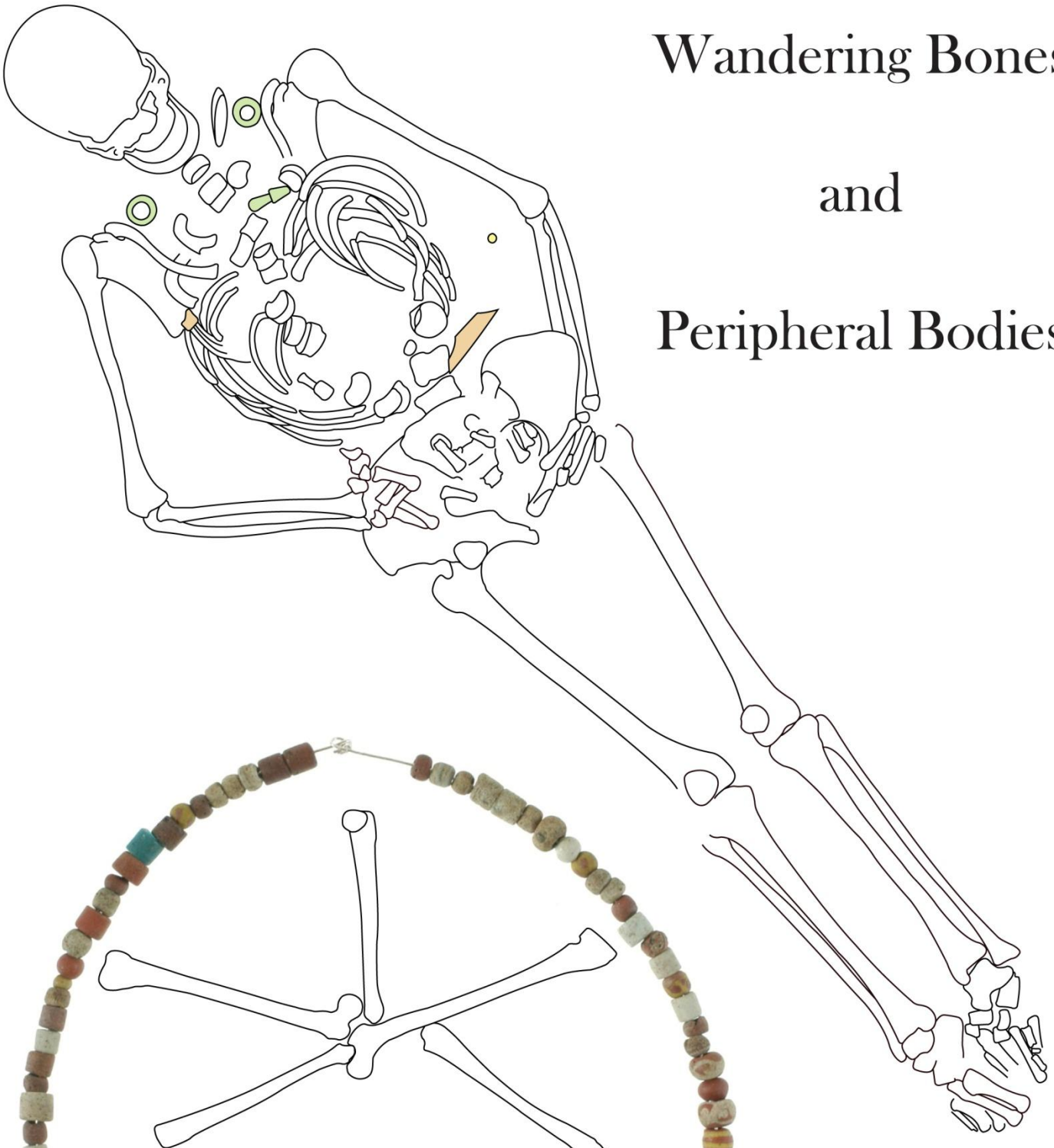
Wandering Bones and Peripheral Bodies



Multidisciplinary analysis of the human remains from the early medieval (AD 500-700) settlement at Oegstgeest, the Netherlands

Frank van Spelde

Figures cover:

Top: field drawing skeleton (individual 2012-01 [figure by author])
Bottom: field drawing star-shaped long bone deposit (2011-3 [figure by author]) and bead necklace (from individual 2012-02 [figure by Restaura])

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1. An early medieval settlement and its bones

An introduction to the human remains of Oegstgeest and their discovery

"As Autumn came on they came back northward harrying, and lay off Friesland. One night when the weather was calm they went up a large river-mouth, where was bad harbourage, and the ebb of the tide was great. There up on land were wide flats with woods hard by. The fields were soaked because there had been much rain. (…) Soon they came to a hamlet where dwelt several peasants. The people ran out of the hamlet into the fields, such as could do so, when they perceived the enemy, but the freebooters pursued them. Then they came to a second village, and a third; all people fled before them. The land was level, flat fields everywhere, intersected by dykes full of water. By these corn-lands or meadows were enclosed; in some place large stakes were set, and over the dyke, where men should go, were bridges and planks laid. The country folk fled to the forest. But when the freebooters had gone far into the settled parts, the Frisians gathered them in the woods, and when they had assembled three hundred men, they went against the freebooters resolved to give them battle. There was then some hard fighting; but the end was that the Frisians fled and the freebooters pursued the fugitives. (…) The freebooters had brought down to the shore much booty and cattle. And when they came to the ships, some slaughtered the cattle, some carried out the plunder to the ships, some stood higher up and formed a shield-burgh; for the Frisians were come down in great force and were shooting at them, being also in battle array."

(Egil's Saga[1])

1.1 Introduction

Few medieval sources describe the landscape and people of Friesland, and none in such detail as the writer of Egil's Saga. It sets a vivid scene, a suitable interlude to a thesis about the people inhabiting this early medieval Friesland. Written down in the early thirteenth century, the saga recounts the life of freebooter Egil Skallagrimson in the ninth and tenth century. Although its credibility as a historic source might be doubted, it is clear that the writer was acquainted with Friesland's (often referred to as *Frisia*), appearance. Even today large parts of the western and northern Netherlands are dominated by the maze of flat fields intersected by dykes (i.e. ditches), much as it was described in the saga. In the same area, only a few centuries before Egil allegedly came to raid, a settlement existed on the banks of the Old Rhine river. The settlement's original name is unknown, but is nowadays known as the early medieval settlement of Oegstgeest, after the modern municipality in which it is located. Extensive

[1] Original anonymous author, written in the thirteenth century. Translation by W.C. Green (1893). See also about this passage: Blok 1974, 119-120.

archaeological excavations in the past ten years revealed the entire layout of the settlement, including a number of human burials, partial skeletons and solitary human bones in various contexts. These human remains and their contexts are the focus of this research.

The western part of the Netherlands, nowadays densely inhabited, has seen an increase in archaeological research in the last decades, partially due to the introduction of the Valetta-convention. Large scale excavations revealed a considerable number of sites dating to the Merovingian era (ca. 500-750 AD [James 1988, 71]) concentrated in core areas of habitation, of which the Rhine and Meuse estuaries and the coastal dunes are most prominent (Nicolay 2014, 21).[2] Although some cemeteries and burials have been found in these areas, skeletal remains are not common and intensive multidisciplinary research on these remains is rare. The skeletal remains from primary- and secondary deposits found in the Oegstgeest settlement provide an opportunity to employ various research methods in order to have a much-needed insight into the lives, and deaths, of the early medieval inhabitants of the western Netherlands.

So, central to this research is the question how the lives and deaths of the inhabitants of the Oegstgeest settlement can be characterized based on their skeletal remains and associated contexts.

Techniques from three disciplines will be employed in an attempt to answer this question, providing three 'views' which complement each other. The first part will be a contextual view, and will focus on how the people were buried, where, and under what circumstances. This will attempt to answer questions concerning rituals surrounding death and modes of deposition. The second view will be osteological, which entails a detailed analysis of the bones. This part will provide answers about the individuals' lives, such as their state of health, age-at-death, stature and endured trauma. The third part will be an isotopic view on the people of Oegstgeest. This part will focus on the reconstruction of migratory patterns trough isotope analysis, challenging long-hold ideas about the 'migration period'[3]. Finally, the three disciplines will be combined to form a synthesizing discussion, where it is attempted to explain the observed trends by

[2] A recent overview of early medieval sites in the Netherlands can be found in Langbroek & Van Leeuwen 2014.

[3] Although the migration movements in northwestern Europe were most intense in the fifth century, evidence from previous research suggests that that migration movements in the western coastal area of the Netherlands extended into the sixth and possibly seventh century, albeit on a smaller scale (Dijkstra 2011, 342-357).

proposing different theories. It should be noted that the figures are not displayed within the chapters, but are combined in part 2 of this thesis. This made it possible to display them on a larger scale and thus with more detail.

1.2 Introducing Frisia

The Oegstgeest settlement was inhabited for a limited time span of ca. 200 years, from 500 to 700 AD (Hemminga 2006; Hemminga 2008; Jezeer 2011), which largely coincides with the Merovingian era (476-751 AD [James 1988, 70-71]). The era is named after the Merovingian dynasty (founded by the semi-mythical Merovech) which ruled the Frankish empire until they were deposed by the Carolingians (James 1988, 71).

During the sixth and seventh centuries AD, the area of the modern Netherlands was a border region between the Frankish kingdom in the east and the Frisian kingdom in the western coastal- and central river area (figure 1.2). Although formally called a 'kingdom' by the Anglo-Saxons and 'earldom' by the Franks (Dijkstra 2011, 362), it is likely that the long-stretched Frisian area was initially subdivided into many smaller chiefdoms (so-called '*Gefolgschaften*'), in which the power of the leader and the size of his retinue was based on the material resources of the leader, which was distributed among his retinue through gift-giving (Nicolay 2014, 4). In the course of the seventh century these chiefdoms were united to form a single 'kingdom' (Dijkstra 2011, 363). Effective central rule of the kingdom was hindered by the poor accessibility of the separate micro regions in the coastal area, which was under heavy influence of the sea and debouching rivers (figure 1.1; Boeles 1927, 198). In northern Frisia large areas flooded twice a day during high tides, while in the west the inland was dominated by vast marches. As a result, habitation was only possible on raised parts of the landscape, such as coastal dunes and river banks (see chapter 2). However, In the north of Frisia (mainly in the modern provinces of Groningen and Friesland) the fight against the relentless water had already begun centuries before, by artificially raising the ground, forming habitation mounds called '*terpen*'. In the west the water was mainly regulated by digging ditches (described above in the fragment of *Egil's Saga)*. Where the groundwater table was low enough crops could be raised, but subsistence was mainly based on a mix of cattle herding, trade and small-scale agriculture (Nicolay 2014, 43-44). Settlements were mostly concentrated along important waterways as these provided opportunity for the transportation of goods and people, which was more difficult or even impossible over land. Extensive ship-based trade networks existed in north-western Europe, most

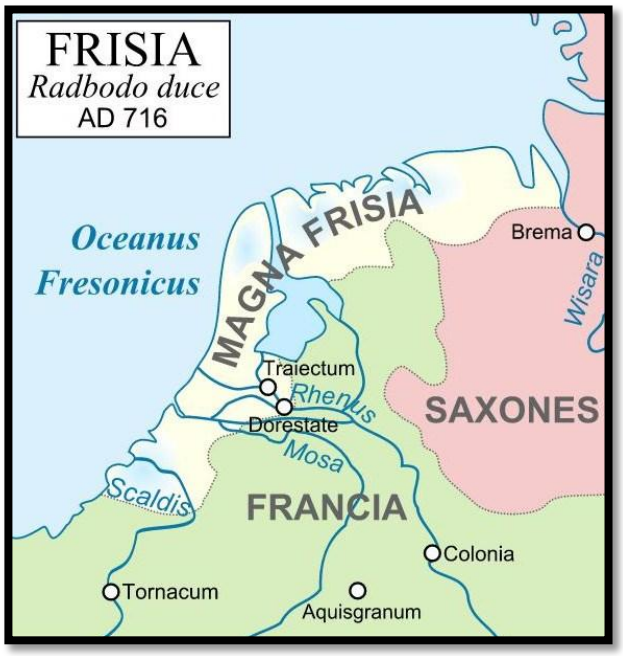
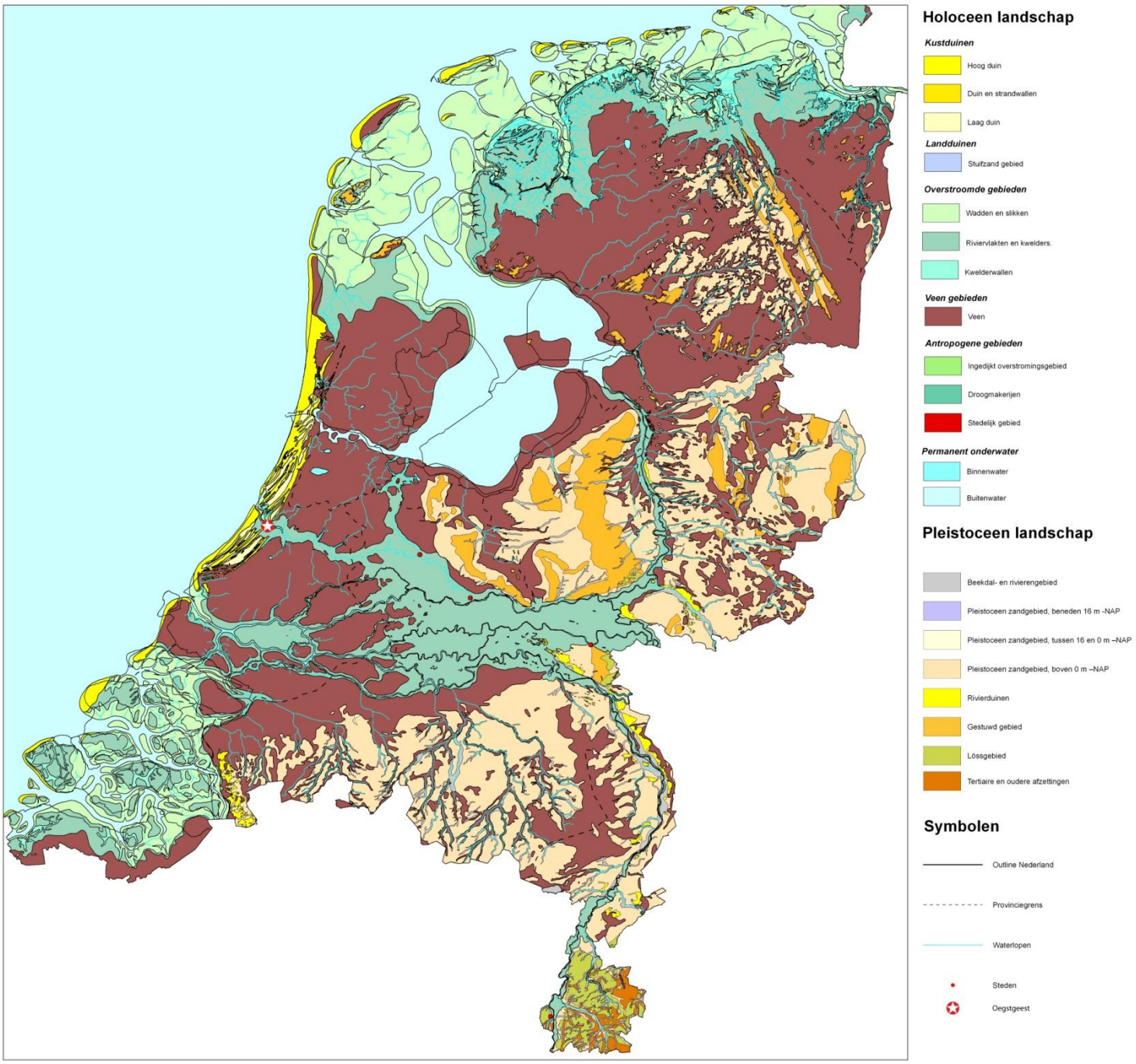


Figure 1.1 (Left): Political map of the Netherlands and surrounding area displaying territories of the Frisians, Franks and Saxons around 716 AD (image from: Wikimedia Commons, accessed 1-2-2016)

Figure 1.2 (below): palaeo-geographical map of the Netherlands displaying the situation around 800 AD. Red-and-white star indicates location of Oegstgeest (image from: Vos & De Vries 2013, modified by author).

800 n. Chr.



importantly with the Frankish kingdom in the east, the Anglo-Saxons to the west, and Scandinavian regions further north (see figure 4.7).

1.3 The Oegstgeest settlement

One of these Frisian settlements with a mixed economy along the banks of the Old Rhine was the Oegstgeest settlement. Its remains were first discovered in 1990 when two silver coins from the second half of the seventh century were found by a metal detectorist. Soon after, during excavation works for a new bicycle path, archaeological features were discovered of which one contained a considerable amount of find material from the Merovingian era (Hessing 1992, 103-106). Two exploratory research projects in 1998 and 2003 concluded that a settlement of early medieval date was preserved *in situ,* existing of several farmsteads (De Boer & Van der Heijden 2003; Marinelli 1998). Due to planned construction works by Leiden University, large areas of the preserved settlement had to be excavated. In 2004, 2005 and 2009 excavations were carried out by commercial archaeological companies (Archol B.V. and ADC Archeoprojecten respectively [Hemminga 2006; Hemminga 2008; Jezeer 2011]). From 2009 until 2014, excavations continued every summer and were carried out by the Faculty of Archeology of Leiden University. The site was used for the university's archaeological field school, where hundreds of first-year students (of which the author was one back in 2009) were familiarized with archaeological excavation techniques. An area of more than ten hectares was excavated during these campaigns, revealing the entire lay-out of the settlement, including its peripheral areas. Circa 20 farmsteads and 30 outhouses or storage buildings were uncovered, surrounded by hundreds of waste pits, wells and ditches. In addition, wooden embankments and quays were found that were originally build on the shore of the Rhine river, which made it possible for ships to moor and unload their goods in safety. Thousands of local and foreign goods were found in the soil features. These consisted mainly of daily household waste such as bones from slaughtered animals, pottery, and, where preservation conditions were favorable, objects of wood and leather. Large quantities of goods originated from the German Rhineland (at that time Frankish territory), such as wine (of which the barrels were sometimes re-used as lining for wells), pottery vessels and even pigs (see chapter 4).[4] Small-scale artisanal production also took place in the settlement, testified by finds of unfinished bone hair combs and dozens of loom weights. Besides the remains of

[4] Further elaboration on the Frisian-Frankish trade in the Merovingian period can be found in Van Spelde 2012, 33-39.

everyday life, a few items were found with a prestigious character, such as a decorated silver bowl. These items, and in particular their relation with the deposits of human bones, will be discussed in detail at the final chapter of this thesis (chapter 5).

1.4 The human remains and their excavation

The excavations at the Oegstgeest settlement yielded not only remains of day-to-day life, but also 27 contexts which contained human remains. These included nine contexts with (partially) complete individuals, of which five are considered to be formal graves.[5] The graves were not expected to be encountered within the limits of the settlement as burial usually took place on a demarcated cemetery outside the area of daily activity (Dijkstra 2011, 223-278).

All the formal graves are excavated in the field campaigns of Leiden University, during the period 2010-2014 (figure 1.3). After recognition of the burials in the field, an archaeologist specialized in (or in the process of specializing in), osteoarchaeological excavation techniques was called in to excavate and document the skeleton and its context. Excavation procedures followed the protocol of the Laboratory for Human Osteoarchaeology of Leiden University. This entails excavation of the burial in horizontal layers, after which the soil was sieved for small finds. In cases where there was a minimal disturbance of the grave before excavation, soil samples were obtained for identification of intestinal parasites or organic inclusions in the burial, such as flowers. After exposing the skeleton, stereographic photos were taken from above with a specially designed ladder. For the purpose of taphonomic analysis, detail photos were taken from the entire skeleton, with special attention to skeletal articulations (e.g. hands, feet, knees etc.). Pins set around the skeleton were measured with a Total Station to geo-reference the stereographic photos. After this, the burial was further described on standardized forms (appendix D). This includes an inventory of the skeleton *in situ*, describing the location of skeletal elements, context and grave goods, and photo- and sample numbers. Because of the poor preservation of the bones, measurements and age- and sex estimations were assessed in the field as far as the conditions permitted. After documentation the bones were lifted to be cleaned in the laboratory. Of three individuals the skull was lifted *en bloc*[6] in order to excavate it in more detail in the lab. Not only was this beneficial for the observation of minute

[5] A 'formal' grave is considered to be the end-product of a standardized burial rite in which the deceased is interred in an inhumation- or cremation grave.
[6] Meaning 'as a block'

articulations such as in the vertebrae, it also permitted more controlled sampling of dental elements for DNA- and isotope analysis.[7]

Three articulated (partial) skeletons were not excavated by a specialist as their contexts were not recognized as a grave, and the remains were encountered unexpected. However, the documentation was sufficient to allow analysis of the context and the remains after the excavation. This was also the case for a deposit of cremated human remains which were found in the top fill of a disused well. The remains were identified as 'human' when the contents of the well were being sieved. The remainder of the encountered human bones consisted of secondary deposits of one or multiple elements. Single bones were mostly recognized during processing of finds. Contexts with elements that are recognizable for non-specialists, such as skull fragments and distinctive long bones, were in some instances identified in the field and excavated with additional care and attention. One of these contexts consisted of two adjacent pits, of which one contained five long bones horizontally placed in a star-shaped pattern (see front cover), and the other contained unarticulated remains of at least six individuals.[8]

Figure 1.3 (next page): excavation process of the burials at the Oegstgeest settlement

[7] Further laboratory procedures will be described in chapter 4.
[8] See chapter 3

Excavation process burials
Oegstgeest

1. Discovery grave in trench
(2012-01)
2. Exposure of skeleton
(2011-01)
3. Levelling of grave context
(2010-01)
4. Photographic documentation
(2012-01)
5. Filling out grave forms
(2012-01)
6. Drawing of skeleton
(2013-01)
7. Lifting and packaging
(2013-01)
8. Packaged skeleton
(2014-01)

Images from collections of:
Leiden University;
J.W. Bron;
F.J. van Spelde

2 The skeletons in their surroundings

a contextual view on the human remains of Oegstgeest

"Then the Geat people began to construct
a mound on the headland, high and imposing,
a marker that sailors could see from far away,
and in ten days they had done the work.
It was their hero's memorial…"

(Beowulf[9])

2.1 Introduction

The landscape fulfilled an important role in the lives of early medieval people. Not only was it used to raise cattle, grow crops and transport goods and people, it was also home to the dead and the godly spirits (Ellis Davidson 1988, 13-35). The place to bury the dead was chosen for a particular reason, such as in the case of Beowulf, visibility. To understand the choice for a burial location we first have to understand the landscape in which it was set. The first part of this chapter will therefore focus on the question:

What was the appearance of the landscape in the western Netherlands, particularly at Oegstgeest, and how were the burials located within this landscape?

To answer this question, data from recent literature is combined with data derived from the excavation campaigns, presented in a number of maps. The aim is to provide an overview of the location of human remains in the landscape and subsequently produce a synthesis on this topic.

Not only the place of burial within the landscape was of importance, the place of the individual within that burial might have been of equal significance. The position of the body and its orientation are a reflection of ritual behavior. The reconstruction of the individual burial environment and the placement of the deceased individual therein will be the second focus of this chapter.

[9] From: Beowulf: A Verse Translation, by Seamus Heaney (2002, 78)

2.2 Part one: the (burial) landscape

2.2.1. Characterization of the Frisian lands

The coastal lands which made up the Frisian territory were more diverse than one would expect. However, they all shared one important element: water. The northern coastal area (the modern provinces of Friesland and Groningen, and parts of northern Germany), consisted of a vast area of salt marshes devoid of woodland, which were open to intrusion of sea water through numerous creeks. With every flood the lands were raised by thin layers of silt until they were high enough to remain dry at high tides. By this process the area became habitable, especially the salt marshes located more inland (Vos 2015; Van der Tuuk 2013, 18-22). However, these low wetlands remained vulnerable, particularly in the event of storm surges. Therefore, already in the late Iron age, the inhabitants began to defend themselves against the water by building small dikes (Gerrets 2010, 191). As flooding remained a problem the people began to artificially raise small patches of land on which single houses could be build. These house platforms eventually grew together by deposits of waste and natural sediments in between them, and, as a result, they formed larger habitation mounds called *terpen* or *wierden* (Nieuwhof 2015, 35). Much of the terpen remain inhabited up till the present day. In the first half of the nineteenth century it was discovered that the soil of which the terpen were made (mainly clay, dung and organic waste) was highly fertile, and useful to improve the poor peaty and sandy soils in the surrounding areas. An owner of land on which a terp was located could make large profits by selling the soil to farmers. For more than a century the terpen were excavated to obtain the rich soil. During this process, the well-preserved remains of 2500 years of terp habitation were uncovered, mostly without scientific supervision. However, as spectacular finds continued to appear, pioneering archaeologists took notice and started excavations which not only were aimed at finding treasure, but also to document ancient structures and contextual information (Nieuwhof 2015, 19-23).

The daily intrusions from the sea which dominated the northern coastal area were of much less influence in the western part of Frisia. Here, the naturally formed dunes had already closed off the inland around 3000-2000 BC. The dunes were only intersected by the rivers debouching into the North Sea, of which the Rhine and Meuse were most important. Although the land behind the dunes was protected from the daily influence of the tides, the area was too low, and as a result too wet, for large-scale habitation

(Berendsen 2008, 292-298). In the vast marshes peat developed and the area was sparsely inhabited until reclamations were initiated in the tenth century. Before these reclamations, habitation was concentrated on high ridges in the landscape which were the dunes along the coast and the levees along the rivers.

The Rhine and Meuse were meandering rivers and determined their own trajectory in the landscape. The flow of water in a meandering river is faster in the outer bend than in the inner, so that erosion occurs in the former and sedimentation in the latter. At periods of high water the river will overflow and flood the surrounding lands. During these events sediments are transported and deposited, in which the heaviest particles will be deposited closest to the channel. Ever repeating cycles of flooding will build up banks of sediments, called levees (figure 2.1), which eventually will be high enough for habitation (Brijker 2011, 17-18). During (extreme) high tides, the sea forces water in the river's estuary, during which the river cannot discharge the same amount of water and the pressure on the river banks will rise. Lower parts of the banks can then be breached and smaller side channels will form out of the main channel (a 'peri-marine crevasse'; Berendsen 2008, 270).

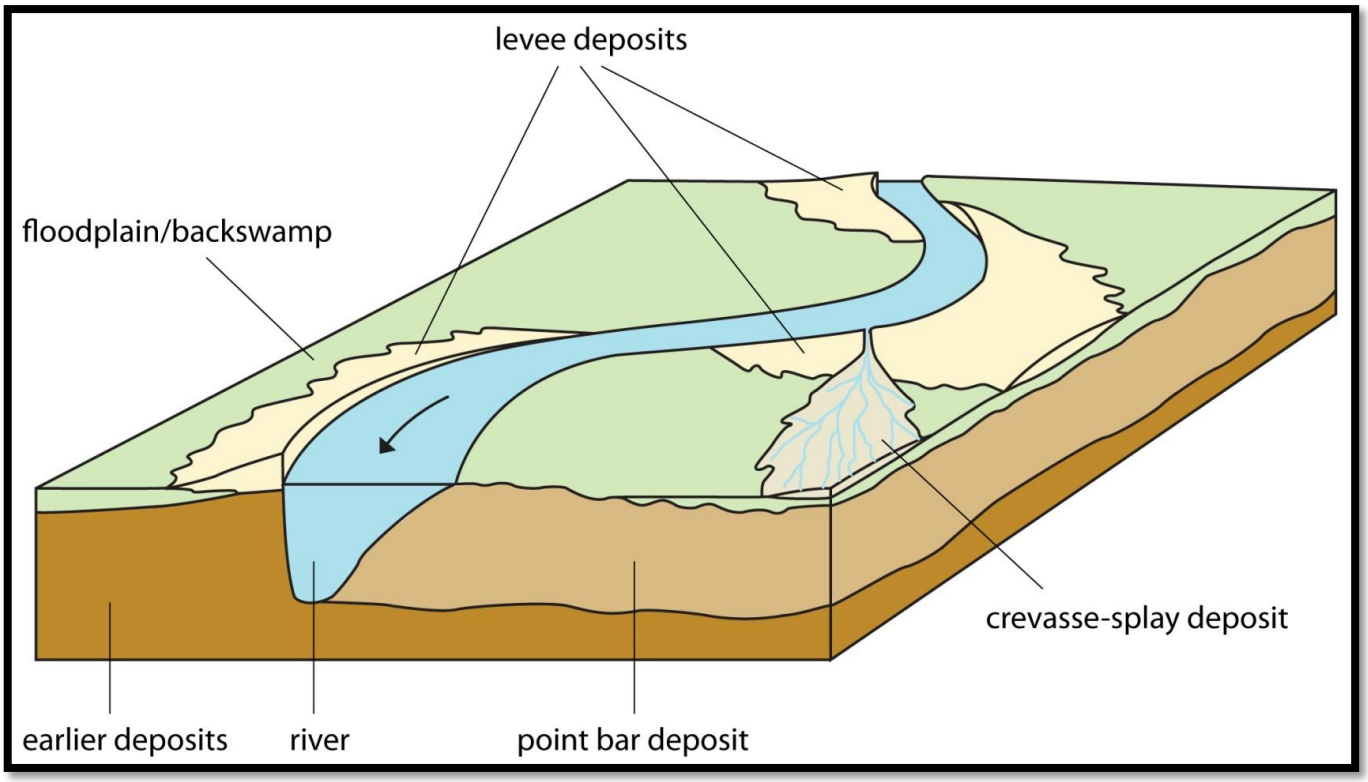


Figure 2.1: Schematic and simplified overview of a meandering river system (similar to the Rhine near Oegstgeest) and its associated deposits. The floodplain would have been too wet for habitation in most places. Buildup of deposits (during floods) on the levees and crevasse-splay created high points in the landscape which remained dry most of the time, and habitation was possible in these areas as a result. The settlement of Oegstgeest was located on one of these high points, which probably consisted of crevasse-splay deposits (figure produced by author, based on Berendsen 2008, 268)

These smaller channels can act as a miniature meandering river and may be several hundred meters to a few kilometers long. They usually silt up over the course of a few decades after which they become inactive (Brijker 2011, 18). Sediments eroding from the river bank as the stream of water passes through will be deposited on the surrounding flood plain (known as crevasse-splay, figure 2.1) and will raise the ground level as a result (Nichols 2009, 139).

2.2.2 The landscape of Oegstgeest

The settlement of Oegstgeest was located on the northern bank of a side channel of the Old Rhine river, which runs ca. 300 meter to the west at the present day (Hemminga 2008, 11). The settlement is divided in the middle by a second channel running east-west. The main north-south orientated channel initially formed as a peri-marine crevasse (Brijker 2011, 19; Dijkstra 2011, 40). In addition of these main channels, smaller gullies were located in the northern half of the settlement (around house cluster 1 and 2) of which it is suspected that they were made or altered by the inhabitants for the purpose of water regulation (pers. comm. J. de Bruin). The smaller gully running between house cluster 3 and 4 was assumed to be present based on earlier research, but later excavation campaigns revealed that it probably only consisted of a lower depression. Two sandy ridges formed by sedimentation along the river are present in the landscape. In between a lower area is located, characterized by sediments of clay and silt, which was not deemed suitable for habitation.

Although the main channels were under a natural regime, anthropogenic influence is archaeologically attested on a number of places. Wooden embankments and quays were build on the shore of the S-N channel to make the settlement accessible for boats. When the channel slowly shifted its course away from the settlement, the muddy shores were reinforced with soil and waste to ensure accessibility. It is probable that the W-E channel was considered to be obstructive to the inhabitants of the settlement. Initially this was not the case, but, as the settlement grew and houses were build on both sides of the channel, it became an obstacle for daily interaction between the inhabitants. To enable easy interaction, two attempts were made to dam off the W-E channel from the S-N channel. The dams were build by driving two rows of poles into the bottom of the gully and filling the space in between with sods. Although the build of the dams was initially successful, both were eventually breached at their northern edge. A period of high water which raised the pressure on the dams might have been the cause of this. On

another occasion, a bridge was built over the channel, connecting the two halves of the settlement.

2.2.3 Human remains in the landscape

The waterways at Oegstgeest were both a divider and a connector. The main river connected the settlement with its neighbors and with a vast network of trade routes stretching from the Mediterranean to Scandinavia. The smaller gullies divided the settlement into islands (house clusters) and formed the border of habitation at its northern edge. The water was essential for the provision of the inhabitants but also formed and imminent threat in the event of floods. Not surprising, the waterways were an important aspect of early medieval life in Oegstgeest. So, is the importance of the waterways in any way reflected in the choices for burial locations? To answer this question, a number of maps were made displaying the distribution of human remains in the settlement (figures 2.2-2.4). The background colors display water, high- and low areas, and the early medieval buildings. Different symbols are used to display the human remains. It should be noted that the resulting conclusions should be considered with some caution as the maps display the traces of two centuries of habitation (i.e. archaeological remains that seem to be correlated on the map can differ in age and might have nothing to do with each other). Fortunately, such discrepancies are easily identified by considering the contextual information of the human remains.

Formal primary inhumations

Five formal burials were excavated during the campaigns (numbers 2, 3, 6, 7 and 10 on figure 2.2). Four of them are found directly north of the gullies surrounding house cluster 1 and 2, which also forms the northern boundary of the settlement. Three individuals were orientated parallel to the gully and one perpendicular. This indicates that the deposits occurred when the gullies were still carrying water or at least were recognizable as a mark in the landscape. The fifth formal burial was located at the northern edge of house cluster 3 (number 10 on the map). Although this young individual was buried near the W-E channel, the distance is too big to assume a direct relation with it. However, its orientation is also parallel to the channel. It is assumed that a sixth formal primary inhumation was present north of the small gully running through the middle of house cluster 2. Here a rectangular pit was found adjacent and parallel to the gully containing, among other material, multiple parts of a young individual. Due to limiting conditions in the field it was not possible to properly expose the context (pers.

Figure 2.2: Map of the Oegstgeest settlement displaying the locations of depositions of human bones and formal animal burials. (Map provided by Jasper de Bruin (Leiden University) and modified by the author).

comm. J. de Bruin). However, considering the location and appearance of the pit, combined with the random representation of multiple (i.a. small) body parts, it is highly likely that a burial was present which could already have been disturbed in earlier times, but may have remained partially articulated *in situ*.

Relation of the formal animal- and human graves

The northern periphery of the settlement was not only reserved for formal human inhumations. Animals that were of high esteem[10] were also buried there, in all cases in the vicinity of (a) human burial(s) (Buhrs 2013). Three dogs and three horses were buried in a formal manner. The three dogs were buried near the graves of two adult women (# 6 and 7), of which two dogs were buried next to the women and one on the opposite bank of the gully. They form a distinct cluster and it is the only place of the settlement where adult women are buried (both with grave goods) and the only place where dogs are formally buried. two contexts with secondary deposited material are also found in this cluster (a deposit of five long bones laid out in a star-shape, and adjacently, a charnel pit). In the northeastern corner of the settlement a horse burial was found which is associated with the burial of an adult male. The last two horses were found at the northwestern edge of the settlement. They were buried adjacent to each other, both wearing elaborate riding gear. In contrast to the other animal burials, they are not buried directly at the edge of the gully and further away from a human grave (ca. 40 meters from the grave of a child). Although these horses and the child are not situated directly adjacent, they do seem to belong to the same habitation area (house cluster 1).

Cremated remains

The remains of two cremated individuals were found, of which one was only partially cremated (see below: individual 2013-01). The remains of the first individual, which was fully cremated, was deposited in the top fill of a well, which was out of use and partially demolished at the moment of deposition. The cremation took place at a different location, after which the burned bones were carefully collected, including the smallest parts, and thrown into the remnants of the well. The fragments were not bundled inside a container, but were scattered across a layer of the fill (see context photo in appendix A). The well was located in the southern part of house cluster 1 (#9 on the map) inside the confines of a house plan. It is assumed that the house was either of an earlier or

[10] This assumption will be further discussed in chapter 5

later date, as wells in houses do not occur in this time period. The second cremation was found, similar to the formal burials, at the northern periphery of the settlement. However, this individual was buried 20 meters south of the gully in an area devoid of early medieval features. Although the orientation on the same line of the formal burials suggests a Merovingian date, there is a possibility that the burial might be from an earlier period. Some scattered material from the Iron Age were found in the area, partially washed away by river floods. However, the fact that the grave and the adjacent postholes (see below) were preserved and not washed out by a flood do not make it likely that it belonged to this Iron Age phase. The grave will be radiocarbon dated in the near future which will provide a definitive answer.

Informal primary deposits

Two individuals were found that are considered to be informal burials on the basis of their posture and the context in which they were found. Both individuals were positioned in a prone position, one on the bottom of a ditch and one in a rectangular pit which was too small to fit the individual horizontally (see part 2 of this chapter). The first individual (#4 on the map) was found in a ditch that was probably related to the gully around house cluster 1. The same context contained a fragment of a tibia with multiple cut- and chop marks, belonging to a different individual. The position of the skeleton at the moment of excavation suggests the body was already lifeless when it was deposited. Whether the body was dumped or ritually deposited is unclear. Its location between the two horse burials and the formal burial of a child (each ca. 20 meter from the body), in combination with the mutilated tibia fragment do suggests that the deposit on that location was not coincidental.

the second informal primary deposit is found in the southern part of the settlement, in house cluster 3. The location of this individual is isolated from any other finds of human bone. The nearest retrieved human bone is ca. 120 meter to the north.[11] The skeleton was found in a pit close to a ditch running north-south, but unlike most other deposits, the grave was not associated with any important waterways.

[11] Although it does not fully explain the observed difference in the intensity of scatter, it must be noted that the intensity of excavation and the size of the area investigated is larger in the northern part.

Secondary deposits

Secondary deposits are deposits of one or multiple human bones originating from bodies that decomposed on a different location. After being released from their soft tissue encasement, the bones are moved to their final resting place either by a human agent or a natural phenomenon. Whether the bone was moved by a human- or natural agent is an important indication to any ritual significance of the deposit. This will be further discussed below. Almost equally important is the location of the bone(s): where and in what context did the secondary deposit took place?

A total of 19 secondary deposits were identified of which 17 contained either long bone or cranial fragments. Only two contexts also contained smaller bones, which are the probable disturbed primary grave of a child (mentioned above) and the star-shaped configuration of bones with associated charnel pit.[12] All identified secondary deposits are located in the northern half of the settlement, concentrated mainly in the northwestern quadrant (figure 2.3). Interestingly, a further division is present in the distribution of long bones and crania (figure 2.4). Isolated long bones (red area) are found exclusively in house cluster 1 and its direct vicinity. Isolated skulls and mandibles (green area) have a wider distribution and are not exclusively associated with one house cluster. The overlap between the distribution areas of crania and long bones is limited. The observed division in the concentration of body parts indicate that the secondary location of the bones was not determined by mere chance. A natural phenomenon as a cause for the dispersal of dry bones, such as flooding or erosion, is thus highly unlikely. In that case a more random dispersal would be expected, and furthermore, small bones would be present between the other material. As a result, it is here assumed that the secondary deposits are created by humans, and, as selection of certain elements took place, are intentional. Why most of the deposits took place in an around house cluster 1 is not clear. It might be that this area represents a chronological phase in which deposits

[12] Because cranial fragments and long bones are easily recognized by specialists and non-specialists, it can be suspected that there is a bias in the sample. To test this, material from a large number of contexts from the 2009 campaign were investigated to determine whether smaller human bones (hand/foot, vertebrae, ribs etc.) were overlooked or not present. Not a single small human bone was found during this, and for now it must be concluded that long bones and crania were selected for secondary deposit. Selection of bones was also clearly attested in the bone star- and pit. Although small bones were indeed present, they only consisted of 9 fragments on a total of 285 (3.2%), and they seem to be interred almost by accident. The pit contained remains of a minimal of six individuals but only two fragments of rib and four hand/foot bones were found, while there should be 144 ribs and 624 hand/foot bones present if the individuals were complete (see further chapter 3).

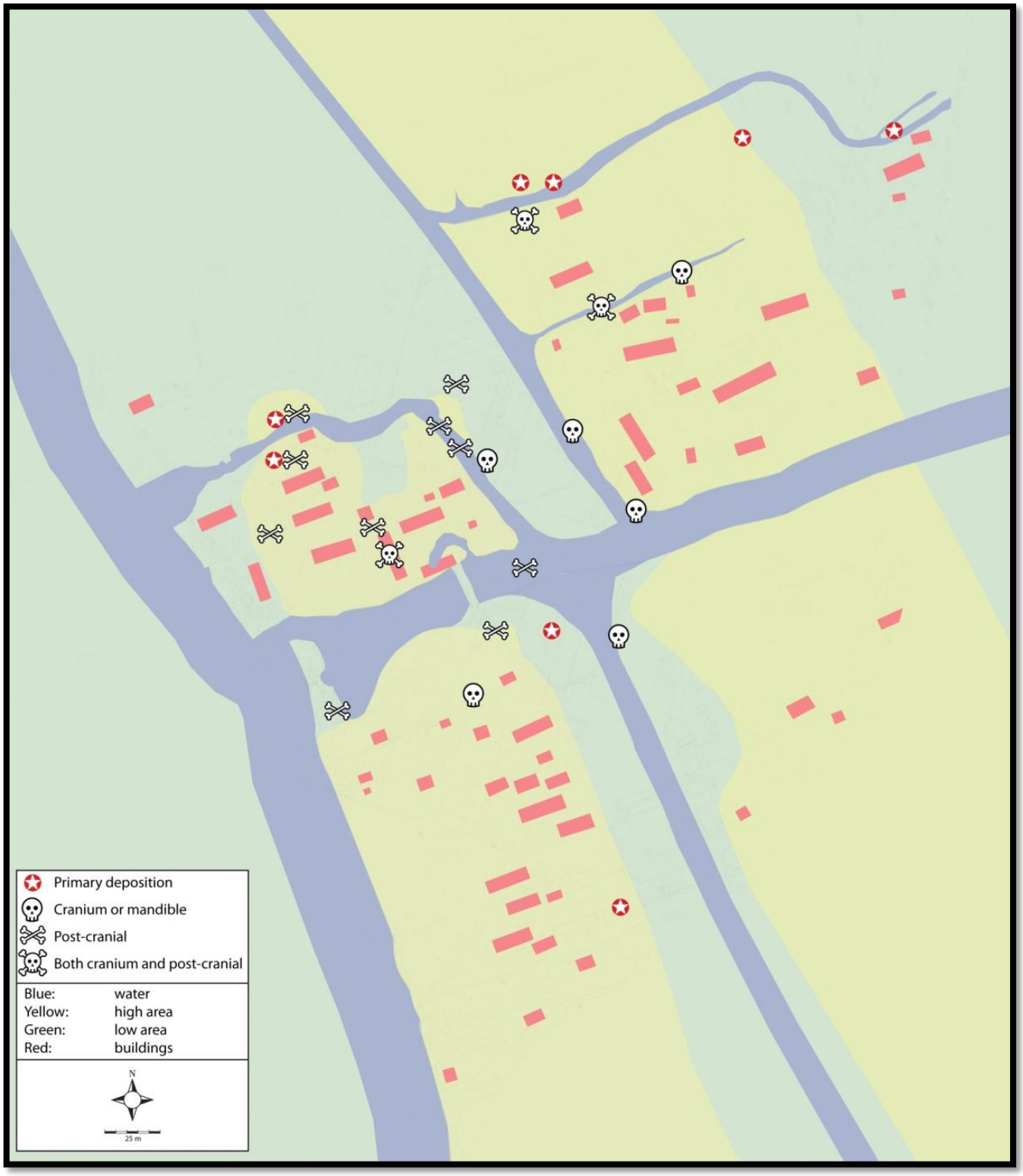


Figure 2.3: Map of the Oegstgeest settlement displaying the locations of the different types of secondary depositions and primary depositions. (Map provided by Jasper de Bruin (Leiden University) and modified by the author).

Figure 2.4: Map of the Oegstgeest settlement displaying the distribution areas of long bone- and cranial deposits and the identified house clusters (Map provided by Jasper de Bruin (Leiden University) and modified by the author).

were common practice or that the area functioned as the centre for depositional events during all phases. At least two other significant deposits took place at house cluster 1: the silver bowl in the northern gully and the aforementioned horses with head gear at the centre of the cluster. Interestingly, only one formal burial is associated with this area, while the majority is located elsewhere, at the northern periphery of house cluster 2.

The deposits of isolated human bones do not occur exclusively in one specific context category. Crania and long bones are deposited both in 'dry' contexts (pits and dams) and in 'wet' contexts (ditches, gullies and wells). However, a preference was observable for depositions in wet contexts (see appendix B).

2.3 Part two: the skeletons in their context

After the exploration of the location of the burials within the landscape, the following section will explore the position of the individual within the burial. The placement of the corpse and subsequent displacement of the skeleton are reflections of the burial ritual and post-burial processes respectively. This section of the chapter will attempt to answer the following related research questions:

1. What was the position of the corpse at the moment of deposition?
2. Was the post-burial displacement of bones influenced by elements that were present at the moment of deposition, such as a sepulcher or burial attire?
3. Are there any signs of anthropogenic post-burial disturbances?

To answer these questions, techniques are employed from a subfield of taphonomic research, called archaeothanatology. Data derived from the excavation of the individual burials (descriptions, drawings and photographs) are analyzed following this methodological procedure. The aim is to reconstruct the individual burial environment and processes therein and, if possible, link the physical evidence to ritual behavior.

2.3.1 The study of burial taphonomy and its application

The field of taphonomy has its origins in paleontology and was defined by Efremov (1940) as the study of the processes by which organic remains are transferred from the biosphere into the lithosphere through geological and biological mechanisms. The word 'taphonomy' originate from the Greek word *taphos* (burial) and *nomos* (laws). In other words, taphonomic research encompasses the study of processes which occurred

between the moment of death of an organism and the moment of the retrieval of its (buried) physical remains. It employs a variety of research techniques ranging from the macroscopic analysis of bone movement to highly detailed microscopic investigation of the bone cortex and chemical analysis. Taphonomic research is of growing importance in the field of forensics in particular, where it is essential for criminal investigations to distinguish between alterations caused by humans and by the natural environment (see for instance: Haglund & Sorg 1997). The study of taphonomic processes are of similar importance to archaeologists, as they determine what remains are encountered and how, or in what state, they are encountered. Therefore they determine the informational value of a find assemblage to a great extent (Lyman 1994, 1).

Archaeothanatology

Archaeothanatology, sometimes referred to as 'field anthropology', was largely developed by French archaeologist Henri Duday, and has been employed increasingly during the last decade after his work was translated and published in the English language (Duday 2009; Duday & Guillon 2006; Roksandic 2002). Archaeothanatology focuses on the principle that when a body decomposes and the skeleton is released from its soft tissue encasement which holds it together, the skeletal elements will move to a (new) equilibrium in the burial environment. Primarily the post-decompositional displacement of the skeletal elements is influenced by gravity, but other forces include floral/faunal activity, and movement by fluids or shifting sediments. The possibility for movement of skeletal elements is partially determined by cultural practices, such as the type of burial sepulcher, attire and bodily treatment.

Essential in archaeothanatological research is the detailed analysis of the skeleton and its context. This starts in the field, where excavation and documentation of the burial has to be done with particular attention to the anatomical connections and possible traces of the skeleton's physical surroundings (Harris & Tayles 2012, 227). Following excavation, the data are combined in a taphonomic description which can be compared with the standards set up by Duday.[13] For the skeletons that were excavated by the author this procedure has been followed. For the remaining skeletons[14] the taphonomic descriptions are made on the basis of field photographs. This proved to be an acceptable method but lacked the level of detail achieved for the graves which were investigated

[13] His 'laws' of skeletal displacement are based on the combination of data from hundreds of excavated burials with a number of burials with known variables (See: Duday 2009).
[14] 2004-01, 2011-02, 2012-02

conform the archaeothanatological procedures . The full taphonomic descriptions of each skeleton found in Oegstgeest are included in appendix B. The results and conclusions regarding the reconstruction of body position and sepulcher are described in the following section.

2.3.2 Burial architecture and its influence on skeletal position

When the soft tissue of an individual decomposes, the freed skeletal elements are able to move if there is space available to do so. Depending on the amount of available space the bones will displace in a somewhat predictable manner.

Lateral rotation of the os coxae is an example of a displacement which is encountered often in coffin burials. In a living individual, the os coxae are articulated with the sacrum (the sacroiliac joint) and with each other (at the pubic symphysis). When these strong articulations disappear during decomposition, the bones of the pelvis are in a state of disequilibrium. If the individual is buried in a pit which is immediately filled after deposition, the os coxae are supported by surrounding sediments and cannot move. However, if the individual is interred with space around the body, such as in a coffin, the os coxae are able to rotate laterally (i.e. to the outside) in the empty space under the influence of gravity, until they find a new equilibrium on the bottom of the coffin. Space can also be created by decomposition of the soft tissue itself, such as in the thorax. When the hands of an individual are placed on the thoracic- or pelvic area, the individual bones of the hand are often found scattered in the void created by the decomposition of the intestines. Space created by this mechanism is always confined to the original volume of the corpse, by which it can be distinguished from space created by architectural elements.

Architectural elements cannot only create space, it can also limit the space available for bone displacement. For instance, a coffin which is slightly too narrow will exert pressure on the shoulders from the sides. When the sternoclavicular joint decomposes, the medial epiphyses of the claviculae will be pushed in- and downwards by the scapulae to an almost vertical position ('*verticalization*' [Duday 2009, 45-46]). A similar effect can be achieved by tight body wrappings, if they take longer to decompose than the body itself (Harris & Tayles 2012). Coffins with a rounded or v-shaped bottom may cause the bones to shift and be concentrated in the middle (the bottom) of the coffin (Duday 2009, 50-51).

These examples are a few of the predictable movements which can be observed and reconstructed through archaeothanatology. This method is particularly useful when the skeleton survives, but few traces of the burial architecture, which is the case in Oegstgeest.

2.3.3 Burial architecture in the early medieval period

From excavations of early medieval cemeteries in the Netherlands it is evident that a variety of sepulchers was used in which the dead were deposited. The choice for a certain type may have been partially dictated by religion or ethnicity, but early medieval written sources indicate that at a certain degree of free choice was present.[15] Additionally, the choice for a certain type of sepulcher was influenced by the wealth of the deceased or its survivors (Dijkstra 2011, 224; Proos 1993). The construction of a burial chamber, the erection of a barrow or grave monument, or the import of an oak tree trunk coffin may have cost considerable energy and resources. The types of graves and burial sepulchers for inhumation burials encountered in the Netherlands in the early medieval period are, among others:

- ***Tree trunk coffins***. Regularly found in the Frisian areas but also occur in the Frankish kingdom (Knol 1993, 176; Taayke *et al*. 1996, 48).
- ***Rectangular plank coffins***. Found in all areas and the most common type of sepulcher. They are made in various constructions usually without nails. In some instances wooden beams support the bottom (Heeren 2010, 144-149; Waasdorp & Eimermann 2006, 45-47; Wagner & Ypey 2011).
- ***Chamber graves***. Range in size from slightly larger than a coffin to chambers of more than 2 by 2 meters (figure 2.5). Either an independent chamber construction is built or the burial pit is lined with wooden planks. Sometimes a double container is used of a wooden coffin inside a chamber. Chamber graves are most often found in Frankish territory and are rare in Frisia (Heeren 2010, 143-149).
- ***Unfurnished burial pit***. Grave without any lining of the walls which is backfilled after deposition. The corpse may have been shrouded to create a barrier with the surrounding soil. These pits occur in small numbers in most cemeteries.

[15] For instance, Beowulf dictates his whishes for his own funeral (Tolkien 2014, 95) Whether this was also the case in the choice between cremation and inhumation, which co-exist during this time period, is doubtful but possible.

- ***Stone sarcophagi***. Considerable numbers of these are found in the southern city of Maastricht (Panhuysen 2006, 95-96) and some in the central river area of the Netherlands (Hessing 1994, 137). In the Netherlands they are linked to the introduction of Christianity and are, possibly because of this, not (yet) encountered in the western coastal area.

All these types of sepulchers might influence skeletal position in a specific way, although some might also produce similar results. A coffin, chamber or sarcophagus create a void around the corpse in which decomposition takes place. Skeletal elements will be displaced freely and are able to migrate outside the original volume of the body. Retention or movement of fluids in a (semi-)watertight sepulcher enable small bones to migrate through the entire void of the container.[16] Tree trunk coffins of which the bottom is rounded cause bones to be displaced to the lowest point in the middle if they are not fixed in place (i.e. in equilibrium). Unfurnished graves inhibit movement outside the body volume, but displacement might be seen in the thoracic region.

Figure 2.5: Example of a chamber grave during excavation at the Merovingian cemetery of Uden (Noord-Brabant, NL). The outline of the chamber is clearly visible, as well as the pit in which it was build. The sides are pushed inward under the pressure of the surrounding soil. Two slightly darker lines across the width of the chamber are traces of support beams (Image by author).

[16] In stone sarcophagi the retention of decomposition fluids was counteracted by adding a drainage hole in the bottom.

2.3.4 Archaeothanatology at Oegstgeest

The results of the taphonomic analysis are presented per individual. An overview of the individuals with accompanying field photo can be found in Appendix A, the complete taphonomic description in Appendix C.

