Transformation through Destruction

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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.

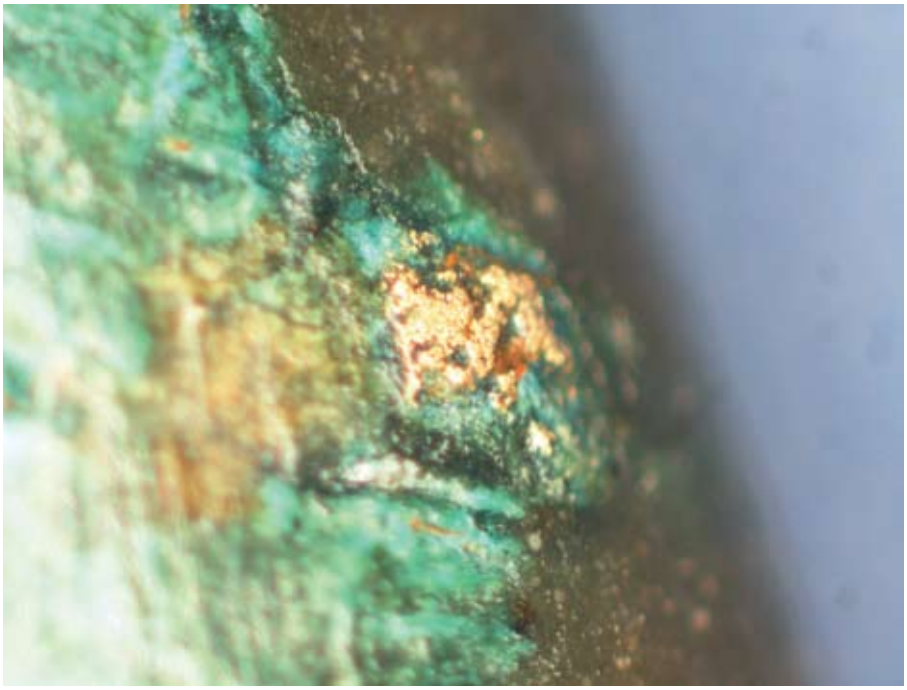


Fig. 7.6 "Gold" patch on bronze ring V 165, under high magnification (up to 65x). Figure by A. Verbaas.

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

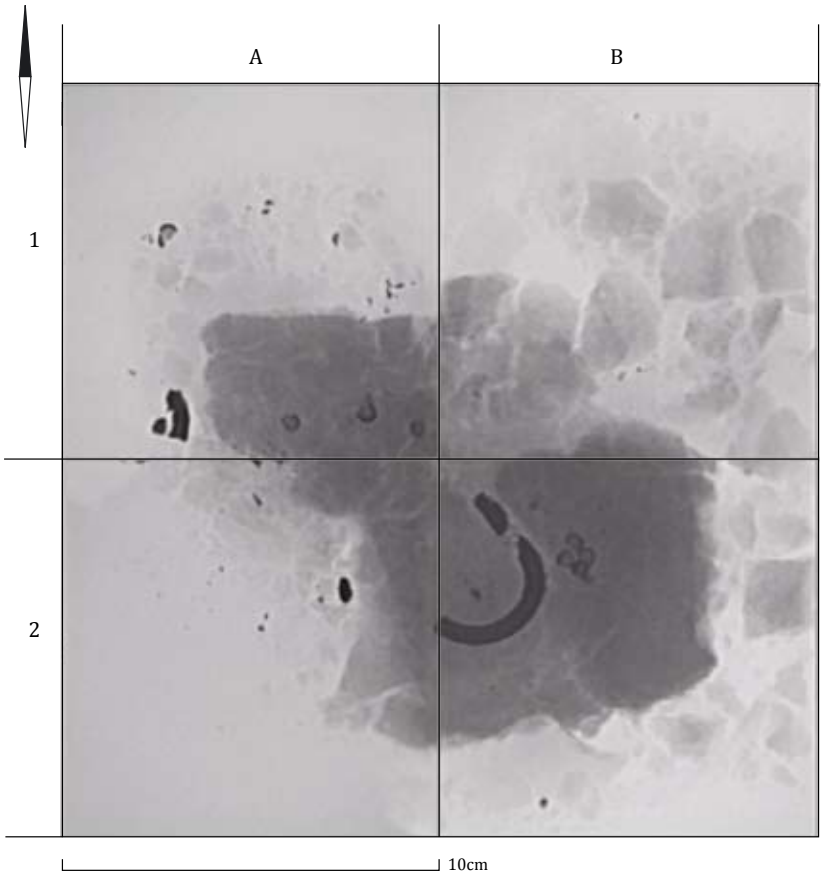


Fig. 7.7 X-ray V 165. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

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.

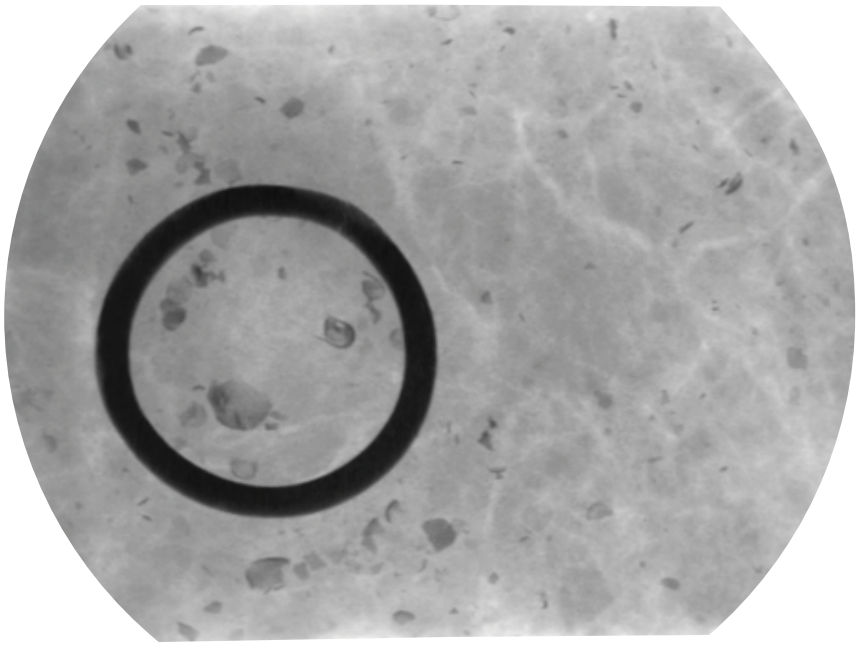


Fig. 7.10 X-ray of V 217 and V 218. Note the legs of V 217. Figure by Restauratieatelier Restaura, Haelen.

