Transformation through Destruction

A monumental and extraordinary Early Iron Age Hallstatt C barrow from the ritual landscape of Oss-Zevenbergen

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Preface

David Fontijn, Sasja van der Vaart and Richard Jansen

This book presents the results of the 2007 excavation of mounds no. 6 and 7 and their immediate environment in the barrow group Oss-Zevenbergen. By combining these with the results of previous excavations, we are now able to sketch, for the first time, a representative overview of the long-term history of an entire barrow landscape. This, in combination with the exceptional nature of two Early Iron Age barrows, makes Oss-Zevenbergen a site with international significance for the study of European prehistory.

After *Living near the Dead* and *Iron Age Echoes*, this is the third book by the *Ancestral Mounds* research group of Leiden University in which the results of an excavation of a specific barrow groups are set out. Our N.W.O. funded research project focuses on the social and ideological significance of prehistoric barrows and on their role in the environment. In case of Oss-Zevenbergen, where an extraordinary barrow could be investigated and studied within the setting of an entire barrow landscape, this site certainly can be seen as one of our most exciting case studies. But it should not be forgotten that this book also builds upon a long tradition of archaeological research by the University of Leiden in Oss in general and in this area in particular. This book can be seen as the culmination of an excavation history that started with prof. dr. P.J.R. Modderman and prof. dr. G.J. Verwers in the 1960's, with another famous Leiden professor, prof. dr . L.P. Louwe Kooijmans – then still a student – in the role of fieldwork leader. This history went on with the present Leiden professor, prof. dr. H. Fokkens, in the late 1990's and early 2000's and for this moment temporarily ends with the fieldwork that is reported in this book.

Given the finances available for this research and the modest scale of the excavation (17 days of fieldwork), the question might be raised whether it was really necessary to do this in such a voluminous book. Would it not suffice to leave it at a basic report in Dutch, and to publish the conclusion concisely in an international journal? Although it would certainly have made things somewhat easier for us, we decided not to do this. The main reason is because we are of the opinion that reporting fieldwork is primary research and much too important to lie neglected in reports that are difficult to access because of language (Dutch) and/or distribution, especially when it concerns an important site like Zevenbergen. In an excavation as complex as the one of mound 7, it is vital that readers are able to follow why particular decisions were made in the field, which ideas steered the fieldwork at a particular moment, and, above all, that they have the possibility to assess the interpretations of the excavators. For this reason, we pay a lot of attention to a description of the fieldwork as it really was, and to an as complete as possible presentation of observations (for example the extensive photographic documentation showing specific arrangements of sods in chapter 4). We think it important to give an equally broad presentation of all our interpretative steps in the analysis of the small *in situ* studs (chapter 7 and 9), but also to report research that was inconclusive (chapter 11). We find this is important because a number of our conclusions are open-ended. For example, we still do not exactly know what the object was that was decorated with over a thousand small bronze studs, but we do know that it was dismantled and that at least elements of it were burned and deliberately deposited.

Essentially, we believe the find material simply deserves the extensive treatment it receives here. With all the imperfections and unknowns that go with it, the mound 7 evidence nevertheless gives us a fascinating window into the prehistoric practice of an extraordinary funeral rite, in which selection, dismantling, fragmentation – in short destruction – were essential to transforming a particular deceased into a special ancestor.

Chapter 1

The last mound(s) of Zevenbergen – cause, aims, and methods of the 2007 fieldwork campaign

David Fontijn and Richard Jansen

1.1 Introduction

Only few drivers who cross the junction of the A50 and A59 highways to the south of Oss will realize that they are driving through what once must have been a special prehistoric ritual landscape. Just along the A59 there once stood an enormous prehistoric burial mound with a diameter of some 53 m – the largest barrow known in the Low Countries (Fig. 1.1 and 1.2). In 1933 an extraordinary grave was found within it, containing a large iron sword with gold inlay, an impressive large bronze bucket, horse-gear, many rings, a knife, a razor, remnants of unidentifiable wooden objects and textiles (Fokkens/Jansen 2004; Holwerda 1934; Jansen/Fokkens 2007; Modderman 1964). Most of these artefacts must have been imported from faraway regions in what is now the south of Germany. These kinds of objects were in use in the 8th and 7th century BC in the Early Iron Age.

This grave and those like it are in Dutch known as *vorstengraven* (Dutch for princely burial). In English, this type of burial in the Low Countries is commonly referred to as a "chieftain's burial". Recently this has become a somewhat negatively "charged" word. We therefore emphasize that we only use it as descriptive term, not a judgmental one. The *Vorstengraf of Oss* will be referred to as the "chieftain's burial of Oss" as that is how it is commonly known in English publications. The site where, amongst others, the chieftain's burial was found will be referred to as Oss-Vorstengraf.

At the other side of the cross-roads, in a partly forested wasteland now completely surrounded by highways, an observant spectator will notice several round mounds, all placed in a row except for one. This area is known of old as *Zevenbergen* (Dutch for "seven mounds"). Archaeological research in the 1960's showed that at least two of these elevations are in fact prehistoric burial mounds, constructed in a period ranging from the Middle Bronze Age to the Middle Iron Age (ca. 1500-500 cal BC; Fokkens *et al.* 2009; Verwers 1966a). In 2004 it became necessary to excavate this barrow group in its entirety because of the construction of a new road. This was done by the Faculty of Archaeology and Archol BV, both of Leiden University. Excavation of an entire group of prehistoric mounds is rare in Europe and this time it even included the area around it. As this is seldom done, this made the results of the research even more valuable. The excavators argued that, at some point in time, this barrow group came to lie within a funerary ritual landscape of a special, possibly even unique kind, structured with several elongated post alignments (Fokkens *et al.* 2009). Of all the interesting zones in the Zevenbergen area investigated by the 2004 team, there was one that could not be inspected. This happened to be one of the most intriguing zones of the entire area. At the eastern end of the barrow row there is one mound that visibly dwarfs all others. With a diameter of around 40 m and a current height of approximately 1.5 m, this round mound is by far the most impressive of all mounds at Zevenbergen, and ranks among the largest mounds in the Low Countries. This monument is known as "mound 7", and when parts of it were investigated in 2007 it proved to contain the remnants of an extraordinary Early Iron Age burial. This book deals with the results of the research of this last mound and with the investigation of a smaller one that lay immediately beyond it, "mound" 6 (appendix 1).

This chapter will start by sketching the background of the research. After a concise research history we will briefly indicate why the Zevenbergen barrows were excavated in the first place, and why mound 6 and 7 had to wait until 2007 (section 1.2 and 1.3). Following this the particular condition of mound 7 and the area around it will be described (section 1.3). We will go on by setting out the ideas with which we started to excavate mound 7 and how these ideas had to be re-adjusted after we found charcoal and bronze remains in the centre (section 1.4). Section 1.5 briefly introduces the methods used (more detailed considerations are given in chapters 3, 4, and 15) and section 1.6 gives an outline of the organization of the rest of the book.

Fig. 1.1 Location of Zevenbergen, municipality of Oss in the Netherlands. Figure by J. van Donkersgoed.

Fig. 1.2 Aerial overview of the junction of the A50 and A59 highroads to the south of Oss in 2004 with a clear view of the (reconstructed) mounds of Oss-Vorstengraf (top) and Zevenbergen (below, in excavation). Mound 7 was not excavated at this time but its position is indicated here. The modern roads literally cut through this once highly special funerary ritual land-scape. Top of the figure is west. Figure by Archol BV/J. van Donkersgoed.

1.2 Research history of the barrow landscape of Oss-Zevenbergen

1.2.1 Reclamation history

In the first half of the 19th century extensive heath lands with open fields as far as one could see lay south of the small town Oss (Fig. 1.3). For the local inhabitants this was a "wasteland" (Dutch: *woeste gronden*), the residence of ghosts, gnomes, and other malevolent demons. These were uncultivated parts of the landscape, only some sand roads or cart tracks ran through this ominous area connecting the villages surrounding it. These linear roads were focused on the higher objects in the area, like church towers, but also on "mounds" that lay scattered over the heath lands. It was known that these mounds were artificial, and that they contained the remnants of decedents that were buried long since. For the overall Christian people of the 19th century, these mounds were heathen objects and from that perspective places to avoid. The mounds were objects of "diabolization" lying in the uncivilized wastelands outside the villages and cities (Roymans 1995).[1]

An indirect consequence of this "diabolization" is that there are many examples of prehistoric burial sites reused as execution sites in the Middle Ages/Early Modern period, as is also the case at Zevenbergen. At least two mounds were used as heathen burial grounds: our mound 7, with at least one burial, and mound 2 with three burials at the foot of the mound. The latter mound also formed a platform for a gallows (Meurkens 2007; chapter 13). It is clear that the burial mounds were deliberately reused for this purpose, lying in a significant location in the (post-) Medieval landscape (Meurkens 2010; chapter 13).

1 The "seven hills" of the Zevenbergen also figured prominently in local folklore, supposedly the remnants of seven fists rising out of the ground to avenge the lives of seven men killed by a local collier (Fokkens/Jansen 2004, 24-25; Sinninghe 1936).

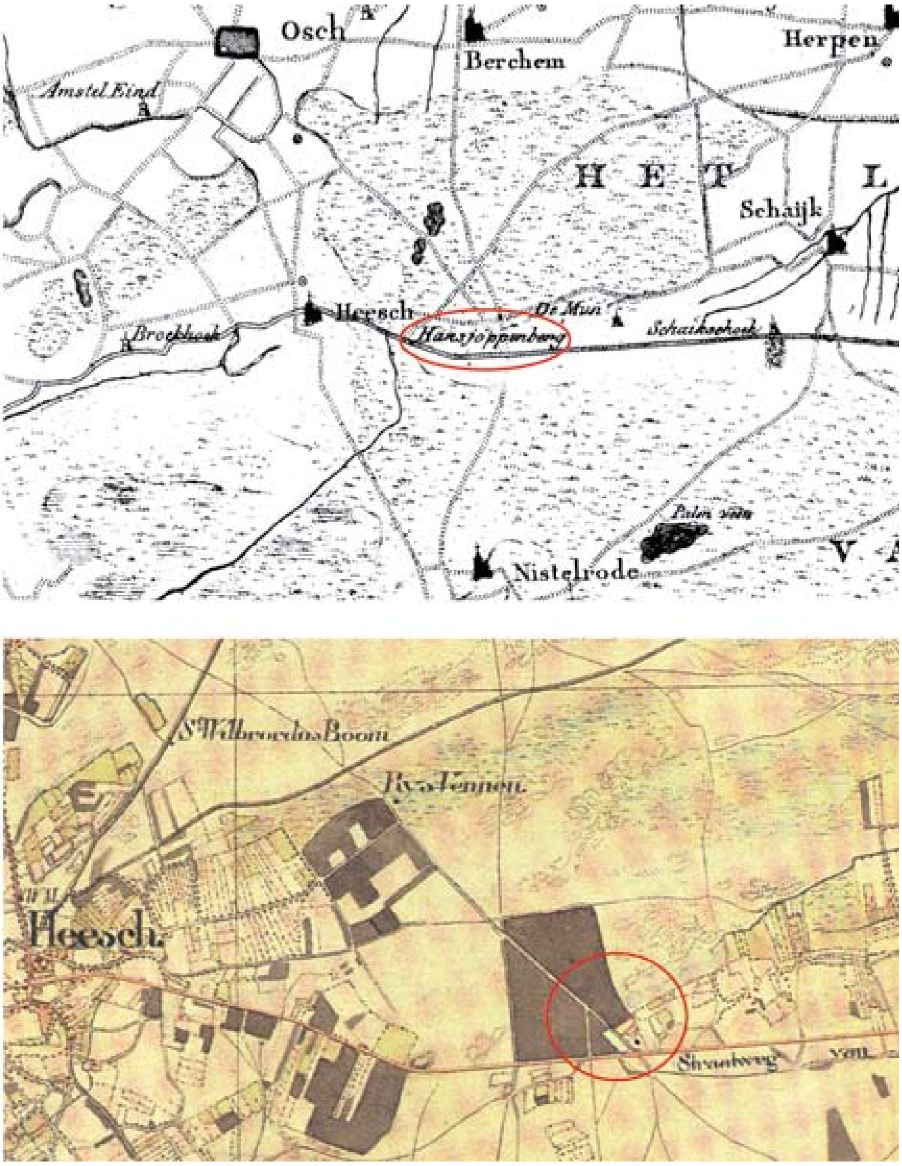

Fig. 1.3 (top) The oldest known detailed map with the Zevenbergen area, dating from 1807. The map was made by Dutch cartographer Kraaijenhoff. The Zevenbergen and Vorstengraf are positioned in the centre of the map where the road from 's-Hertogenbosch-Grave runs around a mound called Hansjoppenberg, indicated with a red circle, which has been identified as the Vorstengraf itself (Fokkens 1997; Fokkens/Jansen 2004). (bottom) The first topographical map from 1837 shows the same area with forests and a small field in the southeast corner. The Zevenbergen is indicated with a red circle. Figure by Kraaijenhoff 1809/ Topografische Dienst/J. van Donkersgoed.

Fig. 1.4 Topographical maps from subsequently 1868, 1928, and 1988. Figure by Topografische Dienst/J. van Donkersgoed.

The extensive heath lands in the 19th and 20th century AD are characteristic for the Peel Blok-area, a relatively high plateau, on which the Zevenbergen lies on the northern edge. The heath lands have a long history. When the first Neolithic farmers started felling trees to create arable land on a large(r) scale, the first small heath lands arose, expanding through continuous deforestation. The resulting soil degradation, and the halt of the regeneration of forest by grazing or burning,

Fig. 1.5 Due to the fragility of the mounds the deforestation was done in an old fashioned way, whereby horses had to pull the felled trees from the forest. Figure by R. Jansen.

caused the heath to expand. First in small stretches, which later covered larger areas (De Kort 2007, fig. 4). So heath lands are in fact old culture landscapes, which have been maintained by humans.

The heath lands of the Maashorst were reclaimed during the 19th and the early decades of the 20th century. The first topographical map from 1837 shows that the Zevenbergen area had been "transformed" into a forest, except for one field opposite a house or inn called the *Zevenbergse Huis* (Fig. 1.3, bottom). During the reclamation of the Zevenbergen estate the first urns were discovered:

> *Bij het ontginnen van het landgoed Sevenbergen, ontdekten arbeiders van de eigenaar, den heer J. Linsen, in 1837, een paar lijk-urnen, die zij echter in stukken sloegen, zodat er thans niets meer, dan dit bericht, van overig is. Reeds bij een andere gelegenheid spraken wij van deze Germaansche begraafplaats (boven II. 100) en merkten op dat, dat digt bij dezelve een Hansjoppenberg gelegen is* (Hermans 1841, part II, 272).[2]

So from 1837 onwards our research area was used as a production forest of pines, with the exception of one field. It is unknown how long the area was used for forestry. Maps from 1868, 1928, and 1988 show the Zevenbergen as a wooded area that was part of an extensive forest in this area (Fig. 1.4). When the area became enclosed by (high) ways in the late 1960's, it probably was no longer used as a production forest. Eventually, the largest part of the forest was removed in 2004 prior to the excavations that year and the subsequent work on the A50 highway (Fig. 1.5).

1.2.2 Research history

With the deforestation and excavation in 2004 the mounds were definitely "freed" from their anonymous existence. It, however, was not the first research done within the area. Several finds and archaeological research had already been done. In this paragraph the various episodes from the research history are described chronologically. This history is inextricably linked to the traffic junction located here, which is aptly called *Paalgraven* (Dutch for "post graves").

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2 Translated by authors: *During the reclamation of the Zevenbergen estate, workers of the owner, mister J. Linsen, discovered several mortuary urns, which were smashed to pieces so that, at present, nothing beyond this note survives. Already at a different occasion did we discuss these Germanic cemeteries (above II.100) and noted that close to these a Hansjoppeberg is located.*

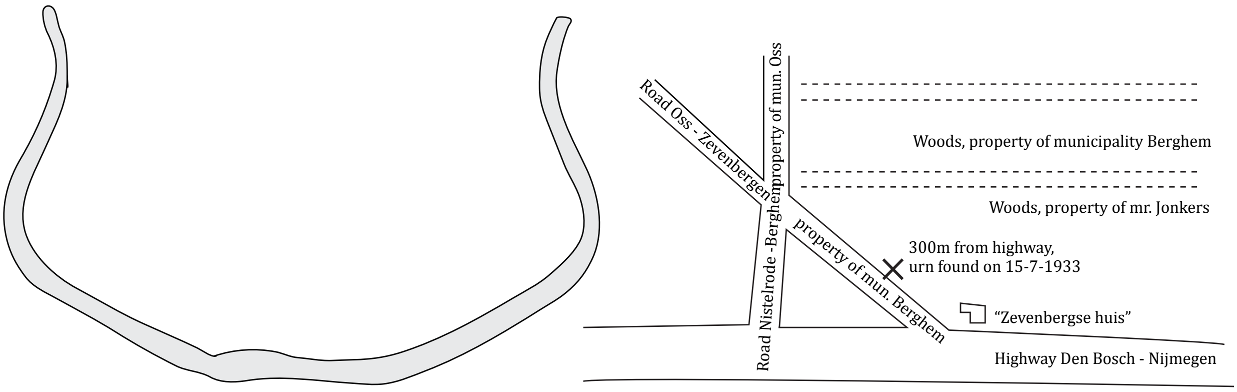

Fig. 1.6 Urn found in 1933 during road constructions of the Zevenbergseweg. Figure by M. van Dijk, found in ROB (currently RCE: Cultural Heritage Agency) archive/J. van Donkersgoed.

One urn

Almost a hundred years after the finds done during the modern reclamation of the area, a new find was recorded. A newspaper article from "*Het Volk*", dated 25-7-1933, cited that south of the village of Berghem an "urn with ashes and cremated bones" was found by a workman.[3] The urn was described in 1934 by a certain Mr. J.P.W.A. Smit from 's-Hertogenbosch, State Archivist and Secretary of the *Provinciaal Genootschap voor Kunsten en Wetenschappen*:

> *Hedenochtend ter gemeentesecretarie te Berghem zijnde, vond ik daar een Hallstatturn in 1933 in de gemeentelijke werkverschaffing gevonden. Hoewel solide van stof, is het stuk zeer geschonden voor den dag gebracht. Omdat van den vondst gedeelten nog over zijn is het profiel nog vast te stellen. De schets op ½ de grootte gaat hierbij. Vindplaats zal mij nog nader bericht worden. Ik zou u willen voorstellen het stuk aan het Prov. Genootschap af te staan.*[4, 5]

Unfortunately the exact find location of the urn is unknown. On a sketch by a certain M. van Dijk of the Forest State Service (Dutch: *Staatsbosbeheer*) the urn is placed 300 m north of the "Zevenbergse Huis", north of the Graafsebaan, and beside the road running from Uden to Berghem (Fig. 1.6).

Institute for Prehistory Leiden research 1964 and 1965

The barrow group of the Zevenbergen was formerly situated to the north of a road – the Graafsebaan – leading from Den Bosch to Nijmegen. In the early 1960's plans were made for enlarging and relaying this old road from 1820, whereby an intersection was planned at the exact location of the Zevenbergen. The presumed burial mounds at Zevenbergen were thereby threatened. To establish the nature of the barrows, it was decided by prof. dr. Modderman, from the Institute for Prehistory Leiden (IPL), in consultation with the State Service for Archaeological Research (known then as ROB, now RCE: Cultural Heritage Agency), to start an excavation of this threatened barrow group. Together with students he conducted what is now called "evaluative research" to find out whether the mounds were

3 Information derived from the correspondence archive of the ROB (currently RCE), and probably originally from the Old Archive of the Dutch National Museum of Antiquities.

4 Translated by authors: *Being in the municipal secretariat of Berghem this morning, I found a Hallstatturn that had been found in 1933 during the unemployment relief. Though of solid material, the piece was recovered in a heavily damaged state. Because fragments of the find remain the profile can still be determined. The sketch on ½ scale is included. Find location will follow. I would recommend that the piece be given to the Provincial Society.*

5 *Archismelding* 35984 indicates this happened. The collection of the *Provinciaal Genootschap* is currently part of the collection of the *Noordbrabants Museum*.

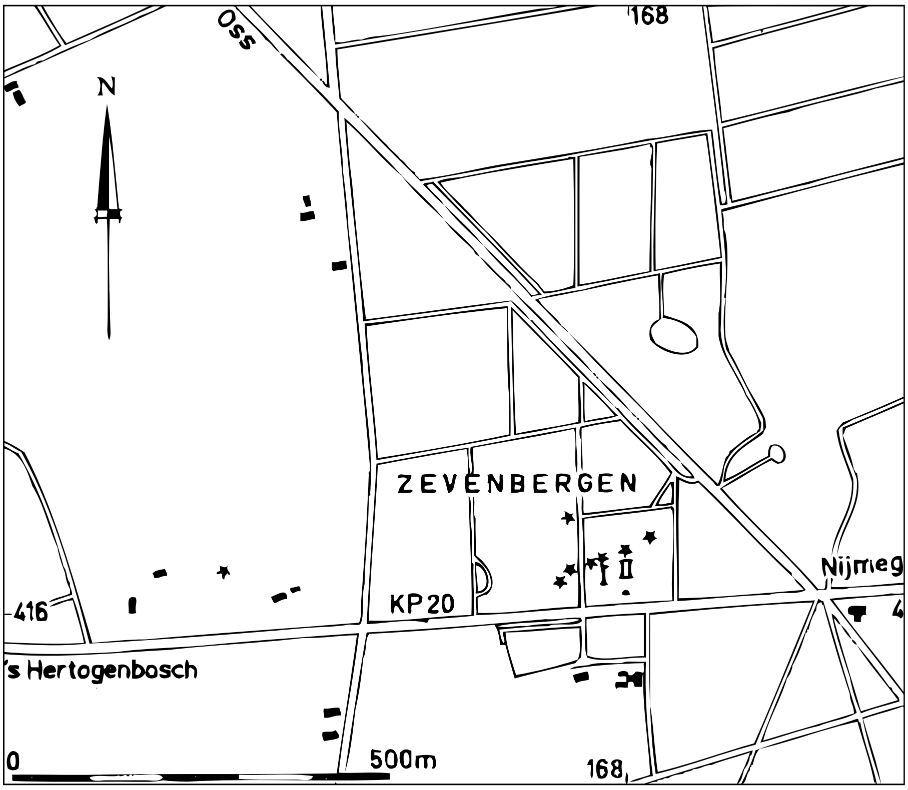

Fig. 1.7 Topographical situation 1964-1965 with tumulus I and II and five other mounds plotted between the roads and fire lanes, directly north of the road 's-Hertogenbosch (west) and Nijmegen (east). The highways A50 and A59 had not yet been constructed. Figure after Verwers 1966a/J. van Donkersgoed.

natural sand dunes or manmade barrows. The excavations took place in 1964 and 1965. Two, out of the then seven recognized mounds, were excavated: mound 8 (*tumulus I*) and 6 (*tumulus II*). The others were measured and documented (Fig. 1.7). In October of 1964 the SW-quadrants of both mounds were investigated, in April 1965 the remainder of mound 6 and two further quadrants of mound 8 were excavated.[6] These investigations proved that at least two of the seven hills were prehistoric burial mounds. The barrow group was therefore placed on the register of ancient monuments and protected by law. Both researches yielded traces from various periods that clearly illustrate the time depth of this burial site. The following is a brief description of the results that were published in *Analecta Praehistorica Leidensia* (Verwers 1966a).[7]

Tumulus I

Underneath this mound (no. 8 in this book), an inhumation burial was found where the dead had been buried stretched on his back in a ca. 40 cm deep burial pit filled up with sods. A corpse silhouette was all that remained of the decedent. The barrow constructed over the burial was ca. 60 cm high. The date of this burial is somewhat unsure. Verwers suggests a date in the Early or the (earliest phase of the) Middle Bronze Age, a date that was left standing after the 2004 investigation (van Wijk *et al.* 2009; Verwers 1966a).

In the body of the barrow an urn filled with cremated remains was found immediately "above" the central burial (Fig. 1.8). According to Verwers this was a secondary burial from the Middle or possibly Late Bronze Age (van Wijk *et al.* 2009; Verwers 1966a). The urn contained a fair amount of cremated remains.

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6 The NW-quadrant of tumulus I was preserved for further research, and was eventually excavated in 2004. Prof. Modderman visited this final excavation and discussed the results with us.

7 Short notes also appeared in the *Bulletin van de (Koninklijke) Nederlandse Oudheidkundige Bond*: Modderman 1964; Verwers 1966a.

Fig. 1.8 Middle Bronze Age urn from tumulus I. The urn is strongly tempered with quartz grit and the outside is deliberately roughened with moist clay. Figure after Verwers 1966a, fig. 3-5/J. van Donkersgoed.

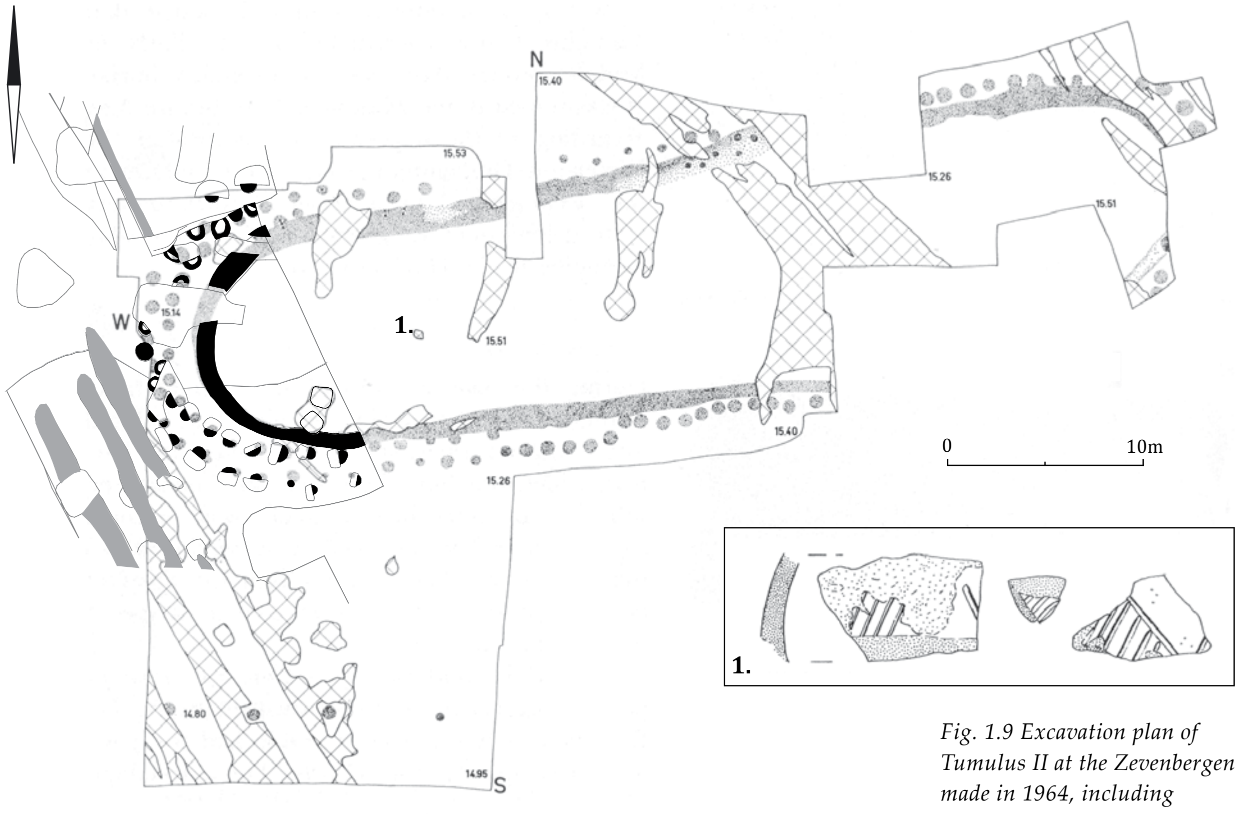


Fig. 1.9 Excavation plan of Tumulus II at the Zevenbergen made in 1964, including re-excavated features (black) found in 2004. The decorated sherds are possibly from an urn found at location no.1. The sherds are tempered with pottery-grit and polished. The fragments are decorated with incised triangles. The shape of the urn is unknown. This is the interpretation of this mound following the insights of 2004. Figure after van Wijk et al. 2009, fig. 6.28/Verwers 1966a/J. van Donkersgoed.

Several bone fragments with carved decorations were also found (Verwers 1966a).[8] A ring ditch constructed within the barrow was associated with another secondary burial. Two sherds and some cremation remains encountered in a disturbance in the centre of the barrow likely belong to this burial (Verwers 1966a).

Tumulus II

Around the barrow of tumulus II (no. 6 in this book), remains of an oblong ditch were found with outside of the ditch a close-set multiple post-placement. The mound was dated to the Late Bronze Age. According to Verwers it was not pos-

8 For more on this find, see section 6.3.3.

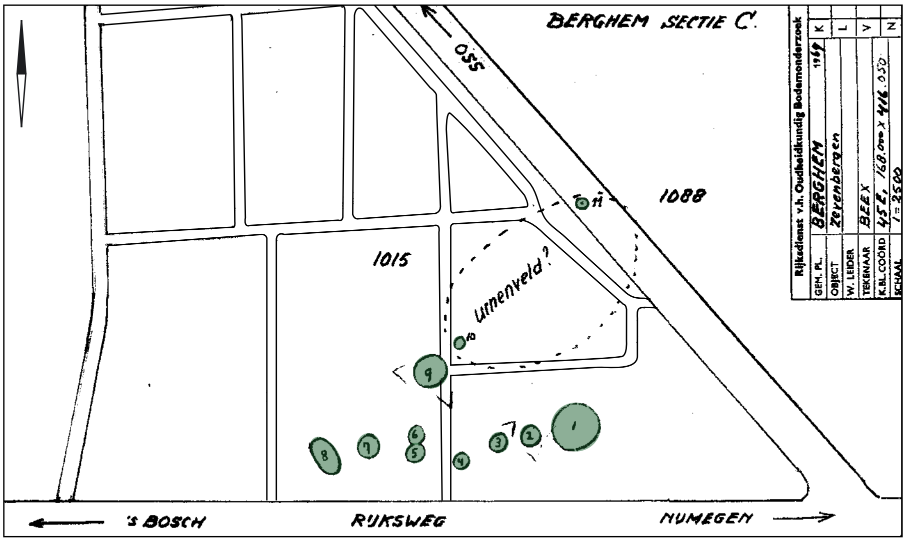


Fig. 1.10 Topographical situation of the area Zevenbergen in 1969 showing ten mounds and a possible urnfield based on Beex' inventory of the area. No. 11 is the location of the urn found in 1933. Figure by G. Beex/J. van Donkersgoed.

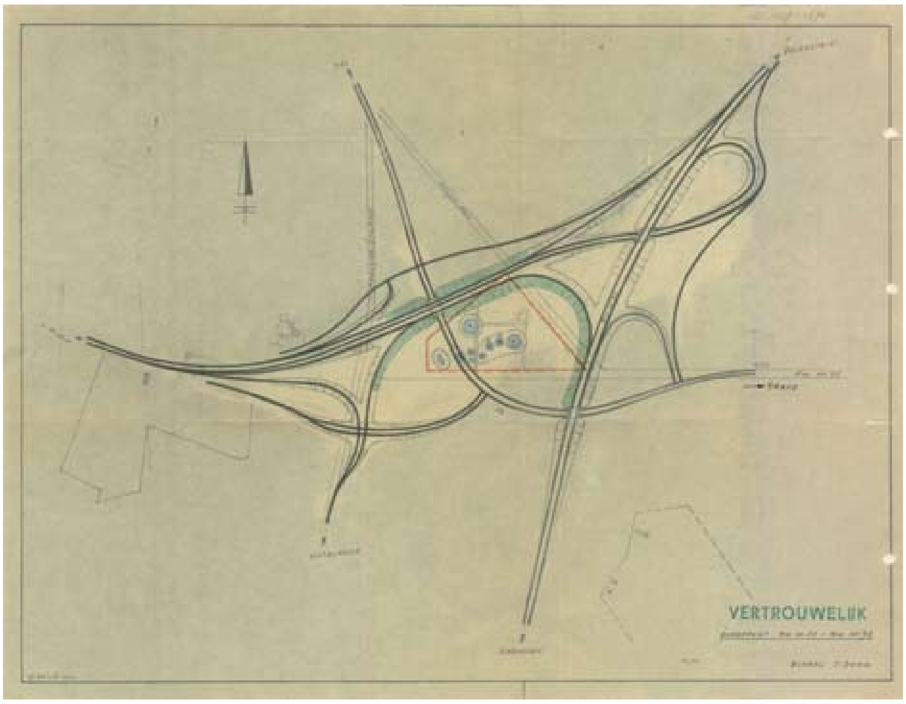


Fig. 1.11 In October 1970 this plan was presented for a traffic junction of the highways no. 55 and 75 by Zevenbergen, in which the mounds were closed in on all sides. Although the plan was eventually carried out in an adapted version, the mounds of Zevenbergen are nowadays still completely closed in by roads. Figure by Rijkswaterstaat.

sible to determine which structure was constructed first (Verwers 1966a, 30; for a much broader discussions, see chapter 3). A central burial was not recognized, but the eastern section in particular was heavily disturbed by wagon tracks. Several sherds with cremated remains from pottery were found in the barrow (Fig. 1.9). Remains of this mound were re-excavated in 2007. Results and new insights will be discussed in chapter 3 of this book.

Beex' inventory

In the late 1960's and early 1970's the infrastructural developments continued. Plans were developed for a traffic junction with access ramps and exits near Zevenbergen and included plans to shift the highway 's-Hertogenbosch – Nijmegen. The various designs all created problems for the mounds (Theunissen *et al.* 2009).

Anticipating these developments G. Beex, provincial archaeologist of Noord-Brabant from 1966 to 1977, had corings done in 1969. This research allowed for the recognition of ten barrows, which he numbered in a different manner than Modderman and Verwers.[9] Note that the map of Beex (Fig. 1.10) cannot be reconciled with the map of Verwers (Fig. 1.7) with regard to the number of mounds and the position of the large mounds. Beex concluded that in addition to the two barrows that had been examined in 1964/1965, four barrows showed a clear sod construction and that four other barrows consisted mostly of drift sand whereby he did not exclude the possibility that this sand was covering an older construction of heath sods. He labelled five barrows as burial mounds and the remainder

Fig. 1.12 Prior to the excavation of 2004, an exploratory research by means of test trenches was conducted. All (possible) mounds were prospected and trenches were also laid out between the mounds. Grey indicates trenches from 2004, red from 2007. The numbers of the 2007 trenches are indicated. Figure by Archol BV/P. Valentijn.

9 Internal report State Service for Archaeological Research (ROB), 5 May 1969.

as urnfield mounds of an urnfield situated to the east of mound 3 (Fig. 1.10). The most easterly point of which is formed by the urn that was found in 1933 during the construction of the Zevenbergseweg (see above).

The results indicated the presence of an intact prehistoric burial ground and a procedure for legal protection was initiated. On 23 March 1972 the definitive protection was enacted. From then onwards the barrows of Zevenbergen formed the legally protected archaeological monument "Paalgraven", closed in by roads on all sides (Fig. 1.11).

Archol research 2004

In the period March through September 2004 the Faculty of Archaeology of Leiden University and Archol BV conducted research in the Zevenbergen area. The research was commissioned by Rijkswaterstaat (RWS) in the context of the construction of the A50. In the following a short summary is given of the results that were extensively published in 2009 in Archol rapport 50 (based on Fokkens *et al.* 2009).

Cause for the research was once again an expansion of the local infrastructure. The junction Paalgraven was to become the link between the existing A59 and the to-be-constructed A50 Oss-Eindhoven. Upon determining the definitive route, the new expansion turned out to partially be planned "over" the archaeological monument Paalgraven. The then ROB determined, in conjunction with Rijkswaterstaat, that since a fly-over was not an option that the best way to preserve the archaeological information would be to excavate the terrain. Starting point at the time was to excavate the whole monument and not only the area covered by the route (Theunissen *et al.* 2009).

Inasmuch as the barrow group had been mapped, only the two most easterly barrows lay in the route. The other mounds would come to lie in the armpit of the future junction.[10] Without an access way the location of the road would make the other mounds almost completely inaccessible for periodic maintenance. In addition the barrow group represented a valuable phenomenon as a whole that needed to be comprehensively excavated (Theunissen *et al.* 2009).

The research was conducted in two phases as is usual in Dutch archaeology. First an exploratory and evaluative research by means of test trenches was conducted (Fig. 1.12). From this it was concluded that most of the barrows were disturbed to some degree, but that there were still enough reasons to continue the research (Jansen/Heirbaut 2009). An excavation of all mounds, except for 6 and 7, was subsequently conducted in the summer of 2004. These were exempted because they were inhabited by a family of badgers, a protected species in the Netherlands (see below).

On the basis of the results of the excavations in the 1960's and that in 2004, the following tentative outline of the history of the barrow group was proposed (Fokkens *et al.* 2009). Briefly summarized, at least three barrows turned out to have been constructed in the Middle Bronze Age (Fig. 1.13, A). In addition to Middle Bronze Age mound 8, excavated in 1964 and 1965 (then known as "tumulus I" see above), two more Middle Bronze Age barrows were discovered: mounds 2 and 4. A large pit underneath mound 2, which was filled with sods, turned out not to contain a recognizable decedent, nor any objects. The earliest phase of the three-phase mound 4 likely also dates from the earlier part of the Middle Bronze age, or less likely Early Bronze Age. Here a (central) burial was not found. In the

10 The work was on such a large scale that archaeological traces outside of the route could also be compromised. Preservation *in situ* could therefore not be guaranteed.

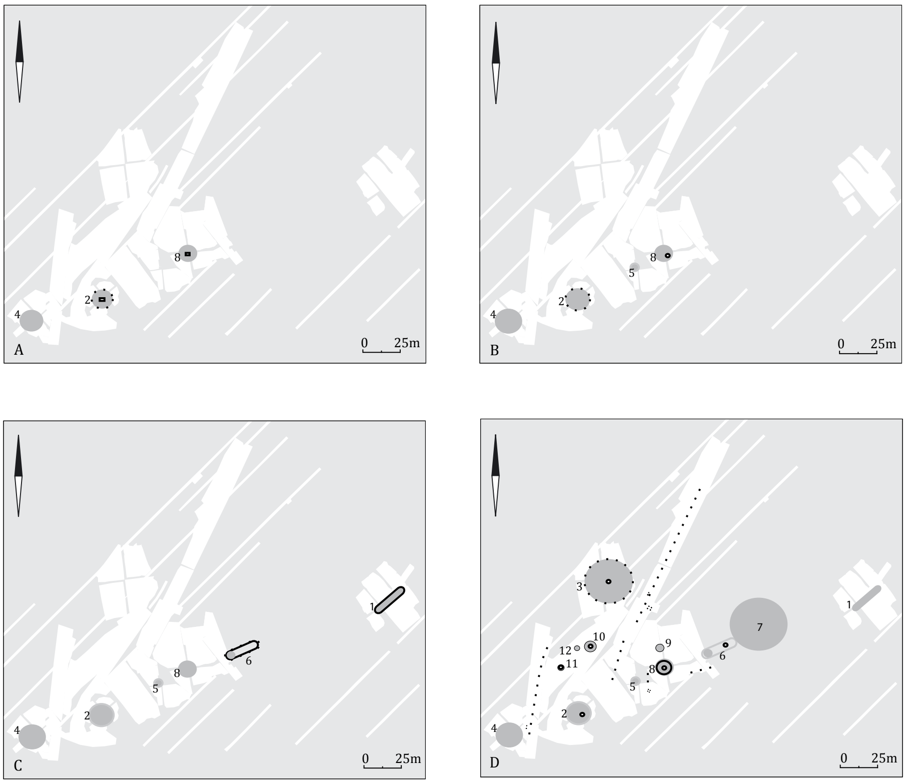


Fig. 1.13 The chronology of the Zevenbergen barrow group based on the 2004 research of the area. The numbers of the mounds are indicated. (A) First part of the Middle Bronze Age; (B) Middle Bronze Age; (C) Late Bronze Age-Early Iron Age; (D) Early Iron Age. Post features are indicated schematically. Figure after Fokkens et al. 2009, fig. 13.01/J. van Donkersgoed.

(directly) following period all mounds were raised, extended or used for secondary depositions. The most striking are two post-circles that were placed around mound 2 at some point (Fig. 1.13, A-B).

In the Late Bronze Age or in the Early Iron Age at least mound 1 was constructed. Mound 6, which was in the badger zone, could not be excavated, but was also thought to date to those periods (Fig. 1.13, C). Both are elongated monuments, long mounds (Dutch: *langbedden*), with (secondary) burials only being found in mound 6. Finally, in the Early Iron Age, probably in the Hallstatt C (Ha C) period, an enormous barrow 30 m across and originally over a 100 cm high was constructed (Fig. 1.13, D). The barrow was surrounded by a post-circle. In the centre of the mound lay a large, burned piece of an oak of over 180 years old, a single cremated fragment, and several pieces of metal objects. This remarkable deposition was dated to the Early Iron Age, possibly Ha C. The burial could therefore be contemporaneous with the chieftain's burial of Oss that was found about 300 m to the west.

To the south of mound 3 remains of five ring ditches were found that probably also date from the Early Iron Age. They are much smaller (a maximum of 9.5 m in diameter) and only two of these still contained the remains of an urn and cremation. It was found that during this period older barrows were also used for the deposition of urns. In addition to the urnfield, five post rows that were discovered around the barrows in various orientations and of varying lengths were likely constructed during this period. One of these was over 100 m long. The rows seem to divide the barrow landscape into sections, though without demonstrable physical partitions. Though direct indications for dating are lacking, the excavators concluded that these post rows were constructed in the Early Iron Age.

Fig. 1.14 The barrow group of Oss-Vorstengraf has been excavated in 1933 and 1998 (here combined). Remains of the Vorstengraf barrow itself are on the left (53 m in diameter). Trenches through its mound dug in 1933 are indicated with line drawings. In 1998 the mound was no longer visible. The smaller ring ditches to the right are the remains of urnfield graves, discovered in 1998. Only a part of a probably much larger urnfield could be investigated. Figure after Fokkens/Jansen 2004/J. van Donkersgoed.

There were no indications that from approximately the 5th century BC onwards the barrow landscape was used as such. This appeared to have lasted for centuries, until in the Late Middle Ages the area once again started to play a more active role. On mound 2, for instance, a gallows was likely constructed in the 13th century AD.

Although this already gives an impressive overview of the long-term history of a prehistoric barrow group, it was by then already clear that important information was missing. Nothing was known on the largest mound of the entire group, no. 7, and a large zone around that monument, including long mound no. 6 remained entirely unexcavated.

1.2.3 The Vorstengraf barrow group

About 450 metres to the west of the Oss-Zevenbergen barrow landscape, the chieftain's burial of Oss was discovered in 1933 (Fig. 1.14). Underneath one of the largest known mounds (53 m in diameter) in this part of Europe the cremated remains of an older man were interred in a bronze *situla* (Smits *et al.* 1995). Not only the *situla*, but also an iron Mindelheim sword with gold-inlayed handle, other weapons and metal tools, and horse-gear components categorize the Oss burial as one of, if not the richest, Early Iron Age grave in the Lower Rhine Area (Fokkens/Jansen 2004; Holwerda 1934; Jansen/Fokkens 2007; Modderman 1964). Recent research has shown that the Vorstengraf was located on the northern edge of an urnfield of which it was not possible to determine its exact size. A number of ring ditches with cremation and flat graves from the Early Iron Age could still be recorded, but it is clear that much was lost during the reclamation of the area in the 1930's, in particular to the west and south of the Vorstengraf. The burial itself was revealed to have been dug into an (Early) Bronze Age barrow and subsequently covered by a new barrow, the Vorstengraf barrow. In addition to graves from the same period, two older barrows from the Middle Bronze Age were also located in the vicinity (Bursch 1937).

The barrow group Oss-Vorstengraf is therefore strikingly similar, both in time depth and character, to the Oss-Zevenbergen barrow landscape located close by. In both cases it concerns a modest barrow group from the Middle Bronze Age to which several new burials and barrows, some of them very special, were added in the Early Iron Age (Ha C/D). One of these special graves turned out to be hidden in mound 7, which up till then had been a badger's home.

1.3 Mound 7: a badger's home

Early in 2002 it became known that a badger family was living in mound 7 and its immediate surroundings (including the zone of "mound" 6). As their habitat would be closed in by the construction of the new road, it was decided that the badgers had to move. To this end, a new sett, similar to their old one, was built, ca. 400 m northeast, directly south of the new road called "Badgers Lane" (Dutch: *Dassenbaan*). A corridor was created to this new home, to allow the badger to already explore his new environment from his old one. Investigations by *Taken Landschapsplanning* from Roermond showed that there were 16 entrances in the badger's home (Fig. 1.15; see also Fig. 16.4). These were partly situated in the area of "mound" 6, but it was expected that the most important tunnels and chambers would be located in and "under" the large mound 7 (van Wijk *et al.* 2009, 120 citing De Leeuwe n.d.).

During the 2004 excavation a zone of 50 m around mound 7 was a "no-go" area. It was strictly forbidden to enter this zone and mobile excavators were also not allowed to drive there. During all the summer months of 2004 that the excavation lasted, subtle signs like broken branches and droppings indicated that the badger indeed still lived there and roamed around the area at night. The creation of a no-go area did have some repercussions for the results of the 2004 excavations. Besides the fact that this area was not investigated, it was also not included in the soil surveys done by hand auger and in some of the height measurements. On some of the maps of the barrow group produced for the report of the 2004 campaign, the height of mound 7 does not come to the fore as it really was – and still is (for example Fokkens *et al.* 2009, fig. 4.8). With regard to the soil survey, figure 4.5 from the report gives no hint that mound 7 was actually created on what must already have been an existing elevation.

Fig. 1.15 Entrances of the badger's home in mound 7 with spoil heaps. Figure by D. Fontijn/J. van Donkersgoed.

When we were able to inspect the Zevenbergen for the first time – then still a dark forest – we had noted that there were large spoil heaps of sand close to entrances at mound 7. This indicated that the digging of the badger must have disturbed the mound considerably. The urgent question was whether the archaeological remains had also been affected? Studies of setts show that the number of entrances is in a one-to-one relation to the number of rooms. This would mean that this sett would have at least 16 rooms. Considering that rooms on average measure 60 by 54 by 42 cm (De Leeuwe n.d.; van Wijk *et al.* 2009, 120), then we may reasonably expect that the archaeological remains of mound 7 must have been damaged to a considerable extent.

1.3.1 Corings

The corings executed before the excavation were meant to verify whether the mound was constructed with sods, and to detect the influence of the badger's disturbances. As is to be expected, the results of the individual corings are very diverse and therefore difficult to interpret. The height of the C horizon seems to vary significantly and sods were not recognized. Only during the excavation did it become clear that the badger disturbances to the central find assemblage were minimal.

1.4 The 2007 excavation of mound 6 and 7: aims and unexpected results

In 2005, the new sett was ready and the badgers were "transferred" to it. For more than a year the old sett was monitored monthly to make sure the badgers did not return. Eventually mound 7 was officially "badger free", and after all permits were received the excavation of Zevenbergen's last mounds could start, finishing the excavation of 2004. At that point it was already May 2007!

This section gives a brief overview of the plan with which we went into the field, what happened, and why and how we had to adapt the strategy to block liftings. A more detailed explanation of the exact approach taken in the field will follow in the chapter about mound 7 (chapter 4).

1.4.1 Aims as set out before the excavation

The main reason why we set out to investigate the former badger zone was to give an overview of the disturbances, assess the surviving archaeological features and to outline the general history of this place in relation to the barrow group. There are questions related to each individual monument (the levelled mound 6 and the still-existing mound 7), to the relation between both, and their place within the broader barrow group and the surrounding "barrow landscape". They were expressed in the original Written Scheme of Investigation (WSI; Dutch: *Programma van Eisen*; Fontijn/Jansen 2007).[11]

"Mound" 6

With regard to the now levelled long barrow "mound" 6, two urgent questions needed answering. The first was regarding the row of post traces that was seen to the south of the mound by the excavators in 1965. The small size of their excavation made it difficult to make more sense of these features. Having already

11 In consultation with the responsible authorities (the RCE) most goals regarding OSL-dating and restoration were dropped.

established that the barrow landscape of Zevenbergen was marked by a number of distinctive post rows, it may be expected that these features represent another example of these remarkable boundaries. In the 2007 campaign, we wished to find out whether more features of this row could be found, and whether they would link the row to mound 6 nearby, thus possibly opening up new possibilities for understanding the function of such post alignments.

The other question that we wanted to answer concerned the ditch and posts that marked mound 6. On the basis of documentation from the 1960's it was not possible to find out more on their internal relations: was the ditch contemporary with the posts, or was one peripheral structure the successor of the other? And if so, in what order?

Mound 7

As remarked above, nothing was known about mound 7 and as this mound was not levelled like mound 6 it seemed appropriate to spend the most time investigating this 7th mound, the largest of the entire barrow group.

The first question to answer here, off course, was whether we were indeed dealing with a barrow (*i.e.* a mound built by people as a burial location). If so, when and how was it built and used? And how does this fit in the history of the Zevenbergen barrow group as established by the 2004 excavation?

Bearing in mind the remarks above on the indications for huge disturbances, another question was to see what the remaining archaeological value of this mound was.

The relation between mounds 6 and 7 and their place within the barrow group as a whole

Long barrow 6 and round mound 7 are positioned very close to each other. During the 2004 campaign it even seemed as if the two were linked. Since at that time no trespassing was allowed here, this could not be verified in the field. It remained an urgent question that needed to be solved: can long mound 6 by seen as an extension of mound 7, or *vice versa*?

The barrow landscape of Zevenbergen

In addition to excavating the mounds, the landscape between and around the barrows was also researched in 2004. Partly through excavation and partly through linear test trenches. In 2007 this was completed with trenches to the south and north of mounds 6 and 7. The questions to answer were: what are the spatial distribution, age, and character of possible features in the former prohibited zone around the mounds?

1.4.2 Adjustment of research aims during the excavation and after the block lifting

With the responsible authorities, the RACM (currently RCE), we planned to excavate the last remains of "mound" 6 entirely, and one or two quadrants of mound 7. As for "mound" 6, all went as planned. However, with regard to mound 7, things soon turned out to be very different than anticipated.

The idea was to start with a quadrant that seemed the least disturbed by badger digging. Extension of the excavation to another quadrant was foreseen if the data uncovered in the chosen quadrant turned out to be insufficient for answering the main questions posed in the WSI. We had considerable problems in locating the original centre of the mound. Due to forestation and natural relief the limits

Fig. 1.16 Disturbances caused by the badgers noticeable in the surface of trench 106 (whitish soil indicated at bottom). Measuring poles mark still-existing tunnels. View from the southwest. Figure by Q. Bourgeois/J. van Donkersgoed.

of the mound were hard to detect. We later found out that the one we started with, the southwestern one, was a couple of metres off-centre. At the top of the NE-quadrant we found several entrances to the sett, indicating that this zone saw quite some badger digging activities. Because of this we chose to stay out of this zone and started working in the SW-quadrant (trench 105). Soon, however, we noticed that the sod layer here was thin for a mound of this size. As we found no archaeological traces apart from the sods, we started to realize that it would be quite difficult to draw conclusions on the dating, development, and significance of this huge mound to the barrow group as a whole from the evidence of just this quadrant. The only thing useable for dating would be pollen data from the sods and old surface. When the foliage at the northeastern foot of the mound was removed, we also learned that the mound was actually larger than anticipated. By then we knew for sure that our quadrant was off-centre and that we would not be able to answer most of the questions posed in the WSI. Having discussed this with the RACM, our excavation was now to include the second, NE-quadrant too (trench 106).

As expected, we were now indeed working in the zone where the badger had been digging intensively. There were several tunnels, sometimes undermining the levels we tried to create. Filled in tunnels that were clearly much older testified that this mound had seen extensive animal digging activities for a much longer time than just since 1965 (Fig. 1.16). This, however, was not the reason for adjusting the excavation aims. On Thursday May 10 we found small bronze items only a few decimetres under the surface. Soon, it became clear that they were only the “tip of the iceberg”. In trying to lift a block of earth containing very small bronze items, more were found. As a matter of fact, an area of approximately 10 m^2 appeared to hold a scatter of hundreds of very tiny, fragile bronze items and large amounts of charcoal. The very bad condition of both bronze and wood, and the fact that they lay not far under the surface, made it clear that they could not be preserved *in situ*. After ample discussion the RACM (currently RCE) decided this find scatter should be lifted in blocks of earth to allow for further treatment, preservation, and excavation in a laboratory. It was also decided that the entire find assemblage should be lifted. To this end, an additional extension in the NW-quadrant was made.[12] After the block lifting, a second WSI was written by the first author and dr. L. Theunissen of the RACM (Fontijn/Theunissen 2008). Here, further research questions were formulated on the preservation and examination of the lifted blocks.

The main question to be answered was on the interpretation of this find assemblage. What does this scatter of bronze, wood, bone, and pottery finds represent? Does it reflect one single event related to the later construction of the barrow (like the construction and use of a pyre)? Is it the place where the primary grave is situated? Of particular interest is also whether organic material was preserved fossilized in bronze corrosion like in the nearby chieftain's burial of Oss.

1.5 Method(s)

Mound 6, mound 7, and the trenches around both were all investigated in a different way, depending on the possibilities and limitations of each specific zone. Excavation methods will be set out in detail in the chapters 3 ("mound" 6), 4 (mound 7), and 15 (surroundings). A concise overview is given here.

The investigation of "mound" 6 was mainly a re-excavation of the trenches dug here in 1965 (Verwers 1966a). The only "mound" still present here appeared to be the spoil heaps of our predecessors. Here the entire surface was laid bare with use of a mobile excavator, continuously supervised by an experienced archaeologist with a metal detector, and filled in depressions were deepened in order to check if there might be other post features beneath it. Sections were placed over most features and studied in order to gain insight into their construction and to unravel the relation between posts and the ditch.

Of mound 7 two quadrants and a small part of the centre of a third quadrant were excavated. In order to get a better idea of the stratigraphy of such a large mound, an extra diagonal baulk was left standing in the middle in each quadrant. This effectively cut the large quadrants in half. Thus, we could concentrate our work in one segment, with two profile sections nearby for referencing horizontal and vertical stratigraphy. Also, we learned from the 2004 excavation that leaving a large surface bare is very unhelpful for getting an overview, as surfaces in these sandy soils are prone to dry out and deflate quickly. By effectively cutting a large segment into two parts, we created manageable areas.

A large part of our excavation was done by hand, as we had learned from previous experiences in Rhenen-Elst that only in this way do finds and subtle discolourations that may indicate inhumation graves not go unnoticed (Fontijn 2010). In addition to this, one zone of one quadrant was entirely sieved. Just like in the case of our barrow excavation at Rhenen-Elst, this time-consuming task did not yield extra finds or information (*cf.* Bourgeois/Fontijn 2010). Only those parts of the mound where there were no or hardly any traces of sods were deepened with a mobile excavator. The intention was to excavate using arbitrary horizontal levels, as we successfully did in all our other barrow excavations (Fontijn 2010; Fontijn *et al.* 2011; Fontijn *et al. in prep*.). The entire centre of the mound was excavated

12 For the entire procedure followed, as well as with the analyses of the finds, see chapter 4, 5, and 7.

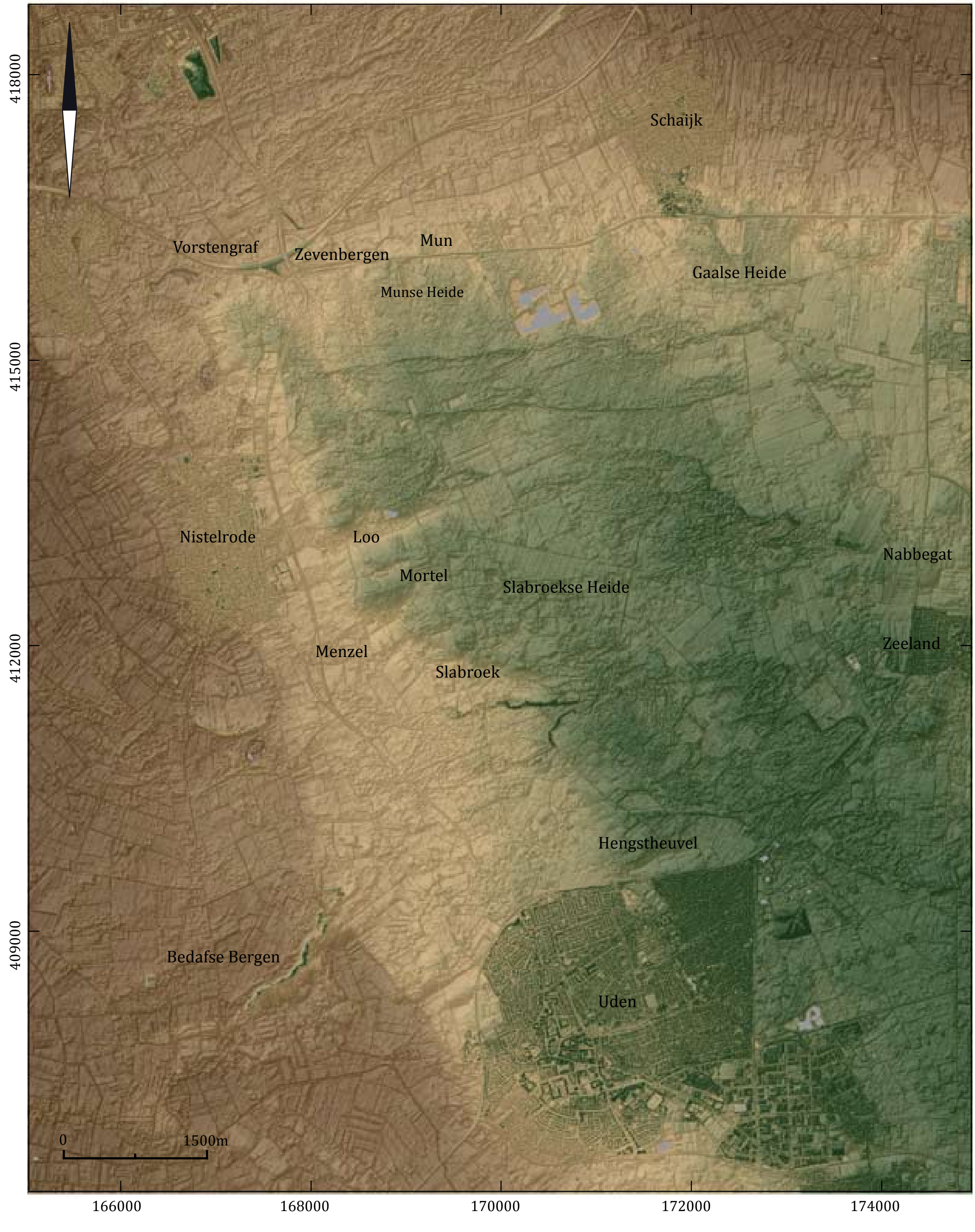
in this manner, but once we learned that the mound was built on a natural dune, we followed the original contours of the dune when creating a deeper level at the flanks (the method used for the 2004 excavations of the other Zevenbergen mounds; Fokkens *et al.* 2009).

The lifting of *in situ* parts of the central find assemblage and their subsequent investigation in the laboratory of Restaura in Haelen deserves a chapter of it own (chapter 4 and 8). For now, we will limit ourselves to remarking that five blocks were lifted (containing the find scatter). The blocks were pragmatically placed in such a way that they included more or less confined concentrations of finds. The excavation was literally moved from the field to the laboratory where it took over 1.5 years to excavate and conserve the hundreds of bronze objects because this had to be done one by one. Considering this, the excavation was officially completed in 2009.

Finally, the area around the mounds was investigated by parallel test trenches 3 m wide. The trenches were placed in the 2004 grid. All trenches were laid bare by mobile excavator, removing only the topsoil. This was continuously supervised by an experienced archaeologist and a metal detectorist. The surfaces and profiles were drawn and the location of the trenches was recorded using a Robotic Total Station.

1.6 Organization of this book

In what follows, the results of the excavation of "mound" 6 and mound 7, the remarkably rich grave of Zevenbergen, are described in detail. After a description of the physical landscape and the archaeological framework in chapter 2, the features of "mound" 6 are described in chapter 3. The following chapters 4 through 7 describe the features and finds of mound 7. In chapters 8 through 14 the specialist analyses of several (find) categories are discussed, including metalwork, pollen, wood, cremation remains and bone material, and flint. Chapter 15 deals with the results of the test trenches. The conclusions and implications of the excavation will be set out in the penultimate chapter 16, where a tentative outline of the history of this barrow group will be described, completing the narrative sketched out in an earlier report about the barrows of Zevenbergen (Fokkens *et al.* 2009). The final chapter (17) discusses the manner in which the Oss-Zevenbergen barrow landscape and finds are currently being preserved for future generations and presented to the public.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Chapter 2

The physical and archaeological landscape of the Oss-Zevenbergen barrow group

Richard Jansen and Cristian van der Linde

2.1 Introduction

The late prehistoric Zevenbergen barrow group is not situated randomly within the landscape. On the contrary, the mounds are located at a very prominent location, not only within the physical landscape, also within the late prehistoric cultural landscape. In this chapter the geological and geomorphological characteristics, as well as the cultural (archaeological) setting of the Zevenbergen barrow group are outlined, thereby revealing its prominent position.

First we will discuss the physical appearance of the landscape in order to provide a framework for the archaeological data. The distinctive structure of the (local) landscape is described by geological, geomorphological, and soil characteristics, first of the larger area, topographically known as the Maashorst[13], and secondly in more detail of the Zevenbergen area itself (section 2.2; Fig. 2.1). The latter is largely based on earlier research conducted during the excavation campaign of 2004 (van der Linde/Fokkens 2009). Subsequently the known archaeological sites and finds in the direct surroundings of Zevenbergen will be shortly discussed. Section 2.3 will give an overview of nearby excavations as well as amateur finds. Together they provide a framework for the "grand narrative" of the barrow landscape of Oss-Zevenbergen, including mounds 6 and 7.

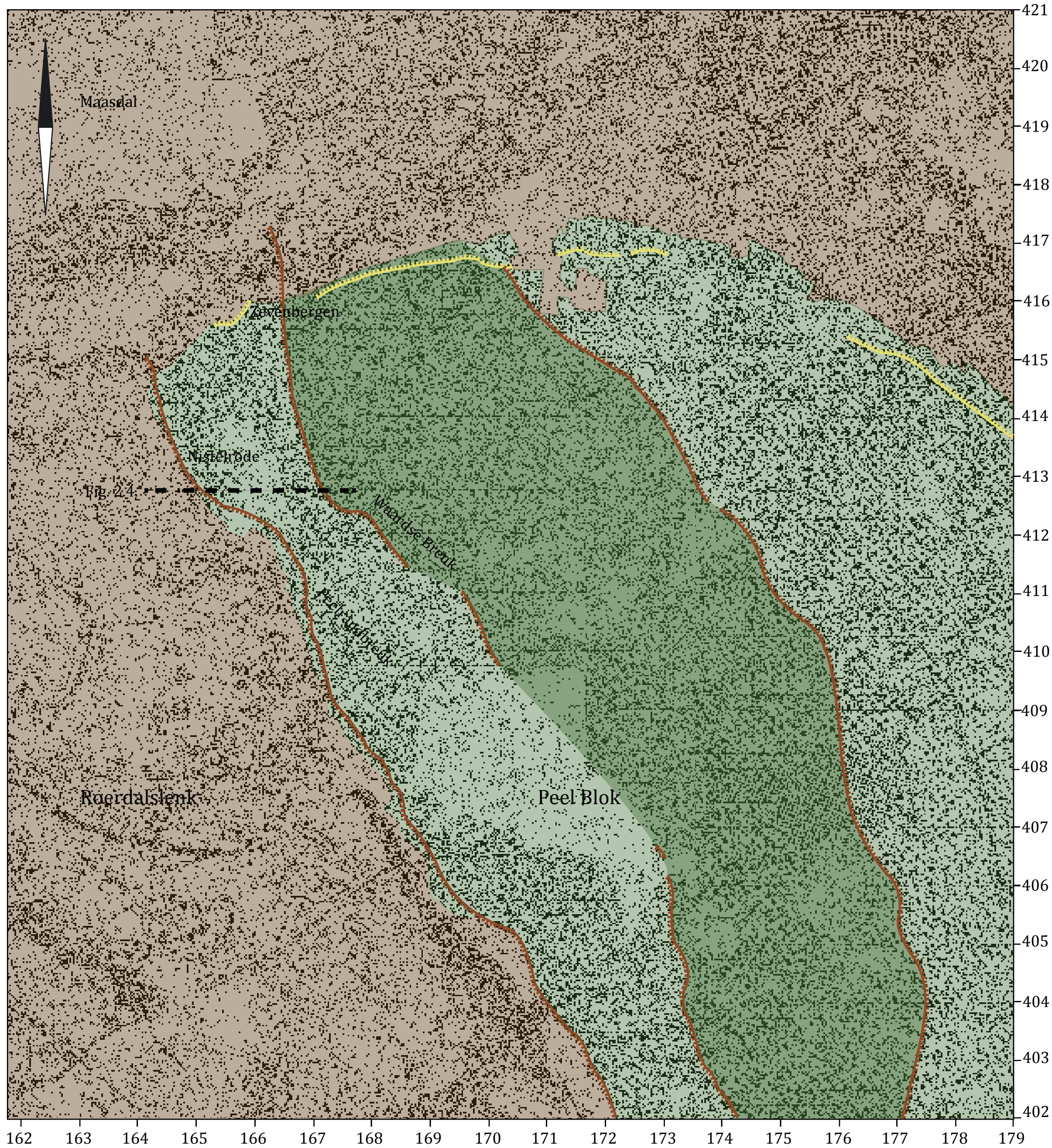
Fig. 2.1 (left page) Based on height measurements this map shows the geographical characteristics of the Maashorst region (green is high; brown is low). The research area Zevenbergen is situated in the northwest corner. Figure after van der Laan et al. 2011/Actueel Hoogtebestand Nederland/J. van Donkersgoed.

2.2 The Maashorst area

2.2.1 The physical landscape

The Zevenbergen barrow group is situated at the northern edge of the Maashorst, the topographical toponym of the northern part of the Peel Blok, a plateau of approximately 10 to 15 km wide that still gradually moves upwards due to tectonic forces (Stichting voor Bodemkartering 1976; van Mourik 1987). This tectonic uplift takes place along elongated, approximately northwest-southeast oriented (underground) fault lines. On the west side of the Peel Blok lies the largest fault line, the Peelrandbreuk, which runs southeast from Heesch along Nistelrode until Uden and is still visible in the landscape. On the eastern side lies the less prominent Tegelenbreuk, which runs along Schaijk and Zeeland. On both sides of the Peel Blok horst lie two grabens, in the west the Roerdalslenk (Roer Valley Graben), also known as the Centrale Slenk (Central Graben; Fig. 2.2) and in the east the Venloslenk.

13 Maas is Dutch for *Meuse.*



The sediments directly under the surface of the Maashorst area are dominated by coarse sands and gravel, and even boulders are quite frequent.[14] These fluvial deposits were deposited by the river Meuse during the Early Pleistocene, when the Meuse and Rhine together formed a broad river zone (van der Laan *et al.* 2011; van Mourik *et al.* 2011; Fig. 2.3). In general the Pleistocene is characterized by strong climate changes with glacial and interglacial periods. During the Cromerian interglacial period upward tectonic movement caused the river Meuse to run through the current Maashorst, to eventually end up in her current course to the northeast of the Peel Blok during the Eemian period, the second-to-latest interglacial period (van Mourik *et al.* 2011).

Fig. 2.2 The geomorphological map of the Maashorst showing the high-lying plateau (green). To the west lies the Roerdalslenk, to the north the landscape gradually runs down to the river valley of the Maas. Brown line: fault line; Yellow line: terrace side. Figure after Stichting voor Bodemkartering 1983/J. van Donkersgoed.

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14 These deposits belong to the lithostratigraphic unit "Beegden Formatie". All deposits of the river Meuse that occur in the Dutch subsoil, from ca. 5 million years ago to the present day (Pliocene, Pleistocene, and Holocene), belong to this formation.

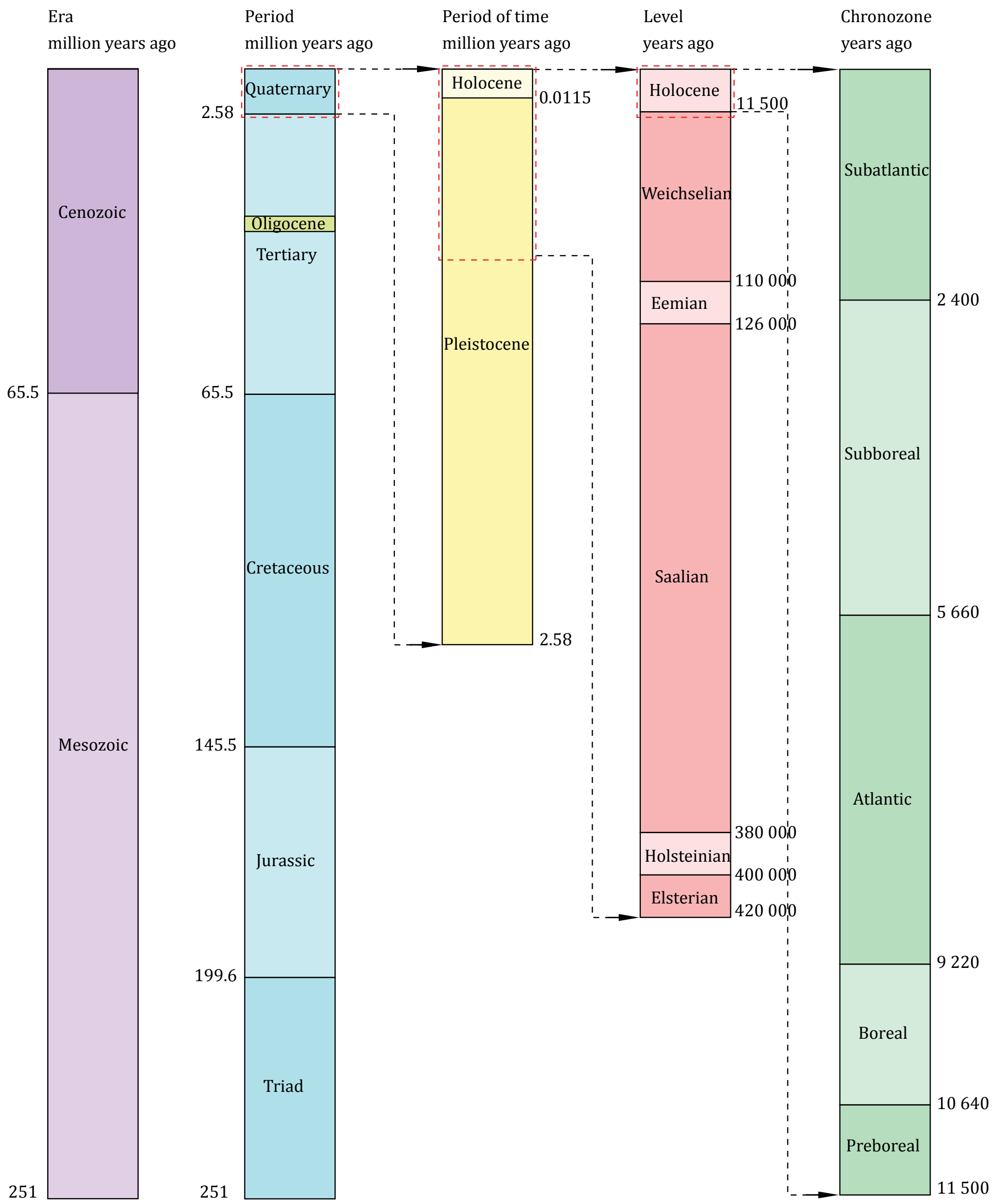


Fig. 2.3 Simplified geological timetable including the periods stated in this chapter. Figure after van der Laan et al. 2011/J. van Donkersgoed.

During the last cold phase of the Pleistocene, the Weichselian ice age, the Maashorst was an erosive plateau, while the Roerdalslenk was a depositional basin. Late Glacial aeolian cover sand deposits at the Maashorst are therefore thin and locally even absent. The Roerdalslenk, in contrast, contains cover sand deposits of several metres thick covering the coarse textured fluvial deposits (van Mourik *et al.* 2011).[15]

The sedimentation of the cover sands on the one hand covers the older relief, but on the other hand also created relief in the predominantly flat landscape by being deposited in dunes, ridges, and planes, characteristic elements of cover sand geomorphology. Numerous large and small(er) cover sand ridges are located in the Roerdalslenk and on the Peel Blok. The barrows of Zevenbergen are located on such a small ridge (see section 2.3.1).

15 The cover sands belonging to the "Boxtel Formatie". This formation contains diverse deposits that occur at the surface of the Netherlands from the Middle and Late Pleistocene, and Early Holocene (from ca. 600 000 years ago).

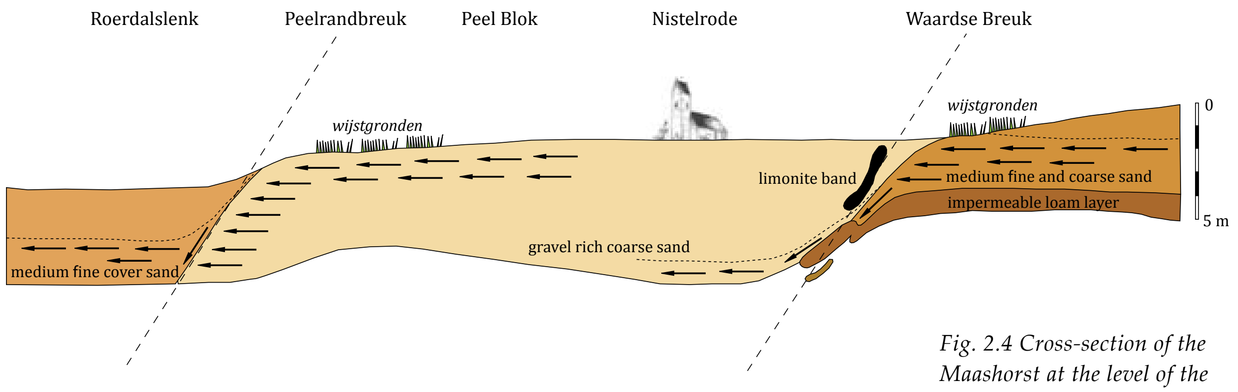


Fig. 2.4 Cross-section of the Maashorst at the level of the village Nistelrode. Figure after van der Laan et al. 2011/J. van Donkersgoed.

2.2.2 Valleys created by solifluction and wijstgronden

In the warmer phases of the last Weichselian ice age, valleys created by solifluction were eroded on the edges of the Maashorst because the melt water could not run off through the frozen subsoil. In areas with relatively high relief the upper soil, saturated with water, slowly moved in the direction of the graben, thereby creating wide, shallow valleys. The surface water of the Maashorst flows through the same valleys. It finds its way in relatively small streams to the Roerdalslenk in the west and the Maasdal in the north. A number of these shallow eroded stream valleys still hold water (van der Laan *et al.* 2011; for example the Kraaienloop, Groote Wetering, and Munsche Wetering). In the valleys locally washed-out loamy cover sands occur, known as Brabants Leem. Small fens or peat has formed in areas where the loam occurs directly beneath the surface (Schokker 2003).

The drainage of the Maashorst is highly influenced by the presence of the faults. For instance, the natural horizontal flow of groundwater to the Roerdalslenk is obstructed by different mineral depositions on the fault planes of the Peel fault. On the higher parts of the faults the flow of groundwater passes through the well-drained Meuse sediments (Beegden Formatie), through the compact cover sand formations (Boxtel Formatie) or even through the impermeable outcrops of Early Pleistocene clay layers (Waalre Formatie). This causes the seepage of groundwater. Anywhere that the ferruginous water makes contact with air and oxidizes, iron pan formation occurs. These hinder the drainage even further. The result is the appearance of shallow groundwater on the elevated block at the upstream side of the groundwater flow system (De Vries 2007, 310; Fig. 2.4). In these areas we find moisture-loving vegetation and areas with humus rich or peaty topsoils. Also, bog iron that can be used for iron is formed here.

2.2.3 Changes by human intervention

The present day relief of the Maashorst was predominantly formed in the Early and Middle Pleistocene under the influence of tectonics and the river Meuse. Late Pleistocene aeolian deposits have partially masked this relief and moderately reshaped it, but not significantly changed it. So the geogenesis of the Maashorst, with tectonics, the river, and the wind being the primary actors, was for the most part "completed" at the end of the Pleistocene. Changes in the physical Holocene landscape are predominantly the result of human intervention whereby the natural landscape was slowly transformed into a "cultural landscape". The most profound impact of human land use on soils and landforms was caused by deforestation. The gradual transformation of the forests into heath land from prehistoric time onwards, together with an increase of population and agriculture, increased soil acidification and affected the hydrology of the area (Spek 2004, 116-117; van

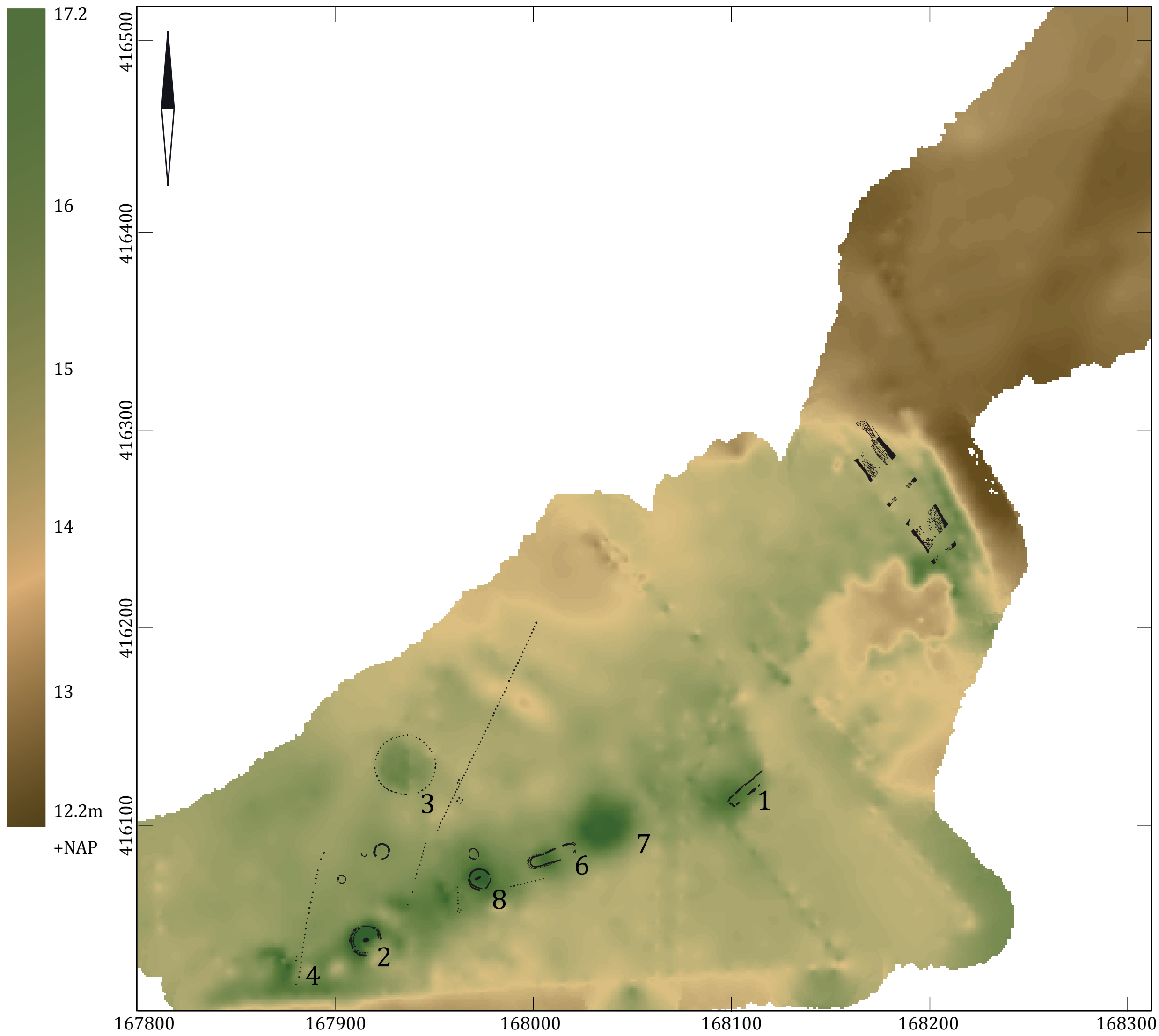


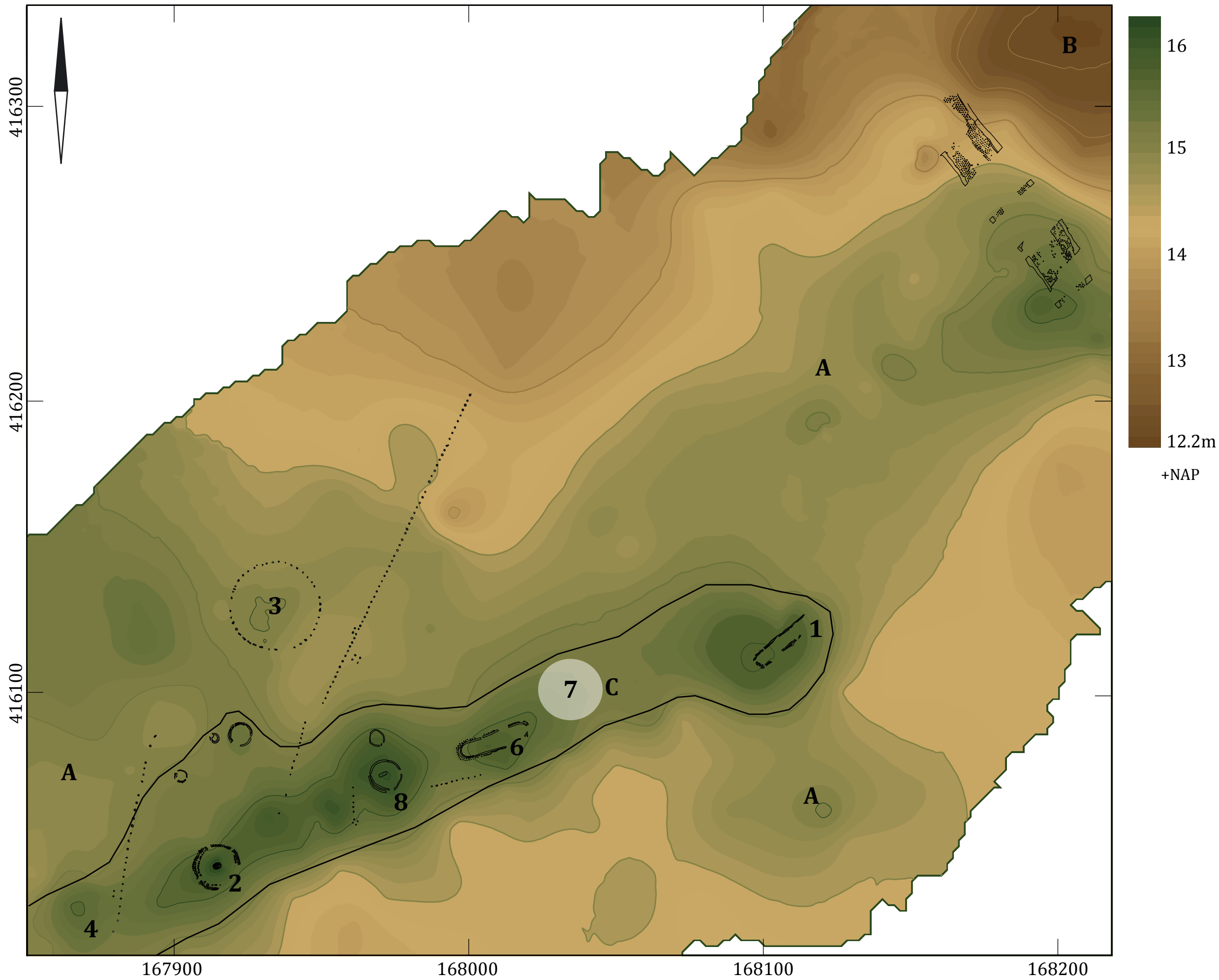
Fig. 2.5 The current micro relief of the research area was mapped in detail prior to the 2004 research. The terrain mostly consists of a relatively flat plateau (14.2 to 15.2 m +NAP) with a northeast oriented ridge upon it (15.0 to 15.8 m +NAP). To the northeast of the plateau there is a natural steep decline (15.5 to 12.5 m +NAP) to a plateau located lower down (12.5 to 13 m +NAP). In the lowest part of the plateau the Munsche Wetering erupts. Figure after van der Linde/Fokkens 2009, fig. 4.4/J. van Donkersgoed.

Mourik *et al.* 2011). During the Middle Ages (and possibly earlier) and up till recent times, the pedogenesis was also influenced by the sod agriculture and drift sand activity, both on a larger and smaller, localized scale (De Kort/Jansen 2011).

2.3 The physical landscape of Zevenbergen

On the 1:50 000 geomorphological map the Zevenbergen area is designated as "low sand dunes with accompanying planes and low areas, located on cover sand ridge(s)". The most prominent element in the local landscape is indeed a relatively low cover sand ridge upon which most of the barrows are located (van der Linde/Fokkens 2009). Because this small ridge is barely visible on maps, a detailed elevation map of the present micro relief was made prior the 2004 excavation (Fig. 2.5).

The 2004 investigation revealed that almost nowhere was the original relief intact. In some cases the natural soil profile (or parts thereof) were covered by aeolian sediments, while in other areas they were completely or partially disturbed (van der Linde/Fokkens 2009). To properly visualize the location of the barrows in relation to landforms, a geomorphological, pedological, and landscape map-



ping of the terrain was conducted by means of a coring research (van der Linde/ Fokkens 2009). The most important results are briefly shown below through two maps (Fig. 2.6 and 2.7).

Fig. 2.6 The original micro relief of the research area was mapped during the 2004 research. It turned out that originally the ridge was smaller and more pronounced. (No additional soil survey was conducted in 2007). (A) Middle terrace; (B) lower terrace; (C) cover sand ridge, note that the low-lying area between mounds 6 and 7 as depicted is a measurement error! At the mound 7 location there also is an elevation. Figure after van der Linde/Fokkens 2009, fig. 4.5/J. van Donkersgoed.

2.3.1 Map of the original micro relief

In the original relief of the Zevenbergen area the cover sand ridge with almost all mounds was smaller and more pronounced than it is in the current relief (14.6 to 15.8 m +NAP in relation to 14.2 to 15.2 m +NAP). The ridge upon which the mounds are located was likely created by locally blown sediments. The micro relief map emphasizes that the barrows are located on a naturally prominent location in the landscape, situated on the highest flank of the middle terrace (Fig. 2.6). Over the course of 25 m there is decrease of 14.0 to 11.2 m +NAP, an angle of ca. 10 degrees (van der Linde/Fokkens 2009).

2.3.2 The local soil map

The parent material of the Zevenbergen area consists on the one hand of poor to slightly loamy cover sand and on the other of coarse gravel-rich sand, the latter being outcrops of old river deposits from the Middle Pleistocene. In both sediments, provided they are dewatered, "podzolization" occurred. This is a process whereby humus and minerals wash out of the vegetation layer and settle in deeper levels. Vegetation and hydrology are some of the important variables during this process, but man also can influence this process.

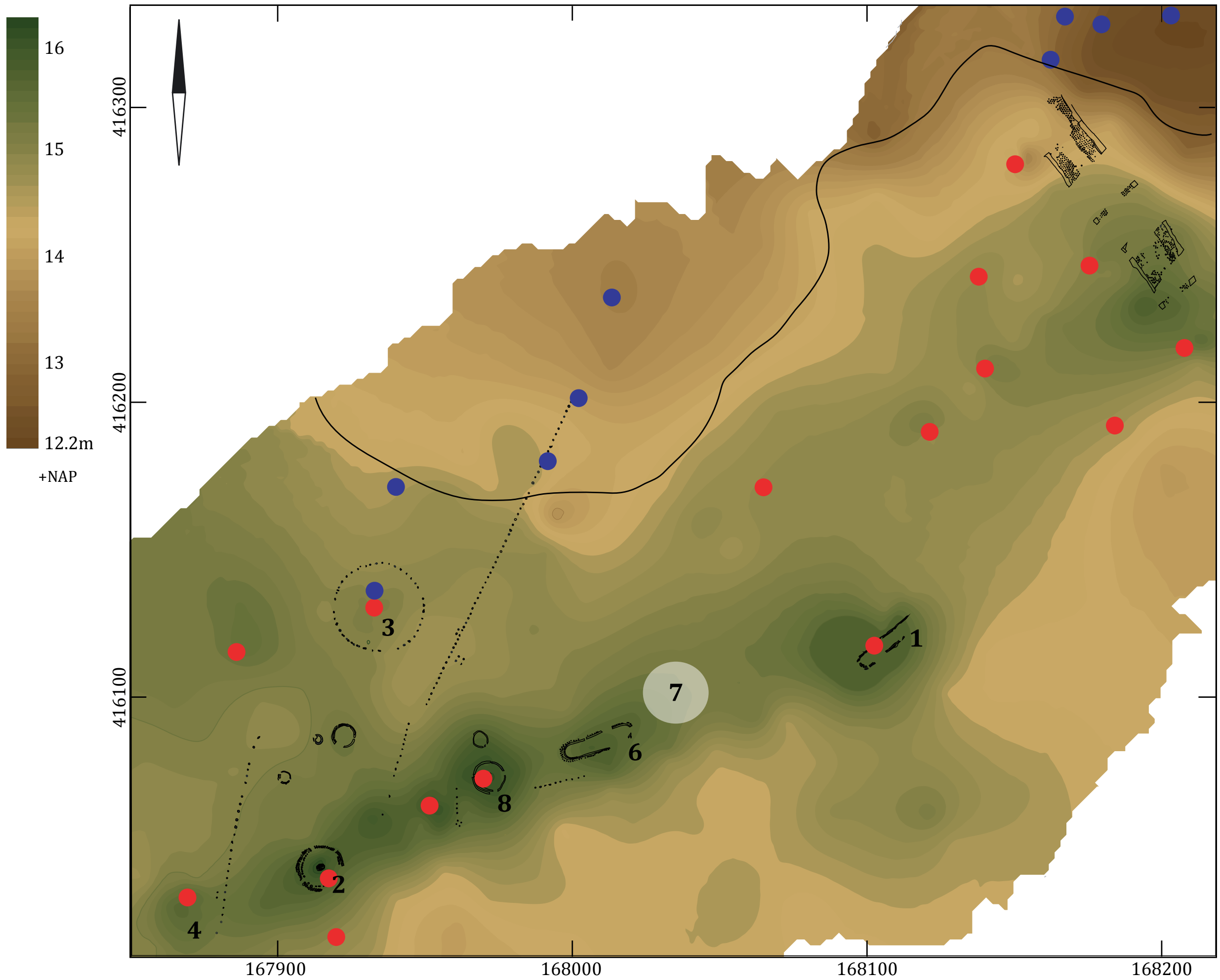


Fig. 2.7 The local soil map of the Zevenbergen is based on the (almost) intact soil profiles, which display a large difference between the prehistoric and modern day pedological situation. Corings: (red) Haarpodzolgronden and (blue) Veldpodzolgronden. The mounds are indicated with their numbers. Top right are the features of a defensive structure from the historical period. Figure after van der Linde/Fokkens 2009, fig. 4.8/J. van Donkersgoed.

The soils on the higher grounds (partly under the mounds) can be classified in the Dutch system for soil classification as *Haarpodzolgronden* (code: *Hd30*), a subdivision of Humus Podzols that developed in the coarse sand of the cover sand ridge and the largest part of the middle terrace. In lower areas of the terrain, coinciding with the low terrace, *Veldpodzolgronden* (code: *Hn21*) developed (Fig. 2.7).

In a number of the deeper profiles a palaeosol was encountered that probably dates from the Allerød Interstadial (11 800-11 000 years ago), a short warmer period at the end of the Late Glacial (van der Linde/Fokkens 2009). A large amount of charcoal (speckles) is characteristic for these usually weakly developed soils, a consequence of the many vegetation fires from in this period. This palaeosol is more commonly known as the *Laag van Usselo* and forms the stratigraphic separation between the *Jong Dekzand I* and *II*.

2.3.3 Summarizing

The barrow group Zevenbergen, together with the nearby barrow group Oss-Vorstengraf, is situated on a very prominent landscape location, at the northern edge of the relatively high lying Maashorst plateau, the most northern part of the Peel Blok.

The majority of the barrows of Zevenbergen is located on a narrow, low cover sand ridge in the landscape which is located at a short distance from the most northern terrace edge of the Peel Blok with a step of maximum (original) height

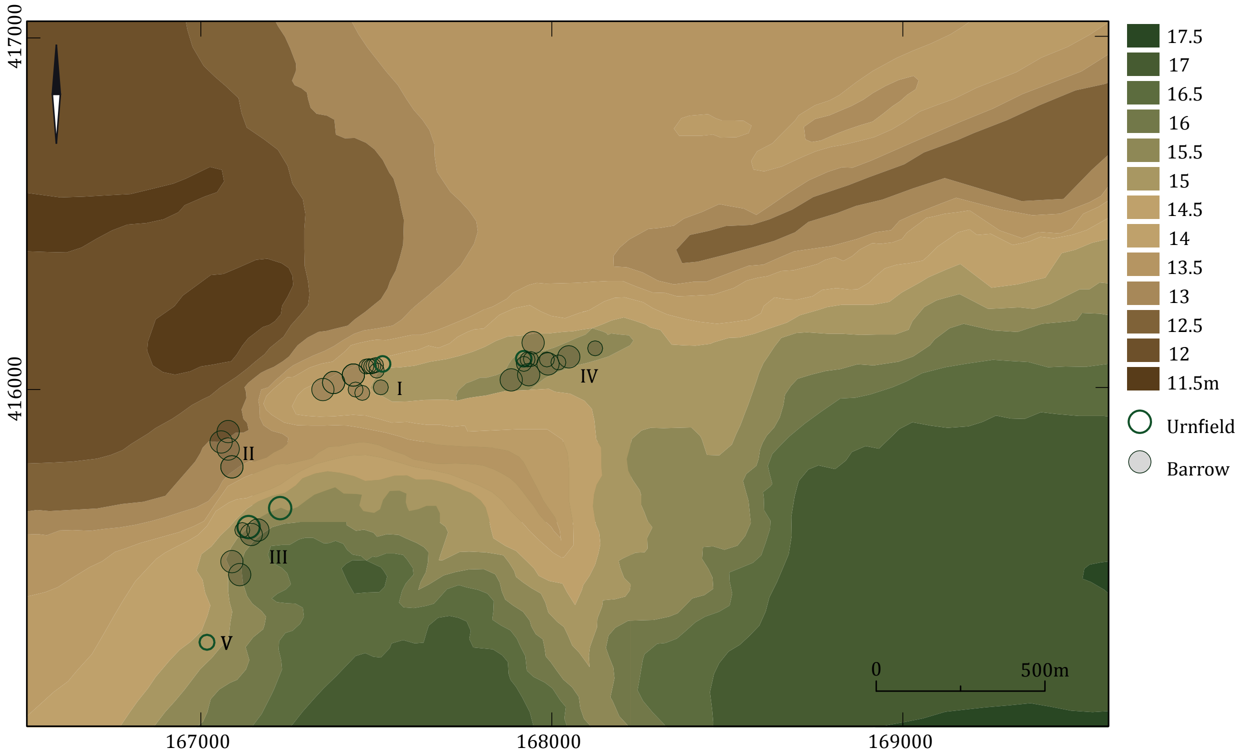


Fig. 2.8 The barrow groups of Zevenbergen (IV), Vorstengraf (I), Klokbeker (II), and Vorssel (III) are situated to the north and south of a small valley created by solifluction. The cemeteries are located hundreds of metres apart, have a similar time depth and still differ significantly. Figure after De Kort 2007, afb. 1/J. van Donkersgoed.

difference of about 5 m. The area is characterized by the outcroppings of different sediments and soils, differences in height between middle, low terraces that are substantial by Dutch standards, and differences in groundwater levels (van der Linde/Fokkens 2009). The latter is caused, amongst other things, by the groundwater being forced to the surface under pressure (Dutch: kwel). To the west of Zevenbergen a similar zone is located where seepage occurs despite the many (infrastructural) interventions in the landscape. To the northeast of Zevenbergen there is fen caused by seepage, as well as the start of a brook, the current day Munsche Weetering. Farther away, to the northwest of Oss-Vorstengraf, there is also a fen (De Kort 2007, afb. 5).

It seems evident that these landscape characteristics – ridge, the presence of water, and soils – strongly influenced the positioning of the (first) barrows and the subsequent evolving of a meaningful "(ancestral) landscape of the dead" that was used for almost two millennia.

2.4 The late prehistoric cultural landscape of Zevenbergen

It is without question that our Zevenbergen barrow group formed a central and significant element of the local cultural landscape in the Bronze and Iron Ages. Not only as a barrow landscape, but also as a place for rituals (Fokkens *et al.* 2009). Contemporary finds and sites from these period(s) are known from the immediate surroundings of Zevenbergen. This paragraph gives a brief overview of the archaeological sites in the area that may be of relevance.

2.4.1 Oss-Vorstengraf

About 300 m west of Zevenbergen lies another barrow group: Oss-Vorstengraf (Fig. 2.8). As mentioned in the previous chapter, the development of this group shows great similarities to that of Zevenbergen. Around a small Bronze Age barrow group, an Early Iron Age urnfield arose, which is best known for one very large barrow, the so-called Vorstengraf, with a central grave containing a bronze urn (*situla*) which, besides the cremated remains of a man, an extraordinary set of objects, including a unique iron Mindelheim sword with gold inlay on the hilt, iron and bronze horse-bits and horse tack fittings, an iron axe and a knife, and a range of other (small) objects (see also section 1.1, Fig. 1.14 and 16.11; Fokkens/Jansen 2004; Holwerda 1934).

2.4.2 Other barrow groups

Together with the barrow group of Vorstengraf, the Zevenbergen barrow group is situated north of a shallow solifluction valley in which a brook might have flowed (at certain times of the year; De Kort 2007, afb. 5). Opposite of this valley there are two other clusters of burial mounds, known as the Klokbeker-cluster and the Vorssel-cluster. Of the former only one mound was (partly) professionally excavated. It contained a Late Neolithic central cremation grave with a typologically late (Veluvian) Bell Beaker and a flint arrowhead (Bursch 1937; Fokkens 1997; Fokkens/Jansen 2004). Three other mounds of this so-called Klokbeker-cluster are most likely lost without any evidence collected. In a short article about four ring ditches found directly south of Vorstengraf, their location is referred to as lying between the excavated Vorstengraf and four barrows further south (Vos 1972; Fig. 2.8).

From this southern barrow group Vorssel, the remains of the central grave of one mound was collected by the provincial archaeologist G. Beex during excavation works for a gas pipeline. Sherds belonging to a Middle Bronze Age urn were found together with cremation remains. The mound itself was already destroyed. The other mounds are still visible and protected, although recently one mound was dug into, without knowing when it happened and what was found in the central grave (De Kort 2005). A recent inspection in the field showed that there are at least three mounds still present (Bourgeois 2004).[16]

2.4.3 Settlements and other sites

Besides burial evidence there are also indications that people lived here, close by the cemeteries, during the Bronze and also the Iron Age. Unfortunately (possible) settlements are only indicated by surface finds, excavations of settlements are (still) lacking. All known settlement sites are situated south and east of the cemeteries, and, looking at the landscape, it seems logical to expect the settlements here, at the higher lying northern edge of the Maashorst plateau. This also seems plausible because the comparable western edge of the plateau was extensively inhabited in later prehistory (Jansen *et al.* 2011). A large-scale test-trenching research north of Vorstengraf provided no evidence of prehistoric habitation. Directly to the north of the Vorstengraf an extensive area of approximately 80 ha was researched by small, parallel prospective trenches (Jansen/Fokkens 2009). More than 3 km of trenches were excavated, revealing that the area was never used for settlement in later prehistory. The relatively low-lying area seems to be too wet for habitation (Jansen/Fokkens 2007; see also De Kort 2002).

The nearest settlements lie southwest of Zevenbergen, close to the Vorssel mounds (Fig. 2.9, VI). Surface finds, especially sherds, indicate the presence of a Bronze and Iron Age settlement. As part of a RCE-project, in which archaeological monuments documented in Archis II all over the Netherlands were prospected, a few small trenches were excavated here and brought some Bronze Age and Roman Period features to light (unpublished information provided by RCE). Some 250 m

16 Recently all trees were removed from the mounds, creating an open area around them. Holes dug into the barrows were backfilled.

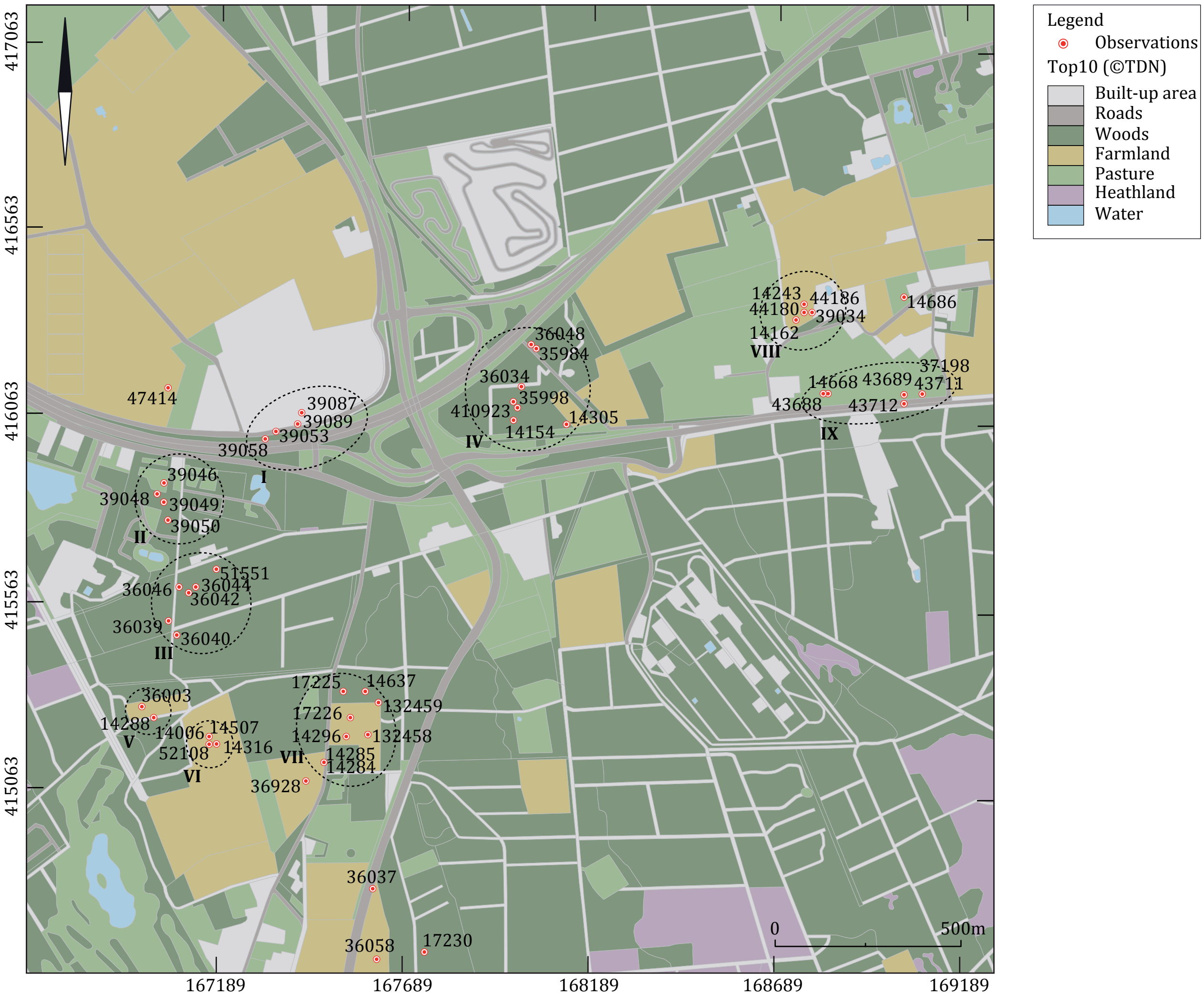


Fig. 2.9 *All sites known from the surroundings of the research area Zevenbergen. The different features and finds are discussed in table 2.1. Map from Archis II/R. Jansen/J. van Donkersgoed.*

to the west a second (possible) Bronze/Iron Age settlement is known (Fig. 2.9, VII). Surface finds were collected here on different occasions. A third (possible) settlement lies 700 m east of Zevenbergen (Fig. 2.9, IX). With certainty this site was inhabited in the Roman Period and the Early Middle Ages, as is evidenced by finds and features from the 1st-3rd century AD and Carolingian times. Iron Age habitation is suspected based only on a few sherds.

To complete the (prehistoric) archaeological setting a few other sites/finds are worth mentioning: a stone (Fels-Oval) axe (Neolithic until Bronze Age) together with a Late Neolithic sherd (Dutch: *potbeker*; Archis-number 36037), a bronze Roman coin (an *As*; Archis-number 36928), and some Bronze Age/Iron Age ceramics (Archis-number 17230).

Some 300 m northwest of Vorstengraf a deposition of a bronze axe (Archis-number 47414) was found with a metal detector within a zone of springs. This fits the generally known picture in which the wetter parts of the landscape were used for depositions (Fontijn 2002).

Finally two locations of possible urnfields are known: at one location a Late Bronze Age urn with cremation was found (Archis-number 36058), at the other it is said that tens of urns were found during earth removal operations in 1969. The urns were unfortunately destroyed on the spot because the contractor was afraid of time-delaying archaeological research.

Table 2.1 (right page) Archaeological sites within the direct surroundings of Zevenbergen – Vorstengraf (based on Archis II, verified and supplemented with information known from literature and local archaeologists (see also Fig. 2.9). continued on next page.

2.4.4 Summarizing

Despite the scarcity of data, the few known sites within the surroundings of Zevenbergen seem to indicate a structured late prehistoric cultural landscape with settlements, burial sites, and deposition sites situated on (very) specific and different locations within the landscape, but within close vicinity of each other. Within this landscape the barrow groups of Vorstengraf and Zevenbergen undoubtedly formed an important place for the (local) people.

	Archis	Reliab.*	Description	Period(s)	Reporter /literature	Interpretation
I	39053	4	Barrow	Middle Bronze Age	Bursch 1937	Barrow group *Vorstengraf*
	39058	4	Barrow	Middle Bronze Age	Bursch 1937	
	39087	3	Ring ditches	(Early) Iron Age	Heemkundekring Maasland	
	39089	5	Barrow "chieftain's grave" of Oss	Early Iron Age	Holwerda 1934; Fokkens/Jansen 2004	
II	39046	3	Barrow	Bronze/Iron Age?	Klok	Barrow group *Klokbeker*
	39048	3	Barrow	Bronze/Iron Age?	Klok	
	39049	3	Barrow	Bronze/Iron Age?	Klok	
	39050	4	Barrow Bell Beaker Culture	Late Neolithic	Bursch 1937	
III	36039	4	Barrow	Middle Bronze Age	Beex /Hulst 1964	Barrow group *Vorssel*
	36040	4	Barrow	Bronze/Iron Age?	Beex	
	36042	4	Barrow	Bronze/Iron Age?	Beex	
	36044	4	Barrow?	Bronze/Iron Age?	Beex	
	36046	4	Barrow	Bronze/Iron Age?	Beex	
	51551	5	Barrows	Bronze/Iron Age?	Bourgeois 2004	
IV	14154	5	Barrow s	Bronze/Iron Age	Verwers 1966a	Barrow group *Zevenbergen*
	14305	4	Flint/sherd (1)	?/Roman period	Verwers	
	35984	3	Hallstatt-urn (*Shräghals-urn*)	Early Iron Age	?	
	35998	5	Barrow s	Bronze/Iron Age	Modderman	
	36034	4	Flint	Mesolithic	Beex	
	36048	3	Hallstatt-urn (idem to 35984)	Early Iron Age	Beex/ROB	
V	14288	4	Ceramics	Iron Age/Roman Period	Verwers	Urnfield (?)
	36003	2	Urns	Iron Age	Beex 1969	
VI	14006	4	Ceramics	Roman Period	Beex	Settlement
	14316	4	Ceramics	Iron Age/Roman Period	Verwers	
	14507	3	Ceramics	Iron Age/Roman Period/Late Middle Ages	van Alphen	
	52108	4	Ceramics	Bronze and Iron Age/Roman Period/Late Middle Ages	*ADC/RCE; internal report*	
			Features	Bronze Age		
			Cultural layer	Roman Period		
VII	14284	4	Ceramics	Iron Age	Verwers	Settlement(s)
	14285	4	Ceramics	Late Middle Ages	Verwers	
	14296	4	Ceramics	Bronze Age/Iron Age/Roman Period	Verwers	
	14637	4	Ceramics	Bronze Age/Iron Age	Verwers	
	17225	4	Ceramics	Iron Age	Verwers	
	17226	4	Ceramics	Iron Age	Verwers	
	132458	4	Ceramics	Iron Age	*RAAP*; Oude Rengerink 1997	
	132459	4	Ceramics	Iron Age	*RAAP*; Oude Rengerink 1997	

	Archis	Reliab.*	Description	Period(s)	Reporter /literature	Interpretation
VIII	14162	4	Ceramics	Early/Late Middle Ages	Verwers	Monastic grange of the *Abbey van Berne*
	14243	4	Ceramics	Late Middle Ages	Verwers	
	39034	2	Ceramics	Late Middle Ages	?	
	44180	4	Ceramics	Late Middle Ages	Verwers	
	44186	3	Flint (1)	?	van der Lee	
IX	14668	4	Ceramics	Roman Period/Early and Late Middle Ages	Verwers	Settlement Roman Period/Early Middle Ages
	37198	3	Ceramics	Roman Period	Smits	
	43688	2	Ceramics	Roman Period/Early Middle Ages	?	
	43689	4	Ceramics and features	Roman Period/Early Middle Ages	ROB	
	43711	3	Ceramics	Roman Period/Early and Late Middle Ages	van Alphen/Datema	
	43712	4	Ceramics and features	Early Middle Ages	ROB/Verwers	
	14686	4	Ceramics	Early/Late Middle Ages	Verwers	
	17230	4	Ceramics	Bronze Age/Iron Age	Verwers	
	36037	4	Stone (Fels-Oval) Axe Ceramics	Neolithic/Bronze Age Late Neolithic	Beex	
	36058	4	Urn with cremation	Late Bronze Age	Beex 1973	
	36928	3	Coin (As)	Roman period	van Alphen	
	47414	5	Axe	Bronze Age	Fontijn *et al.* 2004	

* Reliability (1=very low; 2=low, 3=good, 4=very good, 5=verified)

Table 2.1 continued.