Individual 2004-01

The individual was encountered in an oval pit in a prone position. With a diameter of circa 1,5 meter the pit was too small for the body to be laid in a completely stretched position and the upper body had to be positioned on the slope of the pit in an angle of circa 35 degrees. Because the upper body was on a higher level in de pit, it disappeared in later times during ploughing or soil-extracting activities (Hemminga 2006, 34-35).[17] 'Labile' joints (i.e. joints that decompose rapidly) were found in their original anatomical position, which indicates that the grave consists of a primary deposit (Duday 2009, 25-31). Among the bones that were found in anatomical connection were those of the hands. Their position suggest that the pit was probably refilled after deposition and that no void was present around the corpse during decomposition (Roksandic 2002). It can be concluded that no form of sepulcher was present in which the body was laid.

Individual 2010-01

The preservation of the skeletal elements of this individual is poor but their position could be studied sufficiently in situ. The skeleton was encountered close under the modern surface and was subjected to disturbance by machinery in recent times. The parts of the skeleton that were positioned closest to the surface, the cranium and a large part of the right arm, have disappeared likely because of this. The skeleton was encountered in a rectangular pit which measured 1,4 x 0,5 meter, but was probably some decimeters longer before disturbance of the cranial area. Labile joint connections that were found in close connection indicate a primary deposit (Duday 2009, 25-31). The taphonomic observations indicated that the individual was originally deposited on its left side in a crouched position. The left arm, being fixated on the bottom of the grave, remained in its original location of deposition. When the soft tissue decomposed, the thorax and pelvis rotated to the right and slumped to the bottom of the grave, covering

[17] Clay was extracted in sub-recent times for brick and roof tile production.

the left arm.[18] The weight of the body caused the decomposing ligaments of the left shoulder and hip to sever, causing postmortem displacement of the joints. The right ribs scattered in a more disorganized way than the left, which were fixed on the bottom of the grave at their anterior side. The observed rotation of the thoracic and pelvic area of about 90 degrees is only possible if there is void large enough to accommodate this. This void remained intact longer than the decomposition time of some joint connections.[19] The eventual collapse of the void's covering caused the corpse to be covered with sediment made up of clods used to backfill the grave after initial burial. The dark color of the clods is caused by enrichment of organic material, indicating that they were extracted from the original top soil. This phenomenon was also observed in burials 2012-01 and 2012-02 (Pers. comm. J. de Bruin), which might indicate that the excavation and backfilling of these graves occurred in a similar order.

Individual 2011-01

The quality of the bone of this young individual (ca. 5 years) was very poor and most elements fragmented during lifting. Some of the bones, such as in the hands and feet, had disappeared completely due to the degradation of the material. Fortunately, the skeleton could be exposed and studied *in situ*, providing valuable information. The burial consists of a primary inhumation (anatomical connections are retained) in a supine position. The burial pit measured ca. 1,1 x 0,5 meter, which was more than sufficient to fit the individual. The head is turned to right side with the chin resting on the chest (i.e. the splanchnocranium is directed to the right lateroinferior side). The arms are positioned next to the thorax with the right arm slightly bend. Both legs are fully stretched and parallel to each other. No displacement of bones was observed that indicate a void existing around the body during decomposition.[20] In addition, no traces of a wooden container were observable in the soil feature surrounding the skeleton. The pit did contain two separate fills which differed in color and organization (figure 2.6). The inner fill, roughly corresponding to the original area of the corpse, is lighter and more irregular in comparison to the outer fill, which is homogenous and dark. Possibly

[18] This position, not achievable without destruction of ligaments, indicates that the thorax was not originally placed in a prone position. The position of the pelvis confirms this: the left side is not completely located on its anterior side, while the right is. Because the left side was partially fixated, it did not rotate the full 90 degrees towards the bottom of the grave.
[19] The so-called Amesbury archer, a rich Bell Beaker burial from Britain, was similarly deposited (in a void crouched on its left side). The postmortem displacement of the bones in that burial are very similar to those found in burial 2010-01 (Fitzpatrick 2013).
[20] This was partially due to the poor preservation.

the child was wrapped in a loose shroud (inner fill) and placed in an unfurnished pit which was immediately refilled (outer fill). A small strip of lead found just left of the mandible under one of the first ribs may have served as a functional part of the shroud.

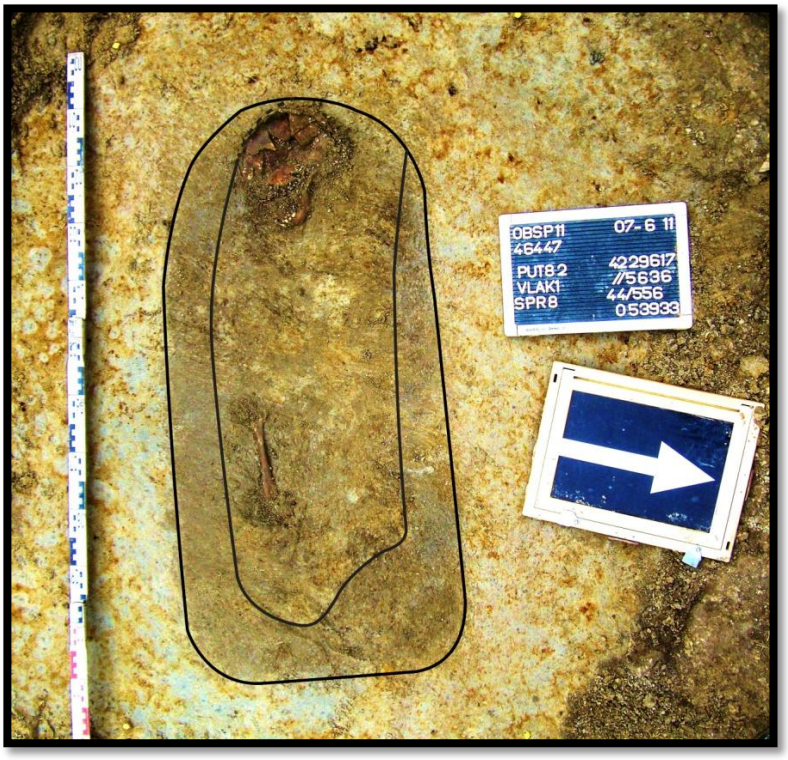


Figure 2.6: Field Photo of Grave 2011-01, first excavated layer. The difference in grave fill is visible (marked with black line [image and adjustments by author]).

Individual 2011-02

This individual was encountered on a relatively deep level on the bottom of a ditch. The quality of the bone was good, which is considered to be a result from the deeper level of interment. The right leg, the left femur and the cranium of the individual are missing, which probably occurred already in the early medieval period as the context is not disturbed by (sub-)recent activity. Retention of labile joint connections, clearly observable in both hands and the remaining foot, indicate a primary deposit.

The thorax is positioned on the anterior side, i.e. in a prone position. It is folded over the left arm which is directed to the right lateroinferior side, similar to the right arm. The left lower leg is positioned on its posterior side, directed superiorly, adjacent to the original location of the missing cranium. The foot rotated towards the right side. The left os coxae rotated 180 degrees laterally and rests on its posterior side. This probably

occurred when the left femur was removed. As the left lower leg and os coxae are found roughly on their original place, the disappearance of the femur must be timed after (advanced) decomposition of the hip- and knee articulations. As it is not found under the thorax or the arms, the right leg must have been directed to the inferior or inferolateral side, in almost opposite direction of the left leg.[21] The position of the legs exclude the possibility that the individual was deposited in a seated position. There are no taphonomic- or contextual indications, except for the lateral rotation of the left os coxae, that the decomposition occurred in an open space. However, it is likely that the corpse remained (partially) accessible, providing opportunity for the disappearance of body parts in ancient times, for instance by scavengers. Several forensic and archaeological case studies have shown that scavengers such as foxes, wolves and pigs can disperse and transport body parts over considerable distances (see: Lyman 1994 161-222; Moraitis & Spiliopoulou 2010 and references therein; Stodder 2008). Markings indicative of animal scavenging were observed on multiple isolated bones from Oegstgeest, which shows that this was not an uncommon activity (see chapter 3).

Based on the observations of the skeletal elements, both present and missing, a possible taphonomic reconstruction can be proposed: the body was deposited in a ditch with the left leg forward and the right to the side or backward. The arms were directed to the right on their posterior side, the hands with the palmar side up. The torso was folded over the left leg and left arm and was positioned on the anterior side (prone position). Progressive sedimentation in the ditch covered the corpse which preserved the anatomical connections. However, the sediment cover was likely not extensive and parts of the body were accessible and removed after (partial) decomposition. While it is possible that the body was originally deposited in the 'unorganized' position in which it was found, it is also plausible that pulling or tearing on the appendages, e.g. by scavengers, could have been responsible for its position.

The preservation of the lower left leg at the primary location of putrefaction, suggests that decomposition was in an advanced stage or complete when the left femur was removed. The time period in which the removal of the right leg and cranium took place is unknown, but must have occurred before the ditch in which the individual was deposited silted up or was backfilled (i.e. within the early medieval period). Although it

[21] That is, if the leg was deposited at all.

is possible that the elements were removed before deposition, no traces indicative of dismemberment were found on the skeleton that would support this hypothesis.

Individual 2011-03

This context consists of two adjacent pits containing human bones from at least six individuals.[22] The first pit contained five long bones (two femora, a humerus and two matching tibiae) of at least two individuals placed in the shape of a star. Considering the arrangement of the bones, it is likely that the 'star' originally contained six long bones. In addition to the long bones, the pit contained a patella which was found on the proximal epiphysis of a tibia and a phalanx of a bovid. The location of the patella suggests that it was still attached to the tibia by ligaments at the moment of deposition. The second pit contained unarticulated and relatively small fragments which were not orientated in a pattern. Much of the fragmentation unfortunately occurred during excavation and post-excavation treatment. As was mentioned earlier, the vast majority of the bones in the second pit consisted of a selection of the largest elements in the skeleton. Three fragments exhibited signs of possible violent trauma (see chapter 3). The absence of anatomical connections, other than the tibia and patella, indicate a secondary deposit. Where the bones originate from, and were the initial decomposition took place, is not known.

Individual 2012-01

Burial 2012-01 consists of a primary inhumation (labile joints are found in articulation) in which the individual is positioned in a supine position with the legs stretched (see drawing on front cover). The skeleton is nearly complete and the preservation of bone *in situ* can be considered fair. Multiple grave goods were retrieved from the grave, most of which can be attributed to the burial attire: two bronze rings from the medial side of the claviculae, a bronze *fibula* (clothing fastener) from the upper left chest, a glass bead with iron corrosion at the medial side of the left elbow, a belt buckle, and some unidentified iron objects from the inferior border of the right scapula and superior side of the os coxae, which are possibly belt fittings or small items suspended from a belt. The feature in which the skeleton was encountered measured ca. 1,9 x 0,9 meter.

The cranium of the individual was positioned upright, with the chin resting on the chest. This indicates that the posterior or lateral sides of the head were supported, for instance

[22] Based on a MNI-count (see chapter 3).

by an object of perishable material, such as a cushion. The calote was severely damaged during the mechanical excavation of the trench, but was complete prior to this. The splanchnocranium was crushed, either during the collapse of the sepulcher or under the pressure of the soil's weight. The thorax displays some interesting skeletal displacements originating from taphonomic processes. To understand these displacement, it is necessary to establish if the decomposition took place in a filled space or a void. Multiple skeletal displacement indicate the latter: lateral rotation of the os coxae, hyperflexion of the feet and displacement of the ribs outside the original body volume (Duday 2009, 32-38).

Most of the thoracic skeletal elements have been displaced after burial and it is evident that a significant disturbance occurred. The majority of the vertebrae have been displaced to the right side without the retention of the intervertebral anatomical connections. The ribs have been pushed to the lateral sides, partially outside the original volume of the body. Three left ribs have rotated 180 degrees away from the midline of the body. The displacement of the elements has left a void in the abdomen region which does not contain any bones. That the vertebral column was disarticulated before, or during, the disturbance indicates that the corpse was either in an advanced state of decomposition or fully decomposed (the vertebral column is usually one of the last parts to disintegrate [Roksandic 2002, 125]). Furthermore, the displacement outside the body volume indicates a void surrounding the corpse, meaning that the burial sepulcher was still intact. This dates the disturbance to the time period of a few weeks after death to 20-30 years after burial (the maximal time it takes for the wood of the sepulcher to disintegrate [Van Haperen 2010, 11]). The non-random pattern of bone displacement suggests it was caused by either a human or animal. A human might have reopened the grave for looting of precious grave goods or as part of a mortuary ritual.[23] Although human interference cannot be excluded, the observed displacements are considered to be more consistent with a burrowing animal, such as a mole (*Talpa europaea*). Graves

[23] Reopening graves without economical motif is highly debated in the past decades. Parts of an individual might be taken out of the grave (as a relic) or parts might be added, such as Christian symbols. One hypothesis focuses on 'retroactive Christianization', a process in which Christian descendents of Pagan dead reopen graves to Christianize their deceased relatives to ensure a place in heaven (Geary 1994, 36-39). See also Van Haperen 2010 for a discussion of ritualized reopening of graves. I agree that ritual reopening was likely practiced during this transitional period. However, the majority of reopened graves are far more likely the product of looting, as items of precious materials were the basis of power for early medieval chiefs. Furthermore, the 'evidence' that I brought forward to support a ritual explanation is often dubious and liable to multiple interpretations.

are attractive for burrowing mammals as the enrichment of the soil with organic material from the corpse and the sepulcher attracts insects and worms, which are their staple food source . Figure 2.7 shows a field photo of the individual with the reconstruction of the probable track of the burrowing animal.

The second noteworthy displacement of bones in the thorax are the ‘verticalisation’ of the clavicles (Duday 2009, 45-46). The verticalisation occurs when the sternoclavicular joint connections decompose and at the same time a transversal compression is present forcing the medial epiphyses in- and downwards. Medially directed force exerted in the shoulders that create this effect normally originate from tight body wrappings or a narrow coffin which has not enough space for the corpse to be laid out fully horizontal on the transverse plane. Other skeletal movements originating from such as a restricted space are i.a. a linear arrangement of the limbs, medial rotation of the humeri and

Figure 2.7: Field Photo of upper body individual 2012-01 with a possible reconstruction of the track created by a burrowing animal (image and modification by author)

oblique rotation of the scapulae (Willis & Tayles 2009, 548). The wide placement of the limbs and the absence of other signs of constriction in individual 2012-01 indicate that the body was not placed in a narrow sepulcher or tight body wrappings. The transverse compression must thus have been caused by a different source. Two bronze rings located on the lateral ends of the claviculae provide an explanation. The bronze ring *fibulae*, and another type of bronze *fibula* located some centimeters below, are the remnants of the burial attire of which the rest was made of perishable materials and has decomposed. Possibly the rings suspended a mantle or cloak which closed at the front with the *fibula*. The attire was loosely draped but tight at the shoulders, causing medially directed pressure. Similar dress accessories and accompanying skeletal displacements are observed in burial 2012-02 (see below).

The pelvis and legs of the individual do not show any signs of disturbance. The pelvis disarticulated and he os coxae rotated laterally. The distal part of the right forearm rested on the ilium and the bones of the hands were scattered in the pelvic area during decomposition. The left hand was located adjacent to the ilium. When the os coxae rotated, it came to rest on the distal forearm and hand. The legs are stretched with the feet slightly turned to the right. The feet are hyperflexed to an extent not achievable with intact ligaments. This indicates that the feet were not supported at the plantar side.

The combination of skeletal displacement and contextual information produces a quite complete image of the burial display. The individual was buried in an sepulcher of perishable material which remained intact longer than it took the corpse to decompose. The feature in which the skeleton was found is the observable trace of this sepulcher. A thin dark line on the edge of the feature must be interpreted as traces of the original wooden structure. The size of the sepulcher, ca. 1,9 x 0,9 meter, is consistent with a burial ‘chamber’ (comparable to the chamber in figure 2.5). This is confirmed by the wide layout of the arms which would not be possible in a normal sized coffin. The rounded edges of the feature and the irregular appearance at some places indicate that the chamber was created by lining the burial pit with planks, and not by a independently pre-built structure which was lowered in the grave. The body was laid inside the chamber in a supine position, dressed in a (burial) attire. Part of the attire was ornamented with two bronze rings, a *fibula* and a belt buckle. The attire was loosely arranged around the corpse but was tight at the shoulders. The material was durable and its decomposition took longer than the decomposition of the sternoclavicular joint.

A glass bead surrounded by metal corrosion at the left elbow are probably also remnants of the burial attire (see also chapter 5).[24]

Individual 2012-02

Burial 2012-02 was found in close association with burial 2012-01 and three deliberate burials of dogs, possibly belonging to the same household. Similar to individual 2012-01, this individual was also buried in full (burial) attire, as is shown by the retrieval of multiple objects related to this attire. On the shoulders, at the lateral ends of the claviculae, a bronze ring *fibula* (at the right side) and a buckle or *fibula* (at the left side) were present. Multiple fragments of a decorated belt were discovered in the pelvic area, from which an iron knife was suspended. A bead necklace containing more than 70 beads was draped around the neck (figure 2.8). The center bead was made of crystal, which was surrounded by amber beads and varying beads of glass paste. These necklaces are a regular find in early medieval woman's graves and their use and symbolism is debated.[25]

Figure 2.8: Bead necklace *in situ*. The corroded bronze ring is recognizable in the upper part of the photo, at the lateral end of the clavicle (Image from: Leiden University; see also front cover).

[24] Possibly they were part of a pouch.
[25] Different beads might represent events in the life history of the woman, just like men were given particular items of weaponry at certain stages in life (Kars 2011, 84).

Slightly higher in the grave an unknown round object was found, possibly the remains of a pouch (pers. comm. J. de Bruin). The dimensions of the burial feature in which the skeleton was discovered measured ca. 1.8 x 0.6 meter, slightly smaller than that of 2012-01. The feature was roughly rectangular, wider at the feet with a straight end, at the head more narrow and with a rounded end. The fill was partially made up of sods and on the edges a thin dark band was observed, which originates from decayed organic material.

The grave was undisturbed at the moment of excavation and the intact labile connections indicated a primary inhumation. The individual was deposited in a supine position with the legs bend. The cranium was turned to the left, with the face directed to the lateroanterior side. The upper arms were positioned next to the thorax, the lower arms were folded over the abdominal area, parallel to each other. The right hand was positioned on the vertebral column, the left hand at the lateral border of the thorax. The legs were turned to the right side. The right leg was bend in a sharper angle than the left which allowed the feet to be placed in extension of each other (on the same axis). The cranium was fragmented under the pressure of externally applied force, either from the collapse of the sepulcher or the weight of the soil. Pressure applied from the right superoanterior side pushed the anterior side of the skull some centimeters to the left, distorting its shape. When the splanchnocranium could not move further due to the presence of an impenetrable object or wall, the frontal bone was forced inside the vault, sliding underneath the right zygomatic and nasals and destroying the orbits and nasal cavity. The left side of the upper body was positioned against the same wall to which the cranium was pushed against. This is indicated by the position of the left humerus, which is displaced to the anterior side, losing its connection with the glenoid cavity. The partial weight of the thorax probably rested on the left arm, fixing it against the wall while the remaining bones of the thorax slumped to the bottom of the grave during decomposition. The sternal ends of the clavicles are displaced inferiorly. This can either be caused by the disappearance of the soft tissue in the thorax, causing the ribs, sternum and clavicles to slump inferiorly under the influence of gravity, or the clavicles are pushed inwards due to transverse compression (similar to the individual 2012-01). Because the inferior displacement of the sternal ends is not significant enough to be classed as complete ‘verticalisation’ (Duday 2009, 45-46), both options are plausible.

The pelvis of the individual is disarticulated and has become fully horizontal due to the lateral rotation of the os coxae. As noted multiple times, this is only possible in a void,

which can already have been present or was created by the disappearance of perishable material. The right leg, including the foot, is positioned on the lateral side. The right upper and lower leg, the calcaneus and the first metatarsal, are positioned on the medial side. The remainder of the foot are positioned on the plantar, or inferior, side. It is likely that the foot was in an unstable oblique position (i.e. in disequilibrium) and that it slowly slumped to the bottom of the grave when the ligaments disappeared. Considering the mostly intact anatomical connections in the legs it is likely that the legs were positioned on the bottom of the grave as opposed to upright or oblique. This is also confirmed by the position of the feet on the same axis, which is far more unstable in an upright position than when the feet are adjacent to each other.

Skeletal displacements observed in the pelvis and left foot indicate that during decomposition a void was present around (parts of) the body. Displacement of the cranium and left arm further indicate that at the left side a wall was present which was resistant against considerable force, at least during the period of decomposition. These observations suggests the presence of a burial sepulcher which has since decayed, possibly made of wood. The dark band around the edge of the burial pit seems to confirm this. The completeness of the skeleton, in addition to the intactness of labile joints, excludes the possibility of a sepulcher which was left open to the elements and scavenging animals. If a wooden sepulcher was present it would not have been a rectangular coffin, as the head end is rounded. The limited thickness of the dark band around the grave's edge also seems to exclude a tree trunk coffin. Thus, the most likely scenario is a small burial chamber created by lining the walls of the burial pit with planks, similar to burial 2012-01.

Individual 2013-01

This context consist of an oval pit measuring ca. 1.0 x 0.5 meter which contained the remains of an adult individual. The individual was deposited in a prone position. The anterior side of the individual was burned, while the posterior aspect was not. The fill of the pit in which the individual was found contained charcoal mixed with the cremated and fragmented remains of the extremities and the anterior parts of the thorax and pelvis. The charcoal from the context was investigated in the archaeobotanical laboratory of Leiden University, where it was found that the wood which was used for the pyre consisted solely of alder (*Alnus sp*.), a species which was locally available (Van Hees 2016). Two postholes were found a few decimeters north of the pit in the same

alignment and, as the area was devoid of any other archaeological features, were clearly related to the cremation/burial pit. The posts may have served as structural elements of a pyre or platform. Possibly the pit was created to act as a reservoir in which the burned and disarticulated remains were collected during the cremation process. The presence of considerable amounts of charcoal and small elements of the skeleton suggests that the incineration did take place on the spot. The absence of a solidified layer of burned soil on the bottom of the pit indicates that the burning did not take place in the pit, but above. Either by intention or accident, the cremation of the entire corpse was not completed. The part of the body which was still articulated (cranium, thorax and pelvis) were deposited in the pit, which was just large enough to accommodate it.

The cranium was located on the right side. The left side was severely damaged during the excavation of the trench. Anatomical connections between the base of the skull and the atlas were retained. Only the chin area of the mandible is burned on a high temperature, indicated by white discoloration and fragmentation due to heat stress. The splanchnocranium is burned on low temperature and the calvaria is unburned. It is clear that the head was not exposed to direct fire or high temperatures and was located outside the core of the pyre. The anterior half of the thorax was exposed to high temperatures and is fragmented as a result. The posterior half is unburned and remains in articulation. The ribs are displaced inferiorly under the weight of the vertebrae after decomposition of the remaining soft tissue in the thorax. This indicates that at least a portion of soft tissue remained after the burning. The left side of the individual is burned and fragmented to a higher degree than the right. As a result, only the proximal 1/3 of the left humerus remains in articulation, while at the right the complete humerus and the proximal half of the ulna and radius remain. Both humeri are place in a slight angle away from the body and the right lower arm is folded under the thorax (pointing laterosuperior). The pelvis retained its anatomical connections at both the auricular surfaces and the pubic symphysis, indicating that no void was present around it to enable any displacement. The anterior aspect of the pelvis was burned at high temperatures and was fragmented as a result. The head of the femora remained in articulation with the acetabula. Only the proximal epiphyses and a small part of the diaphyses remained of the femora while the rest of the legs are completely burned and are found fragmented and scattered in the fill of the pit. The stump of the left femur is burned at the posterior side. It is directed slightly inferior. The stump of the right femur was most severely burned at the lateroposterior side and was directed straight

anteriorly, towards the bottom of the pit. The fragments of the legs were retrieved from underneath the thorax. The distal epiphysis of the right femur was found on the medial side of the right elbow joint, while a patella was located near the pelvis. The legs and part of the arms were burned on higher temperatures and significantly more fragmented than the rest of the body and it is clear that they were closest to the heat source. The location of the cremated leg fragments in the pit, in addition to the burn pattern on the articulated parts of the femora, indicate that they were folded double, possibly over the (folded) arms. Most likely, the body was in a crouched, partially upright, position in which the legs and arms shielded the cranium and posterior thorax from severe burning.[26] The scatter of burned bones and the absence of a solidified burn layer in the pit further suggest that the burning took place on a construction (e.g. a pyre) on which the (semi-) seated body was placed. The fragments of the body and the pyre fell down in the reservoir pit on which eventually the unburned part of the corpse was placed. Considering the limited amount of burning on the skeleton, the pyre was not large but did produce enough energy to reach high temperatures for some time. It certainly did not burn long enough to devour the entire corpse.

Individual 2014-01

This context consists of a well which contained the cremated remains of one individual. The remains were scattered over nearly the entire width of the first and second (of seven) layers which filled the inside of the well. The well was not in use anymore at the moment of deposition and its wooden construction had been demolished and extracted for re-use (pers. comm. S. Hagedoorn). Whether the deposit was linked to the abandonment of the well is unknown (see also chapter 5). It is possible that the well was only recognizable as a depression in the landscape which was deemed as a suitable place for the deposition of the remains. Possibly the funeral pyre was constructed above the depression allowing the remains to fall down. All parts of the skeleton, including small bones, are represented, from which it is clear that no specific selection of parts was made.

[26] A similar crouched cremation was found in a Neolithic site in Hekelingen, the Netherlands (Louwe Kooijmans 1985, 102-103). Although similar positions are unknown from the early medieval coastal area, it is possible that it was common, but archaeologically invisible, practice.

Individual 2014-02

Context 2014-02 consists of a burial of a young individual deposited in a supine position. Labile joints that were found in anatomical connection indicate a primary burial. The context was disturbed on multiple occasions which resulted in the loss of large parts of the skeleton. It is certain that the context was disturbed recently, as a mechanical digger employed to demolished modern buildings left its traces at the distal end of the left femur. Both lower legs, the right arm, the upper parts of the thorax and the cranium are missing.

The ribs have slumped to the bottom of the grave after decomposition of the soft tissue in the thorax. Some of the left ribs have fallen to the lateral sides, partially outside the original volume of the body. The left arm is positioned adjacent to the thorax, the lower arm slightly bend with the hand resting on the left ilium and sacrum. The missing right arm was not positioned identically, as no bones of the lower arm or hand were found in the pelvic area. The bones of the left hand were found in a small concentration indicating that the fingers were contracted. The pelvis of the individual was disarticulated and the os coxae have rotated laterally to a horizontal position on the bottom of the grave. The right os coxae was displaced 3 centimeters away from the sacrum to the inferior side. The femora are in a stretched position, parallel to each other.

Considering the displacement of ribs outside the body volume and the lateral rotations of the os coxae, it is possible that a void was present around the body during decomposition. However, the feature surrounding the skeleton did not reveal any traces of a possible sepulcher. Although the burial pit (of which 1.3 x 0.5 meter remained) was recognizable, no remains of organic material were observed. It is thus unlikely that the individual was interred in a wooden sepulcher. More likely the body was laid in an unfurnished grave, possibly covered by materials that left no trace (e.g. a hide or reed). This might allowed small voids to remain underneath in which minor displacements of bone elements are possible.

2.4 A place for the dead, or, the dead placed: a discussion

Part one

The landscape of the Frisian area in the west of the Netherlands was dominated by the presence of water, both from the sea and from the Old Rhine and Meuse rivers (Dijkstra

2011; Vos 2015). High tides and floods posed a constant threat to which the coastal dwellers began to defend themselves already in the Iron Age (Gerrets 2010, 191). Artificially raised habitation mounds, dikes, ditches, embankments and dams all served to regulate the natural flowing water and keep the feet dry in the Frisian farmsteads. At the same time the waterways were of vital importance to the inhabitants, serving as a highway for transport and communication, connecting the Frisians to the Franks, Anglo-Saxons, Scandinavians and far beyond (Dijkstra 2011, 49-59; Van Es & Verwers 2010). Similar to many other settlements along the Old Rhine, Oegstgeest was located on the high sandy banks formed by repeated cycles of flooding and subsequent sedimentation (Brijker 2011). Embankments and quays, build on the river shore when it moved away from the settlement, indicate the importance of the river's accessibility to the inhabitants. The river channel and connecting gullies also formed the outer boundary of the settlement. Beyond it no living individuals resided.

Watery places (waterways, bogs, wells etc.) are frequently characterized as a liminal area between two worlds, both in prehistoric and later periods (e.g. Ellis Davidson 1988, 27; Hamerow 2012, 132; Nieuwhof 2015, 294; Williams 2006, 194; Van Haasteren & Groot 2012). Deep waters could be seen as entrances to an underworld, similar to caves or deep clefts in the earth (Ellis Davidson 1988, 25-26). The liminal character of a waterway is further strengthened when it also serves as a boundary (Van Gennep 1960, 17-18). Crossing a boundary will take a person from one territory into the other, and the boundary can be seen as an area 'in between', not belonging to one or the other (*Ibidem*; Hylland Eriksen 2001, 137-139). Besides being the demarcation of a political or social territory, they can also have a more ritual character, demarcating the line between the sacred and profane, or the living and the dead. Although a boundary is an intangible concept, it can be made tangible by its demarcation with physical objects. These can be natural occurring elements (mountain ridges, rivers, trees etc.) or anthropogenic (fences, walls, poles, standing stones, signs etc.) or a combination of both. The peripheral areas around settlements in which the boundaries are located were often chosen to accommodate (human) burials (Williams 2006, 186). The burials may have served as a physical marker of the boundary and legitimize an ancestral claim to the territory that was defined by it (see also chapter 5). The placement of burials along a border as a physical marker implies a visibility of the grave above ground. Although early medieval grave markers (with the exception of mounds) are seldom found, it is widely accepted that they were in existence (e.g. Balace & De Poorter 2010, 100; Efros 2003,

179; Graham-Campbell & Valor 2007, 434). The settlement boundary might also have represented the transition between the area of daily life (the realm of the living) and the area of the ritual landscape (the realm of the dead and godly spirits). Transportation of the corpse from the habitation area to the disposal area can then be seen as a transitional (i.e. liminal) stage in the separation of the deceased from the present world and its subsequent incorporation in the world of the ancestors (Williams 2006, 196).

It is clear that the northern boundary of the Oegstgeest settlement was a focal point for ritual performances conducted at the site. Four of the five formal inhumations were located north of the boundary, outside the limits of the habitation area. Furthermore, all intentionally deposited horses and dogs were found near the northern border, most of them associated with the human interments (Buhrs 2013). The most valuable portable item retrieved from the site, the decorated silver bowl, was also deposited in the gully forming the northern border (see figure 5.6). Three of the individuals were orientated parallel to the gullies, the fourth perpendicular. It can thus be concluded that the orientation of these graves was primarily based on the orientation of this element in the landscape. The partially cremated individual and a probable disturbed primary inhumation were encountered at the northern periphery of the settlement, but they were not directly linked to the boundary gullies.[27] Whether the peripheral burials served as territorial markers or that they were interred in the area because of the ritual significance of the (northern) border is impossible to determine with certainty. Although the other borders of the settlement are researched archaeologically with lesser intensity, it appears that deposits (secondary deposits included) become increasingly rarer towards the southern half. It is clear that formal inhumations were intentionally excluded from the settlement area (i.e. the area of daily life). Only one inhumation was found inside the settlement, but it is possible that it was located outside it during its deposition. In contrast, individual human bones were not excluded from the living area and have a wider distribution as a result. The secondary deposits do not cluster exclusively at the northern periphery of the settlement area. Instead they are

[27] However, the disturbed inhumation was located directly parallel to a gully in the middle of house cluster 2. Its association with this gully is clear and it might be possible that the gully initially formed the northern boundary, as it is on the same alignment with the gully around house cluster 1. In addition, only two buildings were found north of the gully in house cluster 2, so it is possible that the cluster was enlarged at some point in time. Curiously, one building, which is too small to be a house, is located in the cluster of two humans, three dogs and the star-shaped deposit. It is tempting to say that this building served a ritual purpose, but this cannot be established with any degree of certainty. Although less clearly visible, similar small buildings were encountered adjacent to the two other burials along the northern border.

distributed mainly in the northwestern quadrant. Isolated long bones occur only in, and directly around, house cluster 1. Isolated elements from the skull are found mainly in the middle of the settlement and house cluster 2. There is a slight preference to deposit bones in wet contexts (12 out of 19). Another two deposits were found in the infill of the dams, which might be regarded as a context with a strong relation to water.

The distribution of the inhumation burials in the settlement of Oegstgeest is difficult to compare with similar sites. This originates from the fact that large scale excavations such as conducted in Oegstgeest, revealing a nearly complete settlement lay-out including its periphery, are rare. The significance of peripheral areas are therefore often overlooked, but as large scale excavations are carried out more often due to new legislations, they are researched with increasing intensity. A similar trend is apparent in the U.K., as Williams (2006, 190) points out: "*Archaeological research, particularly over recent years where rescue excavations sometimes involve the large-scale investigation of an extensive tract of the landscape, has increasingly identified a series of seemingly isolated early medieval burials and small groups of graves, and larger cemeteries can provide alternative locales in close proximity to each other within the settled landscape*." Isolated graves or small grave clusters in settlements are absent from the Rhine estuary and the surrounding region (Dijkstra 2011, 276). However, they do occur in the coastal area of the northern Netherlands (Hessing 1993, 19) and in the southern provinces of the Netherlands (Theuws 1999). A location adjacent to a ditch demarcating a house plot or settlement is relatively common in these cases (Hessing 1993, 21). Secondary deposits of human bones are quite common in the period from the Bronze age until Christianization and wet contexts (bogs and rivers) were the most preferred locations. More than 50 bog bodies are known from the northern Netherlands in addition to 45 find spots of human bones in the Dutch rivers (Ter Schegget 1999, 200-201). Some of these find spots are undoubted ritual deposition sites in which not only human bones, but also other finds, such as weapons, are found. Bone deposits with a ritual character from settlement contexts are a common occurrence all over pre-Christian northwestern Europe. The majority of these deposits concern long bones and skulls, with mutilation and reworking present in a relatively large part of the sample (e.g. Hessing 1993; Nieuwhof 2015; Ter Schegget 1999).

One site that is directly comparable to Oegstgeest in terms of bone deposits and the size of excavation is Utrecht Leidsche Rijn LR51/LR54. The settlement was located ca. 50 km upstream of Oegstgeest and consisted of multiple 7th- and 8th century farmsteads and

storage buildings along the Old Rhine. Complete human burials were absent but two horse burials and one dog burial were found along the periphery of the settlement. Additionally, seven contexts were discovered with isolated human bones, of which 6 contained parts of the cranium and one a fetal humerus fragment. Four of the bones were found in the river bed and all were found in the eastern half of the settlement. One skull exhibited violent chop marks and another skull was found with three cervical vertebrae, possibly a sign of decapitation (Smith 2009). The peripheral location of the animal graves, the clustering of the secondary deposited human bones and the preference for skulls and long bones are all comparable with the data from Oegstgeest. It would not be surprising if settlements excavated in the future on a similar scale as Oegstgeest and Leidsche Rijn will reveal similar trends in bone deposits.

Part two

By taphonomic analysis (archaeothanatology in particular), the original postures of the skeletons buried in Oegstgeest have been reconstructed. Eight primary deposits were identified which displayed a varying range of body postures . Three individuals (one adult woman and two children) were buried in a stretched, supine position, one adult woman was buried supine with slightly retracted legs, one adult male was positioned crouched on its left side, two adult males in a prone position (of which one in a very disorganized position) and one individual was partially cremated in a seated position after which the remaining part of the body was deposited in a prone position. The existence of a void around the body during decomposition was attested in four graves. It is likely that in graves 2012-01 and 2012-02 a wooden burial chamber was constructed inside the burial pit. In burial 2010-01 and 2014-02 a void was present but no traces were identified of a burial sepulcher. The other burials did not reveal any signs of an existing void or of a burial sepulcher, and it is likely that deposition occurred in a unfurnished burial pit. Disturbances were observed in multiple graves (most of which are probably of a (sub-) recent date) but no definitive signs of intentional re-opening were found.[28]

orientation

Both the orientation of the skeleton and the size of the burial pit have gained the necessary attention in early medieval research. The change from a wide range of body

[28] Secondary deposited bones may originate from re-opened graves but can also have other origins, e.g. open air excarnation.

orientations to an exclusively west-east alignment has been regarded as one of the signs of Christianization (Knol 1993).[29] Burials dating to the Merovingian- and early Carolingian period in the western and northern coastal area lack a clear preference in body orientation (Knol 1993, 63; Dijkstra 2011, 270). Most common are west-east orientated graves followed by south-north, but everything in between can be encountered as well. Cemeteries that are located more inland, beyond the borders of the Frisia, show a significantly higher degree of uniformity. They are often arranged in rows in which the graves have a south-north orientation (Van Es 1968). At Oegstgeest, five of the six formal inhumations are aligned on the same directional axis (four southwest-northeast, one northeast-southwest) and only one individual (2012-01) deviates from this, being aligned on the southeast-northwest axis. As was mentioned earlier, the orientation of the graves follows the orientation of the gullies that surround the settlement. It is thus clear that the orientation of the graves was based on the presence of prominent marks in the landscape, and probably not directly on religious preferences. In this aspect the graves show similarities with other cemeteries in the Frisian area.

Grave size and sepulchers

The grave (size) and type op sepulcher are elements of the mortuary cycle in which a considerable amount of energy and resources can be invested. As a result, they are sometimes regarded as indicators for the relative wealth of the buried individual and/or its peers (Effros 2003, 182-183; Proos 1993; Tainter 1975). This was, for instance, attested in a study by Fritz Fremersdorf, who found a direct relationship between the depth of the grave and number of grave goods in an early medieval Frankish cemetery at Köln, Germany (Fremersdorf 1955, 37). Proos (1993, 43) states that for a standard adult coffin a width of ca. 40-50 cm is normal, requiring a pit width of 80-110 cm. anything in addition to this he regards as an additional investment of energy and resources. Whether such a broad pit is required is questionable as this is dependent of soil type and use of tools, such as support planks for the walls.

For Oegstgeest it was possible to reconstruct the size of the burial pit for five inhumations. The uncompleted cremation (2013-01) is excluded as the pit probably served as a catchment reservoir under the funeral pyre, and was not primarily intended as a burial pit. In the modern era, clay extractions for the production of bricks and roof tiles removed ca. 80-100 cm of the original topsoil at Oegstgeest. The precise depth of

[29] The other signs being abandonment of cremation and absence of grave goods.

the extractions is unknown and varies per location on the site (Van Zijverden 2006, 15). To compare the graves it is here assumed that 100 cm of topsoil is extracted over the entire site. This produces the following results:

Table 2.1: Size and reconstructed volume of graves

Grave number	Pit surface size (square m)	Reconstructed depth (m)	Pit volume (cubic m)
2010-01	(1.6* x 0.5) = 0.80 m	1.1	0.88
2011-01	(1.1 x 0.5) = 0.55	1.1	0.55
2012-01	(2.0 x 0.9) = 1.80	1.1	1.98
2012-02	(1.8 x 0.6) = 1.08	1.3	1.40
2014-02	(1.4* x 0.5) = 0.70	1.1	0.77

**disturbed burials, length reconstructed*

Graves 2012-01 and 2012-02 are significantly larger than the other graves, and are the only graves from which it was clear that originally a sepulcher construction was present. [30] For grave 2012-01 it is particularly evident that the burial sepulcher was disproportionally larger than the size of the corpse.[31] The two largest graves are also the only graves in which multiple grave goods were encountered. The grave goods were primarily related to the burial attire, indicating that the individuals were dressed in (decorated) clothes, and not in a simple shroud. The other graves did not reveal any signs of a burial attire. From an archaeological perspective, graves 2012-01 and 2012-02 display a higher energy- and resource investment than the other graves. However, the energy invested in other parts of the funeral ritual, such as a communal meal or funerary gifts that were not included within the grave (see also chapter 5), are invisible. It is therefore not possible to establish whether the individuals were of higher status.

The sepulcher construction in graves 2012-01 and 2012-02 were likely made of wood. The traces of the sepulcher of the first show that the shape was rectangular with rounded edges. The construction in grave 2012-02 is of different shape: rectangular with a rounded head end and a straight, slightly broader foot end. As was mentioned earlier, based on the irregular shape of the archaeological traces of the sepulcher, it is likely the burial pit was originally lined with a plank construction instead of a prefabricated

[30] When comparing the sizes of the pits, it should be noted that burials 2011-01 and 2014-02 contained juvenile individuals. This means that the *necessary* pit is much smaller, although the *actual* pit can be much bigger, depending on the energy investment that is aimed for.
[31] The reconstructed stature of the individual is 168.6 ± 6.19 cm while the pit is 200 cm. The width of the pit is double the size required for a supine burial with the arms positioned parallel to the body.

rectangular coffin-like ‘box’. For the rounded parts of the sepulcher planks of small width must have been used that were placed with the long sides abutting to the next. Staves of barrels, a leftover product from the wine import from the German Rhineland, may have been a readily available resource to use for this purpose. That the barrels were reused for construction purposes in Oegstgeest is attested by their presence in a number of wells, in which they were applied as lining of the shaft (figure 2.9; Kooistra 2011, 59-60).

Figure 2.9: Well lined with a barrel. The staves are preserved at the bottom due to anaerobic conditions. Where the wood is not preserved, a small dark band is visible indicating the original position. Similar traces are visible in graves 2012-01 and 2012-02 (image from: Leiden University).

The sides of the sepulchers were made with straight planks, either from newly felled trees or from reused wood. Reusing wood for the construction of burial sepulchers is a widespread practice in the middle ages, and the wood could originate from different sources, such as buildings and ships (Vredenbrecht & De Ridder 2004[32]; Waasdorp & Eimermann 2008, 52-60). Using wood from ships for burial constructions may have had a ritual or social meaning, because of the special position of the ship in early medieval society.[33] Evidence for this practice was found close to Oegstgeest, in the early medieval cemetery of Solleveld. There, a burial sepulcher was found in the shape of a small boat, which was constructed with reused parts from an originally larger boat (Waasdorp & Eimermann 2008, 56). Although parts of boats were certainly reused in Oegstgeest for construction purposes (Van Campenhout & Vlierman 2011, 65-73), evidence that they were included in graves, such as the presence of characteristic rivets, were not encountered.

[32] The research by Vredenbregt and colleagues gives a remarkably insight into wooden burial sepulchers of the early and high middle ages. The 45 graves that were encountered in Vlaardingen, dating to the late 10th-early 11th century, contained preserved wooden burial containers of a wide variety, showing that standardization was certainly not the norm as it was in later periods (Van Spelde & Hoogland, in prep.).

[33] Ship burials and sepulchers/monuments in the shape of ships are plentiful in the early middle ages all over Northwestern europe. Often the burials are rich in material culture and regarded as high status. Most famous are the burials at Sutton Hoo (Williams 2006, 137-141) and the Oseberg ship. See also in this regard: Brink & Price (2008, 264-266)

3 Demography of the dead

An osteological view on the human remains of Oegstgeest

"…under the altar-place were found human bones. They were much larger than the bones of other men. From the tales of old people it is though pretty sure that these were Egil's bones. (…) The skull was wondrous large, but still more out of the common way was its heaviness. It was all wave-marked on the surface like a shell. Skapti then wished to try the thickness of the skull. He took a good-sized hand-axe, and brandishing it aloft in one hand, brought down the back of it with force on the skull to break it. But where the blow fell the bone whitened, but neither was dinted nor cracked."

(Egil's Saga[34])

3.1 Introduction

The human remains found in the settlement of Oegstgeest are subjected to a physical anthropological investigation in order to get a better understanding of the demographic composition and the state of health of the individuals. The aim of this investigation is twofold. It may provide answers about the physical aspects of life in the early medieval settlement, plus the data can be used to explain archaeologically observed trends in cultural behavior surrounding the mortuary ritual. This chapter will focus on the first aim, while the second will be further explored in the synthesis of this thesis. The research questions that form the basis for the osteological investigation are as follows:

- How many individuals are represented in the total assemblage?
- What is the estimated age-at-death, sex and stature of the individuals?
- Are there any observable signs of trauma or pathological conditions and by which processes are they caused?
- What is the composition of the secondary deposits and how does this relate to the primary deposits?
- How do the data from Oegstgeest compares to data from other sites from the Netherlands in the Merovingian era?

[34] Original anonymous author, written in the thirteenth century in Iceland. Translation by W.C. Green (1893). Based on this and other passages from the saga, some scholars argue that Egil, a tenth-century Icelandic farmer and Viking, suffered from Paget's disease (Byock 1993).

The reader may be assured that the methods for investigating human bones have been greatly developed since the time of Egil, more than a thousand years ago. Although it is interesting that abnormalities in dry bones were already noted in that era, the method of testing the strength of the skull by smashing it with an axe might be regarded a bit outdated. For this research quite different methods have been employed, which are described in the following section.

3.2 Materials and methods

3.2.1 Materials

The excavation campaigns in Oegstgeest revealed 27 contexts containing human bones, of which 16 contained isolated elements and the remainder contained multiple bones or (semi-) complete skeletons. The preservation of the skeletal elements varied from poor to excellent, which resulted in a bias in the observable traits for age- and sex estimation[35]. In particular the formal graves, which were interred on a higher level than most secondary deposits[36], showed poor bone preservation and missing elements due to (sub-recent) disturbances.

3.2.2 Field and laboratory procedures

The excavation trenches were dug by a mechanical digger to the level where the early medieval soil features were clearly visible. As was explained in the previous chapter, circa 50 to 100 cm of the original surface was extracted in the modern period for the production of bricks and tiles. As a result, only the deeper layers of the early medieval features were preserved. Due to their scattered and previously unknown location, most graves were discovered when the mechanical digger exposed the highest parts of the skeleton, usually the cranium. When a grave was identified, a student or laboratory assistant trained for osteological excavation and analysis was called in to excavate and document the grave. The graves were excavated in thin horizontal layers until the skeleton and possible grave goods were fully exposed. A standardized form[37] was used to document the type of deposit, position and length of the skeleton, find numbers, soil texture and taphonomic observations. When possible the skeleton was photographed with a photo ladder, making it possible to take photos directly from above in a strict

[35] The preservation of individual 2010-01 was too poor to be studied in the laboratory and age- and sex assessment was performed in the field.
[36] Most secondary deposits were retrieved from deeper contexts such as gullies.
[37] See appendix D

horizontal plane. Four reference points were placed around the grave and measured with a GPS for the purpose of geo-referencing. The bones were then lifted and transported to the Faculty of Archaeology, Leiden University, where they were cleaned and analyzed. The crania of individuals 2012-01, 2012-02 and 2013-02, and the pelvis of 2013-01 were lifted *en bloc* and further excavated in the Laboratory for Human Osteoarchaeology, Leiden University, to enable more detailed analysis of the anatomical connections and retrieval of small elements. The skeletons were carefully washed with limited amounts of water and stored in plastic zip-lock bags after drying. It proved to be beneficial to allow the bones to dry after lifting before the sediments were washed off. By drying, the soft bones regained some structural strength and the sediment could be removed with minimal further damage to the fragmented remains. From five individuals a dental element was removed after recording for the purpose of DNA and/or isotope research (see chapter 4). From two individuals rib fragments were also sampled. After the physical anthropological analysis the skeletons were stored in cardboard boxes at the storage of the Laboratory for Human Osteoarchaeology Leiden University. They will remain in Leiden until all finds of Oegstgeest are deposited in the provincial depot in Alphen aan den Rijn.

Physical anthropological analysis took place in the Laboratory for Human Osteoarchaeology, Leiden University under the supervision of Dr. Waters-Rist and Dr. Inskip. The results of the analyses of each individual were verified by one of these senior specialists.

3.2.3 Minimum number of individuals (MNI)

The minimum number of individuals is determined on the basis of the most frequently occurring skeletal element. The individual elements from both the formal graves and the secondary deposits have been taken into account so that no double counts could occur.[38] The part of the element that was present was recorded (for instance: proximal epiphysis and diaphysis[39]) plus any other relevant information such as age- or metric assessment.

[38] For instance, a femur from a secondary deposit could belong to a formally buried individual missing this element.
[39] In this way an isolated head and isolated shaft were not recorded as two individuals.

3.2.4 Sex estimation

Macroscopic observation of sexually dimorphic skeletal traits was employed to estimate the biological sex of the individual. In addition, of three individuals DNA from dental elements was examined by an external laboratory which made it possible to verify the macroscopic analyses.

Sexual dimorphism in the skeleton is expressed in a number of locations in the skeleton, mainly in the pelvis (regarded as most reliable), and in the cranium. As these morphological traits develop during puberty, the methods using these traits are only applicable on material from adult individuals. Differences in robusticity (assessed by measuring skeletal elements) can also be used as an indication for the sex of the individual, although this is regarded as less reliable. The Workshop of European Anthropologists (WEA) has published standards for scoring traits for sex estimation, which were used in the analysis of the skeletons (WEA 1980). In this method, ten traits of the cranium, four of the mandible and ten of the pelvis are assessed and assigned a score between -2 (hyper-feminine) and +2 (hyper-masculine). Each score is multiplied by a weight factor according to the reliability of the trait. The factor ranges from 1 to 3, in which 3 is regarded the most reliable. The resultant scores are summed and multiplied by the number of scored traits. This will result in a final score between -2 and +2, which can be translated into an assigned sex: female for -2, possible female for -1, indeterminate for 0, possible male for +1, and male for +2. The method can be summarized in the following formula:

$$Degree\ of\ sexualisation = \frac{\Sigma\, wx}{\Sigma\, w}$$

x = score individual traits; w = applied weight factor

In addition to the traits scored by the WEA, three traits of the pubis have been scored which are known as the 'Phenice-traits' (Phenice 1969). This method is regarded as quite accurate (White & Folkens 2005, 395-398) but due to the vulnerability of the pubis after burial and during excavation[40] it is not always possible to apply it on archaeological assemblages. Combining the methods of the WEA, the Phenice traits, and metric assessments is preferable as this will provide the most complete, and therefore

[40] The pubis is in a supine burial the highest part of the skeleton after the cranium. It is therefore often fragmented when the trenches are dug or the grave is excavated with shovels. In coffin burials, the pubis is regularly fragmented when the coffin collapses after decomposition of the wooden elements.

accurate estimation. Furthermore, it is not unusual that some traits might show contradictory scores in a single individual, and combining multiple methods can average possible outliers. For fragmented material or single bones it is often impossible to combine multiple methods. Although the individual bones from the secondary deposits have been assigned a sex when dimorphic traits were present, the results should be regarded as indications with a limited degree of accuracy. Individual cranial elements are assessed following the methods of the WEA (for mandibles in combination with metric assessment). For the postcranial elements only metric assessments were used which are based primarily on collections of white European, North American and South African individuals from the nineteenth and twentieth century (see table 3.1, and: Bainbridge and Genovés Tarazaga 1956; Dwight 1894; Iscan & Miller-Shaivitz 1984; McCormick *et al*. 1991; Stewart 1979; Steyn & Iscan 1997; Steyn & Iscan 1999).

3.2.5 Adult age-at-death estimation

Age-at-death estimation for adult individuals is based on the assessment of wear and/or morphological changes in a number of articular facets (auricular surface, pubic symphysis and sternal rib end), in combination with the degree of cranial suture closure and attrition of the dental elements. Attrition of the teeth is regarded as least reliable as this is highly dependent on cultural habits (Roberts & Manchester 2010, 78-79), such as the composition of the diet and abrasive particles therein (e.g. from querns), and the use of teeth as 'tools' (e.g. during the manufacture of leather or clothes). Age assessment on the basis of the auricular surface is achieved by scoring five components of its general appearance, which change with age (e.g. the surface texture and bone organization). These scores add up to a composite score, which is translated into an age range (Buckberry & Chamberlain 2002). The age assessment based on cranial sutures is also based on scoring multiple sites adding up to a composite score. The cranial sutures, which are open during birth, gradually close with age until the sutures are completely obliterated. Composite scores are obtained from ectocranial sutures of which seven sites can be scored from the cranial vault and five from the lateral and anterior aspects of the cranium (Meindl & Lovejoy 1985). The methods using composite scores are relatively accurate (Buckberry & Chamberlain 2002, 234-236; Lovejoy *et al*. 1985) but not always applicable to (fragmented) archaeological material, as missing elements inhibit the collection of a complete composite score. This is a particular problem for ancient crania which, even if they are collected completely, are often fragmented

Table 3.1: overview of postcranial metric assessments used to estimate sex

Measurement	Reference	Based on	Female range (mm)	Male range (mm)
Max clavicle length	McCormick *et al*. 1991	North American whites (modern)	<130	>160
Max clavicle circumference	McCormick *et al*. 1991	North American whites (modern)	<28	>41
Max scapula length	Bainbridge and Genovés Tarazaga 1956	West-European whites (17^{th}-19^{th} cent.)	<140 (F) <144 (PF)	>149 (PM) >151 (M)
Max glenoid length	Dwight 1894	North American whites (19^{th} cent.)	<34	>36
Humeral head vertical diameter	Stewart 1979	North American mixed (19^{th}-early 20^{th} cent.)	<43 (F) <45 (PF)	>45 (PM) >47 (M)
Humeral head diameter	Steyn & Iscan 1999	South African whites (modern)	<46.04	>46.04
Humeral epicondylar breadth	Steyn & Iscan 1999	South African whites (modern)	<60.06	>60.06
Humeral deltoid circumference	Steyn & Iscan 1999	South African whites (modern)	<68.30	>68.30
Femoral head diameter	Stewart 1979	North American mixed (19^{th}-early 20^{th} cent.)	<42.50	>47.50
Femoral head diameter	Steyn & Iscan 1997	South African whites (modern)	<45.8	>45.8
Tibia anteroposterior, diameter, transverse diameter, circumference	Iscan & Miller-Shaivitz 1984	North American whites (19^{th}-early 20^{th} cent.)	Means: 34.60, 26.63, 96.13	Means: 30.59, 23.67, 86.44

obscuring essential suture sites. Age assessment of changes in the pubic symphysis (Suchey & Brooks 1990) and sternal rib end (preferably the 4^{th} rib [Iscan *et al*. 1984; Iscan & Loth 1986a; *Ibid.* 1986b]) are done by direct comparison to images or casts with accompanying descriptions of specimens of known age-at-death. The specimen which compares best to the archaeological sample is chosen resulting in an assigned age range. Age assessment based on dental attrition is done by scoring the degree of wear on the molars of each dental quadrant. The results are then compared with references set up for different time periods[41] (Maat 2009, based on Brothwell 1981). The age ranges resulting from the different methods are averaged into a final assigned age category. Because the methods are based on degenerative processes in the skeleton, which are in part related to the health or activity of an individual, the results cannot be directly translated into a specific age. Therefore, adult age estimations are expressed in terms of

[41] The division in different time periods is based on the differences in abrasive particles in the diet. For instance, the usage of tephrite querns in the Roman period resulted in a higher amount of particles which caused accelerated wear of the dental elements.

categories, without specification of exact age-at-death (White & Folkens 2005, 360-361[42]). The categories for adults (18 years and older) used for this research are:

1. EYA: early young adult (18-25 years)
2. LYA: late young adult (26-35 years)
3. MA: middle adult (36-49 years)
4. OA: old adult (50+ years)

When the age estimates of an individual are not limited to one of these categories they are combined (e.g. late young to middle adult 26-49 years).