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

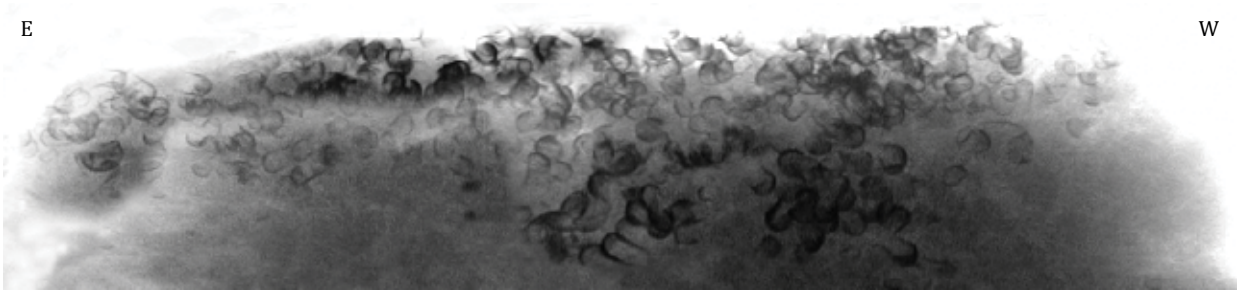


Fig. 7.14 (above) X-ray of V 173A taken from the north side. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

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

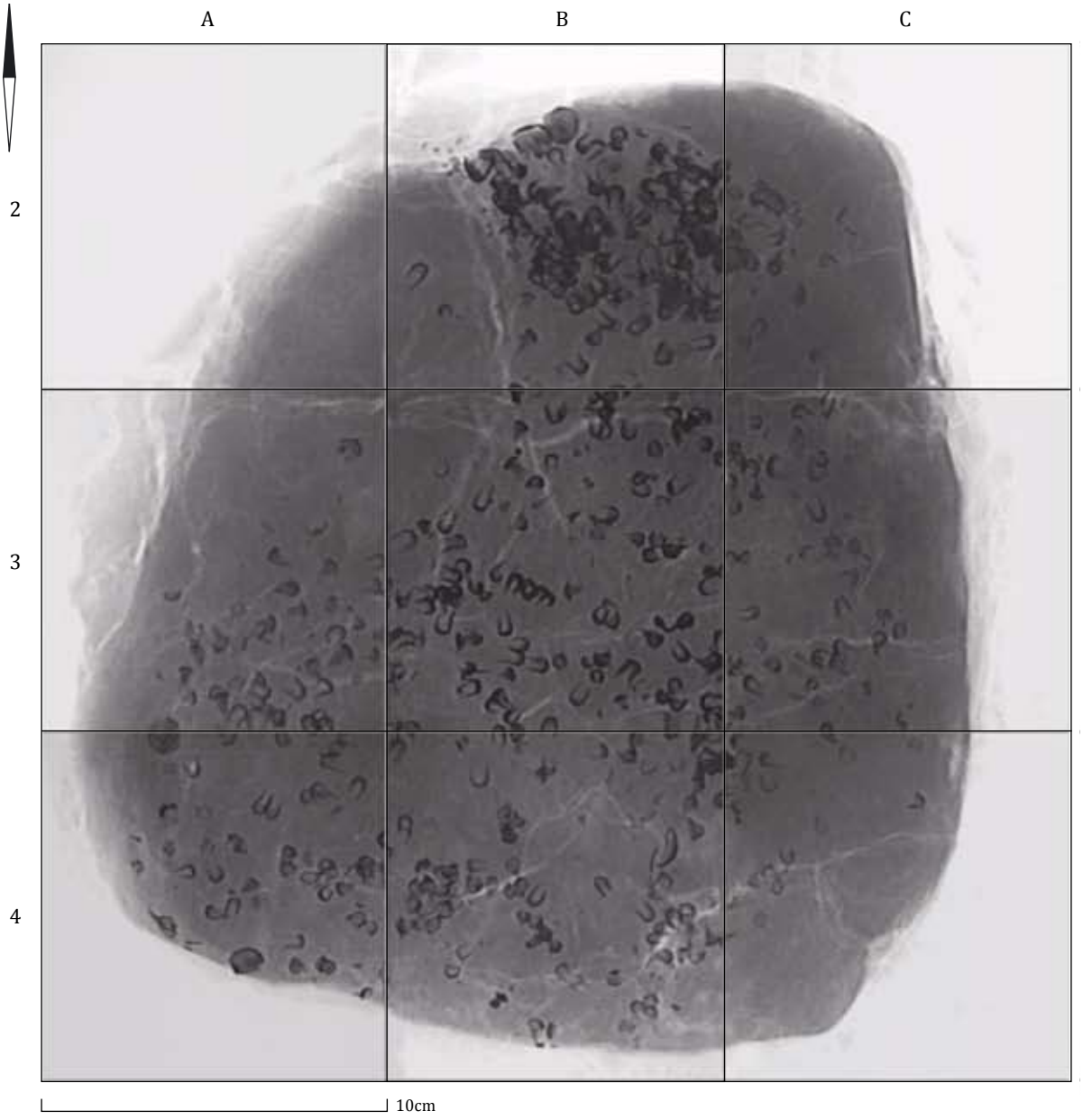


Fig. 7.16 Studs "fossilized" into rows and a triangle from V 173A. Also shown is a single large stud. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

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).

