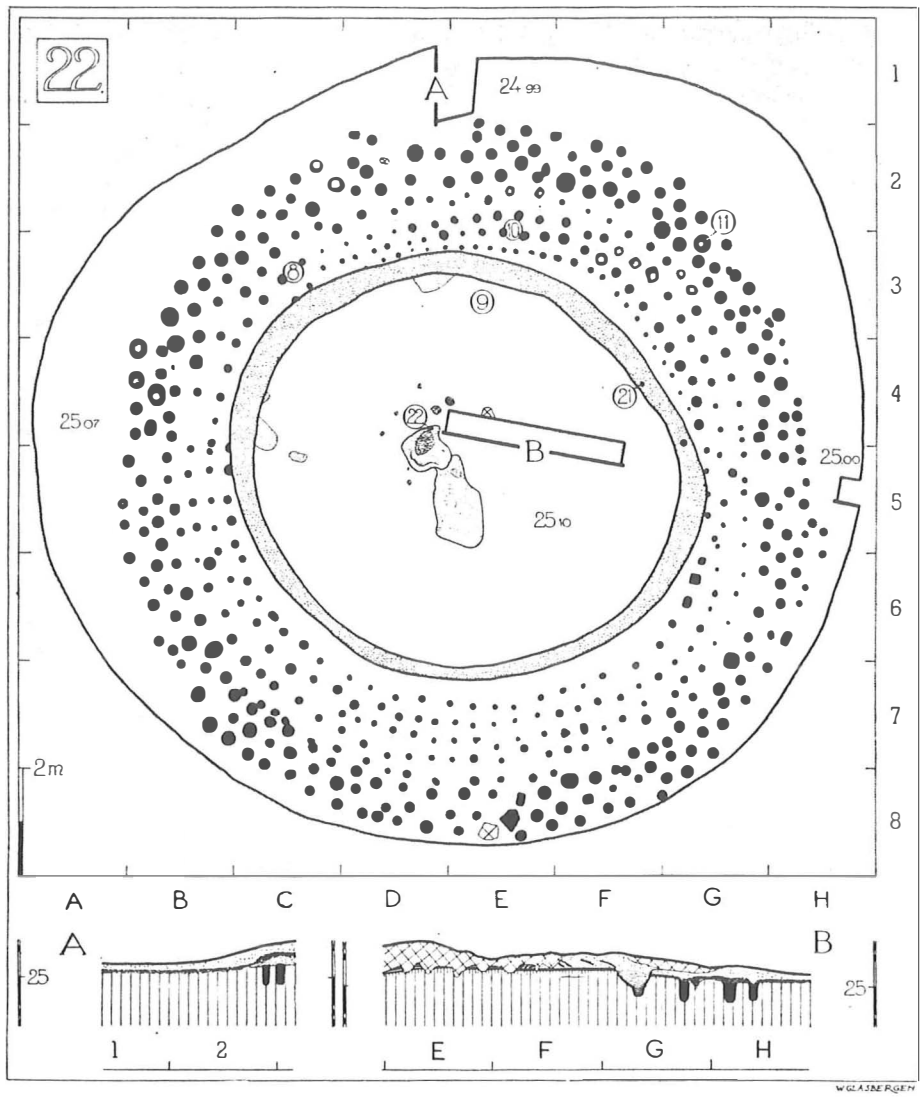

22
A
24.99
B
25.07
25.00
25.10
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
B
25
25
1 2
E F G H
W.GLASBERGEN

Fig. 31

of one period or another. The ESE–WNW baulk stopped just short of the barrow centre, so that no further data on the graves could be obtained from it. E of the Northern patch, however, a thin layer of yellow soil was found on the old surface (section B, square E), which makes it probable that this was the primary grave. The discoloration which it intersected would then be of natural origin.

Apart from no 22 (from the presumed grave) the finds consisted of nos 8 (wall sherd of orange-brown ware, of very gritty texture, wall thickness: 0.007, found on the NW side, between two postholes of the quadruple postcircle), no 9 (fragment of a slightly everted rim of slip-covered, light brownish-yellow ware, of gritty texture, thickness: 0.01, found within the ringditch on the N side, on the old surface), no 10 (very small sherd of yellowish-brown ware, found like no 8, but in the N part), no 11 (wall sherd of ochreous-grey ware, of very gritty texture, wall thickness: 0.01, found in a posthole of the triple postcircle, in the NE), no 21 (wall sherd like nos 9 and 22, thickness: 0.01, found in the ringditch, in the NE part). [15]

Apart from the fact that, in levelling down the barrow, the subsoil had been dented in some places, only a few recent holes of little importance were found. An excavation near the barrow centre (square E–4), along the N side of the ESE–WNW baulk, may reflect the activities of Panken.

It seems most likely that the postcircle(s) described under (2) represented the earliest enclosure of the barrow foot, the triple closely spaced postcircle described under (3) representing a later stage, and the ringditch described under (1) being the latest of all.

TUMULUS 22[A]

with double closely spaced postcircle

Tumulus 22[A] (fig. 32) had been levelled some ten or fifteen years ago when part of the '*voorpoting*' of Halve Mijl, plot no 1166, was brought under cultivation. Its original site could still be shown with some certainty by Messrs W. and A. van der Vondervoort.

The first, E–W trial trench, however, yielded hardly anything; in a second, more Southerly, parallel trench an oval double closely spaced postcircle showed up at a level of about 25.00+. Its internal diameter varied from 4.30 to c. 6.20, the long axis lying WSW and ENE. The round to oval, faintly greyish postholes (average diameter: 0.15) hardly penetrated the very slightly mottled yellow subsoil (occasionally only to a depth of 0.05). After the levelling of the barrow the slight natural prominence (N–S) on which it had been built had also to some extent been ploughed out; as a result a number of postholes, especially on the WSW and ENE sides, had disappeared. Nothing, of course, remained of the mound and of the old surface on which it had lain, neither could any trace be found of a central interment. A small stakehole (diameter: 0.07) at the centre may be the remnant of a marker used in laying out the postcircle. In the plough soil an occasional fragment of cremated bone was found.

On the N and S sides the postcircle was intersected by a roughly rectangular ditch with curved corners, oriented WSW and ENE (internal diameters: c. 14.50 and c. 4, width: 0.25–0.50). This was interpreted as the boundary of a prehistoric arable field of the 'ridge' type. The field must thus have been later than the postcircle. The ditch was semicircular in section. On its W side another N–S ditch of a similar 'ridge' type field was found in the trial trench. This had already been seen in our first trench.

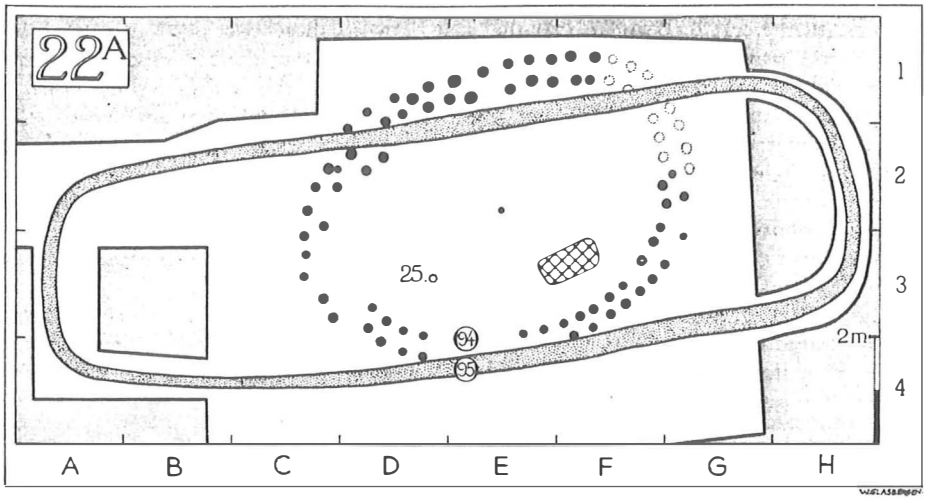


Fig. 32

On the S side, at a spot where several postholes of the circle were lacking, a small pit was found, containing a number of sherds (no 94). They are 20 wall sherds belonging to several medium-sized vessels (wall thickness: 0.008–0.013), the paste invariably tempered with pounded quartz grit (grits up to 0.008 in size); in colour they vary from ochreous-yellow to orange-brown. Some are well-smoothed externally, some only internally. Where this is not the case the core of the sherd is occasionally a deep black. The pit also contained a flaked lump of granite and a very coarsely flaked nucleus of an opaque grey flint. — In the ditch of the 'ridge' field ten pottery fragments were found (no 95), viz. 9 wall sherds of a similar ware as no 94, all slip-covered, and a rim fragment. The latter came from a slightly outbent rim, rounded on top. Its surface is covered with a fine brown slip and its core is black in colour. From the loose arable soil, finally, 31 sherds were recovered (no 93), 25 of them of the same ware as those already described, several again with a black core. Of the remaining fragments three belonged to slightly everted rims, the other three to thick flat bases.

TUMULUS 23

with double closely spaced postcircle

Tumulus 23 (fig. 33, Pl. XXI: 1), which measured some 9 metres across, was 0.25 metres high (top: 25.27, floor: 25.02+). This small barrow had probably been much diminished in height by repeated sod-cutting, not so very long ago. A well-developed covering podsol band was lacking accordingly. A dark, sharply defined sod structure could be observed in the barrow which stood above an unusually fine old surface with clearly delineated humus layer, very thick leaching layer containing clear infiltration veins and secondary iron pan precipitation (Pl. XXI: 1).

An irregular, angular, double closely spaced postcircle (internal diameter: c. 7.40, overall diameter: c. 9.20) was found in the edge of the barrow, with postholes varying greatly in size (mean diameter: c. 0.24, depth: down to 24.71–24.54+). The majority of holes were round to oval; a few were rectangular to square. Two on the W side

had cores (diameters: 0.10 and 0.12); the post between these two stood in a large hole showing iron pan precipitation. Between the posts of the double circle a number of very light-coloured stains showed up (mean diameter: 0.13, depth: down to 24.56–24.54+), indicating that the soil had been disturbed and then allowed to fill in again. A section through one of the places where a posthole of the circle intersected one of these light-coloured holes — in the NE quadrant (square E–3) — proved that the former were the more recent. The spots in question may be interpreted as the original positions of posts of a temporary postcircle, as in tumulus 8. On the SE side a straight segment might indicate an entrance blocking. Finally, an isolated stakehole was observed on the W side, within the postcircle.

In the SW quadrant, at the true centre of the barrow, a patch of charcoal (thickness: 0.06) was found on the old surface; it had, however, been partly destroyed in excavation. To the W of it, other scattered fragments of charcoal were found on the old surface. Probably it represents the central grave. No cremated bone and no finds were recovered from this barrow, and no recent disturbances were found in what remained of the mound.

TUMULUS 24

with double closely spaced postcircle

Tumulus 24 (fig. 34), which measured some 8 metres across, was c. 0.25 metres high (top: 25.46, floor: 25.21+). It rested on a very clearly podsolized old surface, and showed no trace of sods in its composition.

In the barrow foot was found an irregular, angular, double closely spaced postcircle (internal diameter: c. 6.10, overall diameter: c. 7.50, mean diameter of postholes: 0.26, depth of postholes: down to 24.78–24.61+). In the E the postcircle showed a small gap, possibly indicating the site of a blocked entrance.

At the centre no trace of a grave was found, which was not surprising, considering the extensive recent disturbances in this tumulus, affecting many parts including the centre. No finds were made.

TUMULUS 25

with double closely spaced postcircle

Tumulus 25 (fig. 35), which measured some 11 metres across, was 0.30 metres high (top: 25.59, floor: 25.29+). It had been piled up from clearly delineated inverted sods on a very clearly podsolized old surface.

The edge of the barrow was surrounded by a sub-circular, double closely spaced postcircle (internal diameter: 9.00, overall diameter: 10.40) composed of round to oval postholes (mean diameter: 0.28, depth: down to 24.95–24.69+). Two clear misalignments on the SE side indicated an entrance blocking (squares E–6/7, F–6 and G–5).

At the centre of the barrow nothing was found resembling a grave. Some large recent holes (section A, squares 3/4, section B, squares D/E) did not go down very far into the virgin soil. One of these must have been made by Panken. No finds were made in this barrow.

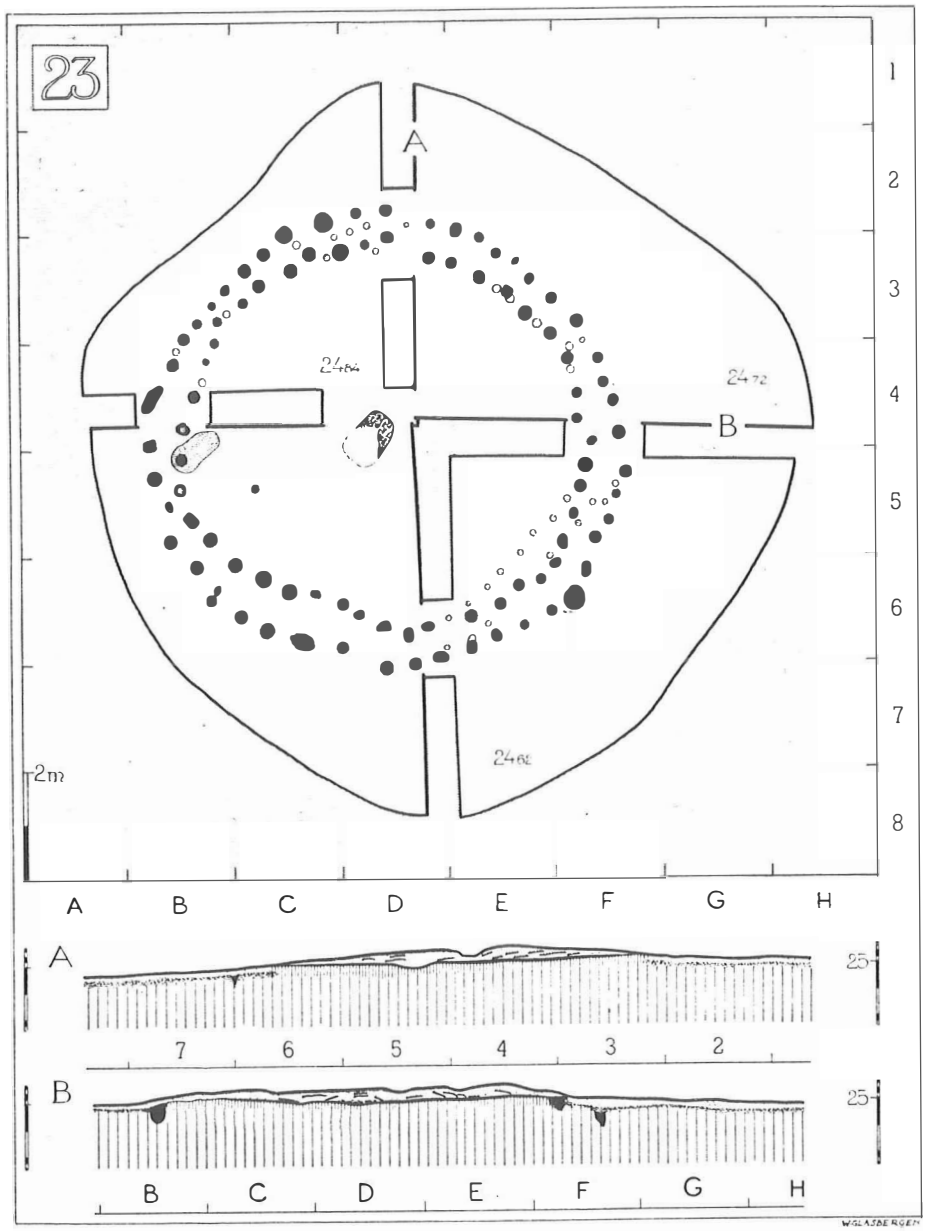


Fig. 33

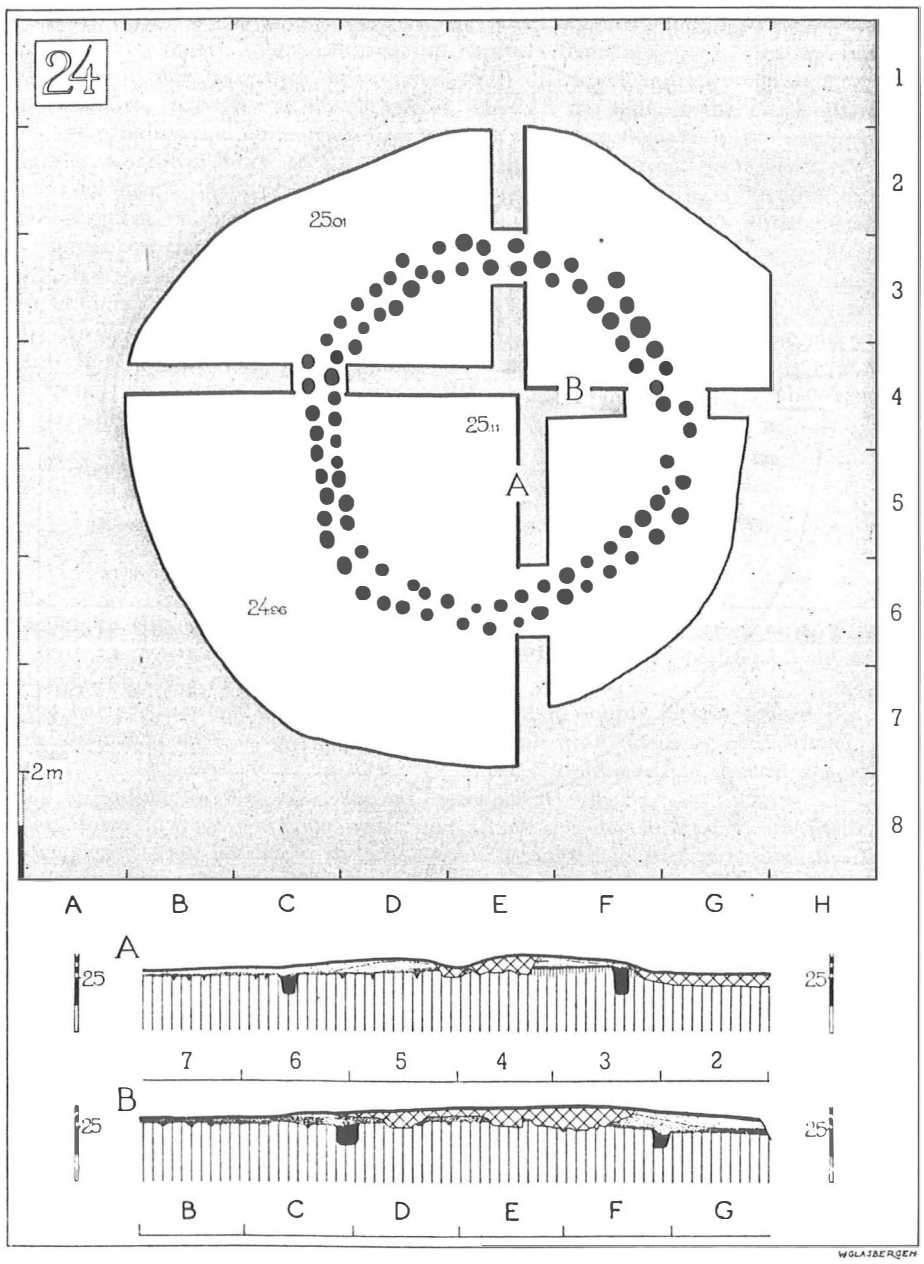

24
25o1
25ıı
24ıo6
B
A
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
25
25
7 6 5 4 3 2
B
25
25
B C D E F G
W.GLAJBERGEN

Fig. 34

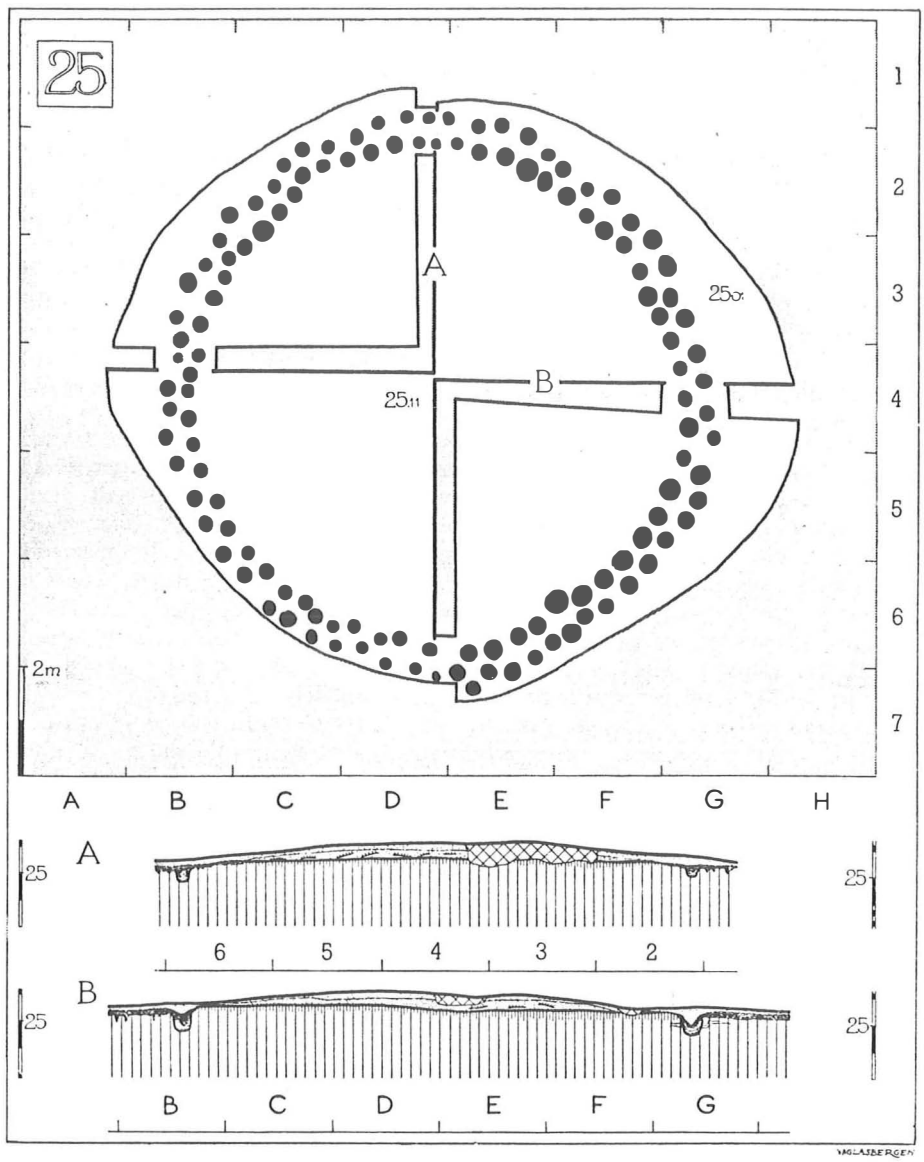


Fig. 35

TUMULUS 26

two-period barrow, with one triple closely spaced postcircle and one double closely spaced postcircle

Tumulus 26 (fig. 36), which measured some 8 metres across, was 0.45 metres high (top: 25.87, floor: 25.42+). It lay on a well-podsolized old surface level, and consisted of grey sand with indistinct sod structure and occasional patches of yellow sand. At the periphery the yellow upcast from a posthole was in places found lying beside it on the old surface (section A, squares 4 and 6, section B, square D). At two points in the sections, on the S and E sides (section A, squares 5/6, section B, squares E/F), it was possible to locate an old barrow slope with vegetation layer, above which lay a secondary addition to the barrow, consisting of brownish-yellow sand. Together with the outer of the two postcircles surrounding it this formed the second phase of construction of this two-period barrow.

The inner, sub-circular, triple closely spaced postcircle (internal diameter: c. 4.40, overall diameter: c. 6.30) consisted of round to oval, occasionally square to rectangular postholes (mean diameter: c. 0.20, depth: down to 25.16–24.97+). The outer, also fairly circular, double closely spaced postcircle (internal diameter: c. 6.75, overall diameter: c. 8) consisted of similar holes (mean diameter: c. 0.24, depth: down to 25.07–24.87+). On the E side the circles coincided in a peculiar fashion; the outer circle appeared to be single on this side. Intersection occurred only once, on the W side, where a post of the inner circle was renewed or moved. It is probable that the straight part on the NE side, found in both circles, represented an entrance blocking. The barrow straddled the ditch marking the cadastral boundary between plots 1465 and 1168, and a portion of the postcircles in the NW and NE quadrants had been completely disturbed (down to 24.95+, on an average). Only the deepest postholes in this sector could still be identified.

At the barrow centre was a grave, an irregular depression in the old surface (length: c. 2.04, depth: down to 25.20+), which had, however, been severely damaged by a recent disturbance. Only charcoal was found above it. In the NW quadrant was a subrectangular grey discoloration (length: c. 1.20, width: 0.60, depth: down to 25.15+), oriented N–S, which was interpreted as a secondary interment; neither charcoal nor cremated bone, however, were recovered from it or from the central grave itself. Possibly this second feature could be interpreted as a 'ritual pit'. There were no finds in this tumulus.

TUMULUS 27

with double closely spaced postcircle

Tumulus 27 (fig. 37) could not be recognized as such in the field. It was accidentally discovered in clearing the NE quadrant of no 28. The original tumulus may perhaps have been levelled through sod-cutting. The N–S section, as drawn, shows the modern, irregular podsol band above an indistinct old surface (c. 25.40+).

After clearing, the mottled yellow subsoil showed a slightly oval (main axis: NW and SE), double closely spaced postcircle (internal diameter: 5.30–6.00, overall diameter: 6.60–7.30, mean diameter of postholes: 0.30, depth of postholes: down to 24.96–24.69+).