3.2.6 Sub-adult age estimation

Age assessment of the sub-adult remains found at Oegstgeest is based on age-related growth patterns of the bones and dentition. Measurements of long bones, from which age can also be estimated, was impossible due to absence of complete elements.

At eleven weeks before birth, the human skeleton is made up of circa 800 elements, which will gradually fuse together to 450 elements at birth, and on average 206 fully developed bones in an adult individual (White & Folkens 2005, 47-48). The age at which the elements, called ossification centers, fuse are relatively predictable. In addition, not all bones fuse simultaneously, which makes it possible to develop a seriation of fusion stages (Baker *et al.* 2005, 157-160; Schaefer *et al.* 2009, 337-356; White & Folkens 2005, 372-374). The degree of fusion observed in the elements of a single individual can thus be translated into an age range.

Age assessment from the dentition is based on a rather similar principle. The teeth form and erupt in a predictable order and at known ages. The dentition develops continuously from before birth until the last permanent molars have been completely erupted after the age of 18 years. As a result, the developmental stage of both the deciduous- and the permanent teeth are usable in assessing the age of an individual (Baker *et al.* 2005, 163; Hillson 1996, 118-148; Schaefer *et al.* 2009, 80-96; White & Folkens 2005, 364-368). The age categories used for sub-adult individuals are:

5. F: Fetal (<38 prenatal weeks)
6. P: Perinatal (38-42 prenatal weeks)

[42] Important variables that influence the accuracy and precision of methods for age- and sex estimation are also discussed in the cited book section.

7. I: Infant (2 postnatal weeks-3 years)
8. C: Child (4-6 years)
9. J: Juvenile (7-12 years)
10. A: Adolescent (13-18 years)

3.2.7 Stature

Reconstruction of the stature of an individual can be made on the basis of measurements of their skeletal remains. Additionally, the length of an individual can be measured in their grave if their skeleton is complete, undisturbed, and in an extended position (either supine or prone), although this is considerably less reliable. Multiple researchers have analyzed skeletal assemblages with known stature at death, resulting in a number of regression formulae (e.g. Breitinger 1937; Ousley 1995; Trotter 1970; Trotter & Gleser 1958; Wilson *et al.* 2010). To use these formulae, intact limb bones have to be measured and the sex and ethnicity of the individual have to be known. Of the individual bones the femur is often most reliable for stature estimation. Combining measurements of multiple bones (e.g. femur plus tibia) results in higher precision rates. When possible all available methods were used on the material from Oegstgeest and multiple limb bones were measured. The resulting stature estimates could then be compared and an average produced.

3.2.8 Pathology and trauma

The presence of pathological conditions and trauma on the skeletal remains were assessed by macroscopic inspection. Dental pathology was also assessed by macroscopic observation and a standard recording form was used to record dental caries, alveolar bone loss, abscesses, enamel hypoplasia and antemortem/postmortem tooth loss. If a tooth was sampled for DNA or isotope analysis (meaning partial or complete destruction of the element), possible pathological conditions were first recorded on the form and the sample was photographed.

Identification of pathological conditions followed the process of differential diagnosis, described by Waldron (2009). In this method, all abnormalities in a skeleton are recorded and the combination of these may be indicative of a disease or group of diseases. Additional identification of pathologies was based on literature that describe and depict pathological conditions which may be encountered in human skeletal remains (e.g. Ortner 2003; Roberts & Manchester 2010). Assessment of traumatic

injuries was achieved by macroscopic observation and comparison with case studies reported in literature described below.

In order to describe the teeth and their associated pathologies, the elements are numbered according to the system used by the World Dental Federation (FDI).[43] This numbering system uses a two-digit code for each individual tooth. The first digit is related to the quadrant, the second to the place within the quadrant (table 3.2 and 3.3)

Table 3.2: Numbering system of permanent teeth, based on the system of the FDI.

Upper left quadrant							Upper right quadrant								
2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.1	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
Lower left quadrant							Lower right quadrant								

Table 3.3: Numbering system of deciduous teeth, based on the system of the FDI

Upper left quadrant					Upper right quadrant				
6.5	6.4	6.3	6.2	6.1	5.1	5.2	5.3	5.4	5.5
7.5	7.4	7.3	7.2	7.1	8.1	8.2	8.3	8.4	8.5
Lower left quadrant					Lower right quadrant				

3.2.9 Additional recorded data

In addition to the recorded traits described above, some additional data have been recorded which is not analyzed in the present study but may be useful for future reference. As these data are recorded for all skeletons analyzed at the laboratory in Leiden and in many other research facilities alike, they can be useful when multiple assemblages are compared. The additional data encompass a list of metrics and non-metric traits. Although a number of measurements are used in this study for the estimation of sex and stature, additional measurements and related indices are collected which may provide information about body size and biological affinity. The same is the case for non-metric traits. These traits are small deviancies in the skeleton which occur in a small part of the population and which may be related to age, sex, pathology, activity, but, most often, ancestry (White & Folkens 2005, 406-407). Examples of non-metric traits are extra foramina or bones in the cranial sutures, a different division of articular facets or a distinct notch in the patella (Schwartz 2007,

[43] More information regarding the FDI and the numbering system can be found on the website of the organization: http://www.fdiworldental.org/

264-287). Because the mechanisms under which the traits form are not fully understood, collection of data from different populations across the globe might provide answers in future research.

3.3 Results

3.3.1 MNI

The skeletal element that was found most often at Oegstgeest was the left femur. Twelve separate left femora were identified, from both primary and secondary deposits (table 3.4). Additionally, part of a right femur with an unfused head epiphysis was found (context 2009-01). The age-at-death of this individual does not match with any of the left femora. Furthermore, the only other sub-adults from the site, individuals 2011-01 and 2014-02, were both found with the right femur complete. As a result, it is certain that the right femur fragment of 2009-01 is of a thirteenth individual. Although the minimum number of individuals is certainly thirteen, it is probable that a fourteenth individual is represented by the cremated remains from the well (2014-01). Multiple femur fragments were found among the remains but it was impossible to identify them any more specifically than either diaphysis or epiphysis. The minimum number of individuals that are represented in the secondary deposits is six. This is based on the most often occurring element therein, the right mastoid process, which surprisingly, are all found in a single context (2011-03).

Table 3.4: Elements used to determine MNI

Nr	Fnr/Individual.nr	Part of femur	Side	Age
1	2004-01	Complete	L+R	Adult
2	2009-01	Proximal epiphysis	R	Sub-adult
3	2010-01	Complete	L	Adult
4	2011-01	Complete	L+R	Sub-adult
5	651/2011-03 (1)	Proximal epiphysis	L	Adult
6	651/2011-03 (2)	Proximal epiphysis	L	Adult
7	653/2011-03 (1)	Complete	L	Adult
8	653/2011-03 (2)	Complete	L	Adult
9	2012-01	Complete	L+R	Adult
10	2012-02	Complete	L+R	Adult
11	2013-01	Complete	L+R	Adult
12	2014-02	Complete	L+R	Sub-adult
13	5333	Diaphysis+distal epiphysis	L	Adult
(14?)	2014-01	Diaphysis+epiphysis fragment	?	Adult

3.3.2 Sex estimation

For all (semi-) complete individuals it was possible to obtain an indication of their biological sex, with the exception of the sub-adult remains. As these sub-adult individuals have not reached the age of sexual maturity, a sufficient amount of sexual dimorphism is not yet expressed in the skeletal remains. During future research, DNA analysis might provide a sex determination for these individuals[44]. Four individuals were sufficiently preserved to apply multiple sexing methods resulting in relatively reliable results (table 3.5). The remains of three other individuals were in such a poor state of preservation or so highly fragmented that only a small number of traits could be observed (last three rows in table 3.5). However, the results of individual 2004-01 can be regarded as reliable as the most indicative part for sex assessment, the pelvis, is preserved completely.

For the (semi-) complete individuals for which it was possible to estimate sex on the basis of sexually dimorphic features, four individuals were estimated as male or probable male, and two as probable female. DNA analysis of the probable females confirmed that they were of the female sex (see also chapter 4). DNA analysis of the sub-adult 2011-01 did not produce reliable results due to degradation of the skeletal elements. The cremated remains from the well (2013-01) did not contain sufficient observable traits to estimate sex.

The sex estimations of the secondary deposited remains were more monotonous than those of the primary deposits. Although it should be kept in mind that the sex assessments are often based on only one or a few traits, not a single observable trait could be classed as definitely female (table 3.6). 23 out of 34 (67.7%) of the sexed elements were assessed as male, while seven (20,6%) elements were assessed as possible male, three (8.8%) as indeterminate and only one (2.9%) element was assessed as possible female. As varying methods were used, this bias is likely not caused by faulty methods. The correct identification (confirmed by DNA) of individuals 2012-01 and 2012-02 as females on the basis of the applied macroscopic methods further supports that female individuals from this population are not wrongfully classed as males using the applied methods. As a result, it can be concluded that elements with (hyper-)

[44] DNA analysis was performed for individual 2011-01but the quality was too poor for results at this moment. However, techniques that are being developed might be more adequate to analyze highly degraded DNA (Kootker & Altena 2012).

feminine traits are rare in secondary deposits and that almost 90% of fragments useable for sex assessment are classed as possible male or male.

Table 3.5: sex estimations of (semi-)complete individuals. For the last three individuals the estimations are less reliable due to the poor preservation or fragmentary state of the remains.

Individual	WEA cranium	WEA mandible	WEA pelvis	Addit. Pelvis	Metrics	Final sex	Remarks
2011-02	Unob.	Unob.	M (+2)	M	M	M	
2012-01	PF (-0,86)	I (-0,44)	F (-1,5)	Unob.	I	PF	(DNA: F)
2012-02	F (-1,26)	PF (-0,85)	Unob.	PF	I/PM	PF	(DNA: F)
2013-01	M (+1,67)	PM (+1)	M (+2)	M	M	M	
2004-01	-	-	PM (+1,09)	-	-	PM	(Hoogland 2006)
2010-01	-	-	-	PM	-	PM	
2014-01	I	-	-	I	-	I	

Table 3.6 (continues next page): Sex assessment of elements (N=34) from secondary deposits. Find numbers 651-655 are the star deposit and adjacent pit. The remainder are from other deposits.

Fnr.	Element	Side*	Method	Sex**
651	Occipital	M	WEA (occipital protuberance)	M
651	Frontal	M	WEA (glabella; supra-orbital margin)	M
651	Frontal	M	WEA (supra-orbital margin)	PM
651	Frontal	M	WEA (supra-orbital margin)	PM
651	Frontal	M	WEA (supra-orbital margin)	M
651	Frontal	M	WEA (supra-orbital margin)	M
651	Occipital	M	WEA (occipital protuberance)	M
651	Femur	L	Stewart 1979 (head diameter)	M
651	Femur	L	Stewart 1979 (head diameter)	M
652	Frontal	M	WEA (glabella; supra-orbital ridge/margin	M
652	Frontal	M	WEA (glabella; supra-orbital margin)	PM
652	Temporal	R	WEA (mastoid; zygomatic arch extension)	M
652	Temporal	L	WEA (mastoid; zygomatic arch extension)	PM
652	Ischium	R	WEA (ischial body)	M
652	Scapula	L	Dwight 1894 (glenoid height)	M
653	Tibia	L+R	Iscan 1984; Steyn & Iscan 1997 (metrics)	M
653	Femur	L	Stewart 1979 (head diameter)	I
654	Frontal	M	WEA (glabella ; supra-orbital margin.; frontal inclination; frontal bossing)	M
654	Temporal	R	WEA (mastoid)	I
654	Temporal	R	WEA (mastoid; zygomatic arch extension)	M
654	Temporal	R	WEA (mastoid)	M
654	Occipital	M	WEA (nuchal plane)	M
654	Temporal	R	WEA (mastoid; zygomatic arch extension)	M
655	Temporal	L	WEA (mastoid)	PM

452	Frontal; Parietal	L+R	WEA (multiple [analysis: Hoogland 2006])	M
3034	Occipital; Parietal	L+R	WEA (occipital protuberance)	PM
3052	Tibia	L	Iscan 1984 (metrics)	I
3268	Cranium (multiple)	M	WEA (supra-orbital margin; zygomatic arch extension; occipital protuberance)	M
4164	Humerus	L	Steyn & Iscan 1999 (deltoid circumference)	M
4659	Mandible	M	WEA (multiple)	PM
5181	Femur	R	Stewart 1979 (head diameter)	M
5323	Tibia	L	Iscan 1984 (metrics)	M
5387	Mandible	M	WEA (multiple)	M
5567	Humerus	R	Steyn & Iscan 1999 (metrics)	PF

** L=Left; M=Midline; R=Right*

*** M=Male; PM=Possible Male I=Indeterminate PF=Possible Female*

3.3.3 Age-at-death estimation

Although the preservation of the skeletons was mostly poor which subsequently resulted in high fragmentation rates after excavation, it proved possible to obtain age estimates for all (semi-) complete individuals. The results of the adult age estimations are presented in table 3.7, those of the sub-adults in table 3.8. The assemblage lacks individuals that died in infancy (< 3 years) or in old age (i.e. over 50 years). The secondary deposits yielded remains exclusively from adult individuals. Some fragments contained traits that permitted a more precise estimation, but they are only based on one applied method per element (table 3.9).

Table 3.7: Age-at-death assessment of (semi-) complete adult individuals. Numbers in brackets indicate gross estimates when composite score could not be completed.

Individual	Dental	Auricular surface	Sutures Vault	Sutures Lateral /anterior	Pubis	Epiphyseal Fusion	Final age range (years)*
2004-01	-	-	-	-	25-35	>23	LYA 26-35
2010-01	-	-	-	-	-	>22	Ad 18+
2011-02	-	37.86 ± 13.08	-	-	35.2 ± 9.4	>25	LYA-MA 26-49
2012-01	17-25	37.86 ± 13.08	-	-	-	<25	EYA 18-25
2012-02	35-45+	37.86 ± 13.08	(40+)	(40+)	-	>25	MA 36-49
2013-01	17-25	17.33 ± 1.53 (L); 29.33 ± 6.71 (R)	-	-	18.5 ± 2.1	<25	EYA 18-25
2014-01	-	-	(26-49)	(26-49)		>18	LYA-MA 26-49

** Ad=adult EYA=early young adult LYA=late young adult MA=middle adult*

Table 3.8: age-at-death assessment of (semi-)complete sub-adult individuals.

Individual	Dental eruption	Epiphyseal Fusion	Final age range (years)
2009-01	-	<12 years	J (7-12)
2011-01	4-5 ± 1,5 years	-	C (4-6)
2014-02	-	13-14 years	A (13-18)

Table 3.9: Age-at-death estimations of elements from secondary deposits

Fnr.	Element	Side*	Method	Result	Final Age range (years)**
181	Cranium	M	Suture closure (Meinl & Lovejoy 1985)	Ca. 26-49	LYA-MA 26-49
651	Maxilla	L	Dental wear (Maat 2009)	17-25	EYA 18-25
651	Pelvis	L	Auricular surface (Buckberry & Chamberlain 2002)	59.94 ± 12.95	MA-OA 36-50+
5387	Mandible	M	Dental wear (Maat 2009)	25-45	LYA-MA 26-49

**L=left M=midline*

***EYA=early young adult LYA=late young adult MA=middle adult OA=old adult*

3.3.4 Stature estimation

Stature estimations based on regression formulae were obtainable from five individuals, of which four were male (table 3.10). When multiple bones and/or multiple methods could be applied in a single individual, an average was calculated. From two individuals a measurement could only be obtained from the skeleton *in situ*. These are considered as gross estimates, as they usually deviate from the result obtained by a regression formula (see for instance the differences in individual 2012-01). The average stature of male individuals is 176.37 ± 5.49 cm.

Table 3.10: Stature estimation of all individuals, including secondary deposits

Individual/ Fnr.	Sex	Length in grave	Bone(s)	Side	Method	Result
2004-01	M	-	Femur + tibia	L	Trotter 1970	174.00 ± 2.99 cm
2011-01	U	98 cm	-	-	-	-
2011-02	M	-	Ulna/ radius	R	Breitinger 1953; Trotter & Gleser 1958; Trotter 1970; Ousley 1995; Wilson *et al*. 2010	182.93 ± 7.07 cm
2011-03/653	M	-	Tibia	R	Breitinger 1953; Trotter & Gleser 1958; Trotter 1970; Ousley 1995; Wilson *et al*. 2010	176.63 ± 5.94 cm
2012-01	F	172 cm	Fibula/ femur/ humerus	L	Trotter & Gleser 1958; Trotter 1970; Ousley 1995; Wilson *et al*. 2010	168.60 ± 6.19 cm
2012-02	F	171 cm	-	-	-	-
5181	M	-	Femur	R	Breitinger 1953; Trotter & Gleser 1958; Trotter 1970; Ousley 1995; Wilson *et al*. 2010	171.92 ± 5.96 cm

3.3.5 Dental disease

Seven dentitions or fragments thereof were available for analysis, containing a total of 117 teeth. From the teeth of individual 2014-01 only the roots remained due to heating at high temperatures during the funeral rite, causing the crowns to burst and fragment. Because dental diseases were not observable as a result, they are not included in the totals presented in table 3.11.[45]

Table 3.11. Individuals or isolated elements with observable teeth. Numbers represent number of teeth. For caries, the number of teeth affected are displayed, so a single tooth with two caries counts as one case. AML = antemortem loss, PML = postmortem loss, UE = unerupted, U = unobservable. For calculus and caries the number of affected teeth are indicated, for the other categories the number of affected tooth sockets.

Ind./Fnr.	Teeth (n)	AML	PML	Calculus	Bone loss	Caries	Abscess	Remarks
2011-03/653	5	-	-	5	-	-	-	Mandible fragment only
2012-01	29	-	1	25	4	-	-	1.8+4.8 UE, peg-shaped 2.8
2012-02	23	-	7	15	-	1	1	3.8+4.8 AML or congenital Absence
2013-01	22	-	1	8	-	-	-	1.8+4.8 UE, 3rd quadrant U. Hypoplasia
(2014-01)	(24)	U	U	U	U	U	U	Only root fragments
4659	4	1	11	1	16	2	1	Isolated mandible
5387	10	-	6	10	16	2	-	Isolated mandible
Total	93 (100%)	1	26	64 (69%)	36	5 (5%)	2	2014-01 excluded

More than two-thirds (69%) of the observable teeth exhibited calculus deposits in various degrees of severity. Although it is not classed as a disease, it does indicate poor oral hygiene, as its formation can be avoided by cleaning the teeth. Calculus is mineralized plaque and is made up of different minerals such as apatite, whitlockite, ostacalcium phosphate and brushite (Hillson 1996, 255-257). Plaque consists of dense accumulations of micro-organisms which obtain nutrients from saliva and gingival crevice fluid, but also metabolize fermentable carbohydrates (starches and sugars) and casein (found in milk and dairy products [Hillson 1996, 254]). These are extracted from ingested food and higher intakes of these products can enlarge the amounts of plaque

[45] It is however noteworthy that the number of retrieved elements (24) is relatively high in comparison to the other individuals. This indicates that after cremation, the remains were gathered with care and attention to small elements. It further indicates that similar care was taken during the excavation of the context and subsequent sieving of the soil in 2014.

and subsequently those of calculus (Hillson 1996, 254-255; Roberts & Manchester 2010, 71). As calculus might form periodontal pockets it can serve as a factor in the development of periodontal disease (Hillson 1996, 260). Inflammation of the soft tissue (gingivitis) is often followed by transmission to the surrounding bone (periodontitis) causing resorption of the alveolar bone (column 'bone loss' in table 3.11, see figure 3.1). The considerable percentage (39%) of alveolar bone loss in the individuals of Oegstgeest might thus be a result of the widespread occurrence of calculus. Continuing resorption and eventual loss of the periodontal ligament will result in antemortem tooth loss. The fact that in this assemblage only one tooth was lost antemortem might be related to the lack of individuals that lived to old age. With increasing age the risk of dental disease, eventually causing tooth loss, will also increase.

Caries and abscesses are present in a small percentage of the observable teeth or tooth sockets. Caries and abscesses are often related as bacteria present in caries may pass through the root canal and trigger an inflammatory response of the periodontal tissue. A periapical granuloma then develops which will accumulate pus. When sufficient pressure is built up and the bone is thinned by resorption a drainage hole will form known as a 'fistula' (Hillson 1996, 284-285). In the maxilla of individual 2012-02, at the root of element 2.7, an abscess was present of eight millimeter in diameter. The margins of the fistula are rounded and appear to be well-healed. On one of the mandibles that were found in isolation (Fnr. 4659) a similar abscess was observed on the buccal aspect between elements 4.7 and 4.8. In this case, the formed fistula was four millimeter in diameter and originated from the root of 4.7. Surrounding the drainage hole, a thin plaque of bone is deposited on the mandible, approximately 2.0 by 1.5 cm in size (figure 3.2). This is likely an inflammatory response to the fluids that drained from the fistula and subsequently contacted the alveolar bone.

The right mandibular condyle of the same mandible was affected by a pathological condition or traumatic event. On the condyle a depression was present of 13 x 9 mm. The bottom of the depression is made up of dense bone on which at the inferior margin a small patch of woven bone is deposited on top. The superior margin of the depression is irregular with the presence of bone spicules (figure 3.3). The presence of dense bone suggests that the lesion formed earlier in life, but the deposition of woven bone also indicates that the body was still actively reacting to it at the moment of death. The appearance and location of the lesion suggest that it might be caused by a traumatic

Figure 3.1: Detail of mandible (Fnr. 5387) which was found in isolation. The lingual aspect of the left side is shown with M1-M3 in place. Considerable amounts of calculus are present (broken off from the M3), combined with alveolar bone loss. Note the distance between cemento-enamel junction and the edge of the alveolar bone (image by author).

Figure 3.2: thin plaque of newly deposited bone on the right buccal side of mandible Fnr. 4659. The bone formation is likely a reaction to the fluids originating from the abscess between the M2 and M3 (image by author).

event such as a hard impact on the anterior aspect of the mandible, hitting the condyle with force to the back of the mandibular fossa.

On the upper central incisors of individual 2013-01 several horizontal lines ('furrows') are visible, of which two are very distinct. These lines are known as linear enamel hypoplasia, and are caused by a disruption of normal enamel formation (a 'defect'). Enamel hypoplasia is a non-specific stress marker caused by periods of reduced and/or insufficient nutritional intake or a period of (chronic) disease. Essentially any prolonged period of physiological stress on the body during the formation of the teeth can cause an enamel defect (Hillson 1996, 165-167; Roberts & Manchester 2010, 75-77). As the upper incisors form between six months (±3 months) and four years (± 1 year), the period(s) of stress can be timed in that period (White & Folkens 2005, 366-367). It is possible that a period of stress extended beyond the time of enamel formation, but this is not observable in the dentition.

The incisal edge of the upper central incisors of individual 2012-01 exhibited an irregular wear pattern which originates from using the teeth as a 'tool' or from modification for aesthetic purposes. Both incisors have a semicircular indentation in the middle (figure 3.4). On the left incisor small pieces of enamel have chipped off at the edge of the indentation. Modification related to cultural practices was not observed on any of the other dentitions found at Oegstgeest.

3.3.6 Skeletal pathologies

Because the sample size is small and pathological conditions are not plentiful, the individuals are discussed separately. This will provide a better overview and more detail. Individuals without observable pathological conditions (other than in the dentition) will not be discussed.

Individual 2004-01

This individual, analyzed by Menno Hoogland (2006), exhibited degradation of the body surfaces of the first three lumbar vertebrae. In addition, the first two lumbar vertebrae also showed a slight compression of the bodies on the right side, resulting in a slight scoliosis. The changes in the vertebrae are probably caused by (uneven) load bearing on the vertebral column (Hoogland 2006, 111).

Figure 3.3: Right mandibular condyle of Fnr. 4659. A depression is observable with dense- and woven bone (image by author).

Figure 3.4: Upper central incisors of individual 2012-01 showing the modification of the incisal edge (image by author).

Figure 3.5: Ossicle from the right glenoid of individual 2013-01. Scale in millimeters (image by author).

Individual 2011-02

Limited macroporosity was present on all plates of the vertebral bodies of this adult male individual, along with marginal osteophytes on a single thoracic vertebra. One lumbar vertebra and the sacral plateau exhibited an irregular surface with micro- and macroporosity, and the replacement of some finely granular bone with dense bone. Some lipping was present on the margins of the sacral plateau and the articular facets of the lumbar vertebrae and the S1. All these changes are related to osteoarthritis (degeneration of the joints) and with the degeneration of the intervertebral discs. They will occur in virtually every person during the course of their life and will gradually become worse with age (Ortner 2003, 549).

Individual 2011-03

Seven fragments of a cranial vault found in this secondary deposit exhibit porotic hyperostosis which appeared to be healed (see for more information on this condition individual 2014-01).

Individual 2012-02

This individual, a woman of 36-49 years, showed changes in the skeleton caused by osteoarthritis (abbreviated as OA) in both the spine and in the hands (table 3.12 [Waldron 2009, 24-45]). Micro- and macroporosity and lipping were present throughout the vertebral column, in addition to eburnation on two corresponding arch fragments of lumbar vertebrae. In the hands, eburnation was present on the right trapezium and the first metacarpals plus the first proximal phalanges of both sides (the thumbs). OA in the hands is relatively rare, in particular on such specific sites as the proximal bones of the thumbs (Ortner 2003, 549). Although OA in the hands is more common in women than in men, it usually involves the distal interphalangeal joints on multiple fingers (*Ibid.*). This is not the case in this individual, and it is highly likely that the attrition of the thumbs was accelerated by a specific activity, and not simply caused by normal age-related wear. The activity which caused the OA in the hands (and possibly also accelerated wear of the lower back) is difficult to reconstruct, but must have involved a repetitive motion of the thumbs. It is tempting to relate these observations to activities which we know took place locally (from archaeological finds in the settlement), such as weaving. However, it is impossible to exactly pinpoint the activity, as the motions that

Table 3.12: Description of pathological changes observed in individual 2012-02

Bone*	Side**	Description
C1	m	moderate lipping superior + inferior articular Facets. Slight enlargement of superior facets in a posterior direction. Slight lipping of the articular facet for the dens
C2	m	slight lipping superior articular facets. Considerate lipping and microporosity Left inferior articular facet. Destruction of anterior border of facet. Micro- and macroporosity Of inferior Body.
C3	m	extensive lipping, micro- and macroporosity and loss of original form of left superior articular facet. A lot of extra bone formation on lateral and posterior margins of facet. Depression of impact from the margin of the corresponding facet C2. Minute patches of eburnation on rims of depression; micro-and macroporosity inferior body; slight lipping inferior articular facets.; microporosity superior body; irregular shape body with inferior border pointing towards the lower left.
C4	m	micro- and macroporosity Superior Body; microporosity Inferior body; minor lipping superior articular facets.
C5	m	Only half of the body remains. Microporosity Superior body; micro-and macroporosity inferior body; considerate lipping posterior margin inferior body.
T (1-6)	m	microporosity inferior body; degeneration of superior body, shallow pits and some extra bone formation on the posterior margin of body.
T (1-6)	m	micro-and macroporosity + small bone nodules on Both sides body
T (1-6)	m	microporosity inferior body; large depression (12mm dia.) on middle of superior body. With rounded edges on right side
T (1-6)	m	microporosity on both sides body, macroporosity on inferior body.
T (7-12)	m	micro-and macroporosity Both sides body.; new bone formation on superior body protruding 5 mm from body surface.; shallow depression on inferior body, possibly small Schmorls node.
T (7-12)	m	microporosity And some destruction of both body surfaces resulting in very shallow depressions.
L	m	fragment of arch with large patch of eburnation anterior Aspect, corresponding to #12
L	m	fragment of arch with large patch of eburnation posterior Aspect, corresponding to #11
Trapezium	r	eburnation on the inferior Half of the distal articular facet, corresponding to the 1st metacarpal
MC 1	r	eburnation on the inferior third of the proximal articular facet; eburnation on the lat.inferior corner of the distal articular facet, corresponding with the proximal articular facet. Of the prox. Phalange.
1st proximal phalange	r	eburnation on the lateral third of the proximal articular facet; eburnation and lipping on the lateral half of the distal articular facet.
MC 1	l	eburnation on the lateral margin of the distal articular facet, corresponding with the proximal articular facet of the first phalange
1st proximal phalange	l	eburnation on the lateral margin of the proximal articular facet.

**C=cervical T=thoracic L=lumbar MC=metacarpal **l=left r=right m=midline*

caused the wear of the joints might be applied in many other daily activities of which we do not find any trace in the archaeological record.

Individual 2013-01

On the first nine thoracic vertebrae deposits of woven bone are present on the anterior aspect of the vertebral bodies. The lesions display both sharp and rounded edges indicating that the disease was active at the time of death, but was contracted earlier in life. It is likely that the bone formation on the vertebrae was caused by an infectious disease present in the soft tissue. The affected area suggests a condition in the respiratory system, a common occurrence in past (and present) populations. Because the affected area is limited and no other sites (such as the ribs) are affected, it is not possible to identify the specific disease causing the formation of the lesions. One relatively common respiratory infection which can cause new bone formation on the vertebrae is brucellosis, a disease contracted by close contact with domesticated animals (Waldron 2009, 96). However, most individuals affected by this disease also display extensive bone destruction, which is not apparent in this individual (Ortner 2003, 216-221; Roberts & Manchester 2010, 182-216 ; Waldron 2009, 90-97).

Other than the lesions on the vertebrae, no signs of infectious disease were observed in this individual. However, one other observation is worth noting. In the right glenoid fossa, an ossicle of ca. 16 x 11 mm was found (figure 3.5). This ossicle formed in the space between the head of the humerus and the glenoid fossa of the scapula, inside the joint cavity. The cause of the formation of this (abnormal) ossicle is unknown, but may possibly be related to the dislocation of the shoulder (Ortner 2003, 159-163). Another condition which might cause a separated bone fragment to become lodged in a joint is osteochondritis dissecans (Ortner 2003, 351-353; Roberts & Manchester 2010, 121; Waldron 2009, 154-155). However, no lesions were observed on the relevant bony joint surfaces that could have been the source of the fragment, which suggests this is not the cause.

Individual 2014-01

Of this adult individual of indeterminate sex, multiple fragments of the cranial vault exhibited porotic hyperostosis (also known as *cribra cranii externa*) on the ectocranial surface. This porosity of the vault can also occur in the orbital roof, in which case it is called *cribra orbitalia*. Although the conditions are often attributed to iron deficiency

anemia, they can be caused by a variety of anemia-inducing conditions (summarized in Ortner 2003, 89; also discussed by Roberts & Manchester (2010230-231), Schultz (2001), and Waldron [2009, 137]) and can thus be regarded as a non-specific indicator of many different diseases, including those that are dietary, metabolic, and infectious (Ortner 2003, 102).

The remainder of skeletal fragments of individual 2014-01 showed no signs of infectious disease which can be related to the symptoms on the vault. Marginal osteophytes were present on the margin of an unsided fragment of the glenoid fossa, the dens of the atlas and some fragments of vertebral articular facets. Most commonly this is related to the degeneration of the joints (Waldron 2009, 24-45).

3.3.7 Non-pathological bone alterations (trauma- and scavenging marks)

trauma

Multiple bones originating from secondary deposits exhibited cut- , hack-, impact- and scavenging marks (table 3.13). Only one of the primary deposits (2011-02) exhibited cut marks on a bone, but it is suspected that these were inflicted during excavation (see below). A number of research projects on both archaeological and modern (experimental) material has provided insight into the reaction of bone to the infliction of damage (Appleby *et al.* 2015; Geber 2015; Humphrey & Tucker *et al.* 2001; Hutchinson 2001; Ingelmark 1939; Lewis 2008; Lockau *et al.* 2013; Maples 1986; Novak 2000; Novak & Kollmann 2000; Quatrehomme & Iscan 1997; Ubelaker & Adams 1995). Bone from a living, or recently deceased, individual contains more collagen and water than bone from a fully decomposed corpse and is more elastic, and less brittle as a result (Maples 1986). This difference in elasticity will result in a different reaction of the bone to trauma or damage, which can be observed macroscopically (Lockau *et al.* 2013). It should be kept in mind that bone will retain its elasticity for some time, and lesions characterized as perimortem might be inflicted several weeks, or even months, after death (*Ibid.*). Lockau and colleagues (2013) set up criteria for the distinction between perimortem and postmortem sharp force trauma in an assemblage of bones resulting from the battle at Stoney Creek (USA) in 1812. Although the criteria were set up for that assemblage specifically, they are also useful for other archaeological contexts. They have thus been used to assess the material from Oegstgeest (table 3.14). Their first criteria involves 1: the intactness of cortical bone around the lesion(s) and 2: whether a color difference is observable. Damage inflicted during, or after, excavation will be different in

Table 3.13: Overview of bones with cut-, impact-, and gnawing/scavenging marks, indicated as C, I and G respectively. Side indicated as: L=left R=right M=midline

Ind./Fnr.	Element	Side	Mark	N	Location	Remarks
275	Femur	L	G	1	Posterior	
554	Tibia	L	C+G	5	Lat. (C), prox./dist. ends (G)	
2011-03/652	Femur	R	I	1	Posterior	Sharp point entry
2011-03/653	Patella	L	C (?)	2	Anterior	Timing indeterminate
2011-03/653	Tibia	L	C (?)	1	Head, anterior	excavation damage
2011-03/653	Femur	L	C (?)	1	Head, anterior	excavation damage
2011-03/654	Frontal	M	C	2	Right post. Border	2 parallel marks
2011-02/519	Tibia	L	C (?)	2	Diaphysis anterior	Prob. excavation damage
3126	Humerus	L	G	1	Diaphysis	
4164	Humerus	L	G	1	Prox. Diaphysis	
5181	Femur	R	C	1	Head, posterior	Excavation damage
5323	Tibia	L	C	1	Distal Diaphysis Anteromedial	1,5 mm deep
5567	Humerus	R	C (?)	1	Diaphysis anterior	Possible excavation damage
2011-03/653	Tibia	R	C+G	1	Epiphysis Lateral (C), tibial plateau (G)	Cut is excavation damage

Table 3.14: Differentiation between perimortem and postmortem lesions according to the criteria of Lockau et al. 2013 (see main text).

Fnr.	Element	Intact cortex	Color difference	Sharp edges	Plastic deformation	V-shaped profile	Peri/post mortem
519	Tibia	Yes	Yes	Yes	Yes	Yes	indeterminate
554	Tibia	Yes	No	Yes	Yes	Yes	Perimortem
652	Femur	Yes	No	Yes	Yes	Not available	Perimortem
653	Patella	No	No	Yes	Unobservable	N	Indeterminate
653	Tibia Left	No	No	Yes	No	Yes	Indeterminate
653	Femur	Yes	No	No	No	Yes	Postmortem
653	Tibia Right	Yes	Yes	No	No	Yes	Postmortem
654	Frontal	Yes	No	Yes	Yes	Yes	Perimortem
5181	Femur	Yes	Yes	Yes	No	Yes	Indeterminate
5323	Tibia	Yes	No	Yes	No	Yes	Perimortem
5567	Humerus	Yes	Yes	N	No	Yes	postmortem

color because they are not stained from the substances in the soil. When the first criteria are met (i.e. the cortex is intact and no significant color difference is present), the following three criteria which are assessed focus on the shape of the lesion and plastic deformity. A minimum of two of the three criteria have to be met for the lesion to be assessed as perimortem. Although in some cases this scheme made distinction more easy, multiple bones exhibited cut- and/or chop marks of which the time of infliction was indeterminate. Particularly difficult was the assessment of bone that was damaged in areas with a thin cortex, such as on and near the epiphyses. Color

differences are often not clearly observable on trabecular bone and plastic deformation is absent. Future research involving microscopic analysis of these indeterminate lesions might provide more insight. It is clear from this assemblage that careful excavation with delicate (non-metal) tools, preferably by specialists, is essential for accurate assessment of violent trauma in archaeological populations.

Sharp force trauma

Four bones exhibited sharp force trauma that was assessed as perimortem, all from secondary deposits. A fifth specimen, from a primary deposit (2011-02, Fnr. 519) exhibited two cut marks that were different in color from the intact cortex but did meet all the additional characteristics from Lockau *et al.* (2013), including plastic deformation. These five specimens are assessed (table 3.15) according to a scheme set up by Lewis (2008), who performed an experimental study aimed to distinguish sword from knife marks. The scheme is useful in assessing and describing sharp force trauma. However, it was found in this study that while it is intended to distinguish between trauma induced by knifes and swords, it rather distinguishes between hacking- and slicing trauma, without being able to identify the object which was used to make the lesion. This is further illustrated by comparing the criteria set up by Wenham (1989) for identification of severe hacking blows with the criteria of Lewis, which are rather similar. Wenham's criteria for severe hacking lesions (see also figure 3.6) include:

1. One side (obtuse-angled side) of the lesion shows a smooth, flat surface cut by the blade (unless the blade enters at a direct 90-degree angle). The other side (acute-angled side) terminates in fractured bone.
2. On the acute-angled side, the outer surface of the bone is detached from the underlying bone as thin flakes/chips.
3. Lesions frequently show large fragments of bone broken away from beneath the blade as they pass through the skeletal elements.

The criteria stated by Wenham (1989) and Lewis (2008) distinguishing hacking lesions (e.g. unilateral flaking, detached bone fragments, ellipsoid shape etc.) are present on four elements from Oegstgeest (table 3.15). Lesions on a fifth element exhibited characteristics that are indicative for a slicing force (e.g. linear shape, no large bone fragments detached etc.). Each element and its lesions will be shortly discussed in the following paragraphs.

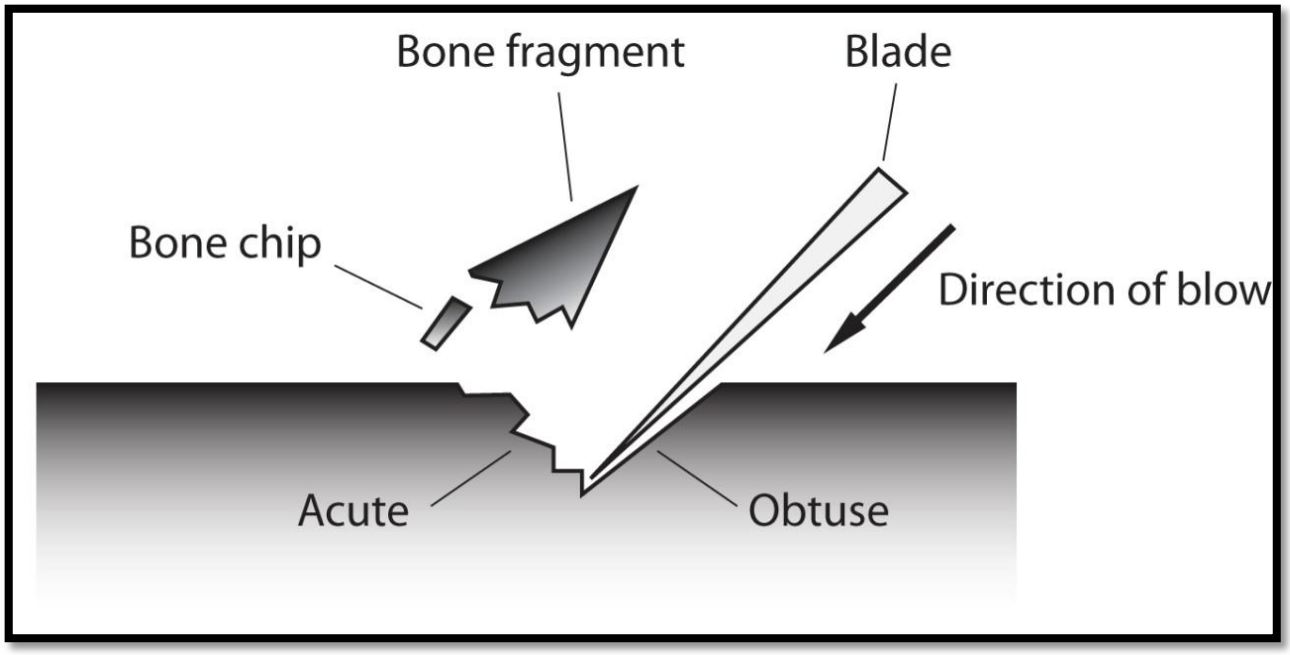


Figure 3.6 (above): Schematic profile of a hacking lesion (figure produced by author based on Wenham 1989).

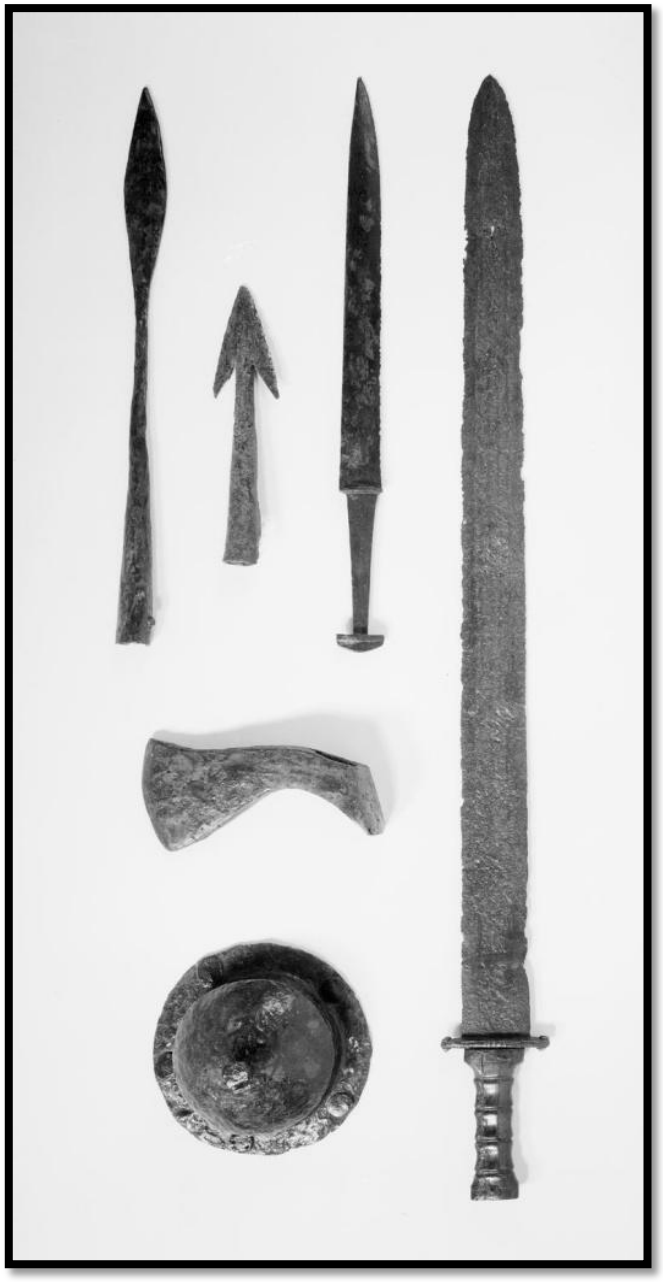


Figure 3.7 (left): Merovingian weaponry from graves in the Netherlands. Top row: lance tip, harpoon tip, short sword (*sax*), long sword (*spatha*). Middle: battle axe (*fransisca*). Bottom: shield boss (*umbo* [Image from: Rijksmuseum van Oudheden, Leiden]).

Table 3.15: Assessment of perimortem traumatic lesions according to the criteria of Lewis 2008 (see main text).

Fnr.	1 (length mm)	2* (shape)	3** (flaking)	4 (feathering)	5*** (cracking)	6 (breakage)	7 (Shards)	8 (aspect)
519	2;4	A;A	UF/UF	No (all)	No (all)	No (all)	No (all)	Glancing; perpen-dicual
554	13;8;6;4;5	A;A;A;I; A	UF;UF;U F;UF;UF	No (all)	Y;N;N;N;N	No (all)	No (all)	Perpen-dicular (all)
652	5	G	UF	No	No	No	Yes	Glancing
654	12; 26+	I	UF	No	No	No	No	Perpen-dicular
5323	10	A	UF	No	No	No	Yes	Perpen-dicular

** A=ellipse I=line G=square **UF=unilateral flaking *** Y=yes N=no*

Femur 2011-03 (Fnr. 652)

On the posterior side of this (very robust) femur an impact mark is present medially of the *linea aspera* (figure 3.8). The mark is rectangular, measuring ca. 5 by 4 mm. The inferior wall is smooth and triangular in shape, with vertical striations marking the direction of impact. The other three walls are irregular from the bone that has been broken off. The sharp point has entered the bone relatively deep, probably through the cortex into the trabecular bone. The implement entered the bone at a superoanterior direction on an angle of ca. 30-40 degrees. Thus, if the individual was standing up, the lesion was inflicted from a lower point. The implement that caused the lesion had a sharp point and was strong enough to slice through soft tissue and deep into the thick cortex of the femur. Based on the material culture used in this period (see for instance Hines *et al*. 1999), the implement was likely an iron weapon with a wide-angled sharp point. A long sword (*spatha*) or a lance are the most likely candidates (figure 3.7).

Tibia Fnr. 554

This left tibia, of which only the diaphysis was preserved, exhibited five hacking marks of which four were located on the lateral border and one on the posterior side, slightly above the nutrient foramen (figure 3.9). The blows that inflicted the lesions were all directed to the anteroinferior side and are orientated slightly diagonally. If the fibula and tibia were still in articulation, the blows were of such force that they cut straight through the fibula and into the thick cortex of the tibia.

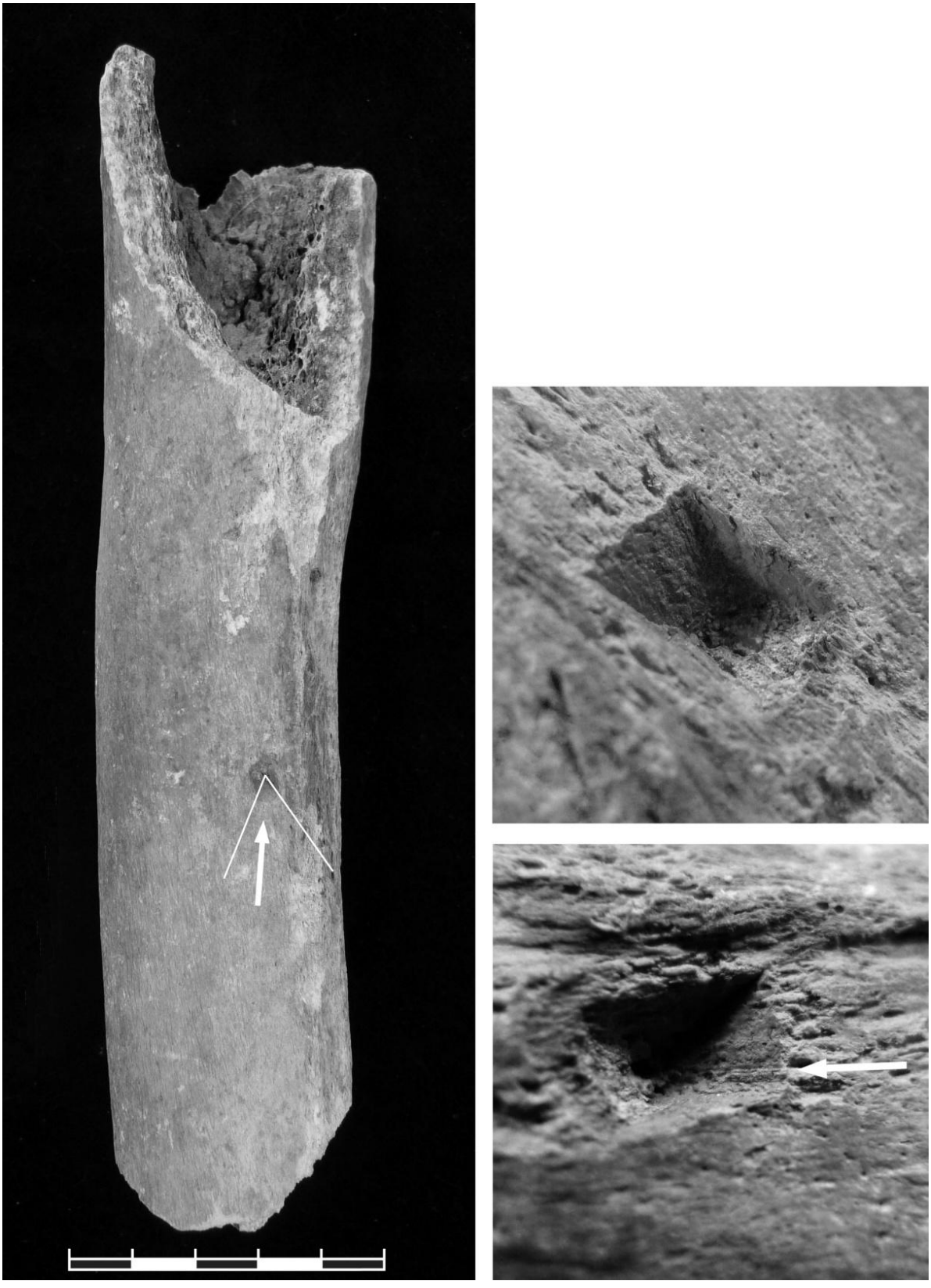


Figure 3.8. Left image: Diaphysis fragment from context 2011-03 seen from the posteromedial side. An impact mark is present left of the *linea aspera.* Scale bar is 5 cm. The inferior wall is smooth and the rim slightly beveled (top right image), while the other walls consist of irregular, broken bone. Its shape is triangular (white lines left image). Striations on the wall mark the direction of impact (Humphrey & Hutchinson 2000, 231), indicated by the white arrows (images by author).

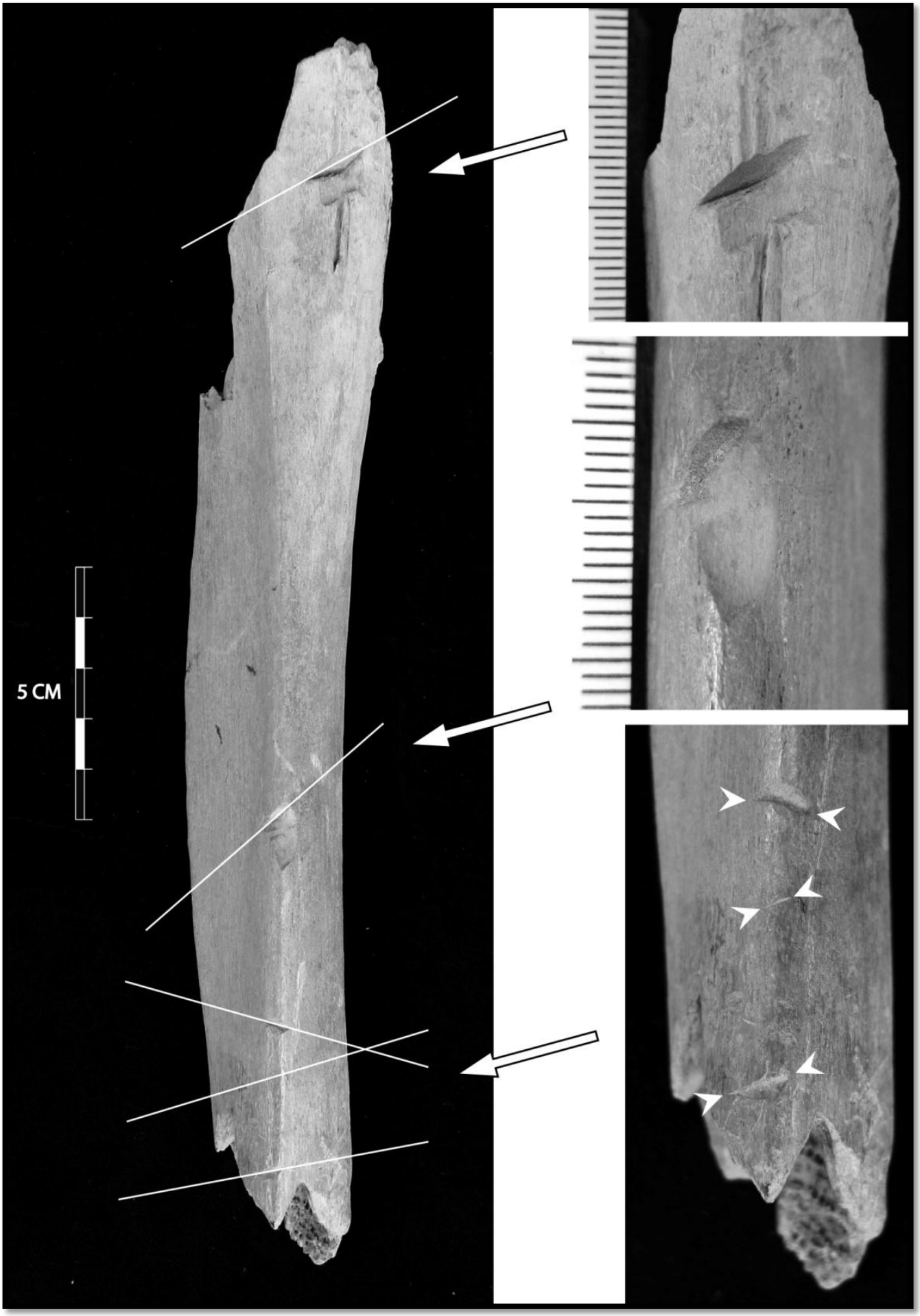


Figure 3.9. Tibia Fnr. 554. Left image shows the posterolateral side with white lines marking the direction of the chop marks. The right images show details of the chop marks with on the bottom image added arrows to highlight the individual marks. The determinations of the individual marks in table 3.14 are from superior to inferior. Note the rounded kerf floor on the top right image (images by author).