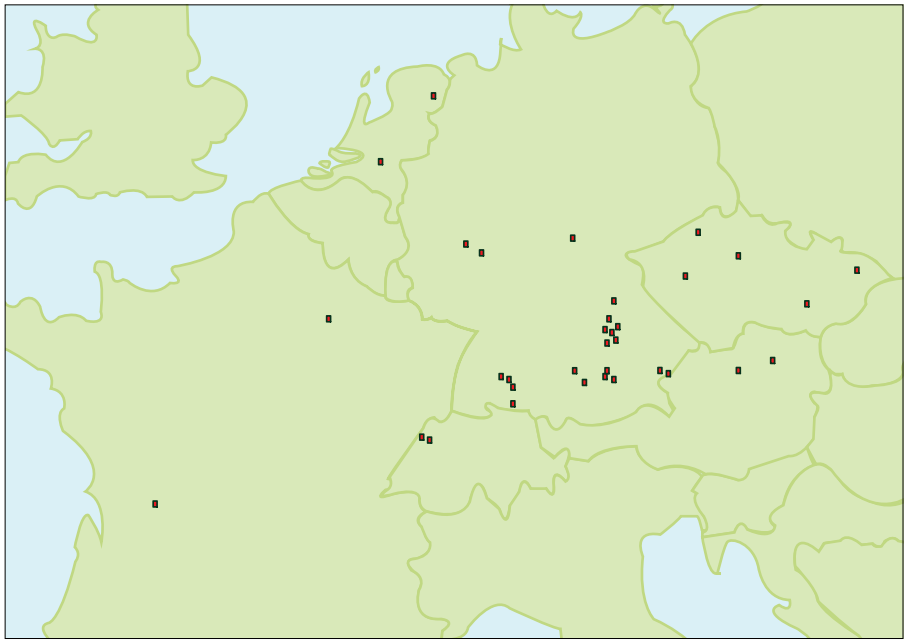


Fig. 7.17 Map showing the find locations of studs. Figure based on Trachsel 2004 with Dutch finds added by J. van Donkersgoed.

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

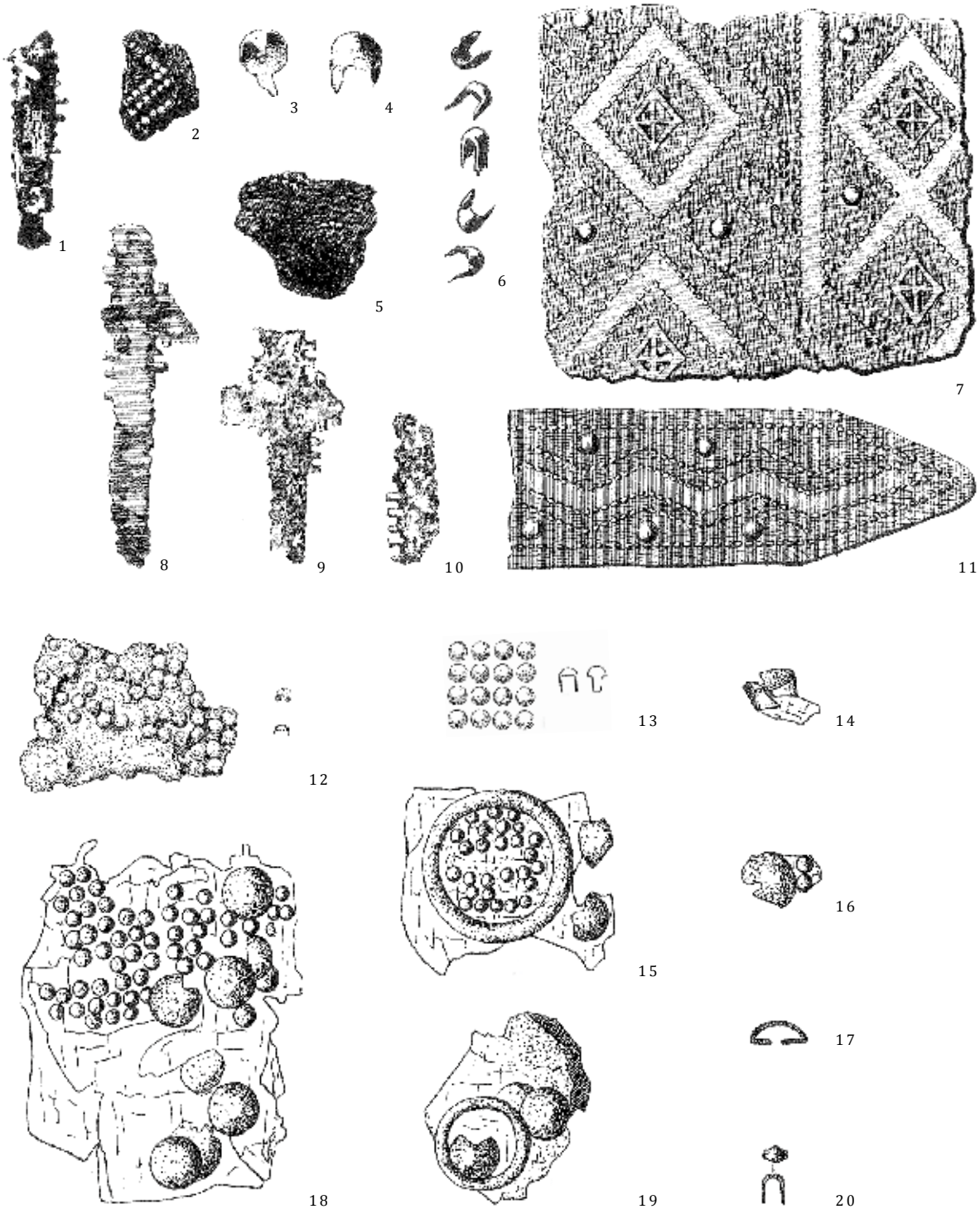


Fig. 7.18 Examples of bronze studs found throughout Europe (provenance of individual drawings, see section 7.5.3). Figure after Kossack 1959, Taf. 80/ Pare 1992, Pl. 44/ Zürn 1987, Taf. 55 and 491/J. van Donkersgoed.

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).