Chapter 3

"Mound" 6: a post and ditch aligned long barrow

Patrick Valentijn

3.1 Introduction

Between mounds 7 and 8 lies the remnant of a long barrow which is far less conspicuous than the monumental mound 7. However, in this case it is not its size, but the ground plan that makes this barrow interesting. In 1964 and 1965 an excavation of an already highly disturbed round mound took place at this location. Unexpectedly, the excavators found the traces of an oblong structure beneath this round mound. A unique long barrow, as it had two peripheral structures: a ditch and a (double) post-setting. The entire barrow was excavated, but a date for the structures was not obtained: what is the chronological relation between the ditch and the post-setting? Is one the successor of the other, and if so, in what order? Another unsolved problem is the row of post traces situated to the south of the monument (Fig. 3.1). Are there more traces of this post alignment in the unexcavated badger zone, allowing us to get a better understanding of the remarkable post alignments found at the Zevenbergen (see section 1.2)? A final question has to do with the relation between mound 6 and mound 7: both seem to be situated very close to each other (*cf.* Fig. 1.13, D). Are we dealing here with a combined monument?

A test-trench dug over the eastern part of the monument by Archol in 2004 showed that the traces of the structures were in a fine state of preservation: most of them were left untouched during the 1960's excavations (*cf.* Fig. 1.9*)*. It therefore seemed worthwhile to conduct a full excavation of the remnants of the long barrow to answer these questions.

The results of this excavation in 2007 are discussed in this chapter. The long mound was situated in excavation trench 110 (see Fig. 1.12). In the following a short outline is given of the research history of mound 6, after which its structure and the nature of its surrounding features are discussed. Finally I go into the evidence for dating the different phases of the long barrow.

3.2 Research history mound 6

Due to plans for enlarging and relocating the road from 's-Hertogenbosch to Nijmegen, two mounds (mound 6 and 8) of the threatened (presumed) barrow group Zevenbergen was (partly) excavated in 1964/1965. The main goal of this research, which was executed by the Institute for Prehistory Leiden (IPL, now Faculty of Archaeology), was to establish the nature of the mounds: were they natural sand dunes or manmade barrows? (see also section 1.2.2).

During the excavation of mound 6, its ground plan soon proved to be the most interesting. Beneath a circular mound body an oval ditch was discovered (Fig. 3.1). Parallel to the long sides of the ditch ran a single row of posthole traces,

Fig. 3.1 Plan and section of the 1964-1965 excavations of mound 6 with additional find locations and the row of post traces to the south excavated in the 1960's. Figure after Verwers 1966a, fig. 6/J. van Donkersgoed.

while in the N and SW-quadrant two rows of posthole traces were visible. So it appeared that the circular mound only covered the south-western part of an (once) oblong monument. Such oblong monuments, the so-called long barrows or long beds (Dutch: *langbedden*), are well-known from the Late Bronze Age and Early Iron Age urnfields of the lower Rhine basin. A surrounding feature consisting of both a ditch and a post-setting, however, is unique. Outside of the mound, the excavators found a row of post traces that runs parallel to the monument (Fig. 3.1 for the post traces found in the 1960's; Fig. 16.9).

Dating the mound proved to be difficult. A C14-date was obtained for charcoal from the ditch, but this was only published as a preliminary one (Verwers 1966a, 31). The chronological relationship between the two kinds of surrounding features could not be established. Cross-sections did show that the round mound covered the ditch and therefore has to be younger than the surrounding feature (Fig. 3.1).

The presence of the badger sett in mound 7 during the 2004 excavation meant that only the south-western corner of mound 6 could be laid bare with a test trench. In the trench the ditch and double post setting were refound. It appeared that all traces were in good condition and that only a small sample of the features had been cross-sectioned in the 1960's. None were fully excavated. The good condition of the features offered possibilities for a full excavation of the barrow once the badger had moved out of its sett in mound 7. The results of this excavation, which took place in 2007, will now be discussed.

3.3 Description of the structure

The mound body was excavated completely already in the 1960's. The only mound we found appeared to be the spoil heaps of the earlier excavations. Although I will continue to speak of "mound" 6, the reader should bear in mind that in 2007, there was no longer a true mound present. We therefore chose to investigate the traces of mound 6 by means of an extensive excavation at one level, directly under the top-soil. The full extent of the barrow structure was opened up by a mechanical digger with a smooth-edged bucket. After removal of the reconstructed mound and the top-soil the surrounding features became visible. Both traces of the ditch and the postholes could clearly be distinguished from the surrounding B and C horizons (Fig. 3.2), as were the infills of the sections made in the 1960's. The excavation level was created at the point where features first became visible, which for most features was at the transition from the B to C horizon. However, as some features became visible at a deeper plane than others, the level created was not perfectly horizontal. Also, some features were covered by modern cart tracks that disturbed a large part of mound 6. These tracks were excavated by hand in

Fig. 3.2 Overview of plan of mound 6 during the excavation in 2007 as seen from the west. At the top of the picture lies mound 7. Figure by Q. Bourgeois.

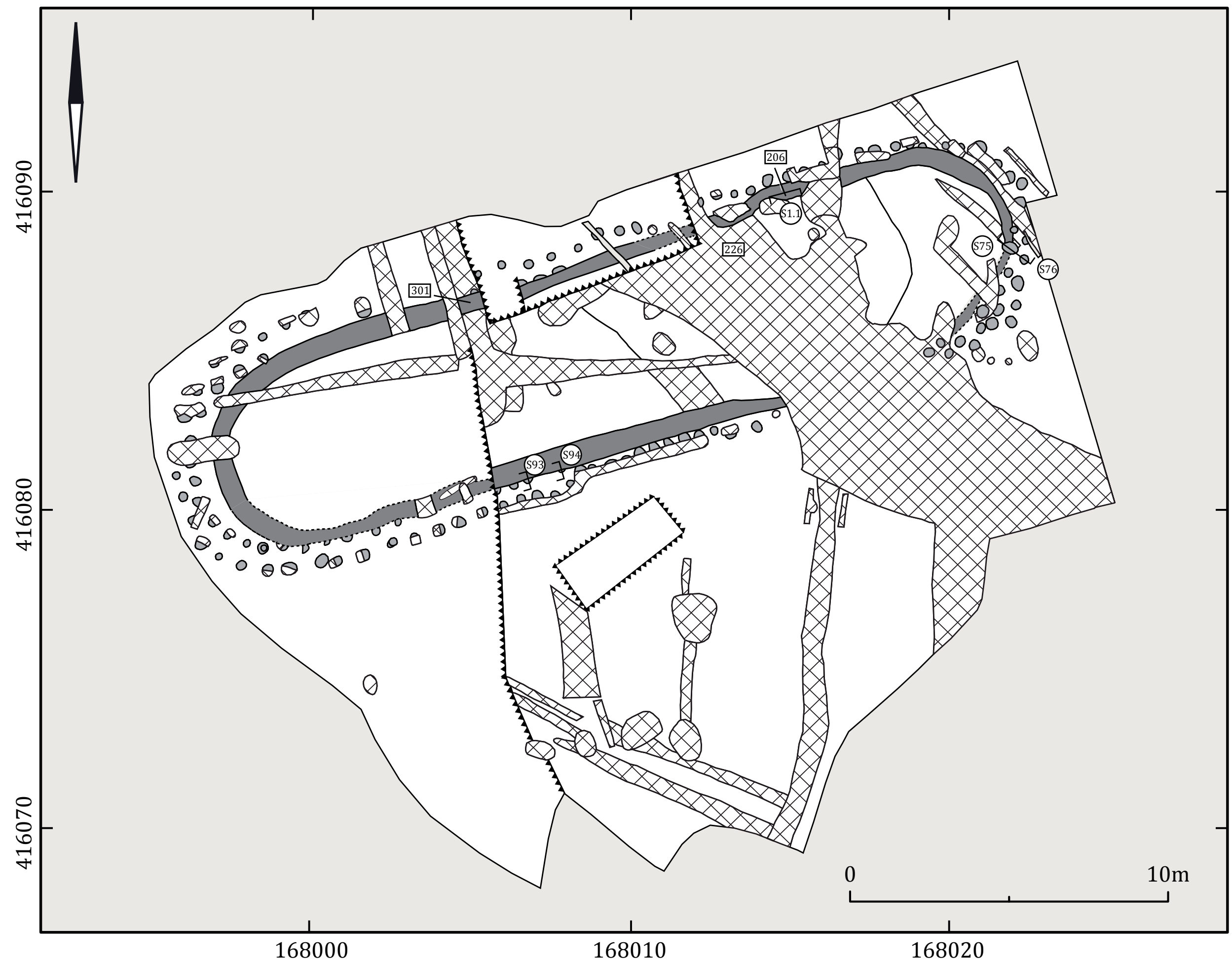


Fig. 3.3 Plan of mound 6 with the find numbers (squares) of the 2007 excavation. The location of features depicted in figure 3.5, 3.8, and 3.9 are indicated (circles). Figure by P. Valentijn/J. van Donkersgoed.

horizontal levels, laying bare the older features beneath them. All features were sectioned and eventually fully excavated. The sections were photographed and, in the case of substantial features, drawn.

In the following the two surrounding elements and the structure of the mound body are discussed in further detail.

3.3.1 Peripheral structure 1: a double post-setting

In the 1960´s a single post-setting was discovered underneath the round barrow, which on the western short end was doubled by a second row of posthole traces. During our excavation most of the features interpreted as postholes were rediscovered plus 35 additional features (Fig. 3.3), bringing it to a total of 123 postholes (Fig. 3.4). The additional features make clear that not only the western end, but also the eastern end consisted of a double post-setting. At the middle of the northern long side a double post-setting also became visible. As these features were partly located underneath the peripheral ditch, it is probable that the entire structure consisted of a double post-setting of which some traces were intersected by the ditch and/or the modern cart tracks.

Over the eastern end of the monument ran a 6 m wide feature. This "disturbance", made up of many narrow parallel strips, can be interpreted as a cart track (chapter 15). During the 1960´s excavations a coin was found at the bottom of one of these tracks, bearing the year 1827 (Verwers 1966a, 31; Fig. 3.1, find no. 7). During the 2004 and our excavations, three more coins were found, respectively dating to 1820-1830, 19th century and the year 1826, all in association with

Fig. 3.4 Overview of all posthole features of the oblong post-setting. For clarity the posthole traces are depicted as perfect circles on top of the plan. The position of the post row is indicated by a dashed line, for the exact locations of the post features that make up this row, see figure 16.9. Features outside of the mound are not shown. Figure by P. Valentijn/J. van Donkersgoed.

the tracks (Fig. 3.3, V 226; chapter 15). The cart tracks were fully excavated by hand in horizontal levels, laying bare some of the additionally found features of the surrounding post-setting.

The surrounding post-setting is of an oval shape and has a westsouthwest-eastnortheast orientation. The structure has a maximum length of approximately 28.5 m and a maximum width of approximately 8.5 m.

The features making up the peripheral structure were in general well distinguishable (Fig. 3.5), although of some features only the lowest part of the illuviation band was found. No actual remains of posts were found. In some of the sections it looked like the posts were placed slightly oblique, but this appearance is the result of illuviation processes. None of the features had a clear oblique placement, so an upright position of the posts is therefore most likely.

The maximum width of the posthole features ranges between 20 and 52 cm, with an average of 32 cm. Their depth, as measured during the 2007 excavations, ranges between 3 and 53 cm, with an average of 22 cm (Fig. 3.6). During the excavations in the 1960's, a depth of as much as 80 cm was measured for one of the features. Originally the postholes must have been at least 30 cm deeper than this, as this is the average depth of the Podzol soils missing above the features. Most of the major differences in depth between the features can be explained as the result of fluctuations in both the original surface and the trench level elevation (Fig. 3.6). Nevertheless, a few posthole features are deeper than one would expect from the level heights, such as some in the northwestern corner. This, perhaps, indicates that some posts were taller than others. Deducing the height of the posts from the depth of the features, however, is difficult. If we assume that the

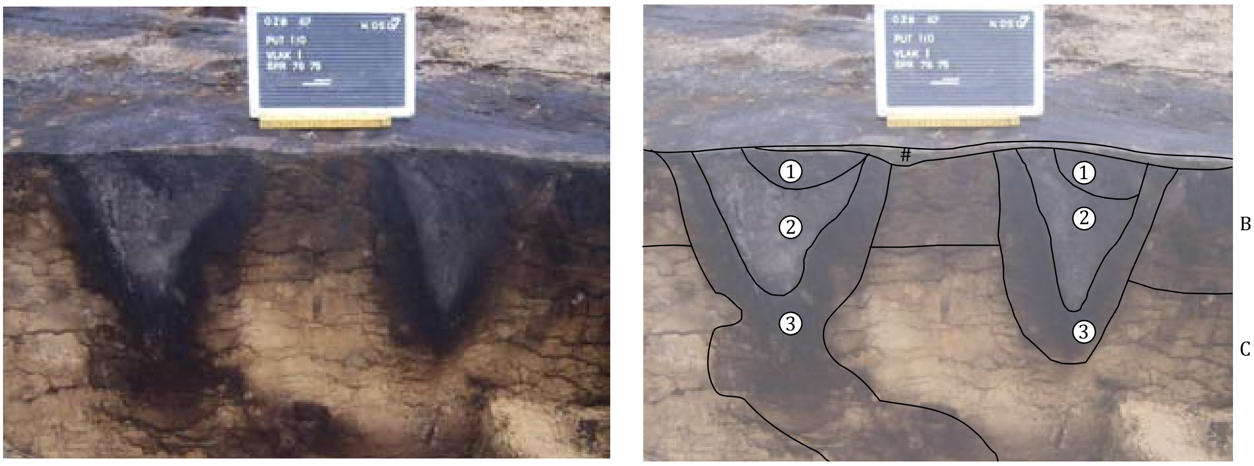


Fig. 3.5 (top) Section of S 76 and S 75 of the oblong post-setting. The features making up the peripheral structure have a grey to light grey core, sometimes with a slightly darker centre, surrounded by a brown to dark grey iron-illuviation band (1 humus-rich core, 2 eluviated core, 3 illuviation band). Figure by P. Valentijn/J. van Donkersgoed.

Fig. 3.6 (above) Ground plan, with overlay indicating depth of the features of the oblong post-setting, projected on an elevation map of the excavation surface. Figure by P. Valentijn/J. van Donkersgoed.

posts had no function as a bearer and that therefore only a fifth of a post needs to be underground (see also Arnoldussen 2008, 72), then the posts could have easily reached a length of three metres above the surface. Whether the posts really reached such a height will remain unknown.

Most of the features are placed 50 to 85 cm apart and none of them intersect. At first sight no obvious patterning seems to be present in the placement of the posts. It does not, for instance, appear that (pairs of) posts were set out from one or a few central points (see for example mound 3, Fokkens *et al.* 2009, 96-98). From a bird eye's view the placement seems to be random.

However, when one moves along the inside of the post-setting – as we have done in a virtual 3D-reconstruction – a clear paring of posts does become obvious, especially in the southwest corner (Fig. 3.7). From successive locations different sets of more or less parallel placed pairs of posts are visible. So it appears that the patterning in the placement of the posts is dynamic rather than static; instead of concentrating on a central point, the posts focus on movement. Interestingly, the

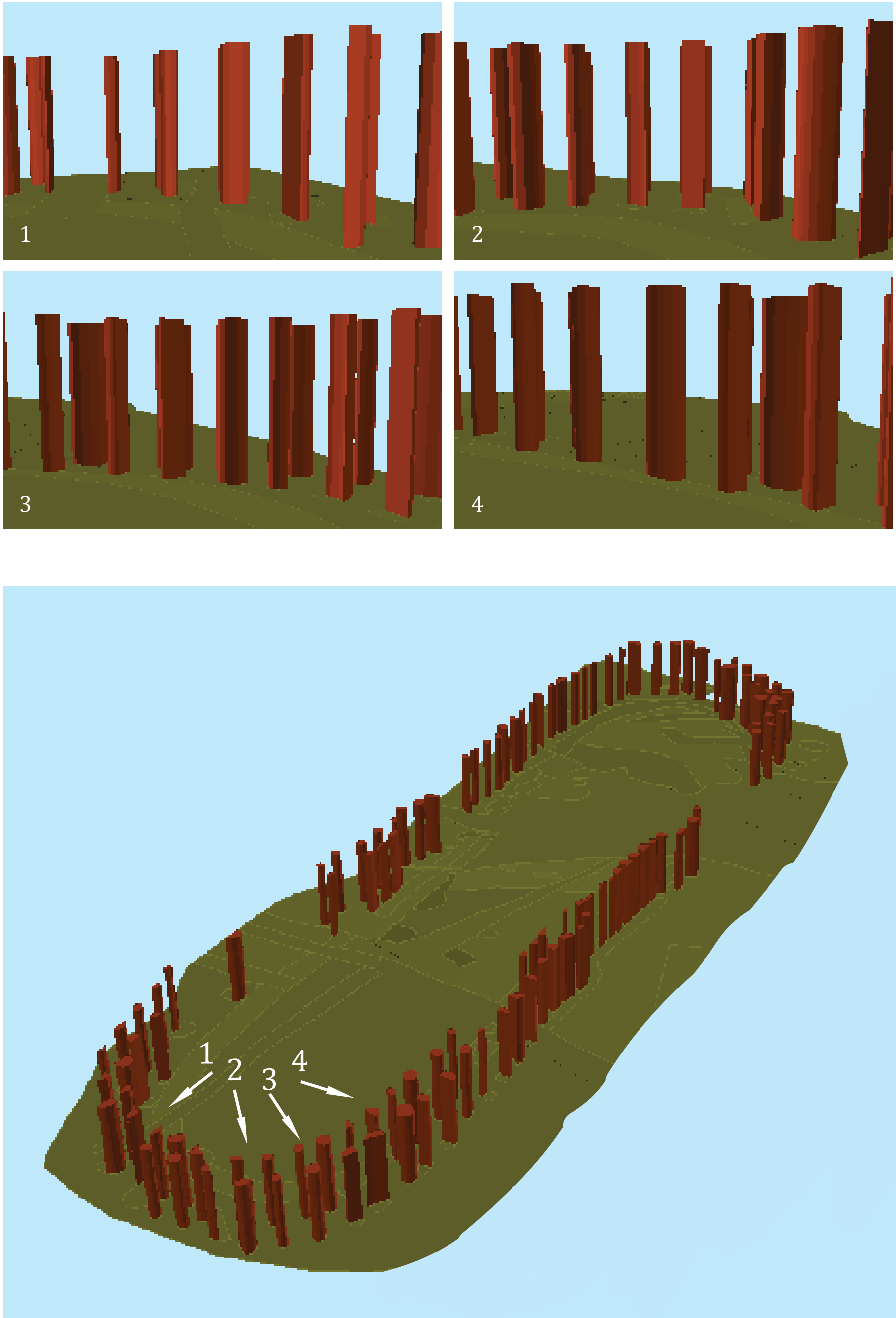
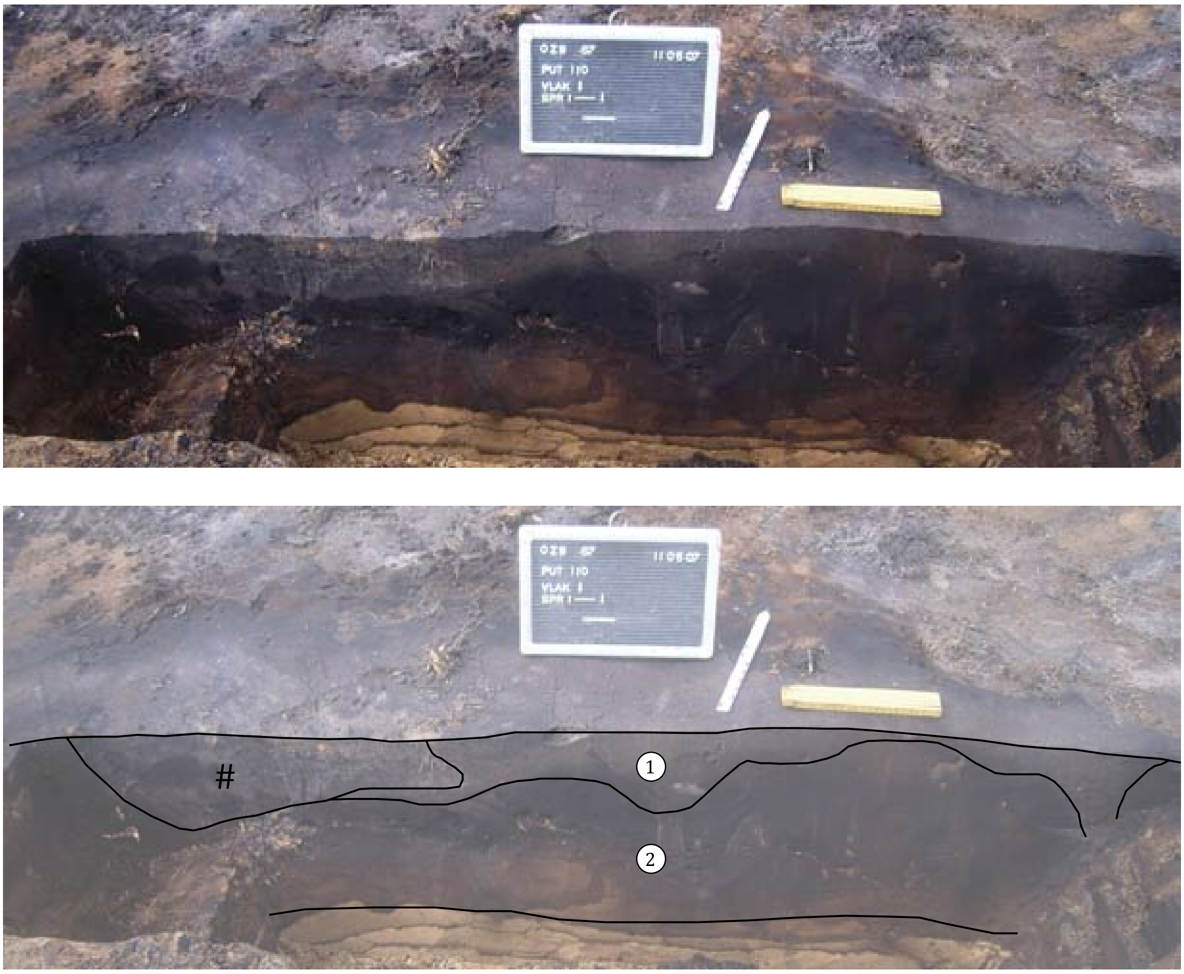


Fig. 3.7 3D-reconstruction of oblong post-setting with a view to the outside from four different locations, illustrating the shutter-effect of the post-setting. Figure by P. Valentijn.

same group of posts (or the entire structure) can be experienced in completely different manners from different angles. Viewed from one location, a group of posts may show obvious pairing and allow an unobstructed view to the inside or outside world. The same group of posts may, however, appear completely randomly or even chaotically placed from another angle and fully block one's view. So the same monument may have been experienced in different ways by persons standing at different locations, or by the same people moving about the monument. This shutter-effect, of course, only works if all posts were contemporaneous and we do not know for sure if this was the case. However, even if the posts were not contemporaneous, the successive placing of posts would change the appearance and experience of the monument.



C

Fig. 3.8 *Lengthwise section through the oblong ditch. With a grey to light grey elluviated core and a surrounding brown to dark grey iron-illuviation band, the ditch was clearly distinguishable from the adjacent B/C horizon (1 eluviated core; 2 illuviation band). Figure by P. Valentijn/J. van Donkersgoed.*

3.3.2 Peripheral structure 2: a ditch

The second surrounding feature is a westsouthwest-eastnortheast orientated oblong ditch. This feature has a maximum length of approximately 26.5 m and an approximate width of 6.5 m. The ditch is not of a regular shape, *i.e.* consisting of two half circles of equal size connected by parallel ditches on the long sides. Rather the eastern short end is not a perfect half circle. The western short end – being more or less a perfect half circle – is smaller than the eastern end. The ditches on the long sides are not parallel, straight lines, but slightly concave, irregularly bending inwards at the middle. So like for the first peripheral structure, regularity and symmetry – seen from a bird eye's view – do not seem to have been of importance to the creators of the ditch. One must keep in mind, however, that only the lower parts of the ditch were laid bare, which of course might differ in shape from the upper parts at the original surface.

The ditch has a maximum width of 70 cm. The depth of the remaining part of the ditch fill, as measured during the 2007 excavations, ranges between 2 and 20 cm. At some places only a remnant of the illuviation band was found. Like the posthole features, the ditch originally would have been at least 30 cm deeper. The variations in depth are mainly the result of variations in both original surface and excavation level elevations. The characteristics of the infill of the ditch were obliterated by pedogenetic processes. Indications for the manner in which the ditch filled up are therefore absent. The entire remaining ditch fill was manually excavated, but no finds were done apart from a few patches of charcoal.

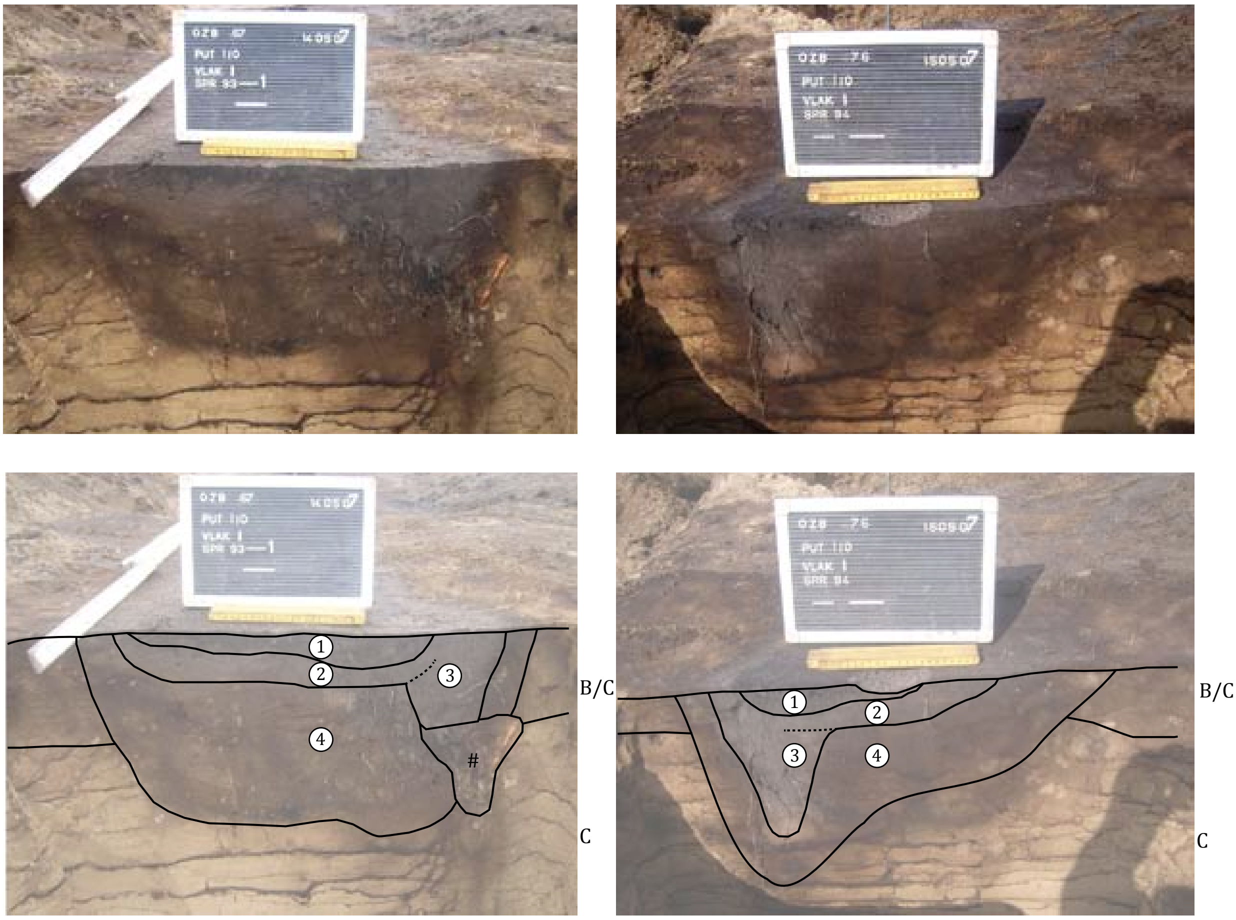


Fig. 3.9 Two examples where the ditch intersects a posthole feature (1 humus-rich core of ditch; 2 eluviated core of ditch; 3 eluviated core of posthole; feature 4 illuviation band underneath post and ditch). Figure by P. Valentijn/J. van Donkersgoed.

According to the field notes of the 1960's excavation concentrations of charcoal were found in and just outside the ditch at several locations. Of only one of the charcoal patches the location is indicated on the original field drawing (Fig. 3.1, find no. 8). This charcoal patch is C14-dated (section 3.3.3). Patches of charcoal in ditches are not an unknown phenomenon. Such patches and depositions of ceramic sherds in both oblong and circular ditches are known from other Late Bronze Age and Early Iron Age burial grounds (Goirle-Hoogeind: Verwers 1966c; Hilvarenbeek-Laag Spul: Verwers 1975). Sometimes these depositions are accompanied by cremated bones. As these kinds of depositions have never been systematically surveyed and studied, the exact nature of the activities of which they are the result is unknown.

Contrary to the 1960's excavations, when the chronological relationship between the surrounding post-setting and ditch remained elusive, during the 2007 excavation it became clear that a posthole feature was intersected by the surrounding ditch (Fig. 3.9). The ditch therefore has to be younger than (some of the posts of) the double post-setting. Exactly how much younger is discussed in section 3.4.

3.3.3 The mound body

Since the round mound on top of monument 6 was already fully excavated in the 1960's, it could not be further investigated during the 2007 excavations. Concerning the nature of the mound, we are limited to the original field documentation and the description given in the excavation report (Verwers 1966a). In the report Verwers notes that mound 6 was built from sods on a podzolized soil. These sods are clearly visible on a photograph of the N-S profile where one can see that sods were placed horizontally and upside-down at the centre (Fig. 3.10).

C N

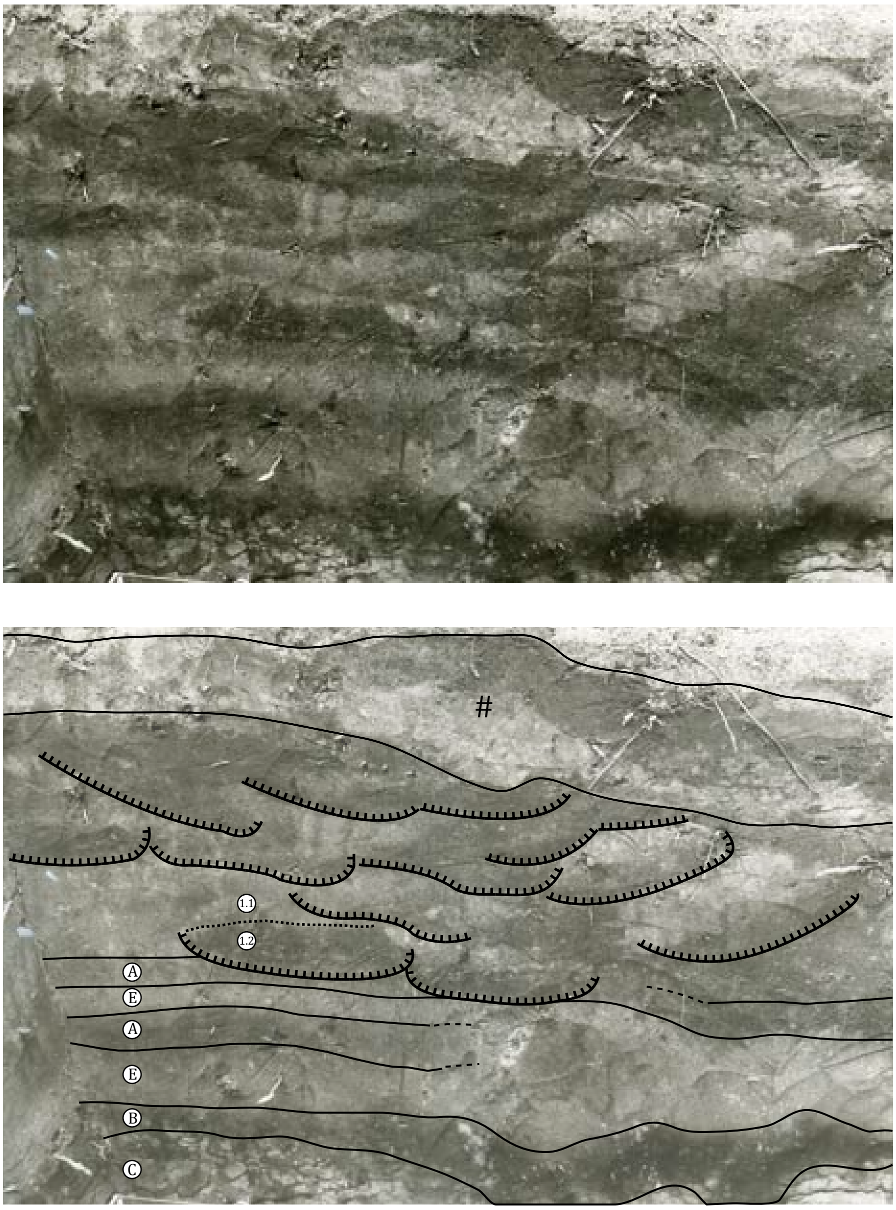


Fig. 3.10 Sods at the centre of the centre-north profile made during the 1964-1965 excavations (1.1 E horizon of sod; 1.2 A horizon of sod). Figure by Faculty of Archaeology, Leiden University/J. van Donkersgoed.

However, in the field notes it is mentioned that the barrow did not consist solely of sods. In the N-S profile a large disturbance can be seen just south of the centre of the barrow (Fig. 3.11 and 3.12). Verwers mentioned that to the south of this disturbance a grey layer was discerned on top of the A horizon, which supposedly also filled in the ditch at this place (Fig. 3.12, 2). He also notes that to the south of the ditch two darker bands were visible within this layer, which were separated by a bleached layer; possibly the signs of starting podzolization. On top of this grey sand lies a mass of heterogeneous, mottled material (Fig. 3.11, 1 and. 3.12, 1). The exact nature of both of these layers could not be established back then.

Although the photographs of this profile do not show that the grey layer fills in the ditch, they do show the Podzol soil in the top of the grey layer. A clear A horizon can be seen (Fig. 3.12, 2.1), with a bleached horizon beneath it (Fig. 3.12, 2.2). It also seems clear that the top of this Podzol connects with the top of the sod mass to the north (Fig. 3.11, 2). It is therefore not unlikely that the sods and grey material formed a single mound body – a mound body that has its centre on

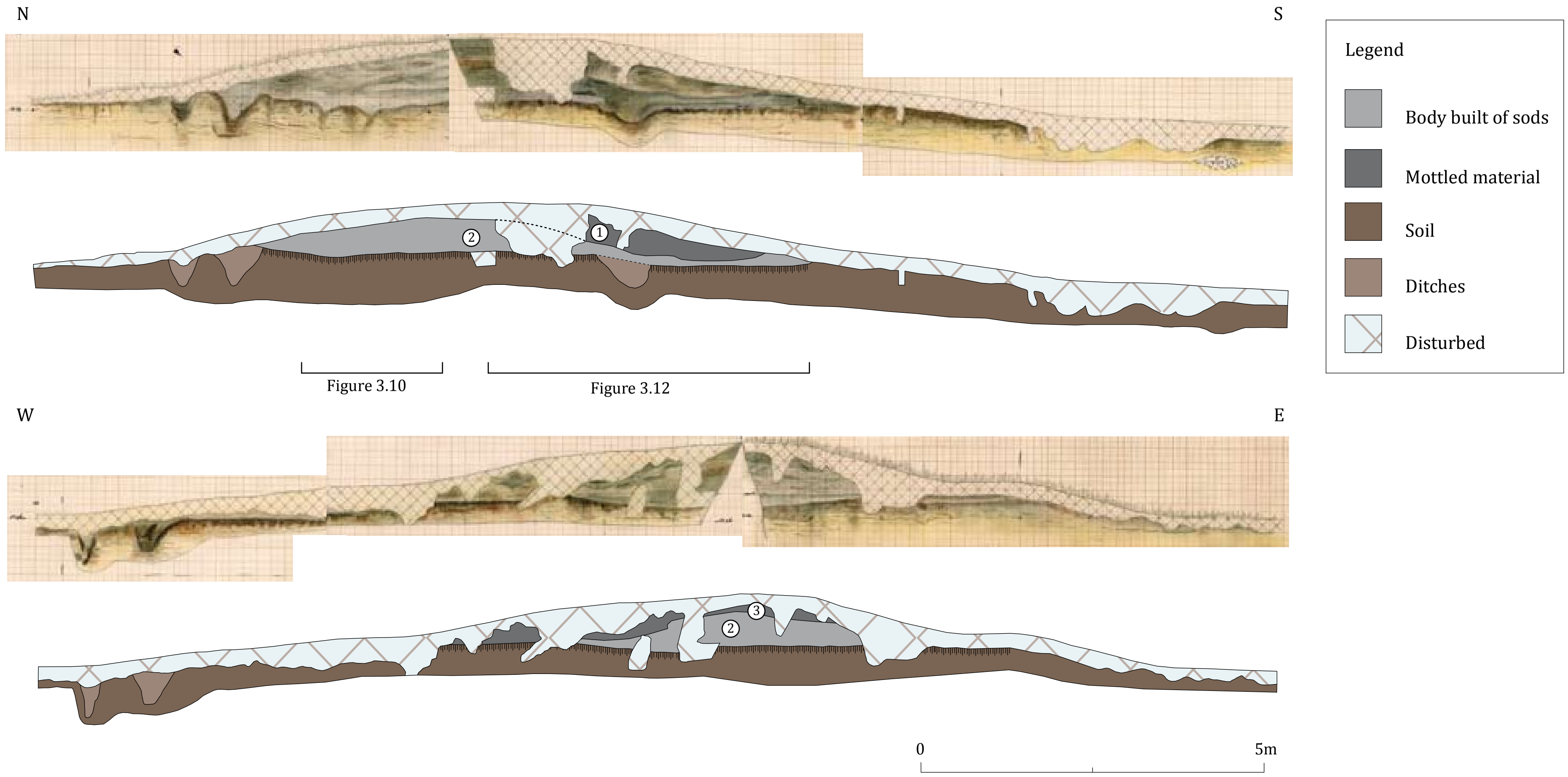


Fig. 3.11 1964-1965 drawings of the profiles. Below them are the current author's interpretation of the mound body on the basis of original field notes, drawings, and photographs (1 southward extension, 2 mound body, 3 probable disturbance). See figure 3.1 for the location of the profiles. Figure by J. Boogerd/P. Valentijn/J. van Donkersgoed.

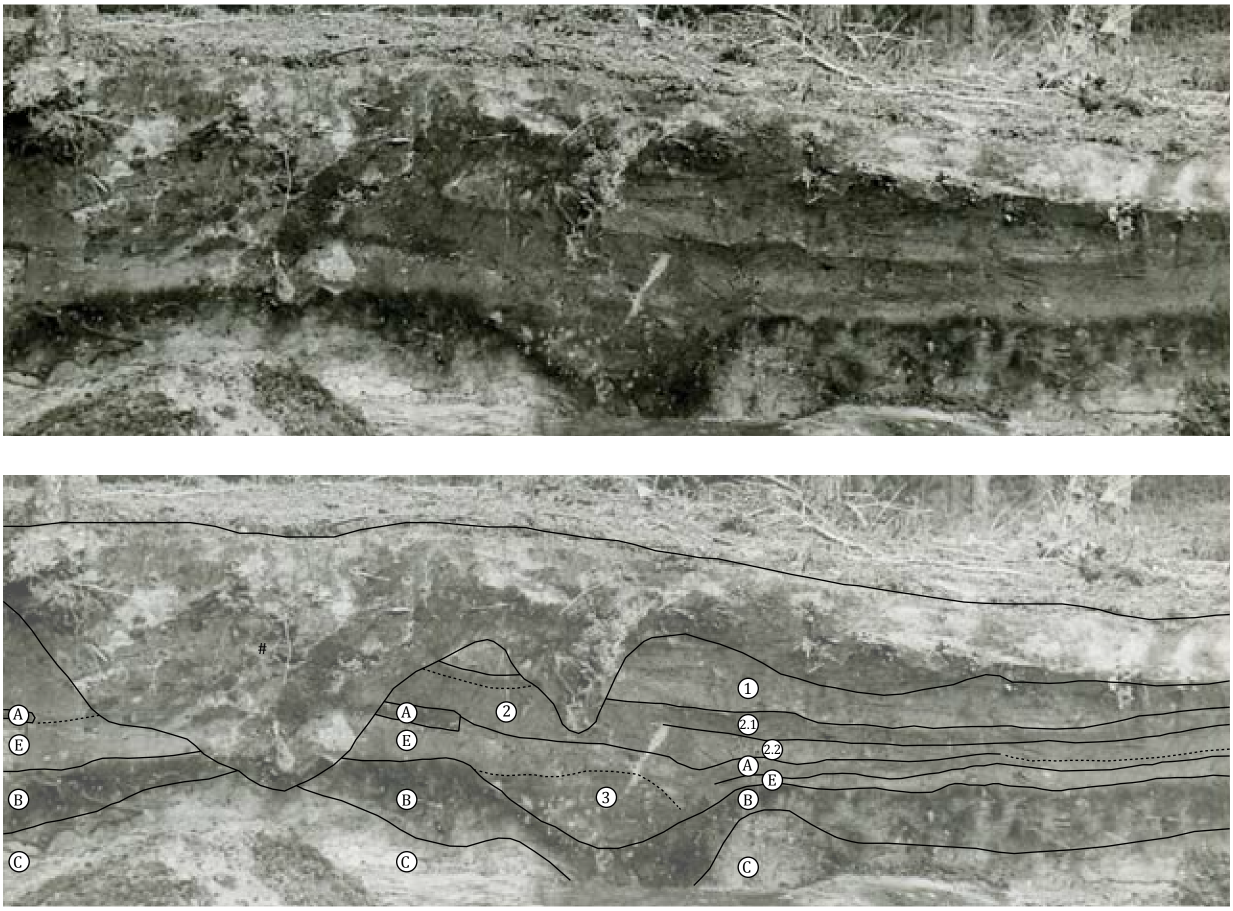


Fig. 3.12 Section of the Centre-N profile made during the 1965 excavations. (Current author's interpretation: 1 south-ward extension made up of heterogeneous, mottled material; 2 (eroded) mound body; 2.1 A horizon in the foot of mound body; 2.2 E horizon in the foot of the mound body; 3 ditch fill). Faculty of Archaeology, Leiden University/J. van Donkersgoed.*

top of the long axis of the oblong peripheral structures.[17] However, in the profiles drawn in 1964 two layers were discerned at the centre of the supposed mound body; a grey one at the bottom and a brown one above it. On the other hand, in the 1965 profiles a larger undisturbed surface was available and in these profiles only a single mass of sods was visible at the centre. In my opinion the two layers discerned in 1964 therefore belong to a single phase (Fig. 3.11, 2).

The profiles (Fig. 3.11) also show that it is likely that the mound body was not round, but oval.[18] Looking at the W-E profile one can see that towards the west the mound body only tapers slightly. It is only to the east, where the cart tracks ran, that the side of the barrow is rather steep. The suggestion of a round mound might therefore very well be the result of the later southward extension of the barrow (see below) combined with the many disturbances, especially the cart

17 A similar situation of a mound body built of sods which ends in a greyish layer at its foot is known from mound 2 of the Zevenbergen (van Wijk *et al.* 2009, 74-88).

18 Round mounds on long barrows are known, however: Achel-Pastoorsbos, monument with find no. 8 and 60, monument with find no. 17 and 22 (Beex/Roossens 1967); Best-Industrieterrein, monument in figure 14, monument with find no. 12 and 28 in figure 16 (Willems 1935); Goirle-Hoogeind, monument with find no. 36 and 37, monument with find no. 39 (Verwers 1966c); Knegsel-Knegselse Hei, monument B and D (Braat 1936); Veldhoven-Heibloem, 100th barrow (Modderman/Louwe Kooijmans 1966). Unfortunately, of only one example both phases can be dated with any certainty. At Goirle-Hoogeind, monument 1 consists of a rectangular monument covered by a circular one (Remouchamps 1926, 99-101; Verwers 1966c). At the centre of the rectangular mound a lugged biconical urn was found, which usually date to the Late Bronze Age. The primary grave of the circular barrow contained an Early Iron Age Schräghals-urn and an iron pin. What this example shows is that some time may have passed between the erection of an oblong structure and a subsequent round mound.

tracks. Although the possibility of a younger, round barrow lying off-centre can of course not be excluded, an oval mound body with its highest point at the centre is more likely.

At the southern side of the long mound a mass of heterogeneous, mottled material can be seen on top of the mound body (Fig. 3.11, 1 and 3.12, 1). This probably is a later extension of the mound. Whether this extension was natural or manmade is unknown, but Dutch examples are known of mound bodies that were only extended by man to one side (Balloërveld, tum. 2.4: van Giffen 1935; Hijken-Hooghalen, tum. 6: van der Veen/Lanting 1991). We do know that quite some time must have passed before the barrow was extended, as a Podzol had started to develop at the foot of the mound. The mottled mass on the western side of the barrow (Fig. 3.11, 3) is probably a zone disturbed by anthropogenic or biological activity.

So in all probability, a long mound was built of sods within the circumference of the peripheral structures, which through time eroded and came to cover the ditch. The original dimensions of this mound cannot be established due to the many disturbances. Eventually a soil started to develop in the foot of the mound body and unknown geological and/or soil processes gave the mound a grey appearance at this location. At a later instance the southern side of the body was extended, preserving the soil in this part of the barrow while leaving it vulnerable to disturbances at other places.

On stratigraphical grounds it is impossible to say to which of the peripheral structures the long mound belongs. Although the mound body appears to follow the circumference of the ditch, this does not mean that it is contemporary with it. The ditch may have been dug at or through the foot of an already existing long mound. A ditch dug into the foot of a mound would be obliterated if the mound again erodes, covering the ditch, and a new Podzol soil would form in its top. The long mound might also be younger than the surrounding structures, or erected in between the construction of the surrounding features.

3.3.4 The finds

Within the circumference of the long mound several finds were done during the excavations in 1964-1965. In total twelve find locations were noted in the original field documentation (Tab. 3.1). Some of the locations were indicated on the field drawings. I have pointed these out on figure 3.1.

Find no.	Material	Description
1	stone	
2	stones, ceramic, cremated bones	pebbles, 25 sherds of one pot?, 4.7 g bones
3	stone	
4	bone	of recent skull?
5	flint	flake (0.5 g)
6	flint	flake (2.7 g)
7	copper	coin
8	charcoal	sample
9	charcoal	sample
10	charcoal	sample
11	charcoal	sample
12	sherds	many, highly fragmented pieces

Table 3.1 Overview of finds from the 1964-1965 excavations.

Fig. 3.13 Decorated sherds (find no. 2) from mound 6, found during the 1964-1965 excavations. Figure by R. Timmermans/J. van Donkersgoed.

Find number 2 consists of 25 ceramic sherds of an incomplete pot, some small pebbles, and cremated bones (4.7 g, found while removing the top soil of the SW-quadrant of mound 6). The cremated bones are preserved, but have not been analyzed. The sherds belonged to a well-fired pot made from grog-tempered clay. The pot was polished on the outside and had a decoration consisting of hatched triangles (Fig. 3.13). The temper and polished outside of the sherds are very reminiscent of the *Schräghals*-urn that was found in the nearby mound 7.

Find number 12 is a second collection of sherds. These were found in the SE-quadrant, but the exact location is unknown. The field notes only mention that they were found in a lump of wet clay. They consist of many small, highly fragmented pieces of pottery with a few larger fragments. The comparable appearance and fabric of the sherds suggest that they belong to a single vessel. This vessel was made of grog-tempered clay. The fabric of the sherds differs from the fabric of the sherds of find number 2 as it is softer and the pieces of grog used are smaller. The sherds are also more fragmented.

Find numbers 8, 9, 10, and 11 are charcoal samples from respectively the ditch fill, two posthole features, and an unknown location in the SE-quadrant.

Find number 1 and 3 are two stones coming from the topsoil. These are not preserved and no descriptions of them are given in the documentation. Numbers 5 and 6 are two small pieces of flint. The first one is a possibly manmade flake and was found in a disturbance outside the barrow. The second piece of flint is a retouched, anthropogenic flake. This is probably a Mesolithic borer (chapter 14).

Find number 7 is a copper coin dated 1827 found at the bottom of one of the cart tracks (chapter 15). Find number 4 is noted as "bones". In the field notes mention is made of a "recent skull". These are probably the bones mentioned under this find number.

3.3.5 The immediate surroundings of mound 6

In the 2007 excavation we also tried to find out more on possible structures in the immediate surroundings of mound 6. We searched for more traces of the post row that was found to the south of mound 6 in the 1960's. The other question was whether mound 6 and 7 were connected or even formed one monument. With regard to the question of the post row, the following can be said. The eastern part of the excavation trench 110 was heavily disturbed, but in the less disturbed western part, no post traces were recognized. Visibility of features was not optimal here, and for that reason we cannot see absence of evidence as evidence of absence (Fig. 3.4, see also Fig. 16.6). With regard to a possible connection between mound 6 and 7, trench 110 in which mound 6 was excavated, and the southwestern quadrant of mound 7 (trench 115) are adjacent and were excavated at the same time (Fig. 1.12). The northeastern end of mound 6 is situated on the flanks of the slope of the natural elevation on which mound 7 was built, but there are several metres between the sods of mound 7 and the eastern end of mound 6 showing that the monuments were not connected.[19]

3.4 Arguments for dating

During our excavations it became clear that the surrounding ditch intersects the oblong post-setting, indicating that the ditch is younger than the post-setting (section 3.3.2). A reassessment of the original field documentation shows that the supposed round mound probably is the remains of a highly disturbed long barrow, which was extended on the southern side after the long mound had covered the ditch. So summarizing, mound 6 seems to consist of at least three phases. We have an oblong double post-setting, which subsequently was intersected by an oblong ditch. A long mound might belong to either of these phases, or pre- or postdate them. The latest phase is the natural or manmade southern extension of the long mound. In the following I will discuss the evidence for dating these different phases, starting with the double post-setting.

3.4.1 The double post-setting

Since some of the posts of the post-setting are intersected by the oblong ditch, the pollen and charcoal from the ditch provide a *terminus ante quem* date for the post-setting to the end of the Late Bronze Age (see below). Considering that the ditch intersected several posthole traces, it is likely that the inner posts were already well decayed at the time the ditch was dug. The outer posts (and possibly some of the inner posts) might have been younger, perhaps even contemporary, with the ditch as these are not intersected by it.

Unfortunately, a more precise date is hard to give as there are no artefacts from the posthole traces. Charcoal was found in one of the posthole features during the 1965 excavation (Fig. 3.1, find no. 9 and 10) but has not been C14-dated. We therefore have to fall back on analogues. But possible analogues for oblong post-settings are scarce in the archaeological record of the Meuse-Demer-Scheldt region. An overview of oblong post-settings and their dating is given in figure 3.14 and table 3.2, showing that this kind of surrounding structure has a broad dating range, from the end of the Middle Bronze Age into the Early Iron Age.

The only datable analogue for a monument with both an oblong post-setting and a ditch was found during a recent excavation at Beerse-Mezenstraat in Belgium (Delaruelle *et al.* 2008). Here a westsouthwest-eastnortheast orientated oblong ditch was found surrounded by a triple post-setting, measuring 20 by 11 m (Fig. 3.14, 1). On the long axis of the long bed a cremation in a Laren or Laren-like urn was found. This type of urn generally dates to the Middle Bronze Age (1800-1050 BC; Lanting/van der Plicht 2003, 161). A radiocarbon date was obtained for the cremated remains of 2935 ± 35 BP (1270-1020 cal BC; Delaruelle

19 An eight-post structure found underneath mound 7, however, may have been related to activities taking place at mound 6. This is discussed in section 4.5.8 and 16.5.2.

	Monument	Date	Remarks	Literature
1.	Beerse-Mezenstraat G1	2935 ± 35BP or 1289-1026 cal BC	C14-date on cremation found in Laren-urn on western half of long axis. Given the position of the urn on the long axis of the monument, it probably belongs to the primary burial and therefore dates the erection of the monument.	Delaruelle *et al.* 2008, 33-34
2.	Knegsel-Knegselse Hei A	-	No datable material was found.	Braat 1936
3.	Neerpelt-De Roosen 111	Early Iron Age	On the long axis of the monument, slightly west of the centre, a cremation in an urn was found. According to the excavators the urn was in Early Iron Age Harpstedt style (Roosens/Beex 1962, 151). Given the position of the urn on the long axis of the monument, it probably belongs to the primary burial and therefore dates the erection of the monument.	Roosens/Beex 1962, 151
4.	Neerpelt-De Roosen 104	Early Iron Age	In the central part of the monument a cremation in an urn was found. According to the excavators the urn was in Early Iron Age Harpstedt style. Given the central position of the urn, it probably belongs to the primary burial and therefore dates the erection of the monument.	Roosens/Beex 1962, 149-150
5.	Haps-Kamps Veld O2	2530 ± 45 BP or 803-513 cal BC	C14-date on cremation found in Schräghals-urn (find no. 239) on long axis of monument. On top of cremation a slicked vessel of Harpstedt style was placed. Given the central position of the urn, it probably belongs to the primary burial and therefore dates the erection of the monument.	Verwers 1972, 20-21; Lanting/van der Plicht 2003, 224
6.	Haps-Kamps Veld O3	3130 ± 45 BP or 1499-1299 cal BC	C 14-date of patch of cremated bones (find no. 319) found at the centre of circular part of monument. Given the central position of the urn, it probably belongs to the primary burial and therefore dates the erection of the monument.	Verwers 1972, 20-1; Lanting/van der Plicht 2003, 196
		Early Iron Age *ante quem*	On the long axis of the "beard" of the monument a cremation was found in a slicked urn in Early Iron Age Harpstedt style (find no. 250). Given the off-centre position of the urn, it probably belongs to a secondary burial.	Verwers 1972, 20-1; Verlinde 1987, 277-279
7.	Haps-Kamps Veld, O1	3165 ± 45 BP or 1528-1316 cal BC	C14-date on cremation (find no. 136) from small pit on long axis of western part of monument. Given the central position of the burial, it probably belongs to the primary interment and therefore dates the erection of the monument.	Verwers 1972, 20-1; Lanting/van der Plicht 2003, 196
		3090 ± 45 BP or 1452-1218 cal BC	C14-date on cremation in Laren-urn (find no. 162) found underneath posthole feature between western and eastern part of monument. Assuming that the urn with the cremation was deposited at the time the surrounding feature of the western monument was erected, the cremation under the posthole feature will be more or less contemporary with the primary grave.	Verwers 1972, 20-1; Lanting/van der Plicht 2003, 196

Table 3.2 Overview of oblong post-settings from the Meuse-Demer-Scheldt area. Numbers correspond to figure 3.15.

et al. 2008). At first sight this monument seems to be a good analogue for mound 6. However, contrary to our monument, the surrounding ditch and post-setting of the monument at Beerse appear to be more or less contemporary, as features of the two structures do not intersect, nor do any of the posthole traces. Also, the post-setting at Beerse is a triple one, not a double one.

Of all oblong post-settings monument O2 from Kamps Veld near Haps (Fig. 3.14, 5) resembles the Zevenbergen post-setting best, both in shape, size, and in the fact that it is a double post-setting. This monument is dated to the Early Iron Age on several grounds (Lanting/van der Plicht 2003, 224; Verwers 1972, 20-21). Firstly, a C14-date of 2530 ± 45 BP (803-513 cal BC) for cremated bones from the central interment. Secondly, both the *Schräghals*-urn in which these cremated bones were found, and the "slicked" vessel on top of the cremation can be typo-chronologically dated to the Early Iron Age (Verlinde 1987, 277-279). An Early Iron Age date for the oblong post-setting of mound 6 does not agree with the Late Bronze Age *terminus ante quem* date of our post-setting.

In conclusion, it can be said that the oval post-setting has a broad dating range. The oval ditch of the second phase provides an *ante quem* date for the end of the Late Bronze Age. As the ditch cuts several of the inner posts, we know that these posts must date before the end of the Late Bronze Age. The outer post-setting may have been younger, perhaps even contemporary with the ditch. Analogues do not

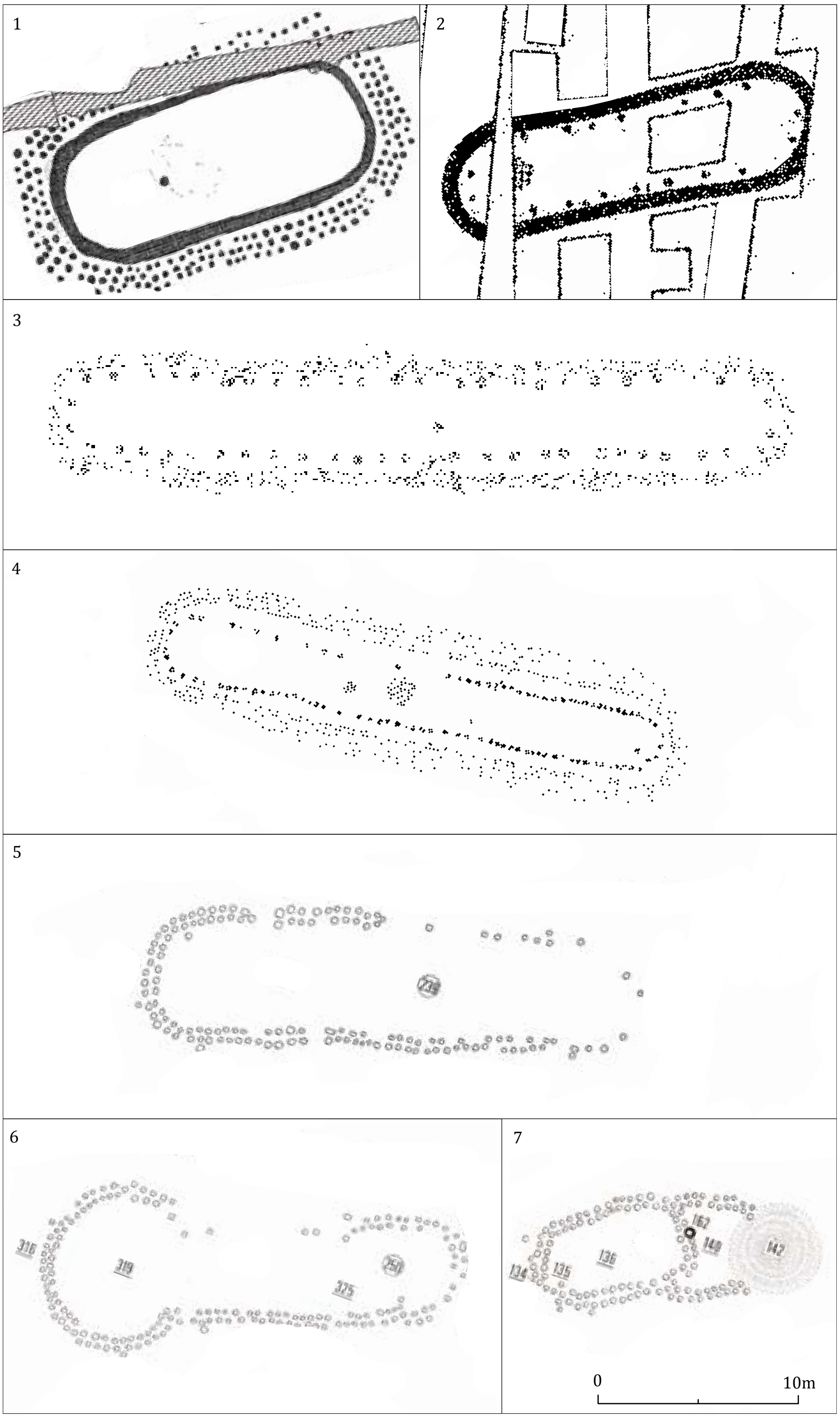


Fig. 3.14 Overview of oblong post-settings from the Meuse-Demer-Scheldt area. All drawings have similar scale and northing (top of figure is north). Figure by Delaruelle et al. 2008, fig. 3 (1)/Braat 1936, afb. 25 (2)/Roosens/Beex 1962, pl. VI; IX (3 and 4)/Verwers 1972, beilage 2; 3; 5 (5, 6, and 7)/J. van Donkersgoed.

provide a more precise dating for the post-setting. Oval post-settings date from the Middle Bronze Age B to the Early Iron Age, but of the analogues none seem to be an exact parallel for our double post-setting.

	Monument	Date	Remarks	Literature
1.	Veldhoven-De Heibloem	1387-1057 cal BC	A small rectangular monument underneath the 100th barrow.	Lanting/van der Plicht 2003, 222; Modderman/Louwe Kooijmans 1966
2.	Riethoven	Ha B	A central interment with a *Kerbschnitt*-decorated urn (find no. 12).	Evelein 1910; Holwerda 1913
3.	Goirle	LBA/EIA	Oblong monument with a biconical urn (find no. 1a) as central interment which Verwers (find no. 37) dates to the Late Bronze Age (but some Early Iron Age examples are known: Verlinde 1987, 250-1 for Gelderland; Kooi 1979, 22-3 for the Northern Netherlands; Verlinde/Hulst 2010, 32-4 for the Veluwe).	Remouchamps 1926; Verwers 1966c, 51
4.	Someren	Ha C	A small rectangular monument with an urn in Harpstedt-style from the central interment (find no. 19).	Modderman 1955

Table 3.3 Illustrative selection of datable Riethoven type monuments.

3.4.2 The peripheral ditch

The second phase I will discuss is the oblong ditch. Verwers (1966b) developed a typology for monuments with elongated surrounding ditches from urnfields in the southern Netherlands. He discerns two types: the Riethoven and the Goirle-type. The former comprises a group of short and wide monuments with an average length of 15.6 m and a width of 5.5 m. The monuments have a length : width index ranging between 2 and 4. These monuments mostly occur as isolated, single monuments. The latter type consists of long and narrow monuments. All monuments of this type are longer than 30 m, with an average length of 42 m. Their width averages 3.8 m. Except for one, none of the monuments of this type has a length : width index between 4 and 8. Monuments of the Goirle type are often part of multiple ditch-systems comprising two to six monuments.

Our oblong ditch is slightly longer and wider than the average Riethoven-monument. But with a length : width index of approximately 4 and an isolated occurrence it fits Verwers' description of this kind of monument.

Monuments of the Riethoven type have a broad dating range, so analogues for Riethoven type monuments do not provide a precise dating for our monument (Tab. 3.3). We do, however, have C14-dates for charcoal from the surrounding ditch. During the 1960's excavation, charcoal collected from the ditch gave a C14-date of 968-544 cal BC, with a 78% probability of dating between 930 and 731 cal BC, and a 17.2% probability of dating between 692 and 544 cal BC (GrN-4959: 2630 ± 65BP; Lanting/van der Plicht 2003, 224/Verwers 1966a, 31).[20] This would mean that the oblong ditch dates to the Late Bronze Age or Early Iron Age. However, during the 2007 excavations a second charcoal sample (Fig. 3.3, V 206) was found, which gave a deviant C14-date of 1500-1320 BC (GrA-41262: 3150 ± 35BP). This sample comes from the B horizon beneath the ditch, whereas the field documentation from the 1960's excavations tell us that Verwers' sample comes from a charcoal concentration within the ditch (Fig. 3.1, find no. 8). The 2007 sample is only a small piece of charcoal, which could have been lingering on the surface and gotten trapped during the digging of the ditch. Just as well, it could have gotten in the ground through bioturbation, the signs of which were erased by pedogenetic processes. The sample of Verwers therefore appears more trustworthy, even though I cannot establish how and when it was deposited in the ditch (section 3.3.2).

Besides charcoal, pollen samples from the ditch also provide us with a date. The pollen spectrum of these samples is comparable to those from the sods of mound 7 and the old surface beneath this barrow, which show spectra characteristic for

20 In the report of the 1960's excavations a preliminary C14-date of 580 ± 50 BC is given by Verwers (1966a, 31), without a GrN number. In his later dissertation he gives the GrN-4959 date of 680 ± 65 BC. I assume that the latter date is the correct one (see also van Wijk *et al.* 2009, 118).

the Iron Age. The main difference, however, is the absence of *Fagus* pollen in the ditch fill, which *is* present in mound 7. This indicates that the infill of the ditch, in which the pollen were trapped, is slightly older than the sods from mound 7. A Late Bronze Age or perhaps even a Middle Bronze Age date seems likely for the infill of the ditch (the pollen evidence is discussed in more detail in chapter 10).

So the second phase is a ditch of the Riethoven type. These have a broad dating range, from the Middle Bronze Age B into the Early Iron Age. A charcoal concentration from the ditch has provided a C14-date with highest probability for the second half of the Late Bronze Age or beginning of the Early Iron Age. However, a second charcoal sample gives a conflicting Middle Bronze Age B date, but this sample comes from a less reliable context. The pollen from the infill of the ditch provide us with a slightly more precise date. They gave a spectrum characteristic for the Late Bronze Age or perhaps even the Middle Bronze Age. So we know that the ditch was dug in the Middle Bronze Age B, at the earliest, but at least before the Early Iron Age.

3.4.3 The (oblong) mound body

Lastly, I attempt to date the erection of the oblong mound body of mound 6 and the last phase of mound 6, the southwards extension of the long mound. We already saw that on stratigraphical grounds it is impossible to say whether the long mound is older, younger, or contemporary with the peripheral structures. Now I will discuss other possible indications for dating the mound body.

During the 1960's excavations cremated bones and some ceramic sherds were found while removing the top soil of the SW-quadrant of mound 6 (section 2.3.3). The excavation plans show that they were located on the long axis of the long mound (Fig. 3.1, find no. 2). The sherds have a decoration consisting of hatched triangles (Fig. 3.13). Such hatched triangle decoration is usually dated to the Late Bronze Age because it is often found at the same sites as urns with typical Late Bronze Age *Kerbschnitt* decoration and in general shows a similarity in decoration patterns with the latter (Desittere 1968, 49-50; van der Sanden 1981, 324). A Late Bronze Age date for our sherds is therefore likely. However, the manifold appearances of this type of decoration on so-called *deckeldosen* (Desittere 1968, fig. 66.4, 71.6, and 72.5), which generally date Ha A to Ha D (Desittere 1968, 31-33), and a derived example on two Schräghals urns from the Early Iron Age cemetery of Beegden (Roymans 1999; Fig. 6.5), show that it is possible that the hatched triangle motif was used some time into the Early Iron Age.

Unfortunately, the sherds and bones were found between tree roots. The fractures of the sherds are not extensively rounded, indicating that the sherds have not lingered on the surface for a long time or been moved extensively by post-depositional processes – they are probably more or less at their location of deposition. Nonetheless, their original position in the barrow is uncertain, as is their relation to the different phases of the monument. They might belong to a secondary burial in the long mound, but they might also belong to a primary burial as they were found on the long axis of the barrow, where primary burials often are found in long beds (Verwers 1966b, 55). It might even be that the sherds and bones belong to a burial in a moundless peripheral structure (it is not certain that all oblong monuments had a mound body), pre-dating the erection of the long mound. So given the many possibilities, it is impossible to give even a *post* or *ante quem* date for the erection of the long mound on basis of these finds.

Dating the southward extension of the long mound is equally difficult. As it is an extension of a mound body that already covers the ditch, it has to be younger than this surrounding structure. The infill of the ditch dates to the Middle Bronze

Age B or Late Bronze Age, so the southward extension must post-date the beginning of the Middle Bronze Age B. And since the extension covered a premature Podzol that had developed at the foot of an already eroded mound, quite some time must have passed between the erection of the mound body and the southward expansion.

In conclusion, little can be said about the age of the long mound. Ceramic sherds which bear a decoration motif that was in use in the Late Bronze Age and perhaps the earliest phases of the Early Iron Age were found on the long axis of the mound. However, as these sherds were found in a disturbance their association to the monument is unknown. It is therefore impossible to date the mound body; it might be contemporary with one the surrounding features, or be younger or older than these structures. The last phase of the monument, the natural or manmade southern extension of the long mound, was constructed in the Late Bronze Age or some time into the Early Iron Age, as it covers the already filled in surrounding ditch of the second phase and the premature Podzol that had developed in the mound body.

3.5 Conclusion

During the excavations in the 1960's, it was discovered that underneath the round mound of monument 6 lay the traces of a unique oblong monument with two kinds of peripheral structures: a ditch and a post-setting. Back then it was established that the round mound was younger than the surrounding structures, but the age of the different phases remained elusive, as was the chronological relation between the ditch and post-setting. As the round mound was already fully excavated in the 1960's, we conducted a single-level, extensive excavation to gain more insight into the phasing and chronology of mound 6.

We found that the oldest peripheral structure is the double post-setting. This structure has a westsouthwest-eastnortheast orientation and measures 28.5 m by 8.5 m. The posts of the structure were on average about 30 cm wide, while their maximum height above the surface may have been as much as 3 m. The posts were placed in a pattern that only becomes obvious when one moves about the monument. When moving along the structure – as we have done in a 3D-reconstruction – a shutter-effect is created. At successive locations groups of parallel placed pairs become apparent which allow an unobstructed view through the post-setting, a snapshot. At other locations the same group of posts may block one's view. As such the post-setting appears to structure the visual experience of people moving around the monument.

The post-setting can be dated to the Middle Bronze Age B or Late Bronze Age. The inner posts are cut by the oblong ditch of the second phase. As the ditch can be dated to the Late Bronze Age or Middle Bronze Age B, it provides an *ante quem* date for at least the inner post-setting. The outer post-setting might be slightly younger, perhaps even contemporary with the oval ditch. Analogues of oval post-settings show that the first phase of mound 6 can at the earliest date to the Middle Bronze Age B.

The youngest peripheral structure is the oblong ditch. This ditch follows the outline of the post-setting and measures 26.5 m by 6.5 m. It is of an irregular shape, with short ends of unequal size and long sides that bend slightly inwards. The ditch would have been at least 50 cm deep and 70 cm wide. Within and just outside the ditch several patches of charcoal were found during the 1960's excavations. As such patches are also known from surrounding ditches at other sites, they are clearly the result of recurring ritual activities at urnfields. However, the configuration of these activities is unknown.

One of the charcoal patches was C14-dated and gave a date of 968-544 cal BC, with a 78% probability of dating between 930 and 731 cal BC. However, a second charcoal sample found during the 2007 excavation was C14-dated between 1500-1320 cal BC. Pollen from the infill of the ditch give a spectrum characteristic for the Late Bronze Age or perhaps even the Middle Bronze Age. So the ditch must have been dug before the beginning of the Early Iron Age.

In the report of the 1964-1965 excavations it was supposed that the round mound was the youngest phase in the biography of mound 6, as the mound body covered the surrounding ditch. However, reassessment of the original documentation shows that the round mound probably was the highly disturbed remains of a long mound. On the profile drawings a greyish layer with a developing Podzol soil at the southern edge of the barrow is depicted. The top of this layer connects with the top of the sod stacking at the centre of the barrow, together forming a single mound body with its centre on the long axis of the long mound. The profile over the long axis of the monument shows that this mound body must have been oblong, but that the eastern half was eroded away by modern cart tracks. The mound was probably erected within the circumference of the peripheral structures, but later eroded and covered the ditch.

However, dating of the long mound proves to be impossible. The chronological relationship between the mound body and the peripheral structures cannot even be established on stratigraphical grounds. The mound body may have been erected before, at the same time as, or after the construction of the surrounding features.

On the long axis of the long mound cremated bones and ceramic sherds were found during the excavations in the 1960's. The sherds are decorated with a hatched triangle motive, which was predominantly applied during the Late Bronze Age and perhaps the earliest phase of the Early Iron Age. However, as the sherds were found within the disturbed top soil their relation to the different phases of the monument is unclear. They might belong to a primary burial of one of the peripheral structures, buried there before or after the long mound was erected. Or they might belong to a secondary burial in the top of the long mound.

The long mound was extended on the southern long side. Here a mass of mottled, heterogeneous material was deposited on top of the above mentioned greyish layer. However, the nature of this deposit is unknown. It might be natural, for instance drift sand, but it might also be manmade, as analogues for partial extensions of barrows are known. The exact age of this extension could not be established, but as the extension covers the oblong ditch it has to post-date the beginning of the Middle Bronze Age B.

Regarding the immediate environment of mound 6, the 2007 excavation showed that mound 6 and mound 7 were separate, unconnected monuments. We found no evidence that informs us whether the post row south of mound 6 extended further to the east.

Chapter 4

Excavating the seventh mound

David Fontijn, Richard Jansen, Quentin Bourgeois and Cristian van der Linde

4.1 Introduction

With a diameter of 36 m and a (present) height of 1.5 m, mound 7 is the largest mound of the entire Zevenbergen barrow group, and was for that reason expected to hold some sort of "key" to understanding the entire group. The aim of the 2007 fieldwork was to find out more on the nature, dating, and significance of this particular mound within the Zevenbergen barrow landscape (chapter 1), by means of a partial excavation of what was initially considered to be a badly damaged burial mound. As set out before, the situation turned out to be quite different, and we ended up with a highly detailed, complex excavation. The large size of the mound, the limited amount of both time and money, the fact that parts of the mound were "undermined" by badger tunnels, and the complex and highly vulnerable nature of the central find assemblage all made the excavation a challenging one and required us to depart from our original set-up and adjust our field methods.[21]

This chapter first describes the state of the mound when we started to excavate it as this had some consequences for the research strategy (section 4.2). We will go on to discuss the how and why of the method itself, paying attention to the way we had to re-adjust our methods to respond to unexpected discoveries (section 4.3). Section 4.4, then, will give an overview of the general stratigraphy of the mound in order to help the reader to find her or his way through the detailed description of features. In the next section 4.5, all relevant features will be discussed from the upper to the lower parts of the mound. Discussion on the central find assemblage of charcoal and bronze will be minimal, mainly paying attention to its stratigraphical position. This is because this find complex will be the main issue of chapters 5, 6, and 7. In section 4.6 the dating evidence will be discussed. The chapter concludes with section 4.7, where all the evidence will be combined to give a broad outline of the history of this mound.

4.2 State of preservation of mound 7

With the construction of the new A50 in 2005/2006, the Zevenbergen area became a practically inaccessible enclave (chapter 1). It was only possible to enter via the highway, and even then the entrance to the site was shielded by a fence.[22] When we arrived at the site for the first time, on the 2nd of May 2007, it seemed as if we were the first to access the area since the excavation of 2004. New trees and dense foliage had developed making it hard to enter the area that had been

21 For the original field methods see the written scheme of investigation (Dutch: *Programma van Eisen*): Fontijn/Theunissen 2008.

22 Nowadays the site can be entered by pedestrians by a small bridge under the fly-over. Since 2012, people can visit the barrows in the setting of the reconstruction of the Early Iron Age landscape (see chapter 17).

Fig. 4.1 *Situation of mound 7 before the start of the excavation as seen from the south. Figure by Q. Bourgeois.*

entirely cleared in 2004. Mound 7 was also covered with foliage and many tree trunks, and it took some efforts to clear the parts we had to excavate. Just to the north of the mound and on its northern flanks there was – and still is – a small part of the original pine forest that had stood here since the 19th century. Due to all the vegetation and the small forest located on and just north of the mound, it was very hard to determine where the mound exactly ended and what should be seen as its centre (Fig. 4.1). During an inventory when the forest was still covering the site, its size was estimated at 40 m. When the mound was cleared, this could be corrected to some 36 m. The excavation showed that this is more or less the size of a natural elevation that was heightened with heather sods. The top of the mound in its 2007 state was some 1.5 m (16.25 m +NAP). Originally it must have been at least 30 cm higher (section 4.4).

One has to realize that this was the first time we were allowed to access the mound since 2004. It was for that reason not so easy to quickly gain an impression of the state of preservation of the mound. We did note at least two entrances to the badger sett and large spoil heaps of sand, which indicated the amount of sand dug away by the badger for creating and maintaining tunnels and rooms (Fig. 1.15). They were all observed on that part of the mound where our NE-quadrant, trench 106, would be situated. Here, walking on the mound could be dangerous as the entrances were often hardly visible among the foliage.

Our National Heritage Agency (RCE) colleagues[23], who accompanied us, did a number of corings in a line covering the whole mound. Most showed an undisturbed profile, but as it appeared to be impossible to penetrate into the deeper layers of the mound due to the tough soil resistance, the corings were not considered useful for getting a general idea of the mound's stratigraphy. Later on in the excavation, this would prove to be a major hindrance. It prevented us from seeing that the burial mound itself was actually built on a natural elevation and that the central grave was actually situated much higher in the mound than anticipated. In retrospect, we can now see that the corings ended up in the double E horizon of the natural elevation (see section 4.5.11), making the profile even harder to interpret. It was also not possible to use corings to prospect the tunnels in the mound, and thus to assess the damage done prior to the excavation. Basing ourselves on the

23 Dr. Liesbeth Theunissen, drs. Axel Müller and Wim de Jong.

location of entrances, the NE-quadrant, trench 106, seemed the most disturbed. During the excavation we indeed found badger tunnels here, particularly between the E-W profile and the extra diagonal profile. These undermined the excavation levels created, and throughout the campaign it proved to be dangerous to access this part. In retrospect, most of the badger's digging activities seem to have taken place in the deeper parts of the mound, inside the natural dune, thus causing less damage to the archaeological remains than feared. Also, as an older, already filled in tunnel in the southwest corner of trench 106 showed (see Fig 4.14 and 4.15), the badger seems to have just bypassed the central find assemblage, (only) damaging a small part of the urn and probably the southern part of the central find assemblage. These vital archaeological remains were located relatively high in the mound (some 80 cm below the top). In places they were disturbed by roots of pine trees and – particularly – deciduous trees. There were also a number of filled in pits from the top of the mound caused by trees that had fallen over or maybe by activities of treasure hunters. If the latter were responsible, they were probably not successful: with the benefit of hindsight we now know that their pits were too shallow to reach the bronzes in the centre. The absence of a developed soil in the top of the mound implies that the highest part, at least 30 cm, had been dug away (see section 4.4). In prehistory, the mound must have been higher than it is now.[24] The remains of this already damaged top, then, were further disturbed by the use of a forest plough, traces of which can be found in the whole area including the first 20 cm of what now is the top soil of mound 7 (see chapter 15). Figure 1.12 shows the two quadrants that were completely excavated (trench 105 and 106). From a third quadrant the central find assemblage was "removed" (trench 115). In each of the first two quadrants three profiles and in trench 115 two profiles were drawn and photographed (Fig. 4.13, 4.14, and 4.15).

4.3 Excavation method

The excavation of the barrows of the Zevenbergen in 2004 was the first time since decades that barrows were being excavated again in the Netherlands.[25] Fokkens, Jansen, and van Wijk experimented with several excavation methods (Fokkens *et al.* 2009). Some methods appeared to work quite well, whereas others proved to be problematic. We benefitted much from these experiences. Having been able to experiment with alternatives in the small barrow excavation of Rhenen-Elst (Fontijn 2010), we reworked all experiences in our approach to the excavation of mound 7. These were as follows.

4.3.1 Combining horizontal arbitrary levels and stratigraphical excavation

First of all, there was the issue of scale. The time set for the excavation was limited to 15 days within four weeks[26] with the task of excavating two quadrants of a mound with a diameter of almost 40 m. The 2004 excavation was largely done with a mobile excavator, whereas the much smaller excavation at Rhenen-Elst was done entirely by hand, aided by sieving. The latter yielded dozens of small finds from the body of the mound. Although this richness of finds so far seems to be

24 This is also the case at the other large barrow of the Zevenbergen, mound 3, see Fokkens *et al.* 2009.

25 Here barrows with a still visible artificial mound are meant. Levelled mounds have been investigated during several (large-scale) excavations, for example in our research area: Oss-IJsselstraat (Wesselingh 1993), Oss-Ussen (van der Sanden 1998), Heesch-Hoge Wijst (van Beek 2004).

26 There were a few official holidays during which we could not work.

Fig. 4.2 (top) Trench 105, level 2, looking west. Manual excavation of the first level in which sods were recognized. In the background the excavation of the levelled mound 6 is in full swing. (bottom) Trench 105, level 2, looking north. The square area in the centre has been manually exposed. The top soil of the slopes has been mechanically removed. In the background the mobile excavator is doing the same in trench 106. Figure by Q. Bourgeois/J. van Donkersgoed.

characteristic for the Rhenen-Elst site only[27], it did suggest that there is much to win by a manual excavation of a mound carried out by archaeologists, archaeology students, and amateur archaeologists. The limited time and the sheer size of mound 7, however, made it clear that we could not do this here. For that reason, we combined a controlled use of the mobile excavator with manual excavation (Fig. 4.2). In the end, apart from the top soil, the entire centre of the mound was manually excavated and so were parts of the flanks (to look for peripheral structures). The lower levels were excavated by mobile excavator. To prevent the mobile excavator from damaging the flanks, the foot of the mound was protected by an extra layer of sand. We also sieved one zone of the mound. This was done to check whether we might have overlooked find concentrations in areas where we deepened mechanically (see below, 4.3.3).

27 Later, and much larger, barrow excavations were also done by hand but only yielded very low numbers of artefacts from the mound itself (Fontijn *et al.* 2011).

Secondly, during the 2004 campaign, there had been problems with finding the best way to start the excavation of a barrow. The method then was to first prospect all mounds with a trial trench in order to get some idea of its stratigraphy, and then to proceed with a more or less stratigraphical excavation of mound layers.[28] In retrospect, this did not work out well. It proved to be harder than thought to get a proper idea of stratigraphy from such a trench, and often crucial features appeared to be unreadable in a small trench. There is even the very real danger (in the case of mounds with less pronounced soil formation) that features like inhumation graves with no bones preserved and just soil discolourations go unnoticed. Also, the presence of a deep trench later often hindered the stratigraphical stripping of the mound.

Thirdly, stratigraphical excavation, though essentially an interesting approach for barrows consisting of several layers, in practice appeared to be very difficult. Particularly at the flanks the successive mound additions were so thin that it proved impossible to safely determine in which stratigraphical unit one was working. Also, what must have been separate additions of sods was later obliterated by soil formation processes. Cases in point are the wholly leached-out additions at the flanks of mound 2 of the Zevenbergen (van Wijk *et al.* 2009).

We then chose to partly adopt the approach taken in Rhenen-Elst and Hijken Hooghalen: to excavate the centre of the mound in horizontal levels (*cf.* Bourgeois/Fontijn 2010, 34-35; van der Veen/Lanting 1991, 192). Starting in the northeastern corner of the SW-quadrant (trench 105) and in the southwestern corner of the NE-quadrant (trench 106), we manually created a first and then a second level.[29] We did the same for the southeastern corner of the NW-quadrant, trench 115. As a result of this way of working, level 2 was larger than the previous one. In retrospect, this led to the rapid discovery of the central find assemblage. If we had started working from the flanks, we probably would only have discovered this find complex much later. Another fortunate consequence of this way of working was the choice for manual excavation. If we had deepened the centre mechanically, the upper part of the tiny and fragile charcoal and bronze concentration might have been dug away without anyone noticing it.

The excavations in the centre soon showed that we were dealing with a relatively high natural elevation on which a mound was created in one phase. Once this was clear, we proceeded to excavate the flanks stratigraphically. From the (rather flat) centre we followed the slopes of the dune, and created three levels here to document the sods.

4.3.2 Recording sods

A new element introduced during the 2004 excavation was the drawing of individual sods, the building blocks of these mounds, in order to get an idea of their construction. At the Zevenbergen conditions for recognizing sods were good: the result of the development of a pronounced Humus Podzol at least from the Bronze Age onwards (*cf.* van Wijk *et al.* 2009: mound 2 and 8). As the sods were cut in the immediate environment of the mounds, they were easy to recognize individually (see chapter 10 on their provenance). Sods are marked by a dark, thin A horizon (the part that originally held vegetation) and a thicker greyish eluvial E horizon beneath it. Indeed, we recognized many of such sods in the Zevenbergen barrows,

28 Trial trenching is a common prospective research method in Dutch archaeology. The Zevenbergen research in 2004 also started with a prospective phase conducted by trial trenches, not only to get an idea of its stratigraphy, but first to establish whether the mound was artificial or natural.

29 Trench 105 level 1 ca. 8 by 7 m; level 2 ca. 16 by 19.5 m. Trench 106 level 1 12 by 10 m; level 2 19.5 by 22 m.

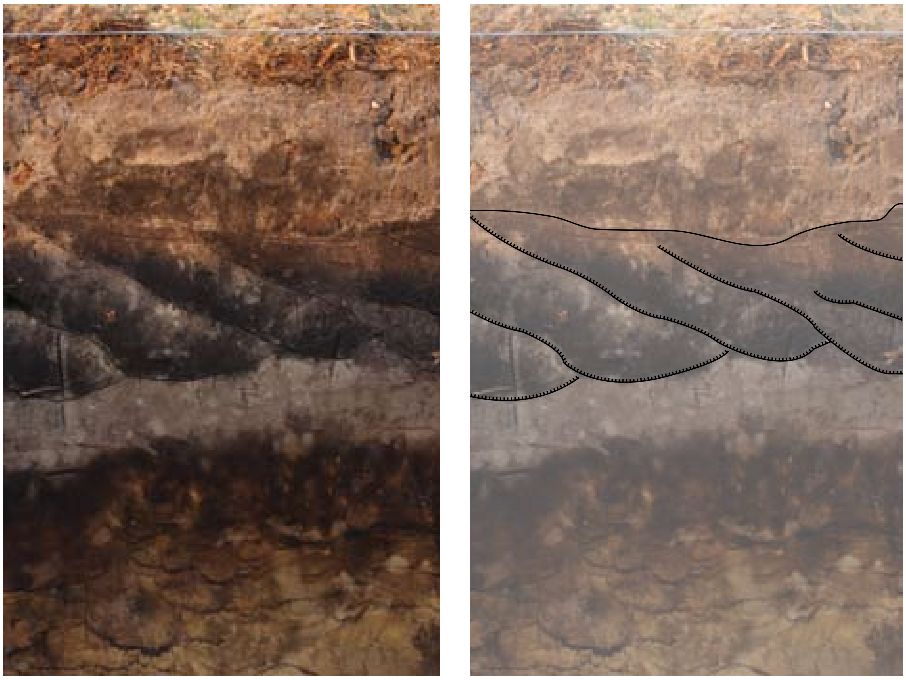


Fig. 4.3 Examples of sods. Shown are sods in the N-S profile of trench 105. Sods were taken from the top of a Humus Podzol and are marked by a blackish top and a grey eluvial horizon underneath. Here it can be seen that individual sods were neatly stacked like roof tiles on top of the original prehistoric surface. The top of the mound was decapitated. See also figure 4.19. Figure by Q. Bourgeois/ J. van Donkersgoed.

including this mound. See figure 4.3 for examples. Sods would have been much harder to recognize if they had been cut from soils in which a Moder Podzol had developed.[30] Lacking a contrasting eluvial (E) horizon, such soils have much less colour contrast and are for that reason much harder to recognize.

Another point is that sods are best recognizable when they are not obliterated by later soil formation. Their position in a mound can become difficult to observe, for example, by illuviation from above. If the mound is very low, chances are that soil formation (the B horizon) in the top obliterated most of the traces of sods below. For most barrows at the Zevenbergen, with the exception of the very low mounds (9-10; van Wijk *et al.* 2009), this was not the case. The largest mounds, no. 3 and the one that is central to this chapter, yielded the most "readable" information on sod arrangement. So, conditions for observation of sods were good, and we tried to use this to get an idea of how the mound was built. There is, however, the practical problem of how to create a surface that allows good observation of the positions of sods. We learned that cleared excavation surfaces either quickly become unreadable through drying out on a hot day or are prone to become unreadable by deposition of dust and sand. In 2004 the surfaces uncovered in mound 3 appeared to be too large for adequate recording: the surface dried out quicker than one could document the traces of sods and parts had to be cleared again and again. This means that we had to clear smaller plots at once, but ones which were still large enough to give a good overview of sod arrangement (approximately no smaller than 4 by 4 m).

In 2004, we also learned that it is necessary to create levels that uncover the sods in the same manner, *i.e.* to record them all from horizontal or all from diagonal levels. When creating a readable surface, one cuts through sods in an arbitrary way, and it is important to realize that a rectangular sod that is cut by a horizontal plane looks different from one that is cut by a diagonal plane. Sometimes sods

30 *Cf.* the barrows from Rhenen-Elst (Fontijn 2010). However, under specific conditions, sods cut from a Moder Podzol soil can also become recognizable, as demonstrated by the barrows from Apeldoorn-Echoput (Fontijn *et al.* 2011). Casparie and Groenman-van Waateringe (1980) also mention mounds built on a Moder Podzol where sods were recognizable: Doorwerth (Late Neolithic B; S 16) and Lunterse Berg, Lunteren (Late Neolithic B; S 23).

Fig. 4.4 Trench 106, level 2, from the north. At the top, the rather flat centre of the mound has already been excavated in horizontal levels to just below the original surface. At the slope, the contours of the mound were followed. Sods placed on the slope are visible. At the foot of the mound the original A-E-B horizons below the sods surface are visible. Figure by Q. Bourgeois/J. van Donkersgoed.

are oriented in such a way that they are difficult to recognize. Think for example of horizontally placed sods that are uncovered in a horizontal excavation level. In this case, the largest part of the sod is a grey body without any contours. The kind of sods used for building this mound particularly become visible through the contrast between the thin, black A horizon, and the larger, grey E horizon below it. If a horizontal excavation level were to cut the sods halfway, we would probably only see greyish rectangular plots without much contrast. This can make it hard to recognize individual sods.

Another problem that needs to be tackled is that sod arrangements are best understood by an optimal combination of horizontal and vertical stratigraphy. Again, in the case of the large mound 3 excavated in 2004, there were too few vertical sections to accurately check ideas on the position of sods based on the horizontal excavation surface (De Leeuwe 2007).

Once it was clear that mound 7 would also yield detailed information on sod arrangement, we tried to design a way of working that would overcome the problems noted above as much as possible, and yet still allow a steady progress.

The first solution was to use an extra, diagonal baulk in the middle of the quadrant. This would improve the combination of horizontal and vertical stratigraphy, particularly in the centre, where the distance between the diagonal and the N-S and E-W profile would be small. The baulk would have to end a couple of metres before the centre of the mound, in order to keep the working space in this important area manageable. The other advantage of the extra baulk is that it automatically created small working units that were less exposed to the wind. One could choose to uncover sods in one segment only and leave the other one covered.

The second solution was to opt for recording the sods as much as possible in horizontal levels. We only deviated from this practice at the flanks where we chose to have our levels more or less follow the contours of the mound (see above on stratigraphical excavation; Fig. 4.4).

A consequence of this is that it is somewhat harder to understand the arrangement of sods at the transition from the top of the mound to the flanks. Fortunately in this case the profile sections of both baulks and N-S and E-W profiles helped to overcome this.

4.3.3 Sieving and the use of the metal detector

Apart from the manual excavation, we also used sieving and a metal detector to make the resolution of our find recording as detailed as possible.

At Rhenen-Elst we experimented with sieving a part of the mound (Bourgeois/Fontijn 2010, 36). For mound 7, we repeated that experiment. In trench 105, along the whole N-S profile, a zone of 50 cm wide was sieved. This included the top of the mound until ca. 10-15 cm underneath the prehistoric surface. The zone was subdivided into units of 50 by 50 cm (Fig. 4.5). Ca. 10 l of soil (one bucket) was sampled from each unit (dug ca. 10 cm into the surface), before the next level was dug. The sieve used has a 4 by 4 mm mesh width. The sieving was done during the excavation. In total 39 soil samples were sieved (V 105; V 131-146; V 193-205; V 304-312). This equalled 2.2% of the total excavated surface of mound 7. It yielded just one artefact: sample V 201 contained a very small fragment of pottery of 0.5 g. Due to its small size, it could not be determined. 18 samples contained charcoal fragments, each weighing less than 1 g. It can be concluded that it is unlikely that many small finds went unnoticed during the excavation of the rest of the quadrants. As a matter of fact, the smallest finds done (the fragments of the small studs) were uncovered during manual excavation (chapter 7).

All levels that were uncovered were systematically surveyed by our metal detectorist, Mr. A. Manders. He assisted on all the barrow excavations we have carried out so far and is highly skilled in prospecting both metal and ceramic finds with his detector. An important point, however, is that this is the first excavation where we were confronted with the limitations of prospection with a metal detector. The very small bronze items in the central find assemblage could not be detected beforehand. They were probably simply too small and too corroded to give a signal.

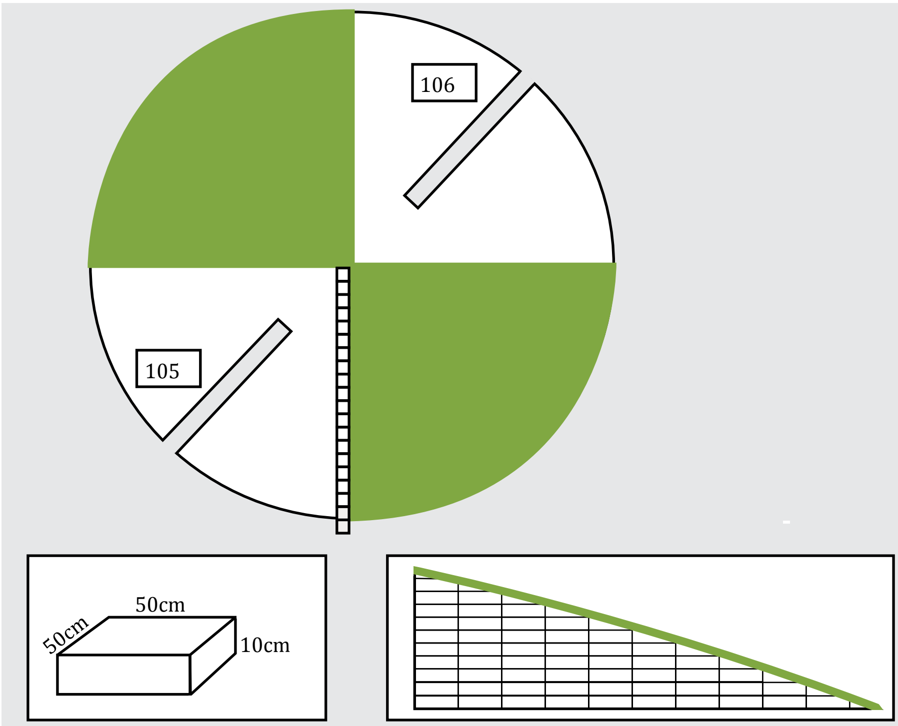


Fig. 4.5 (top) Trench 105, level 1, seen from the north. Along the N-S profile a zone has been marked for sampling (indicated with pins at the left). 10 l of soil per 50 by 50 cm square were collected in the white buckets (lined-up) and sieved. (bottom) Position and size of the samples for sieving. Figure by R. Jansen/J. van Donkersgoed.

4.3.4 Tree trunks

Trees disturb the archaeological record in two ways. They destroy material mechanically: roots can grow right through an urn, and are capable of transporting artefacts and material, thus disturbing the archaeological record. They are also capable of obliterating features by means of secondary soil formation around roots (caused by the eluviation of humus). We often observed discolourations around the places where trees had been growing, particularly in the upper parts of the mounds we excavated. For this reason it is important to record the position of tree trunks as much as possible. The tree trunks that were still standing on the surface of the mound posed a problem, as their removal might create large disturbances even in excavation levels that had to be created far below where the trees once stood. The best way to deal with the trunks appeared to be as follows. First, we removed most of the roots with a hand saw. Once the trunk was laid bare to such an extent that we could be sure that all main roots had been loosened, we had them torn out, straight up, by the mobile excavator.

4.3.5 Fatal Friday: discovering the central find assemblage and its implications

Originally, it was planned to excavate two quadrants: the southwestern and the northeastern one. These were accordingly numbered 105 and 106 (Fig. 1.12).[31] Given the expectations on the damaged state of the mound this was thought to give enough information on the nature, history, and role of this special mound in the entire Zevenbergen barrow group. As the damage caused by the badger seemed

Fig. 4.6 Trench 106, level 1, north is left. This is the centre of the mound. At the top, one can see how the level in the centre is rather disturbed, whereas sods are visible everywhere around it. Below, the location of the urn and two disturbances are projected. All of them only became visible ca. 10 cm lower. The left disturbance is probably a filled in (badger) tunnel. This tunnel cuts through the urn, the location of which is indicated with a red circle. Note that these disturbances could not yet be observed at this level. Figure by Q. Bourgeois/J. van Donkersgoed.

31 The numbering of the trenches follows the numbering already in use at the Zevenbergen for the 2004 excavation.

to concentrate in the centre of the mound, it was generally expected that not much of the central grave remained. However, when we uncovered the first level in trench 106, the zone along the N-S profile was less disturbed than expected. There were filled in tunnels in the centre, but around it, sods were visible in places (Fig. 4.6). It is important to realize that the seemingly undisturbed southeastern part of level 1 depicted in figure 4.6 in reality was undermined by tunnels. Inspection of the surface alone does not immediately give the best indication on the rate of disturbance: on the 10th of May, a seemingly undisturbed zone along the E-W profile in trench 106 collapsed. There appeared to be a tunnel here that could not be observed at a higher level. In this case, we knew beforehand that we had to be extremely careful in this particular area, as we had noticed that there was an entrance to a tunnel in the mound in this zone.

When this first level was deepened, an urn was found, more or less in the centre of the mound (see below, section 4.5.4). Because of its position, it was thought that this urn was the central grave of this large burial mound. By then, it also became clear that we were dealing with sods stacked on a natural elevation. As we found this urn already on the fifth day of the excavation (8th of May), it then seemed as if the excavation was proceeding as planned, and that we did not have to excavate the ca. six levels through the mound that we originally planned for. However, only two days later, everything changed drastically. When we were clearing the zone between the southern end of the diagonal baulk and the southwest corner of trench 106[32], we started to find (very small) bronze items here on Thursday, the 10th of May. The first one was a bronze ring (V 165; see section 7.3.1; Fig. 7.8). After documentation, it was lifted with the surrounding soil as a small block. It appeared to be only the tip of the iceberg. Soon charcoal started to be found everywhere in this corner, as well as tiny bronze items. As remarked above, the small ones could not be prospected by the metal detector, probably because of their small size. The state these items were in was alarming: they were very

Fig. 4.7 The central find assemblage after its discovery on Friday night the 11th of May. The area was covered again to make it inaccessible for treasure hunters. Figure by Q. Bourgeois.

32 Patches of charcoal were already recognized and recorded immediately north of the urn on the day of its discovery (day report Quentin Bourgeois). At that time, it was not realized that we had touched the edge of what would later turn out to be a very large find assemblage.

small and vulnerable and could not be touched by hand. Also, pieces of charcoal turned up everywhere. These were also in a bad state of conservation and started to crumble once they were laid bare. One concentration of very small studs (V 173A-B) was particularly noteworthy. Here, hundreds of items were concentrated on a spot of less than 30 by 30 cm (Fig. 7.22). By that time we suspected that the bronzes were part of something that was probably already half-decayed. It was Friday the 11th by then, and the finds lay exposed at the surface. As the site had been visited by treasure hunters during our 2004 excavation, we were afraid this find would be easy prey for such people, and we decided to lift this concentration with earth and all, expecting it to be the last one. Having lifted it successfully (see chapter 5), we saw that we were wrong: a new concentration of finds turned up immediately below it. This time, we decided to cover the centre of the mound with earth and heavy materials that were very hard to remove, and to make new plans on how to proceed during the weekend (Fig. 4.7).[33]

4.3.6 Adjustments: the block liftings and excavation of the entire centre

When we returned the next Monday, no one seemed to have accessed the site during the weekend. Removing the covering earth and material, we quickly found out that the find scatter was even larger than we thought. We also noted that the condition of the wood in particular had deteriorated to an alarming extent. Things got worse as the weather turned bad: we had had long periods of rain since Friday, which turned the excavation into a pool of mud. We had already built a shelter over the find concentration in the centre (Fig. 4.8), but this construction was barely capable of resisting the hard winds that were blowing here on this exposed position.

We concluded that the find complex that now lay uncovered was at risk and needed to be lifted as soon as possible. However, we also saw that manual excavation, as attempted so far, was not the proper way to do it. The items were far too fragile for that, and even more importantly, we were afraid that we would not be able to optimally document the entire context in which they were situated. We

Fig. 4.8 The central find assemblage just after its discovery (trench 106 from the north). With a shelter we tried to protect the remains from the intensive rain fall. Figure by M. Kuijpers/J. van Donkersgoed.

33 Mr A. Manders inspected the site that weekend several times.

so far recognized a scatter of finds in an area of some 1.5 by 2.8 m. It was clear that these were related to each other, but how? It was not inconceivable that small remains of textile or organic material were preserved in the corrosion of the bronze, and lifting individual finds without fully understanding their context would be tantamount to destroying a very special find assemblage. The entire situation was reported to the authorities in charge, the RCE and to the owner of the area, Rijkswaterstaat. The RCE sent specialists to inspect the situation (dr. O. Brinkkemper, dr. H. Huisman, and drs. C. van Rooijen). After ample deliberation, the RCE agreed with our assessment of the situation. They also decided that simply covering everything up without further excavating (*in situ* protection) would be a bad idea. The first reason for this was that the material was already in a very bad state and would only get worse in the years to come. Second, the material was only some 80 cm underneath the surface. Chances were that treasure diggers could easily reach it. In view of earlier illegal activities in this area (in 2004) this was not an inconceivable scenario. On Monday the 14th of May drs. J. Deeben, head of the research department of the RCE, instructed us to excavate the entire find concentration. As the concentration did not seem to end in front of the N-S profile of quadrant 106, we had to make a small extension in the centre of the NW-quadrant. With Huisman and Brinkkemper we agreed that the best way to excavate the finds would be in a laboratory where the vulnerable wood and bronze could be treated against decay immediately, and where the material need not suffer from the bad weather circumstances we were having at the site at that time. We agreed to lift the central find assemblage – the interpretation of which was by that time still unclear – with soil and all. For this complex task we asked the team of the restoration laboratory Restaura from Haelen. The RCE took care of the first extra finances, and was so kind as to let dr. Huisman carry out thin section analyses of the soils in this location (appendix 2).

4.3.7 Proceedings of the excavation after the decision to block lift the central find assemblage

It goes without saying that this new task of block lifting this central find assemblage, and extending the excavation to the centre of the NW-quadrant intensified the pressure on us considerably. There was a new and highly complex job to be done (preparing, organizing, and carrying out the block liftings), while the time schedule set for the excavation could not be changed or extended. The excavation of mound 6 was by that time still in full swing and had to be finished entirely. The prospection of the environment of the mound with trial trenches was by that time also not finished, and in view of the relevance of data from the environment, it was clear that we also had to finish that task properly. With regard to our two quadrants that were already half-excavated, we also decided to stick to the aims as originally planned, which meant that we finished the recording of the levels of sods at the flanks of both trench 105 and 106 and drew and sampled all profile sections for pollen. When we found a Late Medieval grave in the N-S profile of trench 105, however, we only documented what we found in this quadrant and left the remainder of the grave in the still unexcavated and probably largely undamaged NW-quadrant.

Chapter 5 reports in detail on the results of the block liftings themselves, chapter 8 on the method of lifting and further excavation and restoration in the Restaura laboratory.

Block no. Restaura	Find no.
Block 1	V 1000
Block 2	V 1001
Block 3	V 173C = V 1002
Block 4	V 1003
Block 5	V 1004
Block 6	V 217 + V 218
Block 7	V 173A
Block 8	V 173B
Block 9	V 165
Block 11	V 176

Table 4.1 Conversion table for relating Restaura block numbers to find numbers.

Numbering the blocks: problems

In total five (concentrations of) finds were lifted by the excavators and then later transported to the restoration studio of Restaura. Another five block liftings were done by Restaura. To make them fit in the standard form of a digital excavation database, we refer to these block with find numbers (V 1000 etc.). However, Restaura used their own system of "block numbers" in their restoration documentation. This occasionally makes relating excavation documentation to the restoration documentation somewhat confusing.

To summarize, "blocks" 1-5 were lifted by Restaura, and were later given find numbers starting at 1000 by the excavators to fit them in the KNA[34] prescribed database structure and to avoid overlap with find numbers already in existence. "Blocks" 6-9 and 11 (there is no block 10) are actually finds lifted by the excavators (recorded with find numbers like V 165). They were later renamed by Restaura. To make things even more complicated, a problem with the database resulted in "block 3" being equal to both "V 173C" *and* "V 1002". In order to avoid confusion, in this book V 173C is used. Table 4.1 Facilitates a conversion between the Restaura documentation and those of the excavators. In what follows, only the excavation find numbers will be used.

4.3.8 General procedures

The lifting, conservation, excavation, and analysis of the lifted block were complex and required a special approach (see chapter 5, 7, and 8). For the excavation of the rest of the mound, we used the following procedures. After a level was reached, it was shovelled clean manually, surveyed with a metal detector[35], photographed (photogrammetry), interpreted, and drawn. Level 1 in trench 105, which mainly showed traces of forest ploughing, was only documented with photographs. For the rest, all levels were drawn at a scale of 1:50 and coloured (most by C. van der Linde). The central find assemblage was documented in more detail and drawn in its entirety at 1:20. Sections through features were photographed and drawn at 1:20. All levels were photographed from a photo cabin that was lifted by the mobile excavator. Q. Bourgeois made most of these photographs. 3D-measurements of each level were taken in a grid of 1 by 1 m. Measurement points for photogrammetry in both excavation surfaces and long sections were measured separately. All were done using the Robotic Total Station Sokkia in the Dutch Coordinate System (*RD Stelsel*), this device was used for the first time at this

34 KNA: Kwaliteitsnorm Nederlandse Archeologie.

35 If the detector gave a signal, the location was marked and only inspected after the surface had been drawn.

excavation[36]. Features are indicated as "S" (from the Dutch *spoor*), and numbered from 1 for each new trench. Find numbers, indicated as V (from the Dutch *vondstnummer*) are unique numbers, used for the entire excavation. In what follows, we will concentrate on the features recognized, and refer to the finds only if they are relevant for understanding the features. Finds are discussed in detail in different chapters (5, 6, 7, 9, 12, 13, and 14).[37]

4.4 General stratigraphy of the mound

In what follows we will refer to the general overviews of all features. Each level is depicted with a separate overview: figure 4.9 to 4.11. Figure 4.12 shows the spatial organization of the original sods at level 2. Figures 4.13 to 4.15 show all profile sections.

Working our way through the mound from higher to the lower levels, we distinguished the following (chronostratigraphical) units (see Fig. 4.13 to 4.15). All will be discussed in more detail in section 4.5. To facilitate reading of the next section, we will start with a brief summary of the main stratigraphy of mound 7 from the highest to the lowest levels investigated.

The top layer of the mound, ca. the first 10-20 cm was a loose sandy humus layer, mainly of a greyish colour. This was a disturbed, ploughed out layer that hardly showed any signs of soil formation.

Immediately below this layer we found traces of stacked sods. In most places the transition from the top to the sods was a very sharp one (*cf.* Fig. 4.3), and evidence of any illuviation from above was lacking. This means that the upper layers of the original mound have been levelled. In undisturbed circumstances a (Humus) Podzol would have developed in the top of the mound, the B horizon of which would have penetrated at least 30 to 50 cm deeper: it would probably have made the upper 10-20 cm of the body of stacked sods unreadable as such[38]. As we could see no traces of such soil formation from above, this implies that at least the first 30 cm of the mound must have been dug away. At the flanks of the mounds, less material seems to have been removed, illuviation from the top is visible in places. Evidence for levelling of mounds hardly need surprise us here. Heaths were used for sod cutting up until the 19th century AD. We find exactly the same situation in the case of the other large mound in this barrow group, mound 3 (Fig. 4.16). Van Wijk and his team concluded here that mound 3 must also have been higher. They also found some indications that the levelling of its top can be associated particularly with forestry activities in the 19th century (van Wijk *et al.* 2009, 101-102).

We will discuss the sods in more detail in section 4.5. For now it suffices to say that the layer of sods recognized by us is relatively thin (60 cm at most) and reflects one building phase. The sods were placed on a sand elevation of aeolian origin (chapter 2). As discussed in chapter 2, most of the barrows of the Zevenbergen group were built on this long, stretched out, and narrow Late Pleistocene cover sand ridge (ranging from 16.4 to 15.8 m +NAP). This one must have been the largest of all. The reason this was not known before 2007 has to do with the presence of the badger sett: during the detailed soil survey by one of us (C. van der Linde), mound 7 and its immediate surroundings were not accessible. In the

36 Drs. I. van Wijk took care of most measurements.

37 The entire excavation was filmed by Maikel Kuijpers and Willem Gijtenbeek.

38 This seems to have happened in the case of the upper part of the mound 8 at this site (van Wijk *et al.* 2009). We also observed this in the case of mound 1 from the Echoput in Apeldoorn where sods only became visible at level 6 (van der Linde/Fontijn 2011).