The marks are prototype examples of those described by Wenham ([1989] and figure 3.6) and are identical in appearance to hacking lesions observed in skeletons of individuals that died during the battle of Wisby, Sweden, in 1361 (figure 3.10). The kerf floor (the bottom of the cut, which is also known as a 'kerf') of some of the marks is slightly rounded on the vertical plane. The force that was used, the straight cut, and the rounded floors make it likely that a hacking weapon was used with a sharp rounded edge. The most likely weapon that inflicted the lesions, based on the angle of the kerf floor, is a battle axe (*fransisca*), but a long sword (*spatha*) or short sword (*sax*) are also possible candidates.

Tibia Fnr. 5323

This specimen exhibited a single hacking mark on the distal part of the diaphysis, on the anterior side. The lesion has a distinct 'V' shape with straight walls when seen in profile (figure 3.11). The kerf is orientated slightly diagonally on the diaphysis and the obtuse side (in this case the wall on the inferior side, the left wall on figure 3.11) is at a 50-60 degree angle compared to the bone. This indicates that the lesion was inflicted from a higher point if the individual was standing upright. Small fragments of cortical bone entered the lesion during impact, of which some are still attached. Although the cortex is thin at the location of impact, the blade did not penetrate deep (ca. 1.5 mm), suggesting that the force of the hack was probably moderate. The kerf floor is straight without a rounded angle such as observed on tibia Fnr. 554.

Frontal 2011-03 (Fnr. 654)

This cranial fragment was the only specimen which exhibited perimortem slicing trauma. Two parallel cut marks are located on the right posterolateral border of the frontal bone (figure 3.12), of which one is 12 mm and the other more than 26 mm in length (the bone was broken parallel to the long cut mark). The short mark is less deep than the long mark, which was inflicted with more pressure on the slicing implement. Both marks have a straight (obtuse) wall and a flaked (acute) wall, and the angle of the cut is almost perpendicular to the bone. It is not possible to identify the implement used to inflict the lesions, because any sharp-edged object of a hard material (e.g. knife, sword, axe, arrow, lance etc.) can be utilized to make relatively superficial cuts when used in a slicing motion.

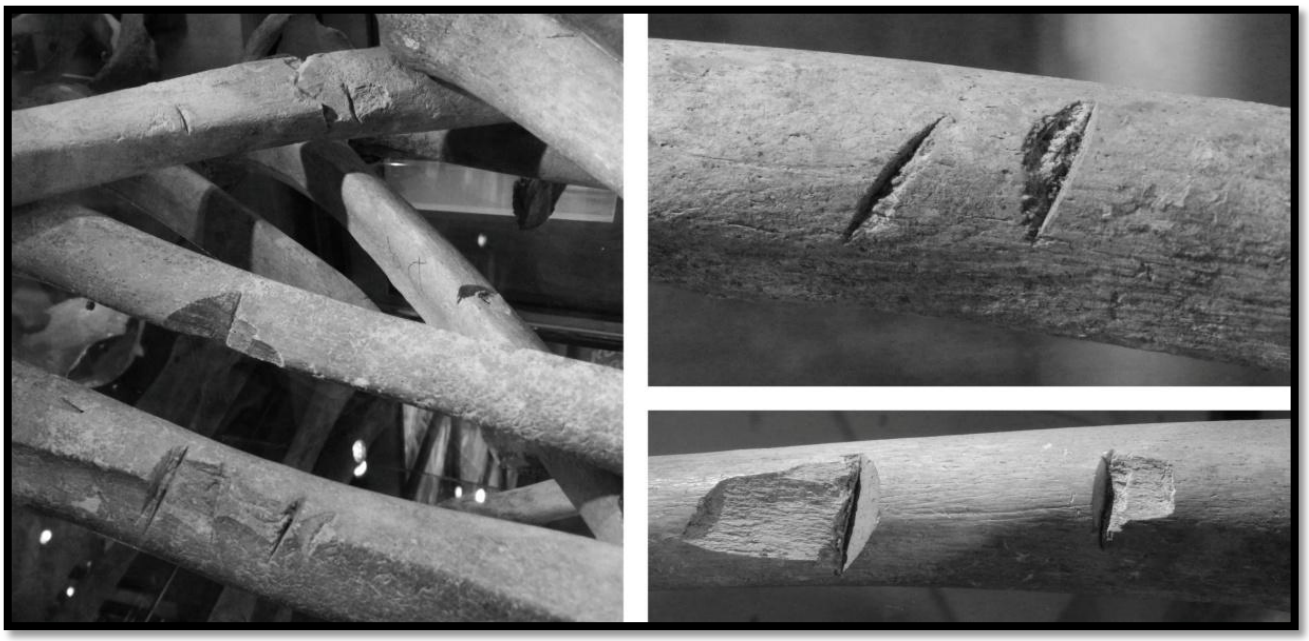


Figure 3.10: Multiple femora and tibiae with hacking marks inflicted during the battle of Wisby, Sweden, in 1361. The lesions are identical in appearance to those from tibia Fnr. 554 (figure 3.10 [Photos taken by author at the Swedish History Museum, Stockholm. See also: Ingelmark 1939]).

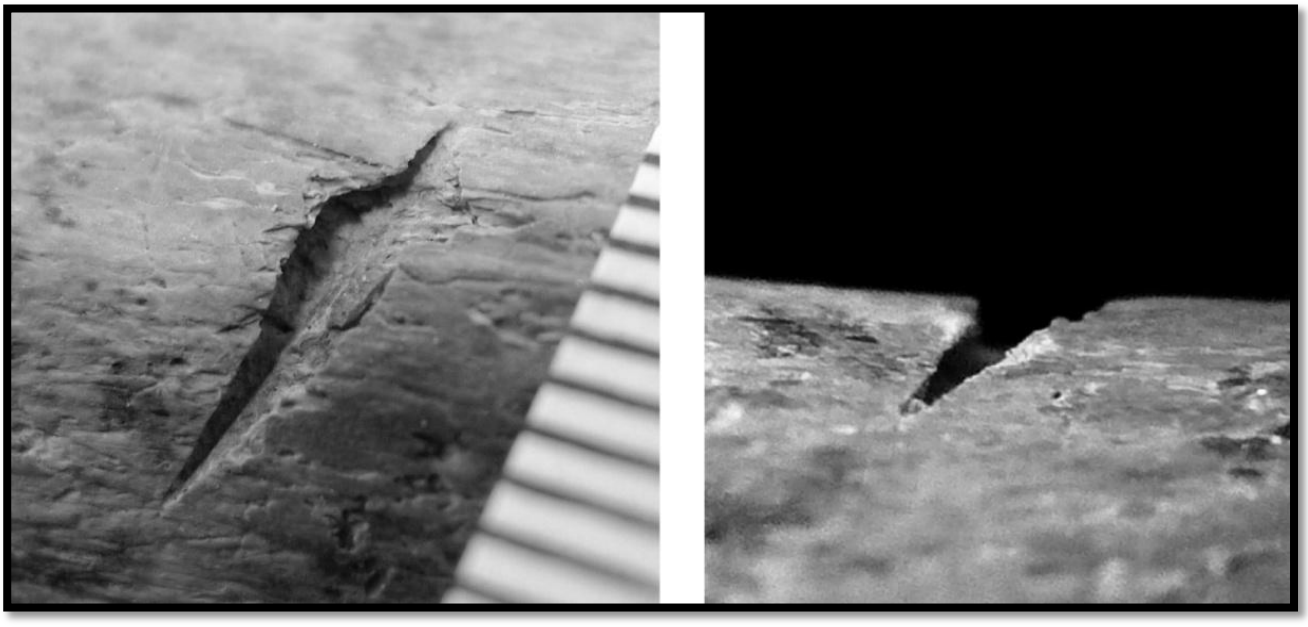


Figure 3.11: Hacking trauma on tibia Fnr. 5323 seen from the lateroanterior side (left image) and in profile from the lateral side. Note the sharp V-shaped profile with straight edges (images by author).

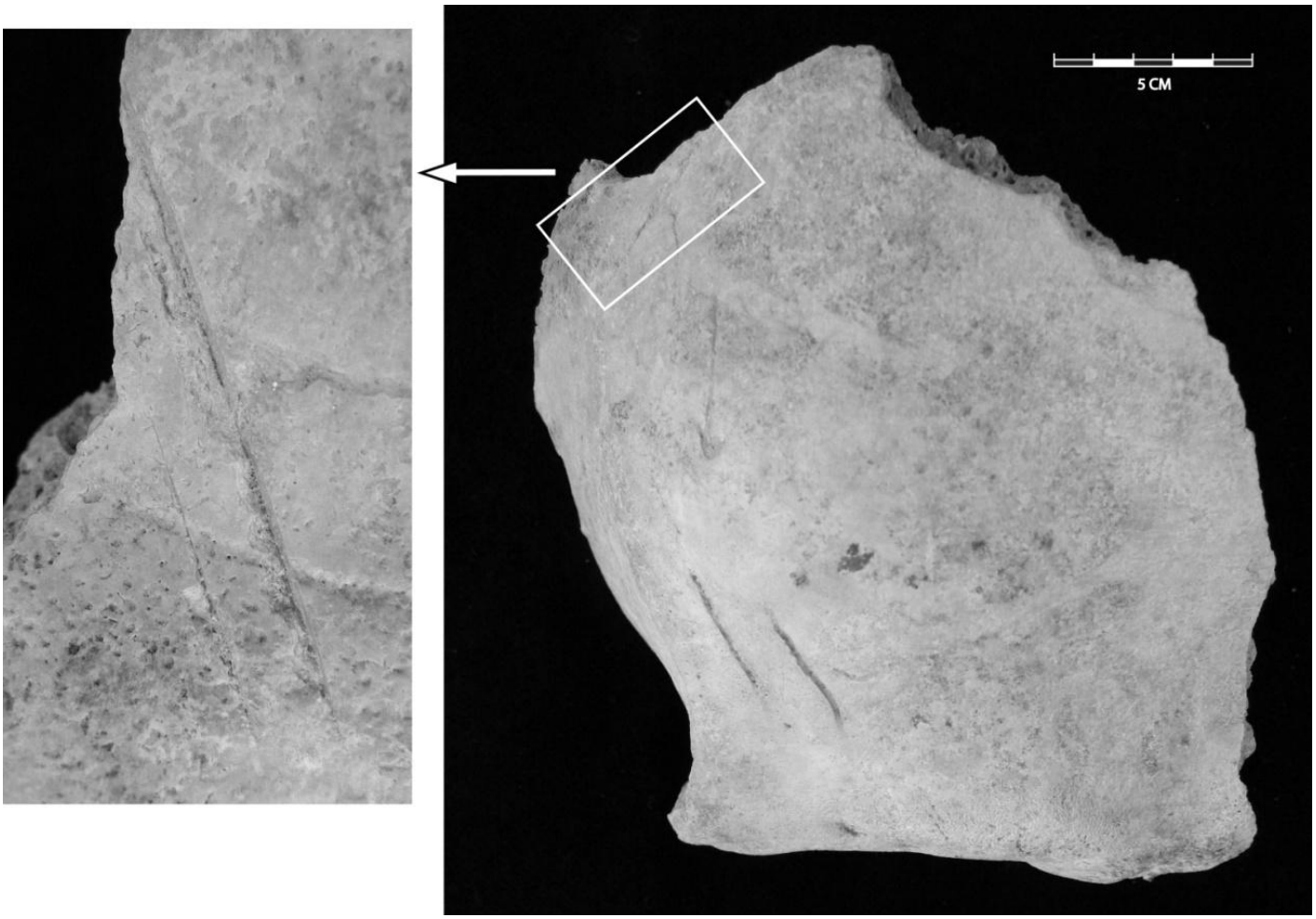


Figure 3.12. Right side of frontal from context 2011-02, Fnr. 654 seen from the superior side. At the posterolateral side two diagonally orientated cut marks are present parallel to each other. Left image is a detail photo taken from the posterolateral side. The two parallel grooves above the orbit are vascular impressions (images by author).

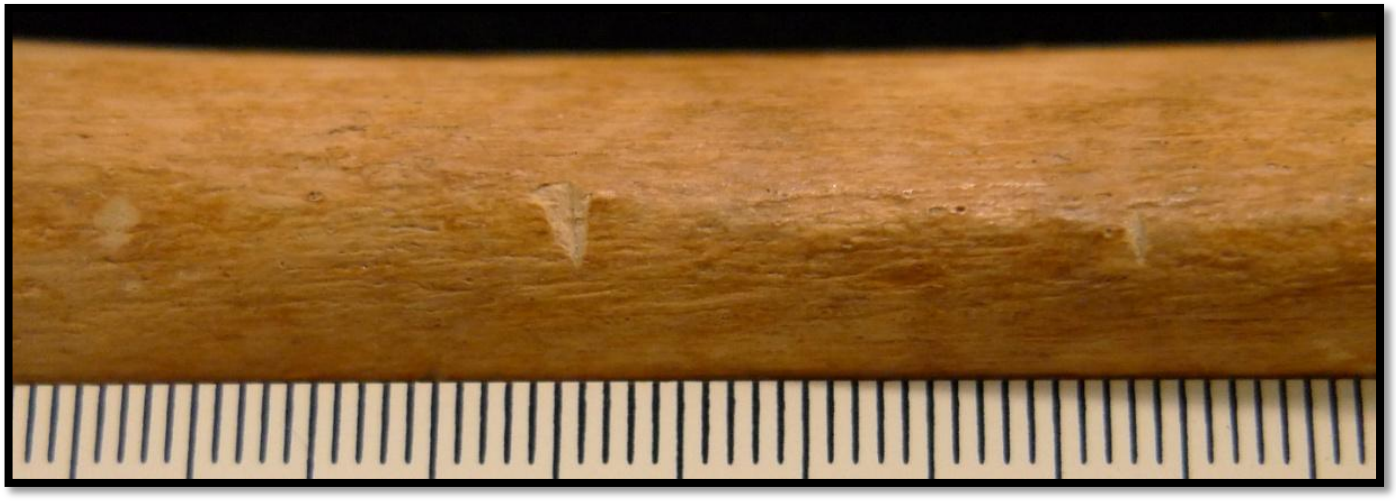


Figure 3.13: Two (pseudo?) cut Marks on the anterior tibia diaphysis of individual 2011-02. The marks are lighter in color indicating that they were probably inflicted during the excavation in 2011 (image by author).

Tibia 2011-02

On the anterior side of the diaphysis, two hacking marks are present which are lighter in color than the surrounding cortex (figure 3.13). It is therefore suspected that they were inflicted during the excavation. However, when seen in profile, the lesions do exhibit characteristics of perimortem injuries, such as plastic deformation. In addition, the lesions both show one straight wall and one irregular, flaked wall (although the flaking is not identical in appearance as those in other hack marks). The obtuse wall of the largest lesion has an impact angle of 30-40 degrees, indicating that if the person was standing, the lesion would have been inflicted from a higher point, which is similar to the other tibiae with traumatic injuries. For the smaller lesion it was not possible to assess the angle of impact. The conflicting characteristics seen in these lesions makes it impossible at this moment to establish the timing of infliction as peri- or postmortem. It is possible that future macroscopic research might be able to do so.

Scavenging marks

Scavenging and/or gnawing marks are inflicted peri- or postmortem, and the timing of infliction is limited to the period in which soft tissue is still present on the corpse.[46] While carnivore marks are often regarded as taphonomic alterations, it is theoretically possible that they have to be regarded as trauma when the timing of infliction is uncertain. For instance, dogs may have been used in combat situations to attack enemies, or carnivores might have begun scavenging before the individual was fully dead (e.g. when left wounded on the battlefield). In these cases the lesions would have to be placed in the same category as other trauma which are not primarily pathological, such as sharp- or blunt force trauma and fractures. Because of the uncertainty of timing of the scavenging marks (if they indeed have to be interpreted as such), and a possible relation with the lesions made by humans (discussed in chapter 5), it was considered to be more appropriate if they were discussed in this section, instead of in the taphonomic section in chapter 2.

[46] With the exception of scavenging marks made by rodents; these animals may also utilize 'dry bone' (see main text).

Types of marks

Most frequently scavenging marks on bones are made by carnivores such as wolves, dogs, or foxes. The appearance of carnivore tooth marks on bone can be categorized into four types (Haglund 1997, 373-374):

1. Punctures: produced when thin cortical bone collapses under pressure of a tooth and often appear as perforations in areas such as the scapular blade or the epiphyses of long bones.
2. Pits: indentations produced by the tip of teeth as the animal bites down, but do not fully puncture the bone surface.
3. Scoring: produced when teeth slip and drag over areas with thick cortical bone. Most often seen as transverse orientated, parallel scratches on the surface of long bone diaphyses.
4. Furrows: channels on the bone produced by cusps of teeth. The channels extend from the end of long bones longitudinally into the marrow cavity.

Besides carnivores, pigs, rodents and birds may also utilize bones and their adhering tissue for nutritional purposes. As the dentition and feeding strategies differ for each of these animals, the marks they leave on bones also have different appearances:

1. Pigs strip or scrape soft tissue from bones with their procumbent incisors or the molars. By doing this, they leave scoring marks in a similar way as carnivores. However, due to the difference in teeth morphology, the scoring marks of pigs exhibit a broader floor than those of carnivores, which are more 'V' shaped (Berryman 2002, 508-509)
2. Rodents alter bones by shaving the surface with their chisel incisors (to obtain calcium). Although the marks can be patterned, they are usually easily distinguishable from human induced alterations (White & Folkens 2005).
3. Large scavenging birds can leave traces on bones by puncturing thin areas of cortical bone with their talons (Armstrong & Avery 2014; Bochenski *et al.* 2013; Sanchis Serra *et al.* 2014;). Additionally, they can leave scores and crenulated edges similar to carnivores, but the marks are of a smaller size and occur less frequently (Armstrong & Avery 2014).

Scavenging marks in the Oegstgeest assemblage

In the Oegstgeest assemblage, four long bones from secondary deposits displayed traces of scavenging and gnawing (Table 3.13, figures 3.14-3.16). Whether their location of deposition was reached because of movement by an animal agent is unknown, but possible. Three elements were retrieved from a wet context (ditch/gully) and one from a pit. The scavenged bones were all from the appendicular skeleton (two humeri, a femur and a tibia). Among the cranial elements that were retrieved from secondary deposits, no parts were found with traces of scavenging. This is a pattern frequently observed, because the appendages are more easily detached and transported by animals than bulkier parts like the thorax or cranium (Haglund 1997). The elements displayed all typical characteristics of carnivore scavenging described above. It was evident that in particular the epiphyses were favored by the animals as they are chewed away and heavily crenulated, pitted and furrowed (figure 3.15). In addition to the relatively large marks made by carnivores, many smaller scratches were observed. In some instances, the large marks superimposed the smaller scratches, implying multiple phases of scavenging. It is possible that the smaller marks were made by a different animal, such as a rodent or bird. Future research which includes microscopic examination might provide further insight into the timing and the animal that is responsible for the scavenging marks.

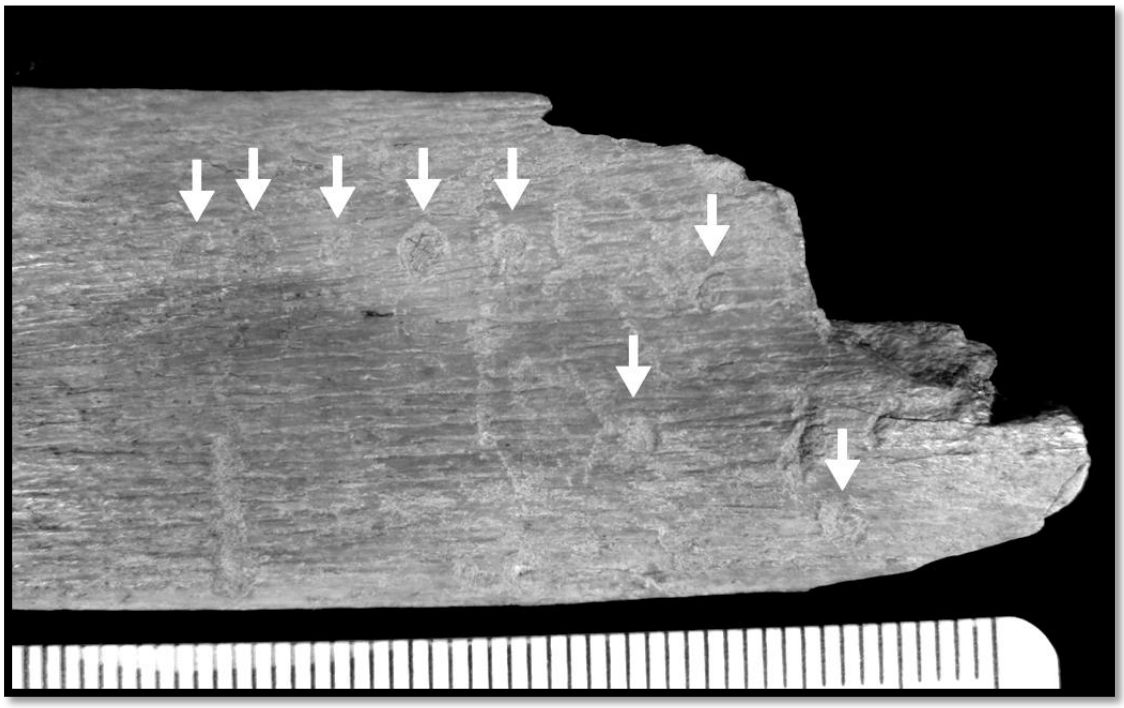


Figure 3.14. Distal posterior end of the tibia diaphysis fragment Fnr. 554. Scoring is observable in combination with pits (arrows) made by a scavenging mammal such as a dog. The distal end (at the right side of the photo) has a polished appearance (image by author).

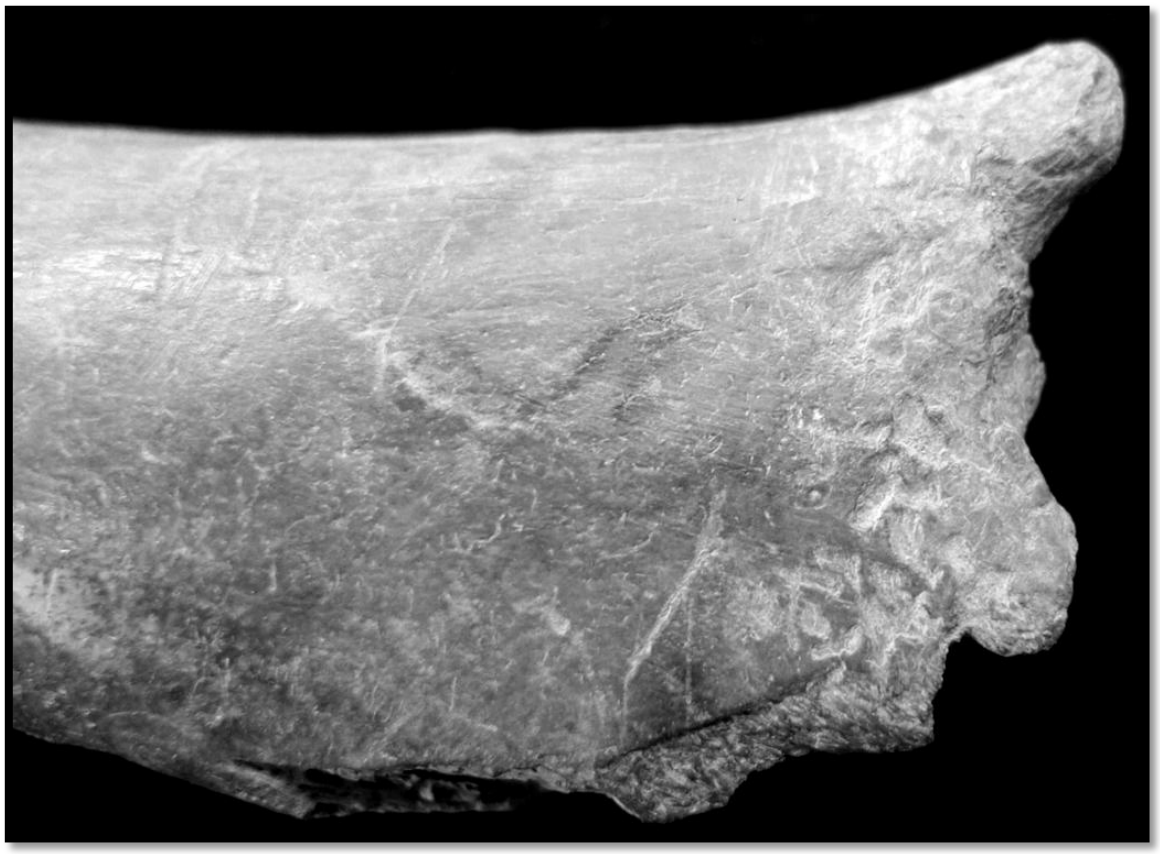


Figure 3.15. Distal posterior end of humerus diaphysis Fnr. 4164. Carnivore gnawing has left parallel scratches on the shaft and a frayed and punctured end where the epiphysis has been chewed away (image by author).

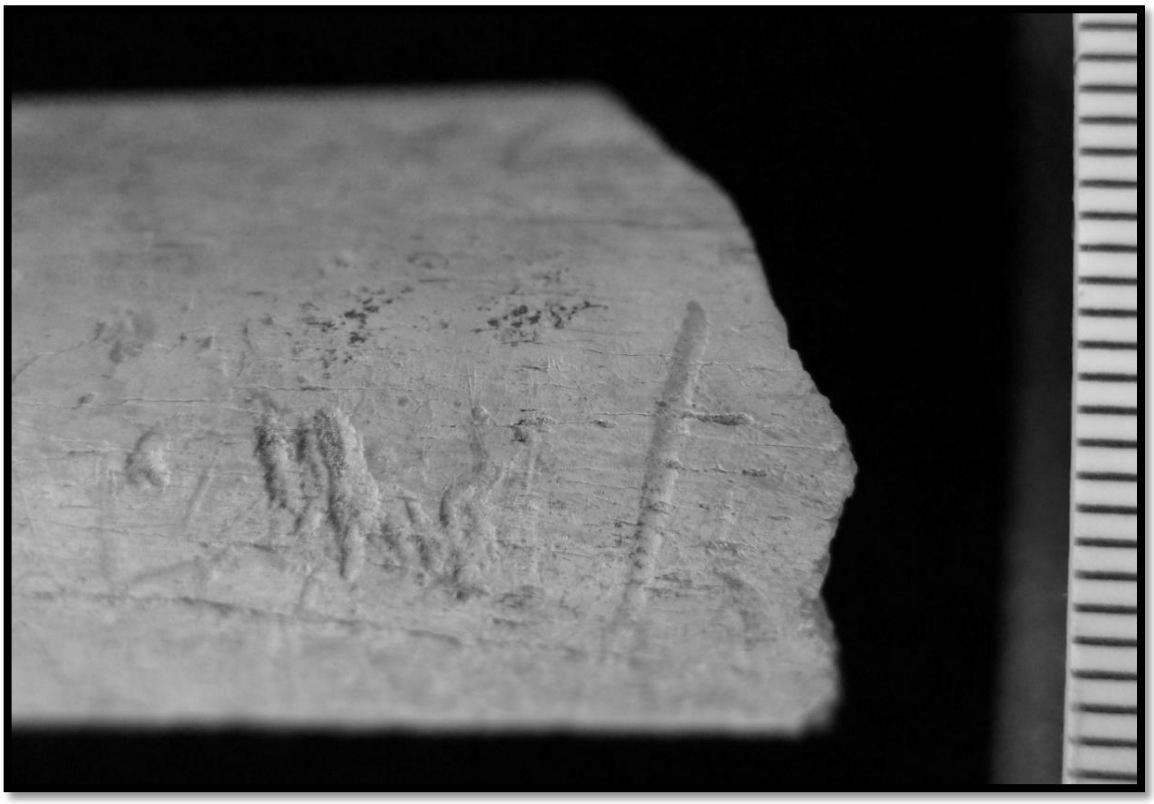


Figure 3.16: Scoring on a femur diaphysis (Fnr. 275). The shape of the scores is typical for carnivore gnawing and is made by the canines (image by author).

3.4 Oegstgeest compared to similar sites

In the introduction of this chapter five research questions were presented of which the first four were answered in the results section above. One question remains to be answered: How do the human osteological data from Oegstgeest relate to similar archaeological sites? Although plenty of early medieval burial grounds have been excavated, few have been subjected to a thorough physical anthropological investigation. This is partially due to the poor preservation of bone material from many of these sites, where the complete disappearance of the bones is a regular occurrence. Fortunately, some excavations have yielded assemblages which were preserved well enough to be subjected to analysis, of which two were selected as a comparison to the assemblage from Oegstgeest. The first is the Frisian cemetery of Oosterbeintum, containing 21 cremations in urns and 47 inhumation graves, dating from ca. 400-750 AD (Taayke *et al.* 1996, 103). As both Oegstgeest and Oosterbeintum were located in the Frisian area, it may be expected that they share certain phenomena in the skeletal assemblage. This is certainly the case for the observed material culture and contextual data, such as grave orientation and design. The skeletal remains from Oosterbeintum were analyzed by dr. Menno Hoogland and reported in Taayke *et al*. (1996), and Knol *et al*. (1996). The second assemblage is from the Sint Servaas-church and the Boschstraat cemetery in the city of Maastricht, in the south of the Netherlands. The Boschstraat yielded 54 inhumations from the late seventh and early eight century AD, while the St. Servaas excavation produced a total of 184 inhumation from three phases, of which the second phase (the '*templum*-phase', 480-700 AD), containing 78 individuals is most relevant for comparison (Panhuysen 2005). Maastricht served as a regional centre for the religious and administrative purposes in the northern part of the Frankish empire and was already Christianized at the end of the Roman era (Panhuysen 2005, 26-32). Different cultural, ethnic and religious influences have resulted in markedly different burial customs and material culture compared to the Frisian west. Whether this is also reflected in the skeletal assemblage will now be discussed. The skeletal remains from Maastricht have been analyzed by dr. Raphaël Panhuysen and the results are presented in his PhD-dissertation (Panhuysen 2005).

Table 3.16: Demographic data for sites used in comparison for Oegstgeest. Data derived from Taayke et al. (1996) and Panhuysen (2005).

Site	Number of individuals	Sex ratio adults Female/Indet/Male, %	Mean age-at-death adult males (years)	Mean age-at-death adult females (years)	Stature males (cm)**	Stature females (cm)**
Oegstgeest	13*	22/0/78* (n=9)	31.8 (n=8)	32.0 (n=2)	176.3 ± 3.5 (n=4)	166.3 ± 3.9 (n=1)
Oosterbeintum	47*	50/0/50*	38.0***	38.0***	174.0	158.0
St. Servaas *Templum*	78	44/0/56	38.6	38.8	176.0 ± 4.3	165.7 ± 4.4
Boschstraat	54	75/6/19	39.0	41.0	170.5 ± 4.2	160.5 ± 7.5

** Cremations are excluded due to the incomplete demographical data ** Based on: Trotter 1970 *** No differentiation between males and females*

The basic demographic data from the three assemblages are summarized in table 3.16. When observing these numbers, some obvious differences stand out. However, when discussing these differences, it should be kept in mind that the sample from Oegstgeest is small, making the sample prone to shift by outliers. Care should thus be taken not to over-interpret the results.

The sex ratio of the Oegstgeest sample has a far greater percentage of male individuals than Oosterbeintum or Maastricht. At the Boschstraat, the opposite situation is present. When the methods for sex assessment are considered to be reliable, differences in sex distributions might originate from two other options. Either the living population that is reflected in the buried sample is balanced towards a specific sex (e.g. a monastic single-sex community), or differences exist in the location for burial, based on the sex of the deceased individual (Panhuysen 2005, 215-216). For Oegstgeest, it is suspected that the latter is the case. When only the contexts that are considered to be formal burials (which are only four adult individuals) are taken into account, an equal ratio of males and females exist. The majority of remains of male individuals were found in secondary deposits and (probable) informal graves. Differentiation of burial location according to sex, and possible status and/or kinship, is furthermore indicated when the location of the only two adult females is considered (see also chapter 2). Although the excavation revealed an area of more than 100.000 square meters, the women were found less than 20 meters apart, where they were accompanied by the only three formal dog burials of the settlement. While large areas of the periphery of the settlement were investigated, a demarcated formal burial ground was never discovered and it is suspected that either

burial also took place at a different cemetery or settlement site, or an alternative method of deposition was practiced, leaving few archaeological traces (see chapter 5).

The mean age-at-death (AAD) of the adult individuals from Oegstgeest was lower than those from both Maastricht and Oosterbeintum, with a difference of ca. six to nine years. This is probably also a reflection of the selectiveness in burial location, which makes the Oegstgeest assemblage not a representative sample of the living population. A formal cemetery site, in which a more diverse and representative part of the population is interred, is expected to result in a different AAD, as is the case for Oosterbeintum (Taayke *et al.* 1996, 88) and Maastricht (Panhuysen 2005, 213-292).

The stature of the Oegstgeest individuals does not deviate much from the samples in comparison, and the St. Servaas *Templum* site shows particularly similar results, within a one-centimeter range. Females from both the Boschstraat and Oosterbeintum were of lesser height, but as only one stature estimation from Oegstgeest was available, the actual difference might be less for the population as a whole.

When the pathological lesions are compared across the samples, the following image emerges. Regarding the dentitions of the skeletons: less than 25% of the individuals from Oosterbeintum suffered from dental caries, in comparison to 50% of Oegstgeest, 43% of St. Servaas and 50% of the Boschstraat. Because caries and abscesses are often related, the percentage of observed abscesses is also lower at Oosterbeintum than at the Oegstgeest, St. Servaas and Boschstraat: 7%, 33%, 29% and 38%, respectively. Because alveolar bone loss and calculus deposition are scored differently for the populations presented here, a comparison for these conditions was not possible. It is evident that when caries and abscesses are considered, Oegstgeest is more similar to Maastricht than to Oosterbeintum. Differences in the composition of food, the use of querns, or the method and extent of tooth cleaning might be responsible for this. As these variables are mostly influenced by cultural practices, it is remarkable that the two populations from the same cultural group (Oegstgeest and Oosterbeintum) do not correspond in this category. However, if the sample from Oegstgeest would be more complete (including older individuals), the observed differences might be smaller.

Of the skeletal pathological changes, joint degeneration resulting in osteoarthritis, particularly in the spinal column, is the condition that was most often found in all samples. The occurrence of osteoarthritis in the thumbs of Oegstgeest individual 2012-02 is unique across the compared samples which strengthens the theory that it was

induced by a specific activity which was not practiced widely. A close investigation of the material culture at the different sites might provide clues about this activity, but it is unlikely that it will provide a definitive answer. An unique pathological case in Oosterbeintum was an achondroplastic dwarf with a stature of ca. 1.24-1.28 meters. The individual reached a mature age (25-35 years) and x-ray analysis revealed well-developed bone surfaces, indicating normal muscle activity and bodily exercise (Taayke *et al*. 1996, 56). Although no grave goods accompanied the dwarf, the individual was interred in a normal position in the communal burial ground. Thus, from an archaeological perspective, no evidence for a social stigma surrounding dwarfism could be observed.

At the sites of the Boschstraat and Oosterbeintum, no traumatic changes to the skeletons were observed that could be related to the use of weapons. Two individuals from St. Servaas Templum exhibited trauma originating from sharp bladed objects, of which one was antemortem (remodeling of bone was present) and one was perimortem, with damage to the skull, atlas, axis and hand (Panhuysen 2005, 183-186). It is noteworthy that from all phases of the St. Servaas (*basilica, templum* and *cella* phases), nine individuals (all adult males) exhibited sharp blade trauma, of which eight were on the skull and one on the tibia. Six of the injuries were remodeled, indicating that the violent confrontations were often survived (Panhuysen 2005, 184). With only two cases (2.6%) from the templum-phase the number of sharp blade injuries can be considered low in comparison to Oegstgeest, which yielded four definitive and four possible cases. In the four definitive cases, a minimum number of two individuals was represented, 15.4% of the total population. Similar to the St. Servaas, all the cases from Oegstgeest which could be assessed for sex estimation were males.

3.5 Conclusion

The minimum number of individuals that were found at the excavations of the early medieval settlement Oegstgeest is low (n=13) and does not consist of a representative sample of the living population. There is a difference between the number of males and females which is mainly due to the composition of secondary deposits and informal burials. These consist almost exclusively of adult male individuals, and is regarded as the result of a specific selective process. Additionally, the types of bones that were used for the secondary deposits seems to have been selected by preference, as the deposits consist almost exclusively of long bones and skull fragments. A relatively large

percentage of the elements from secondary deposits exhibited perimortem hack or slice lesions, inflicted by sharp bladed instruments such as knives, swords, axes or lances. The perimortem timing of the lesions can originate from violent confrontations, but can also be induced by manipulation of the bones or dismemberment in the time period after death of the individual.

The mean age-at-death of the individuals of Oegstgeest was relatively low, which is possibly caused by the bias in the excavated assemblage. Compared to similar excavated samples, the stature estimations are normal or slightly higher. Few pathological conditions other than age-related joint degenerations were diagnosed in the skeletons from Oegstgeest (which is probably the result of the lack of old individuals in the assemblage). The dental health of the Oegstgeest individuals can be considered fair and was comparable to Maastricht, but differed from Oosterbeintum. When comparing the demographic data from Maastricht, Oosterbeintum and Oegstgeest, it must be concluded that although small differences are observable, no clear division between a Frisian and Frankish lifestyle is (macroscopically) observable in the skeletal remains. However, future investigation of larger samples, reconstruction of diet with isotope research, and/or pathogen isolation from DNA might reveal lifestyle differences which remain obscured at this moment.

4 Wanderers and Seafarers

Interregional mobility of the individuals from Oegstgeest, as revealed by isotope analysis

"There come thoughts now
Knocking my heart, of the high waves
clashing salt-crests, I am to cross again.
Mind-lust maddens, moves as I breathe
soul to set out, seek out the way
to a far folk-land flood-beyond."

(The Seafarer[47])

4.1 Introduction

The era during which the settlement of Oegstgeest was inhabited is often referred to as the 'migration-period' (e.g. Nieuwhof 2013), a term which implies the interregional movement of populations or parts thereof. Changes in the material culture of the early middle ages, along with evidence from other sources such as linguistics and historical records, have traditionally been used to trace the movement of 'ethnic' groups across northwestern Europe (Figure 4.1 [Boeles 1927; Dijkstra 2011, 358-359]). The data from these fields have contributed to a model of migration movements in the early medieval Frisian lands:

The northern *Terpen* area (situated in modern Friesland and Groningen) was widely occupied from the Iron age onwards, but became virtually deserted during the third and fourth centuries AD. During the fifth century there was an influx of people that re-occupied the abandoned lands. Their material culture resembled that of the Angles and Saxons, whose place of origin was in northwest Germany. There, the land level was sinking and the people either had to build new habitation mounds (*terpen)* or move to other places (James 1988, 64-65). These Angles and Saxons, or 'Anglo-Saxons' as they are most often collectively called, not only settled in Frisia, where the *terpen* were already in place, but also travelled further across the North Sea to settle in Britain (Nieuwhof 2013, 53-54).

[47] From: 'The seafarer', an old-English poem written down in the 10th century Exeter Book. Translated by Michael Alexander (2006, 76).

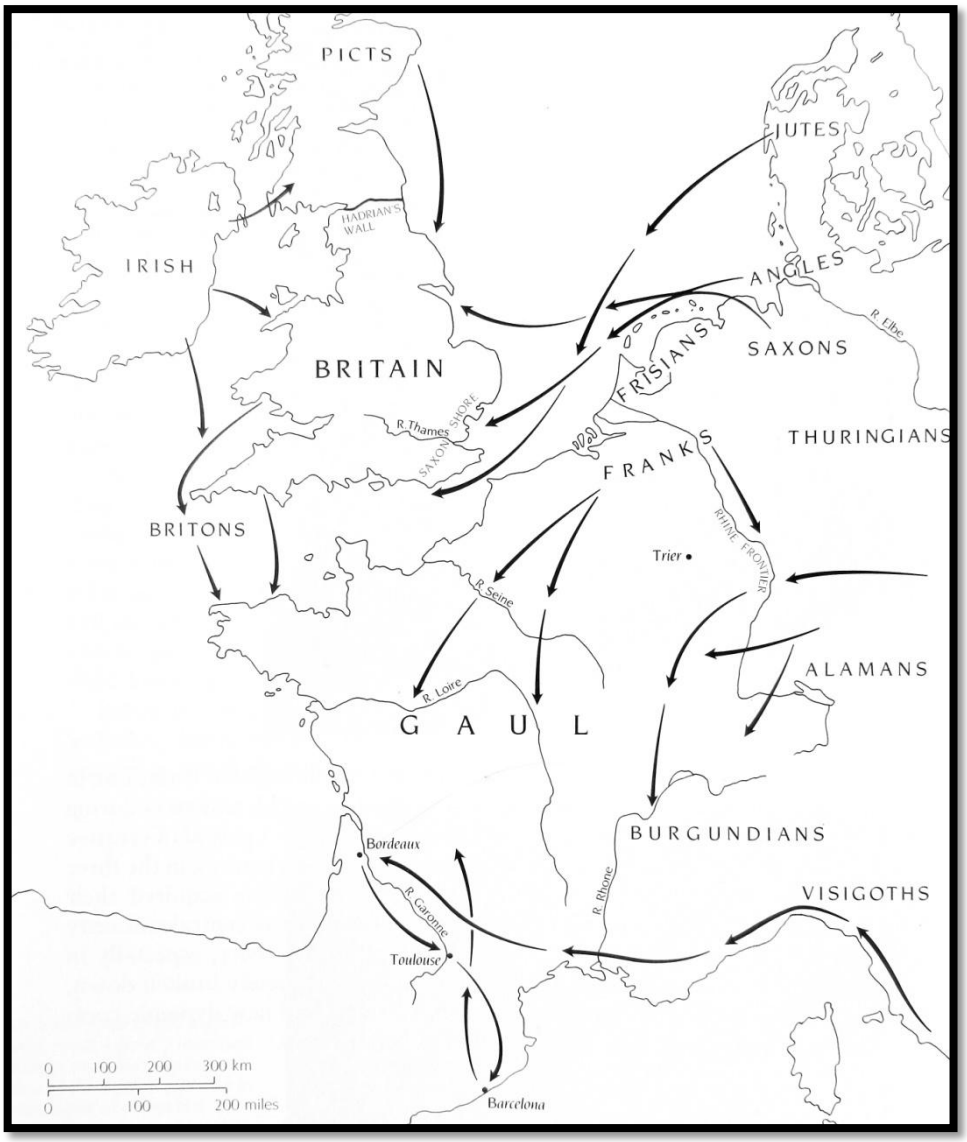


Figure 4.1: Simplified traditional depiction of migration movements in fifth century northwest Europe (Adapted from : James 1988, 62).

The western coastal area, and in particular the Old Rhine, served as the frontier region of the Roman empire. Roman military forts were located at regular intervals, accompanied by supporting villages (*vici*) and smaller farmsteads. Both the Rhine and Meuse estuaries were densely occupied in the Roman period, as well as the habitable lands in the adjacent areas. From the third century onwards, *i.a.* the decline of the Roman empire caused a gradual abandonment of the area to the point that, by the fourth and early fifth century, there are hardly any archaeological traces of human occupation. Not only are there few indications for the *presence* of occupation, there is also evidence for the *absence* of occupation. Pollen diagrams indicate that the forests that were largely depleted in the Roman era were able to regenerate in the late Roman and early Merovingian period. It is only in the course of the sixth century that excavated cemeteries in the coastal area reveal the coming of new people and the end of the

occupation hiatus (Dijkstra 2011, 70-96). Not surprising, this is also the moment when the settlement of Oegstgeest is established (Hemminga 2008, 106-107; J. de Bruin, pers. comm.). Based on evidence from archaeology and occurring toponyms, the reoccupation of the area seems to have taken place primarily via the Rhine and Meuse rivers. The material culture shows cultural influences from multiple directions, including Anglo-Saxon, Frisian and Frankish. The composition of the 'new Frisians' is therefore (currently) considered to be a mix of these geographical populations which developed into a distinct Frisian cultural group in the following centuries. The cultural segregation and political autonomy of the Frisians came to an end after AD 718, when the Franks were able to conquer the Frisian lands after the death of the Frisian king Redbad (Blok 1974, 42-43). The incorporation of Frisia into the Frankish kingdom also marked the uncertain beginnings of the Christianization of the area, although it would take the church more than a century to get a firm grip on the Pagan Frisians (Dijkstra 2011; Van der Tuuk 2013).

Although archaeologically encountered objects and linguistic investigation of words and place names might provide valuable clues about migration flows, basing ethnic or geographical affiliations on such sources has obvious limits and uncertainties. As Edward James (1988, 64) states:

"Archaeologists have tried to map the movement of ordinary people, by looking at the thousands of cemeteries which have survived from this period. But it is an uncertain task. Skeletons of immigrants cannot be distinguished from those among whom they settled, and the jewellery and other objects buried with the dead which might be categorized as 'Saxon' or 'Frankish' are as much a response to fashion or product availability as of evidence of the ethnic identity of the corpse. Archaeology confirms, however, that migration took place."

This was said in 1988, a few years before a rapid development occurred in the application of beta-sciences in modern archaeology, a development which changed the field of archaeology significantly. One of these 'borrowed' techniques was the analysis of stable isotopes, which could be extracted from body tissues. Using isotopes (in particular strontium and oxygen) to map geographical movement was first developed in the field of ecology, after which it was 'discovered' by archaeologists and applied in pioneering studies from the 1990's onwards (Bentley 2006, 135-136). Mapping human movement by direct measurements from their physical remains meant that long hold

theories about migration flows based on material culture, such as described above, could be tested for their validity, and if necessary, altered. A completely new source became available to trace the origins of human populations which were difficult to reconstruct before (which was the case for early medieval northwestern Europe). Unfortunately, systematic archaeological isotope research is not yet carried out on a large scale due to the relatively high cost of the method. It is often not included in the budget of commercial excavations, which account for the vast majority of archaeological research carried out in Europe. However, research projects carried out by universities and government parties employing isotope studies are increasing the dataset steadily.

For the research on the individuals from Oegstgeest, strontium and oxygen isotope[48] research is employed to answer three related questions:

1. What was the birthplace of the individuals and did they migrate after childhood?
2. Can the origin of the individual be related to the mode of deposition?
3. How do the results from the isotope study relate to previous theories concerning early medieval migration in the Netherlands?

The aim of this chapter is twofold: first to explore human mobility in the local context of the Oegstgeest settlement and to put it in the perspective of contextual material evidence, and second, to contribute to the discussion concerning this European-wide 'migration period' by adding to the growing corpus of isotope data.

4.2 Materials

From five individuals dental elements were extracted for the purpose of isotope research, from which the enamel was sampled. Although bone and dentine can also be used for this kind of research, their composition is less dense which makes them more susceptible to post-burial contamination. Pores and micro-cracks in bone and dentine can be filled with minerals from percolating groundwater, which contain minerals with a local isotopic signature. The newly deposited minerals can overwhelm the original signal of the bone, resulting in a false isotope signature. Dental enamel is significantly denser and possesses smaller pores, making it less susceptible to contamination from the burial environment (Bentley 2006, 163-169). Individuals with a varying range of deposition modes (primary inhumation, secondary deposition and (semi-) cremation) were selected

[48] Applying both methods in combination is more informative than using only one (see results and discussion section for further explanation).

to be able to answer the second research question. From individuals with permanent teeth a first molar was extracted without preference for upper or lower elements (Table 4.1). The crown of the first molar mineralizes within the first three years of life (Hillson 1996, 144-145) which means that its strontium and oxygen isotopic composition reflects the area of birth. From the infant individual 2011-01 a lower deciduous canine was used which forms between a few months before birth until the first year of life (*ibid.*).

Table 4.1: Overview of material and associated demographic data used for isotope study

Individual	Deposit type	Sex	Age individual	Element (FDI system)	Mineralisation (Hillson 1996, 144-145)
2011-01	Primary inhumation	Unobser-vable	4-5 years	7.3	5 months *in utero* – 1 year
2011-03	Secondary deposit	Male	Early young adult	2.6	0 – 3 years
2012-01	Primary inhumation	Female	Early young adult	1.6	0 – 3 years
2012-02	Primary inhumation	Female	Middle adult	4.6	0 – 3 years
2013-01	(Semi-) cremation	Male	Early young adult	3.6	0 – 3 years

For individuals 2011-03 and 2013-01 strontium and oxygen isotope research is carried out for this study specifically, and the results are published here for the first time[49]. Strontium isotope[50] and DNA research of individuals 2012-01 and 2012-02 was done for a project of the province of Zuid-Holland, which also included the investigation of a Bronze Age mass grave (Kootker *et al.* 2014)[51]. DNA, and strontium and oxygen isotope research for individual 2011-01 was commissioned by Leiden University and was published in 2013 (De bruin 2013).[52]

4.3 Methods

The preparation and analysis of the strontium and oxygen isotope samples was done by Lisette Kootker at the Institute for Geo- and Bioarchaeology, VU University Amsterdam. This section is thus, in part, based on the reported methodology in these research reports: Kootker (2014), Kootker & Altena (2012), Kootker *et al*. (2014). An excellent overview of the mechanisms, techniques and difficulties of strontium isotope analysis in archaeology is provided by Bentley (2006), which forms the basis for much of the

[49] Funds provided by Leiden University
[50] Oxygen isotope research was not included in the research.
[51] Funds provided by the province of Zuid-Holland
[52] Funds provided by Leiden University.

background information in this section. For additional information about this subject the reader is referred to this article.

4.3.1 Strontium isotopes

Strontium isotopes occur in all geologic materials and is included in the food chain (through soils, water and plants) when geological material erodes. Humans that feed on local food sources (plants or animals that feed off the plants) will obtain that strontium signature in their bones, where it will replace calcium in the mineral composition. If the diet consists primarily of locally obtained nutrients, the strontium signature in the bones and teeth will be a reflection of the biologically available strontium at the place of residence from the period of tissue mineralization (Bentley 2006, 136).

Strontium has four naturally occurring isotopes (^{84}Sr, ^{86}Sr, ^{87}Sr, ^{88}Sr), of which ^{87}Sr is radiogenic and is formed over time by the β-decay of ^{87}Rb, a Rubidium isotope. This means that the amount of ^{87}Sr will increase over time, while the other (stable) strontium isotopes will remain at their original level. The $^{87}Sr/^{86}Sr$ ratio is thus a result of: 1) The $^{87}Sr/^{86}Sr$ at the time of formation; 2) The $^{87}Rb/^{86}Sr$ ratio; and 3) The time elapsed since formation (Bentley 2006, 137). The strontium ratios that can be found in the earth's continental crust vary between 0.702 and 0.750. Older granites usually exhibit values above 0.710 and younger basalts have on average values around 0.703-0.704. Although the differences between the ratios might seem small, instrumental errors of modern mass spectrometry devices utilized to measure the ratios are in the range of 0.00001 or even better, and as a result even very minute differences can be measured with confidence (Bentley 2006, 140).

Although the ^{87}Rb isotopes will continue to decay into ^{87}Sr after erosion of the mineral from the original bedrock, and its subsequent obtainment in the hydrological cycle, the half-life of ^{87}Rb is of such a scale (i.e. 49 billion years), that this will not cause significant changes to the strontium ratio that was present in the original geological material. Thus, it can be assumed that the ratio found in tissue is directly related to ratio from the geological area where the nutrients were obtained, and that no significant alterations occurred between the geological strontium and the bio-available strontium (in nutrients).