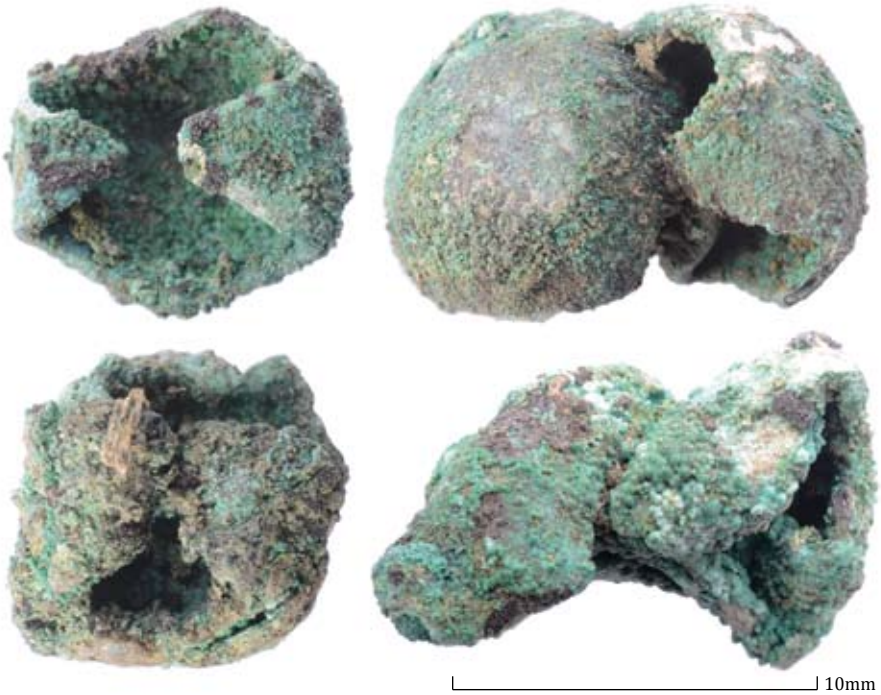


Fig. 7.19 Several examples of bronze studs with folded triangular legs from Emmen-Sectie C. Figure by J. van Donkersgoed.

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

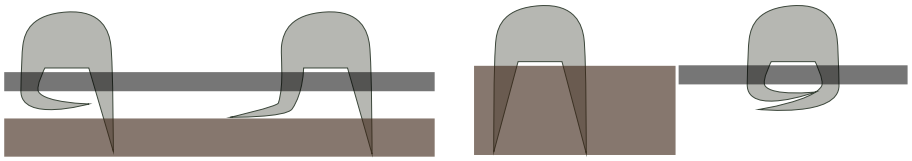


Fig. 7.21 Side-views of how bronze studs might have been inserted through leather and/or wood. Figure by J. van Donkersgoed.

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.

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

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

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

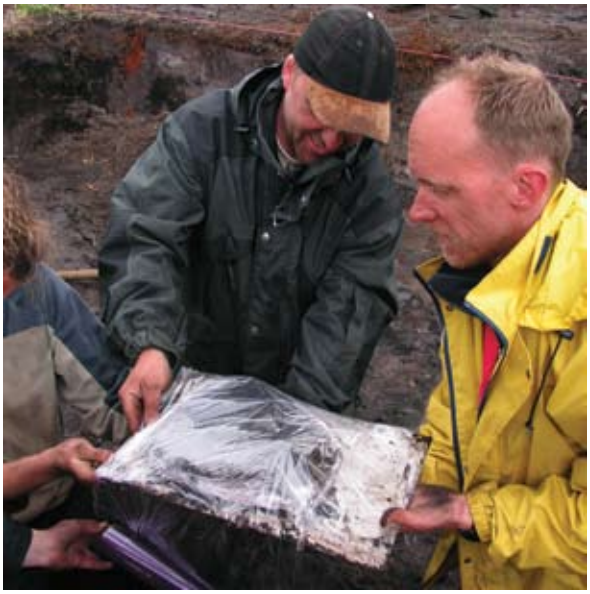
67 In between V 173 and V 1001, just one small bronze fragment was found (V 211).

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).

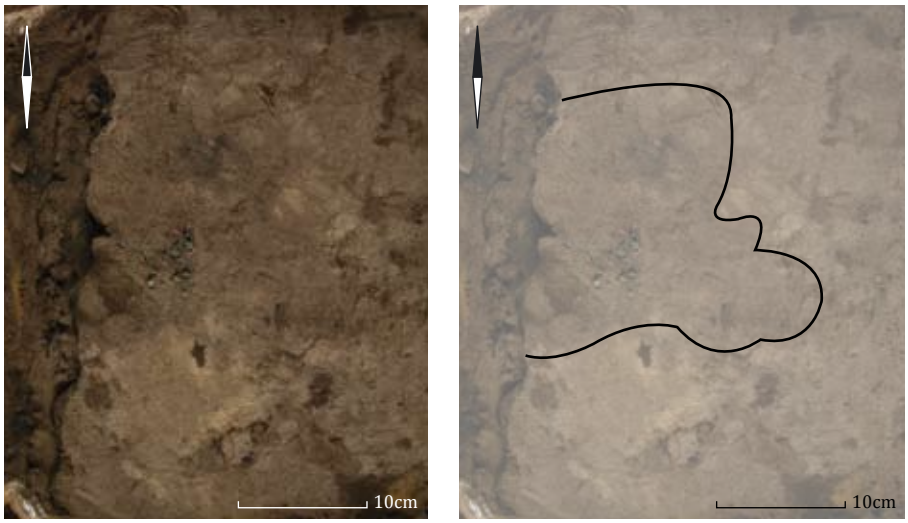


Fig. 7.24 V 173C, showing the feature in which the bronze studs are located. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

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).