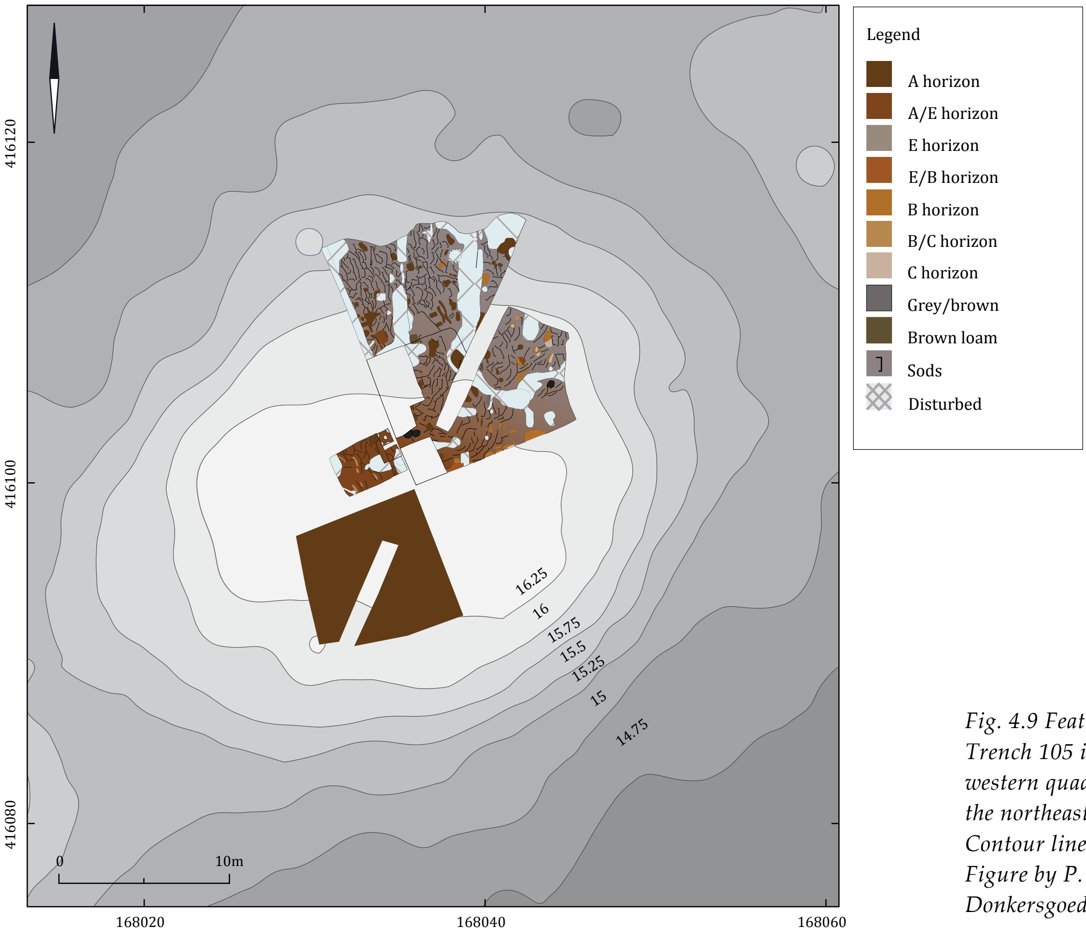


Fig. 4.9 Features level 1. Trench 105 is the south-western quadrant, 106 is the northeastern quadrant. Contour lines in m + NAP. Figure by P. Valentijn/J. van Donkersgoed.

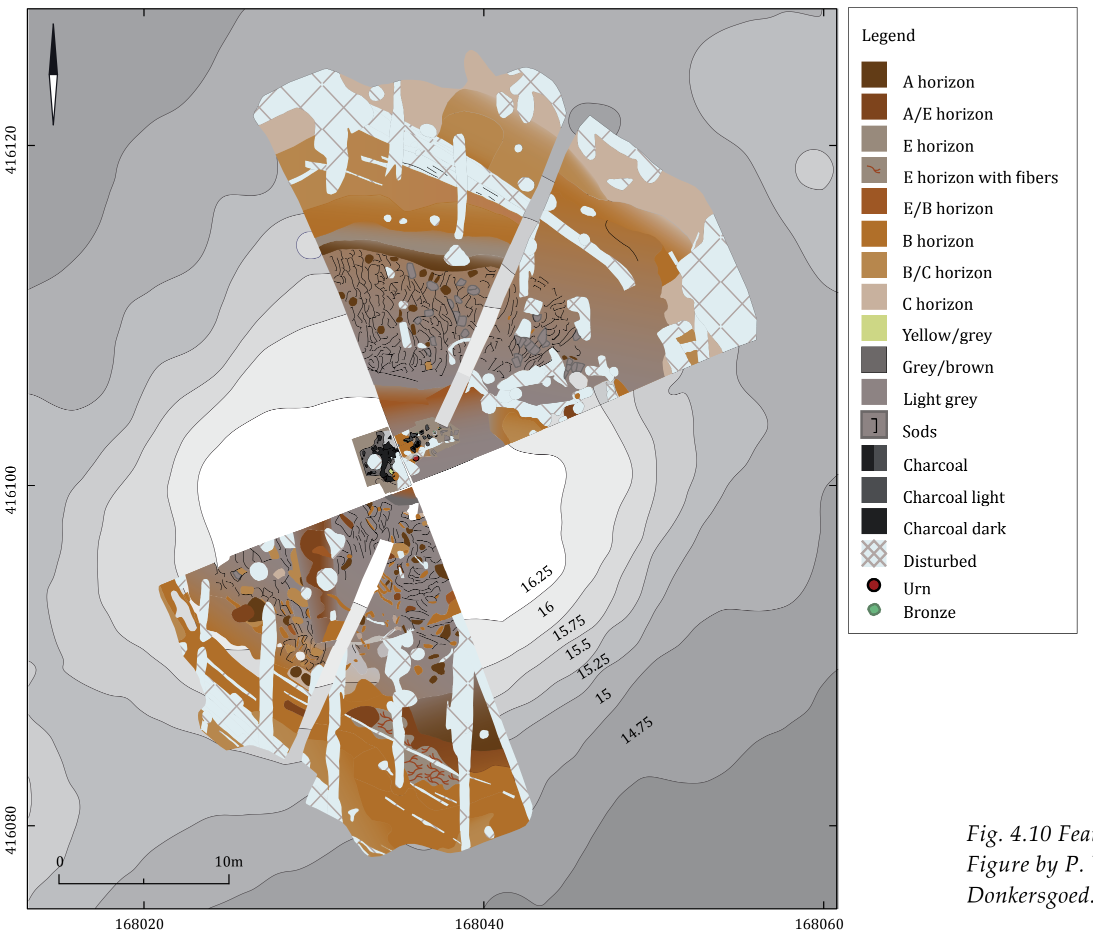


Fig. 4.10 Features level 2. Figure by P. Valentijn/J. van Donkersgoed.

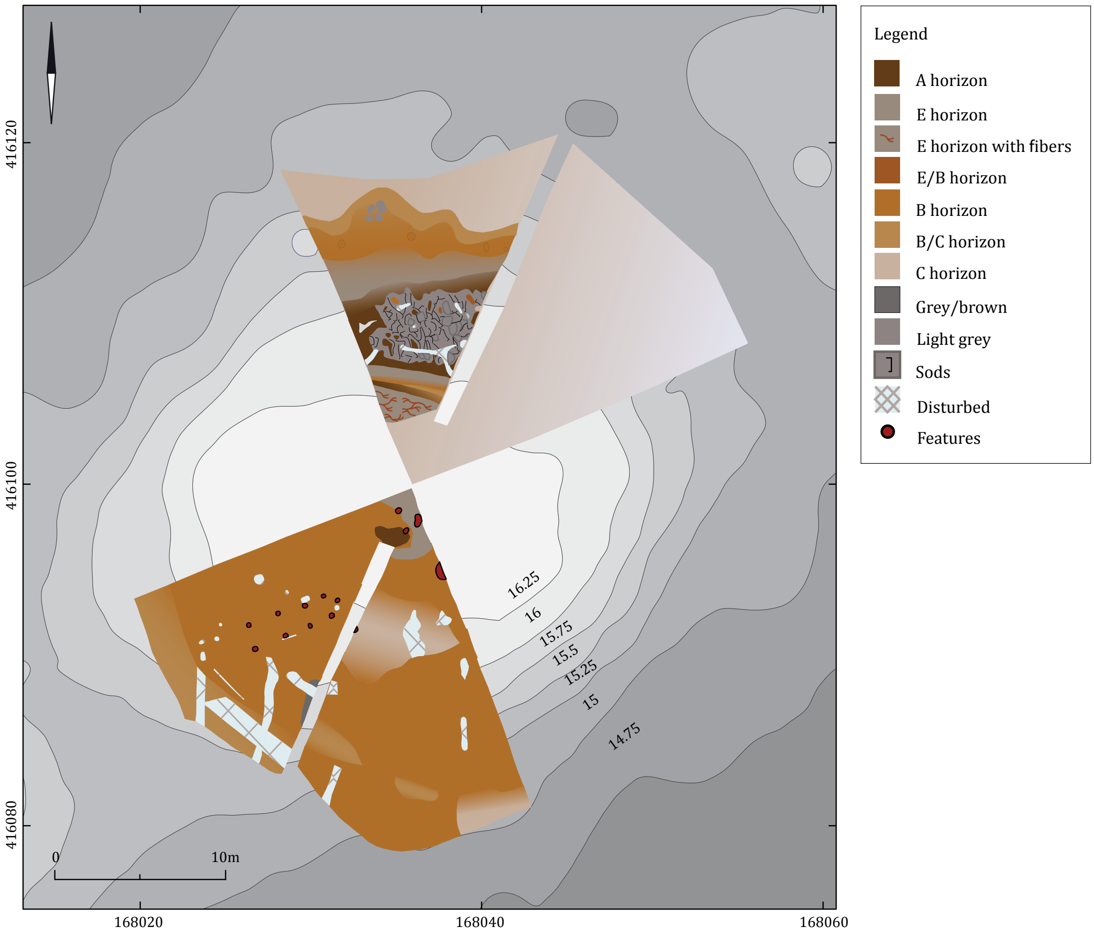


Fig. 4.11 Features level 3. Figure by P. Valentijn/J. van Donkersgoed.

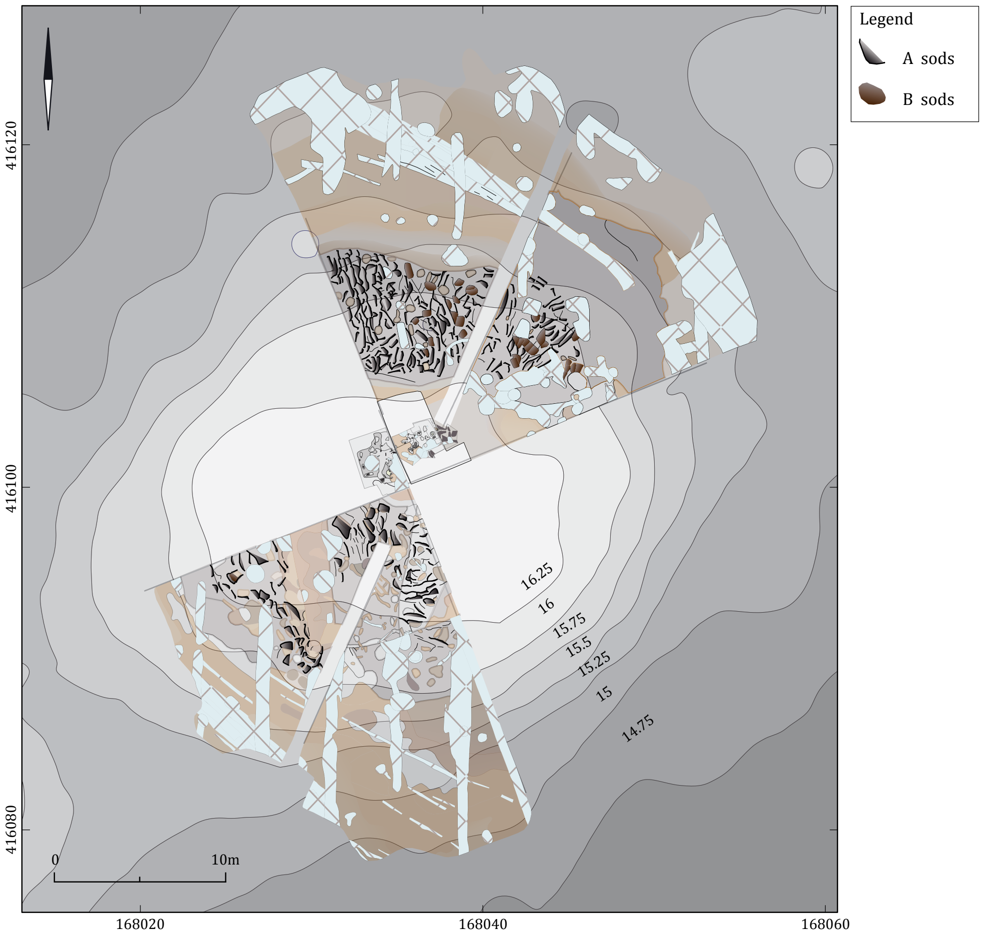


Fig. 4.12 Ordering of sods at level 2. Figure by P. Valentijn/J. van Donkersgoed.

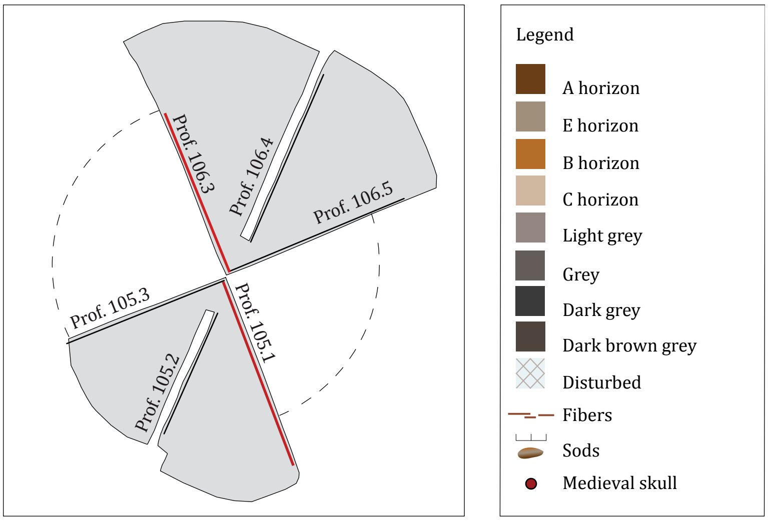


Fig. 4.13 Profile 105.1 and 106.3. Photograph combined with photogrammetry and drawing. There is a small deviation from real size in the photographic compilation which causes a slight mismatch between drawing and photograph. Figure by P. Valentijn/J. van Donkersgoed.

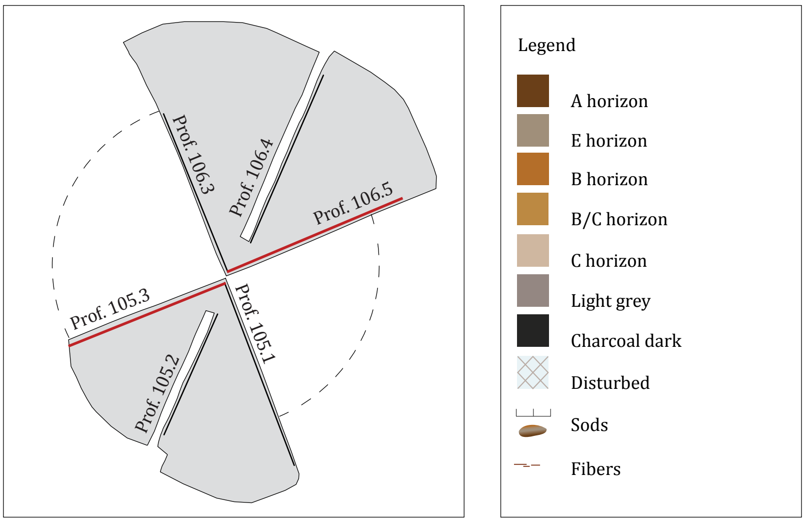


Fig. 4.14 Profile 105.2 and 106.4. Photograph combined with photogrammetry and drawing. There is a small deviation from real size in the photographic compilation which causes a slight mismatch between drawing and photograph. Figure by P. Valentijn/J. van Donkersgoed.


SSE
NNW
15.264m
+NAP
S 4
SW
NE
15.498m
+NAP
0
5m

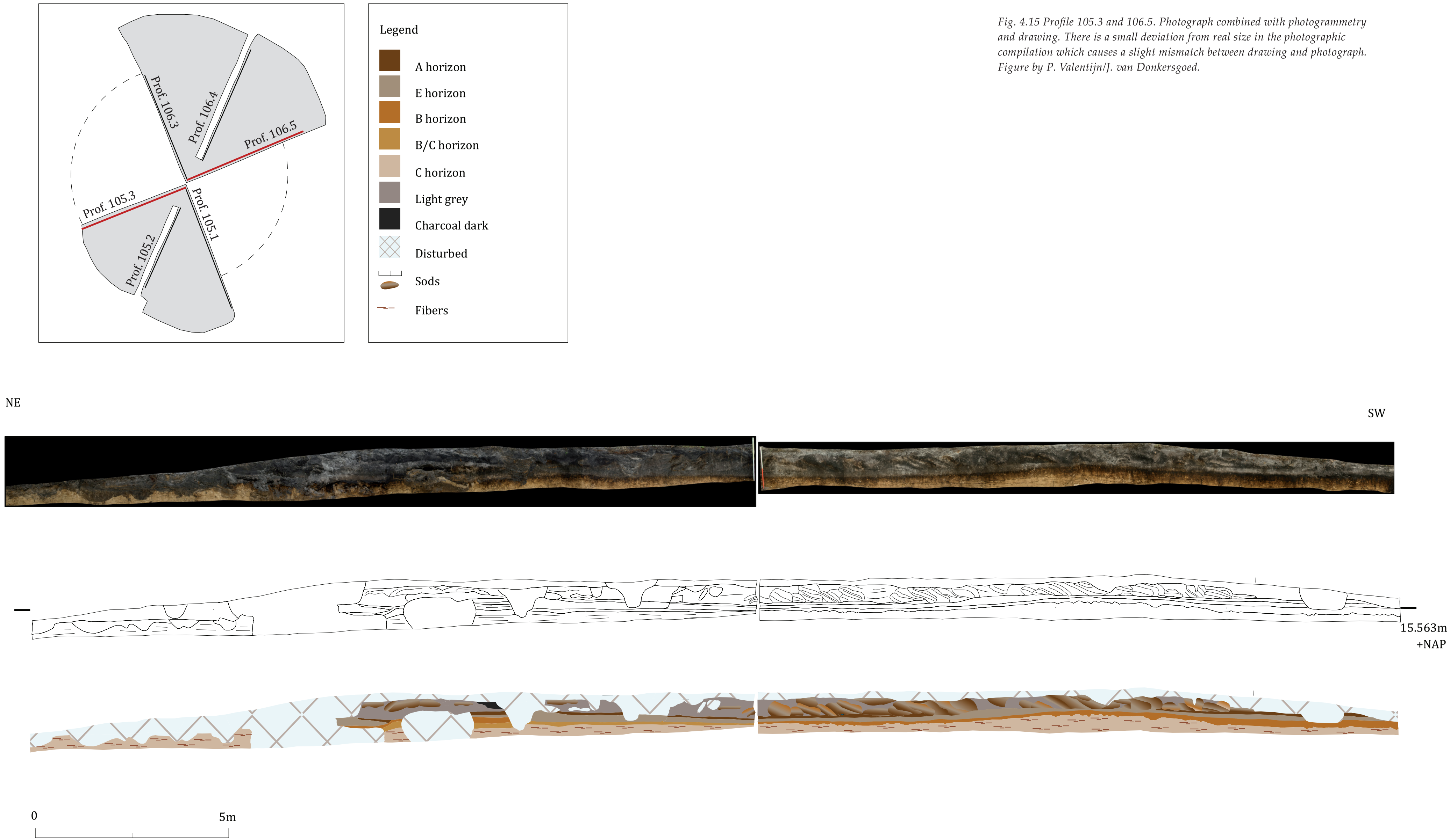


Fig. 4.15 Profile 105.3 and 106.5. Photograph combined with photogrammetry and drawing. There is a small deviation from real size in the photographic compilation which causes a slight mismatch between drawing and photograph. Figure by P. Valentijn/J. van Donkersgoed.

Fig. 4.16 Detail of profile of mound 3 (trench 57). Figure after van Wijk et al. 2009, fig. 6.20/J. van Donkersgoed.

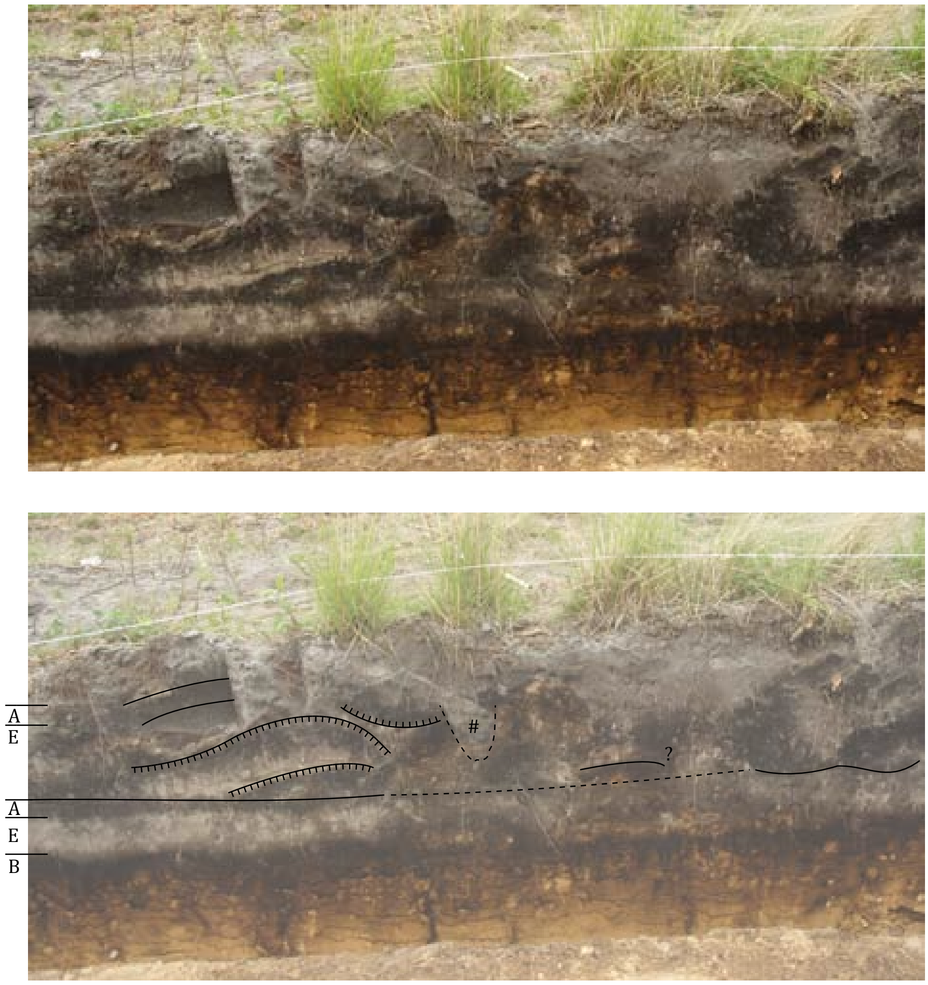


Fig. 4.17 Southwestern end of profile 105.3. Sods placed on a Humus Podzol of which the A horizon is present in certain zones (straight line vs. dotted line). In contrast to what was normally done, here at the foot of the mound sods have been placed with the vegetation horizon (A) on top. Figure by Q. Bourgeois/J. van Donkersgoed.

reconstruction of the original surface published before (van der Linde/Fokkens 2009, fig. 4.5) the local elevation that forms the basis of mound 7 does not come out very well due to a lack of corings in the badger zone.

In the top of this sand elevation we recognized a well-developed Humus Podzol (see Fig. 4.17). In many locations, the original A horizon was preserved underneath the sods, but it was absent under the centre of the stacked burial mound, indicating that this area was stripped bare, probably as part of funerary practices (*cf.* Fig. 4.3). To the southwest of the centre (in trench 105) there are a few pre-barrow features dug into the top of the original dune (traces of one pit and an eight-post structure, see sections 4.5.8 and 4.5.9).

The central find assemblage of charcoal and bronze was situated at the top of the natural elevation, immediately below the sods. The top of the natural elevation is a Humus Podzol. In places, two Humus Podzols on top of each other were

Fig. 4.18 Detail of profile no. 106.4. Here it can be seen that sods were placed on top of a decapitated E horizon (the A horizon with vegetation must have been removed). Below, there is another E horizon of what must have been an older Humus Podzol. The B illuviation of the uppermost Podzol can be seen to have filtered through the older E horizon. Figure by Q. Bourgeois/J. van Donkersgoed.

observed, with illuviation of the highest soil penetrating into the E horizon of the lowest one (Fig. 4.18). This indicates that in the lee side of the dune, after a long period in which a Humus Podzol did develop on its top, new aeolian deposition took place. Here, again, a new soil developed.

4.5 Features

4.5.1 General "readability" of features

In general, features were well readable due to the contrasting colours of the well-developed Humus Podzol. This was less so on the highest levels 1 and 2 where the ploughing and bioturbation (tree roots and badger tunnels) hindered observation. This appeared to be particularly problematic in the centre of the mound in trench 106 where the urn was found. Readability was also low at the outer flanks of the mound where secondary soil formation amplified illuviation considerably, thereby obliterating features such as sods.

4.5.2 Top soil

The top soil is a greyish, sometimes yellowish sand layer the lower boundaries of which show a sharp transition to the sod traces. Furrows are visible, both in profile sections and at level 1 of trench 105, 106, and 115. The furrows are more or less north-south oriented at intervals of some 40 cm from each other. This demonstrates that the top layer results from reworking of the ground with a (forest) plough. Similar traces were observed on other barrows of the Zevenbergen, particularly in the top of mound 3 (van Wijk *et al.* 2009, 101-102). As this ploughed-through layer also cuts through a Late Medieval grave pit dug into the mound (4.5.3; Fig. 4.19), the ploughing must date to the post-Medieval period.

It is likely that the ploughing relates to the reclamation of the area for foresting and the planting of trees in more recent times when the site became a forest, (the 19th or 20th century; chapter 15). It lacks a developed soil and therefore cannot be very old (> 75 years). In the centre of the mound we found the traces of a filled in pit that was dug from the surface (Fig. 4.20). It ends just at the transition of

Fig. 4.19 Traces of the Medieval grave pit are to be seen in the far left (profile 105.1). The pit is dug right through the sods and must post-date it. The greyish top of the mound cuts through both the sods and the pit fill and must therefore be later than the digging of the Medieval pit. Figure by Q. Bourgeois/J. van Donkersgoed.

the E to the B horizon. Fortunately, it missed both the urn and the central find assemblage. In view of its size (ca. 1 m wide, 70 cm deep) and the fact that it was dug from the top, we are dealing here with a manmade pit, probably evidencing the activities of treasure hunter(s).

4.5.3 A Late Medieval skeleton grave

In the N-S profile of the SW-quadrant we observed a deep pit that was dug right through the mound and therefore must post-date it (trench 105, S 4; Fig. 4.19). At its bottom we found unburned human bone (see chapter 13). After deposition of the human remains, at least 1 m of the pit was backfilled. Traces from the upper part suggest that the remainder gradually silted up. The (compacted) top of the thus filled in pit was disturbed by the forest ploughing, demonstrating that this took place much later. C14-dating of bone showed that it dates to 450 ± 35 BP, calibrated with OxCal v4.1.10 this comes down to 1410-1610 AD (95.4%).[39] Late

39 GrA-41266; see chapter 13.

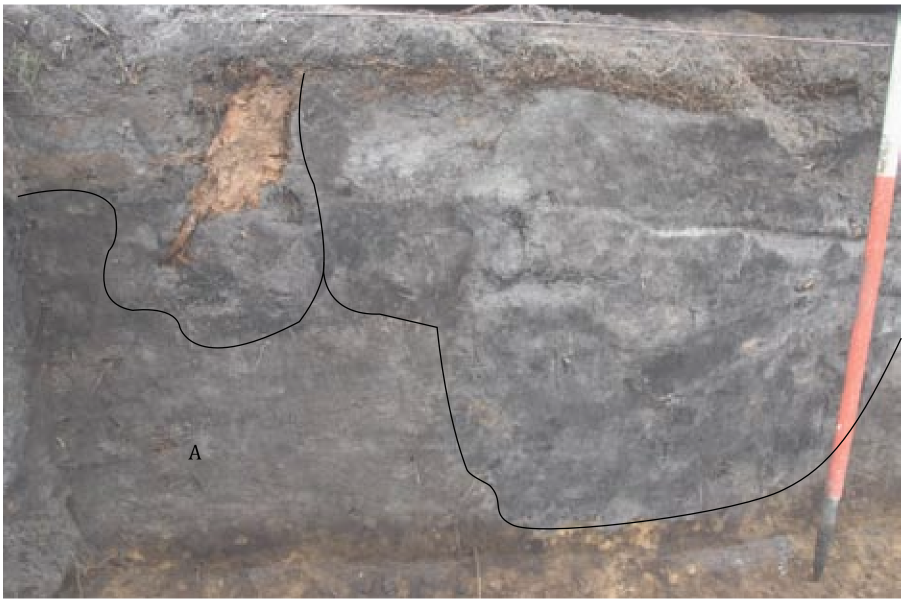


Fig 4.20 Southernmost corner of profile 106.3. At the centre of the mound, we see the traces of a filled in pit, probably evidencing the activities of a treasure hunter. To its left, the roots of a tree damaged the top of the mound. In the greyish area marked A, sods are barely visible anymore. This is because tree roots locally resulted in increased dehydration, obliterating soil traces. Figure by Q. Bourgeois/J. van Donkersgoed.

Medieval human skeletons in comparable deep pits were also found in mound 2. It has been argued that these represent the remains of individuals who were executed here at a gallows that was erected on top of this mound (van Wijk *et al.* 2009, 86-88). Traces of a large post found at the top of mound 2 are interpreted as the remnants of the gallows. We assume that the remains buried in the deep pit in mound 7 represent another case of such a Late Medieval execution, which implies that more than one barrow of this group served as execution place.[40]

4.5.4 An Iron Age urn grave (S 2)

When deepening from level 1 to level 2, a vessel containing cremation remains was found in the centre of the mound in the NE-quadrant (trench 106, S 2, V 151). Already at the first level created in this quadrant, many traces of sods could be seen on the flanks of the mound. The centre, however, proved more difficult to

40 Traces of a post that could be interpreted as the remains of such a gallows have not been identified, but it should be noted that not all parts of mound 7 have been excavated.

Fig 4.21 The urn as uncovered during the excavation while deepening from level 1 to 2. (top) View from the south. The rim of the urn has just been discovered. (middle) View from the south. Here it can be observed that the urn was placed in a small pit, dug into the greyish E horizon of the prehistoric soil. Note the roots at the north side of the urn. (bottom) View from the east. Part of the urn has been destroyed by animal digging activities. The gray-brown fill indicates a filled-in tunnel that was probably dug by a badger. Figure by Q. Bourgeois/J. van Donkersgoed.

read (Fig 4.6). Several disturbances could be seen here, including filled in tunnels that were probably dug by a badger.

The disturbances made the entire area in the southwest corner of the NE-quadrant (trench 106) difficult to interpret. An interesting detail, however, was that four pottery sherds were found already at the first level (V 147, V 148, V 149, and V 161). Later it would become clear that they all were part of one and the same urn situated only a few centimetres lower, which was probably partly demolished by the digging activities of the badger (chapter 5 and 6).

The manual deepening of level 1 (some 10-15 cm) started from the southwest corner of the quadrant. Very soon the rim of an urn became visible (V 151). On its northern side the vessel was partly demolished by an east-west oriented badger tunnel that later must have collapsed. Here, tree roots also added to the urn's plight (Fig. 4.21). Another factor complicating the interpretation of this area was the presence of another large disturbance immediately north of the badger tunnel. As such, it is a small miracle that the urn itself survived. Yet, the context of the find proved to be more difficult to understand. During the excavation the urn was interpreted as having been placed in a small pit. At the time, the idea was that we were dealing here with a secondary grave, dug into an already existing mound. This implied that a pit would already have to be visible at level 1 here. The low readability of level 1, however, makes it hard to detect any feature at this level (*cf.* Fig. 4.6). It is clear that the urn was placed into a small (width 60 cm, depth > 21 cm) pit with a black to mixed dark greyish fill (which we assume to be a mix of the dark top humus layer and the greyish E horizon immediately below it; *cf.* Fig. 4.21). This pit seems to have been dug into the E horizon of the top of the dune, only a few centimetres above the C horizon. If the urn was dug in from the top of the mound, through the sods, one would have to dig at least 30 cm (minimum estimation of disappeared top of barrow) + 70 cm (distance from top of the present mound to the top of the E horizon underneath the sods) + 21 cm (height urn) = 121 cm deep. Accounting for the width of the urn (29 cm), one would have had to dig a > 121 cm deep pit from the top, which at the bottom had a width in excess of 30 cm. At the top, such a pit must have been much wider to prevent it from collapsing. It is unlikely, though it cannot be entirely refuted, that the fill of such a pit did not leave any visible trace at the higher levels. For that reason, we find it most probable that the urn was dug into the original surface before it was covered with sods. Supporting this view is that the urn grave is situated only 30 cm south of the central find assemblage and practically in the centre of the burial mound (*cf.* Fig. 4.10).

As discussed in chapter 6, the urn is of the *Schräghals* type, which is typo-chronologically dated to Ha C, the Early Iron Age. Cremated bone from the urn was C14-dated to 2520 ± 35 BP (Fig 4.36). The central find assemblage immediately north of it is dated to the same period (see section 4.5). This is another argument in favour of our view that the urn and the central find assemblage are functionally related. As we found no other grave, we argue that the urn is the primary grave here.

4.5.5 Traces of sods and how they inform us on the way in which the mound was built

That sods were used to build barrows has already been demonstrated by able excavators from the first half of the 20th century. Van Giffen recognized heather sods in many of his excavations of barrows in Drenthe and beyond (*e.g.* van Giffen 1943). In the province of Noord-Brabant the excavations of Glasbergen at Toterfout-Halve Mijl should be mentioned (Glasbergen 1954a) as an example of a good publication that provides the modern reader with a lot of information on the construction of burial mounds. Modderman's and Verwers' excavations at mound 6 and 8 of the Zevenbergen in 1964 and 1965 can be seen as part of that tradition. If sods were recognized, they were usually drawn when visible in profile sections. If they were visible at excavation levels their position was usually sketched (prof. H. T. Waterbolk to the first author 2011, *pers. comm.*).

One of the most important ways to gain more information on the position and stacking of individual sods. Instead of sketching their position we tried to document each individual sod as much as possible. This might not only provide more evidence-based insight into the particular ways in which mounds were constructed, but it also opened up interesting possibilities for sampling sods for (pollen) analysis, which may help us to get some insight into the provenance of sods (chapter 10; De Kort 2002; 2007; 2009; Doorenbosch 2011). Our Danish colleagues who recently carried out a large barrow excavation in Skelhøj adopted a comparable approach with regard to documenting sods (Holst *et al.* 2004). It has since become standard practice in our barrow excavations (Bourgeois/Fontijn

Fig. 4.22 Profile section 106.3. Horizontally placed sods at the centre of the mound. The sods cover the charcoal of the central find assemblage, which rests on a decapitated Humus Podzol, the E and B-C horizons of which are visible at the right. Two of these sods are B sods, displaying the A-E and top of B horizon from which they were cut. Both are placed with the A horizon down. Figure by Q. Bourgeois/J. van Donkersgoed.

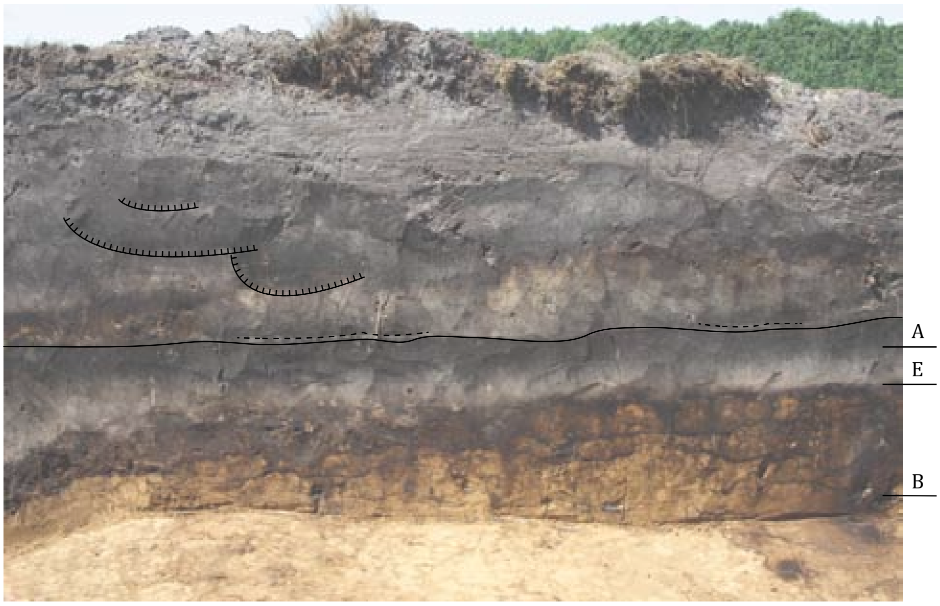


Fig. 4.23 Profile section 106.4. On top of an intact Humus Podzol sods have been stacked horizontally with their vegetation side (A horizon) down. It can be seen that the sods were cut from the same type of soil that we find underneath the mound. The thin greyish layer in between the original surface and the lowest sods is sand that likely spilled from sods during the construction of the mound ("strooisel E" indicated with a dashed line). Figure by Q. Bourgeois/J. van Donkersgoed.

2011; Fokkens *et al.* 2009; van der Linde/Fontijn 2011). Conditions for recognizing sods were very good at mound 7, and we could benefit from earlier experiments and best practices in the drawing of sods at this site (De Leeuwe 2007; *cf.* van Wijk *et al.* 2009, 89-90). A significant improvement between the approach taken in 2007, when compared to the previous excavations at the Zevenbergen, is that we had become more skilled in recognizing sods in all positions (learned by trial-and-error during the first barrow excavations at Zevenbergen in 2004). Also, the presence of an extra profile section (the diagonal baulk) led to a better connection between horizontal and vertical stratigraphy (referencing ideas on positioning of sods at the excavation level to what one could see in the profile and *vice versa*).

Types of sods

The top of a sod is characterized by a dark black humus A horizon. Below it there is (part of) the grey E horizon. In the excavation documentation we referred to such sods as A-E *plaggen* (Dutch for sods). For examples of A-E sods, see figures

4.3, 4.16, and 4.18. Most sods recognized during the excavation were of this type. In a small number of cases there is also a part of the brownish-yellowish B horizon visible below the E. Such sods are called B *plaggen* as they show the A-E-B horizon. For example see figure 4.22[41].

So sods reflect the upper part of the soil that had formed in this area. Such sods become recognizable due to the marked colour contrast between the black A, the grey E and the brownish-yellowish B. As can be seen on figure 4.23, the soils included in the sod are identical to the soil that formed in the ground covered by the sods. Pollen analyses of samples taken from the sods indicated that they were cut in the immediate environment of mound 7 (chapter 10). The thin sections taken by dr. Huisman indicated that the sods were cut in an area where a Moder Podzol soil had transformed into a Humus Podzol soil, likely through anthropogenic activities (see appendix 2).

A-E and B sods only reflect either the local thickness of the E and B and/or the depth with which the barrow-builder dug into the ground to collect sods. As the sand itself barely has a consistency of its own, we assume that the roots of the vegetation kept the sod together. The penetration of roots into the ground may have determined how deep a sod was cut, *i.e.* whether it was an A-E or a B sod (explaining variation in thickness). Figures 4.24 and 4.25 show length and thickness of A-E sods compared to B sods as measured in profile sections. As may be expected, it shows that measured "lengths" of B sods are comparable to those of A-E sods, but some B sods are much thicker (up to 45 cm).

Size and shape of sods

Although traces of several hundred sods were recognized, it was not easy to get a good idea of their shape and size. This is due to the fact that length, width, and height can be measured best when sods have been placed in a horizontal position. A group of horizontally placed sods was found in the centre of the mound, on top of the central find assemblage (Fig. 4.22 and 4.18, left part). However, as these were all placed in an inverted position (with the dark vegetation side, the A horizon, downwards) one only sees a greyish mass without much contrast. This makes it harder to recognize, and to measure, sods in horizontal positions. Also, due to a number of disturbances it was particularly in this zone that sods were hard to recognize in the excavation levels (*cf.* Fig. 4.6). They were much better visible in the undisturbed parts of the profile (Fig. 4.13).

With regard to the horizontally placed sods in the profiles, we have reliable evidence on the length and height/thickness of sods. It was much more difficult, however, to measure the width of the sods. Based on what one can read in profiles in the centre of the mound, sods have a more or less rectangular shape and vary in length and thickness – they do not have a square form. We can also see that there was no rigid standardization of sods: even a superficial glance at the horizontally placed sods in the centre suffices to demonstrate this. Measuring length and thickness of well-recognizable sods from several profiles[42] showed that "length" varies from 20 to 80 cm. Most measured "lengths" are between 50 and 70 cm. For most sods in profiles we cannot say if we are looking at the short side (width) or long side of the sod. It may well be that "lengths" at the lower end of the range (20-35 cm) are actually the short sides of sods. Also, sods will often have been cut through diagonally by the profile. In those cases, it is not their length that is measured. Another problem is that many seemingly "long" sods may in reality be two (or three) aligned sods that cannot be distinguished individually ("one" sod

41 A-E and B sods were also recognized in mound 3 (van Wijk *et al.* 2009, 100).
42 Trench 105: profile 1, 2, 3, and 5. Trench 106: profile 4 and 6.

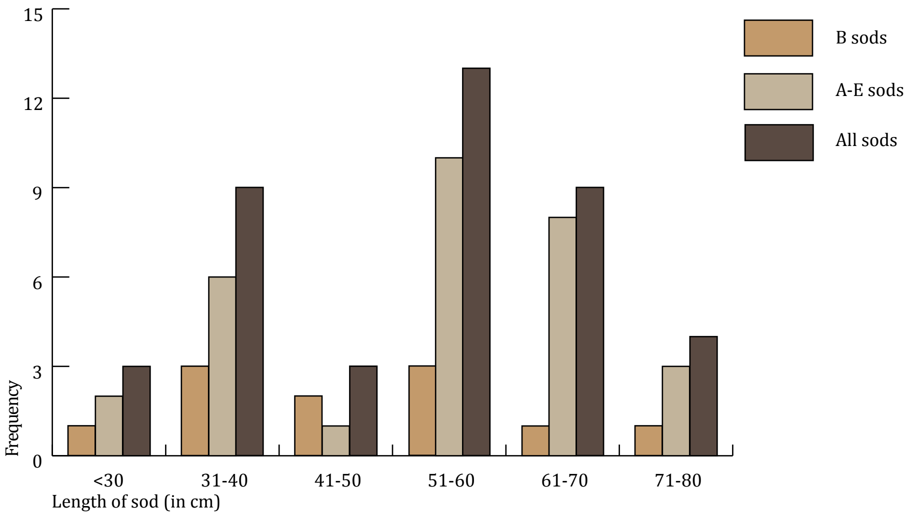


Fig. 4.24 "Length" of A-E and B sods as measured in profile sections. As sods may be cut through diagonally in a profile, these are not the actual lengths, but they do give an indication on the comparison between A-E and B sods. Measurements are grouped in arbitrary classes, the frequency of which is indicated on the Y-axis. Figure by J. van Donkersgoed.

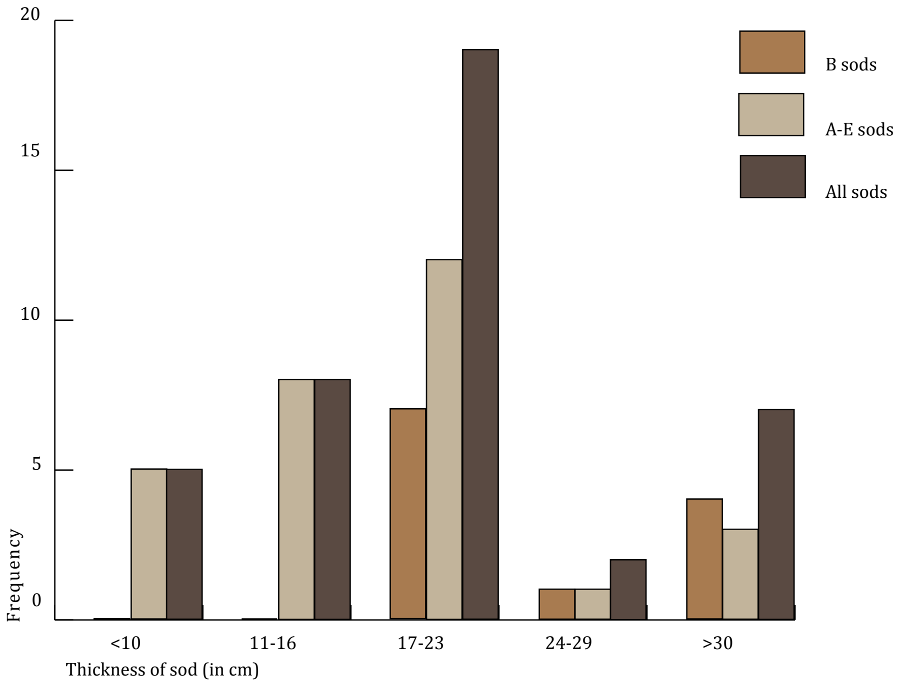


Fig. 4.25 Thickness of A-E and B sods as measured in profile sections. Measurements are grouped in arbitrary classes the frequency of which is indicated at the Y-axis. Figure by J. van Donkersgoed.

of 80 cm may in reality be two aligned sods with a length of 40 cm each). As most sods included in figures 4.24 and 4.25 were not in horizontal position, but in a variety of skewed positions, it is very likely that their section, as recognized and drawn in the profile, is not the same as length or width proper. The same applies to measurements of thickness. These vary between 10 and 45 cm.

In spite of all the pains taken to draw the hundreds of sods in the surface, they do not give a good indication of length and width. Most were in a diagonal or otherwise skewed position, and are therefore hard to measure from the excavation level.

Summing up, we are dealing with roughly rectangular sods, most of which are of A-E type, but some of B type. The latter can be thicker than the former, but this is not always the case. Sizes were not standardized. Sizes can be expected to have been in the following ranges: length (50-70 cm); width (estimated 20-35 cm);

height (10-30 cm for A-E sods and 18-45 cm for B sods). If we compare this to the evidence gathered in a similar way from sods in mound 3 of the Zevenbergen, we find that 66% of all measured sod "lengths" of mound 3 range between 40 and 60 cm (van Wijk *et al.* 2009, 98)[43]. The mean thickness of sods there is indicated as between 8 and 18 cm. This suggests that the sods used for building mound 3 were somewhat smaller than those used for mound 7.

Inverting sods

The majority of sods was placed with the vegetation side (A horizon) downwards (84% out of a total of 171 sods measured in profiles). We see the same in all other burial mounds of the Zevenbergen, as well as in other excavations where photographs or drawings of sods have been published[44]; building a barrow by placing sods with the vegetation side downwards was not a local habit, but standard practice. We assume that this way of placing sods was preferred because the side with vegetation has the best coherence.

Spilt sand: evidence of transportation of sods?

In a few places we found a very thin layer of grey sand on the prehistoric surface and covered by sods placed in inverted position. During the excavation, this was interpreted as a *strooisel E*, which more or less means "spilled E" (Fig 4.23). This greyish sand is similar to the leached out sand that we normally find in the E horizon of the sods. As the bottom of the sod, usually the E horizon, has less consistency than the top with vegetation, chances are that some of this greyish sand could occasionally spill when sods are moved. Alternatively this could be local drift sand from nearby exposed (from sod cutting?) areas. Such very thin, grey sand layers were recognized for the first time during the 2004 excavation of mound 3 (De Leeuwe 2007, *pers. comm.*). In the first case its presence could imply that here sods were handed over with the vegetation side upwards and that they were inverted only just before being deposited. It goes without saying that such a tiny layer will go unnoticed when the A horizon of the prehistoric surface is lacking, or when the first sod to be placed on an intact surface has the vegetation side upwards (in that case the E horizon is placed on the prehistoric surface).

Sods with vegetation side upwards

A minority of sods was placed with the vegetation side (A horizon) upwards. When they were part of multiple rows of sods, we could not find a clear preference for the position of such sods. Five sods with their A horizon upwards were placed on the prehistoric surface, six were in an intermediate position, and we found two in the highest sod layer (which is not the original top of the mound, see above section 4.4). In profile 3 of quadrant 105 (Fig. 4.15), the recognizable sod layer was only two sods thick. At the outer flanks of the mound, practically all sods had been placed with the vegetation side upwards (Fig. 4.26).

We would expect that the top layer of sods had the vegetation side upwards: this allows for quick re-growth, and hence a quick stabilization of the mound. However, as the top layer of sods has not been preserved this cannot be proven

43 Out of a total of 74 measured sods in the profile (as here the entire mound was investigated, more information was available).

44 For examples from the southern Netherlands: Oss-Zevenbergen (Fokkens *et al.* 2009); Oss-Vorstengraf (Fokkens/Jansen 2004); Someren-Philipscamping (Modderman 1962/1963); Alphen (Beex 1964); Toterfout-Halve Mijl (Glasbergen 1954a); Apeldoorn-Echoput (Fontijn *et al.* 2011).

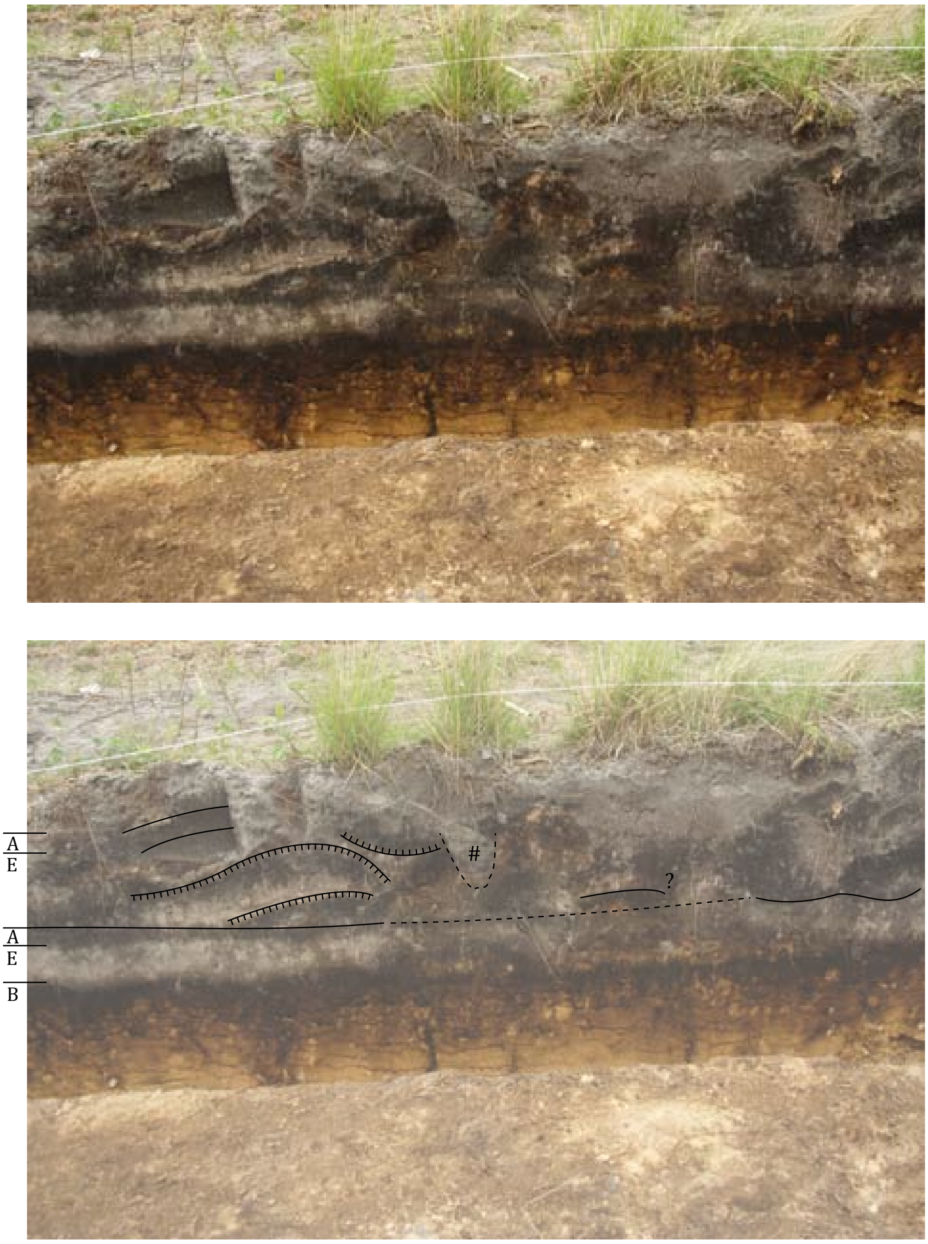


Fig. 4.26 Profile section 105.3. Although most sods have the A horizon downwards, at the flanks of the mound this was sometimes reversed. At the left of the picture, at least two stacked sods are visible that have their A horizon upwards. Figure by Q. Bourgeois/J. van Donkersgoed.

(*cf.* van der Linde/Fontijn 2011, 53). We also lack evidence for such a practice from cases where we have multiple phases of sods in one mound (like in the case of mound 2 of the Zevenbergen*;* van Wijk 2009, 74-88).

We will now describe the general orientation of sods for each segment in each quadrant (N-S to baulk profile), combining evidence on horizontal and vertical stratigraphy.

Orientation of sods: easternmost segment of 105

In the easternmost segment of quadrant 105 (Fig. 4.12 and 4.13) sods can be recognized from the centre to ca. 8 m to the south. Going further down slope, there are no longer any sods. In the innermost zone sods are not easy to recognize, but here we find a few thick B sods that have been placed slantwise. It connects with A-E sods to the south that are placed horizontally, each sod half overlapping the two sods beneath it, in at least three layers, but not in such a regular position as in the centre of trench 106. From there, sods in an angled position, tipped towards the centre and very neatly placed like tiles of a roof were built against this "core" (Fig. 4.3).

A disturbance (the Late Medieval grave) prevents us from seeing the precise transition between the horizontally stacked "core" and the diagonally placed sods (Fig. 4.19). In the profile of the baulk, however, we see horizontally placed sods dipping downwards on both sides, creating a depression that was filled with sods at a later stage (Fig. 4.14). This was certainly not a smooth transition, but rather gives the impression that two systems of placing sods met and were joined in an *ad hoc* fashion. In the horizontal level[45], we do not have much information from the centre of the mound. Beyond the centre, sods were placed both parallel and perpendicular to the radius of the mound. In the outer ring of sods, again horizontally placed sods are stacked against those of the diagonal zone (Fig. 4.13). They were placed in overlapping position (cross bond). Two of the highest visible sods here have the vegetation side upwards.

Orientation of sods: westernmost segment of 105

In the centre we found sods placed slightly slantwise, among which a few B sods. This way of ordering continues when going down slope. Here, sods were not neatly placed like the roof tiles as we saw in the other segment of 105 (and in 106, see below). Down slope, one layer of sods is recognizable in the profile and most sods at the flanks have been placed with the A horizon upwards (Fig. 4.26). Sods could not be recognized in the corner of the quadrant and in one zone between the centre and the outer flanks (Fig. 4.12). In the other zones of this segment, most sods have been placed in a tangential position to the radius of the mound.

Orientation of sods: westernmost segment of 106

In the corner of the quadrant, at the location of the central find assemblage, sods have been stacked horizontally. Up to four layers can be recognized (Fig. 4.13). Some of the sods in the higher positions are among the thinnest examples recognized in this mound. 4.5 m to the north of the corner of the quadrant, the horizontal way of stacking is replaced by diagonal stacking (Fig. 4.13, 4.18, and 4.27). Just like in trench 105, we find sods placed slantwise, pointing towards the centre. The core of horizontally placed sods and the outer rim of diagonally placed sods intersect and were built in one session (Fig. 4.27).

We are not dealing with a core that at a later stage was extended by adding sods.[46] The diagonally placed sods are not as neatly ordered as we saw in trench 105 (as in Fig. 4.3 and 4.19), and further down slope sods are mostly in horizontal position. Here a few have their A horizon turned upwards. In the horizontal plane, we have evidence from three levels. In the westernmost segment, we see that most sods are oriented more or less parallel to the radius of the mound. This is true for both level 1 and level 2. The lowest level is different. Here we cannot recognize a dominant orientation (Fig. 4.28). A local depression seems to have been arbitrarily filled in with sods.

45 Based on level 2, as 1 and 3 did not yield traces of sods.
46 As we originally thought and was brought out in the reconstructions depicted in van Ginkel *et al.* (2009).

Fig. 4.27 Profile section 106.3. Transition of sods placed horizontally (left, on top of the central find assemblage) to a slantwise ordering (right). Figure by Q. Bourgeois/J. van Donkersgoed.

Orientation of sods: easternmost segment of 106

Due to the presence of badger tunnels (that later collapsed) we lack evidence on the orientation of sods in the easternmost segment of 106 (Fig. 4.12). In the SW-NE profile (Fig. 4.14) we see that from the centre to the flanks sods have been placed more or less in an overlapping horizontal position with no marked changes in orientation. Evidence from the horizontal levels (here only available from level 1 and 2, both disturbed by collapsing badger tunnels) shows that there is no prevailing orientation visible among the sods at level 1. Those at level 2 tend to be oriented parallel to the radius of the mound.

Orientation of sods: 115

In this small trench, and in the later excavated part of the N-S profile over the central find assemblage, it could be seen that in 115 sods were placed in a horizontal position (Fig. 4.29). Due to the small size of this trench, it was somewhat

Fig. 4.28 Trench 106, level 3, from the north. Here, one sees the lowest layer of sods. These are rather arbitrarily organized (compare with Fig. 4.4). Figure by Q. Bourgeois/J. van Donkersgoed.

more difficult to recognize a general trend in the orientation of sods. For all three levels, the few recognizable sods are in a perpendicular position to the radius of the mound.

Conclusion: general trends in the orientation of sods

Bringing all observations together, we find that in the centre at least four layers of sods were all placed in a horizontal position. On top of the central find assemblage, the ordering of sods is very regular. Just to the south of the central find assemblage, in the corner of quadrant 105, sods are also horizontally stacked, but in a much less regular fashion. Thus, the sods in the centre form some sort of "core" that is positioned in the corner of trench 106 and 115. To the north and south of it, sods were placed slantwise. Horizontally and diagonally placed sods intersect and are part of one construction, built in one phase.

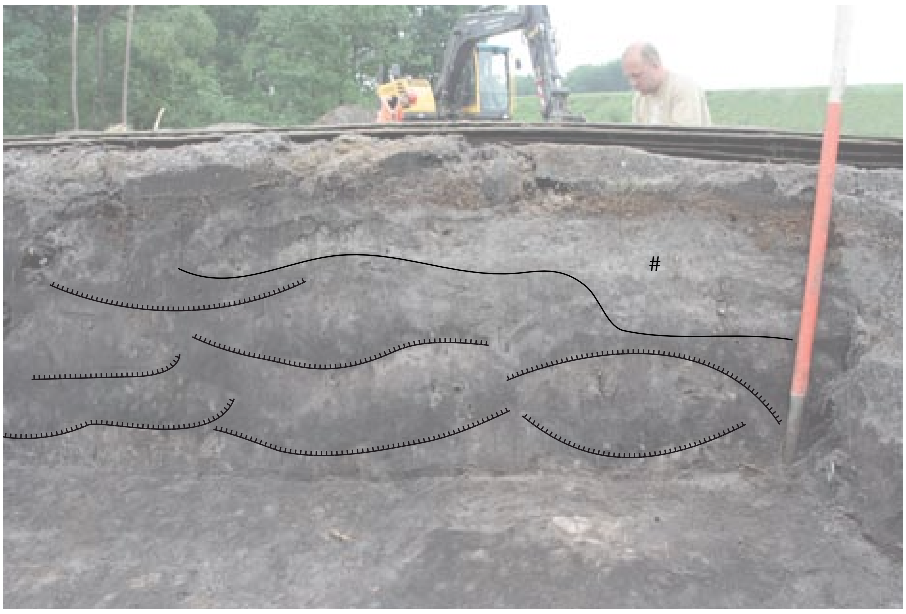


Fig. 4.29 N-S profile of 115, showing horizontally stacked sods. Figure by Q. Bourgeois/ J. van Donkersgoed.

Placing sods slantwise was done in different ways. In one zone in the SW-quadrant (105), sods have been very neatly placed, like roof tiles (Fig. 4.3 and 4.19). This way of ordering is not repeated in the other quadrant. If one reaches the lower ends of the natural elevation, the slantwise ordering turns into a more horizontal one, where sods are more or less placed with the sods half overlapping the two sods beneath. Usually we find at least three layers of sods, but only one at the western end (trench 105). Everywhere, we see a smooth transition from the sods layer to the natural contours of the mound: there was no "step" or marked break between the artificially raised mound and the natural elevation on which it was built. At the lowest level of trench 106 a depression appears to have been filled with sods first, possibly to create a gentle slope that was further heightened with sods. So what people were doing here was raising the higher parts of a natural elevation, mainly by accentuating its existing contours, and by smoothing existing irregularities of the surface. The result of this was a mound 36 m in diameter, of which the sod-covered part is only 22.8 m in diameter.

There are minor local differences in the way in which this was done. In the western segment of the SW-quadrant (trench 105), many sods have been tangentially placed, while there seems to have been a preference for placing those in 106 parallel to the radius of the mound (at least on our higher levels 1 and 2). These kinds of differences are not unique to the Zevenbergen barrows. We also saw them in barrows of another region where detailed attention was given to the drawing of sods[47]. Another difference is that we find more B sods in the southwestern quadrant than in the northeast one. We find them particularly in the corner of trench 105. We cannot find a functional explanation for these differences.

As several people may be expected to have been involved in the construction of the mound, such minor differences might indicate that several groups of people were building in the south and the north at the same time, each with their own way of working. The incongruity noted in one place in the eastern segment of trench 105 might then represent a location where different building systems met and had to be somewhat realigned[48].

4.5.6 The central find assemblage

The centre of the mound obviously holds the key to understanding the motivation for covering an already existing, prominent elevation with sods. The assemblage of charcoal and bronze is undoubtedly the most complex find of this excavation. We will describe it in detail in the next chapter. Here, we will only discuss the stratigraphical position of this find assemblage. As can be seen in figure 4.22, the assemblage is covered by A-E sods that have been placed in a horizontal position with the A horizon downwards. The charcoal and finds rest on a greyish E horizon. There is no A horizon visible here, which means that the surface must have been truncated before the bronze and wood came to lie here.

4.5.7 The absence of a peripheral structure

During the excavation we saw many similarities between this mound and mound 3, which was excavated three years earlier. As the latter was marked by posts, we were expecting to find something similar here. Due to secondary podzolization and disturbances by cart tracks from historic periods, the flank of the mound had a broad zone where features, when present, were not always easy to read (*cf.* Fig. 4.4). For that reason, the entire flank was excavated manually, in order to not miss faint and shallow remnants of possible posts or ditch fills. Both in the horizontal plane as in the profiles, however, we could not recognize traces that qualify as peripheral markers of this barrow. Readability of this zone was such that we can positively state that there was nothing like a ring ditch or post circle in trenches 105 or 106.

4.5.8 Traces underneath the barrow: an eight-post structure

When we deepened the SW-quadrant (trench 105) to level 3, we discovered a group of eight features that we interpreted as the remnants of a double post-alignment (Fig. 4.11 and 4.30).

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47 Echoput mound 1 and 2; *cf.* van der Linde/Fontijn 2011 and Bourgeois/Fontijn 2011.

48 Another local variety is that at the western edge of trench 105 most sods had been placed with their vegetation side upwards.

Fig. 4.30 Trench 105, level 3, looking to the south. Traces of posts underneath the barrow, interpreted as an eight-post corridor. S 5 may be a blocking post. Figure by Q. Bourgeois/ J. van Donkersgoed.

The features are situated at the flank of the natural elevation, and by extrapolation of what we can observe in the E-W profile, all features were covered by sods, with the possible exception of S 10 and S 12 that are situated just beyond the area that was stacked with sods. As can be seen in figure 4.11 and 4.30, S 7 to S 10 are aligned, and so are S 12, 13 and S 15. The position of S 14 deviates slightly. Both lines are almost parallel to each other and oriented southwest-northeast. Measuring from the boundaries of the recognized features, distances vary between 1.10 to 1 m in north-south direction (closer to the centre of the mound the post traces are closer to each other). In east-west direction, distances are 1.60 m. S 10 and S 12 have a somewhat larger distance to the other post traces.

The features are comparable. They have a round shape with a diameter of 25 cm, and a light grey fill at the top; all can be classified as traces of postholes. In section, they have a rectangular and sometimes rounded form, ranging from 35 to 53 cm below the excavation level. The pits of S 12, S 13, and S 15 were dug through a soil that had already seen significant illuviation (Dutch: *fibers*). However, in the case of S 8 and S 14, the fill of the posthole itself shows traces

Fig. 4.31 Trench 105, sections of S 8, S 9, and S 10. Figure by Q. Bourgeois/J. van Donkersgoed.

of illuviation. The fill of the postholes is often patchy (greyish-brown; Fig. 4.31) and for at least three features it is clear that we are dealing with traces of postholes where the posts had been removed at some later stage (S 8, S 9, and S 10). Patches of charcoal were found in a number of features, (S 8, S 9, and S 15).

At the eastern end of this structure, there is one more feature of a posthole: S 5. It has a comparable shape and fill, but is not as deep (only 25 cm) and the fill has seen illuviation. It is situated to the east of S 15 and S 7, and if we draw an imaginary line between the latter (1 m long), S 5 is not in the middle, but somewhat more to the north. In view of its similarity to the other features, we assume that it has a relation to the structure.

The ordering and similarities between the features, and the lack of other features in the immediate surroundings, indicate that we are dealing here with the remnants of what once was one construction[49]. Posts may have been placed to demarcate some sort of corridor, and given the depth of most postholes we must be dealing with a quite substantial construction (*cf.* Arnoldussen 2008, 72). It is possible that the posts supported a roof. In both cases, S 5 does not fit in. If we are dealing with the demarcation of a corridor or *allée*, S 5 seems to symbolically close it (in which case it was placed at a later stage than the other posts).

49 Other discolourations that we initially interpreted as features appeared to be either natural in origin or of recent date (S 6, S 11, and S 17).

By its stratigraphical position, the posts pre-date the construction of the mound (they were covered up by the sods: there are no traces of the posts at level 2. We lack clues for finer dating. Some charcoal (1.5 g) was found in S 15 (V 253) and submitted for C14-dating. Unfortunately, the sample was too small to yield results.

Eight-post structures are known from (Bronze Age) settlements, where they are interpreted as remnants of sheds (Arnoldussen 2008, 232 ff, fig. 5.35: type RH8). There is nothing, however, which suggests that we are dealing with remains of a pre-barrow settlement here.

Another parallel that comes to mind are the many remarkable post alignments that were found around the Zevenbergen barrow group in 2004 (chapter 16; van Wijk *et al.* 2009, fig. 6.44). We are dealing with several post alignments, which are sometimes flanked by two or four-post constructions. They seem to mark out divisions in the barrow area, and symbolize directions along which people were supposed to move. Our eight-poster, however, is different from the other post alignments because it is a double row. The distances between the other post rows and four-posters at Zevenbergen are also different from our example, and all the other post rows were found *outside* barrows, and not *underneath* them, as they were here. For these reasons, our eight-poster indeed may have been an *allée,* a corridor related to funerary activities that took place here. Examples of such cor-

Fig. 4.32 Excavation plan of Oss-Vorstengraf showing the parallel for the eight-post structure of mound 7. Figure after Fokkens/Jansen 2004, 130/J. van Donkersgoed.

ridors or lanes are known from other burial mounds. They are thought to direct movement (funerary processions) to barrows. The best-known example in the Netherlands is mound 75 of the Noordse Veld at Zeijen in Drenthe (Glasbergen 1954b, 153-155). This example also has a closing post at one end.

Considering the possibility that our eight-post construction was such a corridor, the question arises what it might have directed to. Although one might be inclined to think of what happened at mound 7 first, it is necessary to consider mound 6 as well. The eight-post construction is not oriented on the centre of mound 7 at all (*cf.* Fig. 4.11). It is aligned, however, to the central axis of mound 6 (see chapter 3, Fig. 16.5). Does this mean that it was primarily built in relation to mound 6? Unfortunately, this question cannot be answered with a "yes" or "no" as we lack evidence on the dating of the eight-post construction. After all, the construction can also be seen as leading to the corner of quadrant 105 where evidence of Bronze Age activities was found (see next section). The construction could also have something to do with what happened at the higher parts of what later would become mound 7 during the Iron Age.

There is, however, an intriguing parallel from the near vicinity. Just outside the Zevenbergen, the post row of the nearby Oss-Vorstengraf comes to mind (only some 400 m away). Here, the excavators found a 16.5 m long post alignment that was also situated westnorthwest-eastsoutheast. The structure was made up of the traces of many posts, the majority of which seem to form one corridor flanked by posts on each side (like here), but it was clearly much longer. Closest to the centre of the mound, we see three more or less parallel corridors (see Fig. 4.32).

As a whole, the post configuration is somewhat irregular. It seems to have been made up of several "units". One of these units consists of an eight-poster that ends with a closing post that was not immediately placed in the middle. So this unit is comparable to what we found underneath mound 7. Just like in our case, the Vorstengraf *allée* was partly situated underneath the Early Iron Age barrow and thus predates the construction of the Early Iron Age barrow. In contrast to the one under mound 7, the Vorstengraf example runs fairly straight in the direction of the Iron Age interment and is situated to the east of it, instead of to the west. Fokkens and Jansen (2004) relate the Vorstengraf *allée* to an older Bronze Age barrow that was later covered by the huge (D. = 53 m) Early Iron Age mound.

With all this in mind, a relation between the eight-post construction and the funerary use of this area seems the most likely. For its orientation a link between activities around mound 6 seems the most probable.

4.5.9 Pre-barrow traces: a Bronze Age pit

In the corner of the SW-quadrant three oval discolourations were recognized at level 3: S 1, S 2, and S 3. The level was created at the top of the E horizon of the original surface underneath the sods. The features were not easy to recognize. In section, S 2 appeared to be a natural feature. The section of S 3 partly collapsed. We could only make a section through the remaining part. It seems to be a disturbance of the original soil that was heavily disturbed by bioturbation and could not be interpreted with certainty as an anthropogenic feature. For S 1, however, we can be more confident. This is the fill of an oval pit (l. 58 cm, w. 60 cm).[50] In section, it has an irregular shape (see Fig. 4.33). The bottom of its deepest part (depth 15 cm) contains a large amount of charcoal (Fig. 4.33).

50 On figure 4.11, S 1 is the longitudinal feature in the corner of the SW-quadrant.

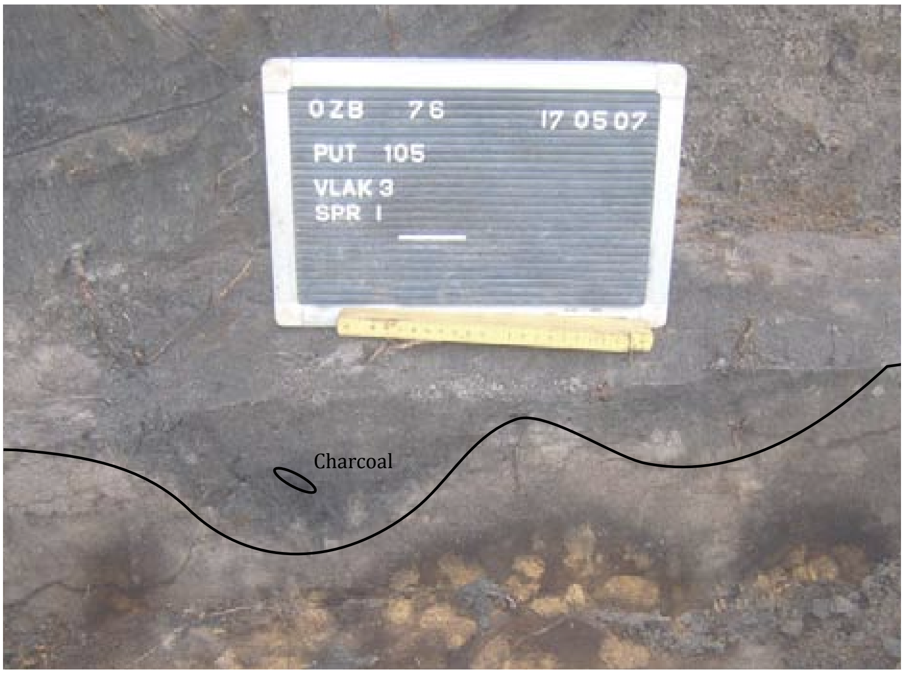

Fig. 4.33 Trench 105, section of S 1, from the west. Note the amount of charcoal at the bottom of the pit. Figure by P. Valentijn/J. van Donkersgoed.

A sample of 53.2 g was sent in for C14-dating (V 227). This yielded a date of 3400 BP ± 35 (GrA-41265). After calibration with Oxcal V4.1 this comes down to a date of 1870-1840 cal BC (2.7%) and 1780-1610 cal BC (97.3% at the two σ range): the Middle Bronze Age A. So, at some moment during that period, people lighted a fire here and left the remains in this pit. It is unclear what sort of activities took place here at that time, but it does show that this natural elevation was used long before the barrow was built. It should be noted that we found hardly any features under any other barrow at the Zevenbergen.[51]

51 Two features dated to the Late Neolithic A were found underneath mound 2. The subsoil of mound 4 has been disturbed in prehistory (van Wijk *et al.* 2009). For a further discussion of such pre-barrow features, see chapter 16.

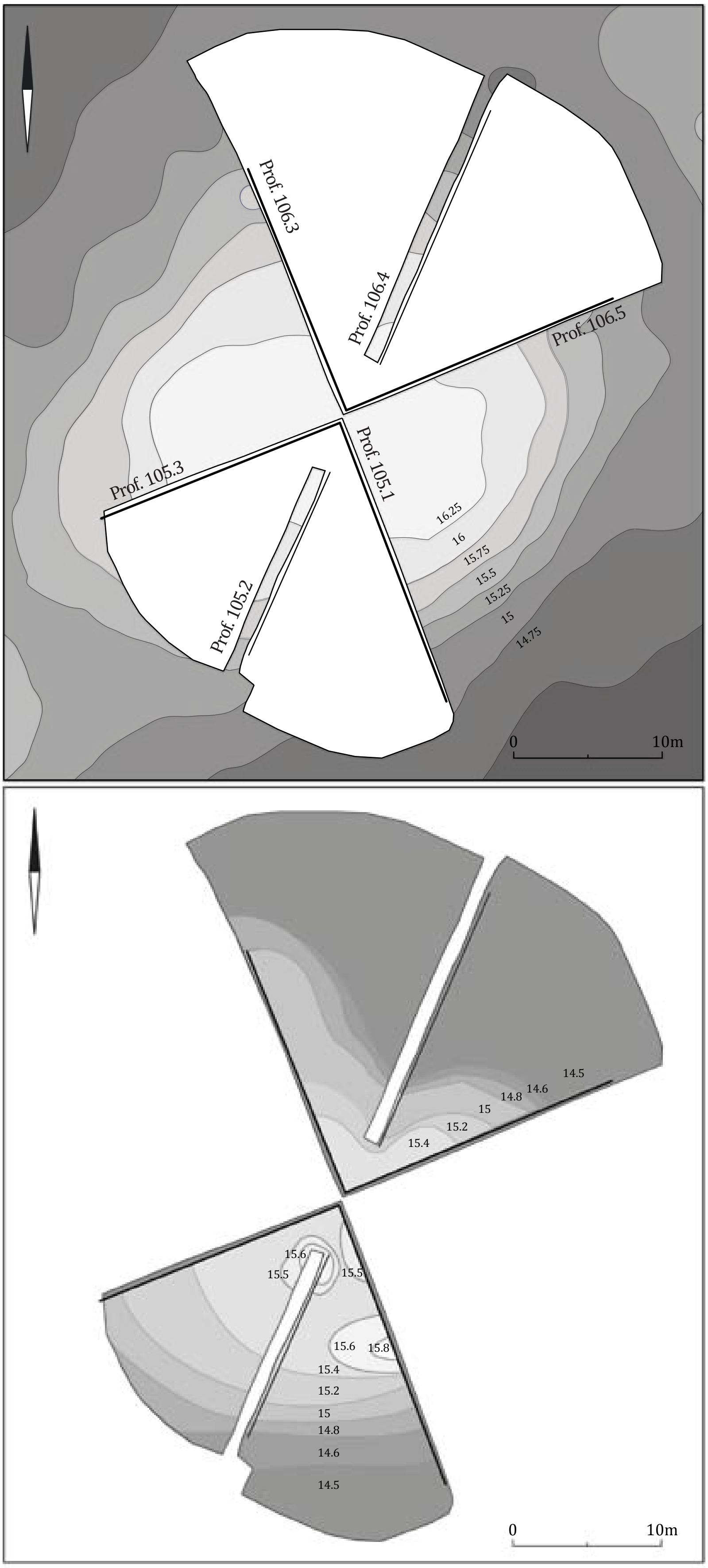

Fig. 4.34 (top) The contour lines of mound 7 at time of excavation. (bottom) Reconstruction of the original surface of the natural elevation that was covered by the sods of the mound. Figure by J. van Donkersgoed.

Fig. 4.35 Trench 105 as seen from the south, showing the contours of the original elevation. Figure by Q. Bourgeois.

4.5.10 The natural elevation underneath the sods

As set out before, the barrow was situated on a natural elevation, but its precise contours could not be prospected before the excavation. On the basis of our profiles, we are now able to give an idea of what must have been the contours of the original natural elevation just before the sods were placed on it. In front of all profiles, we dug a small trench (ca. 30 cm wide and 30-40 cm below the top of the prehistoric surface), to allow us to study the subsoil underneath the mound as deep as into the B-C or C horizon of the elevation. See figures 4.13 to 4.15 for all profiles. Figure 4.34 shows a reconstruction of the original height of the natural elevation. It makes clear that it originally did not have a round shape.

Particularly at the northeast (the lee of the dune), the slope is steeper. Sod stacking was much more intensive at this side than at the south side (filling in the depression at the lee side). Apparently, it was important to create a smooth round mound. Figure 4.35 shows the contours of the south side of the original dune after the sods were removed in our excavation.

The natural subsoil consisted of fine-grained sand. Gravel was not observed. In most places we found the normal sequence of a Humus Podzol (in Dutch: *haarpodsol)*. As mentioned before, in some zones the A horizon was absent (Fig. 4.18). This implies that the top of the mound was stripped before sods were placed on it. As the E horizon has the same thickness everywhere, only the A horizon is lacking. It is unlikely that the stripped parts represent areas where sods were taken to build barrows. All our sods have an A-E or even an A-E-B horizon. The stripping must have been done in order to remove vegetation. At least, the time in between the removal of the top (vegetation) and the stacking of the sods lasted short enough to prevent the formation of an A horizon. As can be seen in figure 4.13 to 4.15, the A horizon is present in most of the excavated mound. It is absent in the centre of the mound, where the central find assemblage is situated, and also in a small zone halfway the southern and western flank. This implies that small parts of the original elevation vegetation on the top were stripped. For the zone that would become the centre of the barrow, where we found the urn and the charcoal, it is well possible that stripping of this area was part of the preparation of this place for funerary practices (the construction of a pyre and burning of the deceased, see next chapter).

4.5.11 Deviations in soil formation

On the northern flank of the natural elevation, underneath the sods, there are deviations in the soil profile. The surface under the centre of the mound (where we found the central find assemblage) shows the normal Podzol horizons (except for the A horizon, see previous section). The centre is rather flat, but a few metres to the north (Fig. 4.13 to 4.15) there is a slope. Here we find an E and B horizon underneath the A-E-B sequence at the top (Fig. 4.13). The lowest E horizon shows traces of illuviation from above, and in all cases there is no developed A horizon visible. This situation can be explained by assuming that a Humus Podzol soil developed first, which perhaps became stripped of vegetation at a later stage (the absence of a developed A horizon). Then, this soil became covered by new (aeolian) deposits at a later stage, in which soil development again took place. We find this phenomenon at the northern slope of a natural elevation which is in line with sand deposition by wind (by prevailing winds from the southwest). A comparable double Podzol soil was also recognized at the southern foot of the mound (Fig. 4.13). We are dealing here with aeolian deposits.[52] Double Podzols, evidencing aeolian deposits, are known from other locations at the Zevenbergen site: in the eastern part (van der Linde/Fokkens 2009, 51) and mound 5. The latter has even been interpreted as a natural dune where at a later stage (during the Bronze Age) new aeolian sedimentation took place (Exaltus 2009, 192-194; van Wijk *et al.* 2009, 110-115).

4.6 Dating the barrow

Two features that were clearly covered by sods were C14-dated. The first is S 1 in trench 105 (charcoal from a pit fill, see section 4.5.9), which was dated to the Middle Bronze Age A after calibration. The second, and most relevant, dating comes from three charcoal samples taken from the find assemblage in the centre of the mound (V 189, V 190, and V 209).[53] As argued in section 4.5.6, this material was placed on top of the original surface of the mound, and covered by the sods (Fig. 4.22). V 189 and V 190 were found above what would be square F/8 in the lifted block V 1001; and V 209 was found above what would be square F/3 in the lifted block V 1001 (see Fig. 5.2).[54] In order to minimize the margin of error we selected two charcoal twigs (V 189 and V 190). V 209 is a fragment of a larger piece of charcoal. We also sent in a sample of cremated bone from the urn

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52 The entire profile has been sampled for OSL-dating by dr. J. Wallinga and P. Lemmers (MSc) of the University of Delft. Preliminary results are reported in an unpublished thesis (Lemmers, p. 2008). Unfortunately, when this book went to the printer, the definite results were not available. Lemmers' results suggest that the top aeolian layer has to be dated to ca. 5000 BP (the Neolithic). The other aeolian deposits at the Zevenbergen are dated to (different phases in) the Bronze Age, *cf.* van der Linde/Fokkens 2009, 51; mound 5, van Wijk *et al.* 2009, 115.

53 V 189: 13.7 g, charcoal twig: GrA-41260: 2550 ± 35 BP; V 190: 10.5 g charcoal twig: GrA-41261: 2445 ± 35 BP; V 209: 27.5 g, charcoal: GrA-41264: 2490 ± 35 BP.

54 Chapter 5 provides further information on the position and nature of these charcoal finds and the fine-meshed grid referred to here.

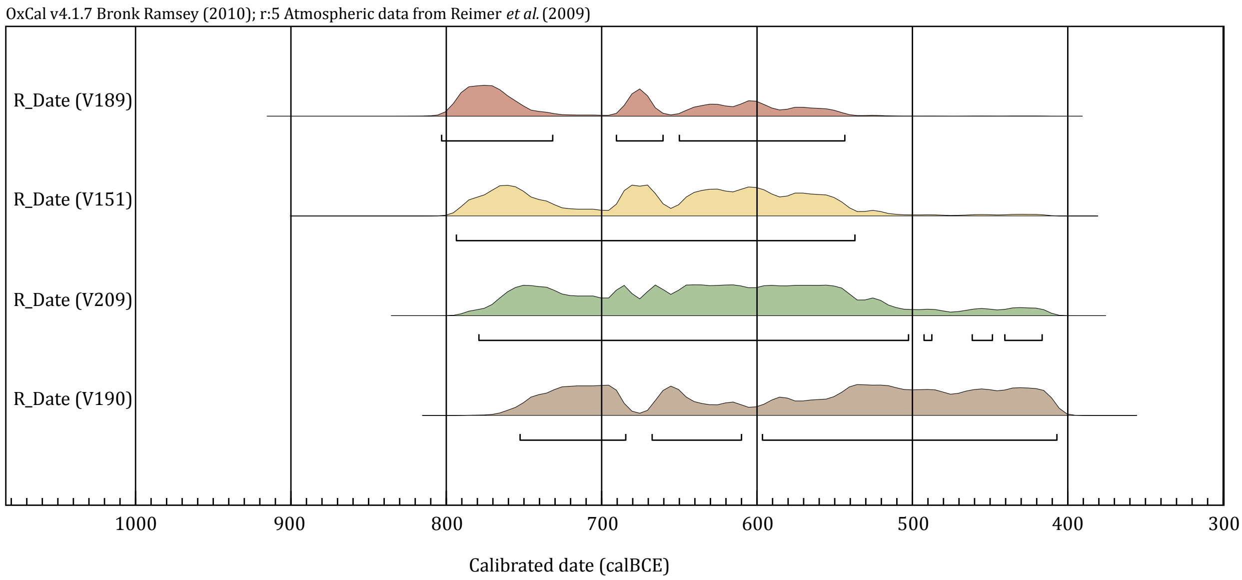


Fig. 4.36 Calibrated C14-dates for various samples from the central find assemblage. Calibrated with OxCal v4.1. Figure modified by J. van Donkersgoed.

(V 151). Wiggles in the calibration curve (the so-called Hallstatt plateau) make it hard to provide a precise dating. Figure 4.36 shows that this comes down to a broad dating of the charcoal in a period which broadly ranges from 800 to 400 cal BC.

Since all wood datings relate to the same phenomenon, we can discard the youngest tail of the dating of V 190 and the oldest tail of V 189. This comes down to a dating between ca. 780 and 520 BC. The dating of the cremated bone from the urn fits in well. Summing up, the C14-datings support a dating of the central find assemblage and central grave to the Ha C period. This is in line with the typochronological dating of the associated bronzes and the urn (chapter 6 and 7). Nothing in the sod stacking suggests that there was a later phase in which the barrow was used again (as was the case for mound 2 of the Zevenbergen; van Wijk *et al.* 2009). The pit containing human bones dated to the Late Medieval Period (S 4 in trench 105) that was dug through the mound is in accordance with this primary dating in the earlier part of the Iron Age.

4.7 Conclusion

The southwest (trench 105) and NE-quadrant (106) of mound 7 were excavated, as well as a small part of the centre of the NW-quadrant (trench 115). This was done by combining sieving, systematic metal detection, and manual and mechanical excavation, in which three levels in each quadrant were investigated. The centre of the mound was excavated by hand in horizontal levels, and the central find assemblage was lifted in blocks that were further excavated in a laboratory. All recognized sods with which the barrow was built were drawn. The flanks of the mounds were also excavated by hand.

Mound 7 was built on a natural elevation which formed in the Late Glacial. At the flanks of the elevation, sand was deposited on top of an already well-developed Humus Podzol, evidencing local drift sands. This may imply that locally areas of this sandy site were without vegetation due to human activities. Preliminary results of OSL-datings suggest that these aeolian deposits date to the later Neolithic, but further research is needed to substantiate this.

During the Middle Bronze Age A, a small pit was dug in the higher part of the southern flank. At its bottom a layer of charcoal was found. We seem to be dealing with the remains of a fire at this place, but for what reason it was lighted is unclear. It can be excluded that we are dealing with the remains of a settlement at this place.

Close to this pit, a remarkable eight-post construction was built. Aligned posts on either side form a corridor which may or may not have supported a superstructure. At its eastern end, there was a post placed that may have (symbolically?) blocked passage. This construction is similar in appearance to one unit in a Middle Bronze Age post alignment found at the Vorstengraf barrow nearby, and has been interpreted as a funerary *allée* relating to the Middle Bronze Age barrow that once stood here before it became covered by the huge Early Iron Age mound. We suggest that the construction that once stood at mound 7 served a comparable purpose, and in this case might have functioned in relation to mound 6 rather than to the funeral activities that took place at mound 7. The posts of this construction were no longer standing there when people started to stack the natural elevation with sods in the Early Iron Age.

Not long before the funerary activities at the natural elevation took place, certain zones of the dune were stripped of vegetation. This particularly took place at the centre, but also halfway the southern and western flank. As will be substantiated in the next chapters: a pyre was built here. An individual was burned on it, accompanied by a number of special (bronze) items. The remnants of the pyre and pyre goods were searched and displaced, and (a part of) the man's cremated bones were deposited in an urn that was buried in a shallow pit just to the south of the burned out remnants of the pyre. This happened during the earlier part of the Iron Age, during the Early Iron Age Ha C period.

The remains of the pyre, as well as numerous bronzes and other artefact (fragments), were covered by heather sods horizontally stacked in at least four layers. Against this core in the centre sods were placed slantwise (to the north) or horizontally in overlapping position (to the south), to artificially raise the already existing elevation. At the northern side, a depression was first filled in with sods, in order to pave a horizontal foundation for other sods. Pains were taken to create a "smooth" transition between the original elevation and the artificially raised surface. This was done to such an extent that an impressive mound arose, which was actually no more than a rather opportunistically raised and filled in natural elevation. Although the mound has a diameter of 36 m, the actual sod-built covered part is only 22.8 m in diameter.

It is clear that the entire mound was raised in one event. Most sods have an A-E horizon and were placed with the vegetation part down. This seems to have been common practice for both Bronze and Iron Age barrows in the Low Countries. Sometimes there are sods where there is also a B horizon preserved ("B sods"). There are deviations in the placement of sods between both quadrants that may have arisen in response to local deviations in the contours of the mound, and/or because of different work parties doing things differently. As the top of the mound is absent in most places, we cannot say how high the mound originally was, nor how it was originally shaped (dome-shaped or with a platform in the centre?). In some places, we presume that at least 30 cm of the original top is absent (at least at the centre).

We did not find any evidence for mound additions from later periods, nor did we find any prehistoric burial that was dug into the mound later. It should be kept in mind though, that only two quadrants and a small part of a third quadrant were excavated. A deep pit, containing the remains of a human skeleton, dates to the Late Medieval period (15^{th} century AD). As a pagan mound in a heath is not a hallowed burial location, we are probably dealing with another victim of a Medieval execution (before, three such Medieval graves were found at mound 2 of the Zevenbergen), and it is well possible that there once was another gallows standing on top of mound 7.

In the centre of the mound, just on top of the central find assemblage, traces of several broad pits probably evidence activities of treasure hunters, who in this case missed both the urn and the central find assemblage. Serious damage was done to the mound later on, when mound 7 housed a badger (family). In the centre two tunnels were dug on either side of the central grave, one partly damaging it. Tunnels and rooms were particularly dug in between the diagonal profile baulk and the W-E profile section in trench 106, leading into the SE-quadrant. Although the mound was severely damaged in this zone, by some whim of fate, the central find assemblage remained largely intact.

Chapter 5

The central find assemblage of mound 7

Sasja van der Vaart, David Fontijn and Patrick Valentijn

5.1 Introduction

As set out in the previous chapter, a very large spread of charcoal, metalwork, bone, and an urn filled with cremated remains was discovered in the centre of mound 7. The concentrations of charcoal were located in an area of roughly 2 by 5 m. As discussed in chapter 4, the charcoal spread was located on top of the old (ablated) surface and had been covered up with sods when the barrow was constructed. This chapter discusses this central find assemblage of mound 7.

Charcoal spreads underneath barrows are usually interpreted as the remains of funeral pyres (Bloemers 1990, 15; Marshall 2011), and already in the field this seemed a likely option. However, the charcoal was distributed over a much larger area than required or usual for "just" a pyre. It was therefore also considered whether the substantial amounts of charcoal might, for example, be the remains of a wagon. In short, under field conditions it was not at all clear what the charcoal spread might be from. The lifting of the find assemblage in several blocks made it very hard to gain a clear overview. To compensate for this and to allow for proper post-excavation analysis the spread of charcoal and artefacts was documented in detail. Both in the field and during the excavation of the blocks in the laboratory of Restaura. Upon completion of all excavations (both the fieldwork and the laboratory ones) the detailed documentation was used to create a 3D-model to allow for a better analysis of the spatial distribution of all the finds and charcoal spreads. How this model was created is discussed in section 5.2. The basic characteristics and find locations of the charcoal, urn, bone, and metalwork are each discussed in their own section. The bone finds, urn, and iron are discussed in more detail and placed in a broader context in chapter 6. One find category, the bronzes, is such a complex find assemblage that they warrant their own chapter to properly discuss their physical appearance, typological parallels, and significance (chapter 7). The remainder of this chapter discusses what the finds and their spatial relations reveal about the activities that took place at this location in the Early Iron Age.

The location of the central find assemblage within the excavation is given in figure 5.1. An overview of the central find assemblage and all artefacts recovered from it is given in figure 5.2.

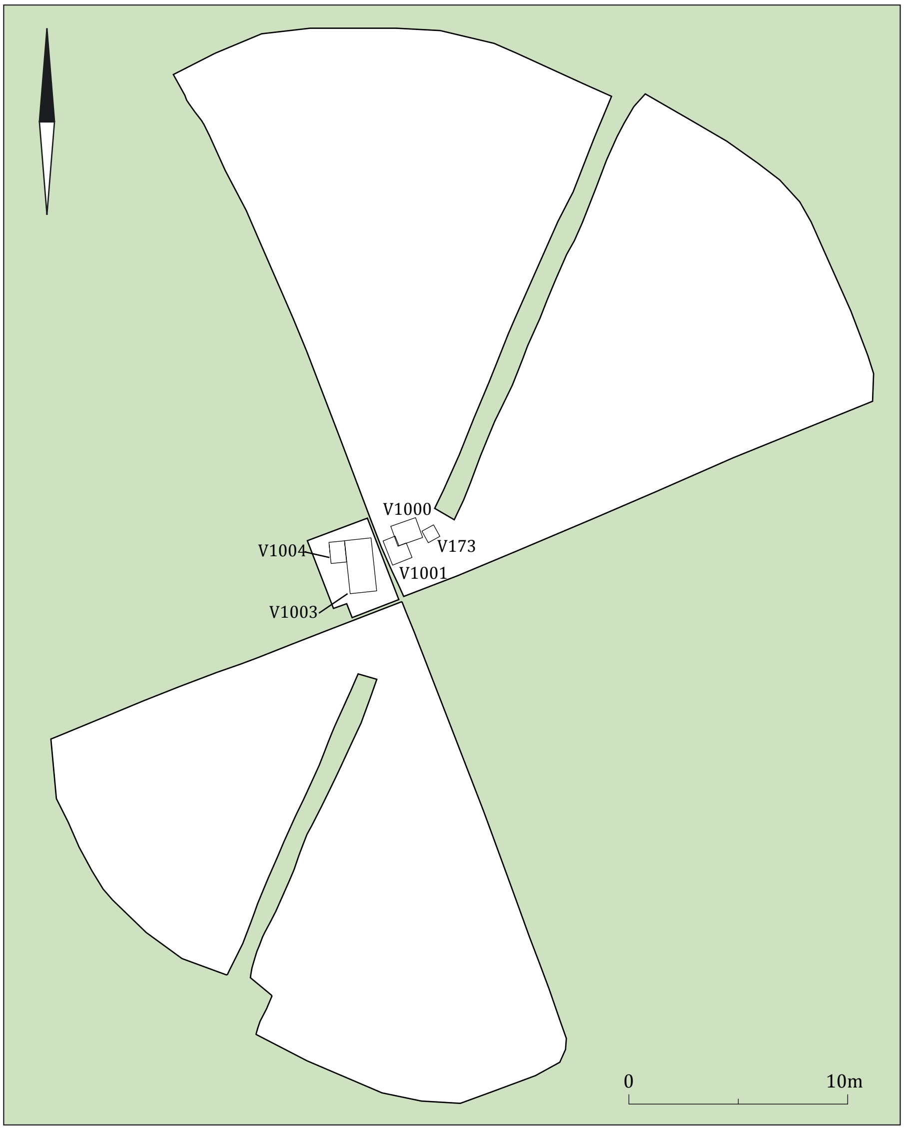


Fig. 5.1 The location of the block liftings (see also Fig. 5.2) within the excavation. Figure by J. van Donkersgoed.

5.2 Interpreting the central find assemblage – creating a 3D-model

5.2.1 Creating a 3D-model

Barrow excavations are often multi-level excavations with a complex stratigraphy, making them very complicated investigations. The excavation of mound 7 is no exception. To ease post-excavation analyses of the complex stratigraphy and find spread, the excavation was modelled in a 3D-reconstruction (Fig. 5.3). This reconstruction was used in visual analyses. This section explains how the reconstruction was created.

The basis of a 3D-model is, of course, xyz-measurements. During the excavation measurements were taken of all levels, profiles, and finds. The measurements were taken with a Robotic Total Station (RTS). As this was the first campaign during which Archol BV used a RTS there were some difficulties with operating it. This resulted in a discrepancy between the z-value of the measurements taken on the first three days of the excavation and those taken on the other days. Luckily, several points were measured more than once, both on the first days and later on.

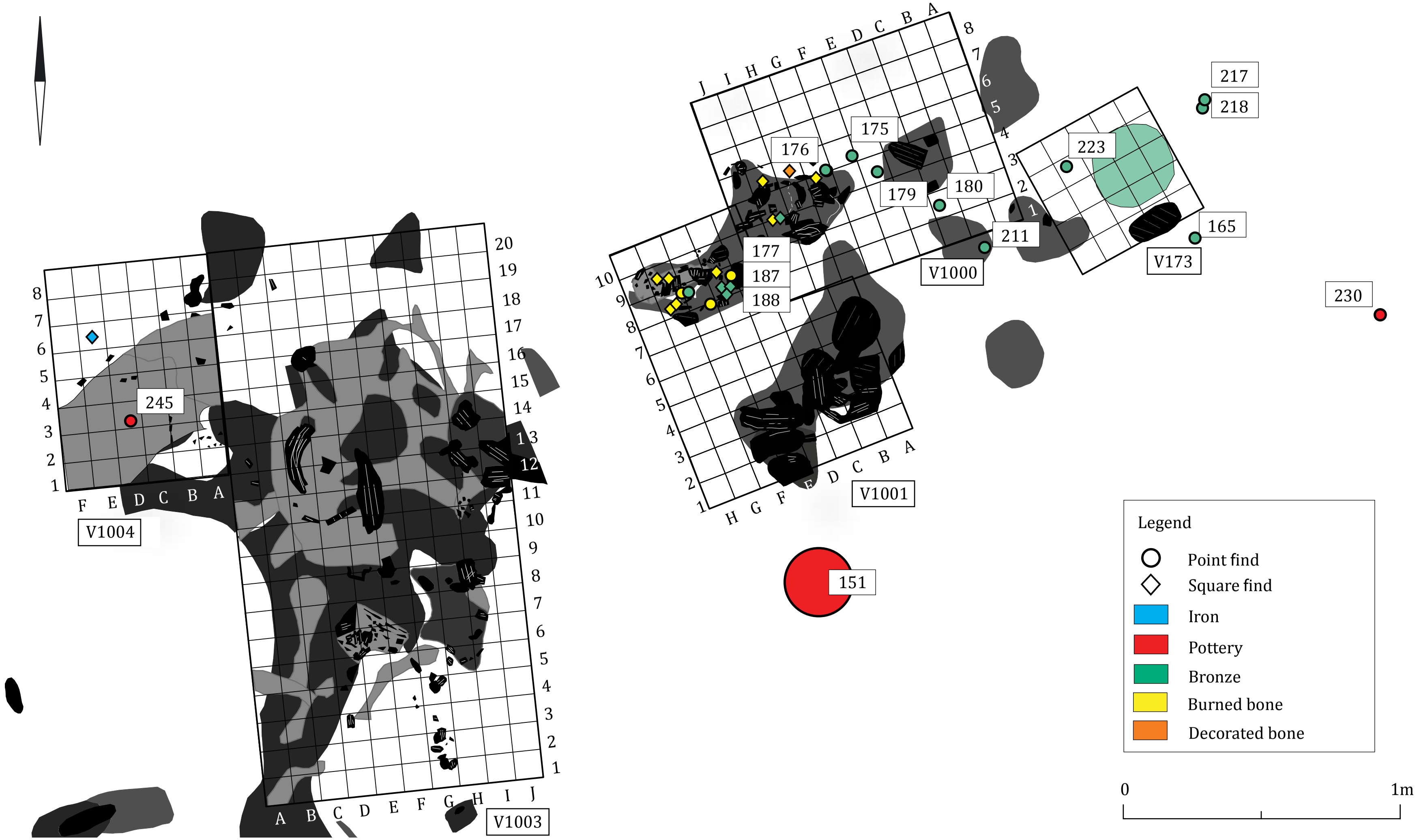


Fig. 5.2 (right page) An overview of the charcoal and artefacts that make up the central find assemblage. Note that only the horizontal relations between artefacts are portrayed, not vertical! The charcoal distribution depicted is a compilation of various excavation levels and therefore represents the maximum distribution. Point finds were lifted by the excavators prior to the Restaura block liftings. Square finds were lifted by Restaura in their lab and recorded per square. Numbers preceded by V (V 1000 for example) refer to the block find numbers, the others to individual finds. V 1003 and 1004 are in trench 115, the rest is in trench 106. Figure by J. van Donkersgoed.

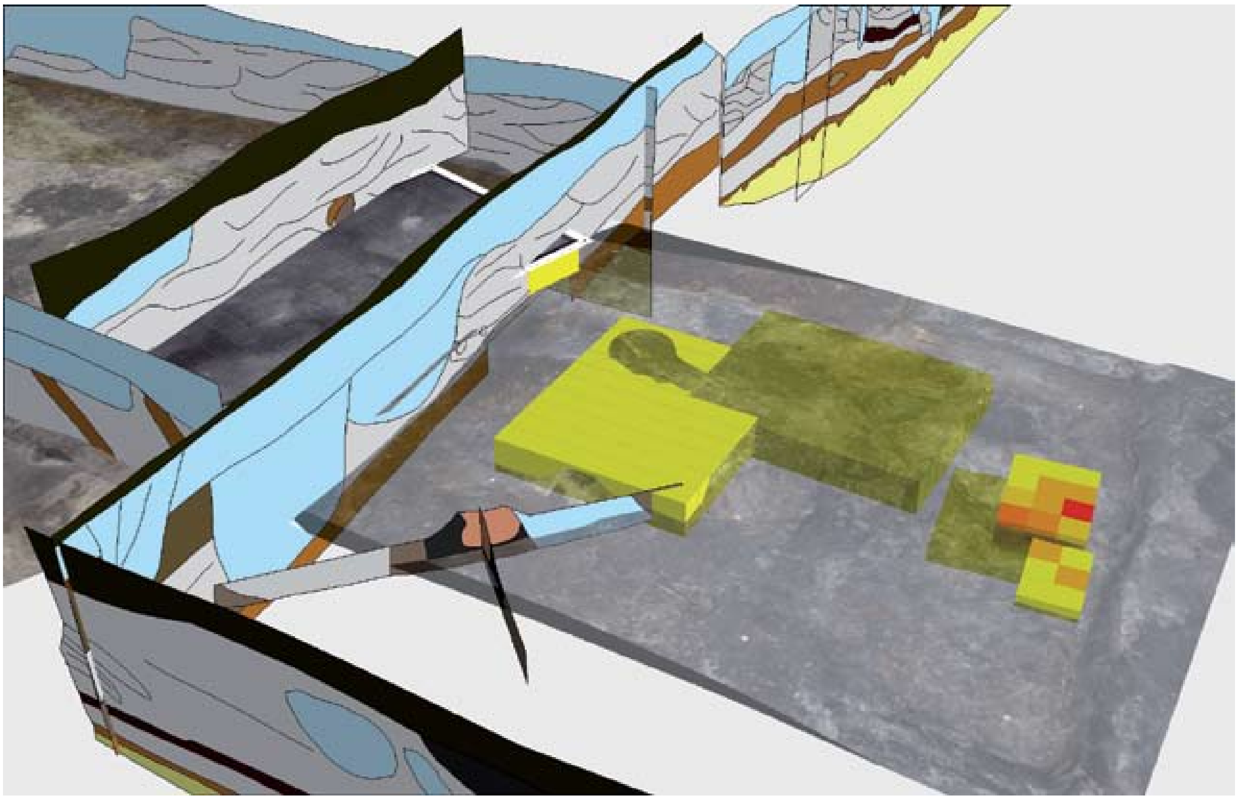


Fig. 5.3 Image from the 3D model showing the central find assemblage. Figure by P. Valentijn/J. van Donkersgoed.

The average discrepancy between the z-value of the two sets of measurements of these points could be established, showing that the z-value of the measurements of the second part of the excavation were on average 1.574 m too high. Subtracting this height brought them to a level that coincides with the measurements of the 2004 excavation campaign.

The corrected xyz-measurements were used to create a 3D-reconstruction with Esri's ArcScene and 3D Analyst tools, an ArcGIS extension specialized in visualization and analysis. The first step in making a reconstruction of the excavation levels was digitizing the excavation drawings of these levels in 2D. Secondly, a Digital Elevation Model for the levels was created by interpolating a raster from the RTS xyz-measurements. These raster surfaces were interpolated from the points by using a simple Inverse Distance Weighted (IDW) technique, with a distance exponent (power) of two and a variable search radius with a maximum of ten points. The last step was draping the digitized excavation drawing over the raster surface. Thus the elevation values of the surface were assigned as base heights to the drawings.

For the profiles a slightly different process was followed. As with the excavation levels, the drawings of the profiles were first digitized in 2D. These were then imported in Autocad. During the excavations a baseline was set out on each profile between two points that had the same height. In Autocad the profiles were rotated 90 degrees on this baseline and then moved to the proper location on the z-axis. Thus a vertical profile was created. Finally, this vertical profile was imported in ArcScene.

For modelling the find spread yet another process was followed, which will now be described in detail.

5.2.2 Creating three-dimensional finds distribution maps

During the excavation of the pyre remains finds were collected in two different ways. They were either collected as point finds or they were lifted *en bloc*. For both, the xyz-coordinates were recorded for (almost) all finds. The lifted blocks were excavated further in the restoration lab of Restaura. In the following the find numbers are used, in section 4.3.7 the conversion to the Restaura documentation can be found. Here the finds were collected in 10 by 10 cm squares and per level (Fig. 5.2). Each square was assigned a unique number, denoted as "find number-level-square". Unlike the size of the squares, the depth of the levels varied. Their top was not arbitrarily assigned, but followed significant archaeological features like charcoal patches.

After the finds from the blocks were collected, they were recorded in a database. Per square, per level the amount of bronze, iron, bone, charcoal, and ceramics was noted. By far, the biggest category of finds is the bronzes, consisting mainly of small bronze studs and a few (fragments of) rings. Per bronze fragment several variables were recorded. For the studs: part(s) of the studs present, head diameter, leg length, number of legs present, legs bent (yes/no), differences in length between the legs (yes/no). For the rings: ring diameter, thickness of cross-section, shape of cross-section. For each bronze find it was also recorded whether it contained organic residue or displayed strong signs of burning.

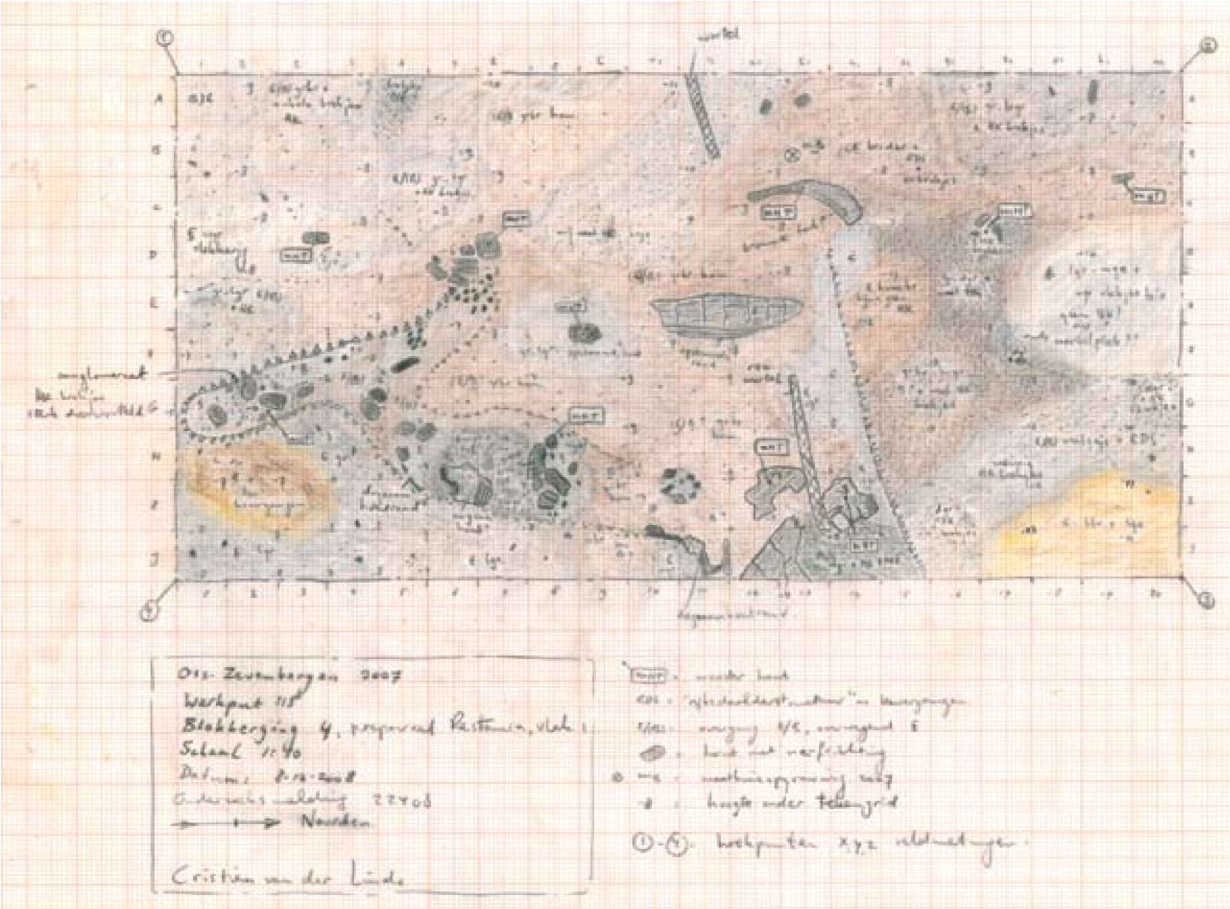
The next step was making a 3D-model of each block. This can be done simply by making a flat, 2D grid consisting of 10 by 10 cm squares for each level of each block. In ArcScene a single z-value – an average of the z-values of the corners of the block as measured in the field before lifting – was assigned as a base-height to each level of the blocks. Next, the squares were extruded to their appropriate depth. This way, a schematic model of each block was created with squares of equal size. However, in reality the depth of the squares varied as the height of the levels fluctuated. The depth was recorded for most levels, but unfortunately not for all. A realistic representation could therefore not be reconstructed for each block. However, a schematic representation of the blocks suffices for a visual analysis.