To determine whether the ratios measured in tissue reflect a local or non-local signal, the range of the local signal has to be established first. Herbivores average the

biologically available strontium in their feeding area and their remains offer a good indicator of the local strontium range as a result. It is preferred to use small animals, such as rodents, as they have a limited life span and a restricted feeding area which makes it highly likely that they only reflect the local signal. Domestic pigs are also a suitable proxy for the local strontium range as their diets and amino acid requirements are quite similar to humans (Bentley 2006, 155-158). However, caution has to be taken when using pigs, because it is possible that they were a commodity which was traded and/or originated from other sources (which was found to be the case in Oegstgeest, see below).

River systems carry a mix of sediments suspended in flowing water. The sediments will be transported over a variable distance, depending on the size of the particles and the speed of the water flow (Berendsen 2008, 265). For instance, larger and/or heavier particles will be deposited first when the speed of the water flow decreases. So, selection occurs in the sediments that are being deposited along the course of the river's track, depending on its variable flow, and the strontium ratios that are linked to these sediments are also quite distinct to specific areas as a result. Upland crystalline areas of the Rhine area for instance, are marked by strontium ratios higher than 0.715, while marine-sedimentary lowlands (such as the area around Oegstgeest) are marked by ratios between 0.708 and 0.710 (Bentley 2006, 146).

4.3.2 Specific methods used to analyze Oegstgeest strontium samples

(as reported in: Kootker 2014; Kootker & Altena 2012; Kootker et al. 2014)

The samples derived from the skeletons were treated with weak acetic acid (0.1 M HAc) and subsequently with Milli-Q water to remove possible contamination of secondary carbonates. Preferably one to three milligrams of enamel powder were removed with a diamond drill to use for the analysis. The samples were analyzed on a MAT 262 Thermal Ionization Mass Spectrometer (TIMS) from Finnigan. The samples of individuals 2012-01 and 2012-02 were also analyzed on a TRITON-Plus TIMS to confirm the initial results. The preferred error margin at two standard deviations is 0.000005 to 0.000010 (Kootker & Altena 2012, 3; Kootker *et al*. 2014, 5; Kootker 2014, 2). Initially the local strontium signature was established by the analysis of the teeth from a number of cats (*Felis catus*), mice (*Muridae*), pigs (*Sus domesticus*) and a rat (*Rattus sp.*) from Oegstgeest and the nearby site of Valkenburg Marktveld, adding up to a total reference sample of 20. The $^{87}Sr/^{86}Sr$ values of these animals ranged from 0.7087 to 0.7094, and is the basis for

a suggested local range (Kootker & Altena 2012). This range was narrowed slightly when subsequent research aimed at establishing the strontium signatures for the entire Netherlands found, on the basis of the analysis of 49 rodents, that the coastal area of the Netherlands exhibited strontium signals between 0.7088 and 0.7093 (Kootker *et al*. in prep).

4.3.3 Oxygen isotopes

Stable oxygen isotopes occurring in the tissues of mammals are derived from ingested water, both from liquids and in food. Humans ingest most of their water from liquids, and only small a amount from food, meaning that the stable oxygen signature in human bone or tooth is directly linked to the composition of drinking water derived from the local environment[53] (Chenery *et al*. 2012, 309; Daux *et al*. 2008, 1138-1139). Drinking water in past (and most modern) populations is most often directly derived from local sources, which are supplied by water from precipitation. Depending on the geographical position of a given region, the stable oxygen isotope composition of the precipitation differs. The oxygen signature is measured as the ratio between the heavier ^{18}O and the lighter ^{16}O isotopes, and is expressed as $\delta^{18}O$, in ‰ (i.e. parts per thousand). In the oceans the stable oxygen isotope composition is uniform throughout the world (Dansgaard 1964, 4). When water evaporates from oceanic reservoirs, lighter isotopes (such as ^{16}O) evaporate more easily than heavier isotopes (such as ^{18}O). As a result, water vapor (i.e. a cloud) formed above the ocean will contain more ^{16}O than ^{18}O. When the cloud is transported to cooler atmospheres, condensation of the vapor will take place and will form precipitation. The heavier ^{18}O will condensate quicker than the lighter isotope and the remaining vapor in the atmosphere will contain relatively more ^{16}O as a result. This process can occur multiple times and every time the composition of the vapor will become relatively richer in ^{16}O, causing the $\delta^{18}O$ to become more negative (this process is called 'Rayleigh fractionation' [Kootker 2014, 2]). Besides this fractionation process, the temperature, altitude, and latitude of an area also influence the rate of discrimination between the stable oxygen isotopes in the precipitation and the resulting $\delta^{18}O$ values (Dansgaard 1964).

[53] Although liquids (i.a. wine) were imported to the Oegstgeest settlement, it can be assumed that this was not the staple liquid for consumption considering its cost and the fact that numerous water wells were also found at the site.

Research facilities across the globe have measured the isotopic composition of precipitation during the last decades, from which it was possible to establish mean $\delta^{18}O$ values for separate areas. A study by Darling and colleagues (2003) focusing on isotope data in Britain has shown that the mean $\delta^{18}O$ measured in precipitation differs from the mean $\delta^{18}O$ in the groundwater by a maximum of 0.5‰, which is probably due to mixing of new rain water and older soil water (Darling *et al*. 2003, 187-189). For the research area of this study, four measurement stations have provided mean $\delta^{18}O$ from modern precipitation (Table 4.2). The station at Groningen has collected samples for the longest period, and the mean $\delta^{18}O$ value represent the period from 1964 until 2009. The means from the other stations are based on a period of five to seven years. From these measurements the $\delta^{18}O$ values of precipitation in the western coastal area range between circa -6.7‰ and -7.6‰ , while that of drinking water can be expected to deviate from this value by a maximum of 0.5‰. Based on the data from research facilities across Europe, the Natural Environment Research Council of the British Geological Survey has composed a map displaying the oxygen isotope values of the different regions of northwestern Europe (figure 4.2). The values on the map are slightly generalized (values in the Netherlands range more than is displayed) but it provides a valuable overview of the $\delta^{18}O$ signatures that can be expected per area. At the moment it is assumed that, in comparison to modern day, the climate of the early middle ages did not differ to such an extent that significantly different oxygen values might be expected (Bentley & Knipper 2005, 631; Darling *et al* 2003, 191).

Table 4.2: Long-term means of modern $\delta^{18}O$ from four stations in the former early medieval Frisian territories. The first three are situated in the western coastal area, while Groningen is located in the northern part of Frisia. Data from the GNIP/IAEA database.[54]

Station	Coordinates	Mean $\delta^{18}O$
Wieringerwerf	52° 48' 00" N - 005° 03' 00" E	-6,804
Braakman (near Terneuzen)	51° 18' 00" N - 003° 45' 00" E	-6,667
De Kooy (Den Helder)	52° 55' 48" N - 004° 46' 48" E	-7,259
Groningen	53° 13' 48" N - 006° 33' 00" E	-7,569

4.3.3 Specific methods used to analyze Oegstgeest oxygen samples

(as reported in: Kootker 2014; Kootker & Altena 2014)

The enamel samples have been analyzed on a Thermo Finnigan Delta+ mass spectrometer. The accuracy and precision of the stable oxygen measurements were monitored by multiple analyses of two internal laboratory standards and Florida

[54] Accessed online (20-11-2015) at: http://www.univie.ac.at/

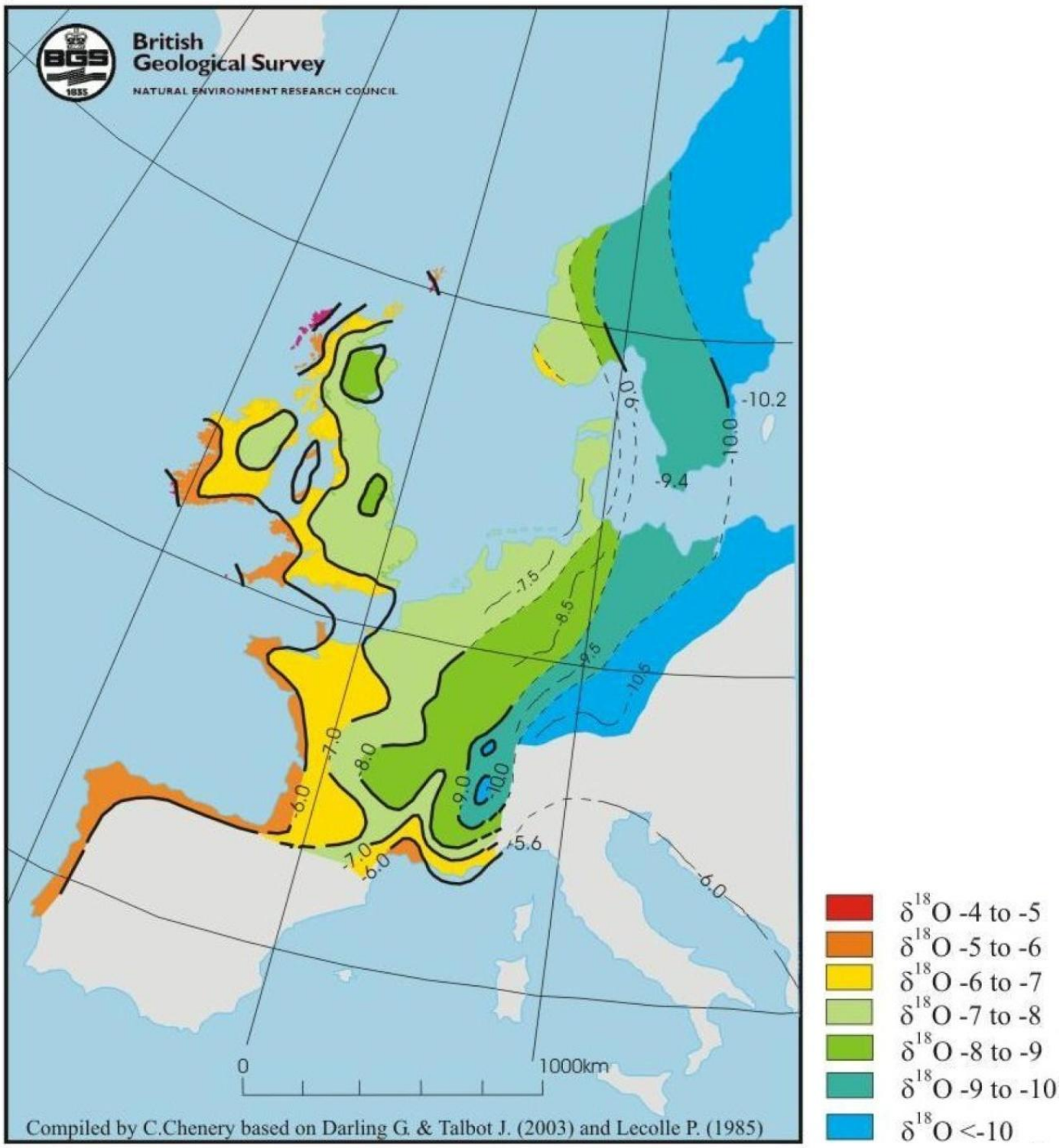


Figure 4.2. Map displaying $\delta^{18}O$ values of modern drinking water. (Adapted from: Montgomery et al. 2006 and copyright of British Geological Survey).

phosphorus rock (NBC 120C). The generated data are calibrated according to the Pee Dee Belemnite (PDB) international standard. To convert the $\delta^{18}O_{PDB}$ value into the $\delta^{18}O$ value of precipitation and drinking water (denoted as $\delta^{18}O_w$), which can be compared to the values from measurement stations or isoscape maps, the following equations have been applied[55] (from: Coplen 1988; Chenery *et al*. 2012; Daux *et al*. 2008):

$$\delta^{18}O_{SMOW} = 1.03091 \cdot \delta^{18}O_{PDB} + 90{,}31$$

$$\delta^{18}O_p = 1.0322 \cdot \delta^{18}O_{SMOW} - 9{,}6849$$

$$\delta^{18}O_w = 1{,}54 \cdot \delta^{18}O_p - 33{,}72$$

[p = phosphate, PDB = Pee Dee Belemnite,
SMOW = standard mean ocean water]

Although it might seem straightforward to convert the measured $\delta^{18}O$ value to the $\delta^{18}O$ of the consumed drinking water and compare these to an isoscape map, a study by Pollard *et al*. (2011) has shown that due to the use of multiple regression formulae, error margins between ± 1.0 and 3.5‰ might occur in the calculated drinking water values[56] (Pollard *et al*. 2011). Fortunately, the formulae used here (Daux *et al*. 2008) produce maximum error margins in the lower half of this range. To make the data from this isotope study useful and comparable for future research, not only the final calculations are presented, but also the initial measurements and the values produced by the separate equations (see table 4.3 below).

The teeth that were sampled for stable oxygen isotope analysis largely mineralized in the period during which the individuals were probably breast fed. Breast milk is enriched in ^{18}O in comparison to normal food due to fractionation in the mother's body. The enrichment of breast milk results in more positive $\delta^{18}O$ values in the infant, which can be up to 0.8‰ higher in the $\delta^{18}O$ PDB carbonate measurement (Wright & Schwarcz 1998). To account for this effect, the equations to convert the measurements to drinking water values were performed on both the raw measurements (without any correction) and on the measurements which were corrected by the highest deviation which can be

[55] Although a slightly different equation was used for individual 2011-01, a recalculation was done with the equations used for the other individuals to make the results more comparable. However, no differences in the outcome were present after recalculating.
[56] In the abstract of the original article error margins of 1 to 3.5 % (percent) are stated, which have to be ‰ (per mil), as is stated in the discussion section. A rather painful mistake in an article focusing on errors.

achieved by the breastfeeding effect (ca. 0.8‰). Because it is not certain how much the influence of the breastfeeding effect really was per individual (ranging between 0 and 0.8‰), the combination of the initial measurement and the corrected measurement provides a range in which the actual value falls. In particular the measurement of individual 2011-01 will be close to the maximum correction, as the deciduous tooth that was analyzed forms largely in the first months of life. The first permanent molars that were analyzed from the other individuals form between birth and three years of age and will probably have an intermediate amount of enrichment due to breastfeeding, depending on the moment at which the individual started to eat solid foodstuffs. The actual $\delta^{18}O_w$ value of these individuals will thus likely be in the middle of the range between the uncorrected and corrected values.

4.4 Results

4.4.1 Strontium isotopes

In the second column of table 4.3 the results of the strontium isotope analyses are displayed. The measured values range from 0.70801 to 0.70932, while those from the analyzed cat- and pig remains have a far wider range, between 0.70584 and 0.71512 (Kootker & Altena 2012, 6). As mentioned above, the established range of values that is to be expected in the western coastal area of the Netherlands is between 0.70880 and 0.70930. However, it must be noted that individuals that fall within this 'local' range might also originate from a different area with a similar strontium signature (see below). On the basis of the strontium results, individuals 2011-01 and 2012-01 are definitely not born in the coastal area, while individual 2012-02 has a value on the dividing line between the local and non-local range. Individuals 2011-03 and 2013-01 have strontium signatures that are compatible with the local range.

Table 4.3: Overview of data from strontium and oxygen isotope analyses[57]

Individual	$^{87}Sr/^{86}Sr$	$\delta^{18}O$ (‰ PDB carbonate)	$\delta^{18}O$ (‰ SMOW carbonate)	$\delta^{18}O$ (‰ Phosphate)	$\delta^{18}O$ (‰ SMOW drinking water)	$\delta^{18}O$ (‰ SMOW water corrected)*
2011-01	0.70801	-3.10	27.7	18.9	-4.6	-5.9
2011-03	0.70906	-5.36	25.4	16.5	-8.3	-9.6
2012-01	0.71040	-	-	-	-	-
2012-02	0.70932	-	-	-	-	-
2013-01	0.70899	-5.54	25.2	16.3	-8.6	-9.9

*correction with the maximal breastfeeding effect of -0.8‰ in the $\delta^{18}O$ PDB carbonate measurement

[57] Data published in: Kootker & Altena 2012; Kootker 2014; Kootker *et al*. 2014

4.4.2 Stable oxygen isotopes

The results from the stable oxygen isotopes are presented in column three to seven in table 4.3. The local range of oxygen isotope values measured from precipitation range in the Dutch coastal area is between -6.7 and -7.6‰, which should deviate by a maximum of 0.5‰ compared to drinking water from the same area. The $\delta^{18}O$ of all three individuals from Oegstgeest fall outside this local range. This is particularly surprising for individuals 2011-03 and 2013-01, which have a strontium range that is compatible with the local environment.

Two pigs of which the oxygen isotopes were analyzed showed $\delta^{18}O$ (‰ SMOW drinking water) values of -9.1‰ and -8.8‰ without any correction for possible breastfeeding (this might be very limited or non-existent in pigs). The values measured for the pigs are in a similar range to that of individuals 2011-03 and 2013-01.

4.5 Discussion

When considering the origin and mobility of people in northwestern Europe, it has been found, both in this study and others, that analysis of strontium isotopes alone is not sufficient to make definitive conclusions (see for instance: Brettel *et al*. 2012). Because many areas (in particular along the coasts) share a similar strontium signature, people of non-local origin might be easily classed as local. Even when an individual is classed as non-local on the basis of a deviating strontium signature, their exact region of birth is still difficult to assign as many areas will exhibit that signature. Combining strontium analysis with the analysis of oxygen isotopes might provide further insight into the place of origin. Although oxygen analysis was only applied to three humans and two pigs from the site of Oegstgeest, it proved to be extremely helpful in identifying the probable birthplace of these individuals. Not only was it possible to identify two humans with a 'local' strontium signature as migrants, it was also possible to identify different origin regions of the individuals. So, what can the results tell us about early medieval migration? At this point it is important to recall the research questions which initiated this isotope study:

1. *What was the birthplace of the individuals and did they migrate after childhood?*
2. *Can the origin of the individual be related to the mode of deposition?*
3. *How do the results from the isotope study relate to previous theories concerning early medieval migration in the Netherlands?*

In the following sections an attempt will be made to answer these question, and subsequently some recommendations will be provided for future research.

4.5.1 The origin of the Oegstgeest people (and pigs)

A total of five humans and ten pigs[58] have been analyzed for their strontium isotope composition, and, in addition, three humans and two pigs have been analyzed for stable oxygen isotopes. The strontium results revealed that two humans and five pigs exhibited strontium ratios that did not match the local signature. Furthermore, the oxygen results identified two humans with 'local' strontium signatures as migrants (fig. 4.3). So, four of the five analyzed humans were not born in the Oegstgeest region but arrived there later in life. While individual 2012-02 exhibited strontium values compatible with the local range, additional analysis of oxygen isotope values have to determine whether she was really born in the coastal region.

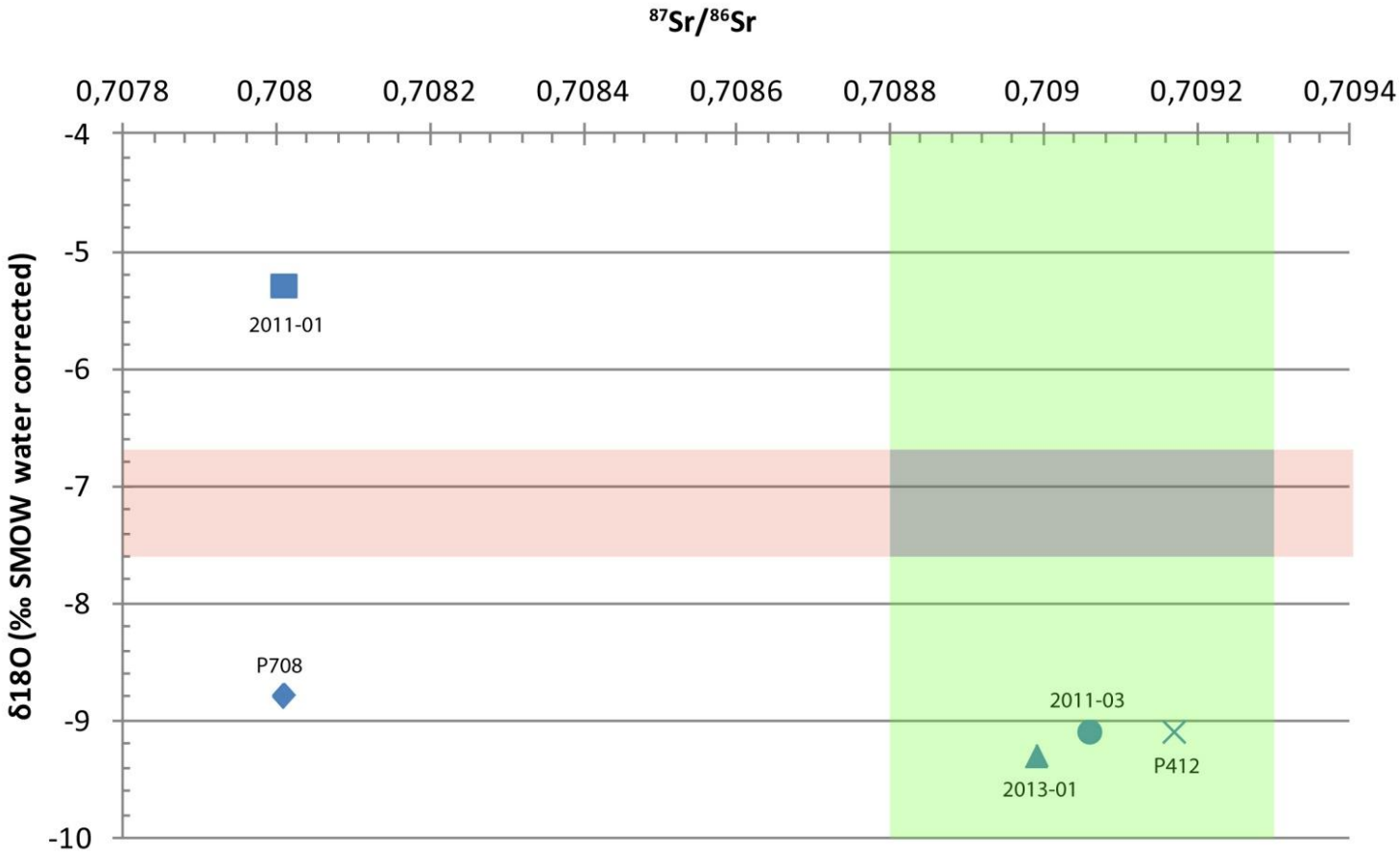


Figure 4.3: Individuals (P-numbers are pigs) which have been analyzed for both strontium and oxygen isotopes. Oxygen values of the humans displayed here are the average of the uncorrected and corrected values (see table 4.3). Green area is local strontium range, red is local oxygen range. (Figure by author).

[58] Research on the pigs published in: Van der Jagt *et al*. 2012

It is clear that at least a considerable part of the population in the Oegstgeest settlement consisted of migrants from other regions. It is interesting to try to identify the place of birth of the individuals to see whether they arrived from a single region (possibly as a group), or came from different areas. On the basis of the oxygen results it is possible to identify a minimum of two different regions of origin. The high (i.e. less negative) stable oxygen ratio of the young child 2011-01 is indicative of a more western region of northwestern Europe with a more direct influence from the sea (fig. 4.2). The more negative ratios of the two adult males 2011-03 and 2013-01 and the two pigs are indicative of an area located more inland, to the east.

To compare the strontium and oxygen results from Oegstgeest with contemporaneous sites in northwestern Europe, data from five other analyses have been collected from recent studies.[59] The combination of both strontium and stable oxygen isotope values have been plotted in a graph (fig. 4.4). This visualization of the data offer interesting insight into the separate populations. It is directly obvious that the two males and two pigs from Oegstgeest represent a distinct and separate population, one that likely originated from a single region. They most closely resemble the individuals from Hanover, although the more negative stable oxygen isotope values indicate an origin area that is probably located further from the coastline. Figure 4.5 shows a map of Europe on which the most likely area of provenance is indicated for the two male adults, based on the oxygen values. This shows that in southwestern Germany is a likely candidate as place of birth. This is also a region from which large amounts of products were imported to Oegstgeest, as witnessed *inter alia* by finds of pottery and whine barrels (Van Spelde 2012).

To compare the values from the two males and two pigs with values from the southwestern part of Germany, average strontium and stable oxygen isotope values from prehistoric pigs from the sub-regions of southwest Germany reported by Bentley and Knipper (2005) have been plotted in a graph in combination with the values from Oegstgeest (fig. 4.6). This shows that the values from Oegstgeest most closely resemble those from the Neckar valley. However, depending on the variable correction that is applied for breastfeeding effect, the values are also relatively close to those from the Main area, Swabian Alb and Rhine valley, of which the last shows the most similar strontium isotope signatures. It is probable that the individuals originate from the Rhine

[59] If the values from these studies were not calculated according to the formulae used for Oegstgeest (from Daux *et al*. 2008), they have been recalculated accordingly.

valley (on the basis of strontium isotope data) close to the area where it connects with the Neckar (based on stable oxygen isotope data). Considering the oxygen results, it is also possible that the individuals originated from central Germany, somewhere south of the line between Hannover and Berlin. However, this is considered to be less likely, as this area was not directly connected to the Rhine estuary by waterways, the primary means of transportation during the early medieval period.

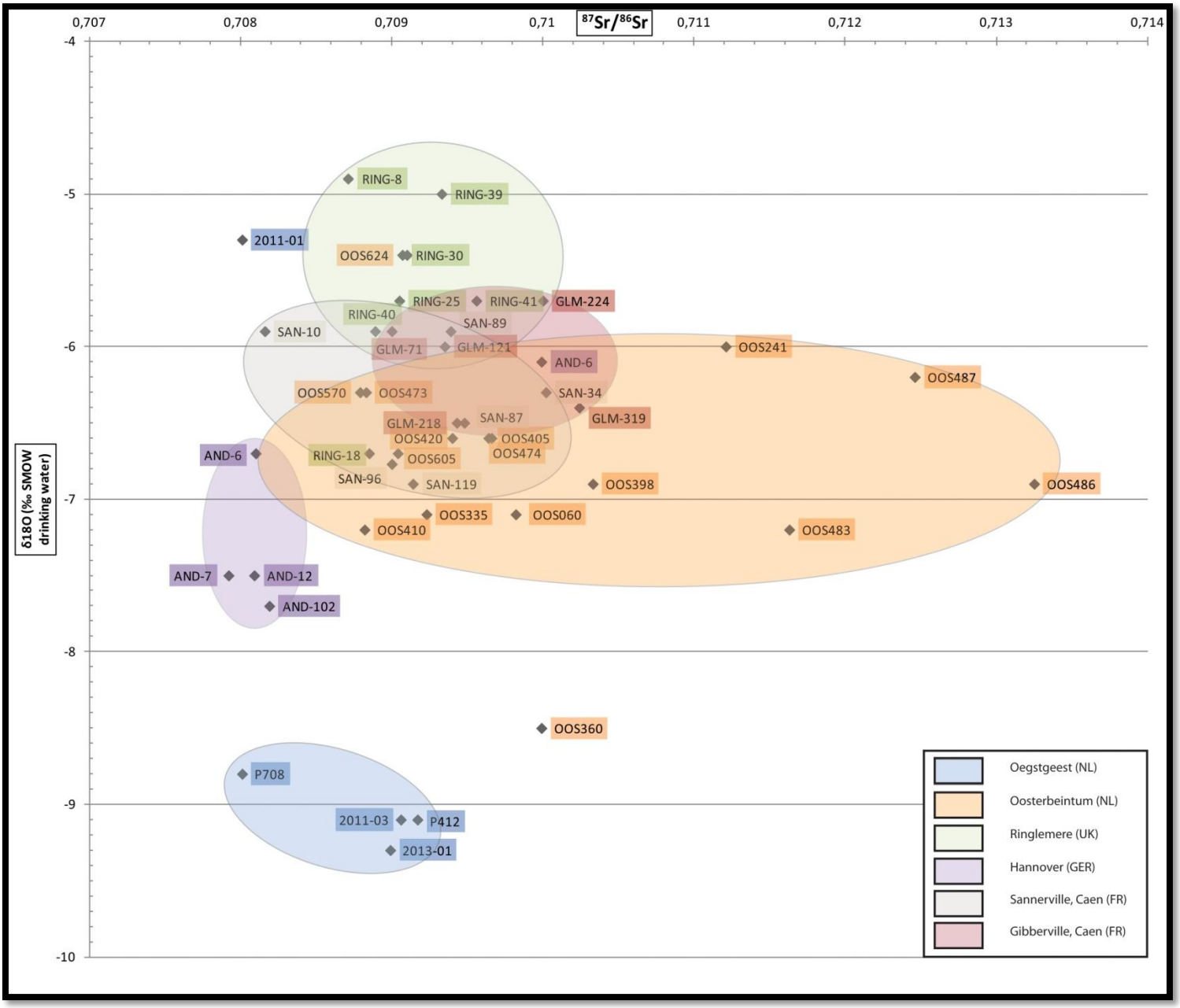


Figure 4.4. Strontium and oxygen results from Oegstgeest compared with contemporaneous sites in northwestern Europe. (Figure by author, data from Brettel *et al*. 2012; McManus *et al*. 2013; Kootker & Altena 2012; Kootker 2014)

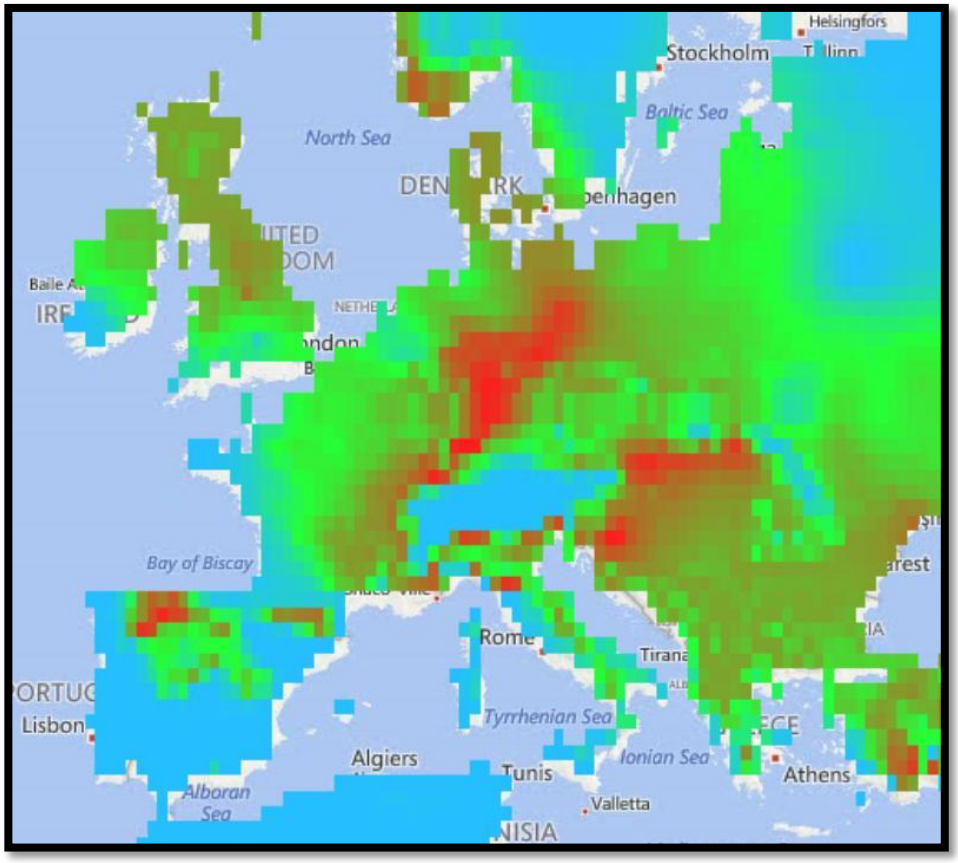
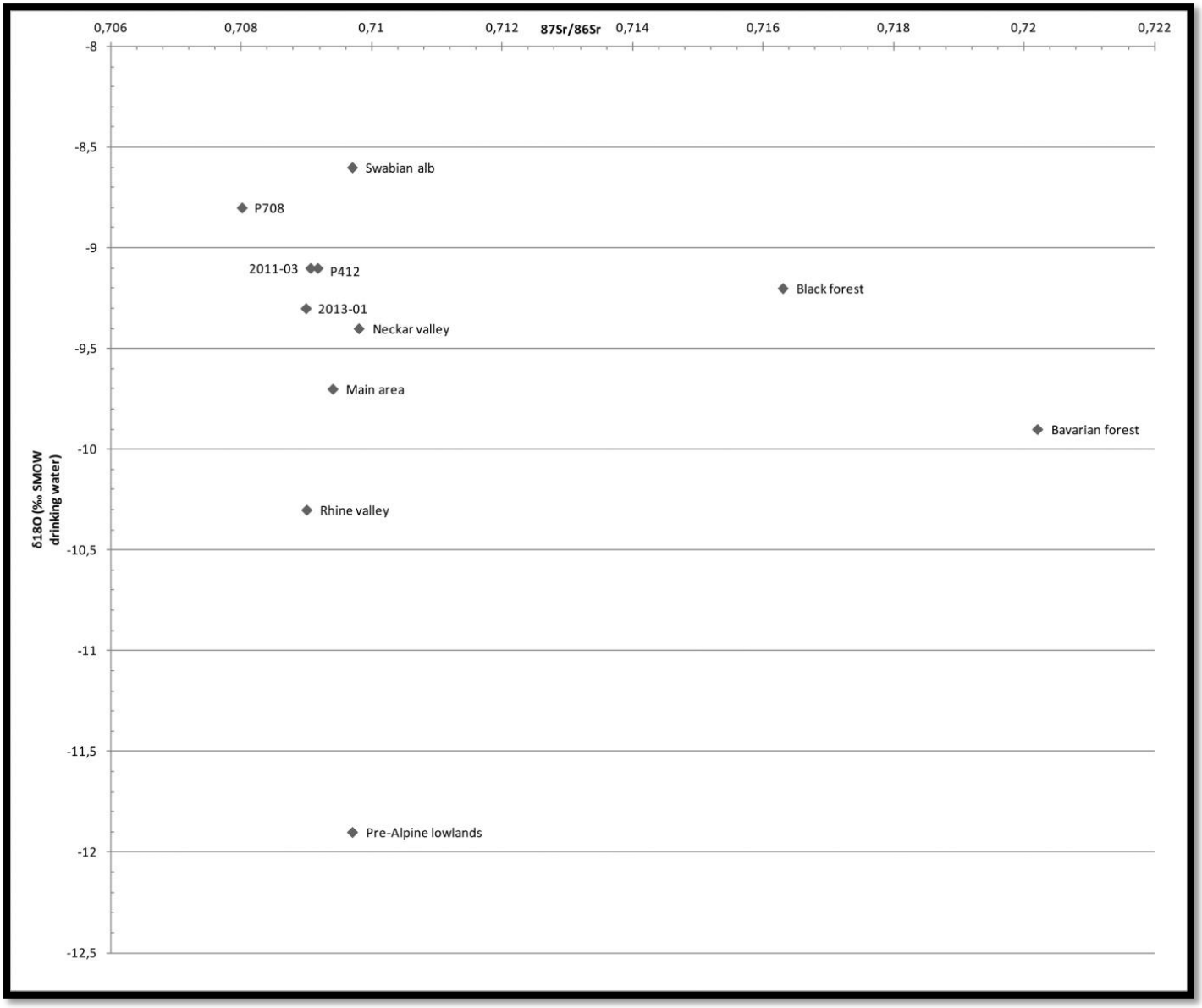


Fig. 4.5 (left). Map of Europe displaying the most likely area of provenance of individuals 2011-03 and 2013-01. Red indicates most likely, green less likely and blue least likely (adapted from: Kootker 2014).

Fig. 4.6 (below). Combined values of oxygen and strontium isotopes from Oegstgeest and from the sub-regions of southwestern Germany. (Figure by author, data from: Bentley & Knipper 2005; Kootker & Altena 2012; Kootker 2014).



The values from the young child are most closely related to the analyzed group from Ringlemere, in the east of the United Kingdom. However, similar values of both oxygen and strontium also occur along the northern coast of France, in Normandy. As seen from a cultural context, both areas were probably in the contact sphere of the Rhine estuary. From this cultural perspective, one clue remains that can point to the origin of the young child. The only object that was found in its grave, adjacent to the skull, was a small strip of lead. Lead mining was widely practiced in the United Kingdom from Roman times onwards, and the product was exported to the continent as well. One of the production centers in the United Kingdom was located in Somerset, which is close to the possible region of birth of the individual. In contrast, no lead is present in the region of Normandy, so it is considered to be impossible that the lead originated from this area. X-ray fluorescence (XRF) analysis of the chemical composition of the lead object might identify the source of the metal. Although it is realized that the lead object does not serve as direct evidence for the provenance of the individual, it does add an interesting contribution to the debate.

The origin of the young woman 2012-01, which was identified as a non-local on the basis of her strontium isotope signature alone, is more difficult to pin down due to the fact that many different areas exhibit similar strontium signatures. The strontium value from this individual is higher than the local signatures in the coastal area, indicating an origin from a region with older sediments or bedrock (Bentley 2006). Possibilities include multiple areas in northwestern Europe, such as the eastern Netherlands, France, the United Kingdom, Germany and others. Only when additional analyses are employed, such as stable oxygen isotopes, will we be able to pinpoint her area of origin with more accuracy. However, it is possible to state that, based on the strontium isotope values, the individual was not born in a similar area as the other four analyzed individuals. Almost identical strontium signals were measured in one pig from Oegstgeest (V411 [Kootker *et al*. 2014, 13]), and one adult human of indeterminate sex from Oosterbeintum (OOS398 [McManus *et al*. 2013, 260], table 4.4).

Table 4.4: Individuals from the cemetery of Oosterbeintum on which both strontium and stable oxygen isotope analysis have been done. Data from McManus et al. 2013.

Individual	$^{87}Sr/^{86}Sr$	$\delta^{18}O$ (‰ Phosphate)	$\delta^{18}O$ (‰ SMOW drinking water)
OOS060	0.70982	17.3	-7.1
OOS241	0.71121	18.0	-6.0
OOS335	0.70923	17.3	-7.1
OOS360	0.70999	16.4	-8.5
OOS398	0.71033	17.4	-6.9
OOS405	0.70964	17.6	-6.6
OOS410	0.70882	17.2	-7.2
OOS420	0.70940	17.6	-6.6
OOS473	0.70883	17.8	-6.3
OOS474	0.70966	17.6	-6.6
OOS483	0.71163	17.2	-7.2
OOS486	0.71325	17.4	-6.9
OOS487	0.71246	17.9	-6.2
OOS570	0.70879	17.8	-6.3
OOS605	0.70900	17.5	-6.8
OOS624	0.70910	18.4	-5.4

Table 4.5: Individuals from Oegstgeest which have been isotopically analyzed with their possible place of origin and mode of deposition.

Individual	Signature	Possible origin	Deposition mode
2011-01	Non-local	South England/Normandy	Primary inhumation supine extended
2011-03	Non-local	Southwest/central Germany	Secondary deposit charnel pit
2012-01	Non-local	Area with older sediments/bedrock	Primary inhumation supine extended
2012-02	Local	Rhine estuary/coastal area	Primary inhumation supine semi-crouched
2013-01	Non-local	Southwest/central Germany	Primary seated cremation/prone inhumation

4.5.2 Origin and mode of deposition

Now that the origin of five individuals from Oegstgeest is partially reconstructed, it is interesting to explore whether a different origin relates to a different method of deposition. In table 4.5 a summary is provided regarding the possible region of birth of the individuals, and their final mode of deposition. Many variables might determine the funerary treatment of a deceased individual, such as religion, status, sex and age, and it is likely that the origin of an individual was only one of the variables that were of importance.

First it should be noted that the mode of deposition is ultimately determined by the peers of the deceased, as corpses are usually unable to bury themselves. However, from early medieval texts such as *Beowulf* or the Scandinavian sagas it is evident that

personal wishes of the deceased regarding their funeral were certainly considered and often realized. Because of this, the mechanisms by which the mode of deposition was determined might have varied, and possibilities include:

1. A non-local individual is buried in the local tradition by local people
2. A non-local individual is buried in a non-local tradition by local people (e.g. according to the wishes of the deceased)
3. A non-local individual was buried in a non-local tradition by non-local people
4. A non-local individual is buried in a non-specific or deviant manner by local people (e.g. if the individual was perceived as enemy or outcast)

For the individuals 2011-01 (the young child), 2012-01 (the young woman) and 2012-02 (the old woman) it is possible to state that they are buried according to the standard burial customs of the period (see for an overview: Halsall 1995). In particular, supine extended burials occur throughout northwestern Europe and beyond, and the burial custom is not restricted to a single cultural group or time period.[60] The position of the old woman, being supine with slightly retracted legs (semi-crouched) occurs less frequently, but is found regularly at comparable and contemporaneous sites from the Frisian coast, such as Oosterbeintum and Rijnsburg (Knol *et al*. 1996; Wimmers 1986), and can be regarded as a regional burial custom.

A rather different image exists for the other two analyzed individuals (2011-03, 2013-01), both adult men from central or southern Germany. Their modes of deposition can both be considered as deviant, of which parallels are extremely rare. To recall, individual 2011-03 was found in a secondary context consisting of two pits, one with five long bones laid out in a star-shape, and one with a large number of human bones which had been selected for re-deposition from a different context. Some of the bones from this charnel pit exhibited perimortem cut- and hack marks (see previous chapter). The other individual (2013-01) was incompletely cremated and subsequently buried prone in a small pit, probably on the same location of the pyre. Both deposition modes are not found in the standard burial repertoire of Frisia and it may be assumed that they were employed for a specific reason. It is unlikely that the individuals were buried in a deviant

[60] It is not possible to say whether the supine extended burials were buried according to Frisian standards or to the standards from their birthplace, due to the fact that this mode is so widespread. However, the burial attire of the young woman is identical to that of the old woman, and also occurs in burials other Frisian sites, such as Oosterbeintum (Knol *et al*. 1996), Rijnsburg and Den Haag Solleveld (Dijkstra 2011, 395-396).

manner on the basis of their foreign origin alone, because this was also not the case for the other foreign individuals. Possibly the men died in an unusual way or during particular events which made it impossible (whether for practical or ritual reasons) to follow the standardized mortuary proceedings. Their foreign provenance could have played a role in this, for instance if they were perceived as enemies or outcasts by the local population. Whatever the case, the relation between a non-local origin and a deviant deposition mode seems hardly coincidental for the two men. In the next chapter the discussion surrounding these deposits will be continued in more detail.

4.5.3 The results from Oegstgeest in light of traditional migration theories

As was explained in the introduction of this chapter, the traditional view of the migration movements in early Merovingian western Europe was of a primarily east to west movement. The northern coastal (*terpen*) area was thought to have been repopulated by northern Germanic people, such as the Angles and Saxons. These Anglo-Saxons did not all stay on the continent and a considerable portion made the crossing to Britain (Knol 1993, 196), accompanied by smaller groups from the continent, such as Jutes and Frisians (figure 4.1). These Anglo-Saxon movements that are detectable in the northern Netherlands do not seem to have taken place in the western coastal region, based on clear differences in material culture and historical sources, such as law texts (Dijkstra 2011, 357). In his PhD-dissertation on the early medieval period in the province of Zuid-Holland, Menno Dijkstra states: "*In the initial period of the 5th and 6th century, the inhabitants along the Dutch coast will have certainly formed a heterogeneous but related group with different ethnic backgrounds: a residual population from the area itself, supplemented by 'Franks' from the Dutch central river area, 'New Frisians' from the northern coastal area and perhaps a number of 'Anglo-Saxons' from England*." (Translated by author from Dijkstra 2011, 357-358). This image is also sketched by historian Luit van der Tuuk in his recent (popular scientific) book about the earliest history of the Frisians (Van der Tuuk 2013). All authors writing about the material culture of early medieval Frisia have noted the connection of the area with, in particular, southern England (mainly Kent and East-Anglia) and southwest Germany (mainly the Rhineland).

This is not surprising when the prominent trade routes in northwestern Europe are considered (fig 4.7), of which the southern branches directly connect the Rhine estuary to these regions. The importance of the cultural connections via the shipping routes are

also reflected in the results from the isotope study. It is highly likely that the non-local individuals at Oegstgeest entered the settlement through one of these routes. The two men (2011-03, 2013-01), which probably originated from the area around Mainz, would have come via the southeastern route (the Rhine). Large quantities of produce, such as wine, pottery and pigs, originated from the same area and would have travelled the same route. The small child (2011-01), who was probably born in southern England or northern France, would have travelled the southwestern route (via the North Sea). At the moment there is no evidence from Oegstgeest to suggest an origin of individuals from the homelands of the Angles, Jutes and Saxons in northwest Germany and Denmark. Isotope results from Oosterbeintum, which is in the core area of the migration routes of these tribes, does show such evidence for some individuals. However, the data from that site indicate that the foreigners among the population were not exclusively from northwest Germany and Denmark, but also included individuals from other regions, such as England and Scandinavia (McManus *et al*. 2013, 273).

Figure 4.7: Frisian trade routes of the Merovingian and Carolingian period (adapted from: Kuipers 2011, 19).

It can be concluded that original migration theories, which were based on material and language studies, do hold a considerable degree of validity. In other words: foreign goods were indeed brought in by foreign people. However, their 'foreign' style and culture may have been rapidly adopted by the local population ('acculturation'). The new approach to the study of migration with isotope research provides additional data which necessitates an adjustment of the traditional view. The migration movements were not as straightforward as has been previously thought. Migration not only occurred in an east to west direction, but also *vice versa*, with people moving from Britain to the continent. It is clear that the early medieval people enjoyed (or were forced to) a high degree of mobility, which was based on accessible waterway routes. This can be traced in the continuous influx of imported goods, but is also described in medieval sources, such as the Scandinavian sagas. In the Merovingian era Frisian trading quarters appeared in various settlements both overseas as inland, such as Birka, York and Mainz (Heidinga 1997), indicating regular contact and a well-established route between these far-away places. But, the connections stretched even further than these trading centers. The Frisian lands were known to various Scandinavian people, of which Iceland represented the most distant direct connection. But the Frisian connection also stretched to the east, as far as Byzantium, although it might be assumed that these were less direct than to the regions in the west and north.[61] Because trade and associated travel seems to have been quite common in this period, foreign people buried in a settlement might not always have been actual migrants (i.e. permanent settlers), but also included people that resided in the settlement for a shorter period, or that died during a voyage. Furthermore, as trading settlements were often well-stocked with (valuable) goods, they were also attractive for freebooters and invaders[62]. Skirmishes with hostile foreigners, resulting in death, might have occurred on occasion and supplemented the burial record of a settlement. It would be unlikely that the hostile invaders were buried with the same respect as local residents or friendly foreigners.

Although the role of individuals that were buried in the cemeteries of Frisia is not always evident, it is clear that the population was far more diverse and came from more varied regions than traditional migration theories stated in the past.

[61] A Byzantine coin weight found in a grave at Rijnsburg (less than 2 km from Oegstgeest) is the material evidence from this eastern connection (Dijkstra 2011, 18)
[62] Such is vividly described in Egil's Saga.

4.5.4 Recommendations for future isotope research on the Oegstgeest material

The results from this small-scale isotope research add a considerable amount of information regarding the origin of the inhabitants of the settlement, their mobility, and the functioning of the settlement in the early medieval trading network. As the burial treatment of the Oegstgeest individuals is quite diverse, which is (as hypothesized in this chapter) possibly related to the origin of the people, it would be interesting to explore whether this is true for all individuals. As a first step it is therefore recommended that also the other individuals for which dental elements are present be analyzed for isotopic data. It is essential to analyze both the strontium and stable oxygen isotope ratios, as strontium isotopes alone are not sufficient to separate locals and non-locals and/or identify the place of origin. In this regard, it would also be worthwhile to perform stable oxygen isotope analysis on individuals 2012-01 and 2012-02 to obtain further information on their birth place.

If more detail about different migration movements of a single individual is preferred, elements that mineralize in different stages of life might be analyzed (such as first molar-third molar-rib fragment). If the contamination by post-burial isotopes in the bones is minimal (which is more likely to be the case for bones from anaerobic contexts with minimal water percolation), bones from individuals from which no dental elements survived can also be analyzed. In that case all fourteen individuals from the settlement can be analyzed to determine their place of origin. It would be particularly interesting to see whether all individuals from the charnel pit were born in Germany, and where the individuals that were buried/dumped in a prone position originate from. These are just a few possibilities to explore in the future, among many other. Not only will this add to our knowledge about Oegstgeest, but additional data also adds to a wider debate occurring in early medieval archaeology across Europe. Additional research which supplements the isotope databank will certainly expand our knowledge on the mobility of early medieval people, the migration flows of populations, and the relation between material culture and ethnic or cultural identity.

5 Death, Burial and Beliefs

A synthesizing discussion on the human remains from an early medieval Frisian settlement along the Old Rhine

"While you, ye Druids, when the war was done,
To mysteries strange and hateful rites returned:
To you alone 'tis given the heavenly gods
To know or not to know; secluded groves
Your dwelling-place, and forests far remote.
If what ye sing be true, the shades of men
Seek not the dismal homes of Erebus
Or death's pale kingdoms; but the breath of life
Still rules these bodies in another age"

(Pharsalia[63])

5.1 Introduction

In the previous chapters diverse methods have been applied to investigate the human remains and their context, which has produced a considerable amount of data. While each data source has been subjected to a discussion individually, it was also deemed necessary to combine the data and discuss them in the light of early medieval culture and/or religion. The human remains have been treated and deposited in the past with a certain concept or design, one which was undoubtedly intertwined with long-lived ritual traditions and contemporary ideas about the afterlife. Although a Pagan religion can be assumed to have been followed by the Frisians of the sixth and seventh centuries, details about which deities were venerated, and how they were venerated in daily life are scarce. For the rationale behind archaeologically observable end-products of ritual cycles, such as the human deposits, we are sometimes only able to speculate. The aim of this chapter is to do exactly that. Taking the human remains as a basis, and combining them with evidence from other archaeological materials and historical sources, a number of theories are presented to explain the human remains in the ritual context of the early middle ages. Thus, this chapter will focus on the question:

[63] Written by the Roman writer Marcus Annaeus Lucanus (commonly known as Lucan) in the first century AD. Translated by Sir Edward Ridley (1905, 20).

How can the phenomena observed in the human remains assemblage from Oegstgeest be explained from a religious and/or cultural point of view?

The reader may be warned that definitive answers will not be provided here, it is merely attempted to supply *an* explanation, as opposed to *the* explanation. Hopefully it will fuel the discussion surrounding this interesting assemblage of human remains, to which other researchers are invited to add to. The remains are grouped into categories on the basis of their appearance and context (Secondary deposits, deviant primary deposits, the cremation, formal primary inhumations, and related to this last category, grave goods and associated deposits), each of which will be discussed and provided with an accompanying theoretical explanation.

5.2 The secondary deposits

Secondary deposits include all contexts containing human bones which were first deposited on a different location, where the decomposition of the soft tissue (either partially or completely) took place.[64] Human bones from secondary deposits found in or near settlements are often interpreted as unintentional disturbed primary inhumations, which have been misplaced by later digging activities or by natural causes such as soil erosion. However, in particular for the pre-Christian period there is plenty evidence that indicate intentional handling, manipulating and depositing of human bones that are (partially) decomposed (e.g. Madgwick 2008; Nieuwhof 2015; Rieckhoff 2002). One early medieval source[65] even mentions the intentional handling and display of human bones

[64] Although the cremation should be treated in this section according to the used definition, it has been decided to give it a section of its own to be able to further elucidate on this unique deposit.

[65] This text is part of the book '*Liber Monstrorum de Diversis Generibus*' (A Book of Freaks of Nature of Various Sorts), which was probably written around 800 in England. It describes that the bones of king Hygelac, of which is known from various sources that he died around 530 in a battle against the Franks, were shown to travelers because of their unusual big size: "*And there are freaks of nature of remarkable size, such as King Higlac, who ruled the Gauts and was killed by the Franks; from the twelfth year of his age no horse could carry him. His bones are preserved on an island in the River Rhine where it breaks out into the Sea and are exhibited as a marvel to people who come from afar*." (Translation by Magoun and published in Storms 1970). Regarding this fragment, a lecturer in Old-English language of Leiden University (Thijs Porck) commented: *"Hygelac's bones have never been found. In the fifties, a scholar suggested that the bones may have been kept on the island Goeree Overflakkee. Given the recent archeological excavations and the evidence outlined above, Oegstgeest within the Rhine estuary seems to me a more likely option. Due to the scarcity of sources for the Early Middle Ages, the best we can do is speculate, but I would not be surprised if the archaeologists in Oegstgeest were to stumble upon some gigantic bones in the ground*!" (Porck 2014). Unfortunately, No 'gigantic bones' were found at the settlement, so there is no archaeological evidence to support the theory that it was indeed Oegstgeest where the bones were displayed.

in the region of Oegstgeest in the Merovingian period (Storms 1970, 9). Direct archaeological evidence for intentional handling of unarticulated human bones is also found in the early medieval settlement of Oegstgeest. Indications that the secondary deposits at Oegstgeest were initiated by intentional human action instead of unintentional disturbance or natural factors are, among others:

1. The star-shaped long bone deposit. This context is an undisputed product of a premeditated human action. It was located in an small area designated for burials with a certain degree of importance or emotional load: the two women and three dogs were buried at the same location.
2. Manipulation of bones. Five bones from secondary deposits exhibited cut- or hack marks of which the timing of infliction was determined as perimortem. Two specimens (a tibia with a minimum of five severe hacking marks and a frontal with two parallel cut marks) have likely been mutilated after death of the individual, as the number and location of injuries makes it unlikely that they were inflicted during an interpersonal conflict situation. Although the bones may have been altered after death, there is no evidence (at present) for the production of objects out of human bone, of which multiple examples have been found in northern Frisia, dating to the Iron Age and Roman period (Nieuwhof 2015, 262-296). However, as not all find material from Oegstgeest is yet analyzed, it remains possible that such objects might still be discovered.
3. Selection of elements. The composition of the secondary deposits indicate a conscious selection of bone elements and the location of deposition. These selective processes makes it unlikely that the deposits were formed by natural causes, as a far more random representation of bone elements would then be expected. Selection was observable in the cases of:
    1. The spatial distribution of secondary deposits. The total excavated area at the Oegstgeest settlement included more than 10 hectares, of which ca. 8 hectares showed signs of early medieval activity. However, the secondary deposits were concentrated in an area of ca. 2.9 hectares, mainly in the northeast quadrant of the settlement (habitation quarter 1). What is more interesting, the isolated long bones and isolated cranial elements show different distribution areas, with the former being concentrated on ca. 1.8 hectares and the latter on ca. 1.4 hectares. The overlap of both distributions is only ca. 0.3 hectares (see figure 2.3 and

2.4 above). The isolated long bones are mainly deposited in and around habitation quadrant 1, while crania are predominantly retrieved from the gullies and ditches enclosing the four quadrants.