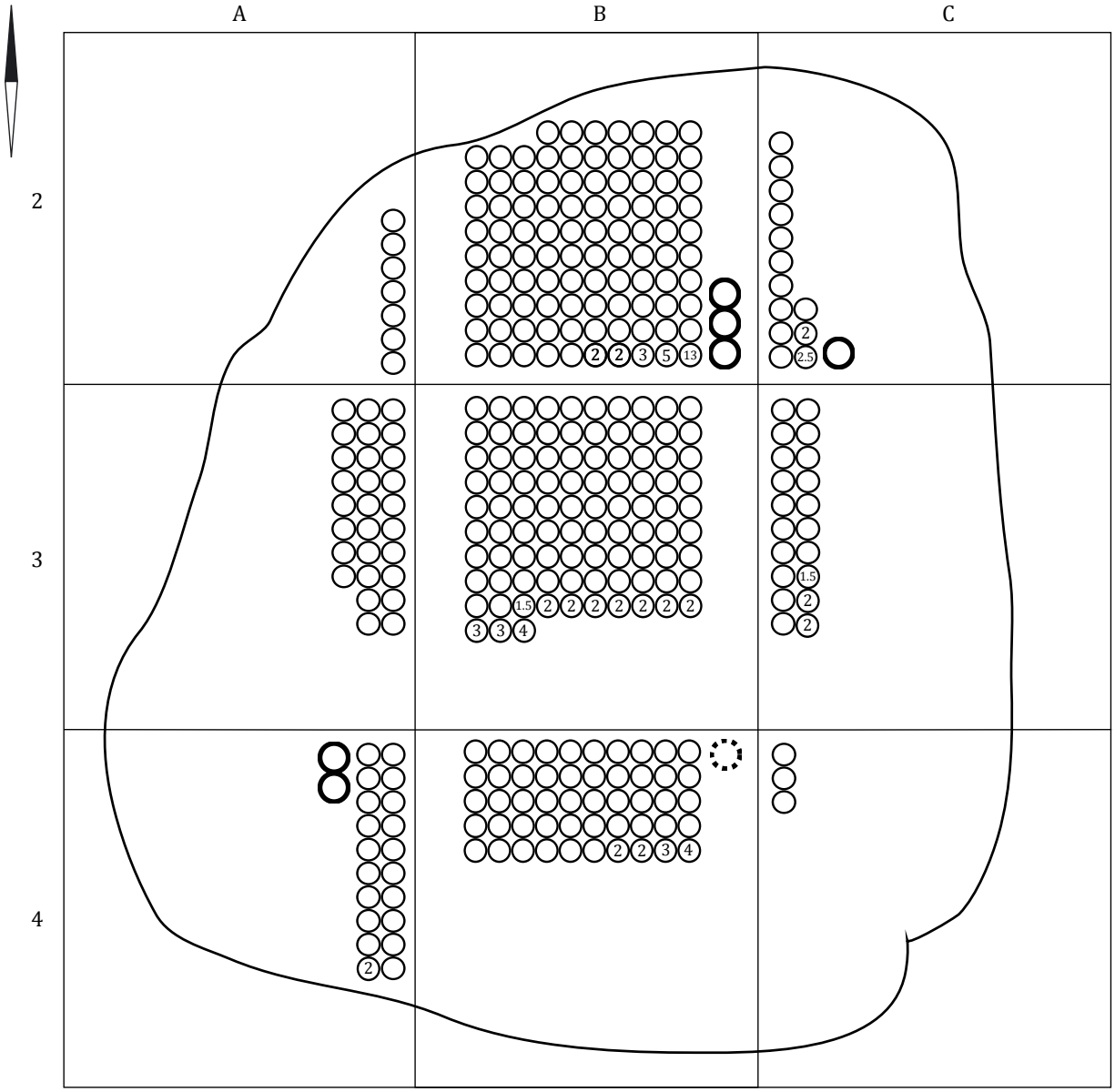


Fig. 7.25 Quantitative representation of where studs were found in V 173A. Figure by J. van Donkersgoed. Small circle: small stud; large circle: large stud; dashed circle: probable large stud). A number in a circle indicates the number of studs corroded in a row.

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".

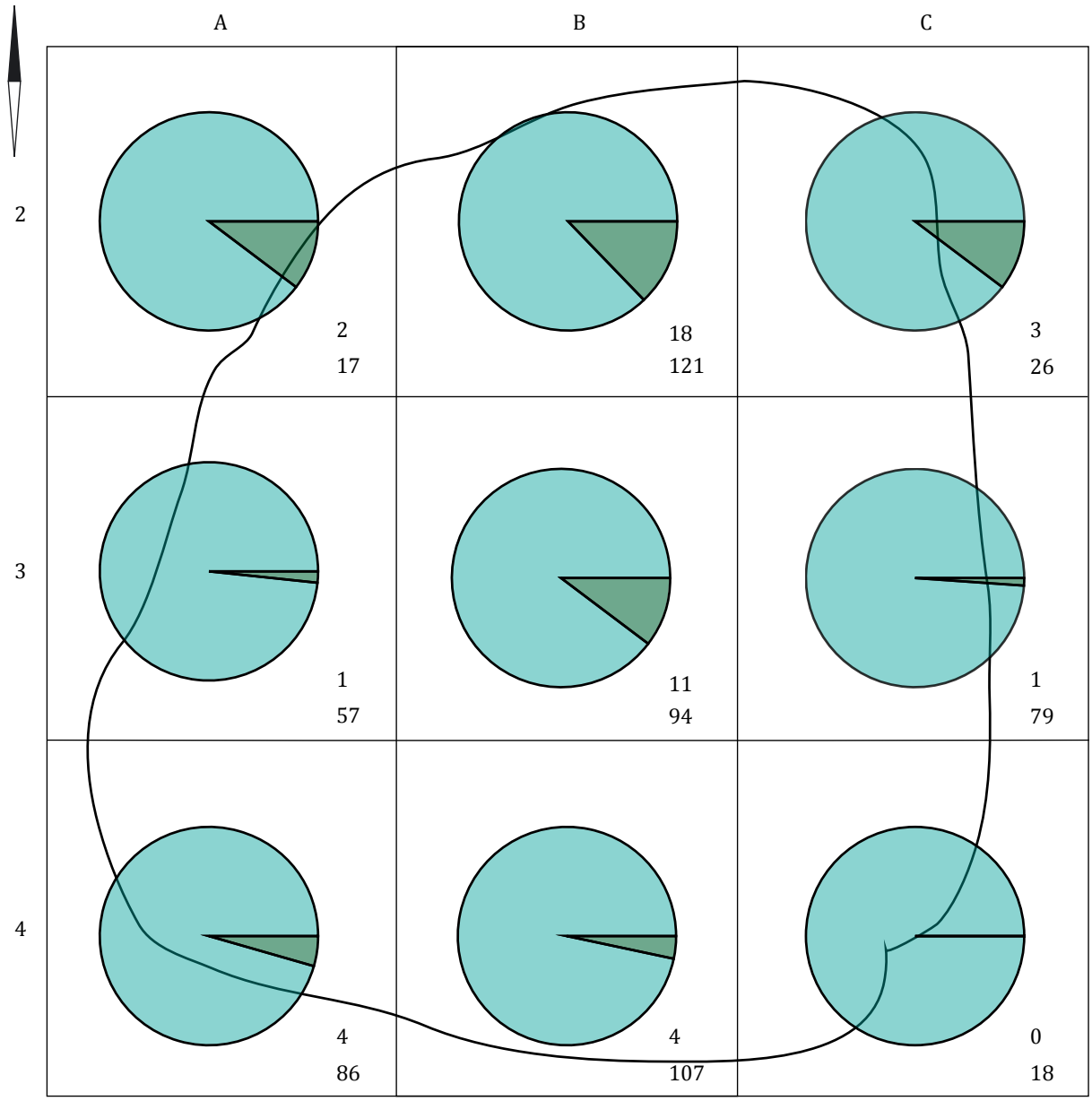


Fig. 7.26 Straight-legged (blue) and folded legged stud (green) dispersal. Figure by J. van Donkersgoed.