Lastly, the database was linked with the 3D-model of the blocks by a unique ID for each square. Now three dimensional distribution maps can be created for each variable recorded, with the possibility of making vertical and horizontal cross-sections through the block.

5.3 The charcoal

In an attempt to get to grips with what the charcoal spread might represent, P. van Rijn from Biax *Consult,* a charcoal specialist, was contacted. Van Rijn's research was geared towards establishing what species were represented, what parts of trees were used, and whether there might be any burned wooden objects. This section discusses the results of this specialist analysis. This information is used later on in section 5.8 to discus what this spread of charcoal and finds might be from.

Van Rijn visited the Restaura lab to examine a selection of the charcoal *in situ* in the surfaces and to take samples (van Rijn 2009). After the first samples were taken Restaura excavated even more layers. Restaura collected the charcoal fragments thus revealed. Cris van der Linde examined each level of each block and identified relevant (soil) features with Fontijn and Jansen. Each relevant level was drawn at a scale of 1:10. Van der Linde recorded the direction of the wood



grain wherever recognizable as this might provide information about how different concentrations of charcoal relate to each other. His observations were checked and confirmed by van Rijn (Fig. 5.4).

Fig. 5.4 Excavation drawing of V 1003, level 2. Figure by C. van der Linde.

V 1003 was impregnated to stabilize the charcoal in order to preserve the block for placement in the Museum exhibit (see chapter 17). Samples for charcoal research were taken from V 1000, V 1001, and V 1003. Multiple samples of loose fragments were taken from concentrations. The exact sampling location was recorded using the local excavation grids as described in chapter 8. Unfortunately, however, the charcoal specialists' documentation of sampling locations in V 1003 could not be reconciled with excavation documentation. The distribution of species within this block is therefore not further considered in this chapter.

For concentrations of charcoal the direction of the grain was examined *in situ* with the naked eye and with a loupe to determine whether the different fragments in a concentration could belong to the same piece of burned wood. To determine species samples were taken and examined in the BIAX *Consult* laboratory using an incident light microscope (magnification 10-400x). The presence/absence of tyloses, which generally speaking is an indication for either heart wood or sap wood, was used to determine what part of the tree was represented by a fragment. Deformations of the wood cell structure that indicate root or burr wood were also looked for. Larger fragments were examined for the number of rings with the hope of finding fragments suitable for dendrochronological analysis.

Unfortunately, the examination of the charcoal was not as fruitful as we had hoped. The charcoal fragments were extremely brittle and easily fell apart during sampling. This made it impossible to thoroughly examine the bottom of larger fragments, for example for any shaping traces. It also sometimes made it impos-

Table 5.1 Weight (in g) per species of the determined charcoal fragments. Table after van Rijn 2009.

Find no.	**Quercus (g)**	Indet. (g)	**Fraxinus excelsior (g)**	**Salix (g)**	Total weight (g)
V 1000	30.548	0.292	-	-	30.84
V 1001	10.02	-	2.928	0.23	13.178
V 1003	18.517	0.019	0.236	-	18.772
Total (g)	59.085	0.311	3.164	0.23	62.79

sible to measure the thickness of fragments. In total 144 fragments were determined. Van Rijn's findings are first given per find number, and then summarized and discussed below. The weight of the fragments examined is given per species in table 5.1.

5.3.1 V 1000

A total of 37 loose fragments were examined from this find number. The samples were taken from squares G-J/3-5 and from two larger chunks. The piece from squares J/5-6 is a branch fragment with a radius of ca. 3.5 cm and the piece from squares H-I/2-3 consists of three fragments of trunk wood that appear to belong together. The larger pieces were randomly spread out and did not seem to belong to the same structure. All fragments were oak (*Quercus*). Nine fragments were oak with tyloses and therefore heart wood. The other four could be branch or sap wood.

5.3.2 V 1001

In the squares D-H/7-10 a separate block with cremation remains was excavated. Restaura also recovered charcoal. In addition to cremation remains and charcoal, worked bone and bronze rings were found. The 20 determined fragments of charcoal from this corner were oak (17 fragments) and ash (*Fraxinus excelsior*; 3 fragments). An additional 21 fragments from the other squares were also examined.

In the squares D-F/1-4 was a piece of ash ca. 24 by 30 with another piece of ash of ca. 22 by 12 cm in squares B-D/2-3. The structure of the wood was burr-like, ca. 1-2 cm thick. Two small fragments of the longer pieces of wood pressed into the sand could be examined. Initially the smooth and slightly rounded surface appeared to possibly be from a wide bowl or flattened dish. When viewed underneath an incident light microscope, however, this appeared to be a natural surface with no recognizable shaping traces.

In squares C-D/3-4 a piece of oak ca. 13 by 18 cm was lying against the piece of ash in square B-D/2-3. In squares A-B/4-5 there was a piece of oak trunk wood of 19 by 5 cm. In A/3 there was a small concentration of oak fragments.

In the middle of square D/1 there was a fragment of willow (*Salix*) right next to the large fragments of ash.

5.3.3 V 1003

Large and small charcoal fragments were spread over the entire surface of this block. In total 66 fragments were determined microscopically. All charcoal examined turned out to be oak, with the exception of one small piece of ash. Van Rijn found several pieces of oak trunk wood, one piece of which was sampled for dendrochronological analysis as it had over 70 rings. A concentration of oak fragments that derived from a single branch was also identified. There was also a spread of oak fragments that showed telltale signs of having been exposed to extremely high temperatures. As mentioned above, the exact location of these samples within the block could not be positively reconstructed.

5.3.4 Conclusion on charcoal

In summary, three species were identified amongst the charcoal spread: oak, ash, and willow. By far most of the charcoal proved to be oak (94% in weight), from both trunks and branches. One oak trunk fragment of about 23 cm wide numbered over 70 narrow annual rings. This fragment was sampled for dendrochronological analysis, but unfortunately did not give a date even though it had the required 70 rings. None of the oak fragments showed any shaping traces. There were oak fragments that showed signs of having been in an extremely hot fire. In the present context it is of interest to note that oak is an extremely calorific and exothermic wood, which is often used for funeral pyres when available.

Ash was the second most common species found (5% in weight), though in very small amounts by comparison with oak. Some substantial fragments of gnarled ash wood in the southeast corner of V 1001 that likely belong together are of particular interest. Already in the field their smooth and slightly rounded appearance was noted. They appeared to form a wide bowl of some kind. Analysis of the fragments identified them as burr wood. Van Rijn's initial examination confirmed that the smooth and slightly rounded surface did indeed appear to possibly be from a wide bowl or flattened dish. However, when viewed underneath an incident light microscope no shaping traces were recognizable. The identification of these fragments as from a bowl or dish could therefore not be positively confirmed. However, it is worth noting that burr wood is uncommon and a very desirable material for making beautifully marked bowls. No such bowls are known from Dutch prehistory, though they have been found elsewhere (Schoch 1980, 22-23). In the context of such a possible bowl found in an Early Iron Age barrow it is worth noting that several worked wooden fragments found in the nearby chieftain's burial of Oss were recently interpreted as the remains of a bowl (van der Vaart 2011).

The last species found was willow, though only in the form of a single fragment in V 1001. The prevalence of oak and ash in the charcoal spread is consistent with the reconstruction of the woodland located around the mounds (chapter 10).

5.4 An urn and pottery sherds

Just south of the charcoal spread an urn filled with cremation remains was found. A full description of the urn is given in chapter 6. It is mentioned here because of its relation to the charcoal spread. Its stratigraphical position was discussed in chapter 4 (section 4.5.4). To recap, the urn appears to have been placed in a small pit dug into the ground of the E horizon. Although local disturbances hampered the readability of features here, we argued that it is most likely that the urn is the primary burial of mound 7. In our opinion, it must have been buried in the prehistoric surface before people covered it with sods. This makes it extremely likely that the urn, and charcoal and metalwork spread discussed in this chapter are the tangible remains of the same event.

The urn is a so-called *Schräghals*-urn, a form that is dated to the Early Iron Age (Fig. 6.1; chapter 6). This dating is corroborated by the C14-date of a piece of cremated bone that was taken out of it (section 4.5.4; Fig. 4.36 and 6.2). The charcoal (C14-datings, see section 4.6 and Fig. 4.36) and the bronzes (typochronology, chapter 7) found there can also be dated to the Early Iron Age.

The "northern" side of the urn was probably dug through by a badger and badly damaged (Fig. 4.21). Just before the urn was found, three wall and rim sherds (V 147, V 148, and V 149) were found in close proximity to the centre of the mound while removing the level of the mound between level 1 and 2 in the

NE-quadrant (trench 106). As the fabric of those sherds is very similar to that of the urn, they are probably pieces of the urn that were displaced by the digging activities of the badger. After lifting the urn, a few more comparable pottery sherds were found in its vicinity. One was found sieving the spoil derived from the area around the urn (V 161), together with a fragment of charcoal (V 160) and a fragment of cremated bone (V 162). Two sherds were found within the infill of a badger's tunnel (V 184 and V 230; Fig. 5.2). Here a fragment of cremated bone was also found (V 164). On the basis of the fabric of the sherds, we assume that these also are part of the destroyed urn.

Summing up, the urn appears to be the only pottery interred. There are no indications that any other pottery was discarded or deliberately deposited in the centre of the mound.[55]

5.5 Bone – decorated, and burned

In addition to the large amount of bone found in the *Schräghals*-urn (discussed in chapter 12), several fragments of cremated bone, as well as decorated bone fragments, were found amongst the central find assemblage. These are discussed here.

5.5.1 Decorated bone

Two pieces of decorated, burned (probably animal) bone were found at the same spot (V 1000, level 3, square H/5; Fig. 6.8). They are described in detail in chapter 6. They are very small: when joined their length is 10 mm, width 5 mm, and maximal thickness 2 mm. If they were broken before or after burning cannot be seen, but it is clear that they were part of something bigger (a shaft or inlay of an object). Intriguingly, only these two fragments were found. As we are dealing here with excavation under favourable circumstances (lab excavation of lifted blocks), it is unlikely that there were originally more fragments that went unnoticed by us. At this location there are also no post-depositional disturbances. At the same position but a few cm higher (V 1000, level 2) three very small and heavily corroded fragments of bronze were discovered. They were so brittle that they crumbled to dust when laid bare. There was no direct association between these bronze fragments and the bone fragments. The decorated burned bone was positioned at the rim of a zone that was characterized by charcoal patches, a few centimetres to the north of larger pieces of charcoal. There is no indication at all that the decorated bone was attached to (charred) wood. As the burned bone was situated very close to fragments of charcoal, we must be dealing with material that as a whole underwent the impact of fire. Thus, the remains do not offer a clear clue as to the use to which this bone was originally put. In chapter 6 the possible function of this decorated bone is further discussed using archaeological parallels. For now, it is important to note that these pieces were originally part of a larger object, and that after burning only these two fragments ended up in the ground when they were no longer attached to the original object. Also, the fact that only a small part of what must have been a larger object was found cannot be explained by disturbances or crude excavation methods.

55 Two other (small) fragments of pottery were found as stray finds in trench 115, dug for the excavation of the western part of the central find assemblage. These finds (V 245 and V 246) were too small to relate undoubtedly to the urn. No other stray finds were found during the gradual levelling of the two quadrants of the mound, and given the meticulous method of block excavations in a laboratory, it is unlikely that they might have been missed.

5.5.2 Cremated bone

As mentioned above, in addition to the large amount of cremated bone found in the *Schräghals*-urn, several fragments of burned bone were also found amongst the central find assemblage. They are discussed here in detail as they might offer some insight into what this central assemblage represents.

In total nine fragments of burned (undecorated) bone were found amongst the central find assemblage (Tab. 5.2). Three fragments (V 177, V 187, and V 188) were found prior to the block liftings, at approximately the same location where later V 1001 would be lifted. Two fragments were found in the southwest corner of V 1000 (V 350 and V 351), roughly above the northeast corner of V 1001. One of these fragments (V 349) was rather substantial and can be identified as a human fibula fragment. Four fragments were found in the northern part of V 1001. As figure 5.2 shows, the burned bone fragments were all found within 80 cm of each other. As will be discussed below, it is interesting to note that this is the same area in which several bronzes were discovered, as well as the decorated bone fragments.

The fragments from the central find assemblage were analyzed by L. Smits to determine whether they are human, and if so, whether they might be from the same person as the remains found in the urn. It was concluded that of only one fragment could it be established beyond a doubt that the fragment was human bone. This was the fibula fragment (V 349) mentioned above. Two other fragments (V 353 and V 354) were identified as most probably human. The other fragments were too small to positively identify. The specialist did note that if the fragments had been found in an urn full of human remains, there would have been no reason to separate them out as not human.

It was determined that the fragments from the urn and the central find assemblage show the same burning degree, which indicates that could have been in the same fire. No "double" elements were found, making the total minimum number of individuals 1 (see chapter 12). However, without bone fragments from the two contexts that actually match up, it cannot be positively determined that they are from the same person.

Find no.	Find location	Bone weight (cg)	Determination
177	Found above V 1001	10	Burned bone
187	Found above V 1001, to the south of V 177	20	Burned bone, indet.
188	Found above V 1001, to the east of V 177	10	Burned bone, indet.
259	Trench 115, level 4	10	Burned bone, indet.
349	V 1001, level 4, square F/9	-	Burned bone, human (fibula)
350	V 1000, level 3, square I/5	10	Burned bone, indet.
351	V 1000, level 3, squares G/4-5	40	Burned bone, indet.
352	V 1001, level 3, square F/8	0	Burned bone, indet.
353	V 1001, level 2, squares F/8-9	30	Burned bone, probably human
354	V 1001, level 2, squares E/8-9	60	Burned bone, probably human

Table 5.2 Burned bone (determined by L. Smits) recovered from the central find assemblage.

5.6 Metalwork

5.6.1 Bronzes

Several different kinds of bronze artefacts were found in the central find assemblage. They represent such a large and complex find category that they warrant their own chapter to properly discuss their exact physical appearance, find context, function, and parallels (chapter 7). In this section they are shortly summarized as their distribution is of relevance to determining what this central find assemblage represents.

In a higher level of what would later be lifted as V 1000, three concentrations of bronzes were found (V 175, V 176, and V 179). V 175 and V 176 were both lifted as "little" blocks by us and turned out to contain several bronze "studs" (see section 7.7). In both concentrations studs were recovered corroded together in rows, indicating that whatever organic material they were originally affixed to degraded in the same spot where the studs were found. Several of the bronzes from V 176 also showed clear signs of being burned (Fig. 5.5). Underneath V 176 a completely melted bronze sphere was even recovered (V 211). V 179 was lifted as a bronze "sample".

In V 1000, so at a lower level than the studs just described, two fragments of rings with square cross-sections were found, as well as several small bronze fragments that could not be further identified. The ring fragments both show signs of burning.

Just to the southwest a fragment of a ring with square cross-section (V 177) was found just above what later would be lifted as V 1001. This ring fragment is of interest because there are indications that it was deliberately broken before ending up in the ground. Several stud fragments were found in association with this ring fragment, all of them appear burned.

*Table 5.3 Bronze finds per type. * This find no. has been subdivided into three layers, see table 7.2. ** Including fragments of one hemispherical sheet-knob. *** An additional eleven bronze fragments are pictured in the Restaura documentation. It is at present not clear where these are currently located, they are therefore not further included.*

Type of bronze	V 165	V 173 *	V 175	V 176	V 177	V 211	V 217	V 218	V 223	V 1000	V 1001	Total
Small stud, complete	4	458	4	4					1			471
Small stud, incomplete/ fragment	25	421	3	48	12							509
Large stud		9										9
Bronze indet. (fragment too small to identify)	2	5				1	66**			5***	1	80
Ring complete	1							1				2
Ring fragment					1					2	3	6
Total	32	893	7	55	13	1	66	1	1	7	4	1080

Fig. 5.5 Melted clump of bronze studs (V 173B). Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Underneath these bronzes, in V 1001, three fragments of rings with square cross-sections were found, as well as some unidentifiable bronze fragments. All show signs of burning, particularly the ring fragment no. 3. Two of the fragments from V 1001 and the two fragments from V 1000 have similarly sized cross-sections, making it possible that they might originally be from the same ring. They were located some 50 cm from each other.

On the eastern fringe of the central find assemblage three separate concentrations of bronzes were found in close vicinity of each other. A large concentration of several hundred bronze studs (large and small) was lifted in three blocks (V 173A-C; Fig. 7.22). A single bronze stud located slightly to the west of V 173 was collected as V 223. To the northeast of the V 173 stud concentration, an intact bronze ring with a round cross-section (V 218) was found. Within the circumference of this ring a bronze hemispherical sheet-knob (V 217) was located. To the southeast of the stud concentration a D-shaped ring with round cross-section (V 165) was found. This D-shaped ring was recovered in fragments, but was interred intact.

In summary, there seem to be two concentrations of bronze finds. One concentration (Fig. 5.6, A) in which six ring fragments and several stud (fragments) were found, many of which show signs of burning; and another located to the east where a large concentration of studs was found, as well as two complete rings and a hemispherical sheet-knob (Fig. 5.6, B).

5.6.2 (Fragment of) an iron object

Only one (fragment of an) iron object was found (Fig. 5.2 and 6.12). As the object is heavily corroded it is hard to make out what we are dealing with, and it is also not possible to determine whether it was burned. It cannot even be said with certainty whether we are dealing with a fragment or a complete object. It was situated in V 1004 (level 4, square E/6) and uncovered in the Restaura laboratory. This is at the westernmost end of the entire central find assemblage, amidst charcoal fragments. No other metal objects were found here – all the bronzes and bone artefacts are situated a few metres to the east. It is unfortunately unclear how or even if this object is connected with the remainder of the central find assemblage. Its stratigraphical location indicates it is (roughly) contemporaneous with the other finds, but whether it is actually (part of) a grave good remains unclear.

5.7 Pyres and recognizing them: some technical considerations

In this section information derived from the 3D-model and information regarding the various finds described above is combined to discuss what the central find assemblage might be. As discussed in section 5.3, a piece of ash wood found in V 1001 was the only charcoal that shows possible shaping traces. It therefore seems improbable that the charcoal is the burned remains of a wagon or the like. Though admittedly not all charcoal was examined in detail in a laboratory setting, considering that the possibly shaped ash fragment was already recognized as a possible bowl in the field makes it plausible that any other shaped burned wooden objects would have been recognized. An absence of shaped wooden artefacts (with the exception of the possible bowl), and the presence of both trunk and branch wood seems to indicate that we are indeed dealing with the remains of fire wood. The presence of burned artefacts and cremated bones found amongst the charcoal, as well as its location underneath the mound make it seem likely that we are dealing with the remains of a funeral pyre. The abundance of oak charcoal, as well as the presence of ash, is also in accordance with this idea, as both are extremely calorific and exothermic woods highly suited for constructing a pyre (Marshall 2011, 10). The *Schräghals*-urn filled with the cremated remains of a grown man found amongst the central find assemblage certainly indicates a cremation took place.[56] As there are no indications that this urn is either earlier than the central find assemblage, or dug into the mound at a later moment, the charcoal spread and associated finds are assumed to be contemporaneous with the urn and its content.

All in all, it would seem a likely possibility that the central find assemblage might be the remains of a pyre with associated pyre goods. In order to examine this possibility further we examined what one might reasonably expect the results of a cremation to be and what marks this might leave in the archaeological record. We looked both to archaeological parallels of "pyres", as well as reference material on the technical aspects of cremation and pyre technology.

5.7.1 Archaeological parallels of pyres

Pyres preserved underneath Iron Age mounds were once probably rather common, particularly in the north of the Netherlands where they are known as cinerary barrows (Dutch: *brandheuvels*; Hessing/Kooi 2005). They mainly date to the later part of the Iron Age (Middle to Late Iron Age). However, it should be emphasized that hardly any of these were excavated in such a way that it (could have) yielded detailed information on pyre construction or post-burning treatment of pyre remains (*pers. comm.* prof. H.T. Waterbolk to Fontijn). In general, it should also be realized that pyre remains tend to escape proper identification due to insufficient knowledge on cremation processes and taphonomy of pyre debris (Arcini 2005).

Examples of pyres found underneath Early Iron Age barrows are unfortunately rather scarce. In the Netherlands we only know one roughly contemporaneous example that was excavated with precision and an eye for detail. In the Late Bronze Age/Early Iron Age urnfield Weert-Boshoverheide, the remains of a pyre were encountered underneath a barrow. Within the barrow a typical Harpstedt-pot was found, dating this burial firmly to the Early Iron Age. Unfortunately, this burial has not been published in detail, making it impossible to properly compare it with mound 7. The published drawings and photograph indicate that under this mound an area of at most 2.20 by 1.20 m with somewhat substantial charcoal beams was found (Fig. 5.7). Within this the Harpstedt-urn was buried (Bloemers 1990; Hissel *et al.* 2012).

With regard to the so-called cinerary barrows of the later Iron Age: these are mainly found in the northeast of the Netherlands and the adjacent part of Germany. This term is slightly tricky, as over time it has been used to describe various phenomena. The latest overview is given by Lanting and van der Plicht regarding funerary ritual in the Middle and Late Iron Age in the Netherlands (2005/2006, 307-313). Van Giffen seems to have used "brandheuvel" to describe any kind of barrow found to contain charcoal remains (for example van Giffen 1949), while Lanting and van der Plicht only use it to refer to one of four subtypes of Iron Age barrow (Lanting/van der Plicht 2005/2006, 308). Of primary interest to us is what they term the "classic" brandheuvel (German: *Scheiterhaufenhügel*). These barrows are erected over the remains of funeral pyres, recognizable by the large amounts of charcoal on the old surface with the cremated remains either concentrated in one spot, or spread over a larger area. In the second type large amounts of charcoal are never present, though occasionally there is a thin scatter

56 For a detailed discussion of the cremated bones, see chapter 12.

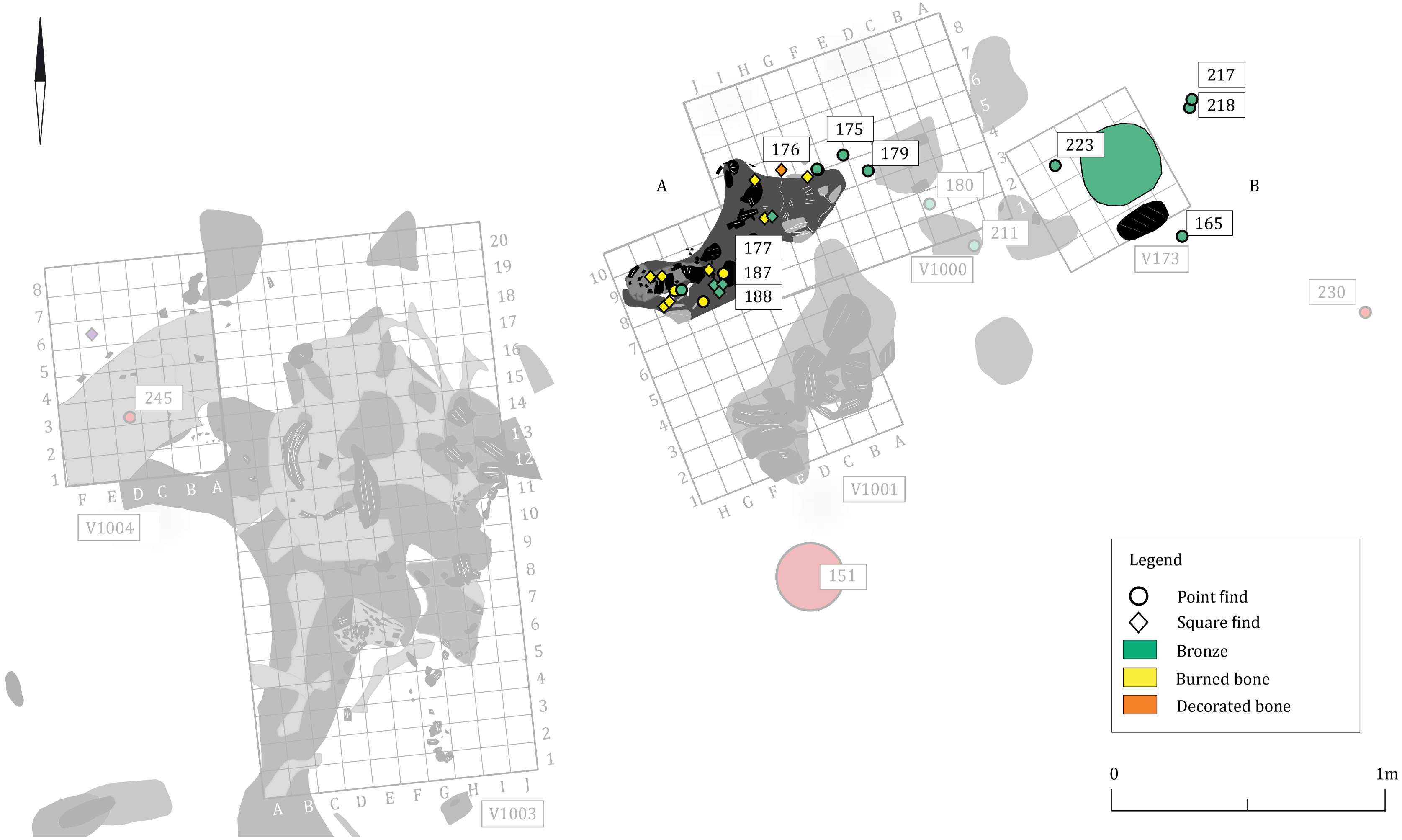


Fig. 5.6 Two concentrations of bronze finds. Figure by J. van Donkersgoed.

Fig. 5.7 The remnants of a pyre found in Weert-Boshoverheide. Figure after Bloemers 1990, afb. 7/photograph by Amsterdam Archaeological Centre, University of Amsterdam/J. van Donkersgoed.

of charcoal. In this kind of barrow the collected cremated remains were placed either on the old surface or in a small pit. The other two types do not contain central interments. This typology, however, is a rather recent one, and it is therefore not always clear how to interpret older mentions of brandheuvels. A remark to be made here is that published drawings of charcoal under such mounds – broad-brush as they may be – indicate that pyre debris was often re-shuffled and re-organized. In the case of mound I from the Noordsche Veld at Zeijen (province of Drenthe), charcoal beams appear to have been laid out in a circle (van Giffen 1943, 503-504; fig. 52).[57] In any case, all varieties seem to be Middle to Late Iron Age in date, and geographically limited to the northeast of the Netherlands and the adjacent area in Germany (van Beek 2012). Moreover, none match our find of charcoal beams, burned pyre goods, and collected cremated remains interred separately in an urn.

All in all, there are very few Early Iron Age finds of charcoal underneath barrows. And none that are particularly helpful to understanding our mound 7 central find assemblage. In the following we therefore look to experimental information regarding pyres in order to establish whether the central find assemblage meets the "requirements" of a pyre. In the following a short summary is given of those aspects of pyre technology relevant to our discussion of mound 7.

5.7.2 The process of cremation: some technical considerations

There is a lot of ambiguity in the terms used to describe both the different pyre components as well as the cremation process. Marshall's (2011) definitions are followed in this book, and terms are explained wherever necessary. *Cremation* is the "*process* of combustion of pyre-structure, corpse, and pyre goods, from the time of ignition to formation of the cooled ash-bed" (Marshall 2011, 13). Unfortunately for us, cremation is a process that leaves behind very limited archaeologically recognizable traces. The burned pyre itself usually leaves only a few earth-fast traces that for the most part only can be detected instrumentally. Those components of the pyre and its load that survive the cremation can subsequently have been treated in a variety of manners. The remains can have been left *in situ* in a range of different states. They can have been left untouched, disturbed, scattered, collected

57 According to van Giffen the charcoal is the remains of a circular pyre.

and buried, or collected and taken elsewhere (Marshall 2011, 8). As with all kinds of burial rituals, it is likely that a range of activities were involved that cannot be recognized in the archaeological record.

According to Marshall, there are four main kinds of cremation-related ritual activities: preparatory, attendant, final, and auxiliary. Preparatory activities take place before the pyre is fired, and attendant activities during. Final refers to those activities that occur after the pyre has burned out, and involve collecting, processing, and selection activities, as well as the possible "withholding" of material and the actual interment of the cremated remains. Auxiliary activities take place either prior to or after the cremation and are not directly involved with it (Marshall 2011, 14).

5.7.3 Location, location, location – where to build a pyre

The choice of location for building a pyre might be dictated by a range of different factors. On the one hand there are purely technical considerations that need to be taken into account. For example, it seems likely that pyrotechnic grounds would lead to a location being chosen that optimizes airflow. This, as well as the orientation of the pyre, can promote combustion and help prevent the pyre partially burning out or collapsing. Both the location and the orientation of the pyre influence the efficiency of the cremation (Marshall 2011, 10).

Other environmental conditions, such as exposure to the elements and the availability of fuel likely also influenced the choice of location (Marshall 2011, 9). On the other hand, there might also have been social or religious motivations behind pyre locations, which unfortunately are much harder to get to grips with archaeologically than purely technical considerations. A pyre-site[58] may have been required to be positioned in a specific relation to settlements or near existing areas of funerary activities (Marshall 2011, 9).

Given that our possible pyre is located on top of an old natural dune, and must have been one of the higher points in what was by that time an open landscape (chapter 4 and 10), it is interesting to consider that from a technical perspective this does not appear to have been the best choice of location. Jonuks and Konsa (2007) performed a cremation experiment on top of hillock, as they believed that cremation was likely a communal event meant to be watched by mourners and spectators. However, partway through their experiment a strong wind picked up. The wind carried the flames and heat away from the body, making the cremation far less efficient (Jonuks/Konsa 2007).

5.7.4 Pyre construction and size

A pyre can be constructed in a variety of different ways, and is formed by several different components. Following Marshall (2011, 12), a *pyre-structure* is "the entire construction in which cremation takes place". One of the components that make up the pyre is the *pyre-cell*, which is "the combustible part of the pyre directly involved with cremation" (Marshall 2011, 12). The pyre-cell combined with any associated sub-structure (anything that penetrates the ground, such as a platform built on posts or a scoop to aid ignition) is the *pyre* proper (Marshall 2011, 12).

A pyre can be any configuration of combustible material that carries the capacity to burn a human body. With regard to ancient pyres, all we have left are occasional finds of their burned remains, which makes reconstructing what they originally looked like practically impossible. However, it is possible to establish standard forms through experiment and compare their remains with archaeologi-

58 Pyre-site: "the basal limit of the unfired pyre" (Marshall 2011, 27).

cal ones. As Marshall stated with regard to research into pyre-structures underneath barrows: "experiment can certainly determine the range of pyre-structures which are practical and minimal for cremation, as a basis for assessing those under barrows, and identifying possible abnormality" (Marshall 2011, 10). They argue that pyres can be classified into two basic types, the "box-pyre" and the "ring-pyre". A box-pyre has a roughly rectangular plan. It is made up of a box-shaped fuel-load which is mainly horizontally stacked. This type can be further divided into three sub-types: stack, log-edged, and framed. The ring-pyre in contrast has a roughly circular ground plan and consists of a sub-conical fuel-load with increased vertical stacking (Marshall 2011, 3). A proper construction of a pyre is required for effective and "neat" cremation as experiments show that at full burn pyres are so hot that a person cannot get close enough to tend them (Marshall 2011, 19). Without anthropogenic or meteorological interference a properly constructed pyre will burn to ashes within a few hours (Le Goff 2012).

The motivations behind selecting specific fuel-wood are most likely predominantly dictated by practical considerations, rather than religious ones. This is for example described for the case of Germanic people by the Roman author Tacitus (Roymans 1990, 247). The availability of different kinds of wood and calorific suitability for cremation can play important roles. Some woods may also be thought to have magico-religious properties. If it can be established that people deviated from optimal and common species, this could indicate that fuel selection was dictated by other than purely practical considerations. There may also be a connection between the kind of fuel wood used and the social status of the deceased (Marshall 2011, 10).

Any type of pyre may also incorporate timber structures that help retain the fuel load. These structures can penetrate the ground, but do not need to. They may also serve the added purpose of displaying a body prior to cremation (Marshall 2011, 3). One must bear in mind though that a pyre structure does not have to be completely functional. It might be heavily embellished and decorated with elements not needed for "just" cremating a body. An elaborate pyre structure could reflect social standing or the need for a visible display (Marshall 2011, 8).

In most cremation experiments a pyre is built that is the same length as the body to be burned (McKinley 1997). However, this is not required. A pyre can also be shorter, with the legs still sticking out. When the body burns, the tendons contract, thereby pulling up the knees and hands. In the end the entire body burns (Le Goff 2012, 65).

5.7.5 Cremation artefacts

A common point of discussion with regard to cremations is how to recognize whether objects interred with cremated deposits were also placed on the pyre ("pyre goods"), or whether they were added later ("grave goods"). The temperatures reached within a pyre can vary substantially and are the result of a variety of factors, such as available fuel, the construction of the pyre, and the weather. Temperatures up to 1200 °C can be reached in open-air pyres (McKinley 1994; Williams 2004, 274). Certain pyre goods may therefore survive, in some form or another. Iron has a melting point of roughly 1500 °C. Iron pyre goods will therefore probably appear unaffected. Clothes will likely burn away completely, while stone and bone objects will usually survive, though in a visibly burned condition. Recognizing bronze pyre goods is somewhat trickier. The melting point of bronze can be reached in open-air pyres. The degree to which a bronze object will melt depends on its specific alloy (Fontijn 2002, 203). It is unclear how long bronze has to be exposed to higher temperatures to really melt, but temperatures between 600-800 °C will affect the bronze. The experiment by Jonuks and Konsa revealed that the degree to which objects melted had little to do with how they were originally placed on the pyre. Some of the objects retrieved from the pyre were so disfigured as to be unrecognizable, while others were only sooted. Surprisingly, objects placed between the corpse substitute (an adult sow) and the pyre had not melted, despite having fallen straight through the hottest part of the fire (Jonuks/Konsa 2007, 105). It is therefore important to realize that bronze objects that do not appear affected by fire, can still be cremation artefacts.

5.8 Spatial distribution of charcoal, bone, and metal

With the above points on cremation techniques and archaeological fingerprints of pyres in mind, we return to the evidence we uncovered in the centre. A broad and discontinuous spread of charcoal, stretching 5 by 2 m on the top of a natural elevation, which is flanked by an urn dug in just to the south of it. The absence of clearly shaped wooden objects (with the exception of a possible bowl), the presence of burned human bone and burned bronzes among the charcoal, the cremation deposit, and the location underneath a barrow all support the idea that mound 7 was built over a burned out pyre.

By its stretched-out size it can be argued that we are dealing with pyre debris that was displaced after burning. Pyres usually burn to ashes. However, we found large pieces of charcoal in both the centre of the assemblage (V 1001) and the western flank (V 1003). An isolated hump of charcoal to the south of V 173 is the easternmost example. Perhaps in this case the somewhat "unpractical" location of the pyre atop the dune led to the pyre being "blown out" prematurely (as discussed in section 5.7.3). Perhaps a strong wind picked up?

Another observation that follows from our survey of literature on cremation is that the area covered by the charcoal here is much larger than one would expect from a funeral pyre. It is too big to "just" be the unchanged remains of one burned out pyre.

In our opinion, examination of the spread of both charcoal and artefacts and their spatial relations reveals three separate concentrations that resulted from interrelated activities. *Firstly*, roughly in the centre of the find assemblage there is a major concentration of burned bronzes (rings and (melted) studs), decorated bone, cremated bone, and a possible wooden bowl. Many of these artefacts show clear signs of having been exposed to extremely high temperatures. In our opinion this area is likely the actual location where the pyre was constructed and a man and his pyre goods were cremated.

A *second* concentration is to be found immediately to the west (V 1003 and V 1004). Here, not a single piece of burned bone or bronze was found. The only finds in this largest of all lifted blocks is charcoal that lacks a prevailing direction. For that reason we assume that we are dealing here with the end of the original pyre and with material that was turned over, searched through, and shoved aside. V 1004, the westernmost lifted block, is hardly anything more than a scatter of charcoal chunks and ashes.

While collecting the cremated bones the mourners also handled and manipulated some of the pyre goods. Rings were intentionally broken and partially left on the pyre, such as V 177. In our opinion a stud-decorated object incorporating rings (see chapter 7) was likely located at the northeast edge of the pyre as it burned and later moved to the east. This object (or objects) was excavated as the concentration of bronze studs (V 173) and two bronze rings (V 165 and V 218). This is the *third* concentration within the assemblage. As figure 5.2 shows, this stud-decorated object with associated rings forms a separate unit from the pyre remains. There is no charcoal located in between. In chapter 7 we argue that this bronze decorated material might relate to yoke components or horse-gear. At this point it is important to mention that studs that likely originate from this object were also found amongst the central concentration that we believe to be the remnants of the actual pyre (V 175 and V 176; Fig. 5.2). These studs corroded together in such a way that indicates that they were still embedded in an organic matrix when deposited. These few studs and the organic component they decorated were likely left behind when the actual decorated object was moved eastwards. So, the original bronze-decorated material, which probably already burned on the fire, may have been torn or roughly moved aside with a small part remaining in the northern part (V 175/V 176) and the other at the southeast end (V 173). Thereby taking some of the charcoal that had come to rest on top of the object with it.

We assume that cremated bone remains, then, were picked out of the pyre debris and placed into an urn. This urn was dug in some 30 cm to the south of the charcoal spread, almost in the exact centre of what would later be the sod-built barrow. It is not just bones that were picked out. Of the large bronze ring V 177 we only have a fragment, the same holds true for decorated bone. As argued before, we think that other fragments were not deposited. This means that they were picked out by the mourners. The breaks of the rings in some cases were not caused by the fire itself, which implies that objects were deliberately broken and parts of it deposited, and other parts taken away. Leaving fragments here may have been just as important as picking things out. The same may be true for the cremated bone. Some of the small bone fragments may have remained unnoticed in the pyre debris, but the large fibula fragment is not easily overlooked. It must not be forgotten that the quantity of cremated bone in the urn is far too small to represent an entire adult skeleton (chapter 12: 640 g).This brings us to the conclusion that the pyre debris is more than just "debris": it seems to have been important in its own right.

5.9 Covered with care

In our view, not just the buried urn, but also the pyre debris must have had an added significance to the mourners. Apart from the leaving in place of fragments (while taking out others), this also comes to the fore in the way in which the entire assemblage was covered. The pyre was situated on the flat top of a natural elevation, which to that end must have been prepared somewhat: it was stripped of vegetation (see section 4.5.10). When all practices were finished and the urn dug in, the entire assemblage was covered with sods. The way in which this was done is noteworthy. As set out in detail in chapter 4, the centre was covered with horizontally stacked sods (Fig. 5.8). It seems logical to start with a base layer of horizontally placed sods, but it does not immediately follow that these have to be so neatly placed as was done here. In places there were four layers of sods on top of each other. The smallest sods recognized in the entire mound are to be found here. On top of the central find assemblage sods were very elegantly piled on top of each other (Fig. 4.29), whereas in the adjacent part of the centre – outside the central find assemblage (the corner of 105, see fig. 4.13) – this was done in a less ordered way. By not removing the charcoal and debris, the sods actually had to smooth out irregularities in the surface.

Fig. 5.8 V 173 in situ following the removal of the overlying sods, looking to the east. Note the horizontal stacking of the sods in the profile. Figure by Q. Bourgeois/J. van Donkersgoed.

5.10 Conclusion – what happened here

Chapter 4 provided us with a broad outline of the structure and chronology of mound 7. This chapter zoomed in on the central find assemblage, a broad spread of charcoal containing cremated bone, a piece of iron, an urn, and huge amounts of very small bronzes. Combining both, it is now possible to sketch a scenario of the events that took place in this small zone at the top of a natural elevation.

People started by removing the vegetation at the top of the natural elevation that would later form the basis for mound 7. At the northern part of this rather flat top, just in front of a small knick in the profile (Fig. 4.13), they built a pyre. How the pyre was exactly built cannot be reconstructed anymore. It is certain that it was not located on top of a draft pit. The top of this natural elevation was by that time, the Early Iron Age, situated in an open landscape, a heath. This means that it was rather exposed to the wind and for that reason not an ideal location for making a pyre; perhaps there were other reasons that made people choose this particular location.

By far most of the charcoal sampled (94%) was determined to be oak; there is also some ash and one piece of willow charcoal. As oak (and ash) are both calorific and exothermic woods this could imply that they are the most resistant pieces. Other wood species may have been used as well in the pyre construction. Oak and ash grew in the forest that bordered the small heath in which the Zevenbergen barrows stood: we assume that they were collected from the local wood. Large oak beams as found in V 1001 and V 1003 may represent the foundations of the pyre. Amidst V 1000 also small twigs and branches were found – material that is more likely to have served to light the fire than to keep it burning. On the basis of the presence of cremated bone and highly melted bronzes, we argue that the pyre was positioned at the location of our V 1000 and the upper part of V 1001 (Fig. 5.6, A). Of the few bone fragments found here, of at least one (a fibula) it is certain that it is human. It cannot be excluded that more than one person was burned here, nor that animals were burned here as well, but there are no indications for this.

The bone fragments found are completely white and this indicates that they burned at high temperatures (at least 800 °C). So the cremation must have proceeded successfully. As a pyre normally burns to ashes and we clearly have quite some large chunks of charcoal lying around, it is not inconceivable that the burning at this exposed position was hindered by a wind picking up.

After the burning, the mourners started to collect the cremated remains of the deceased. It is clear that they did not intend to collect everything: bones, even one as large as the fibula mentioned, remained in place. We suggest that the other remains were collected and put in an urn that was dug in just to the south of the pyre debris. They were collected in a *Schräghals*-urn that was partly filled. The bones from the charcoal zone and the urn have the same colour and there are no double elements, but we also do not have refits that definitively prove that this urn was used for the remains from this pyre. At any rate, it is clear that even the remains in this urn together with the bones from the pyre debris do not make up a complete skeleton. A large part of the bones must have been collected but ended up elsewhere.

In the searching of the pyre remains, the entire area was significantly disturbed. The large wood pieces in V 1001 (including the possible bowl) seem to have been shoved aside a little bit and perhaps dumped on a heap. The spread in V 1003 could likewise represent the parts of the western end of the pyre that were swept away. Organic material decorated with hundreds of small bronze studs may have been standing at the outer east end of the pyre or was partly swept across it. Whatever may have been the case: although it burned, most studs remained in place and corroded in their original position, affixed to organic material. A small part of such studs were found *in situ* "above" V 1000, and the largest concentration of hundreds of studs, having the most integrity, was found (V 173) in an isolated position to the outer southeast, outside the main charcoal spread. Two complete bronze rings are assumed to have been part of it (V217 and V 165). In view of the similarities to the studs *in situ* at the northern end (V 175 and V 176) and those at the southeastern end (V 173) we suggest that they were originally part of one and the same artefact, which after burning broke or was torn, yet retained its inner structure. One end came to lie at the northern end, the bulk of it was shoved aside, perhaps originally resting on the large isolated piece of charcoal that now lies immediately south of it.

Like in the case of the cremated bones, we argue that pieces of bronzes were taken out of the debris, whereas others were left lying there. One large ring (V 177) is broken, but the break itself was not caused by burning. That the other parts are missing can in this case not be seen as absence of evidence (due to favourable excavation and preservation circumstances). So, the mourners picked things out, but also left things lying there.

Everything was then sealed off with carefully placed sods. The mound building must have started at this location, covering the northern slope in one go, whereas the southern slope (with sods placed slantwise at the surface) may have been done at a later stage or by another team (chapter 4 and 16).

One of the most conspicuous things that was covered must have been the many bronzes that dotted the entire burned-down zone and the urn. The next two chapters will deal in detail with those finds and what can be learned from them regarding the events that took place here.

Chapter 6

The urn, bone, and iron from the central find assemblage in mound 7

David Fontijn, Richard Jansen and Sasja van der Vaart

6.1 Introduction

In chapter 5 the finds from mound 7 were discussed within the context of the central find assemblage. It, however, is worthwhile to also view these finds in a broader context. In this way, we might gain a clearer insight into what artefacts (or fragments thereof) might be (from) and their significance within the mound 7 central find assemblage. In this chapter, we pay some more attention to the *Schräghals*-urn and decorated bone, as well as to the only iron find done in mound 7.[59] The bronze finds are so numerous and their context is so complex that they deserve a chapter of their own. They will be discussed in detail in chapter 7.

6.2 The urn

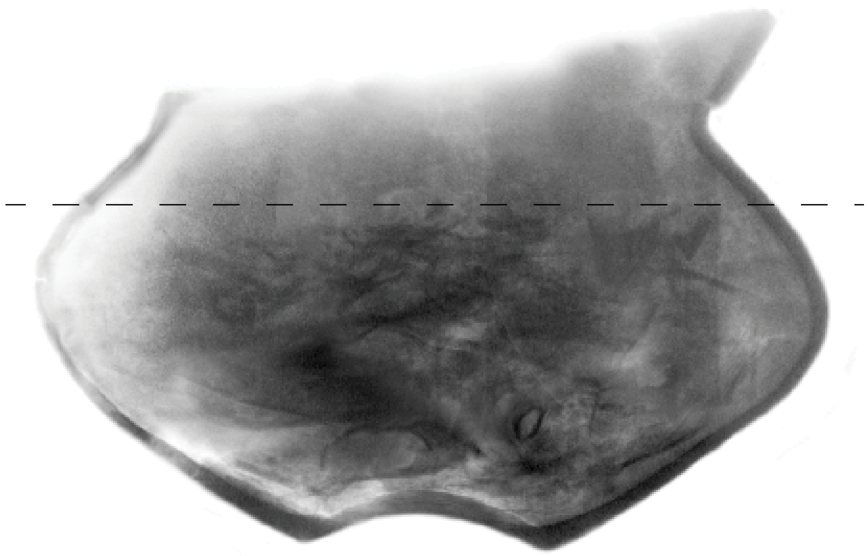
6.2.1 Description

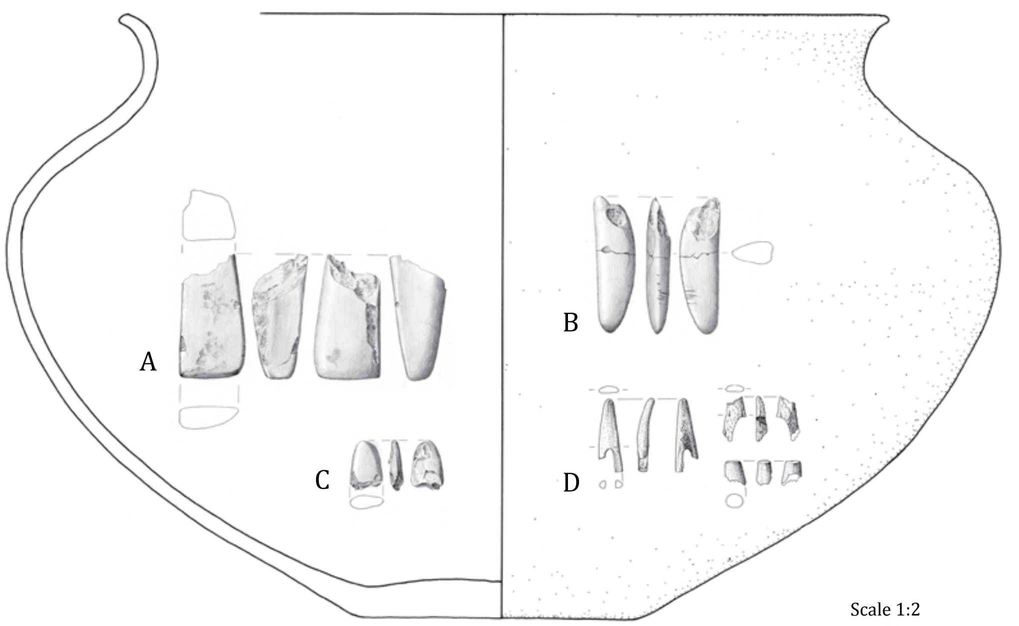
As introduced before (section 4.5.4), a roughly intact vessel (V 151) filled with cremated bone was discovered in the NE-quadrant of mound 7 (trench 106). As argued in chapter 4, it is very likely that this is the grave of the man whose death led to the construction of the barrow. As argued in the previous chapter, the charcoal and bronze immediately to the north of where the urn was interred probably represent the remains of the pyre on which his body was burned. The urn is a handmade pot, which is 21.5 cm high, and 28.7 cm wide at its belly. The walls are ca. 1 cm thick. It has been tempered with pot grit. Its rim has a rounded form. The pot is undecorated, and the outer surface has been smoothed. Overall it has a greyish colour. Although the urn was partly damaged by later digging activities (probably by a badger), it is as good as complete (Fig. 6.1 and 6.2).

The form of the pot is reminiscent of what is conventionally called the *Schräghals* form. Together with the Harpstedt-pot, it is considered as typical for the Early Iron Age Ha C (ca. 800-600 BC). The *Schräghals* (Dutch: *schuinhals* (Desittere 1968); English: pot with oblique neck) is traditionally seen as a form that evolved from the Late Bronze Age Ha B *kegelhals* (pot with conical neck) and/or *cylinderhals* (pot with cylindrical neck; Desittere 1968, 27; 41). In general *Schräghals*-pots are distinguished by certain common characteristics: a distinct profile both at the transition from body to shoulder and shoulder to neck, a neck that is generally short, but clearly present and facing outwards with a "considerable" angle to the shoulder. These pots, furthermore, have a clearly defined rim,

59 The first and third author studied the decorated bone and iron, the second author dealt with the urn.


10cm




A
B
C
D
Scale 1:2

and the maximum height is slightly smaller than the maximal diameter.[60] Both the rigid form definition and its use as chronological marker is debatable (Valentijn 2011, 39). As discussed in chapter 4 (section 4.6), a C14-dating of cremated bone in the pot indicated a date of the bone (and therewith the urn) in the Early Iron Age.

6.2.2 Other Iron Age urns from the Zevenbergen barrow landscape

Fig. 6.1 The urn from mound 7 (h. 21.5 cm). Figure by Restauratieatelier Restaura, Haelen/A. Louwen/J. van Donkersgoed.

The urn from mound 7 is not the only Early Iron Age urn found in this barrow group. Early Iron Age urns have been found in mound 2, 8, and 10 (Fig. 6.4; van Wijk *et al.* 2009, 84; 124-125; 129). In addition, sherds of a pot that had a comparable form were found close to mound 8. The specimens from mound 2 and 8 are both from secondary graves dug into much older Middle Bronze Age barrows. The one from mound 2 is of special interest, as it has a fabric comparable to the mound 7 specimen. It has been interpreted as a pot of the *Schräghals* form by van Wijk *et al.* (2009, 84), though it has a more rounded than oblique form. Within the urn an unburned whetstone was found with traces of ochre (Fig. 6.3, B). Another *Schräghals*-like urn was used also as a primary grave in mound 10, but this time in a barrow that was of a very modest size when compared to mound 7 (Fig. 16.9). This one is decorated with hatched triangles.

6.2.3 Comparable urns from urnfields and barrows in the vicinity

Schräghals-pots used as urns are common in the Early Iron Age (urnfield cemeteries), and are widely distributed over the Netherlands and adjacent areas. In the southern Netherlands examples are known from *e.g.* Goirle (Verwers 1966c), Veldhoven-Heidebloem (Modderman/Louwe Kooijmans 1966), Beegden (Roymans 1999; Fig. 6.5), Mierlo-Hout (Tol 1999), Breda (Berkvens 2004), and Haps (Verwers 1972). Within the direct vicinity of Zevenbergen, *Schräghals*-urns were found at Oss-Vorstengrafdonk (Jansen/Fokkens 2007), Schaijk (Jansen 2011), and Uden-Slabroekse Heide (Jansen *et al. in prep*.; Fig. 6.6). At Meerlo, two iron horse-bits and a bent sword were deposited in an urn that in shape has some similarities to our specimen (Fig. 6.7). However, *Schräghals*-pots are not exclusively used as funerary pottery. There is no real evidence for special funerary pottery, only that possibly specific types of (domestic) pottery were preferred (Kooi 1979, 134-135). The type of vessels that were used as urns varies from small, simple pots to lavishly decorated, well-finished ones, including *Schräghals*-pots.

Fig. 6.2 X-ray of the Schräghals-urn found at mound 7 of Oss-Zevenbergen filled with cremated bone until halfway the vessel (until the dashed line). Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

A common decoration type on *Schräghals*-urns consists of (multiple) triangular (sometimes rounded) zigzag grooves, sometimes in combination with circular depressions (German: *Kreisdellen*; see Fig. 6.6, 6a and 6.6, 5a). The triangular linear decoration patterns are similar to the hatched triangle decoration which is often found on pottery usually dated to the Late Bronze Age (Ha B). Sherds with a decoration consisting of hatched triangles were also found at Oss-Zevenbergen in connection with the nearby mound 6 (chapter 3; in particular figure 3.13 and the discussion in 3.4.3).

Fig 6.3 Urn (h. 16.4 cm) from secondary grave from mound 2, with (A and C) whetstones, (B) whetstone with traces of ochre, and (D) fragments of bone implements. Figure after van Wijk et al. 2009, fig. 6.11/J. van Donkersgoed.

60 The contemporary Harpstedt-pot has a less distinct profile. A clay roughcast was applied to create a (partly) rough surface of the pot, a so-called roughly slipped pot (Dutch: besmeten).

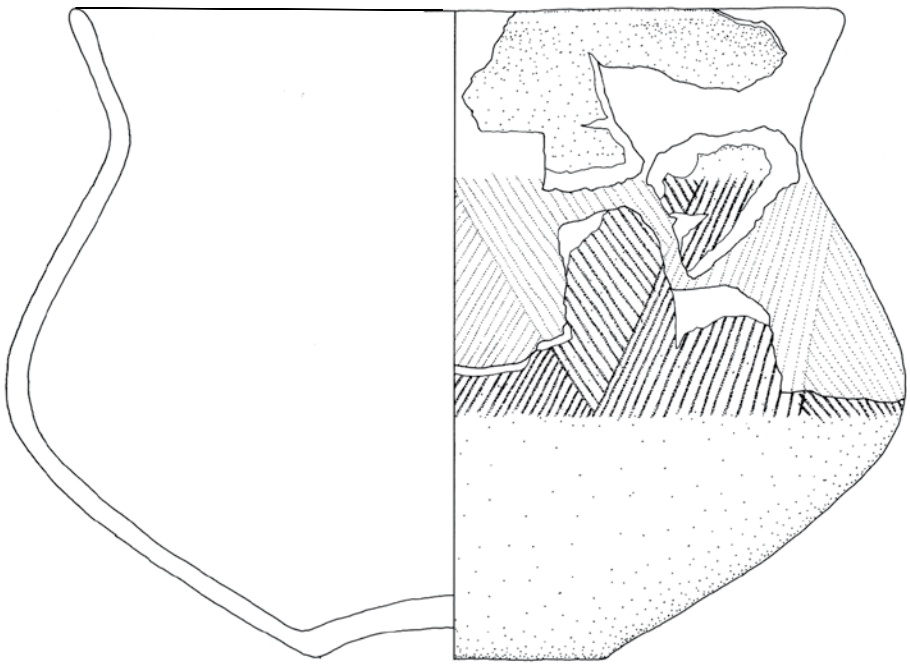
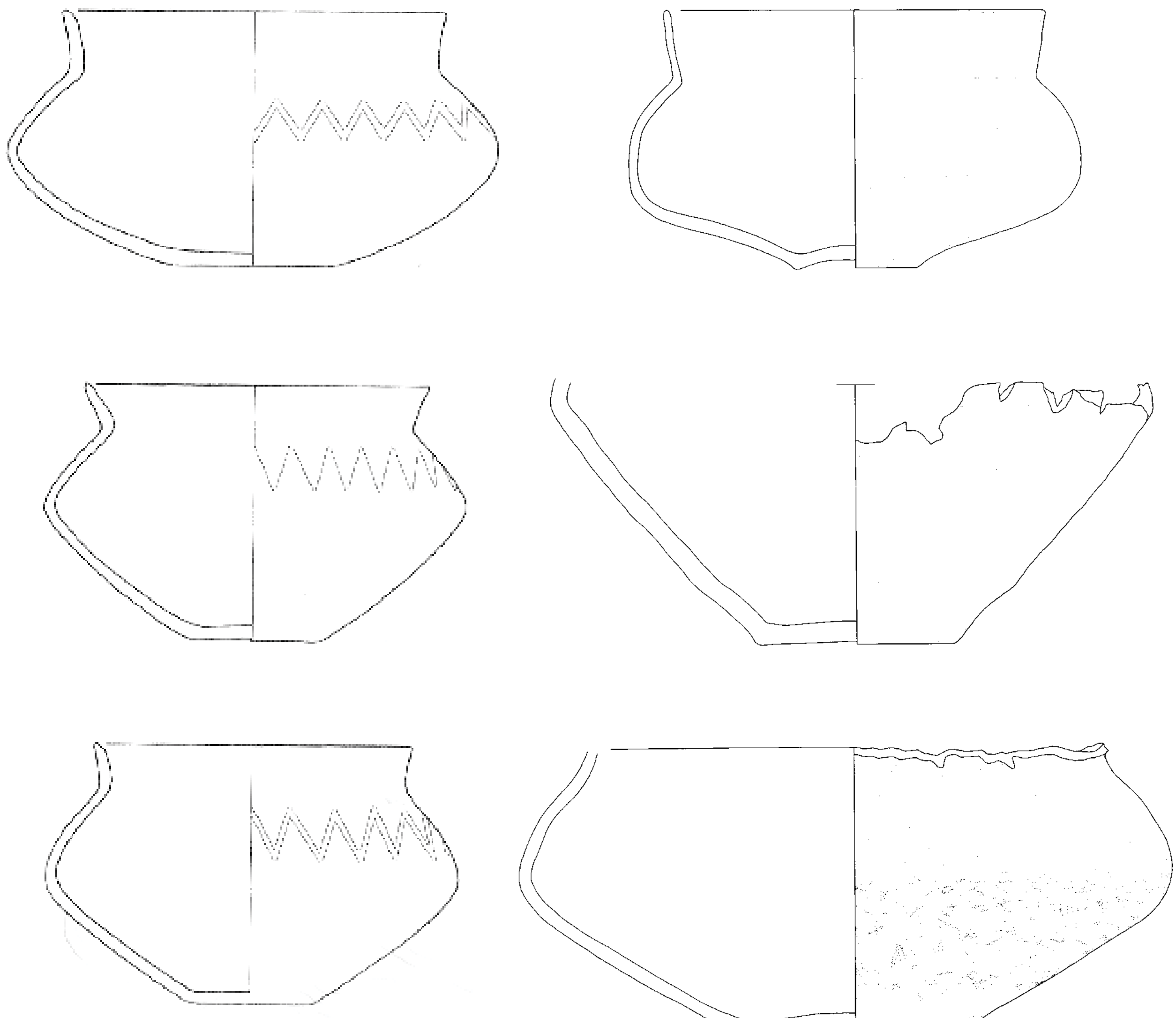


Fig. 6.4 (left) Urn (h. 17.4 cm) from mound 10. Figure after van Wijk et al. 2009, fig. 6.42/J. van Donkersgoed.

Fig. 6.5 (below) Schräghals-urns from the Early Iron Age urnfield of Beegden, northern Limburg (decorated examples; left) and Oss-Vorstengraf (undecorated examples; right).



1 Oss-Vorstengrafdonk

2 Oss-Zevenbergen m.7

3 Schaijk

4 Slabroekse Heide

5 Oss-Vorstengrafdonk

5a Detail

6. Slabroekse Heide

6a Detail

Fig. 6.6 Early Iron Age Schräghals-urns from different sites in the Maashorst region, including a few examples with the decoration type of (multiple) triangular zigzag grooves. Figure by P.J. Bomhof (3, 4, 6, 6a; ©RMO)/P. Cox (1, 5, 5a; ©Museum Jan Cunen)/Restauratieatelier Restaura, Haelen (2)/J. van Donkersgoed.

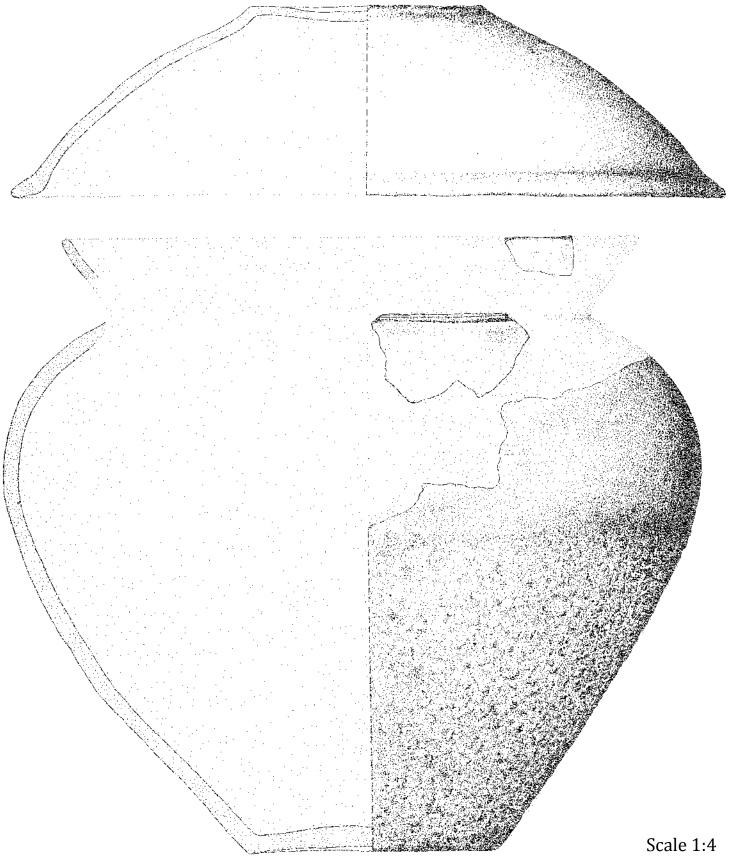


Fig. 6.7 The urn from Meerlo. Figure after Verwers 1968, 4/J. van Donkersgoed.

Fig. 6.8 The decorated bone fragments from V 1000, level 3, square H/5. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

6.3 Decorated bone

6.3.1 Description

Two pieces of burned, decorated bone were found at the same spot (V 1000, level 3, square H/5; Fig. 6.8). If they were already broken when they ended up on the pyre or after burning could not be observed. When joined their length is 10 mm, width 5 mm, and maximum thickness 2 mm. Though likely made from animal bone, it could not be determined what kind (S. Lemmers 2012, *pers. comm.*). It is decorated with incisions describing parts of two concentric circles of which only the largest one allows further description. This one has a diameter of about 5 mm. In cross-section the groove is U-shaped and has an irregular surface where it is deepest. Only a very small part of the inner circle survives and its precise shape cannot be reconstructed. Right next to this decoration we find the edge of another curved incision. No traces that shed light on the use or function of this bone fragment were found.

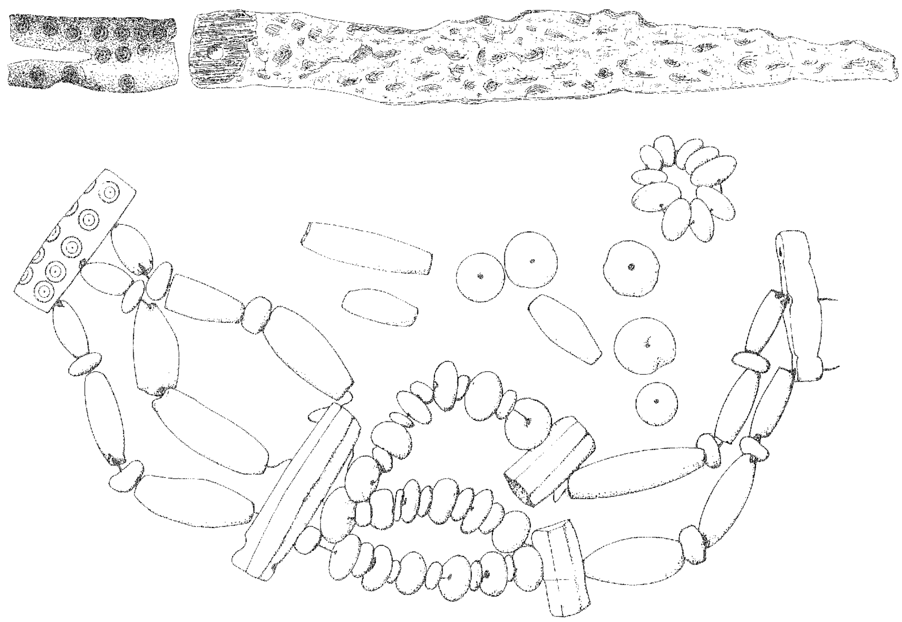


Fig. 6.9
(A) A decorated bone hilt from Staatswald Müllhart, Ldkr. Fürstenfeldbruck and (B) a necklace with decorated bone spacer plate found in Grave 136 in the Hallstatt cemetery (not to scale). Figure after Kossack 1959, Tafel 64/after Hodson 1990, plate 5/J. van Donkersgoed.

6.3.2 Parallels from other excavations?

Comparable examples of prehistoric decorated bone, unfortunately, are not very helpful either. Decorated bone is known from a few Middle Bronze Age cremation graves in the southern Netherlands (Theunissen 1999, tab. 3.13), but it is rarely possible to deduce the original function on the basis of such finds (they are only known as burned bone in cremation graves, and therefore represent objects that already have been transformed before deposition). One find from Goirle (Tumulus II – secondary cremation grave; van Giffen 1937, 23; fig. 11) has a type of decoration comparable to our specimen and is tentatively interpreted as part of a comb (without supporting arguments). Burned antler fragments of what perhaps were parts of the hilt of an (iron) knife were found in Someren grave 175. Here there was an association with an iron pin. They have been dated to the Early Iron Age and the antler was also decorated with the dot-circle motif (Kortlang 1999, 158; fig. 12). Bone or antler decorated with a dot and circle motif is known from other Early Iron Age knives as well. For example an iron knife with bone hilt with dot and circle motif found in Staatswald Müllhart, Ldkr. Fürstenfeldbruck (Kossack 1959, Tafel 64; Fig. 6.9, A). In the cemetery in Hallstatt a necklace incorporating a spacer plate with dot-and-circle motif was found in Grave 136 (Hodson 1990, plate 5; Fig. 6.9, B).

In Gevelinghausen, Westfalen (Germany) two bone plates decorated with concentric circles were found among the cremated bone that was deposited in a decorated bronze vessel (C14-dated to 772-400 BC, although the bronze vessel was probably older; Jockenhövel 2008, 112). Their function remains unknown.

Although the above shows that knives with decorated bone hilts were sometimes deposited in Hallstatt C/D graves, there is no reason to exclude any other interpretation for the find from mound 7.[61] One thing is clear: in the case of the find from mound 7, its stratigraphical position implies that it is contemporary with all the other finds in the central find assemblage and hence must date to the

61 Comparable decorations on bone are also known from later periods, and from a wide range of objects. For examples from Roman, Medieval and Post-Medieval times: see van Vilsteren 1987, 38-9; 44; 53; 56; 60; 67; 69.

Early Iron Age (*cf.* chapter 4). This observation is of some importance in relation to what can be seen as the closest parallel we have: the decorated bone from another mound in the Zevenbergen barrow group.

6.3.3 Parallels from the Zevenbergen: the finds from mound 8

Worked bone was found in the Iron Age urn in mound 2 of the Zevenbergen, but these were not decorated (Fig. 6.3; van Wijk *et al.* 2009, 86). Of more importance, however, are the nine pieces of decorated burned bone that were found during the 1965 excavation of the nearby burial mound 8 of the Zevenbergen (known as "Tumulus I" in Verwers 1966a). Four of them are decorated with concentric circles comparable to our specimen. On one fragment both sides show a concentric decoration. Here fragments of curved bone decorated with lines was also found, as well as one bone fragment with a circular incision (Verwers 1966a, 28; Fig. 6.10)

Is it a mere coincidence that this type of decorated bone, a rare find category after all, was found in two burial mounds that are only 70 m apart? This is a question worth asking as the find from mound 8 so far has been argued to be much older than the Early Iron Age. Here the decorated bone, so the argument goes, is associated with a Bronze Age urn that is seen as a secondary interment into burial mound 8 (Verwers 1966a, 28). Verwers dates this urn to the Middle or Late Bronze Age, a dating which is accepted by van Wijk *et al.* (2009, 124) in their re-analysis of mound 8. However, prof. dr. L.P. Louwe Kooijmans, who was in charge of the fieldwork as a student during the first excavation of mound 8 in 1965, told us that the precise stratigraphical position of this find was hard to determine as the urn was destroyed by animal activity (Louwe Kooijmans 2004,

Fig. 6.10 Decorated bone fragments found in mound 8 in during the 1965 excavation. Figure by J. van Donkersgoed.

Fig. 6.11 Sherds of the Middle Bronze Age pot that was found in mound 8 in 1965 and that was seen as the container of the decorated burned bone fragments. Figure by J. van Donkersgoed.

pers. comm. to the first author; also to van Wijk *et al.* 2009, 124, note 59). This casts some doubts on the supposed association between the decorated bone and the Middle Bronze Age pot (Fig. 1.8 and 6.11).

Both the 1965 and 2004 excavations showed that mound 8 was not only used in the Middle Bronze Age as a burial location, but in the Early Iron Age as well (van Wijk *et al.* 2009, 124-125). In short, there are reasons to doubt whether the nearest-by parallel really dates to the Middle Bronze Age. It is possible that the decorated bone from mound 8 was contemporary with that from mound 7.

6.3.4 Conclusion

To recap, we are dealing with two fitting fragments of burned decorated bone that were found among pyre debris. They must have been part of some large object, but other fragments have not been found. Its function cannot be reconstructed. Parallels suggest a variety of possible uses. It cannot be determined whether it broke due to fire or before (for example by human hand). Considering how rarely decorated bone is found in barrows it is intriguing to see that comparable fragments come from nearby mound 8. Given the find circumstances of the latter, we suggest that these also date to the Early Iron Age use of that mound, rather than to the Middle Bronze Age as is usually argued.

6.4 (Fragment of) an iron object

Only a single (fragment of an) iron object was found in mound 7. It has a slightly curved form, which ends in what seems to be a rounded “knob” on one side (l. 25 mm; w. 15 mm; w. 250 g; Fig. 6.12). The object is heavily corroded, making it practically impossible to determine what it is (from), or even if it was burned. Even whether it is a fragment or complete object is impossible to determine in its present condition. It is unassociated with any other artefact and was found in an isolated position at the west end of the central find assemblage (see chapter 5, Fig. 5.2). Although iron objects are prominent in the contemporary chieftain’s grave of Oss a few hundred metres to the west of the Zevenbergen, iron is remarkably absent in the other graves of the Zevenbergen. The only location where iron objects have been found is the primary grave of mound 3, the other monumental

Fig. 6.12 Iron object (V 1004, level 4, square E/6). Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Early Iron Age mound of Zevenbergen. Here an iron pin and an object of unknown function were found in the centre of the mound (van Wijk *et al.* 2009, 95-96). Both objects, however, have a very different form than the one we found in mound 7.

6.5 Conclusion

In this chapter, three kinds of artefacts were discussed that were found in the central assemblage, which all have counterparts in other graves of the Zevenbergen. Unfortunately, in the case of decorated bone and iron, these are not helpful in unravelling their original function. For the decorated bone, we conclude that fragments of what must have been a larger object were burned on the pyre. What it exactly was that they decorated remains unclear. Remarkably, very similar decorated bone was found in mound 8 nearby. Although these have been dated to the Middle Bronze Age, in our view, there is reason to doubt that dating and we find it more likely that they date to the Early Iron Age as well. Unfortunately, we also fail to get more insight into the iron object. It is different from the iron objects that were deposited in the other adjacent monumental Iron Age mound 3. The urn, then, fits in better. Pots with a comparable shape were used as urns in many urnfields in the southern Netherlands, and on the Maashorst in particular. In fabric and shape, it is comparable to another Early Iron Age urn that was dug into mound 2 nearby, and it is close to the remains of a pot that must have been found very close to mound 7 (but are unfortunately unprovenanced). It also has similarities to the urn in the primary grave in mound 10. Urns like this one were used by the local Early Iron Age community who interred their dead at the Zevenbergen, and we find them both in secondary graves, primary graves in modest barrows and in very large ones like our mound 7.

Chapter 7

Dismantled, transformed, and deposited – prehistoric bronze from the centre of mound 7

David Fontijn and Sasja van der Vaart

7.1 Introduction

This chapter discusses the bronze artefacts that were found in the centre of mound 7. In all, 1080 bronze items were recovered (Tab. 7.1). The majority are very small objects and fragments of objects. Associated finds like the charcoal, the urn, and the cremated and decorated bone remains have been described elsewhere (in chapters 5, 6, and 11). The bronze finds include (fragments of) rings with square and round cross-sections, a hemispherical sheet-knob, studs, and stud fragments.

Each form is discussed in the following way. First a brief description of the objects is given. Then, their find contexts are discussed. Contextual information may help to get an idea on the function of an object. The mound 7 finds are then compared with similar items discovered elsewhere. Closed finds from other sites may hold information on dating and function that can be used heuristically in the investigation of the mound 7 material. A broader discussion on the entire central find assemblage that these artefacts are part of can be found in chapter 5.

We will start with several kinds of bronze rings (sections 7.2 and 7.3) and one hemispherical sheet-knob (section 7.4). Then, we will deal with the studs, our most numerous find category. First, general characteristics of the mound 7 studs will be discussed (section 7.5), and then we try to make sense of a complex of studs that are still *in situ* (section 7.6 and 7.7). As all these bronze finds seem to be related, we will then go on to see what the function of all these bronzes originally was (section 7.8).

For the position of individual finds and the lifted blocks of soil in the mound the reader is referred to figure 5.2.

*Table 7.1 Bronze finds per type. * This find no. has been subdivided into three layers, see table 7.2. ** Including fragments of one hemispherical sheet-knob. *** An additional eleven bronze fragments are pictured in the Restaura documentation. It is at present not clear where these are currently located, they therefore are not included further.*

Type of bronze	V 165	V 173 *	V 175	V 176	V 177	V 211	V 217	V 218	V 223	V 1000	V 1001	Total
Small stud, complete	4	458	4	4					1			471
Small stud, head		55	1	3								59
Small stud, head + 1 leg		5										5
Small stud, legs bent double		3										3
Indet. (probably small type stud, large type cannot be excluded)	24	264		44	12							344
Stud leg (probably of small type, large type cannot be excluded)	1	94	2	4								101
Large stud		9										9
Bronze indet. (fragment too small to identify)	2	5				1	66**			5***	1	80
Ring complete	1							1				2
Ring fragment					1					2	3	6
Total	32	893	7	55	13	1	66	1	1	7	4	1080

7.2 Bronze rings with square cross-sections

Six fragments of rings with square cross-sections were found. Each object and its find context are described individually. Lastly, a general section charts the possible functions of such rings as can be deduced from parallels from other sites.

7.2.1 The ring fragments from V 1000

Two small fragments of a ring with square cross-section were found during the excavation of V 1000 in the laboratory (Fig. 7.1). Both fragments are 3 mm thick, which makes them comparable in size to two fragments found some 50 cm to the west (in V 1001, see below). Both show signs of burning. It is possible that these V 1000 fragments are from the same ring as those with similarly sized cross-sections in V 1001.

The breaks are old, but whether they were caused by burning alone can not be seen. These ring fragments are positioned close to each other in squares I-J/3-4 (level 3) just to the south of a large piece of charcoal. Apart from these ring fragments no other metalwork was found at this location.

7.2.2 The ring fragments from V 177 and V 1001

The ring fragments from V 177 and V 1001 are discussed together as they represent one concentration of ring fragments.

Fragment V 177

V 177 is a large ring fragment that was uncovered and lifted prior to the Restaura block liftings. It was in the highest levels of that part of the central find assemblage that would later be lifted as V 1001 by Restaura. Projected on V 1001, it represents the top layer of square F/8 (Fig. 7.2 and 7.3).

The ring fragment has a square cross-section (thickness 6 mm) and was heavily corroded. There are no clear indications that it has been burned (Fig. 7.2). The breaks are flat and patinated indicating that the breaks are not recent. If the object originally had a round shape, it was slightly deformed before deposition. This may have involved heating.

In the soil lifted with the ring fragment there was a number of small bronze studs. These finds are situated in a zone with charcoal patches and charcoal that is lying on an E and B horizon which is generally intact (apart from a disturbance some 30 cm to its north and by a small recent root immediately to its west some 5 cm higher). After this fragment and some other bronzes lying at the top had been taken out by the excavators, the entire ground was lifted as V 1001 by Restaura and further excavated in the lab. More ring fragments with square cross-sections were found during the lab excavation, but these are all from other rings (judging by their smaller thickness). For these reasons we find it extremely unlikely that there were more fragments of the V 177 ring lying at this location. In the central find assemblage as a whole no other ring fragment was found that could have been part of this ring. At the same location twelve fragments of (loose) small studs were found, all of which seem to have been burned. There is no information on the position of the studs' legs and nothing in the find context suggests a functional link between the studs and the ring fragment. In addition to this, 10 g of burned bone was found here, as well as small pieces of charcoal and the remains of burned twigs lying immediately to the west of the ring fragment. Two of those twigs have been C14-dated (V 189 and V 190), yielding a date in the earlier part of the Early Iron Age (section 4.6; Fig. 4.36).

Fig. 7.1 V 1000, level 3 with a ring fragment indicated next to the wood. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.2 V 177 after restoration. Note that the fragment is deformed. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.3 V 177 in situ during excavation. View to the north. Figure by Q. Bourgeois.

In summary, the most likely scenario for V 177 is that it was (intentionally) broken, and that either only one fragment was deposited or that fragments were taken out again leaving just one in place to be found by us. The bone fragment found nearby indicates that temperatures around 800 °C (chapter 12) were reached, and this makes one wonder why the ring fragment does not show traces of burning. However, the experiment carried out by Jonuks and Konsa (2007, 105) indicates that a lack of visible burning traces does not mean that the metal was not exposed to high temperatures in the pyre (see further section 5.7.5). We must take into account that pyre debris may have been searched through or displaced to some extent which means that the ring fragment originally could have been lying at some distance from the hottest locations in the pyre (see chapter 5).

The fragments from V 1001

Ring fragments V 1001 no. 1 to 3 were all found during the later excavation of V 1001 in the laboratory and were discovered at level 2 of that block. No. 1 and 2 are small ring fragments with the same thickness (3 mm) and hence may represent fragments of the same ring. As remarked above, two ring fragments with similarly sized cross-sections were also found in V 1000. The cross-section of fragment no. 3 is thicker (6 mm) and has a slightly twisted shape and therefore is from a different ring than V 177. All fragments show signs of burning, particularly no. 3 (Fig. 7.4).

The breaks of the rings are patinated. The breaks themselves are deformed (presumably by fire), but whether they broke because of the fire is uncertain. The fragments are all situated in square E/8, a few centimetres below and approximately less than 10 cm to the east of ring fragment V 177 described above.

Fig. 7.4 V 1001 no. 3 after restoration. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

There are hardly any other metalwork finds here, apart from a few deformed and burned indeterminable fragments in square E/8-9 and one in square G/9. Bronze studs were not found.

A concentration of ring fragments with square cross-sections

No (fragments of) rings with square cross-sections were found outside of the area defined by V 1000 and V 1001. All except one (V 177) were clearly burned. It is possible, but it could not be proven, that the four fragments with a thickness of 3 mm in V 1000 and V 1001 were part of the same ring. A viable interpretation is that a complete ring was burned (causing breakage) and came to rest among the pyre debris. People searching through the debris displaced material, and fragments of what was one ring came to lie at different locations (V 1000 and V 1001). This interpretation, however, cannot be used in the case of the larger fragment no. 3 from V 1001. This is a fragment of a different ring from which we have no other parts. The lack of disturbances and the detailed way of excavation (in a lab using X-ray prospection) makes it unlikely that the rest was originally there and went undetected during the excavation. Rather, we must be dealing with a situation in which only a fragment of a ring was placed on the pyre. Alternatively, we could think of a scenario in which one ring was burned (whole or in pieces), and most fragments were later taken out of the pyre debris by the mourners. In both explanations, the result is the *deposition of fragments*. This must also apply to our last ring fragment, V 177. This ring was broken by people, and only one fragment of this ring finally came to rest among the pyre debris.

7.2.3 Parallels of bronze rings with square cross-sections

Summing up, only fragments of rings with square cross-sections were found. These were discovered at just two locations within the entire central find assemblage. In one case (V 1000) there is no spatial association with other metalwork finds, in the other (V 177 – V 1001) ring fragments appear to be clustered, and in one case there is an association with some bronze studs (V 177). Neither context provides a clue as to the sort of use to which these rings were once put. As most material shows traces of fire and is located close to large pieces of charcoal, it must represent material that was secondarily displaced due to the collapse of the pyre and/or subsequent inspection of its remains before becoming covered by the sods (chapter 5). As we have seen, in at least two cases (V 177 and V 1001 no. 3, see above) we most likely are dealing with a situation in which only a single fragment of a ring was left among the pyre debris. All this makes it very hard to say anything regarding the original function of those rings on the basis of how and where they were found. It might therefore be worthwhile to see what sort of information there is on the function of rings with square cross-sections from other Early Iron Age sites.

Rings with square cross-sections occur in a range of sizes. For example, the contemporary wagon grave from Wijchen (less than 20 km from Oss-Zevenbergen) contained rings with square cross-sections in a variety of different sizes (21-46.5 mm; van der Vaart 2011, 131). In most cases where loose rings are found in Hallstatt period burials, it is assumed that the rings are from horse tack, as rings feature regularly in bridles and harnessing (Trachsel 2004, 530). The square cross-section of certain rings is sometimes believed to have been a functional characteristic of horse-gear, the idea being that reins would "block" when pulled on (Willms 2002, 64). However, there are many different kinds of objects other than horse-gear that incorporate rings in their construction. The handles of bronze vessels such as those from Baarlo and Rhenen have rings with square cross-sections dangling from their handles (van der Vaart 2011, 50; 110). Rings with square cross-sections have also been found as part of a "toilet-kit" with a nail-cutter, ear spoon, and tweezers suspended from the ring (Willms 2002, 49). Therefore, even though rings most commonly occur as part of horse-gear, the range of possible objects makes it impossible to determine the original function of a single loose ring fragment.

7.3 Complete bronze rings with round cross-sections

Only two rings with round cross-section were found. In contrast to those with square cross-sections discussed above, the round cross-section rings are both complete and situated in a different zone of the central find assemblage (at its eastern

Fig. 7.5 V 165 (right) and stud concentration V 173 (left) in situ during excavation, top is northwest. (inset) Magnification of V 165 from a different angle. Figure by Q. Bourgeois/J. van Donkersgoed.

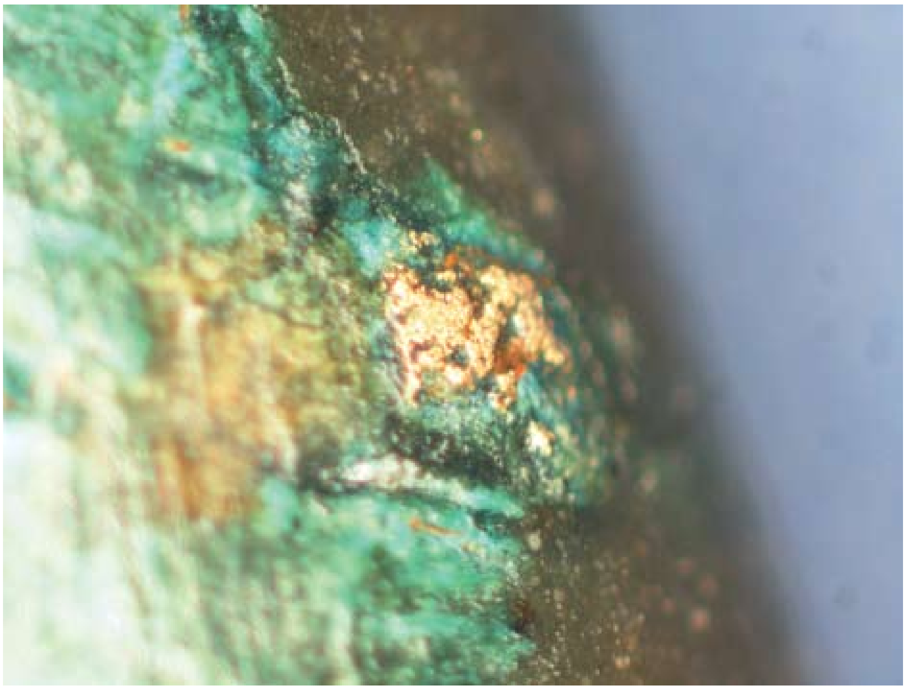


Fig. 7.6 "Gold" patch on bronze ring V 165, under high magnification (up to 65x). Figure by A. Verbaas.

fringe; Fig. 5.2). Situated some 15-20 cm to the south of a huge concentration of bronze studs (V 173, discussed below) a broken but complete D-shaped ring with round cross-section was discovered, together with some other bronze items. This find was recorded as V 165. A large piece of charcoal separates V 165 from the stud concentration (Fig. 5.2). The D-shaped ring was the first bronze find done here and proved to be the tip of the iceberg. It was lifted as a small block (less than 20 by 20 cm) by the excavators and X-rayed and further excavated in the lab using a 10 by 10 cm grid.

Another complete ring with round cross-section was situated immediately to the east of the stud concentration (also some 15-20 cm). This one has been recorded as V 218 (ring) and V 217 (associated material). It was also lifted as a small block during the excavation and further investigated in the lab.

The proximity of the only two complete rings to the concentration of studs V 173 suggests that the concentration of studs and the two rings were related (Fig. 7.5). V 165 and the stud concentration V 173 were laid bare at the same time. V 217 and V 218 were discovered somewhat later.

In order to investigate this fully, this will be discussed in more detail in relation to our discussion of that remarkable stud concentration V 173 in section 7.8. Here, we will restrict ourselves to describing both ring finds and their immediate contexts, that is, the soil in which they were lifted.

7.3.1 A D-shaped bronze ring: V 165

Only one ring fragment was recognized in the field, but remnants of other pieces of bronze were seen. We therefore decided to lift the fragment with soil and all. During the lab excavation the X-rays of this small block of soil around ring fragment V 165 showed that there were even more ring fragments than seen in the

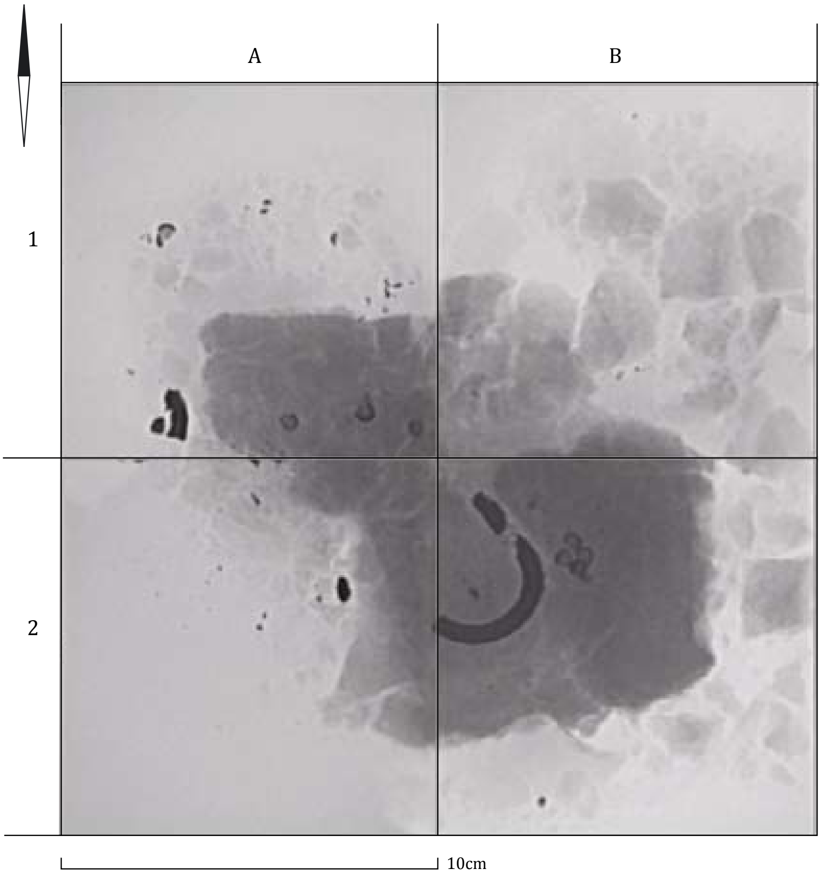


Fig. 7.7 X-ray V 165. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.8 V 165 after restoration. The scratches visible on the straight part of the ring are not original. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

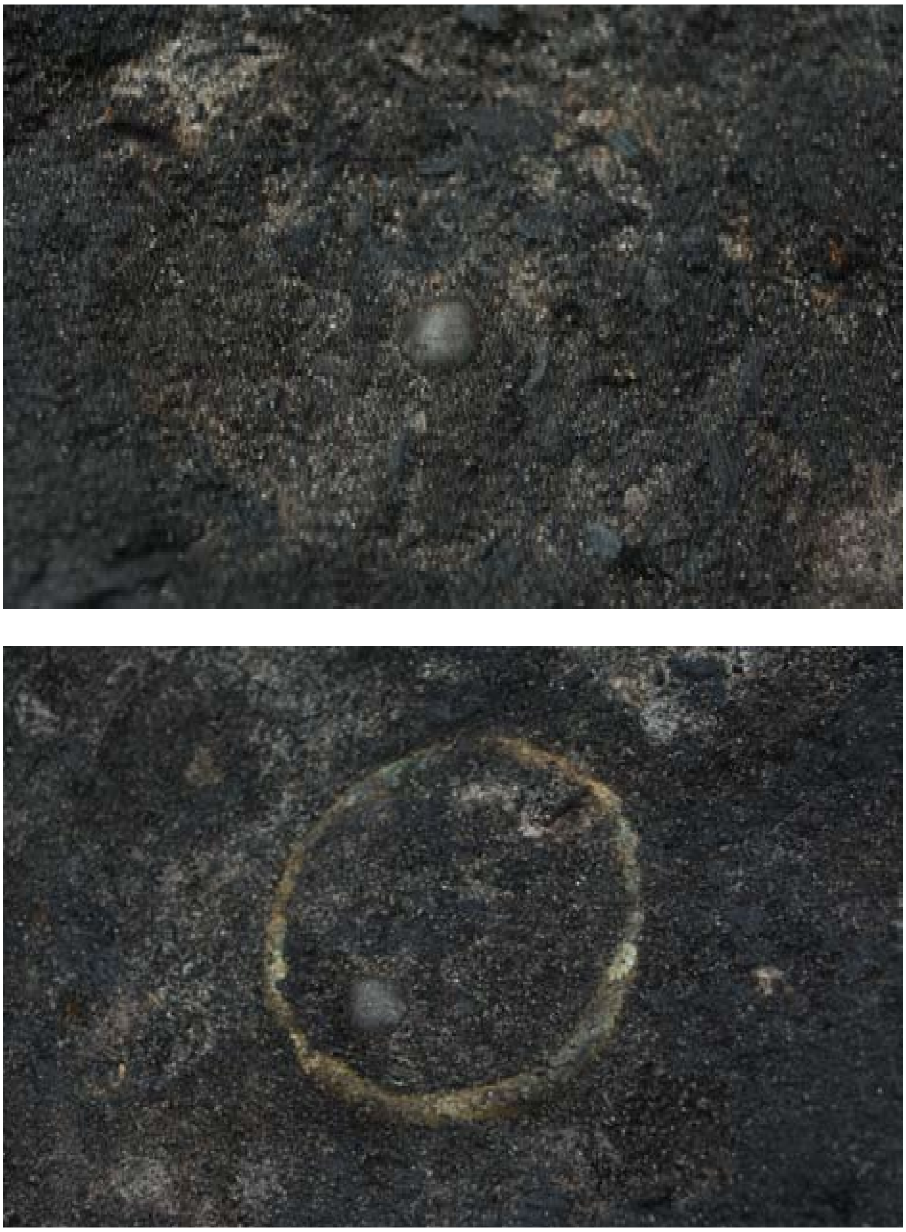


Fig. 7.9 V 217 in situ upon discovery (top) and in association with V 218 after deepening (bottom). Figure by Q. Bourgeois/J. van Donkersgoed.

field (Fig. 7.7). The fragments had a brownish patina, but the breaks were not patinated. There are no clear traces of burning visible. During the lab excavation it became clear that a recent tree root had disturbed this location and must have been responsible for the breaking of the ring and the subsequent distribution of some fragments. The ring fragments could be joined in the lab and it appears that we are dealing here with a D-shaped ring with round cross-section (Fig. 7.8; l. 35 mm; w. 29 mm; th. ca. 5 mm).

Under magnification (up to 65x using a binocular microscope) a remarkable tiny patch of what seems to be gold was visible. Figure 7.6 shows that it is positioned on top of the bronze. This was not detected as such during the restoration. Although general prospective XRF measurements were taken during restoration, this particular location was not inspected. As the ring is now on permanent display in the National Museum of Antiquities in Leiden, further analyses could not be carried out. Determining whether we are dealing with what originally was a gilded ring, must await future research.

As remarked above, the ring was situated to the south of the concentration of bronze studs (V 173), immediately to the south of a large piece of charcoal (V 172; Fig. 5.2). The largest part of the ring was found in square B/2 of the local grid of this small lifted block, where loose fragments of small studs were also found (three head fragments, one leg fragment, nine indeterminable pieces of studs, and two pieces of indeterminable bronze). More ring fragments were discovered in square A/1, and here there is also evidence for more small studs (15 stud fragments, one small stud). Pieces of charcoal were found in squares A/1 and B/1.

7.3.2 A large bronze ring: V 218

The other ring with round cross-section was discovered just to the east of the cluster of bronze studs V 173. Within the ring's circumference what appears to be a bronze hemispherical sheet-knob was visible (section 7.4) during the excavation (Fig. 7.9).

The ring (V 218) and the sheet-knob (V 217) were covered by a black layer of charcoal fragments. The sheet-knob was visible first, with its head up. The ring only became recognizable after some of the soil around the sheet-knob was removed. A rectangular block of earth around the ring was lifted by the excavators prior to the Restaura block liftings, and the material was X-rayed and further excavated in the laboratory. The ring has a diameter of 53 mm and a thickness of 5 mm. It had a brownish corrosion, comparable to that on the D-shaped ring (V 165) found nearby and was in a poor state of preservation.

The ring is situated within a zone of charcoal patches with many small pieces of charcoal, and, as indicated by the X-rays, also a lot of very small bronze fragments (64 in total, three of which fit together, many have a white or yellow colour). The largest fragments are situated in the soil encircled by the ring and just to its north and south.

7.3.3 Parallels of rings with round cross-section

In summary, two complete rings were found in isolated positions close to a huge concentration of bronze studs (V 173). No ring fragments whatsoever were found among the hundreds of bronze studs of V 173. Both rings are situated among charcoal and in and under charcoal debris. The context of the D-shaped ring has been disturbed by recent tree roots, but was originally associated with remnants of small bronze studs. The large ring V 218 was associated with at least one hemispherical bronze sheet-knob and small fragments of other sheet-knobs or studs.

In an effort to understand the functions these rings might have had, we looked to similar finds from other contexts. However, it soon became clear that, as with rings with square cross-sections, those with round cross-sections have been found in a many sizes and as components on a wide variety of objects. Again, rings with round cross-sections are generally assumed to be horse-gear components when found singly. There are many examples of horse-gear incorporating rings, the bit-rings from Wijchen are but one (van der Vaart 2011). In some cases it has proved possible to determine that specific bronze rings were part of horse-gear. For the chieftain's burial of Oss, for example, it was possible to reconstruct that three solid bronze rings in all probability featured in the bridle constructions (van der Vaart 2011). Rings with round cross-sections can, however, also feature in very different kinds of objects. For example, they are often found as part of "toilet-kits" (Kossack 1959). Therefore, even though rings with round cross-sections most commonly seem to feature in horse-gear or as wagon components, their function can generally only be determined from their find context.

7.4 A bronze hemispherical sheet-knob: V 217

Above we already referred to the sheet-knob that was found within the circumference of ring V 218. The top of the knob, recorded as V 217, was clearly visible during the excavation (*cf.* Fig. 7.9). On the X-ray, its hemispherical form is visible, as well as two short legs that are folded inwards (Fig. 7.10).

Unfortunately, preservation was so poor that the object could not be preserved intact. Figure 7.11 shows the fragments from V 217 after lab treatment. At least the three large joining fragments are part of the sheet-knob that was seen during excavation (Fig. 7.9).

As the X-ray shows, there may be more such fragments, though this one is clearly the largest example. The X-ray also shows that there were other pieces of bronzes in the ground that were already fragmented when they were still in the soil. Although not always easy to recognize when there are only fragments left, this is the only example of a hemispherical sheet-knob of this size in the entire find assemblage.

There are many reasons to believe this object was originally a "sheet-knob" even though it did not survive excavation as one. Figure 7.9 shows the object to be hemispherical upon discovery. The legs of the sheet-knob are discernable on the X-ray (Fig. 7.10). Better preserved, complete examples from other burials are very similar to the one seen during the excavation and on the X-ray photographs. In the nearby located chieftain's burial of Oss 15 such sheet-knobs were found (Fig. 7.12).

They are roughly 18-20 by 18-20 mm in diameter. The surviving legs are all bent inwards, similar to what appears visible on the X-ray of V 217. The burial of Rhenen likely also contained a sheet-knob, but this one is in rather bad shape (van der Vaart 2011). In the case of the chieftain's burial of Oss the sheet-knobs are thought to have decorated the bridles (van der Vaart 2011). The leather bridle straps from the Frankfurt-Stadtwald burial were similarly covered in (slightly smaller) hemispherical sheet-knobs (Willms 2002, 72). Their most common use, however, seems to be as decoration on leather yoke panels, often in combination with smaller bronze studs (Koch 2011, *pers. comm.*). This is discussed further below.

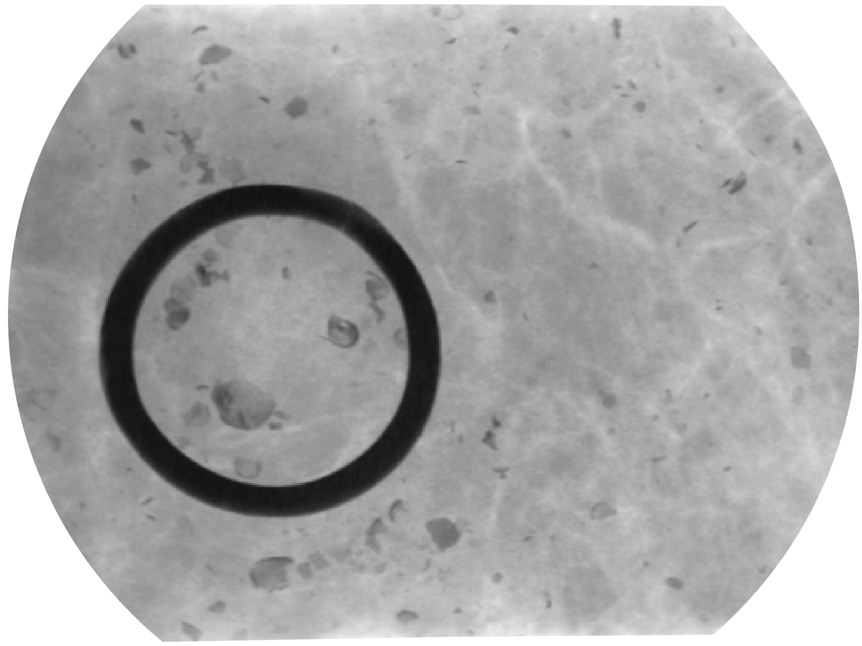


Fig. 7.10 X-ray of V 217 and V 218. Note the legs of V 217. Figure by Restauratieatelier Restaura, Haelen.

Fig. 7.11 V 217 after lifting. Figure by Restauratieatelier Restaura, Haelen.

Fig. 7.12 Three hemispherical sheet-knobs from the chieftain's burial of Oss, seen from the top and bottom. The knob on the left is missing most of its legs, and the middle stud is misshapen. Figure by P.J. Bomhof (© National Museum of Antiquities)/J. van Donkersgoed.

7.5 Bronze studs (*Bronzezwecken*)

Without a doubt, the bronze studs are the most intriguing finds done in this excavation. They are extremely rare in this part of Europe, yet hundreds were found here. Even more interesting, it was clear from the start that for an important part the material was *in situ*, the fossilized remains of a decayed organic object. Investigating what we are dealing with here is far from easy and requires an extensive discussion. In this section, we will start by describing the studs and their find circumstances. We will end with an overview of analogues from other excavations where similar items were found in contexts that reveal something on their function. The next section (7.6) then will deal with the analysis of the largest cluster of studs found underneath mound 7, V 173, as this seemed to represent the remains of a larger, stud-decorated object that had decayed *in situ*. In section 7.7 other, smaller clusters of studs are discussed. This is followed by a final discussion on what all the bronze finds described in this chapter might be the remains of.

7.5.1 Small and large studs: characteristics

By far the most numerous kind of bronze object found in mound 7 is the bronze stud (German: *Bronzezwecke*). Studs are defined here as having a hemispherical head and two (pointed) legs.

We distinguish a smaller and a larger variety. The small variety is, with 521[62] specimens, by far the most common one. A single stud weighs less than 1 g. Most other fragments found can also be identified as the remains of small studs.[63] There are only nine large studs. The small studs are defined as having a head diameter smaller than 8 mm, whereas large studs have a head diameter that is 8 mm or more. Small studs generally have head diameters varying from 3 to 5 mm, and it is therefore not hard to differentiate between small and large studs. The head diameters of the latter vary from 8 to 10 mm. The legs of small studs are usually between 4 and 5 mm long, legs of 7 or 8 mm are uncommon. The legs of large studs usually measure 6 mm. The legs are usually pointed, although some have rather blunted tips. The legs of the small studs are mostly straight, though there are also studs with legs bent in various directions. Figure 7.13 gives an impression of the variety encountered. The large studs always have their legs bent inwards (Fig. 7.13). The studs have different colours, of which particularly a whitish colour is uncommon for bronzes from archaeological contexts. Small as they are, different colours can often even be observed on one stud (for example: whitish legs and a green head (Fig. 7.16 and 9.1).

Analyses of the metal compositions of a selection of small and large studs by Nienhuis *et al.* show that we are dealing with objects made of a tin bronze alloy, containing some lead and arsenic, and probably nickel and antimony as well. Studying the remarkable differences in colouring, they argue that it is most likely that the studs were intentionally tinned to create a silvery appearance (chapter 9). Nienhuis *et al.* also demonstrate that the studs were easy to produce, and were very likely made in the same workshop.

7.5.2 Contexts where the mound 7 studs were found

There is a large concentration (hundreds of studs and stud fragments) on the eastern fringe of the central find assemblage, recorded as V 173. It was clearly visible as a discrete concentration in the ground, conspicuous for its partly green/yellow-

62 See Tab. 7.1: 458 complete, 55 head fragments, five fragments with head and one leg, and three specimens bent completely double.
63 264 fragments classified as “indet.” probably also represent small studs (Tab. 7.1).

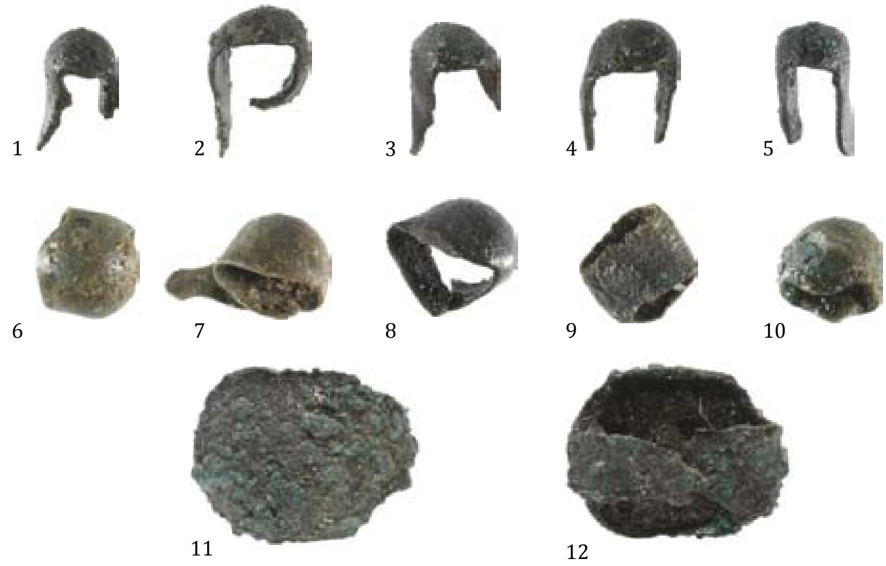


Fig. 7.13 Range of leg positions of small studs. The legs of 1 through 5 are considered "straight" and those of 6 through 10 are considered "folded". 11 and 12 show a "large stud" from two sides. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

ish colour (Fig. 7.22). Small charcoal fragments were lying on top of it (Fig. 7.40). After the boundaries of the stud concentration were recognized, the surrounding soil was deepened somewhat to make sure there were no anthropogenic features beneath V 173. None were identified; the concentration appeared to be resting on top of the decapitated prehistoric surface (the E horizon, see chapter 4). The block was lifted successfully, but when it was removed, a smaller concentration of studs was revealed underneath it. This was documented and lifted as another block of soil. These upper two blocks, by far the largest part of the concentration, were labelled V 173A (thickness ca. 5 cm) and V 173B (thickness 3-4 cm). Having lifted the second one, there appeared to be another small cluster of bronze studs beneath it, much smaller than V 173B. This lowest concentration was probably displaced deeper through bioturbation (Fig. 7.24). As it was by that time already clear that the situation was too complex to handle in a normal fieldwork situation and more encompassing block liftings were needed, we decided to leave this lowest concentration *in situ*. It was lifted later in a much larger block by Restaura, even though the concentration of studs was very small (see also chapter 8). This lowest find concentration was labelled V 173C.

V 173 holds by far the largest number of studs, 888 studs and fragments of studs have been recognized (Tab. 7.1 and 7.2). Studs were also found in V 1000 and V 1001, and a modest concentration also lies adjacent to V 1001 (V 175 and V 176, see Tab. 7.1). In addition to this, stud fragments were recognized in association with the D-shaped ring V 165 (section 7.3.1). However, the huge stud-only concentration V 173 is the most informative on their function and for that reason we will primarily focus on that find cluster.

With regard to context it is important to remark that already during the excavation one could observe that studs were placed in small clusters (Fig. 7.5). X-rays of V 173 also revealed studs placed in rows and other clusters (Fig. 7.14, 7.15, and 7.33; see section 7.6).

It appears that bioturbation prior to and soil shrinkage after lifting the blocks disturbed these orderings somewhat. During the excavation process in the lab, some of the orderings visible on the X-ray fell apart. In some cases, however, their original position was "fossilized" by corrosion. The Restaura team was able to lift and preserve neat rows of aligned studs. In other cases, studs that were uncovered grouped in rows or clusters had not corroded to each other and were therefore lifted individually. In total, 107 studs were found as corroded in a single row of

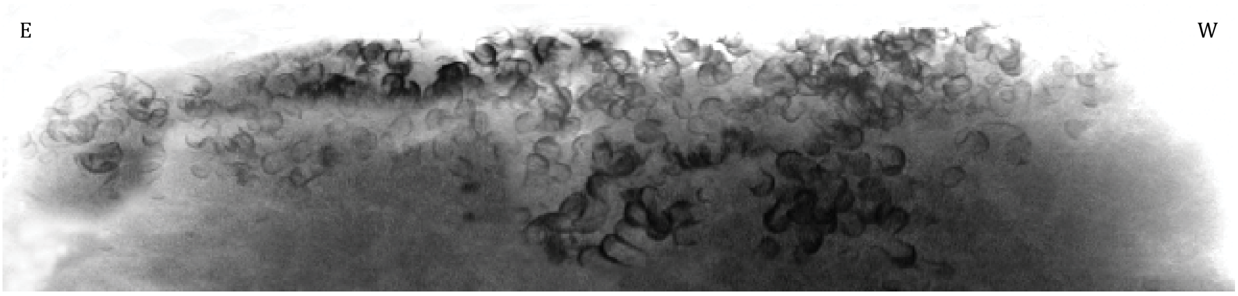


Fig. 7.14 (above) X-ray of V 173A taken from the north side. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.15 (below) X-ray of V 173A taken from above. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

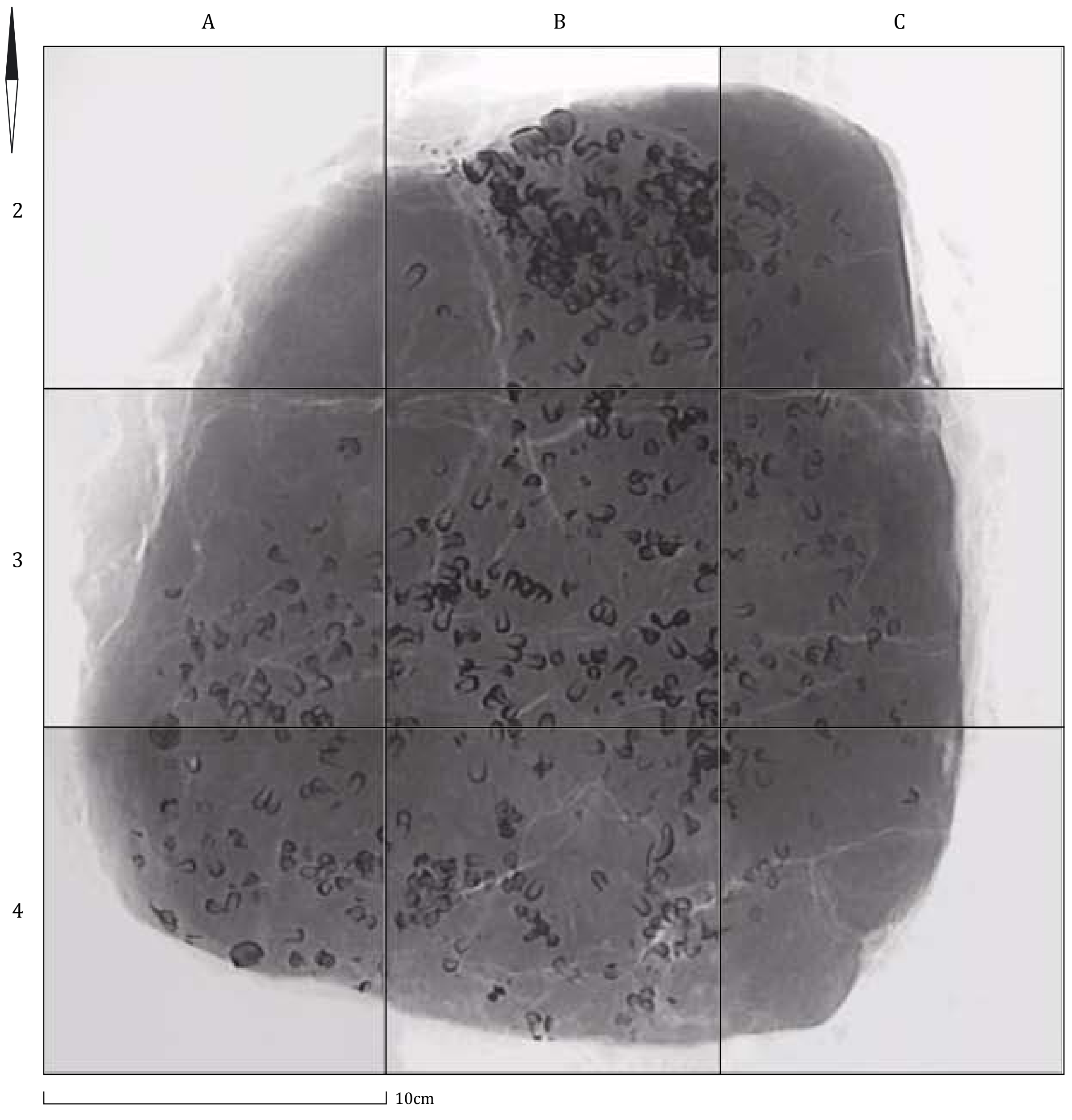


Fig. 7.16 Studs "fossilized" into rows and a triangle from V 173A. Also shown is a single large stud. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

usually two, three or four studs. In one case, 13 studs form multiple rows in a random pattern (Fig. 7.16). By far the largest number of studs corroded in such a way is from the stud cluster V 173. Outside this cluster only a few single rows of studs were found in V 175 and V 176 (see section 7.7).

The corroded examples are all in straight rows with the heads and legs aligned (with the exception of a few corroded transversely, see section 7.6.4). This indicates that the studs became affixed to each other in their original position. They have not been disturbed by post-depositional processes to become joined by corrosion at a later stage. The legs of aligned studs all point downwards, indicating that this was the position in which they were finally deposited. Discussing the contexts in which these kinds of studs are usually found will help us understand their original function and the significance of these rows and orderings.

7.5.3 Parallels and possible functions of bronze studs

Bronze studs like those from mound 7 are rare in Northwest Europe. To our knowledge, there is only one roughly comparable find from the Netherlands or Belgium.[64] This may be because they are so small and vulnerable that they are easily overlooked in excavations, particularly if mobile excavators are used. As remarked before, they often went undetected even with good metal detectors like the ones we used. Comparable studs are mainly known from Central Europe, all dating to Ha C (Trachsel 2004, 440). This fits with the dating evidence we have for the central find assemblage (section 4.6). Figure 7.17 gives an overview of sites that are known to have yielded such studs.

The general idea is that bronze studs were used as decorations on wooden or leather objects. In some cases they decorated leather panels attached to a wooden object. This is based on finds where wood and leather have been preserved.

64 Small studs with a head size comparable to the ones discussed here but with much shorter legs are known from Middle Bronze Age graves in Lower Saxony, Germany (Laux 1996, 99), where they presumably decorated textiles. The same applies to studs that probably decorated Early Iron Age textiles from Sticna. Here, there are tiny loops at the back instead of legs (Gabrovec/Terzan 2008/2010, 68, fig. 5).

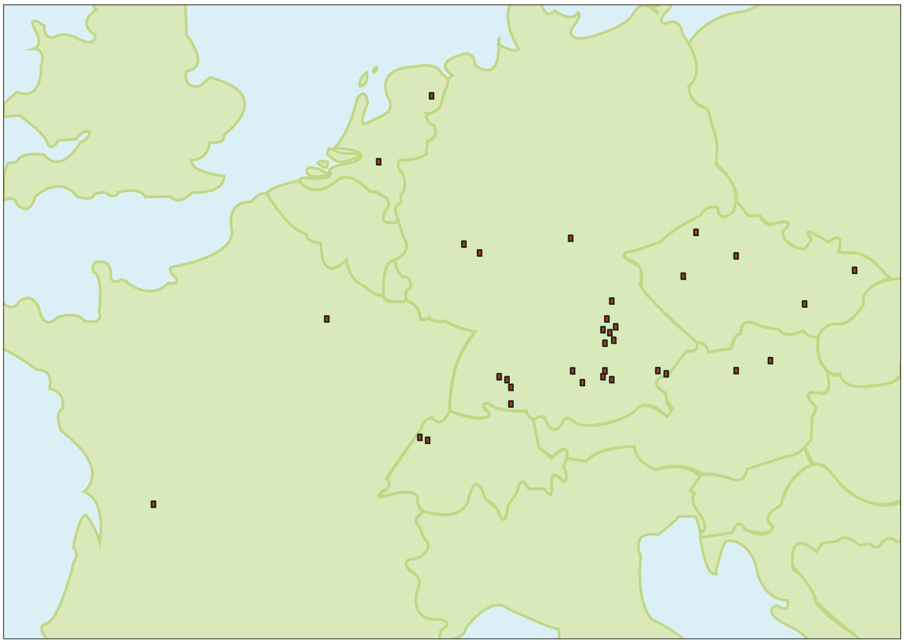


Fig. 7.17 Map showing the find locations of studs. Figure based on Trachsel 2004 with Dutch finds added by J. van Donkersgoed.

Some German examples

A perusal of a number of overviews of Early Iron Age burials uncovered several finds of bronze studs in Germany that are of interest to us. Unfortunately, most come from old excavations, so information regarding context is often very minimal. They are shortly discussed as they provide some interesting insights into our mound 7 studs.

One example comes from the "Haggenberg" in Meßkirch-Langenhart (Landkreis Sigmaringen), where several interesting finds were done in a large barrow (diameter 17.2 m, height 3.4 m). Several finds were recovered throughout the mound. It is impossible to positively determine whether all finds from this mound are from the same grave, though Pare (1992, 263) finds it likely that at least the artefacts considered here are from the same primary wagon-grave (Fig. 7.18, 1-11). A piece of wood (l. 86 cm; w. 57 cm) was found 2.9 m deep. The upper surface of the wood was covered with bronze studs and rhomboidal "frames" with an openwork cross in the middle, the lower surface with leather. A second wooden board decorated with bronze ornaments was also found. This piece is narrower and has a tapering end (Pare 1992, 263). In the 1860's this wooden object was interpreted as a shield, and based on some iron nails it was suggested that is was 28.6 mm thick (Lindenschmit 1860, as cited by Pare 1992, 263). Of interest to us is that the studs that decorated this *wooden* object come in two sizes, and that their legs all appear to be straight.

An interesting contrast comes from finds excavated in a mound in 1867 in Hossingen-Meßstetten (Landkreis Zollernalbkreis). Here the decorative bronze studs of a leather strap (Fig. 7.18, 13) were discovered in association with openwork bronze plaques, bronze rings with square cross-section, and rings with two nails (Zürn 1987, 224). In this case, the *straight-legged* studs are reported to be from a *leather* component.

The bronze studs from the wooden objects from the Haggenberg form striking geometric patterns, incorporating both large and small studs. Studs, however, were not always organized into neat patterns. An example of this was found south of Höllriegelskreuth-Pullach (Landkreis München), where 17 out of a group of 23 barrows were excavated by J. Naue in 1882 and 1883. In one barrow (Hügel 3) a

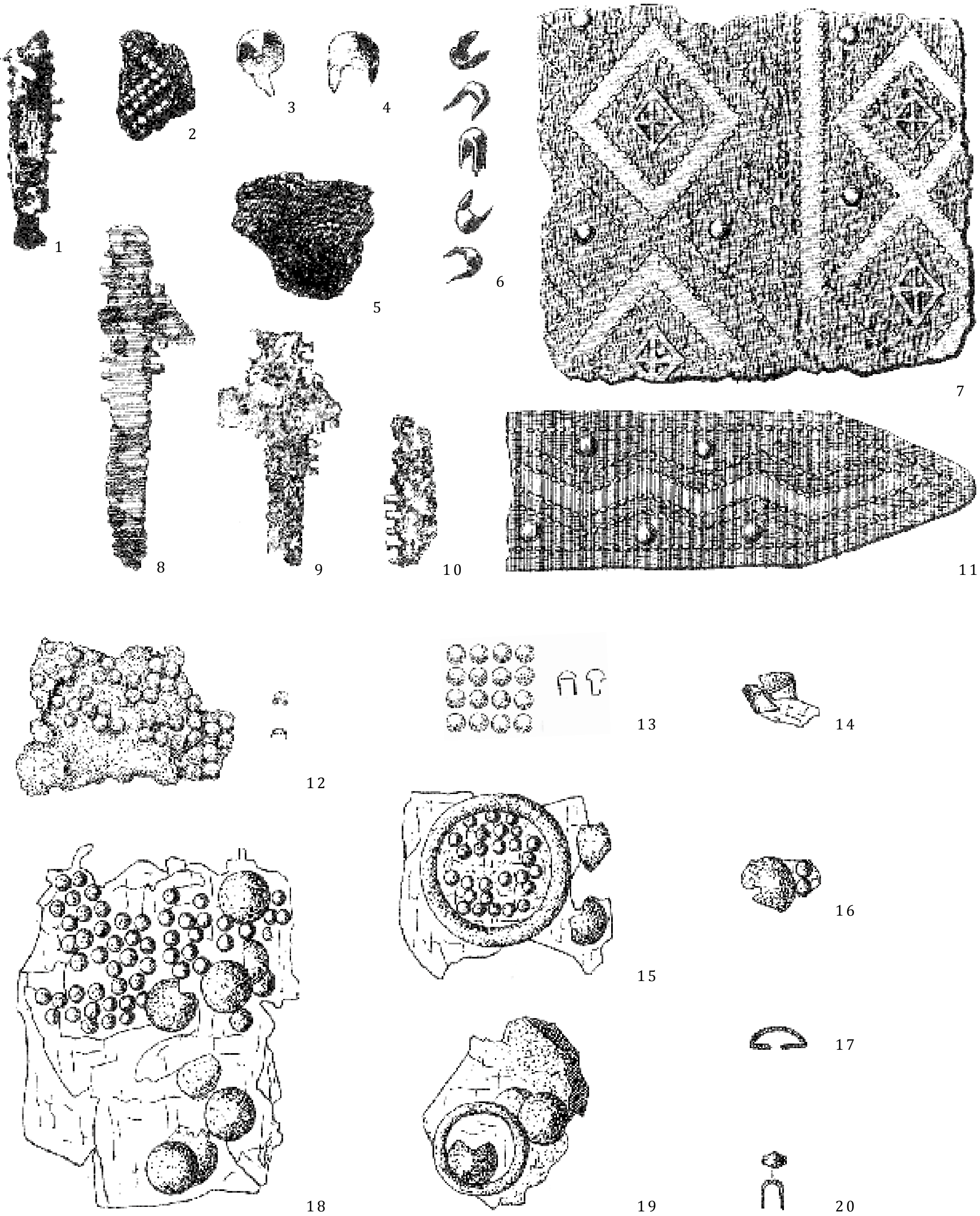


Fig. 7.18 Examples of bronze studs found throughout Europe (provenance of individual drawings, see section 7.5.3). Figure after Kossack 1959, Taf. 80/ Pare 1992, Pl. 44/ Zürn 1987, Taf. 55 and 491/J. van Donkersgoed.

lot of pottery, horse-gear, and wagon components were found, as well as leather straps decorated with bronze studs (Fig. 7.18, 14-20). Both wide and narrow straps were found, decorated with studs in two sizes. Two decorated straps also had bronze rings attached (Kossack 1959, 214-215). These studs appear more randomly placed. Also of interest is that these leather straps incorporate studs with *both* folded and straight legs, *and* rings. Another example of randomly distributed studs was found in 1959 in a grave discovered during construction work in Nebringen-Gäufelden (Landkreis Böblingen). In this grave a number of artefacts was discovered, including several bronze bracelets, part of a bronze belt plate, some decorated sherds, and the remains of a leather belt decorated with bronze studs (Zürn 1987, 54; Fig. 7.18, 12).

Our survey of finds with comparable bronze studs demonstrates that there are cases known where straight-legged studs and those with folded legs were used together. They occur on leather, wood, and combinations of the two.

A Dutch parallel

Drs. L. Amkreutz of the Dutch National Museum of Antiquities drew our attention to a number of bronze studs in their collection. These roughly 35 bronze studs have hemispherical heads (ca. 9-10 mm wide) and two triangular legs each (Fig. 7.19).

They are therefore roughly the same size as our "large" studs. In contrast to those from mound 7, these studs all have folded legs (with the exception of those studs where the legs have not survived).

In terms of find context, which is of course our main interest, these only known Dutch parallels, unfortunately (and rather typically), have a somewhat unclear origin. We know they were excavated in October 1942 under supervision of dr. Bursch. We know that the finds come from a lot located to the north of the Emmerdennen, known as Emmen-Sectie C (van Wijngaarden 1943, 5), but determining exactly where will require more research.

Based on an old (undetailed) excavation drawing and the inventory book of the Museum it could be determined that the bronze studs were found together with a range of other finds in the same context. These appear to be the fragments of bronze fibula, the bronze and iron, broken off head of an animal figurine which could have been part of the fibula, an iron belt hook decorated with bronze knobs and rods, as well as some at present unrecognizable bronze fragments (Fig. 7.20).

These other finds require more extensive study in order to properly determine their origin, function, and exact date than was possible within the context of the current research. They will be examined in more detail in future, as well as the "stone loom weight, cremated bone, and sherds" that were listed in the inventory book as coming from the same context, but which were not accessible for examination at the present time. Preliminary findings, however, suggest we are dealing with a cremation burial, probably Late Iron Age.

In short, the only Dutch parallel for bronze studs comes from a "new" old find which is rather spectacular and interesting in its own right, and will require more study to properly understand. For us it is interesting to note that there is another Dutch example of bronze studs, and that in contrast to our mound 7 ones, these *all* have folded legs.

Clues from the mound 7 studs

In the case of the Zevenbergen studs, it was hoped that residue preserved in the heads of a number of small and large studs might provide primary information regarding the material the studs were affixed to. Chemical analysis of these residues, however, was unfortunately inconclusive (chapter 11). The fact that many of the studs were found corroded into neat rows with legs all ordered in the same way indicates that the studs were still attached to organic material when deposited. When the organic material the bronze studs were attached to does not survive, the position of the legs can offer some insights into their original function. Based on archaeological parallels studs with folded legs decorated leather (Koch 1999).

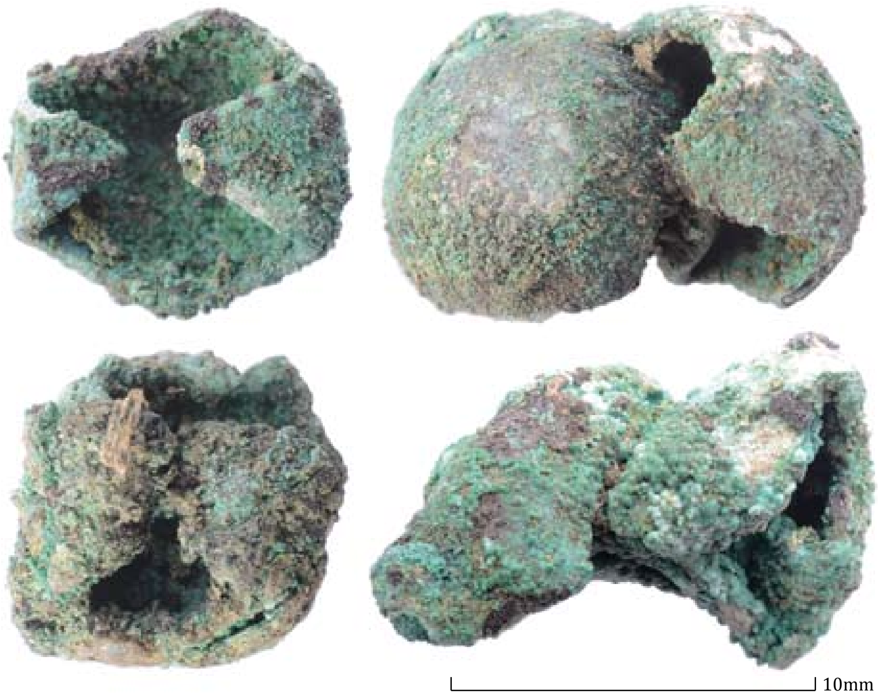


Fig. 7.19 Several examples of bronze studs with folded triangular legs from Emmen-Sectie C. Figure by J. van Donkersgoed.

Fig. 7.20 The bronze and iron finds from Emmen-Sectie C. Figure by J. van Donkersgoed.

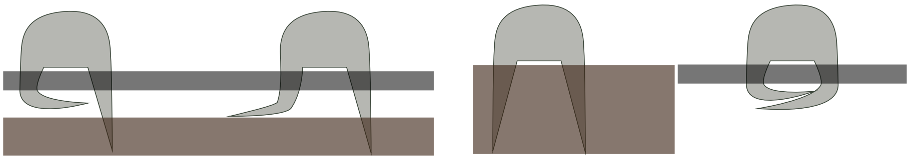


Fig. 7.21 Side-views of how bronze studs might have been inserted through leather and/or wood. Figure by J. van Donkersgoed.

The legs were inserted through slits made in the leather and then bent over on the back in various manners. Sometimes they were all bent inwards, sometimes all to one side.

Interpreting studs with straight legs is slightly more complicated. Straight-legged studs are often found in wooden objects, with the legs inserted straight into slits made in the wood (see above). However, they could also have been inserted into leather that was thick enough that the legs did not protrude through it (Fig. 7.21). However, there is also an example from Neukirchen-Gaisheim Hügel 6 where a leather fragment was found decorated with bronze studs with straight legs protruding through the leather. It is unknown whether this leather in turn had originally been fastened to wood (Koch 2006, 137). This information was used to try and understand the configurations of the studs in the concentration.

Other options

In addition to the parallels described above, there are of course many other kinds of objects that could, in theory, be decorated with bronze studs. We might think of wooden shields decorated with leather and bronze studs. However, the examples given above are, to our knowledge, the only "well-contextualized" finds containing bronze studs similar to our mound 7 ones.

7.6 Analysis of a huge concentration of bronze studs: V 173

This section will now try to make sense of the mound 7 studs by studying one particular find cluster where there are good reasons to expect that it represents the remains of a stud-decorated object: V 173. When the first traces of the central find assemblage were discovered, a tight concentration of small bronzes close to the terminal of the diagonal profile baulk was recognized and registered as V 173[65]. The concentration appeared to contain large numbers of small bronze studs (at least 521; Tab. 7.2)[66] and only a few large bronze studs (nine). It should be emphasized that there is no indication at all for any other type of bronze object in concentration V 173. The many small fragments that were also found are all likely pieces of (small) studs.

The stud concentration stood out not only because of the many small bronze studs at the surface, but also because of a greenish-yellowish shade that contrasted sharply with the black-greyish matrix (Fig. 7.22). There are brownish spots visible within the find concentration as well (Fig. 7.22), particularly at the lower levels when the block of earth was "peeled" in the lab. Just to the south and west of the stud concentration V 173, there were dark patches of charcoal. Pieces of charcoal were also lying *on top* of the find concentration (Fig. 7.40). Upon discovery we trowelled and cleared the zone carefully. This made clear that the concentration of bronze finds really was restricted to a small area with an oval form (l. 26 cm; w. 25

65 As set out above, V 173 was eventually lifted in three blocks: V 173A, V 173B, and V 173C. V 173 refers to the entire concentration.

66 458 complete small studs + 55 heads + 5 head-leg fragments + 3 with legs bent double = 521. In addition to this there are 264 fragments that probably represent small studs, and 94 leg fragments.

Fig. 7.22 V 173 in situ showing the distinct colouring of the concentration. Top of figure is northwest. Figure by Q. Bourgeois/J. van Donkersgoed.

Table 7.2 Types of bronze studs in the V 173 concentration.

Type of stud	V 173A	V 173B	V 173C	Total
Small, complete	398	34	26	458
Small, head	43	3	9	55
Small, head + 1 leg	5	0	0	5
Small, bent double	3	0		3
Stud indet. (probably small type, large type cannot be excluded)	250	7	7	264
Leg (probably of small type, large cannot be excluded)	79	2	13	94
Large	5	0	4	9
Bronze indet. (fragment too small to identify)	5	0	0	5
Total	788	46	59	893

cm). The bronze ring V 165 (and a few other bronze studs) was situated nearby, but there were no artefacts found in between V 165 and V 173 (Fig. 7.22)[67]. The same applies to the find of ring V 218 with the remnants of the hemispherical bronze sheet-knob (see above 7.3.2 and 7.4): no bronzes or other artefacts were found in between this ring and V 173.

Once the boundaries of stud concentration V 173 were documented, we decided to lift this concentration with soil and all as a block. As described in section 7.5, the concentration turned out to extend further down than initially recognized and required three block liftings be performed (Fig. 7.23).

Each block was X-rayed in the Restaura lab. V 173A covers the largest part of the find concentration. It was X-rayed from above (Fig. 7.15) and from two sides (from the east side (Fig. 7.39) and north side (Fig. 7.14)) and excavated in the lab in five levels (each approximately 1 cm thick) using a 10 by 10 cm grid of in total nine squares. The middle (V 173B) and lowest part (V 173C) were also X-rayed individually and excavated in the lab using a grid.[68] V 173B and C yielded only a fraction of the number of studs retrieved from V 173A (46 and 59 respectively, see Tab. 7.2). Restaura kept detailed record of the material recovered from each

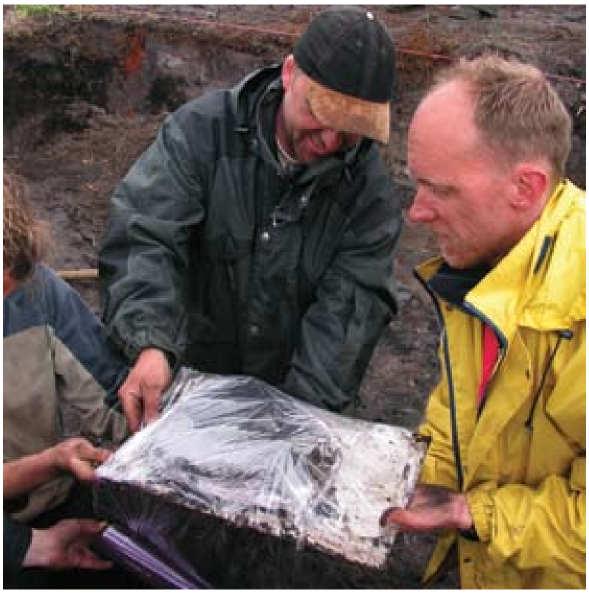
67 In between V 173 and V 1001, just one small bronze fragment was found (V 211).

68 The grid lines for V 173A, V 173B and V 173C are not identical. V 173C was geo-referenced to V 173A, but the position of V 173B was not exactly matched to V 173A and V 173C due to a measurement error.

1 Compacting the find concentration.

2 Sliding V173A onto a base.

3 Packing V173A in clingfilm.



4 V173A after packing.

Fig. 7.23 The lifting of V 173A. Figure by A. Louwen/J. van Donkersgoed.

level in each square. Unfortunately, the exact position of V 173B in relation to V 173A was not recorded properly during the excavation, so we cannot exactly pinpoint the position of V 173B in the overall stratigraphical ordering of the stud concentration. Examination of excavation photographs indicates that V 173B was situated roughly underneath square B/2. V 173C, the bottom of the concentration, yielded only a small number of studs. They appear to be located in a natural feature that is invisible at higher levels, (probably distortion of the ground by tree roots), this is further discussed in section 7.6.8. The material in V 173C must have been displaced somewhat by this bioturbation (Fig. 7.24).

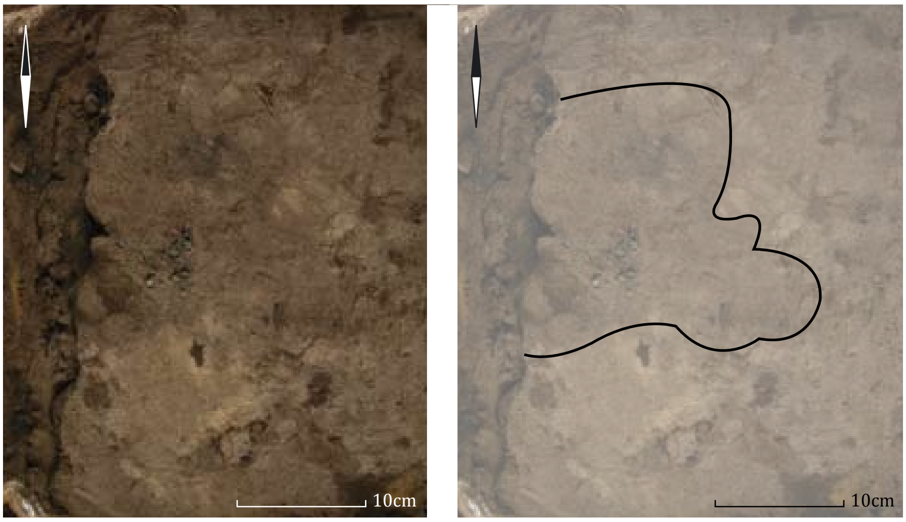


Fig. 7.24 V 173C, showing the feature in which the bronze studs are located. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

7.6.1 Analysis: studs corroded in rows as key to the analysis

As discussed above, that fact that Restaura recovered studs corroded together in neat rows indicates that (at least some of) the studs were positioned in an organic component (likely leather or wood) at the time of deposition. The organic material decayed, but not before the studs corroded together. They were not severely post-depositionally disturbed. The studs are the only surviving elements of something (leather, textile, wood, or both) that they originally decorated. This means that studs corroded in neat rows are probably the only surviving source of information on what was originally deposited here. Charting the spatial organization of these rows may therefore be the key to understanding what we are dealing with here. We therefore methodically examined the X-rays and restoration report for any discernable patterning in the studs. V 173A immediately appeared promising. Due to post-depositional disturbances (bioturbation, probably by tree roots) the lower levels V 173B and V 173C are not suited to this kind of detailed examination and will not be further analyzed.

Using X-rays taken from three sides of V 173A (from above, from the east side and north side) in combination with the detailed restoration report the concentration of studs in this block was systematically examined. The use of X-rays is always complicated by the fact that an X-ray shows multiple levels as one. Studs that appear to be located adjacent to each other on the X-ray might be located at different depths. This problem was, at least partially, overcome through examination of the excavation photos of each level that Restaura made during the lab excavation.

As already discussed, V 173A was divided into a grid of nine squares and excavated in five levels. We started our analysis by establishing the absolute amounts of bronze found in the different squares. This allowed us to examine whether the studs were evenly distributed throughout the block or whether they concentrated in any particular areas. As figure 7.25 shows, square B/2 contains by far the most, closely followed by square B/3 and square B/4. The large studs were found only on the outer edges of this block, with none located in the centre (Fig. 7.25, see also Fig. 7.33).

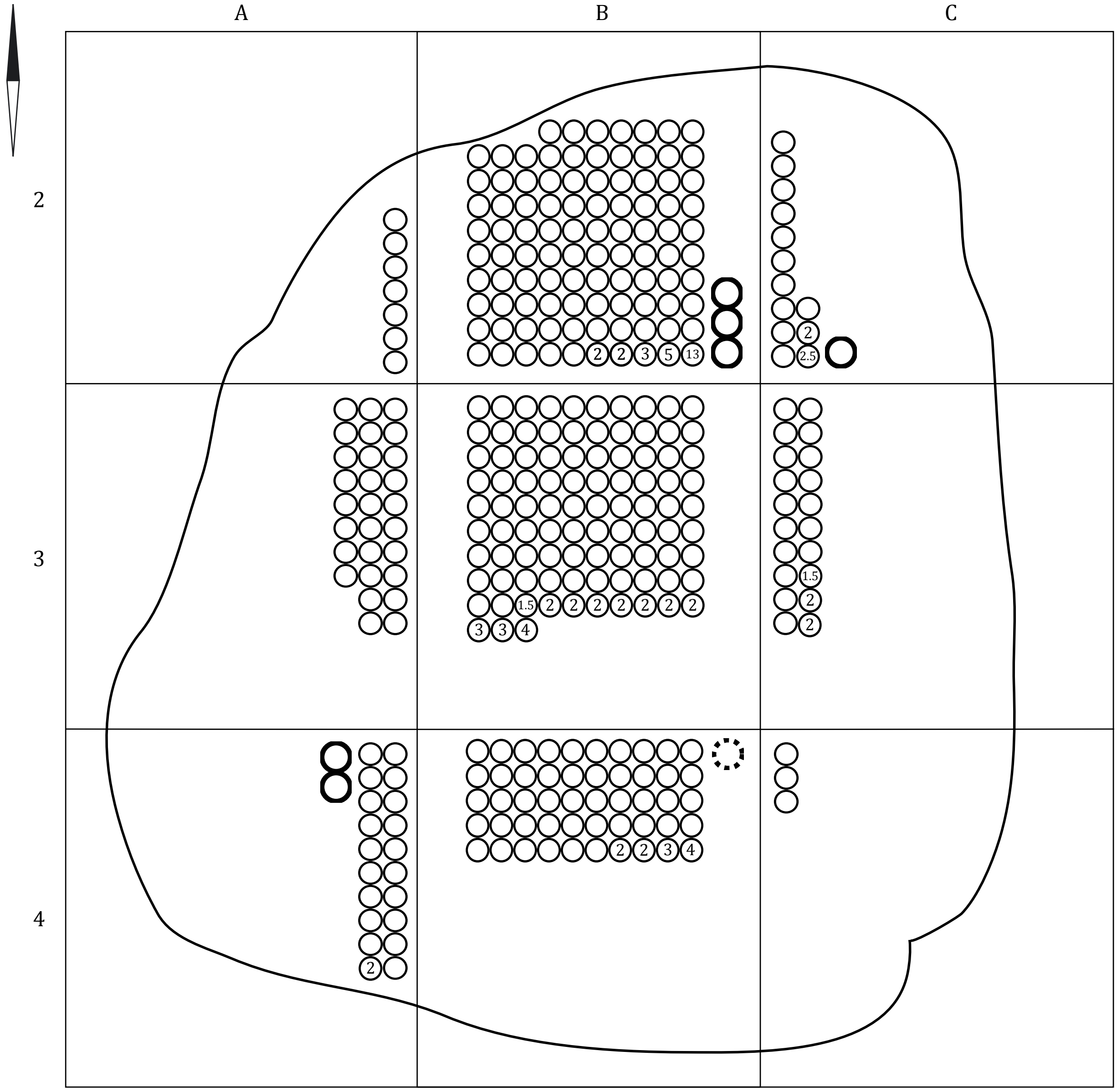


Fig. 7.25 *Quantitative representation of where studs were found in V 173A. Figure by J. van Donkersgoed. Small circle: small stud; large circle: large stud; dashed circle: probable large stud). A number in a circle indicates the number of studs corroded in a row.*

7.6.2 Spatial distribution of straight-legged and folded-legged studs

One of the goals of this work was establishing what material(s) and what kind of object(s) the bronze studs had decorated. As discussed above, the positions of the legs of studs can offer insights into the organic material they were originally attached to. Plotting where in the block straight-legged and folded-legged studs were located revealed that both kinds are present in all squares (Fig. 7.26).[69]

In some places both kinds were positioned immediately adjacent to each other. This observation indicates that whatever object this block contains the remains of, it was made up of multiple components. The folded-legged studs could only have been attached to relatively thin leather (otherwise the legs could not have been folded over). The legs of the straight-legged studs would have protruded through textile, hurting the person or animal who wore it. The same would hold true if they were attached to thin leather. This makes it very likely that the straight-legged studs were not nailed through textile or thin leather. If they were exclusively

69 See Fig. 7.13 for what is seen as “straight” and “folded”.

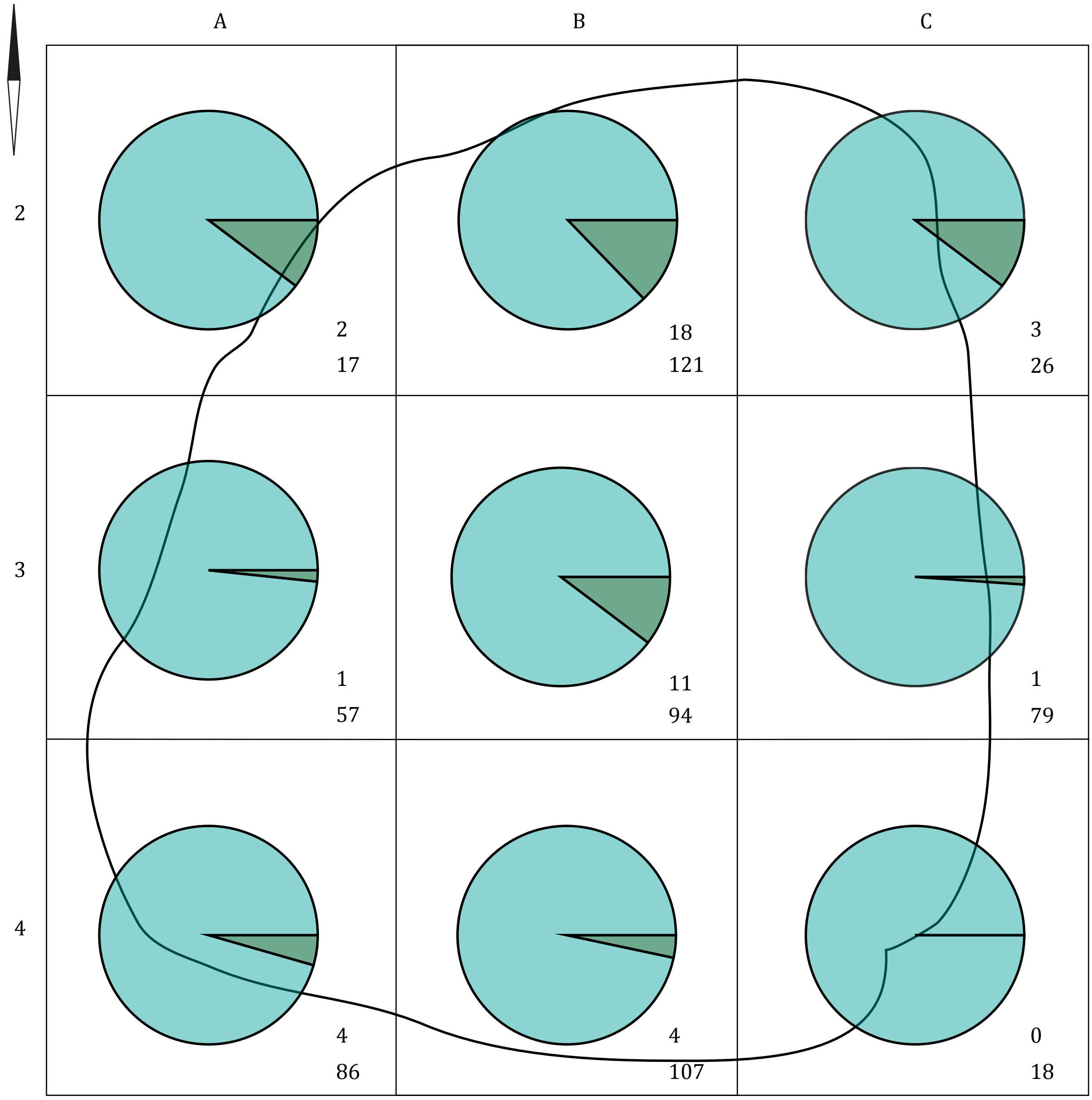


Fig. 7.26 Straight-legged (blue) and folded legged stud (green) dispersal. Figure by J. van Donkersgoed.

Fig. 7.27 Studs with "flicked out" and "flicked in" legs. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

nailed into wood, one would expect that at least some of the wood with studs in it would have survived, (since we are dealing with *in situ* rows of studs, many of which show traces of burning). This is not the case, although there is some wood preserved (see also next section). Also, folded-legged studs appear side by side with straight-legged ones, which makes no sense if the studs had been nailed exclusively into wood. A more probable option is that the studs were attached to and nailed into a multiple-layered material. From sites where organic material is preserved, there are cases where bronze studs protruded through a thin layer with another layer of wood or leather underneath (Koch 2011, *pers. comm.*). The presence of studs with legs "flicked out" or "flicked in" as in figure 7.27, certainly indicates that they were inserted into a panel of one material which was attached to another panel (Fig. 7.27). This is the only manner in which a straight leg might have a "flicked out" tip.

This is further discussed later on, but at this point in the research it already became clear that we were dealing with something made up of multiple components, possibly even of different materials.

7.6.3 Spatial distribution of charcoal

The indications that the studs might have been affixed to different materials made examination of the distribution of wood throughout the block the next logical step. Figure 7.28 shows charcoal was collected from all squares except A/2 and C/3. Square B/4 yielded the largest amount of charcoal, followed by B/2 and C/2.

Fig. 7.28 Charcoal retrieved from V 173A in cg. Figure by J. van Donkersgoed.

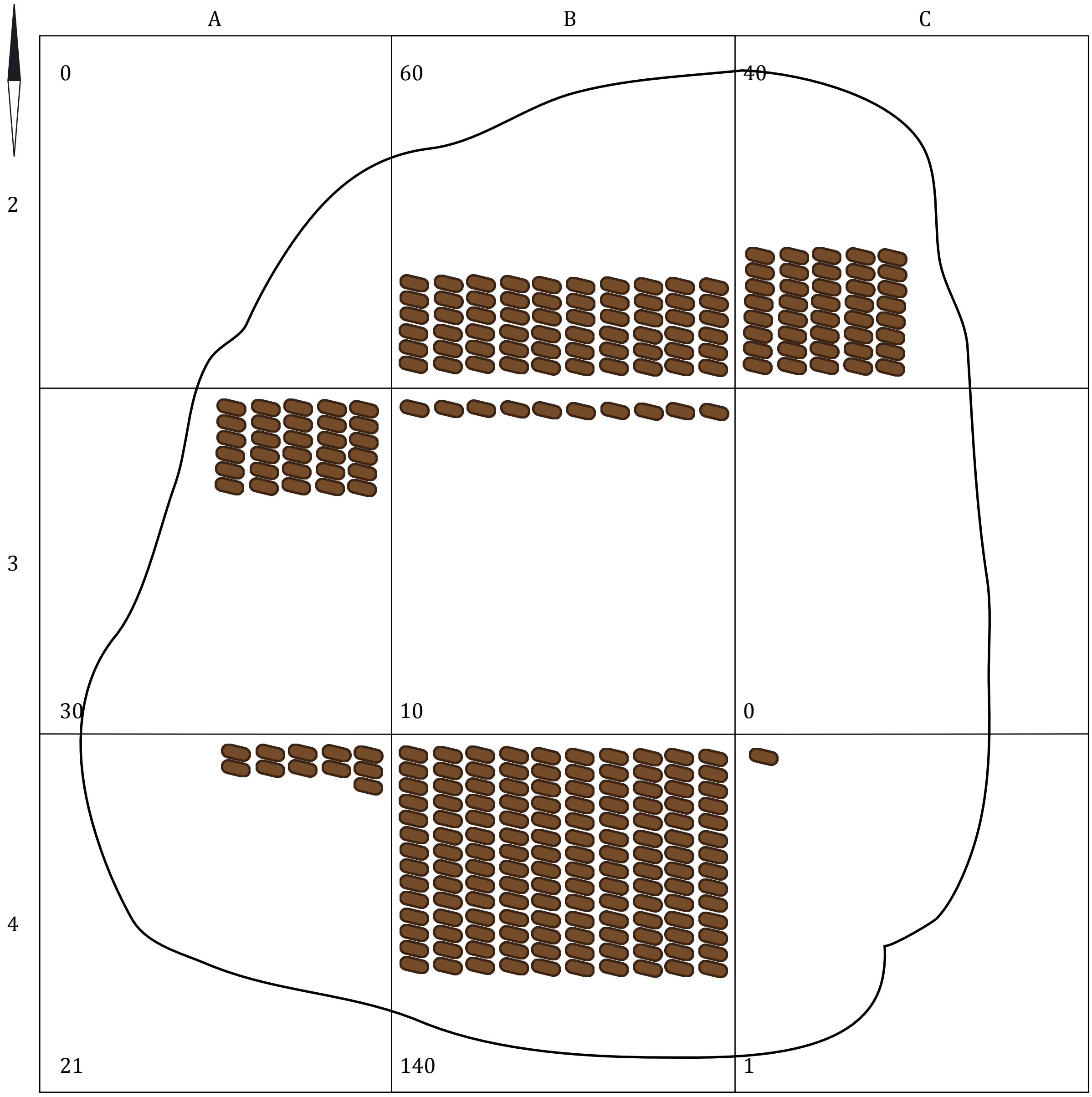


Fig. 7.29 A bronze stud leg possibly inserted into a wood fragment. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

An interesting small charcoal block was retrieved from square B/2. There is a bronze leg of a stud affixed to the burned wooden fragment. Though this may be a post-depositional fluke, it may also be original (Fig. 7.29). *In situ* pictures reveal there was originally much more wood present that was too degraded to retrieve. There appears to be a spread in the southwest corner (in part of squares A/3, A/4, and B/4), and another in the north side of the block (in parts of squares B/2 and C/2). This might partially be wood from the pyre (chapter 5).

The lab excavation by Restaura uncovered a remarkable feature in square B/2. As figure 7.30 shows, there is a rectangular brownish discolouration. In it, and around it, many studs were found. Noteworthy is a series of studs positioned in a circular form. From the position of the studs, it can be seen that they were inserted into something. The brownish feature seems to represent organic material, most probably wood, but possibly leather or both, too decayed to be preserved. Such a round structure with attached studs is reminiscent of a component found on the yoke from the Frankfurt-Stadtwald burial (Fig. 7.31; Willms 2002). At either end of this yoke a wooden knob was found, decorated with the same bronze square-headed nails that decorate that entire yoke. Though the organic component with studs in mound 7 was too degraded to retrieve, the similarity to the decorated knobs from Frankfurt is striking. This similarity is further discussed in section 7.7 in relation to another find (V 176) that also strongly resembles the yoke-component from Frankfurt-Stadtwald.

7.6.4 Geometric patterns?

As discussed above, Restaura retrieved many rows of studs that had corroded together in their original configuration prior to the organic material they were attached to degrading. We examined the X-rays and excavation pictures to establish whether we could discern any patterning to the studs. We started by trying to "place" the rows of retrieved studs back in the block by comparing the rows retrieved from each square with those visible on the X-ray (Fig. 7.32). After doing this we discovered that there were more rows and concentrations of studs visible on the X-ray than were retrieved (*i.e.* though originally forming rows they did not corrode together and were therefore retrieved as loose studs). Following this observation we noted all rows and concentrations of studs visible on the X-ray and excavation photos (Fig. 7.33). This process involved some conjecture and figure 7.33 is more interpretative than figure 7.32.

Square B/3 immediately jumped out as seeming to have geometric patterning to the studs. By far the most corroded rows of studs were retrieved from this square. While almost all studs in rows have their legs oriented in the same

Fig. 7.30 V 173A, level 2, square B/2. Brown discolouration with circle of studs. Figure by Restauratieatelier Restaura, Haelen.

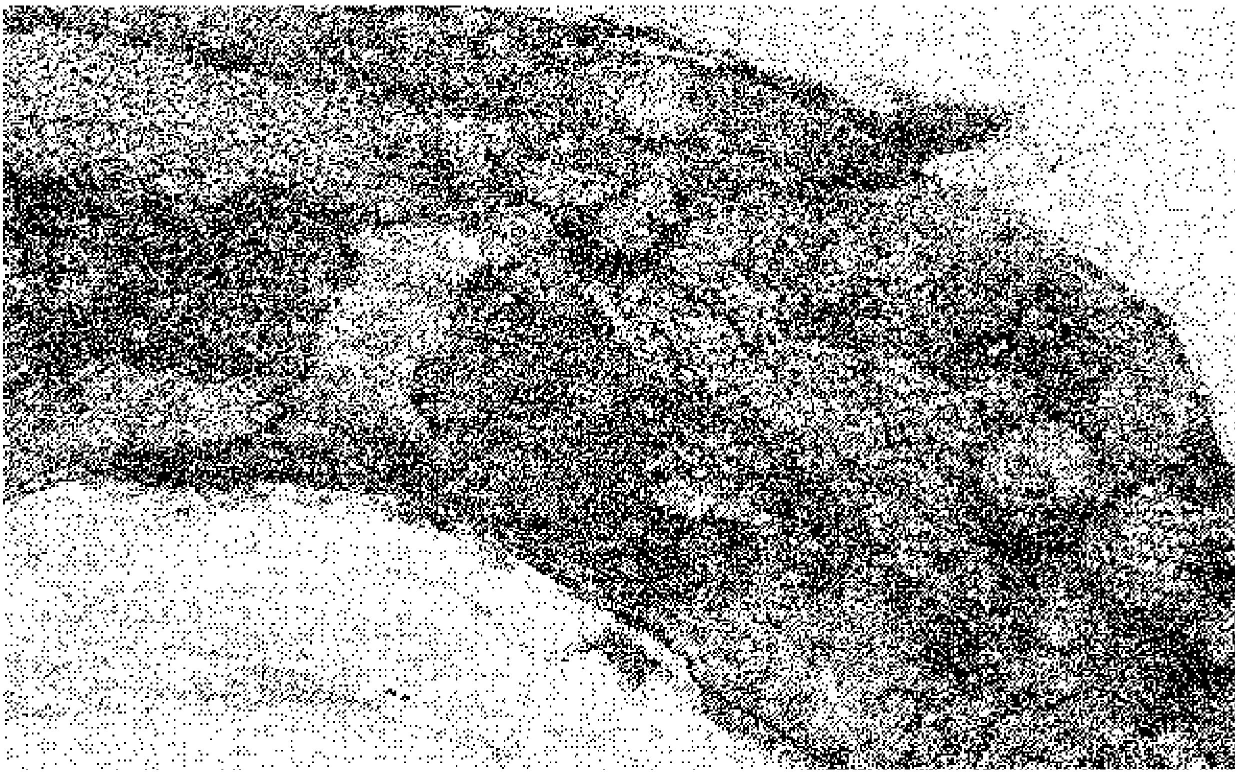


Fig. 7.31 One end of the yoke from Frankfurt-Stadtwald as it was excavated showing the bronze-decorated knob on the right. Figure after Willms 2002, 29/J. van Donkersgoed.

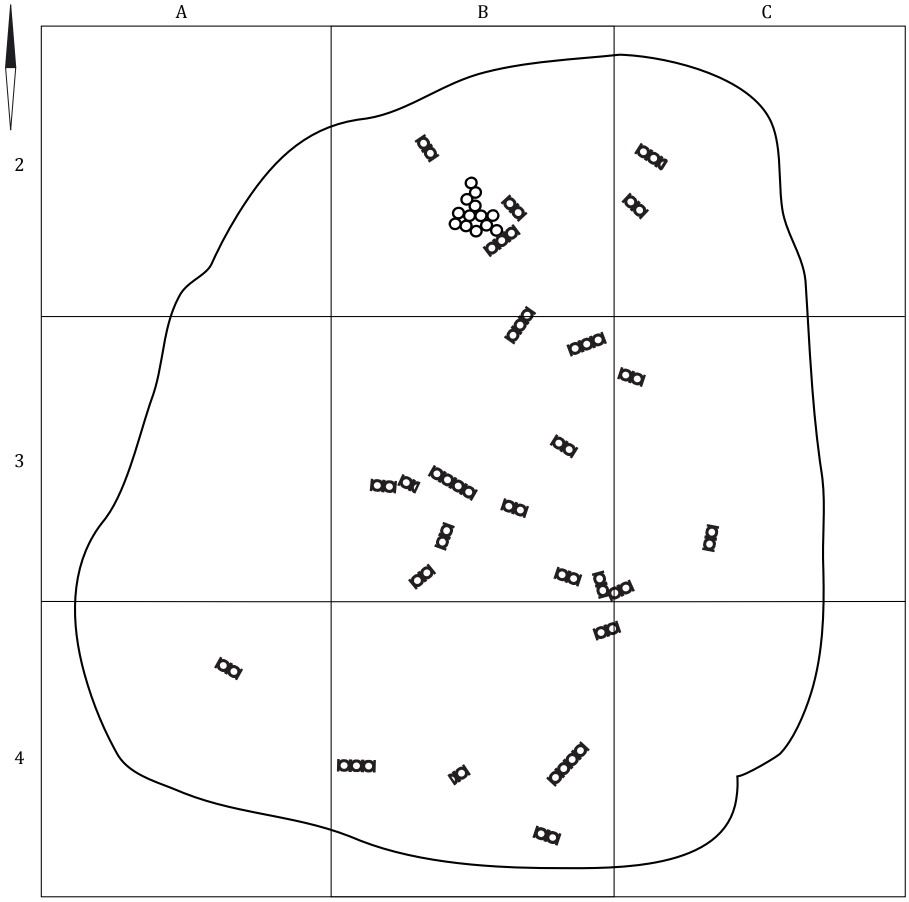


Fig. 7.32 Rows of studs corroded together re-placed in their original location. The straight legs on either side of a circle indicate the orientation of the legs. The triangular cluster of studs in square B/2 is the one depicted on figure 7.16. Figure by J. van Donkersgoed.

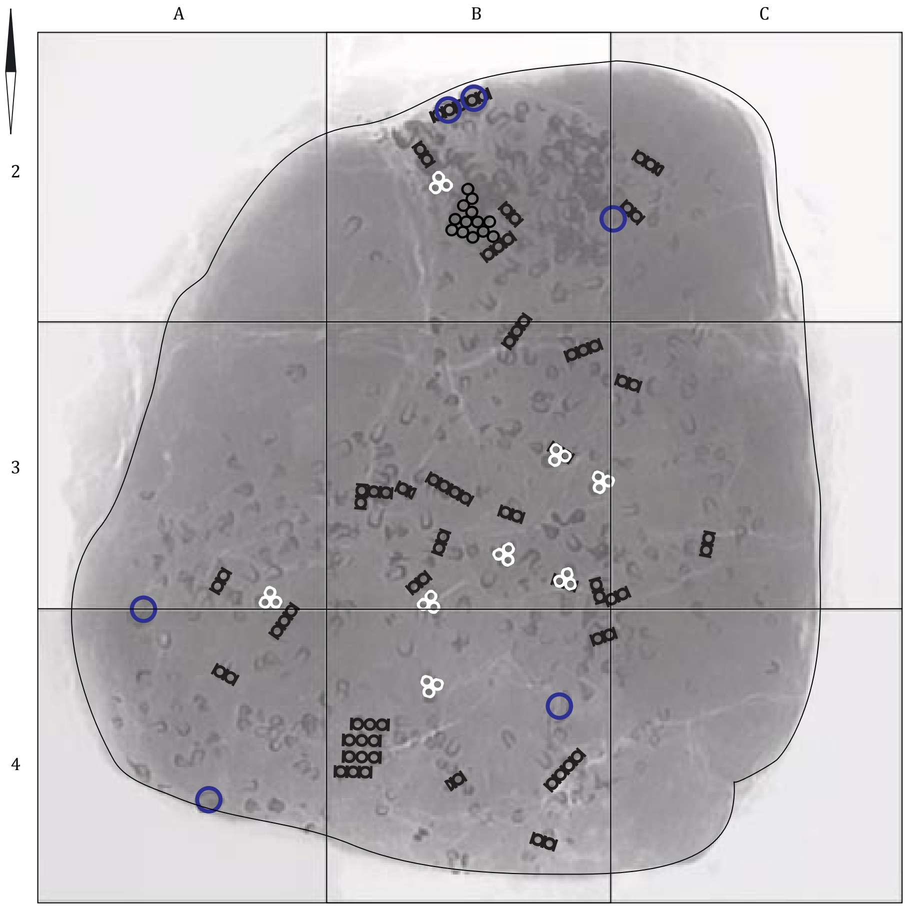


Fig. 7.33 Rows of studs (black), concentrations (white), and large studs (blue) visible on X-ray. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

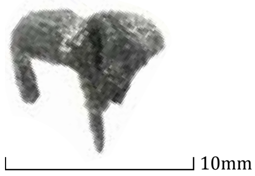


Fig. 7.34 (above) Two small studs corroded transversely. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.35 V 173A, level 3. Note the discolouration left where studs were once positioned in a straight line. Top is north. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

direction, this square also yielded studs corroded transversely to each other (Fig. 7.33 and 7.34). Furthermore, the X-ray and excavation photos revealed that even more rows and groups of studs were originally present. Not only were these rows visible on the X-rays, they also left discolourations in the matrix after they were lifted. Figure 7.35 shows level 3 during excavation by Restaura. The dark line in the soil is where corroded rows were originally located. In a continuing line eastwards there are several more loose studs in the same orientation.

This square also contains several groups of three studs (Fig. 7.37: photo *in situ*; Fig. 7.33: for position on X-ray). One such a group of three was also observed as such during the excavation (Fig. 7.22). On a photograph of the lifted block V 173A, it can be seen that the same group is still there, but fallen apart due to shrinkage of the soil (Fig. 7.36). Another group of three was also observed during

Fig. 7.36 V 173: a group of three studs fallen apart due to soil shrinkage. Top is north. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

Fig. 7.37 V 173A, level 4 showing a group of three studs in situ. Top is north. Magnified in relation to fig. 7.36. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

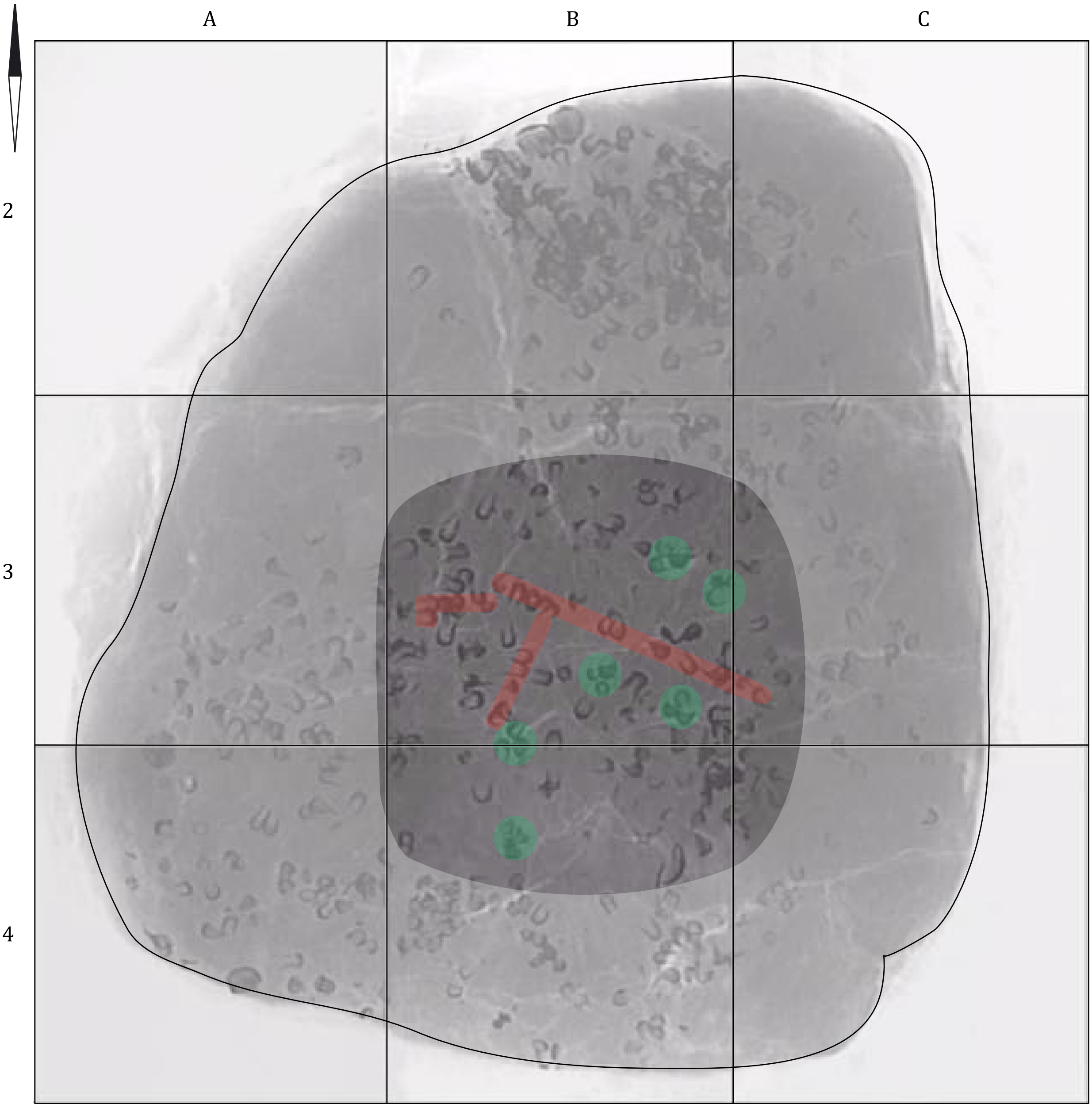


Fig. 7.38 V 173A interpretation of patterns. The highlighted section is the area in which the studs are (roughly) in their original location. Lines are indicated in red, groups of three studs in green. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

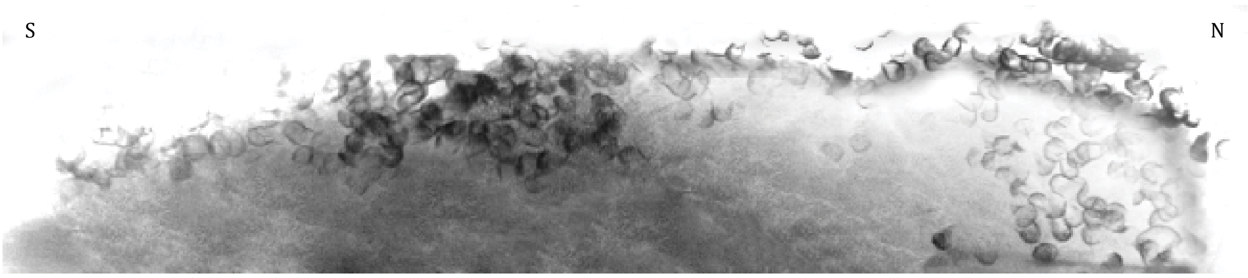


Fig. 7.39 X-ray of V 173A taken from the eastern side. Note that in the centre (correlating to squares A/3, B/3, and C/3) the studs are all located in a single, shallow plane. The depth to which the studs on the right are dispersed is the result of the stud-decorated object(s) being shoved aside. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

the lab excavation at level 4 (Fig. 7.37). As figure 7.38 shows, this square appears to have a geometric pattern involving straight lines running transversely, flanked by settings of three studs.

The recovery of two studs corroded onto each other transversely is in support of this observation (Fig. 7.34). As the X-ray in figure 7.39 shows, the studs from this section are present in a rather shallow plane and not spread through the entire thickness of the block.

All these observations taken together are interpreted by us as evidence that in this square at least, there was an (thin) organic component decorated with bronze studs in a geometric pattern. This organic component, whether made from wood or leather, degraded slowly and left the studs in their original configuration.

Rows of studs corroded together survived in several squares (Fig. 7.32), indicating that in these squares there were also originally organic components decorated with studs that decomposed slowly. In none of them, however, was patterning on the same level as in square B/3 observed. The lack of geometric patterns in the other squares could be the result of differential preservation, but it might also be that they never formed structured patterns and were more randomly affixed. Examples of studs with organic material preserved from sites in Central Europe demonstrate that such random patterns existed alongside geometric ones (Fig. 7.18).

7.6.5 On the distribution of studs in square B/2

With regard to patterning of the studs, square B/2 appears different than the others. This square contains by far the most studs in the entire block. The distribution of the studs in this square, however, deviates from the rest of the concentration. As the X-ray taken from the top shows, the studs in square B/2 are clumped very close together, while in the other squares they are spread out more (Fig. 7.15). The X-ray from the eastern side shows that while in most squares the studs are predominantly located in one level, in square B/2 they are vertically dispersed. All in all, the material in this square appears almost shoved together.

Fig. 7.40 Large studs in situ on the northern side of V 173. Note that the studs are located upside down and the presence of charcoal on top. Figure by Q. Bourgeois.

An excavation photo of the northern side of this block supports this assertion. Figure 7.40 shows two large studs *in situ*. These large studs are also clearly visible on the X-rays taken after the block was lifted (Fig. 7.14 and 7.33). The key feature of this photo is the fact that one of the large studs has its *underside facing up*. This supports our suggestion that things have been moved about in this block as in other squares studs have their heads facing up or appear to have "fallen over" from this position. In square B/2 the studs appear to have been moved about and shoved towards the centre. The high density of studs in this square also reflects a denser clustering of studs. First of all, this is shown by the ring of studs described in section 7.6.3 (Fig. 7.30). This square also contained a lot of rows of studs corroded together. A group of 13 studs corroded together is the only of its kind (Fig. 7.16). The studs appear somewhat haphazardly placed. They currently make up a triangular shape, but it is unclear whether this was originally also so. There were several rows of studs located by this "triangle" that might originally have been part of the "triangle" of corroded studs. They seem to have been a fairly random conglomeration of studs, lacking a clear geometric pattern. However, the fact that they had the "opportunity" to corrode together in neat ordering indicates that they were still affixed in something organic that degraded later.

7.6.6 Burning question

So we are dealing with bronze studs that were fixed onto something organic, a part of which was displaced and moved about. One last issue that must be discussed in relation to the distribution and condition of the studs is that of burning. When the studs were inventoried and their basic data entered into a database, special note was made of any signs of burning on the studs. This information was then used to chart where within V 173A burned studs might be located. This revealed that squares on the outside of the block contain more burned studs than in the interior. This difference would make sense if the bronze studded component(s) had been located near the edge of the pyre as it burned. The fire would have affected those studs on the outside of the concentration, but might not have "penetrated" to the centre of it. In the centre we also find a comparatively small amount of charcoal fragments (Fig. 7.28). As discussed in chapter 5, it is our supposition that this stud-decorated object was likely located by the pyre, somewhat to the east of it, while it burned, and was then moved to its final location after.

7.6.7 V 173: the remains of stud-decorated object

V 173 is a discrete concentration consisting only of bronze studs and fragments thereof. There are 521 small studs (complete, head only, or head plus one leg), nine large ones, and 264 fragments of bronzes (very likely all representing studs). Apart from five very small fragments of bronze, nothing indicates that there were artefacts other than studs here. In our attempt to establish what this concentration of bronzes represents, we had to resort to the fossilized patterning of the studs and the shape of their legs (folded, "flicked out/in", or straight).[70] The presence of studs with bent legs indicates the presence of (thin) leather (or textile) com-

70 As will be argued in detail elsewhere, analysis of residues in the head of studs was inconclusive (chapter 11), and patterns in the corrosion ("curly malachite", see chapter 9) can be explained in various ways.

ponents. However, since most studs have straight legs[71], it is unlikely that they were all nailed into textile or thin (one-layer) leather. The straight-legged small studs could have decorated wooden components or thick leather, so that the legs did not protrude through. Another option is that leather panels were affixed to wooden components, or to a second layer of leather. The presence of studs with legs with "flicked out/in" tip is also best understandable if they were inserted into a panel of one material, attached to another (Fig. 7.21). In a scenario of two different layers of material the straight-legged studs may have served to nail the two layers together. Other sites in Europe where similar bronze studs were found with preserved organic material show that all these options are realistic (section 7.5.3). The presence of studs that appear to decorate wooden knob(s) certainly testifies to the presence of wooden components (Fig. 7.30 and 7.42). So in short, we are dealing with the remains of some kind of object that incorporated both wooden and leather components decorated with studs, in some configuration or other.

But what did this object look like? Though we cannot be sure what its exact appearance was, detailed analysis of the distribution of the studs did provide some clues. In V 173A, square B/3 an organic component decorated with a geometric panel slowly degraded, without any post-depositional disturbance, leaving the studs in their original configuration (section 7.5.5). Figure 7.38 gives a tentative reconstruction of that pattern. The northern side of the block probably had a different, denser clustering of studs. This square B/2 was shoved together at some point, causing a high concentration of studs. The studs came to rest at various angles following this action. They were still affixed to organic components as many ended up corroded together which could only have occurred if the organic component slowly degraded. The large studs are only located around the outer edges of the block, but it is as yet not clear whether this has any significance in terms of patterning.

7.6.8 Post-depositional disturbances of V 173

V 173 was covered with small pieces of charcoal when discovered. Much thicker layers of charcoal ended up on the ring and hemispherical sheet-knob (V 218 and V 217) just to the east of V 173 (Fig. 7.9 and 7.40). As mentioned above, it is our opinion that these objects were located by the pyre as it burned and that during this process charcoal ended up on top of them. After the pyre burned down, these objects with charcoal on top of them were moved to the location where they were discovered. Only then were they covered by sods when people started to build the barrow (see section 5.9). Following this, several post-depositional changes and disturbances of the material took place. These are discussed here.

With regard to whatever the stud-decorated object was, most of the material into which the studs were placed decayed. Only charcoal and material locked in corrosion (the residues preserved in the interior of some studs) could and did survive. This means that any organic material – be it wood or leather – that was not burned will have gotten lost entirely in the soil conditions at Zevenbergen.

With regard to leather: this usually does not burn very well, but even if it did, what remained would have decayed in the soil conditions at this site. The brownish features (Fig. 7.30) might be all that is left of it (though they could also be from degraded wood. As a result, studs are more prone to (minor) horizontal and

71 There are just three small studs that have their legs completely double bent. This means that over 99% of all small studs have straight legs. If we include small studs with legs flicked out or bent in different degrees the number is somewhat higher (depending on which deviation of straight legs one wishes to count), but even then the percentage of small studs without straight legs is very low (at most 10%). All nine large studs found at mound 7 have their legs bent double.

Fig. 7.41 V173 with tree roots. View to the south. Figure by D. Fontijn/J. van Donkersgoed.

vertical displacements caused by bioturbation of (very small) animals and plant and tree roots. Small tree roots, for example, penetrated the stud concentration V 173 everywhere (Fig. 7.41).

Just below the find concentration, more or less underneath square B/2 of V 173A, a vague light brown discolouration was seen during the lifting of V 173A. In this discolouration, there was a loose scatter of bronze studs and stud fragments (V 173B). Slightly deeper, in the block lifted by Restaura (V 173C), a few more studs were found. The discolouration was clearly visible after cleaning the lifted ground (Fig. 7.24). The soil discolouration in this particular place is likely to have formed as a result of local bioturbation (for example as a local illuviation process caused by the presence of roots). It seems as if something – probably a tree root – penetrated underneath V 173A-B, displacing a number of bronzes in the process. If the bronzes were by that time still affixed to something remains unclear. Considering how rare large studs are, it is conspicuous to see that at the deepest level four large bronze studs were found together (out of a total of nine in the entire excavation). This suggests that the moved material stems from a part of the original structure that originally had quite a few of them.

7.7 Bronze studs outside find cluster V 173

Although V 173 has by far the largest number of bronze studs, they were found at other locations as well (Fig. 5.6). One concentration deserves some more attention, as it represent finds of studs *in situ*: V 176. V 175 might relate to V 176, but is poorer preserved.

At an early stage in the excavation of the central find assemblage, we found two concentrations of “bronze” at the northern boundary of the zone with charcoal patches and charcoal: V 175 and V 176. The former is a poorly preserved concentration of seven studs of which a row of two, respectively three connected. This cluster was lying at the surface and could not be lifted with soil and all. It is 10 cm to the east of V 176. The latter represented a dense concentration of small

Fig. 7.42 V 176 in situ. *Inset: X-ray of lifted block. Figure by C. van der Linde/ Restauratieatelier Restaura, Haelen/J. van Donkersgoed.*

items, or a large single item (this was difficult to see during the excavation).[72] Although its position close to V 175 suggests both were related, V 176 was better preserved and deserves more attention. When V 176 was laid bare, it appeared to be one "unit" which could be taken out with soil and all (Fig. 7.42).

This small piece of soil was X-rayed by Restaura (Fig. 7.42), before the bronzes were taken out and restored. We are dealing with a dense cluster of small bronze studs and many poorly preserved small fragments. In total 55 pieces of bronze could be counted, of which only four are complete small studs, and three are studs where only the head and one leg are preserved. There are four leg fragments and 44 small indeterminable fragments that are very likely parts of small studs. Many fragments and complete studs show traces of burning, and there are three rows of two studs (or fragments of) each, and one of three. As can be seen on the photograph taken during the excavation (Fig. 7.42), the studs formed a tight cluster, something that is still visible on the X-rays, even though the earth into which the objects are embedded must have lost some coherence by that time. The presence of such a stud cluster indicates that it was still embedded into some other material. They were lying on top of ground with charcoal fragments (30 cg (12 pieces) could be collected in the lab). Unfortunately, unfavourable preservation circumstances (shrinkage of the dried out soil) make it impossible to see if this is material the studs were nailed into. The presence of a tight cluster of small studs on wooden material reminds us of the circular stud concentration in V 173A, square B/2 (section 7.6.3). Both the circular stud concentration in V 173A and V 176 are highly reminiscent of the bronze-decorated wooden knobs found at either end of the Frankfurt-Stadtwald yoke (see also section 7.8.3).

So although the overwhelming majority of bronze studs are in V 173, a few ended up a metre to its northwest, at the other side of the pyre debris. The studs are identical to those in V 173 and both V 175 and V 176 must have decayed *in situ*, affixed to the organic material they were nailed in. The best preserved find, V 176, shows a similar knob-like configuration as we see in V 173. For all these reasons it is likely that the somewhat peripheral stud concentrations V 175 and V 176 were originally part of one and the same object as the largest stud concentration V 173. In order to explain how they ended up in separate locations, we hold

72 On the drawing made in the field, V 176 was erroneously described as "head of a pin".

the following scenario for the most likely explanation. A stud-decorated organic object (possibly made up of multiple components) was situated along the pyre. The burning partly affected the organic material, and in the searching of the pyre debris by the mourners its remains must have become torn, with one small part shoved to the northeast (V 175 and V 176) and the largest part to the southeast.

7.8 What was this stud-decorated object?

7.8.1 Interpreting the studs as wagon/horse-gear decoration

Summing up, V 173 represents the decayed remains of an organic object decorated with bronze studs. The decoration appears to have incorporated both geometric patterns and more randomly placed studs. Some studs, mostly located on the outer edge of the concentration, were affected and transformed by fire, indicating that they were on or alongside the pyre as it burned. There are indications (but no definitive proof) that the studs decorated multiple panels, perhaps double layers of leather or leather on wood. Bronze studs are extremely rare in Northwest Europe, but as we set out in section 7.5.3, parallels from southern Germany show that similar bronze studs are known from a number of Ha C graves. In many such graves, there is good evidence that these bronze studs were used to decorate yokes (leather on wood) and horses (leather breast belts or other types of horse-gear like reins and bridles; Koch 2011, *pers. comm.)*. The decoration patterns we reconstructed for our find, as well as the combination of many small studs and a

Fig. 7.43 Yoke components from the chieftain's burial of Oss: iron toggles (top) and bronze rosettes (bottom). Figure by J.P. Bomhof (© National Museum of Antiquities)/J. van Donkersgoed.

few large ones, is in line with what is seen on better preserved finds of studs in the German Hallstatt graves mentioned in section 7.3.3 and depicted in figure 7.18. We have no contextualized stud finds that suggest that these kinds of small studs with the combination of folded *and* straight legs were used for a *different* function than decorating yokes of horse-gear. Horse gear and yoke parts are known from several other contemporary graves in this part of the Low Countries, with the chieftain's grave of Oss as a very nearby example (Fontijn/Fokkens 2007; Roymans 1991; van der Vaart 2011). Thus, finding horse-gear or yoke elements in a monumental Early Iron Age grave in this region would certainly fit within this pattern. Decorations of yokes are relatively rare in the Low Countries, but in the nearby chieftain's grave of Oss two bronze oval plates and two iron toggles were found that *represent* the deposition of a yoke (Fig. 7.43). So, formal analogy makes the interpretation of our stud-decorated object as something in the sphere of a yoke and horse-gear likely. It does not prove it, though.

7.8.2 Relating the ring finds to the studs

Although V 173 pulls a lot of the focus, it is important to consider its wider context. In this case, we wish to emphasize that this discrete cluster of studs was located very close to the two locations where complete bronze rings with round cross-sections were found (V 165 and V 218, section 7.5.1 and 7.5.2). By the D-shaped ring (V 165) some more small bronze studs were found. These are partly separated from the stud concentration V 173 by a large piece of charcoal. V 217/V 218, the large ring and hemispherical sheet-knob, to the east of V 173 are not blocked by anything from the stud concentration V 173. In contrast to the rings with square cross-sections (section 7.2), V 165 and V 218 must have ended up in the ground whole and complete. As can be seen from the spatial distribution of pyre debris (Fig. 5.2 and 7.44), the stud concentration and the two rings behind it form a separate unit at the easternmost end of the debris. They are outside the area where large pieces of charcoal lay, and further to the east not a single piece of charcoal or ash was found. The area to the west of V 173 indicated on figure 5.6, A as the likely actual pyre location, is heavily disturbed. As discussed in chapter 5,

7.44 View on the central find assemblage. Note that V 173 is a separate unit. Figure by A. Louwen/J. van Donkersgoed.

in our opinion this is due to the mourners searching through it and manipulating and removing cremation remains and objects. V 173 and the two rings are clearly very different and not the searched through remnants of a pyre, but rather a distinct, separate, and coherent unit that was shoved aside as a whole.

Having argued that the studs were still affixed to an organic object when deposited, the same might well apply to the two ring-stud/sheet-knob finds. Both may represent rings tied to leather or other organic material that was also decorated with studs (V 165) or (a) sheet-knob(s), and they may have been part of the same organic material the studs of V 173 were fixed onto, or represent something else (*e.g.* reins or harnessing in the case of V 217/V 218) that was placed next to or overlapping the V 173 object.

The spatial association of bronze rings and *in situ* stud-decorated object(s) can best be understood if both are components of the same thing. To our knowledge yokes are the only kind of Early Iron Age object that incorporate both wooden and leather elements, as well as bronze rings *and* bronze studs.

7.8.3 Dismantled elements?

If the studs were inserted in a yoke itself, like we see in the Frankfurt-Stadtwald grave (Willms 2002), it would have been preserved as burned wood with studs still in them. V 173 represents studs that are still in their original position, but something close to a charred yoke was certainly not found. Does this mean that our finds can therefore only represent some other element of the wagon/horse assemblage like leather harnessing? This need not necessarily be so: we may also be dealing here with an object that was dismantled or taken apart. As set out in section 7.5.3, there are examples like Frankfurt-Stadtwald where bronze studs with straight legs (and square heads) were placed through leather into a wooden yoke (Willms 2002, 100). It cannot be ruled out that V 173 represents such decorated leather after it was taken off a yoke, put on a pyre, and deposited afterwards together with remnants of associated rings that are usually part of a yoke. The option that the studs represent such a dismantled object should, we think, be taken seriously. As a recent investigation of Ha C metalwork in the Netherlands shows, dismantling objects and breaking things, was actually a very common, perhaps even pre-scribed way of dealing with horse-gear, wagons, and other find categories found in Hallstatt C graves in the Low Countries. All the bronze elements of wagons found in Dutch Hallstatt graves were removed from the wagon and deposited individually. The same applies to horse-gear (van der Vaart 2011). The deliberate transformation of objects seems to have been an important practice. Case in point are all objects in the contemporary chieftain's grave of Oss, that other Early Iron Age mound at only 400 m from mound 7. Think for example of the two bronze yoke rosettes and two iron toggles of a yoke that were removed from a wooden yoke and very likely placed in the bronze urn while still attached to leather components (van der Vaart 2011). So, it would fit in the funerary practices of this part of Europe that we are dealing with an object that was taken off something and transformed later. Our stud-decorated object might therefore be the remains of a horse's harnessing, but it could just as likely represent the decorated leather that was originally put on a yoke or a wagon. This fits in with another observation made before: both in V 173 and in V 176 there is a circle of studs fossilized in an ovoid form. Such raised, circular concentrations of studs remind us of decorations on wooden knobs of yokes like in the Frankfurt-Stadtwald grave. In Frankfurt, such knobs were separate elements that could (in theory) be removed from the yoke (Fig. 7.31).

7.8.4 What does this bronze concentration represent? Some scenarios

In spite of our efforts, a clear-cut answer to the question what object or objects all this bronze originally was part of cannot be given. The find assemblage first and foremost represents the remains of a pyre that has been lying here for some 2500 years. We have established that the mourners not only placed bronzes and organic objects decorated with bronzes on the pyre. They also displaced, shoved about, and searched-through debris of the pyre including the bronzes after the fire. By doing that, some bronzes were displaced from their original context. This applies to the ring fragments found in block V 1000. In one case fragments of a large ring were picked out and removed from the pyre remains, for some reason or purpose. The same must have happened with parts of the burned skeleton (see chapter 5).

At the eastern end of the pyre, they left the *in situ* remains of a stud-decorated object, together with two rings that are associated with small studs and with at least one hemispherical sheet-knob. This unit was shoved aside. We argued that a much smaller *in situ* find of small studs (V 175 and V 176) represents the other end of the same stud-decorated object, that became separate because it must have been torn or disrupted by the fire and later on displaced when the mourners went through the pyre debris. This means that V 173 and the two rings are the closest we have to an object in its original state, and in what follows we focus on that find complex.

We can start by stating what this find complex can*not* represent. We are not dealing with the burned down remains of a wagon, not even with the remains of the yoke itself. There is not a single shred of evidence that crucial parts of horse-gear like horse-bits or other bridle components are represented here. Although hemispherical sheet-knobs are known from the nearby chieftain's burial of Oss and likely decorated bridles, we only have evidence of just one knob in mound 7, whereas the chieftain's burial contained at least 15. However, in the case of our excavation, with the block lifted ground, it is very unlikely that elements were missed. By formal analogy, the combination of many straight-legged studs and rings is particularly known from yokes, but it is clear that we have too few elements. We have two rings, of different sizes, but in all cases of excavated Hallstatt yokes more than two rings are known. We do not want to press the evidence too hard and therefore end up somewhat open-ended with the following scenarios, all of which are possible, but most of which also have evidence speaking against them. These are as follows.

1. We are dealing with a stud-decorated leather panel that was fixed onto a yoke. This was dismantled, placed along the pyre, and burned. What seems to speak against this scenario is that our stud-decorated "leather" is rather small – in stretched form the stud-decorated object that is now V 173 would be at most 40 cm. It is also difficult to account for the rings that lie isolated to the east and south of the stud-decorated object
2. The finds solely represent leather horse tack for fastening the yoke and/or bridles. An argument against this is the presence of what probably were two wooden components with studs. It is very difficult to relate these to horse tack.
3. The finds represent leather horse tack with reins lying over them. Rings V 165 and V 218 would in this scenario be the remnants of those reins. Argument against this idea is the presence of the probable wooden components with studs. Also the fact that V 173 represents a rather wide object (20 cm or more) seems to speak against this scenario, as 20 cm or more is much too wide for bridles or straps. Moreover, in that case horse-bits and other headgear would be expected here as well.

4. Finally, we should remain open to the possibility that the studs decorated an object that has no counterpart at all in other graves, and one could think here of the decorated leather of a wooden shield. What makes this explanation unlikely is that we do not know of any example of shields that were decorated in such a way in the Early Iron Age. Also, the stud and knob-associated rings make no sense in relation to a shield.

Perhaps, we are therefore in fact dealing with a combination of some of the scenarios described. This is discussed further in the next section.

7.9 Conclusion

To recap, among the pyre debris, 1080 small bronze objects were found. By far the most thereof are small studs. In all, there are at least 538 examples of studs, but probably 983 (see Tab. 7.1). This means that at least 50%, but probably 91% of all bronze finds are small studs. What we define as a small stud is an object that usually has a round head with a diameter between 3 to 5 mm, and legs with a length of 4 to 5 mm. Most of the small studs have straight legs. For just 1% of the small studs we could positively determine that the legs were bent completely double (three out of 471 complete examples). Legs that are partially bent, not entirely straight or "flicked out/in" are known, but also in small numbers (estimated at 10% at most). There is evidence that the surfaces of the studs were tinned, giving them a silvery appearance.

There are nine large studs. These have a similar form, but a head which has a diameter of 8 mm or more. For the large variety the in legs are bent double in *all* cases. There is a third stud-like object of which only one example is known: a hemispherical sheet-knob.

The only other bronze object type represented in the centre of the mound is rings. These come in low numbers and in two varieties. There are fragments of rings, all of which are of a ring type with a *square* cross-section, and there are two complete rings, both of which have a *round* cross-section. Apart from a number of very small bronze fragments (N=80) no other bronzes were found.

Summing up: we are dealing with a bronze assemblage that is dominated by bronze studs, a category that is very rare in Early Iron Age graves. Bronze items that regularly turn up in more common urnfield graves like pins, knives or razors are lacking, and so are elements that are from time to time found in more special graves in the Low Countries, like swords, horse-bits, and *situlae*.

We argued that though rare, similar bronze studs are known from Hallstatt C graves in southern Germany, where they are known to decorate yokes and horse-gear. Straight-legged examples are known to have been inserted in wood, but also in leather and in a combination of the two.

Analyzing the find context, a distinction can be made between a cluster of ring fragments in the western part of the pyre debris on the one hand, and a cluster of hundreds of studs and two rings at the easternmost boundary of the debris on the other. We argued that the latter (V 173, V 165, and V 218) represent a unit that was shoved aside after the pyre burned, but while it still had coherence. The ring fragments in the western part were displaced by the searching through of the pyre after the cremation ended. Another small, but coherent concentration of studs (V 175/V 176), probably represents the remnants of a wooden knob decorated with studs. We argued that these originally were part of the object that is now mainly represented by V 173.

The position of individual studs was carefully recorded. Charting these systematically, we found evidence that many studs had corroded when they were still *in situ* and affixed to an organic component that now is no longer there. We could see that this organic object was decorated with studs that were organized in a geometric fashion, but there was also a part that showed a more arbitrary cluster of studs. Large studs were part of the design. The two rings are both associated with studs (one with studs of the small variety (V 165), the other with at least one hemispherical sheet-knob (V 217/V 218). By their spatial position, we argued that they were probably part of the same organic object represented by V 173.

The type of stud, the way in which it decorated a now decayed organic object and the association with rings all fit in best with decoration of yokes and horse-gear as recorded from better preserved Hallstatt C graves in southern Germany. It is clear that we are not dealing with the remnants of a yoke or horse itself, but with material that was taken off the yoke or horse and transformed by the fire. This fits in the general way in which horse-gear and wagon parts were treated in monumental Hallstatt C graves in the Low Countries, like in the case of the chieftain's grave of Oss which is located very close to mound 7.

As to the question what exactly it was that the studs decorated, the previous section described several scenarios that are all plausible, but most of which also have arguments going against them.

Most of the scenarios presented range from deposition of horse tack to yoke decorations, but other interpretations (a shield), though unlikely, cannot be excluded. In our opinion, however, the most likely scenario is that we are indeed dealing with the remains of leather panels and wooden knobs from a yoke, in combination with leather horse tack that incorporated bronze rings, all or most of which was decorated with bronze studs. These components were located by the pyre as it burned, and afterwards most of them were moved eastwards, while some components were left behind. Though this cannot be proven beyond a shadow of a doubt, in our view this admittedly open-ended scenario best explains all features observed, while doing justice to the evidence available.

In spite of this open end, one thing is clear. Whatever it was these studs belonged to: it must have been something that was highly valued and considered as inextricably linked to the status and social role of the individual whose remains were burned at this place.

Chapter 8

Conservation starts in the field - the retrieval and conservation of the finds from Oss-Zevenbergen

Jo Kempkens[73]

8.1 Introduction

The previous chapters showed that the central find assemblage in mound 7 was not only difficult to excavate and analyze, but also required a tailor-made, non-standard conservation. As the conservation proved to be a *condition sine qua non* for the analysis, it is useful to devote a separate chapter to the conservation of the mound 7 finds. Moreover, the mound 7 finds are a perfect example of how good communication and cooperation between archaeologists and restorers can yield additional, valuable information.

8.2 The restoration studio

While in the past people may have been satisfied if an archaeological artefact was recognizable and presentable to the public, today the conditions and demands placed on a restoration have become much more extensive. Not only have methods and materials changed, but insights into the purpose of a conservation or

Fig. 8.1 One of the work stations in the restoration studio. Figure by Restauratieatelier Restaura, Haelen.

73 Restauratieatelier Restaura, Haelen.

restoration have changed significantly. Especially when one works on objects from an excavation. With increasing frequency archaeologists request the presence of the restorer in the field to lift special or complex objects and to further expose these in his studio. This with the goal of retrieving and documenting as much hidden information as possible. The laying bare of archaeological objects is often a complicated process that can only be done right once, just like an actual excavation. If information is missed during this process, then it is lost forever. It is therefore impossible to just start cleaning objects. One first has to review what options there are, what the archaeologist expects, and what the object in question will allow. This in large part depends on the condition of the object, but also on the manner in which it will be treated.

The restoration studio is equipped with all the facilities required for the pre-examination and execution of the right conservation or restoration (Fig. 8.1). The studio is permanently staffed by a team of nine individuals, each with their own specialization. The work is not strictly segregated, but overlaps with other disciplines. Various work stations have been equipped for the treatment of almost all materials that can be encountered during an excavation. Various methods, tools, and materials are available to the restorer, and it is up to him to make the right choice. He must take into account that one treatment can hinder another or even make it impossible. There is no standard treatment. One can make use of certain fixed factors, but these often have to be specifically tailored to the condition and state of the object that needs treatment. It can be expected that a restorer conserves, cleans, and if necessary restores an object as well as is possible. Furthermore, before the conservation takes place, he must take any samples that might be required for further research. It is of great importance to record any relationship that loose objects might have to each other. Were they once part of a larger whole, or are they loose components that were once fastened on another object? This is of particular importance with complex finds like the one from mound 7, of which the larger picture is not immediately observable.

It can be expected that the restorer continues the scientific research of the archaeologist, documenting and recording all data. He must treat the artefacts in such a way that they will be preserved for a long time, and especially in such

Fig. 8.2 Excavation surface that was lifted as V 1003. The coffee swivel sticks indicate areas where signals were detected. These later turned out not to be caused by metal objects, but likely had to do with the burned wood. Figure by Restauratieatelier Restaura, Haelen.

a way that they remain available for further research. It is clear that the work of the restorer starts during an excavation, and that the excavation concludes in the restoration studio. Good cooperation between the archaeologist in the field and the restorer can result in more data becoming available, which can lead to better research results.

8.3 Lifted in blocks

During the excavation by Leiden University of mound 7 at Oss-Zevenbergen, a large number of tiny bronze objects was encountered. These little studs proved to be very fragile and broke apart at the merest touch. Scanning the area with a metal detector revealed that the metal objects were scattered over a larger area. The depth to which these were located and how the objects related to each other could not be determined as the finds were still in situ in the soil. The great fragility and large number of objects would have made uncovering them in the field a very lengthy process. There was also an ever-present risk that information might be missed. By uncovering in the field, and therefore recovering each object individually, it would be impossible to get a total overview. The question whether these studs were lying in a specific relation to each other was foremost in the minds of the archaeologists. It was impossible for the archaeologists to excavate these objects within the set timeframe without risking the loss of valuable information.

Fig. 8.3 Determining the location of V 1003. Figure by Restauratieatelier Restaura, Haelen.

A riddle also presented itself. In a different location the detector gave clear signals that experienced individuals could determine were not from metal objects based on the specific tone produced by the detector (Fig. 8.2).

The archaeologists then contacted us, as specialists in treating archaeological finds, with the question whether we could lift part of the mound *en bloc*. The first conference on the phone was mostly geared towards establishing the timeframe in which the blocks could be lifted. It was important that this be done as soon as possible. After having gotten enough information about the measurements of the sections that needed to be lifted, in particular regarding the height, or rather depth, of the blocks, we took care of the technical execution. This involved having metal containers made with matching sliding bases that would be used to lift the blocks. Two days later we arrived at the excavation with the required materials. In

Fig. 8.4 The steel container is pushed into the soil. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.5 The block to be lifted is separated from the soil by sliding a steel sheet underneath it. Figure by Restauratieatelier Restaura, Haelen.

consultation with David Fontijn and Richard Jansen, assisted by a field archaeologist (Cristian van der Linde), it was determined where the block liftings should be taken (Fig. 8.3).

The metal containers without bottoms were placed in the desired location on the excavation surface. The exact locations of the corners of the containers were recorded so that the locations of the blocks could later be added to the field documentation. The height of the surface was also recorded so that any finds could be related to corresponding finds already done. The steel casing for each block was pushed into the ground to the desired depth by a mechanical digger (Fig. 8.4). In order to be able to slide the steel bottom under the casing the long sides of the surface had to be excavated. This was not a problem. In the earlier consultation it

Fig. 8.6 Part of the excavation is lifted as a block. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.7 The lifted block is transported to the restoration studio. Figure by Restauratieatelier Restaura, Haelen.

had been agreed that archaeologists would be available to lower the surface to the desired depth. The metal bottom was then slid underneath the container, once again with the help of the mechanical digger (Fig. 8.5). Sturdy steel beams that could be fitted with lifting brackets were attached to each side of the container.

Straps were attached to the brackets so that the blocks could be lifted. An imported moment was when a part of the excavation was literally lifted out of its context for further examination elsewhere (Fig. 8.6). During the excavation it had already been determined that the bronze objects were so fragile that they could break from the merest touch. To preserve the bronze objects – mostly studs – they had to be impregnated as they were exposed.

It was also not yet clear how many and in what configuration the objects were in the soil. By this time four large and two smaller blocks had been lifted.[74] These included two measuring 100 by 80 cm (V 1000 and V 1001) and one measuring 100 by 200 cm (V 1003). Several other smaller blocks had been lifted by the archaeologists themselves and several objects were still preserved in the surrounding soil. It was decided to transport the lifted blocks to the restoration studio where these would be further excavated (Fig. 8.7). Here the required facilities and time were available to carefully excavate the objects.

8.4 The block liftings examined with X-rays

One of the questions posed by the archaeologists was whether it was possible to X-ray the blocks in order to gain insight into their content and the distribution of the objects. In order to do this the blocks had to be removed from the thick steel bases, because these would hinder the X-rays too much. The blocks were moved from the steel bases onto wooden planks so that X-rays could be taken prior to excavation and conservation (Fig. 8.8).

This was not without risk as everything within the blocks had to remain in its original location. This also had to happen fast as the wet soil on the bottom might form a rust layer that would make it much harder to move the blocks. First of all, stable bases of waterproof multiplex were made and placed underneath the steel sliding bases. The entire blocks were then carefully moved onto the wooden carriers with jacks as these would not affect the X-rays. A mobile X-ray machine known as a so-called C-arch was used to take the X-rays (Fig. 8.9).[75] This arch, in which the X-ray tube is located on one side and the camera with image enhancement on the other, can be moved in all directions. In this manner it is possible to take X-rays of the lifted blocks step-by-step.

It had to be ensured that it would be possible to relate each X-ray to the block itself. To this end a grid of 10 by 10 cm squares was created over the surface of the block using steel wires. These wires could slide into small notches that had been made in the steel casing every 10 cm. The wires were fitted with a spring on one side so that the wire would remain taught over the block and spring back into position after contact (Fig. 8.10).

Each side of the block is sequentially numbered; the x-axis alphabetically, the y-axis numerically. In this manner each square was given its own unique number, similar to a chessboard. The X-rays were taken in this order, row by row while recording the location of the X-rays themselves. A reference point was attached to the X-ray image so that the X-rays could be taken at a fixed point and height above the block. In this manner all X-rays could be taken from the exact same position

74 Section 4.3.7 and table 4.1 give an overview of all lifted blocks and the numbering used.

75 A C-arch is an X-ray machine in which the source of the X-rays and the imaging camera are positioned across from each other. This arch can be moved over the object.

thereby preventing bias in size and parallax as much as possible. For the block of 100 by 200 cm (V 1003) this meant taking 200 X-rays. Afterwards the loose X-rays were assembled into a single X-ray. In this way it was possible to precisely locate each square of 10 by 10 cm. This was also important for the further excavation of the block. All blocks were processed in this manner, seven blocks in total of different measurements.

In this manner a lot of information about the content of the blocks and the locations of objects within it could be gathered. X-rays show all objects as being on a single plane. For this reason, X-rays were taken from two sides of a block that had been lifted in three layers (V 173A (Fig. 8.11), V 173B, and V 173C). In this

Fig. 8.8 The blocks are moved onto a wooden base prior to taking X-rays. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.9 V 1003 suspended in a frame whereby the X-rays are taken using a C-arch. Figure by Restauratieatelier Restaura, Haelen.

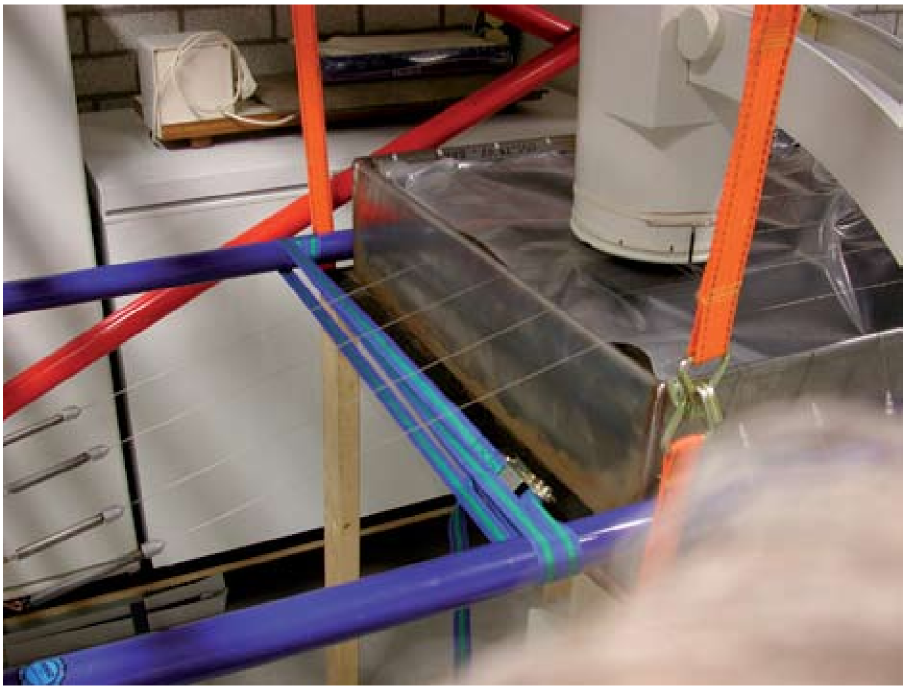


Fig. 8.10 A grid of 10 by 10 cm squares is created over the block so that X-rays can be taken. Figure by Restauratieatlier Restaura, Haelen.

Fig. 8.11 V 173A containing many bronze studs. Figure by Restauratieatelier Restaura, Haelen.

manner a spatial image was created that provided the archaeologists with insight into the distribution depths of the objects as well as allowing them to recognize specific patterns.

Another, not completely unexpected, phenomenon visible in the X-rays was the signs of root activity. For example the presence of several objects located underneath the find layer in what appeared to be clean soil, likely moved there by bioturbation (Fig. 8.12). This has to be taken into account while lifting a block so that one does not cut through such layers. Immediately following the lifting of the blocks the surface was, of course, examined by the archaeologists for any remaining features, but it is still reassuring to be able to determine that a block was taken deep enough.

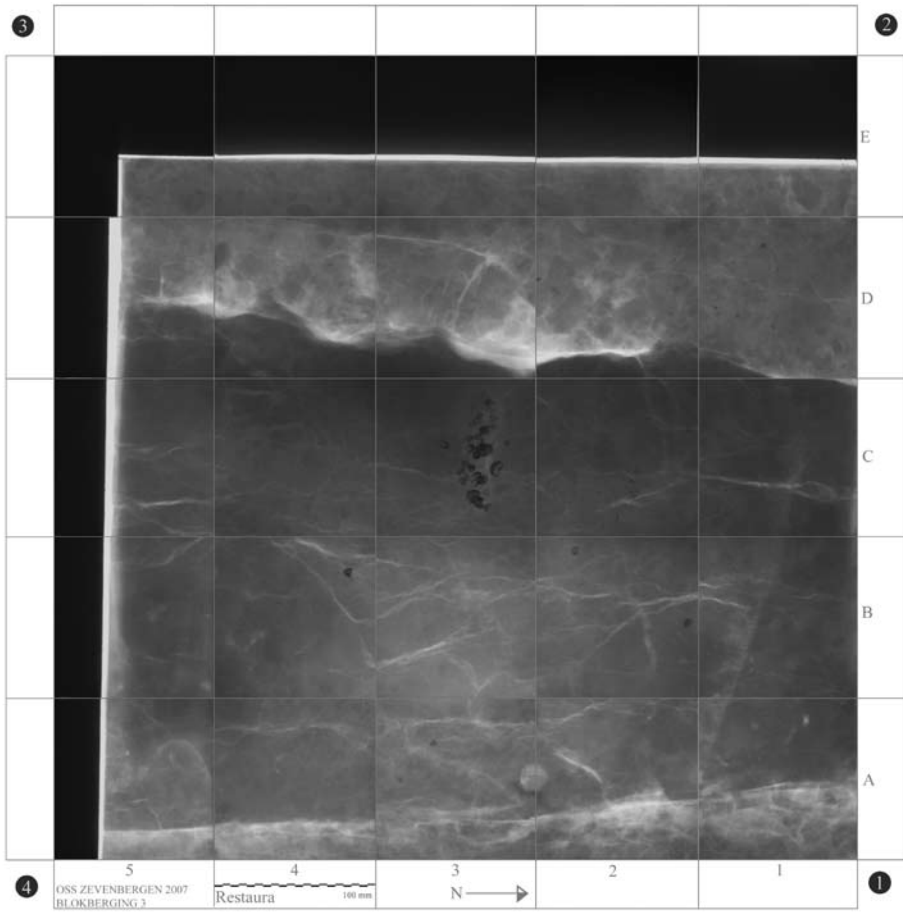


Fig. 8.12 X-ray of V 173C with finds in a bioturbation zone. Figure by Restauratieatelier Restaura, Haelen.

8.5 Excavation in the restoration studio

After these preliminary examinations the excavation of the blocks was continued in the studio. The great advantage of this is that one is not pressured by time concerns or weather circumstances, and that all possible facilities for a proper treatment are at hand. The objects and features were exposed in consecutive levels, just like in the field. The objects were so small and fragile that they were exposed using small spatulas and brushes (Fig. 8.13).

Each object was impregnated *in situ* as soon as it was exposed. Depending on the condition of the material, either paraloid[76] or cyanoacrylate[77], a superglue that penetrated the material well and instantly glued the present fractures, was used. Following this the objects could be lifted and cleaned further. The cleaning of the objects was done by hand under a binocular microscope (Fig. 8.14). Very small custom-made tools such as a scalpel, hooks, and wooden scrapers were used. The presence of bronze rot required the objects be treated with a solution of alcohol and benzotriazole.[78] This procedure was done in a vacuum to ensure the liquid penetrated well. While cleaning the objects – primarily hemispherical bronze studs – special care was taken to leave any traces that might reveal what the studs were originally fastened to untreated. This was the case with several studs in which organic material was observed in the hollow head of the stud. Studs grouped

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76 Paraloid is an acrylic resin that when, for example, dissolved in acetone is used to impregnate objects.
77 Cyanoacrylate is a quick-drying glue.
78 Benzotriazole is a chemical compound that can be dissolved in alcohol and used to stabilize bronze rot.

Fig. 8.13 Exposing the charcoal remains in the restoration studio. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.14 The manual cleaning of the finds under the binocular microscope. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.15 A triangular group of bronze studs from V 173A. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.16 Bronze rings, of which one was found in loose fragments (V 165). From left to right: V 165, V 218, and V 177. Figure by Restauratieatelier Restaura, Haelen.

in rows and surface-covering configurations revealed the remnants of a pattern. These were obviously preserved in their original configuration (Fig. 8.15). The studs occurred in a wide range of sizes.

The location of the studs was recorded per level and documented through digital photography. In addition to the bronze studs, several other metal objects such as several bronze rings were encountered (Fig. 8.16). Some of these rings were intact while others were fragmented. The loose fragments of one ring could be restored into their original configuration. Several fragments of this ring were missing, making it very fragile. The missing fragments were supplemented in order to stabilize the ring. The supplementations were done with polyester resin that had been given a neutral colour prior to use. The rings were also affected by bronze rot and the material had cracked.

Finally the rings were impregnated with epoxy resin under light heating.[79] There are indications that the objects were partially exposed to heat. At least one object, a bronze ring fragment (Fig. 7.4), showed clear signs of exposure to high temperatures that caused it to deform.

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79 Epoxy resin is a resin that consists of two components and is used to glue and impregnate metal objects.

Fig. 8.17 The archaeologists were frequently consulted during the excavation and conservation. Figure by Restauratieatelier Restaura, Haelen.

In addition to the metal objects, two bone fragments were encountered. They were found in V 1000, level 3, square H/5. The fragments were lying close together and upon cleaning were revealed to fit together (Fig. 6.8). This bone had also been exposed to heat, likely during the cremation ceremony in which the other objects were also exposed to high temperatures. A lot of charcoal was encountered in V 1000, V 1001, and V 1003; of which V 1003 of 100 by 200 cm was the only that did not yield any metal finds. These charcoal remains likely explain the strange signals produced by the metal detector in the field. The charcoal was broken into fragments that crumbled easily. In order to preserve them in their right position they were immediately impregnated with Mowilith 501 (10% dissolved in alcohol) upon exposure.[80] The impregnation of larger pieces of charcoal was done from the exposure of the first level onwards so that most of the charcoal could be preserved in the last level. The archaeologists that excavated Oss-Zevenbergen were regularly consulted during the process of excavating the

80 Mowilith is a polyvinyl acetate that dissolved in alcohol can be used as glue or impregnating agent.

blocks. It had been agreed with David Fontijn and Richard Jansen that they would be consulted if anything special was encountered. During these consultations the newly arisen situation was closely examined and the further course the excavation in the studio would take was discussed (Fig. 8.17). During the first consultation it was agreed that each level would be documented, photographed, and drawn. The surfaces were photographed during the excavation, every time a layer was removed. Anything special was photographed in detail. Cristian van der Linde, the Archol field archaeologist who also made the field drawings, drew the surfaces. This was to ensure that the features in the surfaces would be interpreted in the same manner and so that the drawings of the blocks could later be fitted into the larger field drawings. The grid created for the X-rays was used to create accurate drawings.

8.6 Further research, sampling, and analyses

Samples for further research were taken during the excavation of the lifted blocks. This was done in the studio during consultations with the various specialists. Ms. P. van Rijn (BIAX *Consult*) took samples of the charcoal for further research. An OSL-sample was taken by inserting a PVC pipe into the block that was immediately closed off. This sample remained in the block until the last layer was removed.

A sample of the largest piece of charcoal was sent to RING for dendrochronological analysis. Even though there were enough rings present it was impossible to date the sample. Samples were also taken from several blocks and multiple levels and recorded per level.

Metal analyses of the surfaces of several of the rings and a group of studs were done using XRF analysis (X-Ray Fluorescence). This provided quantitative analyses that allow for the determination of the alloy with a high accuracy and low detection value (see also chapter 9).

8.7 The excavation and restoration of an urn

Not only the lifted blocks were brought to the studio for conservation and/or restoration. Other artefacts found during the excavation of the mound were also given into our care. Fragile objects were retrieved with the surrounding soil by the archaeologists. An urn was only exposed on the outside and immediately wrapped in foil for reinforcement. It was then placed in a container that was partially filled with soil as further reinforcement (Fig. 8.18). The soil containing the cremated remains was left in the urn.

It was requested that we also first take X-rays of the urn as it was possible that there might be other objects hidden amongst the cremation remains. It was also requested that we retrieve the cremation remains in layers. This might shed some light on the burial ritual as well as making seed or pollen analysis possible. The urn was, of course, filled during the ritual and is therefore a more or less isolated source of information. The urn found in the barrow had been cracked by the pressure of the soil and was unstable. X-rays were taken from various angles and later compiled to determine whether there might be grave goods amongst the cremation remains (Fig. 8.19). The X-rays, however, did not indicate the presence of any objects. We then started to empty the urn. The cremation and soil was carefully retrieved in six consecutive layers (Fig. 12.1). A seventh layer, the soil directly beneath the pot, was collected as a sample. All samples were labelled with the necessary information.

Fig. 8.18 The urn after it was lifted at the excavation. Figure by Restauratieatelier Restaura, Haelen.

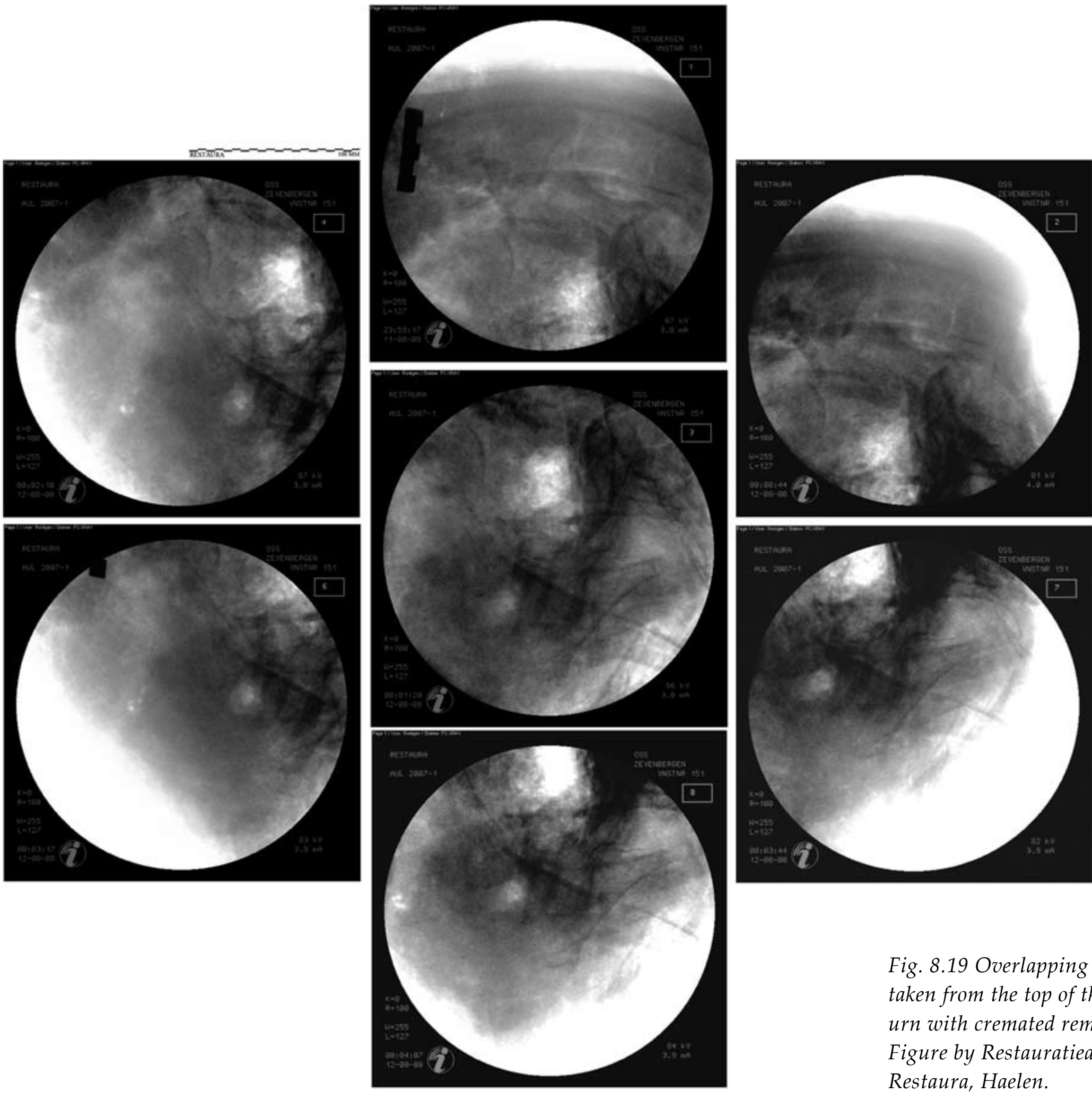


Fig. 8.19 Overlapping X-rays taken from the top of the urn with cremated remains. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.20 Fractures in the urn that have been pushed apart by roots. Figure by Restauratieatelier Restaura, Haelen.

Fig. 8.21 The urn following the restoration during which the missing pieces were supplemented. Figure by Restauratieatelier Restaura, Haelen.

We then proceeded to clean the sherds and restore the urn. The pottery had been fired at a low temperature and had become quite soft during its long stay in the ground. This had caused the fractured edges to crumble. The soil pressure had deformed some of the wall fragments so that these no longer fit together properly. Roots had penetrated the fractures and pushed the fragments apart even further, sometimes deforming the material (Fig. 8.20). The pottery was carefully cleaned with water.

The roots that had attached themselves to the fracture plains were carefully removed using a scalpel. To correct the deformations in the pottery it was kept damp and shaped using controlled pressure. The sherds were then glued using PVAc.[81] About 50% of the rim of the urn was missing. This large gap and the weak pottery made the urn very instable and it was not unlikely that it would break again. It was decided to supplement the missing pieces to reinforce the urn as a whole. The additions were done in gypsum that had been given a neutral colour prior to use. The additions were retouched using acrylic paint while preserving the colouring of the original (Fig. 8.21). Several small sherds of the urn were saved as loose samples.

8.8 The pyre from the barrow preserved for the future

In consultation with Leiden University and the Dutch National Museum of Antiquities it was decided to preserve V 1003. This can be seen as the surface that was specially created for conducting the cremation upon which the charcoal remains deposited have been preserved *in situ.* This layer was quite thick and heavy. The Museum therefore requested that only the top part be conserved. The block had to be cut to the right thickness. In order to slice the block to the right thickness, the surrounding that was used to lift the block was raised to the right height and kept in place using wooden rods. In between these rods and the surrounding handheld jacks were used to slide in a steel sheet. A large wooden beam was used to provide counter pressure. The whole thing was then moved onto the definite carrier and the steel sheet removed.

To ensure that the permanent carrier provided the block with enough stability it was made using a so-called sandwich construction. This is a construction whereby vertical ribs are placed in the inner space of the bottom. Underneath the sandwich construction several ribs were transversely positioned behind the skirting, giving the carrier a high rigidity. The block itself was given a wooden siding. The support was made from waterproof multiplex that was given a hard top layer of HPL, thereby isolating any possible harmful substances. After the block had been transferred onto the permanent carrier, thin needles were inserted from the top to the bottom of the carrier. Through these needles an impregnating agent was inserted through to the base of the block thereby glueing it to the carrier. Mowilith was used as an impregnating agent, the same as was used to impregnate the block and the charcoal remains from the top. The block currently serves as the base of a showcase for displaying other finds from mound 7 in the Dutch National Museum of Antiquities (see chapter 17).

8.9 Where the excavation ends and the analysis starts

All-in-all the work in the restoration studio took nearly two years. Following this the restoration reports had to be finalized; including pictures and descriptions of each object, the context in which it was found, its condition, and how it was treated. This also took quite some time to create. The report is over 150 pages long and was handed over to the archaeologists at the Faculty of Archaeology (Kempkens/Lupak 2010). All files, pictures, and analysis reports were also provided digitally. And yet it is clear that the work in the studio, the exposing of the finds in the blocks, the conservation and restoration, the analysis of some of the finds was only part of the archaeological research conducted. Other specialists

81 PVAc is a polyvinyl acetate that can be used as a glue or dissolved in demineralised water and used as an impregnating agent.

were busy with research within their own disciplines. This project, conducted in collaboration with Archol BV and Leiden University, showed that good cooperation can yield valuable information. As restorers we were able to conduct a part of the research that would not have been possible in the field. It is our opinion that a conservation with research starts during the excavation, indeed one already has to take into account conservation treatments. On the other hand, excavation ends in the restoration lab where it can only be done properly once.

Chapter 9

Bronze studs: colouring, reconstruction, and conservation

Janneke Nienhuis, Jilt Sietsma, David Fontijn, Ineke Joosten and Joris Dik[82]

9.1 Introduction

As the previous chapters demonstrate, the Early Iron Age bronze studs from Zevenbergen, mound 7 are among the most important finds of the excavation, and the procedure followed for their conservation is special. In chapter 7, it was argued on the basis of find context that these studs were affixed to some organic material, probably wood or leather. It was also observed that the objects display remarkable colours. Several questions still remain, which this chapter will address:

1. What is the composition of the bronze studs, and can the different colours be explained on basis of these results?
2. What is the most plausible prehistoric production process of the studs?
3. Does the conservation treatment influence the analyses?

To answer the first research question, an assembly of 66 fragments is available for closer study (section 9.1.1). These fragments include intact studs as well as distorted and broken pieces of bronze once belonging to multiple intact studs. The objects selected show a variety of colours (Fig. 9.1): brownish-black and white with green spots and occasionally red grain-like structures. In section 9.2, the results of several analytical techniques that give insight into the composition of the studs are presented and discussed.

The second question does not necessarily need analytical equipment in order to be answered. This chapter will propose several options for production, based on close visual study of the available studs and literature. A reconstruction of the process is described in section 9.3.

During the use of certain analytical techniques, information about the conservation treatments will be gained. The influence of the application of the treatment on the bronzes therefore can be evaluated as well, which is done in section 9.4.

9.1.1 Available study sample

Not all bronze fragments from mound 7 are available for analytical research and a selection has therefore been made. The sample set is composed of 64 small studs and fragments and two larger studs in order to examine similarities in composi-

82 JN: Cultural Heritage Agency of the Netherlands; Department of Materials Science and Engineering, Delft University of Technology, the Netherlands; Centre of Art and Archaeological Sciences, the Netherlands.
JS: Department of Materials Science and Engineering, Delft University of Technology, the Netherlands; Centre of Art and Archaeological Sciences, the Netherlands.
IJ: Cultural Heritage Agency of the Netherlands.
JD: Department of Materials Science and Engineering, Delft University of Technology, the Netherlands; Centre of Art and Archaeological Sciences, the Netherlands.

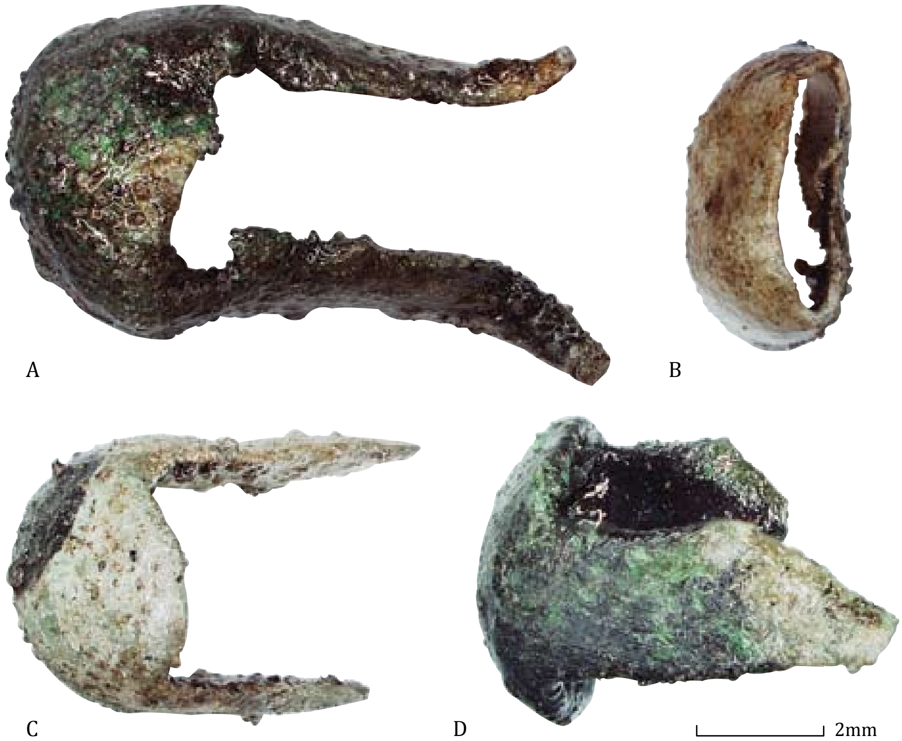


Fig. 9.1 Optical micrographs showing the different colours on the studs and the differences between the bronze objects from Zevenbergen. (A) Brownish-black stud with legs bent outward; (B) white stud with folded legs; (C) white stud with straight, pointy legs and black contamination; (D) brownish-black stud with green and white regions as well as a distinct side-view of the legs. Figure by J. Nienhuis/J. van Donkersgoed.

tion and colour between the two sizes (Tab. 9.1). Also, possible organic residue was found in two studs (section 9.2.7 and chapter 11). Five selected studs were made available for study using techniques that require the stud be destructed in order to fully examine, such as for example microstructure analysis (section 9.2.4). Since the material was excavated with the block-lifting technique, information concerning the positioning of the studs in the barrow is available. Samples from different locations and levels were examined to determine possible interrelationships between the studs and in relation to their position in the burial mound (chapter 7).

Pieces of bronze with the different colours (brownish-black, white, green, and red) were selected, since the colouration of the studs gives rise to questions about the original colour(s).

A broken piece of bronze, seemingly a leg with facetted sides and a white-greenish appearance, was embedded in epoxy resin and sectioned and polished to reveal the internal structure of the object.

Find location	Amount	Head size
V 176	5	± 0.5 cm
V 173A, level 1, square B/2	1	± 1.0 cm
V 173A, level 3, square B/2	29	± 0.5 cm
	1	± 1.0 cm
V 173A, level 3, square B/3	30	± 0.5 cm

Table 9.1 Summary of the origin of the sample set of bronze studs and fragments. Those with head size around 1.0 cm are of the large variety, whereas those measuring around 0.5 cm are of the small variety as defined in section 7.5.1.

9.1.2 Methodology

There are several analytical techniques that can be used to answer the three research questions. This section discusses the various techniques used, as well as their advantages and disadvantages.

Visual examination using optical microscopy

Visual examination can be performed with a digital 3D optical microscope in order to characterize the external features of the studs. This microscope can be set up to take pictures of a sample focussing on sequential height intervals. Synthesizing these partly in-focus images results in an image in which the field of view is completely in focus.

In this research, a 3D optical microscope of the type Hirox KH7700 was used. The colours and sometimes also the morphology of the surface and corrosion products (or patina) of the 66 bronze fragments were characterized on a macroscale, as well as the size of the studs.

X-Ray Fluorescence

X-Ray Fluorescence (XRF) is a technique that non-destructively determines the average composition of a material in a very fast way in a layer of approximately 100 µm beneath the surface. With XRF, the sample material is irradiated with X-rays and the response from the interaction with the sample produces photons with an energy that is element specific. The energy of the fluorescence photons is measured, resulting in a spectrum in which characteristic peaks appear (Fig. 9.2). Primary peaks (usually K-peaks) originate from the first ~100 µm of the material. When certain elements are present in sufficient amounts, like tin in the present samples, secondary peaks (mostly L-peaks) can be identified as well. These peaks originate from only the top few (~10) micrometres of the material. Inelastic collisions of incoming X-rays with the atoms in the materials will generate a so-called Compton peak, which is a measure for the average amount of light compounds in the material (containing elements approximately ranging from carbon to silicon). Consequently, a high fraction of corrosion products, as well as air between the beam exit and the sample, and organic conservation material will contribute to a relatively high Compton peak.

A disadvantage of using XRF on layered and inhomogeneous artefacts is that accurate quantification is not possible. The penetration depth of this technique is low, depending on the material density and the X-ray energy (approximately 100 µm; Gianoncelli/Kourousias 2007). To reduce the background noise, a filter can be used. The disadvantage of using a filter is that the detection limit of certain elements is increased and they cannot be identified as accurately as without the use of a filter.

In this research a portable instrument (Bruker Tracer S1 Turbo SD LE) was used, with a beam size of 3x4 mm^2, which is too large to measure the local composition of, for example, coloured features. It does, however, enable the determination of the average elemental composition of the studs. Several bronze fragments are too small to yield reliable results with XRF, therefore 56 of the 66 available fragments (section 9.1.1) were measured using the portable XRF instrument. A filter containing titanium, iron, and molybdenum was used to reduce background noise. As a consequence, the lighter elements like chlorine, aluminium, and silicon, with atomic numbers up to 25 (manganese), were not identified accurately. Due to the inhomogeneity of the surface of the studs, in practice mostly the corrosion layer was measured. Therefore, XRF was only used to identify elements that are present in the surface layers of the 56 bronze fragments. This means that for this research other techniques must be employed to verify the presence of corrosion products and/or soil contaminations, like Direct Temperature-resolved Mass Spectrometry (DT-MS, chapter 11) or X-Ray Diffraction (XRD).

X-Ray Diffraction

With X-Ray Diffraction (XRD), the entire object can be placed in the instrument and the surface layers are irradiated. The underlying principle is to deduce the presence of crystalline structures of solid materials by the diffraction of known incident radiation in a non-destructive way. The position and intensity of peaks in the resulting diffraction pattern provide qualitative and quantitative information about the crystalline phases present, so both corrosion products and bronze phases. To get an accurate quantification, powdered scrapings of the material are needed. The penetration depth of the radiation is ~10 μm, thereby providing only surface information.

In this research, XRD analysis with a Bruker D8 instrument was performed on six studs. The spot size was either 0.3 or 0.8 mm, so it was possible to solely measure white, brown or green areas on the bronzes. Due to the inhomogeneity of the stud samples, the low penetration depth of the X-rays and the impossibility of acquiring scrapings, only qualitative identification of compounds was performed.

Scanning Electron Microscope

A Scanning Electron Microscope (SEM) can be used to study organic and inorganic material on a micro-scale. This technique enables the creation of an image of the subject with a resolution smaller than 1 μm. The elemental composition (in wt%[83]) can be determined locally and qualitatively from a depth up to a few micrometres with an additional feature in the SEM, called Energy Dispersive X-ray Spectrometry (EDS).

In this research the organic residue in two studs and the microstructure of a cross-section of a stud leg were studied using a type JEOL JSM 5910 LV, under low vacuum (30 Pa). Quantification of the concentration was done on the cross-section with a Thermo NORAN UltraDry detector.

9.2 Stud composition

The objects from mound 7 were buried for thousands of years, making it plausible that their colour (variation) is the result of corrosion processes. As described in the previous section, several measurements were done on the bronze studs to determine whether there is something left of the original bronze composition, whether there are corrosion products present, and also whether organic residue is present. The results of these measurements are discussed in this section in order to answer the first research question.

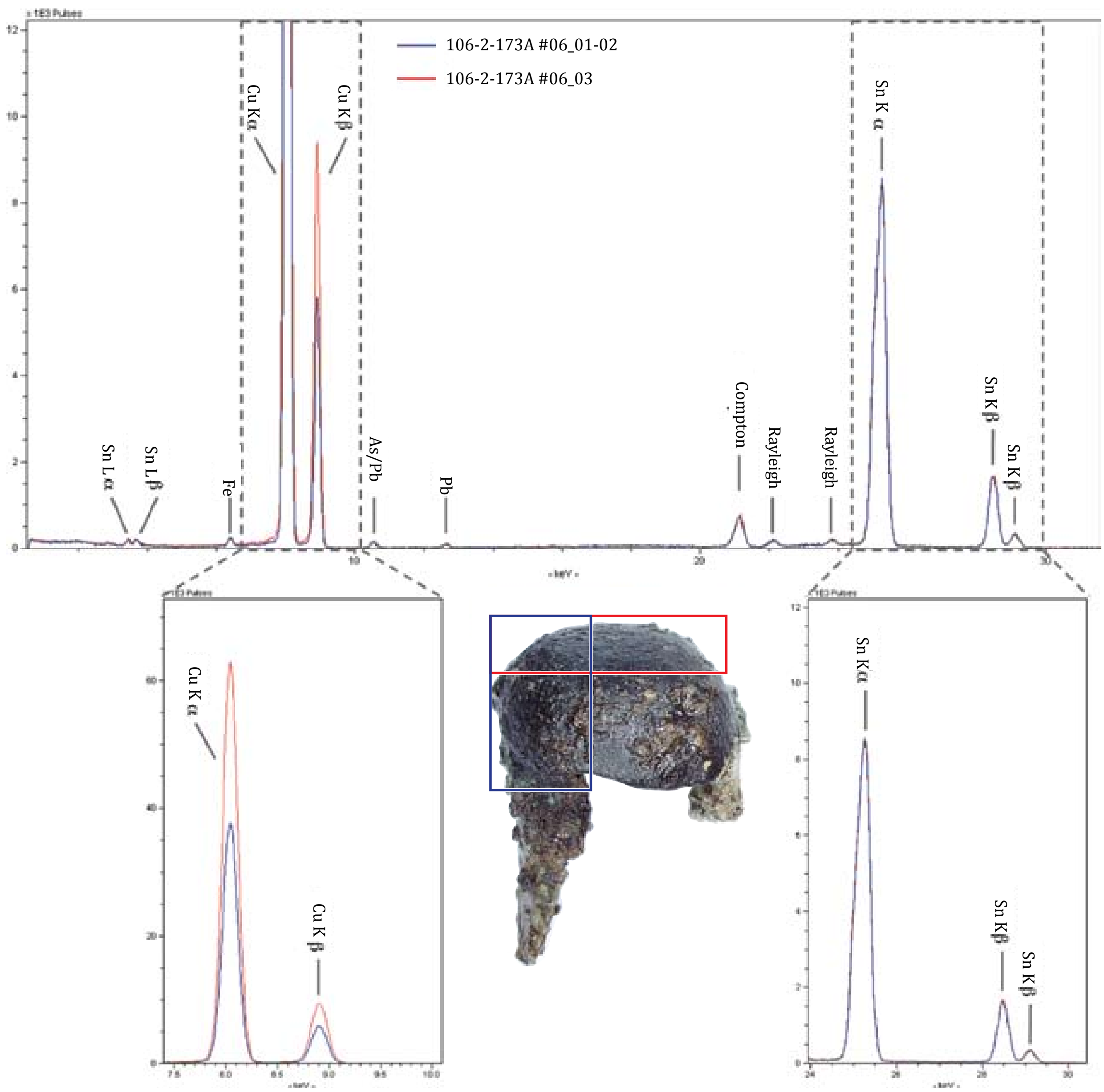
83 wt% is an abbreviation for weight percent. Weight percent is the percentage of the mass of one kind of atom relative to the total mass of the mixture of atoms. Another unit often used is at% (atomic percent): the percentage of one kind of atom relative to the total number of the mixture of atoms.

9.2.1 XRF considerations

In order to properly make use of the results of the XRF analyses, there are some considerations that need to be discussed. As mentioned in section 9.1.2, XRF has a spot size of 3x4 mm^2. The patina of the studs shows a large variety of colours on a smaller scale (Fig. 9.1) and this inhomogeneity has large consequences for the XRF results. One of the first questions that come to mind is whether the spectra resulting from different studs can reliably be compared in order to find out whether the same alloy was used for all objects. To do so, the spectra were normalized on a common peak, in this case the tin Kα1 peak. This means a relative comparison is made on the basis of the ratio between peaks and this was used to define the relative scale for the concentrations.

When two spectra are compared, situations like in figure 9.2 frequently occur: the height of all peaks except for one element is the same for both measurements, while the ratio between the two elemental peaks (Cu-Kα and Cu-Kβ for example) is constant. Differences of a factor two in the peak height were often encountered. This is most likely the result of corrosion phenomena during which one element

Fig. 9.2 Two XRF spectra from the same stud (with unique number 106-2-173A L3 B2 #06), zoomed in at the copper Kα and Kβ peaks (left) and the tin Kα and Kβ peaks (right). Figure by J. Nienhuis/ J. van Donkersgoed.



(either tin or copper) was preferentially leached out or oxidized. To set up a tolerance level, two spectra of one stud (from V 173, level 3, square B/2, known in this research as 106-2-173A L3 B2 #06) were compared: one recorded at the top of the head and the other at the side (Fig. 9.2). No indications for a stud being made of several pieces were found and compositional variations over ranges larger than 3-4 mm are not likely to occur, so in principle these spectra should be the same and originate from the same alloy. The result is that all peaks are indeed comparable, except for the copper peaks. The measurement of the head shows a total intensity of 75.000 counts, while that of the side is approximately 40.000 counts for the largest copper peak. This led to the conclusion that a difference of almost a factor two in the peak height does not necessarily mean that another alloy is involved, so this should be kept in mind while comparing samples. This factor is not a measuring uncertainty, but the consequence of the oxidation products present on the samples.

Comparing the inelastic Compton peaks after normalizing on the largest tin peak gives an indication of the presence of light materials on the sample (as explained in section 9.1.2). A thicker layer of air between the out coming X-rays and the stud surface indeed gave a higher peak, as well as the presence of white and green products. This suggests that these are corrosion products that are lighter than the bronze matrix.

However, these contributions were hard to quantify, also because the presence of conservation coatings may influence the Compton peak height as well. Since all measured studs from the study sample have been treated, it is assumed that these coatings do attribute to the Compton peak in every sample and that this contribution is dependent on the thickness of the applied coating.

9.2.2 Brown, green and red areas

Differently coloured areas on the studs can be seen with the naked eye and through an optical microscope (Fig. 9.3). XRF, XRD, and SEM measurements were performed to measure their composition.

Brown areas

The majority of the studs have a brownish-black appearance. The XRF measurements of brown-black regions show peaks of iron, copper, lead, and tin, and in the majority of cases arsenic as well, but the ratios between the peaks are very different. On several occasions, nickel and antimony were detected next to the abovementioned set of elements. In a single case, the additional presence of only nickel was encountered. A bronze alloy is composed of copper with tin as common major alloying element. Minor alloying elements are lead, arsenic, nickel, iron, and antimony. These are remnants of the impure copper and tin ore used. Upon corrosion of bronze, several oxidation products can form. Elements like lead and iron, most likely originating from the original alloy, can be incorporated in their structure (Wang *et al.* 1995). Iron is present in all measured samples (XRF) and analysis of the residue in the large studs (section 9.2.7) showed that it is mainly a product of soil mineralization. SEM-EDS measurements on the internal structure of the embedded leg showed that about 0.6 wt% iron is present in phases that once contained the original alloying elements. XRD results showed that the corrosion products tenorite (CuO, black) and in smaller amounts cassiterite (SnO_2, white if visible in larger amounts) were measured in the upper 10 μm of the surface of the dark brown samples. The strong L-peaks (section 9.1.2) of tin observed with XRF can confirm this.

Fig. 9.3 A look at the inside of the head of a stud. Due to fracture of the legs, the cross-section shows a white outer layer of about 40 µm thick. Also, grain-like green and red products can be seen. Figure by J. Nienhuis/J. van Donkersgoed.

The thickness of the corrosion layer can affect the detection of lead, arsenic, nickel, iron, and antimony in the bulk. When a thicker corrosion layer is present, the penetration of X-rays will predominantly probe oxidation products and less original alloy. No oxidation products of nickel, antimony, lead or arsenic were identified with XRD, nor any copper-tin compounds. This shows that the top 10 µm of a stud is not composed of original alloy material and that XRD only probes corrosion layers, whereas XRF with its penetration depth of 100 µm does not only probe corrosion layers, but also underlying metal. The copper and tin peaks in the XRF spectra are thus probably composed of a part originating from the original alloy and a part that is due to the presence of corrosion products. The first estimation on the basis of peak area and quantification by SEM-EDS is that the concentration of each of the minor constituents (nickel, antimony, arsenic, lead, and iron) is less than 1-2 wt%.

So it seems that the brownish-black colour seen on the majority of the studs is a combination of bronze, corrosion (mainly tenorite), and soil products.

Green areas

Green products in a predominantly grain-like shape appear on almost every stud, in combination with white as well as brownish colours. The colour is that of malachite ($Cu_2(CO_3)(OH)_2$), and this corrosion product was indeed identified by XRD. A small stud from V 173A, level 3, square B/2 and the large stud from V 173A, level 1, square B/2 display very definite, green curly shapes with a size of up to 1 mm (respectively Fig. 9.4, 9.9, and 9.10). This morphology has a transversely banded, pale green structure (Fig. 9.4). This is typical for the copper corrosion product malachite (Eggert 2007). Malachite usually appears in a grain-like shape or as a continuous layer, the curly shape being rather rare and mostly encountered on archaeological specimens. The grain-like morphologies are indeed malachite, verified by XRD measurements, which renders it possible that the curls in which

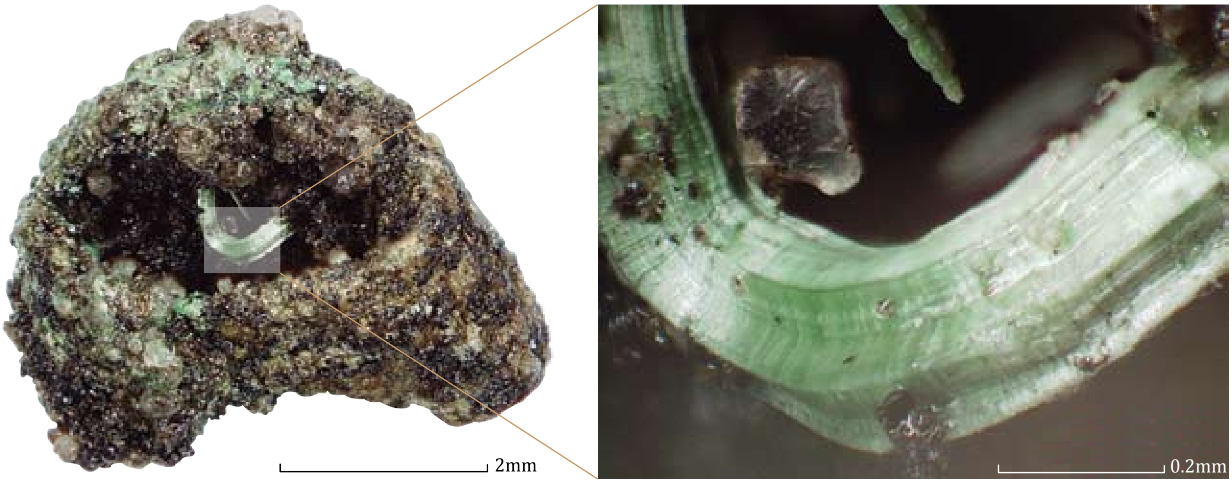


Fig. 9.4 Small stud showing the unique curly shape of malachite, a pale green copper corrosion product. Figure by J. Nienhuis/J. van Donkersgoed.

copper was identified with SEM-EDS are also malachite. The special curly shape may give a clue as to what kind of material the objects may have been attached to.

In principle, the only necessary condition for the formation of malachite is the presence of copper ions. Of course, carbon, oxygen, and hydrogen are required as well, but they are readily present in most soils. In literature, two possible explanations for the formation of curly malachite are given. Either it is a so-called pseudomorph, a mineral replacement of organic material from the archaeological context (Robbiola 2011, *pers. comm.*), or it is a copper corrosion product that grew in a curly shape (Eggert 2007; Wight 1998).

In the last case, the curvature can either be induced by stresses present as surface tension of the growing medium, and/or by external influences like different growth rates of the individual fibres in the malachite bundle (Wight 1998, 318). Eggert (2007, 59) argues that curly malachite is not a pseudomorph, since no interwoven fibres have been encountered, as would be the case for leather, wood, and so on. Also, the production of comparable structures (of chemically different compounds) in the lab, and the presence of curls on mineralogical specimens led to this conclusion. Robbiola, however, states that these fibres are sometimes found in the vicinity of residual organic remains. Besides this, next to the curly shape, more common morphologies (*e.g.* compact) are often encountered on the same specimen or objects from the same site. This leads to the question why this special morphology crystallized in a context where usual compounds can also be formed. In the present case, it is assumed that the observed curly malachite is not a direct pseudomorph of support material of the studs since no interwoven or cellular structure was found. The presence of this type of corrosion product occurring next to usual shapes seems to be related to the former presence of organic remains, thereby only confirming that at some point (but not necessarily during use), the studs were affixed to non-metallic material.

Red areas

About half of the specimens show red products in the shape of grains (Fig. 9.3). Solely based on the colour, they could be impurities from the burial environment, redepositions of copper due to selective corrosion, or copper corrosion products. Since tenorite (CuO) was present on other samples and redeposited copper is more yellow, it is therefore hypothesized that the red particles are copper corrosion products. Most likely this product is cuprite (Cu_2O), which is red in colour. This could not be reliably verified by XRD, since the red particles are smaller (less than 0.4 mm in diameter) than the spot size of 0.3 mm.

9.2.3 White surfaces

A substantial number of studs (15 out of 56 measured with XRF) has a white appearance with sufficient area (approximately 1 mm^2) to be analyzed. A silvery colour on bronze antiquities can be attributed to three processes (Meeks 1986):

1. intentional tinning:
   (a) simple dip or wipe tinning
   (b) cassiterite reduction or cementation process
2. so-called tin sweat during cooling down after casting
3. corrosion processes in which either the high-tin phase remains and copper selectively corrodes, or where white tin-oxide products like cassiterite are formed.

All resulting structures are composed of a layered structure with different (copper-tin) phases and compounds, on basis of which they can be resolved. Usually, the first two processes yield an object that is completely covered with whitish products, while corrosion processes can also lead to localized coloured areas. In the case of intentional tinning, copper-tin phases like delta (δ, $Cu_{41}Sn_{11}$), epsilon (ε, Cu_3Sn) and eta (η, Cu_6Sn_5) are always present in the top layer, which can be distinguished from the bulk.

The tinning step in the production process is the last of all, since working the object will disrupt the white layer. The microstructure evolution in simple tinning starts with a binary ε/η layer of about 10-50 μm thick. As the tinned layer is heated, this layer grows and transforms into ε. By further increasing the temperature, the ε compound undergoes a transformation to δ and consequently into α + δ with α being a solid solution of tin in copper. A thicker, initially tinned layer will result in the existence of a range of the previously mentioned phases and excess surface tin. Bronze tinned by cassiterite reduction shows a eutectoid α + δ structure, with angular α islands in a layer of approximately 50-500 μm thick. Tin sweat (± 10-100 μm thick) on bronze consists of a solid solution of tin in copper (α) with the addition of α + δ penetrated into the core structure and in which the α islands are irregular. When corrosion has taken place, the microstructure of the original matrix can mostly be identified as a "ghost" structure. This means that all four options listed above can be discriminated by looking at their microstructure. However, tinned objects can also corrode, resulting in microstructures similar to that of artefacts that were not tinned intentionally, but that gained a tin-rich surface due to oxidation processes. This hinders the identification process, and analytical techniques other than XRD and SEM(-EDS), like Transmission Electron Microscopy and/or Electron BackScatter Diffraction, are needed to elucidate the origin(s) of the tin-rich surface.

At this moment, measurements with XRF and XRD have been performed on the studs of Zevenbergen. Measurements with XRF on white parts indeed show an increased amount of tin compared to non-white specimens. The L-peaks of tin were also higher, indicating that relatively much tin is situated in the first 10 μm beneath the surface. XRD analyses showed that the sole (crystalline) compound in the first 10 μm of the surface on white samples seems to be cassiterite (SnO_2) and that cassiterite is also present in minor amounts on brownish samples. Sometimes cuprite (Cu_2O) was identified as well. Cuprite not always being detected can be explained by realising that a thick layer of cassiterite will prevent the detection of underlying cuprite. The penetration depth of XRF is larger than 10 μm, which explains the detection of copper, lead, arsenic, and sometimes nickel and antimony. These observations suggest that the tin-enriched top layer mostly consists of corrosion products, which is best visible in the white studs. For those specimens, the existence of this top layer was confirmed by optical micrographs (Fig. 9.3 and 9.5), where a white layer of approximately 40 µm is seen in cross-section due to recent fractures or deliberate sectioning. The variation in XRF peak ratios of several elements possibly originates from the varying layer thickness and composition of the underlying layer(s).

One can expect to find copper-tin phases when analyzing bronze with XRD, originating from the bulk and/or a tinned layer as described above. This is not the case for any of the studs measured. The most plausible explanation for this is the presence of corrosion products in combination with the small penetration depth of the X-rays. For the studs with white features, the tin-rich top layer (mostly around 40 µm) is thicker than this depth, meaning that if bronze phases are situated in this layer as well, or underneath, they cannot be identified with XRD.

Visual examination of the objects from Zevenbergen showed that either the entire stud is white, or only the legs. This could imply that the white regions are the result of tin corrosion processes, locally influenced by the support material and formed after use. In the case of an entirely white stud, the inside of the head would have had to have been in contact with this (flexible) support, simultaneously with the outside. Another option is that the white colour was applied intentionally, but has worn off at the heads during use, but not at the legs. In both cases it can be assumed that the legs have been mounted in a support. To be conclusive on the origin of the tin-rich white surfaces on the studs, the microstructure of the object needs to be characterized, which is discussed in the next section (9.2.4).

9.2.4 Internal structure visible in cross-section

The characterization and composition of the internal (micro)structure of the studs is important in order to establish whether it is still intact or if it is corroded. Production methods and traces of working can be deduced. Also, layering caused by tinning and/or corrosion processes can be visualised. The results are discussed in this section.

In figure 9.5, the cross-section of an embedded piece of bronze (section 9.1.1) from Zevenbergen is visible. One can see a structure that does not correspond to an intact bronze microstructure. First of all, different colours can be distinguished in the internal structure. Height differences on the surface are present, and oxygen was detected throughout the entire sample, indicating that the structure is completely corroded. Second, the grains seem to be detached from each other, while the (optically white) layer is predominantly continuous, but also not adhered to the bulk. It is unclear whether this really is the original microstructure, or whether it has been altered by the influence of heat and/or corrosion. The grains are not flattened, which suggests that the object was not worked in the last stages of production. This does not mean that no working at all took place, since heating after working (annealing) will recrystallize the material and result in an equi-axed grain structure as well. Heating could be intentionally applied, or in this case could also be induced by the objects having been situated near the pyre.

Since the structure is entirely corroded, characteristic features of working and annealing are difficult to detect. Direct evidence of casting and/or working the object can thus not be given. The internal cracking and detached grains can have several origins. Intercrystalline cracking can occur due to overworking (Scott 1991), but the large scale occurence here leads to the hypothesis that it is a result of volume change due to intergranular corrosion (Robbiola *et al.* 1998).

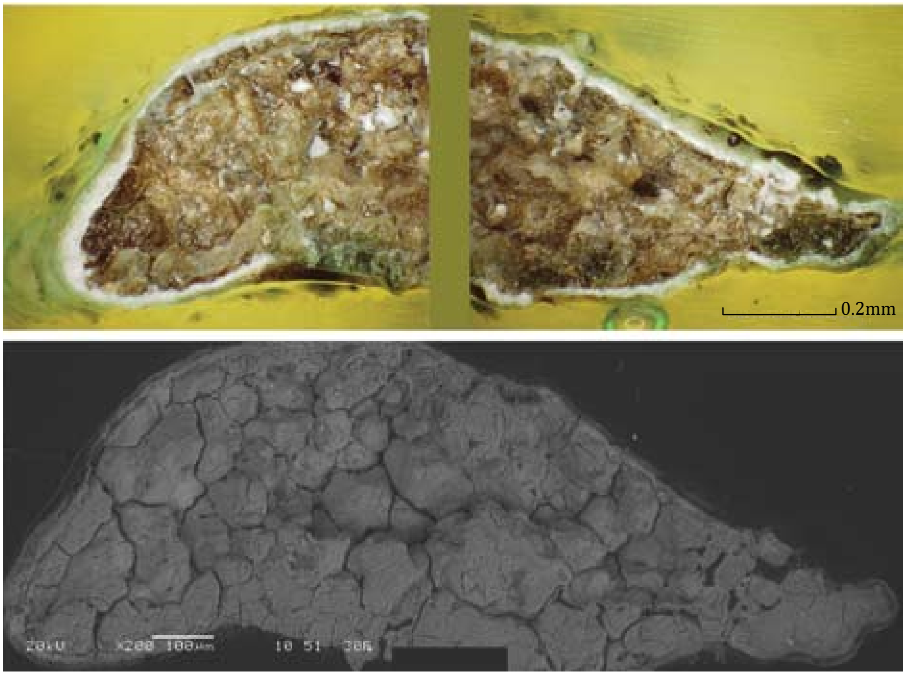


Fig. 9.5 Cross-section of an embedded bronze leg from Zevenbergen. (top) Optical micrograph, showing a white layer covering the bulk, which consists of several coloured grain-like structures. (bottom) Backscatter electron image showing a corroded grain-like structure in which the grains seem to be detached from each other. A continuous outer layer is seen as well. Figure by J. Nienhuis/J. van Donkersgoed.

Grain boundaries can act as galvanic cells to the grain centres due to inclusions, precipitates or other compositional gradients and those boundaries are first to corrode. In bronze, the melting points of the constituents are different, and when the material is heated, coring can occur. This is a micro-segregation process whereby the centre of a grain is rich in the high-melting element (copper) and the grain boundary rich in the low-melting element (tin). This could also be an incentive for intergranular corrosion to occur.

The composition of most grains was measured with SEM-EDS and practically all grains consist of an average of about 50 wt% tin, 18 wt% oxygen, 13 wt% copper, 4 wt% aluminium, 3 wt% silicon, and less than 1 wt% iron. This shows that the structure is indeed composed of corrosion products. The amount of tin is relatively high and that of copper relatively low, indicating that copper has diffused through the object and was preferentially dissolved into the soil. Usually, aluminium and silicium are not present in a bronze matrix and it is therefore assumed that these elements have diffused from the soil into the (already corroded) internal structure of the object. Taking into account the previously mentioned XRF and XRD results, probably both copper oxides and tin oxide are present in the grains. No lead, nickel, arsenic, or antimony were measured with SEM-EDS in this sample, as was the case for the majority of the studs analyzed with XRF. Probably the large amount of corrosion products obscure their presence here. Chlorine, phosphorus, and sulfur were found in all grains as well, in concentrations less than 1 wt%.

A detailed view at the external features of the embedded leg, combined with elemental measurements, showed that there are several layers present on top of what seems to be the bulk. From the outside to the inside, the cyanoacrylate layer is encountered first, and its thickness varies from a few to several tens of micrometres. Beneath this, a layer rich in silicon and aluminium is present (about 10-20 µm thick) which is most probably adhered soil. In one case, a small 10 µm thick fractured layer that appeared red under the optical microscope seems to rest on top of this soil layer. Based on its colour it is assumed that it is cuprite (section 9.2.2), but no compositional data is available at the moment. Directly on top of the bulk structure lies a tin-rich layer (spot measurements give values of about 60 wt% tin,

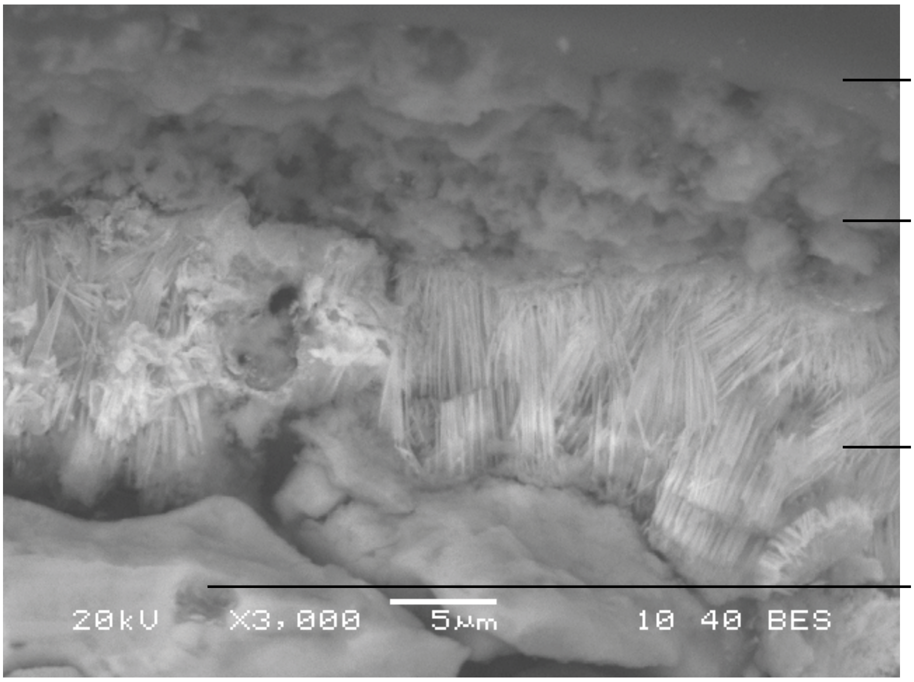


Fig. 9.6 Detailed view of the layered structure found on the cross-section of the embedded leg from Zevenbergen. Bulk grains can be seen, on top of which a layer with acicular, tin-rich crystals is situated. It is covered with adhering soil products. Figure by J. Nienhuis/J. van Donkersgoed.

16 wt% oxygen, 10 wt% copper) that is present almost everywhere. A mapping of the elemental distribution showed that this layer contains some copper, but hardly any oxygen and corresponds to the optically white layer on the sample. This seems to be contradictory to the hypothesis that this white layer is tin oxide. Zooming in on this layer showed that it is composed of acicular tin crystals (Fig. 9.6). A possible explanation for this stratigraphy is discussed in section 9.2.5.

So it seems that the white layer seen on the leg embedded in epoxy resin has a different microstructure and other mechanical properties than the bulk of the object. Not only is the colour different, the composition of the outer layer does not resemble that of the corroded grains. Both tin and copper are present, while for example iron is absent. The thickness of the white layer is relatively consistent and measures 40 µm. Also, the variety in colour on the studs indicates that this is not a simple diffusion situation. All in all, these features seem to point in the direction of the hypothesis that the studs have indeed been tinned intentionally. However, it is still very important to know the characteristics of an uncorroded stud microstructure in order to compare with this corroded sample, and conclude upon the yet unresolved problem of the high tin concentration on the surface of the studs. This will be further discussed in section 9.6.

9.2.5 How and when were the coloured areas formed?

It is useful to know the origin of the coloured areas described above, to determine whether they are consequences of intentional actions by the people who made them, or if the colours are caused by oxidation processes during the burial time of the studs, or even both. Therefore, this section discusses probable formation processes of the structures and colours found.

Robbiola *et al.* (1998) propose a theory about two types of layered corrosion structures frequently found on bronze archaeological soil finds (Fig. 9.7). In both types, the process after burial starts with the alloy dissolution into the soil due to the corrosive environment. Next, ionic species migrate, and thirdly, ageing of corrosion products takes place. The duration of the first two steps is roughly tens of years, while the third continues during the entire burial time and can lead to an entirely corroded bulk.

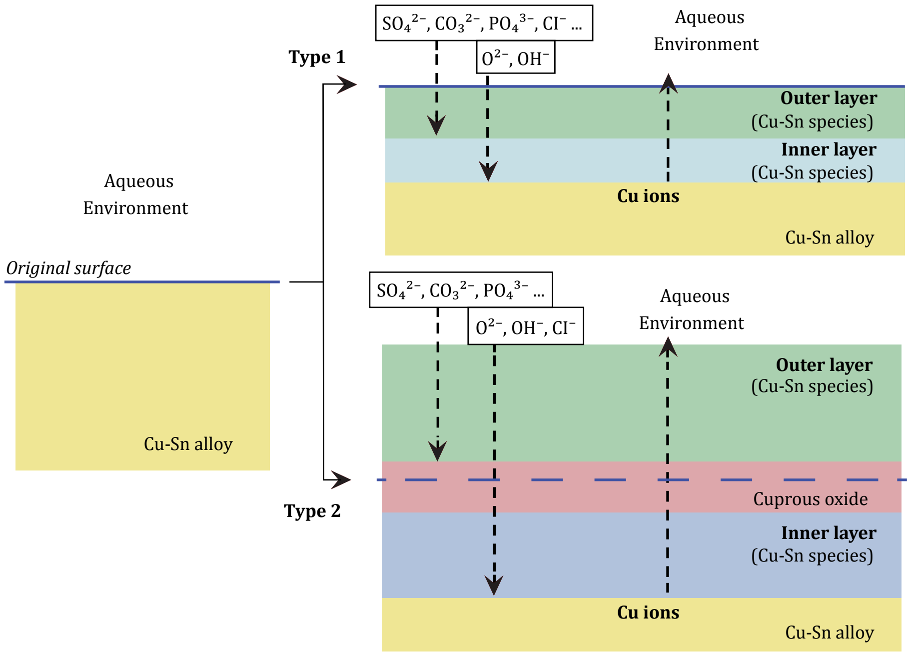


Fig. 9.7 Model of patina growth showing the two main types of corrosion structures found on archaeological bronzes. Figure after Rahmouni et al. 2009, fig. 2/J. van Donkersgoed.

Type 1 ("even surfaces" or "passive layers") structures can be ascribed to internal tin oxidation accompanied by selective copper dissolution (decuprification). Tin compounds are formed, which are insoluble in water and act as a passive barrier layer preventing further copper dissolution. Patina growth is controlled by cationic diffusion, where positively charged copper ions migrate from the alloy to the outer surface. In most cases, a bilayer is present with a pseudomorphic outer layer (4-50 µm) with a very low copper content (compared to the base alloy), a tin content comparable to that of the alloy and elements from the environment (silicon, oxygen, etc.). This is also the place where copper ions oxidize and form compounds like malachite (Chase 1994, 101). The inner layer, which is sometimes not observed, is in contact with the bulk bronze, and contains copper in the form of cuprite. Due to localized corrosion processes, type 1 can develop into a type 2 structure during ageing, whereby for example cuprite (Cu_2O) can transform into tenorite (CuO).

Type 2 ("coarse surfaces") structures are formed by anionic control, so by movement of negatively charged ions. This concerns mainly oxygen and chloride from the surrounding soil, forming a chloride-enriched zone at the interface between the alloy and the corrosion layers. Alteration and/or degradation of the original surface take place, resulting in corrosion structures of a total thickness of about 200 µm to several millimetres. These can be divided into three layers. There is an external zone of green copper compounds like malachite, an underlying red layer of cuprite that is mostly fragmented, and an internal layer with a relatively low copper content due to decuprification and high tin concentration, associated with chloride and oxygen ions. Scott (2002, 13) adds that removal of the tin-rich phase of the alloy can occur and a surface corrosion layer of tin oxide can form. The copper-rich phase will therefore corrode last.

On the studs measured with XRD, several types of copper corrosion products (malachite, tenorite, cuprite) were found next to cassiterite, a tin corrosion compound. Since no significant chlorine concentrations were measured with XRF and SEM-EDS, the explanation of the corrosion product formation is probably not characterized by a type 2 structure. The outline of the objects is still clearly visible and the size variations are relatively small (chapter 7). A type 1 corrosion process with the diffusion of oxygen and copper throughout the structure fits this description quite well. But the cross-section of a white leg (Fig. 9.5) shows that there is no clear bilayer present, and the chemical composition does not confirm the characteristics of a type 1 structure. The existence of an outer SnO_2 layer is still under discussion, and the oxidized grain structure of the bronze bulk is not directly explained by Robbiola's typology of bronze corrosion. This could imply that the corrosion circumstances were markedly different than usual. Also, the studs could have been tinned intentionally, whereby the initial structure used to explain the corrosion structures is already deviating. A combination of both factors cannot be ruled out either.

In summary, there are two options:

1. The bronze studs from mound 7 have not been tinned on purpose. The layered structure surrounding the bulk is a result of copper dissolution in the soil and oxygen diffusion during their burial time. Cassiterite, tenorite, cuprite, and malachite are formed at the surface and a marked interface of a layered structure with the bulk can occur, even though a gradual diffusion zone is encountered more often on antiquities. Different appearances occur due to different environmental circumstances (*i.e.* by surrounding support material and/or previous heating effects induced by the pyre). The internal structure is oxidized by physical disruption of the outer layer or by prolonged diffusion during their burial time.

2. The studs have been tinned intentionally. During use, the silvery coating has worn off completely or only at the heads, while the legs were fastened in a support and the coating stayed intact. On the studs where the original tinned layer still remains, cassiterite will be the main corrosion product that is formed after burial. In time, the copper-rich phase will oxidize as well. On the more worn samples, copper corrosion products will predominate. During 2500 years the bulk could have started corroding as well, due to diffusion through the outer layers. However, the microstructure of the bulk is different from the outside in the case of intentional tinning (section 9.2.3), and so the corrosion structure will be different as well.

Combining these considerations with the discussion in section 9.2.4, makes option 1 seem the least probable. Option 2 gives the most plausible explanation for the existence of studs that are entirely covered in white, so including the inside of the head (like the ones in figure 9.1, B and C). In option 1, the colouration of the studs would be reversed to what was observed (section 9.2.3): the white tin oxide would cover everything but the legs and occasionally, when a whole stud was surrounded by organic material, the entire stud would have a whitish appearance.

The cross-section of the leg showed that there is a clear difference between the layered surface and the bulk. It showed a marked interface and no penetration zone into the bulk. The outer white layer seemed largely intact and continuous, while the internal bulk structure showed detached grains. It is most likely that this is a result of a deliberately added layer. The existence of two seemingly different corrosion structures on one object could be explained by the influence of the heat of the pyre. An object with no intentionally applied tin-rich layer would probably undergo an annealing treatment when situated near the pyre (section 9.2.4). Coring could be induced and intergranular corrosion would be seen along the (recrystallized) grain boundaries throughout the bulk, including the surface. The microstructure of a tinned layer is different from that of the bulk and consequently will react differently to the application of heat (Fig. 9.8). It shows that excess tin can still be present after tinning and even after heating. At the moment it is not possible to distinguish between simple dip tinning and cassiterite reduction as the

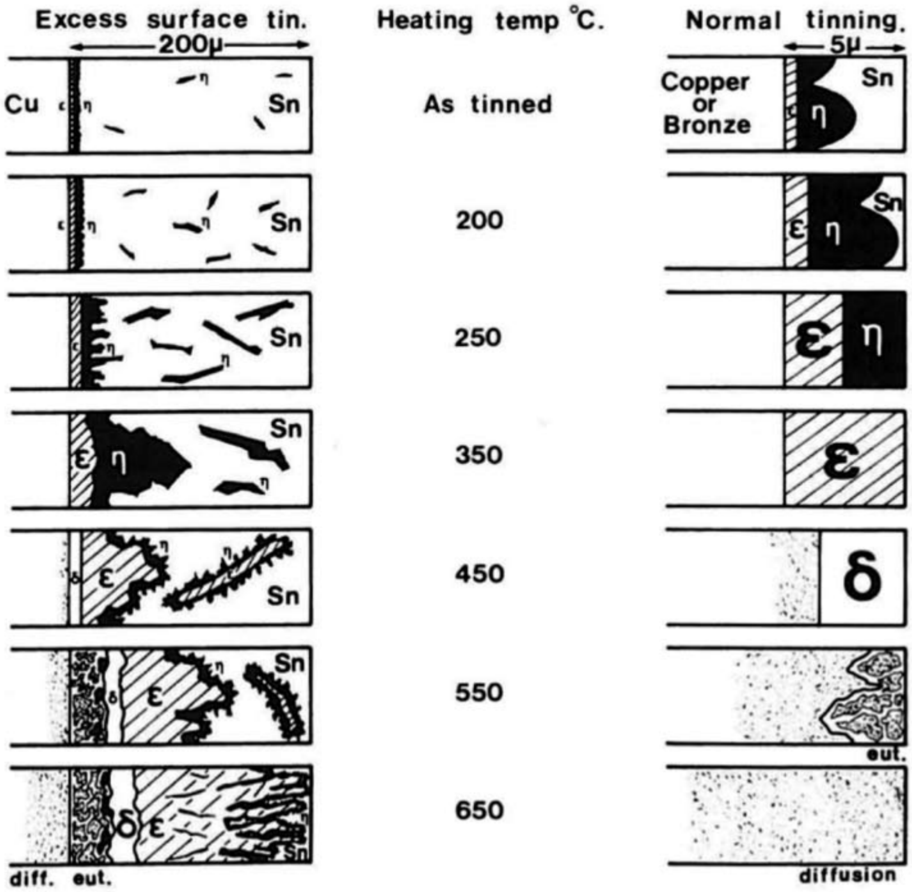


Fig. 9.8 Summary diagram of tinned structures with simple dipping after heating. Figure after Meeks 1986, fig. 8.

used method, since the phases ε, δ, and η have not been identified. It is unclear, however, why this tin-rich layer has supposedly not oxidized to SnO_2, while the rest of the microstructure of the stud seems to be corroded. A similar question is also posed in section 9.2.2, where the occurrence of curly malachite is discussed. It seems likely that external factors have had a large influence on the oxidation process. Not only the pyre or the organic support material, but also parameters like the CO_2-concentration and the pH of the soil are important to investigate as well (section 9.6). It is for example known that the more CO_2 is present in the surrounding soil, the more likely it is that malachite and tenorite will form as main copper corrosion products (Tylecote 1979).

If the bronzes were tinned intentionally, the silvery layer would cover the entire stud. If a leg broke off during use, the cross-section would show a layered structure. A 40 µm thick white layer was seen on several fractured surfaces. However, studs were found on which the fractured surface also shows white areas in its centre. Inside the cross-section of the leg (Fig. 9.5), optically white grains are also present. At the moment it is not possible to determine what their origin is, since SEM(-EDS) analyses did not directly show a microstructural or compositional correlation of these grains with the tin-rich layer shown in figure 9.6 (see section 9.6 for future research).

In conclusion, the white tin-rich layer seen on several studs was probably formed as a result of tinning, and locally possibly corroded to SnO_2. The other coloured areas are also corrosion products formed while the object was in the ground. Sometimes it is so extensive that the bulk of the bronze was oxidized as well, thereby obscuring the original microstructural features.

9.2.6 One batch of bronze?

The results from the previous sections show that the coloured features found on the studs are mostly the result of corrosion processes. But what does this reveal about the underlying bronze? This section tries to establish whether the studs were all made from the same batch of bronze, because this may provide insight into whether the studs were made at the same time in the same workshop. In order to achieve this, optical characterization of the intact studs from the study sample and XRF measurements were performed on 56 stud fragments (section 9.1.2).

The variations in shape of the studs and colour of the bronzes are quite large (chapter 7), but no clear correlation between these two features was found. For example, there are completely white studs that have bent legs, but there are also dark brown studs that have folded legs. Elemental analyses did not indicate such a correlation either, and no coherence between composition and spatial distribution in the mound was found. All the samples from the study set contain more or less the same set of elements: copper, tin, lead, arsenic, nickel, antimony, and iron. As argued above, iron is mainly present due to adherence and/or local mineralization of iron-containing soil products. The presence of the corrosion products malachite, tenorite, cuprite, and cassiterite explains the appearance of large peaks of copper and tin detected with XRF. As mentioned before, large peak ratio differences are not uncommon in corroded bronze. In some cases, not all of the above-mentioned elements were measured with XRF. In this case, XRF probed mostly corrosion products and only a small part of the original metal matrix. These observations lead to the hypothesis that the studs measured with XRF could well be made from the same base alloy.

Considering the small dimensional variation of the studs, it is highly likely that they were even made in the same workshop with the same tools. However, for this to be conclusive, the chemical composition of the uncorroded bulk of the studs (if present) should be determined.

9.2.7 Organic residue?

It is highly likely that the studs found in Zevenbergen have been affixed to a support. One can think of textile, leather, or wood (chapters 7 and 11). Possible organic residue was encountered in the hollow head of two large studs during restoration (Fig. 9.9). Several analytical techniques were employed to determine the type of material left. The microscopic study and SEM analyses performed on two large studs are discussed here.

The plant fibre in the stud from level 1, square B/2 (Fig. 9.9) can reasonably be seen as rather recent. It is not burned, as would probably be the case if the stud had been situated near the pyre. Also, it has grown through the brownish soil products and the green products that are assumed to be the result of corrosion (section 9.2.2). Therefore, the fibre probably does not belong to the support material of the stud.

SEM analyses allowed a more detailed view, as can be seen in figure 9.10. Semi-quantitative measurements with SEM-EDS of the composition were performed as well to provide a guide to the type of material present. However, from this elemental composition alone it is not possible to discern between, for example, wool and wood. For this differentiation, DT-MS can be used (chapter 11). The hollow space inside the head of the studs seemed to be completely filled with organic material. It is therefore assumed that the elements measured with SEM do not originate from the bronze beneath it.

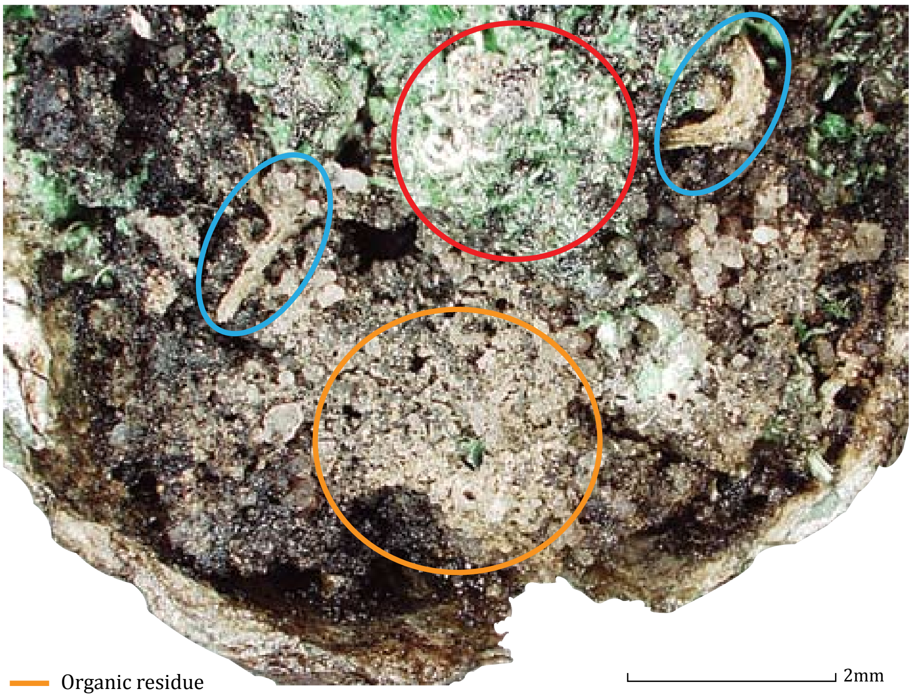


Fig. 9.9 (right) Optical micrographs of the (location of) possible organic residue, plant fibre, and curly malachite in a stud from V 173A, level 1, square B/2. Figure by J. Nienhuis/J. van Donkersgoed.

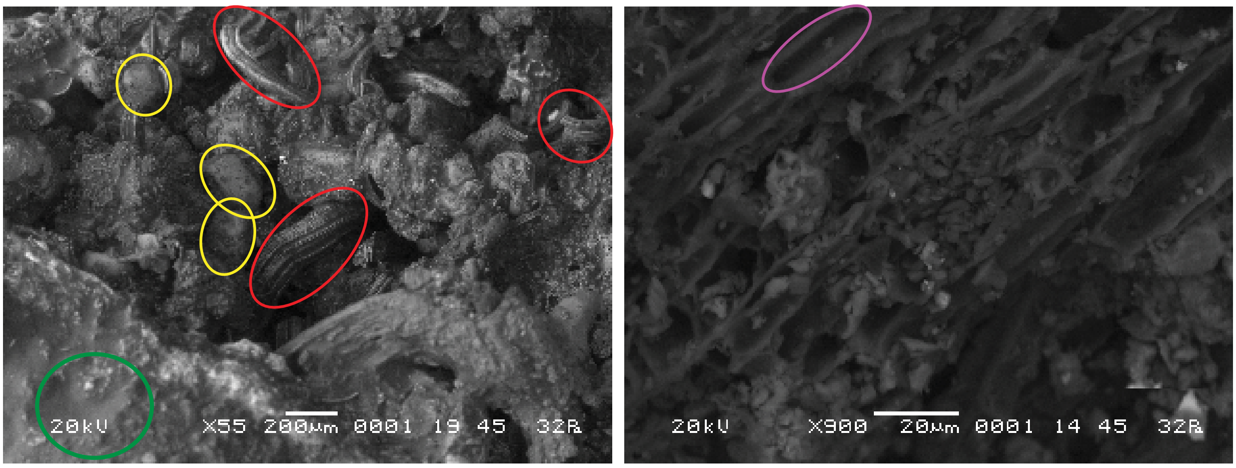


Fig. 9.10 Details of the organic residues, electron micrographs. (left) Sand grains, cyanoacrylate, and copper-rich products in the stud from V 173A, level 1, square B/2. (right) Layered, cellular structures in the stud from V 173A, level 3, square B/2. Figure by J. Nienhuis/J. van Donkersgoed.

The two large studs seem to possess different features, although similarities were observed as well. On both samples, sand grains could be identified, as well as layered cellular structures (best visible on the stud from level 3, square B/2; Fig. 9.10). These structures were in some cases visible under a microscope as well and appear black. The black colour indicates that they are likely small pieces of charcoal, which were also found in this part of the burial mound itself (chapter 5). Since the cellular structured pieces are embedded in other soil products and seem to have a random orientation, it is assumed that they do not form a constituent of the support material of the studs.

The semi-quantitative measurements of the organic material showed that the two studs contain the same elements in the hollow space inside the head. Their concentrations differ, which is mostly due to the measurement positions, which were spots with varying amounts of sand grains, charcoal, and corrosion product. It is assumed that mostly soil products were measured. Strontium, zirconium, silicon, and aluminium point to the presence of clay and/or sand grains, while carbon, calcium, and phosphorus seem to originate from ashes, charcoal or uncharred organic remains. This is in agreement with the charcoal and sand grains that were found in mound 7. Iron was also identified, which probably originates from the slightly shiny black component in the hollow heads of both bronzes as seen under a microscope. The appearance is that of magnetite (Fe_3O_4) and it is assumed that dissolved iron from the soil has precipitated on particles in the inside of the stud, in the form of magnetite.

Under standard conditions in poor (*i.e.* pure quartz) and dry soils, this mineral will not necessarily form. This indicates that locally different (*i.e.* reducing) conditions were present in the environment of burial mound 7, where the formation of magnetite consequently took place.

9.2.8 Conclusion on colours and corrosion

In summary, several colours were found on the bronze studs from the study sample and measured with several techniques. Brown areas are combinations of bronze, corrosion (mainly tenorite, CuO), and soil products. Green patches with two different morphologies were seen as well. The grain-like shape is predominant and is identified as the corrosion product malachite ($Cu_2(CO_3)(OH)_2$). On only two studs a definite curly shape was found, and this special type of supposedly malachite is assumed not to be a direct pseudomorph of support material of the studs. However, its presence seems to be related to the former presence of organic remains. Red particles were observed and these are most likely a copper corrosion product (cuprite, Cu_2O) formed during the burial time of the studs. A substantial number of studs display a white appearance, and a cross-section of a stud leg revealed that it is positioned as a layer with acicular, tin-rich crystals around a corroded bulk structure. It is hypothesized that the bronze studs once were tinned intentionally, giving them a silvery appearance. Possibly due to complicated corrosion processes, this layer turned white. So it seems that all coloured features seen today are the result of products formed while the studs were in the soil of mound 7.

9.3 Reconstructing how the mound 7 studs were made

This section discusses the most probable production process of the bronze studs, thereby answering the second research question. First, some theoretical considerations regarding the production of studs are discussed (section 9.3.1). These were used to reconstruct the most plausible production process. Using this process several studs were made, as described in section 9.3.2.

9.3.1 Forming bronze

There are two basic ways to manufacture bronze objects that were in use during the Iron Age (Scott 1991): casting or forging (hot and/or cold), a combination also being possible. Casting yields a fully shaped artefact, where finishing mostly consists of only removing flashes and seams either by cold-working or polishing. A mould is required to define the shape of the object. However, casting of very small objects with thin walls (less than 1 mm) is not easy and very labour-intensive. Cold-working of bronze is very well possible, but with large dimension changes, the material needs to be heat-treated in order to prevent embrittlement. Thinner but less intricate objects compared to casting can be shaped in this way, and thin sheets from which shapes can be cut are readily formed with working.

The differences between these two ways of shaping objects can be identified on an object in several ways. The least invasive research is looking on a macro-scale at the presence of visible traces of the processing steps, like polishing and working. One can also zoom in on the metal and look at the microstructure: the assembly of micro-scale crystals and inclusions in a material, with characteristic features like grain dimensions, morphology, and phase composition. This structure is the result of steps of the production process. Consequently, by studying the microstructure of the bronze studs from Zevenbergen, this process can be reconstructed. However, cross-sections need to be made, which means undesirable destructive research.

In the case of the bronze studs from mound 7 in Zevenbergen, casting of the objects seems unlikely because it is way more complicated and time consuming than necessary. A mould of sand can be made, but since the mould cannot be reused, several hundreds of them would need to be formed. Lost-wax casting can also be used, but a complex system of casting channels is required. Also, a new mould needs to be produced for every single (batch of) object(s). That is not the case with a bronze bi-valve mould. However, making a bronze mould in the first place would take a lot of effort. This would be considerably easier using clay, which can be shaped into a mould by using a model of a stud. Re-use of the mould is not possible because the clay material has to be broken off after casting to retrieve the bronze object. However, once a stud model is made, a mould containing several tens of shapes can be made.

Hallstatt period studs found in burial places with a slightly different shape and/or composition have been found in Germany, and several production methods are described by Koch (1999) and Raub (2002). These authors suggest that first a parallelogram is cut out of gold or silver "foil" (ca. 300 μm thick) with a stone knife. A U-shaped punch is used to bend the shape, and the result is a U-shaped stud with pointy legs with a facetted side of around 30°. Rounded sides are found as well, and it is believed that this is the result of finishing after cutting. To produce semispherical studs, a punch with a semispherical head is used. Another initial shape can be used for bronze or gold-silver alloy foil with a thickness less than 80 μm. A spherical disc is punched from the foil and bent directly around a leather strap. Consequently, the entire stack of metal with leather is punched to yield a semispherical shape. For all shapes, mass production originating from one workshop is assumed as they are all (practically) the same size.

In the present research, the assumption is made that the studs have been produced using several working methods, partly conform the observations of Koch and Raub. This hypothesis will be elaborated on in the next section, where an actual reconstruction experiment of the stud production from Zevenbergen is described in order to determine in an easy, non-destructive way whether forging could indeed have been used to produce the objects.

9.3.2 Reconstruction of stud production

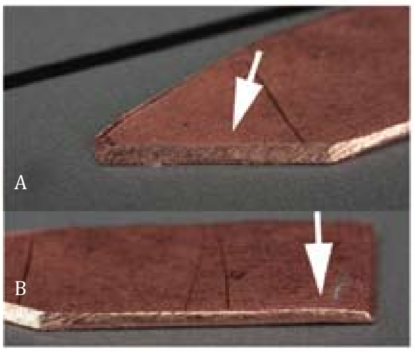
For this reconstruction, modern materials and tools were used, but in such a way that they have ancient counterparts. The sequence of steps is schematically displayed in figure 9.11. The reconstruction started with a thin (~0.7 mm) sheet of nearly pure copper. A sheet with such a small thickness could be created in the Iron Age by repeated hammering (and annealing) of a cast ingot, preferably cast in a flat shape. The outline of the unfolded stud was cut out and flattened with a

How to make a stud in four steps

1 Cut a template from a thin sheet of bronze.

1A Pointy legs; 2B Parallellogram.

2 Finish the rough edges.

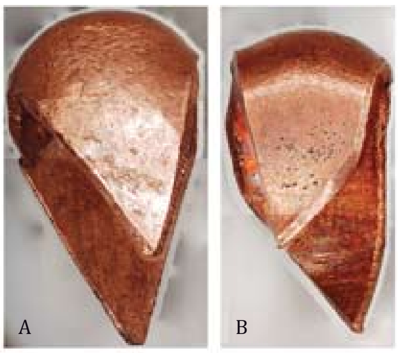


2A Facetted legs; 2B Rounded middle.

3 Place the punch on the template, above a preformed hole, and hit it.

3A The outline of a stud starts to form.

4 Straighten the legs and yield the final shape by hammering the stud around the punch.



4A Pointy legs; 4B Parallelogram.

Fig. 9.11 Possible production process of the bronze studs from Zevenbergen (by T. Beentjes). Figure by J. Peters/J. van Donkersgoed.

hammer. The set found in Zevenbergen mainly shows a variation in the size and model of the legs (chapter 7), which is taken as a starting point for the initial template. It is assumed that this variation originates from the use of different forms in the first step of the production process. Not only pointy legs can be cut, also parallelograms (Fig. 9.1 and 9.11). By aligning the templates before cutting, economic material use is obtained. The (anti-)parallel models will yield a stud that is more stable when it is placed on the surface it needs to be driven into. Some legs seen in the sample set are facetted, other legs and the sides of the semispherical head have a more rounded outline. This is too pronounced to be the result of cutting tools alone, or of corrosion processes. It seems likely that rough edges were finished to facilitate handling, but also for aesthetic reasons. Polishing the studs, especially the visible parts, will smooth the surface and create a lush appearance. A plausible reason to facet legs is that this enhances the driving of the object into a solid substrate. Therefore, step two in this reconstruction was to facet the legs, and to make a round edge alongside the head using a fine file (Fig. 9.11, 2).

Everything is now ready to transform the flat shape into a three-dimensional object. A vital tool in this final step is a punch with a rounded (or spherical) head, its size determining the inner diameter of the head of the stud. A metallic punch seems to possess the right hardness to deform the copper sheet, even though wood is an option as well. It was used to preform a hollow shape in the substrate material, on which the flat model was positioned. When this material is too soft (for example wood), a hollow side-view of the head is obtained. Removing the finished stud can also cause some trouble. A material with a higher resistance to deformation will prevent this problem and will yield a straight head side-view, which is the most seen configuration in the Zevenbergen set. In the reconstruction, the centre part of the template was positioned above a preformed depression in a lead slab (Fig. 9.11, 3). Repeated controlled punching will define the rounded head. When the object is removed from the substrate material, the legs will not be positioned in a 90° angle (Fig. 9.11, 3a). Therefore, a last step is needed (Fig. 9.11, 4): the stud was placed on top of the punch and hammered in shape to straighten the legs.

Once finished, the stud was gently driven into a piece of wood with a flat steel hammer. This resulted in visible flattening of the semispherical head. This is not seen on the studs from Zevenbergen, so either a hollow metallic punch was used to avoid flattening, or more likely, a hollow wooden punch was used. When the stud is not hit in the centre, it is difficult to align the object perpendicular to the wooden surface, and skewed legs can be seen when the stud is removed from the support material. This suggests that studs with opposite parallel end points of the legs are more stable and suitable for driving the stud into a harder material like wood, for which punching is needed. In leather, pointy legs would be sufficient to insert the stud in a pre-cut strap.

This experiment shows that a nicely finished stud, comparable to those found in the burial mound, can be produced in relatively few steps and with simple tools. The proposed production method explains all dimensional features that are found among the bronzes from Zevenbergen (Fig. 9.11), but does not intend to be the only possible method. The shape of the side of the head is defined by the number of times of hammering with the punch and the sequence is: first a hollow head is formed, then upon hammering a straight side view and further working will result in a spherical side view. When the template is not exactly centred above the preformed depression, a zigzag shape can be seen at the angle between head and legs. The outline of the template is a result of finishing after cutting the initial shape, where either a facet or a rounded outline can be obtained. The difference in the tip shapes of the legs (either pointy or parallel) is created in the cutting stage.

The position of the legs seems to be related to the use. They can be bent inwards or outwards to prevent the points sticking out of the support material. Skewed legs are seen when the stud is not driven in at the centre of the head in the support. Since the studs are all (practically) the same size (chapter 7), it means that they were probably all made using the same production steps and tools, maybe even by the same person. To make the reproduction more realistic, improvements can be made on several points. This could be included in future research and is described in section 9.6.

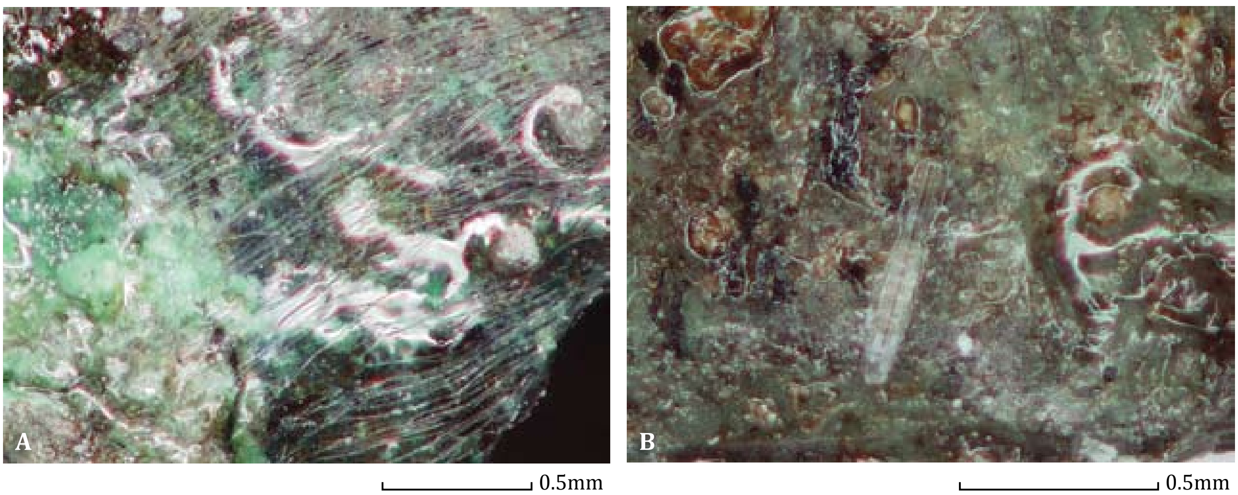
9.4 Conservation of the studs: help or hinder?

This section discusses the advantages and disadvantages of the conservation work done on the Zevenbergen studs, as encountered during the application of several analytical techniques, thereby answering the third research question.

For the bronze finds of Zevenbergen, the value of the conservation of the studs is a little ambiguous. On the one hand, without physical consolidation, this type of research could not have been performed in the first place since the objects would have disintegrated upon touching. However, the conservation materials sometimes hinder obtaining information. The bronzes were treated using several chemicals and coatings (chapter 8). One of the most obvious features is the near plasticized appearance. Not only does this influence the aesthetics, it reflects the light in such a way that a discoloured and less readable image is formed when making optical micrographs. Two clear examples can be seen in figure 9.12. Cyanoacrylate might show shrinkage cracks upon drying, which show at high magnification under a microscope. With the naked eye, this streaked appearance can easily be mistaken for use traces or remains of the production process (cp. Fig. 7.8). Another feature that is ascribed to conservation is the presence of rod-like particles on top of the cyanoacrylate layer (Fig. 9.12, B), which locally obscure or blur the surface view.

Another disadvantage of the use of polymeric coatings was encountered during the analysis by means of Scanning Electron Microscopy. Polymers are non-conductive, which means that the incoming electrons pile up and form a charged area on the sample, disturbing the observation, even in low vacuum. Imaging is also performed with an electron beam and thus repulsion will occur, leading to an opaque picture (Fig. 9.10). This means that where the objects were coated, hardly any details on the surface of the studs can be discerned with SEM. The organic conservation material in principle does not influence the compositional measurements, since the elements present in the coatings are too light for an electron

Fig. 9.12 Optical micrographs of the influence of conservation material on the bronzes. (A) Discolouration and a streaky appearance; (B) crystal-like structure on the surface. Figure by J. Nienhuis/J. van Donkersgoed.



microscope or XRF instrument to detect. However, the elemental analysis of a coated area cannot be related to the structure since the region of interest cannot be mapped or visually checked.

The substances used for consolidation, restoration, and conservation are not crystalline and thus do not form a problem when XRD is carried out. Light elements were also not detected in the set-up used for XRF analysis of the bronze studs, so these materials did not influence the compositional measurements. However, the coating forms an extra layer that the incoming X-rays as well as the resulting photons need to pass through. Consequently, the intensity will be decreased and a lower penetration depth and absolute number of counts will be the effect. However, this effect is very small compared to the total number of counts.

9.5 Conclusion

In this research, several analytical techniques were employed to answer the three research questions introduced in section 9.1.

Firstly, a combination of Optical Microscopy, X-Ray Fluorescence, X-Ray Diffraction, and Scanning Electron Microscopy analyses was used to establish the composition of the studs, and whether this would make identifying the different colours possible. The analyses showed that a layered corrosion structure is present on the bronze studs from Zevenbergen. This complicates the determination of the original alloy, but it could still be deduced that it contains copper with tin as a major alloying element. Minor constituents are lead and arsenic and most probably also nickel and antimony. It is not unlikely that the studs are made from the same base alloy. The brownish-black colour seen on the majority of the studs is a combination of bronze, the corrosion product tenorite, and soil products. A tin-rich surface layer, locally seemingly oxidized to cassiterite, causes the white exterior seen on about a third of the sample set. It is assumed that the objects were tinned intentionally before use to create a silvery appearance. The green regions found on most studs were identified as malachite. Two different morphologies of this corrosion product coexist: grain-like and curly. The curly shape is not regarded as a direct pseudomorph of support material of the studs. Occasionally, red particles were found on the surface and it is highly likely that they can be classified as yet another corrosion product: cuprite. A mechanism for the corrosion process is proposed. The organic residue found in two large studs mainly consists of soil products combined with pieces of charcoal, which are assumed not to have been a part of the support material of the studs.

Secondly, this research attempted to reconstruct how the studs likely were made. Several theoretical ways of producing bronze studs were considered, and a reconstruction of a plausible production process was carried out and described. This revealed that once a thin sheet of bronze is obtained by casting and hot- and/or cold-working, a template in the shape of a (more or less pointy) parallelogram can be cut out. The rough edges are smoothed to a round outline, and some legs are facetted to facilitate driving the stud into its support material. Next, a (probably metallic) punch with a spherical head is used to preform a depression in a block of material with a high resistance to deformation (*e.g.* bronze). The centre part of the template is then positioned above this depression and repeated punching will define the rounded head of the finished stud. Hammering the stud around the punch yields the final shape. Since the bronze studs are all (practically) the same size, they were probably all made using the same production steps and tools, maybe even by the same person.

Lastly, this research considered whether the conservation treatment of the studs influenced the analyses. While performing the various analyses, several observations were done that led to a description of advantages and disadvantages of the use of conservation treatments. The most positive influence is that the current treatment consolidated the fragile bronze studs, so that they can be handled and analyzed. However, disadvantages were encountered as well. The cyanoacrylate coating reflects the light in such a way that a discoloured and blurred image is formed when making optical micrographs. Also, the low conductivity of this polymer complicates the imaging in Scanning Electron Microscopy, and consequently also the positioning of the compositional measurements. Its light components cannot be determined with X-Ray Fluorescence and Scanning Electron Microscopy, so it does not influence element identification on the bronzes. None of the conservation materials used form crystalline structures, so there is no problem in analyzing (corrosion) compounds with X-Ray Diffraction.

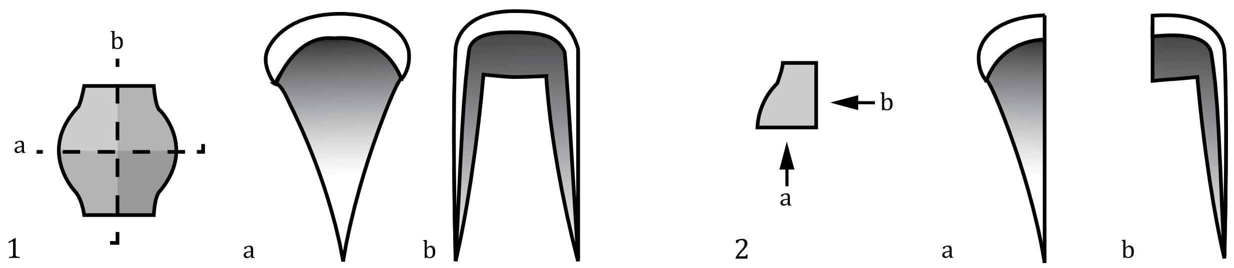
9.6 Possibilities for future research

Even though this research revealed a lot, it also raised more questions. In this section these questions are discussed, as well as the possible ways of answering them.

The chemical composition of the bronze alloy could not be reliably assessed and quantification was difficult due to the presence of corrosion products. More accurate compositional analysis could be done on more cross-sections, also to determine whether tinning-specific phases are present in the outer surface layer. For this, destructive sectioning of several studs would be necessary, and it is optimal if a stud with an uncorroded core is sectioned. X-Ray Fluorescence in combination with Scanning Electron Microscopy allows a view on the average composition of the cross-section and on the microstructure that shows the local distribution of elements and bears traces of the production process. It could then also be deduced whether intermittent recrystallizing had taken place between production steps. A proposal of a sectioning method can be found in figure 9.13. A cut should be made in two perpendicular directions, so that a lengthwise cross-section through the legs and through the head is obtained. Layers in the metallic core and the corrosion layers are then clearly visible and composition gradients can be analyzed as well. Ideally, a section made across the legs would be made as well, where possible traces of faceting could be found. The intact stud would probably have to be embedded into a polymeric resin before sectioning to be able to handle the resulting pieces of bronze.

In order to decide from which studs useful cross-sections could be made, the objects could be integrally analyzed with X-ray photography and micro-tomography. Density differences (between the corrosion products and the metallic core) can be mapped on a (micro-)scale and it is thus, in principle, possible to see whether a bronze core still exists. However, these techniques do not reveal features

Fig. 9.13 Indication of the position of the cross-sections of the studs that could be taken to study the microstructure and corrosion layers. (1) Top view of sectioning of (embedded) sample using a saw along line a and b (side views of consequent cross-section); (2) resulting quarter of a stud with respective side views. Figure by J. van Donkersgoed.



on a micrometre scale, so to closely study the microstructure, cross-sections still have to be used. Also, density measurements using a pycnometer can provide a means of comparing the density of the studs with theoretical values of bronze and tin and copper corrosion products.

The understanding of the corrosion processes that have played a role during the lifetime of the studs is far from complete. The corrosion products need to be characterized more specifically and on more samples using XRD or Raman spectroscopy. It is vital to compare the corrosion structures with a bronze bulk of a stud that has not entirely been corroded. Also, more literature on soil influences can provide more insight into the essential parameters of bronze corrosion. Chemical analysis of the soil in and around mound 7 could be of additional value.

The physical reconstruction of the bronzes can be improved as well. First, if the chemical composition of the base alloy from Zevenbergen could be quantified, a thin sheet with that exact composition and microstructure could be made. This would give insight in the ductility, formability, and hardness of the material. Also, tools of the type used in the Iron Age should be used to reconstruct the production steps, and the possible traces of polishing, filing or scraping, could be studied and checked on the studs from Zevenbergen if the corrosion products do not inhibit a good view.

It is striking to see that the legs of studs that are not intact seem to have consistently fractured just beneath the head. Did they fracture at exactly that spot because of deformation during the production process or the attachment of the stud to leather, wood or textile, or is this only related to corrosion processes? Finite element simulation of the forces that are applied to the studs during these various stages may be very helpful in determining a possible cause for fracture.

9.7 Acknowledgements

This research involved a lot of different disciplines and therefore many people have used their expertise in reaching the presented results. First of all, the authors want to thank Pieter ter Keurs and Luc Amkreutz (Dutch National Museum of Antiquities) for making the bronze studs from mound 7 available and for their pleasant cooperation. Because of enormous care during conservation, Ton Lupak and Jo Kempkens of Restaura were able to save the studs from deterioration and provide us with information about their restoration. We want to thank Hans Huisman, Bertil van Os, and Joke Nientker (Cultural Heritage Agency of the Netherlands) for their help with analysis of organic materials. Also from the Cultural Heritage Agency is Luc Megens, who helped with XRF and XRD and the resulting data. The reconstruction of the studs could not have been possible without the practical help of Tonny Beentjes of the University of Amsterdam and the thought experiments of Harry Fokkens (Leiden University). The authors acknowledge Luc Robbiola (Université de Toulouse, France) for sharing ideas about curly malachite and Arjan Mol (Delft University of Technology) with his help on corrosion problems. The Centre of Art and Archaeological Sciences, the Netherlands is thanked for their interest and financial support.

Chapter 10

The local vegetation at the time of the construction of the Oss-Zevenbergen mounds 7 and 6

Corrie Bakels and Yvonne Achterkamp
with a contribution by Pauline van Rijn

10.1 Introduction

This chapter deals with the vegetation of the terrain on which the barrows were built. The vegetation at the time of construction, the origin of the sods used, and the vegetational history of the area are considered. As this vegetation proves to have been heath, the way of maintaining this manmade vegetation is discussed as well.

It is far from plausible that present day vegetation resembles the vegetation of the past. Therefore, vanished vegetations need to be reconstructed. The best and most frequently used relics of this past are pollen grains. It is common practice to retrieve these grains from waterlogged deposits such as peats or sediments at the bottom of lakes, but dry-land sources exist as well. Buried soils, for instance, can contain pollen. Deposition of sediment on top of the original surface cuts off all matter, pollen included, from air with its oxygen, and under such conditions pollen will be preserved. Erecting barrows is precisely such an action and results in the preservation of the pollen released by the local and more distant vegetation present at that time. When the construction material consists of sods, as is the case at Oss-Zevenbergen, those sods have old surfaces too, which are buried as well. Their pollen content provides insight into the vegetation of the area where the sods were cut.

A second source of pollen connected with barrows is the infill of the dry ditches that sometimes surround these structures. The humic matter accumulating on the bottom contains pollen, which has a chance to survive. Material derived from the slope of the barrow and the near surroundings of the ditch will settle on top of this initial fill, adding pollen from (slightly) younger vegetations and, theoretically, older pollen eroded out of the construction material. And especially if the ditch is shallow, pollen from an even younger vegetation will travel down through tiny channels left by rootlets and burrowing fauna. Such pollen contaminates the original record, but if the infill is sampled at the deepest levels of the ditches, the results almost always "make sense". In cases where they could be compared with the ancient surface the results agree, though the results provided by ditches tend to be slightly younger than those provided by the surfaces (Waterbolk 1954).

In the case of mound 7 we could use information based on the analysis of an old surface and of sods. This kind of material was not available for mound 6, where we had to rely on a single sample from the ditch.

10.1.1 Research goals

Though the main goal of our research was to provide a reconstruction of the vegetation present at the time of the construction of the barrows, we also tried to get insight into the vegetation which preceded this time. In one way or another, podzolic soils seem to preserve a record of the past (Havinga 1962; Munaut 1967; van Mourik 1985). How this is possible is still not completely clear, but this is not the place to dwell on the several explanations put forward (Doorenbosch *in prep*.). Anyhow, we looked at pollen in the soil horizons under mound 7.

10.1.2 Sampling technique

The ancient soil was sampled by driving a tin into profile 106.4 of mound 7. Samples of old surface material and surfaces of sods in mound 7 as well as the infill of the mound 6 ditch were taken directly out of the profiles and collected in plastic bags. The sandy material was processed in the archaeobotanical laboratory of the Faculty of Archaeology, Leiden University, following the common procedure of treatment with KOH, HCl (hardly necessary), specific gravity separation (s.g. 2.0), and acetolysis. Before the treatment, tablets with a known quantity of *Lycopodium* spores were added (method Stockmarr). Pollen and spores were identified and counted by Y. Achterkamp using the works by Beug (2004), Faegri *et al.* (1989), Punt *et al.* (1976-2003), and van Geel (2001). The pollen sum used to present the results is the sum proposed by van Zeist (1967), *i.e.* a tree pollen sum minus birch (*Betula*). The reason to omit birch is that birch is a fast pioneer on open areas and behaves almost as a locally growing herb. The work on mound 7 was part of Y. Achterkamp's Research Master thesis.

10.2 Mound 7

10.2.1 The old surface

Mound 7 was built on top of a low, sandy hill of Pleistocene origin. During the Neolithic some wind-blown sand was added to the northern side of the hill, enlarging it slightly (4.5.11). The excavation revealed that parts of the surface were stripped of its topsoil before the actual building started (see chapter 4). It was therefore difficult to find a location with the old surface preserved, but one was found on top of the Holocene wind-blown sand mentioned above. The section in question contained a second ancient soil under the pre-barrow one, which is interpreted as the old surface of the Pleistocene hill. Each of the two soils was sampled by driving a tin into the section wall. Only the upper soil revealed pollen and the result of the analysis is depicted in the pollen diagram of figure 10.1.

The uppermost spectrum reflects the vegetation present at the time of barrow-building. The local vegetation appears to have been extremely poor in species. Heather (*Calluna*) was almost the only plant growing there. Even grasses (*Poaceae*) are nearly absent. The hill was covered by a heather vegetation. Most of the other kinds of pollen belong to trees. Pine (*Pinus*) is interpreted as a long distance element, blown in from hundreds of kilometres away. Alder (*Alnus*) is supposed to have thrived in marshy parts of the landscape, which are indeed present nearby. One of those is situated at 450 m distance. The other trees, oak (*Quercus*), lime (*Tilia*), elm (*Ulmus*), birch (*Betula*), and hazel (*Corylus*) grew on drier terrain. As mentioned before, birch can grow and flower profusely in a heath, but the percentages of birch are so low that the Oss-Zevenbergen birch presumably did not grow on the location where the barrow was built. Hazel pollen is dominant. Some of this dominance may be due to the fact that hazel sheds large numbers of pollen,

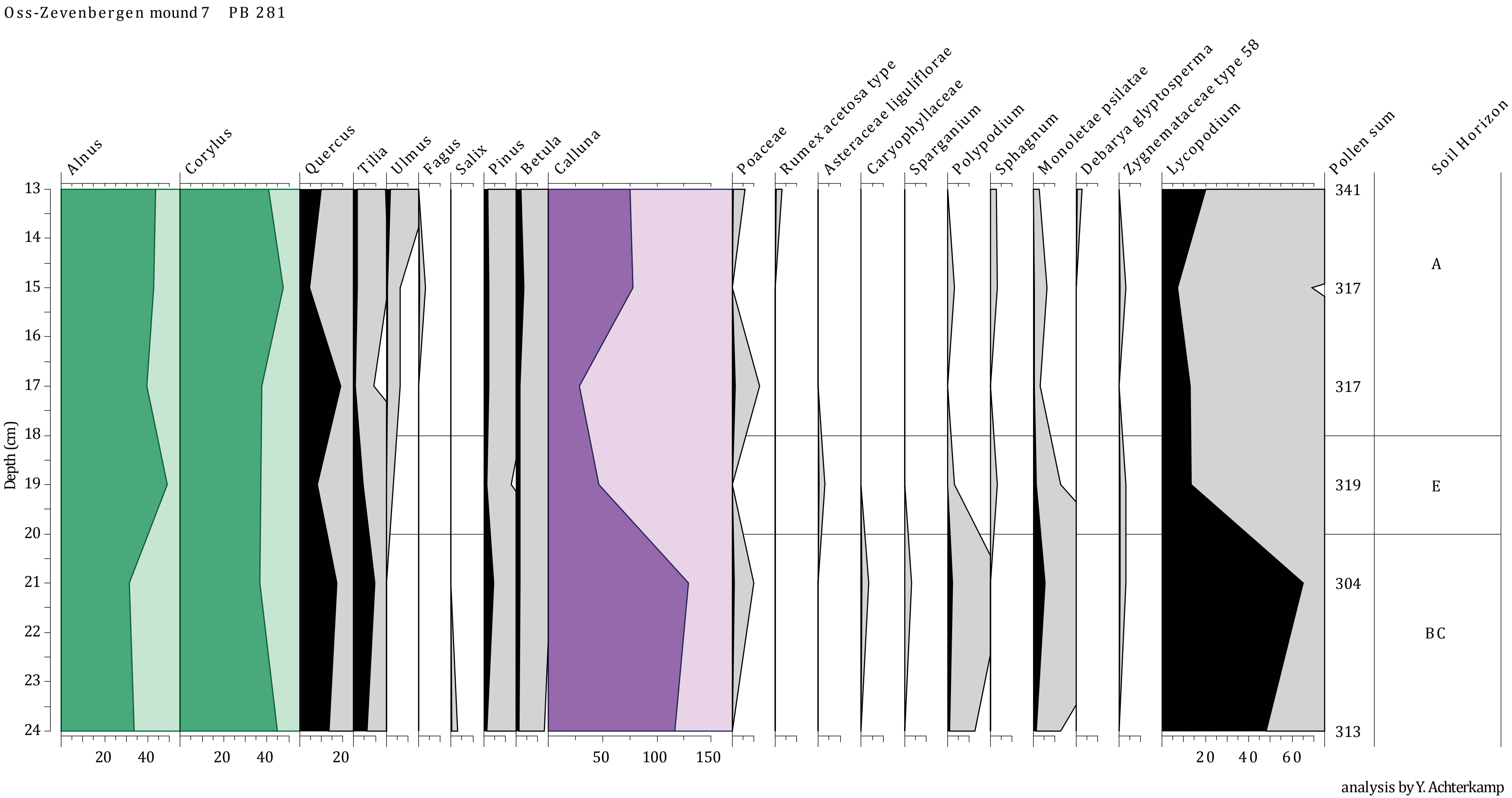


Fig. 10.1 Pollen diagram from the soil beneath mound 7; exaggeration of curves (grey), 10x. Figure by C. Bakels/Y. Achterkamp/J. van Donkersgoed.

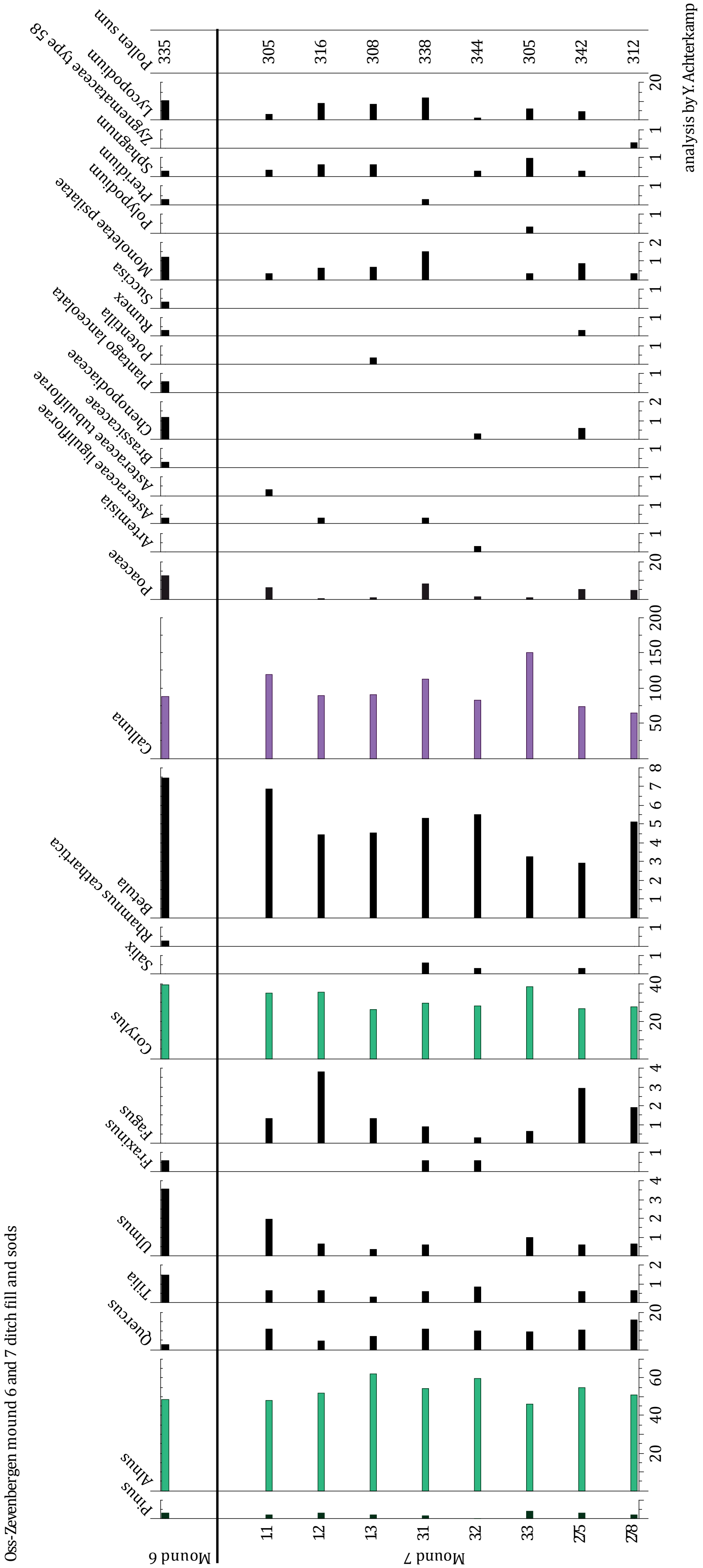


Fig. 10.2 Pollen spectra from mounds 6 (ditch fill) and 7 (original surfaces of sods). Numbers on the Y-axis refer to samples. Figure by C. Bakels/Y. Achterkamp/J. van Donkersgoed.

which are transported, moreover, easily by wind. Hazel is always overrepresented in records. Nevertheless, it may be assumed that hazel played an important role in the local vegetation, which implies the presence of much forest edge. Either the forest edge was nearby, or the original forest was split up in a kind of forest "islands" surrounded by hazel shrub.

10.2.2 The sods

In contrast to the old surface of the hill, the sods with which the barrow was constructed were readily visible. The original surfaces of eight of them were sampled for pollen analysis. The sampled sods came from various places within the barrow.

The spectra offer the same picture as the old surface of the hill (Fig. 10.2). Heather is the dominant plant. The share of other herbs, such as grasses, is unimportant. Pine and fir (*Picea*) are long distance components. The share of alder is slightly higher than in the old surface and three kinds of tree are added to the list: ash (*Fraxinus*), beech (*Fagus*), and willow (*Salix*). Birch is as scarce as in the old surface sample. The find of three extra tree species must be attributed to mere chance. Only beech was noted in all sods, the other two are present only twice, respectively thrice. The result implies that the sods were cut out of the same kind of vegetation as was originally present on the place where the barrow was constructed. Presumably they were cut in the near vicinity and, in view of the slightly higher alder percentages, somewhat nearer the wet depressions with alder. As the highest points were covered with barrows and related structures this would have been the obvious place to go.

10.3 The local heath

Calluna heath is not a natural vegetation (Fig. 10.3), at least not in the region we are dealing with. Its origin is anthropogenic. Heath will revert into forest when not maintained. There are four ways to maintain heath: sod cutting, burning, mowing, and grazing. With sod cutting heather plants are removed in their entirety. Regeneration of the vegetation through sprouting of remaining stems is made impossible and has to rely on any seeds left in the soil. How long the process takes depends on the thickness of the sods. When thin sods are cut, containing

Fig. 10.3 Calluna heath. Figure by C. Bakels.

only the A horizon of the soil and as little of the E horizon as possible, regeneration is relatively quick, taking only 5 to 8 years. This kind of sod was traditionally cut to be used as fuel or to serve as bedding in stables (Pape 1970). But when sods were meant as construction material, and needed to provide as much volume as possible, they were cut deep and included not only the A, but also the E horizon. In that case it may take up to 40 years before the heath returns in such a way that it is suitable for sod cutting again (Stoutjesdijk 1953, 25).

Burning heather destroys the upper parts of the plants. How fast they recover depends on the intensity of burning and the age of the plants. The vegetative regeneration of *Calluna* plants older than 5 years is already limited. Therefore, burning has to be done regularly.

Mowing is only effective when done on a large scale. As a matter of fact, mowing is a kind of grazing: it keeps plants down. The difference is that grazing is more selective in its action. Animals tend to pick out what they like best. Cattle are less selective than sheep (Gimingham 1972, 171). They nip off the younger heather plants and green leafy branches of the older ones, thus preventing flowering (Burny 1999, 45-47). Sheep prefer tree saplings, grasses, and other herbs to the evergreen heather. As a result heath grazed by sheep is poor in species. Also, in a heath grazed by sheep, heather plants flower more abundantly than in a heath grazed by cattle. And as other plants, such as grasses, are prevented from flowering, pollen shed by *Calluna* is going to dominate the pollen assemblage in the original surface (see also Groenman-van Waateringe 1993).

When considering the heath at Oss-Zevenbergen, we are confronted with three facts. We know that thick sods were cut, including the E horizon, and that according to the pollen assemblage the heath was poor in species, at least flowering species. Charcoal particles were observed during the preparation of the pollen slides, but not in large quantities. Earlier micromorphological studies, connected with other Oss-Zevenbergen barrows, mention the presence of charcoal almost everywhere (Exaltus 2009, 187-194), suggesting a regular burning of matter. Therefore, sod cutting, grazing, and burning come into the picture as the agents which kept the heath from returning to forest.

Raising mound 7 to the volume observed during excavations would have required cutting sods from a large area of heath land. To estimate the size of the area, the following calculation is used. The assumption is that the barrow is a segment of a sphere. The volume of which can be calculated using the following formula:

$$Vss = 1/6 \cdot \pi \cdot h \cdot (3r^2+1h^2)$$

Here, Vss = Volume spherical segment; h = height of the barrow, and r = radius of the barrow. For h, a minimum height of 0.80 m is taken. The diameter of the sod-built mound is around 22.8 m (*cf.* Fig. 4.13 to 4.15), so the radius is 11.4 m. If sod thickness is estimated at 20 cm (Fig. 4.25), the area would be 815 m^2.[84]

Other barrows were made in the same way. These actions alone would have maintained the heath, especially as the bared parts of the land would have taken some 40 years to recover. Seen in this light it may be questioned whether all these sods were cut next to each other. If so, the space laid bare would have easily become a source of wind-blown sand. In the case of mound 7 we also have to consider a large and more or less contemporaneous barrow, mound 3. Some wind-blown sand was mentioned above as addition to the hill on which mound 7 is situated, but this sand was deposited before the first Oss-Zevenbergen barrows were laid out. More wind-blown sand was found in the southeastern part of the

84 In the original calculation (in the RMA thesis of Achterkamp) this was much higher because it was assumed that the entire mound was sod-covered (D. = 40 m).

terrain. Pollen analysis suggests a Late Subboreal to Early Subatlantic age (De Kort 2009), which tallies with the construction of the large mounds 3 and 7. But it is quite possible that the builders of the barrows were aware of this effect, and cut the sods in, for instance, strips alternating with heather left standing. As it is, the heath where the sods were cut must have been very uniform in structure, and not very young and not too old, otherwise it would have been impossible to produce sods with the roughly uniform appearance and uniform size (ca. 75 cm^2, see chapter 4) observed during excavation. This part of the heath represents a specific stage in the rejuvenation of the heath.

Grazing by livestock, and especially sheep, may have kept the heath at this stage, low and compact. Whether this was intentional or a by-product of the general agricultural practice of the time remains unknown. The third possibility, regular burning, perhaps has to be rejected. The structures on the terrain included not only barrows, but also wooden structures such as rows of posts and circles of posts around the monuments. It would not have been easy to avoid damage to them when open fire was used to keep the heather down. The charcoal observed in the soil samples may have had another source.

10.3.1 The history of the local heath

As explained before, the soil horizons beneath the old surface may reveal something of the history of the vegetation. The pollen diagram presented in figure 10.1 depicts the results of such an analysis. The alder (*Alnus*) pollen percentages are lowest in the B horizon, lower than the percentages of hazel (*Corylus*). Lime (*Tilia*) and heather (*Calluna*) percentages are highest in the B horizon. Lime almost disappears in the higher zones while heather percentages show a dip in the E horizon, to rise again in the A horizon. The curve of the (added) *Lycopodium* spores indicates that the total pollen concentration was lower in the B horizon (sample volume and number of tablets added are the same everywhere). Part of the result may, therefore, be ascribed to the disappearance of pollen types prone to selective corrosion. De Kort found the same under mound 2: higher values for lime and heather in the B horizon, and suggested the same conclusion (De Kort 2009, 160). But alder and hazel are as sturdy and as resistant as lime and heather. It may be that the trends represent something real. And a comparable pollen diagram obtained from the soil under mound 8 does not suggest much influence of selective corrosion (De Kort 2009, 163).

Therefore the mound 7 diagram may tentatively be read as follows: a heath was present during the entire period covered by the pollen diagram; the dip in the heather curve may be ascribed to an intensification of grazing by livestock including cattle; the part of the history provided by the A horizon may be interpreted as a lowering of grazing pressure.

According to the scheme devised by De Kort for Oss-Zevenbergen, the spectra obtained from the B horizon are to be dated to the Early Bronze Age. The pollen assemblage found in the E horizon falls within the Middle Bronze Age or Late Bronze Age. Those counted for the A horizon, with beech (*Fagus*) present, and heather percentages higher than those found in the previous phases and reaching ca. 70%, place them in the Late Bronze Age or Early Iron Age; only the ratio alder percentage – hazel percentage does not quite agree with this date, alder being too low (De Kort 2009, 165). The dating of the uppermost spectra agrees with the date of the construction of the barrow: Early Iron Age.

If this tale is true it implies that at least from the Early Bronze Age onwards the local terrain was covered by heath. As the earliest barrow at Oss-Zevenbergen, mound 8, was built already on heath and the soil beneath showed the presence of still earlier heath, a long history for the heath at Oss-Zevenbergen looks quite plausible. It may even date back to Neolithic times. Perhaps it is even not too far-fetched to connect the Neolithic wind-blown sand on the side of the mound 7 hill with the stripping of a heath.

10.4 The local forest

The presence of a heath is well established, but, as mentioned before, the pollen record points towards the existence of woodland as well. Starting from pollen spectra alone it is almost impossible to reconstruct the extent of a heath in relation to the extent of woodland (De Kort 2002). We can safely assume that the entire terrain with barrows was heath land, because heath was present at the base of each of these monuments. The high percentage of hazel suggests long stretches of forest edge, but the circumference of the Oss-Zevenbergen heath would already have presented such a long fringe. We simply do not know whether the heath was an island in a forest or whether the landscape was more open with patches of original forest remaining. We know only that a comparable heath was present at 250 m distance, connected with the Oss-Vorstengraf barrow (De Kort 2002), which suggests that patches of heath may have been alternated with patches of forest.

10.4.1 Wood from mounds 7 and 3

Some additional information may be derived from the charcoal found in the central grave of mound 7 (see section 5.3). Larger and smaller fragments of charcoal, 144 pieces altogether, were studied by P. van Rijn of Biax *Consult*. Their position did not suggest any recognizable structure or larger implement such as a yoke. Most of the charcoal, 94% in weight, was identified as oak (*Quercus*), derived from both trunks and branches. One piece of trunk, 23 cm wide, numbered over 70 narrow annual rings, but oak fragments with wider rings were also present. Unfortunately the wood does not provide information on how the trees looked or whether they came from old stands or not.

The second species found was ash (*Fraxinus excelsior*). One piece represents gnarled wood and was interpreted as burr wood. On account of its form and dimensions it may be the remnant of a wooden bowl, although this could not be proven. Burr wood is not common at all, and is much sought after as raw material for making beautifully marked bowls from. The growth of burrs is a sign of stress, often triggered by parasitic fungi.

A fragment of willow (*Salix*) represents the third species found.

Taken all together, the charcoal from mound 7 gives no clue regarding the structure of the forest present in the Oss-Zevenbergen landscape. In this respect the charcoal found in the contemporaneous mound 3 has more to tell. It represents a board ca. 2.5 m long, 80 cm wide and 2 cm thick. Analysis by C. Vermeeren of Biax *Consult* showed that the board was radially split from an oak trunk. It misses bark and sapwood, while the rays run parallel indicating that the board represents wood far away from the centre of the trunk. The original trunk must have had a diameter of at least 2 m. Counting and extrapolating its annual year rings revealed an age of over 180 years. This oak tree was very large and very old (van Wijk *et al.* 2009, 92-93). Such an old tree with a trunk straight and long enough to allow the splitting of thin boards can only have grown in a wood with a closed canopy. Otherwise it would have had branches nearer to the ground and therefore a trunk not suitable for making thin boards. Such woods, or remnants of such woods, must have been present in the surroundings of the barrows. Nevertheless, one tree cannot tell us much about a landscape, and therefore we remain in the dark about the heath-woodland ratio.

10.5 Mound 6

As written before, of mound 6 only the ditch which surrounded the monument was left to be sampled. Suitable material could be obtained at only one location, because most of the traces of this ditch turned out to be discolourations connected with soil formation under the fill of the actual ditch. The pollen spectrum is depicted in figure 10.2 where it can be compared directly with the spectra from mound 7. The result is rather similar, but the mound 6 ditch displays some more lime (*Tilia*), elm (*Ulmus*), and herbs other than heather (*Calluna*), and lacks beech (*Fagus*). The assemblage looks slightly older than the assemblages belonging to mound 7. Following the suggestions offered by De Kort (De Kort 2009, 165), the infill at the bottom of the ditch should be dated Middle to Late Bronze Age. This fits in with the C14-date of charcoal found in the ditch: 930-731 cal BC (78%, other possibility 692-544 cal BC 17.2%; section 3.4.2).

Taking into account that the age of a ditch infill is always slightly younger than the monument, the date of the long barrow 6 should be set at Middle to early Late Bronze Age.

10.6 Conclusion

Mounds 6 and 7 were built on a heath with a long history. It is impossible to tell how large this heath was, but it certainly did not extend to the horizon. Stands of trees obstructed a truly wide view. Whether the heath was an island in a sea of woodland or part of a segmented landscape composed of patches of heath alternating with patches of trees is not clear on the basis of the Oss-Zevenbergen pollen data. In wetter parts alder carr could be found, while on the higher grounds deciduous forest was present, dominated by oak with hazel shrub in the edge.

The building materials for the barrows were heather sods cut locally, and it is quite possible that the heath owed its existence partly to this activity. Sod cutting is also held responsible for the patches of wind-blown sand detected on the terrain. But cutting sods cannot have been the only, or even the main reason, for the longevity of the heath. Maintenance by burning was presumably impractical because of the many wooden structures erected near the barrows. The remaining possibility is grazing by livestock. Cattle and sheep prevent the returning of tree growth. As heather was obviously less hampered in flowering and shedding pollen than other herbs, sheep may have been the most important. The diagram obtained from the soil under mound 7 suggests that cattle had a higher share in the livestock during the earlier part of the Bronze Age and that sheep gained importance later on. During the Late Bronze Age/Early Iron Age grazing pressure seems to have weakened, but it never disappeared. We cannot avoid the picture that livestock was regularly driven into the terrain with the barrows to graze there. The Oss-Zevenbergen heath had apparently two functions: to provide space for important dead and to provide pasture for livestock, quite possible ordinary livestock. But it is, of course, possible that such terrains were grazed ritually, by special animals, but this we shall never know.

Chapter 11

An attempt to chemically identify the organic material inside the bronze studs from mound 7 using DT-MS

T.F.M. Oudemans[85]

11.1 Introduction

As set out before, the excavation of mound 7 at Oss-Zevenbergen yielded a large number of bronze studs. As discussed in chapter 7, there are reasons to believe that these studs were originally affixed as decoration to an organic component. Several archaeological parallels show studs affixed to wooden or leather matrixes (section 7.5.3), and the way the studs were corroded in neat rows shows that were still affixed to something when deposited. An interesting observation is that several of the bronze studs contained some residual material that may have been of organic origin. It was therefore decided to submit the residues obtained from the inside of several studs to a chemical characterization using Direct Temperature-resolved Mass Spectrometry (DT-MS), in an attempt to identify the original organic material.

11.1.1 Organic residue analysis

The goal of this organic residue analysis is the detection of organic compounds preserved in residues adhering to the inside of the metal studs. However, the detection of original compounds indicating the nature of the matrix to which the studs were affixed faces two major challenges. Firstly, the temperatures reached during the cremation process are estimated to have risen to at least 320 °C (see also section 12.3). The thermal degradation of the organic compounds therefore is assumed to be relatively high. Secondly, post-excavation conservation methods to protect the metal studs from further oxidation and degradation may severely hinder the detection of original organic compounds in the residues. The conservation techniques involved the application of the corrosion inhibitor 1H-benzotriazole (BTA) and, when needed, an additional application of methyl-2-cyanoacrylate (or mercrylate) to the outside surface of the metal studs (Kempkens/Lupak 2011, *pers. comm.*; see also chapter 8). Although these materials were carefully applied to the outside surface of the studs only, it is unknown how much of the liquid may also have been absorbed by the residues adhering to the insides of the studs.

85 Kenaz Consult, Pücklerstr. 44, 10997 Berlin, Germany, www.kenaz.nl.

11.1.2 Available study sample

The material available for sampling consisted of four studs of two different sizes. The two larger studs came from V 173C (level 0, square C/3) and the residues they contained were numbered OZ01 and OZ02. The two smaller studs came from V 173A (level 2 and 3, square A/3,) and the residues they contained were numbered OZ03 and OZ04 respectively. Each stud had been packaged in a plastic bag. The selected residues are described in table 11.1.

Sample no.	Find no.	Layer	Square	Stud type
OZ01	V 173C	0	C3	Large
OZ02	V 173C	0	C3	Large
OZ03	V 173A	2	A3	Small
OZ04	V 173A	3	A3	Small

Table 11.1 Samples from Oss-Zevenbergen with description of the residues.

11.2 Methodology

11.2.1 Chemical residue analysis using DT-MS

Direct Temperature-resolved Mass Spectrometry (DT-MS) is a powerful tool in the analysis of very small samples of complex solid organic materials. Within archaeological research DT-MS techniques have primarily been applied in the study of complex organic solids such as carbonised grains and pulses (Braadbaart 2004), pitches and tars (Kubiak-Martens/Oudemans 2007; Oudemans 2009; van Gijn/Boon 2006), food remains (Oudemans 2006; 2007; 2008), and other coatings on ceramics (Boon 2006). DT-MS makes it possible to characterize the complete composition of the material, including both volatile, extractable compounds and non-extractable solid compounds. The chemical DT-MS "fingerprint" gives information about a broad range of compounds such as lipids, waxes, terpenoids, polycyclic aromatic compounds (PAC's), oligosaccharides, small peptides and protein fragments, and a broad range of thermally stable more or less condensed, polymeric components (commonly called "charred", or "carbonised").

The DT-MS technique basically employs the mass spectrometer (MS) to monitor the organic compounds released from a solid sample as the temperature is increased. A very small amount of sample is applied to a platinum/rhodium (Pt/Rh, 9:1) filament. After inserting the filament into the DT-MS, the sample is heated by sending an electrical current through the filament. In the ionisations chamber of the MS, the compounds are ionised and their masses measured in the MS detector. The DT-MS measurement shows all masses of all organic compounds released as a function of time (and thus of temperature – as the temperature is increased during the measurement). The DT-MS measurement lasts roughly two minutes (or 120 scans) and usually consists of two phases:

– *The desorption-phase* (roughly scan 10-20). At lower temperatures many extractable, volatile compounds such as lipids (free fatty acids, acylglycerols, waxes, and sterols), aromatic compounds (polycyclic aromatic compounds), and resinous compounds (diterpenoids and triterpenoids) are released from the solid sample through evaporation or desorption. Some contaminants such as phthalate-esters and sulphur-containing compounds are also released during this phase.

– *The pyrolysis-phase* (roughly scan 20-50). As the temperature increases, non-volatile compounds are released through thermal fragmentation (breaking of larger molecules into smaller, indicative fragments). Important compounds that are released in this phase are small peptides and amino acids. Polymeric compounds of more condensed nature are also released at this stage. Due to the controlled circumstances of the chamber (absence of oxygen and controlled temperature increase), the fragments are found in a predictable way indicative of the chemical structure of the original compounds.

11.2.2 Sample treatment and analysis

Prior to DT-MS analysis a small amount of sample (50 µg) was pulverized and homogenized in a small glass mortar and pestle after adding 10-50 µl of ethanol. A small amount (2-5 µl) of the sample suspension was applied to the filament of the mass spectrometer, dried (in vacuum), and subsequently analyzed.

The mass spectrometer used was a JEOL SX102-102A tandem mass spectrometer. The following MS conditions were applied: 16 eV electron ionisation voltage, 8kV acceleration voltage, a scanning range of mass m/z 20 – 1000, and a scanning speed of 1 scan per second. Data were collected with the use of a JMA7000 data system and appropriate software.

11.3 Results

11.3.1 Chemical characteristics of the residues

The results of the DT-MS analyses are presented in mass spectra (Fig. 11.2 and 11.3) and summarized in table 11.2. Because the four residues presented similar chemical profiles only one sample (OZ01) is discussed in greater detail and seen as representing all four samples (Tab. 11.2).

11.3.2 OZ01 (DT-MS-code 29juni2011049) stud from V 173 C

The DT-MS *Total Ion Current* (TIC) of sample OZ01 shows a signal of high intensity (14.10^6), indicating a sample with high organic content (Fig. 11.1). The TIC shows one distinct peak on the border between the evaporation-area of volatile, non-chemically bound components and the pyrolysis phase with cross-linked or condensed compounds (scan 20). The peak is medium broad and appears at a high evaporation temperature or low pyrolysis temperature (scan 20), indicating a medium complex polymer-fraction with a low degree of condensation. An extra peak can be seen decreasing over the first 10 scans indicating the evaporation of a small amount of volatile organic material from the sample (this material is not part of the original prehistoric sample).

The spectrum of the volatile material (Fig. 11.2) in area A (scan 1-5) shows indicators for a mixture of two compounds in low mass range up to m/z 150: 1-H-benzotrialzole and ethyl-2-cyanoacrylate. Markers for 1-H-benzotrialzole (BTA) are the most prominent in the spectrum. The molecular ion (m/z 119) is the mass with the highest intensity throughout the entire measurement. Major fragment ions (m/z 91, 64) and smaller fragment-ions are also present in lower intensities (m/z 52, 41, 38). The presence of ethyl-2-cyanoacrylate (ECA) is proven by the presence of a small amount of the molecular ion (m/z 125). Decarboxylation of the polymer results in intense fragment-ions m/z 98 and m/z 80 for the loss of

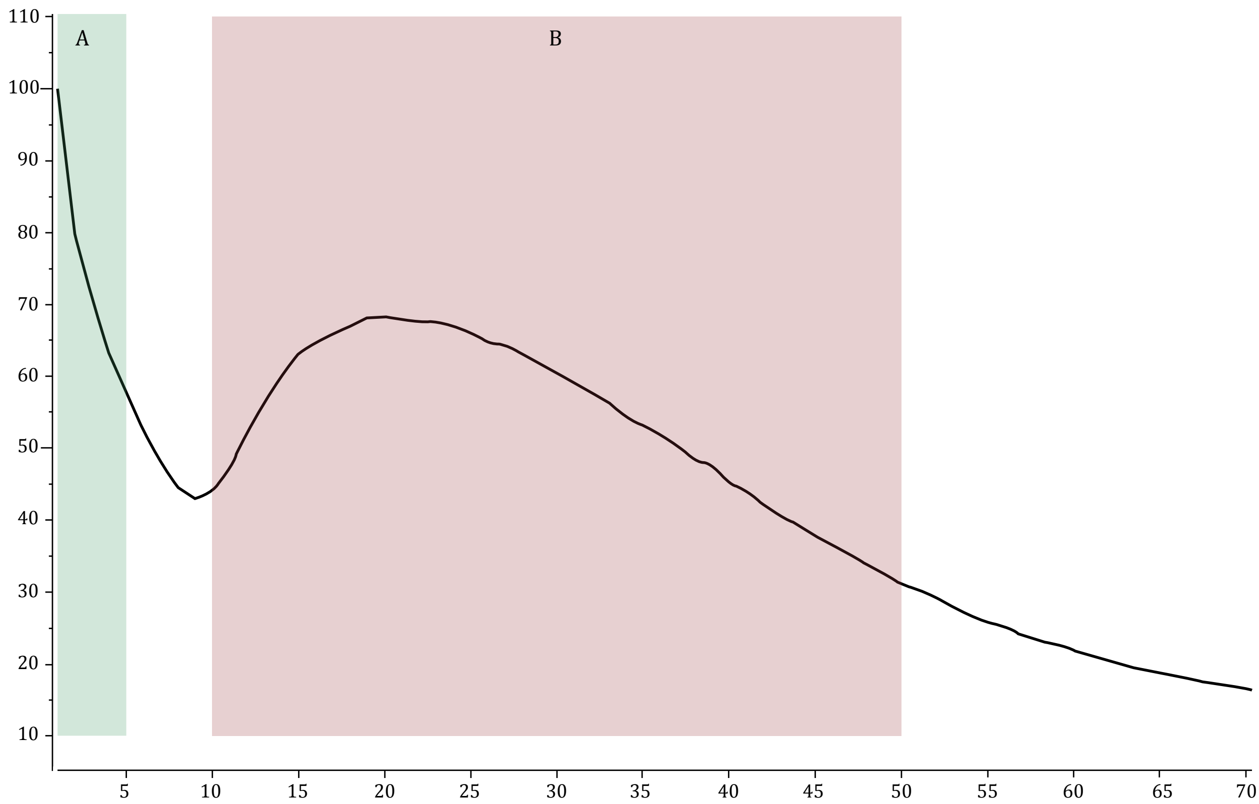


Fig. 11.1 The TIC of residue OZ01 shows two major peaks: one in the early evaporation-phase (area A, scan 1-5) and one in the evaporation-phase and pyrolysis-phase combined (area B, scan 10-50). Figure by T. Oudemans/J. van Donkersgoed.

CO (m/z 28) and CO_2 (m/z 44) respectively.[86] No other indicators are present in reliable intensities except for some traces of plasticizers such as phthalates (m/z 149, 167) originating from the plastic packaging materials.

The mass spectrum (Fig. 11.3) for the pyrolysis-phase in area B (scan 10-50) shows only markers for 1-H-benzotrialzole (BTA). The molecular ion (m/z 119) is visible in combination with fragment ions (m/z 91, 64) and smaller fragment-ions (m/z 52, 41, 38). Markers for ethyl-2-cyanoacrylate (ECA) are no longer visible. In general it can be said that 1-H-benzotrialzole (BTA) markers were released during the entire measurements and ethyl-2-cyanoacrylate (ECA) was only released during evaporation. No markers for original prehistoric materials were detected.

11.4 Discussion and Conclusion

11.4.1 Origin of the residues from the studs from mound 7

A summary of the most significant chemical compound classes detected in the residues is given in table 11.2. The residues from the studs all show markers for ethyl-2-cyanoacrylate (ECA) and the residues from two large studs (OZ01 and OZ02) also contained markers for 1-H-benzotriazole. Three of the four samples also showed some indicators for contaminating compounds originating from plasticizers such as phthalates, originating from the plastic bags in which the studs were packaged.

86 See also the NIST Chemistry WebBook (http://webbook.nist.gov/chemistry).

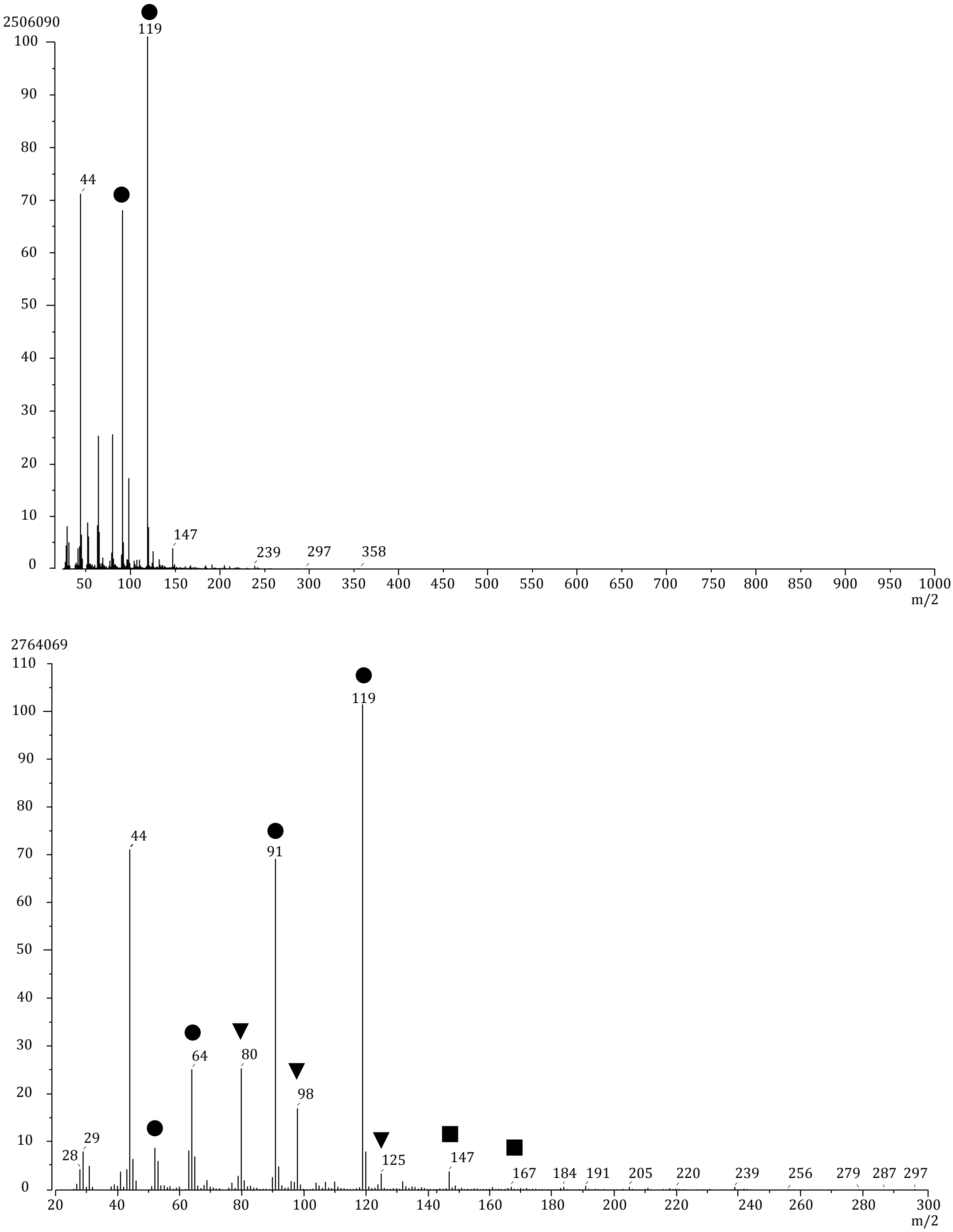


Fig. 11.2 DT-MS spectra of a volatile material in residue OZ01 area A (scan 1-5): indicative markers are represented with symbols: ECA = ethyl-2-cyanoacrylate (triangles); BTA = 1H-benzotrialzole (circles); Ph = Phthalates (squares). Figure by T. Oudemans/J. van Donkersgoed.

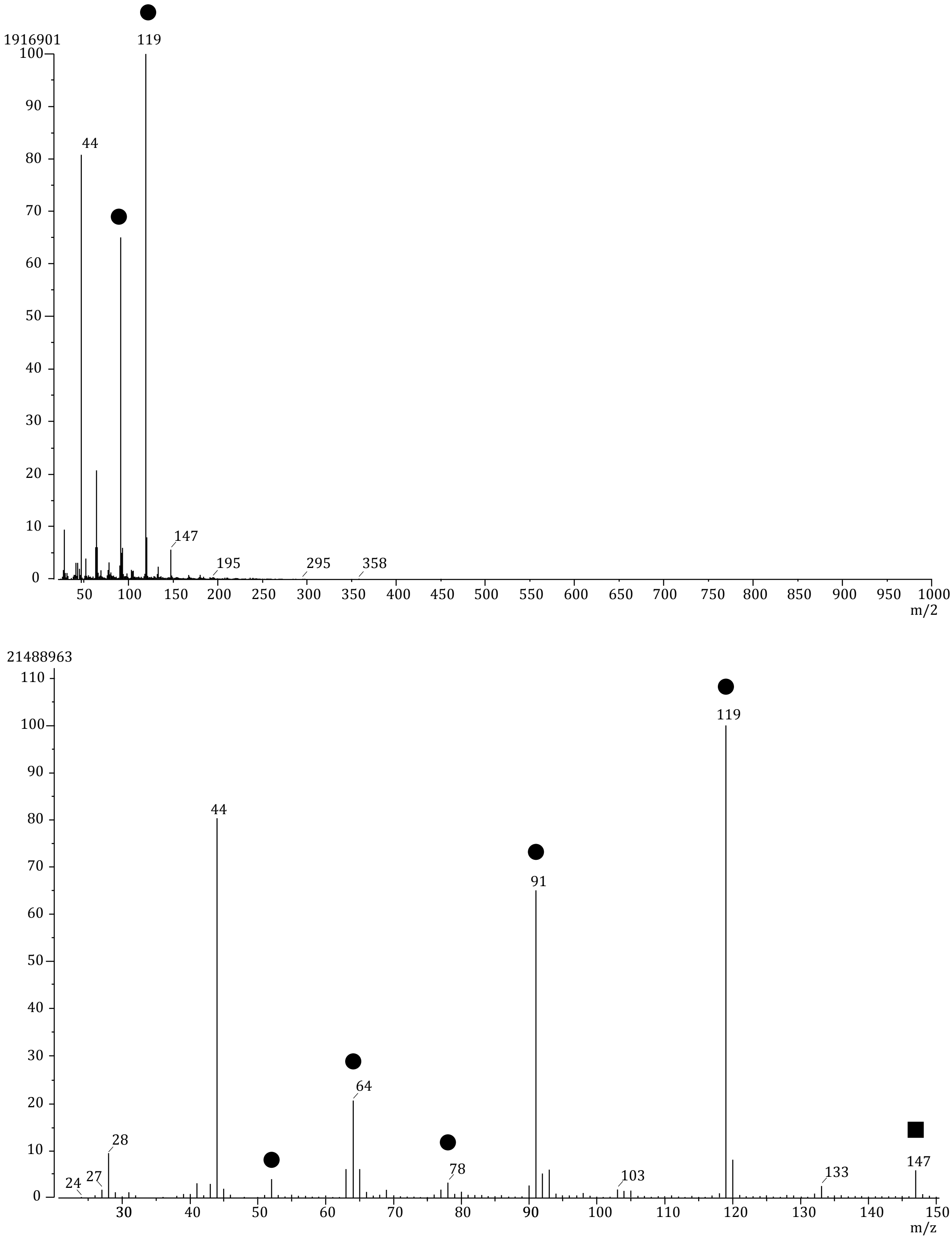


Fig. 11.3 DT-MS spectra of residue OZ01 the later evaporation-phase and pyrolysis-phase combined (area B, scan 10 - 50): indicative markers are indicated with symbols: BTA = 1H-benzotrialzole (circles); Ph = Phthalates (squares). Figure by T. Oudemans/J. van Donkersgoed.

	DT-MS Code 29juni 2011	Tot Int [10^6]	TIC	Lipids	Proteins	Polysaccharides	Benzotriazole (m/z 119)	Cyanoacrylate (m/z 80)	Contamination	Original Material
OZ01	049	H (14)	19	-	+/-	-	+++	++	Phth	unknown
OZ02	051	H (59)	15	-	-	-	+++	++	-	unknown
OZ03	052	H (14)	-	-	-	-	-	+++	Phth	unknown
OZ04	053	H (9)	15	-	-	-	-	+++	Phth	unknown

Table 11.2 DT-MS results of residues from Oss-Zevenbergen. Depicted is the absence or presence of DT-MS indicators for various classes of chemical compounds. Tot Int = Total intensity of the TIC signal during the analysis; Cont = Contamination such as Phth for Phthalates. (The intensity of the Total Ion Current (TIC) is a measure for the amount of organic material present in the sample. H (= high) is defined as a minimum of 80x the intensity of a blank measurement; M (= medium) is 30 through 80 x the value of a blank measurement; M/L (= medium/low) is 20 through 30 x the value; and L (= low) is less then 20 x the intensity of a blank measurement).

11.4.2 Conclusion

The chemical evidence obtained using DT-MS clearly shows that no organic compounds originating from prehistoric materials could be detected. Although all residues were firmly adhered to the interior of the studs, mass spectrometric research showed that the residues were not representative of the original material to which the studs were attached during prehistoric times. As was predicted after consulting the restoration experts, the residues showed a combination of indicators for an artificial polymer and an anti-corrosive material used for post-excavation restoration and preservation of the metal studs.

It needs to be noted that the restorers aim to prevent contamination of the original prehistoric organics was unsuccessful. The selective application of preservatives only to the exterior of the objects did not prevent the impregnation of the interior with the modern preservatives. This is probably partly due to the very small size of the objects and partly due to the high viscosity of the preservatives. In the future it may be more productive to simply save some samples in a freezer without any conservation treatment at all. These could then be analyzed without interference from the preservatives. The valuable information this type of research could provide outweighs the loss of a few of the many hundreds of studs.

Chapter 12

Analysis of the cremated bone from mound 7

Liesbeth Smits

Fig. 12.1 Content of urn divided into seven layers. Cremation remains were present in layer 3 to 6 (cf. Fig. 6.2). Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

12.1 Introduction

This chapter describes the results of the analysis of the cremated remains found in the urn from Oss-Zevenbergen mound 7 (chapter 4). The content of the urn was collected and separated in seven layers (Fig. 12.1). The content was examined per layer to determine any possible collection and deposition method. In addition to this, this chapter will discuss whether the few cremated bones found amongst the pyre were “left behind” after burning and belong to the deceased whose bones were buried in the urn.

12.2 Methods

The composition of bone changes during cremation. The high temperatures that are reached cause the organic components to disappear until only the inorganic components remain (hydroxyapatite). Cremation also changes the crystalline structure of the hydroxyapatite mineral. Bone breaks, shrinks, and deforms during the cremation process, and is usually fragmented afterwards. This can make determination of cremated bone rather difficult. In cases where a substantial amount of sizable bones are left, the minimum number of individuals (MNI), sex and age determinations may still be possible. Research of cremated bone involves describing the bones themselves (burning and fragmentation degree), as well as describing physical-anthropological characteristics such as determination of the bone fragments, age, sex, body length, MNI, and pathological conditions.

12.2.1 Bone description

Various depositional and post-depositional processes influence the degree of fragmentation.

The bones are very vulnerable when still hot following the cremation process. If they cool down quickly (for example when the fire is quenched with water), the bones become fragile and will break easily when collected, causing further fragmentation. Bones can also break during excavation. Bone recovered from an intact urn is therefore usually less fragmented than bone that was deposited in pits without containers. In table 12.1 the degrees of fragmentation used for the description of fragmentation of cremated bones are given (following Wahl 1982).

Bone colour and shrinkage patterns on the burned bone fragments are some of the factors by which the burning degree can be determined. Both the duration of and the temperatures reached during the burning process influence the colour. The different stages of burning that are distinguished are listed in table 12.2 (following Wahl 1982).

Stage	Description	Size of fragment (cm)
1	Very small	<1.5
2	Small	1.6-2.5
3	Medium	2.5-3.5
4	Large	3.6-4.5
5	Very large	>4.6

Table 12.1 Degrees of fragmentation of cremated bone (Wahl 1982).

Colour	Degree of burning	Temperature (°C)
Light brown	0 = unburned	-
Dark brown	1 = hardly burned	<275
Black	2 = poorly burned	275-450
Grey	3 = averagely burned	450-650
Chalk white	4 = well burned	650-800
"Old" white	5 = very well burned	>800

Table 12.2 Degrees of burning (Wahl 1982).

12.2.2 Description of physical anthropological characteristics

The cremated remains of the various skeletal categories are weighed. The fragmentation and burning degrees are determined per skeletal category. The maximum fragment size is rounded off to ½ a cm. When cremation remains weigh less than 1 g this is rounded up to 1 g. Determination is usually particularly done through the study of bone fragments larger than 10 mm. Smaller fragments generally do not allow proper identification (Maat 1985). The fraction that is smaller than 10 mm, however, is examined for relevant bone fragments useable for determining age, sex, and the MNI. Suitable bone fragments are collected using a sieve with a 1 mm mesh. This has proven to be the best way to collect small bone fragments that are important for determination of the MNI, such as auditory ossicles. The remainder is labelled residue. In some cases the residue is very contaminated and an

Skeletal part	Description
Neurocranium	Cranial vault
Viscerocranium	Facial part of the skull
Axial	Scapulae, vertebrae, ribs, pelvis, sacrum, clavicles
Diaphyseal extremities	Shaft fragments of the long bones (extremities)
Epiphyseal extremities	Joints of the arms and legs

Table 12.3 Groups of skeletal parts used for the inventory of bone fragments.

estimation is made of the weight of the cremation remains present in the residue. The groupings used for the inventory of bone fragments are listed in table 12.3. Specific bones might be present in the sample, but be so fragmented that they are too small for determination. This implies that when specific bones have not been recognized, it does not necessarily mean that they are not represented.

Sex

For sex determination the criteria of the Workshop of European Anthropologists (WEA; 1980) are used, whereby the determination is based on a number of characteristics of skull and pelvis that differ in form and size between the sexes. A value that varies from -2, -1, 0, +1, to +2 is attributed to each feature. Negative values represent female and positive values male manifestations of sexual traits on the pelvis and skull. The weighed average of all examined features determines the outcome. Only the bones of adults can be determined in this manner. Another indication for sex is the robustness of the post-cranial skeleton (Schutkowski/Hummel 1987). When a question mark follows the sex determination (for example "m?") this indicates "very likely male". Two question marks indicate the sex determination is unsure.

Age

For age determination of cremated bone the same conventions apply as for unburned human remains. The age of non-adults is estimated mainly by the epiphyseal fusion (WEA 1980) and the eruption patterns of teeth and molars (Ubelaker 1984). For adults standard methods are used based on degeneration features of the skull, the pelvis, and the trabecular structure of the femur and humerus, also known as the complex method as described by the WEA (1980). Apart from this method, other features are used as well, because when dealing with incomplete and fragmented remains all the observable indicators for the age at death of an individual are important.

The obliteration of the internal and external sutures is scored (respectively according to Acsádi/Nemeskeri 1970, also WEA 1980; Rösing 1977). The pelvis can give indications based on the morphology of the symphysis and the auricular surface (respectively WEA 1980; Lovejoy *et al.* 1985). The trabecular structure of the proximal femur and humerus can give a rough indication for the age at death as well (WEA 1980). However, because of the incomplete nature of the cremated remains, only a few criteria can be used, resulting in mostly a rough estimate of the age at death.

Estimation of the stature

For estimating stature the size of the proximal joints of the humerus, the radius, and the femur are used (Rösing 1977).

Pathology

Research into diseases and accidents on cremated individuals is very hard due to the incompleteness of the material. A description of the symptoms is usually the most that can be achieved.

12.3 Results and conclusion

The weight of the cremation remains is 640 g. The bone fragments are very well burned (stage 5) and the maximum fragment size varies between 2 and 10 cm. Per layer different skeletal categories are represented (Tab. 12.4). No specific sequencing was observed in the placement of bone fragments in the urn. With regard to the general content of the urn it is striking that very few skull fragments are present (section 4.2). The few cremated bones recovered from the pyre show the same burning degree as those recovered from the urn, but it was impossible to positively determine whether they are from the same individual.

The minimum number of individuals is one. Evaluation of sexually differential morphological characteristics of skull and pelvis indicate the remains are those of a male (Tab. 12.5). The trabecular bone structure of the proximal femur (= phase 1 (dense)) indicates the man was between 23-40 years old when he died. As pathological bone changes were absent there is no information regarding possible diseases or the cause of death. There were no burned animal bones present in the urn.

Layer	Fragments of
Layer 3	Zygomatic bone, temporal bone, parietal bone, mandible, orbit, cervical vertebrae, ribs, femur, tibia, tarsal bone.
Layer 4	Occipital bone, vertebrae, ribs, pelvis, femur, tibia, humerus, tarsal bone
Layer 5	Occipital bone, clavicle, pelvis, femur
Layer 6	Femur

Table 12.4 Types of bone fragments found per layer. Layer 1, 2, and 7 do not contain cremated remains.

Morphological characteristic	Score
Relief nuchal plane	+1 (masculine)
External occipital protuberance	-1 (feminine)
Orbital margin	-1 (feminine)
Preauricular sulcus	+2 (masculine)
Greater sciatic notch	+2 (masculine)

Table 12.5 Evaluation of morphological characteristics.

Skeletal part	Weight (g) Layer 3	Weight (g) Layer 4	Weight (g) Layer 5	Weight (g) Layer 6	Content (+ = observed)	
Neurocranium Fragment size: 4 cm	6	5	2	-	+	Occipital bone
					+	Parietal bone
					+	Temporal bone
						Frontal bone
Viscerocranium Fragment size: 2 cm	3	-	-	-	+	Orbit
					+	Zygomatic bone
						Maxilla
						Mandible
						Teeth/molars
Axial Fragment size: 6 cm	27	20	-	-	+	Vertebrae
					+	Ribs
						Clavicle
					+	Scapula
					+	Pelvis
Diaphysis Fragment size: 10 cm	65	115	75	45	+	Humerus
						Radius
						Ulna
					+	Femur
					+	Tibia
						Fibula
						Finger and toe bones
Epiphysis Fragment size: 4 cm	7	30	40	-	Joints of:	
					+	Hand/arm
					+	Foot/leg
Residue Fragment size: <1 cm	65	75	40	20	Various skeletal elements	
Total (human)	173	245	157	65	Total 640 g	
Animal	-	-	-	-		

Table 12.6 Cremated bone from V 151. Layer 3 through 6 (layer 1, 2, and 7 do not contain cremated remains).

Chapter 13

A secondary burial in mound 7 – a macabre reuse of the Oss-Zevenbergen barrows in the Late Medieval Period

Richard Jansen and Liesbeth Smits[86]

13.1 Introduction

Sometime before the end of the Early Iron Age (ca. 500 BC), the prehistoric barrow landscape Zevenbergen fell into disuse. The mounds and their surroundings show no traces of any use during the following centuries (chapter 15). Eventually, the monumental mounds, once erected for the deceased who were buried here, formed only a remembrance.

In the Middle Ages the barrow group Zevenbergen was located on extensive heath lands between the villages of Oss, Berghem, Schaijk, and Nistelrode. For travellers crossing the heaths the barrow group served as an orientation point. At the end of the Late Medieval and/or Early Modern Period, at least two mounds came into use again. Two barrows (mounds 2 and "our" mound 7) were reused as execution and/or gallows sites and also as burial sites (Meurkens 2007; 2010; van der Linde/Jansen 2009).

This chapter firstly describes the Late Medieval burial found in 2007. The results are then interpreted together with the results of the 2004 excavation and historical sources, thereby shedding light on the reuse and perception of the mounds of Zevenbergen in the Late Medieval/Early Modern period and their place within the Medieval landscape.

13.2 The gallows mound 7?

While deepening one of the transverse sections (profile 1; trench 105; Fig. 4.13) a pit (S 4) was found containing human bones in what seemed to be a disarticulated state (see paragraph 13.2.1). The deep (ca. 1.2 m, measured from the present surface), rectangular pit (width 1.20 m) clearly cut through the original sod body of the mound. Depth, form, and fill are strongly comparable to the Late Medieval burials pits found at the foot of mound 2 (Meurkens 2010; van der Linde/Jansen 2009). In this case the Medieval burial pit lay "in" the eastern half of the mound, close to its centre (Fig. 13.1). The remainder of the burial could not be excavated because only two quadrants of the mound were excavated and the pit lay precisely in one of the transverse sections.

86 Interpretation of features, Medieval context, and historical evidence by first author, skeletal determination by second author.

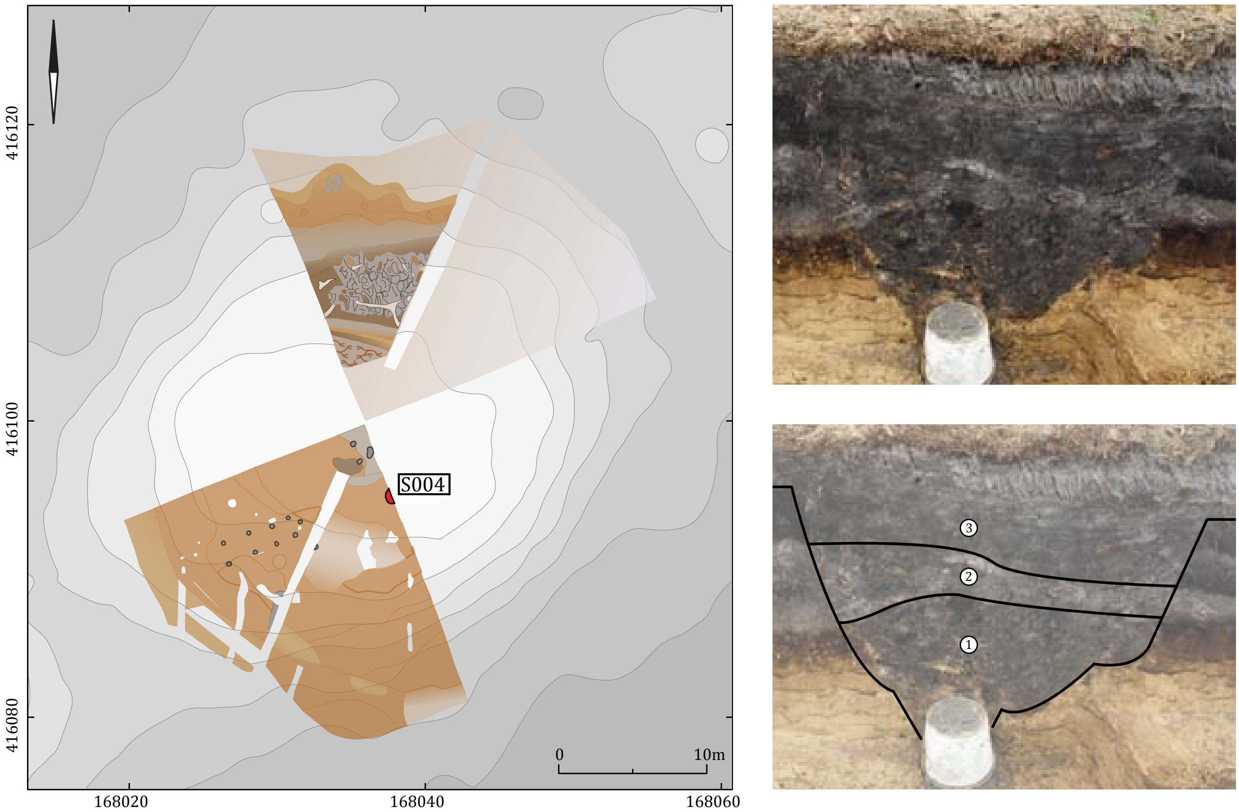


Fig. 13.1 Location of the Late Medieval burial in mound 7 and section of the burial pit S 004. The burial was placed at the bottom of the deep pit after which the pit was refilled entirely. (1) Initial fill of the burial pit; (2) silting up of the remaining pit; (3) more recent fill, possibly in relation to forestry. Figure by Q. Bourgeois/J. van Donkersgoed.

The physical anthropological analysis showed that our observation in the field of a pit with disarticulated bones was incorrect. Only parts of the skull and teeth were found, indicating that we most likely excavated the skull of what was a formal, Late Medieval burial, comparable to those found around mound 2. The bones found in mound 7 were C14-dated to the 15th century AD.[87] The calibrated C14-date of the bones found at the foot of mound 2 lies in the 13th and 14th century AD (Meurkens 2007). The Zevenbergen barrows were therefore used as gallows and burial sites for a considerable length of time.

13.2.1 The skeletal remains

The skeletal remains (V 228 and V 268) are very incomplete and fragmented. Only some parts of the skull and the lower jaw are present (Fig. 13.2). The fragmented bones are poorly preserved, brittle, and very fragile. Based on the sex characteristics of the skull bones and given the robustness of the cheekbone (zygomatic bone; Tab. 13.1) the remains are those of an adult male with a serious dental pathological condition. During his life he lost some of his dental elements.

Sex characteristics of the skull	Weight	Value	W x V
Mastoid process	3	+1	+3
Zygomatic process	3	+2	+4
Zygomatic bone = very robust	2	+2	+4
Supramastoidal crest	2	+2	+4
Sexualization skull = Σ W x V /Σ W = + 1.5	Σ W = 10		Σ W x V = 15

Table 13.1 Sex characteristics of the skull.

87 GrN-41266: 450 ± 35 BP. With 95.4% certainty the calibrated date lies between AD 1410 and 1610 (95.4%).

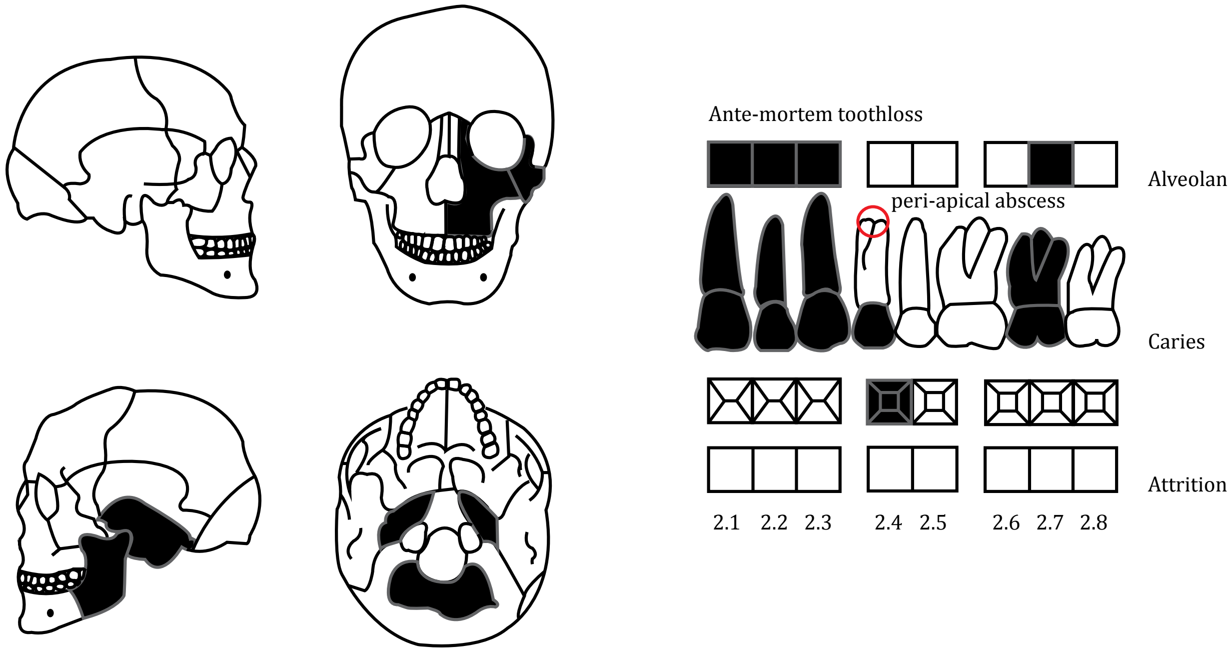


Fig. 13.2 Skull and dental Skull: black is present; dentition: black is absent. Figure by L. Smits/J. van Donkersgoed.

In addition, tooth decay led to an infection around the root apex in the upper jaw (maxilla; Fig. 13.2). To conclude, the age at death could not be determined and there are no signs of the cause of death.

The secondary burial in mound 7 indicates that this mound was, similarly to mound 2, used as a burial site in the Late Medieval Period. Whether there was also a gallows or wheel erected on the mound remains unknown as only half of the mound was excavated.

13.3 Reuse of the Zevenbergen mounds in Late Medieval Period

13.3.1 The gallows on mound 2

Situated at one of the highest points in the natural local landscape, mound 2 seems to be the highest mound (1.20 m) in the Zevenbergen barrow landscape. The multi-period Middle Bronze Age barrow with three post circles as peripheral structures was reused for a burial in the Early Iron Age (van Wijk *et al.* 2009). Roughly two millennia later the mound was reused again. A deep, well-defined posthole feature dug into the centre of the mound was found. The assumed post was thought to be the post of a gallows structure or a wheel for the public display of a corpse (Meurkens 2007; 2010; van der Linde/Jansen 2009).

This assumption was supported by three burials found at the foot of the western side of the mound. All burial pits contained poorly preserved skeletal remains. One skeleton belonged to a young woman who was buried on her left side. A young adult male lay on his back with his hands bound and crossed behind his back (d'Hollosy 2009). It was concluded that these people were probably executed, hanged and/or displayed here and buried in these heathen grounds (Meurkens 2010).

13.3.2 The Zevenbergen mound gallows

The erection of a gallows on the prehistoric mounds of Zevenbergen is not a unique phenomenon. A significant number of other sites in the (southern) Netherlands yield examples of such practices (for an overview, see Meurkens 2010), indicating a strong relation between prehistoric barrows and Medieval execution sites. Furthermore, there are examples known where mounds bear the toponym of *Galge(n)berg* (gallows hill) and/or are indicated on old maps. Mostly these gallows lay along roads and/or at the boundaries of different territories or jurisdictions, well away from villages and cities (Meurkens 2010). This is also the case for the gallows of Zevenbergen which are indicated on a late 16th century map of the area. In addition there is also an early 16th century historical source in which, most likely, a gallows at Zevenbergen is mentioned.[88] In a Medieval charter, *i.e.* a written transcript of agreements compiled by C.R. Hermans (1850, 136) in *Verzameling van Charters en Geschiedkundige Bescheiden betrekkelijk het Land van Ravenstein,* the chronicle is mentioned in a fragment of text *omtrent de civiele en criminele jurisdictie welke de stad 's-Hertogenbosch in zekere gevallen uitoefent in de landen van Ravenstein, Herpen en Megen*: [89]

> … *ende zouden daer een geleit (= een schouw) ende een palinghe doen tusschen tlant van Herpen ende tusschen den darp van Nystelre, ende nam vij man te Nystelre ende eyden die, ende deden die gaen dat vors. gheleit metten recht. Daer ghingen die voirs. Vij manne tot den witten Scibberge toe en wysden dair een pale. Doe dede die voirs. here Ian, schout, die* **galghe** *metten eenen style aldaer setten, daer sy dien pael ghewyst hadden. .. (Old Dutch for gallows: galghe)*

The idea of the actual presence of a gallows in this area is strengthened by the late 16th century map showing a gallows ("*Ravesteins Gerijcht"*) at the location of Zevenbergen. However, the date of the map is later than our youngest Medieval grave (Fig. 13.3). Combining the historical, archaeological, and cartographical data it is now clear that the Zevenbergen mounds formed an important and long used gallows and burial site in Late and probably post-Medieval times. Being a central orientation point for travellers crossing the extended heath lands and situated at the boundary between the remote communal lands (Dutch: *gemeint*) of the villages of Oss, Berghem, and Nistelrode, the mounds of Zevenbergen were an ideal place for such an, at least in our view, brutal ritual.

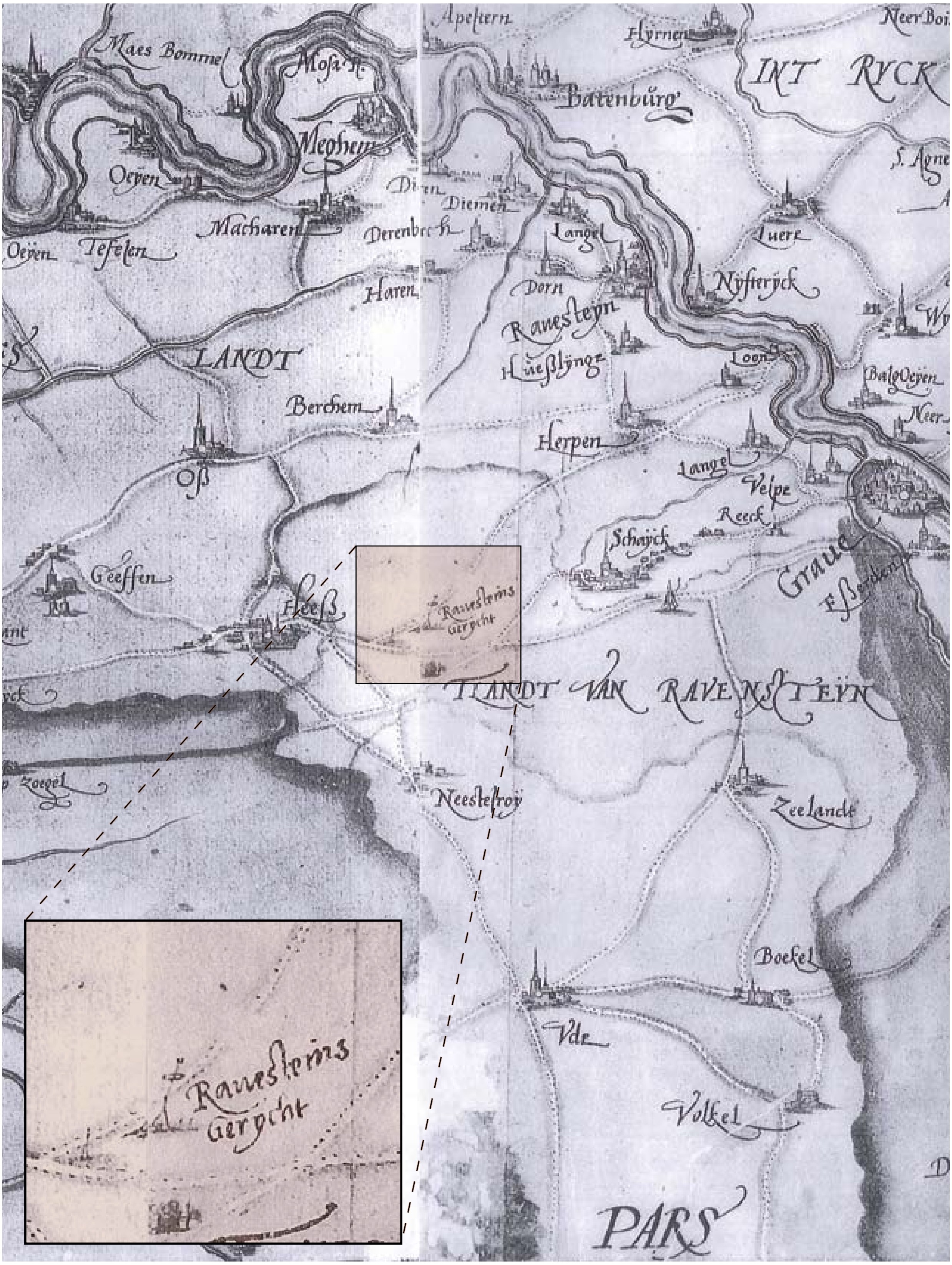
Based on the 16th century map, the gallows here must have belonged to the autonomous Land of Ravenstein. The feudal lord of Ravenstein indeed had the authority to sentence criminals to corporal punishment and/or hanging. An authority that the lower courts (Dutch: *schepenbanken*) of Oss, Berghem, Nistelrode or Heesch did not have. This right was reserved to the higher courts of 's-Hertogenbosch. However, it is unlikely that the gallows of Zevenbergen was used from 's-Hertogenbosch.

Fig. 13.3 (right page) Reproduction of a map made by German geographer Christiaan Sgrooten. Map was made between 1557 and 1595 and ordered by the Spanish King Philip II. Sgrootens' maps are considered quite reliable because he travelled around the area himself. Figure C. Sgrooten/reproduction courtesy of BHIC 's-Hertogenbosch.

13.3.3 Why were mounds used for gallows?

The practice of displaying the bodies of executed individuals occurs from the Late Middle Ages onwards, until even the late 18th century, and was customary in many parts of Europe (Jelgersma 1978). The larger towns generally had separate execution and gallows sites. In smaller villages in more rural areas the two were often combined, which is also suggested for the Zevenbergen site (Meurkens 2010).

88 Chronicle by Peter van Oss, see Meurkens 2010, 23.
89 With thanks going to mr. H. Buijks of the *Brabants Historisch Informatie Centrum (BHIC)* in 's-Hertogenbosch who informed us of the existence of this map and sources.


Maes Bomme
Batenburg
INT RYCK
Megen
Oeyen
Macharen
Diemen
Derenbrech
Langel
Luere
Nyfferyck
Haren
Dorn
Ravestein
Huesslinge
LANDT
Berchem
Loon
Herpen
Oß
Langel
Velpe
Reeck
Schaijck
Geeffen
Heeß
Graue
Ravesteins Gerecht
LANDT VAN RAVENSTEYN
Neestelroy
Zeelandt
Boekel
Vde
Volkel
PARS

The meaning behind displaying the bodies of criminals hanging from a gallows or lying on a wheel is generally explained in terms of deterring potential criminals. By burying the executed criminals here, they were denied a formal Christian burial in a parish churchyard. The dead were literally expulsed from society. The latter relates to the demonization of prehistoric burial mounds and cemeteries by the Church. In this manner heathen monuments were associated with elements outside society that did not belong in the Christian world (Meurkens 2010; Roymans 1995).

Their non-Christian character and their preventative function led to gallows often being erected far away from villages and cities, usually on the border of a parish or seignory and along busy roads (a.o. Dewulf 1957, 26, cited in van der Linde/Jansen 2009).

13.4 Conclusion

Gallows were probably placed on the two highest prehistoric burial mounds of Zevenbergen two thousand years after they were erected. By this time the barrow group was located on the boundary between the communal land of the villages of Oss, Berghem, and Nistelrode, and at the border of the Duchy of Brabant and the Land of Ravenstein, which was probably later marked with an extended defence system (Dutch: *landweer*, see chapter 15). Placed alongside a sand path that crossed the open heath lands (chapter 15), the gallows (or wheels), and the men or women displayed here, must have had a great visual impact. Visible from a great distance to deter potential criminals passing by. Eventually the displayed criminals (at least four of them) were also buried here, thereby denying them a Christian burial in the parish churchyard.

In this manner the use and perception of the mounds of Zevenbergen changed considerably two thousand years after their erection. People were buried here again, but with a considerably different background and ritual. For the local Bronze and (Early) Iron Age communities the mounds formed an important central focal point in the landscape. Within the Medieval landscape the mounds were marginal, lying literally in remote, non-cultivated grounds with strong negative connotations.

Chapter 14

Mesolithic finds in an Iron Age barrow

Alexander Verpoorte

14.1 Introduction

Five Mesolithic flint artefacts were documented during the meticulous excavation of mound 7 at Oss-Zevenbergen. In total 5.5 m^2 of the old land surface below the barrow were sieved for more potential finds. Earlier research activity at Oss-Zevenbergen already recovered some flint artefacts. Beex mentioned several dozen flint flakes as surface finds in a firebreak in the national archaeological database Archis (observation number 36034, no year of administration). Though no accurate description of these finds is available, they were determined as probably Mesolithic. The exact location of the firebreak is not known.[90] The 2004 excavations of Oss-Zevenbergen uncovered a total of 27 flint artefacts in the cover sands around the prehistoric barrows and a demarcation line from the Middle Ages (van Hoof 2009). Two microlithic cores and a triangular point indicate a Mesolithic age of the finds (Fig. 14.1). Several square metres were sieved specifically to recover any small flints, but did not deliver any results. With a short description of the finds from mound 7, this chapter discusses the implications of the small Mesolithic collection from Oss-Zevenbergen.

14.2 Description

The total assemblage of only five flint artefacts recovered in 2007 is composed of three small flakes (including one chip), a bladelet, and a fragment of a possible point (Fig. 14.1). Table 14.1 provides a detailed description of the finds.

Different raw materials can be distinguished among the finds. Most interesting is the presence of a flake of fine-grained, light-grey and translucent flint, possibly of the "light-grey Belgian" variety. The bladelet is made of a quartzitic raw material. The other finds are made of "terrace flint" that is locally available in the Middle Pleistocene fluvial deposits.

Table 14.1 Description of the flint artefacts. l. = length; w. = width; th. = thickness. All measurements in mm.

Find no.	Trench	Level	Context	Description	l.	w.	th.	Raw material	Cortex	Remarks
210	115	1	Plough soil	Flake	25	20	5	Light grey, translucent	0	Proximal part
150	105	2	Sods	Flake	29	35	12	Terrace flint	>75%	Distal part
235	105	3	Old surface to "sods"	Flake	<10	-	-	Terrace flint	-	-
216	105	3	Old surface to "sods"	Blade	34	14	4	Quartzite	0	Complete
170	106	2	S 3 charcoal spread	Point?	21	13	3	Terrace flint?	0	Heated, recent damage

90 Van Wijk *et al.* (2009, 88) mention a firebreak as a potential disturbance of the eastern edge of mound 3.

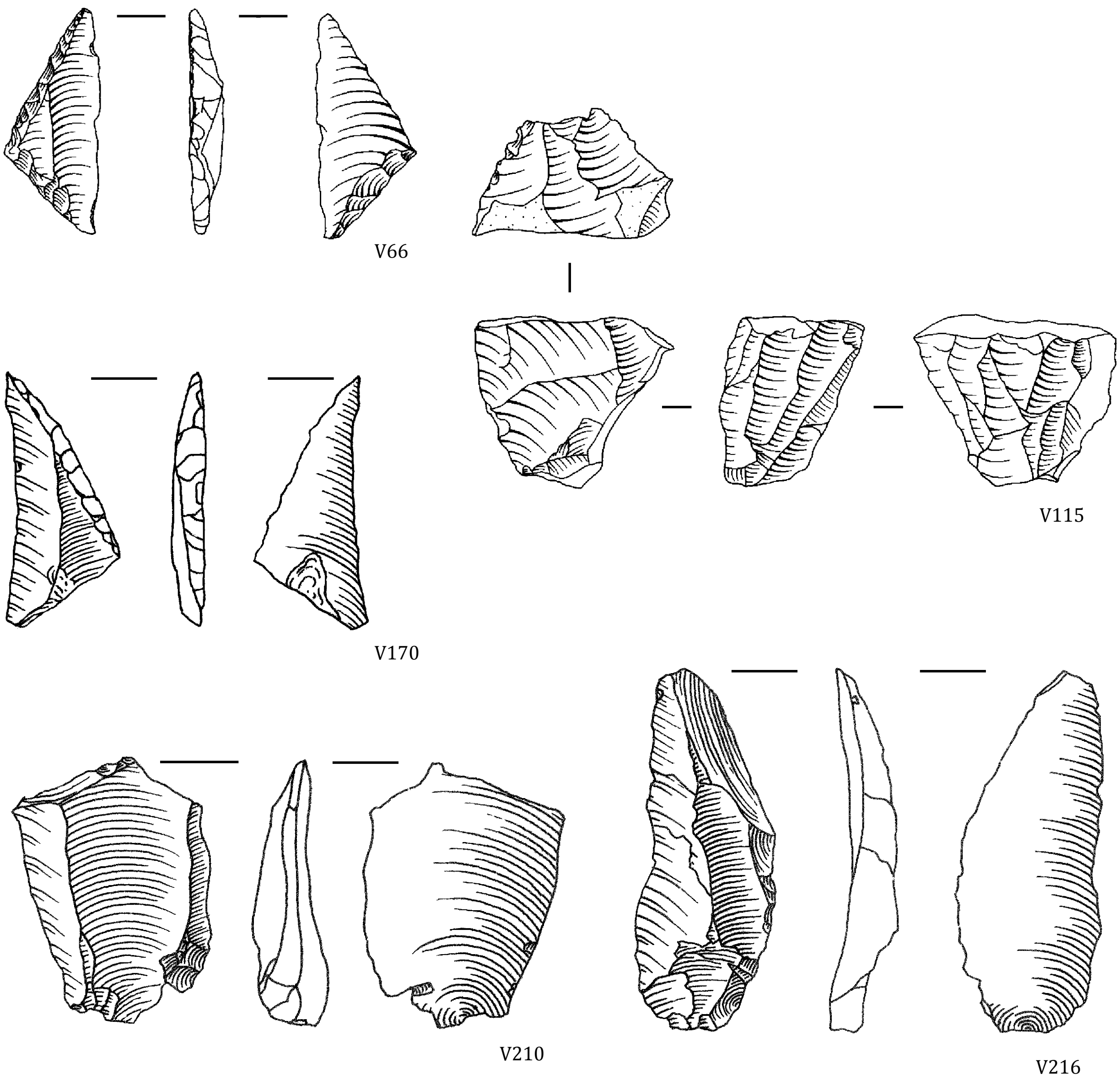


Fig. 14.1 Triangle (V 66); microlithic core (V 115); fragment, ventral basal retouch (point?) (V 170); flake, light-grey translucent flint (V 210); bladelet, quartzite (V 216). Scale 1:1. Figure by van Hoof 2009/R. Timmermans/J. van Donkersgoed.

The fragment of a point has the appearance of a backed lateral edge, but a closer look reveals that this "retouch" is due to recent damage. Most of the fragment (including a basal ventral retouch) is greyish-white in colour with craquelé from heating whereas the "retouched" edge is black with the original grey colour of the raw material at the core. The piece is interpreted as a heat-damaged fragment of a bladelet point with ventral basal retouch. The fragment was found between the distributed remains of the pyre, and it is most probable that the heating is secondary.

14.3 Interpretation

No highly diagnostic features are present in the material from mound 7, but the small blade and fragment of a bladelet point indicate an attribution to the Mesolithic in accordance with the results of earlier research (van Hoof 2009). The raw materials used also fit the pattern of the other finds from Oss-Zevenbergen. Van Hoof (2009) also describes the presence of light-grey, translucent flint of the "light-grey Belgian" variety in addition to "terrace flint" and quartzite. A sample of charcoal particles from a soil formed underneath a ditch of mound 1 provided

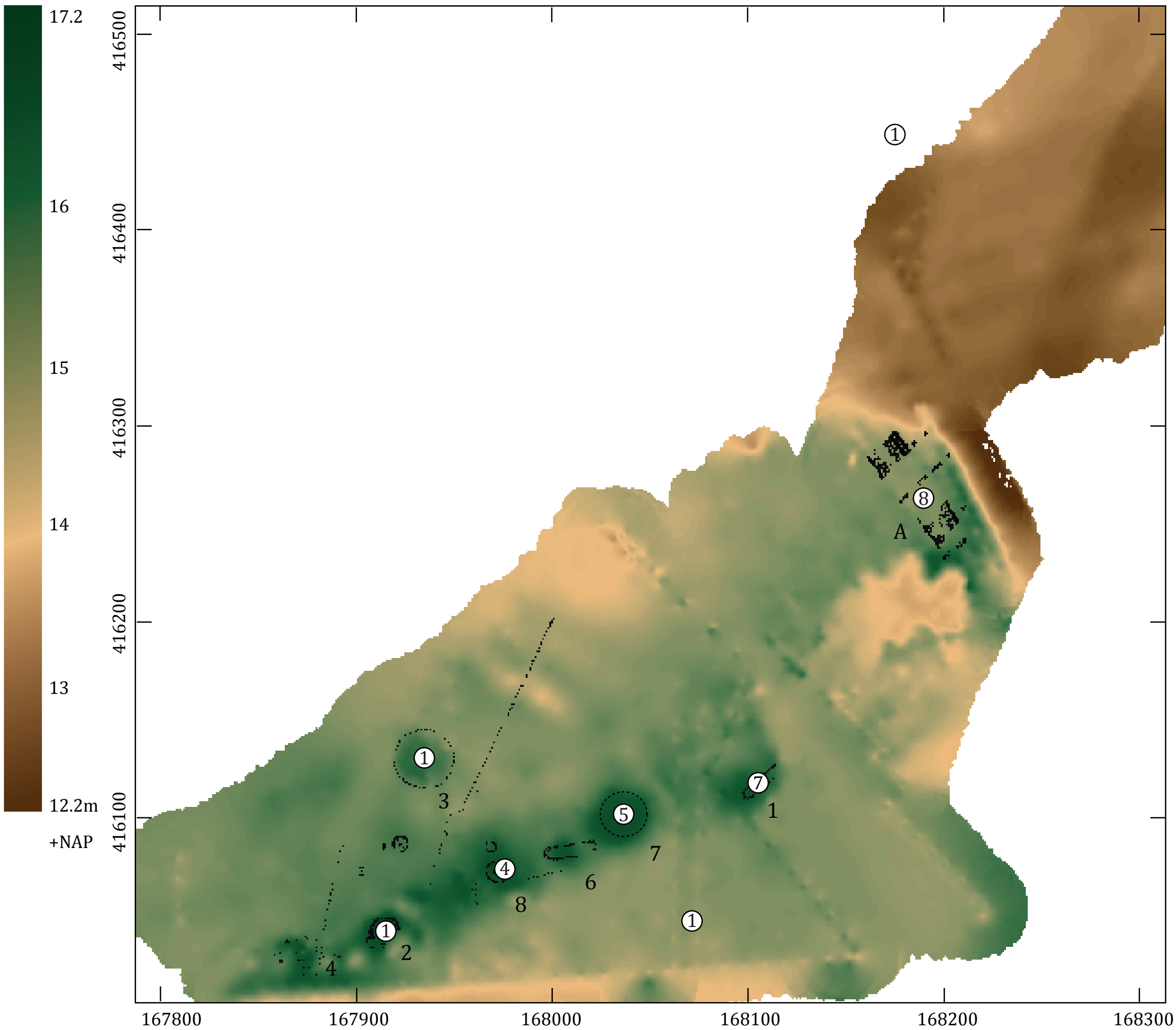


Fig. 14.2 Location of mounds and demarcation line of Oss-Zevenbergen with the amounts of flint artefacts listed per location (encircled). Numbers of the mounds are indicated as well. Figure after van Hoof 2009, fig 9.1/J. van Donkersgoed.

a date between 7040 and 6700 cal BC (GrA-27853: 7960 ± 50 BP; 95% probability, calibration using OxCal 4.1) fitting in the Mesolithic, but there is no direct association with archaeological finds or a fireplace.

The different find contexts are informative about the find situation of the Mesolithic assemblage (Fig. 14.2). Three finds (V 150, V 235, and V 216) of mound 7 were found in secondary positions within the mound itself – in the heavily disturbed plough soil on top, between the sods of the mound, and between the remains of the pyre on top of which the barrow was constructed. These finds likely derive from the immediate surroundings which provided the sediment to build the mound with.

Two more finds (V 170 and V 210) from mound 7 derive from the transition of the old land surface below the mound to the sod body of the mound. These finds, therefore, also may be from the surroundings of the barrow. The finds discovered during the excavation of long mound 1 dating to the Late Bronze Age or Early Iron Age derive from the cover sand. The mound itself was not preserved. One artefact ended up in the fill of a posthole of the circle of posts of mound 2. Other flints were found in the cover sand below and next to mound 8 dating to the Middle Bronze Age with later depositions. Several other finds, including the two microlithic cores, were discovered in cover sands during the excavation of a demarcation line from the middle ages. The find situation points to a thin, continuous find distribution with two or more clusters mainly in the C horizon of the cover sands.

The site is located on a small cover sand ridge, probably formed in the Late Glacial and partly reactivated during the Holocene. The location is close to the Meuse valley as well as small brooks originating on the Peel Blok. It is in close accordance with the pattern of Mesolithic find spots in the southern Netherlands and the Belgian cover sand region. This pattern is primarily indicative of locations with a high potential for discovery of finds, but it is too biased to be representative of Mesolithic land use (Peeters/Niekus 2005; Verhart/Arts 2005).

14.4 Evaluation

The thin distribution of flint artefacts in the trial trenches and excavations of Oss-Zevenbergen points to activities in the Mesolithic on a small cover sand ridge on the Maashorst. The artefacts were mostly found during and after levelling of trenches for documenting prehistoric features. This results in an interesting methodological question: could the Mesolithic component have been investigated better using another research strategy? The answer is nuanced. Most flint was found while shovelling. These can be considered incidental finds. Systematic sieving of the upper layer of the old surface below mound 7, as well as selected squares in the cover sand next to mounds 1 and 8, did not provide more than two chips in more than 10 m^2. It is likely that large-scale prospective coring (5 by 5 m grid) and systematic wet-sieving with a 1 or 2 mm mesh would yield more finds and a better picture of the spatial distribution (Bats *et al.* 2004). However, this time-consuming methodology has to be evaluated also in terms of the contribution to our knowledge of the Mesolithic. In this case it is unlikely that the benefits outweigh the costs. Large parts of the research area were deeply and heavily disturbed, with little chance for information about such key issues in Mesolithic research as chronology, stratigraphy, spatial patterning of activities, or preservation of organic material. The Mesolithic finds derive mainly from the C horizon and represent only those parts of the find scatter that were moved vertically deeper down in the soil by bioturbation (*e.g.* roots). Given the deep disturbances in Oss-Zevenbergen, it is likely that the find distribution was mostly in the plough soil. The small find assemblage of Oss-Zevenbergen is therefore a typical example of a Mesolithic flint scatter: a collection of surface finds, a thin scatter of finds with several possible clusters, no good indications for accurate dating, and a lot of disturbances by later prehistoric activities and recent land use.

Chapter 15

Excavating the surroundings of the Oss-Zevenbergen mounds (6 and 7)

Richard Jansen and Ivo van Wijk

15.1 Introduction

Despite intensive archaeological research of barrows, especially in the 1960's and 1970's, the surroundings of burial mounds have hardly ever been examined or considered. Barrow research in the past often was restricted to the mound itself and its primary and secondary burials. The excavation of Oss-Zevenbergen, therefore, provided a valuable opportunity where the surroundings of burial mounds could be excavated as well. It was therefore one of the main goals of the 2004 research to also examine the surroundings (Fokkens *et al.* 2009). Important questions were: are there archaeological features preserved? Are there non-funeral structures or non-monumental graves present? What sort of relation did they have to the burial mounds? How have the (immediate) surroundings of the barrows on this small ridge been organized? Another interest was the usage and meaning of the cemetery (long) after the dead had stopped being interred.

The research was carried out by excavating the direct surroundings of the mounds. A larger area was also researched with trenches every 10-15 m (Jansen/Heirbaut 2009; van der Linde/Fokkens 2009; van Wijk *et al.* 2009). The latter was continued in 2007 with seven trenches (trenches 107-109; 111-114) surrounding mounds 6 and 7 (Fig. 15.1). The areas between mounds 6 and 7 and around mound 6 were also excavated (trench 110).

In this chapter the results of the 2004 excavation, as well as the methods and results of the 2007 research of the surroundings of the barrows are first described. Subsequently the results are analyzed and interpreted together with the results of 2004. However, since the 2007 excavation yielded no prehistoric features, the focus in this chapter is mainly on Modern Era cart tracks and foresting traces.

15.2 Excavating the surroundings of the mounds

The excavation of the surroundings of the barrows in 2004 was largely based on the results of a preceding prospective research. The latter was executed with long, parallel trial trenches in a systematic grid between and around the barrows.[91] Some trenches could not be excavated or had to be repositioned because manoeuvring with a mobile excavator was difficult due to the large numbers of tree trunks and the undulating surface (Jansen/Heirbaut 2009). Subsequently, during the 2004 excavation the area directly around and between the mounds was excavated. If (logistically) possible other interesting features and/or configurations of features were excavated in a larger area. For instance, several post alignments were followed

91 During this phase all mounds were also prospected with a small trench to find out whether they were natural or manmade mounds.

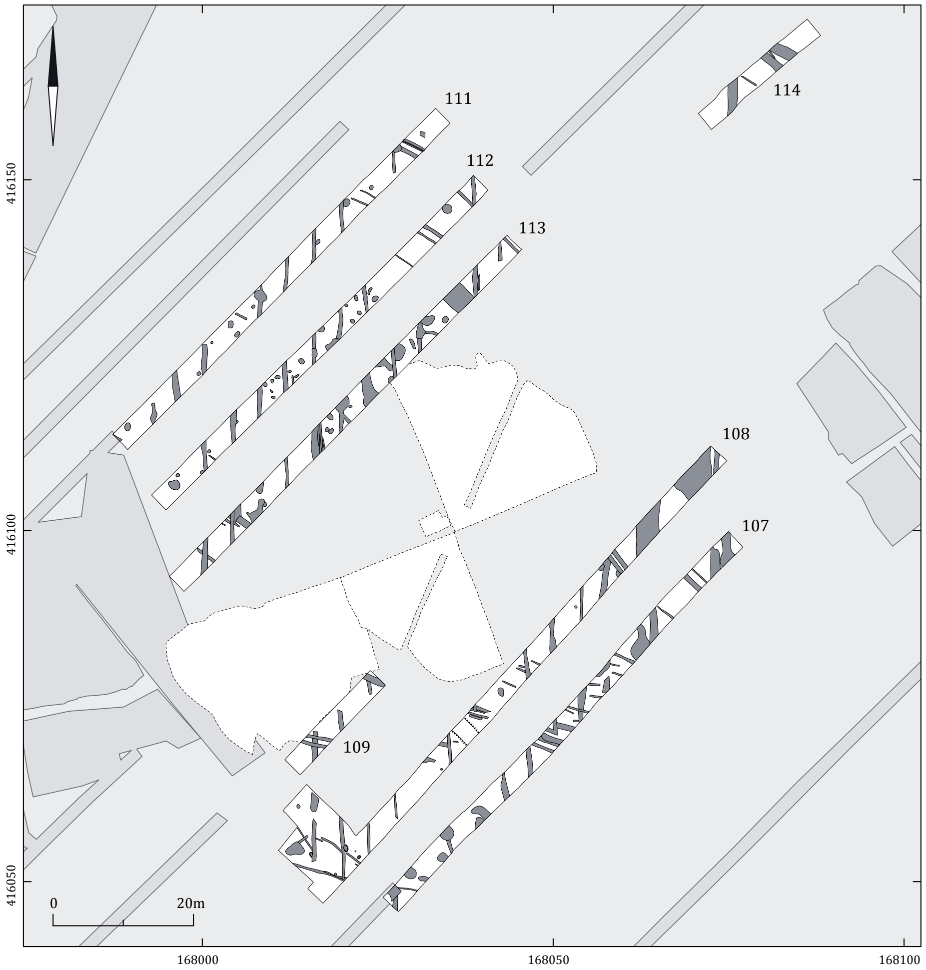


Fig. 15.1 Location of the 2007 prospective trenches 107-109 and 111-114 and the larger trenches 105, 106, 110, and 115 together with (some of) the 2004 excavation trenches. Figure by Archol BV/J. van Donkersgoed.

until they ended. The main goal of all this was to gain insight into the nature of the archaeological record of the surroundings of barrows. And although the research was constrained by financial considerations, at least a representative idea of the features in the surroundings of the barrows was gained together with ideas on their usage and meanings many centuries later.

The excavation of the surroundings of the barrows in 2007 should be seen as supplementary to the 2004 campaign. The 2007 trenches lie in line with those of 2004 (Fig. 15.1). This is the area that could not be investigated in 2004 due to the presence of a badger family (chapter 1). The same method was used and is shortly described.

The parallel trenches were situated to the north and northeast of mounds 6 and 7 and lay 15 to 20 m from each other, with a northeast-southwest direction. The procedure for excavating the trenches was as follows. After removing the top soil a horizontal level was created. Features usually became visible at the transition from the A to the B horizon, or when these were missing in the C horizon. Once features were recognizable, the surface was shovelled clean and drawn to scale 1:50. Individual sections were prepared over a selection of features, which were drawn at a 1:10 scale and photographed. Because individual (colour-) descriptions of features tend to be subjective, features from different trenches were compared in the field.

15.2.1 Excavating the surroundings of the mounds in 2004: summary of the results

In 2004 an extensive area around the mounds was excavated. Together with the trenches of the prospective research it provided a very interesting and sometimes unexpected insight into the usage of the (immediate) surroundings of the barrows over a long period, providing a long-term perspective of the "barrow-landscape" of Oss-Zevenbergen (Jansen/Heirbaut 2009; van der Linde/Fokkens 2009; van Wijk *et al.* 2009).

In the direct vicinity of the barrows, contemporary posts-alignments and four-post structures were found indicating that the area was more than just a burial ground: a ritual landscape in its own right (Fokkens *et al.* 2009). We will come back to the role of these post-alignments in chapter 16. Additionally, the trenches also revealed features caused by the re-use and re-interpretation and different perception of the mounds in the (Late) Medieval Period, their significance in post-Medieval times, and the reclamation history of the area (see also chapter 1 and 13).

15.2.2 Excavating the surroundings of the mounds in 2007: results

Features were discovered in all trenches. The features were easy to discern and could be connected to those found in 2004. None of the features yielded finds despite continuous and intensive (metal) detecting during the excavation of the trenches. Because of this it is impossible to date the features individually. Dating can only be done through typology or parallels.

Prehistoric features were completely absent, both within the trenches and the surrounding area of mound 6. As expected a significant amount of cart tracks was found, especially in the central parts of trenches 107 and 108. The orientation and distribution of the tracks follows the cart tracks found in 2004.

Figure 15.2 clearly shows that the Late Medieval (and later) tracks avoid the biggest mounds. In some cases they even follow the round contours of the mounds. Interesting hereby is the positioning of traces of cart tracks running "over" the eastern part of mound 6 (see chapter 3).

Later the sand track(s), which are spread over a large area, are converted into smaller sand roads, fragments of which were found in some of the flanking trenches. These parts could be connected to the road trenches found in 2004 (Fig. 15.2).

Finally, all trenches yielded a significant amount of ploughing marks. This is hardly surprising as the Zevenbergen area was used for harvesting pine trees following its reclamation in 1837. Within the many small "furrows" (Dutch: *voren*) found, pine trees were planted whereby literally the whole area was disturbed by the 19th and early 20th century forest farmers (section 1.2.1).

15.3 Modern Era features

Although the 2007 trenches yielded no prehistoric features, they did reveal something about the Modern Era. In this section the Modern Era sand roads and forestry marks are discussed.

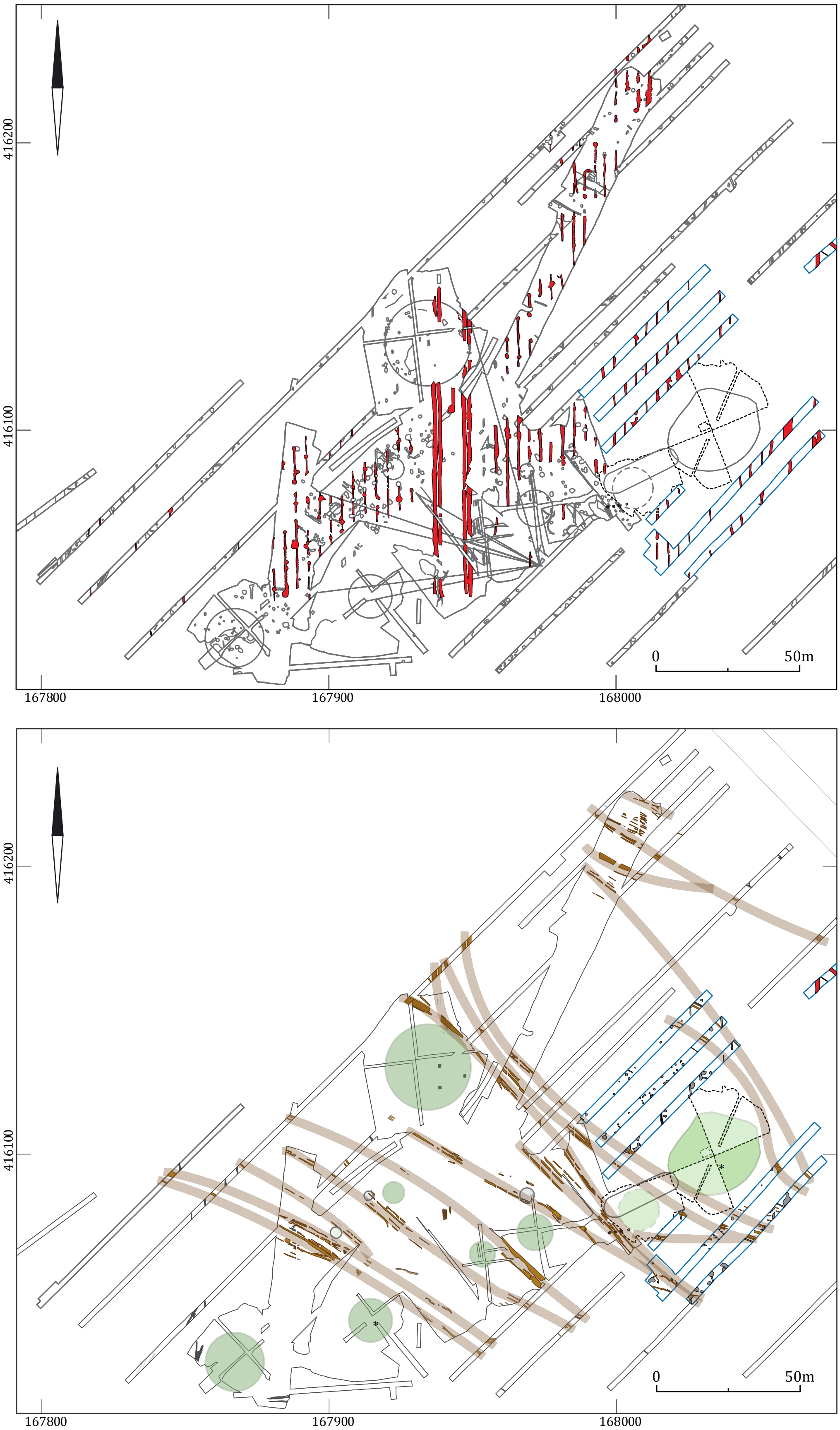


Fig. 15.2 Overview of planting "furrows" found in 2004 and 2007 (top) and overview of cart tracks, sand roads with flanking ditches, also from both excavations (bottom). Figure after Fokkens et al. 2009, fig. 7.8/J. van Donkersgoed.

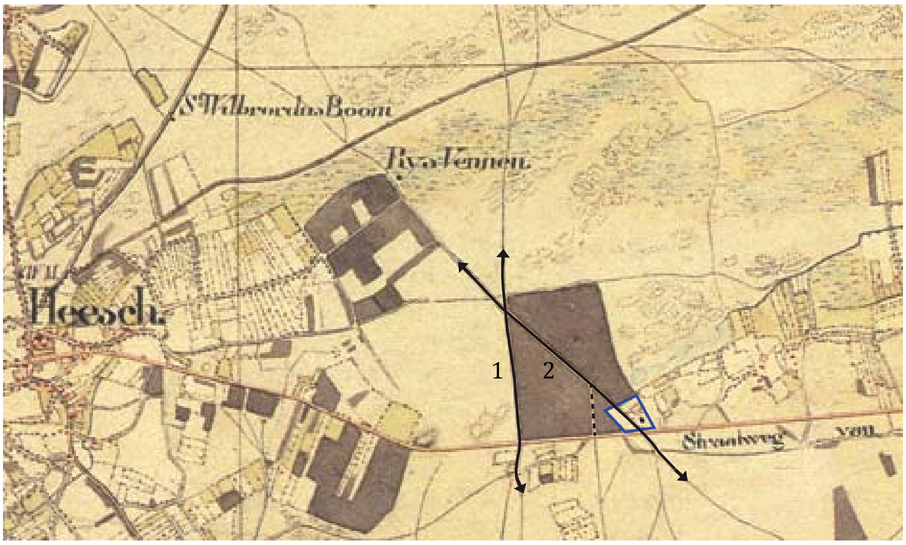


Fig. 15.3 Map from 1837 with numbers indicating the Nistelrodese Baan (1) and the Zeelandse Baan (2). The Zevenbergen reclamation area with the "Zevenbergse Huis" on it is outlined in blue. Figure by Topografische Dienst/J. van Donkersgoed.

15.3.1 Modern Era: sand roads

In the early 19th century, by decree of Louis Napoleon and later Willem I, a large number of paved highways were laid, also in what is now the province of Noord-Brabant. An important east-west connection was to be the already existing highway of 's-Hertogenbosch to Grave. In a historical overview of highways in the province of Noord-Brabant, Hermans (1853, 52-53) reports the following:

> *".. De aarden baan van daar [Geffen] tot aan den Hansjoppenberg aan de scheiding van Heesch en Oss, 1822 opgeworpen, werd in 1829 en 1830 ter lengte van 2574, in 1835 ter lengte van 1545 en in 1836 ter lengte van 300 ellen met keijen belegd, terwijl de aarden baan tot Grave mede in 1822 voltooid was. In 1835 werd de weg ter lengte van 4540 ellen van den Hansjoppenberg tot aan den Reekschen Molen bekiezeld. .."*[92]

Sometime during the same period, in the course of the 19th century, a number of further unpaved "roads" were laid in the Zevenbergen area. These cart tracks have much smaller courses than the cart tracks discussed earlier, as well as a different orientation. On the map from 1837 two roads are indicated on either side of the Zevenbergen barrows that more or less define our research area: the Nistelrodese Baan (from Nistelrode to Berghem; Fig. 15.3, 1) and the Zeelandse Baan (from Oss to Zeeland, later the Zevenbergseweg; Fig. 15.3, 2). On the crossway of the latter with the highway from 's-Hertogenbosch to Grave, stood the Zevenbergse Huis with surrounding fields. A large part of the heath (north)west of the Zevenbergse Huis had by then turned into forest. Our mounds were literally lost from sight, together with their function as an orientation point.

In addition to the roads mentioned above, the forest was cut by a north-south oriented road, the remains of which were refound during both excavations in the form of a slight elevation flanked by ditches, directly to the east of mound 7. A second, later road manifested in the 2004 excavation as a 7.5 m wide zone within which no foresting ditches were found. This path, which runs over the eastern

92 Translated by author: ".. The earthen lane from there [Geffen] to the Hansjoppenberg on the division of Heesch and Oss, erected 1822, was paved with cobbles in 1829 and 1830 for a length of 2574, in 1835 for a length of 1545, and in 1836 for a length of 300 *ellen*, while the earthen lane to Grave was also completed in 1822. In 1835 the lane was cobbled for a length of 4540 *ellen* from the Hansjoppenberg until the Reekschen Molen. .." The "Hansjoppenberg" is probably the huge barrow of Oss-Vorstengraf (chapter 1).

part of mound 3, also was flanked on both sides by parallel ditches (van der Linde/Jansen 2009). It is striking that these paths are indicated on the map from 1837, but not on later topographical maps. It is not until maps from the 1960's that they "reappear" (chapter 2). The situation of our research area is revealed not to have changed much. The situation as known from 1837 in effect was unchanged in 2004.

15.3.2 Modern Era: ploughing marks caused by forestry

Laying (unpaved) roads went hand in hand, or was part of, the reclamation of the Zevenbergen for forestry (see also chapter 2). The "construction" of the forest was part of the so-called young heath reclamation from the early 19th century, that was mostly done after 1840 (De Bont 1993). In this period (the last) large areas of heath and waste land were reclaimed. We know our research area was reclaimed around 1837. The traces of this were visible during both excavations as deep, stretched out parallel features. The furrows were oriented almost exactly north-south and were regularly spaced about 4 m apart (Fig. 15.2, top). It was probably during this reclamation that the first urns, which unfortunately have been lost, were found in this area (Fokkens *et al.* 2009; see also Fokkens/Jansen 2004; Hermans 2012 (1865)).

Lost coins?

In 2007 two copper coins were found, both in trench 110, and both dating to the 19th century. These findings do not stand alone. During each excavation campaign (1964-1965, 2004, and 2007) one or two copper coins were found (Verwers 1966a; van der Linde/Jansen 2009). It is striking that each coin can be dated to the (first half of the) 19th century, with three coins dating between 1820 and 1830 and two from respectively 1826 and 1827 (Tab. 15.1).

All coins were found close to each other, but during the different excavations of (the surroundings) of mound 6. But how did they end up here? The coins found in 1965 and 2004 both were connected by the excavators to the many cart tracks that were present between the mounds (van der Linde/Jansen 2009, 153; Verwers 1966a, 31). The coins found in 2007 were found among the cart track traces. Furthermore, the dating within a limited period can hardly be a coincidence. The most logical explanation therefore is that they were lost at one occasion. Maybe one of the workers of the first reclamation of the area in 1837 lost them during a hard day of work: a small personal detail in the long term narrative of the Zevenbergen mounds.

Year	Find number	Trench	Layer	Feature	Description
2007	OZB00163*	110	1	-	copper; 19th century
2007	OZB 00226*	110	1	-	copper; 1 cent; place Utrecht; king Willem I 1826. Crowned W between 18 and 26, reverse side crowned weapon between 1 and C
* Determination: Geld en Bankmuseum, Utrecht.					
1965	OZB 1964-65-7	bottom cart track			copper; 1827
2004	OZB 2004	within cart track			copper; 1820-1830

Table 15.1 19th century copper coins found during the three different excavations of Oss-Zevenbergen.

15.4 Summarizing

Excavation of the immediate surroundings of mound 6 and 7 with trenches yielded no prehistoric features. The most important features are the traces of many cart tracks, evidencing travels through the area when it was still a heath presumably during the Late Medieval and later periods. They fit in the pattern of cart track traces as observed for the Zevenbergen area during the 2004 excavations. The 2007 excavation shows that mound 7 was avoided, but mound 6 was partly run over by many cart tracks, damaging the mound significantly. Other traces are ploughing marks, representing the transformation of the heath into a pine forest in 1837 and its maintenance ever since. It is suggested that finds of two copper coins in trench 101 reflect activities during these reclamations.

Chapter 16

Conclusion: the seventh mound of seven mounds – long-term history of the Zevenbergen barrow landscape

David Fontijn, Richard Jansen, Sasja van der Vaart, Harry Fokkens and Ivo van Wijk

16.1 Introduction

In this concluding chapter we will bring together all the evidence discussed in this book and try to answer our central question: what were the role and significance of the last unexplored mounds of the Zevenbergen barrow landscape, mound 6 and 7?

It is the final step on a long avenue of research that started with the excavations at Zevenbergen in 1964-1965 and 2004 and – at least for the foreseeable future – stops here. Although this book focused particularly on the largest mound of all, mound 7, the significance of this barrow and its smaller neighbouring mound 6 can only be understood when the results are fully integrated with those of the previous campaigns. We also built upon many insights in excavation techniques that were first tried out in the previous fieldwork in 2004, and benefitted enormously from these experiences. As the mound 7 excavation was by far the most complex one of all, the fact that it was excavated after the 2004 experiences had sunk in, was a blessing in disguise. In a way, the 2007 excavations with their spectacular finds are the best conclusion thinkable of the entire fieldwork done here. It is for that reason that participants of the previous excavations (Fokkens and van Wijk) are also involved in the writing of this chapter.

In this chapter we try to bring together the various threads of evidence that were discussed in the 15 previous chapters in an accessible way. This means that we will only briefly refer to chapters where crucial evidence is presented and evaluated, leaving out lengthy discussions regarding dating and so on. In what follows, the long-term history of the Zevenbergen site will be sketched with a focus on the question what the specific role and significance of mound 6 and 7 were. All conclusions regarding the other mounds, the Medieval *landweer* and the single post alignments are based on the 2004 fieldwork and an extensive discussion of that evidence and its interpretation can be found in Fokkens *et al.* 2009 and in one more recent publication (Fokkens 2012). When our reading of those data differs, this is explicitly indicated.

Table 16.1 gives a simplified overview of the results of the various excavations.

No	Phase	Shape of monument	Grave	Size of monument	Dating
Mound 1		Long barrow	Not found	4.7 by > 23.5 m	LBA/EIA
Mound 2	1	Round mound w. widely spaced single post circle	Pit filled with sods in centre	D. : 12.5 m	MBA
	2	Round mound with closely spaced double post circle	Not found	D.: 16 m	MBA
	3	No addition	Urn grave dug into mound	-	EIA
	4	No addition	Inhumation graves	-	13th/14th century AD
Mound 3		Round mound with single, widely, partly paired spaced post circle	Burned wood, 1 piece of human bone, and pieces of 4 metal artefacts in centre	D.: 30 m	EIA (possible: early MIA)
Mound 4	1	(Probably round) mound	Not found	Indet.	MBA (A)
	2	(Probably round) mound	Not found	14.5 m	MBA B
	3	Addition south flank?	Not found	Indet.	
	4	Probably round) mound – "phase 3"	Not found	Indet.	MBA B
Mound 5	1	Interpretation as anthropogenic mound uncertain	Not found	Indet.	Indet.
	2	Idem	Not found	Indet.	Indet.
Mound 6	1	long barrow surrounded by posts	Cremated bones, sherds; position in mound unknown	28.5 by 8.5 m	MBA B-LBA
	2	Long barrow with ditch		26.5 by 6.5 m	LBA (EIA)
Mound 7		Round mound without peripheral structure	Urn grave, next to pyre debris, including metal and bone artefacts	D.= 36 m	EIA
Mound 8	1	Round mound	Inhumation	D.= 12 m	MBA (A)
	2	No addition	Urn dug into mound	-	MBA B
	3	unknown	Sherds, remains of urn?	Indet.	EIA
	4	Ring ditch		D. = 9.5 m	EIA
"Mound" 9		Ring ditch, no true mound recognized	Not found	D. = 5 m	Probably EIA
"Mound" 10		Ring ditch with opening in southeast, no true mound recognized	Urn	D. = 7.5 m	EIA
"Mound" 11		Ring ditch, no true mound recognized	Remnants of 2 pots, no crem. bone found	D. = 4 m	LBA/EIA
"Mound" 12		Ring ditch, no true mound recognized	Not found	D. between 2.5 and 2.8 m	Probably EIA

Table 16.1 All excavated burial monuments at Zevenbergen. After Fokkens et al. 2009, Table 13.1 with changes. D. = diameter; MBA= Middle Bronze Age; MBA A= Middle Bronze Age A; LBA= Late Bronze Age; EIA= Early Iron Age; MIA= Middle Iron Age.

16.1.1 Fieldwork methods

The excavation focused on the southwest (trench 105) and the northeast (trench 106) quadrants of mound 7, incorporating a small part of the NW-quadrant as well (trench 115). The levelled mound 6 was excavated in its entirety. Around both, test trenches were dug following the planning that was set out in 2004, but which could not be completed because of the presence of the badger.

In assessing the results of the 2007 excavation, it is important to note that not much was expected of the results of the excavation of what was a sett – the large number of entrances, the heaps of soil dug out by the badger: in advance, nothing suggested that we would find what we did find. There were financial aids to support an excavation of 17 days, from which only two field workers of Archol BV and material costs such as the mobile excavator could be paid. The project leader (Fontijn) and the fieldwork leader (Jansen) did the work as part of their research track at the Faculty of Archaeology, University of Leiden, and the same is true for the palynological research done by prof. dr. C.C. Bakels, the metallurgical research by the Technical University of Delft, and that done by the RCE. The majority of the fieldwork (mainly manual excavation) was done by (unpaid) students and a number of amateur archaeologists. All this means that financial means were limited which made itself felt when we became confronted with a very complex and time consuming excavation of the centre of mound 7.

The remains of mound 6 – effectively the second excavation of this structure – could be examined with a one level excavation, since there was no longer anything left of the original mound itself. What differed from the excavation in the 1960's is that we also created some deeper levels underneath the traces of disturbances. This strategy was effective, as the lowest parts of many more traces of posts appeared to have been preserved underneath such disturbances.

In the case of mound 7, we clung to the quadrant method where sods would not only be documented in profile sections, but also at the excavation levels. We made a mix between the strategy of 2004, where it was aimed to excavate as much as possible stratigraphically, and the strategy developed in 2006 for the excavation of two barrows in Rhenen-Elst (Fontijn 2010). In the latter case, we chose for manual excavation in horizontal levels, starting from the centre of the barrow, supplemented with sieving of a part of the mound. We also used two extra diagonal profile baulks. In retrospect, this method worked better, particularly because we worked on a very large barrow, and the extra profile baulk made it easier to combine horizontal and vertical stratigraphy. Another new element was the systematic use of photogrammetry and a Robotic Total Station. Both enabled the use of ArcGIS for the later analysis (chapter 5).

It was the choice for manual excavation that led to the discovery of the very small bronzes in the centre (which could not be prospected with a metal detector in advance). The entire central find assemblage was lifted in blocks which were investigated in a laboratory by Restaura (chapter 8). After initial prospection with X-rays, which identified the position of metal and large pieces of charcoal, a detailed excavation in a 10 by 10 cm grid was carried out in each block. It was only in this way that the badly preserved small bronzes could be adequately 3D-documented and restored.

16. 2 Before the barrow landscape

16.2.1 Outline – a ridge of natural mounds

The Zevenbergen barrow landscape is situated on a very prominent landscape location, the northern edge of the relatively high lying Peel Blok plateau, a tectonically uplifted area that commands a fine view of a low-lying area that is – in places – rather wet because of ground water forced to the surface by pressure (Dutch: *kwel*). The Zevenbergen area consists of Late Pleistocene loamy cover sand and of coarse gravel-rich sand of Middle Pleistocene fluvial origin. Most barrows of the Zevenbergen lie on a narrow, low cover sand ridge on which we find several small natural elevations. Mound 7 is built on what locally was probably the largest and highest of all. Mound 6 is located immediately to its west, with its easternmost end on the flank of the natural elevation under mound 7. In the location we excavated, a Humus Podzol soil had developed (Dutch: *Haarpodzol*; code Hd30). Research shows that this originally was a Moder Podzol which degraded into a Humus Podzol because of anthropogenic influences (long-term maintenance of heath vegetation; see appendix 2 and chapter 10).

16.2.2 Previous activities at the site – Mesolithic

The Zevenbergen area was used during the Mesolithic, thousands of years before the barrows were built. During the 2004 excavation, 27 flint artefacts were found. In 2007 we found a few more (five). For the 2004 finds, it was concluded that the artefacts could not be dated more precisely than "Mesolithic", and that the thin distribution of material across the Zevenbergen represents the remains of foraging-related activities that were heavily disturbed by later use of the area, preventing us from getting any detailed insight into what it exactly was they were doing here, and in which phase of the Mesolithic (van Hoof 2009). The few additional finds done in 2007 do not help us any further (chapter 14). The area of mound 6 had been deeply damaged because of its location on a much used sand road on the (post-) Medieval heath. The area underneath the sods of mound 7 was relatively better protected, but before mound 7 was raised, the natural elevation had been lying on a heath for centuries. Sods for building the Bronze Age mounds may have been cut there, and the top and parts of the flanks were levelled. The presence of aeolian sediment also indicates that deflation took place locally, long before the barrow was built. The excavated part of mound 7 is 245.31 m^2. The old surface was excavated manually, of which the block lifted centre in great detail (chapter 8). A zone of 5.5 m^2 of the mound, including the old surface until the B/C horizon was sieved (2.2%) with a 4 mm grid sieve. This yielded no finds. Three of the five flint artefacts were found in secondary position (as parts of the sods with which the mound was built), two others, a flake and a blade, were found during the shovelling of trench 105 at the transition of sods to the ancient surface covered by the mound. Even for these two artefacts we cannot be sure if they were originally part of the soil beneath the sods, or ended up here as inclusions in the sods.

The Mesolithic artefacts we found were made of the same materials that were used for those found during the 2004 fieldwork (including the light-grey Belgian flint variety). They represent moved and/or heavily disturbed remnants of debris of activities which once took place in this area. As such, the modest flint finds of Oss-Zevenbergen are like many other Mesolithic sites in the province of Noord-Brabant: a thin, heavily disturbed scatter of finds lacking evidence for more precise dating (chapter 14). Their presence here does indicate that this pronounced area at the transition from a high and dry to a lower and wetter zone, was of relevance to people long before it came to be used as a heath and burial zone.

16.2.3 Neolithic use of the landscape

There is no indication at all that people used the Zevenbergen area during the 6th, 5th, or 4th millennium BC. Only for the 3rd millennium BC are there a few traces which indicate that there were activities in this area. Traces of two posts were found underneath the Middle Bronze Age mound 2. C14-dating of charcoal in one of the post traces indicates that it dates to the earlier half of the 3rd millennium BC (the period of the Vlaardingen-culture; Fokkens *et al.* 2009, 209). Another Middle Bronze Age mound, no. 4, was built over ground which had been dug through (van Wijk *et al.* 2009, 103-105). Whether these traces relate to an agricultural field at this location or not is a discussion which need not concern us here (*cf.* Fokkens *et al.* 2009); what is clear is that it evidences that the Zevenbergen locally saw some ground working before the Middle Bronze Age. Another hint in that direction are the aeolian deposits at the northeast side of mound 7 and at its southern flank. Drift sands deposited on an ancient Humus Podzol surface, indicating that parts of the area by that time must have been without covering vegetation and roots to allow the wind to blow away sand and to deposit it elsewhere. Unpublished OSL-analyses of this sediment underneath mound 7 suggest that this might have happened in the Middle Neolithic (chapter 4). If this holds true, it implies that people by that time had already created an open landscape, locally stripping it to the extent that the subsoil became exposed. There are no indications that people built barrows here during the Late Neolithic or the Early Bronze Age (ca. 2500-1800 BC), but only 680 m to the southwest of mound 2, the remains of a Bell Beaker Period barrow were found (chapter 2; see also Fokkens/Jansen 2004), demonstrating that people started to build barrows in the northern edge of the Peel Blok from that period onwards.

16.3 Middle Bronze Age: the formation of a barrow landscape

If we are to identify two elements in the *longue durée* history of the Peel Blok environment, these are the *Calluna* heath and the presence of a group of barrows on it. For a very long period of time, a heath dotted with barrows would be a ubiquitous element in the prehistoric landscape of this part of the Netherlands. For the Zevenbergen, the roots of both have to be looked for in the earlier part of the Middle Bronze Age.

In the period between ca. 1800 to 1400 BC, at least three round barrows were built here, no. 4, 2, and 8 (from west to east; Fig. 16.1). They are positioned on the highest part of the sand ridge, and mound 2 was built on a natural elevation. The analysis of pollen found underneath those mounds, in combination with pollen from the soils underneath mound 7 (chapter 10) give us a good impression what the environment looked like. In the early Middle Bronze Age, but possibly already before that period (De Kort 2009), there was a small heath, partly ringed by an oak-lime forest with hazel growing at its edges. In the wetter parts of the low

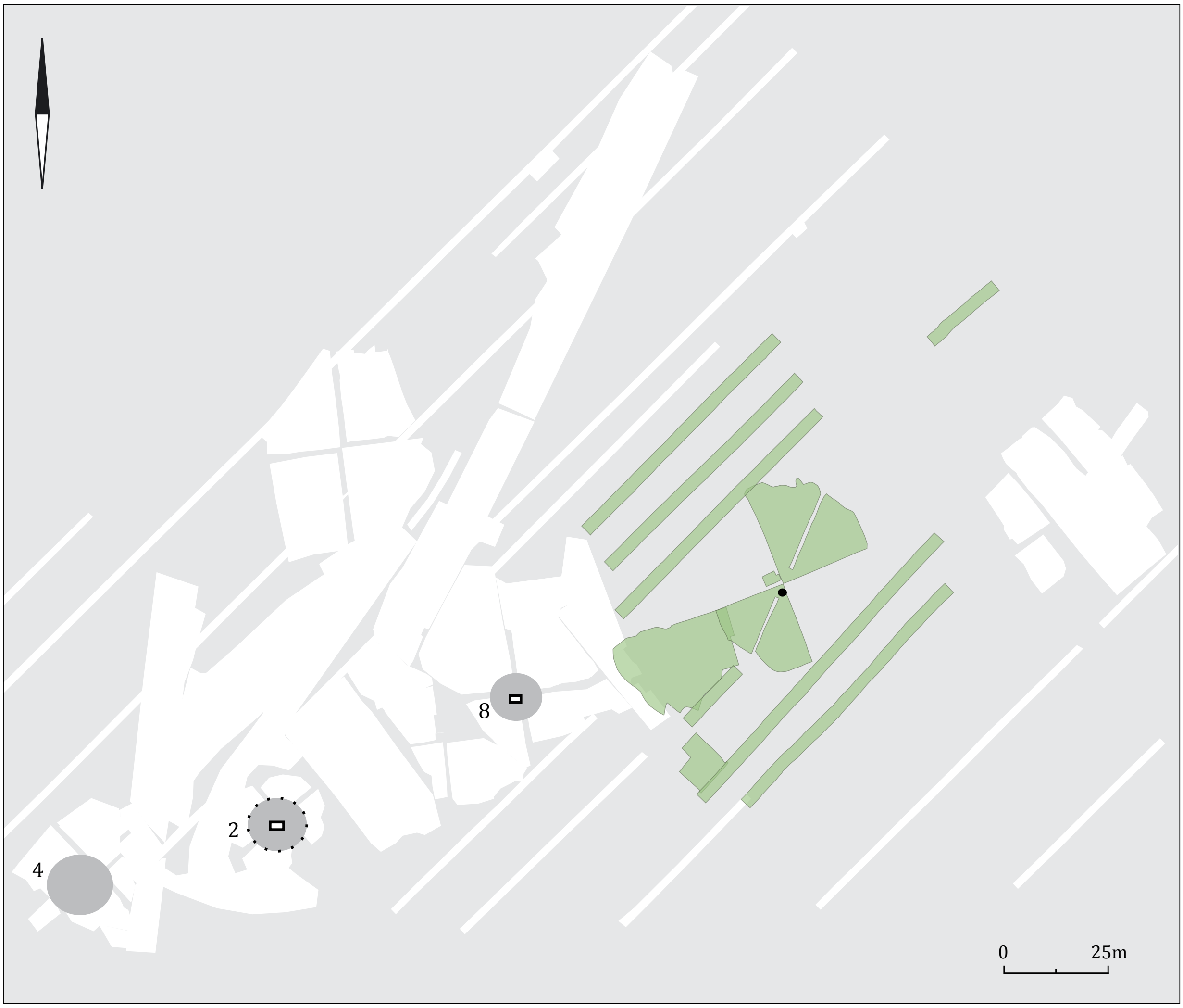


Fig. 16.1 Zevenbergen in the Middle Bronze Age. The excavation of 2007 is in green. The black dot at the location of the later mound 7 represents a pit dating to this phase. Figure after Fokkens et al. 2009, fig. 13.01b/J. van Donkersgoed/P. Valentijn.

lying area to the north there was an alder brook forest.[93] Mound 2 may have been constructed on a location that had been cleared of trees not long before the monument was built (De Kort 2009, 160). Heath vegetation must have dominated the area around all Middle Bronze Age mounds at Zevenbergen, a type of landscape that is entirely anthropogenic and can only have been maintained as such by regular grazing (chapter 10). It is not possible to reconstruct which mound was built first, but it is clear that all three barrows were re-used for burial and heightened, and for all later mound additions it could be demonstrated that heather was the environment in which they stood (De Kort 2009; chapter 10). Research by members of the *Ancestral Mounds* project now shows that barrows on a small heath that was used and maintained for a very long time was a very characteristic element of the cultural landscape that developed in the Low Countries since the earlier half of the 3rd millennium BC (Bourgeois in press; Doorenbosch forthcoming). We now also know that the same is true for the ordering of barrows in a row. Research of barrow groups all over the Low Countries shows that Middle Bronze Age barrows are to be found in two types of orderings. The first is as small barrow rows. These consist of a few barrows only (they are not the kilometres long lines as we find them in Epe-Vaassen or Renkum (Bourgeois in press; Fontijn 2011)). A contemporary example from Noord-Brabant is the barrow row of Goirle (van Giffen 1943), another nearby example is a group of four Middle Bronze Age barrows at the Kops Plateau in Nijmegen (Fontijn/Cuijpers 2002). The other variety is the loosely scattered or extensively dispersed barrows. Here, barrows do not seem to cluster and appear to be distributed in a – to our view – haphazard pattern (Fontijn 2010, 16). A famous example of the latter from Noord-Brabant is the barrow group of Toterfout-Halve Mijl (Glasbergen 1954a; Theunissen 1993). Barrow *cemeteries*, tight clusters of graves, do not exist before the Late Bronze Age urnfields. At Zevenbergen, we are clearly dealing with an example of a (small) barrow row[94]. Every barrow was re-used during the Middle Bronze Age (Fig. 16.2; Tab. 16.1).

Research of a representative sample of all Middle Bronze Age barrows in the Low Countries shows that this is the normal pattern. It seems to have been part of the culturally desired life-path of such burial monuments, that they be re-used for new burials not long after their construction (Bourgeois in press; Bourgeois/Fontijn 2008; Theunissen 1999). Another interesting observation that is now better understood than when the first report was written is that all barrows had a different peripheral structure. The use of peripheral structures around Middle Bronze Age barrows appears to vary from site to site. There are examples where a particular type of post circles is used to visually define sub-groups of barrows within one barrow cluster (like at Toterfout-Halve Mijl; Bourgeois/Fontijn 2012), and examples where different structures were used to differentiate individual barrows (like at Goirle; Fontijn 2007; van Giffen 1943). The Zevenbergen mounds seem to be an example of the latter.

At the eastern end of the Middle Bronze Age barrow row lies a large natural elevation. This is the location where mound 7 later would be built on. There are a few indications that this elevation already played a role in the Bronze Age barrow

93 In De Kort 's useful reconstruction (2009, 167; fig. 8.4), we see a fen to the northwest of Zevenbergen. Excavations at this location show that it was a location where ground water was pushed upwards (Dutch: kwel), but there are no indications for the presence of a fen (Fontijn *et al.* 2004). It should be emphasized that the prehistoric roads along the barrows in this same reconstruction are entirely hypothetical.

94 Today, there is a highway immediately to the west of mound 4. If there were originally barrows here as well can no longer be verified. The presence of kwel along the east flanks of the highway suggests that the present road was built through a natural depression. This makes it less likely that barrows were built immediately west of the Zevenbergen.

Fig. 16.2 Northwest quadrant of mound 2. (top) View on centre of mound. The yellow sand is dug out sand for the central pit underneath the first phase of the mound; (bottom) west profile of the NW-quadrant. A clear separation between two phases of Middle Bronze Age use is visible. Figure after van Wijk et al. 2009, fig. 6.6.

landscape. We will discuss this below, but first something has to be said about two remarkable monuments that were added to this barrow row during the next phase.

16.4 Late Bronze Age/Early Iron Age: building long barrows

During the Late Bronze Age or Early Iron Age, the existing barrow row was lengthened with two long barrows, monuments that differ in shape from their round predecessors: mound 1 and mound 6. Both were badly damaged in later times. Which one was built first remains unknown. Since we lack positive indications that Zevenbergen was used for burials during the later part of the Middle Bronze Age, it is probable that the long barrows were the first monuments built at this site since a long time.[95] Pollen from these two long barrows indicate that at that time there was still a heath at Zevenbergen (De Kort 2009; chapter 10).

16.4.1 Mound 1

Mound 1 must have been a northeast-southwest oriented long barrow (Dutch: *langbed*), which was badly damaged by recent digging activities by people and rabbits (Fig. 16.3).

95 A synthesis of C14-datings of barrows show that only few date to the MBA B. It has been argued that during this period, the frequency of barrow construction and use of barrows for burials decreased significantly (Arnoldussen/Fontijn 2006; Bourgeois in press; Bourgeois/Arnoldussen 2006).

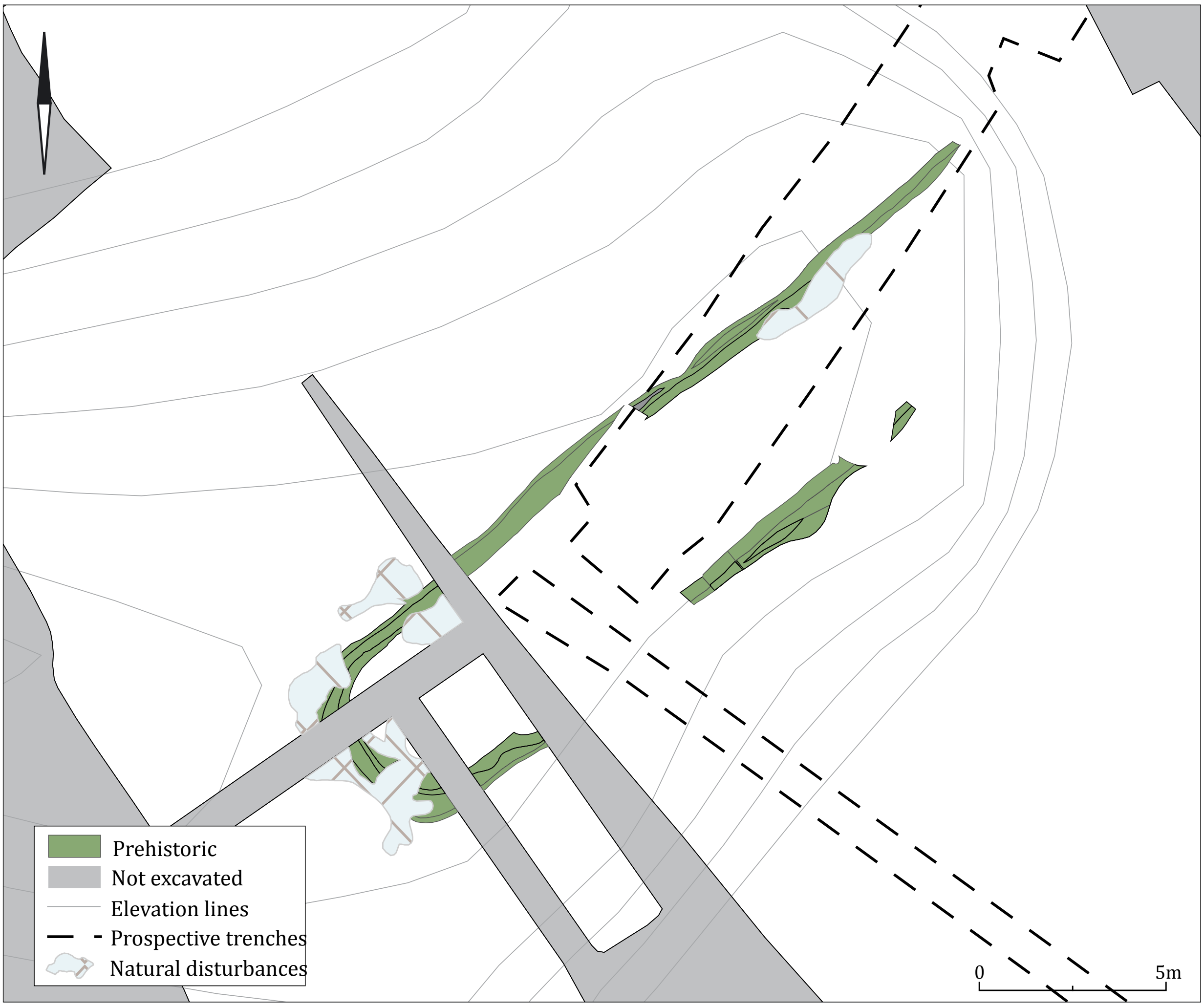


Fig. 16.3 Ditch of mound 1. Figure after van Wijk et al. 2009, fig. 6.2/J. van Donkersgoed.

Hardly anything but the fill of the rectangular ditch with rounded corners remained, and no traces of a grave were found. There are indications that the ditches originally indeed surrounded a low mound. The traces can only provisionally be dated to the Late Bronze Age or Early Iron Age by the shape of the ditches.[96] By analogy with other such structures, it was argued that we are dealing with the remains of a barrow. When this mound was built, the local relief was elegantly used. The monument uses a small elongated platform that has relatively steep slopes to the northwest, the southeast, and the northeast. Just like would happen later in the case of mound 7, a natural feature is used to give the monument a more prominent position in the landscape. It seems as if the local relief was tailor made for the desired shape of the monument. This is the easternmost natural top of the ridge that dominates the local environment. What was not clear during the 2004 excavation is that there was another natural elevation to its west: this would be the location where mound 7 would be built.

96 Probably those of a so-called *langbed* type Riethoven (Fokkens *et al.* 2009, 73).

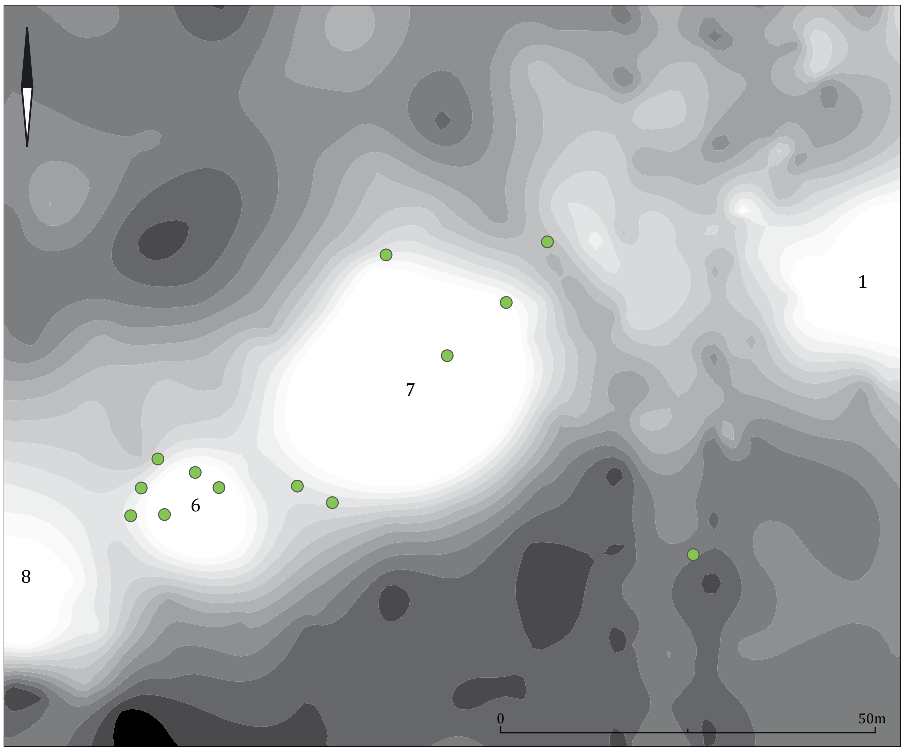


Fig. 16.4 Entrances of the sett (green dots), based on survey by Taken Landschapsplanning BV. Figure after van Wijk et al. 2009, fig. 6.31/J. van Donkersgoed.

16.4.2 Mound 6

The 2007 campaign is the third time the features of mound 6 were uncovered and the second time since 1964 -1965 that it was thoroughly investigated. The most recent excavation and the re-interpretation of the old find documentation yielded a number of new insights and in details depart from the previous interpretations (for what follows: *cf.* chapter 3).

It is difficult to unravel the sequence of building events at this location, particularly because the features were badly damaged. Apart from the later cart tracks that eroded a part of the mound here (chapter 15), the more recent digging activities of the badger also had their effect. A number of the entrances to its sett were located here (Fig. 16.4).

There are no indications that mound 6, like in the case of the other long barrow, mound 1, was built on a natural elevation. Rather, its eastern end is situated at the gentle slope of the natural elevation on which mound 7 would be built. However, when mound 7 was built, the monuments were not connected to each other as we thought during the 2004 fieldwork. The monument initially consisted of a mound surrounded by a post-setting. If both existed at the same time, or one preceded the other, cannot be found out anymore. The mound probably had an oblong shape. The round mound reported by the excavators of the 1960's may be the product of selective preservation (erosion of a part of the mound by the more recent dirt roads that cut through it). The mound was partly built of horizontally-placed sods with their vegetation side downwards (like in the centre of mound 7). Loose sand also seems to have been used. Cremation remains found in the mound in the earliest excavations, though in disturbed context, suggest that it indeed was a burial monument. The post-setting can be dated to the Middle Bronze Age B or the Late Bronze Age. The posts were not set out from one location, but their setting may not have been done in a haphazard way. If the double rows of posts at the outer end of the monument are indeed contemporary, then moving about the mound would have created some sort of shutter-effect. From one location

Fig. 16.5 The Zevenbergen in the Late Bronze Age. The long barrows can also date to the Early Iron Age. The excavation of 2007 is in green. Figure after Fokkens et al. 2009, fig. 13.01c/ P. Valentijn/ J. van Donkersgoed.

there is a clear paring of posts, from another place, one's view would be entirely blocked (see Fig. 3.7). Our excavation proved that people later dug a ditch around the location: the ditch fill cuts through the traces of a number of the (inner row of) posts. Like in the case of mound 1, this ditched monument can be classified as type Riethoven. C14-dated charcoal from the ditch fill yielded a dating in the Late Bronze Age. Pollen from the ditch fill is comparable to that of mound 7, but without *Fagus* (chapter 10). This suggests that it dates before the Iron Age and is older than mound 7.

We are dealing here with a monument that was re-shaped and probably re-interpreted for a longer period of time. In this respect, it is far more complex than that other long barrow, mound 1. The post-setting indicates that energy was spent in marking out something of which we may assume that it already was visible (a mound). Apparently, it was considered important to mark it out with posts as well. The digging of the ditch at a later stage, which must have taken place after some (or all) of the posts had decayed, indicates a different way of marking a boundary (much less visible from afar, only from nearby and in view of the loose sand texture probably not for decades).[97] Why was it necessary to do this when the monument already existed for quite some time? It is possible that it

97 The ditches that were dug around the reconstructed barrows at Oss-Vorstengraf, for example, are completely overgrown and hardly visible after eight years. Without maintenance, it is unlikely that ditches were visible markers for decades.

went with a new use of the location for a burial, but in view of the damage done to the original mound we cannot be sure of that. The re-interpretation of the original documentation of the parts of the mound in the 1960's does not support the view then held that the mound itself was heightened in several use phases. As to the motivation behind the different use phases of this particular monument, we can only guess, but as will be argued in the next section, there are indications that the natural elevation on which its eastern end was built, which later would become mound 7, had a special significance to Bronze Age communities using the Zevenbergen (Fig. 16.5).

16.5 The special significance of the natural elevation that would become the seventh barrow

Imagine someone who would approach the Zevenbergen from the low-lying area to the north of the Zevenbergen around the middle of the Middle Bronze Age. She would walk through an uninhabited area[98], pocked with alder carr and locally watery places. Going upwards (the edge of the tectonically lifted area, a few metres higher), our Bronze Age visitor would enter a small heath, perhaps only 300 m wide, and several hundred metres long. To the south, it was ringed by a mixed oak-lime forest. In places, there might have been small stripped areas where the wind was blowing away the sand. Approaching the Zevenbergen from the northwest, our imaginary visitor would recognize at least three round barrows ordered in a row: mound 4, 2, and 8, of which one (no. 2) may still have been marked with posts by that time. At the eastern end, two more elevations would be visible, one of which stands out by its size and round to oval shape (Fig. 4.34). This is the elevation that would become the basis for mound 7.

Imaginative as this opening may seem, it is based on the environmental research of the Zevenbergen as it is reported in this book (chapter 4 and 10) and on previous research (De Kort 2002; 2009). It is a way to emphasize something that was not – and could not – be appreciated in the 2004 research: the fact that the largest mound of the entire Zevenbergen barrow group is located on what must have been a conspicuous elevation with a shape that is not that different from that of an earlier barrow. During the Middle Bronze Age, visually, the natural basis of mound 7 may have looked like another hump in the landscape after mounds 4, 2 and 8. An important result of the excavations reported in this book, is that we now know that it was also the scenery for a number of activities during that period.

Only two quadrants of mound 7 were excavated, but they do give an impression of what the natural elevation looked like (Fig. 4.13-15 and 4.34). From southeast to northwest, the elevation had a gentle slope, with some highest parts at what is now the flank of the mound (Fig. 4.34; south of S 4 in trench 105). It rose to ca. 1.5 m when approached from the south (cf. Fig. 4.34). The elevation had a rather flat top that stretches out until halfway in the NE-quadrant 106 (Fig. 4.13). At this place there is a marked knick in the profile. This is the original lee side of the ridge, an area that in the Holocene was partly filled in with aeolian deposits (chapter 4). By the Middle Bronze Age, this mound was covered with heath (chapter 10). The entire mound had a somewhat oval to round shape. The southern side had the same form as it has now (though it is now somewhat raised by the sods), but it is particularly the northern side that was much steeper. It is this side that was much changed by the sod stacking.

98 This low-lying area was prospected with trenches but no prehistoric features were found (Fokkens/Jansen 2004).

16.5.1 Bronze Age pit

On the flat plateau, several metres south of what would become the centre of the barrow, a large pit was dug which was filled with soil and a large amount of charcoal. A C14-dating of a charcoal sample yielded a dating that after calibration is Middle Bronze Age A. Other such pits have not been found, although we should bear in mind that there are still two unexcavated quadrants that may conceal more such traces. Apparently, people made a fire here and buried the charcoal in this pit. Characteristic settlement features are wholly absent, so the fire perhaps had something to do with management of the heath, or was the camp fire of a shepherd. It may also have been related to one of the funerals that took place in the Zevenbergen barrow landscape at that time.

16.5.2 An eight-post construction at the west flank of the natural elevation.

Another possibility is that this pit had something to do with a remarkable eight-post corridor that was built at the west flank of the natural elevation. When this was built is unknown, but it must have happened before the construction of the Early Iron Age barrow (section 4.5.8). There were two parallel post rows of four posts each (Fig. 16.5). They may or may not have supported a roof. It is at least possible that they did, for they were dug in rather deep into the ground. They form a corridor that is wide enough to let one man or woman walk through it. An intriguing detail is that there are traces of a ninth post at the east side that blocks the corridor that is formed but the two post rows. This means that the structure was ostentatiously blocked at some time.

In section 4.5.8, we argued that our eight-post construction has close similarities to corridors or *allées* as they are sometimes found at Middle Bronze Age barrows. This includes the blocking post, which already by Glasbergen was seen as an integral element to such structures (1954b, 153-155). It appeared to us that the mound 7 corridor particularly has affinities to a module in the much larger Bronze Age *allée* that was found underneath the nearby mound of the Early Iron Age chieftain's burial of Oss (Fig. 4.32), pre-Iron Age structure that has been interpreted as related to the original Middle Bronze Age mound underneath the chieftain's burial of Oss. In general, these corridors are associated with activities related to funerals or veneration of ancestors. They mark out a prescribed route towards a specific barrow, but usually end a couple of metres in front of it. The blocking post might function as the visual marker indicating that this route was no longer to be taken.

Our structure is much smaller than all others, and – although found underneath a true barrow – it was built at a moment when that barrow did not exist. In a previous popular scientific publication, this structure was interpreted as related to the Early Iron Age funeral of the deceased buried underneath mound 7 (van Ginkel 2009). Although we still do not have decisive dating evidence, we are now of the opinion that it is more likely that the eight-post structure is earlier, and dates to the Bronze Age. Arguments in favour of this view are the similarities in form and structure between our corridor and those that can safely be dated to the Middle Bronze Age, and the fact that our construction does not lead to the centre of the Iron Age mound at all. But where did the corridor lead to then? There are two options. The first is that the corridor leads to the plateau at the top of the natural elevation. In that case, there might have been a relation to the MBA A activities to which the pit with charcoal testifies. The second option is that the corridor leads down slope to mound 6. It has the same orientation as mound 6 and it is broadly (but not precisely!) aligned to the main axis of that monument (Fig. 16.5).

16.5.3 A natural elevation flanked by two long barrows

An additional observation is that the natural elevation that would become mound 7 became flanked by two long barrows in the course of the Late Bronze/Early Iron Age. Mound 1 cannot be more precisely dated than that, but for mound 6 there are arguments that it predates the building of mound 7 (chapter 3). On the one hand, the construction of two long barrows can be seen as the continuation of a barrow row as it emerged during the earlier part of the Middle Bronze Age. On the other, the forms contrast to the round mounds that stood there for a long time. In the case of mound 1, it seems as if the choice for an elongated instead of round monument has to do with the peculiarities of the local environment (the presence of an elongated, small ridge; Fig. 16.3), but there are no indications that this is also the case for mound 6. For the latter, the decision to build a long instead of a round barrow thus may have been a deliberate choice. On the one hand, this indicates that the Late Bronze Age/Early Iron Age community saw itself as connected with the older barrows (maintaining the existing order of a barrow row). On the other hand, the choice for extending the row with a monument with a deviant shape suggests that they also defined themselves as different from their forerunners.

In the first publication (Fokkens *et al.* 2009), it was suggested that there was a considerable time in between the construction of the round Bronze Age mounds and the long barrows. The new insights in the general chronology of Bronze Age barrows by Q. Bourgeois (in press) confirm this idea. In the Low Countries as a whole, for the period between ca. 1400 and 1100 BC, barrow building seems to have decreased, only to revive with the start of Late Bronze Age urnfields.

So, somewhere in the last phase of the Bronze Age, or even the start of the Early Iron Age, two long barrows were built. Both are a continuation of the barrow row and both flank a large natural elevation in between. It is hard to think – but impossible to prove! – that the large elevation in between did not play a part in the narrative Late Bronze Age/Early Iron Age people had for this by then already ancient barrow row.

In conclusion, we argue that the natural elevation that would become mound 7 may already have been seen as an important place in the barrow landscape by the Late Bronze Age/Early Iron Age communities, and perhaps even as remains of an ancestral barrow itself.

16.6 Events immediately preceding the construction of a monumental burial mound

16.6.1 Setting: a natural elevation on a heath

A pollen diagram made on the basis of pollen sampled from the soil underneath mound 7 shows that the natural elevation had been covered with heather vegetation for some time before the barrow was raised (see chapter 10 and Fig. 10.1). A dip in the heather curve may be ascribed to an intensification of grazing by livestock including cattle, later followed by a lowering of grazing pressure. Before the barrow was built, there was a heath ringed by woodland, the high percentages of hazel suggesting long stretches of forest edge. Whether the heath was an island in a forest or a more open landscape with patches of open forest remains unknown.

Fig. 16.6 The Zevenbergen in the Early Iron Age. Position of posts in post alignments and in post circle around mound 3 are given in schematized form. Dots represent cremation graves. The attribution of the long mound 1 to this phase is possible, but it can also be older. The same is true for the corridor underneath mound 7. The excavation of 2007 is in green. Figure after Fokkens et al. 2009, fig. 13.01c/P. Valentijn/J. van Donkersgoed.

A comparable heath was present at only 250 m distance around Oss-Vorstengraf, suggesting a mosaic-like landscape of small heaths alternated by patches of forest. This is a very different kind of heath than the one that grew here during the historical period (see below). The heath is entirely anthropogenic and it has been argued that grazing by cattle and sheep in particular was the best way to maintain it (chapter 10). As the heath existed here for a long period of time (Middle Bronze Age, Late Bronze Age/Early Iron Age, and Early Iron Age) it must have been a structural, *longue durée* element in the local landscape, its maintenance must have been among the main tasks of local communities which were shared and organized between different groups (of those whose deceased were buried here?). Although we tend to pay a lot of attention to the role of this area for funeral practices, it was also a structural part of the economic zone of local agrarian societies, whose dwellings and agricultural fields probably have to be looked for in the area immediately to the south and east of the Zevenbergen (chapter 2). The large natural elevation on this heath, flanked by one or two long barrows, was selected for a ritual that would lead to the construction of the monument that is central to our book: mound 7 (Fig. 16.6).

16.6.2 Selecting and preparing a ritual location

Mound 7 was not just the location where a deceased with a specific history, role, and significance was buried. It was also the place where his body was burned (chapter 5). During the Late Bronze Age/Early Iron Age urnfield period in the southern Netherlands, most of the cremation graves we have do not seem to have been the location where the burned bones were also buried (*cf.* Theuws/Roymans 1999). In this way, mound 7 is an exception.

A pyre could have been constructed on many locations, and the place where they did it in this case – at the northernmost part of the plateau on the top of the natural elevation – may not have been the best choice for purely practical reasons. It was situated at an exposed location. If there was any wind, it could have made the cremation process harder, and would also have hindered the mourners by blowing up the loose sand that was by that time lying at the top (as we will see below, the top was stripped bare of vegetation before the burning; during our excavation we were also hindered by dust and sand blowing in our face if the wind started to blow).

There must therefore have been particular reasons to choose this location for the cremation. We already suggested that it may have had something to do with a special meaning that was attached to this large natural elevation (memory of its previous history, the *allée* or what happened here in relation to mound 6, and/or the fact that it more or less had the shape of a large barrow). Another reason may be the prominent, visual qualities of the location. The pyre was not just located at the top of the mound, but particularly at the northern part of it, in front of a knick in the profile of the elevation. The entire scene of burning would have been visible to a public standing around the mound, or at the top of the older mound 8, or even from much further in the heath.

The location seems to have been prepared for the occasion: the zone where we find the pyre debris was stripped of vegetation. This may have been part of the ritual or something that was done to prevent fire from the pyre from spreading to the (dry?) heather.

We argued that what we have called "the central find assemblage", a large charcoal spread containing (burned) bronzes and burned bones were the remains of the pyre measuring 5 by 2 m. Analyzing the finds and their spatial organization in chapter 5, 6, and 7, we arrived at the following conclusions concerning the preparation of the pyre.

A pyre was built at the northern part of the flat top of the elevation. Charcoal of oak, ash, and one fragment of willow were retrieved, the overwhelming majority being oak (94% in weight). As oak and ash are both calorific and exothermic woods they probably are the most resistant pieces, other wood species may have been used as well but may have been reduced to ashes. Oak and ash are likely to have been collected in the local forest ringing the heath, willow was to be found in the alder brook forest at the lower lying wetter parts just to the north of the Zevenbergen. The large oak beams in V 1001 and V 1003 (Fig. 5.2) were probably foundations of the pyre. We argued that the pyre was built at the location of our block V 1000 and the northern part of block V 1001 (Fig. 5.6, A). A remarkable element among the burned wood is a piece of burr wood. These are not very common and known to be used for making wooden bowls. However, there are no definitive indications that the piece in our pyre debris was worked.

The exact shape of the pyre cannot be reconstructed anymore, but we do know that it was not built over a pit, but on flat unworked ground.

16.6.3 Dismantling a wagon/yoke

The deceased was buried with a number of special artefacts that apparently were seen as inextricably linked to his social role. 1080 small bronze objects were found, at least 538, but probably 983, of them represent small studs (Tab. 7.1). There are nine large bronze studs (section 7.5; Fig. 7.13), at least one bronze hemispherical sheet-knob (section 7.4; Fig. 7.9), two complete bronze rings with round cross-section (section 7.7; Fig. 7.8 and 7.9), and six fragments of bronze rings with square cross-section (section 7.2; Fig. 7.2 and 7.4). In addition to this, one piece of indeterminable iron (section 6.4; Fig. 6.12) was found as well as two small pieces of burned, decorated bone (section 6.3; Fig. 6.8).

An important point for the analysis of those finds is that the central find assemblage was hardly disturbed in later times, and could be lifted in several blocks with soil and all, which were meticulously researched in a lab.

Bronze studs of this type are very rare in Northwest Europe, but are recorded for a number of rich graves of the Hallstatt C period in southern Germany, where they are known to decorate yokes and horse-gear. The majority of our small studs have straight legs, which were used to decorate wood, leather or a combination of both. Our studs were probably produced in series using a rather simple method (section 9.3). Metallurgical research suggests that the whitish colour they have now is due to the fact that they were tinned in order to create a silvery appearance. Residue is preserved in the head of some studs, but unfortunately it could not be determined what is stuck inside them (chapter 11). Although disturbed by the burning and re-shuffling of the pyre debris by the mourners, detailed analysis of remains in blocks shows that most studs decayed while they were still inserted into the organic material. Rows of studs often fossilized together through corrosion, even though the organic material itself almost completely disappeared. Fine-grained analysis of studs *in situ*, particularly of V 173, by far the largest cluster of finds (reported in chapter 7; Fig. 7.22) shows that studs were organized in geometric patterns of straight lines and groups of three, but also in rather arbitrary clusters. Small studs were dominant, but large studs (always with their legs folded) were part of the same decorative pattern. For these decorative patterns, we found parallels in Central European Hallstatt finds. The majority of the small studs have straight legs. V 173 represents a unit that was shoved aside after the burning while the stud-decorated object(s) still had coherence. The two complete ring fragments behind it (V 165 and V 218) must have been part of it. A ring of studs in V 173 (Fig. 7.30) and beyond it (V 176) may have decorated a wooden knob as is known from Hallstatt C yokes (section 7.7). As to the question what it was these studs decorated, we put forward several hypotheses (section 7.8), all of which have their pros and cons. The most likely scenario in our view is that we are dealing with the remains of leather panels of a yoke decorated with many small and a few large bronze studs and with wooden knobs of a yoke, in combination with leather horse-tack that incorporated bronze rings V 165 and V 218. These must have been dismantled from a yoke and horses and carefully placed along the pyre. Of the entire wagon/horse-gear assemblage, only parts were selected to be burned at this location. Missing are wagon decorations, the axle-caps, horse-bits and the like. But there is also no sign of other parts we usually find in association with horse-gear in Hallstatt C graves in the Low Countries, like swords, situlae, axes and personal adornments. Only a very specific selection of elements was placed on the pyre and left there.

16.6.4 Burning the deceased

A few burned bone fragments, one of which is a large fragment of a human fibula, show that the deceased was burned at the location of our block V 1000/the northern part of V 1001. The white colour of the bones shows that he (it was probably a "he", see below) was burned at a temperature of ca. 800 °C (chapter 12). The cremation must have gone well, but the large amount of remaining charcoal chunks make clear that something prevented the pyre from burning to ashes as would normally have happened. Perhaps a wind picked up at the end, or it started to rain. Many bronzes do also show impact of fire. This is particularly the case for those located in V 1000, but much less visible in the case of the huge stud cluster V 173. This coherent unit – studs still affixed into their original component – may therefore have been located along or at the rim of the pyre.

16.6.5 Picking things out, leaving things in place

When the fire was out, the mourners searched through the remains and picked out certain elements: cremated bone remains in the first place, but also bronze elements and parts of the decorated bone. If it was their intention to collect all human bone fragments, they may have overlooked several small bone fragments and the two small fragments of the burned decorated bone object, but it is hard to accept that they simply overlooked the large fibula fragment. The same is true for the fragments of bronze rings with square cross-section. The large fragment V 177 (Fig. 7.2) on top of block V 1000 was broken, but this cannot have been the result of the burning. It must have been broken by people, before or after the cremation. Its missing parts were not found and in this case it can be ruled out that this is because they were overlooked by the excavators or got lost due to later disturbances. The first is unlikely because all soil here was lifted in blocks and X-rayed and searched through in a very detailed way in the Restaura laboratory. The second option can be dismissed because there are no disturbances at this location. So people not only picked out human bones, they also picked out – and broke on the spot? – fragments of other objects.

It is just as important to note that they not only picked things out, they also *left other things in place*: fragments of rings, and a coherent set of what we presume were stud-decorated elements of a yoke and associated horse tack were left. By the time of excavation, the dense cluster of studs V 173 immediately caught the eye after the covering sods were removed and this must only have been stronger when the material still had its original whitish glimmer. By its coherence and position, we reconstructed that V 173 was one intact piece of stud-decorated organic material with associated rings that was shoved aside (for the northern edge, studs were in intact position but lying with their legs up (Fig. 7.40), indicating that the organic sheet here got folded). One large chunk of charcoal seems to have been displaced as well (see Fig. 5.2). A smaller, very comparable piece containing *in situ* studs probably placed on wood is represented by V 176. This one was found ca. 1 m northwest of V 173. The spatial ordering of the burned wood indicates that it was partly displaced and heaped after the searching by the mourners. The southern part of V 1001 represents wood shoved to the south and V 1003 material worked and displaced to the west.

16.6.6 Burying the deceased

Some 30 cm south of the charcoal spread, in a small pit, a complete *Schräghals*-urn was dug into the decapitated soil in a small rectangular pit that is almost just as deep as the height of the urn (Fig. 4.21 and 6.1). It was half-filled with cremated bone. Although one side was damaged by bioturbation (probably by the badger tunnelling past it), the main body of cremated bones was intact. These represent the remains of one male individual in the age of 23-40 year (chapter 12; Tab. 12.4-6). There were no pathological conditions recognized and animal bones and grave gifts are absent. The fill of the urn was collected in different levels, but no form of sequencing could be determined. It is remarkable that there were relatively few skull elements. The bones from the urn have the same colour (*i.e.* were exposed to the same temperature) as those from the pyre debris along which it was situated. Also, there are no double elements. Although there is no definitive proof, it seems very likely that this urn contained the remains of the deceased whose body was burned on the pyre. The fact that the urn contained only 640 g of bones cannot be explained by the damage done to the urn but must be due to the fact that only a part of the collected bone was deposited in the urn. Even if we add up the bones from the pyre to those of the urn we still have too few bones to make up an entire skeleton. This means that some bones were picked out of the burned out pyre, whereas other were left lying there, and of those picked out only a part was put into the urn. The mourners must have taken the other (a.o. skull) fragments with them. We can only speculate what they did with it.

The urn was dug in the soil, but very undeep. It is located just outside the pyre debris and almost exactly in the centre of the sod-covered barrow that would be built on top of it. We therefore assume that this was the man whose remains were associated with the special stud-decorated organic material that was deposited along the pyre remains. His remains were placed into an urn that is very similar in fabric and form to urns placed as secondary graves in the Bronze Age mound 2 and probably also in mound 8 (chapter 6), and centrally in a very small urnfield grave elsewhere at Zevenbergen (mound 10). All this must have happened during the Early Iron Age. Arguments for this dating are the type of urn and the small bronze studs, three C14-datings of wood from the pyre debris and one C14-dating of cremated bone from the urn (Fig. 4.36). It is also in accordance with the pollen samples from the surface of the mound, which because of the presence of beech (*Fagus*) date to the Iron Age rather than Bronze Age.

16.6.7 Treating things and human remains in the same manner

When the fire at the top of the mound went out, the funeral ritual went on. The mourners collected the largest parts of the bones, but left a few in places. One part of the pyre more or less haphazardly came to be scattered on the western part of the centre (V 1003 and V 1004). If there were originally any bronzes lying here, all of them must have been taken out. One remarkable thing was left – an unidentifiable piece of iron at the westernmost end of the charcoal spread. This is the only piece of iron found in the entire centre. A coherent and largely intact stud-decorated organic panel(s) (V 173) was shoved aside and came to lie at the western end, with two associated rings (possibly attached to leather horse tack). A smaller part of what probably was also part of it, but which may have been broken or torn due to the fire, came to lie at a heap of material at the northern end (V 176). Bronze was picked from the centre of the debris (V 1000) and at least in one case deliberately broken (V 177). The other fragments of burned rings were also all found here and none of them can represent material in their original setting. So walking from west to east, one would see material scattered in all directions in the west, a heavily searched-through centre, with conspicuous bones and large fragments of rings still in place, to a dense and almost intact cluster of heavily stud-decorated organic material *in situ* in the east. The centre was swept through, but not cleaned up – V 173 and the rings represent material that was deliberately and carefully put aside: after its transformation by the fire it was meant to stay here, just like a selection of the cremated bone which was left at the pyre and buried in the urn. One could say that after transformation, objects were being treated like the remains of a body or vice versa (*cf.* Brück/Fontijn in press). Of other things we know that they must have been picked out but were not re-deposited, at least not at the location we excavated (like the missing bone fragments or the other fragments of the large ring V 177). We can only guess what people did with them and it is also interesting that although the urn was placed next to an unusually rich assemblage of burned bronzes, not a single piece of bronze was put in the urn.

We conclude that, even though there are many things about these actions we do not understand, every decision to pick things out or leave others lying, might have been meaningful here. The pyre debris was not a bunch of meaningless leftovers, but a collection of material, important in its own right.

16.7 Building mound 7

The significance of the pyre remains and the urn also come to the fore in what was the next step in the funeral ritual. The large spread of material (undoubtedly considerably more spread out by the searching and moving of stuff than it was immediately after the burning) was covered with large sods. This process ended up in raising of the original elevation with at least 1 m and smoothing its irregular form into that of an impressive, monumental barrow.

16.7.1 Cutting sods

Sods were cut from the immediate surroundings of the mound. They look very similar to the soil they cover and have the same pollen spectrum as the surface underneath the mound (chapter 10). Analysis of the soils confirms we are dealing with the same soils (appendix 2). Some sods (the alder rich examples) were probably cut nearer to the wet depressions (in the eastern part of the Zevenbergen). As at least 815 m^2 of heather had to be cut for building this mound (chapter 10), we expect that heath was cut in alternating strips to prevent serious damage being done to the environment. If this was not the case, one continuous denuded surface must have marked the heath. Such a bared part of the land takes 40 years to recover. In the mean time, further deflation and drift sands may occur. If mound 3 was built not long after (or before) mound 7, it may have become more important to cut the sods in strips. Evidence for aeolian deposits at the Zevenbergen show that sand deflation took place during the Middle Bronze Age (van Wijk *et al.* 2009, 115).

Only in the centre of the mound, sods were placed in such a way (neatly stacked horizontally) that it allows us to see that we are dealing with sods of rectangular shape. Two kinds of sods were recognized: A-E sods and B sods. The former have the black vegetation layer and the eluvial horizon of the Humus Podzol, the latter also have some part of the B horizon underneath the E. The thickness a sod could be cut was determined by how the roots penetrated. A-E sods need not necessarily be thicker than B sods (Fig. 4.25). Most sods are of the A-E variety. All sods were individually drawn both on profile sections and on the horizontal levels. It is usually not so easy to measure length and width exactly, as sods are usually not positioned in such a way that length and width can be exactly determined (section 4.5.5). Measuring their thickness and length shows that there was variation, but lengths are mainly between 50 and 70 cm. Width is very hard to determine, and short "lengths" (20-35 cm) may well represent "widths". Thickness ranges from 10 to 45 cm. Sods must have been heavy; 5 to 10 kg may be a rather normal weight. Stretchers or planks must have been used to transport them. Spilt sand (from the grey E horizon) found at the original surface underneath the sods might indicate that sods were in these cases handed over with vegetation side upwards, spilling some sand from beneath, only to be turned upside down at the last moment (Fig. 4.23).

16.7.2 Stacking sods

Most sods were stacked with their vegetation side down. This was regular practice in both the Bronze Age and Iron Age, and it has been observed in burial mounds all over the Netherlands (*cf.* van der Linde/Fontijn 2011). On flat parts like at the centre of the mound, sods were stacked horizontally. However, this was very neatly done for the sods that cover the remains of the pyre, and the bronzes, but more irregularly at the flat part south of it (the corner of quadrant 105; Fig. 4.13). As the large chunks of charcoal or the stud decorated material must have created irregularities on the surface to be covered, it is all the more interesting to see how neatly ordered the sods in the centre are. Here, up to four layers of sods stacked horizontally could be recognized. The smallest sods recognized are situated in this part of the mound. It gives the impression that the centre was treated with the utmost care.

16.7.3 Organizing the work

Although only two quadrants were excavated, a rather good impression was gained of how the sod stacking was organized. There are differences between the way of working on the flat top (centre 106 and 105) and the northern slope (106), and the stacking of sods on the western and southern slope (105).

Two actions were essential in creating the smooth mound, and we cannot see which was done first. One is that the depression north of the small knick (the original lee side of the elevation) had to be filled in, in order to create a flat basis for sod stacking from the northern centre to the northern slope. This depression was flattened with sods that were not ordered in a rather arbitrary way (Fig. 4.28). The other action is that the chunks of charcoal and bronze had to be covered with sods. As these also formed irregularities on the otherwise flat surface, a flat basis had to result from it. The neat way in which sods were stacked here in up to four layers shows that they successfully accomplished this. The best way of working seems to have been to first fill in the northern depression, thus "evening out" the irregular surface and creating a flat base layer for further sod building. Then, the base layer of sods was lain at the northern part of the centre, over the pyre debris.

People then went on to raise the sods in the centre and proceeded to stack sods along the northern flank. When they reached the slope, sods were placed slantwise. This must have been done in order to create a gradual, smooth flank, instead of a blockwise transition. We could observe that the horizontally placed sods in the centre and the diagonally placed sods at the slope intersect (Fig. 4.13 and 4.18). Thus, they were built in one session and as part of one system. The height to which the centre was raised with horizontally stacked sods must have served as reference point for the height at which the sods at the flanks were piled up. Apart from their orientation in height (horizontal, diagonal), there are also different ways to place sods alongside each other in the horizontal plane. At the northern slope of the mound, it is clear that the majority of sods were oriented parallel to the radius of the mound. Summing up, it is suggested that, perhaps after an initial levelling of the northern depression, sod stacking proceeded from the centre to the northern slope in one uninterrupted system.

The way of working at the southern and western slope was slightly different, and we have indications that two work systems met here. The southern and western slopes did not have awkward depressions to be filled in, but rather, the original mound already had a gradual surface here. As a matter of fact, most of our trench 105 actually had a rather flat base with even some higher bumps in the south than in the centre (*cf.* Fig. 4.34). Using the preferred height of the barrow in the centre as reference, the southern and western flanks could be gradually filled in, using the already higher basis here. As a matter of fact, we indeed see that much fewer sods were used here to raise the original elevation and a very gradual transition from sods to original flank could be constructed here (Fig. 4.13 and 4.15). Interestingly, at the westernmost end, most sods had their A horizon upwards (Fig. 4.26).

The sequence of activities in our trench 105 was probably as follows. In the corner of the quadrant, sods were still placed more or less horizontally as an extension of the way of working started on top of the pyre debris. Apparently, after the basal layer of sods was laid out, in the southern part sods were less neatly stacked than in the northern part. This somewhat irregular ordering continues until the slope is reached, but then changes. In one location, we see a transition to sods placed slantwise, built against a "core". In one place, we see an irregularity in the sod ordering, where a depression in the built-up sods seems to have been filled in later (Fig. 4.14). This suggests that two ways of working met. What is also interesting to note is that in quadrant 105 sods are much more irregularly ordered in the horizontal plane. Unlike in the NE-quadrant 106, in 105 sods tend to be placed perpendicular to the radius of the mound. In conclusion, the organization of sods in 105 suggests that it was either added at a later stage, or carried out by a different work group.

It is difficult to say anything definitive on the way in which the barrow-building was organized as only 50% of the mound was excavated. The following conclusions can be drawn:

From the first moment, there must have been a generally accepted idea on what the barrow should look like. The sod stacking in the centre must have started first and the height reached there served as a reference for sod stacking at the flanks. There must have been a clear general agreement on how to proceed and one or a few people who saw to it that everything went according to plan.

The desired shape was to create a round mound that followed the original contours of the elevation underneath it, but adjusted to give it an even, smooth shape (infilling the northern depression). The flanks of the barrow were to have a smooth, almost invisible transition to the flanks.

The southern half was built at a later stage or by a different work group. The latter option is the most likely, as otherwise the work would have taken quite some time.

Once finished, the barrow must have been somewhat higher than it is now (at least 30 cm was lost during more recent disturbances like forest ploughing). It was not marked by a peripheral structure like a post circle.

Sods at the western flank all have their A horizon upwards. It is possibly that this originally was true for all covering sods, in such a way creating a barrow that even just after its construction became part of the heath environment.

Mound 7 actually was a mound on a mound. A natural elevation was opportunistically used to create a maximum of visual effect. The people who built mound 3, which is located on a flat basis, must have cut many more sods to create a mound that looks the same as mound 7.

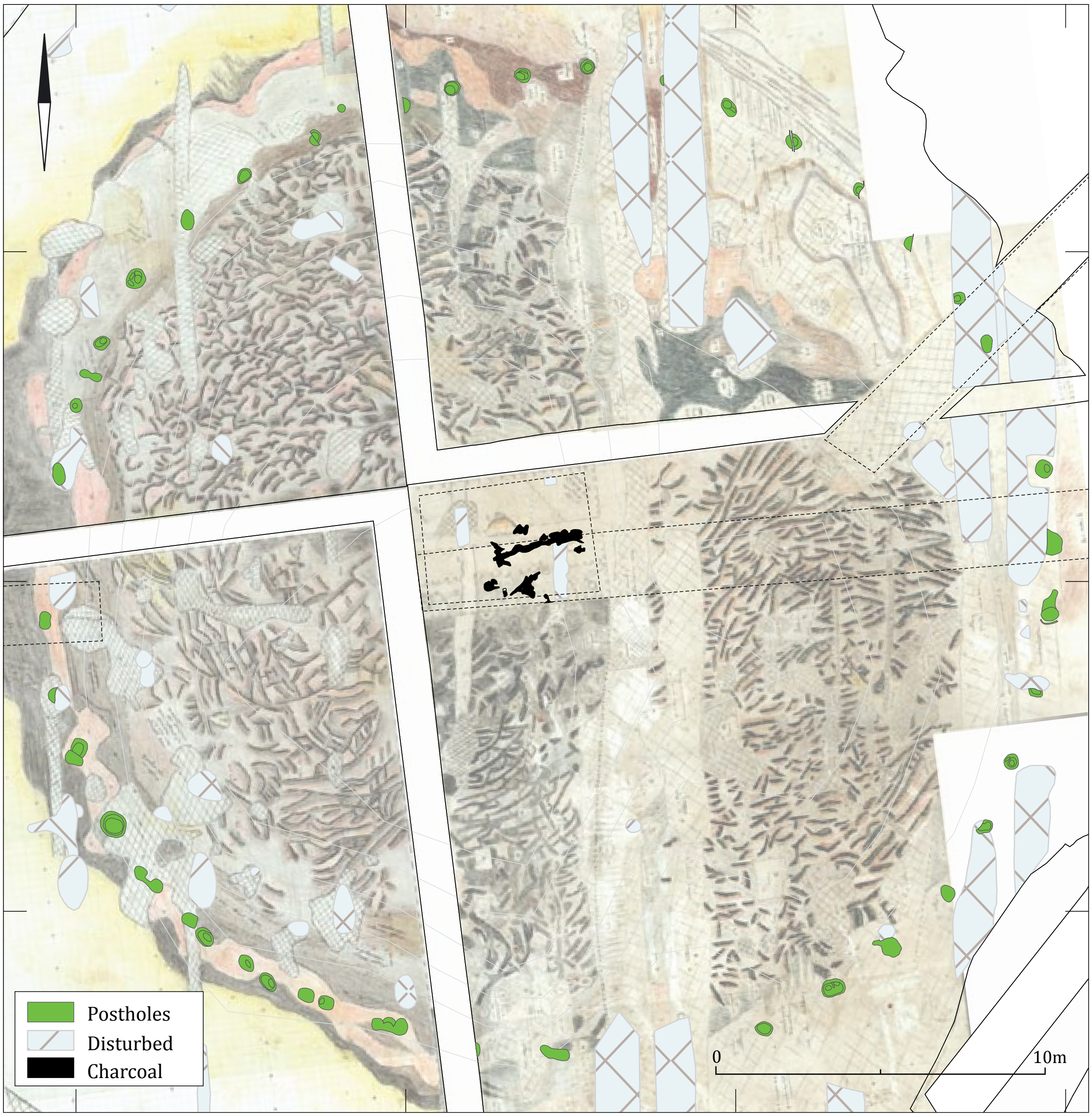


Fig. 16.7 Mound 3. Compilation of field drawings of sods, the wood in the centre (black) and the traces of the post circle. Figure after van Wijk et al. 2009, fig. 6.14/J. van Donkersgoed.

16.8 Mound 3: a remarkable companion to mound 7

Mound 7 was not the only huge mound built at Zevenbergen. It has a counterpart in another Early Iron Age mound, no. 3 (Fig. 16.7).

A large barrow measuring 30 m in diameter, with a current height of 60 to 80 cm high (but originally higher than that). If we leave the small urnfield graves no. 8 to 11 out of consideration, mound 3 is the only barrow that is situated outside the barrow row. It was built along the northern edge of the high lying area, but on a flat area that is slightly lower than the ridge on which mound 7 was built. Its position in the landscape has similarities to the nearby chieftain's burial of Oss , that other huge barrow: it is positioned in such a way that it overlooks the low lying area to the north. Its original vista can no longer be imagined, as it is now cut off from that area by the highway that is much higher (Fig. 16.8), completely reversing the natural relief.

Fig. 16.8 View on the south-west quadrant of mound 3 in 2004. One can see the traces of the post circle in front. The highway at the background inverts the original relief. In prehistory, from here one would have looked at lower lying grounds. Figure after van Wijk et al. 2009, fig. 6.18.

Like mound 7, mound 3 was built on a heath in one phase with heather sods. Like in the case of mound 7, in the centre burned wood was found. One of the larger examples was of an oak that originally had over 180 year rings. Associated with it, fragments of two iron and two bronze objects were found. There is an iron pin and a pin-like object of unknown type, one completely burned piece of bronze, and one broken and decorated piece. It is unclear what we are dealing here with, but in shape it has similarities to a bronze sword (hilt-blade transition). The decoration is totally without parallel though. In addition to this, there is one piece of cremated bone which has been determined as human. Like in the case of mound 7, we see broken, transformed and incomplete pieces of a human and of objects together with wood. The oak fragment may even represent a quite special tree, judging by its age. It has been interpreted as an extreme *pars pro toto* grave (*cf.* Fontijn 2002, chapter 9). Apart from these objects in the centre, no other grave was found. C14-datings of the wood demonstrate that we are dealing with an Early or early Middle Iron Age barrow (between 680 to 400 cal. BC; van Wijk *et al.* 2009, 102). This means that it dates to the same period as mound 7 and the chieftain's burial of Oss, although it cannot be seen which of these mounds was built first. The centre was covered with horizontal sods, just like in the case of mound 7.

There is an indication that these sods were cut at some distance from mound 3, as the pollen spectra of the sods differ from those of the surface underneath the mound (van Wijk *et al.* 2009, 101). We had comparable difficulties in measuring the size of sods as we had in the case of mound 7 (chapter 4)[99], but 66% of 74 measured sods are reported to be between 40 and 60 cm (van Wijk *et al.* 2009, 98). This fits in well with the measurements we have for the sods of mound 7 (*cf.* Fig. 4.24). For its thickness an average of 8 to 18 cm is given (van Wijk *et al.* 2009, 98-101). For mound 7, the majority of sods have a thickness between 17 and 23 cm, and there are still quite some sods that are thicker than that (Fig. 4.25). In mound 3, A-E sods dominate, but there are also B sods. Just like in the case of all other mounds, most sods were placed with the A horizon downwards. A detailed assessment of the construction method as we did for mound 7 was not done here, although all sods were drawn in the same way as in mound 7. A few

99 This mound was excavated and drawn by drs. C. van der Linde and drs. R. de Leeuwe. Both were also involved in drawing the sods of mound 7, and brought their mound 3 experience with them to mound 7.

observations may be relevant. We are here not dealing with a mound built on a natural elevation: the ground was flat. This means that particular problems that were relevant for mound 7 (like the depression that had to be filled in) did not matter here. Here, we also see that sods in the centre were stacked horizontally (Fig. 4.16), and more diagonally to the outer end of the barrow. Against a core of horizontally stacked sods, diagonally placed sods were laid, creating the desired slope in the profile of the barrow (*cf.* van Wijk *et al.* 2009, fig. 6.19 profile section at the top). This way of working is probably not just characteristic for the Zevenbergen, but might represent a "best practice" known to communities in other regions of the Low Countries as well. For example, we documented a similar way of sod stacking (horizontal in the centre, diagonal against a core) at two Middle to Late Iron Age mounds we excavated at Apeldoorn- Echoput (mounds 1 and 2; Bourgeois/Fontijn 2011; van der Linde/Fontijn 2011). More analysis is needed to find out if this mound was also built by different work groups or at different stages.[100] Like in the case of mound 7, this mound misses at least 30 to 50 cm of its top. De Leeuwe (2007, 214) assumes that it was 1 m high. If that were the case, some 2350 m^2 of heath must have been cut for sods (De Leeuwe 2007, 210; 214). This is considerably more than the minimum of 815 m^2 heath required to provide the sods to build mound 7. So, although mound 3 and 7 are comparable in size, for building mound 3 an area needed to be stripped that is much larger than in the case of mound 7.

The barrow was visually marked with a post circle (Fig. 16.7), something that is absent around mound 7, and rather rare for burial mounds from the Early Iron Age. We will come back to the significance of this mound in relation to mound 7 in section 16.13.

16.9 A small (Early Iron Age) urnfield?

Another Early Iron Age addition to the ancient barrow landscape is a group of damaged ring ditch features: no. 9 to 12. Only in the case of no. 10 and 11, the ditches surrounded a cremation grave, one of which (no. 10) could be dated to the Early Iron Age by the typology of the urn (Fig. 6.4). No. 11 contained the damaged remains of an urn which on the basis of its fabric could be dated to the Late Bronze Age or Early Iron Age (van Wijk *et al.* 2009, 126-131). Nos. 10 to 12 lie north of mound 2 and south of mound 3 (Fig. 16.9). In no case, clear traces of a mound were recognized. If the role of the post alignments was to compartmentalize the barrow landscape, then these three small ring ditches are situated in one such compartment (by post alignment P3 in the west and P1 in the east. The other ring ditch, no. 9, was badly damaged, but by its form we assume it once defined another small barrow. This one, then, would be the only one situated outside that "compartment". As we are in no position to reconstruct the finer chronology of the post alignments in relation to the smaller Early Iron Age graves, we wish to leave out a discussion on issues of spatial ordering as suggested above, until more precise dates become available.

These ring ditch structures are a remarkable element in the entire barrow landscape. Although we lack definitive evidence that they were all graves, two of them certainly were, and at least one of them can be safely dated to the Early Iron Age, the same period in which two huge mounds were constructed. Did the difference in size matter? We suppose it did. We see a similar contrast in size at the chieftain's burial of Oss, where the largest mound of all is surrounded by a comparable loose

100 An interesting pilot study is to be found in De Leeuwe 2007.

cluster of other Early Iron Age graves (Fig. 1.14). It seems that in both locations very large round mounds and small ones were positioned next to each other, indicating at least a ceremonial or ritual hierarchy in the landscape.

16.10 New burials in ancient mounds

We have now seen that people buried the dead in small ring ditch surrounded graves and under two very large mounds. There is a third category of graves that mattered here as well. At least the remains of two Early Iron Age dead were interred in urns in the mounds of Bronze Age barrows nos. 2 and 8 (Fig. 16.6). If there was also such a secondary grave in mound 4 remains unknown, as its mound was very damaged. At the time of burial, both mounds were already more than 500 years old. By this act, these old mounds were not only practically, but also conceptually revived as burial locations. It has been argued that the interment of the urn central in mound 8 went hand in hand with the digging of a ring ditch around it (van Wijk *et al.* 2009, 125-126), in line with the ring ditch structures that by that time were constructed at Zevenbergen. This view, however, is not supported by the pollen from that ditch (De Kort 2009, 163).

These urn graves, the graves surrounded by ring ditches like no. 10 and 11, and the central grave of mound 7 all represent events that took place in the same period. The Early Iron Age urns in mound 2, mound 7, and mound 10 have a similar fabric and comparable shape. The same holds true for pottery sherds that lack a clear context, but were found close to mound 8 (chapter 6). The urn from mound 8 is different, but there is no reason to doubt that this one belongs to the Early Iron Age as well. During the Early Iron Age not only new graves were constructed (the ring ditch graves and mound 3 and 7), much older monuments were integrated as well. Very conspicuous elements of the Iron Age re-appropriation of the Zevenbergen barrow landscape, already hinted at before, are the post alignments. It is to them that we must now pay attention.

16.11 Dividing the barrow landscape: the role of monumental post alignments

One of the most special discoveries of the 2004 campaign are the post alignments found all over the Zevenbergen barrow landscape (Fig. 16.6 and 16.9). There were no new post alignments found in those parts of the site excavated in 2007. The Zevenbergen post alignments have been discussed in detail by two of us before, and for that reason we will only briefly summarize the main conclusion (Fokkens 2012; Fokkens *et al.* 2009; van Wijk *et al.* 2009). The post alignments are all single, widely spaced structures. In places, they were flanked by small four-post constructions. They are thought to be part of a complex of alignments dating to the Early Iron Age, although this date cannot be definitively substantiated (Fokkens *et al.* 2009). Based on this assumption the different features encountered give us a distinct insight of the spatial organization of the environment of a (older) barrow group and urnfield dating to the Early Iron Age. In general the structures can be characterized as singular post alignments (with a two-post extension in two alignments) and solitary four-post structures (Fokkens *et al.* 2009, 131-139). The five singular alignments differ strongly in size (116 m, 58 m, >18 m, >17 m, and 8 m) and orientation. The two four-post structures look very comparable, measuring 1.8 by 1.9 m and 1.3 by 1.3 m. Fokkens *et al.* (2009, 136) stated that these structures are an integral part of the cemetery and therefore that the burial ground of Zevenbergen, at least in the Early Iron Age, was not exclusively used for burials.

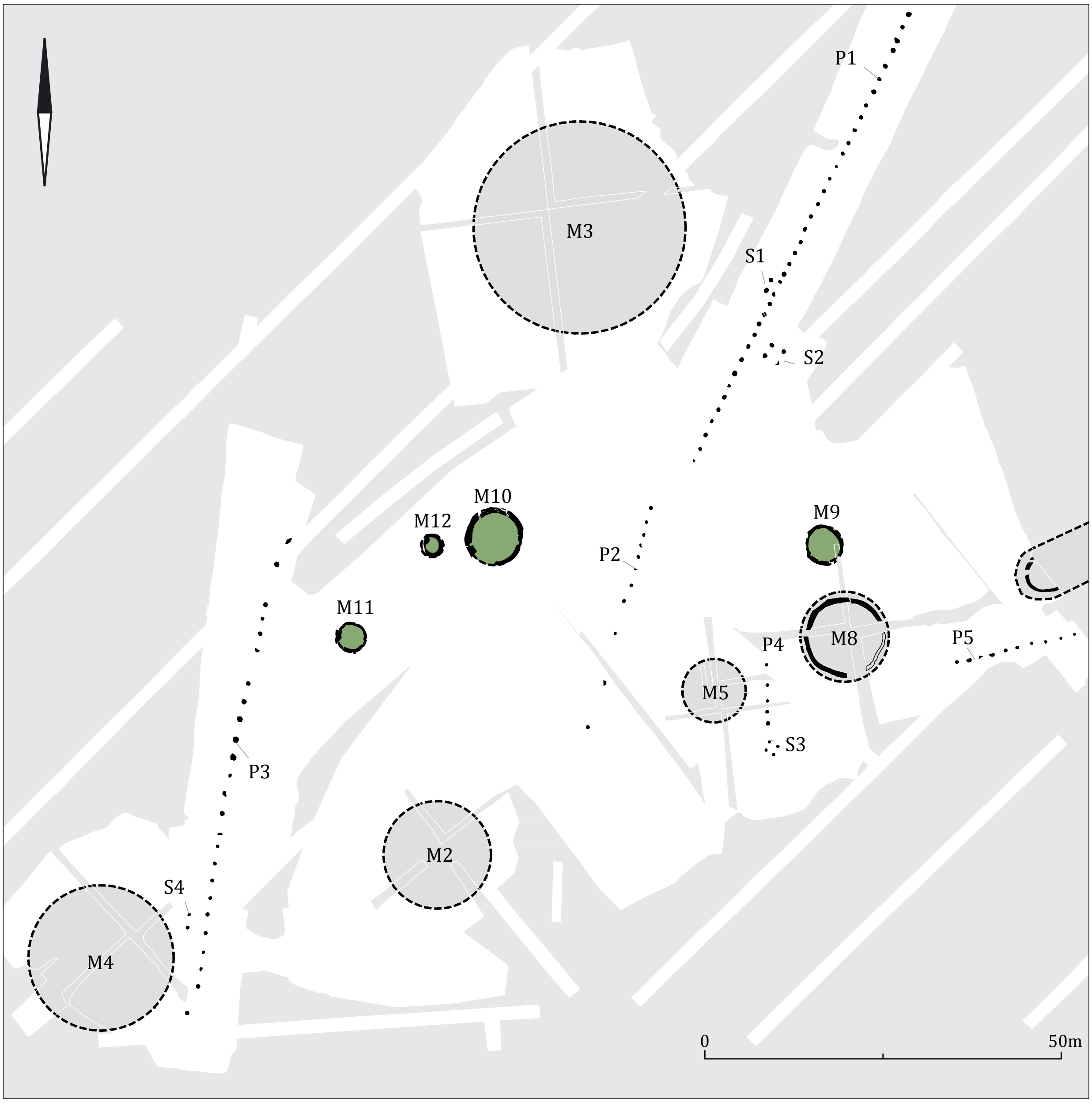


Fig. 16.9 Detail of the Zevenbergen barrow group showing the position of the small urnfield graves 8 to 11 (in green), mound 3 and the post alignments. Figure after van Wijk et al. 2009, fig. 6.44/by J. van Donkersgoed.

But what was the function and meaning of these structures? The only parallel for the singular post rows known at the moment is located in the cemetery of Slabroekse Heide located several kilometres to the south, of which the most important use-phase is also in the Early Iron Age (Jansen *et al.* 2011; Jansen/Louwen *in prep*.). In contrast to the more common, mostly older, double or triple post rows as found under the chieftain's burial of Oss and probably the eight-post structure under mound 7 as well, the post rows of Slabroekse Heide and Oss-Zevenbergen do not have a spatial association with a particular barrow. Based on a parallel of a cemetery in the English Barleycroft where similar post rows are also not associated with barrows, van Wijk *et al.* posit the idea of a compartmentalization of the barrow landscape through post rows (van Wijk *et al.* 2009, tab. 6.1; Evans/Knight 2001). Following from this, the two small "extensions" in two post rows could have formed an entrance or passageway (Fig. 16.9). Creating a visible compartmentalization of a monumental funerary landscape suggests that certain zones in the barrow landscape were symbolically shielded from others and/or that particular routes through that landscape were emphasized (for example, in relation to formal funerary ceremonies where different groups gathered).

The question remains, however, whether the post rows formed a physical barrier. The distance between the generally sturdy posts makes it difficult to determine whether these areas were closed off. If there was indeed a compartmentalization of the cemetery it seems to have mostly been symbolic, which, moreover, need not diminish its significance.

It is also plausible that the erection of the post rows played a part in a process of redefining the cemetery whereby an older cemetery is given new meaning. As if it were "reclaimed" in a broader context of radical changes that seem to occur at the start of the Iron Age (Fontijn/Fokkens 2007).

Explaining the two four-post structures is also difficult (Fig. 16.9). From funerary contexts in the Netherlands we know of several parallels where such four-post constructions were placed in the centre of what would later become Middle Bronze Age barrows (Theunissen 1999, 91). They are considered to be funerary structures or exhumation platforms, functions that fit well in a funerary context (*cf.* the discussion in Theunissen 1999, 91-92). Fokkens *et al.* (2009), however, point out the physical similarities with *spiekers*, grain storage structures that occur in almost all Iron Age settlements. It is possible that this is no coincidence, but rather a reference to a symbolic relationship between grain storage and death (see also Bradley 2005). This interweaving of ritual and daily life is, however, hard to substantiate, especially based on the features themselves.

Whatever the functions of the various structures may have been, the area was more than a burial ground restricted to the mounds. The surroundings of the mounds were also shaped and/or (regularly) used. Presumably, for funerary purposes of an as yet unknown nature.

16.12 Early Iron Age: re-definition of an ancestral landscape

If we now order the sequence of developments sketched above, it appears that the Early Iron Age represents a fundamental episode in the long-term history of the Zevenbergen barrow landscape. It should be emphasized that we have no means to precisely date mound 3, mound 7, the post alignments or the other Early Iron Age structures. The exact sequence cannot be reconstructed in detail anymore, unfortunately. What we can see, is how each act related to the basal structure of the barrow group and adhered to it or departed from it.

During the Late Bronze Age or Early Iron Age, the existing barrow row was first extended with one (or two, if mound 1 was older than mound 7) long barrow. During the Early Iron Age, however, a more fundamental change took place. The construction of mound 7 represents both continuity and change. It is another addition to a by then already age-old barrow row, with a shape that mimics that of the Bronze Age barrows (continuity), but then strongly exaggerated (contrast), dwarfing all existing mounds (Fig. 16.6). Mound 3, then, clearly breaks with the old spatial ordering. With its monumental size, it is situated outside the existing order, near the edge of the higher grounds. In terms of its remarkable *pars pro toto* content, it looks more like a token structure than like a "true" grave. The otherness of mound 3 seems to have been brought out in its separate position. Nevertheless, as we noted before, although mound 7's content seems more substantial, we also see a deliberate incompleteness in what was deposited in its centre (chapter 5, 6, and 7). Mound 3 differs more in degree than in kind. Whatever the motivation behind the token deposition in the centre of mound 3, its size and the efforts put into its construction underline that what was inside of it was very important to the communities who built it.

Although mound 7 may have looked even more impressive than mound 3 by its clever use of existing topography, the two are comparable in terms of energy put into their construction, which exceeds by far the pains given to mark the graves deceased buried in the ring ditch graves. These "humble" graves were also built outside the existing barrow row, in an intermediary position between mound 3 and the row of older mounds. Was this deliberately done? Unfortunately, we have too little information on the graves to say more on this in detail, but some details are remarkable. The huge mound 3 only contains one piece of cremated bone, whereas the secondary Early Iron Age grave dug into mound 2 contains 2014 g of cremated bone (van Wijk *et al.* 2009, 85). For the Early Iron Age, this is an excessively large amount of bones from one individual (compare for example the data from the urnfields in Theuws/Roymans 1999 or the 640 g of our own deceased in mound 7). So close to each other, we seem to have two ends of the continuum – a huge barrow containing just one bone fragment in the centre, and an urn without a mound of its own having a near complete skeleton! The bones in the mound 2 urn are those of a female of 30 to 50 years who was buried with – again – an unusual number of grave gifts, one of which was decorated with ochre – another unusual characteristic (see Fig. 6.3).

The post alignments represent another re-ordering of the old barrow landscape; a lot of energy was spent in creating long and truly monumental sight lines that visually seem to parcel or compartmentalize the barrows (Fig. 16.6). The motivations behind it remain hidden, but given the efforts put into it, it must have been something that was very important to these communities, like the construction of the enigmatic mound 3. What the alignments practically do is visually structure the environment. We do not know if they all stood side by side, or if one was built later than another. One contrast that they do emphasize is to separate mound 3 from its counterpart mound 7 (Fig. 16.6 and 16.9).

Although the barrow group may have been in use during the Late Bronze Age (mound 1 and 6), it is during the Early Iron Age that definitive changes took place in its ordering. Old barrows were again used in a totalizing way (at least two of three), valorising and re-defining ancestors, and building another barrow in the existing line, it might have felt like extending an ancient genealogy, or fitting in within an existing narrative in a by then ancestral landscape. The time distance between the Middle Bronze Age and the Early Iron Age in itself makes clear that, although recognized as older graves, true genealogical links between Bronze Age and Iron Age dead are very unlikely to have governed people's actions in the Iron Age. Ancestors were claimed, defined, and appropriated.

As some dead were buried in existing mounds, whereas another one – the man under mound 7 – got an impressive mound of its own, the conclusion seems unavoidable that in the manner in which Early Iron Age dead were inserted into an ancestral landscape, categorical distinctions were made. If we extend this line of thought, an intriguing question is what the visually deviating ring ditch additions placed at some distance of this old row mean. Did the people who buried them deliberately keep their distance?

The Early Iron Age use of the old Zevenbergen barrow landscape seems to have a ritual syntax of its own, in which differentiations were made between categories of deceased. Unravelling this – if possible at all – is not something that can be done on the basis of a book like this. Here, more and new research is needed. Without interpreting the order we identified now as a basic reflection of basic social differences, it goes without saying the mound 7 represents a pivotal element in that landscape. Fitting in and extending the ancient barrow row in order and shape, mound 7 is at the same time a magnification of all existing monuments.

This brings us to an essential problem: mound 7 was not the only monumental barrow in this area. Within a distance of a few hundred metres, there were actually two others: mound 3 and the Vorstengraf. This is a unique situation for the Early Iron Age in the Netherlands, and begs the question: why?

16.13 Three adjacent monumental Early Iron Age barrows: thoughts on the social significance of the Oss barrow landscape

Even though we cannot unravel the finer sequence of events that re-shaped the Zevenbergen barrow landscape during the Early Iron Age, we can safely conclude that a fundamental change took place during the Early Iron Age. If we wish to place this into perspective, it is necessary to zoom out. As set out several times in this book, Zevenbergen is only one stretch of a much larger barrow landscape (chapter 1 and 2). Groups of barrows are known from many locations on the northern edge of the Maashorst. In fact, we may describe this landscape as a discontinuous spread of barrows – zones rather than cemeteries (*cf.* Fontijn 2010). Research of the *Ancestral Mounds* team has shown that this is not exceptional, but very common. Very comparable zones of barrows can be found at the ice-pushed ridges of Nijmegen, Rhenen, and Ede for example (Bourgeois in press). For Zevenbergen, only a few hundred metres to the west, there is another group of barrows – those of Oss-Vorstengraf (Fig. 1.2). To place Zevenbergen in the right perspective, it is to that group that we now must turn.

Vorstengraf and Zevenbergen are now separated by a highway, but must be seen in close connection – if not as one spread of barrows than at least as two clusters very nearby (Fokkens/Jansen 2004). The Vorstengraf group developed around a Middle Bronze Age barrow, just like at Zevenbergen. Similarly, the monumental Early Iron Age mound was flanked by extensively dispersed, non-monumental

Fig. 16.10 The excavation of the Vorstengraf by F.C. Bursch in 1933. A trench was dug through the already damaged mound. The sods are well visible – note the similarities to the sods with which mound 7 was built. They are also in inverted position and stacked horizontally to diagonally, like in the case of mound 3 and the western half of mound 7. Figure ©RMO.

Fig. 16.11 Objects found in the chieftain's burial of Oss. Note that this is only a "presentable" selection and not the complete inventory of the chieftain's burial. Figure ©RMO.

flat graves and ring ditch graves from the same period (Fig. 1.14). The reason this group has become well-known in archaeological academic circles and to a broad audience is because of one particular barrow: the chieftain's burial of Oss.

As mentioned in the beginning of this book, in 1933 a huge barrow was excavated here by F.C. Bursch (the so-called Hansjoppenberg, see Fig. 1.3 and 16.10). In its centre, a bronze situla was found together with many other items, including iron horse-bits, iron and bronze yoke components, an iron axe and a knife, iron razors, three bronze and iron dress-pins, a whetstone, and a curved iron Mindelheim sword with gold inlay. This extraordinary set of Hallstatt C items finds its closest parallels in so-called Fürstengräber of the Hallstatt period in Central Europe – seen there as members of the elite of a ranked society.

The chieftain's burial of Oss has also been interpreted in this way, particularly because this grave was found in what is the largest barrow found in the Low Countries: a round mound with a diameter of 53 m and at least 1 m high (Fokkens/Jansen 2004). So this is the third huge Early Iron Age barrow apart from mound 3 and 7. The chieftain's burial is clearly the largest of them all. It has been calculated that some 15 000 m^2 of heath had to be cut to provide enough sods for a mound this size (compare this to the estimated 815 m^2 necessary for mound 7, chapter 10; Fokkens/Jansen 2004, 150). Like mound 3 and 7, the chieftain's burial was surrounded by much smaller graves – ring ditch graves like we have at Zevenbergen (section 16.9) or older graves (Bronze Age barrows nearby). Like in the case of mound 7, the chieftain's burial was built on top of an elevation, in this case a Bronze Age barrow. It has been argued that the central grave of this older mound was even carefully avoided when burying the Iron Age deceased (Fokkens/Jansen 2004, 137).

The chieftain's burial of Oss is one of a group of graves with Hallstatt equipment that is known in the south of the Low Countries. On the basis of a survey of finds it was argued that these included elements from the following categories: weaponry, horse-gear or parts of a four-wheeled wagon, jewellery, and drinking and feasting sets (Roymans 1991, 31), many of which represent imports from Central Europe. More recent research argued that the Hallstatt "chieftains' graves" can be seen as a mix between novel elements that were added to martial paraphernalia that were already in use for a longer period of time. Particularly, it was suggested that the Hallstatt equipment was re-contextualized in a different way from what was common in Central Europe. Transformation of items and a *pars pro toto* attitude seem to have been important (Fontijn/Fokkens 2007). All these conclusions were done on the basis of data that were mainly collected a long time ago and often during chance discoveries or low quality excavations. The picture that emerges from both Roymans' and Fontijn/Fokkens' inventories is that of a distinct, recurring set of objects. However, with the Zevenbergen excavations we have now found two monumental mounds from the same period that contain objects that lack a parallel in any of the other "Hallstatt chieftain's graves" in the Low Countries. Although the many studs in mound 7 are extremely rare in Northwest European Early Iron Age graves, they are known from Central European rich graves. Given their modest size, it is well possible that if they were part of Hallstatt graves excavated in the past, chances are high that they were not collected or not seen. The collection of fragments from the centre of mound 3 is even more enigmatic. Not one of these objects has a counterpart in any known Hallstatt grave in this region or in Central Europe, but we can be sure that it dates to the Early Iron Age or perhaps earlier part of the Middle Iron Age. We can only guess as to the number of mound 3-like barrows that went unnoticed during excavations in the earlier half of the 20th century.

What the Zevenbergen excavations thus brought us is nuance. Whereas we thought – until very recently – that in the Netherlands there was never more than one Hallstatt "chieftain's grave" in an urnfield, we now have found no less than three monumental Early Iron Age graves in a barrow landscape that actually has little in common with the dense cluster of graves that Early Iron Age urnfields usually are (Fokkens 1997). Although very similar in outer appearance (and construction), the three monumental barrows cover three completely different graves. A collection of horse-gear, a sword with gold-inlayed hilt, elements of a yoke, an iron axe and a knife, razors, a whetstone, dress-pins and the cremated remains of a male without pyre remains interred in a bronze situla in one grave (chieftain's burial), a cremation in an urn deposited with horse tack/yoke elements deliberately left with pyre debris in another (mound 7), and an extreme example of a *pars pro toto* deposition of personal paraphernalia in the centre of a third (mound 3). It almost seems as if they are complementary: there are yoke rosettes and toggles in the chieftain's burial and other elements of the yoke and associated horse tack in mound 7, but no weapons or horse-bits and other bridle components which are present in chieftain's burial. New research by one of us (van der Vaart) shows that the selection, manipulation, and deposition of particular elements of the "Hallstatt package" may well have been what made these items meaningful in the first place. This is indeed what we see in all three graves. Different as they may be in their content, in all the objects were bent, folded, transformed, and dismantled. Objects were picked out, and others were left. What happened to objects also happened to the remains of the deceased. Think of the incompleteness of the remains of the deceased underneath mound 7 in his urn, and of the token deposit of just one bone under a large barrow 30 m in diameter – mound 3, while in contrast the chieftain's burial contains one of the most complete and best-preserved prehistoric cremations ever found.

Whatever exactly happened here, the deposition of different, but related materials under three huge Early Iron Age mounds must have been related in the collective memory of the local communities living here. We may expect that the people who built mound 7 did know about what was in the chieftain's burial or vice versa (the exact sequence cannot be reconstructed anymore). How else could each of them be so different and still complementary?

All three mounds represent huge accomplishments, probably made to celebrate collective ideals held by a large group of people living here. The three huge mounds visually contrast with the contemporary graves adjacent to them, and for at least two of them we know that they cover the graves of single male individuals. It is common to see this as evidence that these were the graves of chiefs, leading individuals who based their power on connections with Central European exchange networks (Fokkens/Jansen 2004; Roymans 1991). At the same time, it is important – as the excavation of mound 7 showed – to see these huge mounds as constructions made on behalf of and by a wider collective of people. In the complementarities of these three barrows, and particularly in the sheer symbolism of the *pars pro toto* monument of mound 3 we find evidence that these monuments relate just as much to the living as to the social status of the one deceased buried underneath it.

One the one hand, mound 7 gives us a new and unique insight into the vast range of contact networks of communities in the Early Iron Age low countries and how power may derive from it. On the other, it shows us how these were embedded, re-contextualized and celebrated in ritual landscapes of local communities.

16.14 Late Medieval period: crossroads in a landscape of terror?

After the Early Iron Age, almost two millennia passed that to our knowledge have not left any archaeological trace at the Zevenbergen. There are no indications that the barrows were used during the later Iron Age. In the Roman Period, the area to the south of the Zevenbergen (around Nistelrode) was intensively occupied (Jansen *et al.* 2011). There were Roman Period burials nearby at Gaalse Heide, Uden-Slabroekse Heide, and Heesch-hoge Wijst. In the latter two cases, native Roman burials were added to prehistoric ones. As far as we can see from the evidence we have, this never happened with the barrows at Zevenbergen or at those of the nearby Vorstengraf, even though barrows like the chieftain's burial, mound 3, and mound 7 visually outrank any other barrow on the Maashorst and must have caught the eye of anyone travelling north of the Maashorst. We also lack pollen records for this period and can only guess at what might have happened at Zevenbergen during the later part of the 1st millennium AD. During

Fig. 16.12 Grave 4 in mound 2. The victim of a Medieval execution? This pit contained the remains of a young adult of ca. 25 years, who died somewhere in the 13th or 14th century AD. His hands were probably bent behind his back. Figure after van Wijk et al. 2009, fig. 6.12/J. van Donkersgoed.

the Early Middle Ages, people lived south of the Zevenbergen near Mun, and particularly for the full to Late Middle Ages, we know several settlements south of the Zevenbergen (like Nistelrode; Jansen *et al.* 2011). What is clear is that in the Late Medieval Period, the Zevenbergen was – again – a heath. This time the heath must have been much larger than before, situated between Medieval Oss, Schaijk, Berghem, and Nistelrode (chapter 13). Like in the Bronze Age and Iron Age, but now on a much broader scale and in a much less compartmentalized landscape, people used the area for grazing sheep.

The Zevenbergen became part of a large heath that was used by different local communities, and at the same time it formed the boundary between them. In the shifting power relations of the feudal lords, the area may have been contested land, as the construction of a defensive structure (Dutch: *landweer*) indicates. There were also important routes through this heath, connecting Oss to Berghem and Schaijk. On these extensive heaths, the barrows probably served as orientation points, but as our excavation revealed, they also had a different, more macabre, purpose.

16.14.1 A Medieval execution site

Dug in deep into mound 2, three large pits were found in 2004 that probably all represent inhumation graves. In two of them skeletal remains were found (Fig. 16.12).

The third was too badly preserved to yield bones, but is in form and stratigraphical position similar to the other ones and is assumed to represent a third grave. The remains are dated to the 13th-14th century cal AD on the basis of C14-dating. One skeleton was of a young female, the other of a male whose hands were bound on his back. Late Medieval dead buried in a non-Christian location are likely to represent victims of execution. Remains of a large post in the centre of mound 2 probably represent the post of a gallows or execution wheel.

In the SW-quadrant of mound 7 a small part of an equally deep pit was found. It contained fragments of a human skull and lower jaw, possibly of a male. C14-datings of a bone fragment shows that this man probably died in the 15th century cal AD. We must be dealing here with another Medieval grave, the largest part of which is still situated in the unexcavated SE-quadrant. In view of its position, we must be dealing with another victim of a Medieval execution. Although we did not find the remains of a post like we did at mound 2, we assume that this deceased was also buried close to the place where his life was ended. This implies that not only mound 2 was a place where people were executed and their bodies displayed, but that the same may hold true for mound 7. Interestingly, the body from mound 7 dates to a younger period than the body of mound 2. Apparently, the Zevenbergen was an execution place for a long period of time.

Research shows that gallows were preferably located along roads and/or at the boundaries of different territories or jurisdictions, well away from villages and cities (Meurkens 2010). This fits in well with archaeological evidence. The remains of a defensive structure (Dutch: *landweer*) to the east of the Zevenbergen barrow landscape makes sense only if it were located at a (contested or threatened) boundary. Historical sources demonstrate that the Zevenbergen lay at the border between the Duchy of Brabant and the Land of Ravenstein (van der Linde/Jansen 2009). We now also have historical sources informing us on the presence of gallows in this area. A late 16th century map shows two symbols, one of which must represent a gallows in the heath. The location is described as *Ravesteins Gerijcht* (*Gerijcht*: a place where justice is passed; Fig. 13.3). This *Gerijcht* is situated along a road that runs from southwest to the northeast (from Heesch to Herpen). It is likely that the Zevenbergen is meant (chapter 13). As the most recent victim we have dates to the 15th century cal AD and this map to the late 16th century, it implies that the barrow landscape continued to be used as a *Gerijcht* for a longer period of time than our archaeological evidence currently suggests – it is not inconceivable that there are still more Medieval graves in the unexcavated parts of mound 7.

16.14.2 Roads in the heath

Something which is also brought out by the late 16th century map is the presence of a road. It is tempting to identify the southwest-northeast road on that map with a route along our barrow row, leading all the way to Herpen. In our excavation we found the traces of numerous cart tracks in the sand, representing many passages with wagons through the heath. Unfortunately, these tracks can hardly be dated. As all go beyond the barrows, avoiding mound 7, they post-date these barrows. Most tracks identified during the excavation run north-south, going in between mound 7 and 8, and across mound 6 (implying that its mound apparently was not a major hinder to traffic). This route is parallel to the position of the defensive structure in the east (situated along the political boundary), and then probably bends off to the west (leading to Oss; Fokkens *et al.* 2009, 218). The southwest-northeast route indicated on the 16th century map could not really be identified in the traces of cart tracks, but it should be realized that more recent (north-south) traffic may have obliterated its traces completely. Anyway, with the bodies of executed criminals on display on the top of mound 2 and mound 7, travelling across the extensive heath would not have been a very pleasant experience. Thus, when people were being buried here again, more than 2000 years after the barrows were built, the mounds were situated in a heath again. But this time the background to their reuse as a burial location could not have differed more from prehistory. Whereas the mounds must have been central ritual places for Bronze Age and (Early) Iron Age communities, they were marginal, feared locations in the Medieval period, only good enough to be used to bury the executed outcasts of society.

16.15 How the barrows disappeared from view

The heath remained a hub in local traffic for a very long time. Under the reign of Louis Napoleon and Willem I in the early 19th century, this became more formalized by decrees ordering the construction of paved and sand roads in this part of the province of Noord-Brabant (chapter 15). In a historical document reference is made to the *Hansjoppenberg* which is the local name of the huge mound of the Early Iron Age chieftain's burial of Oss to the immediate northwest of Zevenbergen. This indicates that barrows kept on functioning as orientation points for the construction of roads. In the Zevenbergen area, two new formal roads were constructed as unpaved sand roads with a different orientation from former ones: the Nistelrodese Baan and the Zeelandse Baan (cf. Fig. 15.3). These roads still define our research area. Around 1837, the Zevenbergen, which had been a heath for so many centuries, now gradually was reshaped into a production forest. Three or four copper coins dating to the first half of the 19th century were found close to each other in the car tracks near mound 6. In view of their comparable dating and vicinity, we assume they ended up there during the heath reclamation, and perhaps represent the lost salary of one of the workers.

Fig. 16.13 (right page/top) The start of the excavation of mound 8 in 1964 by the Institute of Prehistory of the University of Leiden by prof. P.J.R. Modderman (not on this photograph) and G.J. Verwers (sitting, with beard, top left). Note the dense forest around the mound. In the centre L.P. Louwe Kooijmans, who participated in the excavation as a student. (rightpage/bottom) The same mound during the excavations in 2004. The entire forest has gone. Prof. Modderman, now retired, visits the excavation and interprets the profile. He is assisted by the same L.P. Louwe Kooijmans (to the right), who now is professor and his successor and the first dean of the Faculty of Archaeology of the University of Leiden. Figure by Faculty of Archaeology/J. van Donkersgoed.

The 1837 reclamation was the end of a very long period in which this area was characterized by a heath marked with barrows. The heath became a dense pine forest, and the mounds that had been visible beacons for centuries disappeared from view and knowledge about their whereabouts gradually was lost. In the forest two north-south oriented roads were created. One was situated immediately to the east of mound 7. Its remains were found during our excavation. The new use of the area for forestry left its marks in the form of deep parallel furrows in the top of mound 7 and elsewhere. It was probably during this period that the highest part of the mound was truncated and that the first urns were found on the Zevenbergen (chapter 1). When the area was enclosed by high ways in the 1960's, it probably was no longer used as a production forest. Due to the activities of the then provincial archaeologist G. Beex, the barrows were rediscovered and brought to the attention of prof. Modderman, who together with G.J. Verwers excavated two of them ("our" mound 8 and mound 6) in 1964 and 1965 (Fig. 16.13).

Although they excavated mound 6, which is situated very close to mound 7, no reference is made to a huge mound immediately to its east. Only when the forest was cut down in 2004, the monumentality of this barrow was visible for the first time since long. But by that time, mound 7 had become the home of a badger (family) and could not be accessed until 2007.

Chapter 17

Preserving and presenting the mounds and finds of Oss-Zevenbergen

Richard Jansen, Luc Amkreutz and Sasja van der Vaart

17.1 Introduction

The previous chapters in this book presented the extraordinary results of the excavation of (two of) the mounds of Oss-Zevenbergen and their environment. The story of Oss-Zevenbergen, however, does not end with its scientific publication. This chapter therefore discusses what happened to Oss-Zevenbergen and the finds from this site after excavation. There are several aspects to this that will be addressed in the following.

Firstly, though the 2004 and 2007 excavations have had an enormous impact on our understanding of barrow landscapes throughout different prehistoric and even historic periods, the archaeological site of Oss-Zevenbergen was not researched in its entirety. The profile baulks of five burial monuments (2, 3, 4, 5[101], and 8) and half of mound 7 were not (completely) excavated. This is also true for the features of the post rows, which were only sectioned. Most of the landscape around the barrow group was likewise only explored through test trenches. We are therefore dealing with archaeological "residual value" (Dutch: *restwaarde*) of a late prehistoric barrow landscape. This "value" has to be protected.

The starting point of this is two-fold: firstly the *in situ* preservation of the physical residual value as a knowledge source. Thereby endeavouring to counteract the degradation of the archaeological values (Jansen, section 17.2). Secondly, a durably laid-out terrain that is accessible to those who are interested is aspired to. A place where people might see and experience something of the past. This last starting point is part of a long term vision, whereby sustainable structural management is important (Jansen, section 17.3).

There, however, is more to Oss-Zevenbergen than just the actual location. Section 17.4 (Amkreutz and van der Vaart) therefore discusses the finds that were excavated, and how they ended up in the collection of and on display at the Dutch National Museum of Antiquities (RMO).

In short, this final chapter discusses how the site itself, the finds, and the results of the excavation are currently being preserved for future generations and presented to the public.

101 Mound 5 is probably a natural wind blown dune, though an interpretation as barrow cannot be completely excluded (see discussion van Wijk *et al.* 2009, 110-115).

Fig. 17.1 *Reconstruction of mound 3. The profile baulks were "packed" in root canvas and wire mesh (left). The quadrants were then supplemented and the entire mound covered with an extra layer of sand (right). Figure by R. Datema (© Archeologische Monumentenwacht Nederland).*

17.2 Preserving the barrows for future research

17.2.1 The remaining archaeological values

As a result of the excavation technique used, the "quadrants method" (Dutch: *kwadrantenmethode*), (parts of) the central crosses of almost all mounds were preserved for future research.[102] The posthole features surrounding mounds were completely excavated, the posthole features of the linear lines were only sectioned, preserving the second part (Fokkens *et al.* 2009). In addition to the preservation of the profiles, all mound bodies were re-erected based on the excavation results (Fig. 17.1).[103]

Mounds 1 and 6

The (original) mounds of both of these long barrows were already gone or excavated prior to our research, only the surrounding structures were preserved.[104] Subsequently, in 2004 and 2007, these monuments were excavated completely. The location of mound 1 is nowadays overbuilt by highway A59, mound 6 has been reconstructed based on our excavation results.

Mounds 2, 3, 4, 5, and 8

The profiles of mounds 2, 3, 4, 5, and 8 have been preserved by sealing them off with so-called root canvas (Dutch: *worteldoek*) to prevent the growth of shrubs and trees, and wire mesh to protect against treasure hunters. This gives future generations of archaeologists the opportunity to study and/or sample the profiles again using new research techniques. After the profiles were sealed, the mounds were reconstructed by supplementing the excavated quadrants. Finally the entire mound body was covered with a layer of sand (Datema 2008).

102 Only mound 1 and 6 were completely excavated.

103 Preservation and reconstruction work has been done by the *Archeologische Monumentenwacht Nederland* conform protocol Fysiek Beschermen KNA 3.2. The situation prior to restoration and documentation regarding the reconstruction work is described in Datema 2008. The mounds are inspected annually, resulting in a report concerning the physical state of the monuments and their surroundings. In this way the scientific value is protected for the future.

104 Mound 1 was probably destroyed during the reclamation and/or forestry activities. Mound 6 was completely excavated in 1965 (Verwers 1966a).

Mound 7

Only the NE- and SW-quadrants and a part of the NW-quadrant of mound 7 were excavated. The other quadrants, including the larger part of a Medieval burial, is still of great scientific interest. Subsequent to the excavation, the excavated parts of the mound were reconstructed. After that the monument was sealed off with root canvas and wire mesh.

Mounds 9-12

The (original) mounds of these small urnfield barrows were practically invisible prior to our research. The monuments were discovered during the excavation of the area between the mounds, whereby the surrounding structures were excavated completely. The results were used to reconstruct the mounds.

Posthole features

All posthole features associated with mounds were completely excavated. The posthole traces of the different linear lines were only sectioned, with the second half left unexcavated. The holes were filled in to preserve the second parts of the fill of the postholes for future research.

17.2.2 Archaeological perspective on management and ordering

The following arguments form the starting points for the preservation of the remaining archaeological values. In the first place it concerns a legally protected terrain. The still remaining archaeological values provide opportunities for gaining additional information. It is possible, for example, that in future new methods might allow for a better dating of burial monuments. Secondly the preservation of the spatial coherence is of importance, not only because of the entirety of the burial mounds as a group, but also because of the structures in between, the post rows, which are considered a rare phenomenon. The starting point is to consider the remaining mounds as a single, valuable ensemble. Thirdly, the relation to other sites on the Maashorst is of importance. By physically preserving the barrow landscape, in future it will be possible to make spatial and chronological connections, with visible elements such as the Vorstengraf, as well as less well known burial mounds on the Vorssel or the urnfield on the Slabroekse Heide or values as yet unknown (accompanying settlement traces from late prehistory) in the area.

17.2.3 Summarizing

Preserving and protecting the mound(s) for the future is essential. Therefore it is fortunate that the mounds are now situated in a remote area, enclosed by a junction of roads. At the same time the barrow group of Oss-Zevenbergen is still literally visible as a prehistoric element. Visitors should be able to observe and experience the (reconstructed) prehistoric barrows of Zevenbergen and their surroundings, forming a monumental, long-term prehistoric relict situated in a dynamic modern landscape (Fig. 17.3). From this viewpoint it forms a unique opportunity for the municipality of Oss to illustrate her history to residents and visitors. Also, they are the only visible and (partly) original archaeological monuments within the municipality, besides the constructed Vorstengraf monument.

Fig. 17.2 During the excavation of 2004, an open day was organized during which hundreds of people visited the site. Figure by Archol BV.

17.3 Oss-Zevenbergen for the public: the archaeological monument *Paalgraven*

An important commitment in Dutch (and European) Monument Law is public participation and/or involvement.[105] Increasingly, professional archaeology is becoming aware of her task to inform people in an accessible way about their (local) heritage. Not only during an excavation with an open day or social media and internet sites, but also *after* an excavation through, for example, information panels, books, and reconstructions (Fig. 17.2). Within the municipality of Oss, to which the Zevenbergen area belongs, a good example is the nearby *Vorstengrafmonument*. On the exact find spot half of the barrow of the chieftain's burial of Oss was (re)constructed. Visitors can walk between the mounds, whereby information is given on information panels or within the popular-scientific publication "Het vorstengraf van Oss. Een archeologische speurtocht naar een prehistorisch grafveld" (Fokkens/Jansen 2004).

Today the Zevenbergen mounds – known as the archaeological monument *Paalgraven* – also are accessible to the public.[106] The area can be entered by foot in the southeast, from where people can walk over the higher lying remnants of the old *Rijksstraatweg* alongside the mounds. From here it is possible to view and experience the monuments and their surroundings. By choosing heath-like vegetation, inspired by the landscape image from prehistory, a rather open landscape comes into existence whereby the physically protected burial monuments and post rows are clearly visible to the visitor. The actual terrain is not accessible, partially to protect the mounds (Fig. 17.3). An information panel tells about the results of the excavation and the ensuing narrative that can be told about this area.

The narrative about these intriguing "mounds" is, besides within this academic book, also presented in an accompanying popular-scientific booklet "Prins onder Plaggen" written by Evert van Ginkel, together with the archaeologists (van Ginkel 2009; Fig. 17.4).

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105 Verdrag van Malta, article 9.

106 Initiative for the current ordering of the monument Paalgraven was taken by the municipality of Oss. The execution was done in association with Rijkswaterstaat, RCE, *Stichting Landschapsbeheer Oss*, *Brabants Kenniscentrum Kunst en Cultuur*, and *Archeologische Monumentenwacht Nederland.*

Fig. 17.3 The Zevenbergen barrow group anno 2012. Figure by R. Jansen.

Fig. 17.4 The popular-scientific booklet "Prins onder Plaggen" written by Evert van Ginkel. Figure by Sidestone Press.

17.4 The finds in the National Museum of Antiquities

17.4.1 Oss comes to Leiden

In 1933 the RMO excavated and consolidated the chieftain's burial of Oss. The finds from this burial have formed a centre piece in the collection and displays of the Museum ever since. This was further stressed after the objects were treated and restored for the third time in 1992/1993 by Restaura, thereby returning them to much of their former glory. The cremated remains of the chieftain were also studied for the second time. This led to new discoveries and ideas concerning the content of the grave and the role of the objects, inspiring new field research to take place.

When the new excavations at Oss-Vorstengraf were conducted in 1997-1998 and at Oss-Zevenbergen in 2004 and 2007, it became the Museum's intent to actively act as the location where all these (expected) finds would be located and preserved, as well as studied and displayed. Dutch law regarding finds done during excavations, however, had changed since the 1960's and, later on, with Malta. Finds are the property of the provinces and so have to be stored in provincial depots. This actively disabled the RMO from consolidating its role as central Museum for most of the (important) finds from Dutch excavations. The Museum was left with a right to claim finds of national importance, but the procedure involved is difficult. It also has a distinct negative connotation as it claims finds of national importance thereby "taking them away" from the region they were found in. Despite this lack of good legislative positioning of the National Museum within these new rules, in 2009 it was attempted to claim the finds from the Zevenbergen excavation with the Ministry of Education, Culture, and Science (Dutch: *Onderwijs, Cultuur en Wetenschap*). The RACM (currently RCE: Cultural Heritage Agency) at that time responded by suggesting it might be better to seek alternative ways of presenting the finds, for example through loans. This, however, did not take into account the argument that the Zevenbergen and earlier Oss-Vorstengraf finds were part of one complex that should be preserved together.

While the Museum still negotiated to have the Zevenbergen finds displayed in the new permanent exhibition "Archaeology in the Netherlands" (which opened in 2011), and financed the preservation of the pyre feature, the Province of Brabant took the initiative to house the Zevenbergen and later Vorstengraf finds in the RMO collections. They themselves argued that it was in the best interest of the finds and their documentation that they be kept together and accessible for study in the same place since they were integrally part of one and the same funerary landscape. The RMO and the Province of Brabant thereupon signed an agreement that not only the Zevenbergen finds, but the finds from the earlier 2004 campaigns (Fokkens *et al.* 2009) as well as from the 1964-1965 Verwers research campaign at the Zevenbergen were to be handed over to the RMO for inclusion in the Museum collection. In the end the pragmatic disposition of the Brabant province and the good contacts between it and the RMO, ensured the possibilities for access and loans, and enabled the complex to remain intact in one place.

17.4.2 Displaying the finds

Some of the unique finds of Oss-Zevenbergen are currently displayed in the permanent exhibition "Archaeology of the Netherlands" in the RMO. This exhibition was opened in 2011, and shows a complete survey of the archaeological history of the Netherlands. The visitor is taken through 300 000 years of Dutch history, focusing on 75 major archaeological sites. A few places where objects were found are also explored in more detail, Oss-Zevenbergen among them. With Google Earth, you travel back in time and see what the landscape used to look like, and what event(s) occurred there. One of these "zoom-animations" focuses on the burial ritual that took place at Oss-Zevenbergen. By combining information from the excavation reports and talking to the various excavators an artist, Paul Maas, was instructed to come up with a visual interpretation of the ritual. This led to a

Fig. 17.5 The finds of Oss-Vorstengraf (foreground) and Oss-Zevenbergen (background, under the white "ribbon") within the exhibition Archaeology of the Netherlands in the RMO in Leiden anno 2012. Figure by L. Amkreutz (©RMO).

Fig. 17.6 The finds of Oss-Zevenbergen on display on top of the preserved pyre remains. Figure by L. Amkreutz (©RMO).

series of interactive drawings that depict the cremation ritual, including some of the finds (Fig. 17.5). The display ends by zooming out and showing the European connections of the Oss burials, first in relation to adjacent Hallstatt burials and subsequently with respect to the central Hallstatt culture zone and its contacts. In this manner both graves are given a context, both their direct relation as well as from a European perspective.

As mentioned in chapter 8, one of the block liftings from the central find assemblage (V 1003) was preserved so that it could be displayed in the exhibit. The find of an Iron Age pyre is so rare that it was deemed worthwhile to present it to the public in such a tangible manner. Kempkens and Lupak therefore uncovered and preserved the charcoal remains in this block *in situ*. They now form the base of the display case of Oss-Zevenbergen (Fig. 17.6). The urn with cremated remains, several bronze rings, and a selection of bronze studs are displayed on top of this pyre base.

The mound 7 finds are located right across from the "original" chieftain's burial of Oss (Fig. 17.5). As these burials were found not 400 m from each other, it has a striking impact that these finds are displayed so close together. Though only part of the artefacts found in this area is displayed, one can catch a glimpse of the marvels that were once interred in Oss.

While the 1933 finds form a centre piece in the exhibition, the recent Zevenbergen finds are hidden underneath the white display ribbon (see Fig. 17.5). Through a couple of "windows" the visitor can catch a glimpse of this second burial, while at the same time maintaining some of the dignity appropriate for displaying what are in fact the remains of a burial ritual "frozen in time". The texts in both displays, apart from their physical proximity, indicate that we are dealing with one find complex. While the 1933 finds boast the wealth and status of the

Early Iron Age burial ritual, the display of the more recent finds underlines much more the interesting question marks that still exist with regard to what ritual actually took place.

17.5 Conclusion

The first 16 chapters of this book presented the results of the excavation of the last two mounds of a remarkable barrow landscape. This, the last, chapter of this book discussed how the site of Oss-Zevenbergen is being preserved for future generations and presented to the (current) public. The unexcavated parts of the mounds and surrounding areas have been left *in situ* and protected against treasure hunters, and the barrow landscape has been reconstructed to how it appeared in the Early Iron Age. The finds and excavation documentation are currently safely stored in the RMO, where interested parties can also go and admire (a selection of) the Early Iron Age finds from Oss. The material continues to fascinate, and thus ends the story of an extraordinary Early Iron Age Hallstatt burial.

Or does it….?

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Appendix 1

Administrative data

Period of execution	
Fieldwork:	2nd – 25th May 2007 (17 days)
Analysis/reporting:	2008-2012
Client:	Rijkswaterstaat
Execution:	Faculty of Archaeology, Leiden University
Responsible authority:	ROB, currently RCE
Location	
Municipality:	Oss
Site:	Oss
Toponymn:	Zevenbergen/Paalgraven
Depot:	National Museum of Antiquities in Leiden
Project code:	OZB
Research report number:	22408
Monument number 241:	45E-001
Find report number 1964/1965:	14154
Coördinates research area	
Mound 6:	168.006/416.082
Mound 7:	168.034/416.097
Geomorphology:	Formatie van Beegden/Boxtel Formatie
Soil:	Humus Podzol

Administratieve gegevens

Periode van uitvoering	
Veldwerk:	2 Mei – 25 Mei 2007 (17 dagen)
Uitwerking/rapportage:	2008-2012
Opdrachtgever:	Rijkswaterstaat
Uitvoerder:	Faculteit der Archeologie, Universiteit Leiden
Bevoegd gezag:	ROB, momenteel RCE
Locatie	
Gemeente:	Oss
Plaats:	Oss
Toponiem:	Zevenbergen/Paalgraven
Depot:	Rijksmuseum van Oudheden te Leiden
Projectcode:	OZB
Onderzoeksmeldingnummer:	22408
Monumentnummer 241:	45E-001
Vondstmeldingsnummer 1964/1965:	14154
Coördinaten plangebied	
Heuvel 6:	168.006/416.082
Heuvel 7:	168.034/416.097
Geomorfologie:	Formatie van Beegden/Boxtel Formatie
Bodem:	Humuspodzol

Appendix 2

Micromorphology reveals sods

Hans Huisman

A single micromorphological sample was taken from profile 106.3. At a second location sampling failed. The sample was taken from the sod body of the barrow. A thin section was made by the University of Sterling laboratory. This was examined with a Wild 420 macroscope and a Zeiss Axioskop 40 polarization microscope in the microscope laboratory of the National Heritage Agency (RCE).

This revealed that macroscopically three elements can be identified: halfway the thin section is a sharp, horizontal demarcation that separates two layers. In the middle of the plate a large rounded aggregate (ca. 3 cm in cross-section) is visible, which is located precisely between the two layers. The differences between the three units are not large: they are mostly caused by subtle differences in grain size and amount of organic material present. There is therefore no point to describing each of the three units separately. The most relevant characteristics of the material are the presence and manifestations and the organic material:

Between the sand grains the organic material is present as:

- Moder: irregularly shaped fragments degraded organic material without recognizable fabric or cell structures in the space between the sand grains. In standard Moder Podzols this humus consists most typically of a mixture of more degraded material (mostly excrement of soil fauna) and better preserved matrix fragments (so-called polymorph organic material). The humus here, however, is more degraded and a darker colour, and better preserved matrix fragments are absent.
- Humus: on many of the grains there is a layer of washed in humus with a dark brown colour, and a characteristic pattern of shrinkage cracks. This is typical for the humus form that occurs in Humus Podzols.
- The two humus forms are somewhat heterogeneously spread out within the different units.

These observations can be interpreted as follows. The structure of the thin section, with two sharply segregated layers and a large aggregate, reflects the construction of the barrow. The demarcation is likely the border between two sods. The aggregate is a clod of soil material that ended up there by coincidence when the mound was constructed. No further conclusions can be drawn from the subtle difference in grain size between the two sods as it is unclear how heterogeneous the sand is in the area where the sods were taken from.

The organic material is a reflection of the soil formation in the soil before the sods were cut and used as construction material for the mound. Soil formation after construction of the mound likely had little influence. The combination of dark and highly degraded moder on the one hand and the illuviation of humus on the other indicate a history of soil degradation pr edating the construction of the mound: Moder Podzol likely first formed in the area. Exhaustion of the soil likely caused changes in the vegetation and soil type. Moder Podzol soils were transformed into Humus Podzol soils in this manner. Exhaustion of the soil was likely caused by anthropogenic activities, like overexploitation of fields, overgrazing or litter extraction on uncultivated soils. A link can be made with the sand drifts observed in this area.

Fig. 1 Scan of the thin section. Boundaries between units indicated with broken line. A rounded aggregate can be seen in the centre of the sample. The sand above it is slightly lighter than the sand below it, marking a slightly higher content of organic matter in the lower half. Figure by H. Huisman and J. van Donkersgoed.

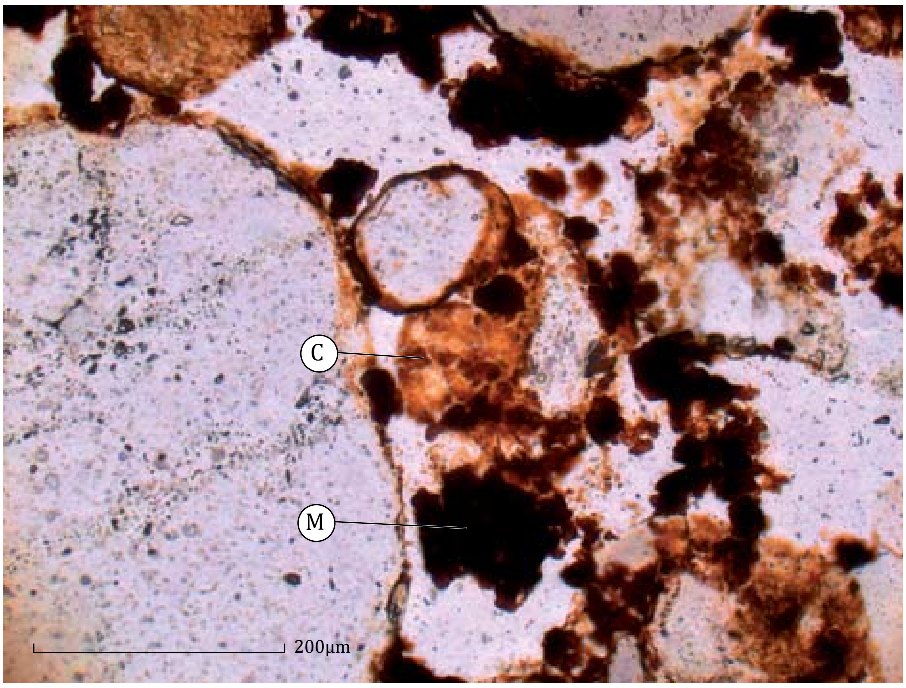

Fig. 2 Micrograph (plane polarized light) of the types of organic matter surrounding the sand grains. The craquelure-type pattern on one of the grains (C) is typical for Humus Podzols. The fragments of organic matter in between the sand grains (M) are darkened Moder humus. Figure by H. Huisman and J. van Donkersgoed.

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David Fontijn, Sasja van der Vaart and Richard Jansen

The excavation and analysis of mound 6 and 7 was a complex and sometimes even utterly difficult project. That we were able to bring it to a conclusion is in no small part due to the fact that so many people were willing to help us. Here, we would like to thank them.

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Mound 6 and 7 were excavated by the Faculty of Archaeology, by two staff members, two archaeologists of Archol BV and a number of unpaid students and amateur archaeologists. We are enormously grateful to all the people who worked so hard under weather circumstances that were often so bad. Drs. Cristian van der Linde and drs. Ivo van Wijk (both Archol BV) and drs. Quentin Bourgeois (then Faculty of Archaeology) of the permanent field team helped us wherever they could. The then students Arjan Louwen, Patrick Valentijn, Niek van Rijswijk, Dieuwke Ingenegeren, Erin Lyklema, Adé Porreij, and Joseph Sproule were indispensable and good company. Organizational help during the preparation of the excavation was done by drs. Tiziano Goosens (Archol BV). André Manders was our metal detectorist but helped us in numerous other ways as well. Amateur, or rather *local* archaeologists Gerard Smits, Peter van Nistelrooij, and Gerard van Alphen (the latter two from the *Archeologische Werkgroep Oss*) joined in many times, and we also received much-appreciated incidental help from dr. Peter Jongste, drs. Roosje de Leeuwe, drs. Leon van Hoof, drs. Lucas Meurkens, drs. Maurits Pruysen, and Wouter Verschoof. René van Hinthum operated the mobile excavator. Willem Gijtenbeek and Maikel Kuijpers (KG Visuals) handled the camera which resulted in a unique reporting of the excavation in film. The lifting of the blocks was only possible thanks to the efforts and knowledge of Jo Kempkens and Ton Lupak from Restauratieatelier Restaura, Haelen. Thanks to all of you!

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The finds aroused a lot of interest, also from outside the Netherlands. In 2011 we were visited by colleagues from the *Fürstensitze* Project in Germany. In a workshop at the Faculty of Archaeology, we discussed our finds and ideas. We are most grateful to prof. dr. Chris Pare (University of Mainz), prof. dr. Christoph Huth (University of Freiburg), dr. Dirk Krausse (Landesamt für Denkmalpflege), dr. Julia Koch (University of Leipzig) and dr. Ute Dietz (University of Münster).

Anticipating this scientific publication drs. Evert van Ginkel, together with Sidestone press (Karsten Wentink RMA and Corné van Woerdekom MA), compiled in a short time a small public publication: *Prins onder Plaggen*. This was presented at the opening of the first exhibition of the finds in Museum Jan Cunen in Oss. The latter was made possible by the then director drs. Rene Pingen.

Following the 2007 excavation the remains of the mounds were covered and (re)constructed by the Archeologische Monumentenwacht Nederland. In 2012, with the financial support of the municipality of Oss, and in cooperation with Brabants Kenniscentrum Kunst en Cultuur (BKKC), the location has been further designed to bring the Early Iron Age period to life. The archaeological monument "Paalgraven" is open to pedestrians who can visit the mounds lying within a small heath(en) landscape. We are really very happy that this unique and for us once in a lifetime excavation resulted in a still visible archaeological monument where people can experience the unique prehistoric barrow landscape of Oss-Zevenbergen!

Colophon

Transformation through Destruction. A monumental and extraordinary Early Iron Age Hallstatt C barrow from the ritual landscape of Oss-Zevenbergen

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Summary

In the summer of 2007 archaeologists of the *Ancestral Mounds* project of Leiden University excavated parts of mound 6 and 7 of the Oss-Zevenbergen barrow landscape. Following excavations at this barrow group in 1964/1965 and 2004, these were the last elements that as yet had gone (partially) unstudied due to them being previously off-limits because of a resident badger, a protected species in the Netherlands. Continuing previous work of excavating also outside of the barrows proper, several test trenches were also dug in 2007, but these yielded no prehistoric traces.

The body of mound 6 had been excavated and levelled prior to our 2007 excavation. Previous research, however, had left several questions unanswered. It was unclear whether mound 6 was originally a round mound or a long barrow, or how two peripheral structures (a ditch and a double post-setting) related chronologically. The remnants of the long barrow were fully excavated in order to answer these remaining questions. This work revealed that mound 6 indeed had been a long barrow. A section showing a posthole being intersected by the surrounding ditch showed that the ditch has to be younger than (some of the posts of) the double post-setting. Another aim of this part of the excavation was to establish whether a post row previously discovered to the southwest of the mound extended eastwards. It did not.

Two quadrants and part of the centre of mound 7, the largest in this group, were fully excavated by hand in horizontal layers. Recognizable sods were documented in detail. This barrow was soon discovered to contain an extraordinary and complex central find assemblage. A cremation interred in an urn lay adjacent to a massive spread of charcoal, burned bone, and bronzes over 5 m long and 2 m wide. This concentration proved to be so complex that the entire assemblage was block lifted and painstakingly excavated in a restoration lab. This assemblage proved to be located on top of the ablated top of a dune that had been opportunistically used to create a large barrow (D. = 36 m) following the burial ritual. By combining detailed excavation with a range of specialist and comprehensive studies of the finds and their context, this 2800 years old burial ritual can now be brought to life in surprising detail.

The cremation had been interred in an Early Iron Age *Schräghals*-urn. The cremation remains in the urn were determined to be those of a man 23-40 years old when he died. Analysis also showed that the cremation remains in the urn do not represent the remains of an entire individual, a fair bit is "missing". Several cremation fragments found among the charcoal spread could well be from the same individual, but even so some of the man's cremated remains must have been removed from the assemblage prior to the barrow being constructed. The massive spread of charcoal consisted of both substantial beams and a thin dusting of the area. The charcoal remains did not form any kind of structured pattern and appeared to have been moved about. Analyzed samples show the spread to mostly be oak, but also some ash and a single fragment of willow was found. Species that are highly suited to use in a cremation pyre (oak and ash particularly). Several bronze rings and ring fragments, either with a square or a round cross-section, were found throughout the charcoal spread. Certain fragments were clearly of rings that had been intentionally broken, with only some fragments being left behind while the others were removed. Over a thousand tiny bronze studs with hollow hemispherical heads and two legs were found, most of which were located in one concentration. The studs in this concentration still formed geometric patterns, showing that the studs were still attached to organic components when interred. DT-MS

analysis of residue found in several studs was unable to shed more light on what organic material the studs originally were attached. Parallels from Germany indicate a combination of wood and leather to be likely. Using a range of analytical techniques it was determined that the bronze studs had been intentionally tinned to give them a silvery appearance. The most probable scenario is that the studs and ring (fragments) are the remains of a dismantled yoke and/or horse tack. Two joining fragments of bone decorated with concentric circles were also found. Though they are too small to reveal their original function, it is significant to note that these are also pieces of a larger object of which only fragments were intentionally interred. Also found was a single iron fragment, too corroded to interpret. C14-dating of several charcoal twigs and cremation fragments, as well as typology, date the assemblage to the Early Iron Age Hallstatt C period.

Taken together, the various specialist analyses tell a story of how a man was cremated here, in a landscape littered with monuments, on top of a dune that was later opportunistically used to construct a sod-built barrow. This man's pyre, cremated remains, and pyre goods were searched through and moved about, with various elements being dismantled, manipulated, intentionally broken and interred or removed. In essence being *transformed through destruction*. Those remains left behind were lovingly covered with heather sods and form the centre of one of the largest mounds ever excavated in the Netherlands.

The 2007 excavation of and finds from mound 6 and 7 form the last piece of the Oss-Zevenbergen puzzle and give insights into a remarkable funerary ritual and the landscape in which it took place. With the first mound constructed here during the Bronze Age, and the last prehistoric phase involving the construction of not one but two monumental Hallstatt C barrows and extensive post rows that seem to have compartmentalized this remarkable barrow landscape.

But the story of Oss-Zevenbergen does not end there. In the Late Middle Ages two of the barrows (mound 2 and 7) were used at the locations for gallows. These two barrows formed the highest point in a heath landscape. The corpses of criminals displayed here would have been visible for kilometres. At least four individuals were executed and buried in this heathen setting.

Transformation through Destruction

Some 2800 years ago, a man died in what is now the municipality of Oss, the Netherlands. His death must have been a significant event in the life of local communities, for he received an extraordinary funeral, which ended with the construction of an impressive barrow.

Based on the meticulous excavation and a range of specialist and comprehensive studies of finds, a prehistoric burial ritual now can be brought to life in surprising detail. An Iron Age community used extraordinary objects that find their closest counterpart in the elite graves of the Hallstatt culture in Central Europe. This book will discuss how lavishly decorated items were dismantled and taken apart to be connected with the body of the deceased, all to be destroyed by fire. In what appears to be a meaningful *pars pro toto* ritual, the remains of his body, the pyre, and the objects were searched through and moved about, with various elements being manipulated, intentionally broken, and interred or removed. In essence, a person and a place were *transformed through destruction*.

The book shows how the mourners carefully, almost lovingly covered the funeral remains with a barrow. Attention is also given to another remarkable monument, long mound 6, located immediately adjacent to mound 7. Excavations show how mound 7 was part of an age-old ritual heath landscape that was entirely restructured during the Early Iron Age, when it became the setting for the building of no less than three huge Hallstatt C barrows. Thousands of years later, during the Late Middle Ages, this landscape underwent a complete transformation of meaning when the prehistoric barrows became the scenery for a macabre display of the cadavers of executed criminals.

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