2. Body parts. The secondary deposits consist almost exclusively of long bones or parts from the crania. A large number of contexts containing a mix of bones from different species were analyzed to check whether small human bones were present (and possibly overlooked during excavation), but none were found. The context of the star-shaped deposit and the adjacent charnel pit contained the remains of a minimum of six individuals, but only 9 out of 285 (3.2%) of the retrieved fragments consisted of smaller elements of the skeleton (ribs, vertebrae, hand/foot bones). The predominance of large and recognizable body parts is a common phenomenon for secondary deposits that are comparable to those from Oegstgeest (see for instance: Nieuwhof 2015, 299-414; Smith 2009, 302).
3. Sex and age. Although the sex and age assessments of the isolated bones should only be taken as indications (because only one or a few traits could be assessed), they do show a clear dominance of certain categories. nearly all traits that were scored for sex were either of a male, possible male or indeterminate sex. In addition, nearly all bones that could be assessed for age were of adult individuals.

The patterns observed in the deposits of unarticulated bones at Oegstgeest are not unique in the Netherlands. For instance, in the early medieval settlement excavated at Utrecht Leidsche Rijn, which has a comparable appearance as Oegstgeest, a number of secondary deposits was encountered consisting primarily of bones from adult males, which were located at the eastern periphery of the settlement (Smith 2009). In addition, the deposits only consisted of crania and long bones, of which one cranium was severely mutilated (Smith 2009, 304).

That the custom of selective bone deposition was present in multiple settlements implies a specific (possible ritualistic) rationale which initiated these kind of deposits. The bones which were selected were acquired from a location of primary deposition, where the decomposition of the soft tissue (partially or completely) took place. At Oegstgeest, there are indications that some of the bones were moved from their primary place of deposition before they were completely ‘dry’. Firstly, one of the tibiae

from the star-shaped deposit was found with the associated patella on its anatomical location. Secondly, five long bones exhibited scavenging marks, which were made by an animal with large canines, such as a wolf, dog or fox. As these scavengers are mainly interested in the bones for their adhering nutritional soft tissue and marrow, it is assumed that that the corpses were not fully decomposed when the bones were acquired by the animals.[66]

The reconstructed depth of the primary inhumation burials were all over one meter (see chapter 2), from which it may be assumed that the bones were not scavenged from corpses that were buried too shallow. Instead, the bones are likely collected from excarnation locations above ground, which were accessible to both humans and animals.

5.2.1 Excarnation in Oegstgeest and the 'Beasts of Battle'

Finds of unarticulated human bone or articulated parts of corpses are a regular occurrence in prehistoric settlements and ritual sites in northwestern Europe, and have gained considerable attention in recent literature (Colard *et al*. 2014; Madgwick 2008; Mercer & Healy 2008; Nieuwhof 2015; Pietrzak 2014; Rieckhoff 2002; Redfern 2008; Reilly 2003;). In areas where traces of inhumations or cremation are so scarce that they do not account for (even a part of) the living population, excarnation above ground is often considered as a very likely alternative for corpse disposal. In her PhD-dissertation, which focuses on rituals in the Frisian *terpen* region in the Iron Age and Roman period, Nieuwhof (2015, 270) states:

"…excarnation was practiced as one of the ways of dealing with the dead, followed by secondary use and deposition of collected bones. As long as there is no evidence that most terp residents were buried outside the terps (either cremated or not), the possibility that excarnation even was the common way to deal with the dead in the terp region should be taken seriously."

It is likely that (ritual) traditions of late Prehistoric Frisia, continued to be in use until the beginning of the Christianization of the area in the late eight century. This is particularly evident in the province of North-Holland, where formal cemeteries remain absent throughout the Merovingian period (Dijkstra 2011, 271). A few small clusters of burials

[66] This may be different for scavenging marks of rodents. These animals are interested in the calcium in the bones, for which they chisel off fragments of dry bone.

are known from archaeological excavations, accounting for only a small percentage of the original population. The burial clusters found at the edges of the Oegstgeest settlement have a similar appearance to those from North-Holland. However, while in North-Holland large cemeteries are absent, multiple cemeteries of considerable size did exist a few kilometers from Oegstgeest, such as at Rijnsburg, Valkenburg and Katwijk. While the burials at Oegstgeest are only a fraction of the original population, it is possible that the inhabitants also had the option to be buried at one of these nearby cemeteries, or on a cemetery which has not been discovered yet. We may therefore assume that excarnation above ground was not the primary method of corpse disposal. It is far more likely that the custom was reserved for people with a certain status, sex or age (in the case of Oegstgeest and Utrecht Leidsche Rijn: adult men). Such a selection was not apparent in Iron Age northern Frisia; there, people from all age groups and sexes were represented in the assemblages of secondary deposited bones (Nieuwhof 2015, 266).

If excarnation prior to the deposition of unarticulated bones was indeed practiced, what may have been the motivation behind it and why was it reserved for adult men in certain areas? The answer to this question can possibly be found in early medieval Pagan narratives, such as epic poems and saga's. Three scavengers that inhabit northwestern Europe figure prominently in these, and take up a special role in pagan mythology. Well-known early medieval narratives, such as *Beowulf, Judith, The Wanderer* and the *Edda*; the wolf (*Canis lupus*), the white-tailed eagle (*Haliaeetus albicilla*) and the raven (*Corvus corax*), are repeatedly referred to as animals feeding on corpses, in particular those of warriors that died in battle (See table 5.1, and: Alexander 2006; Brodeur 1916; Honegger 1998; Prummel 2001; Savelli 1997; Serjeantson 2009). The combination of these three scavengers, collectively called the 'beasts of battle', is a recurring theme which probably originated out of a common Germanic tradition. Most scholars agree that these animals were introduced in early medieval narratives to set a scene of death and destruction on the battlefield, as they were known to be dominant scavengers in the ecosystem of Northwestern Europe (Honegger 1998, 289-290). However, their reputation was certainly not negative (as it was in various other periods), and they also fulfilled other important roles in Pagan religion and art (figure 5.1). For instance, ravens were also known as the birds of Odin/Wodan, for which he is sometimes referred to as the 'Raven-God' (figure 5.2). The two ravens of Odin, Huginn (his 'thought', surviving in the Dutch language as '(ge)heugen') and Muginn (his

Table 5.1: fragments of well-known early medieval stories containing the 'beasts of battle'

"War took off some,
carried them on their course hence;
*one a **bird** bore over the high sea;*
*one the hoar **wolf** dealt to death;*
one his drear-cheeked earl stretched in an earthen trench."

The Wanderer (from: Alexander 2006, 73)

"The corpse-sharers, shadowy-coated,
*they left them behind: the black **raven***
*with its horny beak; the brown **eagle***
of white tail-feather, to feast on the slain
- greedy war hawk; and the grey one,
*the **wolf** of the weald."*

Brunanburh (from: Alexander 2006, 115)

"Their shields resounded,
*made a loud noise. Accordingly, the lean **wolf***
*rejoiced in the forest, and the hungry **raven**,*
that bloodthirsty bird. Both beasts of battle knew
that soon the warriors would go to work for them,
fix their fill of food; and flying behind them,
*an **eagle**, dewy-feathered, eager for flesh,*
dark-coated, horny-beaked, did call out lowly
a sad war song."

Judith (Savelli 1997)

"Thus sang Einarr Tinkling-Scale:
With flesh the Host-Convoker
*Filled the feathered **ravens**:*
The raven, when spears were screaming,
*With the she-**wolf**'s prey was sated."*
…
"As Ottarr sang:
The Erne swills corpse-drink,
*The She-**wolf** is sated,*
*The **Eagle** there feedeth,*
Oft the wolf his fangs reddens."

The Prose Edda (Brodeur 1916, 145)

"…the swept harp
*won't waken warriors, but the **raven** winging*
darkly over doomed will have news,
*tidings of the **eagle** of how he hoked and ate,*
*how the **wolf** and he made short work of the dead."*

Beowulf (Heaney 2002, 75)

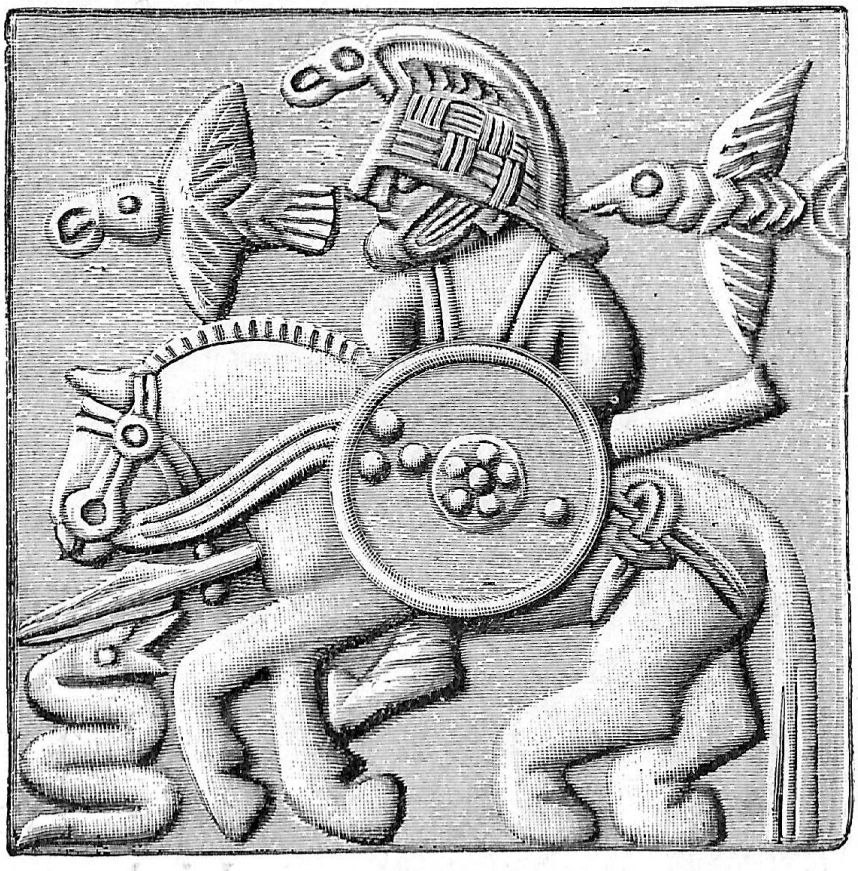


Figure 5.1 (above). Purse cover from Sutton Hoo (UK), 7th century. The lower decoration shows a man with two rampant beast (probably wolves), and in the middle two birds of prey attacking another bird (image from: The British Museum).

Figure 5.2 (left): Decoration from a 6th-7th century helmet found at Vendel, Sweden. The man on the horse is often identified as Odin, flanked by his ravens Huginn and Muninn (adapted from: Montelius 1905, 98).

'memory' or 'mind'), fly all over the world to collect information, from which Odin becomes very wise (Brodeur 1916; Hveberg 1969, 17-18). Nonetheless, Odin's ravens also had a taste for the corpses of the slain: "*Two ravens flew from Hnikar's* [i.e. Odin's] *shoulders; Huginn to the hanged and Muninn to the slain*" (fragment from a thirteenth-century text; Wills 2006, 1054-1063). Two wolves were also associated with Odin, named Geri and Freki (Hveberg 1969, 18), and they too were known to be *"…greedy for the corpses of those who have fallen in battle*" (Lincoln 1991).

Prior to the Frankish conquest of the Frisian lands, the inhabitants of Frisia followed a pagan religion (Dijkstra 2011, 361). Because so many similarities exist in the material culture of tribes that lived around the North Sea in the early medieval period, they are sometimes collectively grouped into a 'North Sea culture' (Dijkstra 2011, 257). It is likely that this North Sea culture, including Frisia, shared similar pagan beliefs, although details may have differed. Particularly in the symbolism of decorations on (luxury) items, which were often based on themes from mythology, we can trace the communal Pagan background of the North Sea culture before Christianization. It is assumed that many of the epic stories and saga's were known throughout northwestern Europe before they were eventually written down. For instance, the Icelandic '*Volsünga Saga*' was also known in similar form in contemporary Germany (from which it probably originated), where it was called the '*Nibelungenlied*' (Tolkien 2009). As Frisia was situated between the region of Britain and Scandinavia on the one hand, and the continental Germanic and Frankish region on the other, the stories that were passed orally by travelers and '*skalds*' (poets), must have been well known to the Frisians. It is not surprising in this respect that the Frisian lands and their inhabitants appear multiple times in famous stories such as *Egil's Saga* (Green 1893) and *Beowulf* (e.g. '*The Frisian slaughter*' Heaney 2002, 89-90). Because the theme of the 'beasts of battle' occurs in a large number of stories, it can be assumed that their meaning and role in pagan mythology was similar throughout the North Sea culture. The white-tailed eagle, raven and wolf were certainly known to the people of Frisia from their natural environment, and the bones of these animals are found in small numbers in archaeological excavations[67] (Prummel 2001, 83-84). The bones of wolves and white-tailed eagles were sometimes processed into artefacts such as pendants (Prummel 2001, 76). Among the tens of thousands of animals bones from Oegstgeest, retrieved from thousands of contexts, only one white-tailed

[67] see for an overview the online 'BoneInfo' database of the Rijksdienst voor het Cultureel Erfgoed at http://archeologieinnederland.nl/bronnen-en-kaarten/boneinfo

eagle and one raven was identified. Surprisingly (or maybe not so much) the eagle and the raven were found together in a single context (a small ditch [Aerts 2015]), possibly an intentional deposit.

So, is it plausible that the secondary deposits were a product of a ritual process in which excarnation of the human corpses was conducted by animals in the natural environment, in particular wolves, ravens and eagles? Summarizing the data from this and previous chapters it can be stated there is evidence for:

1. Intentional and premeditated human interference
2. Selection of bones based on sex, age, and part of the body
3. Designated and restricted areas in which the bones were deposited
4. Relatively high degree of sharp-force trauma and/or alterations
5. Important role of scavengers in mythology
6. Presence of scavengers in the natural environment
7. Scavenging marks on secondary deposited bones

On the basis of these indications, it may be concluded that the 'beasts of battle' scenario is certainly a possibility. However, regarding the validity of the hypothesis some uncertainties remain. For instance, there is no material or historical evidence from Oegstgeest, other than the bones, to suggest that the individuals directly engaged in armed skirmishes or warfare (i.e. no weapons were found[68] and historical sources do not mention battles in the direct area). However, at some point in time weapons must have been present, as the perimortem lesions found on the bones from Oegstgeest were inflicted by sharp edged objects which were either weapons or could be used as such. Unfortunately, because these bones were not retrieved from a battlefield context (such as at Wisby [Ingelmark 1939] or Towton [Novak 2000]), it remains impossible to distinguish whether the lesions were inflicted during interpersonal conflict or during processing of the corpse.That the bones from secondary deposits originated almost exclusively from adult males, of which at least one was of a foreign birthplace, is not considered to be coincidental. The denial of a 'normal' inhumation or cremation ritual,

[68] Although weapons and armor were prestige items often passed as heirlooms or deposited in the grave (see for instance: Wagner & Ypey 2011), it is not uncommon to find these items in settlements, for instance as (ritual) depositions. At the excavation of the nearby early medieval settlement of Leiderdorp Plantage for instance, multiple axes, a lance tip and two sword fragments were found in a gully, along with a staggering amount of other material, including 185 human bones (Dijkstra *et al*. 2014, 27; 33). As the material is awaiting analysis, conclusions about the nature of this high amount of bones and weapons cannot yet be made. Intentional deposition or erosion of a formal cemetery are both likely scenarios for the formation of the assemblage.

or maybe rather the bestowing of a 'deviant' ritual, is in Oegstgeest clearly a phenomenon which is reserved for this category. This was not only the case for the secondary deposits, but also in the assemblage of 'deviant' primary deposits, which will be discussed in the following section.

5.3 The deviant primary deposits

The excavations in Oegstgeest yielded three primary deposits which are considered as 'deviant' on the basis of their context, body position and/or the treatment of the corpse. Deviant primary burials such as found in Oegstgeest are rare in the early medieval Netherlands, and three examples from a single site is considered to be unique.[69] Interestingly, the three deposits from Oegstgeest (figure 5.3) share a number of characteristics:

1. They are deposited in a (semi-) prone position
2. They are not deposited in a sepulcher and probably not in a formal grave
3. They lack associated finds, such as clothing accessories or weapons
4. They are adult male individuals

Figure 5.3: The deviant primary depositions from Oegstgeest. Top image: individual 2004-01 (image from: Archol B.V.), bottom left: individual 2011-02 (image from: Leiden University), bottom right: individual 2013-01 (image by author).

[69] In Anglo-Saxon England the practice of prone burial seems to be more widespread, and Reynolds (2009, 72) reports 115 examples from 60 cemeteries. However, when seen nation-wide, Stoodley (1999, 55) has found that the prone burials account for only 1 percent of the total burial assemblage.

While the three deposits share some characteristics, they are certainly not identical, and the execution of the deposit is different for every context. As was discussed in chapter 2, individual 2004-01 was deposited in a pit which was too small to contain the body horizontally, and the upper body was curved upwards on the slope of the pit. Individual 2011-02 was deposited in a ditch with the upper body folded over the seemingly disorganized appendages. Some parts of the body were missing, which possibly occurred not long after deposition. Individual 2013-01 was burned in a (semi-) seated position, but only the appendages and the anterior part of the trunk were thoroughly cremated. The remaining unburned and articulated part of the corpse was deposited prone on top of the cremated remains, in a pit just large enough to contain the trunk.

Besides the differences in the execution of the deposit, the geographical location of the deposits also vary. Individual 2004-01 was the only deposit of human bone(s), either primary or secondary, at the southern part of the settlement. Its location is completely isolated from any other find of human bone and it is not associated with any of the major gullies or ditches of the settlement.[70] The other two individuals however, where located at the northern periphery of the settlement, an area which was designated for formal burials and special deposits. Individual 2011-02 was located in the middle of an area where two horse burials and the inhumation of a child (2011-01) were clustered. In addition, the isolated tibia fragment with five hacking lesions (which did not belong to individual 2011-02), was found in the same context. The half cremated individual 2013-01 was located in an area which does not contain traces of habitation, and is not linked to a cluster of other burials or deposits. However, it is located halfway between the cluster of women and dog burials and the cluster of a male and horse burial. Thus, the location does not seem to be completely randomly chosen. A further deviation of these three deposits in comparison to the formal primary burials also concerns their geography. The deviant burials are all located within the border of the settlement (see chapter 2), while the formal burials are all located just beyond. Interestingly, similar to the deviant burials, the horse burials were also located within the border of the settlement.

The parts of the skeletons that were present in the deviant deposits did not display any signs of endured trauma or a violent death. Also, based on the position of the

[70] It should be noted that the southern periphery of the settlement was excavated less extensively than the northern, and it is thus possible that some deposits were missed. However, the most densely occupied habitation areas were excavated in the southern quadrants, and among the find material from that area no human bones were recognized.

appendages, there are no signs that the hands or feet of the individuals were bound together. So, while the deposits might appear as formed during a hurried, possible clandestine event, the deposits might well be the product of a ritualized process. As Andrew Reynolds states in his work on Anglo-Saxon deviant burial practices: "*…the prone aspect (…) is a powerful rite that must have been enacted very consciously by a burial party fully aware of its social meaning*." (Reynolds 2009, 69). The varied appearances of the deviant primary deposits at Oegstgeest indicate different actions in the deposition process, which are possibly linked to differences in the rationale behind the deposits. Because deviant pagan burials in the U.K. were equally varied in their appearance, it has been suggested that prone and decapitation burials where considered to be indicators for a wide range of 'otherness', such as suicides or witchcraft. Although the exact reason for prone burial remains unknown, it has been often proposed that it is intended as an obstacle to prevent the soul from returning to the corpse (Reynolds 2009, 89-90). The identity of the deceased, along with the circumstances of death, have likely played a part in the execution of the funerary rituals and the ultimate method of deposition (Williams 2006, 97). Unfortunately, both are incredibly difficult to reconstruct, in particular in the absence of grave goods, which are often attributed as being linked to the status, wealth or ethnicity of the buried individual and/or its peers (see for instance: Kars 2011). Besides the knowledge that all three individuals are adult males, there is only one other indication, from individual 2013-01, why it possibly received a different treatment. Just as one of the secondary deposits, this individual was born in the area of southwest or central Germany (see chapter 4). However, a foreign birthplace alone was not a primary reason to be denied a normal burial rite, as individuals 2011-01 and 2012-01, also individuals of foreign birth, were not interred in a deviant manner. As was said earlier, it is possible that the two German individuals, and possibly also the other abnormally buried individuals, died under particular circumstances which made it impossible to receive the normal burials rites. It is further possible (and the one does not exclude the other) that the individuals were perceived as being socially situated outside the local community, for which they were treated differently after their death.

A final remark has to be made about the half cremated corpse. While the most straightforward explanation for this deposit might be that it is a failed cremation, it is possible that the fire was only utilized as a way to 'cleanse' the body (either physically or spiritually) and was not intended as a full proper cremation at all. The fact that locally

available wood (*Alnus sp.* [Van Hees 2016]) was used for the pyre which did not have an optimal burning capacity like other species, such as oak, might be an indication that the burning was not intended to reduce the physical remains of the individual to a minimum.

Two similar examples of incomplete cremations were found in the *terpen* area, dating to the (Roman) Iron age. It was suggested that one was burned after interrupted excarnation, but other scenarios were also considered, such as a possible lack of firewood for the pyre, or an accidental fire (Nieuwhof 2015, 262). The application of full cremation as a method of corpse disposal was certainly practiced in Oegstgeest, but as only example was found in the entire settlement, it is considered to be a rare practice. However, in the largest nearby cemetery of Rijnsburg (located less than 5 km from the Oegstgeest settlement over water [Dijkstra 2011, 115]), cremation was by far the most dominant method of disposal (Wimmers 1986, 46-48).

5.4 An alternative explanation for the secondary- and deviant primary deposits

While the secondary- and deviant primary deposits have been considered as separate categories above, it might also be possible that they have to be explained together, as the outcome of a single Pagan votive cult. The concept of the 'beasts of battle' is primarily of Scandinavian and British origin. Although it is clear that contact existed between these areas and Frisia, there was also a considerable influx of people and ideas from the eastern Germanic, and the southern Gallic regions. As a result, it is plausible that (a part of) the population of Oegstgeest followed one of the Celtic religions that developed on the continent during the (Roman) Iron age. The Celtic pantheon consisted of many deities, some of which were clearly more important than others (Green 2011, 25-26). The Roman writer Lucan, living in the first century A.D., mentions three Celtic deities with specific importance. These deities - i.a. known as *Taranis, Esus and Teutates* - required specific offerings of humans in order to be pleased (Green 2011, 23; Mac Congail & Krusseva 2010):

- *Teutates:* drowned captives and fallen warriors
- *Esus:* prisoners who are hanged on trees and then dismembered
- *Taranis:* prisoners who are burned.

It is possible that the secondary- and deviant primary deposits represent the remains of such offerings. The prone corpses 2004-01 and 2011-02, found in a pit and ditch

respectively, might be the remains of offers dedicated to *Teutates*. The secondary deposited bones, some of which showed indications of excarnation and mutilation, are possibly the remains of offerings to *Esus*, while the half-burned individual (2013-01) can then be interpreted as being dedicated to *Taranis*. Because no signs of a violent death were observed on the skeletons from the primary deposits, it is considered to be unlikely that the individuals were purposefully killed solely to function as offering. Instead, the individuals might have died from other causes after which their corpses were utilized to find favor with a specific deity, or the individuals might have died under such circumstances that a specific treatment was deemed necessary according to the regulations of the religion that was being followed.

If indeed Celtic elements were present in the religion of the inhabitants of Oegstgeest, another phenomenon might be explained within that framework as well. At least from the first millennium BC, a solar cult was part of the wider Celtic religion, which was symbolized by wheel-motifs. These wheel-motifs, often materialized as miniature metal wheel-shaped pendants, occur in the Iron age and Roman period from Britain in the west to Czechoslovakia in the east (Green 2011, 29; 33-44). Additionally, the wheel-motifs occurred on many other decorated items, of which at least some had religious functions. A well-known example is the 'Gundestrup cauldron', a silver Iron Age cauldron found in Denmark, but which probably originated from Thrace where it was commissioned by a Celtic patron (Taylor 2001). One of the decorated panels from the cauldron depicts a female deity, flanked by two wheels (figure 5.4). Another panel probably depicts *Taranis*, holding a broken wheel in his right hand (figures 5.5). The association of the wheel with the thunder god *Taranis* is known from other instances as well, and it is assumed that the wheel was one of his attributes. The archaeological evidence for the cult of *Taranis* is equally widespread, and the distribution of the votive wheels and dedicatory inscriptions are known from Britain, France, Germany (in particular the Rhineland), and Yugoslavia (Green 2011, 42). His name and association survived in most pagan northwest European mythologies, for instance as *Thor* (Norse), *Þunor* (Anglo-Saxon) or *Donar* (Germanic). Not surprising, the wheel- or sun-motif also survived into the early middle ages, and was often included in the decoration of objects (figure 5.6).

It is considered to be plausible that the wheel-motif was also an important symbol in the (religious) lives of the people of Oegstgeest, because it occurs in two deposits with a ritual character (figure 5.17 below). The first is the star-shaped long bone deposit. This

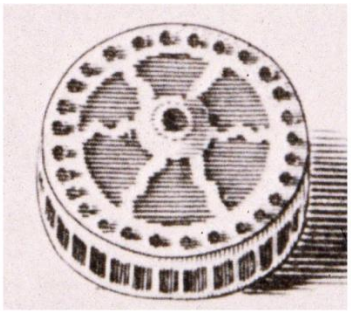
intentional deposit was formed with five long bones, but it is possible that a sixth was initially present which has since been lost, in which case it would form a symmetrical wheel with six spokes. The second deposit which contained the wheel-motif (also with six spokes), is the silver bowl (this object will be further discussed below). Besides being represented in these two ritual deposits, the wheel- or sun motif also occurred at Oegstgeest in the decoration on ceramic vessels (figure 5.7). It is further possible that the two silver discs that decorated the bridle of a buried horse (see below and figure 5.13), were also some kind of sun symbols.

Figure 5.4 and 5.5 (above): Two plates from the Gundestrup Cauldron. Above: female deity riding on a chariot. The who wheels closely resemble those from the Oegstgeest bowl. Below: in the middle a male deity, probably Taranis, holding a broken wheel in his right hand. The faces of the deities resemble the stylized faces on the mounts of the Oegstgeest bowl (images from: http://www.native-science.net/Gundestrup-Cauldron.htm [27-01-2016]).

Figure 5.6 (next page): Depictions of wheels on early medieval items from the Netherlands, Belgium (Doornik) and Germany (Hornhausen). First two rows: decoration on biconical pot (photo by author), and disc fibulae (all images from: National Museum of Antiquities Leiden, except for Doornik [Chifflet 1655]). Bottom row from left to right: belt end (image from: National Museum of Antiquities Leiden, drawing adapted from: Wagner & Ypey 2011), biconical pot (photo by National Museum of Antiquities Leiden) and decorated (grave?) stone with a depiction of a Merovingian warrior (image and drawing by author).

Oegstgeest 550-650

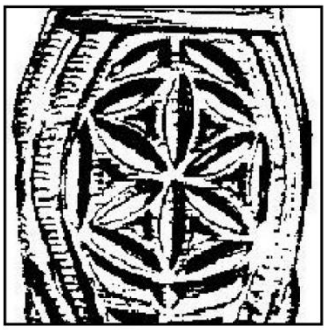
Gennep 450-500

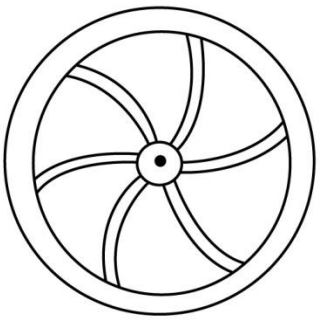


Doornik (Childeric) 481

Winsum 500-600

Rhenen 500-700





Rhenen 400-450

Garderen 550-650

Hornhausen ca. 700

5.5 The cremation from the well: a closure or foundation deposit?

The only remains from a full cremation found in Oegstgeest were recovered from the top fill of a well, which already was out of use, or went out of use, at the moment of deposition. A large part of the skeletal remains that were left after incineration were collected, including small elements, along with many fragments of charcoal. In contrast to the other secondary deposits found in the settlement, no selection has taken place of particular body elements. Some cremated fragments of animal bone were found between the human remains, and it is likely that the animal parts were included on the pyre. The human remains were of a single individual of adult age, of which the sex estimation was indeterminate.

Both the context itself and the geographical location of the deposit deserve some attention. The well was located in the middle part of habitation area 1, and is not associated with any nearby burial cluster. It was found in the interior of a building, along with two other wells, and it is assumed that the building was build after the wells went out of use (figure 5.7). It is likely that the wells belonged to one of the nearby houses which were built in an earlier phase. When the well went out of use, the remaining depression was backfilled with soil to level out the ground, during which the cremation was deposited. Two possible reasons are proposed here why the cremation was deposited on this unusual place:

1. As a 'closure deposit', to signify the end of the well and possibly also the nearby farmstead to which it belonged.
2. As a 'foundation deposit', to signify the moment when the overlying farmstead was constructed.

It is not impossible that it was actually a combination of these two, if the adjacent house was demolished to be rebuild next to it. Both closure- as foundation deposits are a frequent occurrence in prehistoric and early medieval societies of northwestern Europe (Hamerow 2012, 138-140; Nieuwhof 2015, 55-56). Nieuwhof (2015, 56) states that for the pre-Roman and Roman Iron Age: "*Ritual deposits associated with houses are so common that it may safely be assumed that they reflect a common ritual practice in northwestern Europe. They seem to be related to the building, occupation and abandonment of houses*." Besides deposits related to houses, deposits in wells were also relatively common in pagan Europe. Different kind of depositional items may have been related to separate stages in the life cycle of the well (construction, use, abandonment

Figure 5.7: Aerial photograph of trench 202. Highlighted in red are two excavated buildings, in the building on the right the well is highlighted in white with a 'C'. (image from: Leiden University, modified by author).

etc. [Van Haasteren & Groot 2012]). In many holy places of pagan Europe a specific link was present with wells, springs or other deep places in the earth such as clefts or caves, as they were viewed as entrances to a lower, and other world. In places where natural deep places were absent (such as in the western Netherlands), artificial wells may have served a similar purpose, explaining the regular occurrence of votive offerings in them (Ellis Davidson 1988, 27). However, it is doubtful whether a deposit in the top fill was viewed in this sense, as the depth of the well was considerably limited by then. Deposits in the top fill are thus also less common. In addition to the cremated remains, one other secondary deposits of human bone (a fibula), was found in a well in Oegstgeest, which was located ca. 55 m to the west. The fibula was not burned and almost complete, missing only a fragment of the proximal epiphysis.[71]

Besides the cremation, there may be more evidence for foundation deposits from the Oegstgeest settlement. For this we have to briefly return to the secondary deposits, of which two were strikingly similar. At some moment during the occupation of the Oegstgeest settlement, the inhabitants attempted to dam off the large gully running west-east, which divided the northern and southern habitation quarters (see chapter 2). Two dams were build (though probably not at the same time), and both contained a

[71] A deposit that was somewhat comparable to those from Oegstgeest (albeit from the Roman period) was found in the Geldermalsen-Hondsgemet. There, the skeleton of a dog was found in the top fill of one the wells in the settlement (Van Renswoude & Roessingh 2009, 596).

right femur, without any other associated human bones. One of the femora, of which the stratigraphical position could be observed, was deposited directly on top of the soil of the gully, after which it was covered by a foundation layer of branches to support the sods that made up the body of the dam (figure 5.8; pers. comm. S. Baas).

Figure 5.8: top image: perpendicular section through the body of the dam in trench 191. Observable are the individually marked sods resting on a layer of branches, serving as a strengthening foundation. Directly underneath this layer the right femur was found, which can be seen in detail on the bottom image. On the top image the femur was already removed during documentation. (Images from: Leiden University, modified by author).

5.6 The formal primary inhumations: separation, denial or territoriality?

The excavation in Oegstgeest uncovered the remains of five primary inhumations that were partially or completely undisturbed. In addition, a sixth context (2009-01) was found that is considered to be a formal primary inhumation that was (unintentionally?) disturbed by later activities, and of which few remains were left *in situ*.

Apart from one individual, all formal primary inhumations are located at the northern periphery of the settlement, at the opposite bank of the gullies enclosing the habitation quarters. Although individual 2009-01 seems to be interred in the middle of habitation area 2 (when seen on the maps in chapter 2), this was probably not the case at the time of deposition. The adjacent ditch, to which the burial was positioned parallel to, has likely run all the way from the river channel in the west to the most easterly gully. In this case a border would form to which burials 2009-01, 2010-01 and 2011-01 were deposited adjacent in an almost straight line (figure 5.9). In fact, given the lack of clear remains of houses it is likely that the enclosed area north of this border was not designated for habitation at all. Whether it was a later extension of the settlement territory or that it was already included as a separate (agricultural) area from the beginning is not yet known.

Around the burials located at the northern periphery, distinct clusters have formed of combined primary human burials, primary animal burials and secondary human deposits (A, B and C on figure 5.9). Other than these types of deposits, other (more modest) objects might also have been ritually deposited, which have not yet been recognized as such. The identified clusters were clearly designated as foci for ritual behavior from which the traces can be detected in the archaeological record. Why the clusters were located at these specific points along the northern border is not clear. Possibilities include that they were close to the farmstead to which the burials belonged, that they were on a visible location, or that they were close to a place where the gullies could be traversed. In a recent survey of graves from settlement contexts in Anglo-Saxon England by Clifford Sofield (2015), it was found that while there was a clear preference (>75%) for burial near boundaries, along those boundaries there was not an observable preference for certain features (such as a terminus). So, how can the location of the formal burials at Oegstgeest be explained? And also, why was a location chosen in close association with the habitation area, and not oe a nearby cemetery such as Rijnsburg?

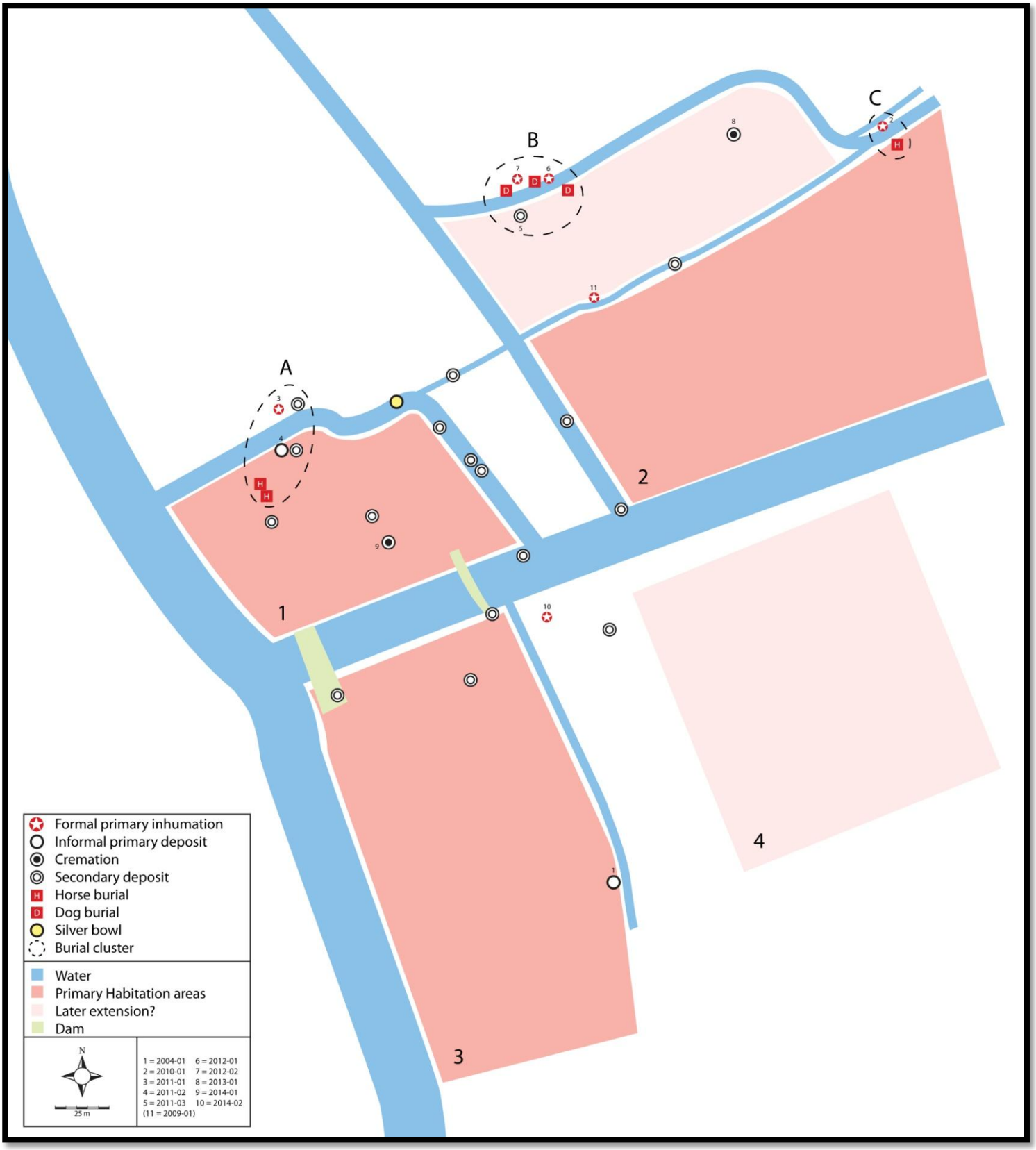


Figure 5.9: Simplified map of the Oegstgeest settlement with the location of burials and depositions. The border ditch of the northern habitation quarters and the eastern border ditch of the southwestern habitation quarter are reconstructed on the basis of incomplete features encountered in the excavations. The extent of the southeastern habitation quarter is not clear from the present data. The most northern extension was probably never used for habitation and an agricultural use is assumed. (Map by author, based on the maps from J. de Bruin (see chapter 2) and additional maps provided by Archol B.V).

Regarding the first question it is interesting to note that all the formal inhumations are located *outside* the primary habitation quarters, which is in contrast with the other 'special' deposits, which occur mostly within the quarter or in the ditches and gullies. It seems that a conscious separation between the 'normal' dead and the living took place. This separation can be viewed as both symbolically as physically, as a tangible physical line (the water) had to be crossed in order to complete the funerary cycle. However, although a separation from the living was apparently desirable, it was also deemed necessary to keep these individuals close (even in sight?), and not at a cemetery some distance away. The question arises why these people were selected to be buried at the settlement while others were not. We are unable to recognize a preference for a particular age or sex category in these burials, as we could in the case of secondary deposited remains. One adult men, two adult women and three juveniles make up the assemblage of formal inhumations, a rather varied group (see chapter 3). In addition, it was also possible to establish that the two women, which were both buried in cluster B, were not of the same bloodline. Further adding to the diversity of the group, the two women and the 5 year old child (2011-01) were all born in different areas (see chapter 4).

One possibility for the burial of these individuals at the settlement is the deliberate avoidance of a communal burial ground governed by an elite ruler with competing interests. The avoidance of its burial ground can then be seen a denial of the ruler's power (Hadley 2007, 200). If the diverse birthplaces of the Oegstgeest individuals would be representative for all early medieval dwellers in the Rhine estuary, such competing interests would certainly not be surprising. In particular after the Frankish incursions and the first establishment of churches in the eight century, denial of the burial grounds of the 'foreign oppressor' (if they were viewed as such) can be considered to have been a common occurrence.

A different scenario that was suggested by Helena Hamerow (2010) for comparable burials in Anglo-Saxon England might also be an option for Oegstgeest. She observed a relationship between the establishment of burial grounds at the settlement, and the increase of spatial organization and stability of the settlement itself, as visible in the introduction of elements like enclosures and increasing frequency of house repairing/rebuilding (Hamerow 2010, 71-76). Regarding this theory, Sofield (2015, 376) states:

"*These changes speak of a need to exert control over settlement space and agricultural land. If claims to settlement space and agricultural land had any ancestral basis, then burying the dead closer to landholdings could have helped to strengthen and legitimize those claims*. (…) *That over three-quarters of human burials in settlement contexts were associated with spatial boundaries seems to fit with Hamerow's suggestion that burials were being used to reinforce claims to land — in this case, land within the settlement."*

In other words, the presence of a buried ancestor on, or at the boundary, of a stretch of land, would legitimize a territorial claim on that land by the descendant, given that ownership was hereditary. Hamerow further argues that if communal cemeteries were indeed used to legitimize group rights over an area or resource by demonstrating a descent from (important) ancestors, this would be most prominent in periods of increased expansion or competition (Hamerow 2012, 128). Frans Theuws has argued that burials at farmsteads in Austrasia (Frankish Kingdom) were those of 'founders' of the settlement, and thus the first inhabitants of the settlement (Theuws 1999). Hamerow concludes that this was in contrast with practices in England, where it seems that burials were added to pre-existing settlements (Hamerow 2012, 129). This last scenario was probably also the case at Oegstgeest, considering the geographical position of the burials along with their demographic composition.

Although the use of burials for territorial claim in Oegstgeest is plausible, it is doubtful whether the individuals were regarded as 'important ancestors'. For the juvenile individuals in particular, it is unlikely that they were regarded as equal - or 'full'-members of society in comparison to adult men and (married) women. Some important indications for the differences in the status of men, women and children in early medieval Frisian society can be extracted from the *Lex Frisionum*, a Frisian law text which was written down at the end of the eight century by command of Charlemagne. While the text extensively describes which fines should be paid for all kinds of misdemeanors to men (whether nobles, free men, serfs or slaves), women are mentioned far less often and children only in a few instances (see for a full Dutch translation of the law text: Van der Tuuk 2013, 251-271). It is for instance stated that a child expelled from the womb (a miscarriage?) can be killed by the mother without any repercussions or fines (Van der Tuuk 2013, 255). In another section it is said that when someone kills a *married* woman, a fine should be paid equal to that of a men from the class to which she belongs (Van der Tuuk 2013, 270). It is thus probable that a woman only achieved a status equal to their husband at the moment of marriage. However,

some artists or artisans which were particularly important in Frisian society were attributed a higher value[72], which could include (unmarried?) women. An interesting example: when someone that was either a harpist, goldsmith or woman that made *fresum* (Frisian woolen cloth) [73] was hit on the hand, four times the fined amount had to be paid that was set for hitting a person on the hand that did not perform these trades (*Ibid.*).[74]

Whether the burials were linked to a designated territory within the settlement or not, the three distinct burial clusters do seem to belong to different households. Each cluster has an unique character but they also show similarities, such as the combination of human inhumations with animal burials. A further interesting similarity in all three clusters is the presence of a small wooden building at the opposite bank of the gully. Such small buildings occur throughout the settlement and are usually interpreted as storage buildings for agricultural products or other produce. However, the building located within burial cluster B (see figure 2.2) has aroused suspicion regarding the function of these small buildings which are in close association with the human burials. The building is rather isolated from the habitation areas, and only a part of one other building was found in this area, somewhat to the south. The plan of the building is similar to other small buildings in the settlement (see for instance: Hemminga 2006, 27-31) and is thus not considered to be 'special'. However, its segregation from the domestic areas and its location within an area of ritual significance raises the question whether this building served a purpose in ritual and/or mortuary programs conducted at the settlement. While pagan shrines or temples certainly existed in early medieval Frisia (see footnote below), it is likely that they were build according to the architectural knowledge that was present in the region, and appear as 'normal' buildings when excavated. This was similar in Anglo-Saxon England. There it is clear from the writings of early medieval scholars such as Bede and Aldhelm that pagan religious structures indeed

[72] It is not possible to say whether their higher 'value' in the law text would also mean a higher status in society.

[73] At this point it is interesting to consider again the older woman 2012-02, which exhibited rather a-typical severe osteoarthritis in both thumbs (and only there). Could this localized degeneration of the joints be caused by an activity as harp playing or cloth weaving?

[74] The law text mentions the church a few times, but also preserves pagan aspects. For instance in its final article, it states punishments imposed on people who dishonored a temple by stealing sacred objects. Although it is not specifically mentioned, it is assumed that this regards a pagan temple, as the perpetrator is sacrificed to the god venerated in that temple: "*He who hacks into a sanctuary and takes away one of the sacred objects will be led to the sea, and on the sand that is covered by the high tide, his ears will be cleaved, he will be castrated, and be sacrificed to the God of which the temple he dishonored*. " (translated by author from: Van der Tuuk 2013, 271).

existed, but modern archaeological excavations have failed to identify any of them with certainty (Hamerow 2012, 141-142). Whether the buildings found in Oegstgeest occupied a special position in the daily life of the settlement is equally difficult to say with any certainty, but closer investigation of the remains and associated finds might shed further light on this topic.

5.7 Some considerations of the grave goods related to the primary formal burials

Most of the grave goods that were found in the burials in Oegstgeest await conservation, and given their poor quality during excavation, cannot be investigated in much detail at the moment. However, some preliminary statements can certainly be made.

A distinction in grave goods is here made between mobilia which were actual grave gifts, such as vessels (or their content), coins and animals, and objects which served more functional purposes, such as parts of the burial attire or sepulcher. The dividing line between them is however not always clear, as a choice might have been made to inter functional items which were executed in a more luxurious style than was necessary for their function, making them also suitable as 'gift'. Examples of these are items which both existed in plain and elaborate versions, such as *fibulae* and pottery vessels used as container.

Grave goods related to the burial attire have been encountered in the graves of the women (2012-01 and 2012-02), but not in any other of the primary- and secondary deposits. The remains of the attire of individual 2012-01 consisted of two bronze ring *fibulae* on the shoulders, one *fibula* on the chest, one small belt buckle near the pelvis and a glass bead with organic material and bronze fragments at the medial side of the left elbow, which were possibly parts of a pouch or purse (see also chapter 2). Other small iron fragments were found near the pelvis which were probably parts of the belt, or items suspended from the belt, such as a knife. The remains of the burial attire of individual 2012-02 consisted of one bronze ring *fibula* on the right shoulder, one *fibula* or buckle of a yet undetermined type on the left shoulder, a bead necklace of more than 70 beads (of crystal, amber and glass), a possible pouch or purse near the legs, and a decorated belt with buckle around the waist, from which a knife was suspended. From the excavation data and the x-ray images it became clear that the *fibula* from individual 2012-01 was probably of the 'Domburg'-type, which is frequently found in the Frisian areas (figure 5.11). Another (more recognizable) example of this type was found in

Oegstgeest in a different context (figure 5.12). The curled kidney-shaped ends of the *fibulae* are a rudimentary form of two opposing bird heads, which were present on earlier types of fibulae (see also the birds on the Sutton Hoo purse, figure 5.2 above). It is questionable whether the *fibulae* have to be regarded as a distinct Frisian ethnic element, or that they have to be regarded as Frisian in a geographical sense (i.e. its distribution [Dijkstra 2011, 354-3])

It is possible that the *fibulae* (which can be dated in the late sixth and seventh century) were employed as a sign that a woman was married, or as a symbol with a pagan mythological meaning (*ibid.*). The combination of one or two ring *fibulae* on the shoulders, and a Domburg (or other type of) *fibulae* are regarded as a clothing style typical for the Frisian area. Examples of these combinations have been found in graves of multiple Frisian cemeteries (figure 5.10), to which the two women from Oegstgeest can now be added. It is interesting to note that although the young woman (2012-01) was not born in the Frisian area, she was integrated to such an extent that it was possible to be buried in a distinct Frisian (mortuary) dress-style. In contrast to the *fibulae*, the bead necklace of the older woman cannot be regarded as distinct Frisian, as these types of necklaces appear throughout northwestern Europe during the entire early medieval period. They are predominantly found in the graves of women, but also occur in those of children. The beads often formed a gathered assemblage with specimens of various color, material and age, some being centuries old at the final moment of deposition. Although the beads were often displayed on necklaces, they could have also been sewn onto cloth or kept in a purse or box (Kars 2011, 84). It is likely that the isolated bead from the grave of individual 2012-01 was probably part of a purse or was contained in one. Some scholars assume that the beads were seen as objects with a certain biography and that they were acquired at different life stages of an individual. In particular beads made from highly valued material, such as precious metal, or from materials with possible symbolic meaning, such as rock crystal, might have been linked to noteworthy events in a woman's life (e.g. marriage, giving birth etc.). The occurrence of beads of considerable antiquity further indicate that not all beads were directly interred in the grave of the owner, but were also circulated and passed as heirlooms to subsequent generations (*Ibid*.). In this sense, the bead necklaces and other jewelry can be considered to fulfill an identical role for women as weaponry does for men (i.e. both being objects with biographical significance and used as heirlooms).

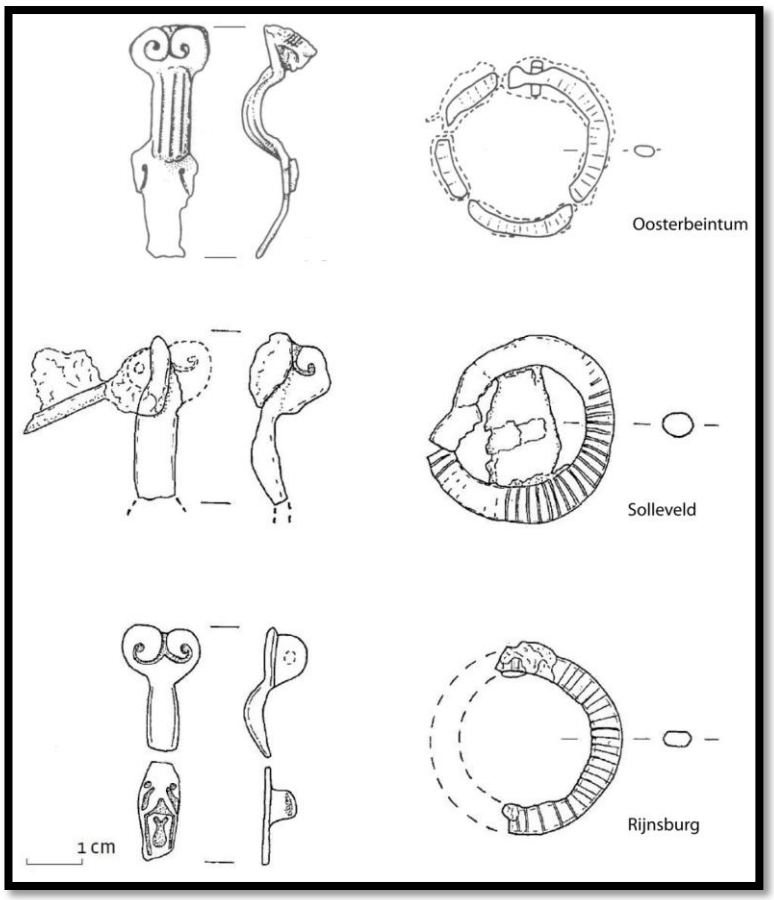


Figure 5.10 (left): Combinations of Domburg- and ring fibulae from Frisian cemeteries (drawings from: Knol et al. 1996, 130; Dijkstra 2011, 356, and modified by author)

Figure 5.11 (middle): Distribution of Domburg fibulae (finds up till 2011). Dotted lines indicate the borders of early medieval Frisia (image from: Dijkstra 2011, 355).

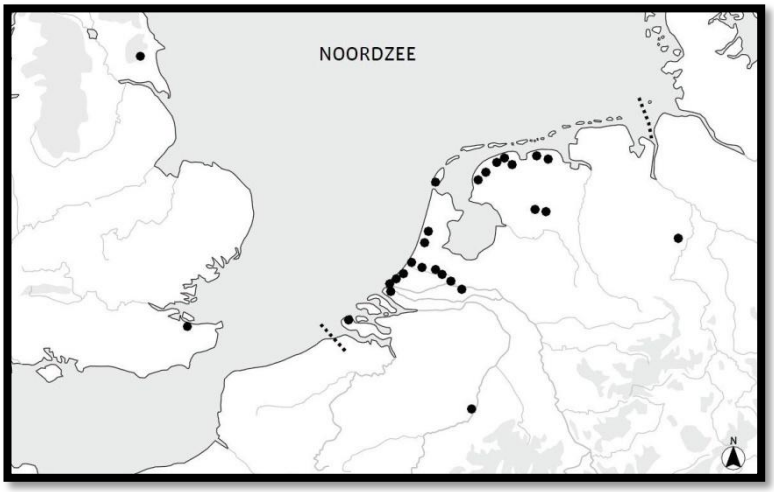


Figure 5.12 (below): Domburg fibulae from the Frisian areas. from left to right: 1. mold and fibula from Dorestad (Wijk bij Duurstede [www.dorestadonthuld.nl, 25-01-2016)), 2. fibula from Maurik (www.huisvanhilde.nl, 25-01-2016), 3. fibula from Winsum (www.geheugenvannederland.nl, 25-01-2016), 4. X-ray image of Domburg fibula from a context in Oegstgeest (Restaura) 5. X-ray image of broken (probable) Domburg fibula from burial 2012-01 in Oegstgeest (Restaura).