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.

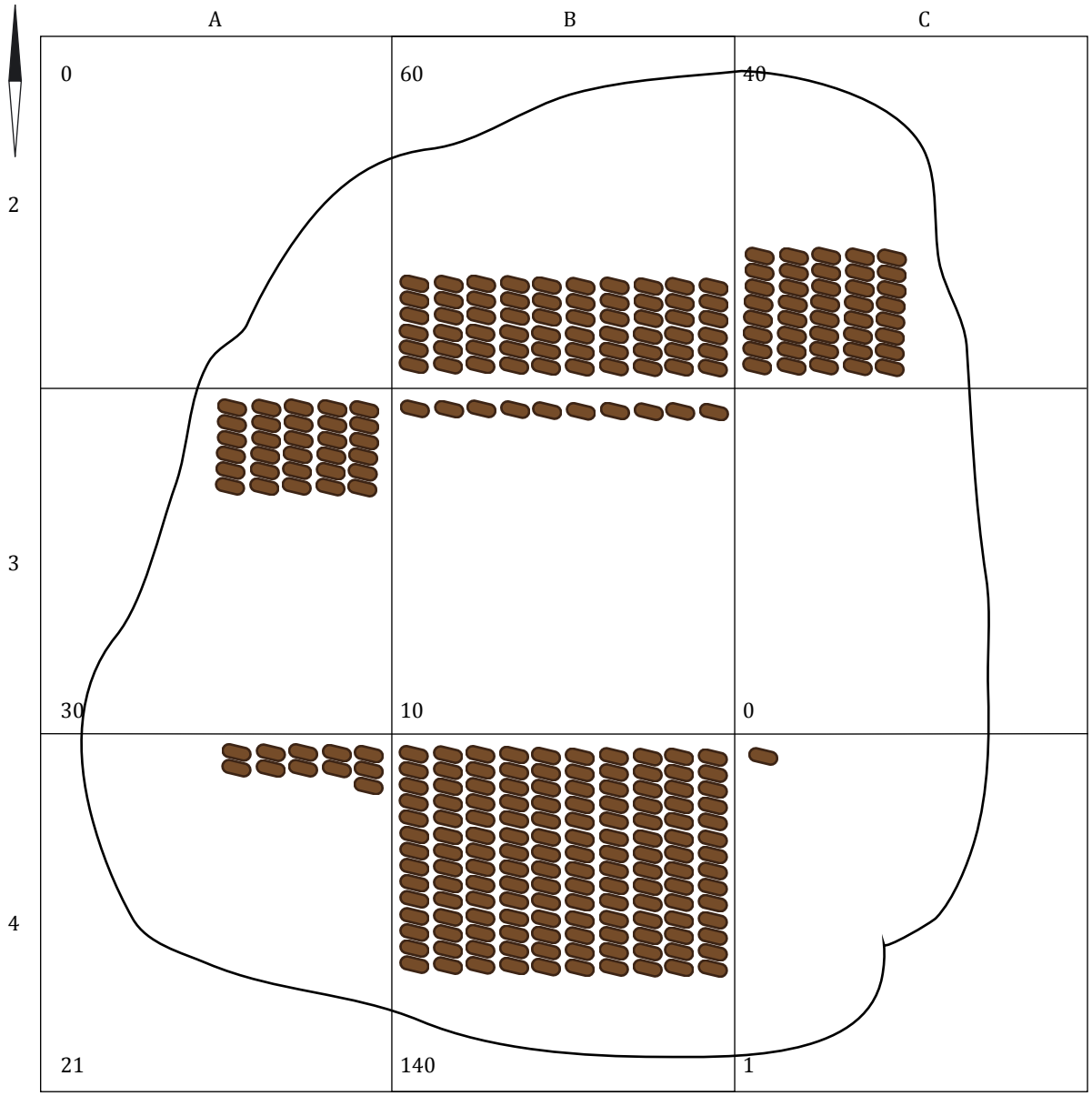


Fig. 7.28 Charcoal retrieved from V 173A in cg. Figure by J. van Donkersgoed.

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.