Within this postcircle were four postholes, approximately placed in a rectangle (2.80 by 2.20, diameter of postholes: c. 0.40, depth: down to 24.71–24.61+). The axes of the rectangle had more or less the same orientation as those of the postcircle, the short axes approximately coinciding, the long axis of the rectangle being almost parallel to the main axis of the oval, and S of it. The SE posthole had another alongside it: a remar-

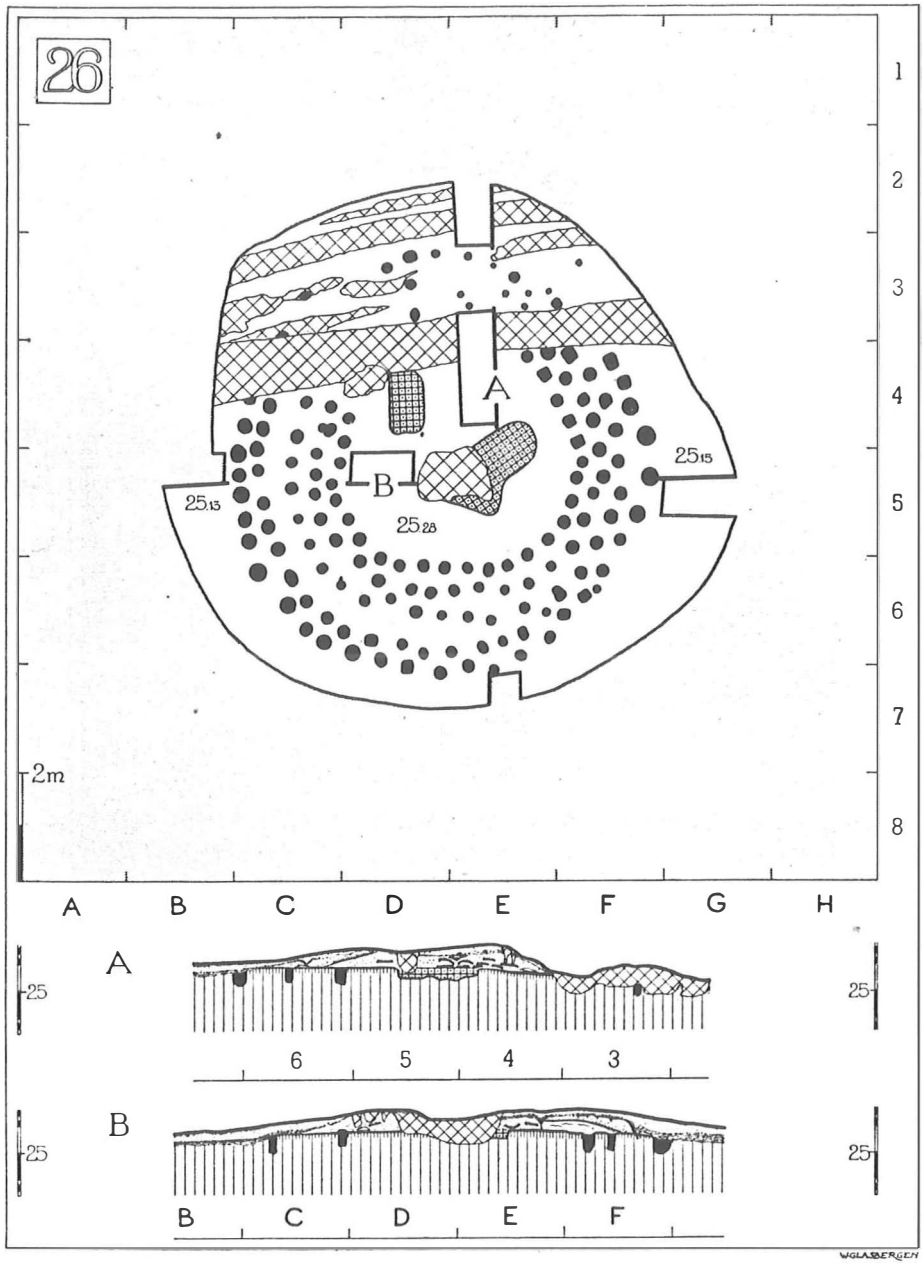

26
1
2
3
4
5
6
7
8
A
B
25.15
25.15
25.28
2m
A
B
C
D
E
F
G
H
A
25
25
6
5
4
3
B
25
25
B
C
D
E
F
W.GLASBERGEN

Fig. 36

kable irregularity, perhaps to be explained as a subsequent correction. The entire configuration links up with the mortuary house tradition, though this house would be of much larger dimensions than *e.g.* those in nos 5, 8, 11, 14, 15, 19 and 21. It is questionable, too, whether the present construction was only of a temporary nature. No trace was found of a central grave, neither were any finds recovered.

TUMULUS 28

with double closely spaced postcircle

Tumulus 28 (fig. 37) was c. 0.30 metres high (top: 25.61, floor: 25.31+). Before the beginning of our investigation, in May 1949, more than half of this barrow had fallen a victim to the moorland reclamation started in the preceding April. The original diameter must have been upwards of 8 metres. The NNW–SSE section reproduced showed a very clearly podsolized old ground surface. The mound itself consisted of grey sand without a trace of sods. As with tumulus 29, however, the latter observation can carry little weight, as the section could only be made through the periphery, where loose sand is usually found thrown up against the core of sods.

The base of the barrow showed the remnant of — as far as could be judged — a sub-circular double closely spaced postcircle (mean diameter of postholes: 0.30, depth: down to 24.96–24.73+), with an irregularity to the SE (squares B/C–7/8). The centre, where a grave might have been expected, had already been completely destroyed.

TUMULUS 29

with ringditch

Tumulus 29 (fig. 38), like no 28, had been largely destroyed before excavation, and only its Eastern part remained. It must originally have measured some 11.50 metres across, and been c. 0.22 metres high (top: 25.65, floor: 25.43+). The section showed a very clearly podsolized old surface level with leaching layer and secondary iron pan precipitation. The mound, which consisted of grey sand, showed no sod structure. [18]

The edge of the barrow was surrounded by a roughly circular, flat-bottomed ringditch (diameter: c. 10.20–11.70, width: 0.60–1.00, depth: down to 24.81–24.75+) into which the iron pan had precipitated. No grave was discovered, nor any finds. The barrow had suffered much from recent disturbances, especially at its centre, as is apparent from the section. Probably these were due to Panken.

TUMULUS 30

with triple closely spaced postcircle

Tumulus 30 (fig. 39), the last barrow of the group, situated on the S bank of the Donker Ven, measured some 10 metres across, and was 0.48 metres high (top: 27.02, floor: 26.54+). Above the clearly podsolized old surface the mound showed an extremely fine, dark structure of inverted sods.

Around its edge was a regular, circular, triple closely spaced postcircle (internal diameter: 6.20, overall diameter: 8.30, mean diameter of postholes: 0.26, depth of postholes: down to 26.26–26.11+). The SW part showed doubling (squares C/D–6/7), possibly indicating a blocked entrance.

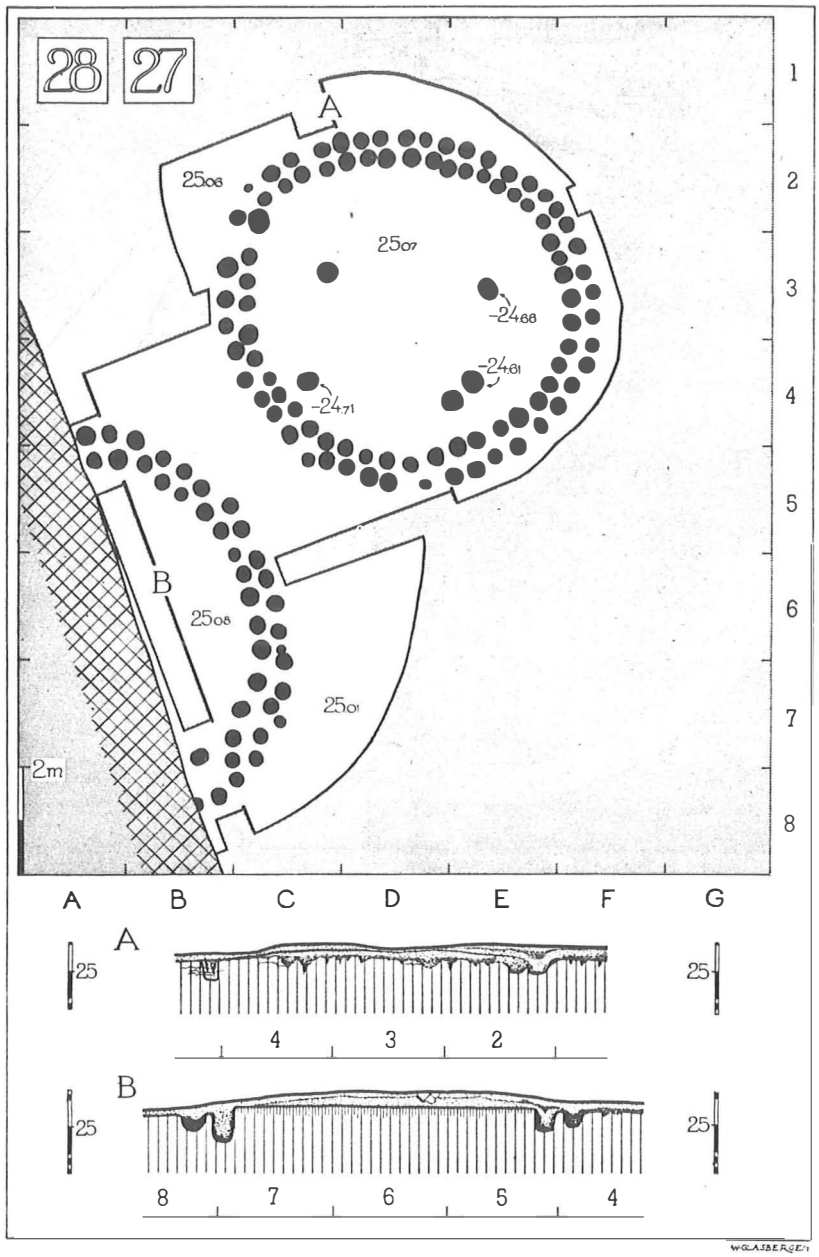

28
27
A
25.08
25.07
-24.66
-24.61
-24.71
B
25.08
25.01
2m
1
2
3
4
5
6
7
8
A B C D E F G
A
25
25
4 3 2
B
25
25
8 7 6 5 4

Fig. 37

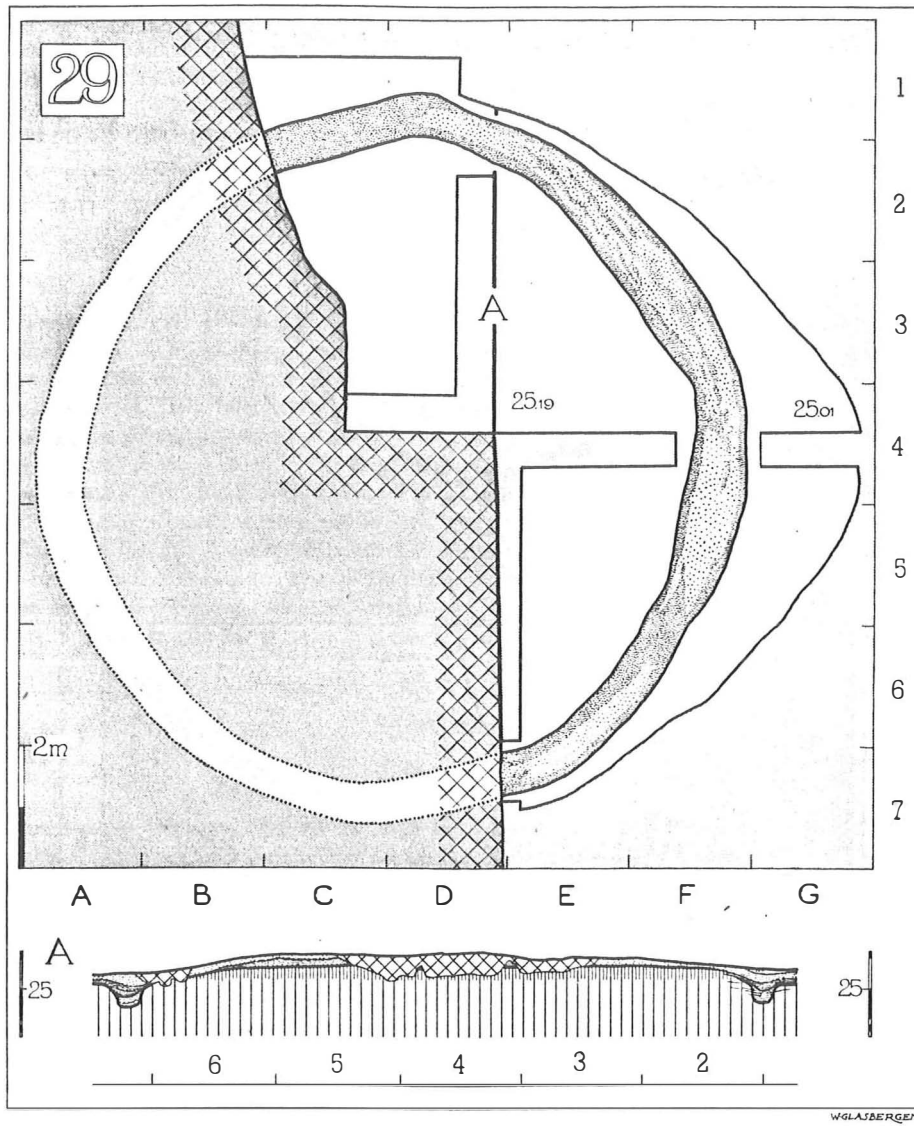


Fig. 38

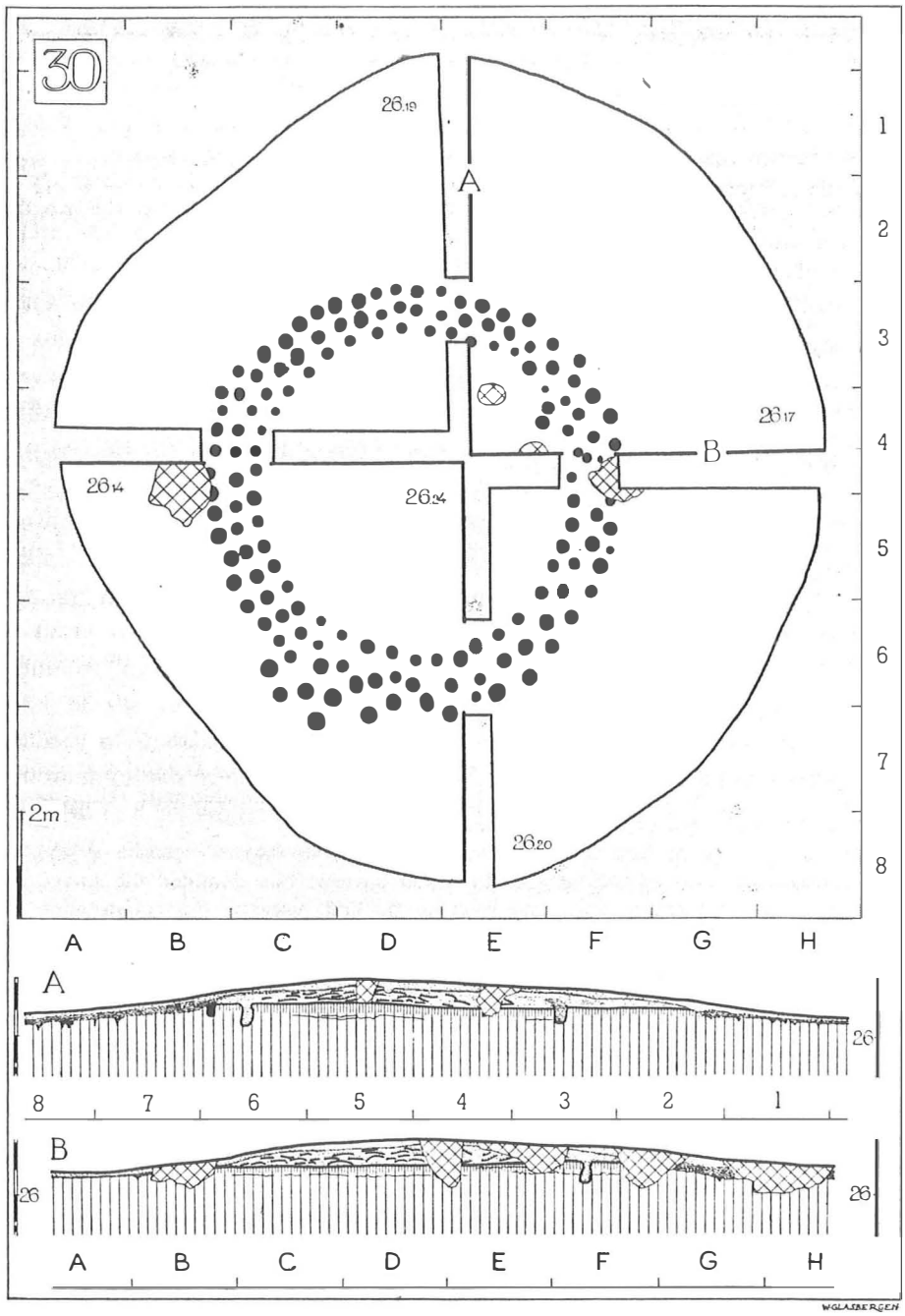

30
26.19
A
26.17
B
26.14
26.24
26.20
2m
1
2
3
4
5
6
7
8
A B C D E F G H
A
26
8 7 6 5 4 3 2 1
B
26
26
A B C D E F G H
W.G.L. BERGEN

Fig. 39

No central grave was found; the body was probably interred at surface level. The barrow had, however, been severely damaged by a number of recent disturbances, as is apparent from the sections. Panken did not excavate this barrow.

---

[1] One of the recent disturbances must be the pit dug by a farmer — after Panken's visit on October 19, 1845; cf. p. 14 — which yielded only some charcoal.

[2] Special permission was obtained from the Municipality of Veldhoven to dig test pits in the road, while Mr C. J. Bolck gave permission to follow up the ringditch in his orchard.

[3] See below, pp. 95–7.

[4] The three cinerary urns to be described below, being secondary burials in the inner slope of the bank, make this appear likely.

[5] See also above, tumulus 3.

[6] On the other hand it is possible that they were not placed there until after the posts had decayed. Unfortunately it was no longer possible to obtain good sections. See below, tumulus 11.

[7] In the S part of section A and in the W part of section B it can be clearly seen how the core of the mound was first piled up with long inverted sods, short sods being then used for sloping off before the whole was smoothed over with yellow sand to give the pile of sods the appearance of a regular dome-shaped round barrow. Cf. also tumulus 15, section B, squares B–C.

[8] In the other sections the sod structure was less clearly defined; apparently yellow sand had been used more freely.

[9] As with tumulus 16, the old surface was absent locally, probably on account of sod-cutting.

[10] The old surface showed local interruptions.

[11] The old ground level of this barrow was difficult to distinguish; so a dark stain in the body of the mound, originally — but incorrectly — interpreted as a sod, was sampled. On analysis the sample appeared to have been seriously contaminated with recent heather pollen, which made further investigation pointless.

[12] It was thought at first that sand was used for this barrow because at the time of its construction the cutting of sods for other barrows had denuded the surrounding moorland to such an extent that none were to be had. Clearly, the construction of a sizable tumulus required a considerable quantity of sods. — This is unlikely to have been a Neolithic sand barrow, for the characteristic light colour of the barrow material, without distinct sods, and the initial stage of podsolization are lacking. — Panken's observation that a number of the barrows investigated by him consisted of yellow or reddish sand is of some interest. Cf. also p. 134, note 1, and Part II, pp. 176–8, note 32.

[13] Cf. Pl. XIV: section of a posthole under the NW edge of tumulus 8, with heavy iron pan precipitation around and far down below the posthole.

[14] No 6 belongs to a pottery class typical for Urnfield times.

[15] Cf. also '*The Finds*', pp. 100–1. These are examples of Bronze Age pottery.

[16] A deep excavation near the barrow centre (fig. 31, square E–4), along the N side of the WNW–ESE baulk, may reflect the activities of Panken, who noted for this barrow: 'N°. 8, high 1.00 ell, in circumference 32 ells. CONTENTS: nothing (worked over completely)'.

[17] This tumulus must have been about the same size as no 14.

[18] Probably for the same reason as the remnant of tumulus 28.

THE URNFIELD

The still uncultivated strip, plot no 1302, near Toterfout, N of the Zandoerle-Vessem road, contained several irregular mounds. On investigation by means of a number of E–W trial trenches they were found to be natural. In the subsoil, however, a number of circular ditches of an urnfield became visible (fig. 41). The low mounds thrown up from the ditches have disappeared as a result of sand drifts.

In section the ringditches were generally almost semicircular. As a rule they reached down to c. 24.60+. In the majority the modern iron pan had precipitated to a considerable depth. Nothing remained of the old surface on which the mounds must originally have lain. In some places the wind had made deep holes and drifted them over again, in others irregular blown sand deposits covered the fairly recent (?) moorland podsol. Considerable disturbances occurred in a number of places. With few exceptions only fragmentary remains were found of the urns which formed the central interments. The subsoil again consisted of mottled yellowish soil.

A total of ten ringditches were found. Their internal diameter varied from c. 2.50 to c. 8.50, whilst the ditches were from 0.30 to 0.70 wide at a mean level of 24.75+. They comprised (from E to W):

(1) Three penannular ditches (internal diameters: c. 5.80, c. 4, and c. 3.30) lying in a row from WSW to ENE. They each had an interruption (on the SE, SE and E sides respectively). In the largest, SW, a completely crushed urn (no 77) filled with cremated bone (no 77*a*) was found NW of the centre. Restored it has a squat truncated pear shape (height: 0.175) with low cylindrical neck (fig. 42*d*: no 77). Smooth and thin-walled (0.005–0.006), it is covered with reddish-brown to dark brownish-violet slip. Just to the NW of the interment lay a number of stray flakes of opaque grey flint, and two sherds (no 78) of gritty texture (wall thickness: 0.009). One of these is a fragment of a rounded rim (approximately fig. 41: 6). At the centre of the middle ringditch, where the interment was to be expected, nothing remained except a darker stain in the soil. In the smallest, the most NE ringditch, a fairly completely preserved small urn (no 80) was found; it contained a cremation (no 80*a*), and charcoal (no 80*b*) was found near it. This brownish-grey, slip-covered, fairly thick-walled (0.007–0.009) pot (height: 0.133) had a rim externally decorated with finger-tip impressions (fig. 42*d*: no 80). The shoulder was emphasized by a row of vertical finger-tip impressions, and below this the whole area had been decorated by alternating groups of vertical and horizontal rows of similar impressions.

(2) N of the first group lay a further two penannular ditches (internal diameters: c. 3.70 and c. 6) on a SW–NE line. Within the SW and smaller, which showed an interruption on the E side, a number of flint flakes (no 81) were found in the made soil. They

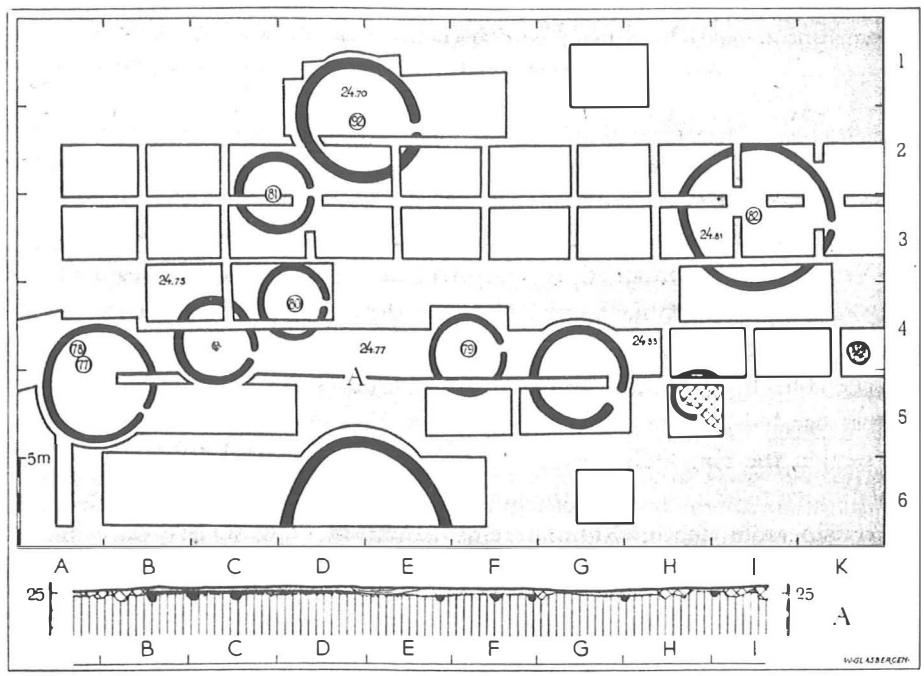


Fig. 40

were unrelated to the ringditches. Some were of transparent, others of opaque grey flint. Within the large NE ringditch, which also showed an interruption on the E side, cremated bone (no 92*a*), a wall sherd of a smooth, thin-walled urn (0.005) covered with grey slip, and three wall sherds (wall thickness: c. 0.009) of a brownish grit-tempered vessel (no 92) were found in the made soil.

(3) Farther SE a WNW–ESE row of three penannular ditches came to light (internal diameters: c. 3.80, c. 4.50, and c. 2.50). They showed an interruption on the ENE, ESE and S sides respectively. Only in the most WNW did part of the interment remain, viz. the lower portion of an urn (no 79) filled with cremated bone (no 79*a*), placed in a small pit. The urn seems to have been a tall, slender, fairly thin-walled (0.006) specimen (fig. 42*d*: no 79). In contrast to the slightly roughened outside, covered with a stained violet-brown to ochreous slip, the inside shows a smooth black finish. Only one fragment of the (slightly everted?) flat-topped rim was found. The original height will have been some 0.26. A small fragment of a bronze bracelet (no 79*c*), semicircular in section (width: 0.0085), was found among the cremated bone: it is the only piece of bronze found in the Toterfout-Halve Mijl cemetery.

(4) NNE of the most SSE of the three last-mentioned lay a large penannular ditch (internal diameter: c. 8) showing an interruption on the E side. At the disturbed centre lay some wall and base sherds of a large slip-covered urn, ochreous-brown to grey in colour (no 82). SE of this ringditch a shallow pit (diameter: 1.30) was found, containing grey sand and fragments of charcoal. It may perhaps be interpreted as an *ustrinum*.

(5) S of the sets of three described under (1) and (3) was found the N half of a large ringditch (internal diameter: c. 8.50) similar to that given under (4). Its S half had been destroyed by the road.

The ten circular ditches formed part of a ringditch urnfield that probably ran N over the already cultivated plot no 1551, on which tumulus 2 was situated. In the trenches extended Eastwards across the site no further interments were found. The Zandoerle-Vessem road, passing the site on its S side, doubtless covered several burials. Possibly the oval ringditch monument 1^A (internal diameter: 8.70–10.40) found in digging the long trial trench across the uncultivated plot no 1861, S of the road, was no more than a very large ringditch of the urnfield.[1] The oval ringditch (internal diameter: 4.60–5.10) within the annexe of tumulus 1^B might also have belonged to it.[2]

S of the road a small N–S trial trench revealed an urnless cremation burial (no 86) without a surrounding ditch. Probably the cremation had been interred wrapped up in a cloth only.

Among the stray finds that came to light before and after the excavation of the urnfield were a fairly large number of flakes (nos 81 and 91) of both opaque and translucent grey flint. Probably these were Mesolithic or Neolithic remains. Besides the stray sherds of very gritty texture (nos 78 and 92) already mentioned, a base (diameter: 0.09) of a 'Deverel' urn (no 35*b*) was recovered from the made soil.

---

[1] See p. 36.
[2] See p. 37.

THE SETTLEMENT

The settlement, already alluded to in the description of the site,[1] could only be partially excavated. It was situated some 60 metres NE of tumulus 5 on the '*Groote Aard*'. We could only obtain permission to excavate a small area of this site, which had already been planted with fir and oak. A N–S rectangle of 4.30 by 11.40 metres was cleared where the sherds had been found. The plough had disturbed the soil to a depth of some 0.30 to 0.40 metres. Besides many traces of tree-roots, only four small postholes (diameter: c. 0.12) with no recognizable configuration were found in the subsoil. A test pit, 1.30 by 2.00, at 1.50 metres from the SW corner of the excavated area, at a place where some large sherds had been found on the surface in the plough soil, yielded nothing whatever. Perhaps, however, an excavation on this site on a larger scale would yield more tangible results.

In the plough soil a large number of sherds, flints, etc. were found (no 37). They are:

Pottery (fig. 41). Large rim fragment (fig. 41: 2) with part of the shoulder of a probably truncated pear-shaped, medium-sized vessel, slip-covered only at shoulder and rim on the outside and just over the rim on the inside, in a warm brownish red; the remainder a light ochreous brown to greyish brown. The outbent rim rounded on top. Very gritty (quartz grits up to 0.008 in size). — Two fitting fragments (fig. 41: 1), giving almost the entire profile, of a small, truncated pear-shaped pot with slightly everted rim, rounded on top. Slip-covered on the outside and just over the rim on the inside, in a stained light to dark ochre and greyish black. Tempered with fairly sparse quartz grit (up to 0.003 in size). Original height: c. 0.115. — Ten rim fragments (fig. 41: 3–12) of seven small or medium-sized vessels and three large, probably truncated pear-shaped pots, some of them slip-covered, in colours from a stained yellow, ochre or grey to dark brown and black, with fine shrinkage cracks. The paste tempered with much intentionally pounded quartz (grits up to 0.007 in size). Striations made by a wooden smoothing implement on the outside. The slightly everted rims rounded on top, occasionally flattened. — Four shoulder fragments with the offsets of outbent rims (wall thickness: 0.006–0.013) and two shoulder fragments with sharp offsets (wall thickness: 0.009), one of them exceptionally coarse and uneven on the inside; another shoulder fragment (fig. 41: 13), of a slip-covered, ochreous, small vessel (wall thickness: 0.008) with boss (height: 0.01). — Nine base fragments (*e.g.* fig. 41: 14) of medium-sized to large, externally flat-bottomed vessels, all very gritty. — 142 wall sherds, some very small, the majority slip-covered, with fine shrinkage cracks; the stained colours of the outside varying from light grey or yellow ochre to light or dark warm brown or red; on the inside also great variations in colour. The paste tempered with much quartz grit (up to 0.009 in size). In some specimens the grit was also on the surface, but generally it was only in the core and was covered by the slip. Core never pitch black. The majority belonged to medium-sized pots, only a few to larger ones. Wall thickness from 0.006 to 0.015.

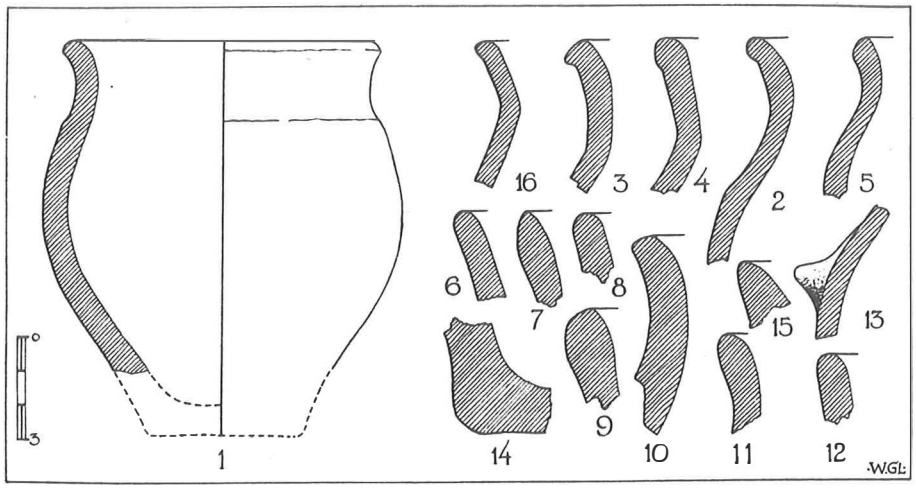


Fig. 41

Flint. A small fragment, crackled by fire, of one of the flat sides of a polished grey flint axe; two further fitting fragments of the fairly sharp rounded side of a polished axe of opaque grey flint. Two transverse arrowheads of almost opaque grey fint. Neolithic. — Two irregular flint flakes, crackled by fire, and now white, each with one finely retouched edge (scrapers). Three irregular flakes of dark grey, fairly opaque flint and seven flint flakes, crackled by fire and now white.

Miscellaneous. Four heat-fractured fragments of stone, one a large pebble. — Eight lumps of baked clay not, or only sparsely, tempered with quartz grit. Not pottery fragments, but possibly from a hearth or oven (?).

The objects picked up on the '*Groote Aard*' before the excavation (no 36), which led to the trial dig, comprise:

Pottery. 33 Wall sherds of small to medium-sized pots, generally with fine shrinkage cracks, some of them slip-covered, a light greyish ochre to warm dark brown in colour, the paste tempered with much quartz grit (up to 0.005 in size). Wall thickness: 0.007–0.017. One of these fragments shows a slight kink in the profile. Two had black incrustations on the inside. One rim sherd was found, the rim rounded on top (fig. 41: 15).

Flint. Very roughly flaked large nodule (diameter: c. 0.07) of light to dark grey flint, on one side still covered by part of the cortex; according to the flaking technique Neolithic or later. — Small scraper (length: 0.037) of fairly transparent, dark grey flint, finely chipped on one side, the other still covered with cortex. — Two flakes of transparent grey flint, one covered on one side by cortex. — Two splinters of opaque white flint.

Miscellaneous. Six quartz fragments. Fragment of some grey to ochreous object of baked clay, with sparse grit; loom weight?

At the centre of the '*Groote Aard*', finally, was found a rim fragment, with part of the shoulder, of a small vessel, the outbent rim rounded on top (fig. 41: 16). Slip-covered, dark greyish-brown on the outside, light grey on the inside. The paste tempered with much quartz grit.

---

[1] See pp. 19–20.

THE FINDS

The finds from the cemetery consist of four categories:

(1) Pottery, bone, bronze, flint, &c.
(2) Soil samples.
(3) Cremations.
(4) Charcoal samples.

1. POTTERY, BONE, BRONZE, FLINT, &c.

These finds have already been separately described when dealing with the excavations.

Pottery. The ceramic material comprises several classes of hand-made earthenware.

A. Sherds of greyish-yellow to ochreous-brown ware, strongly tempered with pounded quartz grit (grits up to c. 0.008 in size). The uneven surface often shows fine shrinkage cracks; the core is sometimes black, but normally of the same colour as the surface. The wall thickness varies from 0.006 to 0.012. The external wall is covered in a number of cases with a fine, ochreous-brown smoothed slip, viz.

Tumulus 21 : in or on the floor nos 2, 3, 4, 7 (probably from the same vessel as no 2), 18, 19 (?), from the bottom of the ringditch no 23;
Tumulus 22 : in or on the floor no 9 (fig. 42*a*: 9), from the ringditch (phase 4) no 21, from the grave no 22;
Tumulus 21 or 22: no 20 (fig. 42*a*: 20; rim fragment with black core);
Tumulus 22A : from the ditch (phase 2) no 95.

In some other cases the external wall is dull and has been only indifferently smoothed, viz.

Tumulus 1B : from the floor no 71*a* (fig. 42*a*: 71*a*);
Tumulus 3 : from the floor no 54;
Tumulus 4 : from the floor no 89;
Tumulus 14 : from the floor no 75*a*;
Tumulus 21 : in or on the floor no 24 (?);
Tumulus 22 : in or on the floor nos 8 and 10;
Tumulus 22A : from a small pit no 94, from the ditch (phase 2) no 95.

This category probably represents the earliest specimens among the pottery found. The technique seems Neolithic — the slip-covered specimens suggest affinities with Beaker ware. The surface is never stained, as in the next category. Little can be said about the shapes of these generally fairly small or medium-sized vessels; probably they were truncated pear-shaped or bucket-shaped domestic pots, some with flared rims, rounded on top (fig. 42*a*: 9, 20 and 71*a*). — Possibly these pots were made by descendants of the French Seine-Oise-Marne and the Belgian Vaucelles groups.[1] Especially the sherd (no 89) from the floor

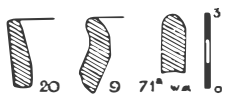


Fig. 42*a*

of *tumulus 4*, the '*Lambertsbergje*', a pale ochreous yellow, and only tempered with sparse fine grit and fragments of pottery, makes a primitive impression, as does an as yet unmentioned fragment (no 45), from the mound of *tumulus 5*, of reddish-brown, ill-baked ware, the paste only admixed with fragments of pottery.

Very probably the group described mainly dates from the Early Bronze Age, and thus provides a shadow of a dating or a *terminus post quem* for tumuli 1^B, 3, 4, 5, 14, 21, 22 and 22^A.

Parallels for this pottery class are still very scarce in North Brabant, and complete specimens are only exemplified by a small pot from a secondary grave in tumulus IV of the '*Vijfberg*' on the 'Rechte Heide' near Goirle (cf. Part II, postcircle type 3, North Brabant, no 3) and a stray find from the Oss Heath. [2]

B. As a normally later class we would regard the sherds of generally stained, dark ware, similarly tempered with pounded quartz grit (grits up to c. 0.008 in size). The ware is coarser than class A and is especially distinguished from it by its darker, stained colours. The surface again shows shrinkage cracks. It also differs strongly from the so-called 'Deverel' urns to be mentioned hereafter. The pots have generally been more or less smoothed, sometimes also slip-covered externally, the grits then being obscured by the slip. The wall thickness varies from c. 0.006 to 0.017.

The pottery material (nos 36 and 37; fig. 41) from the inferred settlement on the '*Groote Aard*' belongs here. The majority are sherds of small and medium-sized, sometimes of large truncated pear-shaped domestic vessels, flat-bottomed, and with flared rims rounded on top. Whether the few transverse flint arrowheads and fragments of polished flint axes found on the same site are chronologically related to this pottery class could not be determined with certainty.

Further pottery finds belonging to this group are:

Tumulus 8^A : from the floor no 26;
Tumulus 19 : no 5 (?);
Tumulus 20 : from the floor no 12;
Tumulus 21 : just below the surface of the mound no 15;
Tumulus 22 : from a posthole of the triple closely spaced postcircle (phase 3) no 11;
Tumulus 22^A : no 93 (non-stratified);
The Urnfield : nos 78 and 92 (stray finds).

This class should have the same derivation as class A and should be mainly dated in the (Early and) Middle Bronze Age.

The two small stained bucket-shaped vessels (fig. 42*b*: nos 52 and 56, Pl. XII: 1, no 52),

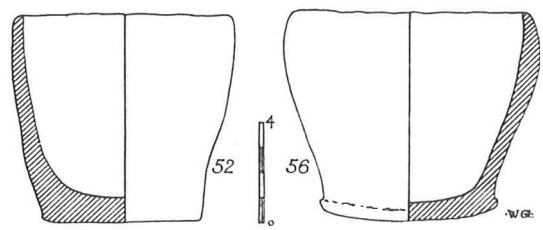


Fig. 42*b*

from tumuli 10 and 16 respectively, with very uneven wall, perhaps also belong to this pottery group. The paste of the first is tempered with sparse grit; the second, extremely friable, is copiously quartz-gritted. Both also show the characteristic base for the Early and Middle Bronze Age: externally flat, internally scooped out bowl-fashion. [3]

C. The tall cordoned cinerary urns, strongly tempered with pounded quartz and also pottery grit, found in tumuli 1 and 1^B — and probably also in the vanished tumuli W of Toterfout — belong to the so-called 'Deverel' group. They are:

Tumulus 1 : no 1*a* (secondary interment);
Tumulus 1^B : no 73 (primary interment) (Pl. VI, Part II, fig. 59: 1), nos 60, 61, 62 and 65 (secondary interments) (Pl. V: 2, Pl. VII–VIII, Part II, fig. 59: 2–5).

While find no 1*a* only comprises base fragments, the specimens from tumulus 1^B are complete or more or less complete urns. In the ringditch urnfield another, stray base (no 35*a*) was found. Finally, fragments of a friable medium-sized urn (fig. 42*c*: no 83), ornamented on the shoulder with a horizontal row of circular impressions (tubular bone or reed), from the destroyed primary grave beneath tumulus 9, may also be reckoned to this class, which must mainly date from the Middle and Late Bronze Age. This group will be extensively discussed in Part II, on pp. 89–137.

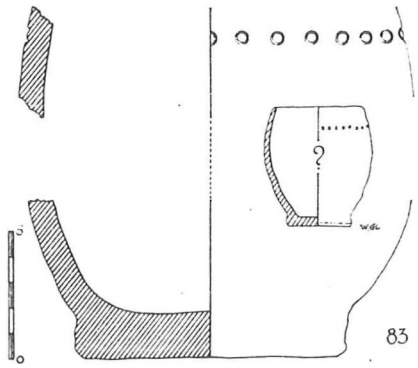


Fig. 42*c*

D. The ceramic material from the ringditch urnfield comprises only a few more or less complete specimens. They are slip-covered urns, the paste of which had been well levigated and contained no admixtures of quartz or pottery grit.

One of the urns (fig. 42*d*: no 77), a truncated pear-shaped, well-slipped, thin-walled

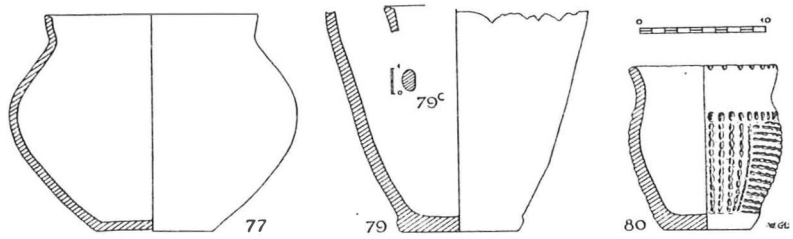


Fig. 42*d*

(0.005–0.009) urn with flared neck, belongs to Bursch's Urnfield group C:[4] the strongest Urnfield group in the Southern Netherlands, dated between 500 B.C. and the beginning of our era. A small, fairly thick-walled (0.007–0.009) urn (fig. 42*d*: no 80), externally covered with all-over finger-tip ornament in alternately horizontally and vertically finger-tipped panels, can be assigned to group G.[5] Bursch interprets this group as independent and widely diffused native reactions to the first appearance of the large Urnfield groups.

In the lower part of another, truncated pear-shaped urn (fig. 42*d*: no 79) — probably with flared neck — a fragment of a bronze bracelet (fig. 42*d*: no 79*c*) was found among the cremated bone.[6] — Of the other burials of the urnfield sherds remained in only two instances (nos 82 and 92), giving no further indication of the shape of the urn.

The pottery from the urnfield dates undoubtedly from the Iron Age, and gives a rough *terminus ante quem* for the tumuli. A few sherds, found in tumuli 19 (no 6, from the upper filling of a posthole of the outer postcircle, phase 2) and near tumuli 19, 20 and 21 (no 25) may also be counted among the pottery of the Urnfield period.

Bone. No parallels are known from the Netherlands for the two tubular bone ornaments decorated with transversely incised grooves that were discovered among the cremated bone of the primary grave of tumulus 5 (Pl. XII: 2, nos 43*a* and 43*b*). Unfortunately both are damaged at either end, so that we have no certainty as to original length. The one, perforated opposite the middle zone of decoration, could be a toggle. They no doubt date from the Bronze Age.

Equally unparalleled in the Netherlands are the two fragments of a burnt bone pin, round in section, found among the cremated bone (no 1*a*) of the primary grave of tumulus 1 (Pl. XII: 2, no 1*a*). These, too, should date from the Bronze Age.

Two burnt bone pins (Pl. XII: 2, 61*b* and 61*c*), made from a split hollow bone — according to Dr C. Krumbein perhaps the ulna of a goose (?) — were found among the cremated bone in a secondary 'Deverel' urn (no 61, Pl. VIII: 1, Part II, fig. 59: 3) from tumulus 1^{B}. A very similar pin was found by Bursch in a secondary 'Deverel' urn (Part II, fig. 58: 15) from a tumulus at Oss (cf. Part II, postcircle type 5, North Brabant, no 3, and type 8, North Brabant, no 1).[7]

Bronze. The fragment of a bronze bracelet burnt on the pyre (fig. 42*d*: no 79*c*), from an urn (no 79) of the urnfield, is the only bronze find from the cemetery. The fragment is approximately semicircular in section (width: 0.0085).[6] It probably dates from the Iron Age.

Flint. The flint artifact (fig. 4) found near the SW slope of tumulus 8 and the flint flakes from the floor of tumulus 1^{B} (no 71*b*) and from the urnfield (nos 78, 81 and 91) are clearly from an earlier period than the cemetery. The first, a finely chipped specimen, is Late Mesolithic (Tardenoisian IV), and the other pieces are probably Mesolithic or Neolithic. The fragments of polished flint axes, chipped transverse arrowheads, small scrapers, a nucleus and flakes — some crackled by fire — found in the settlement site on the '*Groote Aard*' are Neolithic in appearance, but might equally well date from the Early Bronze Age.[8] As they were found in the plough soil it could no longer be determined whether they were directly related to the pottery remains described under B.

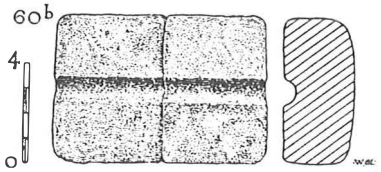


Fig. 42*e*

Stone. An interesting find is the burnt arrowshaft polisher (fig. 42*e*: no 60*b*) from a secondary 'Deverel' urn (no 60, Pl. VII: 2, Part II, fig. 59: 5) of tumulus 1^{B}.[9] This tumulus further yielded a fragment of a grinder of sandstone (no 66).

Miscellaneous. See the description of the finds from the settlement on the '*Groote Aard*', p. 99.

The dating evidence provided by the finds from the Toterfout-Halve Mijl cemetery is therefore only vague and scanty. We can deduce that the site probably already knew human settlement in the Late Mesolithic, perhaps also in the succeeding period, till the coming of the Tumulus culture. The majority of the barrows, as the typical pottery from a number of tumuli shows, will

date from the (Middle) Bronze Age. The urnfield and the 'ridge' type field (phase 2 of tumulus 22^{A}) form a *terminus ante quem* (Iron Age). Very important for the dating is the series of tall cordoned cinerary urns from tumuli 1 and 1^{B}. These vessels, the stratified position of which is known — once as a primary, otherwise as secondaries — date from the Middle and Late Bronze Age.[10]

The finds are therefore entirely insufficient when it comes to tracing the development of the cemetery in detail. A possibility for determining the relative chronology of the individual monuments is, however, offered by the palynological analysis of the soil samples taken from old surfaces below mounds and from sods in them. For the absolute chronology, finally, measurements of the amount of radioactive carbon (^{14}C) in four charcoal samples, by Professor Dr Hl. de Vries, have given most interesting results.

---

[1] Cf. V. G. Childe & N. Sandars, *La civilisation de Seine-Oise-Marne*, *l'Anthropologie* 54, N° 1–2, 1950, pp. 1–18; A. de Loë, *Belgique Ancienne* I, 1928, p. 146, fig. 49 (Vaucelles, Belgium); M. E. Mariën, *Bulletin des Musées Royaux d'Art et d'Histoire* 22, 1950, pp. 79–85, *l'Anthropologie* 56, N° 1–2, 1952, pp. 87–92 & *Oud-België*, 1952, pp. 151–75.

[2] In the *Jan Cunen Museum, Streekmuseum voor Oss en Omgeving*, at Oss.

[3] For parallels to these small vessels cf. L. Stroobant, *Ann. ARAB* LIV, 5e Série, Tome IV, 1902, pp. 372–6 (excavations at Weelde, Province of Antwerp, in Belgium), especially p. 374 (small, very gritty pot, h.: 0.105, inverted on a charcoal layer in tumulus D, Pl. II. III. 'Ses dimensions réduites permettent de supposer qu'il ne s'agit pas ici d'une urne funéraire, mais bien d'un vase ayant servi aux rites'). — C. Dens, *Ann. SAB* XI, 1897, p. 243 ('Kloosterbosch' at Grand-Brogel, Province of Limburg, in Belgium, tumulus 3, dm.: 9.00, h.: 0.60, Pl. VI: 5, raised over a pyre with cremated bone, on top of which lay a small inverted pot. Small accessory vessels, also inverted, were found by him in urns. 'Le fait de les trouver toujours dans cette position anormale permet de supposer qu'en certaines circonstances, les rites commandaient de verser sur le mort un liquide symbolique'). Cf. also P. Cuypers, *Bulletin et Annales de l'Académie d'Archéologie de Belgique* II, 1844, p. 171 (a small pot, dm. mouth: 0.10, excavated at Casterlé, Province of Antwerp, Belgium, in 1844, from tumulus 1, h.: c. 0.50, among much charcoal and cremated bone, probably at the old surface).

[4] Bursch, *OM Leiden*, NR XXIII, 1942, pp. 53–6, especially fig. 25: 14. Cf. the literature there cited for the North Brabant and Limburg urnfields. — Cf. also Hermans, *NO*, 1865, Pl. III–VI, *passim*.

[5] *Ibid.*, p. 62, cf. particularly fig. 33: centre (from Groot-Driene, in Twente, Province of Overijssel).

[6] Remains of bronze bracelets burnt with the body are rare in Brabant urns. Cf. *e.g.* Holwerda & Smit, *Cat.* 1917, pp. 35–6, nos 644, 646, 652, 661 (?). All from the Knegsel urnfield. See Part II, postcircle type 6, North Brabant, nos 15–7.

[7] Bursch, *OM Leiden*, NR XVIII, 1937, pp. 2–3, *Marburger Studien*, 1938, pp. 20–1.

[8] Characteristic is at least the steep retouch, which is considered late.

[9] Burnt, and thus too friable for the object to be conserved. A comparable 'arrow-straightener' in Childe, *Preh. Comm.*, 3rd ed. 1949, p. 138, fig. 42.

[10] See Part II, pp. 89–137.

2. SOIL SAMPLES

A. *Palynological investigation of the barrow cemetery between Toterfout and Halve Mijl*, by H. Tj. Waterbolk

Introduction

Soil samples were taken from nearly all tumuli investigated. By their examination it was intended to obtain data concerning the relative ages of the tumuli and the characteristics of landscape and climate during the period of settlement.

What follows is a preliminary discussion of the results of the palynological analysis, in which the main emphasis will lie on the chronological aspect.[1]

The samples were taken:

(*a*) from the old surface forming the floor of the barrow;
(*b*) from the sods with which the mound had been piled up;
(*c*) from the silting of ringditches etc.

The old ground surface usually showed as a stratum of dark humous sand, a few centimetres in thickness (see *e.g.* Pl. XVI: 2). This stratum represents the unweathered humus present at the time of construction of the barrow, and it contains the pollen rain of the immediately preceding period of perhaps a few decades. Where this old surface does not show up separately, the upper stratum of the subsoil may still be rich in pollen. This is the case when, after the building of the barrow, weathering of the humus has continued to such an extent that the dark colour has practically disappeared (Pl. XI: 1–2). It is then often difficult to find the exact dividing line between barrow and subsoil. The same conditions are found where a barrow has been raised on arable soil (Pl. XIX: 2).

In structure the sods often agree completely with the podsolized upper stratum of the subsoil, but occasionally they vary from it (Pl. IX: 1). In that case they were not, apparently, cut in the immediate vicinity. Not infrequently more than one type of sod is found in a single barrow. It is clear that samples taken from sods can again contain only pollen from the time immediately preceding the construction of the barrow.

The silting of ringditches was always sampled in the dark humous parts, and as deep as possible, because it may be assumed that in part at least it derives from a vegetation in existence not long after the construction of the monument.

date from the (Middle) Bronze Age. The urnfield and the 'ridge' type field (phase 2 of tumulus 22[A]) form a *terminus ante quem* (Iron Age). Very important for the dating is the series of tall cordoned cinerary urns from tumuli 1 and 1[B]. These vessels, the stratified position of which is known — once as a primary, otherwise as secondaries — date from the Middle and Late Bronze Age.[10]

The finds are therefore entirely insufficient when it comes to tracing the development of the cemetery in detail. A possibility for determining the relative chronology of the individual monuments is, however, offered by the palynological analysis of the soil samples taken from old surfaces below mounds and from sods in them. For the absolute chronology, finally, measurements of the amount of radioactive carbon (^{14}C) in four charcoal samples, by Professor Dr Hl. de Vries, have given most interesting results.

---

[1] Cf. V. G. Childe & N. Sandars, *La civilisation de Seine-Oise-Marne*, *l'Anthropologie* 54, N° 1–2, 1950, pp. 1–18; A. de Loë, *Belgique Ancienne* I, 1928, p. 146, fig. 49 (Vaucelles, Belgium); M. E. Mariën, *Bulletin des Musées Royaux d'Art et d'Histoire* 22, 1950, pp. 79–85, *l'Anthropologie* 56, N° 1–2, 1952, pp. 87–92 & *Oud-België*, 1952, pp. 151–75.

[2] In the *Jan Cunen Museum, Streekmuseum voor Oss en Omgeving*, at Oss.

[3] For parallels to these small vessels cf. L. Stroobant, *Ann. ARAB* LIV, 5[e] Série, Tome IV, 1902, pp. 372–6 (excavations at Weelde, Province of Antwerp, in Belgium), especially p. 374 (small, very gritty pot, h.: 0.105, inverted on a charcoal layer in tumulus D, Pl. II. III. 'Ses dimensions réduites permettent de supposer qu'il ne s'agit pas ici d'une urne funéraire, mais bien d'un vase ayant servi aux rites'). — C. Dens, *Ann. SAB* XI, 1897, p. 243 ('Kloosterbosch' at Grand-Brogel, Province of Limburg, in Belgium, tumulus 3, dm.: 9.00, h.: 0.60, Pl. VI: 5, raised over a pyre with cremated bone, on top of which lay a small inverted pot. Small accessory vessels, also inverted, were found by him in urns. 'Le fait de les trouver toujours dans cette position anormale permet de supposer qu'en certaines circonstances, les rites commandaient de verser sur le mort un liquide symbolique'). Cf. also P. Cuypers, *Bulletin et Annales de l'Académie d'Archéologie de Belgique* II, 1844, p. 171 (a small pot, dm. mouth: 0.10, excavated at Casterlé, Province of Antwerp, Belgium, in 1844, from tumulus 1, h.: c. 0.50, among much charcoal and cremated bone, probably at the old surface).

[4] Bursch, *OM Leiden*, NR XXIII, 1942, pp. 53–6, especially fig. 25: 14. Cf. the literature there cited for the North Brabant and Limburg urnfields. — Cf. also Hermans, *NO*, 1865, Pl. III–VI, *passim*.

[5] *Ibid.*, p. 62, cf. particularly fig. 33: centre (from Groot-Driene, in Twente, Province of Overijssel).

[6] Remains of bronze bracelets burnt with the body are rare in Brabant urns. Cf. *e.g.* Holwerda & Smit, *Cat.* 1917, pp. 35–6, nos 644, 646, 652, 661 (?). All from the Knegsel urnfield. See Part II, postcircle type 6, North Brabant, nos 15–7.

[7] Bursch, *OM Leiden*, NR XVIII, 1937, pp. 2–3, *Marburger Studien*, 1938, pp. 20–1.

[8] Characteristic is at least the steep retouch, which is considered late.

[9] Burnt, and thus too friable for the object to be conserved. A comparable 'arrow-straightener' in Childe, *Preh. Comm.*, 3rd ed. 1949, p. 138, fig. 42.

[10] See Part II, pp. 89–137.

2. SOIL SAMPLES

A. *Palynological investigation of the barrow cemetery between Toterfout and Halve Mijl*, by H. Tj. Waterbolk

Introduction

Soil samples were taken from nearly all tumuli investigated. By their examination it was intended to obtain data concerning the relative ages of the tumuli and the characteristics of landscape and climate during the period of settlement.

What follows is a preliminary discussion of the results of the palynological analysis, in which the main emphasis will lie on the chronological aspect.[1]

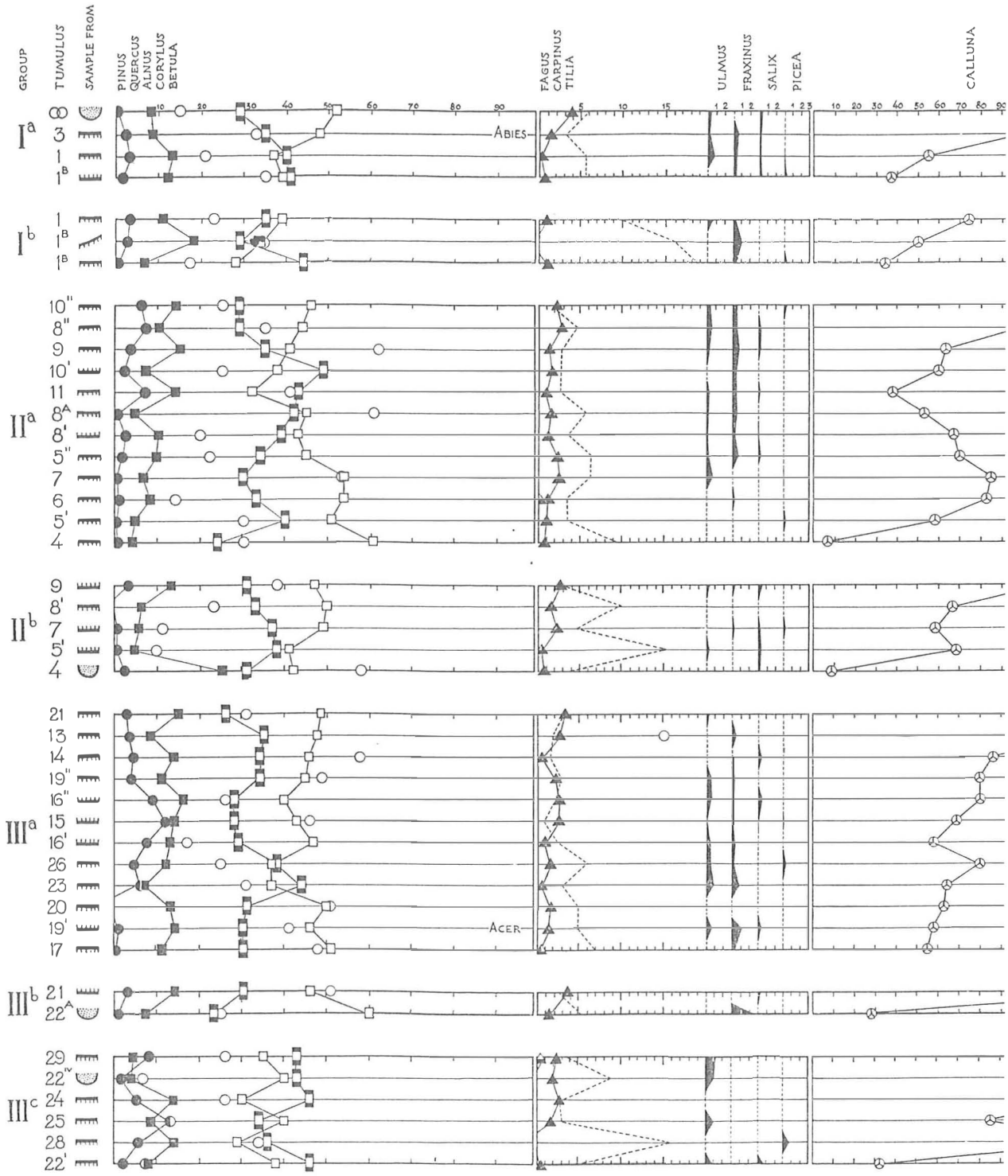
The samples were taken:

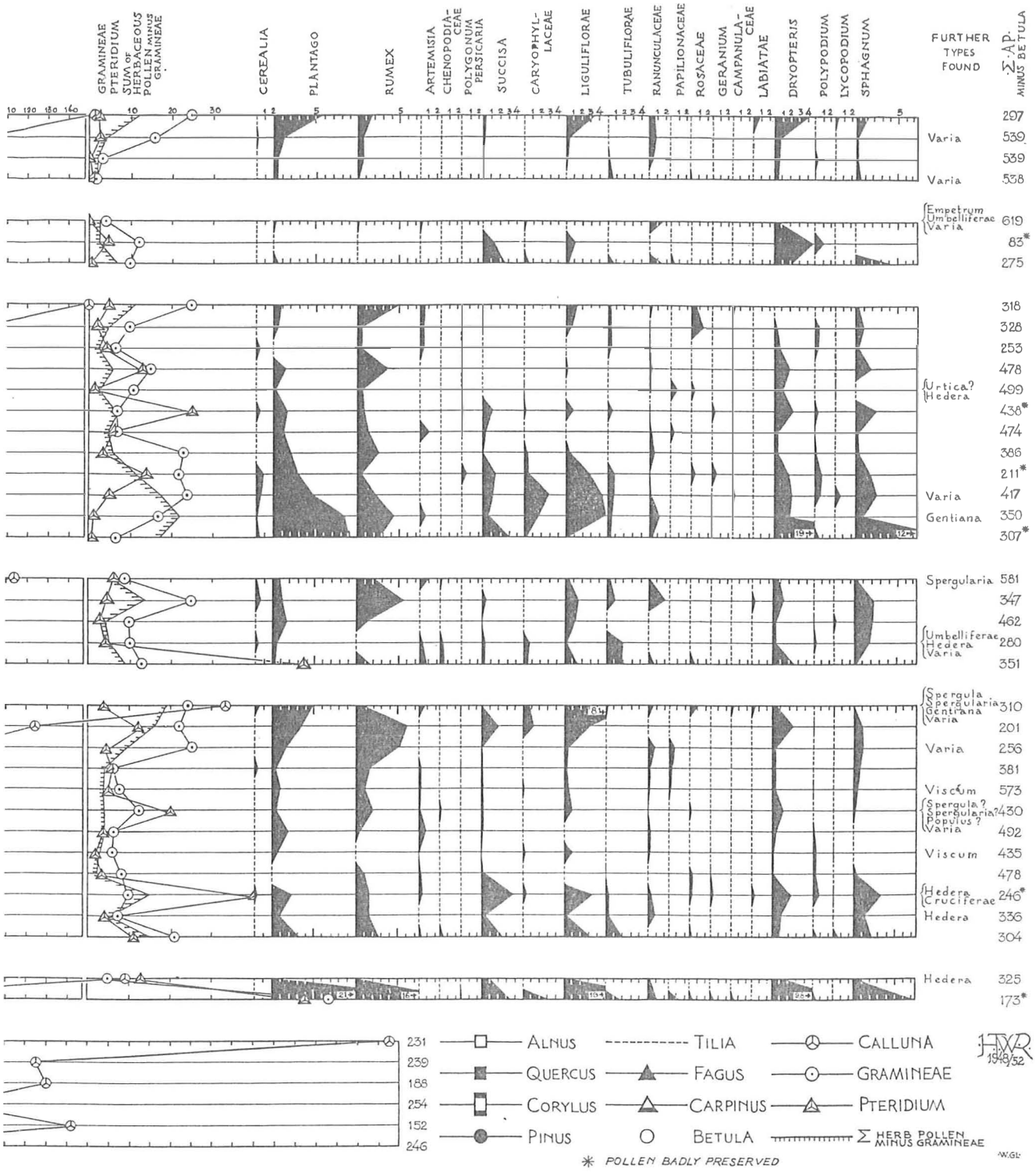
(*a*) from the old surface forming the floor of the barrow;
(*b*) from the sods with which the mound had been piled up;
(*c*) from the silting of ringditches etc.

The old ground surface usually showed as a stratum of dark humous sand, a few centimetres in thickness (see *e.g.* Pl. XVI: 2). This stratum represents the unweathered humus present at the time of construction of the barrow, and it contains the pollen rain of the immediately preceding period of perhaps a few decades. Where this old surface does not show up separately, the upper stratum of the subsoil may still be rich in pollen. This is the case when, after the building of the barrow, weathering of the humus has continued to such an extent that the dark colour has practically disappeared (Pl. XI: 1–2). It is then often difficult to find the exact dividing line between barrow and subsoil. The same conditions are found where a barrow has been raised on arable soil (Pl. XIX: 2).

In structure the sods often agree completely with the podsolized upper stratum of the subsoil, but occasionally they vary from it (Pl. IX: 1). In that case they were not, apparently, cut in the immediate vicinity. Not infrequently more than one type of sod is found in a single barrow. It is clear that samples taken from sods can again contain only pollen from the time immediately preceding the construction of the barrow.

The silting of ringditches was always sampled in the dark humous parts, and as deep as possible, because it may be assumed that in part at least it derives from a vegetation in existence not long after the construction of the monument.


GROUP
TUMULUS
SAMPLE FROM
PINUS
QUERCUS
ALNUS
CORYLUS
BETULA
ABIES
FAGUS
CARPINUS
TILIA
ULMUS
FRAXINUS
SALIX
PICEA
CALLUNA
ACER
Ia
Ib
IIa
IIb
IIIa
IIIb
IIIc


GRAMINEAE
PTERIDIUM
SUM of HERBACEOUS POLLEN minus GRAMINEAE
CEREALIA
PLANTAGO
RUMEX
ARTEMISIA
CHENOPODIACEAE
POLYGONUM PERSICARIA
SUCCISA
CARYOPHYLLACEAE
LIGULIFLORAE
TUBULIFLORAE
RANUNCULACEAE
PAPILIONACEAE
ROSACEAE
GERANIUM
CAMPANULACEAE
LABIATAE
DRYOPTERIS
POLYPODIUM
LYCOPODIUM
SPHAGNUM
FURTHER TYPES FOUND
Σ A.P. minus BETULA
Varia
Varia
Empetrum
Umbelliferae
Varia
Urtica?
Hedera
Varia
Gentiana
Spergularia
Umbelliferae
Hedera
Varia
Spergula
Spergularia
Gentiana
Varia
Varia
Viscum
Spergula?
Spergularia?
Populus?
Varia
Viscum
Hedera
Crucifera
Hedera
Hedera
ALNUS
QUERCUS
CORYLUS
PINUS
TILIA
FAGUS
CARPINUS
BETULA
CALLUNA
GRAMINEAE
PTERIDIUM
Σ HERB POLLEN MINUS GRAMINEAE
* POLLEN BADLY PRESERVED
H.V.R. 1949/52
A.W.G.L.

We must, however, always reckon with the possibility of infiltration of older material, for instance from the mound itself.

The samples were prepared for analysis by the Erdtman method, as modified by Iversen.[2] For every sample between 400 and 500 tree pollen grains were counted. In many cases the part of the slide that had not been counted was examined for further types.

The spectra obtained were combined into diagrams (fig. 43), and some explanation is necessary on this point. As a rule diagrams are only prepared where the relative stratified position of the samples is certain. In our case, however, this is only beyond doubt where we are dealing with sub-periods of a single tumulus. Accordingly it is these that form the backbone of the diagrams, and the phenomena thus observed — such as an increase of Fagus and Pinus and a decrease of Tilia — afforded a starting point in fitting the other spectra into place.

This same increase and decrease can be seen in a certain part of the diagrams for the Peel moor, published by Eshuis.[3] As an example I have added his diagram Deurnse Peel I (fig. 44).[4] As all his sections, scattered widely over this extensive peat bog, are in agreement, it is clear that we are here concerned with regional phenomena in the woodland history, which must therefore also apply to the Eight Beatitudes, situated some 35 kilometres West of the Peel.

From a consideration of these facts it follows that the other phenomena on which these diagrams agree might also be represented in the barrows. This was actually the case with the fluctuation in the Corylus values. It must, however, be said that a detailed comparison of the Eshuis diagrams amongst themselves is hampered by the probable occurrence of interruptions in the peat formation in nearly all his sections.

It has become clear in earlier investigations[5] that the increase of Ericaceae in a given area is also a good criterion for relative age. The Calluna values in the Peel diagrams are apparently determined solely by the production of the Sphagnetum itself, for within the range mentioned they show no clear increase.

A large part of the tumuli could be fitted in easily with the help of the Fagus, Tilia, Pinus, Corylus and Calluna values. It was not, however, possible in this way to determine with certainty the relative chronology of a number of tumuli with practically identical pollen spectra. An attempt was nevertheless made with the aid of the herb pollen, which not infrequently invited such an attempt. In any case it is natural to suppose that some tumuli were built at approximately the same time.

In order to give more significance to local phenomena and to obtain a more convenient arrangement of the results, the tumuli were divided, according to the three main locations, into an Easterly, a Central and a Westerly group.

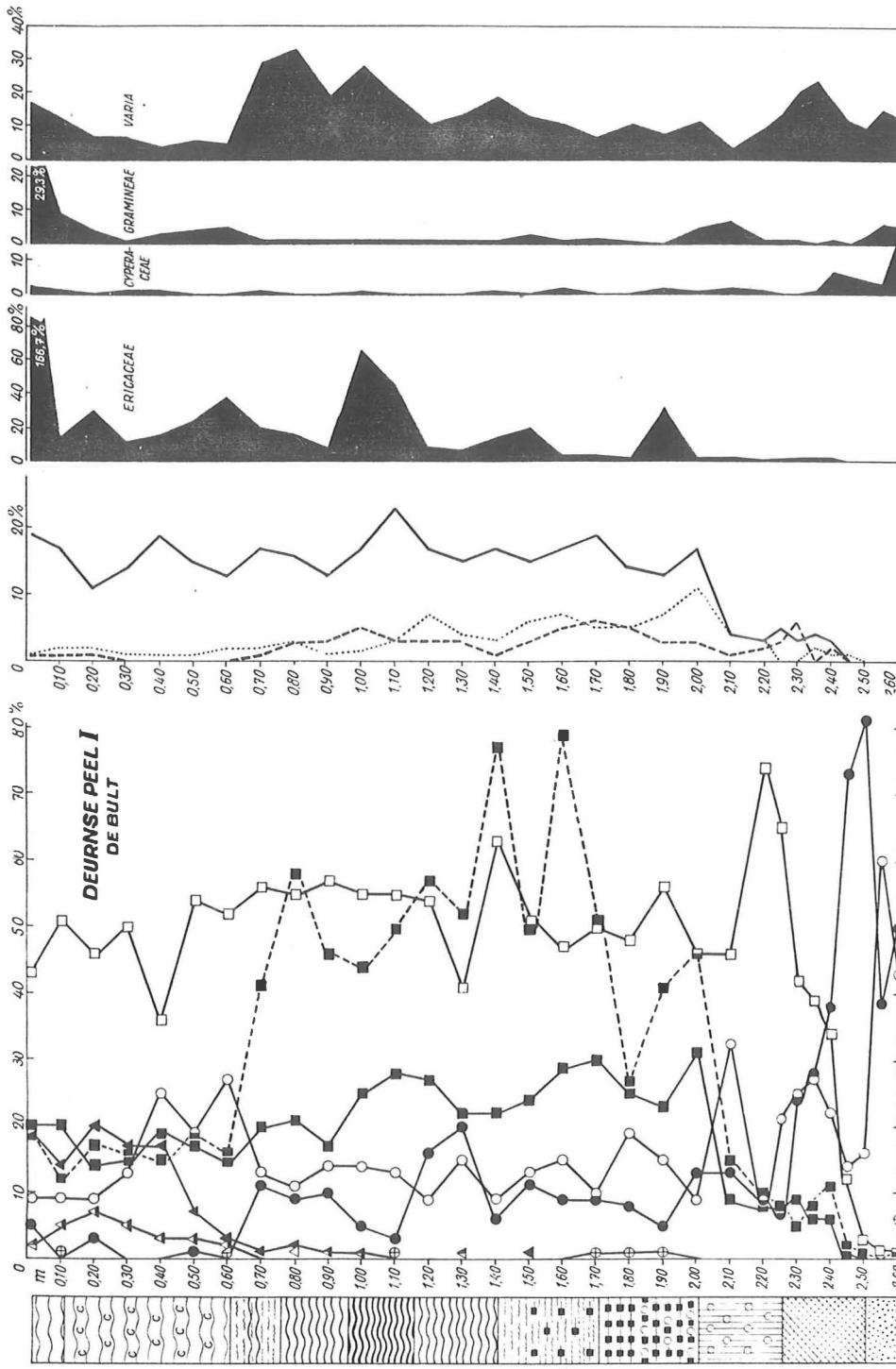

DEURNSE PEEL I
DE BULT
VARIA
GRAMINEAE
CYPERA-CEAE
ERICACEAE
29.3.%
185.7%

Fig. 44

For every group one analysis per tumulus or sub-period — if possible that of the old surface — was selected to make up a master diagram for the group. Control analyses and such-like were united in a subsidiary diagram. For the Westerly group a number of older and therefore not entirely comparable analyses were assembled in yet a third diagram (fig. 43: III^{c}).

As it soon appeared that the high values for birch must be conditioned by local occurrence they were excluded from the tree pollen total. In so far as the pollen totals are concerned this has led to larger differences between the analyses than was intended. Following the example set by Faegri and Iversen, [6] hazel was, however, included in the tree pollen total which is given on the right in the diagrams.

Bad preservation of the pollen has been indicated by an asterisk. Some pollen types may then have been missed, and the percentages are less reliable as a large number of fragments were unrecognizable. Generally speaking the preservation of the pollen in the samples was worse than in peat or *gyttja*.

All percentages are, of course, subject to the laws of statistics, which means that the place of a tumulus as indicated in a diagram is only probable. The degree of probability is conditioned by the significance of the difference between successive spectra.

If we consider, for instance, the table given by Faegri and Iversen [7] for the limits within which, in 95 per cent. of the analyses of a single sample, the percentages found for one type will fall, it is evident that a single analysis can usually be shifted through a fairly considerable range in the sequence if we wish to demand the same certainty — still less than one hundred per cent. The numerical value of the tree pollen total also plays an important part here.

Finally we must not forget that the choice of criteria for placing our barrows in sequence is indeed confirmed, on broad lines, by the Peel diagrams and the comparison of the sub-periods in single tumuli, but that as regards the details it is hypothetical to a considerable degree. It is therefore to be regretted that no suitable peat layers could be found in the immediate vicinity of the cemetery.

For practical reasons the diagrams themselves show some deviation from the usual type. From left to right we find the following sub-diagrams:

(1) Pinus, Quercus, Alnus, Corylus and Betula (scale 1 : 1);
(2) Fagus, Carpinus and Tilia (scale 2 : 1);
(3) Ulmus, Fraxinus, Salix and Picea, in silhouette curves (scale 2 : 1);
(4) Calluna (scale 1 : 2);
(5) Gramineae, Pteridium, and the sum of the herbs belonging to group (6) (scale 1 : 1);
(6) Cerealia, Plantago lanceolata, Rumex acetosella-type, Artemisia, Chenopodiaceae, Polygonum persicaria-type, Succisa, Caryophyllaceae, Liguliflorae, Tubuliflorae, Ranunculaceae, Papilionaceae, Rosaceae, Geranium, Campanulaceae and Labiatae, in silhouette curves (scale 2 : 1);
(7) Dryopteris-type, Polypodium, Lycopodium cf. clavatum and Sphagnum, in silhouette curves (scale 2 : 1).

At outer right a few further types of herbs have been recorded that were only occasionally met with. Comparable tree pollen types have been recorded on the right in the first sub-diagram.

Finally I would stress that in determining the relative ages of the barrows the results of the archaeological investigation, for instance those concerning the barrow type, have been ignored. Only botanical considerations have been allowed to count.

The Easterly group

To the Easterly group belong the two important Dutch disc barrows nos 1 and 1^B (see Part II, p. 8, note 72), the ringditch barrows nos 1^A and 2, the postcircle barrow no 3 and the ringditch urnfield, all situated to the East of the Bruggenrijt rivulet. Tumulus 1 now lies slightly apart, some 300 metres East of the main group, two barrows in between having been flattened in the first half of the last century. No samples were taken of the levelled tumuli nos 1^A and 2, so that these cannot figure in the comparison.[8]

Tumulus 1 had been built on a podsolized subsoil with clear humus layer, and showed a fine sod structure. The old surface of tumulus 1^B showed less clearly, but locally the mound also contained some fine dark sods.

For the master diagram (I^a) the old surface of no 1 and a sod from no 1^B were used, because the spectrum of the old surface of 1^B has clearly been influenced by the local occurrence of Tilia. For tumulus 1 a mixed sample of the old surface and the ringditch was further analysed (not recorded in the diagram); for 1^B a sample was also analysed from a secondary vegetation layer above the ringditch, for orientation purposes. For tumulus 3 the old surface was analysed, whilst a sample from the silting of a ringditch was all that was available from the urnfield.

The two diagrams clearly show that tumuli 1 and 1^B are the earliest: they are characterized by high values for Tilia, low for Fagus and Ericaceae. The herb pollen also shows considerable agreement. The percentages in question are conspicuously low, also when compared with those for early tumuli in the two other groups.

Tumulus 1 has slightly higher values for Calluna and might therefore be the later of the two, though the distance between the two barrōws is too large for a definite pronouncement. The high Quercus value in the secondary vegetation level of 1^B may indicate a renewed approach of the natural forest. That this was in any case near is proved by the high Tilia values in the old surface under both mounds. The absence of Ulmus in 1^B is remarkable. It is possible that there was a good habitat for this tree near tumulus 1, for instance in the undisturbed natural forest, but we may also think that a difference in time of

construction is responsible. The Pinus value also shows a slight difference between the two mounds. In an earlier analysis of the silting of the ringditch of no 1 only 0.9 % Pinus was found. This might indicate that 1^B, also with little Pinus, could be the later. As a matter of fact a comparison with the Peel diagrams, which show several Pinus maxima, also affords pointers in this direction. The Calluna values, however, argue against this view, as does the fact that the old surface of 1^B contains slightly more Gramineae, Succisa, Compositae, Dryopteris and Sphagnum than that of 1. In these latter respects 1^B shows a certain affinity to tumulus 4 of the Central group, certainly the oldest barrow in the area. A definite verdict cannot therefore be given.

The relative ages of tumulus 3 and the urnfield, both showing a high Calluna percentage, need not be in doubt. It is true that the ditch sample still contains an appreciable amount of Tilia, but this is surely due to the nature of this sample, older material being easily found in silted ditches. All the more weight should, however, be given to the high Fagus value (c. 4 %). It is the highest of the entire area, and it proves that the urnfield is the latest feature in the cemetery.

Eshuis did not find comparable Fagus values until the top of the older Sphagnetum or the lower part of the younger Sphagnetum where, however, Fagus as well as Carpinus immediately rise to even higher values. The urnfield will have been laid out at a time when the growth of the younger Sphagnetum had hardly, if at all, begun.

The place of tumulus 3 in the whole of the cemetery can only be determined when the other groups have also been discussed. The high Calluna values indicate, however, that it is late, and it looks therefore as if the area East of the Bruggenrijt had been uninhabited over a fairly long period. It is very probable on archaeological grounds that the ringditch barrow no 1^A (not sampled) was also late, and immediately preceded the urnfield.

The Central group

The Central group has been taken to contain tumulus 4, surrounded by a narrow ditch, the postcircle barrows nos 5 (two periods), 6, 7, 8 (two periods), 8^A, 10 (two periods?) and 11, and the Dutch disc barrow no 9. A settlement probably lay slightly NE of no 5. One or more samples were analysed for each tumulus.

For every barrow except nos 8^I and 10^I the spectrum of the old surface was entered in the master diagram (II^a); in the subsidiary diagram (II^b) were entered the spectrum of the ditch filling of 4, of sods from 5^I, 7 and 9, and of the old surface of 8^I. The latter was not entered in the master diagram because, possibly as the result of local occurrence, Tilia appeared to be too strongly represented relatively.

Tumulus 4, the '*Lambertsbergje*', lies apart from the rest, but the distance — some 400 metres — is certainly not so large as to explain the marked difference with the other barrows. Raised from yellow sand on a hardly podsolized subsoil (Pl. X: 1), and provided with a narrow ditch, this barrow had already yielded the impression, during excavation, that it was among the very earliest (Aeneolithic ?). This impression is wholly confirmed by the palynological analysis of the old surface. The low values for Fagus and Calluna, and the high value for Tilia (0.5, 5.3 and 7.0 % respectively) prove that tumulus 4 is the oldest in the entire area.[9] The high values for Plantago, Rumex, Succisa and Dryopteris, and the low value for Pteridium are also striking. In this respect the spectrum completely agrees with those for Neolithic or Aeneolithic barrows elsewhere in the country, especially, it seems, with those of the Beaker culture. Apparently we are here concerned with a group of the population that made a characteristic impression in the natural landscape. We think particularly of the '*landnam*' by means of '*svedjebrand*' which Iversen has proved for Denmark by pollen analysis.[10] The regular distribution of charcoal particles over the old surface below this barrow entirely agrees with this supposition.

The silting of the narrow enclosing ditch provided a spectrum that is also of great importance for our purposes. In broad outline it agrees with that for the old surface, but it differs from it in its high values for Quercus and Pteridium and the low value for Tilia and the herbs. It is clear that an oakwood with much bracken has begun to cover the site after the settlement had been abandoned.

The grouping of the other tumuli rests on the following considerations. The Peel diagrams show an increase of Pinus; it was therefore plausible to begin by grouping the tumuli according to their Pinus values, the more so as in all two-period barrows the second period contains more Pinus than the first. On the whole there was then an accompanying difference in the values for Fagus and Tilia. Within the two main groups thus obtained, however, classification became difficult. Among the oldest barrows 5^{I} and 6 gave very little Fagus (c. 1 %) and little more Tilia (3.5 %), whilst 7 and 5^{II} contained more Fagus, but also more Tilia (upwards of 6 %). As regards 5^{I} and 5^{II} the relative ages cannot be in doubt. A closer examination, also of the other diagrams, shows, however, that there is a fairly clear parallelism — at least in the middle phase of the diagrams — between the paths of the curves for Fagus and Tilia. The conclusion is perhaps warranted that these two trees had similar habitats. Through some unknown cause the pollen production of this type of vegetation — perhaps a moist Querceto-Carpinetum — might have been accentuated during the construction of tumuli 7 and 5^{II}, and we may perhaps think of a regeneration after some sort of '*landnam*'. In fact the spectrum of 5^{I} with its high herb values (particularly Plantago) and low Pteridium value is strongly reminiscent of that of tumulus 4. The low Quercus

value is also in agreement with this, and as Calluna is lower for 5^{I} than for 6 an order 4, 5^{I}, 6 seems to rest on a sound basis. Then follow 7, 5^{II}, the spectra of which show strong mutual resemblances. That of 5^{II}, with slightly more Pinus, has been taken for the latest.

If we now disregard, for the moment, tumuli 8^{I} and 8^{A}, and fix our attention on the barrows marked out by high Pinus values, it is evident that 10^{II} with very little Tilia and 150 % Calluna must be the latest. Tumulus 8^{II} with 110 % Calluna, nearly 3 % Fagus and low Corylus links up with this. We next come to tumuli 9, 10^{I} and 11. The fairly pronounced difference for Calluna between the two closely adjoining tumuli 10^{I} and 11 makes it probable that 11 is the older of the two. Both are characterized by high Corylus values, and 9, with its low Corylus value and high Calluna and Fagus values — especially in the sod — then falls into place between 10^{I} and 8^{II}.

We are still left with 8^{I} and 8^{A}. The spectrum of 8^{A} contains indeed little Pinus, but in view of the parallel paths of the Pinus and Quercus curves in the diagrams (in fact not easily explainable), this need not turn the scale. The fairly high Corylus value argues for a place near tumulus 11. On the other hand Quercus (and Calluna) would actually vindicate a place either before or after 5^{I}. Fagus and Tilia would allow both placings. In the fairly homogeneous herb picture of tumuli 5^{I}, 6 and 7, tumulus 8^{A} would not fit in so well. I should, however, hesitate to commit myself.

The analyses of sod and old surface of tumulus 8 differ *inter alia* in the amounts of Pinus and Corylus. That of the sod links up closely with 5^{II}, whereas that of the old surface stands nearer to 6 and 7. Perhaps the humus formation at the old surface did not, for some reason, continue down to the time of construction of the barrow, or possibly the upper stratum of humus had been removed.[11] In any case the sod would have to be the later, which is actually the case.

The Calluna values, as will have been observed, have only been taken into account where closely adjacent tumuli were being considered. Actually tumuli 5, 6, 7 and 8 show little difference in this respect, which becomes even more clear if the analyses in the subsidiary diagram are studied. Tumuli 8^{A}, 9 and 11, however, contain less Calluna, and it looks as if their construction was attended by new inroads on the natural forest, in NW and SW directions respectively, starting from a heath of comparatively small dimensions. As appears from the occasionally high values for Pteridium this heath lay open to a considerable degree of regeneration to forest. In a few instances (old surface 8^{I}, sod 5^{I}) the Tilia values were still so high as to establish that this tree did not only form part of the moist forest already mentioned — which must surely have bordered the rivulet — but also of the vegetation in the immediate vicinity of the tumuli, and that it must therefore also have grown in the higher parts.

The Westerly group

The Westerly group, the largest of the three, comprised tumuli 12–30. A glance at the map (fig. 3) shows that four sub-groups can be distinguished: (a) 12 and 17–20; (b) 13–16; (c) 21–29; (d) the isolated tumulus 30.

The samples taken from tumuli 12 and 18 proved unsuitable for palynological analysis, whilst tumuli 27 and 30 were not sampled.

A part of the samples was analysed some years ago (1948–9), when our knowledge of herb pollen was still restricted. In preparing the samples acetolysis was not yet applied. The number of unrecognizable pollens was thus much larger than in the later analyses, and this means that the easily recognizable types such as Calluna, Tilia and Pinus are favoured. As, moreover, only from 150 to 200 tree pollens were counted per sample, all analyses for which this was possible have been repeated. For tumuli 22 (phases I and IV), 24, 25, 28 and 29, however, only old analyses are available. These have accordingly been recorded in a separate diagram (III^c).

In the master diagram (III^a) the other analyses have been united. For tumuli 16 and 19 both sub-periods are represented. In the subsidiary diagram (III^b) an analysis of another sample of the old surface under 21 has been entered, as well as the silting of the sub-rectangular ditch cutting across tumulus 22^A. This latter analysis differs strongly from all others, [12] and this is one reason why it is difficult to fit it into the master diagram.

After our discussion of the two previous groups it is easy to see why tumuli 17, 19 and 20 have been considered the oldest: the Pinus and Fagus values are low, the Tilia value is fairly high. The values for Fagus, Tilia and Calluna make an order 17, 19, 20 seem plausible. [13] For each of these pollen types by itself, however, the differences would be too small to warrant conclusions.

Both tumuli 23 and 26 are still characterized by fairly high Tilia and low Fagus values, but they contain some 5 % Pinus besides. One of the two (23) shows a high Corylus value. Their relative order is difficult to determine with certainty. On the basis of the differences in the Calluna values, 23 was taken to be the older.

The other spectra are characterized by lower values for Tilia, and generally higher for Fagus. That of 21 is richest in Calluna (216 %), and is certainly the most recent. Tumulus 13, with 125 % Calluna, links up with this. Tumulus 14 is conspicuous by its low Fagus value, but otherwise agrees in every respect with 13 except for the lower Calluna value (86 %). If, for the moment, we ignore tumuli 16^{II} and 19^{II}, it seems clear enough (again because of the Calluna values, an important point as adjacent barrows are concerned) that 15 precedes 14, and 16^{I} precedes 15. The spectra of 16^{II} and 19^{II} can now be fitted in without difficulty between 15 and 14.

As a rather striking result we now see that the three sub-groups seem to be chronologically determined: 17, 19^{I} and 20 are the oldest, then follow 23 and 26, then 13–16^{I} (with 19^{II} and 16^{II}), and finally 21 again in the Westerly sub-group.

We shall now try to fit the earlier analyses into the sequence thus obtained. From diagram III^{C} it appears that tumuli 22^{I} and 28 are among the earliest. The analysis of the first must certainly be placed between 20 and 23. This is the more evident because a spectrum of the Central group (that of 8^{A}) was also characterized by low Pinus and already high Corylus values. Tumulus 28, with low Alnus value and rather much Pinus will not differ much in age from 26.

Tumuli 25, 24 and 29 all contain a fair amount of Fagus and little Tilia, and are therefore later. Tumulus 29, with very much Calluna, is certainly close to 21, as is perhaps the case with 22^{IV}, though little can be said with certainty concerning the latter, as only a ringditch filling could be analysed. On account of the high Corylus values both mounds would have to be placed between 21 and 13. For the same reason 24, in spite of its fairly low Calluna value, could not be much older. Tumulus 25, finally, is earlier, and would fit in best in the neighbourhood of 16^{I}, on account of the low Corylus and the not very high Fagus value.

Meanwhile it appears that the gap in the Westerly sub-group between 23 and 26 on the one side, and 21 on the other, is being filled in completely.

It remains to determine the place of the ditch silting of tumulus 22^{A}. We are here concerned with an oblong sub-rectangular ditch, later than a double closely spaced postcircle obviously belonging to a destroyed tumulus. In the spectrum we found no less than 21 % Plantago, 16 % Rumex, 60 % Gramineae, etc., so that it is clear that we are in the immediate vicinity of cultivated land. The supposition that these so-called 'ridges' are prehistoric arable plots is thus fully corroborated by palynological analysis.

The whole configuration makes us suspect that we have before us here a late feature in the cemetery. The spectrum, however, would rather argue for the contrary: Pinus is low, and Tilia predominates over Fagus, so that some might be inclined to place the ditch near 17, 19 and 20. The state of preservation of the pollen in the sample was, however, very bad, so that Fagus, for instance, was very difficult to recognize; moreover we must reckon with contamination by older material. When we take note of the high Alnus value, which causes the percentages of the other types to seem depressed, and when we realize that *e.g.* tumulus 14 also showed little Fagus, we see that the possibility should not be wholly excluded that 22^{A} is indeed much later. The low Calluna value would, however, still remain remarkable.

There is, however, quite another possibility, viz. that the oblong ditch dates from later times, when the area had been abandoned over a long period of time,

and had been covered by forests again. [14] The very high Pteridium value might also argue for this.

A confirmation of this latter opinion is obtained by a somewhat ampler investigation that could be carried out on an entirely comparable 'ridge' field near Steensel, [15] some 5 kilometres SE of Halve Mijl. Both the old surface and the ditch filling were analysed. The old surface gave a good spectrum, with 3.6 % Fagus, 1.6 % Tilia, and 22 % Corylus, whereas in the ditch we found only 2.1 % Fagus, 2.6 % Tilia and 22 % Corylus. The Pinus values were 3.6 and 3.1 %, those for Calluna 106 and 110 % respectively. It is clear that we have to do with a very late phenomenon, of about the same age as the urnfield in the E part of the cemetery. Many herbs were found, particularly in the ditch: 53 % Gramineae, 5.2 % Plantago, 20 % Rumex, 10 % Papilionaceae, etc. Pteridium was present with 51 %. Also in this respect we thus see that the 'ridge' field at Steensel corresponds entirely with that at Halve Mijl. This correspondence also holds good for the very high Alnus values (Steensel: 59 and 56 %; 22^{A}: 60 %).

Taking all together we see from the above how careful we must be in interpreting the results of analysis, especially of samples from the silting of ditches.

Comparison of the diagrams

We shall now attempt a comparison of the diagrams in order to arrive at a chronological survey of the entire barrow group of Toterfout-Halve Mijl.

In the first place we can state that, by and large, the three main groups show a parallel vegetation development. It should therefore be possible to determine which tumuli in the several groups are approximately contemporaries.

The diagrams of the Central and Westerly groups agree well even in details; conversely, this agreement in detail argues for the correctness of the order chosen within the groups. As an example we may notice the high Corylus values at the exact place where the Pinus values begin to increase. Just below this level we find already a little more Fagus together with the still high Tilia values. In all, three Corylus maxima can be distinguished. The diagram of the Easterly group shows two gaps, but offers no difficulties when compared with the others.

In the correlation table the results of a close comparison have been laid down (see also Part II, figs 73-6); the principal phenomena on the basis of which the diagrams have been divided into phases 1–13, have been listed on the right in the table.

The table now also shows the course of settlement of the area. Tumuli 2 and 4 are the oldest; then follow 1^{B} and 1 in the Easterly group. Next a simultaneous development takes place in the Central and Westerly groups, which seems to start somewhat earlier in the Central group, and in any case ends earlier than in the Westerly group. The Eastern part of the area is again inhabited in the final

phase of the cemetery. In discussing the groups separately we have already seen that in some cases the tumuli must have been laid out on a certain plan. We may think of the order 5, 6, 7, 8 in the Central group and of the several subgroups in the Westerly group. Within one of these latter (13–16) the barrows appear to have been built in the same order in which they lie in the row. In contrast to tumuli 5–8 construction here advanced in an Easterly direction. This is probably connected in some way with the sites of the settlements. [16] We might think that the occupation of the central area finally shifted towards the East, to the other side of the rivulet. The gap between tumulus 3 and the urnfield is perhaps filled by tumulus 1^{A}.

It goes without saying that the reservations made in placing several of the barrows within their groups apply with even greater force in the adjoining

Correlation between the diagrams, showing the proposed relative chronology of the Toterfout-Halve Mijl cemetery as based upon palynological evidence [17]

Phase	Westerly Group		Central Group	Easterly Group	Principal changes in the vegetation (to be read from bottom to top)
13		(22^{A})		ringditch urnfield	Corylus low; very little Pinus
12		21			Corylus low
11	29	13			Corylus high; abundant Calluna
10	22^{IV} 24	14 19^{II}		3	Corylus high; less Pinus
9		16^{II} 15	10^{II}		Corylus low; more Fagus than Tilia
8	25 28	16^{I}	8^{II} 9		Corylus low; Alnus higher
7		26 23	10^{I} 11		Corylus high; Alnus low; Pinus high
6	22^{I}		8^{A} 8^{I}		Corylus higher; slightly more Pinus; Fagus slightly less
5		20 19^{I}	5^{II} 7		Fairly high Tilia and Fagus
4		17	6		Corylus low
3			5^{I}		Corylus high; slightly more Fagus
2				1 1^{B}	Corylus high
1			4	2	Calluna low; Corylus low

schematic table. It should also be pointed out that the changes in the spectra used in preparing the table are not all of the same order and may in some case rest on accident. In such a case slight shifts might thus occur.

The herb pollen

As has already been said in the introduction, a full treatment of the analyses will not yet be given here. [1] This is particularly the case for the herb pollen. A large number of types were identified, partly in strongly fluctuating amounts. We shall here only deal with them in so far as they lead to archaeologically valuable conclusions.

In connexion with the phenomenon of the podsol band the Calluna values are significant. The expansion of the heaths in the Bronze Age, proved in Drente by the palynological investigation of small peat bogs as well as barrows in the same region, [18] is also clear in the Toterfout-Halve Mijl area. In contrast to tumuli 2 and 4, with hardly any heather pollen, we have a number of tumuli and an urnfield with very high percentages. Yet the mutual differences are actually quite small for a large number of tumuli. For two thirds of the spectra plotted in the three master diagrams the percentages show a fairly constant variation between 50 and 90 %. It looks as if the area of the clearings in the natural forest settled by man changed but little over a long period of time. In view of the probable intensity of occupation this is rather striking. We may think of a strong regenerative power of the natural forest, as a result of the fertility of the soil, which must certainly have been much greater then than now. [19] We shall come to speak of this again.

The curves for Gramineae, Pteridium, Plantago, Rumex and the other herbs must now be considered. Iversen [20] proved from a series of pollen diagrams from several parts of Denmark that an early Neolithic population had practised a so-called *svedje* culture: large tracts of forest were burnt down, cereals were cultivated on the ash for a few years, and the cattle were tended on the remainder of the cleared area. After some years another tract of forest was selected to carry out the same *landnam* again. As a rule the forest regenerated, so that in course of time the same area could be occupied again. Iversen recognized the regeneration phases of the forest in the tree pollen diagrams and found that at one and the same moment — related to the cattle-grazing — all manner of herbs either, as Plantago and Rumex, made their appearance, or, as Gramineae and Artemisia, showed a marked increase. Pteridium would be the first indicator of the regeneration. In our country, viz. in Drente, such a marked peak for Plantago and Rumex has also been found, [21] and this seems to accompany the Beaker culture. Several barrows of this culture yielded high Plantago and Rumex values, fairly often attended by Dryopteris, whereas Calluna was very low.

Very probably the analysis of the old surface beneath tumulus 4 — with charcoal particles — should also be viewed in this light, and it therefore appears very probable that this barrow was built by the last wandering bands of the Beaker culture. [22] The same holds good for tumulus 2.

The analysis of the ditch silting of tumulus 4 very clearly shows that the forest was once more gaining the upper hand, certainly with an intermediate Pteridium phase. On the whole, however, the soil will have degenerated to such an extent by this '*landnam*' that in many places the heather was at once able to maintain itself, and even to expand. On the sandy soils of Drente this is certainly the case.

It is remarkable that the barrows that now follow, 1 and 1^{B}, show very little cultivation pollen and Pteridium. The Calluna percentage is also low, which means that in this neighbourhood no more than a small area can have been cleared of forest. The heather vegetation had, however, been consolidated already at this spot, as is shown by the clear podsolization, especially under tumulus 1. If it may be assumed that the barrows were not built far from the centre of habitation we must conclude that the population in question interfered to a far smaller extent with the natural landscape than did the Beaker culture. Stockbreeding may have been unknown. The '*Zwartenberg*' at Hoogeloon, an impressive Dutch disc barrow [23] very probably of the same age as nos 1 and 1^{B}, also showed very little cultivation pollen. [24]

In this connexion we may remark that Troels-Smith has recently been able, through pollen analysis, to obtain data concerning two radically different prehistoric systems of '*landnam*'.

We next come to the large group of 'palisade' barrows. Both in the Central and in the Westerly group the earliest tumuli are characterized by high values for Gramineae, Plantago, Rumex, Compositae, Caryophyllaceae, etc. Now and then high Pteridium values occur. The whole gives the impression of a continuous struggle between man and forest, not with the help of fire — for continuous occupation would then be impossible — but through the cutting of wood for use, and especially through wandering herds. The herb flora is characteristic for places where cattle are grazing freely in open woodland (German: '*Triften*').

Agriculture was certainly practised by the side of stockbreeding. The sporadic occurrence of cereal pollen proves this. In the Westerly group it was found in tumuli 20, 19^{II} and 21. Perhaps this links up with traces of fences found beneath tumuli 14, 20 and 21, and more particularly with tumuli 12 and 18 built on and of arable soil. In the Central group tumuli 5, 6, 7, 8, 8^{A} and 9 contained cereal pollen, tumulus 7 as much as 1 %. In the Easterly group, finally, it was found only in tumulus 3.

Generally speaking the later 'palisade' barrows are somewhat poorer in herbs; the latest tumuli — usually with ringditches — are, however, richer again.

It looks as if in the phase of the highest Pinus values the herb values are at their lowest. Perhaps we may look to the climate for an explanation, but we shall return to this matter presently.

A word may finally be said concerning the 'ridge'-type fields, which are characterized by high herb values. Some doubt is still possible in the case of 22^{A}, but those of Steensel are certainly very late, and presumably date from advanced Urnfield times (Late Iron Age). That the 'ridges' represent arable soil is certain, though it is remarkable that no cereal pollen was found whatever. Perhaps other crops than wheat and barley were cultivated.

Climate and soil

A comparison between our barrow diagrams and the Peel diagrams of Eshuis shows that the period of occupation was pre-eminently favourable to the formation of the older Sphagnetum.

This means that the climate must have been decidedly moist, a conclusion markedly at variance with the old view of the Sub-boreal. Weber, and many after him, were of the opinion that the dry phase in the bogs represented a millennium before 1000–700 B.C. In Drente the formation of the younger Sphagnetum does apparently not begin until c. 400 A.D. [25] Judging from the pronounced step in the curves at the transition to the younger Sphagnetum in Eshuis' diagrams — we may notice Fagus and Carpinus — this is probably also the case in the Peel. The almost total absence of Carpinus in the spectra of the 'ridge' fields proves that in the Late Iron Age (until approximately the second century A.D.) the formation of the younger Sphagnetum had not yet begun. The dry period is thus removed to a time comprising the Iron Age and the Roman occupation, *i.e.* c. 700 B.C. – c. 400 A.D.

According to Grosz [26] the older Sphagnetum was primarily formed in a warm oceanic climate (slightly warmer than the present-day English climate). Wassink [27] agrees, but in contrast to Grosz he does assume a hiatus in the peat formation. This might also have been caused by edaphic circumstances, *e.g.* by drops in the sea level.

As regards the temperature during the period of occupation, most writers consider the time from c. 2500 to c. 500 B.C. (to be called Sub-boreal, if so wished, but *without* reference to the original meaning of the word) as still fairly warm. Firbas [28] speaks of the '*Späte Wärmezeit*'. Iversen still found an appreciable amount of Viscum. In the Sub-atlantic period (from 500 B.C. onwards, but with the same restriction as for the Sub-boreal), when summer temperatures also begin to drop, this disappears almost entirely. We also found Viscum (in tumuli 16^{II} and 26).

A marked difference with present-day vegetation is found in the strong representation of Tilia. In spite of '*landnam*' and cattle-grazing it could still maintain itself for a considerable time. During the settlement period a definite regression can be observed, and at the time of the formation of the younger Sphagnetum the tree has disappeared.

Among the causes of the Tilia regression replacement by Fagus is to be singled out (cf. Firbas). That this cannot have been the only cause is clear from its local occurrence on the high sandy soils occupied by man, which certainly were not favourable to Fagus. Fagus pollen was accordingly never found in any quantity in analysing barrow samples.

A second cause of the Tilia regression may be found in human exploitation of the natural forest. Firbas' supposition that the climate, in the form of a drop in summer temperatures, played a part, is in the writer's opinion confirmed by the fact that in the North of the country Tilia already disappeared in the course of the Neolithic period, whereas in the South it could maintain itself till the beginning of the Iron Age.

The meaning of the high Pinus values, which were also found in other areas in the older Sphagnetum, is not entirely clear. Firbas thinks of a temporary decrease in the rainfall.

The fluctuations in the Corylus values are also not easily explained. Generally speaking the Sub-boreal regression is certainly the result of a decrease in the area of moist forest on rich soil (Firbas).

The occurrence of Tilia and the rich herb vegetation on the higher soils indicates that the soil had as yet been little subject to leaching. This is confirmed by the inconsiderable increase of heather. The absence of Pteridium, one of the first indicators of deteriorating soil, from the oldest barrows also fits into this picture. Only when as a result of increasing podsolization the degeneration of the soil had advanced sufficiently far was it possible for the heather to gain the upper hand. It was then that the poor sandy soils originated that we now find in the area. [19]

Summary

A palynological investigation was carried out on soil samples from the old surface, from sods, or from the silting of ringditches of a group of some 30 prehistoric tumuli between the hamlets of Toterfout and Halve Mijl.

The spectra obtained were grouped according to their most probable relative ages and combined into three diagrams on a geographical basis.

The criteria for determining this order were mainly obtained by a comparison of the spectra from sub-periods of individual tumuli, and by a study of the

regional vegetation history as this appears from the diagrams for the Peel moor.

From a comparison of the diagrams the chronological survey of the order of succession of the tumuli, printed in tabular form on p. 116, was drawn up. [29]

The period of settlement coincides with the formation of the upper part of the older Sphagnetum in the Peel moor. The climate was moist and fairly warm. The last phase of the cemetery (the urnfield) probably falls in the dry period of the '*Grenzhorizont*'. The originally rich soil gradually degenerated into the poor moorland soil.

A closer analysis of the herb pollen is reserved until a later date.

---

[1] The final analysis of all data will find a place in a study, now in preparation, of the influence of prehistoric man on the vegetation of the diluvial soils in the Netherlands.

[2] K. Faegri & J. Iversen, *Textbook of Modern Pollen Analysis*. Copenhagen, 1950.

[3] H. J. Eshuis, *Palynologisch en stratigrafisch onderzoek van de Peelvenen*. Diss. Utrecht, 1946.

[4] Eshuis, *l.c.*, fig. 11.

[5] H. Tj. Waterbolk, *Palynologisch onderzoek van grafheuvels en oud akkerland op het Noordse Veld bij Zeijen*. *NDV* 1949, pp. 126–45.

[6] *l.c.*, p. 68.

[7] *l.c.*, p. 100.

[8] After the completion of this study, however, it turned out that for tumulus 2 a ditch sample was after all available. Its palynological analysis was a great surprise, as it yielded a spectrum showing a very remarkable correspondence with that of the old surface of tumulus 4 (see p. 111). The pollen was fairly badly preserved. A total of 411 tree pollen grains were counted (including Corylus but not Betula). The percentages were: Alnus 67, Betula 7.6, Quercus 3.9, Tilia 3.9, Fraxinus 0.3, Pinus 0.3, Fagus 0.3, Corylus 24, Calluna 9.7, Gramineae 18, Plantago lanceolata 13, Ranunculaceae 1.5, Rumex 3.4, Caryophyllaceae 0.7, Liguliflorae 1.7, Tubuliflorae 0.7, Papilionaceae 0.5, Polygonum persicaria 1.0, Artemisia 0.3, Succisa 0.3, Sphagnum 8.0, Dryopteris 8.0, Polypodium 0.7. From a comparison of the tree pollen values it appears that tumulus 2 must be of the same age as tumulus 4 (probably Late Neolithic); the low value for Calluna and the high for Plantago and the other herbs prove that the environment was also similar.

[9] From this period therefore also tumulus 2.

[10] J. Iversen, *Landnam i Danmarks Stenalder*. *Danmarks Geologiske Undersøgelse*, II. Række, Nr 66, 1941, *The Influence of Prehistoric Man on Vegetation*. *Danmarks Geologiske Undersøgelse*, IV. Række, Bd 3, Nr 6, 1949.

[11] Perhaps as a result of the complicated burial practice locally preceding the building of the barrow? See pp. 51–3 and Part II, pp. 157–60. figs 70–1. *W.Gl.*

[12] See below, pp. 114–5, 119.

[13] It is to be regretted that for tumulus 17 the second phase of construction was not sampled.

[14] That this was in fact very probably the case appears, among other things, from the subsequently mottled silting of the late ringditches in tumuli 21, 22^{IV}, 22^{A} and 29. Cf. Pl. XIX: 1 and Pl. XX: 1–2. *W.Gl.*

[15] In the urnfield of Veldhoven-Steensel, investigated in 1844 by P. N. Panken, in 1909 by J. H. Holwerda and M. A. Evelein, and in 1948 by the author. Cf. *supra*, pp. 9–10, fig. 2. *W.Gl.*

[16] The probable location of one of the settlements, as suggested by the orientation of a number of blocked entrances in timber circles, is discussed in Part II, pp. 154, 176. *W.Gl.*

[17] To the tumulus numbers have been added the symbols used for the peripheral structures on fig. 76. *W.Gl.*

[18] F. Florschütz & E. C. Wassink, *Untersuchungen an niederländischen Mooren* L. *Recueil des Travaux botaniques néerlandais*, Vol. XXXVIII, 1941.

[19] Cf. also the analysis of soil samples from tumulus 12 by Dr Jac. van der Spek, pp. 122–5. *W.Gl.*

[20] *Ibid.*

[21] Not yet published.

[22] Not far from tumulus 4, in 1952, a son of Mr Sanders found a small flint axe (length: 0.095), oval in section. — For the as yet very scarce indications of the Beaker culture in North Brabant see Part II, pp. 165–6. *W.Gl.*

[23] Dated by a bronze palstave chisel. See p. 11 and Part II, fig. 72. *W.Gl.*

[24] This may tie up with the cultural connexions of this exotic barrow type. See Part II, pp. 129, 166–70. *W.Gl.*

[25] H. Tj. Waterbolk, *Palynologisch onderzoek van de versterking bij het Witteveen en de cultuursporen in het Bolleveen, beide bij Zeijen, gem. Vries. NDV* 1950, pp. 100–21.

[26] H. Grosz, *Das Grenzhorizontproblem. Proc. 6th Internat. Bot. Congr.* II, 1935.

[27] E. C. Wassink, *Über den Grenzhorizont in niederländischen Hochmooren. Recueil des Travaux botaniques néerlandais*, Vol. XXXVI, 1939.

[28] F. Firbas, *Waldgeschichte Mitteleuropas* I. Jena, 1949.

[29] This also forms the basis for figs 73–6, representing the development of the cemetery. See Part II. *W.Gl.*

B. *Analysis of soil samples from tumulus 12*, by Dr Jac. van der Spek

(Agricultural Experiment Station and Institute for Soil Research T.N.O., Groningen)

The soil samples were taken on 30 April 1952 in the highest part of the barrow (fig. 21, section B, square E), which rises to about 50 cm, and at various depths below the surface. A sample was also taken from the yellow sand underlying the mound. The tumulus is situated in the old '*voorpoting*' or screening plantation of the hamlet of Halve Mijl. [1]

The samples were numbered as follows:

30 B 133 taken at c. 20 cm below the top of the mound;
30 B 134 ,, half-way down below the top of the mound;
30 B 135 ,, from and just above the non-podzolized old ground surface;
30 B 136 ,, from the underlying yellow sand.

Sample 30 B 135 comes from the stratum that may have been old arable. It is from this soil that the barrow was raised. The mound contained no sods, and the old ground surface, at least at the time when the barrow was built, was not covered with a natural (heather or grass) vegetation.

The soil samples were analysed for granular composition, *i.e.* for percentages of carbonate of lime ($CaCO_3$), organic matter, clay (particles $< 16\,\mu$), and sand (particles from 16 to 2000 μ) and its subfractions. The results of this analysis are given in Table I, expressed in percentages of the soil dried at 105° C.

Table I

No	$CaCO_3$	Org. matter	Clay		Sand
			$< 2\,\mu$	$2–16\,\mu$	$16–2000\,\mu$
30 B 133	0	1.0	2.7	3.4	92.9
30 B 134	0	0.9	2.6	2.8	93.7
30 B 135	0	0.5	3.8	2.4	93.3
30 B 136	0	0.1	3.5	2.5	93.9

No	Sand subfractions in μ									
	16–25	25–35	35–50	50–75	75–105	105–150	150–210	210–300	300–420	> 420
30 B 133	2.4	2.6	8.3	10.5	6.7	26.8	16.2	8.0	6.5	4.9
30 B 134	2.6	3.1	8.8	9.1	6.8	26.9	16.7	8.2	6.7	4.8
30 B 135	2.1	2.4	9.4	9.6	6.4	26.5	16.0	8.6	7.1	5.2
30 B 136	1.8	2.4	7.8	10.8	7.0	25.9	16.7	8.5	7.1	5.9

All four samples show the same granular composition. The sample from the upper stratum has the highest organic matter content, the percentage decreasing with depth. In the yellow sand hardly any organic matter occurs. The organic matter content of the sample from and just above the non-podzolized old surface is somewhat higher than that of the yellow sand. This organic matter may, partly at least, derive from the vegetation at the time when this stratum lay at the surface, but not from a grass or heather vegetation. Perhaps part of it may also derive from organic remains of possible crops grown in this surface stratum at the time. The samples from the two higher strata contained still more organic matter and the percentages are almost the same for both. This higher percentage of organic matter must be a result of vegetation, probably since the fifteenth century, when, long after the barrow had been built, trees, and latterly coniferous trees, grew on the site. In this acid sandy soil (pH of the successive layers respectively 4.50, 4.50, 4.43, 4.39) some of the organic matter of the upper stratum may have dissolved and have been washed down with the percolating rain water, finally precipitating in the old surface stratum and thus perhaps slightly increasing the organic content of this layer.

The clay content is approximately the same in all four samples (about 6 %). The soil of these samples should accordingly be classed as sandy, and on account of the distribution of the sand over the several sand subfractions it should be

classified as *cover sand*. Cover sand frequently occurs in North Brabant. It is drift sand, deposited by the wind in a generally thin layer over older formations. It is poor in plant-nutrient components.

The four samples were also analysed for phosphorus content, both total amount of phosphorus and amount soluble in 1 % citric acid. The latter is a measure of the phosphorus supply available to plants. If the old ground surface was arable land before the raising of the barrow, manuring with animal dung should make one expect a high phosphorus content.

The contents found, in grammes of P_2O_5 per 100 grammes of soil dried at 105° C, are given in Table II.

Table II

No	P_2O_5 soluble in citric acid	P_2O_5 total	Free iron oxide (Fe_2O_3)
30 B 133	0.01	0.03	0.20
30 B 134	0.01	0.025	0.21
30 B 135	0.01	0.01	0.22
30 B 136	0	0.005	0.13

The yellow sand contains hardly any phosphorus. In the soil just above the old surface there is slightly more of it. The phosphorus found in this soil is almost entirely soluble in citric acid. The soil of the two higher strata contains a still higher total of phosphorus, and that of the top layer contains most.

As this top layer never has been arable land, the phosphorus in this layer cannot derive from a manure containing it. The entire site ('*voorpoting*') is covered with forest, at present coniferous. Probably phosphorus was absorbed from the old surface by the tree roots (hair roots could be observed in the old surface stratum, but not in the underlying yellow sand). A part of this phosphorus got into the top layer with the fallen leaves, and was again in part leached down by percolating water.

The total phosphorus content in the two upper strata is not high. Of these amounts not more than roughly one third is soluble in citric acid. The phosphorus in these strata has thus been fixed fairly strongly, in contrast to that in the stratum just above the old surface. This fixation should be attributed either to the higher content of organic matter in the upper two layers, or to a higher content of iron in a form in which iron is capable of phosphate fixation.

In order to ascertain this the content of free iron oxide in the four strata was determined. These contents (percentages of Fe_2O_3 on dry soil) have also

been entered in Table II. It appears that in the strata above the yellow subsoil these contents are practically the same. This fact, and the solubility of all the phosphorus of the old surface in citric acid, may lead one to conclude that in the upper two strata it mainly consists of organically fixed phosphorus. This would then have been absorbed from the old surface stratum by the tree roots, and part of it have been brought into the present top stratum with the fallen leaves. Thus the old surface stratum would have contained more phosphorus before the raising of the barrow than is now found in it. Whether this stratum was then arable soil, however, cannot certainly be concluded from these data.

[1] See p. 21. *W.Gl.*

3. CREMATIONS

Osteological examination of the cremation burials of the Toterfout-Halve Mijl cemetery,[1] by Dr Med. C. Krumbein

Tumulus 1, no 1*a* primary interment at ground level:
I *Weiblich Matur + Infans I* (Beigabe: zwei Bruchstücke einer Knochennadel. Pl. XII: 2, 1*a*);
II *Weiblich Adult + 2 × Infans I.*

1*b* primary interment at ground level: *Weiblich Matur + Infans I.*

1*c* secondary interment in an irregular pit at the edge of the barrow, on the NE side: *Männlich Matur.*

1*d* secondary interment in an oblong pit at the edge of the barrow, on the S side: *Weiblich Adult + Infans I.*

1*f* secondary interment in a trunk coffin at the edge of the barrow, on the E side: —

1′ secondary interment in a cinerary urn (no 1) at the edge of the mound, on the S side: *Infans I.*

Tumulus 1^{B}, no 74 primary interment in a cordoned cinerary urn (no 73), within a temporary mortuary house (?): *Männlich Matur.*

60*a* secondary interment in a cinerary urn (no 60) buried in the inner slope of the bank, on the ENE side: *Juvenil.*

61*a* secondary interment in a cinerary urn (no 61) buried in the outer slope of the bank, on the S side: *Infans II* (Beigabe: zwei Knochenpfrieme, die mir aus den Ellenknochen einer Gans? angefertigt zu sein scheinen. Pl. XII: 2, 61*b* and 61*c*).

62*a* secondary interment in a cinerary urn (no 62) buried in the inner slope of the bank, on the ESE side: *Juvenil.*

65*a* secondary interment in a cinerary urn (no 65) buried in the inner slope of the bank, on the E side: *Juvenil.*

76 secondary interment in a trunk coffin SE of the central, primary interment: *Weiblich Adult.*

63 secondary interment found in the filling of the grave pit, above the secondary trunk coffin with cremation (no 76), at the N end: *Infans II–Juvenil.*

Tumulus 2, no 35*a* primary interment: *Unbestimmbar.*

Tumulus 4, no 88 primary interment: *Weiblich Senil.*

Tumulus 5, no 44 primary interment in a shallow, bowl-shaped pit, within the 4 stakeholes of a temporary mortuary house: *Infans I.*

47 sloping patch of cremated bone between the sods, deposited during the construction of the barrow, on the E side: *Infans I.*

39 secondary interment in an irregular pit at the edge of the barrow, on the W side: *Erwachsen.*

Tumulus 8, no 48 primary interment in a shallow bowl-shaped pit, within the 4 stakeholes of a temporary mortuary house: *Infans I.*

Tumulus 8A, no 34 primary interment in a shallow bowl-shaped pit, within the stakeholes of an irregular temporary covering of the grave: *Infans I.*

27 some fragments of cremated bone deposited in a posthole of the outer row of the primary, inner, double closely spaced postcircle, on the N side: *Unbestimmbar.*

28 as before, on the N side: *Unbestimmbar* (*Infans I?*)

29 as before, on the N side: *Unbestimmbar.*

31 as before, on the W side: *Infans I.*

32 as before, on the W side: *Unbestimmbar.*

33 as before, on the W side: *Unbestimmbar.*

30 secondary (?) interment between two postholes of the primary, double closely spaced postcircle, on the NNW side: *Infans I.*

35 stray fragments of cremated bone collected before the excavation from the ploughed-up surface of the mound, on the NNE side: *Erwachsen.*

Tumulus 9, no 83*a* some fragments of cremated bone, found together with fragments of a cinerary urn from the destroyed primary grave: —

Tumulus 10, no 50 primary cremation burial scattered at the W side of a rectangular, shallow, bowl-shaped pit, except for some skull fragments (no 50*a*: *Weiblich Matur*) found together in the SE corner: *Weiblich Matur* + *Infans I.*

Tumulus 11, no 53 some fragments of cremated bone from a posthole of the outer, secondary, single widely spaced postcircle, on the W side. Deposited before the placing of the post. *Erwachsen.*

Tumulus 12, no 85*b* primary interment in a shallow oval pit: —

Tumulus 14, no 70 primary interment in a shallow square pit, within a temporary mortuary house: *Erwachsen.*

Tumulus 15, no 67 secondary interment, some 0.30 metres below the surface of the barrow, on the E side: *Unbestimmbar.*

Tumulus 16, no 59 primary interment in an irregular pit: *Erwachsen.*

56*a* small quantity of cremated bone from a small, very friable bucket-shaped vessel, found among the sods under the talus of the primary barrow: —

Tumulus 17, no 14 primary interment in a shallow rectangular pit: *Erwachsen.*

Tumulus 18, no 13 primary interment in a shallow oblong pit: *Unbestimmbar.*

Tumulus 19, no 16 primary interment in an irregular pit, within a temporary mortuary house: *Unbestimmbar.*

The Urnfield, no 77*a* cremation from urn (no 77), within a ringditch: *Erwachsen.*

79*a* cremation from urn (no 79), within a ringditch: *Erwachsen.*

80*a* cremation from urn (no 80), within a ringditch: *Erwachsen.*

86 cremation burial, without urn, in a small pit under the level heath and not surrounded by a ringditch: *Erwachsen.*

92*a* small quantity of cremated bone from a destroyed urn burial within a ringditch: —

[1] Terms used:

Infans I = up to 7 years;
Infans II = 7 to 14 years;
Juvenil = 14 to 22 years;
Adult = 22 to 40 years;
Matur = 40 to 60 years;
Senil = over 60 years.

Dr Krumbein, in a letter of 6 November 1951 comprising partial results of his examination, writes: 'From the results so far available it seems that few men but many women and children were interred'.

4. CHARCOAL SAMPLES

The number of charcoal samples preserved is fairly large.[1] Some samples, nos 74*a*, 87, 49 and 80*b*, were submitted to Professor Dr Hl. de Vries and G. W. Barendsen, Physics Laboratory, University of Groningen, for measurements of the amount of radioactive carbon (^{14}C). The ages, in solar years, thus derived, have been entered after the numbers in question.[2]

Tumulus 1, no 1*e* charred parts of a trunk coffin, hollowed out by fire. Secondary interment on the E side.

Tumulus 1^B, no 72 charcoal from the old surface, around the primary cordoned urn (no 73).
74*a* charcoal lying in the upper part of the primary cordoned urn (no 73): 3450 ± 100.
62*b* charcoal particles from secondary urn (no 62).
65*b* charcoal particles from secondary urn (no 65).

Tumulus 3, no 55 from a patch of charcoal, a little below the surface of the barrow (remains of a funeral repast?).

Tumulus 4, no 87 charcoal from the primary grave: 3375 ± 200.
90 charcoal particles lying scattered in places on the old surface at the centre of the barrow.

Tumulus 5, no 42 charcoal from the primary grave.
41 from a patch of charcoal in the SW quadrant (funeral repast?).
46 from a sloping patch of charcoal with cremated bone deposited between the sods during the construction of the barrow.
40 charcoal from a secondary grave, on the W side.

Tumulus 7, no 38 charcoal from a small (ritual?) pit, in the SW quadrant.

Tumulus 8, no 49 charcoal from the primary grave: 3055 ± 90.

Tumulus 9, no 84 charcoal from the primary grave.

Tumulus 10, no 51 charcoal from the primary grave.

Tumulus 12, no 85*a* charcoal from the primary grave.

Tumulus 14, no 69 charcoal from the primary grave.
75 charcoal from an irregular patch of grey sand, in the NE quadrant.

Tumulus 15, no 64 charcoal from the primary grave.
68 charcoal particles from a natural depression under the old surface, filled with leached sand, in the SW quadrant.

Tumulus 16, no 58 carbonized boards (width: 0.23 and 0.25) lying along the sides of the primary grave.
59*a* charcoal from the primary grave.
57 from a patch of charcoal under the slope of the primary barrow.

Tumulus 17, no 14*a* charcoal from the primary grave.

Tumulus 19, no 16*a* charcoal from the primary grave.
17 charcoal from a — probably secondary — cremation burial, on the E side.

The Urnfield, no 80*b* charcoal (all *Pinus*) found near an urn (no 80) within a ringditch: 7865 ± 240.[3]
86*a* charcoal from a cremation burial without urn in a small pit under the level heath and not surrounded by a ringditch.

---

[1] It is to be regretted that the charcoal samples could not be macroscopically examined to determine the kind of wood. As a rule oak seems to have been used for the pyre. Cf. also pp. 5–6.

[2] Through the kind offices of Dr H. L. Movius, Jr, of Harvard University, three samples (nos 42, 64 and 87) were submitted to Professor W. F. Libby (Institute for Nuclear Studies, University of Chicago) in 1950; so far they have not been measured.

[3] The results of this measurement are greatly at variance with the age to be expected (Iron Age). In the immediate vicinity of the urn burial, however, a number of possibly Mesolithic flint flakes were found (find no 81). It may be supposed that the urn pit was sunk through a patch of charcoal from a Mesolithic settlement. Mr W. van Zeist, biol. drs, Assistant in the Institute for Biological Archaeology, gives the wood as *Pinus*.

THE RESTORATIONS

As has been mentioned in the descriptions of individual barrows, a number of these monuments were restored in the light of evidence obtained from the excavations. Some others were only brought back to the state in which they had been found. In principle, restoration was only undertaken where the monuments concerned were situated on municipal ground, their preservation over a longer period of time thus being assured.

Restoration, reconstruction and preservation of excavated tumuli have one special aspect of paramount importance. The remaining parts of the crossbaulks (cf. fig. 5) can always at some future time offer an opportunity for renewed study of the sections, for the further analysis of the structure of both the mound and the old surface, and for the taking of fresh soil samples. This practice has already yielded fruitful results. From 1945 onwards the Institute for Biological Archaeology has undertaken intensive palynological examinations of the old surfaces under tumuli, in the course of which numerous samples were taken from barrows that had been excavated and restored at earlier dates. The ground plan will also invariably be preserved to some extent. Thus, for instance, at the Toterfout-Halve Mijl excavations it was our constant endeavour to leave one half of each posthole undisturbed. As was only natural, however, the interments were invariably removed completely.

In undertaking the restoration of prehistoric round barrows, the demarcation of the original edge of the barrow and the calculation of the original height form the main problems. [1]

It is not, generally, very difficult to identify the original edge of a barrow in the course of excavation. Where a barrow consists of more than one period, moreover, one or more vegetation lines can usually be observed, corresponding to the outer slopes of successive phases in its history. Similarly, where a barrow is surrounded by a peripheral structure (timber circle; ditch, sometimes with internal bank), it is not infrequently possible to establish from one or more of the sections that, for instance, the postholes are situated at the exact place where the vegetation line of the original slope meets the old surface, *i. e.* at the original edge of the barrow.

The calculation of the original height of a barrow meets with greater difficulties, as the settling of the mound, and the spreading of earth at its edge — as a result of which the remains of peripheral constructions are generally covered over

by its foot — cause considerable changes in its proportions. Generally a secondary accretion of wind-blown sand has been deposited on the N and NE slopes, causing the true centre with the primary grave to be situated SW of the apparent centre. [2] This accretion must be the result of S to SW winds prevailing since Bronze Age days. The circumference of the barrow having thus increased considerably, the height has diminished in proportion. In this manner the silhouette of an at first dome-shaped round barrow has gradually flattened in course of time. The Neolithic and Aeneolithic monuments, built of more or less pure sand, normally show much greater spreading than the later, sod-built barrows.

Where a tumulus is stated to have been restored, the original edge, with possible attendant constructions — postcircle, bank or ringditch — has been marked again. The soil that has spread outwards beyond the edge, and also the wind-blown accretions, have been used to replace the mound itself, which thus attained a greater height than before excavation. A covering blanket of heather sods ensures a firm new vegetation on the restored barrow. Instead of the more or less flattened shape prior to excavation, the restored tumulus once again shows itself as a regular dome-shaped mound. As the loose material of which it has been piled up will settle again in course of time, the height will naturally diminish somewhat over a period of years.

* * *

Though it had originally been the intention to restore tumulus 1, with its monumental enclosing bank, various causes contributed to defeat this plan. Its situation, partly on private ground, partly under the Zandoerle-Vessem road, made a complete restoration of ringditch and internal bank impossible from the first, whereas the immediate propinquity of a farmhouse threatened to make future upkeep exceedingly difficult. Part of the barrow having, moreover, been levelled, a large volume of sand would have had to be carted to the site, which would without doubt have entailed considerable expense.

For tumulus 2 restoration was clearly out of the question. Tumulus 3, however, and the contiguous tumuli 1^{A} and 1^{B}, all lying on municipal ground, were restored after excavation. Tumulus 3 was outwardly brought back to the state in which it had been found; the low mounds 1^{A} and 1^{B} were restored to the form they must have had when freshly built, 1^{A} with the surrounding ditch at its base, 1^{B} enclosed by its ∞-shaped ditch with internal bank. Tumulus 4, the isolated '*Lambertsbergje*', North of the road, in which only some trial trenches could be made, was restored to the state in which it had been found.

Much care has been given to the restoration and future environment of tumuli 5, 6, 7 and 8, on the '*Groote Aard*'. When the site was planted, in 1949, with

oak and fir saplings, a small area surrounding these four barrows was left clear, so that in the distant future they will come to lie in a clearing amid the forest. After the excavation the tumuli were carefully rebuilt. For the two-period tumulus 5, eight-foot creosoted fir posts were placed in the postholes of both circles (Pl. XXII: 2, to the right); the edge of the barrow as restored is that of the second period, marked by the outer ring of widely spaced posts with clear entrance blocking. Finally, the position of the temporary mortuary house has been marked by four stakes at the top. Tumuli 6 (Pl. XIII: 1, background, and Pl. XXII: 2, to the left) and 7 are now surrounded each by a similarly restored circle of posts at the original edge of the mound. No special problems were raised here, as neither consists of more than a single period of construction. Of the very complicated tumulus 8 only the primary, single widely spaced postcircle was restored, four stakes being again placed at its top to mark the position of the temporary mortuary house. The methods of replacing described above have resulted in a considerable increase in height of the monuments, especially tumulus 5. The four tumuli on the '*Groote Aard*', until a few years ago no more than small sagging mounds, with a little extra flattening as a result of the Allied tank practice in 1944 (Pl. XXI: 2), now stand out against the forest border as fine, regular, dome-shaped barrows (Pl. XXII: 2).

Tumulus 8^{A}, which had already been completely levelled, was not rebuilt.

The much ploughed-out tumulus 9, surrounded by a ditch with internal bank, was carefully restored, so that now, in a clearing in the dense fir wood, mound, bank and ringditch once again stand out perfect. With the Dutch disc barrow on the Rechte Heide near Goirle and the '*Zwartenberg*' at Hoogeloon, both in the province of North Brabant, tumuli 1^{B} and 9 form the third and fourth restored monuments of this type in the Netherlands.

The ploughed-out tumuli 10 and 11, now also situated in clearings in the fir wood, equally regained the appearance of normal barrows. The edge of tumulus 10 was surrounded by a single closely spaced circle of three-foot creosoted fir stakes; for tumulus 11 only the single row of nine widely spaced posts forming the inner, primary circle was marked.

The tumuli South of Halve Mijl were sacrificed to moorland reclamation schemes in 1948 and 1949, with the exception only of the four finest of them, nos 13, 14, 15 and 16, on the high North bank of the former Postelsche Weier. These four have been set aside on a rectangular plot of heath by the municipality of Veldhoven. After excavation they were carefully restored. The excavated narrow ditch marks off the original edge of tumulus 13; for tumuli 14 (Pl. XXII: 1) and 15 this function is performed by a single circle of widely spaced seven-foot fir posts. Tumulus 16 is now surrounded by a single closely spaced circle of creosoted fir stakes marking the edge of the secondary barrow, whilst the widely

spaced posts of the primary, single circle rise up from the body of the mound. The small plot of heath on the high ridge with its four barrows, where the high-lying arable land dips down towards the meadows of the Postelsche Weier, is now all that remains to bear witness to the wide moorland of former days.

Tumulus 12, on private ground, was restored to the state in which it had been found.

Together with a number of tumuli on the Rechte Heide near Goirle, [3] Province of North Brabant, the '*Meelworstenberg*' on the Warnsborn estate near Schaarsbergen, [4] Province of Gelderland, and the '*Zwartenberg*' at Hoogeloon, [5] Province of North Brabant, tumuli 5, 6, 7, 8, 10, 11, 14, 15 and 16 of the Toterfout-Halve Mijl cemetery are among the relatively few tumuli restored complete with timber circles in the Netherlands. [6]

---

[1] For observations on the natural spreading of barrows with age cf. Van Giffen, *Brab. Oergesch.*, 1937; here also calculations of this spreading with a view to restoration (see figs 8, 11, 14, 17, 19 and 24, tumuli I–VI on the Rechte Heide near Goirle). See also the '*Biesterveldheuvel*' near De Knolle (Part II, postcircle type 6, Friesland, no 1): original diameter: c. 12 m, now c. 18 m. *Bauart*, 1930, pp. 73–4. Cf. also Part II, p. 186, note 32. — For the Goirle barrows special attention was given to the zone beyond the edge of the barrow, where the sods were stripped off. Cf. our tumulus 1. For tumulus 2 at Balloo (Part II, postcircle type 3, Drente, no 11) Van Giffen could also determine the place where the material had been obtained for a secondary capping. *NDV* 1935, pp. 95–6.

[2] See p. 24, in the discussion of the quadrant method, and p. 30.

[3] See Part II, postcircle type 3, North Brabant, nos 2–3, type 5, North Brabant, no 2, type 6, North Brabant, nos 1 and 14, type 7, North Brabant, no 4.

[4] See Part II, postcircle type 3, Gelderland, no 4.

[5] See pp. 10–11, and Part II, postcircle type 5, North Brabant, nos 5–6.

[6] The final erection of the creosoted fir posts took place on 16–19 July 1951, and the monuments were handed over to the Municipality of Veldhoven by Professor Van Giffen in a ceremony on the site, on 19 July 1951. With deep regret we record that the Burgomaster, Mr A. J. van Hooff, was prevented by death from seeing the work completed in which he had taken such interest.

PLATE I

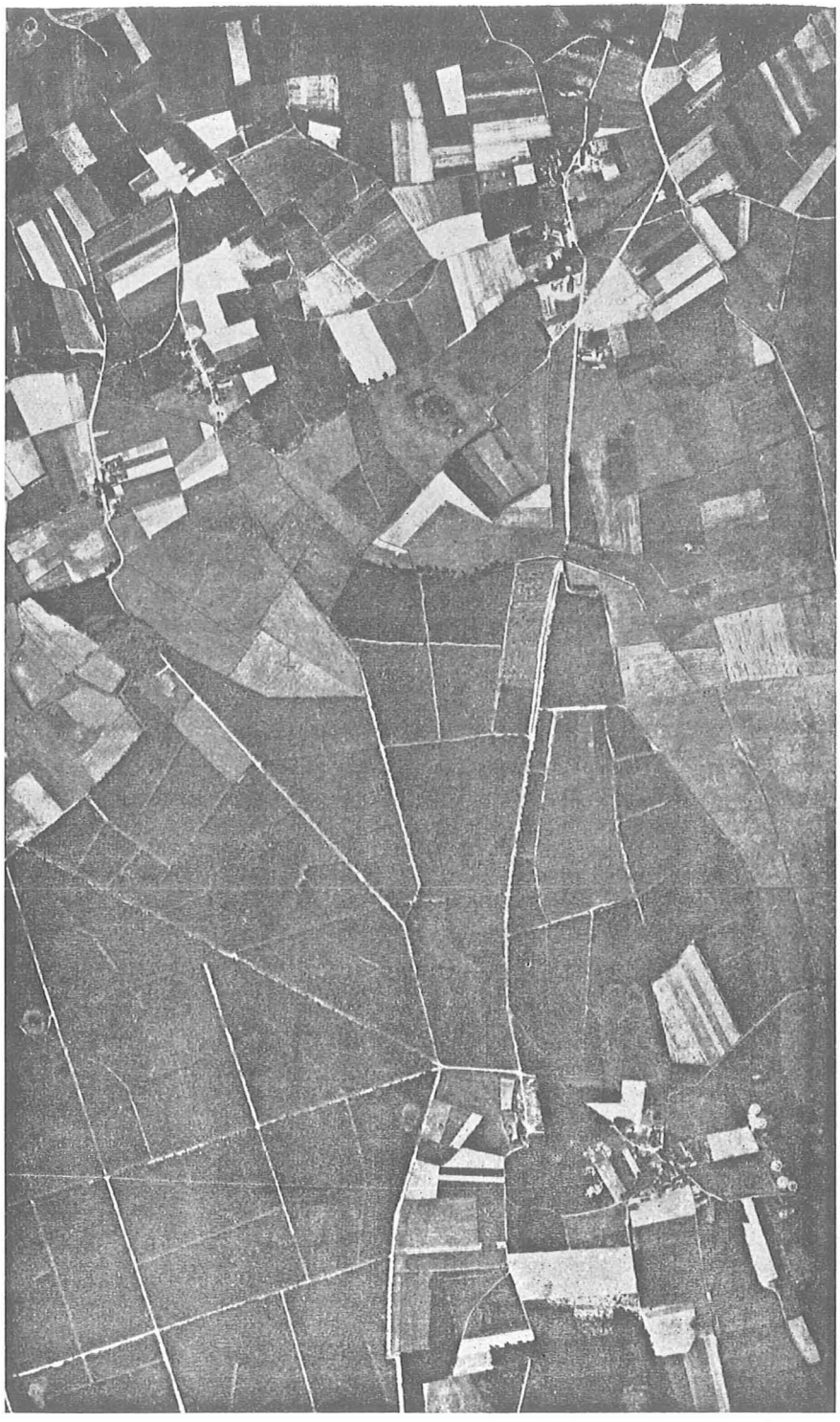
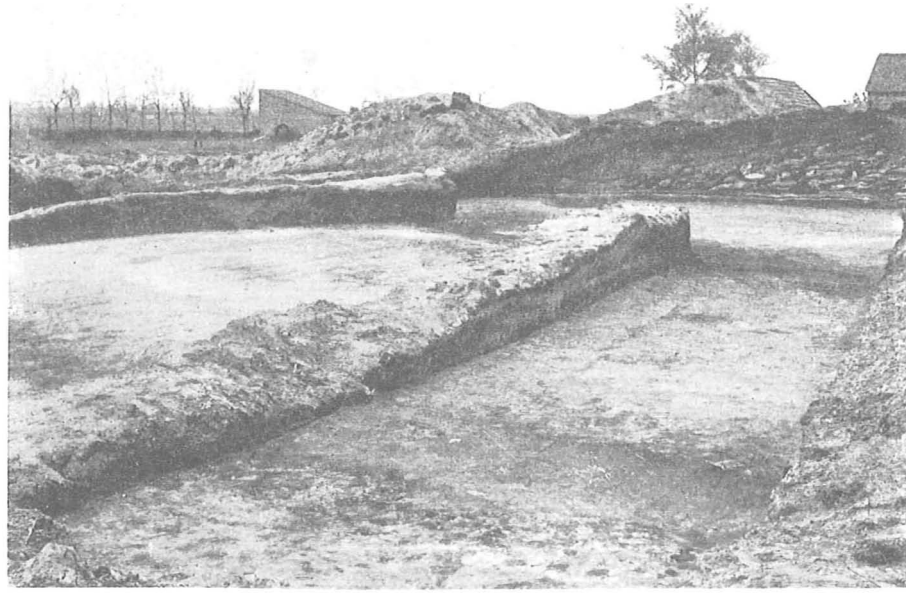


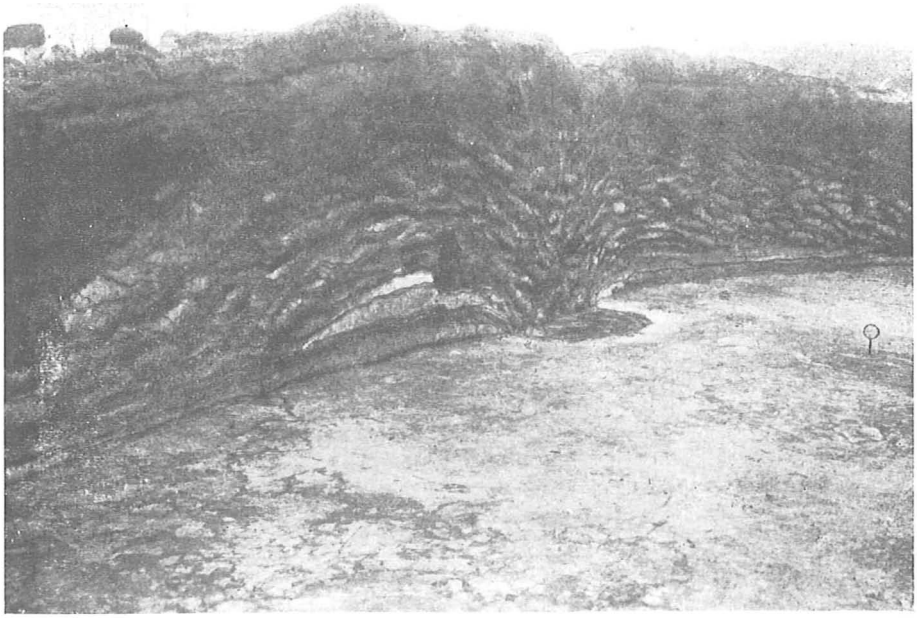
PLATE II



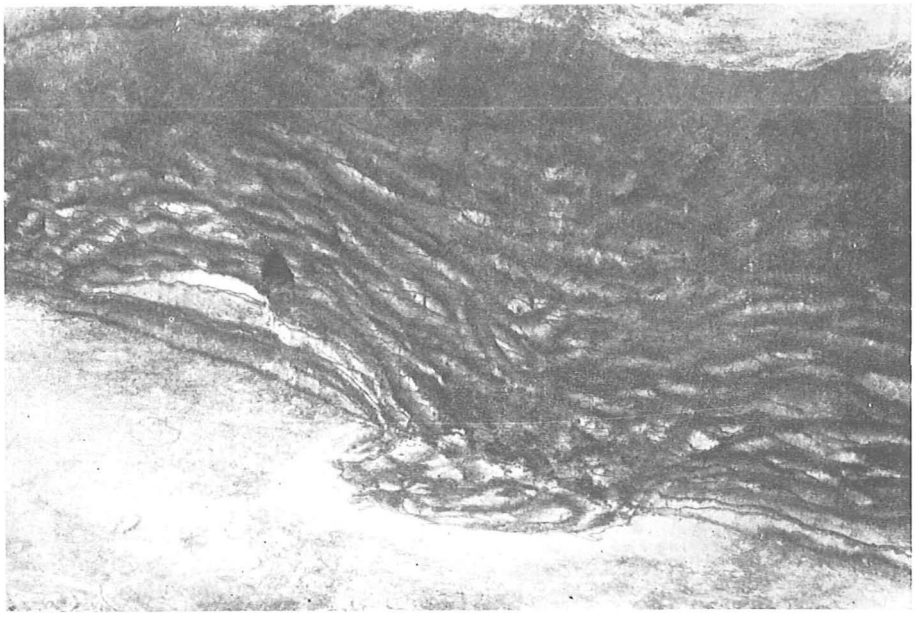
1

2

PLATE III

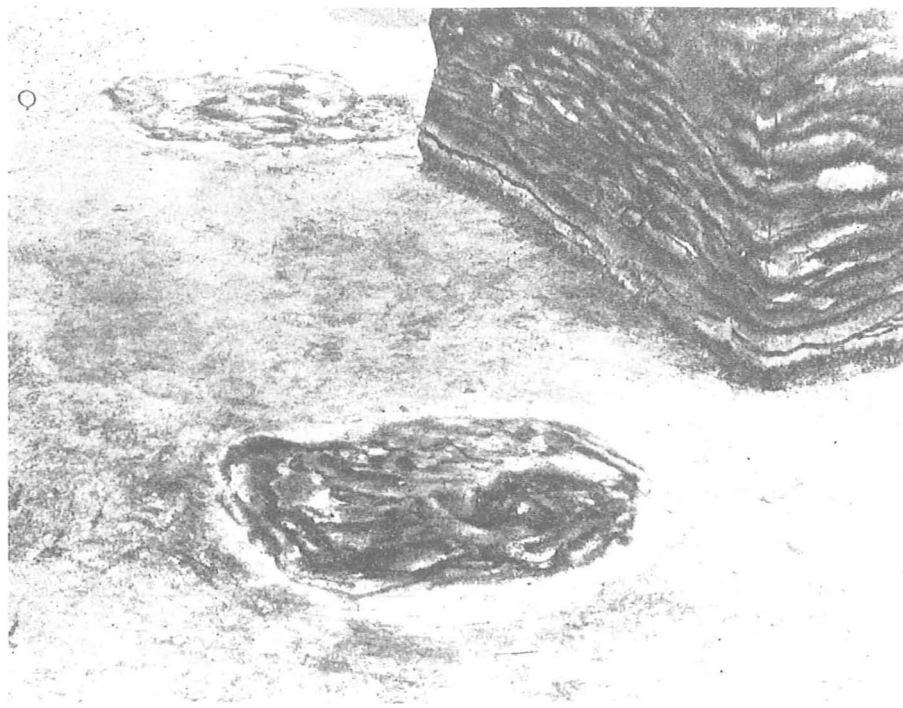


1

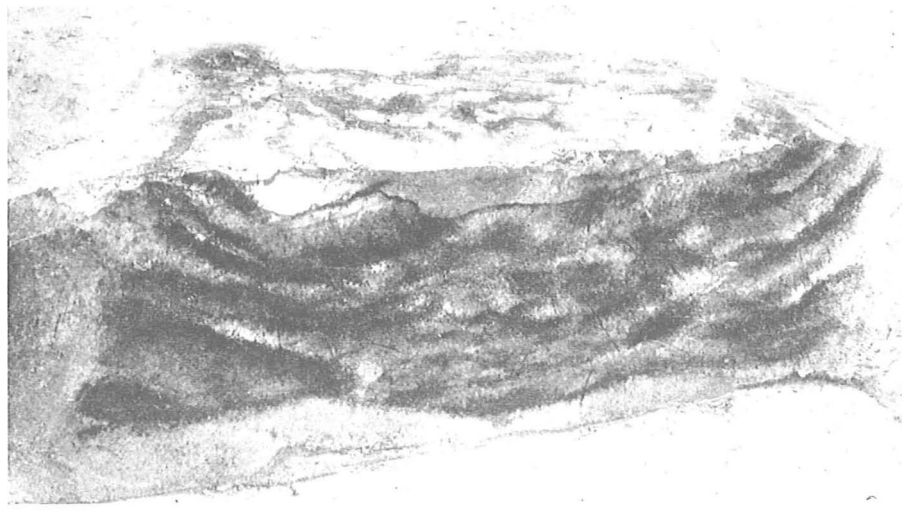


2

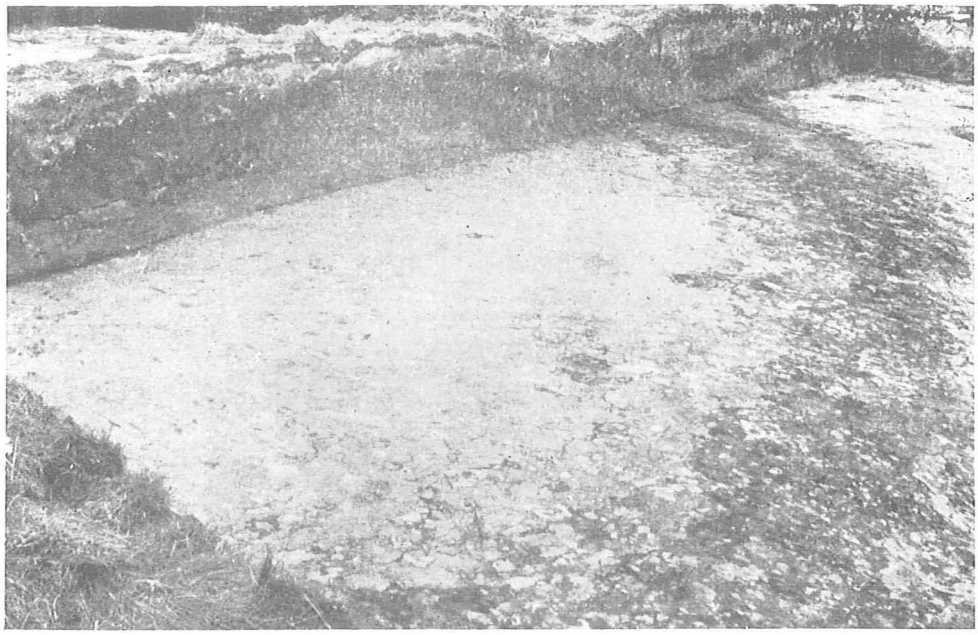
PLATE IV



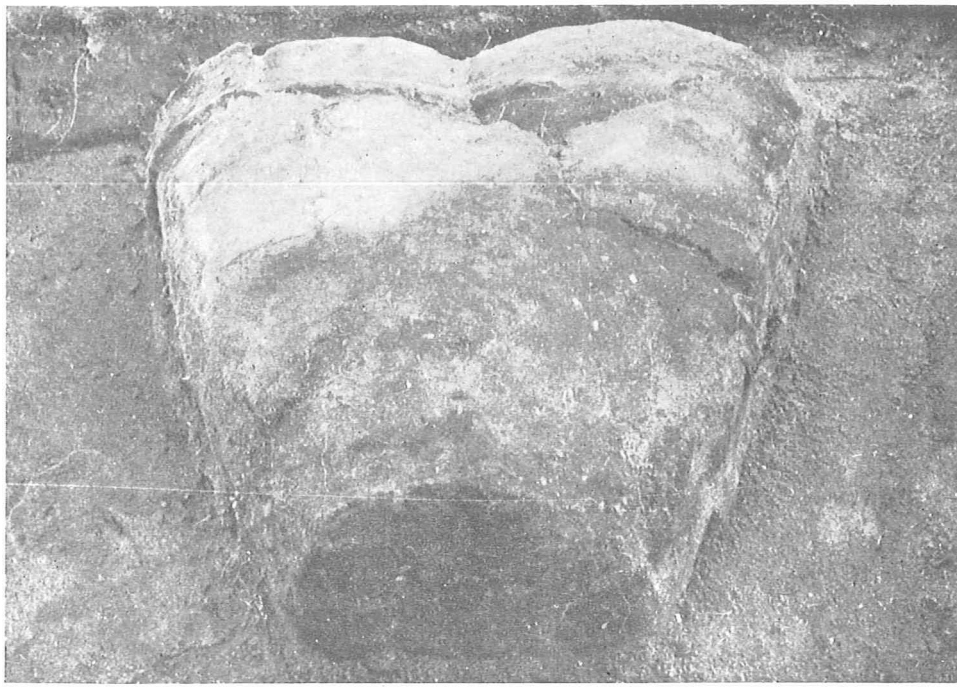
1



2



1

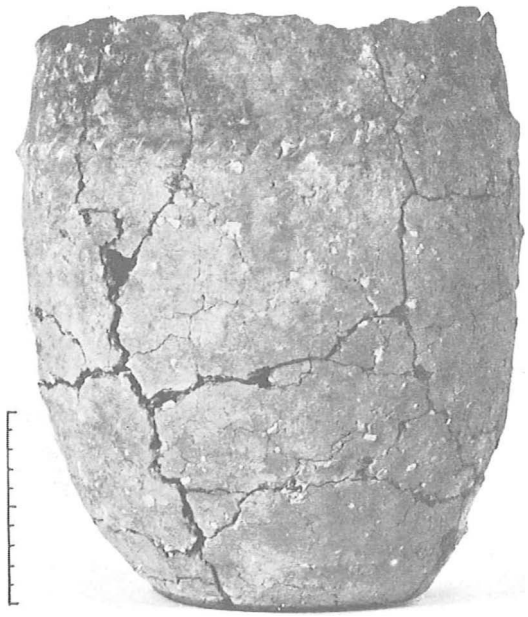


2

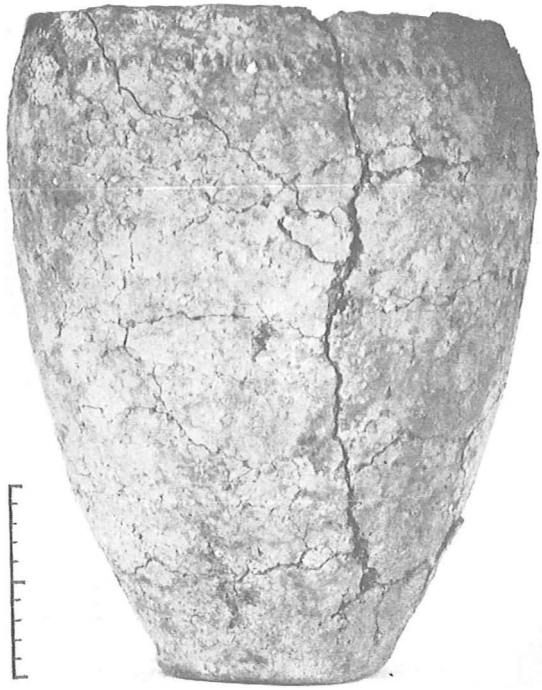
PLATE VI

1

2

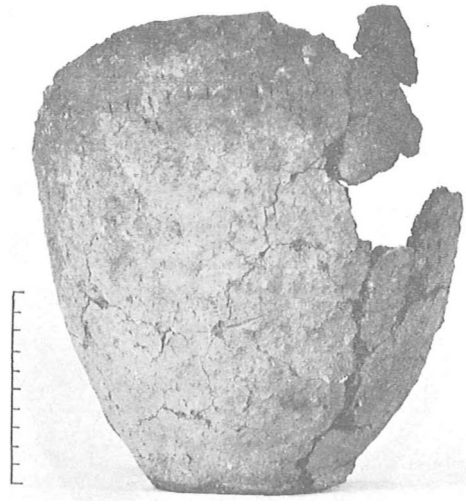


1

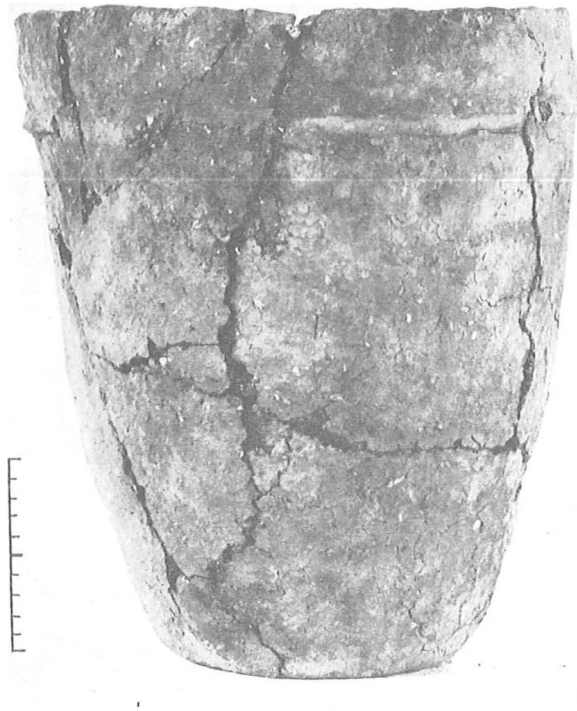


2

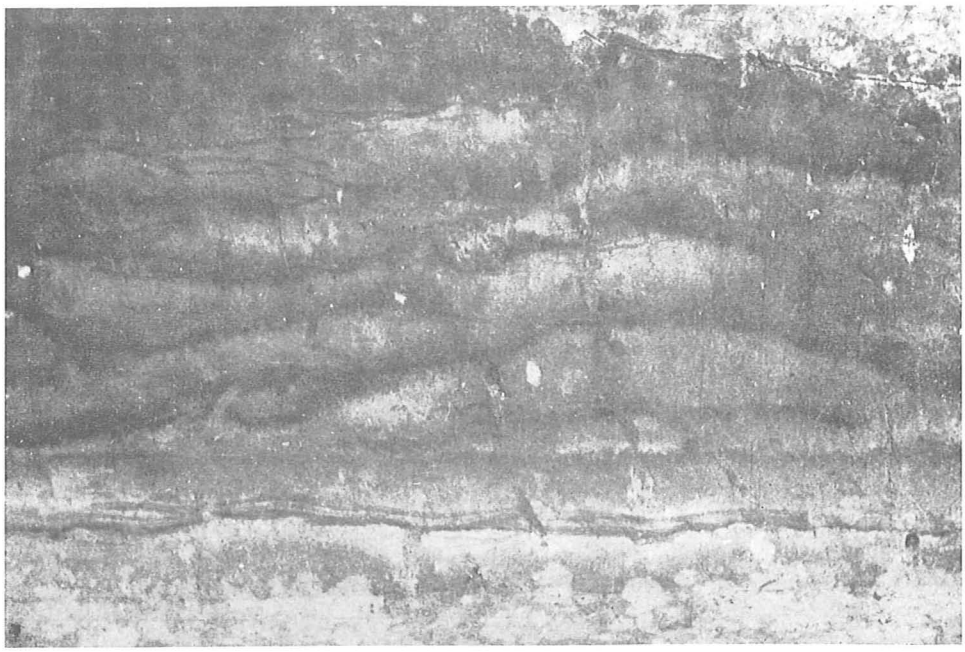
PLATE VIII



1



2

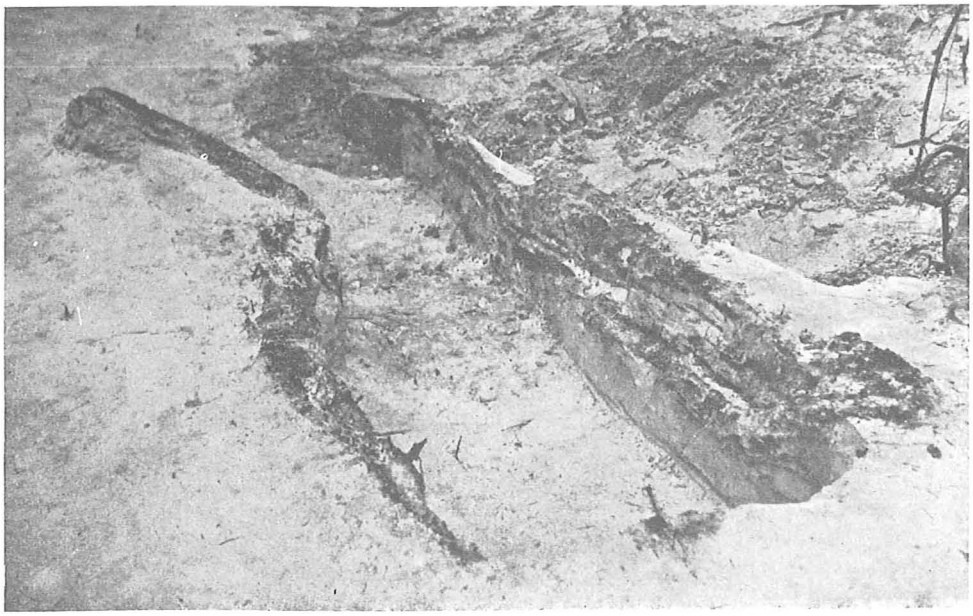


1

2

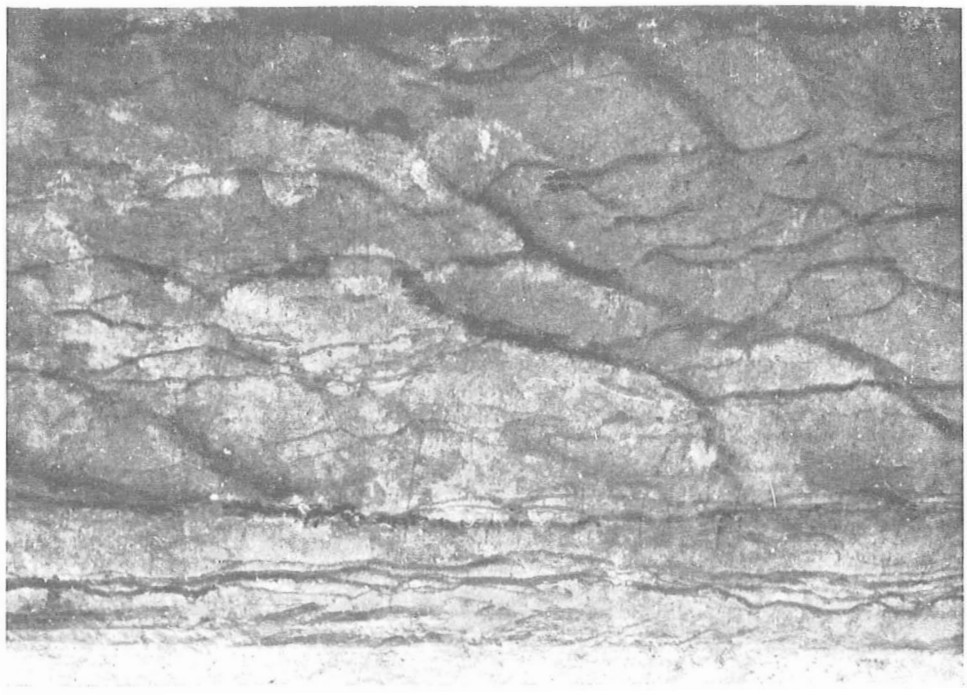
PLATE X

1



2

PLATE XI

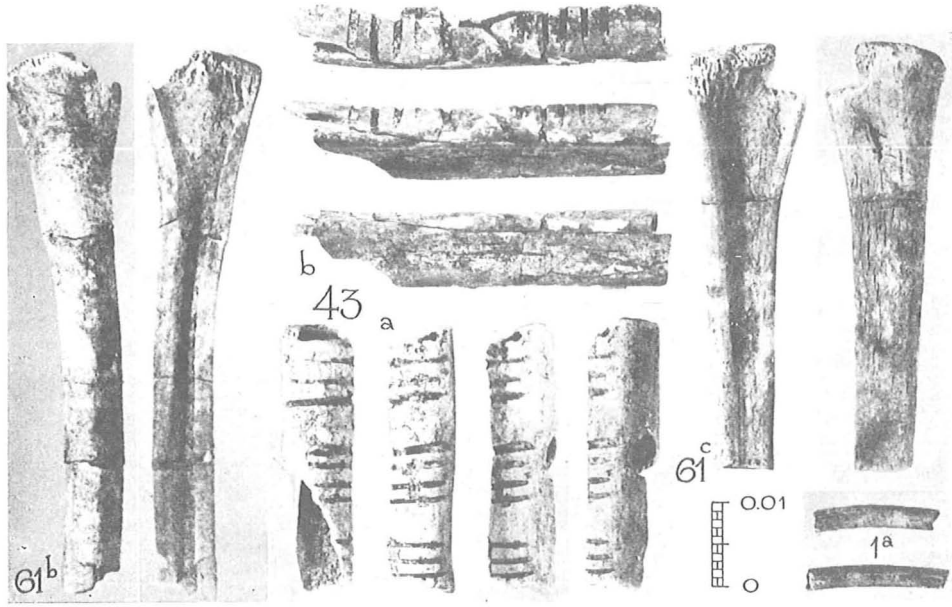


1

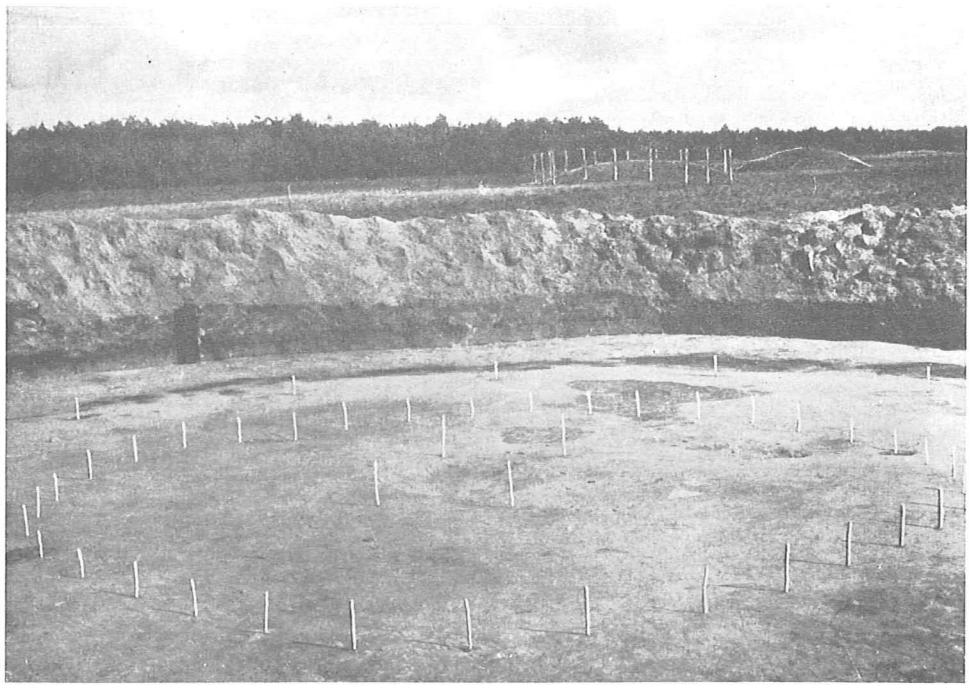
2

PLATE XII

1



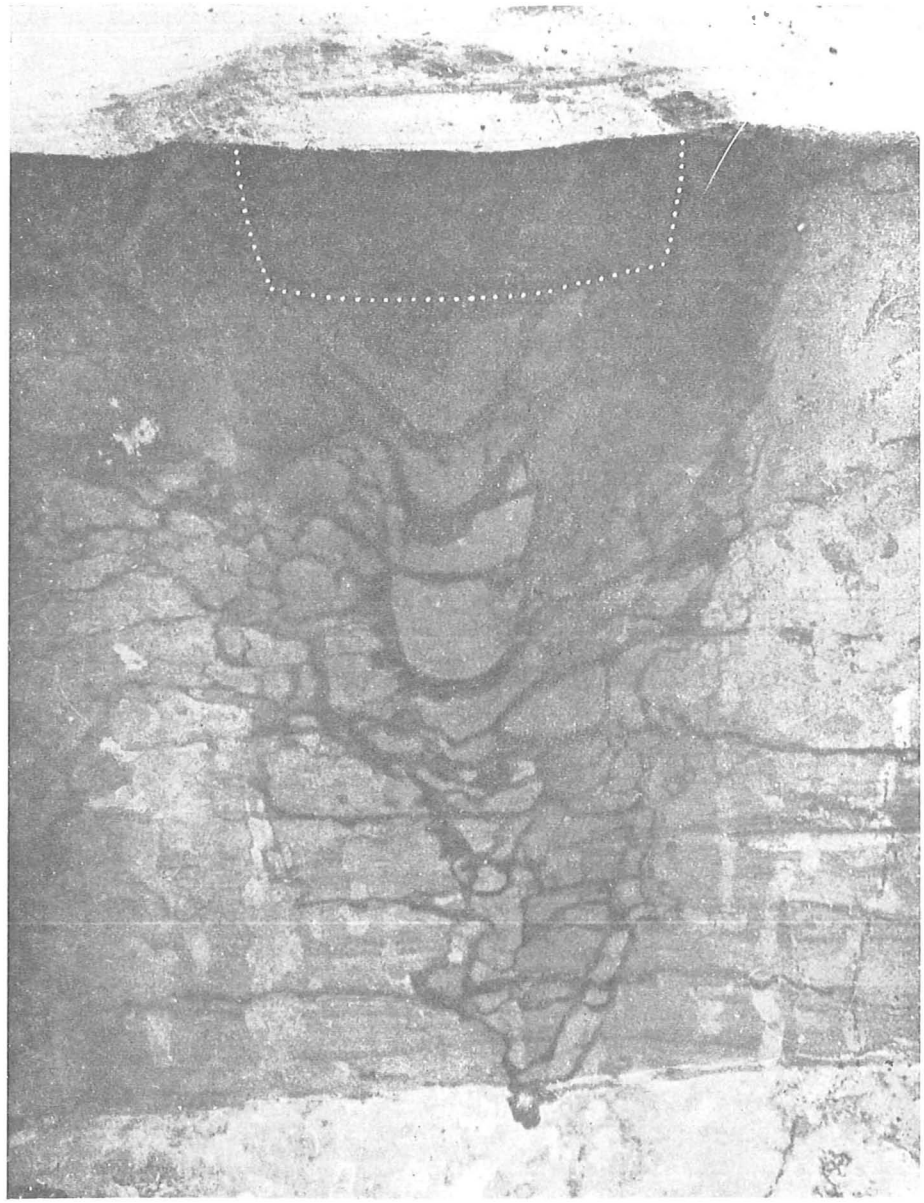
2

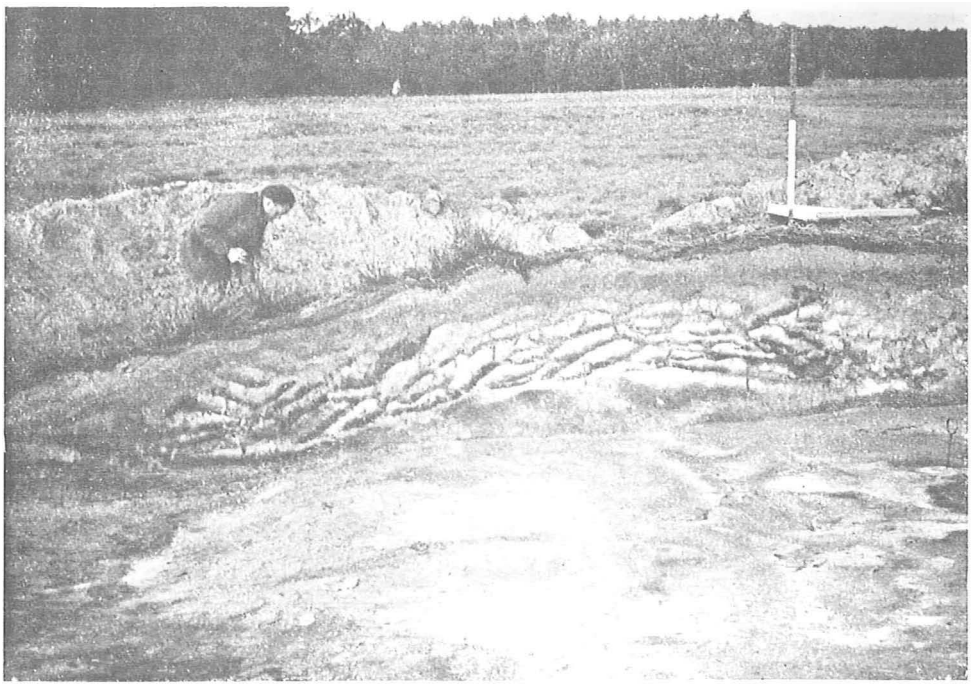


1

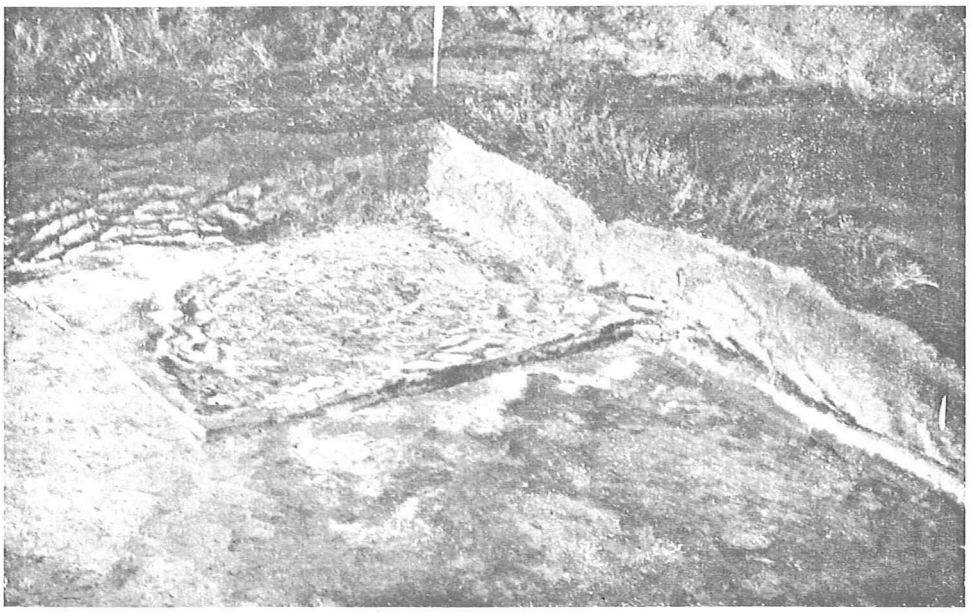
2

PLATE XIV



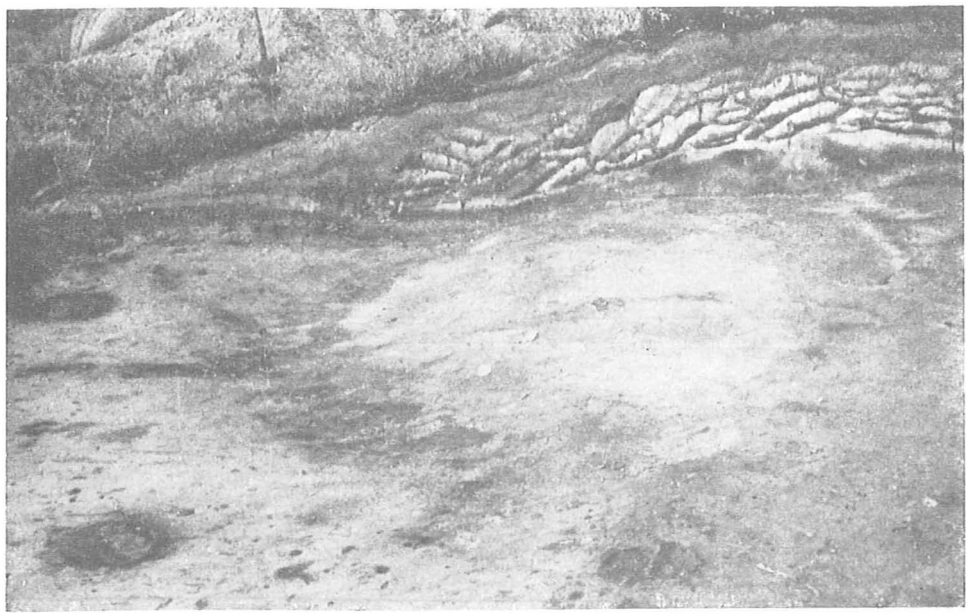


1

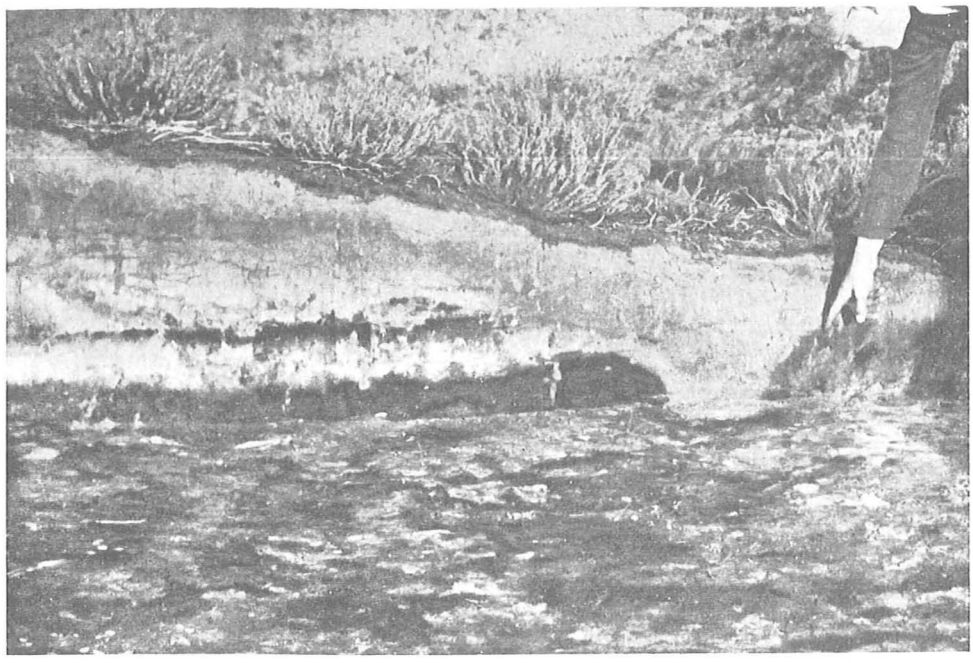


2

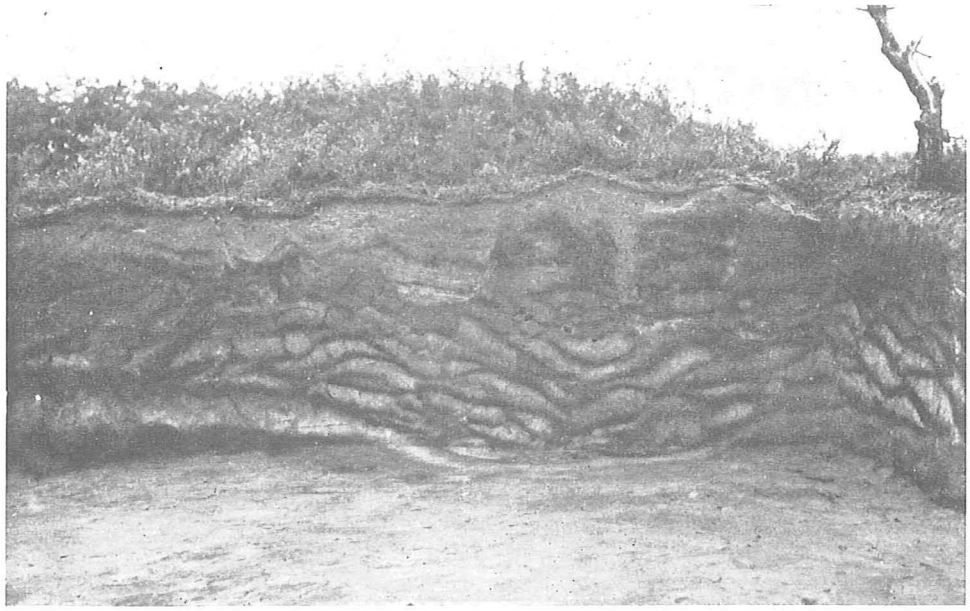
PLATE XVI



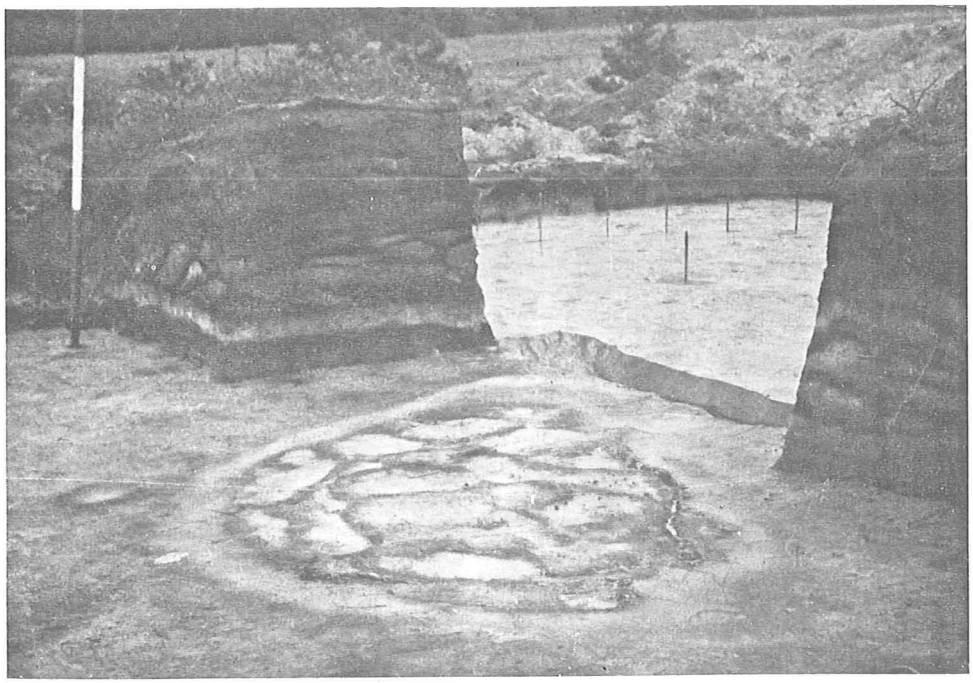
1



2

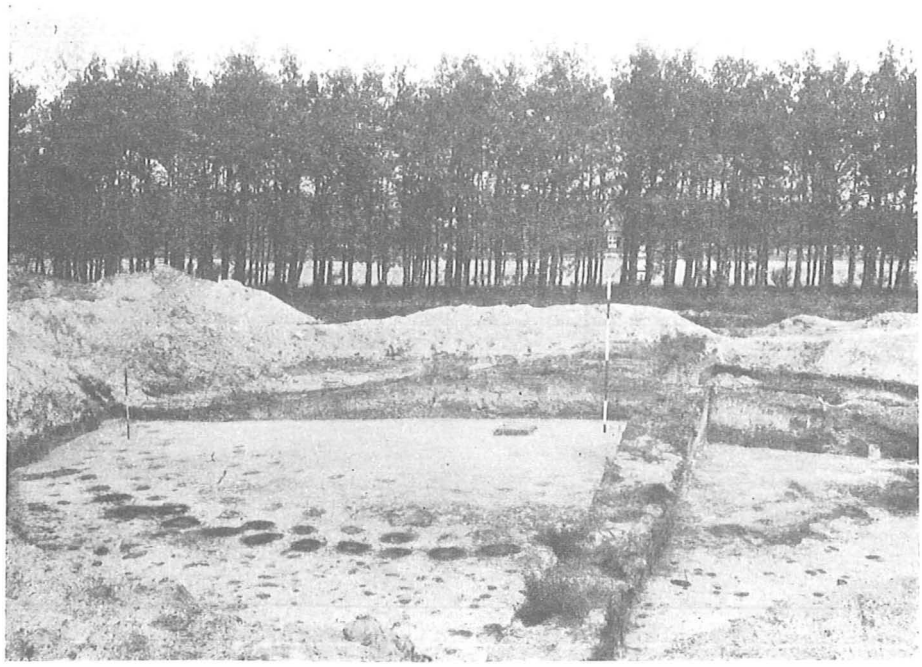


1

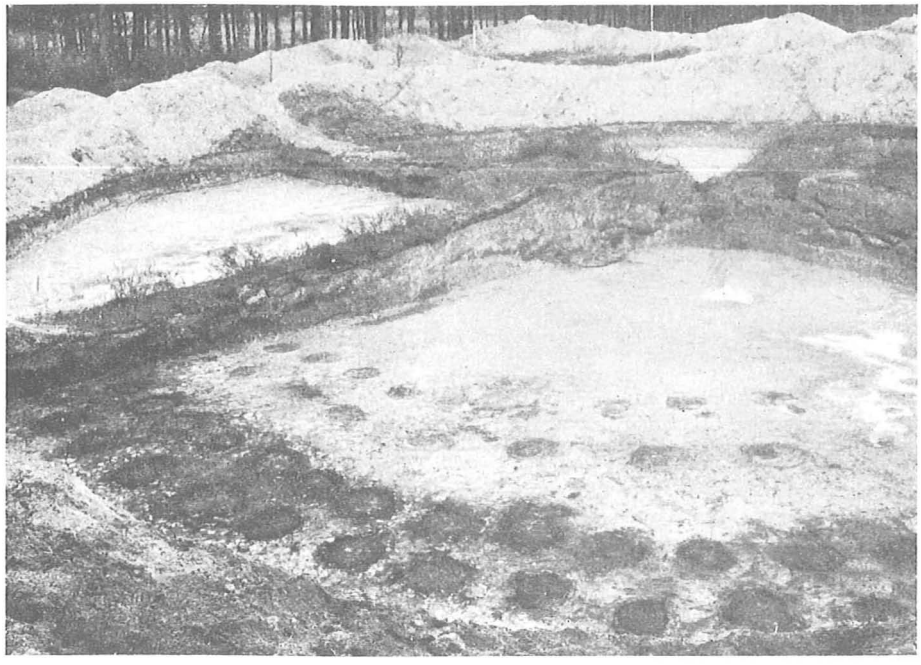


2

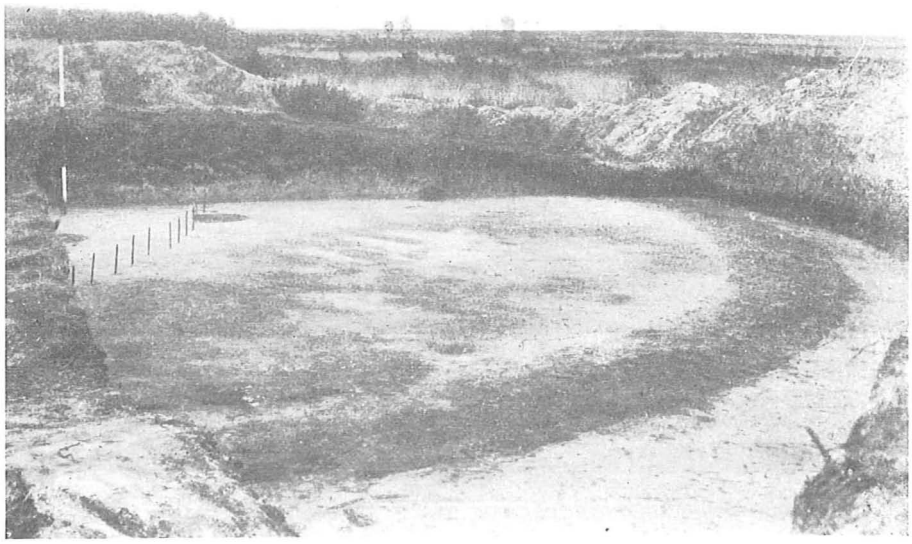
PLATE XVIII



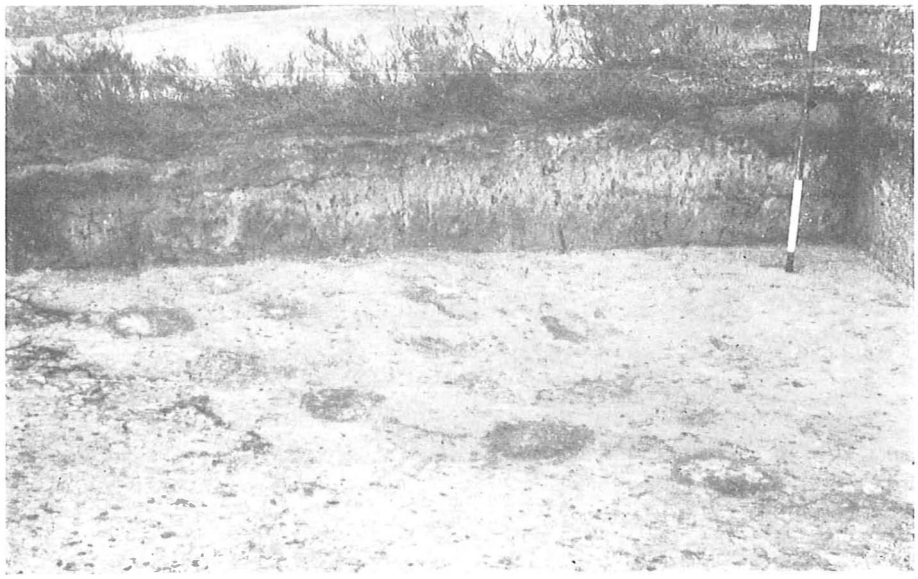
1



2

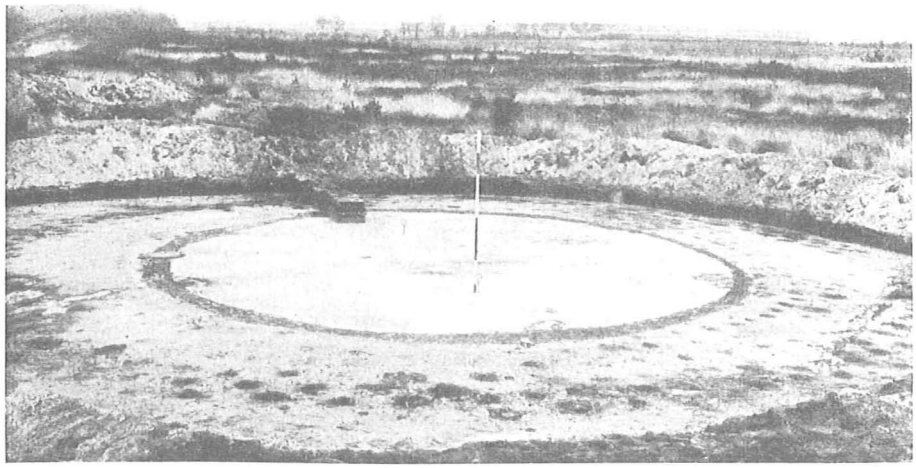


1

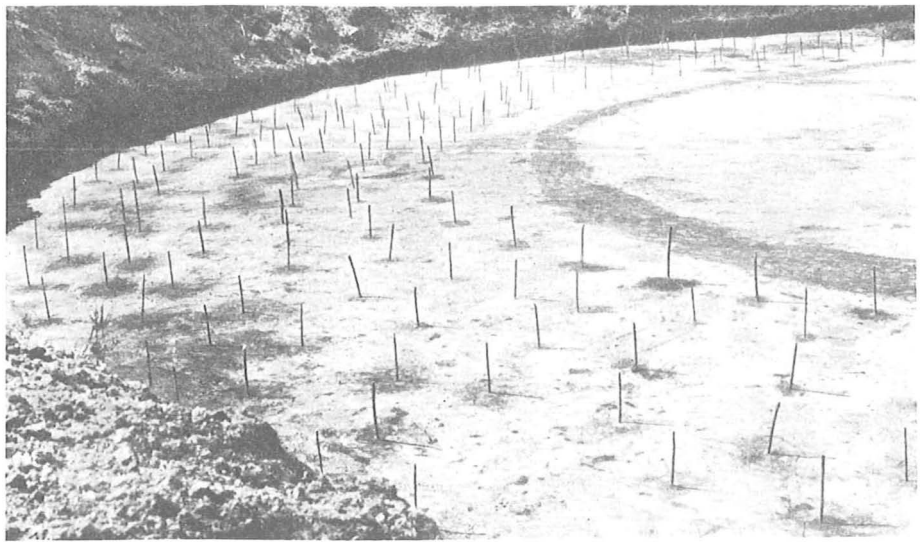


2

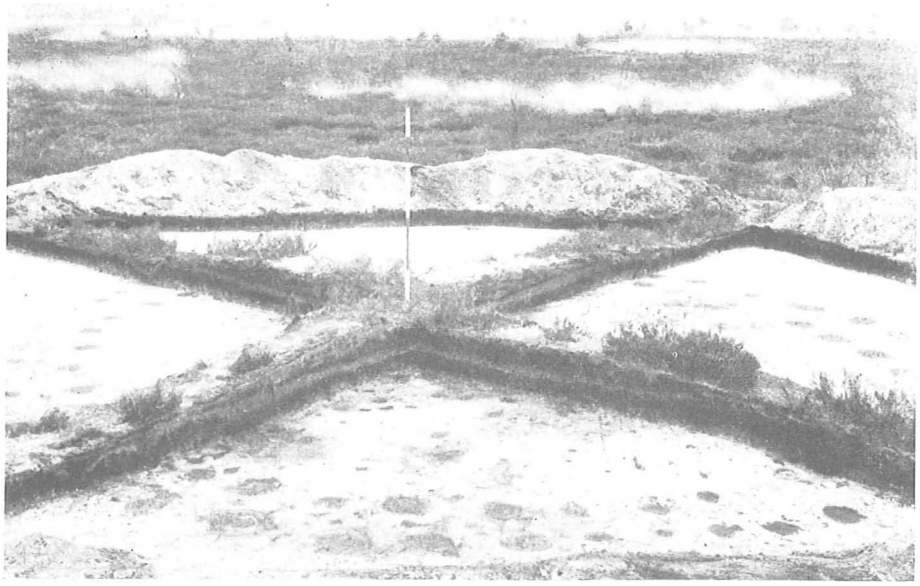
PLATE XX



1



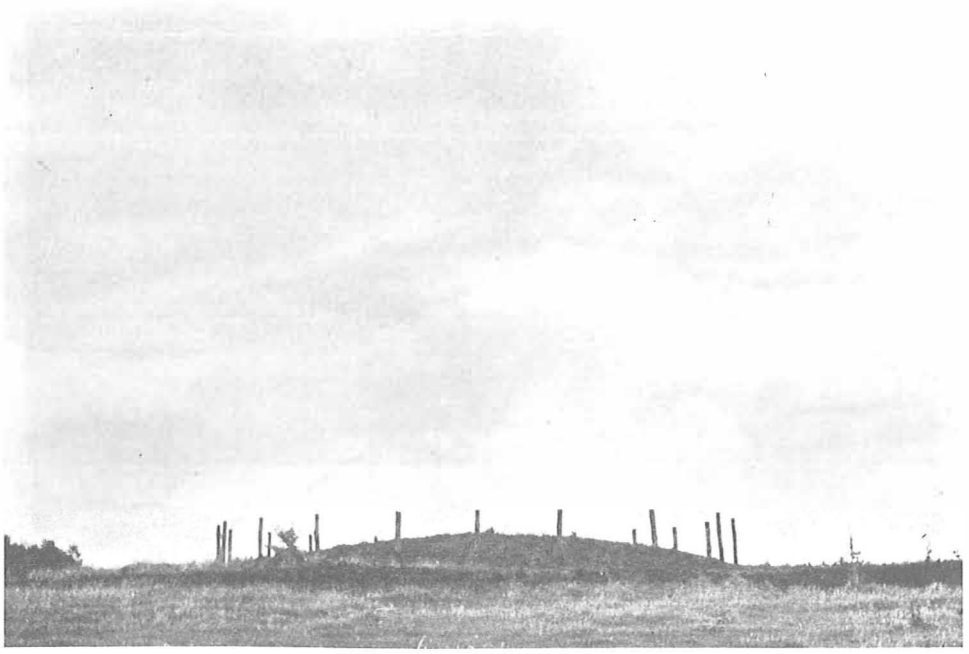
2



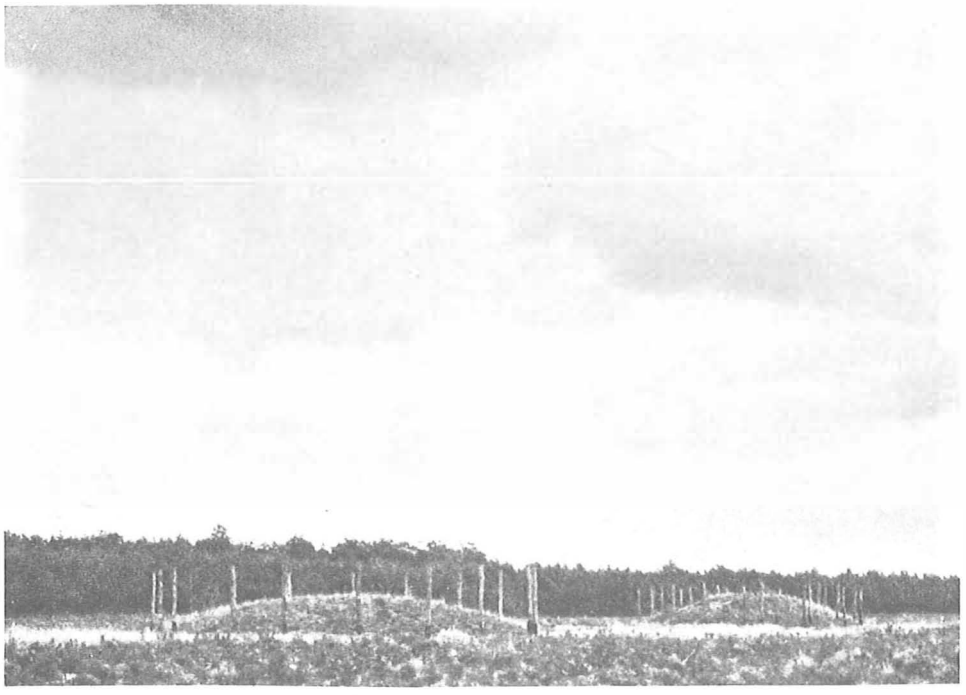
1

2

PLATE XXII



1



2