As was mentioned before, no weapons were found in the settlement of Oegstgeest, including the human burials. It is not surprising that they were not found in graves, as this is relatively rare and only one formal burial of a male individual was found. Although no grave gifts were found within the graves of the male and juvenile individuals, it remains possible that grave 'offerings' were made which are not directly visible from the burials context. The offerings could have consisted of perishable materials, such as food and drink, but it could also have been that they were not interred in the grave itself. For instance, the animal burials that were found in association with the human burials could have been part of the grave gift assemblage. In particular for the horse burials this seems to be a plausible scenario. Elfi Buhrs, who analyzed the dog- and horse burials from Oegstgeest for her master thesis, has found that the buried horses were killed in the prime of their life and did not show any observable signs of pathology or trauma. In addition, two of the three horses were buried still wearing elaborate bridles (figure 5.13), indicating that they were used for riding (Buhrs 2013, 51). If the horses died from a disease, and were not meant as an offering or deliberate burial, the decorated bridles would have been certainly removed. That the carcasses were not processed or butchered (which was done with other horses in the settlement) further indicates a rationale which was not primarily economic.

The close association of the male individual 2010-01 and the adjacent horse burial in a relatively isolated location, can be regarded as an indication that this animal was indeed meant as a grave gift or offering. In contrast, for the two horses in burial cluster A the direct association with the child 2011-01 seems to be less likely for two reasons. Firstly, the horses are located some distance away, and it would be expected that they would be closer together if they were buried within a short time-span. Secondly, the young age (ca. 5 years) of the individual makes it unlikely that it would have had a social position sufficient to be bestowed with such elaborate gifts. Animals used for riding do not seem to be a fitting gift for someone not old enough to even ride a horse. Although the association with this individual is questionable, it remains possible that the horses were killed in honor of another individual whose grave is since lost, or was never present at all (considering the possibility of excarnation). Whatever may be the case, the killing of riding horses in the prime of their life, and the related deposition of elaborate riding gear, is a considerable destruction of economic property (which can be directly compared to other valuable deposits such as the silver bowl). It may be assumed that these deposits were initiated by an individual or group which was able to bear the loss

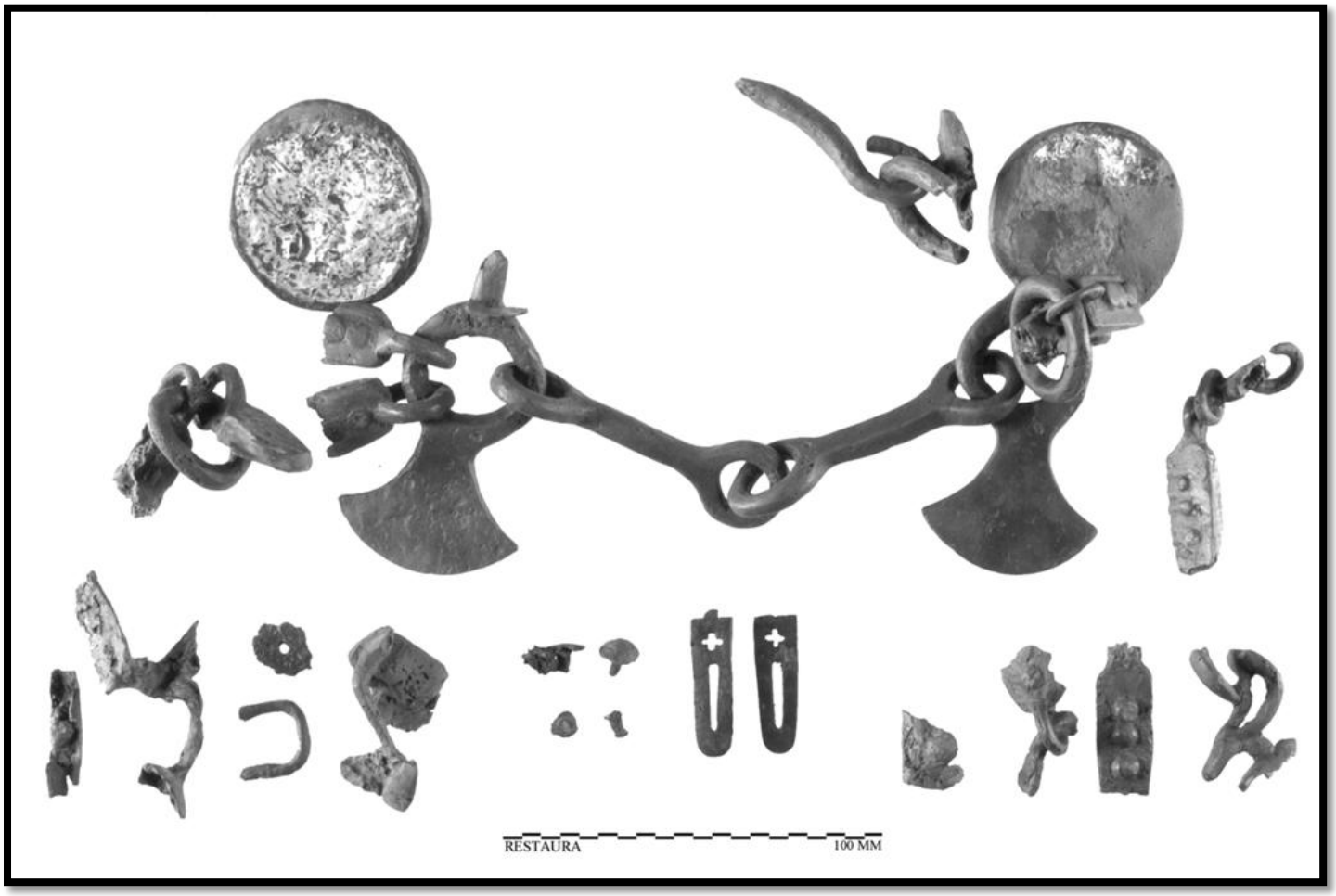


Figure 5.13 (above): Decorated bridle of bronze (round discs are silver-plated) which was worn by one of the buried horses from Oegstgeest. Including such expensive gear in the grave indicate a motive for deposition which was not primarily economic (Image by Restaura, provided by J. de Bruin)

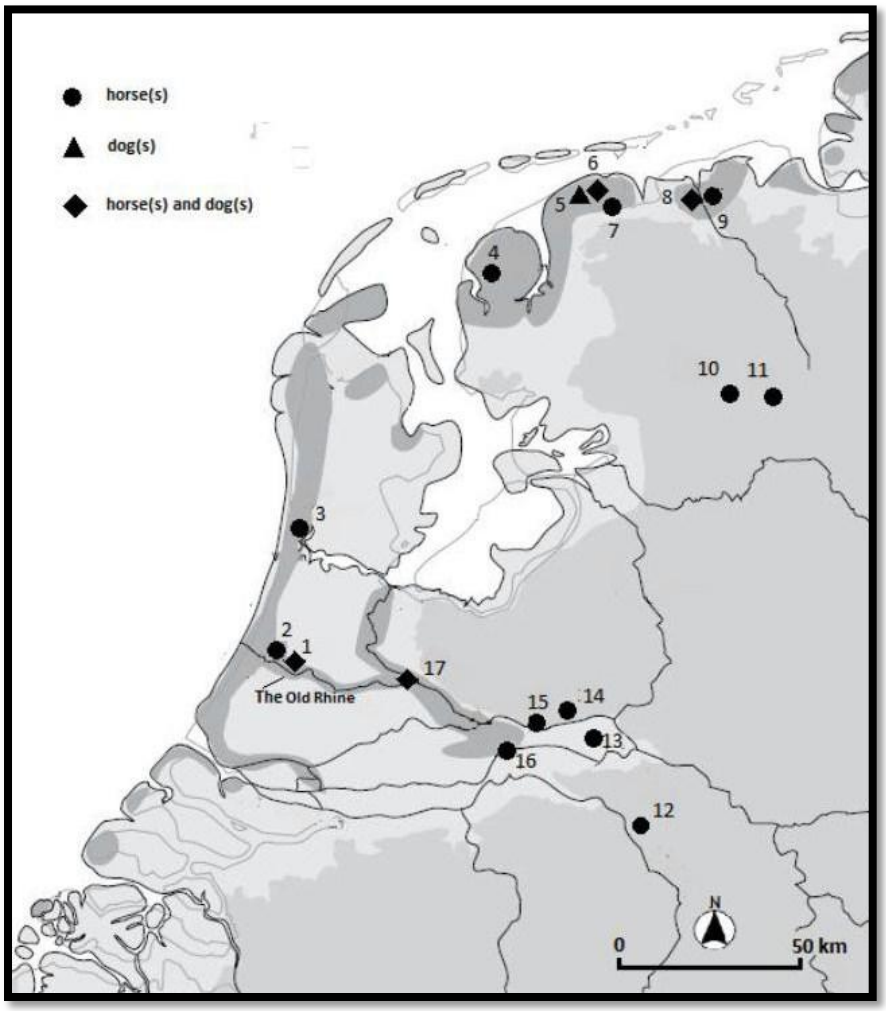


Figure 5.14 (left): Location of early medieval dog- and horse burials in the Netherlands, excluding Limburg. Dark grey areas indicate habitation centers., 37). 1: Oegstgeest; 2: Rijnsburg; 3: Dorregeest; 4: Zweins; 5: Hogebeintum; 6: Oosterbeintum; 7: Dokkum; 8: Hogebeintum; 9: Antum; 10: Looveen; 11: Zweeloo; 12: Gennep; 13: Elst; 14: Wageningen; 15: Rhenen; 16: Echteld; 17: Leidsche Rijn (adapted from: Buhrs 2013).

of such economic property, which may be regarded as a sign of a certain degree of high status and/or (economic) power.

For the dog burials, Buhrs found that these animals were probably not killed as an act of ritual, but died of old age. The presence of spinal arthritis and advanced dental attrition indicated that the dogs were at least older than six years. In addition, the skeletons showed few to no signs of maltreatment. While other dogs at the settlement ended up in the waste pits of the settlement, these three dogs were buried in a deliberate and respectful manner in close association with two human burials. It is therefore likely that they were valued members of the household during life, and given their large size, were possibly used as guarding or hunting dogs (Buhrs 2013, 50-51). If the dogs indeed died of old age, their deaths would probably not have occurred at the same time as the two humans which were buried in the same cluster. It is therefore unlikely that they were a direct grave gift to a deceased human.

Dog and horse burials are not common, but do have a widespread distribution in the early medieval period (figure 5.14). In particular in eastern Germany and the North Sea coastal areas they occur most often (Prummel 1992, 147-152). However, in the western coastal area of the Netherlands they are rare, but this may in part be due to the scarcity of cemeteries in this area. For a full discussion on the dog- and horse burials from Oegstgeest and their setting in the context of early medieval Europe, the reader is referred to the thesis of Buhrs (2013). Two concluding remarks concerning the graves are however in place here. First, considering the distribution, the dog an horse burials cannot specifically be regarded as a Frisian custom, although separate dog burials are more frequent in the Frisian area than inland (Prummel 1992, 147-152). With the inclusion of both dogs and horses, Oegstgeest is (for now) considered to be unique in the western coastal area of the Netherlands, including the Rhine estuary. Second, the horse burials and the riding gear from Oegstgeest represent one of the few indications for an individual or group with a relatively high degree of status or wealth within the local community. In the absence of weaponry it is impossible to determine whether the riding horses were the ‘equipment’ of a martial elite or another wealthy class, such as merchants.

5.8 The silver bowl of Oegstgeest

When discussing the human remains and other special deposits which might be related to them, one last item found at the settlement of Oegstgeest certainly has to be

mentioned. During the excavations in 2013, an extraordinary deposit was found in the gully which formed the northern border of the settlement (see fig. 5.9).[75] The deposit consisted of a silver and gold bowl, which was decorated at both the in- and outside (figure 5.15). The decoration in the inside, made from gold leaf applied on silver, is divided into three zones, separated by stylized plants or trees, which are topped by symbols of wheels with six spokes. A horizontal line divides the lower and upper parts of the bowl, forming three friezes in between the wheel symbols. In the friezes depictions of creatures can be seen, resembling stags, hounds, goats and mythical creatures, of which one is shown with a human leg in its mouth. In the middle of the bowl a round gold disc is attached (probably a later addition), decorated with garnets and swirls of gold wire. The garnets are set in a cross shape, with four garnets between the arms of the cross, making it appear as an eight-armed star/wheel. On the outside of the bowl, two mounts are present with a raised ridge, which has a loop from which rings are suspended. The plates of the mounts are decorated with encased garnets and gold filigree thread. The lower border of the plates display a human head, and below one of the heads, a symbol similar to the stars/wheels from the inside of the bowl is present, only with five arms. The decoration of both mount plates is designed to look similar, but obvious differences are observable in the quality and execution of the pieces.[76] The raised ridges are decorated with animal figures, of which one resembles a seated dragon or lion and the other, considering the shape of the head, possibly a bird. The animal motifs resemble Celtic (possibly Thracian) and/or Anglo-Saxon patterns, but the design of the central disc resembles objects made in Frankish areas, in particular the German Rhineland. Further research has to establish the direct influences and production area.

Through the bottom of the bowl a small hole was drilled, which also perforated the central disc. While the hole can be interpreted as a deliberate destruction prior to deposition, it might also have had a function during the use-life of the vessel. A number of possible functions have been opted (none of which have been published yet), ranging

[75] The description is partially based on a document published by Leiden University at the time when the find was made public in 2014. In the document, only a preliminary interpretation was provided, as the find is awaiting detailed analysis. The document can be accessed at: http://media.leidenuniv.nl/legacy/beschrijving-schaal-van-oegstgeest-plaatjes-eng.pdf (accessed 26-01-2016).

[76] It is here assumed that the mount which is from an obviously less quality is a later copy of the other mount and was fabricated by a craftsman with less skill. This may be apparent in the lack of filigree work, the poor and unharmonious design and the improper encasing of the garnets. The raised ridge of the mount, which is manufactured separately, does seems to be from the same goldsmith.

Figure 5.15: The bowl of Oegstgeest seen from the inside (top right) with details of the decoration. Top left: mythical creature with a human leg in its mouth. Middle left: decorated plate and suspension ring with a human face at the lower end. Bottom left: drawing of the face and star/wheel (?). Bottom right: side view of the plate and suspension ring with decoration of stylized animals (Images by Restaura, provided by Leiden University, modified by author. Drawing by author).

from drinking vessel, to compass, to 'water clock'. Whatever it may have been, the two suspension rings indicate that one of the functions of the bowl was to be hanged, either for practical or aesthetic purposes. It was not possible to hang the bowl horizontally, as only two suspension ring were present that were not located opposite to one another. Any indications that a third mount was present halfway between the other two have been thoroughly searched for (including with the help of X-ray) but not been found. Either the bowl was meant to be hanged from two rings, or the third mount was planned but not completed. It is here assumed that the former option would likely have been the case, as this would hang the bowl vertically, by which the lavish decoration on the inside would be clearly visible.

Besides being one of the few lavishly decorated items of high (intrinsic) value from the settlement, the bowl is also of importance in regard to the human remains for multiple reasons:

1. The bowl is regarded as a probable ritual deposit of considerable significance. Similar to many deposits of isolated bones it was deposited in one of the gullies forming the boundary of the settlement. Its location at the northern periphery of the settlement, close to burial cluster A, further indicates the ritual significance of that area.
2. The bowl is the only item from Oegstgeest which clearly depicts human figures. One of the depictions consists of a mythical creature (possibly a manticore or satyral [figure 5.16 and Edmondson *et al*. 1780; Salisbury 1997, 12]) which holds part of a dismembered human corpse (a complete leg) in its mouth.
3. The bowl depicts three wheel symbols, of which another example exist in Oegstgeest made of human long bones (figure 5.17).

Because the bowl is probably manufactured in the period before the occupation of Oegstgeest (pers. comm. J. de Bruin), it is not possible to establish whether the symbols still were of ritual significance to its early medieval owner(s). While the symbols resemble early medieval examples, there is a possibility that this might be purely coincidental. However, as the Celtic religions were so widespread and existed for such a long time-span, it is suspected that both the presence of the Celtic symbols on the bowl, and the presence of the bowl in Oegstgeest, are not coincidental.

Figure 5.16 (left): Manticore from a 13th-century manuscript (MS. Bodl. 764, fol. 25r. (image from: http://johnguycollick.com/pards-and-manticores-a-medieval-bestiary/ [27-01-2016])

Figure 5.17 (below): drawing of star-shaped bone deposit (above) and side view of the silver bowl (below), displaying the six-armed symbols which take a prominent place in the design of the bowl's interior (drawing by author, image of silver bowl by Restaura).

6 Conclusion

"Thus glory endeth,
and gold fadeth,
on noise and clamours
the night falleth.
Lift up your hearts,
lords and maidens
for the song of sorrow
that was sung of old."

(The Legend of Sigurd and Gudrún[77])

In the introduction of this thesis, one research question was presented which formed the basis for this research:

How can the lives and deaths of the inhabitants of the Oegstgeest settlement be characterized based on their skeletal remains and associated contexts?

This question was addressed by investigating different aspects of the human bones and their associated contexts. These aspects were grouped into three categories (context/taphonomy, osteology, isotopes), each of which was addressed with corresponding research questions. The research questions presented for the separate categories are repeated below, followed by the concluding answers that were formed on the basis of this research.

(2.1)[78] What was the appearance of the landscape in the western Netherlands, particularly at Oegstgeest, and how were the burials located within this landscape?

In the western coastal area, the dunes largely protected the inland areas from daily (tidal) intrusions of seawater. The dunes were only intersected by rivers, such as the Rhine and Meuse, debouching into the sea. Because the ground level of the inland areas was relatively low and the water table high, they were too wet for habitation. In these marches peat developed until the high middle ages, when large-scale reclamations were initiated. In the early medieval period habitation was concentrated on higher (and

[77] An epic poem written by J.R.R. Tolkien (2009, 310), based on the thirteenth century Völsunga saga.
[78] The number refers to the chapter (first number) and order (second number) in which the research questions were addressed

therefore drier) ridges in the landscape, such as on the coastal dunes and raised banks along the rivers. These river banks had been gradually build up by thin layers of sediment which were deposited each time the river overflowed.

The habitation in Oegstgeest was located along a side-channel of the Old Rhine river, and the buildings were primarily situated on two river banks. In between these raised areas in the landscape, a lower depression existed in which no buildings were present. Water management was essential in the settlement to ensure that the buildings and economic resources were kept dry. Multiple gullies and ditches were present or created, which regulated drainage of the lands. The waterways divided the settlement into four habitation quarters, three of which were relatively densely occupied. A large gully, which was orientated perpendicular on the river channel, divided the northern and southern habitation quarters. Possibly to connect these quarters, two attempts were made do dam off the gully (but both dams were breached), and in one instance a bridge was built across.

Within this landscape, the place of deposition for human remains was consciously selected, and often based on associations with prominent features. The primary formal burials were located along the gullies that formed the northern border of the settlement. The orientation of the graves was based on the orientation of the gully. The graves were specifically located north of the boundary, outside the habitation areas ('the land of the living'). Only one formal primary burial was located in the southern half of the settlement, but also outside the main habitation area. The primary burials along the northern periphery were divided into three clusters, in which either a combination was present with other human deposits, with formal animal burials, or both. Animal burials were not exclusively buried outside the habitation areas, but also within.

Secondary deposits of human bone were primarily located within the habitation areas, or in the features which made up the boundaries of these areas. A preference existed for deposition in wet contexts with a possible liminal character, such as ditches, depressions or wells. In addition, two isolated femora were located within the dams, one in each. The distribution of isolated long bones on the one hand, and isolated cranial fragments on the other, showed notable differences. Long bones were exclusively deposited in and around the northwestern habitation quarter, while crania showed a wider distribution, mainly concentrated in the middle of the settlement.

The three identified deviant primary deposits were located within the habitation areas. However, two of them are located in the direct vicinity of a boundary ditch (one within a burial cluster) and the third is located halfway between two burial clusters at the northern periphery. So, while the three burials seem to be dispersed, their location does not seem to be randomly chosen.

The last category consists of a single cremation which was found in a disused well. The well is located in the middle of an habitation area and is in no way associated with a boundary feature. Why this location in the landscape was chosen for the deposition is unknown, but it is possible that it served as a closure- or foundation deposit for the well, or the house to which it belonged.

(2.2) What was the position of the corpse at the moment of deposition?

The reconstructed position of the bodies at the moment of burial is quite varied. The individuals from the formal primary burials were either in a supine (three individuals, of which one female and two sub-adults) or crouched (two individuals) position. Of the crouched individuals, one (a male) was positioned on its side with the legs slightly retracted, and one (a female) was positioned on her back with the legs retracted and to the side.

The three deviant buried male individuals were all in a full or partial prone position at the moment of excavation. One was buried prone in a pit that was too small to contain the body horizontally, causing the upper body to curve upward on the slope of the pit. The second individual was deposited in a ditch, his legs splayed and the upper body folded face down over the left leg, the arms to the right side. The third individual was partially cremated, possibly in a seated position, after which the unburned torso was deposited prone on top of the burned remains, in a small pit.

The position of the secondary deposited bones within their context have been only sparsely considered, but one contexts is worth noting. One pit, which was located in the most northern burial cluster, contained five long bones that were positioned in a star-shaped pattern. The interpretation of this pattern is explained below.

(2.3) Was the post-burial displacement of bones influenced by elements that were present at the moment of deposition, such as a sepulcher or burial attire?

Based on the position of the skeleton and the soil traces (features) around the corpses, it was found that two individuals were likely buried inside a wooden structure. These individuals were the two women that were buried in cluster B (individuals 2012-01 and 2012-02). The wooden structures were not of a regular size or shape, making it unlikely that it consisted of a prefabricated rectangular coffin in which the corpse was enclosed before being deposited in the grave. More likely, the wooden structure was built inside the excavated grave, creating a chamber-like sepulcher.

Displacement of skeletal elements in some of the other burials were indicative for an existing void around the corpse at the moment of decomposition, but no traces of constructed sepulchers were found there. As a result, it was not possible to reconstruct the appearance of the burial structure in which these individuals were deposited.

In two graves, again of the two women, remains of a burial attire, consisting of *fibulae* (clothing fasteners), buckles and beads, were found on and around the skeleton. The style of the attire accessories (in particular the combination of ring *fibula(e)* and (Domburg) *fibula(e)*) that was encountered in these graves can be regarded as a style typical for the Frisian area and/or culture. In the grave of a sub-adult (2011-01) a small strip of lead was found adjacent to the skull, which may have been part of an attire. All the other deposits of human remains did not produce any indication for a burial attire. Either the individuals were enclosed in an attire of perishable materials (e.g. a shroud), or the corpses were deposited without any form of covering.

Both the wooden sepulcher and the clothing of the two female individuals influenced the position of the skeletal elements after burial. The void around the corpses allowed displacement of skeletal elements under the influence of gravity, such as lateral rotation of the os coxae. The collapse of the sepulcher roof is considered to be the most likely cause of the fragmentation and displacement of the facial regions (splanchnocranium). The medial ends of the clavicles were displaced in an inferior direction (‘verticalization’), which was likely caused by a medially directed pressure. It is possible that the pressure originated from the attire, which was held together by the *fibulae* at the lateral ends of the clavicles.

(2.4) Are there any signs of anthropogenic post-burial disturbances?

Multiple primary deposits were disturbed after the initial burial event. The graves of three individuals were disturbed in (sub-) recent times during ploughing, soil extraction or building or demolition activities.

Disturbances in two other graves occurred in earlier periods. Skeletal displacement in the thoracic region of individual 2012-01 was possibly caused by a burrowing animal, such as a mole (*Talpa europaea*). Based on the observed skeletal displacements, the disturbance occurred in the period after (advanced) decomposition of the corpse, but before the collapse of the wooden sepulcher (i.e. between ca. multiple weeks to ca. 30 years after burial).

Although its context seemed to be intact, the skeleton of individual 2011-02 was missing multiple elements at the moment of excavation, such as the cranium, the entire right leg and the left femur. The remainder of the skeleton appeared to be undisturbed, except for the left os coxae, which rotated laterally. The disappearance of the elements probably occurred after (advanced) decomposition, but before the ditch in which the corpse was deposited, silted up or was backfilled.

(3.1) How many individuals are represented in the total assemblage?

In the total assemblage of human remains found at Oegstgeest, a minimal of thirteen individuals is represented. It is probable that the cremated remains from the well represent a fourteenth individual, but as skeletal parts could not be determined in detail, this is uncertain. The charnel pit adjacent to the star-shaped deposit (2011-03) contained the remains of minimally six individuals, by which it is the context with the highest amount of human remains from different individuals.

(3.2) What is the reconstructed age-at-death, sex and stature of the individuals?

Three individuals found in the Oegstgeest settlement died at a sub-adult age, at an estimated age of 7-12 years, 4-6 years and 13-18 years respectively. Sex- and stature estimations were not possible for these individuals. All other human remains that could be assessed for age-at-death were of adult individuals, in the age range of 18 to 50 years. Only one of the skeletal elements had an age estimation of middle- to old adult (36-50+ years), and this is the only possible old adult from the site.

The sex estimation of two adult individuals indicated a female sex, which was confirmed by subsequent DNA analysis. One element from a secondary deposit was assessed as possible female. Four primary deposits and 30 elements from secondary deposits were assessed as male or possible male. From one primary deposit and three elements from secondary deposits the sex estimation was indeterminate, meaning that the observed traits were neither distinctively male nor female.

From four males and one female it was possible to obtain measurements for stature estimation. The estimation of the female was 168.60 (± 6.19) cm, while those of the males range between 171.92 (± 5.96) cm and 182.93 (± 7.07) cm, with a calculated average of 176.3 (± 3.50) cm.

(3.3) Are there any observable signs of trauma or pathological conditions and by which processes are they caused?

Dental pathology

Dental pathology was present in most dentitions that were found at the site. A total of 93 teeth, belonging to seven individuals, was recovered. For one dentition it was not possible to observe pathologies, as only the roots remained (due to the cremation process). Calculus was present on 69% of the observable teeth, while only 5% of the teeth exhibited caries. Two dentitions showed traces of abscesses within the alveolar bone. One individual exhibited an enamel defect known as enamel hypoplasia, which is caused by a prolonged period of physiological stress.

The upper central incisors of individual 2012-01 exhibited two semicircular indentations on the incisal edge, which are either the result of aesthetic modification, or using the teeth as 'tools'(for instance to hold nails or needles).

Skeletal pathology

In the category of skeletal pathologies, no severe conditions were encountered. Multiple individuals exhibited some degree of degradation of the joint facets (osteoarthritis), which is common and primarily related to advancing age. One adult female (2012-02) exhibited eburnation in both thumbs and the right trapezium, while the other fingers were unaffected. Both the site at which the eburnation occurred, and the age at which it was initiated, make it unlikely that it was caused by normal wear-and-tear. It is assumed that the woman engaged in an activity that necessitated a repetitive motion of the thumbs, causing accelerated wear of the joints. One of the activities that was performed

at the settlement is weaving, and this is considered to be an activity which might possibly has caused the wear.

The (semi-) cremated individual 2013-01 exhibited deposits of woven bone on the anterior aspect of the first nine thoracic vertebrae. The location of the lesions suggests that they were caused by a condition in the respiratory system. The lesions are not specific for a single disease. However, brucellosis, a relatively common disease contracted by contact with (domesticated) animals, was considered as a possible option.

On the left mandibular condyle of an isolated mandible, a depression was present caused by the detachment or compression of bone. The lesion was in an active state of healing at the moment of death. Possibly the lesion was caused by an impact on the anterior side of the mandible, by which the condyle was forced against the mandibular fossa.

Trauma and scavenging marks

Four elements, all from secondary deposits, displayed one or multiple traumatic lesions of which the timing of infliction could be assessed as perimortem. The lesions of two elements (both tibiae) were caused by a sharp-bladed weapon used in a hacking motion. The lesions on one of these elements exhibited slightly rounded kerf floors, suggesting that a weapon was used with a rounded edge, such as a battle axe. The lesion on the second element exhibited a straight kerf floor, suggesting that a weapon was used with a straight edge, such as a long- or short sword. A lesion on a third element, a femur, was caused by the impact of a sharp point (possibly from a sword or lance), leaving a distinct impact mark. The fourth element which exhibited perimortem trauma was a frontal bone on which two parallel cut marks were present. The lesions were inflicted by a sharp-edged object used in a slicing motion. For all lesions it was impossible to establish whether they were inflicted shortly before death (during interpersonal violence), or shortly after death (during processing of the corpse). Repetitive inflictions on single bones, such as the two parallel cut marks on the frontal bone and the five hacking marks on a single tibia shaft, suggest that the latter would have been the case.

Marks on bone that were caused by scavenging animals were present on four elements from secondary deposits. All elements were long bones (two humeri, a femur and a tibia). Scavenging marks on bones from the appendicular skeleton are relatively common, as the appendages are more easily detached and transported by animals than

other body parts. The four elements all exhibited marks which are characteristic for large carnivores, such as dogs or wolves. In some instances smaller scratches superimposed the larger carnivore marks, which are possibly created by other animals such as scavenging birds (e.g. white-tailed eagle).

(3.4) What is the composition of the secondary deposits and how does this relate to the primary deposits?

The sex- and age estimations of the elements from secondary deposits indicated that they consisted primarily of adult male individuals. Furthermore, it was found that for the secondary deposits, large elements from the skeleton were selected, such as long bones and crania. Eight elements from the deposits exhibited marks indicative for perimortem trauma or postmortem scavenging. These findings are in stark contrast with those from the primary deposits. They consisted of individuals from both sexes and varying age categories. Also, no traumatic lesions or traces of scavenging were discovered on the bones from the primary deposits. It may thus be concluded that secondary deposition was a disposal method reserved for a particular category of people, and inclusion into this category was possibly based on sex, age, provenance or the way in which the person died (e.g. in battle).

(3.5) How does the data from Oegstgeest relate to similar archaeological sites?

The demographic data from Oegstgeest has been compared to data from the early medieval cemeteries of Oosterbeintum (a 'Frisian' cemetery) and two cemeteries from Maastricht (St. Servaas *Templum* and Boschstraat, both 'Frankish' cemeteries). Unfortunately, because the sample size from Oegstgeest is small, reliable conclusions could not be made on the basis of the comparison. However, from the demographic data that could be (cautiously) compared, it seemed that no significant differences were observable between the burial groups.

(4.1) What was the birthplace of the individuals and did they migrate after childhood?

Of five human individuals the isotopic composition of the teeth have been analyzed to establish the area of birth. Of all five individuals the strontium isotopes were analyzed, and from three of these individuals the composition of the stable oxygen isotopes was analyzed as well. The results from these analyses indicated that four of the five individuals were not born in the coastal area of the Netherlands. These individuals were born in a different region and migrated to Oegstgeest at some point in their life.

With the combined results of both strontium- and stable oxygen isotope analyses it was possible to identify the region of birth of three individuals. The sub-adult 2011-01 originated from an area to the west of the Netherlands, most likely the United Kingdom or the northern coast of France (Normandy). Both the semi-cremated individual 2013-01 and one individual from the charnel pit 2011-03 originated from an area to the east of the Netherlands, likely in southwest- or central Germany. Interestingly, two pigs that were found in Oegstgeest originated from the same area as these two men.

For the fourth non-local individual from Oegstgeest, the woman 2012-01, only strontium isotope analysis was done. As a result it was merely possible to establish her region of birth as being an area with geologically older bedrock or sediments. Although this excludes the coastal area, many areas in northwestern Europe are made up of such older material. However, her strontium isotope signature did not match any of the other individuals, from which it can be concluded that she was born in a different area than them.

(4.2) Can the origin of the individual be related to the mode of deposition?

As the provenance of an individual is but one of the variables that might determine the mode of deposition after death (which is ultimately determined by the peers of the deceased), it is impossible to establish the exact relation between the birthplace of an individual, and its mortuary treatment. However, the results from Oegstgeest suggests that the place of birth did play *some* role in determining the mode of deposition for a part of the buried population. From the five analyzed individuals, three were formal primary inhumations (the sub-adult 2011-01 and the two women 2012-01 and 2012-02). Two of these individuals were not born in the region of Oegstgeest, but they were nevertheless buried according to local customs. The young woman 2012-01, an individual of foreign birth, was even buried in an attire characteristic for the Frisian region. For these individuals it seems, from an archaeological perspective, that a non-local birthplace was not of primary influence on the mortuary treatment. For the other two analyzed individuals (2011-03 and 2013-01), this might be different. Both were deposited in a manner which is regarded as deviant, of which parallels are rare in Frisia. Both also originated from the same region in Germany. It is possible that these individuals were of a different social status than the individuals from the formal inhumations, necessitating a different mortuary treatment. However, it remains the

question whether their foreign origin was the cause of their deviating status (e.g. if they were perceived as enemies), or that it was caused by something else.

(4.3) How do the results from the isotope study relate to previous theories concerning early medieval migration in the Netherlands?

Traditional theories about the early medieval migrations in northwestern Europe, based on the material culture and language of populations, focus primarily on east to west movements. The isotope results from Oegstgeest have shown that at least part of these traditional theories are valid. However, they have also shown that migration flows were more diverse than was previously thought, as the five analyzed individuals originated out of four different regions. The British or Norman origin of the child 2011-01 further indicates that early medieval migration in northwestern Europe was not a one-way street from east to west, but could also occur in the opposite direction. Frisia had a central position between the Scandinavian and British regions to the west, and the Frankish and Germanic regions to the east, and movement of people through the area over the waterways was probably a common occurrence. The establishment of Frisian trading quarters in distant places such as York, Mainz and Birka, indicate that Frisia was not only a destination for foreigners, but that the Frisians also frequently travelled to foreign destinations.

(5.1) How can the phenomena observed in the human remains assemblage from Oegstgeest be explained from a religious and/or cultural point of view?

The human remains that are found in the settlement of Oegstgeest are considered to be the end-product of a mortuary program, combined with taphonomic processes. The way in which human remains are treated is often strongly related to prevalent traditions and concepts surrounding death and the afterlife. Unfortunately, there are no detailed historical accounts about the traditions and ritual concepts of the early medieval inhabitants of the Frisian coastal region. Although it is assumed that the Frisians followed a Pagan religion, it is unknown exactly which deities were venerated, and how they were worshipped in daily life. As a result, it is also unknown which traditions and concepts formed the basis for the treatment of human remains. In an attempt to explain the concepts and ritualized acts surrounding the human remains of Oegstgeest, different theories have been proposed for each category of deposit.

The secondary deposits

For the secondary deposits it was concluded that they were the product of intentional and premeditated, probably ritualized, actions. Multiple selective criteria were applied which determined where the deposits took place, whose bones were deposited and which type of bones were used. The selective deposition of isolated bones was not unique for Oegstgeest, but was also practiced at other sites, such as Utrecht Leidsche Rijn. The analysis of the bones from the secondary deposits at Oegstgeest indicated that at least a part of the corpses from which the bones were derived decomposed above ground. In addition, at least in one instance the soft tissue of the corpse was not completely decomposed when the secondary deposition of the bones took place. Combined with the indications for postmortem processing of human cadavers (i.e. the sharp force lesions), it is proposed that a ritualized excarnation process was performed on (a selection of) the deceased individuals. The scavenging marks of carnivores and possibly birds indicate that excarnation might have been accelerated by animals. Some scavenging animals that inhabited the natural environment of the Netherlands fulfilled an important role in the mythology of Pagan Europe. These animals - the wolf, raven and white-tailed eagle ('the beasts of battle') - were widely known as disposers of the corpses of fallen warriors, but also as the companions and messengers of the gods, such as Odin/Wodan. It is possible that corpse disposal by, or with the help of, these (esteemed) animals, was the preferred method for a part of the deceased population, such as warriors. The demographic composition of the secondary deposits, being almost exclusively adult males, might reflect that this practice was reserved for a warrior group.

The deviant primary deposits

The three deviant primary deposits were considerably varied in their execution, geographical location and context. However, In accordance with the secondary deposits, they all consisted of adult male individuals. It is thus assumed that a deviant primary deposition was also reserved for a particular category of society. It is possible that the different executions of the deposits are linked to different motivations why the individuals were deposited in such a way. In particular for the semi-cremated individual 2013-01, a motivation different to those from the other deposits may be assumed. It is proposed that the burning of the individual was not intended as a proper cremation, but more as a ritual to cleanse the body and/or the soul of the individual.

Furthermore, the possibility was proposed that the inhabitants of Oegstgeest venerated Pagan Celtic deities, in which case the deposits might be explained from that perspective. Among the many Celtic gods, three deities formed an important trinity, each of which required specific offerings to be pleased. *Teutates* demanded offerings of drowned captives and fallen warriors, *Esus* demanded prisoners who were hanged on trees and then dismembered, and the third, *Taranis*, demanded prisoners who were burned. The deviant buried individuals might represent the remains of offerings to these deities. However, it is deemed unlikely that the individuals were solely sacrificed for this purpose. The corpses of the already deceased individuals might rather have been a suitable opportunity to find favor with the deities by treating them in specific ways. If indeed offerings to these gods occurred in the Oegstgeest settlement, it is possible that the secondary deposits can also be explained from this perspective. In that case, they were not meant specifically for the 'beasts of battle', as was earlier mentioned, but were actually offerings to *Esus*.

The cremation from the well

Only one full cremation was found in the Oegstgeest settlement, which was deposited in the top layer of a disused well. The well was probably associated with one of the adjacent houses. Two possible options were proposed to explain the purpose of the cremated remains in this particular context. Either it served as a 'closure deposit', signifying the abandonment of the well and/or the nearby farmstead, or it served as a 'foundation deposit', signifying the construction of the farmstead which was built on top of the disused well.

The formal primary inhumations

Five formal inhumations were found in the settlement that were largely intact, and a sixth context probably contained the disturbed remains of a formal inhumation. Five inhumations were located at the northern periphery, at the 'outside' of the gullies which formed the border of the habitation areas. Comparable burial clusters at the boundaries of settlements have been found at contemporaneous sites in northwestern Europe, and multiple theories have been proposed to explain this phenomenon. One of these theories state that the burials were intended to legitimize territorial claims on the lands enclosed by the boundaries. If ownership of land was hereditary, burying a member of the household at the boundaries of the owned land served to reaffirm the ancestral affiliation. For Anglo-Saxon England it was found that when an increase of spatial

organization and stability of the settlement occurred, an increasing amount of burial grounds were established in the settlement area. It is plausible that the formal burials at the edges of the Oegstgeest settlement were likewise intended to establish, or reaffirm, territorial claims on the adjacent habitation- and/or agricultural areas. The presence of three separate burial clusters might then suggest that the settlement was divided into smaller areas with separate burial grounds, which were controlled by different households.

The formal inhumations of Oegstgeest fit in with the prevalent early medieval burials customs in the Frisian region. Their orientation, body posture, sepulcher and grave goods all share similarities with contemporaneous sites in the coastal area. In particular the grave goods of the two women, such as the *fibulae* combinations, have been identified as distinct elements of the early medieval Frisian culture.

Although hardly any grave gifts were found within the graves, it is possible that the formal horse burials, located within the identified burial clusters, represent gifts to deceased household members. Not only were the animals purposefully killed in the prime of their life, two of the three horses were buried wearing elaborate riding gear. The burial of a riding horse and its valuable gear can be regarded as a significant destruction of economic property and would have been a powerful display, one which might have been intended as a ritual offering, but undoubtedly would also have served as a signal to the human peers of the offerer.

The silver bowl

One (possible) ritual offering of comparable significance was a silver bowl, found in the gully close to burial cluster A. The bowl is decorated with a number of symbols and animals (of which one was displayed with a human leg in its mouth). One of the symbols appears multiple times, and is interpreted as a wheel with six spokes. The wheel is often interpreted as a symbol for the sun, and occurs regularly in the symbolism of late prehistoric and early medieval pagan mythology. Interestingly, the wheel was also the standard attribute of the Celtic deity *Taranis*. The wheel symbols of the bowl resemble the appearance of the star-shaped long bone deposit, found in burial cluster B. Furthermore, the motif appears regularly in the decoration of other early medieval items, such as *fibulae* and pottery vessels. It is thus likely that the wheel was still a powerful symbol in the early medieval Pagan religion.

Concluding remarks

The characterization of the lives and deaths of the Oegstgeest inhabitants, based on their skeletal remains, has proved to be a challenging task. While it was possible to generate a large amount of data from the remains, the relatively small size of the assemblage, combined with its great diversity, made it difficult to recognize clear trends. However, it may be concluded that it is exactly this diversity which characterizes the lives and deaths of the Oegstgeest inhabitants. The population consisted of people from different regions in northwestern Europe, which all brought their own ideas and traditions to the settlement. Every social group might have had their own worldviews based on their culture or religion, which is reflected in the varying ways in which the deceased were treated and deposited. While in a part of the settlement the remains of the dead were integrated into the structures of daily life, in other parts they were segregated and exiled beyond the boundaries of the world of the living. However, whether the remains were located in the center or the periphery of the settlement, all were deposited with a lasting connection to the settlement and its inhabitants. As a result, the dead were able to remain an integral part of the Oegstgeest settlement for many centuries, right until the discovery of their remains during the archaeological excavations some 1400 years later.

Abstract

In the municipality of Oegstgeest (NL), an early medieval settlement was excavated spanning an area of circa eight hectares. The excavation revealed both the core habitation areas and the periphery of the settlement. Among the thousands of features and finds related to the daily activities of the inhabitants, 27 contexts were excavated that contained human remains, of which nine contained (partially) complete individuals, and 18 secondary deposited remains. The human remains and their associated contexts are the focus of this research. The human remains were subjected to various analyzes, which provided different views on the lives and deaths of the inhabitants of early medieval Oegstgeest. Based on the analysis of the geographical location of the remains, it was argued that the choice for burial location was influenced by the presence of landmarks with a liminal character, such as boundary ditches. The analysis of the burial features, and the position of the corpse therein, revealed a variety of body positions and sepulchers. The osteological analysis of the bones indicated that a minimum of thirteen individuals was represented in the assemblage. The primary inhumations consisted of both male and female individuals with a varying age-at-death. The demographic composition of the deviant burials and secondary deposits was highly homogenous, consisting almost exclusively of adult male individuals. Few pathological conditions were identified, but a relatively large number of bones (from secondary deposits) exhibited perimortem sharp force trauma and scavenging marks. From five individuals strontium and/or stable oxygen isotopes were analyzed to determine the area in which they were born. The results indicated that four individuals were not born in the coastal region of the Netherlands. It was possible to state that the five individuals were born in four different areas. Based on the isotope results, it was argued that early medieval migration flows were more diverse than previously thought. The final part of the thesis discussed cultural explanations for the phenomena that were observed in the assemblage of human remains. For the secondary deposits it was proposed that they were the product of an excarnation ritual. Possibly the wolf, raven and eagle - important animals in early medieval mythology- fulfilled a role in the excarnation process. Alternatively, the secondary deposits and deviant primary deposits might be the product of ritual offerings to specific Celtic deities. Sun or wheel symbols found in the settlement (such as in a deposit of human bones and on a silver bowl), were possibly also linked to a Celtic religious cult. The cremated remains of one individual, found in the fill of disused well, were interpreted as a foundation- or closure deposit. For the primary inhumations, which were exclusively found near the boundaries of habitation areas, it was proposed that they possibly served as territorial markers. Depositing deceased relatives at the periphery of the household estate might have strengthened the ancestral affiliation, and thereby the claim on the territory.

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[80] The numbers in brackets, which follows the figure number, e.g. [172], refers to the page on which the figure is displayed

Figure 3.4 [70]: Upper central incisors of individual 2012-01 showing the modification of the incisal edge (image by author).

Figure 3.5 [70]: Ossicle from the right glenoid of individual 2013-01. Scale in millimeters (image by author).

Figure 3.6 [77]: Schematic profile of a hacking lesion (figure produced by author based on Wenham 1989).

Figure 3.7 [77]: Merovingian weaponry from graves in the Netherlands. Top row: lance tip, harpoon tip, short sword (*sax*), long sword (*spatha*). Middle: battle axe (*fransisca*). Bottom: shield boss (*umbo* [Image from: Rijksmuseum van Oudheden, Leiden).

Figure 3.8 [79]. Left image: Diaphysis fragment from context 2011-03 seen from the posteromedial side. An impact mark is present left of the *linea aspera.* Scale bar is 5 cm. The inferior wall is smooth and the rim slightly beveled (top right image), while the other walls consist of irregular, broken bone. Its shape is triangular (white lines left image). Striations on the wall mark the direction of impact (Humphrey & Hutchinson 2000, 231), indicated by the white arrows (images by author).

Figure 3.9 [80]. Tibia Fnr. 554. Left image shows the posterolateral side with white lines marking the direction of the chop marks. The right images show details of the chop marks with on the bottom image added arrows to highlight the individual marks. The determinations of the individual marks in table 3.14 are from superior to inferior. Note the rounded kerf floor on the top right image (images by author).

Figure 3.10 [82]: Multiple femora and tibiae with hacking marks inflicted during the battle of Wisby, Sweden, in 1361. The lesions are identical in appearance to those from tibia Fnr. 554 (figure 3.10 [Photos taken by author at the Swedish History Museum, Stockholm. See also: Ingelmark 1939]).

Figure 3.11 [82]: Hacking trauma on tibia Fnr. 5323 seen from the lateroanterior side (left image) and in profile from the lateral side. Note the sharp V-shaped profile with straight edges (images by author).

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Figure 5.3 [127]: The deviant primary depositions from Oegstgeest. Top image: individual 2004-01 (image from: Archol B.V.), bottom left: individual 2011-02 (image from: Leiden University), bottom right: individual 2013-01 (image by author).

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Figure 5.5 [132]: plate from the Gundestrup Cauldron. in the middle a male deity, probably Taranis, holding a broken wheel in his right hand. The faces of the deities resemble the stylized faces on the mounts of the Oegstgeest bowl (images from: http://www.native-science.net/Gundestrup-Cauldron.htm [27-01-2016]).

Figure 5.6 [133]: Depictions of wheels on early medieval items from the Netherlands, Belgium (Doornik) and Germany (Hornhausen). First two rows: decoration on biconical pot (photo by author), and disc fibulae (all images from: National Museum of Antiquities Leiden, except for Doornik [Chifflet 1655]). Bottom row from left to right: belt end (image from: National Museum of Antiquities Leiden, drawing adapted from: Wagner & Ypey 2011), biconical pot (image from: National Museum of Antiquities Leiden) and decorated (grave?) stone with a depiction of a Merovingian warrior (image and drawing by author).

Figure 5.7 [135] Aerial photograph of trench 202. Highlighted in red are two excavated buildings, in the building on the right the well is highlighted in white with a 'C' (image from: Leiden University, modified by author).

Figure 5.8 [136]: top image: perpendicular section through the body of the dam in trench 191. Observable are the individually marked sods resting on a layer of branches,

serving as a strengthening foundation. Directly underneath this layer the right femur was found, which can be seen in detail on the bottom image. On the top image the femur was already removed during documentation (Images from: Leiden University, modified by author).

Figure 5.9 [138]: Simplified map of the Oegstgeest settlement with the location of burials and depositions. The border ditch of the northern habitation quarters and the eastern border ditch of the southwestern habitation quarter are reconstructed on the basis of incomplete features encountered in the excavations. The extent of the southeastern habitation quarter is not clear from the present data. The most northern extension was probably never used for habitation and an agricultural use is assumed (Map by author, based on the maps from J. de Bruin (see chapter 2) and additional maps provided by Archol B.V).

Figure 5.10 [144]: Combinations of Domburg- and ring fibulae from Frisian cemeteries (drawings from: Knol et al. 1996, 130; Dijkstra 2011, 356, and modified by author)

Figure 5.11 [144]: Distribution of Domburg fibulae (finds up till 2011). Dotted lines indicate the borders of early medieval Frisia (image from: Dijkstra 2011, 355).

Figure 5.12 [144]: Domburg fibulae from the Frisian areas. from left to right: 1. mold and fibula from Dorestad (Wijk bij Duurstede [www.dorestadonthuld.nl, 25-01-2016)), 2. fibula from Maurik (www.huisvanhilde.nl, 25-01-2016), 3. fibula from Winsum (www.geheugenvannederland.nl, 25-01-2016), 4. X-ray image of Domburg fibula from a context in Oegstgeest (Restaura) 5. X-ray image of broken (probable) Domburg fibula from burial 2012-01 in Oegstgeest (Restaura).

Figure 5.13 [146]: Decorated bridle of bronze (round discs are silver-plated) which was worn by one of the buried horses from Oegstgeest. Including such expensive gear in the grave indicate a motive for deposition which was not primarily economic (Image by Restaura, provided by J. de Bruin).

Figure 5.14 [146]: Location of early medieval dog- and horse burials in the Netherlands, excluding Limburg. Dark grey areas indicate habitation centers. 1: Oegstgeest; 2: Rijnsburg; 3: Dorregeest; 4: Zweins; 5: Hogebeintum; 6: Oosterbeintum; 7: Dokkum; 8: Hogebeintum; 9: Antum; 10: Looveen; 11: Zweeloo; 12: Gennep; 13: Elst; 14: Wageningen; 15: Rhenen; 16: Echteld; 17: Leidsche Rijn (adapted from: Buhrs 2013, 37).

List of appendices[81]

[81]The numbers in brackets, which follows the appendix letter, e.g. [204], refers to the page on which the appendix begins

Appendix A: Overview and summarized data of skeletons Oegstgeest

(images from: Leiden University)

Individual number	2004-01

Age/Sex/Stature	Adult; 25-35 years / Male / 171-177 cm
Pathology	IVD L1-L3 and slight compression of L1-L2 causing scoliosis
Isotope signature	unknown
Deposit type	Primary deposit; non-formal grave (?); rectangular pit of ca. 130x105 cm
Location	Southern half of settlement in the middle of house-cluster 3. Not associated with any waterways.
Remarks	Analyzed by Menno Hoogland and published in Hemminga 2006, 34-35; 110-111.

Individual number	2010-01

Age/Sex/Stature	Adult / Possible male / unobservable
Pathology	Unknown
Isotope signature	Unknown
Deposit type	Primary deposit; buried on left, legs slightly folded. Skull lost by disturbance
Location	Northwestern periphery of settlement, north of gully around house-cluster 1. SW-NE orientation skeleton (parallel to gully)
Remarks	

Individual number	2011-01

Age/Sex/Stature	Juvenile 5 years/-/-
Pathology	No observable pathologies present
Isotope signature	Non-local: Sr 0.70801. Possible British or Norman origin.
Deposit type	Primary inhumation in stretched position. Rectangular grave of ca. 125 x 50 cm.
Location	Northeastern periphery of settlement. North of gully around house-cluster 2. SW-NE orientation (parallel to gully).
Remarks	- Small lead strip found underneath left side skull, use unknown.

Individual number	2011-02

Age/Sex/Stature	Adult 26-48 / male / 182,93 ± 7,07 cm
Pathology	Minor osteophytic lipping and porosity on most vertebrae
Isotope signature	Unknown
Deposit type	Primary deposit, non-formal grave (?). Upper body prone, arms to the right side. Left leg stretched under thorax with foot near head.
Location	In a ditch, SE-NW orientation of midline body.
Remarks	- Right leg and cranium missing at time of excavation. No evidence for time of disappearance, no cut marks present.

Individual number	2011-03
 	
Age/Sex/Stature	MNI = 6; All adult / Present dimorphic features all male / One stature obtained: 176,63 ± 5,94
Pathology	One patella, one frontal, one femur with cut marks, one tibia with possible chop mark
Isotope signature	One individual tested, non-local on basis of Oxygen levels. Pos. west-German.
Deposit type	Two pits with secondary remains, one with five long bones in star shape, one with selection of bones (only cranium and long bones)
Location	Northern periphery settlement, south of gully around house-cluster 2
Remarks	Deviant deposit, no known parallels in the Netherlands.