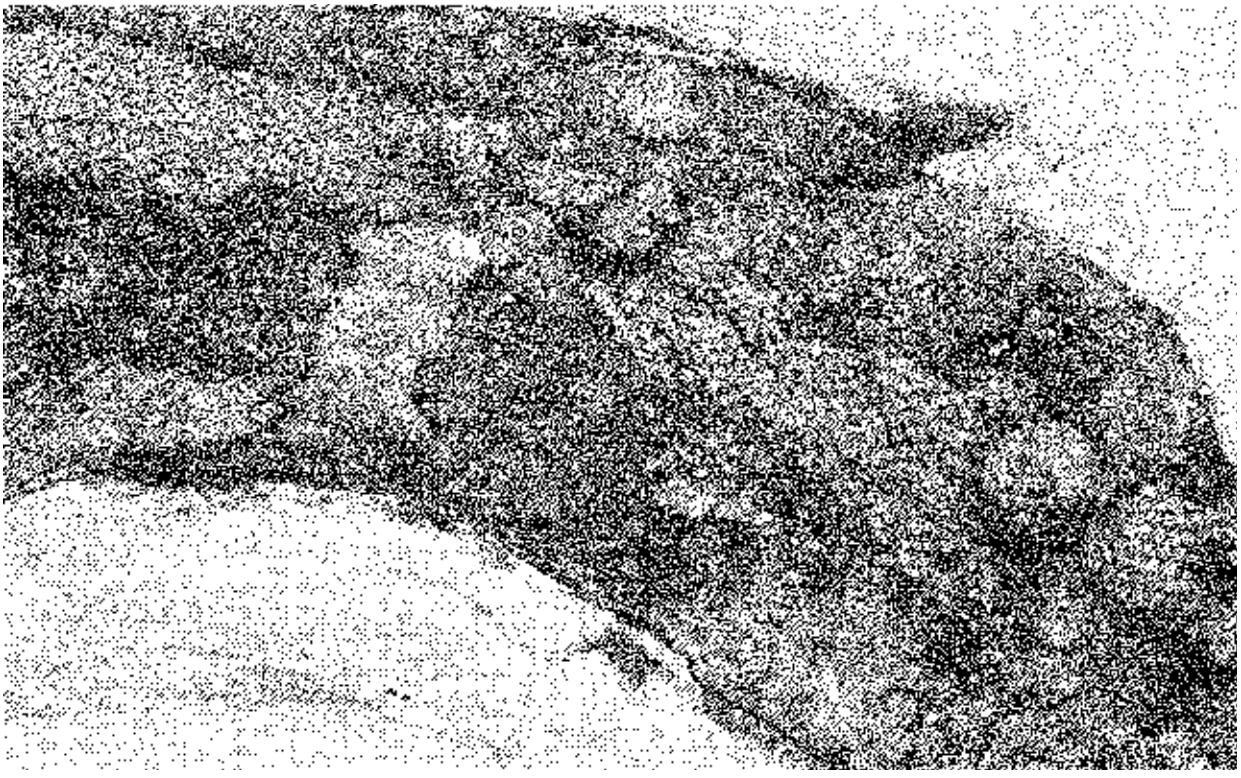


Fig. 7.31 One end of the yoke from Frankfurt-Stadtwald as it was excavated showing the bronze-decorated knob on the right. Figure after Willms 2002, 29/J. van Donkersgoed.

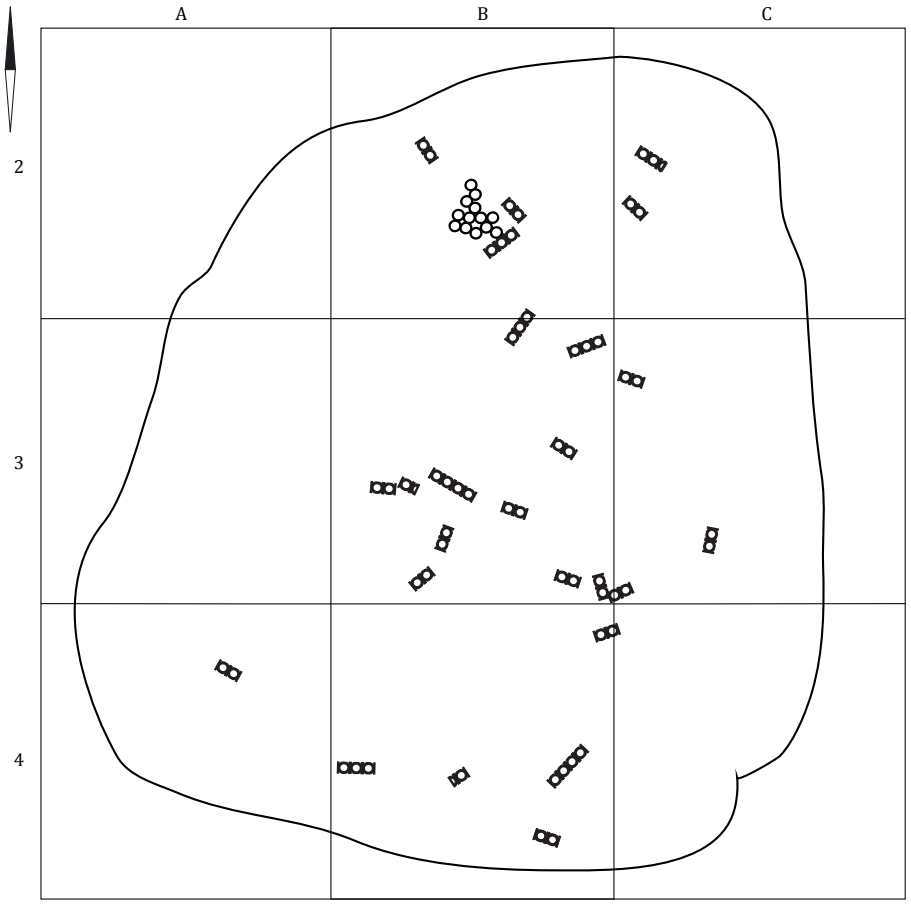


Fig. 7.32 Rows of studs corroded together re-placed in their original location. The straight legs on either side of a circle indicate the orientation of the legs. The triangular cluster of studs in square B/2 is the one depicted on figure 7.16. Figure by J. van Donkersgoed.

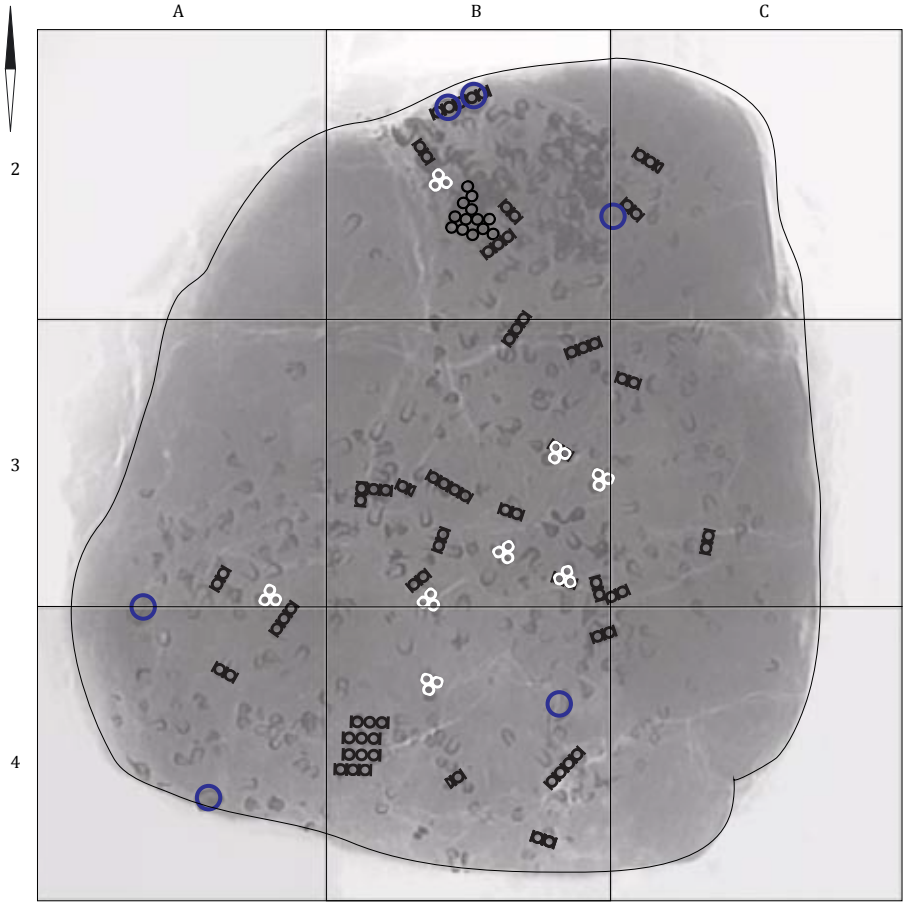


Fig. 7.33 Rows of studs (black), concentrations (white), and large studs (blue) visible on X-ray. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

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.

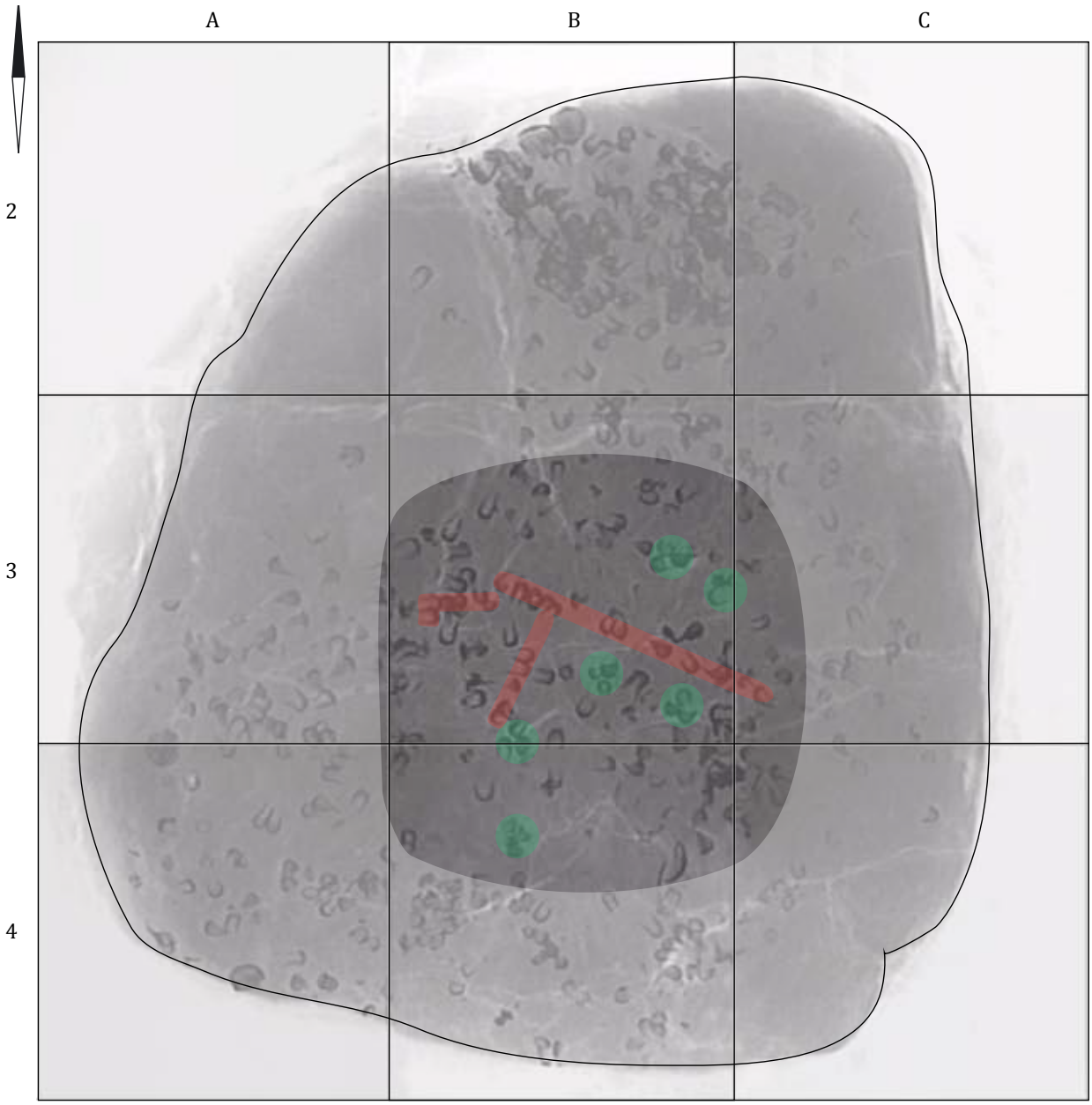


Fig. 7.38 V 173A interpretation of patterns. The highlighted section is the area in which the studs are (roughly) in their original location. Lines are indicated in red, groups of three studs in green. Figure by Restauratieatelier Restaura, Haelen/J. van Donkersgoed.

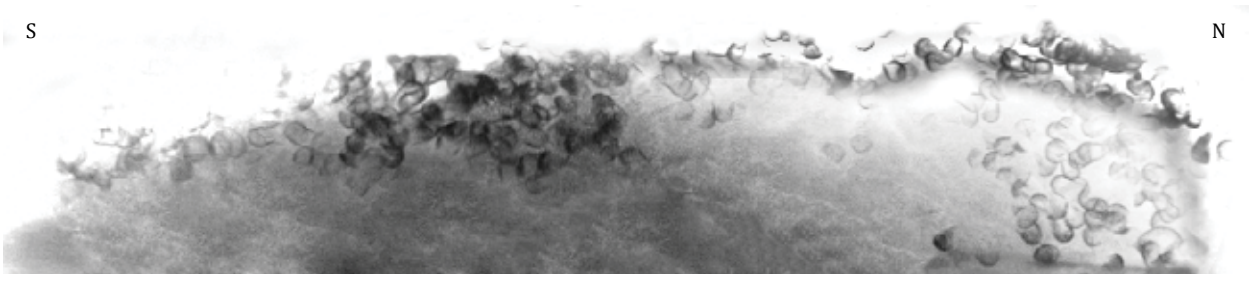


Fig. 7.39 X-ray of V 173A taken from the eastern side. Note that in the centre (correlating to squares A/3, B/3, and C/3) the studs are all located in a single, shallow plane. The depth to which the studs on the right are dispersed is the result of the stud-decorated object(s) being shoved aside. Figure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