Individual number	2012-01
	
Age/Sex/Stature	Adult 18-25 years / (possible) female / 168,6 ± 6,19
Pathology	No observable pathologies
Isotope signature	Non-local
Deposit type	Primary inhumation in supine position. Rectangular grave of ca. 200x90 cm
Location	Northern periphery settlement, north of gully around house cluster 2. SW-NE orientation of skeleton (parallel to gully).
Remarks	- Multiple grave goods: two ring fibulae, one Domburg fibula, one bead, one belt buckle, a possible knife and other small unidentified metal fragments

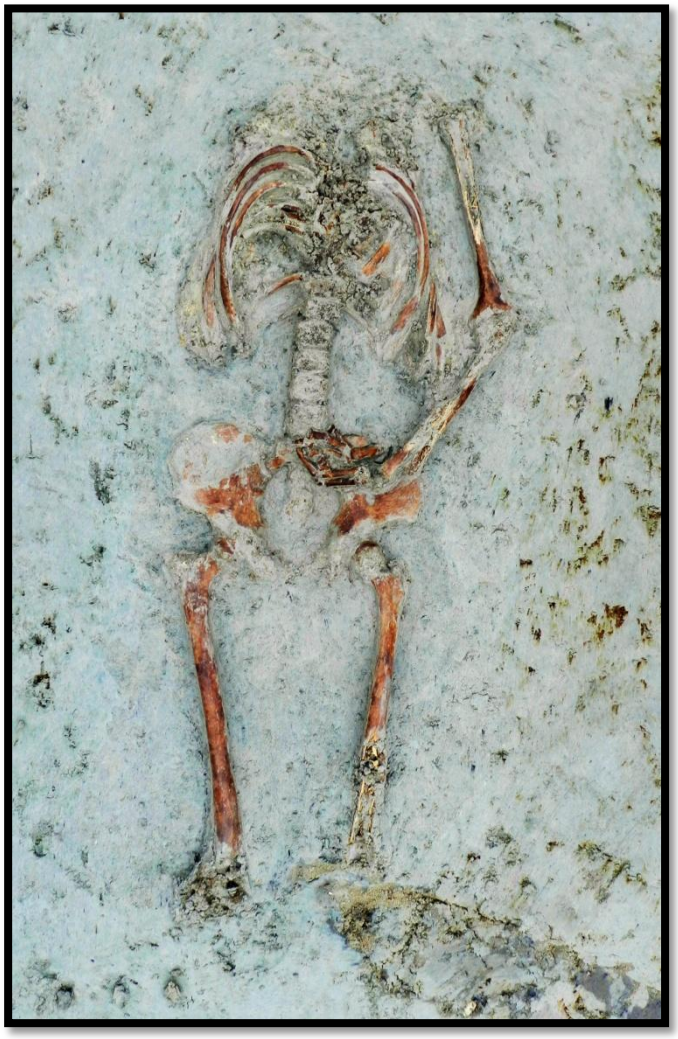
Individual number	2012-02
	
Age/Sex/Stature	Adult 36-49 years / (possible) female / unobservable
Pathology	OA of both thumbs; OA of two lumbar vertebrae
Isotope signature	Local
Deposit type	Primary inhumation, upper body supine, legs contracted
Location	Northern periphery settlement, north of gully around house-cluster 2. Close to individual 2012-01. W-E orientation skeleton.
Remarks	Multiple grave goods: Bead necklace, iron knife, a ring fibula, one or more belt buckles and other unidentified metal objects.

Individual number	2013-01

Age/Sex/Stature	Adult 18-25 years / male / unknown
Pathology	No observable parhologies
Isotope signature	Non local on basis of Oxygen levels. Possibly west German origin.
Deposit type	Primary inhumation/cremation. Extremities and anterior body burned in pit of deposit. Posterior not burned.
Location	NE-SW orientation skeleton
Remarks	Deviant deposit, no known parallels in the Netherlands

Individual number	2014-01

Age/Sex/Stature	Adult 26-49 years / indeterminate / unobservable
Pathology	Cribra crania, lipping glenoid, lipping and microporosity on several vertebrae
Isotope signature	Unknown
Deposit type	Secondary deposit of cremated remains in well
Location	In the middle of house cluster 1, inside an earlier or later building plan
Remarks	The remains are deposited in one of the top layers (layer 2) of the well. No signs of sedimentation are present after that so it is likely the well was not carrying water anymore when the deposit took place.

Individual number	2014-02
	
Age/Sex/Stature	Juvenile / unobservable / unobservable
Pathology	-
Isotope signature	Unknown
Deposit type	Primary inhumation in supine position. Cranium, left arm and lower legs disappeared by (modern) disturbance.
Location	SW-NE orientation skeleton
Remarks	

Appendix B: Overview of all human remains from Oegstgeest excavation campaigns 2004-2014

Individual nr.	Deposition type	Project code	Trench	Surface	Feature	Find number	Context	Date	Specialist	Contents and remarks
-	Secondary deposition	ODO-78	19	1	74	452	pit	1-1-2004	Hoogland	cranium
2004-01	Primary deposition	IOR-71	14	3	70	929-935	pit	1-7-2004	Hoogland	informal deposition
-	Secondary deposition	OSLP-10	47	1	6	514	gully	1-1-2010	van Spelde	cranium
2009-01	Disturbed primary deposition?	ONRZ-09	25	1	19	1077	pit	1-1-2010	van Spelde	multiple elements sub-adult
2010-01	Primary inhumation	OSLP-10	60	1	2	765-767/769-774/776	grave	13-7-2010	van Spelde	formal burial
-	Secondary deposition	OBSP-11	82	1	10	275	pit	1-1-2011	van Spelde	femur
-	Secondary deposition	OBSP-11	91	1	3	649	well	1-1-2011	van Spelde	fibula
2011-01	primary inhumation	OBSP-11	82	1	8	706-711	grave	7-6-2011	van Spelde	formal burial
-	Secondary deposition	OBSP-11	86	1	1	554	ditch	22-6-2011	van Spelde	tibia
2011-02	primary deposition	OBSP-11	86	1	1	514-523	ditch	22-6-2011	van Spelde	informal deposition
2011-03	Secondary deposition	OBSP-11	94	1	7+8+9	651-655	pit	28-6-2011	van Spelde	formal secondary deposition
2012-01	primary inhumation	OBSP-12	121	1	1	2415	grave	12-6-2012	van Spelde	formal burial
2012-02	primary inhumation	OBSP-12	121	1	24	2285	grave	14-6-2012	van Spelde	formal burial
-	Secondary deposition	OBSP-13	145	1	4	3034	gully	1-1-2013	van Spelde	cranium
-	Secondary deposition	OBSP-13	148	2	1	3052	ditch	1-1-2013	van Spelde	tibia
-	Secondary deposition	OBSP-13	181	1	6	3268	gully	18-6-2013	van Spelde	cranium
-	Secondary deposition	OBSP-14	191	101	161	5181	dam	18-6-2013	van Spelde	femur
2013-01	primary cremation/inhumation	OBSP-13	185	3	1	3422	grave	21-6-2013	van Spelde	(semi-) cremation
-	Secondary deposition	OBSP-14	148	1	5	3126	gully	1-1-2014	van Spelde	humerus
-	Secondary deposition	OBSP-14	193	2	1	4164	gully	9-5-2014	van Spelde	humerus
-	Secondary deposition	OBSP-14	199	2	1	4659	gully	22-5-2014	van Spelde	mandible
2014-01	Secondary deposition cremation	OBSP-14	202	1	218	5527	well	30-6-2014	van Spelde	cremation
-	Secondary deposition	OBSP-14	210	1	4	5323	pit	2-7-2014	van Spelde	tibia
-	Secondary deposition	OBSP-14	207	2	2	5333	dam?	3-7-2014	van Spelde	femur
-	Secondary deposition	OBSP-14	207	1	21	5567	channel	7-7-2014	van Spelde	humerus
-	Secondary deposition	OBSP-14	152	1	1	5387	depression?	10-7-2014	van Spelde	mandible
2014-02	primary inhumation	OBSP-14	217	1	37	5741	grave	15-7-2014	van Spelde	formal burial

Appendix C: Full taphonomic descriptions primary deposits

Individual 2004-01

General

The individual was encountered at the bottom of an oval pit in a prone position. The bottom of the pit was ca. 1,5 meter in diameter, which was insufficient to lay the body in stretched position. From the section of the pit it is clear that it sloped in an angle of ca. 35 degrees. The upper body was positioned on this slope and because it was on a higher level, it disappeared due to ploughing or soil extractions. From the twelfth thoracic vertebra downwards, the skeleton remained preserved at the bottom of the pit. Persistence of labile anatomical connection in the hands and feet indicate that the deposition was primary. However, the context and the position of the individual make it highly unlikely that it was a formal burial. The burial was initially published in the excavation report (Hemminga 2006) from which some of the information is derived, supplemented by the authors own observations from the original field documentation.

Cranium/thorax

The cranium is completely missing, as is most of the thorax. However, it is clear from the vertical outline of the pit that the upper body was in a ca. 35-degree upward angle from the lower body. The lower vertebrae retained their anatomical connection.

Arms

The arms are situated underneath the thorax. Both hands are located slightly superior of the right ilium. The right hand is folded under the remains of the lower arm and ribs with the dorsal side upwards. The remains of the left arms were recovered when the pit was sectioned. The hand remained *in situ* and was lying with its dorsal side upwards. That the hand bones were recovered *in situ* in a position of disequilibrium if they would have been decomposed in a void is an indication that the decomposition probably did not take place in such a void. It is thus plausible that the pit was immediately filled after deposition of the individual. Unfortunately it is not possible to claim this with any degree of certainty due to the lack of detailed documentation of the body during excavation.

Pelvis and legs

The pelvis and legs are fully articulated and are located on their anterior aspect. After decomposition of the soft tissue in the lower abdomen and the connections of the auricular surface, the os coxae sunk into the created void. The os coxae are therefore more horizontally orientated than they would be in life. The femoral heads are embedded in the acetabula. The distal parts are connected with the tibiae, although the tibiae have sunk slightly deeper into the soil of the pit. The left lower leg is bent slightly (ca. 15 degrees) to the left and the foot is pointing in a straight angle to the right side. The right lower leg is laid out completely stretched. The calcaneus and the tarsals are bent down towards the right lateroinferior side and the connected metatarsals are bent further down, pointing inferiorly with the distal facets.

Individual 2010-01

The preservation of the bone material from burial 2010-01 is very poor. Furthermore, the cranium and part of the right arm are missing, the date of their disappearance unknown. Fortunately, the position of most of the skeletal elements could be observed *in situ*.

Thorax

The thorax is positioned with its anterior aspect directed downwards. The original volume of the thorax is not maintained when the internal soft tissue decomposed. A significant difference in organization is observable between the left and the right ribs. The left ribs are organized well and their anatomical order is maintained. All are positioned on their anterosuperior aspect. The right ribs are more disorganized and spread out in a fan-pattern . Most fragments are positioned on their superior aspect. Although poorly preserved, it is clear that the vertebral column maintained its anatomical connections during decomposition. Most of the left and right ribs maintained their connection with the vertebrae as well. The entire vertebral column is positioned on its anterior aspect.

Arms

The left arm (of which the proximal epiphysis of the humerus is missing) is positioned underneath the thorax, on the bottom of the grave. The humerus lies parallel to the vertebral column underneath the left ribs. The lower arm makes a 105-degree angle and is thus positioned transverse to the vertebrae. The entire arm, including the hand has remained in anatomical connection. This means that the humerus is postioned on its anterolateral aspect and the radius and ulna on their posterior aspect. The hand is turned so that the palmar side is directed towards the verterbral column and the medial side towards the bottom of the grave. The only remaining part of the right arm, the diaphysis of the humerus, is located next to the right ribs, at their lateral side. Its original position cannot be reconstructed.

Pelvis

In accordance with the thorax, the pelvis is positioned on its anterosuperior aspect as well. The anatomical position of the os coxae is largely maintained (the left os coxa did not rotate the full 90 degrees due to its fixation on the bottom of the grave). Although highly degraded, the remains of the sacrum and lumbar vertebrae suggest that anatomical connections are mostly maintained here as well. The left pubis is broken and the inferior border has shifted slightly downwards, however, it remains in contact with the right pubis.

Legs

The legs are bend in a wide angle and are resting on their left side. In comparison to the vertebral column, the left femur is bend in a 135-degree angle, the right in a 155-degree angle. Compared to the femur, the lower leg is bend 115-degree angle on the left and 135-degree angle on the right. The right lower leg is laid parallel on top of the left with the left knee-joint slightly higher than the right, so that it is positioned under the distal diaphysis of the right femur.

Although the head of the left femur is not present it is clear by the space between the femur neck and the pelvis that it was not in anatomical connection with the acetabulum after decomposition. Furthermore, the acetabulum has moved slightly superior, away from the femur. The femur is

positioned on its anterolateral aspect. The connection with the tibia is maintained. The position of the left fibula and foot cannot be observed from the field documentation. The proximal third of the right femur was disturbed during deepening of the excavation trench and as a result the connection between acetabulum and femur head was unobservable. The femur is positioned on its medial aspect and the anatomical connection with the tibia is maintained. The tibia is positioned on its medial aspect as well. The fibula has shifted during decomposition slightly posterior, however, the movement is very minimal. Although fragments of the foot bones were found at the distal end of the lower legs, they were too fragmentary to be properly exposed. The scatter in which the fragments were found suggest however, that the feet were stretched in a wide angle compared to the lower legs.

Reconstruction of the body position at the time of burial

The persistence of fast decaying connections, for instance in the left hand, indicates that burial 2010-01 consists of a primary inhumation. However, the skeleton did not remain in the exact position in which it was buried. Two skeletal movements, anatomically impossible to achieve in a living or perimortem individual, serve as evidence for post-mortem movement of the body within the grave. The first is the position of the left arm underneath the left ribs. In a living individual, the arm is placed laterally, some distance away from the ribs and is held in place by strong ligaments between the humeral head, glenoid fossa, acromion and coracoid. Without the destruction of these ligaments it is impossible to move the humerus completely in front of the thorax, as is seen in this skeleton. A similar discrepancy is observable in the pelvic area. The combination of the os coxae lying on their anterior side, and the femora on their anterolateral and medial aspect respectively is not possible without the destruction of the ligaments connecting the pelvis and femora. When combining the available information the post-burial taphonomic process can be reconstructed as follows. The individual was originally deposited on his left side. The left arm was laid underneath the body with the upper arm parallel and the lower arm transverse to the thorax. The right upper arm was laid parallel on top of the thorax. How the lower was positioned cannot be reconstructed. The legs were laid on top of each other in a wide angle, the left raised slightly more superior than the right. During decomposition the right arm and right leg remained on their original place as they were already in a state of equilibrium on the bottom of the grave. When the soft tissue in the thorax disappeared, the entire upper body rotated 90 degrees counterclockwise towards the bottom of the grave. The left ribs maintained their original order and organization due to fixation of the anterior aspect on the bottom of the grave. The right ribs, which were not fixated and thus in disequilibrium, scattered in a more disorganized way. The right arm rotated with the thorax to the right side of the grave. The right leg shifted towards the right side when the pelvis rotated, but, as the lower leg was fixated to some extent and the hip is a freely moveable ball-and-socket joint the leg did not rotate 90 degrees as the thorax did. It is likely that due to the body weight acting on the left shoulder, combined with its fixation on the bottom of the grave, that this connection was torn quite rapidly during decomposition. It is furthermore clear that the thoracic skeletal connections decayed less rapidly than the internal body tissue, as anatomical connections, such as those of the left ribs and vertebrae, maintained after rotation. A 90-degree rotation of the entire thorax and pelvis can only occur when there is enough space around the body to do so, i.e. a substantial void. If there was no void present around the body (i.e. the body was tightly enclosed by soil, wrappings or other material), the body would not have rotated, but the bones would had sink vertically into the internal volume of the body's soft tissue.

Individual 2011-01

General

The bone quality of individual 2011-01 is very poor. Although the bones could be exposed during excavation, their structure was lost after lifting of the skeleton. Especially the lower lying parts of the skeleton are highly degraded, most notably the posterior half of the thorax and the pelvis. Furthermore, from the higher parts the most fragile elements, such as the long bone epiphyses and hand/feet bones, were degraded and partially dissolved. Fortunately, thanks to careful excavation the skeleton and its position could be studied *in situ*. The remaining parts of the skeleton were fully articulated and it is clear that no disturbance occurred after the act of burial. The individual was laid in a supine position with the arms and legs stretched.

Cranium

The head is turned to the lateroinferior side, the splanchnocranium (the 'face') is resting on the right clavicle and as a result the individual is facing directly to the east. The cranium is complete but is crushed under the weight of the soil. The left half of the calotte (the 'dome') is pushed inwards, into the space originally occupied by the brain. The most fragile parts of the splanchnocranium are crushed as well, but the maxillae and mandible largely retained their original structural form. They are in articulation and the teeth of the upper and lower jaw are into contact with each other. The surface of the left maxilla was largely destroyed but as a positive result the development of the unerupted teeth could be observed in detail. The teeth are preserved well, although it proved to be impossible to extract a detectable DNA-sample from it (Kootker & Altena 2011, 3-4).

Thorax

As was mentioned above the posterior part of the thorax was poorly preserved and is not observable as a result. Vertebrae C1-T1 were preserved under the right side of the cranium. They were all in articulation with the exception of C1 (the atlas) which shifted a few millimeters probably when the cranium was crushed. The scapulae were found in articulation with the humeri with the right scapula in articulation with the clavicle as well (the left was unobservable). No verticalisation occurred of the right clavicle. After the decomposition of the thorax' internal soft tissue the ribs sank under the influence of gravity to the bottom of the existing or created void. Because the ribs are positioned slightly oblique in a living individual the sternal ends are displaced inferiorly during decomposition. The ribs are placed on top of each other in their original order and there is no displacement outside the original volume of the thorax.

Arms

The arms are place outside the body in a stretched position. The left arm is positioned parallel to the midline of the body, the right lower arm is bend very slightly with and inward angle of 20 to 30 degrees compared to humerus. Both arms are articulated with the exception of the distal epiphyses of the right ulna and radius which have moved ca. 1 cm away from each other. Unfortunately, due to the poor preservation of the epiphyses and the bones of the hand, the original position of the hands cannot be reconstructed.

Pelvis

The pelvic area was too degraded to make any taphonomic observations.

Legs

The legs are stretched parallel to the midline of the body. The medial border of the distal epiphyses of the femora are separated by ca. 2 cm, those of the tibiae by ca. 3,5 cm. The femora, tibiae and fibulae are fully articulated, the patellae and feet are not preserved.

Conclusion

Although the bones of the individual were poorly preserved, careful exposure of the skeleton did reveal important information about the position of the skeleton during burial and the following taphonomic processes. With exception of the natural degradation of the bones the skeleton was found intact without any signs of bioturbation or human intervention. There are no signs of a void that was present around the body during decomposition. However, some vital indicative areas to detect voids, such as the feet and pelvis, are unobservable and it can therefore not be excluded. The soil feature surrounding the body indicate a burial pit significantly larger than the body. Furthermore, a separate inner fill can be seen but without traces of a wooden container. The fill is of an irregular shape and narrows towards the cranium. Considering the straight arrangement of the limbs, no indications of a void and an irregular inner grave fill it is possible that the individual was wrapped in a shroud or a similar covering. It is however clear that the covering was not tightly wrapped around the body, as no constriction of the skeleton or verticalisation of the clavicles is present. The only durable find from the grave consisted of a small piece of lead, found under the left shoulder. This cannot be considered as a grave 'gift' in itself, but it probably belonged to the burial attire or shroud.

Individual burial 2011-02

General

It is impossible to say whether individual 2011-02 was deposited in a ritualized event (what we may call a 'burial' or 'ritual deposition') or that the body end up where it did by accident. The body is not complete, the left femur, entire right leg and cranium are missing, without any sign of when they were lost. However, it is likely that this occurred after decomposition as no cut marks indicative for dismemberment were found on the skeleton (see further chapter 3). Survival of labile (rapid decomposing) joints indicate that the cadaver was not in an advanced state of decomposition at the time of deposition, and it is thus marked as a primary deposition.

Thorax

Most of the remaining parts of the individual are laid in a prone position. The anterior aspect of the vertebral column is thus directed downwards. The anatomical connections are maintained and are only interrupted around the area of the last thoracic/first lumbar vertebrae due to the left arm, which is laid diagonally underneath the upper body. The remaining ribs are found in articulation and are positioned on their anterosuperior aspect. When the soft tissue in the thorax decomposed, the thorax gradually sank forwards to the bottom of the context, maintaining the original organization of the ribs. The right scapula remained at the posterior side of the thorax, in articulation with the humerus. The left scapula cannot be seen on the excavation documentation, however, it was recorded present during osteological analysis.

Arms

The left humerus is entirely covered by the thorax and cannot be studied on the excavation documentation. The left arm is positioned diagonally to the right lateroinferior side in an angle of 50-60 degrees in comparison to the vertebral column. The ulna and radius lay adjacent with the ulna at the medial side, both on their posterior aspect. This means that the arm rotated 180 degrees and that, in opposition to the thorax and pelvis, is facing with the anterior side upwards. Three metacarpals can be seen at the right side of the radius, not in articulation with the lower arm. It is probable that the hand was folded and that the lower arm shifted some distance away when the soft tissue connection disappeared. The metacarpals are likely to have remained in the original place of deposition as they were fixed at the bottom of the context, while the lower arm was not.
The right arm is positioned on the right side of the body with the distal end directed away from the midline. The angle of the humerus is 75 degrees from the vertebral column and 150-160 degrees of the ulna and radius compared to the humerus. The humerus rotated 90 degrees counterclockwise and as a result the medial aspect is facing upwards. The lower arm has rotated further (180 degrees) and the connection at the elbow joint has been lost accordingly. Both the ulna and radius are positioned with the anterior aspect upwards and are laid adjacent, the radius at the medial side. The carpals and metacarpals are anatomically connected and the hand is facing with the palmar side upwards.

Pelvis

The right os coxa is positioned on its anterior aspect and is articulated with (the remains of) the sacrum, which in turn is articulated with the vertebral column. The left os coxa is positioned on its posterior aspect. It is clear that the medial side has rotated (180 degrees clockwise) away from the sacrum. As a result, the medial side of the os coxa, i.a. with the greater sciatic notch, is directed to the lateral side. When this happened is unclear, but it is certainly possible that it occurred at the same moment when the femur disappeared.

Legs

The right leg is not present and its position during deposition cannot be reconstructed as a result. However, it is likely that it was not positioned in the same direction as the left leg, in which case the bones would have remained *in situ* underneath the thorax and arms. It is thus clear that the right leg was positioned to the right lateral side, to the inferior side or anywhere in between. The lower left leg is directed towards the superior side of the body. The proximal epiphyses of the tibia and fibula are located at the lateral border of the left scapula. Both fibula and tibia, which are in articulation, are positioned on their posterior aspect. The foot has fallen to the right side and lost direct articulation with the distal lower leg but remains in its anatomical position. The retention of the articulation in the lower leg indicate that it decayed *in situ*. In addition, the distance between the left pelvis and the proximal epiphysis of the tibia corresponds to estimated length of the missing femur if a femur-tibia ratio of ca. 6:5 is taken as a reference. It is thus likely that the entire leg was present before disturbance.

Conclusion

It is clear that context 2011-02 consists of a primary deposition. There are no indications to reconstruct of the body decomposed in an void of in a filled space. The body is positioned very disorganized and it is hard to imagine that the deposition consists of purposeful burial, in particular when the context (the bottom of a ditch) is taken into account. During deposition, the left leg of the individual was directed forwards. The upper body was folded over in a prone position with the cranium near the left foot. Both arms, the left underneath and the right next to the body, are directed to the right lateral side. The right leg was directed somewhere in the range between 90 and 270 degrees from the midline of the body, as if the individual made an acrobatic split. It is unclear when the missing parts of the individual disappeared, although the absence of cut marks indicate a disturbance after (partial) decomposition. Why this person ended up in this position on the bottom of a ditch is unknown, but possible scenarios can be that the individual was victim of an accident (for instance a flood) or that the body was dumped, either carelessly or as part of a ritual. The persistence of labile articulations further indicate that the body was covered with sediments after a limited time span.

Individual 2012-01

Cranium

At the moment of excavation, the cranium was nearly upright with the chin resting on the vertebral column. This means that the anterosuperior aspect of the cranium was positioned upwards and the splanchnocranium was directly facing to the feet (towards the north-west), which are in extension from the body. Due to its upright position the cranium was elevated some decimeters above the rest of the body. When the excavation trench was deepened the calote (the cranial vault) was hit by the excavator and the top was damaged severely. While it can be said that the calote remained (almost) intact prior to excavation, the splanchnocranium was not. Under the pressure of the soil above the fragile face-area was crushed. The volume of the existing cavities, such as the orbits and nasal cavities, were minimized as a result. The relatively strong zygomatics were detached and pushed laterally outside the crushing area. The frontal was pushed slightly posterior, inside the brain cavity. The maxillae were pushed posterior as well and the contact between the upper and lower teeth were lost accordingly. As the mandible was fixed on the thoracic vertebrae, it remained in place during the destruction of the splanchnocranium. The position of the chin on the chest had to be achieved by a support underneath the cranium. From the fact that the head remained in place after decomposition it can be said that there also existed a supporting effect from the lateral sides, either from the grave fill or from objects made of perishable materials.

Thorax

It is obvious that the thorax was subjected to a disturbance after burial, mainly concentrated at the lower abdomen (see below). Additionally, another interesting phenomenon can be observed in the upper part of the thorax, which is the verticalisation of the clavicles. The medial epiphyses of the clavicles are displaced toward the inferior side while the lateral epiphyses have remains in contact with the scapulae. Both rotated to an angle of 62 degrees with the shoulder line. Furthermore, the right scapula has rotated slightly in a superior direction, after which the glenoid is directed to the superolateral direction. This ‘verticalisation-effect’ is achieved by a medially directed force exerted on the shoulders, pushing the clavicles inferiorly. Most commonly a V-shaped coffin or tight body wrappings are creating this force (Duday 2009, 45-46). However, from the horizontal orientation of

the skeleton and the wide layout of the arms it becomes clear that both these options are not applicable in this case. A valuable clue is given by the presence of two bronze *fibulae* (clothing fasteners) at the lateral side of the clavicles, and a bronze *fibula* some centimeters lower. Such items can be associated with a cloak or mantle and it is likely that one of these was suspended from the rings on the shoulders and closed at the front with the *fibula*. The material of this dress item was quite durable as it took longer to decompose than the connection of the clavicles with the sternum.

The first elements of the vertebral column remained in place as they were fixed underneath the weight of the cranium. The rest of the vertebrae, along with most of the ribs, have been disturbed. Around the area of the last thoracic vertebrae a void is created in which no bones were found at all. The bones that originally occupied the void have been pushed to the side. The vertebrae, with the exception of one lumbar and one thoracic element, are displaced to the right side. Their position is variable with most orientated on their original posterior- and some on the superior or inferior aspect. The last lumbar vertebra has remained in articulation with the sacrum. The ribs have been pushed to the lateral side out of the void. Some are displaced out of the original volume of the thorax, indicating that there was no physical boundary present to withstand them (i.e. there was a void present around the thorax). Most disturbance is observed in the left half, where three ribs have rotated 180 degrees out of the created void, and are deposited on top of the other ribs. At the right side the disturbance seems to be less severe with the ribs maintaining their original order and orientated on the posterior aspect.
The loss of contact between the vertebrae and their subsequent scattering indicates that the individual was in an advanced- or full state of decomposition at the moment of disturbance. The displacement of thoracic elements outside the original body volume further indicates that a void existed around the body which was not filled when the skeleton was disturbed. With a burial container of wood as most likely candidate, the disturbance in the skeleton can be dated between a few weeks (disappearance of soft tissue) and multiple decades (disappearance of perishable sepulcher), probably within the span of one generation. Two possible candidates can be brought forward as disturber. The first is a faunal agent. As the surrounding soil is enriched by nutrients from both the human body and the organic sepulcher, floral and faunal activity will be accelerated in the micro-environment of the grave. This enrichment can be of influence for millennia, as is seen from the excavation of Merovingian graves in Uden (figure 2.4). Small burrowing animals such as insects and worms attract larger burrowing predators such as moles. It is possible that an animal of this kind made a burrow inside the thoracic area of individual 2012-01. On the basis of a thoracic vertebrae which is displace to the left, instead of the right, its possible entrance route can be reconstructed as seen in figure 2.6. The second possibility is that the grave was disturbed by a human agent. A motive for reopening of the grave can be either looting (items of precious metal were frequently included in early medieval graves), or a secondary ritual (see for a discussion on reopened graves: Van Haperen 2010). It cannot be said with absolute certainty which was the case.

Arms and pelvis

The arms of the individual were laid out in a bend position next to body. The right hand is laid on the upper part of the pelvis, while the left is laid on the lower part of the pelvis and head of the humerus. The humeri are bend in an angle of 113 (L) and 114 (R) degrees with the midline of the shoulders. The forearms make a 128 (L) and 103 (R) degree angle with the humerus.
The humeri remained in articulation with the glenoid fossae at the proximal end, and with the radii

and ulnae at the distal end. The left humerus is positioned on its medial side, the right on its posteromedial side. The ulnae are located on medial sides while the radii have turned slightly more inwards during decomposition and found an equilibrium on their anterior side. The majority of hand bones lost their anatomical connections and are scattered in the post-decompositional void of the pelvic area. However, the position of the lower right arm indicates that the hand probably rested on its palmar side. The remaining articulations of some of the left metacarpals indicate that the left hand rested on its medial side with the palmar side directed superiorly. Because the metacarpals were located under the illium, it provided support when the sacro-iliac joint decomposed and the left os coxa rotated laterally towards the bottom of the grave. Therefore it did not achieved a complete horizontal orientation but remained in equilibrium on top of the hand. The right os coxa did rotate completely because the hand rested on top of the ilium, which was weighed down because of it. The rotation of the os coxae is substantial on both sides and is accompanied by a loss of anatomical connection in both the auricular surface as the pubic symphysis. The rotation of the os coxae is only possible when they are not supported by either grave infill, (semi-) durable body wrappings or the impenetrable wall of a burial sepulcher. It can thus be concluded that a void existed around the pelvic area during the period of putrefaction.

Legs and feet

The legs are laid out in a stretched position parallel to each other. They have retained their anatomical connection after decomposition. The femoral heads are embedded in the acetabula and the femora are positioned on their posterior side. The patellae were found on top of the distal femora with the left patella slightly more to the lateral side. The right lower leg is turned ca. 45 degrees to the lateral side, also turning the foot to the right side, which is apparent by the position of the calcaneus. The metatarsals are bent double so that the distal part are pointing to the left lateroinferior side. This bent is not achievable when the ligaments of the foot are intact and indicate that the plantar aspect of the foot was not supported (i.e. surrounded by a void) at the moment of decomposition. The left lower leg is turned less to the lateral side and the foot was probably in a more upright position during burial. The remaining metatarsals are bent in a similar way as the right foot and point towards the inferior side. The phalanges were not encountered during the excavation of the individual.

Individual 2012-02

Cranium

The cranium is turned slightly to the individuals' left side, facing to the north. The complete cranium is fragmented due to externally applied force. The cranium, mandible and first vertebrae were block-lifted to be further examined in a laboratory environment, where further taphonomic details could be studied. Here it was observed that the inferior border of the frontal was displaced underneath some of the parts of the splanchnocranium, such as the right zygomatic and both nasals. Furthermore, the volume of the orbit- and nasal cavities were reduced vertically. The splanchnocranium is pushed laterally, outside the original volume of the cranium. The mandible has been displaced in a posteroinferior direction, and rests on the anterior aspect of the cervical vertebrae. At the right side the connection of the temporomandibular joint (TMJ) was preserved, although the mandible opened more than is possible in a living individual. The left side was removed before the laboratory analysis and could not be observed. Due to the movement of the

splanchnocranium to the left side, a gap of about 3 cm formed in a horizontal plane between the maxillae and the mandible. The connections of the first cervical vertebrae were large preserved as well. C1 to 5 were included in the block, all were in full anatomical connection with the exception of the left superior articular facet of the atlas (C1), which lost its connection due to the inward movement of temporal and occipital fragments. However, it can be stated that prior to the fragmentation of the cranium, this connection was preserved.

Considering the preserved anatomical connections of the cervical vertebrae and the TMJ it is clear that these parts have remained in their original post-decompositional position, along with small parts of the skull. A force that was directed from the right superoanterior side of the cranium pushed the anterior aspect of the cranium 3 cm to the left where the splanchnocranium was forced against an impenetrable wall and could not move further. The applied force then pushed the frontal inwards which shoved underneath the right zygomatic and both nasals, crushing the orbits and nasal cavity. It is likely that such destruction was caused by a sudden collapse, for instance of structural elements of the burial sepulcher. Another possibility is that the grave remained open and that the fragmentation of the cranium occurred when it was finally filled in. However, this is highly unlikely as crushing the dome-shaped form of the skull requires more instant force than can be generated by gradually filling in the grave, which distributes the applied force in equal small amounts.
That the cranium was able to move for a few centimeters before coming to a stop, indicates that there was space available around the body to do so. That the mandible did not move along with the rest of the cranium but remained in place further indicates that the soft tissue connections had disappeared by then. This dates the collapse of the sepulcher after the body was at least partially decomposed. That an open space remained after the body was (partially) decomposed implies that the material of the burial sepulcher was more durable than human soft tissue and could withstand considerable force from the soil on top. The most probable scenario is that the individual was buried in a wooden coffin or burial chamber.

Thorax

The vertebral column is arranged in a straight line which lies in an angle of 35 degrees to the right of the grave midline. Although the vertebral bodies are poorly preserved it is evident that the column is fully articulated from cranium to sacrum. All ribs are connected with the vertebrae but fell inferiorly and are arranged adjacent to each other (as opposed to on top of each other) in a horizontal plane. The claviculae are connected with the scapulae (which are in original anatomical location) but their sternal ends have been moved slightly inferiorly, along with the sternum. The downward movement of the clavicles could have been achieved by two mechanisms:
1. When the soft tissues in the thorax decompose, the sternal rib ends, the sternum and the clavicles will ‘sink’ under the influence of gravity to the bottom of the grave where they will find a new equilibrium. Often these parts will move in an inferior direction, initiated by the slightly downwards pointing position of the ribs in a living individual. In this way, the clavicles can only obtain a limited oblique angle, and not true verticalisation (i.e. more than ca. 150 degrees).
2. When the lateral sides of the body are constricted, for instance by a narrow coffin or tight body wrapping, medially directed force works on the skeleton which can push the clavicles downwards. This has been labeled by Henri Duday as ‘verticalisation of the clavicles’ (Duday 2009, 45-46).

Because the angle of the clavicles is limited in this individual (from the line of the shoulders, the right clavicle is positioned at a 45-degree angle and the left at a 55-degree angle) it is difficult to say which mechanism is applicable. However, when we look at the contextual information, some clues can be found. On the lateral ends of both clavicles, a bronze clothing fastener (so-called *fibulae*, not to be confused with the bones in the lower legs) was found that was used to hold together pieces of the burial garment. Another individual, 2012-01, a young woman, had a similar arrangement of two bronze rings on the shoulders used for the same purpose. Although individual 2012-01 was buried in an open space without any signs of restriction in the skeleton, her clavicles showed full verticalisation. It is likely that the rings held together some sort of cloak that was only held tight at the shoulders, applying medially directed pressure. Another clue can be found in the arrangement of the ribs. When the sternum and the clavicles move in an inferior direction due to the decomposition of tissues in the thorax the first few ribs usually move simultaneously with them, as they are connected with longer lasting cartilage. In this individual this seems not to be case. Instead, the ribs that are still observable moved laterally, away from the midline. The combination of the present *fibulae* and the position of the ribs makes it likely that the slight verticalisation of the clavicles is caused by restriction of the burial garment. However, it cannot be excluded that it was caused by the decomposition and gravitational forces working on the bones of the skeleton.

Arms

The right arm is fully articulated and the upper arm is positioned parallel next to the body while the distal part of the lower arm is folded over the thorax, resting on the lower thoracic vertebrae. The distal part of the humerus is directed inferior and slightly lateral (making a 25-degree angle compared to the vertebral column) and it is positioned on its posteromedial aspect. The lower arm is bend in an angle of 65 degrees from the distal humerus, and is thus positioned in a 90-degree angle compare to the vertebral column. The radius is located superior of the ulna and is positioned on its anterior aspect. the ulna is positioned on its medial aspect, both are achieved by a ‘natural’ bend of the arm (as opposed to a forced or post-decompositional bend). The right hand rests with the palmar side on the thoracic vertebrae with the fingers bend. Some retention of anatomical connections is present, most notably at the carpals and metacarpals. The majority of the phalanges have been displaced posterior after the decomposition of soft tissues in de abdomen area. However, the displacement is minimal (within 5 cm area of their original position) and are clearly caused by gravitational force.

The left humerus is positioned on its medial aspect parallel to the body, with an outward angle of 15 degrees. The humerus has been pushed upwards and is raised slightly higher than the ribs. The head is displaced from the glenoid cavity and rests on the glenoid’s anterior border. This is likely caused by the fixation of the humerus by an impenetrable border (the same border where the left side of the splanchnocranium is pushed against). The body of the individual probably rested with considerable weight against this side of the grave in a state of disequilibrium. When the connections of the shoulder decomposed, the weight of the upper body pushed the humerus upwards until a new equilibrium was reached. Only the proximal half of the humerus seems to be displaced upwards, the lower half is on the same level as the lower ribs. The proximal radius is articulated with the humerus, the ulna is in correct anatomical position but the proximal end has moved a few millimeters out of the olecranon fossa. Similar to the right arm, the radius is located on its anterior aspect and the ulna on its medial aspect, as would be expected by a natural bend. The angle between the upper and

lower arm is 75 degrees which means the lower arm is again in a 90-degree angle with the vertebral column. The entire lower arm is placed on the thorax with the carpals and metacarpals resting on the most lateral side. The left hand is fully articulated and is located between the last ribs and the superior border of the ilium. The fingers are inferiorly bend and originally rested on the side of the individuals' body.

Particularly in both arms, but also in right tibia and fibula it is evident that parts of the shafts of the long bones are crushed. Most likely this has been caused by weight of soil on top of the bones. As the shafts with their cylindrical form can bear considerably high amounts of force in life, crushing of the shafts must have occurred when the structural strength was affected. Extraction of calcium from bones (demineralization) in which percolating ground water serves as a means of transport may have been the prime cause of the weakening of the bones.

Pelvis

The right os coxa is located on its posterior aspect, in a horizontal plane. The area around the acetabulum is slightly raised due to the presence of the femur head. The left os coxa is also located on its posterior side but is not completely horizontal. This may either be due to a supporting effect from the connecting femur or to some inorganic grave goods located adjacent to ilium. From both os coxae the pubic symphyses are missing. However, the remaining part of the pubis clarify that if they would have been present the symphyseal area would be facing to the anterolateral side. The sacrum is located in the middle of the os coxae and, as the os coxae have rotated away from the sacrum when the auricular connection decomposed, are not articulated with them. The 'opening' of the pelvis to the point where the illia are (nearly) horizontal is only possible when the os coxae are not supported from the lateral sides, i.e. in a void.

Legs

Both legs are slightly bend at the hip (right 15 degrees and left 32 degrees) and sharply bend at the knee (right 48 degrees and left 58 degrees). The distal end of the femora are directed towards the right posterolateral side, the lower legs towards the left superolateral (right leg) and the posterolateral (left leg) side. The left leg is positioned on top of the right with contact around the area of the knee joints. The entire right leg, including the foot, is positioned on its lateral side. Anatomical connections are maintained at the joints of the hip, knee and foot. The right fibula is positioned anterior of the corresponding tibia. The bones of the foot are fully articulated and also positioned on their lateral aspect. The left femur rests on its posteromedial aspect and is articulated with the acetabulum and the tibia respectively. The left tibia and fibula are articulated and positioned on their medial aspect. The phalanges of the left foot are missing due to an unknown cause. The talus is connected with both the tibia/fibula and the calcaneus. The position of metatarsal 1 corresponds with the position of the leg (on its medial side). The remainder of the foot has been displaced towards the anterior side, resting on the plantar aspect on the bottom of the grave. This bend cannot be achieved when the soft tissue connections of the foot are maintained and thus post-dates their decomposition. It is furthermore clear that this bend of the foot can only be completed when no support is present from the plantar side, i.e. in a void around the foot. It is likely that this foot was already in an oblique position when the individual was deposited. This would explain why this type of displacement was present in the left, but not in the right foot.

The original placement of the legs and feet cannot be reconstructed with absolute certainty. The legs could have been upright, horizontal or somewhere in between. However, it is unlikely that the legs were upright considering the placement of the feet. The positioning of the feet in extension of each other, i.e. on the same axis, creates a severe disequilibrium in which it is very easy to tip the legs off balance. The horizontal position of the right leg and foot indicates that it was probably laid down on the bottom of the grave. The slight oblique angle of both the left os coxa and foot serves as a further indication this leg rested on top, or was a raised to some extent (for instance when some perishable material such as clothes was placed in between).

Individual 2013-01

General

Burial 2013-01 consists of the primary deposition of a male individual which was partially cremated. Whether the cremation process was unsuccessful is not clear, but the posterior side of the body remained unburned. The bottom of the pit was just large enough to fit the articulated remains which were left (partially) unburned, i.e. the cranium, thorax and pelvis. The fill of the pit was made up of soil mixed with charcoal and the burned remains of the extremities and anterior parts of the thorax, including small elements such as carpals. At the left side of the burial two postholes were found while the surrounding area of the grave was void of archaeological features. It is clear that the postholes were related to the grave and possibly belonged to a timber structure such as a pyre or platform. Only the legs below the proximal part of the femur shafts, the left arm below the proximal part of the humerus shaft, the distal half of the right lower arm, and the anterior half of the ribs were completely burned with a varying degree in burning temperature. The presence in the pit of most of the bones (including small elements) combined with charcoal residue suggests that the individual was burned on the spot. The pit was possibly present underneath the pyre as a reservoir in which the burned remains were collected. The absence of a solidified layer of burned soil on the bottom of the pit further indicates that the fire did not burn at high temperatures there but on a higher level above the pit. When the pyre gradually collapsed during the burning process, the skeletal elements freed from the soft tissue, fragments of charcoal and eventually the remaining unburned articulated part of the body fell (or was deposited) into the reservoir. The position of the articulated remains are described below.

Cranium

The cranium was lifted *en block* to be further excavated in the lab so that more details could be examined. During the excavation in the lab it became clear that the cranium was located on its right side. Most of the left side was damaged and partially lost during the initial excavation of the trench in which the grave was located. Anatomical connection between the skull and the atlas was retained. The right side of the skull displays a remarkable burn pattern. The splanchnocranium and the anterior side of the cervical vertebrae are burned, but only on low temperatures. This is evident by brown-blackish discoloration of the bone. The calvaria and the nasals are unburned and the border between the burned and unburned part is quite marked. The chin area of the mandible is burned at high temperatures, which is evident by blue and white discoloration and high fragmentation due to heat stress. The differences in degree of burning can be caused by several mechanisms. For instance, areas with more soft tissue cover might take longer to burn to the bone surface than areas with thin soft tissue cover. Because the calvaria is an area of almost no soft tissue cover, this cannot have

caused the discrepancy. The lack of burn traces must thus have been caused a lack of burning, i.e. the area was not exposed to the fire. Either the splanchnocranium was facing the heat source or the calvaria was covered, for instance by a leather cap/helmet. Whatever was the case, it is obvious that the skull was not exposed to a heat source for long.
At the moment of burning, the mouth of the individual was closed and the articulation at the tempero-mandibular remained until the anterior part of the mandible was fragmented. At that point the right mandibular condyle was displaced laterally out of the fossa and the body of the mandible moved slightly medially.

Thorax and arms

The vertebral column is fully articulated from the base of the cranium to the base of the sacrum. As the individual is laid in a prone position, the bones of the thorax are mostly located on their anterior side. The cervical vertebrae are turned slightly to the left as the cranium is laid on its right side. This indicates that the connections between the cervical vertebrae were still 'mobile' when the individual was deposited. The anterior side of the thoracic and lumbar vertebrae are unburned, indicating that the fire did not consume all the soft tissue of the thoracic region. The ribs were exposed to high temperatures at the anterior side which decreases progressively to an unburned appearance at the posterior. The remaining parts of the ribs are in articulation with the vertebrae. The anterior ends of the rib fragments have move towards the inferior under the influence of gravity when their soft tissue encasement decomposed. The scapulae also remained in articulation and on their original anatomical position. The left side of the thorax is burned and subsequently fragmented to a higher degree than the right. This is particularly evident when observing the arms. Of the left arm only the proximal 1/3 part of the humerus remains in articulation while the rest is burned and fragmented and ended up in the fill of the pit. Of the right arm the entire humerus remains along with the proximal half of the ulna an radius. Both humeri are positioned in an angle away from the body, the left ca. 15 degrees and the right ca. 20 degrees. The right lower arm is folded under the thorax and the distal part points to the left laterosuperior side. The hand was probably located under the chest area before the fire was started.

Pelvis

Similar to the cranium, the remains of the pelvis and legs were lifted *en bloc* to enable detailed excavation in the lab. This revealed valuable clues which were possible overlooked if the remains were disassembled in the field. The pelvis remained in full articulation and was turned slightly to the upper right side, so that the left os coxa was located more inferiorly than the right. The anterior half of the illia are exposed to high temperatures and fragmented and the transition to the unburned part is rather abruptly. The rest of the pelvis is mostly unburned with some patches of scorching on the anterior side.

Legs

The configuration of the legs is rather peculiar. Only the proximal epiphyses and a small part of the diaphysis remains unburned and in articulation with the acetabula, while the rest of the legs is found in the pit fragmented and discolored due to burning on high temperatures. The remaining part of the left femur is burned and fragmented at the posterior side. It is directed laterally and slightly inferior, which probably occurred when the body was deposited in the pit and the rest of the leg was already

fragmented. The stump of the right femur was burned and fragmented at the lateroposterior side and was pointing straight anteriorly towards the bottom of the pit. Again this happened during deposition, when the leg was already fragmented. The scattered remains of the legs were found underneath the thorax. The distal epiphysis of the femur is clearly visible on the field photos on the left side of the elbow joint and in addition, the patella was found in the area of the pelvis. The location of the fragments and the high temperature on which they were burned (they were much more thoroughly burned than the rest of the body) indicate that they were folded double and closest to the heat source. This is also indicated by the fact that the posterior sides of the femora are burned while the body was in a prone position in which the anterior side of the body was exposed directly to the heat source. Remains of the feet bones were found in all segments of the pit. If the body would have been laid in a prone position on top of the folded legs (in a fetus position) the feet would be positioned just inferiorly of the pelvis. In this case it would be unlikely that the bones of the feet would end up under the thorax and near the cranium, unless the remains were scattered by human intervention before depositing the rest of the body. Although the evidence suggest the body was indeed in some sort of fetal position, it is more plausible that the body was more upright, possibly (semi-) seated, and collapsed downwards when tissue and ligaments were destroyed. The feet would then be more underneath the lower thorax and pelvis. Furthermore, the scattered location of the bones indicate that the person was not positioned directly in the pit as the feet would be more fixed at the bottom inhibiting such scattering. The body was thus supported on a pyre which was directly lit, or on another construction under which a fire was made. Whatever the case, the two postholes found at the left side of the grave (possibly matched by two on the right which were lost) were likely part of this construction. The lack of burn traces on the posterior side of the body, the superior side of the cranium and the inferior side of the pelvis indicate that the pyre was small. Although it had enough energy to burn the legs and parts of the anterior side of the body at high temperatures, it burned out or was extinguished too soon to devour the entire corpse.

Individual 2014-02

Grave type and secondary disturbances

The bones of individual 2014-02 that remain in situ at the time of excavation are articulated very well. Joint articulations that disappear rapidly, such as those of the hands, are maintained. It can thus be said that it was a primary inhumation where the individual was placed in a supine position. However, parts of the skeleton are missing likely due to secondary disturbances. The cranium, upper part of the thorax (cervical vertebrae, claviculae and part of the scapulae), and right have disappeared. No soil traces were observed that give clues about the date of this disturbance. The lower legs, from the distal part of the femora down, are missing as well. Here it can be attested that the disturbance took place very recently (probably last year when buildings on the site were demolished), as traces of a mechanical excavator are clearly seen in the natural occurring soil.

Thorax

The cervical and the most of the thoracic vertebrae are unobservable due to secondary disturbances, The remaining parts of the thorax are fully articulated. The ribs from both sides have fallen with their anterior (sternal) ends to the inferior side. When the soft tissue of the thorax decomposes the anteroinferior orientated ribs will fall under the influence of gravity to the bottom of the available void. A ‘horizontalization’, or ‘flattening’ of the rib cage is the result. The right ribs are positioned

vertically on top of each other, with the lowest ribs at the bottom. The left ribs are more dispersed: the upper ribs are orientated medially, while the lower ribs are displaced towards the lateral side, hereby falling outside the original volume of the thorax. This indicates that a void around the body existed at the time of decomposition.

Upper appendices

Only the left arm remains of which the proximal end of the humerus and the diaphyses of humerus, radius and ulna are (recently) damaged. However, it is clear that the arm resides in the original place of deposition. The humerus is positioned at the lateral side of the thorax in a slight (20-degree) angle away from the body. It has been turned inwards so that it is positioned on the posteromedial aspect. The lower arm is bend towards the body in a 135-degree angle with the humerus. The distal parts of the radius and ulna rests on the superior border of the left ilium. The ulna is situated on top of the radius and both are articulated with the carpals. The left hand is positioned on the medial half of the illium and the left half of the sacrum (S1-2).

Pelvis

The sacrum is articulated with the L5 and is positioned on the same axis as both os coxae. However, the os coxae are not articulated with the sacrum. Instead they are horizontalized and rest on the bottom of the grave. The pelvis has 'opened' whereby the parts that are directed medially in a living individual are now orientated anteroinferior. The auricular surfaces of the os coxae and the sacrum have moved approximately 3 cm away from each other, which occured when the bones found a new equilibrium in the grave after their separation. The horizontalization of the os coxae is only possible when a void exist around the pelvis, allowing the parts to rotate beyond the original volume of the body (otherwise they would be fixed by surrounding soil).

Legs

The heads of the femora are articulated with the acetabula and have thus rotated laterally with the opening of the pelvis. Both femora are positioned on their posterior aspect. The right femur is turned slightly medially, with the distal part resting on the posteromedial aspect. If the legs were laid out without forcing the joints beyond the limits of a living individual, it is only possible that the legs were fully stretched. However, due to the unfortunate recent disturbance this cannot be determined with any certainty.

Appendix D: example of skeletal form used during excavations

Grafformulier

	Spoornr.:	Vondstnr.:	Matrix:	Vulling:

Begravingspositie (kruis meerdere vakjes aan indien nodig):

☐ Gestrekt ☐ Gebogen ☐ Sterk gebogen ☐ Op rug ☐ Op buik ☐ Links ☐ Rechts

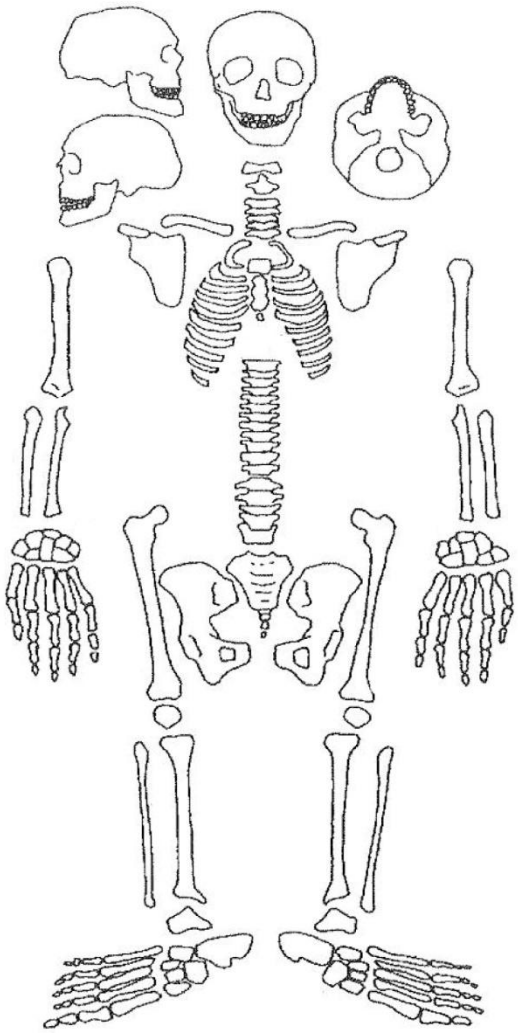
Positie armen (kruis meerdere vakjes aan indien nodig):

☐ Gestrekt ☐ Gebogen ☐ Sterk gebogen ☐ Gekruist

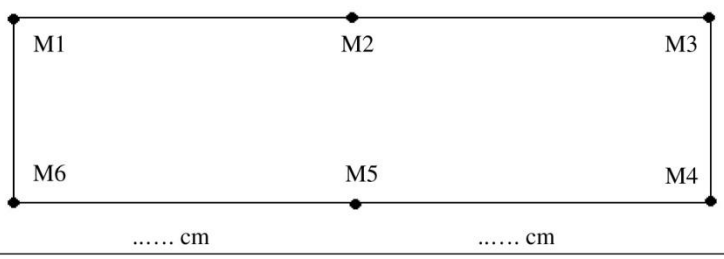
Positie benen (kruis meerdere vakjes aan indien nodig):

☐ Gestrekt ☐ Gebogen ☐ Sterk gebogen ☐ Gekruist

Markeer de **afwezige** botten



Schets



Monsters: Vondstnr.:

☐ Maag: ☐

☐ Grond, nl: ☐

☐ Hout ☐

☐ Anders, nl: ☐

Vondsten: Vondstnr.:

..... ☐

..... ☐

..... ☐

☐ Gezeefd

Foto's Fotonr.:

☐ Stereofoto ☐

☐ ..... ☐

☐ ..... ☐

☐ ..... ☐

☐ ..... ☐

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Conservering:

☐ Goed

☐ Redelijk

☐ Slecht

Opmerkingen:

Skelet lengte in graf ☐ cm

Legenda:

B = Breuk (zowel AM als PM)
OS = Opgravingsschade
A = Artefact
P = Pathologie

Opgr. datum:

Opgraver(s):

Tafonomieformulier: Beschrijf de positie van alle botten en/of verbindingen

Cranium en mandibula:	
Torso (clavicula's, scapula's, wervels en ribben):	
Armen en handen:	
Bekken en sacrum:	
Benen en voeten:	
Opmerkingen:	Extra botelementen: