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Clothes make the man : early medieval textiles from the Netherlands

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Clothes make the man

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Clothes make the man

Early medieval textiles from the Netherlands

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Chrystel Richarda Brandenburgh

geboren te Boxtel
in 1975

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Preface

In the autumn of 2008, after having worked as a municipality archaeologist for more than 10 years, I decided it was time for a new challenge. A PhD-research had been in the top 3 of my bucket list for many years, so I wrote a research proposal to investigate the early medieval textiles that had been found in The Netherlands during the last few decades and submitted it at Leiden University. After a few discussions with Prof. Dr. Willem Willems († 2014) my project was approved and I started a research that eventually continued until 2015 and took me towards nearly every corner of the country.

Why textiles? That question has been asked more often than I can remember. The short version of my answer always was: "I have this thing with threads…", followed by a (often) longer explanation why it would be useful to look into the way people made and used cloth and clothing in this period of our history. Textiles and clothing provide information about the identity of people (or the identity they want to have), their status, their age and their social contexts to name a few. Because clothes act as a social messenger even today, it brings us very close to the people, whose past archaeologists try to unravel.

Since no comprehensive research had been conducted into early medieval textiles from The Netherlands it seemed a good idea to fill this gap in our knowledge.

At the outset of my research some publications were available in which textiles from the early middle ages were described in more or less detail. However it soon became evident that several museums and depots still contained many textiles that had never been published before. These textiles were hidden in boxes of which the exact content was often not known. Therefore, I had to undertake miniature excavations within the storage rooms of the museums to (re)discover unique finds. The research has resulted in the publication of eight articles of case studies covering textiles from both settlements and cemeteries. These case studies have been included in this thesis as chapters and can all be read individually. The first and final chapters of the thesis summarise the results of the case studies and place them into a broader geographical and theoretical context.

Having finished my research I now come to the pleasant part of being able to thank all those who have helped me in the last years. First of all I would like to thank the late Prof. Willem Willems for guiding me in the first years of my PhD-research. From the early days I had also received help from Prof. Dr. Frans Theuws and thankfully he agreed to take over the role of Willem Willems after his demise. I thank him for the way he acknowledged my research as an important contribution to his own cemetery-project and for involving me in the discussions regarding burial practices. His guidance during the final phases of my research has been of great help. A special thanks is due to Prof. Dr. Lise Bender Jørgensen for sharing her knowledge on textile research, discussing the theoretical and practical dilemmas of the topic, for her guidance and for her supportive and kind comments on earlier drafts of my texts.

Special thanks are due to my paranymphs Dr. Yvonne Lammers and Irene Gerrits. Yvonne, thank you for your critical review of my texts and guidance in the do's and don'ts of defending a thesis. Irene, dear friend, I thank you for your friendship and your help over the years.

This thesis could not have been written without the generous help of many people who shared their knowledge and provided access to the textiles. I am indebted to Dr. Gillian Vogelsang (Textile research Centre Leiden) and Sandra Comis for sharing their knowledge about textile research and for opening their libraries on archaeological textiles.

Furthermore, many thanks are due to Dr. Penelope Walton Rogers of the Anglo-Saxon Laboratory, York, for conducting the necessary analyses on fiber and dye samples and for sharing her knowledge built up in many years of textile research of the early medieval period.

I would like to express my thanks to Dr. Mirjam Kars, Maaike de Haas en Martine van Haperen for their discussions on burial practice and chronology; Dr. Piet van der Velde for his theoretical contribution; Paul Rossel who shared his documentation of the textiles from Sint-Servaas church; Wim Dijkman, Sjoerd Aarts and Dr. Titus Panhuysen for providing access to the textiles and documentation of the textiles from Maastricht and Dr. Raphael Panhuysen for providing the physical anthropological data on the burials. Likewise I would like to thank Dr. Annemarieke Willemsen, Marianne Stouthamer, and Robert Ritter for the opportunity to analyze the finds in the National Museum of Antiquities, Leiden. I would like to express my thanks to Dr. Egge Knol (Groninger Museum), Evert Kramer (Fries Museum), Dr. Ernst Taayke (provinciaal depot Nuis), Vincent van Vilsteren (Drents Museum) and Henk Hendrikse (Stichting Cultureel Erfgoed Zeeland) for providing access to the textiles in their collections as well. Lastly I thank Dr. Stijn Heeren, Joep Hendriks, Floris Reijnen and Ronny Meijers for enabling me to analyse the textile finds from Nijmegen.

My colleagues from Erfgoed Leiden en Omstreken deserve a special word of thanks. It would demand too much paper here to thank you all personally, so thank you all for your support and our refreshing and often hilarious discussions regarding the subject of my thesis.

Nick and Julie, thank you! You know why…

I would like to thank my parents for their unconditional love and support, throughout my studies and career.

Dear Eeke, Aeneas en Leander, writing this dissertation has lasted most of your childhood. Instead of complaining about having an absent-minded or busy mother you were happy and loving whenever we were together. From now on time will be undivided for you.

Lastly, and most importantly, I thank my dear husband Job for his infinite support throughout the years and for keeping the family running while I was busy writing this thesis.

1. Introduction

Textiles have been the subject of archaeological studies for several decades. These remains of garments, household furnishings, but also sails, have been preserved in fragments of varying sizes as well as in mineralized state. The pioneering textile specialists were mainly preoccupied with the study of prehistoric and early medieval fabrics. Fragments of prehistoric textiles were regularly found in bogs in Scandinavia and Germany and, in lesser amounts, also in the Netherlands. Eventually these fragments were all documented by Hald and Schlabow, and later re-assessed by Van der Sanden.[1] The textiles from early medieval settlements and cemeteries also drew the attention of several researchers. These early studies were however to a large extent descriptive and dedicated to the reconstruction of models and used techniques. In the last years, with the establishment of the Centre for Textile Research in Copenhagen, more attention is given to natural scientific, theoretical and experimental approaches.[2] Additionally, we see a (renewed) shift towards the study of prehistoric and Roman remnants of textile.[3]

The focus on early medieval textiles in northwestern Europe resulted in a considerable number of site-reports. For Scandinavia these are for instance the works by Bender Jørgensen, Geijer, Hald, Hougen, Hägg, Ingstad, Mannering, Østergård and Nockert.[4] In Germany H.-J. Hundt published the textile remains from a large number of Alamannic, Frankish and Saxon cemeteries and from the *terpen* settlement of Elisenhof,[5] while Tidow, Ullemeyer and Schlabow mainly focussed on the textiles from the settlements from northern Germany and the Netherlands.[6] For Great Britain and Ireland G. M. Crowfoot, E. Crowfoot, F. Pritchard and P. Walton (Rogers) have produced a great number of publications on the study of early medieval textiles.

The last 25 years saw the appearance of overviews in which textiles from different sites and regions were put together. Well-known examples of these are the studies by Bender Jørgensen and Tidow[7] on textiles from the North Sea region. Walton Rogers and Owen-Crocker did similar work reconstructing the use of cloth and clothing in early medieval Britain, while Harrington has examined textiles and textile tools from Kent and compared them with finds from Germany and Norway. Swift has examined the role of dress accessories as expression of identity in late Roman Europe.[8] Many recent studies cover various aspects of early medieval fabrics. Rast-Eicher for instance published detailed accounts of the technical characteristics and the use of textiles from different sites in Switzerland, and (with Desrosiers) France,[9] while various authors such as Banck-Burgess, Siegmüller, Peek and Haas-Gebhart have studied individual sites from Germany.[10] In Belgium the cemetery of Broechem yielded a large amount of textiles as well.[11]

1. Hald 1950/1980, Schlabow 1976, Van der Sanden 1996.
2. For publications regarding provenance studies see Frei 2013; theoretical approaches see Andersson 2007, Experimental approaches: Andersson Strand 2010, Hammarlund (various articles).
3. Gleba & Pásztókai-Szeoke, 2013; Nosch 2012; Gleba & Mannering 2012.
4. Bender Jørgensen 1986; Geijer 1938, Hald 1950/1980, Hougen 1935, Hägg 1984, 1991, Ingstad 1982, 2006, Mannering 1997, Nockert 1991, Østergård 1991.
5. Hundt 1966, 1972, 1981 and many others.
6. Tidow 1990, 1995, Ullemeyer & Tidow 1981, Tidow & Schmid 1979, Schlabow 1953, 1974.
7. Bender Jørgensen 1991, 1992; Tidow 1995.
8. Walton Rogers 2007; Owen-Crocker 2004, Harrington 2007, 2008, Swift 2004.
9. Rast-Eicher 2010, 2012; Desrosiers & Rast-Eicher 2012, and many more.
10. For Hessens see Siegmüller 2010, 183-202; Unterhaching has been published by Haas-Gebhard 2013 and some preliminary results from Dunum are presented by Fischer, Peek & Siegmüller 2012. The textiles from the cemetery of Lauchheim (1300 graves) are currently under analysis by the Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart. Banck-Burgess (Banck 1998), Gauβ, Peek & Scheschkewitz 2013 published some preliminary results of this site.
11. For a preliminary report see Annaert 2012, Annaert & Ervynck 2013.

In this PhD-thesis the textile remains from early medieval settlements and cemeteries in the Netherlands will be discussed. The aim of the research is to reconstruct the use of cloth and clothing from cemeteries and settlements from the period 400-1000 AD in the area that is now defined as the Netherlands. In this respect the study aims to be a first step towards an up-to-date overview of different aspects of early medieval textiles, which further research can use as a starting point and continue to expand. However, creating an overview of the technical aspects of the fabrics that were used in this period is not enough. We are always trying to come to terms with the human aspects of the objects we analyse: how did early medieval men, women and children use these textiles, what did they mean to them and how do we explain the variability we perceive in the textiles? Therefore the research should also ascertain changes in the use of textiles throughout time and between different groups and contribute to the understanding of (changing) social structures in this period. In the fourth to seventh centuries, the Netherlands lies in the frontier zone of several spheres of influence. In the south was the Roman Empire and later the Frankish realm, while the Frisian north and west bordered on the North Sea area and the people living in this region had contacts with the Scandinavian and Anglo-Saxon worlds. During the period of research the entire region became part of the Frankish kingdom. The organisation and social stratification within the different areas of the region, which we now call the Netherlands, is subject to an ongoing debate. Since textiles and clothing are pre-eminently used to express identity (among which status), a basic knowledge of the variation of fabrics that were used in this period in different areas of the country will prove valuable.

This dissertation is not the first publication dealing with early medieval textiles from the Netherlands. In the past various authors have published textile finds from this region. These will be briefly summarised since they provide the background for the current research. Several museums and regional depots of archaeological finds in the Netherlands contain rich collections of textiles from the early Middle Ages. Parts of these collections were published by Schlabow, who described a considerable number of the textiles present in the Groninger and Drents museum[12] and by Bender Jørgensen, who made an inventory of textiles present in the Fries Museum in Leeuwarden, the Groninger Museum, Drents museum in Assen and the National Museum of Antiquities in Leiden.[13] The last decades witnessed the publication of several books and articles in which textiles have been described in more or less detail as well. A well-known example is the work by Vons-Comis who was the first textile researcher in the Netherlands to look further than the technical aspects of textiles in her reanalysis and reconstruction of the garments of the so-called Princess of Zweelo.[14] Other examples of textile publications discuss the sites of Dorestad and Middelburg.[15] Mineralized remains of fabrics have also been found in cemeteries but only few of these had been published before, mainly by J. Ypey.[16] Recently the catalogue of the cemetery of Rhenen has been published which includes a detailed inventory of the textiles by J. Ypey.[17]

Looking back at the research that has been conducted so far we must however conclude that early medieval textiles have been a somewhat neglected issue in Dutch archaeology. Where the surrounding countries have witnessed a development in which textile archaeology has become a fundamental part of archaeological site reports and many theoretical and comparative studies, a similar development has been lacking in the Netherlands. As a result our knowledge of the production and use of textiles and aspects relating to these subjects is mainly derived from the surrounding countries, where more textile research has been carried out.

This thesis is the final assemblage of several articles that have been published as individual articles or chapters in journals and books. To avoid overlapping descriptions of theory and questions, the original articles were modified and information was condensed. In the case study of Maastricht new

12. Schlabow 1974.
13. Bender Jørgensen 1992.
14. Vons-Comis 1988.
15. Miedema 1980; Leene 1964; Zimmermann 2005/2006; Zimmermann 2009.
16. Van Es & Ypey 1977; Ypey 1963/1964.
17. Wagner & Ypey 2012.

information was added in footnotes and figures. The case study of Nijmegen has never been published before and is a new addition to the data.

The final result of assembling all previously published articles has led to the following structure of this publication: the first chapter is an introduction and presents a general description of the research and its historical, theoretical and methodological framework. The following chapters describe the data of six case studies that were carried out. The thesis is concluded by a last chapter, which brings all data together and summarises the main conclusions.

1.2 RESEARCH QUESTIONS

This study aims to answer the following questions:

1. What textiles and clothing did people use during the early Middle Ages (400–1000 AD) in the area now called the Netherlands?

2. When we look at the distribution of the textiles: Which differences and changes are visible in the area and period under investigation? Are differences visible between sex and age groups, types of settlements, different types of cemeteries (such as rural, urban, rich and relatively poor)?

3. How may the differences observed in the textiles be explained?

4. Which spheres of influence are visible in clothing and textiles in comparison to the surrounding countries?

1.3 HISTORICAL AND THEORETICAL BACKGROUND

Textile research is closely related to other artefact-based studies and theoretical models. The historical and socio-political background of the area have to be taken into account to put the data into perspective. In the following paragraph a short introduction to the Netherlands during the early Middle Ages is presented to illustrate the framework in which the studied textile fragments were used and produced. In addition several theoretical models, which have been applied in this dissertation are described.

1.3.1 A short historical framework

Following the fall of the Roman Empire major changes took place in parts of the Netherlands. Although no demographic data are available to sustain the picture presented below, historical sources testify that Germanic people, who had hitherto lived north of the Rhine, moved south and colonised the arable lands that were abandoned during and after the unstable final stages of the Roman reign. In the course of the sixth century the Merovingian kings who's territory in the end consisted of large parts of France, Germany, Belgium and the southern parts of the Netherlands extended their reach northward. It is however unknown whether these political changes actually had demographical consequences. Archaeological evidence sustains the assumption that new settlements were created in this period in the south, allowing models of immigration or colonisation.[18] The north of the country saw different changes. Habitation of the raised mounds (*terpen*) in the northern coastal area was given up at the end of the third century. It is assumed that the Frisians living here migrated south and were incorporated in the northern Roman provinces. After the fifth century population increased again and the *terpen* were gradually reoccupied – presumably by Scandinavian and Saxon immigrants - and raised to meet the never-ending threat of the seawater.[19] The centre of the country and the higher grounds in the north show a much more stable habitation pattern. The changes over time in the western coastal areas are not easily explained. The discontinuity of habitation between the third and the fifth century is also observed here. In the fifth century new elements are introduced into the material culture but these changes occur not only locally and fit into a larger pattern that covers the coastal areas of England and Scandinavia. Influences from these areas are to be expected since the western (and northern) coast of the Netherlands was easily

18. Theuws 1999, 340; Theuws 2009, 309; Theuws & Van Haperen 2012, 10.
19. Gerrets 2011, 196.

accessed from these countries through the trade-networks over sea. Understanding the nature of the movement of people from this is however not easy. Dijkstra states that the changes in material culture observed in the western coastal areas, showing evidently Anglo-Saxon influences, may have been caused by small groups of immigrants but may also be the result of the entrée of foreign brides or merely of trade networks.[20] In the middle of the eighth century the central and northern parts of the Netherlands (Frisia) were incorporated into the Frankish realm, which may have resulted in more south eastern oriented influences.

Although settlements from the early Middle Ages are numerous, these are generally small and presumably of rural nature. Central places are scarce in the Merovingian period. From the fourth century onwards Maastricht developed into an important centre, becoming the administrative, commercial and religious centre of the area. The location of the old Roman castellum Traiectum in current day Utrecht shows signs of habitation during the fifth and sixth century and historical sources inform us of a church on this site in the seventh century. From this period onwards Utrecht developed into the religious centre of the area.[21] Dorestad (nowadays Wijk bij Duurstede) became an important centre in the early eighth century, but coins show that habitation already occurred as early as the sixth century. Other centres, such as Nijmegen, Deventer and Tiel developed later.[22]

It is assumed that Christianity did not spread evenly and at a regular pace throughout this region. Maastricht was an early religious centre in the area from the late Roman period onwards, while in Nijmegen Christian symbols have been found which date from the third to fifth century as well. In other places there is no proof for Christianisation earlier than the seventh and eighth centuries. The church in Utrecht for instance was founded around 630 AD and most cemeteries do not show any signs of Christian burial customs before the eighth century. This does however not need to imply that there were no Christians around: the heathen burial custom may have long been practiced while in other aspects the population acted as Christians.[23]

Discussing objects from early medieval contexts is directly related to discussing the matter of social organisation. Textiles are in many ways associated with the concepts of status and identity. They can be used to express a social position or vertical status of an individual or groups of people (see below). They were also part of a network of trade. The production of textiles was labour intensive and time-consuming, something that meant that textile production and the organisation of it was firmly embedded in the subsistence economy of the society in which it takes place. As Andersson Strand e.a. have described it : *"A textile is not simply a binary system of spun, twisted, or spliced fibres, but first and foremost a result of complex interactions between resources, technology, and society. The catalysts for this interaction are the needs, desires, and choices of any society, which in turn influence the exploitation of resources and development of technology. Conversely, the availability of resources and the state of technology condition the choices of individuals and society. The totality of these interactions is expressed during textile production."*[24] Therefore the different ideas regarding the way society was organized during this period will be briefly discussed here.

The Frankish realm is generally characterized as highly hierarchical with a substantial group of aristocrats at the top and several layers of social groups underneath. There may however have been local differences in the degree of social stratification in the periphery of the Frankish world. This model greatly contrasts with the picture often given of the Frisians living in the northern and western part of the Netherlands. The Frisians are described as tribal, more or less egalitarian, self-sufficient

20. Dijkstra 2011, 354.
21. Van Rooijen 2010, 158.
22. Nijmegen continued to be habituated from the Roman period onwards and became a Frankish administrative centre in the second half of the eighth century; Deventer developed into a town in the middle of the 9th century and Tiel became a city of trade from 900 AD onwards (Oudhof e.a. 2013, 133-134).

23. Willemsen 2014, 139 ff.
24. Andersson Strand e.a. 2010, 150.

farmers.[25] Local elites would not have greatly stood out from the rest of the population and would have secured their positions by providing gifts to their subordinates. Gerrets however states that the new Frisians that inhabited the northern part of the Netherlands from the fifth century onwards were of Saxon and Scandinavian origin and had a long tradition of complex social structures, including an aristocratic elite layer and hierarchically organized groups beneath. The differences between Frisian and Frankish social organisation may therefore have been smaller than generally assumed.[26] The concept of gifts being distributed by the aristocratic elite has been subject to debate as well. Traditionally it is assumed that the top layer of early medieval society controlled the distribution of tradable goods. They secured their power and the relations with their subordinates by providing desirable, exotic or luxurious goods.[27] This concept has been disputed lately. Theuws for example argues that the amount of luxurious objects found in rural cemeteries is too large to be merely the result of aristocratic control and gift giving and suggests that local peasants must have had direct access to exchange or trade networks.[28] Textile research can contribute to our understanding of the degree of vertical social stratification and the degree in which people had access to luxurious objects such as fabrics.

1.3.2 Theoretical framework

1.3.2.1 The social and symbolic dimensions of dress in early medieval society

Textile historians nowadays commonly accept the idea, that clothing is not merely 'practical' in function, but holds a social dimension as well. These social aspects of dress did however not receive much attention by dress historians well into the 20th century as is vividly pointed out by Taylor in her overview of dress history publications.[29] Stone made an important early contribution to the debate on the social role of clothing in 1962. He stated that the appearance of an individual is at least as essential for the establishment, maintenance and alterations of his identity as language.[30] Appearance, of which clothing is an important part, is therefore to be considered a form of communication. Many authors have developed this concept further, among which Barnes and Eicher have played an important role. In their 1991 article they state that *"On basis of ....visual impact and what we know of communication, we can expect dress to precede verbal communication in establishing an individual's gendered identity as well as expectations for other types of behaviour (social roles) based on this identity."*[31] They also posed a new definition of dress that not only included clothing but also body modifications (such as hair style) and body supplements (such as jewellery), which are equally if not more important ways to express gender roles as clothing.

Roach-Higgings and Eicher have furthermore pointed out that dress may express all sorts of identities: "*...individuals acquire identities through social interaction in various social, physical and biological settings. Identities are communicated by dress as it announces social positions of wearer to the observer...*" These social positions may arise by kinship, economic, religious and political activities.[32] In its simplest form, dress, textiles and dress accessories can be used to denote the identity of groups of people, or the position of an individual within a group. Bazelmans however was one of the first to stress that one should not only try to interpret dress in terms of social-political terms. Objects such as weapons and clothing do not merely reflect the position of their owner. He states that objects and the person wearing them are intertwined to such an extent that they influence each other's value. The image of a person thus creates his identity. In other words: a noble man may wear certain weapons

25. See Gerrets 2011, 198-199; Dijkstra 2011, 321, based on Wickham 2005, 542-545.
26. Gerrets 2011, 196 & 198-199.
27. Bazelmans 1999 (111-114, fig. 6.1); Bazelmans 2002, 80.
28. Theuws 2010, 58; Theuws 2014, 8.
29. Taylor 2004, 61.
30. Stone 1995 (1962), 19.
31. Barnes & Eicher, 1991, 17.
32. Roach-Higgings & Eicher 1995, 12-13.

and dress befitting his status, while the fact that he wears them will - in the eyes of his surroundings - automatically transform him into a noble man.[33] We should be careful not to mix up this concept with the modern concept of fashion, which is an economically stimulated construct based on mass production and the demand of individuals. Wilson and De la Haye for instance have pointed out that with the development of mass production fashionable clothing has become part of a mass culture whereby individuals express themselves and construct identities.[34] In the 1980's it was thought that dress could only become fashion (i.e. an instrument to create identities) in western capitalist societies, but this idea has been challenged since. Dress has been subject to change in non-capitalist societies as well so we can assume that not only modern fashion enables an individual to create his identity, but that the same processes could have taken place in earlier era's. Through its ever-changing nature however fashion probably does not have the same meaning as clothing did in the past.

In the past, differences in grave-inventories have often been explained in terms of ethnic identity.[35] Most recent publications on mortuary archaeology of the Merovingian period however have dismissed this line of interpretation.[36] There are several reasons to regard ethnic identity as an unlikely explanation for differences in textiles in Merovingian burials. Firstly, the mobility of goods (through trade) in this period was an equally important phenomenon as the mobility of people. Changes in textiles, therefore, are not automatically a reflection of migration of ethnic groups. Secondly, written sources and ethnographic research have demonstrated that dress generally serves as a vertical social marker instead of a horizontal one.[37] Pohl has pointed out that certain early medieval textual examples demonstrate that costume as an ethnic marker was not unknown, although its role in marking social distinctions such as age, gender or status was probably far greater.[38] We need to keep in mind that our ideas regarding horizontal group affiliation and clothing have been influenced to a large extent by the concept of national costumes and village costumes, of which we still see relics in our times. This however is a fairly modern phenomenon, created in the 19th century, where we see a (constructed) group affiliation reflected in the way people dressed, without there being an ethnic difference between the groups.[39] Nevertheless there are differences between archaeological sites and one can identify small (horizontal) regional groups based on their material culture (such as clothing).[40] Group affiliation in small regional groups may therefore be visible in the archaeological record but there are more ways to explain these than the ethnicity of the members of the group. Lastly, ethnic groups are generally ascribed to larger regions. The larger regional groups or material cultures that can be identified (often only by using statistical methods) do however not correspond to known ethnic units or their individual characteristics are so subtle that they may not have been recognised as such by the people involved.[41]

33. Bazelmans 2002, 79-81. The relation between dress and personhood has not been further elaborated in this thesis.
34. De la Haye & Wilson 1999, 1.
35. Summarized by Effros 2003, 101-108 and discussed by Theuws 2009, 288-293. See for examples the various contributions of Böhme 1974, 1996, Härke 1990, Koch 1998. Regarding costume reconstructions (based on the configuration of dress accessories) of the 'Franks' and other contemporary ethnic groups see for examples the contributions by Zeller, Vallet, Siegmund, Perin & Kazanski in Die Franken – Wegbereiter Europas 1996.
36. Theuws 2009, 288-290. Although Williams in his review-article of 2005 attentively states that no critical evaluation of this model has been carried out yet and that the current view on the role and symbolic use of Merovingian grave objects may just as well be a product of the political and social background of modern-day archaeologists as the ethnicity-model was of those in the past (Williams 2005, 200).
37. See for example Raudszus 1985, 183-194; Schubert 1993, 9-17, 61-69.
38. Pohl 2006, 137.
39. Schubert 1993, 9-17.
40. Schubert 1993, 12.
41. Pohl uses the example of the transition of the peplos towards the tunic to illustrate this point. This transition took place in the fourth/fifth century in several historically known tribes and from this we can conclude that there probably was no ethnic issue behind this change in dress. Pohl 2006, 136 & 141.

1.3.2.2 Mortuary practice as a social display and ritual performance[42]

The concepts described above may be true for the living population, but when dealing with the dead, it becomes even more complex. The Merovingian funerary ritual was not merely used by the living to express the identity, status or wealth of the deceased individual during his lifetime. It is also likely that the burial was instrumental in the creation of an identity, reflecting the aspired identity or status of the deceased or his/her descendants and expressing their own aspired relations with a leader or association with a specific group (of which they were or were not yet part).[43] This view is (partly) based on contemporary anthropological research pointing out that the dead were often presented with many extraneous objects in their graves, showing burial witnesses the wealth the heirs could afford.[44] Exotic objects were purchased exclusively to play a role in the burial ritual,[45] and old objects, having passed from one generation to another, were interred. Most likely, this was also the case during early medieval funerary rituals. It is assumed that many burials were adorned with additional grave goods that were not directly associated with the body of the deceased[46] and probably also with textiles more rich than usual, including shrouds or death robes made especially for burial. Some of these objects may have been circulated and used by the living (including the deceased or his ancestors) long before they were buried in the grave.[47] In this line of interpretation, the numerous goods and clothing deposited in graves may represent a competitive display of resources[48] or be laden with symbolic or amuletic meaning specific to the context of the funerary ritual.[49] It is often assumed that the textiles found in graves represent the daily clothing of the deceased, and therefore reflect the identity and social status of his life.[50] Following the concepts above it is possible to take a different view wherein the clothes themselves have been chosen in accordance with the social and symbolic function of the early medieval burial rituals. Resulting from the debate, grave objects and clothing are now considered to be symbolic for the social status, age or gender of the deceased and/or the mourners and as such played a role in the grave ritual. They were used to confirm or create the identity of the people involved in the burial ritual or social categories in general.

1.3.2.3 Perception of textiles and their qualities

Following the model of the burial as a stage in which all sorts of meaning may be attached to the grave inventory, the logical step forward is to try to grasp the differences between graves. Here we have to focus inevitably on the part of the burial ritual that we can still see: the visual aspects of the grave inventory, while other equally important aspects of the burial ritual, such as sounds, smells, presence and movement[51] are forever beyond our grasp. Defining differences between textiles often involves an assessment of quality. Textile quality can be determined by many factors such as the shape, drape, colour, pattern and texture of a fabric. These aspects are visible and recognisable with the naked eye and will have determined the way people perceived and valued these fabrics. In most textile studies however the quality of textiles is measured in numbers of

42. This section has been published previously in Brandenburgh 2012a, 126-127 (chapter 2) and is therefore removed from chapter 2.
43. Halsall 1995, 245-248; Effros 2003, 124-128; Cohen 1985 shows how symbols have different meanings for different groups and can change over time, enabling people to (re) create the boundaries of their social group, p. 16 & 50.
44. It is also possible that objects were brought by funeral attendees.
45. Effros 2002b, 69-91.
46. Evidence from burials in southern Germany from this period shows how the dead not only received objects in their graves, but also that these objects were wrapped in textiles or leather cases; Bartel 2003.
47. Kars 2012, 115-116; 125-127.
48. Pader 1982, 18ff.
49. Effros 2002a, 7; Coon 1997, 52-70 shows how the use of specific types of clothing plays an important role in the creation of archetypical roles in early Christian context.
50. Walton Rogers 2007, p. 245-246, for example, on the basis of the numerous repairs and wear on garments and dress accessories in Anglo-Saxon graves, concludes that the objects and garments in those graves had been used for a considerable time, and were not made especially for the grave. This is seen as evidence that most people were buried in their daily clothes and is contrasted to the royal burials, such as Sutton Hoo, where the grave goods were more numerous, and probably served as a public display.
51. Williams 2005, 208.

threads per cm and thread thickness; an analysis that requires a microscope. This is a somewhat technical and limited approach towards textile quality for early medieval people did not have to use a magnifying glass to assess the quality of a fabric and neither do we nowadays. In this study both methods will be explored: textile quality is assessed using both characteristics that can be observed by the naked eye as well as the microscopically measurable number of threads/cm.

Textile quality based on visible characteristics

The macroscopic characteristics of a fabric are often still discernible in early medieval textiles. Nevertheless, it is still difficult to attach meaning to them because we only have a generalized concept of the value people attached to objects, including their dress. In order to understand and measure these factors we will first have to understand how people in the past actually experienced what they saw. Wells argues that people in the past had a different frame of reference (cognitive map), causing them to see things differently than we do nowadays.[52] In other words: what people saw depended upon the cultural and historical circumstances in which they lived.[53] People in the past possessed fewer objects than we do nowadays and consequently these objects may have meant more to a person in history than in present times. Moreover, objects had greater significance to people who did not possess a system of writing, because they were means of communicating a whole range of information that is communicated in writing today.[54] It will therefore be impossible for us to perceive our archaeological objects the way people did in the early Middle Ages. Fortunately however, the way our eyes perceive information in general has not changed over time, and what we see is often determined by the fact that we unconsciously focus on a single aspect or pattern.[55] Wells study is based on this assumption and provides us with some useful tools to look at grave objects in a different way than we normally would. He discerns the following aspects that influence the way we see the characteristics of objects.[56] The size and texture of surfaces attract the eye, just as colour, decoration and glitter. *'Textured surfaces, whatever the nature of the texture, are visually more challenging and therefore hold our attention. It is the different ways in which differently textured surfaces reflect light that gives them their distinctive visual properties.'*[57] Although no written sources are available to help us understand the meaning attached to certain colours there is no doubt that from the Palaeolithic onwards colours were used in a symbolic way to express some sort of message.[58] The places best suited for decoration on the body are the region around the face, the upper half of the body (which is an ideal large and flat surface, blank except for colour and texture), the area of the belt and the wrists and feet.[59] Lastly, the way we see objects, depends on how they are lighted, and changes in lighting can greatly affect how they appear. Here Wells makes a connection between lighting and movement and states that objects are better visible when moving (for example in funeral procession).[60] Based on this study we may conclude that colour and decoration, preferably with contrasting coloured or shiny yarns (such as gold thread) and applied on certain areas of the body, are important aspects of garments that must have drawn the eye of the observer. Furthermore, as Wells and textile scholar and hand weaver Hammarlund both have pointed out, the appearance of the textiles – its texture or surface - may also have been of significance because it can be just as important in signalling social status as the form or shape of a garment.[61] Harris stresses that not

52. Wells 2008, 2012.
53. Wells 2008, 15 & 59; Wells 2012, 13.
54. Wells 2012, 8-9.
55. Wells 2008, 35.
56. Wells 2008, 43-47. In several examples Wells shows that these concepts are applied lavishly in rich burial contexts. Here many objects were used that visually made most impression on the people watching the burial: there are many visually complex objects and different colours in textiles. In ordinary burials generally no or very few visually complex objects are present.
57. Wells 2012, 29.
58. Scarre 2002, 230. In the early medieval period some colours were easily obtained while others required raw materials that were scarce or expensive. To wear them was thus a social signal to the wearer's contemporaries, that they could afford this level of luxury (Hedeager Krag 1993). However there may have been a whole range of other meanings attached to the use of colours in this period.
59. Wells 2008, 65-68.
60. Wells 2012, 156-157.
61. Hammarlund et al. 2008, 69.

only the surface and structure, but also the drape, properties of cloth types when used (warm, cool, soft etc.) and sometimes even their smell will determine how people experienced and valued fabrics.[62]

As mentioned above, textile analysis generally focuses on weave and number of threads/cm - two important characteristics of a fabric that contribute to the texture. However these are certainly not the only factors that determine the structure of a textile. For example, a fabric woven in tabby can be thin and delicate, using thin threads and open spaces between the threads, or coarse and densely woven, using thick threads. The eye perceives these differences but judging by the standard analytical methods for archaeological textiles, which uses thread count and weave, these differences are not so easily discernible.[63] Hammarlund has stated that aspects that determine the structure of textiles are the spacing of the threads (densely packed or loosely woven with open spaces between the threads), the regularity of the fabric and the thickness and degree of twist of the yarns in combination with the thread count. To measure or quantify this, we need to take into account the regularity and density of the woven fabric and the thickness and degree of twist of the threads.[64]

Textile quality based on thread count

A useful tool to analyse any type of production, including textile production, is the concept of *chaîne opératoire,* which considers a production process as a sequence of (interrelated) actions, influenced by technical possibilities, access to raw materials and personal, social and cultural choices and conditions.[65] Olaussen discussed the various types of production and the degree of specialisation one can achieve by using this model of *chaîne d'opératoire.* She states that the time and effort spent and the degree of specialisation needed for the production of specific objects can determine the value adhered to these objects.[66] Andersson adopted Olaussen's model for archaeological textiles.[67] She proposed that textile production on a household level required easy access to raw materials and widespread knowledge of the techniques needed to produce cloth, whereas specialized production involved the production of luxurious products, the investment of more time and required higher technical ability.[68] Following the assumption that invested time (partly) defines the value of the finished product, a fabric that required more time to produce would qualify as being of higher value.[69] Thread count and the quality of spinning (thread thickness) are easy ways to measure the time and effort involved in producing textiles for one may assume that weaving a fabric out of thin threads requires more time than coarser fabrics. It is however not evident that spinning thin threads required more time than needed to produce thick threads. Systematic spinning experiments have provided information on the types of threads one could make and the variation in required time connected to the use of different spinning whorls.[70] Kania concluded from these experiments that the used tools affect the quality and speed of production in only a limited degree. The person doing the work is a far more important factor in the outcome of the spinning process and experienced spinners could just as easily produce thinner threads as thick ones.[71] However, weaving a fabric out of thin threads generally requires more meters of thread, which means that altogether more time was needed for spinning before one could weave such a fabric and that more time was needed to weave as well. In this line of thought an assessment of the value of textiles recovered from settlements in the Netherlands has been published previously (see also chapter 6).[72]

62. Harris 2008, 82; Harris 2010, 105, 109.
63. Hammarlund 2005, 88.
64. Hammarlund 2005, 106-107; Hammarlund & Vestergaard Petersen 2007, 213; Hammarlund et al. 2008, 71-75.
65. Skibo & Schiffer 2008.
66. Olaussen 1997.
67. Andersson 2003 & 2007.
68. Andersson 2007, 151-152.
69. Brandenburgh 2010a, 54.
70. Andersson et al. 2008, Kania 2013.
71. Kania 2013, 24-26.
72. Brandenburgh 2010, 46-48.

1.4 DATASET

This study focuses on textile remains from nine cemeteries from the centre and south of the Netherlands (table 1.1). In addition textiles from 31 different settlements have been analysed, mainly from the north of the country (table 1.2). These finds are in many respects complementary: not only by their find context but also by their date and use (Merovingian cemeteries versus Karolingian settlements). The different cemeteries will be briefly described below, followed by a general overview of the settlement sites, including a reference to the case studies in chapter 2-7 where these sites are discussed in more detail. This section ends with some comments on taphonomy, quality and limitations of the dataset.

1.4.1 The cemeteries

1.4.1.1 The cemetery of Bergeijk (chapter 2)[73]

The cemetery of Bergeijk was excavated in 1957 and 1959, and was provisionally published by Verwers and recently in full by Theuws & Van Haperen.[74] With 126 graves it is the largest cemetery in the region and it has yielded several rich burials containing unique and exotic objects. The site is part of a small and spatially isolated cluster of cemeteries in the Kempen region north of Maastricht. The Kempen region is characterised by brook valleys, large areas of unfertile land and relatively small spots of fertile land. On these fertile patches several (presumably rural) settlements and cemeteries have been found. The area seems to have been colonised later in the sixth century and developed into the core of the pagus Taxandria. Within this core Bergeijk (together with Lommel) seems to take a central position. The cemetery was in use from the later sixth until the eighth century.

73. Theuws & Van Haperen 2012, 11-16.
74. Verwers 1998; Theuws & Van Haperen 2012. The textiles from this cemetery were published in this volume, see Brandenburgh 2012a. This publication is one of the results of the Anastasis-project.

Fig. 1.1. Location of the cemeteries discussed in this study: 1. Maastricht, 2. Posterholt, 3. Bergeijk, 4. Wijchen, 5. Lent-Lentseveld, 6. Rhenen, 7. Leusden. Map: E.Gehring.

1.4.1.2 Posterholt (chapter 3)[75]

The cemetery of Posterholt is situated northeast of Maastricht. The site lies close to two important Roman roads: the road coming from Maastricht over Heerlen leading north along the eastern bank of the Meuse and another secondary road following the bank of the river Roer. The settlement that was originally associated with this cemetery has not been found. The area in the immediate vicinity is rich in archaeological finds from the Roman period and the early Middle Ages. The cemetery was discovered

75. De Haas & Theuws 2013, 10-23.

in 1953. The 80 graves – dating from the period 510-750 - were excavated in 1983-1984 and were published by De Haas & Theuws as part of the Anastasis-project.[76]

1.4.1.3 The cemeteries of Maastricht: Sint-Servaas church, Vrijthof and Pandhof (chapter 4)[77]

During the Roman period Maastricht was a central place of administration and a wealthy centre of trade for the surrounding area. The Roman road from Tongres, the urban capital of the district, to Cologne passed through the town, crossing the Meuse with a bridge. Along this road numerous funerary monuments were erected.[78] Around 270 AD the vicus of Maastricht was (partly) demolished but after several decades intensive building activities and an increase in population give evidence of a renewed Late Roman habitation in Maastricht. During the fourth and fifth century Tongres declined in both size and population, while Maastricht only experienced an increase. Somewhere in this period Maastricht took over the role of Tongres as administrative and commercial centre of the area. The city was also a centre in religious terms. Gregory of Tours mentions the city in the sixth century. He describes how Servatius, a fourth-century bishop of the diocese, died in Maastricht and was buried in a cemetery along the Roman road. Whether Servatius was actually buried in Maastricht remains unclear. It has been argued that the tale of the burial may have been a construct of Gregory of Tours, who was a contemporary of bishop Monulphus, to legitimate and encourage the building of the new and big Sint-Servaas church in Maastricht.[79] The people buried in this Sint-Servaas church and in the cemeteries around the church are considered to be representatives of the higher social circles of society. Evidence supporting this assumption can be found in the many stone sarcophagi, the luxurious grave goods and the physical anthropological data of the human remains.[80]

Extensive archaeological research in and around the Sint-Servaas church has uncovered the remains of (predecessors of) the church and other religious buildings surrounding the church such as a monastery and chapel. Large areas within the church, monastery, chapel and outside the buildings were used as burial ground. These cemeteries have been excavated in 1953/1954 (Pandhof), 1969/1970 (Vrijthof) and 1980/1981 and 1985 (Sint-Servaas church)[81] resulting in the documentation of nearly 1700 graves.[82] Recently the objects from the Vrijthof and Pandhof cemeteries have been published by Kars.[83] Publications on the spatial aspects of these cemeteries and the finds and chronology of the cemetery of St. Servaas church are being prepared.[84]

1.4.1.4 Lent-Lentseveld (chapter 5)[85]

The cemetery of Lent-Lentseveld was found during large-scale building activities on the northern bank of the river Waal in the east of the country. The site was excavated completely in 2011 and consists of 50 inhumation graves with well-preserved human remains and 20 cremation graves. The first burials in the cemetery are from the period 475-500 AD but may be even older (>425 AD). The cemetery remained in use until the end of the sixth century. Lent-Lentseveld is situated in a landscape with a rich habitation history going back to the Bronze

76. De Haas & Theuws 2013.
77. The following paragraph has also been published in Brandenburgh 2015.
78. The remains of these funerary monuments have been documented and published by T. Panhuysen 1996.
79. Theuws 2001, 170-171; 2003, 12-13.
80. Kars 2011, 10; Panhuysen 2005, 37, 230 & 235 (regarding the Late Roman period), 241-242 & 249 (regarding the sixth & seventh century).
81. Panhuysen 1991.
82. Panhuysen 2005, 52 & 65-66.
83. Kars 2011.
84. These publications are the results of the Sint-Servatius- and Anastasis-project of the University of Amsterdam (since January 2012 this project has moved its base to the University of Leiden). These projects received large grants, making it possible to catalogue and analyse several cemeteries in the south of the country that were excavated in times when financial limitations prevented the analysis and publication. This project incorporates the spatial analysis of the graves, the human remains and the analysis of all the grave inventories. See Theuws & Kars in press for the Vrijthof cemetery.
85. Hendriks 2013.

Age. Evidence for habitation during the early Middle Ages is found 500 m southeast of the cemetery. Also known in the vicinity is another early medieval cemetery (Lent-Azaleastraat), situated 600 m east of Lent-Lentseveld and excavated in the seventies of the previous century. This cemetery consists of 120 graves dated to the seventh-eighth centuries and is therefore not contemporary to the cemetery of Lent-Lentseveld.

1.4.1.5 Wijchen (chapter 5)

The cemetery of Wijchen is situated approximately 10 km southeast of Lent-Lentseveld. The results of the excavations of this site (from 1991, 1992 and 1996) have recently been published, including a catalogue of the excavated textile fragments.[86] This cemetery has been in use for a longer period, starting around 350 AD and ending in the second half of the seventh century. Nearly 350 graves of which 309 were inhumation graves were excavated. Soil conditions were not as favourable as in Lent: the skeletal remains have sparsely survived and reconstructions of the burial population in this cemetery are therefore based on the gender-associated objects found in the graves.

1.4.1.6 Leusden

The cemetery of Leusden is situated on the border of the Gelderse vallei and the Utrechtse Heuvelrug in the province of Utrecht. It lies on a sandy slope that rose several meters above the surrounding landscape. The site was discovered in 1925 and excavated in 1983-1984 during the construction of a new motorway. During this excavation approximately 175 inhumation graves were documented.[87] This is probably not the whole cemetery; the northern boundaries of the burial ground have not been documented within the trajectory of the motorway. The cemetery was in use between the end of the fifth century and the middle of the eighth century.[88]

1.4.1.7 Rhenen[89]

The cemetery of Rhenen is situated in the centre of the country, on the slope of the Donderberg, overlooking the Rhine valley. The cemetery was excavated in 1951, bringing to light more than 1100 graves (including both cremations and inhumation graves). Only recently a catalogue of the grave inventories was published.[90] The cemetery was in use from the late fourth century AD to approximately 750 AD. Rhenen is generally considered a wealthy burial place but there are considerable differences between graves. Based on burial size (coffin versus chamber), the presence of horse burials and horse harnesses and the quality and quantity of the objects deposited in the graves, there obviously is a cluster of rich graves present, but the majority of the graves is far more modest in terms of deposited grave goods.

This is also the case in the burial grounds in the vicinity of the cemetery of Rhenen such as Wageningen, Leersum, Ermelo, Garderen and Putten. In these cemeteries a wagon grave and several other rich graves have been found.[91] The wealth of the cemetery of Rhenen is therefore not unusual in this region, but it does stand out by its sheer size. The large amount of cemeteries in a relatively small area indicates that every village had its own cemetery and that there are differences within the buried population regarding the wealth in which they were buried. At the end of the seventh century the area around Rhenen was lying in the frontier zone between the Frisian and Frankish spheres of influence. From historical sources we can gain an impression of the struggle between Frisian and Frankish elites over the control of this important central part of the country. Influences from both the north and the south may therefore be reflected in the graves.

86. Heeren & Hazenberg 2010; Brandenburgh 2010b.
87. Van Tent 1985 & 1988.
88. The cemetery was reanalysed as part of the Anastasis-project. The author thanks M. de Haas and M. van Haperen who made their documentation and results available.
89. Huiskes 2011.
90. Wagner & Ypey 2012. Unfortunately this catalogue does not include the dates of the individual graves.
91. Remains of a wagon have been found in a grave on the Koerheuvel, north of Rhenen (Huiskes 2011, 17).

Site	n inhumation graves	n graves containing textiles	N textiles	Period which cemetery was in use	Date of the textiles
					400 500 600 700
Bergeijk	126	17	40	(565) 590 - 730/40	
Lent-Lentseveld	50	21	44	(425) 475 - 600	
Maastricht - Vrijhof	456	10	11	400 - >750	
Maastricht -Pandhof	830	26	25	510/20 - > 725	
Maastricht - St. Servaas Church	385	21	59	400 - >750	
Oud-Leusden	175	17	22	460 - 750	
Posterholt	80	15	22	510/20 - 750	
Rhenen	820	157	306	375 - 750	
Wijchen	309	45	87	(300) 350 - >640	
		329	616		

Table 1.1. Cemeteries discussed in this study; including the amount of graves containing textiles, the number of textile fragments per cemetery and the period in which the cemetery was in use.

1.4.2 The settlements (chapter 6 & 7)[92]

Most of the settlement textiles analysed in this study were uncovered in the dwelling-mounds (or *terpen*) in the north of the country.[93] The habitation of the earliest *terpen* dates back to ca. 600 BC. Textiles from the *terpen* are often broadly dated due to the way they were recovered. At the end of the nineteenth century the soil that had accumulated for centuries had been discovered as a valuable fertilizer and therefore groups of diggers methodically dug away large parts of the mounds. These people sometimes had an eye for antiquities but as they dug straight from the top down, they could collect objects dating over 1000 years apart in one single day. As a result there may be textiles in the dataset spanning approximately the period from 500 BC to 1500 AD. Other sites have a shorter habitation history and the textiles from these sites have been assigned to these habitation phases. A small percentage was found in large settlements of a different character, such as Dorestad and Middelburg. The textiles from these sites are dated to shorter periods. Other textiles have been dated using radiocarbon analysis, while one find complex was found in association with a hoard of coins and could consequently be dated precisely.[94]

92. The following paragraph is based on Brandenburgh 2010a.
93. The textiles from the settlements in the Netherlands have been published in Brandenburgh 2010a, 2012b & 2012c.

94. Brandenburgh 2012b.

Site	N individual woven textiles	N individual cords, ropes and braids	Habitation period of site	Date of the textiles
				300 400 500 600 700 800 900 1000
Aalsum	6	0	300-900	
Anjum	1	0	700-1400	
Beetgum	1	0	350-900	
Blija	1	1	600 BC-900 AD	
Cornjum Dekema-/stoomterp	3	1	400 BC-900 AD	
Cornwerd	0	2	475-725	
Dokkum, Berg Sion	77	2	500-900	
Dorestad, Wijk bij Duurstede	3	3	600-900	
Emmer-Erfscheidenveen	6	0	unknown	
Ferwerd Burmaniaterp	12	3	200 BC-900 AD	← 200 BC
Ferwerd Burmaniaterp II	1	0	400 BC-900 AD	← 400 BC
Foswerd	4	0	350-900	
Holwerd, dorpsterp	0	1	350-900	
Hoogebeintum	5	1	350-900	
Jouwswier	0	1	350-900	
Kimswerd	1	0	300-900	

Table 1.2. Settlements discussed in this book; including the number of textiles per site and the period in which the settlement was in use and the date of the textiles within this habitation period.

1.4.3 Taphonomy, quality and limitations of the dataset

1.4.3.1 Cemetery textiles

Research of burial textiles has many advantages over the study of settlement related textile fragments. Cemetery finds are often reasonably well dated. The fine chronology of the metal objects offers the possibility of creating a detailed typology of the associated textiles used throughout the Merovingian period in different areas of the country. Furthermore, the sex and age of the deceased and the position of the textiles in the grave and in relation to the body are often known. Research of cemetery textiles therefore offers many chances for reconstructing the clothing of the deceased and the way the graves were furbished in the Merovingian period. After the Merovingian period the burial tradition changed. The contents of the graves from this later period are more sober for they lacked the grave goods that were deposited in the previous period. Unfortunately, the decrease in number of grave objects over time leaves us with fewer textiles, which makes it increasingly difficult to reconstruct burial clothing in this later period. Textiles found in Dutch settlements may give insight into these later periods while many of these finds are dated up to 900 AD. The context and use of these textiles is however so different from the cemetery-finds that a real comparison is not feasible (see below).

Site	N individual woven textiles	N individual cords, ropes and braids	Habitation period of site	Date of textiles
				300 400 500 600 700 800 900 1000
Kloosterwijtwerd	4	0	0-900	
Leens	42	10	600-900	
Leeuwarden hoogterp	7	2	350-900	
Menaldum	1	2	unknown	
Middelburg	12	0	875-1600	
Oosterwijtwerd	2	0	350-900	
Oostrum, Mellemastate	4	0	500-900	
Rasquert hat	1	0	350-900	
Rasquert other finds	4	0	350-900	
Sellingen/ Zuidveld	2	0	350-900	
Teerns	1	1	200 BC-900 AD	← 200 BC
Ulrum	1	0	600-800	
Westeremden	26	1	500-1000	
Wetzens	0	5	350-900	
Wierhuizen	1	0	250 BC - 1300 AD	← 250 BC; 1300 AD →
Wijnaldum	5	3	100-1000	← 100 BC
unknown, prov. Groningen	1	0	unknown	
Total	235	39		

There are several limitations of the dataset from the cemeteries. The most important one is the fragmentary character of the textile remnants. Due to the soil conditions in burials organic substances such as leather and textile are generally only preserved in a mineralized form resulting from direct contact with metal artefacts. This process of mineralization occurred in the first months after burial and was influenced by factors such as moisture, acidity, soil type and temperature. For a detailed description of the process and speed of decay and mineralization of textiles in burials see chapter 4 (section 4.4). Textiles that were not in contact with metal decayed in the years afterwards. Consequently we only find remains of cloths or other grave furnishings in graves that contain metal dress accessories. Many graves however lack metal objects which means that the persons buried here were dressed or shrouded differently: either without dress accessories at all, or with objects made out of other materials such as bone or wood. One could argue that the people who could afford metal artefacts were only a small or upper part of society and that the textiles excavated in cemeteries are those from the upper part of Merovingian society, but this is not likely. The amount of luxurious or exotic objects in Dutch cemeteries is simply too large to be reserved for the elite only.[95] We more and more get the impression that luxurious objects were within reach of many layers of Merovingian society and that the variation observed between rich and

95. Theuws 2010, 58; Theuws 2014, 7.

less rich graves within the cemeteries reflects other social processes or structures present at that time or different ritual repertoires. This does however not automatically mean that the buried population is an exact mirror of the living population. Some of the graves with few or without metal objects may have belonged to the poorer part of the population, but on the other hand, objects made out of organic materials could have been equally precious and been worn with luxurious garments as well. Moreover the deposition of objects in graves gradually disappears in the course of the later seventh century in the south of the Netherlands and in the eighth century in the central and northern parts. Since no textiles are available from these 'empty' graves it is difficult to determine whether the excavated textile fragments are a realistic mirror of the type and quality of clothing in this period or of a small percentage of the population.[96] The expected increase of the dataset may however solve this problem in the future.

Another problem textile research faces is the fact that many graves have been reopened in the period the cemetery was in use or shortly after that period. This act was in most cases not economically motivated (grave robbery), but was probably part of the complex process of treatment of the dead.[97] During the reopening of the graves the objects were often removed or at best displaced, resulting in a decrease in metal objects and, as a result in fewer textile finds.

Information was not only lost during the period that the textiles were buried. After excavation many metal objects underwent restoration, which often included the complete removal of all organic materials. Consequently many of the important objects from the graves, such as weapons and brooches are lacking all traces of textiles. In some cases, such as Maastricht and Rhenen, the restorer took care to document the textiles that were to be removed.[98] The author gratefully included this information in the database, but unfortunately this documentation is far from complete. Only the objects not suitable for exhibition purposes were left in their original state, leaving the mineralized remains of textiles preserved on these objects. After restoration however, the non-conserved objects, including the textiles adhered to them, have deteriorated further resulting in worn down and indeterminate fragments of textiles and damaged fibres. Due to these poor conditions it was often not possible to determine the weave, thread thickness, spin or fibre type. The preservation of the fabrics from recently excavated sites is in general higher than those of cemeteries that were excavated 20 years ago or earlier. As a result, there are biases and gaps in the dataset, which makes a comparison between different cemeteries somewhat cumbersome.

The fine chronology of the cemetery finds has been praised above as one of the qualities of the textile dataset. Some critical remarks regarding this chronology are necessary as well. Kars has pointed out that chronological seriation which is the basis for dating early medieval cemetery-finds overlooks the fact that there is considerable variation in grave inventories caused by social processes. Differences between gender and age can result in different grave assemblages within contemporary graves.[99] Moreover objects may have had a longer pre-burial circulation than we expect or objects have been included in the grave that are not contemporary, but heirlooms, saved for the special occasion of the burial.[100] These circumstances disturb the chronological framework and should be considered as a warning against using a too detailed chronology. Another problem arises when we try to compare the textiles from different periods. Textiles have been assigned to specific phases, which often overlap each other. As a result making a chronology with well-defined boundaries automatically becomes artificial.

1.4.3.2 Settlement textiles

Preservation of non-mineralized textiles is determined by many factors such as acidity, presence of micro-organisms and oxidization. For a detailed description of degradation and preservation of different fibre

96. Theuws en Van Haperen 2012, 150.
97. Van Haperen 2010.
98. P.A. Rossel documented the textiles from Maastricht - Sint-Servaas church; those from Rhenen were documented by J. Ypey.

99. Kars 2012, 111
100. Kars 2012, 115-116; 125-127.

types see chapter 6 (section 6.2.2.1). Soil conditions in the settlements were favourable for fabrics made out of animal fibres (such as wool) but not for plant fibres resulting in a well documented but incomplete dataset.[101] Textiles from settlements are dealt with separately for several reasons. One is geography. Most textiles were recovered from the *terpen* sites in the north of the country setting them apart spatially from the cemeteries found in the centre and south of the Netherlands. Furthermore, as mentioned above, they are generally poorly dated. This makes it impossible to combine the datasets from these two types of sites to create a chronological framework for textiles in the early Middle Ages. We should also consider that the use of textiles found in settlements was probably different from those in cemeteries. The textile remnants found in 'refuse' layers in settlements are likely to have been garbage, while burial textiles as argued earlier represent part of the funeral display. The fragments from settlements are generally heavily worn, re-used and finally discarded as rags, which makes it difficult to ascertain their original function. The textiles from the settlements do however have considerable qualities as well. These textiles are often preserved in much larger pieces giving ample opportunity to study the woven patterns and traces of sewing and to reconstruct the cut and shape of some garments.

1.5 METHODS

The analysis of the textiles comprised two phases:

1. A technical analysis of the finds from individual cemeteries to present an overview of the range of textiles used in each site.

2. A spatial and chronological analysis to reconstruct the use of the textiles in the burials, distinguish developments over time and differences between cemeteries or groups of burials within the cemeteries on the basis of textiles.

101. Huisman 2009, Brandenburgh 2010a, 45.

1.5.1 Technical analysis

The cemetery textiles have been analysed using a stereo-microscope (magnification 6-40x). The analysis comprised identification and description of several aspects of the fabric, including yarn type, twist and thickness, weave type, density and quality of the fabric. There are several reference works for describing archaeological textiles.[102] In this study the publications of Walton & Eastwood and Burnham have been used to describe and categorise the character of the yarns and the fabrics types. Quality of textiles has been assessed measuring thread thickness and thread count (number of threads/cm). There are several systems in use that categorise groups of textiles according to thread counts.[103] In this study textiles have been divided into quality groups using the categories defined by Tidow.[104] The density of the fabric has been assessed as dense where a fabric showed no spaces between the threads, or open where there were spaces between the threads. Warp and weft could generally not be identified since starting borders and selvedges are often lacking in the dataset. In many cases the system with the highest thread count may be considered the warp, but since there are exceptions to this rule the terms warp and weft have been avoided and replaced by 'system X' and 'Y'.

102. Emery 1980, Burnham 1980, Walton Rogers & Eastwood 1988. The Textillexikon by Diehl, De Graaf & De Jonghe 1991 is – like Burnham 1980 - based on the standardized glossary of the Centre International d'Etude des Textiles Anciens (CIETA, Lyon).
103. Grömer 2010, 120; Tidow 1995. Tidow 1995 has published several contemporary textile assemblages from Germany. He assessed the quality of these textiles by measuring the number of threads per 2 cm's. When we apply this to the current methods of measuring threads/1 cm Tidow discerns the following quality groups: Very coarse: <5threads/cm; Coarse : 5-7,5 threads/cm; Medium fine:7,5-12,5 threads/cm; Medium fine to fine:10-15 threads/cm; Fine:>15 threads/cm. Grömer uses the same methods for assessing the quality of the prehistoric textiles from Austria but uses slightly different names and boundaries between the quality groups, Grömer 2010, 120.
104. Tidow's scheme has been slightly modified to avoid the overlapping categories 'medium fine' and 'medium fine to fine': Very coarse: < 5 threads/cm; coarse: 6-9 threads/cm; medium fine:10-15 threads/cm; fine: >15 threads/cm. The term 'very fine' is also used in the text for textiles finer than 20 threads/cm.

Fibre identification of the textiles was conducted using an optical metallographic microscope Nikon optiphot 2 (magnification 200x or 400x, camera Nikon DXM 1200). Fibres were identified as either wool or plant fibres.[105] In many cases however the fibres were damaged to such an extent that fibre analysis was not possible. Dye analysis has only been conducted in a few cases. Reconstructing the dyes that were used is often difficult. Natural dye materials deteriorate over time and may have disappeared entirely during the period the textile was buried. Consequently a negative result in dye analyses does not necessarily mean that a fabric was not originally dyed. Many dyes that were locally available, like the brown colours from nuts and bark, would be hard to detect as well. It is generally difficult to discern the chemical signature from these dyes from those naturally present in the soil because of their similarity to material found in the natural environment. Furthermore objects may have been contaminated during the period they were buried. In those cases the chemical signature of those contaminations may be detected which could be mistaken for original dyes. As a result the outcome of both fibre analysis and dye analysis may give an indication but may not be considered as reliable evidence. The results of the technical analysis have been recorded in a database that has been kindly made available by English Heritage.[106] Also recorded are the position of the textile on the metal object and the position of the object in the burial. Using this information it may be possible to distinguish certain groups of textiles associated with specific objects in the graves. This provides information on the types of textiles placed or worn on different parts of the body.

The stratigraphy of the textiles has been recorded using the methods and colour coding applied in the cemetery of Unterhaching (fig. 1.2; methods developed by the Bayerischen Landesamte für Denkmalpflege).[107]

105. Appleyard 1978; Catling & Grayson 1982. Preservation of the textiles from Sint-Servaas church and Vrijthof was very poor and it proved impossible to identify fibres from these textiles. Plant fibres were not further identified into species.
106. The full database is available through Leiden University institutional repository.
107. Nowak-Böck 2013, Nowak-Böck & Van Looz 2013.

The textiles from the cemetery of Rhenen have not been analysed by the author. Information regarding the textiles has been derived from the publication of Wagner & Ypey.[108] J. Ypey was a restorer who had a thorough knowledge of textile techniques and who systematically documented the organic remains before cleaning and restoring the metal objects that past his laboratory. Although his recordings are not complete and may need correction on minor details, his observations are in general good.

1.5.2 Spatial and chronological analysis

A spatial and chronological analysis of the cemetery finds was made to reconstruct the use of the textiles in the burials, distinguish developments over time and differences between cemeteries or groups of burials within the cemeteries on the basis of textiles. The association of textiles with object types could be ascertained, although in many cases these objects were no longer in their original position. This provided information regarding the types of textiles placed or worn on different parts of the body, enabling us to gain a generalized picture of the use of the textiles in the grave. This picture can be complemented using the data derived from the settlement textiles.

Groups within the cemeteries could be defined on the basis of the chronology of the cemetery, but have furthermore been defined in terms of gender/sex[109] and (where possible) age.

Statistical analyses of the dataset have not been conducted for two reasons. Firstly, the number of textiles in the dataset is not large enough and the timeframe in which they occurred is too wide to allow that kind of statistical use. Secondly, trends and distribution patterns of information gathered under

108. Wagner & Ypey 2012.
109. The quality of the human remains in the cemeteries varied considerably. Due to the excellent state of preservation and the advanced methods of excavation all textiles of Lent-Lentseveld can be associated with men, women, children of different age groups. The textiles from the other cemeteries have been assigned to gender, which was based on the presumed gender associations of the objects present in the graves.

a microscope and that are statistically observed are unlikely to have been perceived as such by the people who made and used the textiles.[110] Therefore the technological data provided by textile analyses have only been used to sketch trends and developments on a larger scale.

A comparison between the (distribution and quality of the) textiles and similar information from the other grave objects has not been made because the analyses of the grave objects of several cemeteries were not yet completed and this information was not available yet. Moreover, it has been a deliberate choice to carry out the textile analyses as an independent discipline first before starting a comparison with other types of finds. This will allow for an objective assessment of the characteristics of the textiles.

Lastly, no mention will be made in this dissertation of the reliquary textiles from Sint-Servaas church[111] because these textiles more often than not come from other locations and the origin of these textiles cannot be traced back to specific burials. Neither will the Maaseik textiles be discussed because they lie beyond the geographical reach of this study.

1.6 TEXTILE PRODUCTION, TECHNOLOGY AND TERMINOLOGY

In the early Middle Ages textiles were made in various ways. In the following section the production process of textiles in this period is discussed, including the terminology, which has been used throughout this thesis.

1.6.1 Textile production in the early Middle Ages

Textile production was a long and elaborate process in which fibres were produced, harvested, processed, spun into yarns and woven into pieces of fabric.[112] The first step in the process is the procurement and processing of fibres. Early medieval textiles were made of fibres from plants such as flax, hemp and nettle, or from animal fibres such as sheep's wool, and in small quantities silk. Fabrics in which fibres from goat, beaver or rabbit were used have been known in this period as well,[113] although these are rare and not observed in Dutch cemeteries. After shearing, sheep's wool needed to be sorted into different categories, washed, dried and perhaps dyed, and impregnated with oil. Prior to spinning the wool was further prepared by combing, thus aligning the fibres in the same direction and/or separating the long hairs of the outer fleece from the soft and short fibres from the inner fleece of the sheep. Plant fibres from flax and hemp needed several steps to acquire. After harvesting the plant, the stems were gathered in bundles and these were combed – a process called rippling – to remove the pods from the upper stems. After this the stems were retted, i.e. left to rot for several weeks in a pond or stream in order to break down the stems. These retted stems were dried again and pounded – presumably with a wooden object - to break up the stem further. Then comes the step called scotching which involved swiping of all loose fragments with a wooden blade resulting in clean fibres. These fibres are still in their natural bundles, which need to be split into single fibres during a process called heckling. In this final stage the bundles of fibres are hackled, or combed using a wooden board with a dense amount of metal spikes sticking out.

Gold thread was used to embellish certain areas of the clothes. There are several ways gold thread was produced during the early Middle Ages. It could either be drawn by pulling small rods of gold through diminishing holes in a so-called drawing plate, or it could be cut from a thin sheet of hammered gold foil into flat thin strips (so-called lahn). Lahn could be further processed by wrapping (or spinning) it around a core of silk, wool or linen.[114] Gold thread could either have been embroidered onto the cloth (gold appliqué) or worked into a pattern in tablet woven bands (also called gold braids or brocading). The latter technique generally resulted in narrow bands up to a cm wide but gold thread could also

110. Pohl 2006, 136.
111. Stauffer 1991.
112. For an overview see Walton Rogers 2007, chapter 2; Grömer 2010, 43-220.
113. Owen-Crocker 2004, 182.
114. Reifahrt 2013, 60-61, 75.

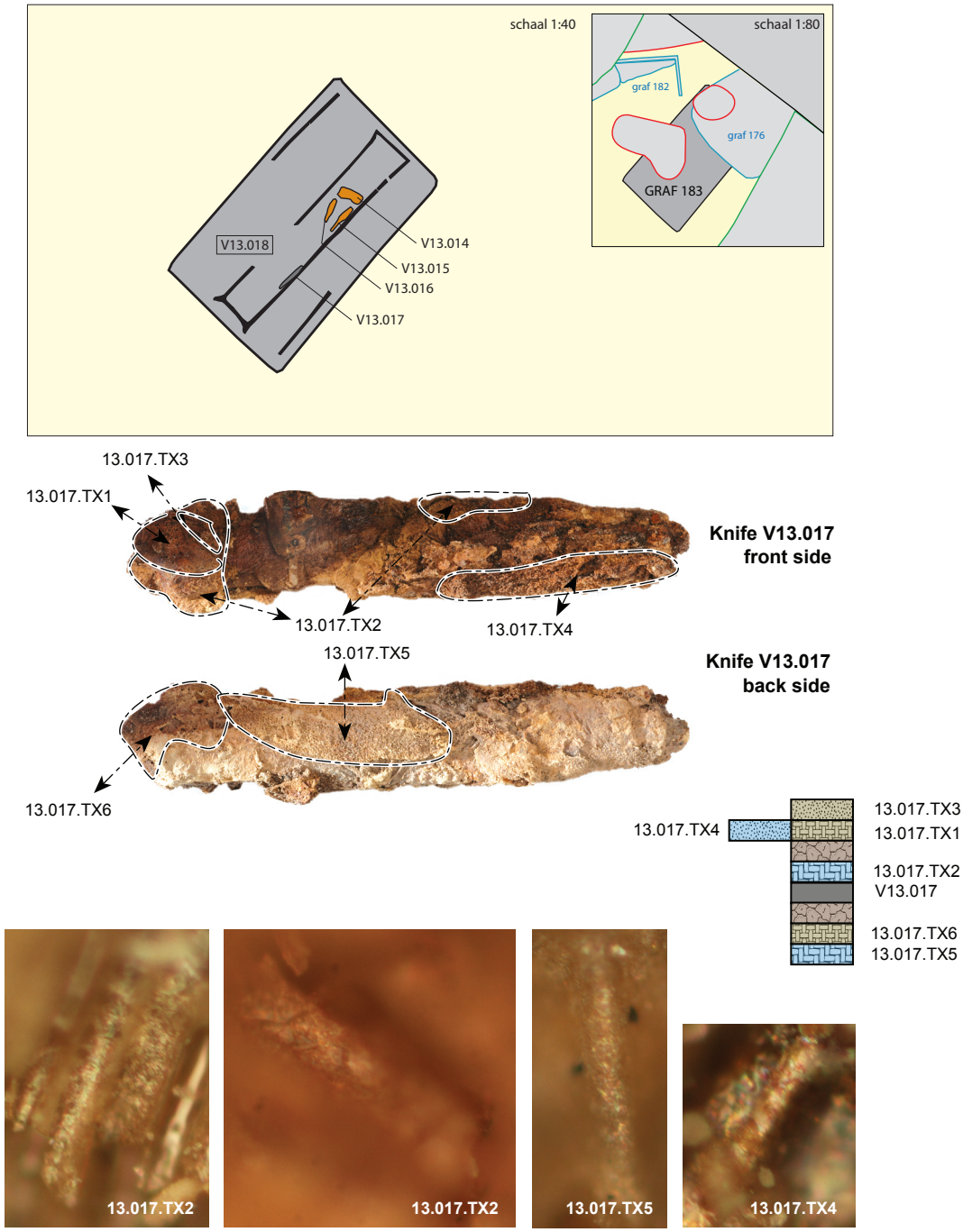

Fig. 1.2. Example of the way textiles have been recorded in the cemeteries. The location of the textile in the grave and on the object has been documented. Technical aspects of the fabric have been analysed. Where possible the fibres have been identified and recorded on photograph. Lastly the stratigraphy of the objects and the textiles has been recorded using the methods and colour coding applied in the cemetery of Unterhaching (methods developed by the Bayerischen Landesamte für Denkmalpflege, Nowak-Böck 2013).

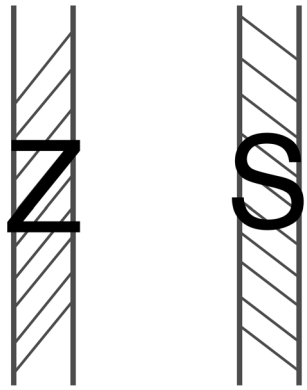

Fig. 1.3. The direction of the twist of a yarn is indicated as z or s.

Fig. 1.4. Small ball of wool found in the settlement of Teerns. Photo: M. Schouten.

have been incorporated into wider bands of several centimetres.[115]

Spinning yarns from wool or plant fibres is generally done using a spindle. Depending on the direction the spindle rotated, the threads were twisted either clockwise or anticlockwise, resulting in z- or s-spun thread (fig. 1.3). To produce a thicker or stronger yarn, string or rope, two or more threads were plied together. The produced yarns were wound into balls or skeins (fig. 1.4).

Dying was a process that could be done at several moments in the textile production process: in the wool, i.e. before spinning; yarn-dyed, after spinning, or piece-dyed after weaving. In early historic times many dyes were used.[116] A red colour was obtained from dye material extracted from different species of dyer's madder (*rubiaceae*). Red could also be obtained from Kermes insect or from insects of the *Porphyrophora* species. Blue colours were obtained from woad (*Isatis tinctoria L.*).[117] Yellow dyes were extracted from weld (*Reseda luteola L.*), which was widespread in western Europe.[118] Another source for yellow dye materials is the plant Dyer's broom, which has been identified in nineth century finds form York.[119] Purple was obtained from lichens of the genera *Ochrolechia* and *Umbilicaria*. Different hues of brown would have been obtained using natural dyes from bark and nuts that were readily available in any wooded area.

The process of weaving large pieces of cloth was generally conducted on a loom.[120] At least two types of looms are known from this period: the warp-weighted loom and the two-beam vertical loom. Finds of loom weights in settlements from this period in the Netherlands suggest that the warp-weighted loom (fig. 1.5) was used here.[121] This type of loom would

115. The use of gold thread in woven bands (gold-brocading) is discussed by Crowfoot & Hawkes 1967, 43; Walton Rogers 2007, 96-97; Owen Crocker 2004, 283-285. See also section 4.5.2.
116. For an overview see Cardon 2007; Brandenburgh 2010 54-56 summarises the use of dyes in textiles from the Netherlands.
117. Cappers 1994.
118. Cardon 2007, 170.
119. Cardon 2007, 177.
120. Walton Rogers 2007, 28.
121. The two-beam loom was entirely made out of organic materials and consequently archaeological remains of this loom type are very rare. Since no parts of the two-beam loom have been found in the Netherlands it is not certain whether this type was in use in the area.

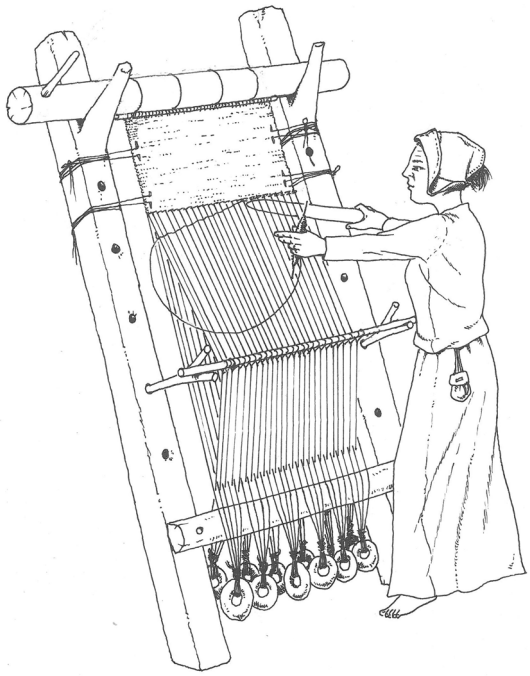

Fig. 1.5. Reconstruction of a warp-weighted loom. Drawing: C. van Hees.

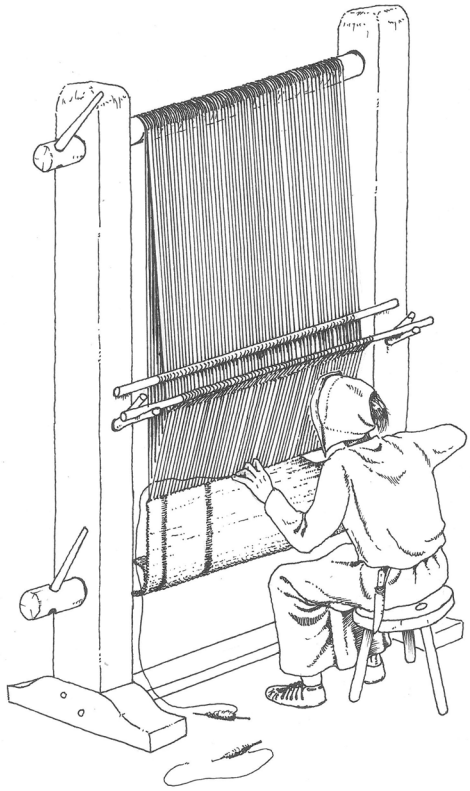

Fig. 1.6. Reconstruction of a two-beam vertical loom. Drawing: C. van Hees.

have stood slightly at an angle against the wall of a building. The vertical threads of the fabric, the warp, were hung onto the upper crossbeam of the loom and put under tension by attaching loom weights. The two-beam vertical loom (fig. 1.6) was used during Roman times and must have remained in use in parts of France during the Merovingian and Carolingian period, re-emerging in more widespread use around the end of the 9th century.[122] Henry associates the change of loom with a predominance of a weave-type, which hitherto had not been very popular, the 2/1 twill.[123] Moreover the shift from one loom type to the other may be related to a change in the organisation of textile production from a domestic basis to a more organized and centrally controlled production.[124] If and when this loom type was actually in use in the Netherlands is not certain. From the 10th century onwards historical texts mention a third loom type: the horizontal treadle loom (fig. 1.7).[125] The oldest finds in northwest Europe associated with this loom type are dated in the 10th century.[126]

122. Henry 1998; Henry 2005.
123. Henry 1998, 159.

124. Henry 2005.
125. Cardon 1999, 412.
126. See for a detailed discussion of these loom types Brandenburgh 2010a, 56-58 (case study 5).

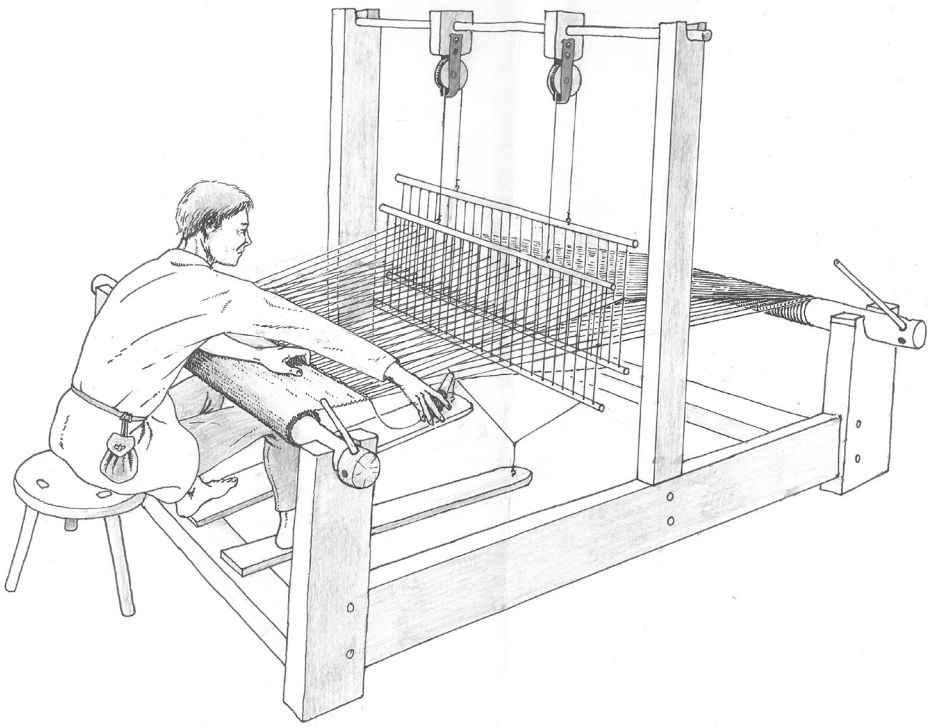

Fig. 1.7. Reconstruction of a horizontal treadle loom. Drawing C. van Hees.

Smaller bands or ribbons could be woven with a band loom (rigid heddle) or in the technique called tablet-weaving (fig. 1.8). Tablet weave (or card weave) is a band-weaving technique made with a number of tablets with four (or two) holes through which the warp threads are threaded. The spacing between the holes of the cards creates a shed through which the weft thread is woven. By turning the cards the warp threads are twisted around each other and a new shed appears. The resulting band has the appearance of several cords (weft threads twisted around each other), parallel to each other and held in place by the weft threads. The end product of this weaving technique is a strong band, which could be sewn onto cloths as decoration or reinforcement.

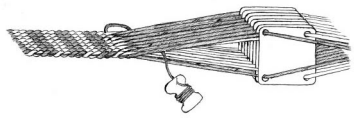

Fig. 1.8. Tablet weaving.

Weaving was not the last step in the process of textile production. Linen fabrics were often washed and bleached to achieve a white colour. Woollen fabrics would be wetted, brushed and in some cases be felted (fulled) in order to make them more dense and waterproof.

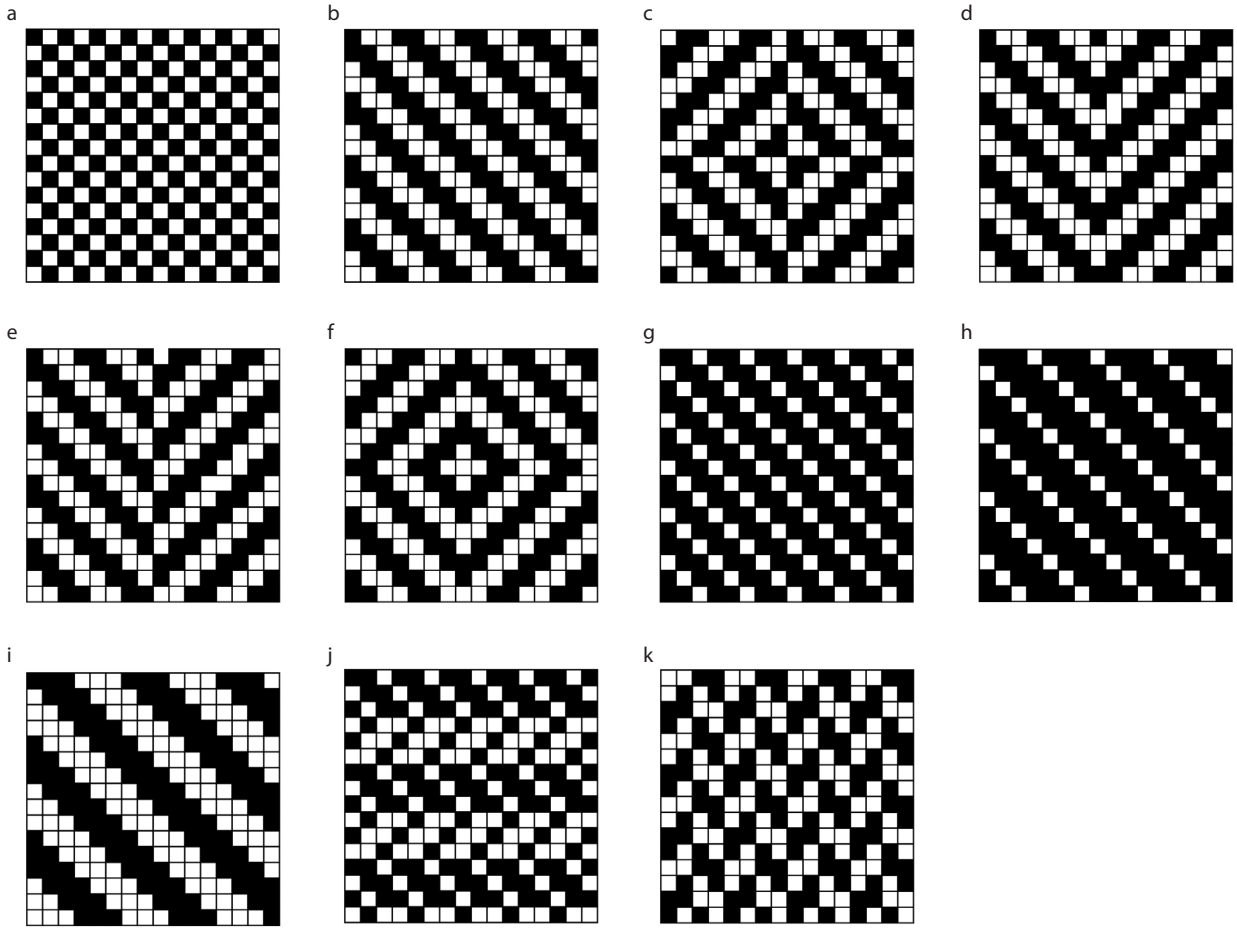

Fig. 1.9 Fabric types documented in the Netherlands (in cemeteries and settlements).
a. tabby, b. 2/2 plain twill, c. 2/2 broken diamond twill, d. chevron twill, e. herringbone twill, f. lozenge twill, g. 2/1 twill, h. 3/1 twill, i. 3/3 twill, j. Rippenköper, k. cross twill.

1.6.2 Terminology

The appearance of a fabric is determined by the way the horizontal weft threads were woven into the vertical warp threads. During the early Middle Ages, several types of weaves were in use. In the cemeteries and settlements of the Netherlands fabrics were generally woven in tabby or 2/2 twill. Variations of 2/2 twill such as broken diamond twill, and other types of twill (2/1 twill, 3/1 twill, 3/3 twill, chevron twill and Rippenköper) were also observed in small quantities. Tablet weave has only been documented twice. Some textiles were decayed to such an extent that identification of weave was not possible.

1.6.2.1 Tabby weaves

In a tabby weave, the weft threads regularly pass over and under each warp thread. A tabby can be balanced with (more or less) equal numbers of threads/cm in warp and weft. Where one system has more than twice the amount of threads/cm than the other it creates a very dense fabric called a repp weave. Since starting borders and selvedges are generally lacking in archaeological finds it is impossible to tell which thread system is warp and which is weft.

1.6.2.2 2/2 twills

In 2/2 plain twills, the weft thread passes over two and under two warp threads, creating a diagonal woven pattern. 2/2 broken diamond twills are 2/2 twills in which the weave is reversed in both systems, resulting in a diamond shaped pattern. The size of the diamond (or the pattern repeat) may vary, depending on the amount of warp and weft threads used during each reversal. When the pattern reverses in only one system we speak of chevron or herringbone twill

1.6.2.3 2/1 twills

In 2/1 twills, the weft thread passes over 2 and under 1 warp threads, creating a diagonal pattern. If the weft passes over 1 and under 2 warp threads the term 1/2 twill is used.

Rippenköper is a kind of 2/1 twill where the pattern is reversed to 1/2 twill after three weft threads. The term was introduced by H.-J. Hundt (1966).

1.6.2.4 3/1 twill and 3/3 twill

3/1 twills are twills in which the weft thread passes over 3 and under 1 warp thread. In 3/3 twills the weft thread passes over 3 and under 3 warp threads.[127] Both fabrics create a diagonal pattern.

127. This fabric type has been documented by J. Ypey in the cemetery of Rhenen. It is very unusual in this period. Unfortunately this observation could not be checked by the author.

2. The textiles from the cemetery of Bergeijk

Previously published as:
Brandenburgh, C.R., 2012: The textiles from the cemetery of Bergeijk, in: F. Theuws & M. van Haperen, The Merovingian cemetery of Bergeijk-Fazantlaan, Bonn (Merovingian Archaeology in the Low Countries I), 126-137.

The cemetery of Bergeijk was the first cemetery to be published by the *Anastasis*-project.[128] It was also the first publication of cemetery-textiles of this thesis. Therefore it was used to explore the ways we can look at cemetery textiles: Who were buried in this cemetery and is this an equal representation of Merovingian society? Are these textiles the reflection of people's everyday clothing or were they ceremonial garments, especially chosen for the occasion of the burial? Such questions inevitably involve a discussion of Merovingian burial ritual and the way in which textiles may have been used in this ritual. This whole section however has been moved to chapter 1 (section 1.5.2.2) where it serves as a general introduction for this topic.

Since no reference data was available on the time of publication of the Bergeijk-cemetery a comparison of the textiles form this site with those from other sites could not be attempted yet.

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128. See note 84.

2.1 INTRODUCTION

The cemetery of Bergeijk yielded a considerable number of textiles. Of the 126 excavated graves, 17 contained one or more pieces of textile. This resulted in a total of 66 fragments of 40 individual textiles (appendix I). The fabrics were in most cases mineralized and imbedded in the corrosion on metal objects.

Many graves were reopened after burial, often displacing the objects within. This makes it difficult, if not impossible, to reconstruct the garments of the deceased. However, in some cases it is possible to establish which textiles were worn under or over each other or specific dress accessories. The textile finds also enable some preliminary conclusions relating to the association of different fabric types to specific objects in the graves. Lastly, the cemetery provides a well dated body of textiles that can be compared to textiles from other regions. This will in the long term provide a detailed overview of the types of fabrics in use throughout the area, which may lead to a better understanding in production and (long distance) exchange of textiles.

2.2 RESEARCH QUESTIONS, DATA AND METHODS

It is commonly assumed in textile research that clothing is not merely 'practical' in function. In the past as in the present, dress holds a social dimension as well. In its simplest form, clothing, textiles, and dress accessories can be used to denote the identity of groups of people, or the position of an individual within a group. It is useful, therefore to not only reconstruct the deceased's dress, graves' furnishings and textiles deposited as grave goods in their own right, but also to search for variability of textiles within a cemetery, between different cemeteries, and over time.

There are two additional reasons to search for differences in textiles within and between cemeteries in the area under investigation.
First, there are changes in the settlement and burial system in the Bergeijk region. In the middle of the sixth century, new settlements and cemeteries were created in an area that hitherto was uninhabited. Following this period in the middle of the seventh century, new and bigger settlements were created, and the spatial organisation of the cemeteries changed. We do not know where the newcomers from the sixth century came from, or whether the people creating the bigger settlements in the seventh century were newcomers or descendants of the original sixth century colonists. It has been argued that the seventh century inhabitants were new to the area and came originally from the south.[129] The study of textile remains from cemeteries in the area may in the long term provide evidence to the origin of the area's inhabitants, or point to other trends which have so far gone unnoticed. Certain textual examples demonstrate that costume as an ethnic marker was not unknown, although its role in marking social distinctions was probably far greater.[130] Furthermore mobility of goods in this period was far greater than the mobility of people; changes in textiles, therefore, are not automatically a reflection of immigration. Second, since the cemetery provides a well dated body of textiles, an analysis of long term shifts in textiles will provide a detailed overview of the types of textiles in use throughout the area, which will lead to a better understanding of production and (international) exchange of textiles.

Detailed textile research of early medieval cemeteries in the Netherlands has only just fully begun.[131] A comparison of the fine chronology of the Bergeijk cemetery with those of other cemeteries is therefore not yet possible. As a result, this chapter will focus on the following questions:

1. In what textiles and clothing were people buried during the period the Bergeijk cemetery was in use?

2. Which differences and changes are visible within the cemetery over time?

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129. Theuws 1999.
130. Pohl 2006, 137.
131. There is an excellent study which gives a broad overview of the long term developments in textiles in northwestern Europe (Bender Jørgensen 1992). However, this study does not contain the fine chronology necessary to make a comparison with the cemetery of Bergeijk.

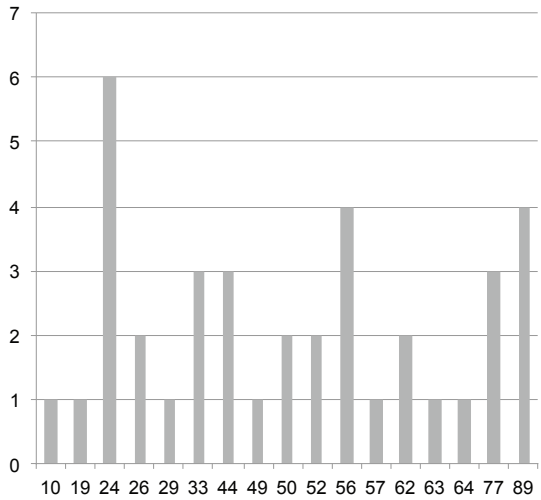


Fig. 2.1 Number of individual textiles per grave.

Fig. 2.2 Shield boss 64.abc1 with large fragment of 2/2 plain twill z/s attached.

2.3 DATASET

The cemetery of Bergeijk has yielded 66 fragments of textile. In some cases, several fragments of the same fabric were present within one grave. These identical fabrics have been grouped together, resulting in a total of 40 individual textiles, which were found distributed over 17 graves. Most graves contained one or two different textiles; six graves provided more (fig. 2.1). The dataset is not very large considering that only 13.5% of the graves are represented, with these being distributed over a period of c. 150 years. Furthermore, the excavated fragments are not a complete representation of the textiles present when the deceased were buried, since they were probably fully dressed while the graves were furnished with additional textiles. Therefore, developments or differences observed in the textiles are not supported by sufficient data and should be considered preliminary. Most of the textile remains were preserved in the corrosion layer of the metal objects. The textiles not in contact with metal decayed in the years after burial. Because of this, the remaining fragments are often very small, measuring between 0.5x0.5 and 3x3 cm. One extraordinary large fragment measured 5x10 cm (fig. 2.2).

Practically no restoration had been conducted on the metal objects in the graves. This was more or less advantageous for the textiles because in most cases they were well preserved and not polished off during restoration.

2.4 CEMETERY TEXTILES AS A SOURCE FOR TEXTILE RESEARCH

Research of cemetery textiles has many benefits. Cemetery finds are often reasonably well dated. The metal objects' fine chronology offers the possibility of creating a detailed typology of the associated textiles used throughout the Merovingian period in different areas. Furthermore, the sex and age of the deceased and the position of the textiles in the grave and in relation to the body are often known. Research of cemetery textiles therefore offers many opportunities for reconstructing the clothing of the deceased, and the manner in which graves were furnished during the Merovingian period. After the Merovingian period, burial tradition shifted from conspicuous deposition of grave goods towards wealth display by building chapels, sponsoring masses, and recitation of the deceased's names by clergymen. The contents of the graves from this

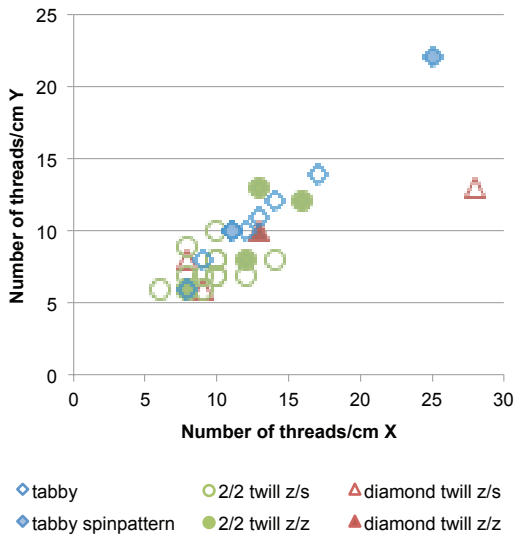


Fig. 2.3 The quality of the different fabrics in Bergeijk in number of threads per cm in warp (horizontal) and weft (vertical).

later period are more sober, for they lack the grave goods used in the previous period. This change of burial tradition did not coincide with the shift from pagan to Christian belief in northern Gaul; rather, it took place at a later stage, when Christian belief had already been established.[132] Unfortunately, the decrease of the number of grave objects over time leaves us with fewer textiles, making it increasingly difficult to reconstruct burial clothing in this later period.

Some critical remarks are in order. In most cases, textiles are preserved only in contact with metal artefacts; therefore remains of cloths are almost exclusively found in graves containing metal dress accessories. Many graves lack metal objects. The persons buried there were dressed either without accessories or with objects made of other materials, such as bone or wood. One could theorize that only a small, more wealthy portion of society could afford metal artefacts and that the textiles excavated in cemeteries are those from the upper part of Merovingian society, but considering the context of the cemetery, this is not likely. Some of the graves without metal objects may have belonged to poorer populace, but objects made of organic materials could have been equally precious and worn with luxurious textiles as well. Moreover, metal object deposition gradually disappears during the course of the later seventh century. Since no textiles are available from these 'empty' graves, it is difficult to determine whether excavated textiles are a realistic mirror of the type and quality of clothing in this period or whether these textiles were only worn by a small percentage of the population.

The cemetery of Bergeijk does not allow us to investigate all these potential leads. First, no human bones were preserved. The age of the deceased could therefore not be ascertained, and gender determination was based on presumed gender associations of the objects present in the grave. Consequently, differentiating between textiles from graves of men and women becomes somewhat disputable, for one should not overlook the possibility that women may have been buried with weapons or men with female objects. Archaeological evidence for women being buried in rich weapon graves is available from Eastern Europe[133] and Scandinavia.[134] Closer to home is the man buried in female attire in the Oosterbeintum cemetery, in the northern part of the Netherlands.[135] Second, a large part of the graves were reopened while the cemetery was in use. In most cases this was not economically motivated (i.e. grave robbery), but was probably part of the complex process of treatment of the dead.[136] During the graves' reopening, objects were often displaced. This makes it difficult, if not impossible, to reconstruct the primary position of the textiles in the graves. However, some insight in the process of mineralization enables us to take a more optimistic perspective. Mineralization, a chemical reaction whereby metal incorporates the textiles lying on or beneath it, occurs in the first months after deposition

132. Effros 2002a, 5-12.

133. Pohl 2004, 31-32.
134. Price 2002, 149-153.
135. Knol e.a. 1996, 302, table 18 and fig. 33. The person in Oosterbeintum grave 398 is osteologically a man, but is buried with grave goods that are typical for women's graves.
136. Van Haperen 2010.

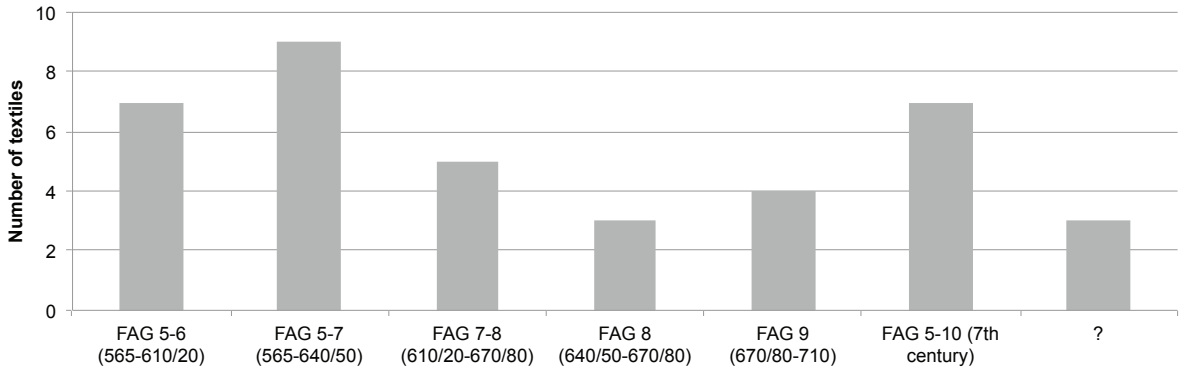


Fig. 2.4 Number of textiles per phase.

in the grave.[137] It is assumed that the graves were usually reopened after the soft tissues of the body had decayed, leaving only the bones, hereby marking another phase in the transition from the living to the dead.[138] Reopening, therefore, must have taken place after mineralization had occurred. Consequently, the textiles adhering to metal objects were in their primary position unless they were displaced during this short period by animals or the decay of the body's soft tissues. Although the objects may not have been excavated in their original place, in theory it is possible to reconstruct which type of fabric/garment was associated with which dress accessories.

2.5 RESULTS

2.5.1 The textiles from Bergeijk

During the early Middle Ages, several types of weaves were in use, but in the Bergeijk cemetery, only fabrics woven in tabby, 2/2 plain twill, and 2/2 broken diamond twill were observed. Most graves containing more than two textiles show a variety of fabrics. In one grave (grave 33), there is only one cloth type present.

2.5.1.1 Tabby weaves

In Bergeijk, nine fabrics were woven in tabby, of which six were made out of wool. The other three tabbies are probably woven out of linen, but positive fibre identification was not possible due to damage to the fibres. Most tabbies were woven out of z-spun yarns in both warp and weft. Two of the woollen tabbies were woven in a spin-pattern.[139] These patterns are created using both z- and s-twisted threads in the warp. The different direction of the twist of the yarns bestows a very subtle but clear striped pattern to the fabric. The first is woven in warp-pattern: 1z-1s-1z-1s..., and is a rather open weave with 11x12 threads/cm. The other fabric is much finer (25x22 threads/cm) and woven in warp-pattern: 4z-4s-4z-4s...

2.5.1.2 2/2 twills

In most cases where the fabric was evidently woven in 2/2 twill, it was not possible to ascertain whether it was a 2/2 plain twill or a variety of this weave, such as diamond twill. Only where the fragments were of a considerable size was the pattern in the twill visible. Consequently, most of the smaller fragments are assigned to the group of 2/2 plain twill, making this group considerably overrepresented. A large share of the textiles from Bergeijk were woven in a variety

137. Gillard e.a. 1994.
138. Van Haperen 2010.

139. Find numbers 63.d1 and 89.h1.

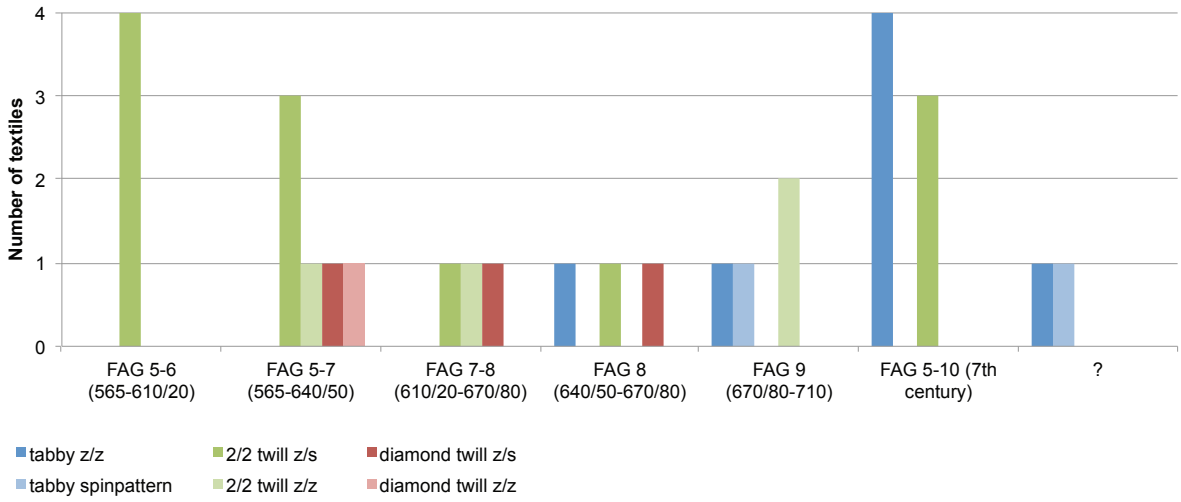


Fig 2.5. Distribution of the different types of weaves per phase.

of 2/2 twill. The majority of these textiles were woven of woollen fibres, with z-spun warp threads and s-spun weft threads. Few examples are present of woollen twills woven in z-spun yarn in both warp and weft. No linen fibres have been observed in this group of textiles, although several fibres could not be identified.

With several finds, it was not possible to ascertain the type of twill, either because the weave was very decayed or because the fabric was contorted. These fabrics are indicated as '2/? Twill'. Some textiles were decayed to such an extent that identification of weave was not possible. Also present in the cemetery were two fragments of plied rope.

2.5.2 Quality of the fabrics

A common method of estimating a fabric's quality is establishing the number of threads per centimetre in both warp and weft. As visible in figure 2.3, there are considerable differences in quality of the textiles from Bergeijk, with most tabbies and 2/2 twill z/z in the higher quality groups, and 2/2 twill z/s in the lower quality. Diamond twills are present in all qualities.

The cemetery of Bergeijk differs notably from textiles excavated in settlements in the Netherlands. In settlements, the majority of textiles possessed thread counts below 12 threads/cm.[140] In Bergeijk, the fine and coarse groups are more evenly represented. This difference is not caused by the fact that the settlements only contained woollen fabrics, since in the cemetery of Bergeijk most textiles were woollen as well, and the few linen textiles were rather coarse.

2.5.3 Developments in textiles

In the cemetery of Bergeijk, graves have been grouped into three phases. Phase I consists of graves from the late sixth century and the first half of the seventh century (510/20 – 640/50). Phase II is relatively short, from 640/50 – 670/80, and phase III lasts from 670/80 to c. 730/40. The textiles have been analysed according to this chronology, but in order to compare the textile remains from Bergeijk to those from other cemeteries and create a fine textile-chronology, they have also been analysed according to the Franken AG-phases.[141] Comparing the different

140. Brandenburgh 2010a.
141. Müssemeier, Nieveler, Plum & Pöppelmann 2003.

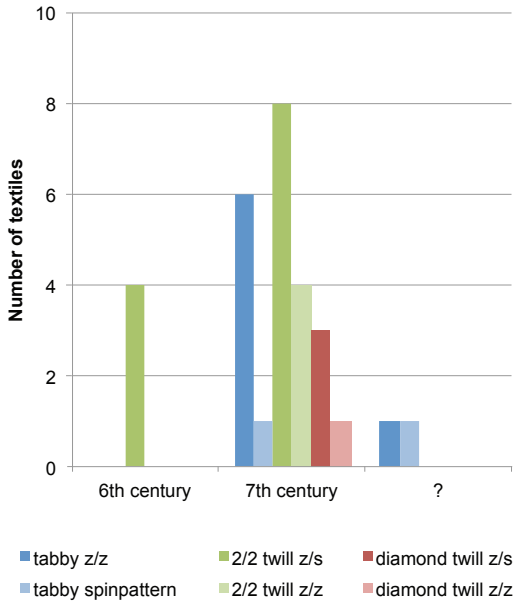


Fig 2.6. Distribution of the different types of weaves in the later sixth and seventh century.

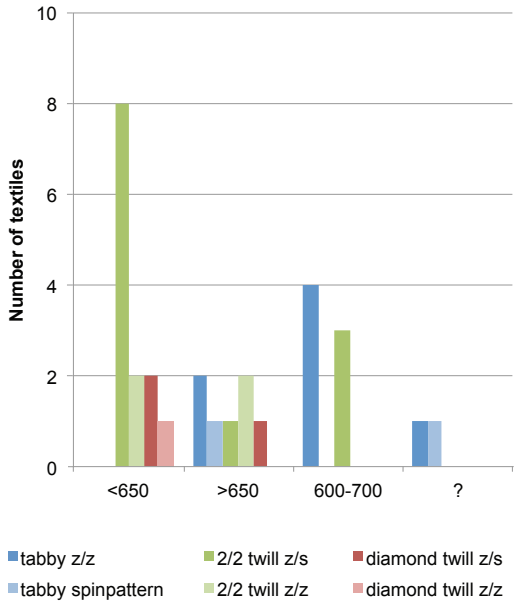


Fig. 2.7. Distribution of the different types of weaves before and after 650 AD.

weaves throughout time can, in the case of Bergeijk, seem a somewhat misleading exercise since some phases, such as phase III, are represented by only one grave. Its textiles may not reflect the totality of that particular phase, and may differ from the other graves in that period. To analyse the textile remains through time, they have been grouped together into the following phases (fig. 2.4). The first two phases FAG 5-6 (565-610/20) and FAG 5-7 (565-640/50), seem to have a large overlap. However, the three graves assigned to the first phase are dated in the period 5-6 and are representative of the sixth century,[142] while most of the graves and textiles assigned to the period 5-7 in reality are dated in phase 6-7 (580/90-640/50) and are more representative of the first half of the seventh century.[143] Phase FAG 7-8 (610/20-670/80) and FAG 8 (640/50-670/80) are each represented by two graves. The last phase FAG 9 (670/80-710) consists of only one grave. Seven textiles could not be dated more accurately than the seventh century, and three are of an unknown date.

The different weaves are not evenly represented through time (fig. 2.5). In the first phase, only 2/2 twills z/s are present. In the following phase, different types of weaves come into use: initially diamond twills z/s, 2/2 plain twills z/z and diamond twills z/z emerge, and in the second half of the seventh century, tabbies also occur. The increase of weave types in the seventh century becomes more evident when textiles are grouped together in the sixth and seventh century (fig. 2.6). We must, however, keep in mind that among the 2/2 twills there may be diamond twills that were not recognised as such due to textile fragmentation. It is therefore possible that the variability of weaves in the sixth century is larger than shown in figure 2.6 and it is impossible to conclude anything about the popularity of the 2/2 plain twills over other types of twills. Comparing the periods before and after

142. Graves 33, 44 and 64.
143. Grave 19 contains one textile and is assigned to phase FAG 5-7; Graves 24 and 62 together contain eight textiles and are assigned to FAG 6-7.

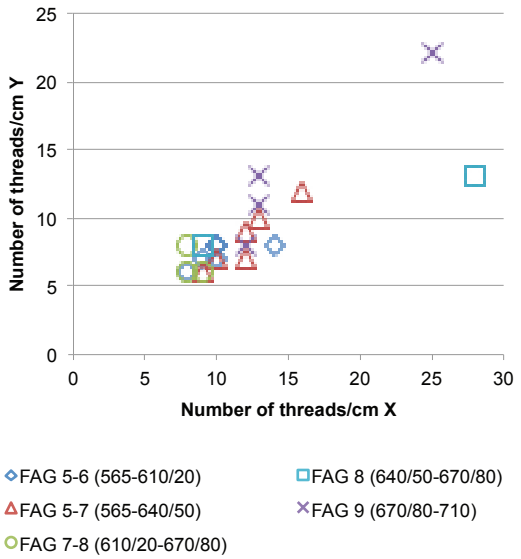


Fig. 2.8. Quality of the textiles per phase in number of threads per cm in warp (horizontal) and weft (vertical).

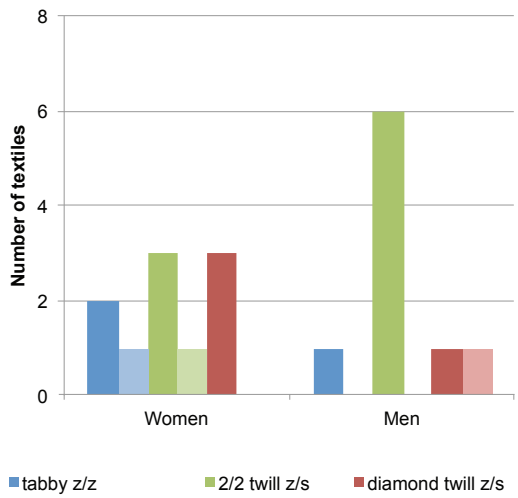


Fig. 2.9 Distribution of the different weaves in graves of women and men.

650 AD (phase I opposed to phase II-III) brings to light some differences as well. The z/s twills seem less dominant after 650, and other weaves like z/z twills and tabbies are increasingly present (fig. 2.7). The textiles from the earliest phase are all of coarse to medium quality, while the later textiles are more fine (fig. 2.8). This is partly caused by the new types of textiles such as tabby and 2/2 twill z/z, generally of finer quality (fig. 2.3), which were previously not present.

2.5.4 Textiles from graves of men and women

Gender determination is based on 'male' or 'female' objects present in the grave. Five graves, containing a total of 11 textiles, have been assigned to women. Seven graves, containing 18 textiles, were probably men's graves. The dataset from Bergeijk is too small to discern differences per phase but may serve as a building block in a future comparative study.

When comparing graves of men and women from Bergeijk, some differences emerge, but considering the small dataset, these differences are not significant (fig. 2.9). In women's graves, there is an equal share of 2/2 plain twills z/s and 2/2 diamond twills z/s. In men's graves, the majority of textiles are 2/2 plain twill z/s with only one example of diamond twill. This distribution should not be given too much weight, since in most cases it was not possible to differentiate between different variations of 2/2 twill. Hägg has previously called attention to the clear pattern of gender-related textiles for Scandinavian and German cemeteries in the North Sea region during the period 750-1000. Women's graves tend to contain equal amounts of plain twills and diamond twills, whereas diamond twills are practically absent in men's graves.[144] More textile research is needed on Dutch cemeteries to provide a larger gender-related dataset and to enable a comparison with other regions and periods. Some differences in quality between men and women are visible in figure 2.10. Textiles from men's graves are grouped together in a relatively small cluster of quality, while textiles associated with women have a wider range of qualities, both slightly coarser and some considerably finer. The finer textiles are represented by two textiles from two women's graves from the end of the seventh century.

144. Hägg 1993, 86-89.

2.5.5 Graves rich in textiles

Several graves contain three or more individual textiles. It is sometimes possible to confer an impression of textile wealth in these graves, although it is not possible to fully reconstruct the clothing in which the persons were buried. The following paragraph will elaborate on the textiles in grave 24, 56, 77 and 89.

2.5.5.1 Grave 24

Grave 24, a man's grave, contained at least three different types of weaves and several threads. The grave was reopened, as a result of which the objects in the grave were displaced. Several objects belonging to one belt[145] had fragments of the same type of textile as well as straw adhered (fig. 2.11). The textile is a dense and somewhat irregularly woven woollen z/z diamond twill with 12-15x9-12 threads/cm. The textile was present on the front side of a plate buckle, suggesting that it (partly) covered the belt while in its original position. Considering the fact that the grave was probably reopened after mineralisation had taken place, the straw attached to the objects was in its original position as well. This means the belt was either lying beside or beneath the body. It is also possible that the belt was not part of the clothing of the deceased, but was a loose object lying in straw or on a straw filled pillow, partly or entirely covered by the diamond twill.

On the backside of plate buckle 24.ee1, three fragments of a woollen 2/2 twill z/s were present (fig. 2.12). This textile is rather coarse, woven with 10x7 threads/cm, and was worn or lying under the belt. On the front of the same buckle, several strands (5mm thick) or untwisted bundles were visible.

On the face of strap end 24.x1, a second woollen 2/2 twill z/s is present, with 12x9 threads/cm (fig. 2.13). This twill is only slightly finer than the one described above, but has similar thread thicknesses and may therefore be the same fabric. In that case, and if it is worn in its normal position hanging from the belt, this strap end may have been partly covered by a fold in the same garment worn under the belt.

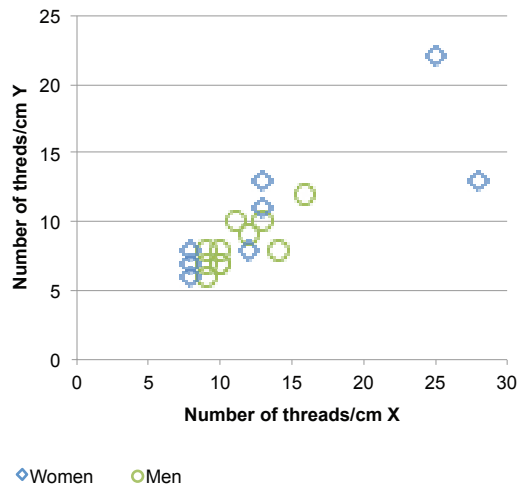


Fig. 2.10 Quality of the textiles in graves of women and men via number of threads per cm in warp (horizontal) and weft (vertical).

On two indeterminate fragments of iron, a woollen 2/2 twill z/z and straw were present. This textile is much finer and more regular than the diamond twill, although the thread count is not much higher (16x12 threads/cm). Neither the function of this textile nor its original position in the grave or its relation to the body are clear. The presence of straw on the object suggests it was lying besides or under the body.
Lastly, on a small fragment of iron, a negative cast of a z/s fabric was present. The weave and thread count of this fabric could not be ascertained.

2.5.5.2 Grave 56

Grave 56 yielded at least three different weaves. It is unclear whether these textiles belonged to one burial. It is possible that the grave was used secondarily, since it contained a substantial number of glass beads in the upper half of the grave as well as a spearhead,

145. Three fragments of indeterminate iron, one fragment of plate, one plate buckle and one belt plate together contained six fragments of the same textile.

Fig. 2.11 Fragment 24.hh3, part of a belt, with straw and z/z diamond twill attached.

Fig. 2.12 Back (above) and front side (below) of plate buckle 24.ee1. On the back, fragments of 2/2 twill z/s are present; on front, several strands of fibres.

Fig. 2.13 Strap end 24.x1 with 2/2 twill z/s.

Fig. 2.14 Fragment of non-mineralized diamond twill z/s, found in association with belt plates 77.q (above) and 77.o (below).

artefacts not usually buried together due to different gender association. All textiles were adhered to indeterminate fragments of iron, making it difficult to affix a function to the textiles. The grave contained two woollen 2/2 twills z/s: one coarse with 6-7x6 threads/cm, and one finer with 8x9-10 threads/cm. Both weaves have similar threads and are open and distorted. It is possible that the different thread count was caused by the garment stretching during wear and that both fragments are from the same cloth. Also present in the grave is a fine woollen tabby with 14x12 threads/cm. A coarser tabby with 8x6 threads/cm is made out of a plant fibre.

2.5.5.3 Grave 77

In the centre of the grave, the remains of two belt fittings were found.[146] It is not clear whether both belts were originally positioned on the body. It is possible that one was placed beside the body. The position of both strap ends in the lower half of the grave may indicate that they were lying in their original location, had they been positioned on the body. There are at least two, and possibly three, different textiles in this grave, of which one is associated with these belts. Five fragments of a non-mineralized woollen diamond twill z/s have been found in association with two copper belt plates 77.q1 and 77.o1 (fig 2.14). This diamond twill is regularly woven with 8-10x8-10 threads/cm. The other two textiles are associated with pieces of shoe or leg wear. This ensemble consists of a plate buckle, counter plate, and strap end. On strap end 77.r1, a woollen textile was present. The fabric had decayed to the extent that the weave could not be ascertained, but its threads were thinner (0.5-0.75mm) than those on the belt plates (0.75-1mm). It is however possible that the fabric on this strap end is identical with the diamond twill described above. Strap end 77.q4, also belonging to leg or shoe wear, had been in close contact with a coarse and somewhat open woollen 2/2 twill z/z, woven with 8x6 threads/cm. The threads of this fabric were 1mm thick.

146. Textiles are associated with belt plates 77.q and 77.o, counter plate 77.r1, and strap end 77.q4.

Fig. 2.15 Belt fitting 89.h1 with two types of textile adhered.

Assuming that both the belts and the leg or shoe wear were worn on the body, the deceased was dressed in or covered by at least two types of fabrics, the diamond twill covering the area around and below the waist, and the 2/2 twill z/z swathing the lower part of the legs. If positioned beside the body, the belts could also have been lying on, covered by, or wrapped in the textiles.

2.5.5.4 Grave 89

Grave 89 is the only grave from phase III to yield textiles. This grave, assigned to a woman, contains very fine and very varied textile remains. The grave was reopened, but the 'Ophoven' type belt it contained was still in its original position. This makes the grave very interesting, because it enables a reconstruction of which types of fabrics were worn from the waist down in relation to the belt.

Belt fitting 89.h1 was part of the strap suspended from the waist. On the front of this object, two different fabrics were present (fig. 2.15). This implies that the belt was lying in the folds of one garment and was partly covered by a second outer

garment or shroud. Partly wrapped around one edge is a very fine woollen tabby, 25x22 threads/cm, woven with a spin pattern in the warp: 4s-4z-4s-4z... The threads were very fine and regularly spun with a thickness of 0.2 mm. The belt was probably lying in the folds of this fabric. Also covering the belt was a coarser 2/2 twill z/z woven with 12x8 threads/cm. The threads were irregularly spun, ranging from 0.5-1mm in warp and 0.2-0.3mm in weft, resulting in a very uneven and open fabric. The fibres had the curly appearance of wool but were damaged; no positive fibre identification was possible.

A bit lower on the body was strap end 89.k2. Textile and straw were present on one side of the strap end, indicating that it had been lying on a fabric on the grave's bottom. This textile and straw may have been part of the container's lining or of a mattress on which the deceased was lying. The textile was a fine 2/2 twill z/z, smoothly spun and woven with 13x13 threads/cm. The regularity of both weave and threads is very different from the fabric found in association with the belt fitting a bit higher on the body.

It is not clear whether buckle loop 89.b1 was part of the same belt, since it was found on the other side of the body, in the waist area. It is also possible that it belonged to a pouch or other type of strap. On the front side of this buckle loop were two layers of the same fabric: a z/z tabby woven with 13x11 threads/cm. The threads of this fabric were very irregularly spun, varying from 0.2-0.7 mm thick. The threads bore the somewhat curly appearance of wool, but no positive fibre identification could be made.

In summation, it is most likely that the person buried in this grave was lying on a mattress or cloth made of a fine 2/2 twill z/z. The person was dressed in a garment composed of very fine tabby woven in a spin pattern covering at least part of the legs. Over this lay another garment (or shroud?) made of a coarser fabric, very irregularly spun and woven. The function of the fine 2/2 twill found on the buckle loop is not clear. It may have belonged to a pouch or a garment covering the waist but not the legs.

2.6 SOME PRELIMINARY TRENDS IN BURIAL TEXTILES

When comparing the different graves described above, it is obviously not yet possible to discern any clear patterns in burial clothing. Only in graves 24, 77 and 89 it is to some extent possible to reconstruct which types of textiles were worn over each other and how metal dress accessories were arranged in relation to the textiles or clothing. These graves belong to different genders and are dated at least a hundred years apart.[147] In grave 56, the textiles could not be localised so precisely. It is evident, however, that the deceased was dressed in or covered by four different textiles of varying quality. In grave 24, the male deceased wore a garment made of a coarse 2/2 twill under the belt. This garment ranged at least to the upper legs. A finer diamond twill covered the belt. It is possible that this textile belonged to a garment such as a cloak; it may also have been a shroud. It is equally plausible that the belt was lying under the body and that the person was actually lying on top of this second textile. In that case, the fine diamond twill could still be a cloak but could also have been a mattress or other type of grave lining.

The woman in grave 77 was dressed in or covered by a garment composed of a diamond twill reaching at least to the waist. Unfortunately, the textiles associated with the belt were not adhered to the metal anymore, making it impossible to ascertain whether the garment was worn atop or beneath the belt. The leg or shoe wear worn on the lower part of the legs was covered by a 2/2 twill z/z, suggesting either a long garment or a shroud encasing the entire body.

The woman in grave 89 was dressed in a garment made of a very fine tabby woven in a spin pattern. This covered at least part of her legs and was tied at the waist with a belt. Over this garment and belt lay another garment (or shroud), made of a coarser fabric, and possibly a third garment of a fine 2/2 twill reaching at least to the waist. It is noteworthy that the quality of both the undergarments varies in these two

147. Grave 24 belongs to phase I / FAG 5-7 (565-640/50); grave 77 is dated in phase I-II / FAG 7-8 (610/20-670/80) and grave 89 is dated in phase III / FAG 9 (670/80-710).

graves. In the case of grave 24, the undergarment is much coarser than the outer garment. In grave 89, the opposite is true, containing a very fine undergarment and a coarser outer garment.

The textile finds also enable some preliminary conclusions relating to the association of types of fabrics to specific objects in the graves. Many textiles were found in association with belt parts. In practically all these cases, the textiles were either 2/2 twills or 2/2 diamond twills of varying quality. In most cases these fabrics were present on the front side of the belts. This does not necessarily mean that the garments were worn over the belt; it is also possible that they were worn beneath but partly folded over the belt. One example clearly showed a 2/2 twill worn under the belt. Grave 89 is the only grave where it can be shown that the deceased wore a garment woven in a fine tabby under the belt.

The shield boss from grave 64 was covered by a 2/2 twill z/s of medium quality (10x7 threads/cm). The shield was probably standing against the side of the grave. It is possible that the shield fell on top of the clothing, but it is also likely that the shield was completely wrapped in a separate piece of textile.

There are only a few textiles woven in tabby observed in the cemetery of Bergeijk. These fabrics are associated with a broad range of objects: a knife, a rivet (function unknown), a buckle loop (of a belt or pouch), a belt and an iron ring. In some cases, these objects may have been worn under or between the cloths, making it likely that the tabby was used as an undergarment.

3. Textiles from the Posterholt cemetery

Previously published as:
Brandenburgh, C.R., 2013: Textiles from the Posterholt cemetery, in: M.V. de Haas & F.C.W.J. Theuws, The Merovingian cemetery of Bergeijk-Fazantlaan, Bonn (Merovingian Archaeology in the Low Countries 2), 132-137.

The cemetery of Posterholt was the second publication of cemetery-textiles in this thesis. Although the find complex of this cemetery is rather small it provided a first opportunity to compare textiles from two different sites (Posterholt and Bergeijk). Moreover it was the first cemetery in which the relationship between certain types of grave objects and the textiles adhered to them were analysed.

3.1 INTRODUCTION

The Posterholt cemetery yielded several fragments of textiles. Of the 80 examined Merovingian inhumation graves, 15 contained one or more pieces of textile. This resulted in a total of 33 fragments (appendix II). In most cases, the textiles were mineralized and imbedded in the corrosion on the graves' metal objects.

Due to the small size of the dataset, it is not possible to ascertain any developments in the cemetery's textiles over time. Furthermore, many objects in the graves were displaced; most graves had been reopened after burial. This makes it difficult, if not impossible, to reconstruct the garments of the deceased.[148] However, most finds can be assigned to a period in the late sixth and/or seventh century, making it a useful body of textiles that can be compared to other cemetery textiles from this same period.

3.2. DATASET

The Posterholt cemetery yielded 33 textile fragments. In some cases, several fragments of the same fabric were present within one grave. These identical fabrics have been grouped together, resulting in a total of 22 individual textiles. Some textiles were very badly preserved, making it impossible to analyse the fabric's technical details. These textiles are listed in appendix II but have not been included in the analysis presented in this chapter. In nineteen cases, the weave type could be established. The weave types are discussed below. Most of the graves contained one or two different textiles; only grave 85 yielded more (3 different fabrics).

Most of the textiles were preserved in the corrosion on the graves' metal objects. The textiles not in contact with metal decayed in the years after the burial. This is why the remaining textile fragments are often very small, measuring between 0.5x0.5 and 3x3 cm.

Many objects had already undergone restoration in the years following excavation; this undoubtedly has led to textile removal. However, there was still a considerable amount of (often indeterminate) iron fragments where no restoration had been conducted. The preservation of the mineralized organic remains on these objects was in many cases rather poor.

3.3 RESULTS

3.3.1 The textiles from Posterholt

During the early Middle Ages, several weave types were in use; in the Posterholt cemetery, fabrics woven in tabby, 2/2 plain twill, and 2/2 broken diamond twill were observed. They will be discussed here shortly.

3.3.1.1 Tabby weaves

In Posterholt, 11 fabrics are tabby weaves. Five were made of wool and two of plant fibres.[149] Most tabbies were woven fully of z-spun yarns. One fabric was woven in z- and s-spun yarns, and one in only s-spun yarns. One of the tabbies was woven in a spin-pattern.[150] Spin patterns are created using both z- and s-twisted threads in the warp. The yarn's different twist lends the fabric a very subtle striped pattern. The warp-pattern is: 1z-2s-1z-2s, and it is a rather open weave with 10x10 threads/cm.

148. The possibilities and constraints of textile analysis on cemetery finds has been elaborated in detail in Brandenburgh 2012a. However, Posterholt's textile dataset is too limited to enable any conclusions on grave textiles, their function as garments or grave furnishing, or their cultural significance. Nevertheless, the cemetery provides a well dated body of textiles that can be compared to textiles from other regions. In the long term, this will provide a detailed overview of the types of textiles in use throughout the area, which may lead to a better understanding of textile production and (long distance) exchange.

149. Positive fibre identification of the other four tabbies was not possible due to damage of the fibres.

150. Find numbers 62-III-13. Unfortunately, a positive fibre identification was not possible for this fabric.

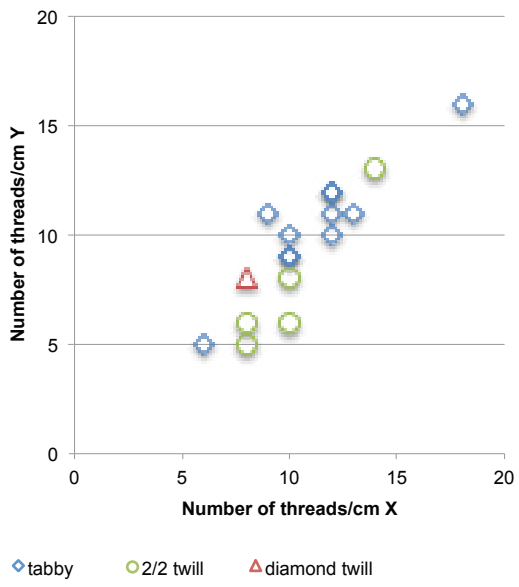


Fig. 3.1 The quality of the different fabrics in Posterholt in number of threads per cm in warp (horizontal) and weft (vertical).

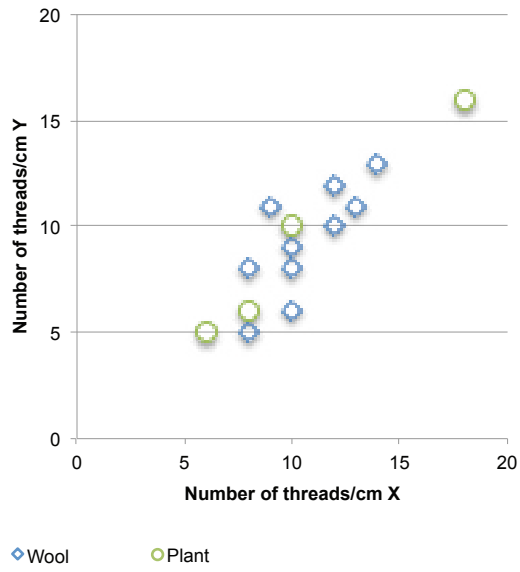


Fig. 3.2 The quality of the fabrics made out of wool and plant fibres in number of threads per cm in warp (horizontal) and weft (vertical).

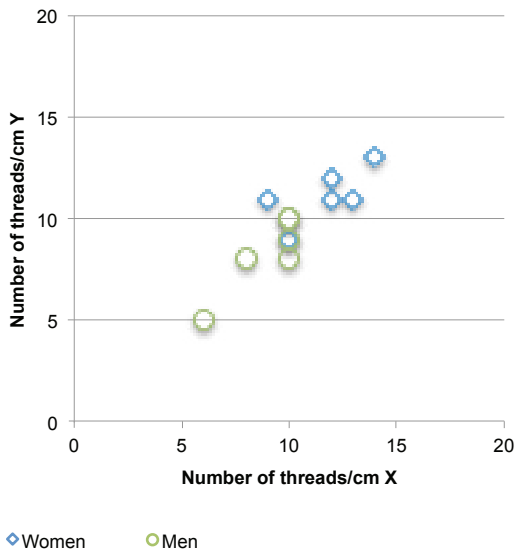


Fig. 3.3 The quality of the graves of men and women in number of threads per cm in warp (horizontal) and weft (vertical).

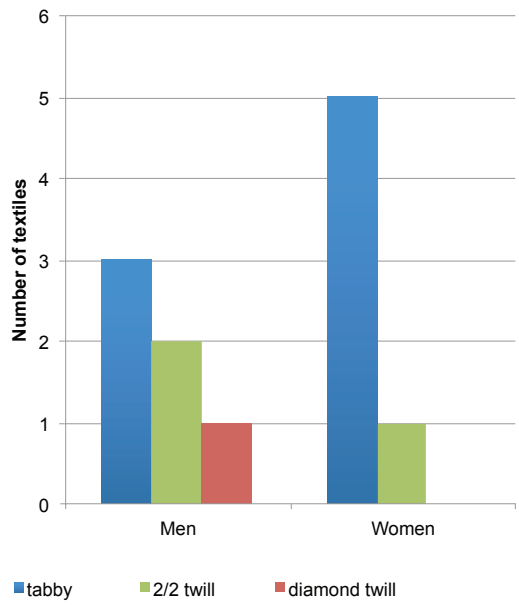


Fig. 3.4 Distribution of the different weaves in graves of men and women.

Fig. 3.5 Buckle (23-34) from a juvenile in grave 23 (10-20 years) with fine tabby folded over the front side of the buckle.

Fig. 3.6 Back plate (81-1) with a woollen 2/2 plain twill on the outside of the belt. This means this fabric belongs either to a garment worn over the belt or the person was lying on a mattress made out of this fabric.

3.3.1.2 2/2 twills

In most cases where the fabric was evidently woven in 2/2 twill, it was not possible to ascertain whether the twill was plain or a variety of this weave, such as diamond twill. The twill pattern only becomes visible in fragments of considerable size. Consequently, most of the smaller fragments are assigned to the 2/2 plain twill group, making this group considerably overrepresented. Seven of Posterholt's textile fragments were woven in a variety of 2/2 twill.[151] One of these textiles was woven of plant fibres, with z-spun threads in both thread systems. Five textiles were woven with woollen fibres, with either z/s, z/z, or (in one case) spin pattern z/z&s-spun threads.

3.3.2 Quality of the fabrics

A fabric's quality is commonly measured by the number of threads per centimetre in both warp and weft. As visible in figure 3.1, there are some quality differences in the Posterholt's textiles, with most tabbies being in the higher quality groups and most 2/2 twill in the lower quality group. This distribution differs from textiles excavated in settlements in the Netherlands. In settlements, the majority of textiles had thread counts below 12 threads/cm.[152] In cemeteries such as Posterholt and Bergeijk,[153] the fine and coarse groups are more evenly represented. This difference is not caused by the fact that the settlements only contained woollen fabrics. Both woollen and plant-based fabrics in Posterholt are present in a variety of qualities (fig. 3.2).

3.3.3 Textiles throughout time

The graves in the Posterholt cemetery have been grouped into four phases. Phase I consists of graves from the middle of the sixth century I (510/20–580/90) Phase II spans the end of the sixth and the first half of the seventh century (580/90–640/50). Phase III is relatively short, from 640/50to 670/80, and phase IV lasts from 670/80 to 750. It is not possible to analyze the textiles strictly according

151. For one fabric it was not possible to ascertain the twill type, because the weave was very decayed. This fabric is indicated as 2/? twill in appendix II.

152. Brandenburgh 2010a.

153. Brandenburgh 2012a.

to this chronology, since many graves (and with that, most textiles) could not be ascribed to a single phase but to a longer period of several phases; some graves (containing nine textiles) could not be dated at all. Furthermore, some phases, such as phase I, are represented by only one grave. Its textiles do not reflect the totality of fabrics of that particular phase. Moreover, the dataset from Posterholt is too small to support any conclusions about textile development through time. All phases show a variety of textiles in small quantities. Diamond twill is only present in the cemetery's earliest phase.

3.3.4 Textiles from graves of men, women and children

Conservation of skeletal remains in the graves was very poor. As a result, the sex of the people buried could only be ascertained in a few graves, and only one of these graves (grave 21) contained textiles. Many other graves were distinguished as 'male' or 'female' based on the presumed gender associations of the objects found in the graves. A total of 17 textiles could thus be assigned to gender (four female graves and four male graves), but several of those were difficult to analyse, resulting in incomplete technical data.[154]

The graves of women and men from Posterholt bear some differences, but considering the small dataset, these differences are not significant (fig. 3.3 and 3.4). Graves of women contain predominately tabbies and only one example of 2/2 twill. Men's graves show a more equal share of tabbies and twills. More textile research is needed on Dutch cemeteries to provide a larger gender-related dataset and to enable comparison with other regions and periods. Some quality differences between fabrics associated with men and women are visible as well. Textiles from men's graves are slightly coarser than those found in women's graves.

Few graves contained enough skeletal remains to ascertain the age of the deceased, but nevertheless it is clear that several children or juveniles were buried in the cemetery. One grave from a juvenile individual contained mineralized organic remains (grave 23). Unfortunately, this grave could not be dated and yielded only one textile fragment. Nevertheless, this information inaugurates a juvenile textile dataset, making future comparison with other datasets possible. The textile present in this grave was a fine tabby of plant fibres (fig. 3.5). The garment was folded over the front side of the buckle, which means it was probably worn over the belt. The textile found in this juvenile grave is by far the finest fabric in the Posterholt cemetery.

Fig. 3.7 Belt part (58-11) with a coarse tabby (z/z 5x6 threads per cm) on the outside.

154. In the case of five textiles, weave and/or thread count could not be ascertained.

3.3.5 Textiles related to belt parts

It has been mentioned that most of Posterholt's graves had been reopened. As a result, many objects have probably been removed from the graves while the remaining objects were displaced. This situation has had great effects on the amount and conditions of the excavated organic remains and consequently results in limited textile analysis. Two of the textile-containing graves (grave 21 and 23) had not been disturbed, but these graves yielded too few fabrics to make any assumptions about the garments and burial textiles within the graves. However, in some cases it is possible to establish which fabrics were originally worn under or over specific dress accessories. Many textiles were found in association with parts of belts. In practically all these cases, the textiles preserved in contact with the belt were tabbies of varying quality. The finer tabbies seem to have been worn as a garment or shroud over the belt. One example of a back plate (81-1, see fig. 3.6) shows the deceased was lying atop a 2/2 plain twill of medium quality. This may have been an outer garment, but could also have been a mattress cover.

The belt in grave 58 (fig. 3.7) was probably not worn on the body but placed beside the deceased. During excavation, the belt was found near the deceased's head, but the grave had been reopened; the original deposition location is thus inconclusive. However, remains of straw adhered to several parts belonging to this belt; these could only have been embedded in the metal's corrosion during the first months after inhumation. Therefore, the belt was probably lying directly in the straw on the grave's bottom, not worn by the dead. It may be considered as an extra object placed in the grave, or probably a displaced object.

Comparing the textiles associated with belt parts from Posterholt with those from Bergeijk results in noticeable differences. As mentioned above, tabbies are predominately found covering belt parts in Posterholt, whereas in Bergeijk we find mainly 2/2 twills or diamond twills.[155]

3.4 THE TEXTILES FROM POSTERHOLT IN A BROADER CONTEXT

The 22 textiles found in Posterholt are a rather uniform body of textiles with only a few basic fabric types and no special or fine weaves. Since most graves had been reopened and only a very small amount of textiles has been preserved, it is not possible to attempt a reconstruction of the buried garments or an analysis of temporal changes within the burial ground. However, considering Posterholt's textiles as a building block in a larger dataset of cemetery textiles, the textiles may provide information on the use and development of textiles and clothing in the region's burial-context.

In many respects, the Posterholt cemetery is comparable to the Bergeijk cemetery: it is a rural cemetery with a similar number of – if not more – reopened graves and a chronology which may begin earlier but follows the same phases and ends at about the same time. When comparing the textiles from Posterholt with those from Bergeijk, it is apparent that the fabrics of both cemeteries are of similar quality. Very fine luxurious textiles are absent in both cemeteries, befitting the general characteristics of burial assemblages. Bergeijk, however, contains a larger variety of weaves, which may be related to the larger body of textiles found in that cemetery. There are other differences as well: Posterholt has far more tabbies compared to Bergeijk and the distribution of weaves among men and women also differs. Women from Posterholt seem to have been buried often in tabbies, whereas men were buried equally in twills and tabbies. In Bergeijk, tabbies were less represented and differences between men and women are shown in the use of diamond twills and plain twills. The presence of different fabrics on belt parts from Posterholt and Bergeijk suggests that people were dressed differently – or at least used different fabrics - in these two cemeteries.

155. Brandenburgh 2012a, 130.

Some developments observed in Bergeijk cannot be compared to Posterholt, such as the changes over time in the use of different fabrics. This is clearly due to the small size of the dataset from Posterholt.
Noting the characteristics, similarities, and differences between the two cemeteries is the first step towards understanding the differences between these cemeteries and the people buried there. However, textile variation within the cemeteries probably does not only reflect the changes and differences within the living population but also the role textiles played in the burial practice, both practical and symbolic. Insight into these processes requires more data on the cemeteries and their textiles. This topic will be addressed in more detail in future publications.

4. The textiles from the early medieval cemeteries of the Sint Servaas church in Maastricht

A comparative study of the cemeteries of the church, Pandhof and Vrijthof

Previously published as:
Brandenburgh, C.R., 2015: The textiles from the early medieval cemeteries of the Sint Servaas church in Maastricht. A comparative study of the cemeteries of the church, Pandhof and Vrijthof, in: Zeitschrift fur archaeologie des Mittelalters, 33-75.

In this article the textiles from three cemeteries in Maastricht were discussed. These are all urban cemeteries and as such represent a different social group of people than those from the rural cemeteries of Bergeijk and Posterholt, which had hitherto been published. The high status burials from Maastricht proved to contain different types of textiles of a higher quality than those from the rural sites. Moreover, the large amount of textile remains created a possibility to further investigate the way textiles were used in the grave, as clothing, but also as a mean for furnishing the grave and wrapping objects before or during the burial ritual.

This case study also uses information from an article that has not been included in this thesis:
Brandenburgh, C.R., in press: The textiles from the cemetery of Maastricht-Vrijthof, in: F. Theuws, & M. Kars (ed.), The Saint-Servatius complex in Maastricht. The Vrijthof excavations (1969-1970). Roman infrastructure – Merovingian cemetery – Early town development, Bonn (Merovingian Archaeology in the Low Countries 3).

4.1 INTRODUCTION

The early medieval burial tradition, with its richly furnished graves, is known from numerous burial sites in the south of the Netherlands.[156] Maastricht takes a somewhat separate position in the late Roman and early medieval landscape: it is the 'urban' centre in the area, with at least one early stone church.[157] The people buried in the Sint-Servaas church and in the cemeteries around the church will have had varied social positions. Some of them are considered to be representatives of the higher social circles of society. Evidence for this can be found in the many stone sarcophagi, the luxurious grave goods and the physical anthropological data of the human remains.[158] Other graves might contain 'ordinary' members of the Maastricht population. The graves in these cemeteries often include fragments of (mineralized) textiles. These are the remains of the garments in which the dead were buried and of other textiles in the graves such as the covers of mattresses or pillows, shrouds or pieces of cloth wrapped around objects deposited in the graves. The presence and quality of fabrics in the graves indicate that a significant amount of attention was spent on the clothes, grave textiles and dress accessories of the deceased. Textiles have probably also been used to indicate the role, position or status of the deceased. Although some research has been done regarding the objects deposited in these graves before the analyses in the context of the Saint Servatius-Project and the Anastasis-Project began, including the dress accessories, less attention was paid to the textile finds themselves. The study of these remains can become an important aspect of cemetery-research, providing information about how textiles were used in the burial context and the social message they propagated.[159] Furthermore it enables a comparison of the use of grave textiles by different people within the cemeteries and between the cemeteries of Maastricht and those of the rural areas around Maastricht. For this reason the textile remains from three cemeteries in and around the Sint-Servaas church have been analysed: the burials inside the church itself, the Pandhof cemetery and the Vrijthof cemetery. These three cemeteries have yielded a total amount of 122 fragments of 96 individual textiles (appendix III & fig. 4.1).[160] Not included in this analysis are the reliquary textiles from the Sint-Servaas church[161] because these more often than not come from other locations and their origin cannot be traced back to specific burials.

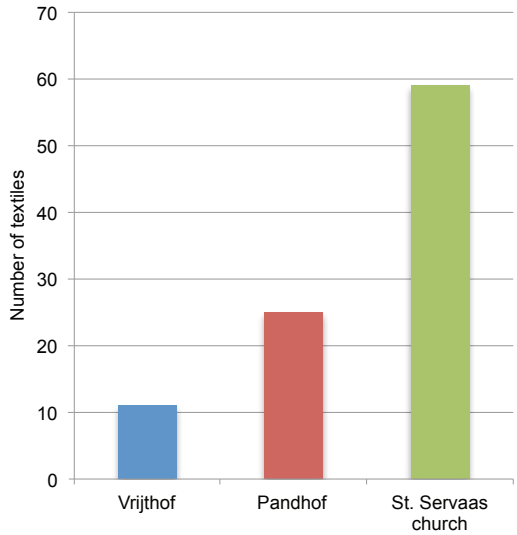


Fig. 4.1 The number of individual textiles per cemetery.

156. Recently several early medieval cemeteries have been published. The Saint Servatius-project and thereafter the Anastasis-project of Leiden University catalogues and analyses several cemeteries in the south of the country, including those from Maastricht (Theuws & Kars & in press), Bergeijk (Theuws & Van Haperen 2012), Posterholt (De Haas & Theuws 2013), Oud-Leusden, Sittard, Obbicht and Stein and the farmyard burials of several settlements. This project incorporates the spatial analysis of the graves, the human remains and the analysis of all the grave inventories. The cemeteries of Wijchen (Heeren & Hazenberg 2010) and Rhenen (Wagner & Ypey 2012) were also catalogued recently.
157. The transition from the late Roman period to the early medieval period takes place around 450 AD (in Dutch archaeology). The mentioned stone church is the Saint-Servaas church, other stone churches might be present at the location of Saint Mary's Church and Saint Martins church in Wyck.
158. Kars 2011, 10; Panhuysen 2005, 37, 230 & 235 (regarding the Late Roman period), 241-242 & 249 (regarding the sixth & seventh century).
159. For recent examples of cemetery-research that incorporate textiles see Wamers & Perin 2012, Reifarth 2013, Nowak-Böck & Von Looz, 2013.
160. Appendix III is a summary of the database, which was kindly made available by English Heritage.
161. Stauffer 1991.

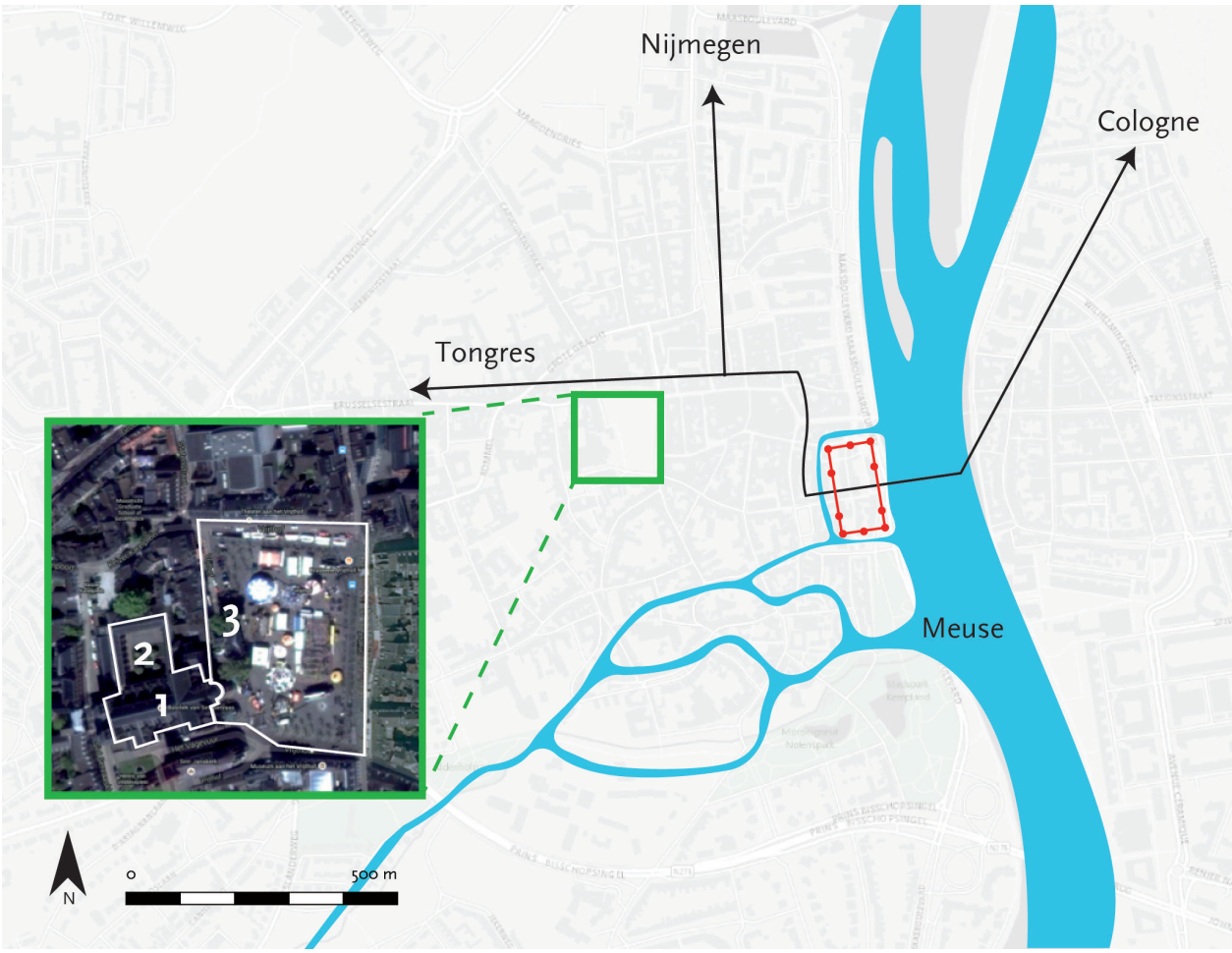


Fig. 4.2 Detailed map of Maastricht showing the location of the three cemeteries Sint-Servaas church, Pandhof and Vrijthof. Map: E. Gehring.

The cemeteries in and around the Sint-Servaas church represent a burial tradition that starts in the Late Roman period and ends around 1800. The graves discussed in this chapter are those of the earlier phases: the Late Roman until the Carolingian period. In order to understand the discussion and research issues in this article the following paragraph briefly summarizes the historical background of early medieval Maastricht, and the development of the population and the burials sites. Sections 4.3 – 4.4 give an overview of the research hypotheses and questions, the quantity and quality of the textiles and the research methods. In section 4.5 and 4.6 the results are presented, which include various aspects of the excavated textiles, the use of textiles in the burial context and the significance of the distribution of the textiles over the cemeteries, over time and also over different groups of inhumed persons. Lastly, section 4.7 provides a discussion of the research hypotheses and questions.

	Sint-Servaas church	Vrijthof	Pandhof	Total
Number of graves	321	320	498	1139
Number of possible graves	64	126	332	532
Graves with grave goods	125	146	152	423
Datable graves	70	90	104	264

Table 4.1 Basic information on the graves, grave goods and skeletal remains from the Sint-Servaas church, Vrijthof and Pandhof cemeteries. (After Kars 2011, table 8).

4.2 A SHORT HISTORY OF MAASTRICHT AND THE CEMETERIES OF THE SINT-SERVAAS CHURCH[162]

During the Roman period Maastricht was a central place (vicus) and a wealthy centre of trade for the surrounding area. In the fourth century Maastricht experienced an increase and in the post-Roman period it became a religious, administrative and commercial centre of the area.

Raphael Panhuysen divided the graves in and around the Sint-Servaas church into three phases.[163] The first burial phase is the 'Cella Memoria phase' spanning the fourth and fifth centuries. This phase is named after a construction of stone that was excavated inside the church and for some time was thought to be the grave chapel of Saint Servatius. During this period inhumations took place in the Pandhof–cemetery and the area that was later occupied by the Sint-Servaas church. Recent analysis of the graves in the Vrijthof cemetery has indicated that there was also burial activity in this area in the fifth century, although the number of inhumations is very small.[164]

The following phase is the 'Templum phase' (sixth-seventh century), named after the construction of the Templum Magnum by bishop Monulphus. During this phase burial took place in all three cemeteries: within the Sint-Servaas church and outside in the Pandhof and Vrijthof cemeteries.

The third and last phase is the 'Basilica phase' (eighth-tenth century), named after the large new church with a ground plan of a basilica on the location of the Templum Magnum of the previous phase. This period marks the transition from the Merovingian to the Carolingian phase, during which the burial tradition changed from richly furnished graves to graves lacking grave goods.[165]

4.3 RESEARCH AIMS AND QUESTIONS

During the Merovingian period the burial ritual was probably used in the confirmation, adjustment or creation of an identity or social position of the deceased and his/her descendants.[166] Grave textiles and clothing were prominently in sight during the burial ritual and therefore must have played an important role in propagating this identity or social position. Following these assumptions this chapter attempts to assess the character, quality and use of textiles and clothing in the burials in and around the Sint-Servaas church in order to determine the role fabrics played in the burial ritual.[167] The following hypotheses and research questions will be discussed:

162. Based on the summary of the habitation of Maastricht in Panhuysen 2005, 20-50. See also section 1.4.1.3.
163. This phasing may change when subsequent cemeteries are published in the context of the Saint Servatius project.
164. Only four graves have been attributed to his phase. Kars 2011, p. 129 table 14 (context 66, 264, 294 & 309).
165. Kars 2011, 8-9.
166. Halsall 1995, 245-248; Effros 2003, 124-128.
167. For a more detailed discussion on the role and use of textiles and clothing in the burial ritual see Brandenburgh 2012a, 128-129.

1. Historical sources show the presence of nobility in Maastricht and the luxurious graves and human remains found in and around the church indicate they, or other rich people, have adopted the custom of being buried near the grave of Saint Servatius.[168] Did these people use textiles to indicate their wealth or status?[169] Are there textiles of a high quality, fabrics woven in intricate patterns, colourfully died fabrics and shiny precious materials such as silk and gold thread present in the burials of Maastricht? Is there a significantly higher amount of these textiles present in Maastricht as opposed to rural cemeteries? Which graves contain these precious materials and what is the meaning of this distribution? Is there a difference in grave textiles between men, women and children?

2. Do the textile remains show differences between the burials *intra* and *extra muros*? If so, how and when do these differences occur? In most churches the place near the altar or the grave of the saint is the most desired burial location. The presence of the grave of Saint Servatius within the Sint-Servaas church may have had a similar effect, resulting in richer *ad sanctum* burials within the church than in the cemeteries outside the church. This difference would have been most clearly from the sixth century onward, when the Sint-Servaas church was built - centred around the grave of Saint Servatius - and the Pandhof cemetery became the *extra muros* burial ground.

3. Can the textiles from the cemeteries in Maastricht be placed in a local or regional textile tradition? Are there for instance Germanic or Roman characteristics in the textiles and to which degree do the fabrics from Maastricht differ or resemble the contemporary finds from the surrounding countries?

4. There is a difference between the dress accessories of the sixth century and the seventh century, with a clear transition period between 580/90-610/20, which is characterised by the introduction of the use of iron buckles with silver inlay. Is this difference also visible in the textiles associated to these objects? Although the textiles can generally not be assigned to short periods of time it is possible to investigate whether there is a difference between the sixth and seventh century.

5. During the transition from the Merovingian to the Carolingian period the burial ritual changed significantly. More attention was given to the construction of burial monuments whereas the content of the grave, which was previously rich in grave goods, became more sober. At the end of the seventh century hardly any objects were deposited in the graves any more. One might assume that the grave textiles became sparser and less luxurious over time as well but the question is if such a trend exists and, if so, if it followed the same rhythm as the decrease in the number of grave objects. Both in the Pandhof and Servaas church graves from the Carolingian period were recovered making it possible to compare the textiles from this period to those of earlier centuries.

4.4 DATASET

The cemeteries have yielded a varying number of textiles. Sint-Servaas church contained most textiles: 75 fragments. In some cases, several fragments of the same fabric were present within one grave. These identical fabrics have been grouped together, resulting in a total of 59 individual textiles. In the Pandhof cemetery 35 fragments of 26 individual textiles were found whereas Vrijthof yielded 12 fragments of 11 individual textiles (fig. 4.1).

168. Panhuysen 2005, 39.
169. One would expect graves of nobility to contain dress accessories and textiles of equally high quality. This is however not always the case as for instance is shown in the grave of queen Arnegunde (buried in the church of St.-Denis). Here the textiles are of extraordinary quality but the dress accessories themselves have been used and undergone reparation (Périn et.al. 2013, 117). Here we touch upon the fact that objects can have value for different reasons. Not only the monetary price of an object decides whether it has value, the biography of an object and the fact that it may have been passed on for generations can also influence the way people value them. Therefore it is interesting to investigate to which extent wealth or status was expressed in the use of textiles.

Most of the textiles were preserved in the corrosion layer of the metal objects. The textiles not in contact with metal decayed in the months or years after burial.[170] Because of this, the fragments of textile remaining are often very small, measuring between 0.5x0.5 and 3x1.5 cm.

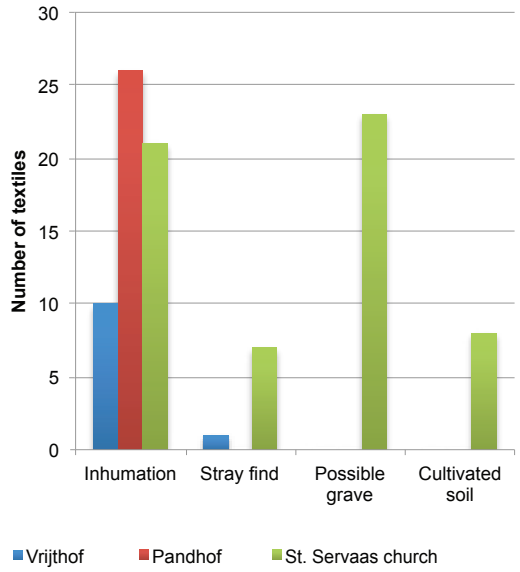


Fig. 4.3 Number of textiles related to the type of context in which they were found.

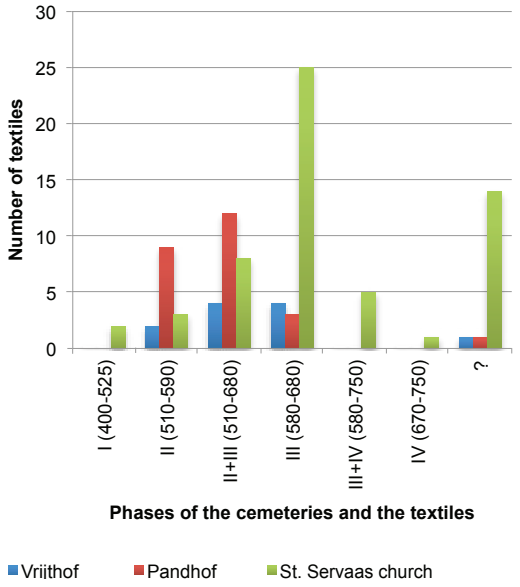


Fig. 4.4 The number of textiles per phase of each cemetery. The textiles have been analysed according to the Maastricht/Vrijthof burial phases (table 1, right column). Transition phase F (580/90-610/20) could generally not be isolated and is therefore incorporated in II-III or III.

170. The process and speed in which mineralisation occurs depends on the amount of moisture, acidity, soil type, temperature and geochemical environment of the burial (Chen e.a. 1998, 1016; Janaway 1987,133). This process has been simulated several times under laboratory conditions. According to (Gillard e.a.,1994) mineralisation happens in the first few months after burial. Janaway (1987) tested the process of decomposition of a buried body, in relation to the process of corrosion of metal objects and the mineralization of organic materials. For this purpose, he buried rats, either in a wooden coffin or directly in the soil. Metal objects and textiles were placed on top and underneath the bodies. The burials were opened after 34 days or 226 days. He concluded that after a month no visible changes had occurred regarding the decomposition of the bodies and the state of both metals and textiles. After 226 days however, considerable changes were visible: corrosion had taken place and the first textiles had begun to decay (Janaway 1987, 143). He also concluded that corrosion occurs later in burials where the coffin is filled with the liquid of a decomposing body. This causes different conditions within a burial: the metal objects lying on top of the body will start corroding earlier, while the metals underneath the body remain more or less the same until the body fluids have disappeared from the coffin (Janaway 1987, 133-134). Several studies have dealt with the process of decay and mineralisation of textiles under different conditions in a range of sediments, leading to rather varied results. These studies have been described by Peacock (1996a, 36-37) and will be briefly summarized here. Simulations in wet burial conditions (both sand and turf) made it clear that linen could be completely degraded after a period of 9 years whereas wool was at that point still intact. In a simulation of an inhumation linen was completely degraded in a period of only 32 weeks. When buried in a simulated archaeological refuse pit for a period of 45 weeks, wool would still be intact while linen – again – was completely decayed. In a similar study linen and wool were both completely degraded after burial in a refuse pit for 45 weeks. Peacock herself investigated the decay of textiles as well under wet conditions in sandy loam and peat (Peacock 1996b). She concluded that burial in sandy loam for a period of 1-32 weeks led to serious deterioration of the fabrics with linen being less resistant to biodegradation than wool or silk. All these experiments show that there is no fixed time in which textiles will have decayed in a burial or when the process of mineralization has occurred. Many factors such as moisture, temperature, acidity, presence or absence of a coffin and different soil processes play a role in this process and will have influenced the timeline in which this occurred.

Franken AG 2003		**Bergelijk 2012**		**Posterholt 2013**		**Maastricht**			
						Maastricht graves*		**Vrijthof burial phrases 2014***	
Phase	**Dates**	**Phase**	**Dates**	**Phase**	**Dates**	**Phase**	**Dates**	**Phase**	**Dates**
						A	200-400		
1-2	400-460/80					B	400-460/80	I	400-510/25
3	460/80-510/20					C	460/80-510/25		
4	510/20-565			PH I	510//20-580/90	D	510/25-565	II	
5	565-580/90	BE I	565-640/50			E	565-580/90		
6	580/90-610/20			PH II	580/90-640/50	F	580/90-610/20	IIIa	580/90-640/50
7	610/20-640/50					G	610/20-640/50	IIIb	610/20-670/80
8	640/50-670/80	BE II	640/50-670/80	PH III	640/50-670/80	H	640/50-670/80		
9	670/80-710	BE III	670/80-c. 750	PH IV	670/80- c. 750	I	670/80-725	IV	670/80-c. 750
10	710-<750					J	>725		

Table 4.2. The chronological burial phases of the cemeteries Bergeijk, Posterholt and Vrijthof Maastricht in comparison to the chronological scheme of the Franken AG (after Theuws, F. & M. Kars, in press.).
* Maastricht: The Maastricht cemeteries Vrijthof (cemetery 4) and Servatius cemetery (the graves excavated in the church (1981-1989) and the Pandhof (1953-1954) are analysed according to the same methodology and dating scheme (Maastricht graves).

The state of preservation of the textiles was generally not good. After excavation many objects have undergone restoration, which included the removal of all organic remains. The condition of the remaining textiles was often very bad, with deteriorated fabrics and badly damaged fibres. Consequently fibre analysis of the textiles from Vrijthof and Sint-Servaas church was not possible. Only in the Pandhof cemetery the textiles were sufficiently intact to make positive fiber identification. This was possible in approximately 50% of the textiles.

Due to the different circumstances of excavation, the fact that many textiles have been removed during conservation and the fact that objects have gone missing or have been removed from the graves prior to excavation, we must accept that the textile dataset is flawed and not suitable for statistical analyses.

The textiles from the Pandhof and Vrijthof cemeteries have practically all been found in inhumation graves. This is not the case in the Sint-Servaas church where only 21 textiles were found in inhumation graves and 38 textiles were found in disturbed contexts (fig. 4.3). This last category seems less suitable for reconstructing the use of textiles in a burial context since the primary position of the objects is not known. However, since the mineralization process occurred in the first months after burial one can assume that the objects, which the textiles adhere to, were originally also in contact with the textiles at the moment of burial. Therefore, where the objects could be assigned to a specific period the textiles on these objects have been included in the general analysis.
Most graves contained remains of one or two different textiles; only grave 164 from the Sint-Servaas church provided four different textiles. This means that the excavated textiles are only a very

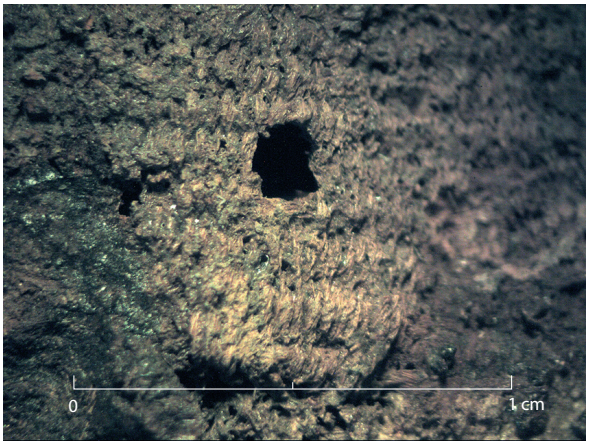


Fig. 4.5 Repp weave from grave 10128, Maastricht Pandhof (find number 40.1.TX1).

small representation of the textiles present when the deceased were buried, since they were probably fully dressed and the graves may well have been furnished with additional textiles.

Skeletal remains have been rather well preserved in all three cemeteries. The analysis of these human remains has resulted in information about the sex and (in some cases) age of the deceased.[171] This makes it possible to assign a number of textiles to graves of men or women and analyse the differences in use of textiles between the sex and age groups in these cemeteries.

The textiles have been assigned to the burial phases that have been used for the Vrijthof cemetery (table 4.2, right column).[172] Many objects have been dated to smaller periods in time, defined by the Maastricht burial phases shown in table 4.2 but the dataset of textiles is too small to discern any developments over time when the textiles are divided according to these fine subgroups. Figure 4.4 shows the distribution of the textiles according to the Vrijthof phases. The transition phase between the sixth and seventh century (580/90-610/20) could not be isolated easily in this dataset and is therefore incorporated in either phase II+III or III. Phase II+III generally ends at the end of the tradition phase, while phase III starts at the beginning of this transition phase. The textiles from the Sint-Servaas church cover the largest period with a peak in phase III and – unfortunately – many stray finds that could not be assigned to a specific period. Although the Pandhof cemetery was in use throughout the sixth and seventh century, mostly sixth century graves have yielded textiles. This narrows the possibilities to compare the use of textiles over time of the different cemeteries.

4.5 RESULTS

4.5.1 The types of textiles from the Sint-Servaas church, Pandhof and Vrijthof cemeteries.

In the cemetery of Maastricht fabrics woven in tabby, 2/2 plain twill, 2/2 broken diamond twill and rippenköper were observed. Some textiles were decayed to such an extent that identification of weave was not possible. Nevertheless it is clear that the textiles from these cemeteries show limited variation in fabric types. Grave 164 for example contained four different textiles of which three fabrics were woven in tabby (one of these in ribbed weave) and one consisted of remains of a gold brocaded band.

5.4.1.1 Tabby weaves

In a tabby weave, the weft threads regularly pass over and under each warp thread. In Maastricht, the majority of fabrics were woven in this manner. Most tabbies (41) were woven out of z-spun yarns in both warp and weft. Three were woven out of s-spun yarns in both systems whereas six were made out of z-spun yarns in one system and s-spun yarns in the other system. All these fabrics were evenly distributed over the three cemeteries under investigation.

Most tabbies were rather balanced with approximately the same number of threads in both thread systems. Three fabrics however show a large difference between warp and weft with more than thrice as

171. Osteological analyses have been conducted by R. Panhuysen and will be published in Theuws & Kars (ed.), in press and future publications.
172. Theuws, F. & M. Kars (ed.), in press.

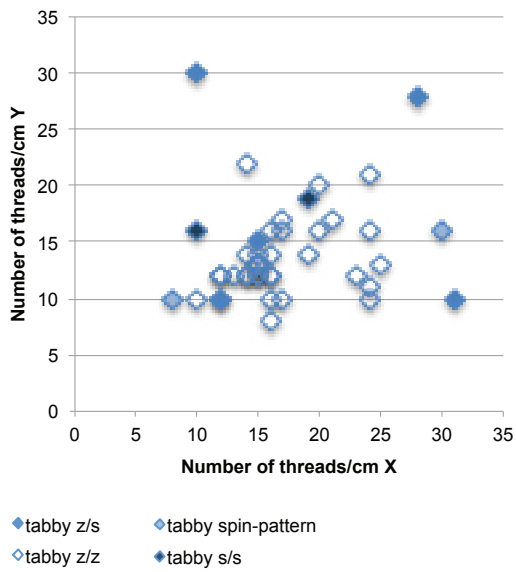


Fig. 4.6 The quality of the different types of tabby, measured in threads/cm.

many threads in one system than in the other (30x10 to 45x6).[173] This creates a very dense fabric called a repp weave (fig. 4.5). Normally a ratio of 2:1 or a difference of at least ten threads per cm is used to justify the use of the term repp.[174] When applying this to the textiles of Maastricht another four textiles from Sint-Servaas church and one from Vrijthof qualify as repp, among which the spin patterned tabby discussed below.[175]

Two of the tabbies were woven in a spin-pattern.[176] This pattern is created using both z- and s-twisted threads in one or both systems. The different direction of the twist of the yarns bestows a striped pattern to the fabric. In a fabric from Vrijthof the spin pattern is only present in one system alternating as follows: ... 2s - 6z - 2s… This is a rather open weave with 8x10 threads/cm. A fabric from Sint-Servaas church shows a spin-pattern in both systems. This fabric was partly wrapped around a crucifix pendant and was much finer (30x16 threads/cm) than the one from Vrijthof. The pattern in the system with the highest thread count (presumably the warp) is …2z-2s-4z… while the other system (weft) shows the pattern …2s-3z-3s...

Figure 4.6 shows the quality of the different types of tabby, measured in number of threads/cm. The common tabby z/z occurs in many qualities ranging between 10-25 threads/cm. Remarkably, the spin-patterned tabbies and tabby z/s are either among the coarsest or finest fabrics.

4.5.1.2 2/2 twills

In 2/2 plain twills, the weft thread passes over two and under two warp threads, creating a diagonal woven pattern. 2/2 broken diamond twills are 2/2 twills in which the weave is reversed in both systems, resulting in a diamond shaped pattern. The size of the diamond (or the pattern repeat) may vary, depending on the amount of warp and weft threads used during each reversal. In most cases where the fabric was evidently woven in 2/2 twill, it was not possible to ascertain whether it was a 2/2 plain twill or a variety of this weave, such as diamond twill. Only where the fragments were large enough to cover part of a reversal in the pattern, the difference between the types of twill could be discerned (3 times). Consequently, most of the smaller fragments (< 0.5 cm) are assigned to the group of 2/2 plain twill, making this group probably overrepresented. Twenty fragments of the textiles from Maastricht were woven in a variety of 2/2 twill. The majority of these textiles were woven out of z-spun threads in one system and s-spun weft in the other system. Five were made out of z-spun threads in both systems. In some cases it was not possible to ascertain the type of twill, either because the weave was very decayed or because the fabric was distorted. These fabrics are indicated as '2/? twill'.

173. Pandhof: find number 40.1.TX1; Sint-Servaas church: find numbers 17-02-07.1 (stray find) and 21-02-03.1 .
174. Bender Jørgensen 1992, 13.
175. Sint-Servaas church find numbers 03-06-01.1, 16-DD-01, 16-DD-03 & 23-03-01.1. Vrijthof find number 1419.1
176. Find numbers Vrijthof 1614 & Sint-Servaas church 16-DD-03.

Fig. 4.7 Rippenköper found on back plate (find number 01-04-03) from Sint-Servaas church.

4.5.1.3 Rippenköper

Rippenköper is a kind of 2/1 twill where the pattern is reversed to 1/2 twill after three weft threads.[177] One fabric from Sint-Servaas church could be identified as a rippenköper pattern (fig. 4.7).[178] This fabric was of fine quality (17x12 threads/cm, woven in z-twisted yarn) and present on a back plate of a belt, which has been documented as a stray find. Rippenköper is not common in this area; it is considered a typical fabric type for burials in the fifth to eighth century in southern Germany and Switzerland.[179] Therefore the presence of rippenköper in other areas might be interpreted as a sign of trade, but since the distribution of this fabric type has not been analysed systematically yet, conclusions such as these are rather premature. In burials in southern Germany and Switzerland rippenköper was used for clothes of men, women and children alike. In women's burials the fabric is often associated with long garments, whereas in men's graves the fabric was used in wide cloaks.[180]

177. Bender Jørgensen 1992, 13-14.
178. Sint-Servaas church find number 01-04-03.
179. Banck-Burgess 2003, 126.

4.5.2 Gold thread

Gold thread was used to embellish certain areas of the clothes. There are several ways gold thread was produced during the early Middle Ages. It could either be drawn by pulling small rods of gold through diminishing holes in a so-called drawing plate, or it could be cut from a thin sheet of hammered gold foil into flat thin strips (so-called lahn). Lahn could be further processed by wrapping (or spinning) it around a core of silk, wool or linen.[181] Gold thread was applied in various ways. It could have been embroidered onto a ground fabric (gold appliqué) or woven into the fabric. Often observed are tablet woven bands where gold thread was brocaded into the surface of the band (gold-brocading).[182] The latter technique generally resulted in narrow bands up to a cm wide but gold thread could also have been brocaded into wider bands of several centimetres.

The place where gold thread was applied on clothes would normally be the area around the head, the torso (including the area of the belt), wrists and feet. These areas attracted by itself most attention and would have been the ideal place to add prestigious accessories and decorative embroideries with gold thread.[183] Many examples of gold-brocading and gold appliqué are known from sixth to eighth century graves of men, women and children, with decorative motifs such as bands, crosses and even insects on the outer garment and around the head.[184]

180. Banck-Burgess 2003.
181. Reifahrt 2013, 60-61, 75.
182. For an overview of the way gold thread has been used in embroideries see Coatsworth 2005, 4-5, Owen Crocker 2004, 311-315. The use of gold thread in woven bands (gold-brocading) is discussed by Crowfoot & Hawkes 1967, 43, Walton Rogers 2007, 96-97.
183. Wells 2008, 68.
184. Coatsworth 2005, 4-5; Magoula 2008, appendix I.

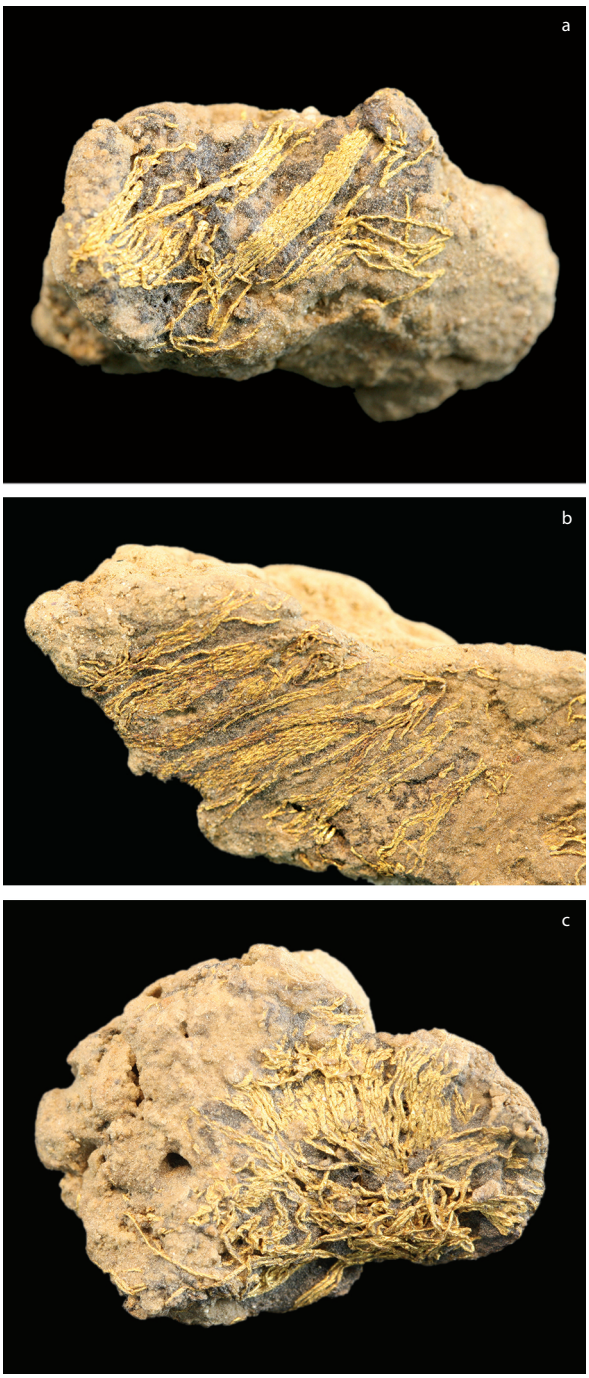


Fig. 4.8a-c. Gold thread found on blocks of sediment in woman's grave 164 in Sint-Servaas church (find number 21-02-01.TX1). These are probably the remains of gold braids (a-b) or an embroidered decoration (c). Photo's by Sjoerd Aarts.

Most of the gold-brocaded bands are associated with headwear in graves of women in the sixth and early seventh century and with decorated men's clothing in the seventh century.[185] A well-known example of the use of goldthread on clothing is the grave of queen Arnegunde (grave 49 in St. Denis cathedral).[186] A reconstruction of the garments of this person indicates that she was buried in a long half-silk garment or cloak with gold embroideries on the cuffs of the sleeves. A tablet woven band with gold thread worked onto the surface was found on the veil on and around her head. Archaeological finds give ample evidence for the use of gold-brocaded bands in headbands/veils in women's graves.[187] In men's graves headbands with gold decoration are not present,[188] but tablet woven bands with gold thread are often found as decorative strips on tunics, mantles, wrist, hoods, scabbards or belts in these graves.[189] Archaeological evidence from the late eighth century onwards is lacking due to the fact that burials from that period include fewer and fewer textiles.

185. Walton Rogers 2007, 96.
186. Desrosiers & Rast-Eicher 2012, 6. Rast-Eicher 2010; Périn et.al. 2012, 100.
187. Often observed in early medieval burials are remains of gold-brocaded headbands (also called fillet or vitta). These bands were worn over the hair and were originally used by unmarried young women. Judging by the quite large amount of vittae found in cemeteries we may assume that women often continued to wear the vitta after marriage. The vittae could have been decorated with gold-brocading on the area of the forehead (most examples of gold-brocaded bands are too short to have encircled the enitre head) but there are also examples where the entire vitta was brocaded with gold and the ends would have hung down at the back or bossom of the wearer. Headdresses or veils have also been observed in Merovingian burials and these could have been decorated with gold-brocaded bands as well. (Crowfoot & Chadwick Hawkes 1967, 61-64).
188. There is one possible exception to this rule. In the grave of king Childeric II, his wife and child Dagobert in the church of St. Germain-des Pres, a gold foil braid was found on a piece of gold-woven cloth which was draped over the the face of one of the buried persons in the grave. It is not clear whether this person was actually king Childeric himself or the queen (Magoula 2008, 91).
189. Crowfoot & Chadwick Hawkes 1967, 48, 59-60, Magoula 2008, 91.

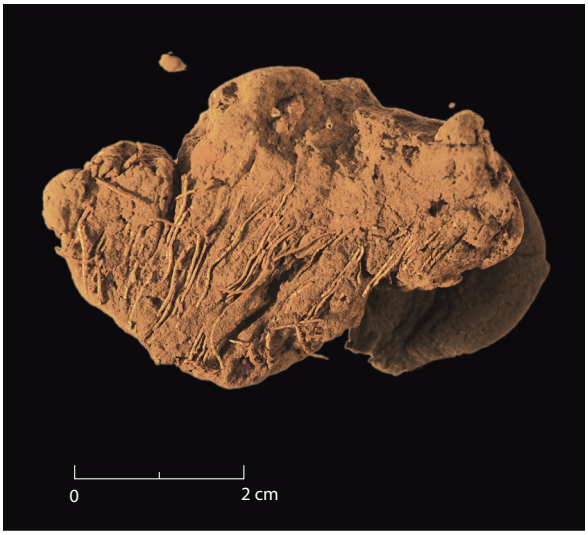


Fig. 4.9 Gold thread found on a block of sediment in woman's grave 10525 in Maastricht-Pandhof (find number 333). Photo's by Sjoerd Aarts.

Fig. 4.10 Remains of sewing on fabric from Sint-Servaas church. The 'wrong' or backside of the fabric is visible, showing the length of the 5 mm long running stitch.

One characteristic of gold-decoration has not been mentioned yet and that concerns the value of this material and the associated status it conveys. There is ample written evidence for the fact that gold-brocaded bands were very expensive and therefore must have been a sign of extreme wealth. In the Roman period the use of gold-decoration on garments was even restricted by law to the imperial family and the aristocracy. We may therefore assume that in the Merovingian period this material was a sign of high status.[190]

In Sint-Servaas church one grave (grave 164, female, 510/25-610/20) contained gold thread.[191] In this grave three blocks of sediment were recovered in which the gold thread was still more or less in its original configuration although the ground cloth to which it was originally attached had decayed over time (fig. 4.8a-c). In this case the gold thread was made out of 0.2mm wide strips (lahn) of gold leaf wrapped around a core, which was not present any more. On one of the blocks the gold thread forms a round pattern and may have been sewn onto the cloth. The other blocks show the same type of gold thread (lahn wrapped around a core) in 1-4 cm wide bands with 5mm high strips of gold. These are probably the remains of brocaded woven bands, but the gold thread may also have been sewn onto a ground cloth.

In the Pandhof cemetery two graves have yielded some gold thread. In grave 10252 (female, 460/480 – 580/590) only a small fragment was still attached to a block of sediment.[192] Many stray fragments have been recovered as well. The gold thread was made out of 1 mm wide strips of gold leaf wrapped around a core, which – again – was not present any more. It was worked into a 1.3 cm wide band. The stray fragments were max. 2.5 cm long (fig. 4.9). Grave 11321 (probably female, 510/20-580/90) has yielded another fragment of gold thread.[193] In this case the thread consisted of a narrow strip of flat gold-foil which was found near the skull of the woman buried in the grave. It is assumed that the gold thread was part of a golden fillet used with or without a veil.[194]

The type of gold thread found in two graves in Maastricht, a thin strip of foil wrapped around a core, is not common. Parallels of this type are only known from Cologne, Paris, Italy, and very sporadically in Northern France in the sixth century and in Bavaria in the later seventh century.[195] In

190. Crowfoot & Chadwick Hawkes 1967, 65.
191. Find number 21-02-01.TX1.

192. Find number 333.
193. Find number 418-6.
194. Magoula 2008, appendix 1, 12.
195. Crowfoot & Chadwick Hawkes 1967, 56, Magoula 2008, 89.

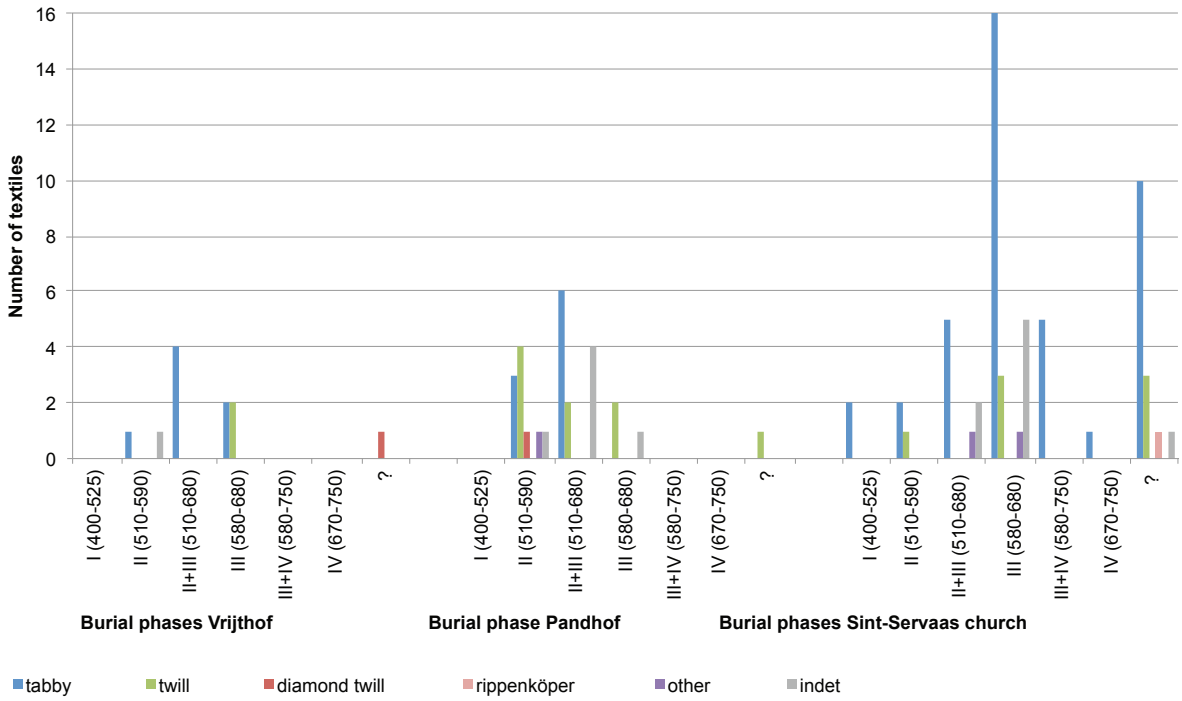


Fig. 4.11 Distribution of the textile types per period in Vrijthof, Pandhof and Sint-Servaas church.

Anglo-Saxon England and most Merovingian cemeteries only flat strips of gold foil have been found.[196] The bands with spun-gold however have a much earlier origin in Byzantium and the sparse examples of these found in France, Germany and the Netherlands may have been imported from this area or have been prestigious gifts from the emperors in Constantinople to the Merovingian court.[197] Magoula takes a somewhat different approach. She poses the possibility that the tradition of spinning gold survived from the Gallo-Roman craftsmen and was continued in or near the Frankish royal centres.[198]

4.5.3 Remains of sewing

Remains of stitching are rare in cemetery finds because of the very small size of the fragments. However, the Sint-Servaas finds have yielded one fragment with some sewing remains (fig. 4.10).[199] The stitching consisted of a running stitch of 5 mm length. This stitch was only visible on the backside of the fabric; on the front side it covered only two threads of the fabric. The sewing thread was a double z-twisted thread, 0.2mm thick.

4.5.4 Distribution of the textiles among the cemeteries

There are striking differences between the three cemeteries regarding the types of textiles that have been used (fig. 4.11). To start with, there is very little variation in types of textiles in the graves of Sint-Servaas church. The most dominant textile in this cemetery is tabby (41 of the total of 59 textiles, 70%) with a small amount of twills (seven examples, 12%), one fragment of rippenköper, two examples of gold thread and eight indeterminate fabrics. Pandhof shows a more varied distribution with nine

196. Crowfoot & Chadwick Hawkes 1967, 56, Walton Rogers 2007, 96-97.
197. Crowfoot & Chadwick Hawkes 1967, 55.
198. Magoula 2008, 89.
199. Find number 23-04-00.TX6.

tabbies, ten twills (among which one diamond twill), one example of gold thread and six indeterminate fragments. Vrijthof lastly yielded only eleven fabrics: eight tabbies, two twills (of which one diamond twill) and one indeterminate fragment. Interestingly in this respect is the occurrence of rippenköper and one example of gold thread in the Sint-Servaas church. The Pandhof and Vrijthof sites yielded no special fabrics, but two examples of gold thread.

The difference between Pandhof (textiles types more evenly distributed) and Vrijthof/Sint-Servaas church (dominance of tabbies) needs some explanation. The textiles are found on the same types of dress accessories and grave objects so in terms of functionality the finds from Sint-Servaas church and Pandhof/Vrijthof seem to be more or less similar. There is also no explanation to be found in the chronology of the textiles. It has been mentioned before that the chronology of the cemeteries is not the same: Pandhof cemetery has mainly yielded textiles from the earliest periods (up until the transition from sixth to seventh century); Sint-Servaas church on the other hand has yielded far more textiles from the later phases (transition phase and later). This could lead to the conclusion that there was more variation in types of textiles used in the burial in the sixth century than in the seventh century. However, the earlier textiles from Sint-Servaas church show a very distinct domination of tabbies as well. Other angles of approach are needed to explain the differences between the two cemeteries and these may be found in either differences between the buried populations within and outside the church or different ideas on how one should be dressed upon burial within a church.

Very few textiles can be assigned to the eighth century. In Sint-Servaas church two graves with a total of five textiles are from the period 610-725 and one grave with one textile is from the period 754-784. All of these textiles are tabbies of varying qualities. Where the earlier periods show some variation in fabrics, this is completely lacking in the transition period between the Merovingian and the Carolingian period of Sint-Servaas church. The very small dataset from this period however does not allow conclusions on this subject.

As to the use of raw fibres in the textiles little can be said regarding the whole complex of cemeteries since fibre identification was only possible in 14 of the 26 textiles from Pandhof and not for Vrijthof and Sint-Servaas church. Most of the fabrics (twills and tabbies) from Pandhof have been made out of wool. Two tabbies are woven with threads from plant fibres (flax or hemp).

4.5.5 The use of the textiles in the burial

The textiles that have been preserved in the corrosion of the metal objects in the graves are generally considered to be the remains of the clothes in which the dead were buried and of other grave textiles such as shrouds, mattress covers etc. The textiles that have survived over the years are without doubt a very small representation of the original amount present in the graves. The simple fact that textiles are only preserved in contact with metal objects means that textiles have decayed in all places where there were no metal objects, leaving a meagre sample of what was once a very rich set of textiles. Consequently, it would be optimistic to assume that it is possible to fully reconstruct the use of textiles in the graves and the shape and fit of the actual garments on the basis of the small surviving fragments. Nonetheless, the dataset allows some conclusions regarding the use of the fabrics because the position of the textiles on the metal objects and the position of the objects on the body are often known. Using this information we can attempt to reconstruct which types of fabrics were used on specific areas of the body and which types of textiles were worn over or under each other.

4.5.5.1 Textiles associated with the belt

There are several groups of objects associated with textiles. Belt parts such as buckles, buckle plates and belt plates are by far the largest group.[200] When preserved on the back of a belt part one can assume that the fabric originally was worn under the belt. Textiles are often present on the front side of the belts as well. These fabrics can be interpreted as the remains of a garment worn over the belt such as a

200. For an overview of all the belt parts found in the cemeteries of Vrijthof & Pandhof see Kars 2011, 225-260.

cloak or an outer tunic, but this may not always be the case. It is also possible that the garment was worn under but partly folded over the belt. Lastly: fabrics found on the front side of buckles and other belt parts do not necessarily represent garments. These can also be the remains of shrouds (when present on the front of the body) or mattress covers or coffin lining (when present on the back of the body).

Among the textiles from Sint-Servaas church there is practically no difference between the types of fabrics present under and over the belt. In both cases tabbies were predominantly used in qualities ranging from 14x15 up to 24x22 threads/cm. Twills were occasionally worn under and over the belt as well. One example shows a textile on the front side of a back plate. Since the back plate is situated at the back of the body we can assume that the body was lying on top of this fabric: being either a mattress cover or an outer garment or cloak. However, we are dealing with a fabric woven in rippenköper (see fig. 4.7), which is a fabric type that in its region of origin (southern Germany and Switzerland) has been recognized in wide cloaks. Therefore it is more likely that the fabric belonged to a similar garment than to a mattress cover.[201] Attached to the fabric was straw, which suggests that the body was lying directly in straw on the bottom of the coffin.

In the Pandhof cemetery there is more variation with an almost equal amount of tabbies and twills worn under and over the belt. In one sixth century grave from this cemetery there is evidence for two garments worn over the belt: this belt was covered firstly by a fine 2/2 twill (20x10 threads/cm) which was in its turn covered by a garment woven in an even finer diamond twill (28x15 threads/cm).[202] Another grave shows a medium tabby worn under the belt (10x10 threads/cm) and a rather thin, open tabby worn over the belt. The open and fine character of this fabric differs greatly from the other textiles that have hitherto been identified as outer garments.[203] This type of fabric would also have been very suitable for veils.[204] Practically all the other fabrics worn under and over the belt in Pandhof cemetery can be described as dense, with no or very few open spaces between the threads. Sometimes the garment under the belt had been woven a bit more open, showing small open spaces between the threads.

It is not possible to make statements on this subject for the textiles from Sint-Servaas church because of the limitations in the documentation of these fabrics.

In the Vrijthof cemetery only three textiles have been found that can be associated with belt parts. Two buckles showed that a garment woven in twill was worn under the belt. In grave 105 the garment was thin, woven with approximately 18-20 threads/cm and made out of very thin threads.[205] Over this garment another fine fabric was worn. On the front side of the buckle there was also a fragment of a fine, dense but also very thin tabby (20 threads/cm) present. This garment, which was worn over the belt, was clearly of high quality as well.

Knives and other utensils hanging from the belt show remains of textiles as well. This has only been documented on finds from Sint-Servaas church and Pandhof. On the objects from Vrijthof unfortunately no textiles have been preserved. It is often difficult to determine the function of these fabrics. When more than one layer is present, these could be different garments (or a garment and a shroud), but the object could also be lying in the folds of one single garment. Lastly, this type of object may also have been encased in a pouch (hanging from the belt). An example will clarify the difficulties in interpretation. Two types of textile were present on a knife from

201. Findnumber 01-04-03.TX1, an undated stray find. Banck-Burgess summarises the use and distribution of rippenköper in Alamannic burials in Switzerland and southern Germany. She shows that in men's graves the fabric is often present on the outside of belt parts and (based on the many folds in the surviving textiles) concludes that these garments were wide mantles (Banck-Burgess 2003).
202. Findnumber 556.1, grave 10332, sex unknown, 565-580/90 AD. It is also possible that the first textile was worn under the belt and partly folded over it.
203. Findnumber 60.1, grave 10042, sex unknown, 565-640/50 AD. The outer fabric was rather open, made out of 0.2mm thin threads, 16x12 threads/cm. The sex of the person in this grave could not be identified.
204. Magoula 2008, 99-100.
205. Findnumber 1473, grave 105, sex unknown, 610/20-670/80 AD.

Sint-Servaas church[206]: the leather scabbard was covered by a rather coarse (probably woollen) 2/2 twill, which was covered by a somewhat finer tabby. Several interpretations regarding the function of these textiles are possible. The twill may have been a fold of a garment (worn under the belt) partly covering the knife and the tabby an outer garment. The twill can also be a cloak or other type of garment worn over the belt and the tabby covering this could then perhaps be a shroud.

Most knives from Sint-Servaas church are only covered with textile on one side, not surprisingly tabbies. On every object the fabric has thread counts ranging between 20-30 threads/cm. This is also the case with other utensils hanging from the belt such as (parts of) keys, a fire steel and a purse bar, which were all covered on both sides with fine tabbies. Contrastingly, the three Pandhof knives are all covered with woollen twills (one rather coarse and two fine textiles).

An interesting object from Sint-Servaas church is a foldable knife, which was covered on both sides with a medium fine tabby. This object may have been worn in a pouch hanging from the belt, in which case the remains of the pouch have been documented.[207] However it is also possible that the foldable knife was hanging from the belt and the remaining fabric is a fold of a garment worn under or over the belt or was wrapped in a separate piece of textile.

A small elongated object measuring 6,2 cm long and Ø 1,5 cm proved to be a needle case (fig. 4.12).[208] The object (of unknown material) has been cut in halves during restoration in order to determine the function of this somewhat amorphous find. In the cross section the 1mm thick shell of the needle case is clearly visible, although it is not clear what material this shell was made of. Within the needle case one can discern the cross sections of 34 needles varying in thickness between 0.8 and 1.2mm. The object was completely wrapped in a regularly woven tabby, woven in 16x12 threads/cm. The threads were regularly spun creating a dense fabric. Covering the first textile was another, more open tabby woven out of fewer and thinner threads/cm. This fabric was wrapped around the entire object as well. Since the needle case was likely hanging from the belt in a pouch, we may assume that the first fabric was part of this pouch and the second (outer) fabric belongs to the folds of a garment worn under or over the belt. It is however also possible that the needle case was hanging directly from the belt on its own suspension loop, in which case both fabrics were probably

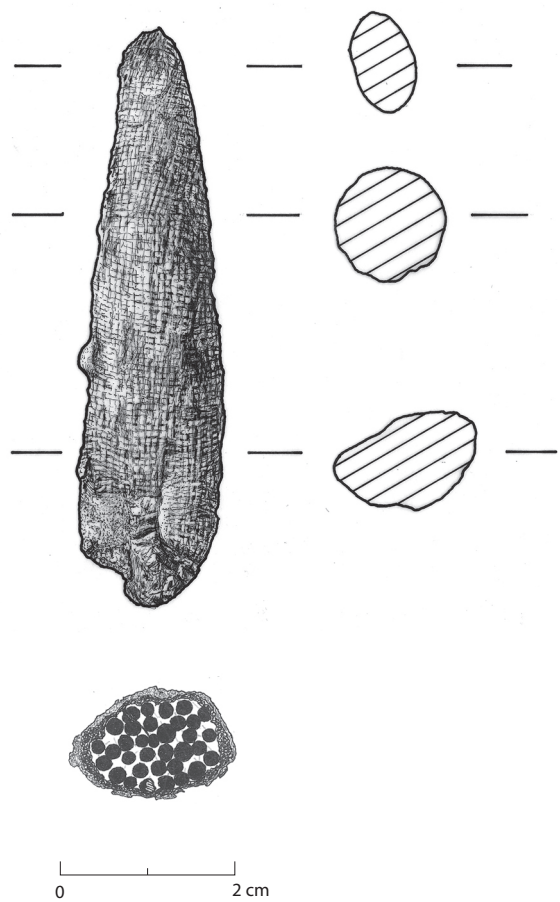


Fig. 4.12. Needle case (find number 30-01-05.3, an undated stray find). Drawing by P.Rossel.

206. Findnumber 28-02-10.3, from a disturbed context (possibly a grave) of uncertain date.
207. Findnumber 30-03-06.2, sex unknown, dated in the period 580/90-725 AD.
208. Findnumber 30-01-05.3, an undated stray find.

garments. It could also firstly have been wrapped in a piece of cloth and afterwards put into a pouch, in which case the second fabric is not a garment but part of the pouch.

4.5.5.2 Textiles associated with the lower body

Strap ends and the textiles attached to these objects give information about the garments that were worn between the belt and the knee, since the strap end was hanging down from the belt. There are five examples of strap ends from Sint-Servaas church and one from Pandhof cemetery. Most information about the stratigraphy of organic materials can be derived from find number 23-04-00, dating to the period 610/20-640/50 (phase III). Unfortunately this object is found in a disturbed context; therefore no information is available about the age or sex of the deceased. During the reopening of the graves objects were often displaced. This makes it difficult, if not impossible, to reconstruct the primary position of the textiles in the graves. However, since the process of mineralization occurred in the first months after deposition in the grave, we can be fairly sure that the textiles adhered to the metal objects were there in their original position as well.[209] Unintentional disturbing during the process of digging another grave within a Christian church or adjacent cemetery occurred most likely long after the burial had taken place. It is therefore assumed that the graves were usually reopened after the soft tissues of the body had decayed and the mineralization process had run its course. Consequently the textiles adhered to metal objects were there in their primary position, unless they have been displaced during this short period by animals or due to the decaying process of the soft tissues of the body. Even though the objects may not be in their original place any more, in theory it is possible to reconstruct which type of fabric/garment is associated with specific dress accessories. Strap end 23-04-00 shows a stratigraphy of several organic layers. At the back of the object there are remains of human skin, covered by a fine open tabby (20x16 threads/cm, z/z). The sewing remains described above were documented on this fabric. On the front side of the strap end another fabric is present: a (probably woollen) 2/2 twill, covered by a layer of leather. Unfortunately this twill and the leather have been removed during restoration leaving no possibilities to fully describe the fabric. The textiles show that the strap end was lying in-between two different garments: a garment made out of tabby which was worn directly on the body and held in place by a belt. This garment was covered by another garment made out of twill. Both garments reached the thigh but may have been longer. The sewing remains on the undergarment can be part of a hem - in which case the garment reached halfway the thigh – but may also be part of a seam in a longer garment. The sewing is of high quality and has been executed with care, resulting in a seam or hem that was not visible on the outside of the garment, which is for a garment that is covered by an outer gown, not self-evident.
Four other strap ends were found, wrapped in the folds of garments made out of z/z tabby. The fabrics were made of varying quality ranging between 12x10 – 14x22 threads/cm. In all these cases the function of the textiles (under or outer garment) is not clear.

In Sint-Servaas church a set of garter buckles has been found on which several types of fabric were present.[210] These buckles were – like the strap end discussed above - unfortunately not found in a grave but in a disturbed context, but will nevertheless provide information on the garments present on the body below the knee at the moment of burial. On the back of both buckles was a rather coarse (probably woollen) plain twill made out of 10x10 threads/cm. This garment has been interpreted as a hose or leg winding. On the front of both buckles there were two layers present of the same medium fine tabby woven with 16x10 threads/cm. On top of this tabby another fabric woven in 2/2 twill was present. Unfortunately this fabric had been removed during restoration so no technical details on this fabric are available. The textiles show that the legs were clad in roughly woven hose or leg windings, which were tightened by a strap or garter with small buckles. Over the lower legs a long undergarment woven in tabby was worn which was covered by another garment of approximately equal length woven in twill.

209. See discussion in note 170.

210. Findnumber 29-03-07, dated to the period 460/80-725 AD.

4.5.5.3 Textiles associated with the upper body: brooches

The occurrence and configuration of brooches have often been used to reconstruct female dress in Merovingian graves, resulting in a fine chronology of female attire in the fifth and sixth century.[211] When remains of textiles are lacking or scarce the brooches are inevitably still an important source of information about dress in this period. For the Pandhof and Vrijthof cemeteries Kars has discussed the occurrence and configuration of brooches in the graves and this will be briefly summarized here.[212] In three of the graves in Pandhof cemetery (al dating to the sixth century) a pair of disc brooches was found on the chest as well as a pair of bow brooches in the area of the pelvis. This configuration of two pairs of brooches has been described as the "four-brooch fashion" or *Vierfibeltracht*: the occurrence of four brooches in a more or less vertical line on the body.[213] The upper two were generally a pair of small round brooches, whereas the lower two were a set of larger bow brooches. This lower set was probably used to fasten a cloak and the upper two may have had the same function or were used to close the head aperture of the gown beneath the cloak.[214] From the middle of the sixth century onwards the two brooches at the chest are slowly replaced by one larger brooch and at the end of the sixth century the two lower bow brooches have disappeared as well. The above-described four-brooch fashion is generally dated to the period 460/80-580/90,[215] whereas the single brooch fashion occurs later, in the sixth century and the seventh century.

Vrijthof cemetery has yielded several round brooches as well, but these generally are not part of a pair of brooches and are not found in combination with pairs of bow brooches. The graves in which the Vrijthof brooches were recovered are dated to the sixth century and are therefore contemporary to the finds from Pandhof. It seems that in the Vrijthof graves the transition to the newer fashion is visible in the archaeological record earlier than in Pandhof. Here however we must bear in mind that the Vrijthof excavation was not as thorough as the excavation of the Sint-Servaas church and Pandhof cemetery. In the Vrijthof cemetery, objects may have been overlooked during excavation and have gone missing in the decades afterwards. Therefore the relative absence of brooches in this cemetery may not reflect the original deposition pattern at all.

Textiles were attached to several of the brooches found in Pandhof and Vrijthof. Pandhof cemetery has yielded three brooches with textiles, all dating to the sixth century.[216] In all these cases the textiles were present on the back of the object and were fastened by the pin of the brooch. When we look at the position of these brooches in the graves, it is clear that they were positioned on different areas of the body. The brooch from grave 11220 is one of a pair of bow-brooches, found in the area of the hip. Theoretically this brooch would have been used to close the front of an outer garment or cloak. The brooch from grave 11321 is one of a pair of small round brooches worn on the chest. We would expect this brooch to either fasten a cloak or the head aperture of the gown or tunic worn underneath the cloak. Brooch 466 is a single brooch in grave 11342 whose location in the grave is not clear. When we compare the textiles

211. Strauβ 1992; Siegmund 1998; Müssemeier e.a. 2003, 31-32.
212. Kars 2011, 260-279.
213. Strauβ 1992, 79 and Siegmund 1998, 55-56 have summarized the chronology of the configuration of brooches in Frankish burials. Siegmund states that the pared brooches at the shoulders, associated with the peplos gown, are characteristic for the period 400-440. In the middle of the fifth century the Vierfibeltracht occurs for the first time but is still scarce. From the end of the fifth century to the middle of the sixth century the Vierfibeltracht is dominant with two small brooches at the chest and two large bow brooches at the waist. From 555-585 the two brooches at the chest are slowly reduced to one brooch. In this same period the two bow brooches that were previously positioned at the waist are now present lower on the body: on the upper leg. Also present in this is a dress type with only two small brooches at the chest. From the end of the sixth century the pair of bow brooches at the hip disappear and now we only see one large filigree disc brooch at the chest.
214. Ibidem; For examples of reconstructions of the Merovingian dress that would have accompanied the Vierfibeltracht: Walton Rogers 2007, 190 fig. 5.44c.
215. Franken AG phase 3-5 (see table 1).
216. Find number 466.7 from grave 11342 (woman, 510/25-610/20 AD); find number 375 from grave 11220 (woman, 510/20-580/90 AD) and find number 418 from grave 11321 (indet. sex, 510/20-580/90 AD).

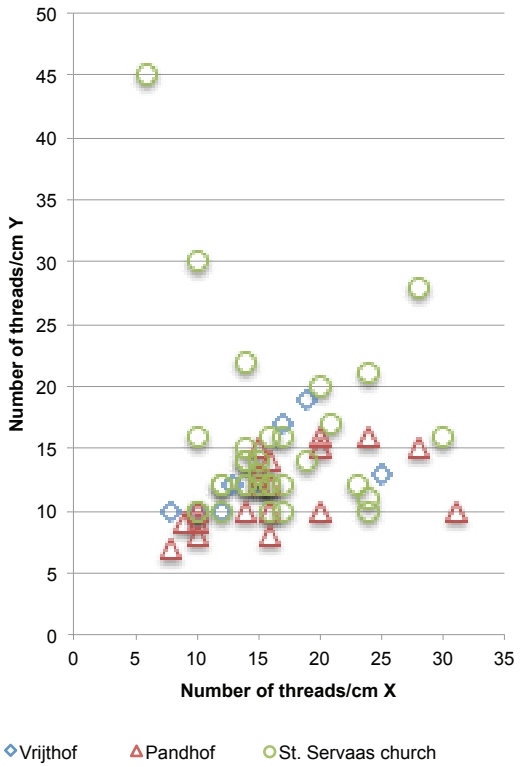


Fig. 4.13. Quality of the textiles from Sint-Servaas church, Pandhof and Vrijthof expressed in number of threads/cm. The majority of the textiles is grouped between 10-20 threads/cm. Only few textiles are coarser than 10 threads/cm. Textiles finer than 20 threads/cm are predominantly found in Sint-Servaas church.

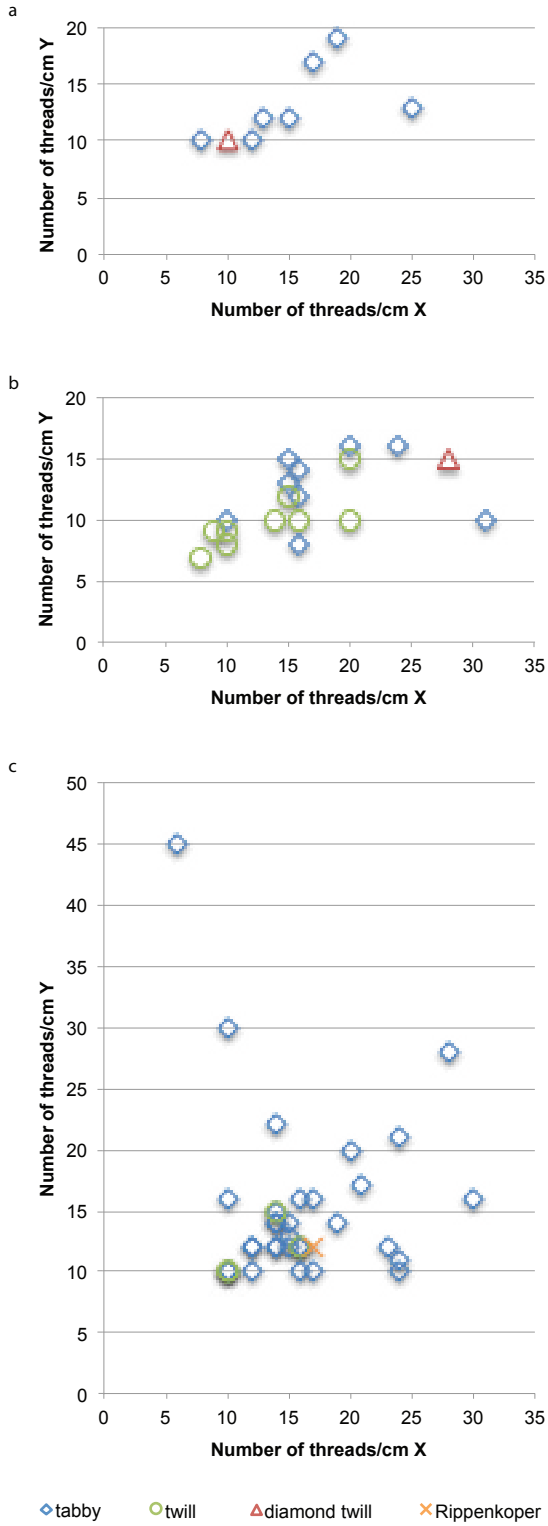


Fig 4.14.
a. Quality of the textile types from Vrijthof. Vrijthof cemetery predominantly yielded tabbies and it is therefore difficult to compare the quality of these fabrics with other types of textile. All textiles are finer than 10 threads/cm.

b. Quality of the textile types from Pandhof. Pandhof cemetery yielded equal amounts of tabbies and twills and these fabrics are present in all quality groups, although tabbies are on average finer than twills.

c. Quality of the textile types from Sint-Servaas church. This cemetery yielded predominantly tabbies and these are represented by coarser and very fine fabrics. The few twills excavated in this cemetery are present in the group of 10-20 threads/cm.

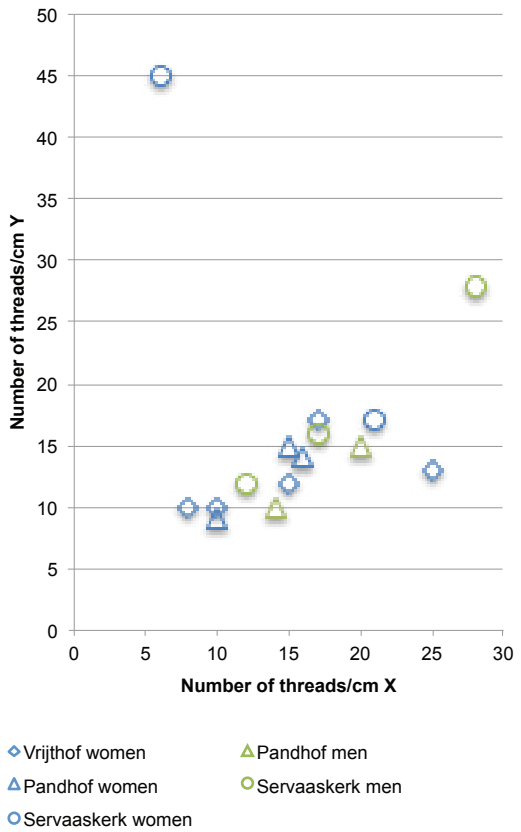


Fig. 4.15 Quality of the textiles in graves of women (blue) and men (green) in the three cemeteries of Maastricht. The small number of textiles (15) that could be assigned to men or women does not allow any conclusions regarding textile quality between men and women in Maastricht.

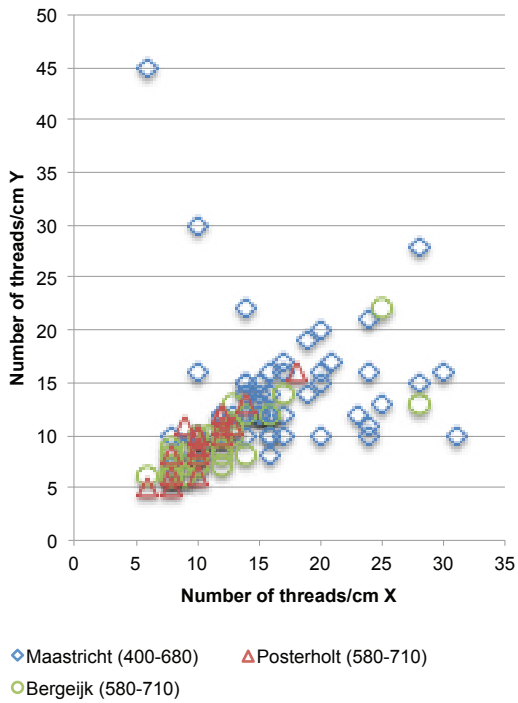


Fig. 4.16 Quality of the textiles from Maastricht (Sint-Servaas church, Pandhof and Vrijthof) and the rural cemeteries Bergeijk and Posterholt. The textiles from Maastricht are generally finer than those from Bergeijk and Posterholt.

adhered to these brooches one would expect to see differences but this is not the case. Two of the fabrics were tabbies; the last was badly preserved making identification of the weave impossible. Interestingly these fabrics were of similar quality: rather open, woven with 16x14 threads/cm and thin threads (0.2 mm). This combination of thin threads and thread count, resulting in an open and thin fabric, occurs only four times, three out of these in association with brooches.[217] Since the textiles found on belt parts are assumed to be remains of cloaks, gowns and tunics (and these were invariably made out of coarser fabrics), it doesn't seem likely that the fabrics found on the brooches belonged to those garments. This raises the question whether the fabrics on the brooches can be considered as veils of varying length that were attached to the outer garment by a brooch. The open character and thin threads of these fabrics fit this function, although they are not as fine and delicate as the so-called *Schleiergewebe* from the seventh-nineth centuries found in the *terpen* area in the north of the country. These are woven with equally thin threads but even fewer threads/cm.[218]

217. An exception is the fabric found on the front of a belt part in find number 60.1 from Pandhof grave 10042.

218. Schleiergewebe is found in the terp-settlement of Leens, dating in the period 600-900 AD (Brandenburgh 2010a, 63).

Another fine tabby was found on the back of a brooch from Vrijthof.[219] This brooch, which is of Scandinavian origin, can be dated between 510/25 and 640/50 and was found in a women's grave on the left shoulder. The fabric on the brooch is woven out of thin threads but much more threads per cm than the Pandhof examples, resulting in a fine but dense fabric. The position on the left shoulder is not normal in this period, but the brooch could have fastened a fine and densely cloak at the shoulder or fastened a veil (made out of a similar fabric) onto an outer garment.

4.5.5.4 Textiles associated with headwear

In one woman's grave from the sixth century a fragment of gold thread was found near the skull. It is assumed that the gold thread was part of a golden fillet or a decorative band on a veil.[220] As mentioned above, evidence for gold thread used in headbands and veils is abundant in the archaeological record from the sixth century and later.

4.5.5.5 Textiles associated with weapons

Weapons were either positioned on the body or placed separately in the grave. In the cemeteries of Maastricht several weapons with remains of textile have been recovered, all dating to the decennia around 600. Unfortunately most of these objects have been cleaned completely during restoration without basic documentation of the textiles. This makes it very difficult to gain insight in the degree in which weapons were covered with or wrapped in fabrics and which role they played in the display of the burial ritual. In two cases weave identification was possible (tabby) and in only one object thread count was documented. A tabby wrapped around a lance head from Sint-Servaas church[221] was woven in 24x10 threads/cm. The fabric was present on both sides of the object, which suggests that the object was not merely covered (for instance by a garment or a shroud) but wrapped separately before or during deposition in the grave.

Worth mentioning is an axe from around 600 AD, found in Sint-Servaas church.[222] This object was lying on the lower leg of the deceased. Between the bone and the axe two layers of a coarse fabric were found. The function of this fabric may have been trousers, hose or leg winding, but other functions are possible as well. A sax excavated in a woman's grave in Vrijthof cemetery was covered by or lying on top of a coarse and open fabric, woven with 10x10 threads/cm.[223]

4.5.6 Textile quality

The quality of textiles is often measured in numbers of threads per cm. Many authors - including myself – have pointed out that the time and effort spent and the degree of specialisation needed for the production of specific craft products, including textiles, can give an idea of the value adhered to these fabrics.[224] Thread count is an easy way to measure these factors for textiles and will be discussed below. Textile quality can be determined by many other factors such as color and decoration, preferably with contrasting colored or shiny yarns (such as gold thread).[225] Furthermore the appearance of the textiles – its texture or surface - may also have been of significance because it can be just as important in signaling social status as the form or shape of a garment.[226]

4.5.6.1 Quality of textiles based on thread count

When we compare the fabrics of the three cemeteries of Maastricht solely on the basis of thread count there are small differences between these sites. The textiles from Sint-Servaas church are slightly finer

219. Find number 1419-1 from grave 85, woman 510/20-640/50. This fabric is woven out of 0.2 mm thick threads with 25x13 threads/cm.
220. Findnumber 418-6 in grave 11321, sex unknown, 510/20-580/90, documented in Magoula 2008, appendix 1, 12.
221. Findnumber 23-03-01, grave 363, sex unknown, 565-610/20.
222. Findnumber 05-11-03, grave 68, man 31-37 years old, 580/90-610/20. The fabric had been removed during restoration.
223. Findnumber 1614.1, grave 115, woman, 510/20-580/90.
224. Olausson 1997, Andersson 2003 & 2007, Brandenburgh 2010a, 46-48.
225. Wells 2008, 43-47.
226. Hammarlund et al. 2008, 69.

Type	Cemetery/findnumber	Gravenumber/ Gender	Date	Threads/cm
Rippenköper	Sint-Servaas church 01-04-03	0, ?	undated stray find	17-18 x 12
Spin patterned / repp tabby	Sint-Servaas church 16-DD-03	137, ?	610/20-725	30 x 6
Spin patterned tabby	Vrijthof 1614	115, Female	510/20-580/90	8 x 10
Repp (tabby) distinct example	Pandhof 40.1.TX1	10128, ?	510/25-670/80	30-32 x 10
Repp (tabby) ⟶ distinct example	Sint-Servaas church 17-02-07.1	0, ?	undated stray find	10 x 30
Repp (tabby) distinct example	Sint-Servaas church 21-02-03.1	164, Female	510/25-610/20	6 x ±45
Repp (tabby) ⟶ less distinct example	Sint-Servaas church 03-06-01.1	26, ?	580/90-640/50	24 x 11
Repp (tabby) ⟶ less distinct example	Sint-Servaas church 23-03-01.1	158, ?	610/20-670/80	24 x 10
Diamond twill	Vrijthof 1687-3	0, ?	undated stray find	10 x 10
Diamond twill	Pandhof 556.1	10332, ?	565-580/90	28 x 15

Table 4.3 Special fabrics found in the cemeteries of Maastricht. The sex or gender of the deceased could in only two examples be ascertained. Therefore differences between men and women based on special fabrics cannot be discerned.

than those from Pandhof and Vrijthof and there are more fabrics that are very fine (>20 threads/cm), but the majority of all sites lie in the medium fine to fine categories (10-20 threads/cm) (fig. 4.13 & 4.14a-c). This means that in terms of thread count there is a small difference in textile quality *in* and *ex muros*.

It is remarkable that only very few textiles are coarser than 10 threads/cm. When plotting the thread count per site and per textile type it becomes obvious that several textiles from Pandhof are in this category and that all of these are twills. This does however not mean that twills are always coarser than tabbies: the Pandhof twills show much variation in terms of thread count and are among the coarsest and finer textiles from Maastricht (fig. 4.14b). The small number of textiles (15) that could be assigned to men or women does not allow any conclusions regarding differences in textile quality between men and women in Maastricht (fig 4.15).

A comparison of the textiles from urban Maastricht with those from two rural cemeteries in the south of the Netherlands brings out the most interesting information (fig. 4.16). The textiles from Maastricht are evidently finer than those from Bergeijk and Posterholt.[227]

4.5.6.2 Quality of textiles based on texture

This paragraph started with the notion that thread count is not the only factor that defines textile quality. The patterns woven into the fabric, thread thickness, regularity and degree of spin of the yarns and the density of the fabric (open spaces or not) contribute to the texture, drape and functionality of a fabric and

227.The textiles of Bergeijk (40 textiles) and Posterholt (22 textiles) have been published in Brandenburgh 2012a & Brandenburgh 2013. The textiles from the cemeteries of Wijchen and Rhenen have not been included into this comparison because of dating problems in both sites.

may have influenced the way textiles were valued. Thick threads generally result in heavier fabrics that may have had a different function than fabrics woven out of thin threads. Thin threads may be woven into thin and supple fabrics or - when using only few threads/cm - become fragile like the veil-like fabrics described earlier. The naked eye often perceives these subtle differences while they are not easily measured with the standard variables documented during textile research.

Special weaves have been observed in several graves (table 4.3). These fabrics do not always stand out in terms of high thread count but they have different textures that are clearly visible with the naked eye. Examples of these are rippenköper, spin-patterned tabby and repp (tabby). Diamond twill creates a similar visual effect and has been listed in table 4.3 as well, but this fabric is in fact a very common weave in this period in the Netherlands and is known in both coarse and fine qualities.[228] Due to the small size of the remaining textiles in cemeteries this weave is often hard to discern from plain 2/2 twill so many more examples may be present in this cemetery that cannot be identified as such.

Another approach towards textile quality is to incorporate the thread thickness into the picture of thread count. The range of textiles documented in Maastricht is however rather narrow: most fabrics have been woven out of threads approximately 0.5 mm thick with only a few very coarse textiles and a group of finer textiles woven out of 0.2-0.4 mm thick threads. Generally the thicker threads have been woven in a low thread count and the thin threads result in a high thread count. The area where these groups overlap is an interesting mixture of textiles. These textiles woven with 10-20 threads/cm consist of both thick, dense fabrics and thinner, loosely woven and supple fabrics. These textiles are evenly distributed over all three cemeteries.

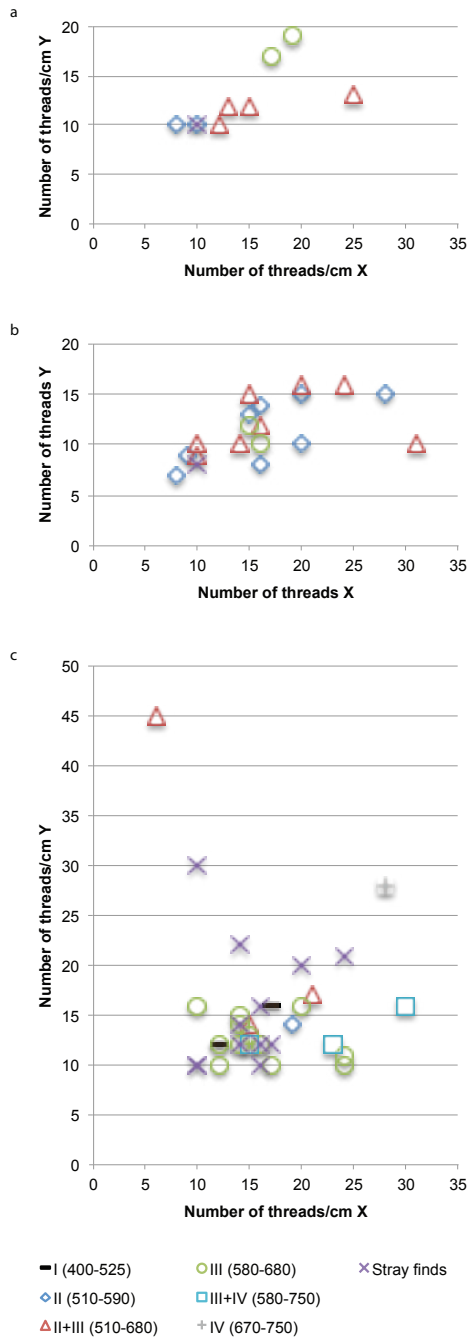


Fig. 4.17
a. Thread count of the textiles from Vrijthof according to phase.
b. Thread count of the textiles from Pandhof according to phase.
c. Thread count of the textiles from Sint-Servaas church according to phase. A single textile from the eighth century (phase IV) stands out from the previous period by its high thread counts.

228. Brandenburgh 2010a, 60, table 8, in early medieval settlements in the north of the Netherlands only 6% of all fabrics are woven in tabby with 50% of diamond twills and another 35% of other types of 2/2 twills.

4.5.6.3 Quality over time

Figure 4.4 showed that the textiles from the three cemeteries are assigned to several phases. The quality of the textiles can be assessed according to these phases as well. This is shown in figure 4.17a-c. Starting with Vrijthof cemetery, there is a tendency towards finer textiles as time goes by (fig. 4.17a). However, the amount of textiles from this cemetery that could be assigned to a phase is not very large so the importance of this outcome is disputable. Contrastingly, the textiles from Pandhof and Sint-Servaas church cemetery are of varying quality throughout the entire timespan of the cemeteries (fig. 4.17b-c). The transition to the Carolingian period is visible in a single textile in phase IV from Sint-Servaas church and three textiles from phase III/IV. The textiles from phase III/IV are finer than average and the textile from phase IV stands out from those of previous periods by its high thread counts (fig. 4.17c) but again, four textiles is not enough to allow any conclusions regarding the changes in textile quality throughout these periods.

4.5.7 Textiles associated with gender

It is reasonable to assume that men and women in Maastricht were dressed differently during life. Iconographical and written sources and numerous archaeological finds from cemeteries in the countries surrounding Maastricht indicate that men and women distinguished themselves during daily life and in the burial context not only by different dress accessories, but also by the use of different garments and fabrics.[229]
Although many textiles were found only a very small number (26) of these could be associated with graves identifiable as those of men or women. Of these 26 textiles 19 were preserved well enough to allow documentation of weave and 15 with a recorded thread count. Consequently the textiles from Maastricht do not allow any conclusions regarding differences between men and women. In Vrijthof cemetery only textiles associated with women's graves were documented and these were all tabbies. Pandhof showed a bit more variation with twills in the men's graves and an equal share of tabbies and twills in women's graves. Sint-Servaas church only yielded tabbies in both women's and men's graves. There seems to be no difference in textile quality between men and women as is shown in figure 4.15.

4.6 THE TEXTILES FROM MAASTRICHT IN A BROADER GEOGRAPHICAL CONTEXT

To better understand the nature of the textile finds from Maastricht it is necessary to compare them with textile finds from other sites in the area. Cemetery textiles from the Netherlands have been published recently and are listed in table 4.4. Also available is a large dataset of textiles from settlements in the north of the Netherlands, but many of these are probably younger than the cemetery finds from Maastricht, which makes it difficult to compare them.[230] For the countries surrounding the Netherlands the extensive inventory made by Bender Jørgensen gives the best overview of regional differences in textiles[231] whereas for Britain the inventory of Walton Rogers provides a solid reference work.[232] The dominance of tabbies in the cemeteries from Maastricht, especially Sint-Servaas Church, makes Maastricht stand out from all other sites in the Netherlands. Gold thread and several special weaves also occur only in Maastricht. Bender Jørgensen points out that throughout the Merovingian period Britain and the northern parts of Germany are reasonably comparable regarding the use of cloth types with an equal distribution of tabbies and twills and small percentages of special

229. For the earliest phases after the Roman period we may expect some continuation of the dress as is seen on Roman sculptures and described by Roman historians. Written sources and illuminations from the early Middle Ages include a countless amount of descriptions and images of clothes and their context in (everyday) life. Together these historical sources provide us with the general picture of early medieval dress and its social context. Archaeological finds complement this picture.

230. Brandenburgh 2010a, 44.
231. Bender Jørgensen 1992, including the analysis of textiles from Germany (Roman period: 111 textiles from 56 sites; Merovingian cemeteries: 313 textiles from 72 sites). Belgium and France were not part of this study.
232. Walton Rogers 2007, 104-110.

Location	Period	N textiles	Textile assemblage
Wijchen	400-640	95 textiles (50% from the period 400-570; 50% from the period 570-640)	33% tabby, the remaining textiles are twills (5% diamond twill)
Bergeijk	565-740	40 textiles	20 twills (incl. 4 diamond twills), 9 tabbies (remaining are indeterminate fragments).
Posterholt	510-680	22 textiles	4 twills, 8 tabbies (remaining are indeterminate fragments)
Textiles from settlements Netherlands	350-1000	226 textiles (majority from period 500-900)	6% tabby, with 50% diamond twills and another 35% of other types of 2/2 twills.

Table 4.4 The textiles from the cemeteries of Wijchen,[233] Bergeijk[234] and Posterholt[235] in the south of the Netherlands and the settlements from the north of the Netherlands.[236]

weaves such as rippenköper.[237] Walton Rogers refined this chronology for Britain considerably, resulting in a detailed and deviating distribution pattern with a predominance of tabbies only in the seventh century onwards.[238] Central Germany (the area of the Thüringen which was conquered by the Franks in the first half of the sixth century) dominates in tabbies in a way comparably to Maastricht and also eastern Austrasia (Rhine valley and Westphalia, the principal territory of the Franks) shows considerably more tabbies than other cloth types.[239] The southern parts of Germany yielded a more even distribution of cloth types, again with a larger share of special weaves than the northern areas. Having ascertained the similarities between Maastricht and central Germany and, in slightly lesser degree, the core territory of the Franks, the question arises whether this textile tradition is the result of Frankish influences or the remains of Roman or Germanic traditions. In order to answer this question we need to look at the cloth types used during the Roman period in the areas around Maastricht as well. Starting with the Germanic areas across the Rhine the dominance of tabbies is striking in all areas in Germany with the textiles from the area just north of the Rhine being most similar to those from Merovingian Maastricht. Contrastingly, the Roman areas of Germany show a much more even distribution of tabbies and twills.[240] This could point to Germanic influences regarding textile traditions in the areas that were colonised in the sixth century by the Franks. There may however have been many other processes involved that we do not fully grasp yet. Going back to the example of Britain described above, it becomes obvious that we can discern more variation in the use of textiles over time when we have enough data to divide the textiles into smaller date-groups.[241] For most areas these detailed overviews are not available yet and

233. Brandenburgh 2010b, 124-125 fig. 9.4, 9.5 & 9.6.
234. Brandenburgh 2012a, 132-133.
235. Brandenburgh 2013, 135.
236. Brandenburgh 2010a, 60.
237. Bender Jørgensen 1992, fig.16-29 for different parts of Britain, fig. 82 for north Germany.
238. Walton Rogers pointed out that in Britain there is a development from the fifth to the seventh century, starting with a predominance of 2/2 twills z/z in the fifth century and ending with an increase of tabbies (linen, z/z) in the seventh century. Tabby became the most popular fabric type in this later phase (50%) whereas twills (z/s in this phase) constituted only 37%. Walton Rogers 2007, 104-105.
239. Bender Jørgensen 1992, fig. 83-84.
240. Bender Jørgensen 1992, fig. 63-65 for the textiles from Germania Libera. Feddersen Wierde in the upper north of Germany and the Thorsbjerg finds from South Schleswig show a very different textile assembly with equal shares of tabbies and twills, fig. 71 for Roman Germany.
241. Walton Rogers explains the detailed chronology in Britain as a result of three separate phenomena: a disappearance of twill z/s at the end of the Roman period and a reintroduction of this fabric at the end of the sixth century, an increase in the use of linen fabrics (that tend to have been made in tabby z/z) and a trend towards using wool predominantly in z/s twills.

we must therefore be reluctant to explain the crude trends observed in terms of ethnic concepts such as Germanic and Roman.

When comparing the quality of textiles found in Maastricht to those from other sites in the Netherlands and the surrounding countries it becomes clear that Maastricht has by far the finest textiles found in the Netherlands (fig. 4.16) but that Maastricht is quite average compared to the Germanic sites during the Roman period and the cemeteries in Merovingian Germany.[242]

4.7 DISCUSSION

This chapter set out to test several hypotheses regarding the burial tradition and the use of textiles in the cemeteries in Maastricht. These hypotheses will once again be discussed below and an attempt will be made to answer the research questions relating these topics using the results of the textile research.

1. To which degree were textiles used as a status symbol or social identifier in the context of the burial? Do the elite burials in Maastricht contain more fabrics of a high quality, textiles woven in intricate patterns, colourfully died fabrics and shiny precious materials such as silk and gold thread? Is there a significantly higher amount of these finds present in Maastricht as opposed to rural cemeteries?

   Which graves contain these precious materials and what is the meaning of this distribution? Is there a difference in grave textiles between men, women and children?

The textiles from Maastricht are of considerably higher quality than those from the rural cemeteries in the direct surroundings of Maastricht analysed so far. There are more special fabrics; several examples of gold thread and the fabrics are generally of a higher quality (being woven out of thinner thread and more threads/cm). This would indicate that the people in Maastricht were buried in more luxurious textiles than the people that were buried in the rural cemeteries in the south of the Netherlands and that these textiles may have been used as an expression of a higher status. Interesting in this respect is the fact that the quality of the textiles does not fully agree with the other objects recovered from the graves in Maastricht. In Sint-Servaas church and Pandhof most grave objects were not uncommonly rich, in fact they are quite similar to those found in rural cemeteries, with only few exceptions that show more than average luxury.[243] Moreover, a comparison between the textiles from the sites from Maastricht and the rural sites may not be as straightforward as presented above. Many graves in rural cemeteries have been reopened and we may expect that the most precious objects (including the most luxurious textiles?) have been removed from these sites before they could be excavated. It is therefore possible that the differences observed between the Dutch cemeteries were in reality not as large as the archaeological remains show. When we compare the fabrics from Maastricht to those from the sites known in other Frankish cemeteries in for example nearby western Germany, the textile assemblage of Maastricht doesn't stand out at all in terms of quality and is actually rather average. Therefore one could conclude that Maastricht may have been a local focal point for the elite in the region but was also on the edge of the Frankish hearth land and - based on the textiles - was not exceptionally rich.

It was not possible to distinguish specific rich graves within the cemeteries of Maastricht: men, women and children were all buried in rich textiles and due to the limited number of textiles that were recovered in each grave it is not possible to get a good picture of the wealth of the individual burials.

242. In Germanic sites in northern Germany the tabbies, that were the predominant textile type in Maastricht, had thread counts between 10-20 threads/cm. Sites from Merovingian Germany show slightly finer tabbies with thread counts between 10-25 threads/cm, whereas the twills from these sites were woven with approximately 5-15/20 threads/cm. Spinpatterned tabbies from these sites were documented in the range 15-30 threads/cm (Bender Jørgensen 1992, fig. 72-73 and 77 for Germanic sites in the Roman Period and fig. 87, 90, 92, 94 for Merovingian Germany).

243. Personal comment F.Theuws

2. Do the textile remains show differences between the burials *intra* and *extra muros*? If so, how and when do these differences occur?

There are distinct differences regarding the textiles found in the burials inside and outside the church. Furthermore there are differences between the two cemeteries outside the church (Vrijthof and Pandhof) as well. In Pandhof cemetery the female burials show evidence of the four-brooch-fashion while this is completely lacking in the Vrijthof cemetery. Here however we must bear in mind that the Vrijthof excavation was not as thorough as the excavation of the Sint-Servaas church and Pandhof cemetery. In the Vrijthof cemetery, objects may have been overlooked during excavation and have gone missing in the decades afterwards. If however in the Vrijthof graves the transition to the newer three-brooch-fashion is visible in the archaeological record earlier than in Pandhof cemetery, this might might point to different burial populations with their own burial dress code. Within the church the burials contained practically only fabrics woven in tabby, while outside the church more variation in cloth types was used. Special fabrics have been found predominantly in Sint-Servaas church while only one example of a special weave was present in Pandhof and one example in Vrijthof. Gold thread on the other hand has been found in Sint-Servaas church (1x) and Pandhof (2x). When we compare the textiles of the three cemeteries of Maastricht solely on the basis of thread count there are small differences between these sites.

The textiles from Sint-Servaas church are slightly finer than those from Pandhof and Vrijthof and there are more fabrics that are very fine (>20 thread/cm), but the majority of the textiles from all sites lies between 10-20 threads/cm. Summing up, there are differences in textile quality and characteristics *intra* and *extra muros*. The question that needs answering is however, how must we interpret these differences? Were the people buried within the church a different, richer part of the population than those buried outside or did they merely use textiles of a higher quality because the location of burial (near the altar) prescribed it? In the first case the tabbies found in the burials in the church may be attributed to the highest circle of Maastricht's society and may have been part of their way to distinguish themselves from other groups in society. The second suggestion is equally valid: the differences observed might reflect the ideas of the population of Maastricht on how the deceased should be dressed upon being buried in the church as opposed to outside the church. In that case the differences observed in the cemetery textiles have no meaning in terms of different groups in society, the position of the people in daily life, nor for the place Maastricht fulfilled as a centre in the region, but it merely reflects the aspired status of the deceased or the way people would like to be seen during the burial ritual.

3. Can the textiles from the cemeteries in Maastricht be placed in a local or regional textile tradition? Are there for instance Germanic or Roman characteristics in the textiles and to which degree do the Maastricht textiles differ or resemble the contemporary textiles from the surrounding countries?

There are strong similarities between Merovingian Maastricht and the (Roman period) textiles from what during that period was called Germania Libera, whereas there are no similarities with the surrounding areas that were part of the Roman Empire. The dominance of tabbies is striking in all Germanic areas in Germany and the textiles from the area just north of the Rhine are most similar to those from Merovingian Maastricht.

When we compare the textiles from Maastricht with contemporary textiles, Merovingian Maastricht seems to have had the same textile tradition as central Germany and, in slightly lesser degree, eastern Austrasia (Rhine valley and Westphalia, the principal territory of the Franks. There may however have been many processes of interaction and the development of local textile tradition that we do not fully grasp yet and we must therefore be reluctant to explain the crude trends observed in terms of ethnic concepts such as Germanic and Roman. The gold thread found in several graves may be considered either as an import from Byzantium or as a remnant of a Gallo-Roman tradition.

4. Are there differences between the textiles from the fifth/sixth century and those from the seventh century?

The documented textiles from the period before 580/90 do not differ from those from the later periods. Therefore any changes in dress that might have occurred are not visible in the archaeological record in Maastricht. This is partly the result of the poor conservation of the textiles in these cemeteries making it impossible to provide a detailed chronological overview of the developments in textiles in Maastricht.

5. Did grave textiles become sparser and less luxurious from the end of the seventh century onwards?

Both the Pandhof and Sint-Servaas church contain graves from the Carolingian period but the amount of textiles recovered from those graves is very small, which is to be expected with the diminishing amount of grave goods in this period. This makes it very difficult to compare the textiles from this period to those of earlier centuries. In Sint-Servaas church two graves with a total of five textiles are from the period 610-725 (phase III-IV) and one grave with one textile is from the period 754-784 (in phase IV). All of these fabrics are tabbies of varying qualities. Tabbies woven out of s-twisted threads in both tread systems occur only in the seventh and eighth century while the other weaves (z/z and z/s) are present throughout the entire period. So where the earlier periods show some variation in fabrics, this is completely lacking in the transition period between the Merovingian and the Carolingian period of Sint-Servaas church.

When we look at the quality of the few finds from this period the textiles from phase III/IV are finer than average and the one fragment from phase IV stands out from those of previous periods by its high thread counts so there seems to be an indication that textiles may have become finer during the transition from the Merovingian to the Carolingian period. Again however, the dataset is too small to allow any firm conclusions on this subject.

5. The textiles from the early medieval cemeteries in the region of Nijmegen, The Netherlands

A comparative study of the cemeteries of Lent-Lentseveld and Wijchen

The cemeteries of Wijchen and Lent-Lentseveld were put together into one case study because they are geographically very close together. Wijchen was excavated in the ‘90s and only recently published. Lent-Lentseveld on the other hand was recently excavated and this cemetery provides a detailed dataset of well preserved textiles from a short period of time. Moreover, the skeletal remains from this cemetery are well preserved creating the opportunity to analyse the differences in burial textiles between men, women and children. Although all these conditions were radically different in the case of Wijchen, the amount of textiles from Wijchen and the overlap in the period in which these cemeteries were in use, enables a comparison beween both sites form this region.

The textiles from Wijchen were published in a catalogue before (see below), but a reanalysis and re-dating of the graves provided more information about the use of the textiles in the burials which is why these finds have been included in this case study once more.

The catalogue of Wijchen was published before in:
Brandenburgh, C.R., 2010: Textielresten, in S.Heeren & T. Hazenberg (red.), Voorname dames, stoere soldaten en eenvoudige lieden. Begravingen en nederzettingssporen uit het Neolithicum, de laat-Romeinse tijd en Middeleeuwen te Wijchen-Centrum, Leiden, 121-128.

5.1 INTRODUCTION

In the region around the city of Nijmegen several early medieval cemeteries have been excavated. The graves in these cemeteries often include fragments of (mineralized) textiles. In this study the textiles of two cemeteries will be discussed: Lent-Lentseveld, excavated in 2011 and 2013 and Wijchen, excavated in 1991-1996.

The textiles from Lent-Lentseveld were analysed recently, directly following excavation. The textiles from Wijchen have been partly analysed previously in 2009 resulting in a preliminary publication and catalogue.[244] However, since this publication several adjustments are in need: objects that were hitherto not analysed were found in the storage resulting in more textiles, the dates of the graves have been revised and more time could be spent in the spatial analysis of the textiles in the graves.

5.2 THE CEMETERIES OF LENT-LENTSEVELD AND WIJCHEN

The cemetery of Lent-Lentseveld was found during large-scale building activities on the northern bank of the river Waal. The site consists of 50 inhumation graves and 20 cremation graves. The oldest burials in the cemetery are from the period 475-500 AD but may even be older (>425 AD). The cemetery stayed in use until the end of the sixth century. Several clusters of burials can be distinguished: a group of burials in the north of the cemetery is probably the oldest phase and the graves in the centre and southern part of the cemetery are younger. Due to the fact that post-excavation restoration and interpretation has not yet been fully completed, more precise dates of the graves are not available. Grave dates have to be based on the objects found in the graves and can result in dating margins of several decades. A number of graves could not be dated very accurately and are therefore assigned to the lifespan of the entire cemetery (475-600). In this cemetery and period no signs of Christianisation are visible in the archaeological record.

The inhumation graves of Lent-Lentseveld were well preserved. No natural disturbances or intentional reopening of the graves have occurred resulting in intact burials where the skeletal remains and the grave objects were still in their original position. These graves were documented in great detail using the most advanced excavation methods, which creates the opportunity of making 3D-reconstructions of the position of every object in the graves. The human remains were of high quality as well which may enable a reconstruction of the population, such as sex, age and family relations.[245] A considerable amount of young children has been buried in this cemetery. Out of the 50 inhumation graves 17 individuals were children not older than six years old. The 33 adults can be divided into 12 men, 14 women and 7 individuals of whom the sex/gender could not be ascertained.

The cemetery of Wijchen has been in use for a longer period, starting around 350 AD and ending in the second half of the seventh century. Many of these graves are contemporary to Lent-Lentseveld making this site suitable for a regional comparison. The cemetery of Wijchen is considerably larger: it consisted of nearly 350 graves of which 309 were inhumation graves. Soil conditions were not as favourable as in Lent: the skeletal remains have sparsely survived. Intentional reopening of the graves has been observed in only 15 graves, but since a number of graves overlap there may have been some displacement of objects within the older (and partly) disturbed graves.

5.3 RESEARCH QUESTIONS AND AIMS

Lent-Lentseveld is a unique cemetery in the region of Nijmegen, with its rich demographic information, short but distinct chronology and spatial distribution. It is therefore very suitable for an attempt to assess the way the families, groups or individuals within this specific population were treated upon burial. For example the large amount of children within the cemetery give ample chance to ascertain how children in general or specific young individuals were treated

244. Brandenburgh 2010b.

245. DNA-analysis has not been conducted yet.

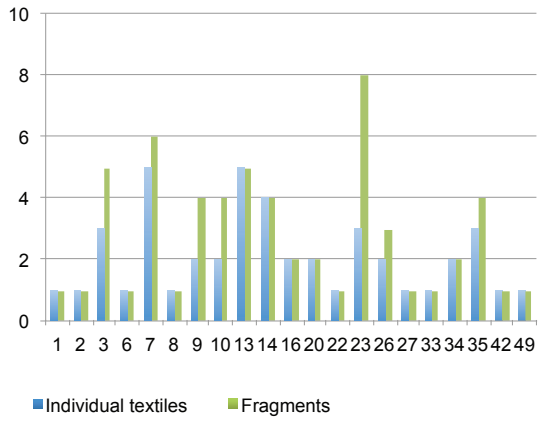


Fig. 5.1 Lent-Lentseveld: the number of individual textiles (dark grey) and number of fragments (light grey) per grave (grave number is listed on the horizontal axis).

in the burial ritual, and this can easily be compared to the way the adults were buried. This analysis will likely shed light on the different relations within this part of Merovingian society.

This chapter therefore attempts to assess the character, quality and uses of textiles and clothing in the burials in the cemetery of Lent-Lentseveld in order to determine the role these materials played in the burial ritual and to discern differences within the buried population.[246] The finds of Wijchen are dealt with in the same way to compare and value the textiles of Lent in its region. This will also enhance the overview of the fabrics in use in this area of the Netherlands and provide a substantial dataset that can be used in an analysis of the use of textiles in a larger spatial context. The following research questions will be discussed:

1. What are the character, quality and development over time of the textiles found at Lent-Lentseveld and Wijchen?

2. How were the textiles used in the burials?

3. Are there differences in textiles or the use of the textiles between individuals or groups within the cemeteries?

4. Are there similarities or differences between the two cemeteries regarding the character or use of textiles?

5.4 DATASET

The textile remains from the cemeteries of Lent-Lentseveld and Wijchen were preserved in the corrosion on the metal objects in the graves. The textiles that were not in contact with metal decayed in the years after the burial. Because of this the remaining fragments are often very small, measuring between 0.5 x 0.5 and 5 x 6 cm.

The cemetery of Lent-Lentseveld has yielded 58 fragments of textile, which were found in 21 graves. Most of these graves contained one or two different fabrics; six graves provided more (fig. 5.1). 42% of the graves therefore have yielded textiles, which may be considered a rich find complex compared to other Dutch cemeteries excavated and analysed so far. In some cases there were several fragments of the same fabric present within one grave. These identical fabrics have been grouped together resulting in a total of 44 individual textiles. Wijchen yielded 87 individual fabrics (117 fragments) from 45 graves (fig. 5.2).[247] This means that in only 14% of the 309 graves textiles have survived. Only eight out of those 45 graves contained more than two textiles.

The preservation of the fabrics from Lent is in general higher than those of Wijchen, but this is mainly because most of the iron objects from Wijchen have deteriorated badly during the last 20 years after they

246. Halsall 1995, 245-248; Effros 2002b, 69-91; Effros 2003, 124-128; Cohen 1985 shows how symbols have different meanings for different groups and can change over time, enabling people to (re)create the boundaries of their social group, p. 16 and 50. For a more detailed discussion on the role and use of textiles and clothing in the burial ritual see also Brandenburgh 2012, 128-129.

247. In the textile catalogue published in Brandenburgh 2010b only 95 fragments of textile were listed. Since this publication "new" fragments have been documented.

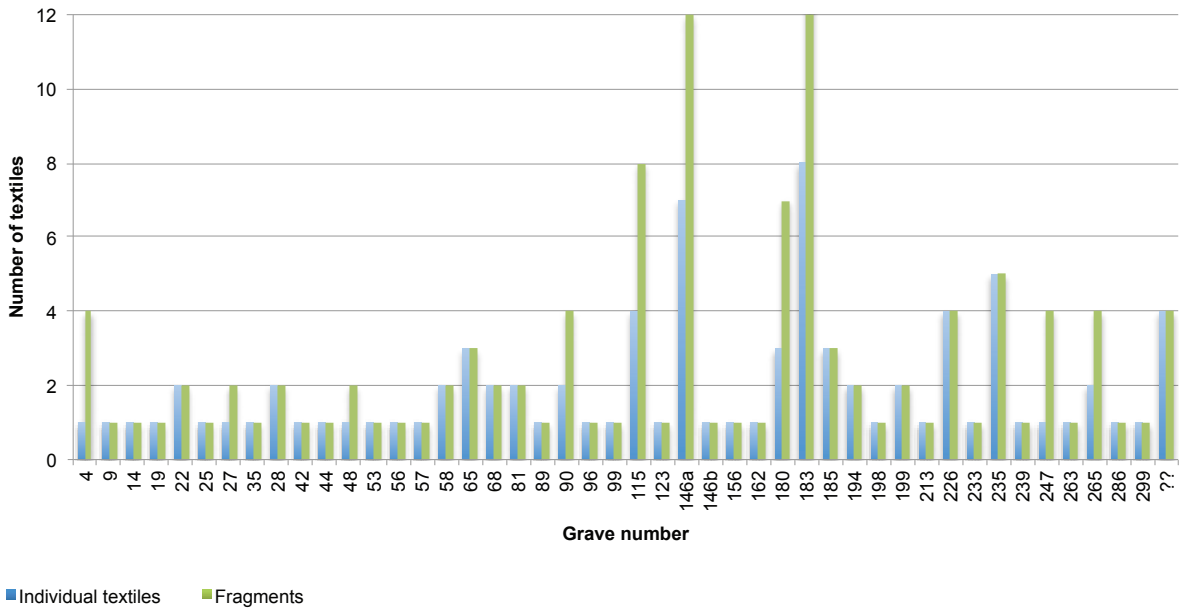


Fig. 5.2 Wijchen: the number of individual textiles (blue) and number of fragments (green) per grave (grave number is listed on the horizontal axis).

were excavated, resulting in crumbling objects, indeterminate fragments of textiles and damaged fibres. Due to these poor conditions it was often not possible to determine the fabric, thread thickness, spin or fibre type of the textiles from this cemetery. There were many indeterminate fragments among the textiles from Lent-Lentseveld as well, but these are mostly single threads preserved in the springs of brooches. Due to their small size it was not possible to ascertain the weave of these fabrics (hence the label 'indeterminate') but the thread thickness and spin was often visible giving information on the original quality of the fabrics to which these brooches were attached. Similar textile remains are completely lacking in the cemetery of Wijchen because most brooches were selected for display after the excavation and have undergone restoration, which included the removal of all organic remains. The fibres from Lent-Lentseveld were well preserved resulting in successful fibre analysis. This was not possible in the Wijchen-complex. Here the fibres were damaged and analysis proved successful in a smaller number of objects.

Due to the excellent state of preservation and the advanced methods of excavation all textiles of Lent-Lentseveld can be assigned to men, women and children of different age groups. The textiles from Wijchen have been assigned to gender, which was based on the presumed gender associations of the objects present in the graves (fig. 5.3). This leaves room for discussion for one should not overlook the possibility that some women may have been buried with weapons or men with female objects.[248]

Some of the textiles from Lent (9 fragments) are dated very narrowly, resulting in a subdivision of the dataset in small groups of overlapping sub phases, while most can not be dated more specific than 450-600 AD. The number of textiles that can be ascribed to these sub phases is too small to be used in analyses. Therefore the textiles from Lent will be dealt with as one single phase. The textiles from Wijchen have originally been divided into four main phases, which were further divided into sub phases (table 5.1).[249] In order to enable a comparison with

248. Pohl 2004, 31-32; Price 2002, 149-153; Knol e.a. 1996, 302; Brandenburgh 2012a, 128-129.
249. Heeren & Hazenberg 2010, 157.

the cemetery of Lent the textiles from phase 2, 3 and 4a will be grouped together and dealt with separately from the textiles of the period before (phase 1) and after (phase 4b). Only 24 out of the 87 textiles from the cemetery of Wijchen are from these periods 2, 3 and 4a and are consequently contemporary to Lent. Another 14 could not be dated more specifically than the period 530- 640 or later and some of these may be contemporary to Lent as well (fig. 5.4).

5.5 RESULTS

5.5.1 The types of textiles from the cemeteries of Lent-Lentseveld and Wijchen.

During the early Middle Ages, several types of weaves were in use. In the cemetery of Lent-Lentseveld fabrics woven in tabby, 2/2 plain twill, 2/2 broken diamond twill and 2/1 twill were observed. In the cemetery of Wijchen 2/1 twills have not been found. Some textiles were decayed to such an extent that identification of weave was not possible. Nevertheless it is clear that the textiles from both cemeteries show limited variation in fabric types. In Wijchen a border or selvedge was documented on a tabby z/z found in woman's grave 81 from the period 570-610.[250] This border consisted of a bundle of four warp threads. The weft thread passed over these four threads and was immediately woven back into the fabric. There is no evidence for hems or tablet woven borders in the graves

5.5.1.1 Tabby weaves

In Lent-Lentseveld only five fabrics were woven in tabby. They were found in two men's graves and three graves of children of 4-6 years old. All these tabbies were woven out of z-spun yarns in one system and s-spun yarns in the other system and they vary greatly in number of threads/cm. Most tabbies were rather balanced with approximately the same number of threads in both thread systems. Two of the tabbies were made out of wool. The other three examples were too damaged to allow fibre identification.

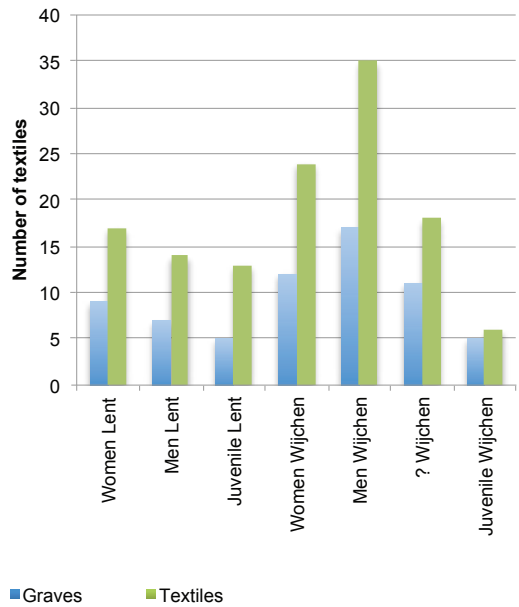


Fig. 5.3 The number of textiles (green) found in burials (blue) of women, men and juveniles from the cemeteries of Lent- Lentseveld and Wijchen.

In Wijchen the majority of the textiles were woven in tabby (35x). Here as well the fabric occurs in graves of men, women and juveniles. 29 of the tabbies were woven out of z-spun yarns in both warp and weft. In only four examples the fabrics were woven out of z-spun yarns in warp and s-spun yarns in weft.
One was woven in a spin-pattern.[251] This is created using both z- and s-twisted threads in one or both systems. The different direction of the twist of the yarns bestows a very subtle but clear striped or check pattern to the fabric. In the fabric from Wijchen the spin-pattern is only ascertained in one system but the pattern could not be distinguished because of the very limited size of the surviving fragment (0.3x0.5mm). It was a fine and smooth fabric woven out of thin threads (0.2-0.3mm). Most tabbies however were woven much coarser than this spin-patterned fabric. Fibre identification was possible in a limited number of fabrics. Most of the tabbies have been made out of wool; only one example of plant fibre could be identified (in a z/z tabby).

250. Find number 06.106.TX2

251. Find number 10.110.TX3.

1	300 (?) – 450 (?)	1a cremation graves 340-370 AD 1b inhumation graves +/- 400 AD
2	450 (?) - 530	
3	530 – 570	3a: 530-555 3b: 555-570
4	570 – 640	4a: 570-610 4b: 610-640

Table 5.1 The chronology of the cemetery of Wijchen according to Heeren & Hazenberg 2010.[252]

5.5.1.2 Twills

In most cases where the fabric was evidently woven in 2/2 twill, it was not possible to ascertain whether it was a 2/2 plain twill or a variety of this weave, such as diamond twill. Only where the fragments were large enough to cover part of a reversal in the pattern, the difference between the types of twill could be discerned (3 times). Consequently, most of the smaller fragments (< 0,5 cm) are assigned to the group of 2/2 plain twill, making this group considerably overrepresented. 2/1 twill is a weave in which the weft thread passes over two and under one warp threads.

In Lent-Lentseveld the majority of textiles were 2/2 twills. Twelve fragments were woven in a variety of this weave: one of these was a plain twill and two were diamond twills.[253] The diamond twills occur in two different graves from the sixth century: one of them is a man's grave and the other is of unknown sex. The other twills have predominantly been found in graves of women and only in smaller quantities in graves of men and children. There is great variation in the spin of the threads of these fabrics. Six fragments were woven out of z-spun warp threads and s-spun weft threads. Four fragments were made out of z-spun threads in both systems and one had s-spun threads in both systems. One 2/2 twill was woven in spin-pattern using z- and s-spun threads in both warp and weft.[254] Due to the small size of this fragment the pattern repeat could not be discerned. Most twills were made out of wool. Plant fibres have not been observed among the twills.

2/1 twill occurs only once in a woman's grave in the cemetery of Lent-Lentseveld.[255] This grave belongs to the earliest phase of the cemetery (425-525). In some cases it was not possible to ascertain the type of twill, either because the weave was very decayed or because the fabric was contorted.

In the cemetery of Wijchen 30 textiles were woven in 2/2 twill. Two of these were evidently plain twills; another six fabrics were woven in diamond twill z/s. Just as in Lent-Lentseveld there is variation in the spin of the threads in these fabrics: 20 fragments were woven in z/s; eight fragments in z/z and two were woven in spin pattern with z- and s-spun threads in one system and z-spun threads in the other system. Wool is the predominant fibre in this type of fabric in Wijchen. Only one possible example of plant fibres was observed in a 2/2 twill z/z but due to bad preservation this identification is not certain.[256]

252. Heeren & Hazenberg (2010) maintain a conclusion of the cemetery around 640 AD. The grave assemblages however give room for a longer life span of the cemetery. Many objects may have been in use after 640 AD (pers. comment F. Theuws). Therefore the dates of the graves containing textiles have been reviewed with kind assistance of prof. dr. F. Theuws, Leiden University.
253. Find number 529.TX1 may also be a 2/2 chevron twill but due tot the small size of the fragment the exact pattern was not visible.
254. Find number 273.TX1
255. Find number 255.TX1.
256. Find number 10.109d.TX1

The diamond twills have all been found in graves of men. The other twills were predominantly present in graves of men and sparsely in those of women and one possible juvenile.

In order to compare the distribution of the textiles from Lent-Lentseveld and Wijchen the fabrics from Wijchen have been grouped together in a period before Lent-Lentseveld was in use (350-450), a group contemporary to Lent-Lentseveld (450-610) and after (610- >640). Another group could not be dated narrowly resulting in a group of textiles from the sixth/seventh century or unknown date (fig. 5.5). The earliest period from Wijchen shows most variation and an even distribution of textile types. Note however that these textiles have been found in only 3 graves (all of these men) so this distribution should not be given much significance. The textiles from Wijchen 450-610 are considered contemporary to those of Lent-Lentseveld and here it is remarkable that the predominant textile type in Lent is tabby and in Wijchen it is 2/2 twill. However, when we take into account the large amount of indeterminable fabrics in the cemetery of Lent-Lentseveld it is obvious that this distribution is not altogether reliable either. In the seventh century the cemetery of Wijchen continued to be used and here we see that 2/2 twills and tabbies become equally popular.

5.5.2 Textile quality

5.5.2.1 Quality of textiles based on thread count

When we analyse the textiles from Lent-Lentseveld solely on the basis of thread count there are small differences between the different fabrics (fig. 5.6). The majority of the textiles is medium fine to fine (10-20 threads/cm), a small number is coarser and only one fragment is very fine (30x30 threads/cm). This is a 2/2 twill z/z from a woman's grave that could not be dated more narrowly than 450-600.[257] The twills from this cemetery are on average finer than the tabbies.

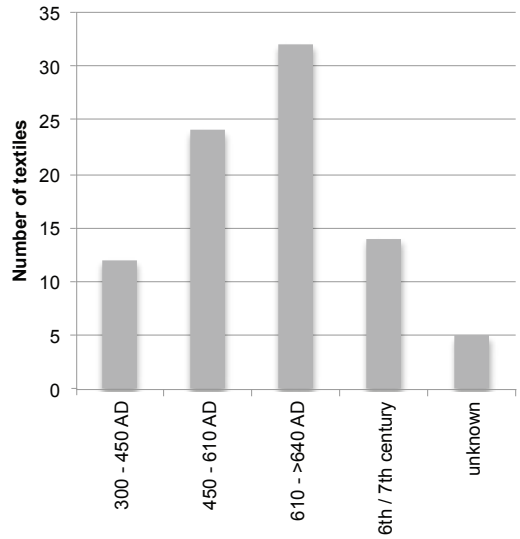


Fig. 5.4 The textiles from Wijchen, grouped by phase. In order to enable a comparison with the cemetery of Lent the textiles have been grouped together in three big phases: before 450, 450-610 (according to the lifespan of the cemetery of Lent) and 610 – 640 (or later). A group of textiles could not be dated more accurately than the sixth / seventh century.

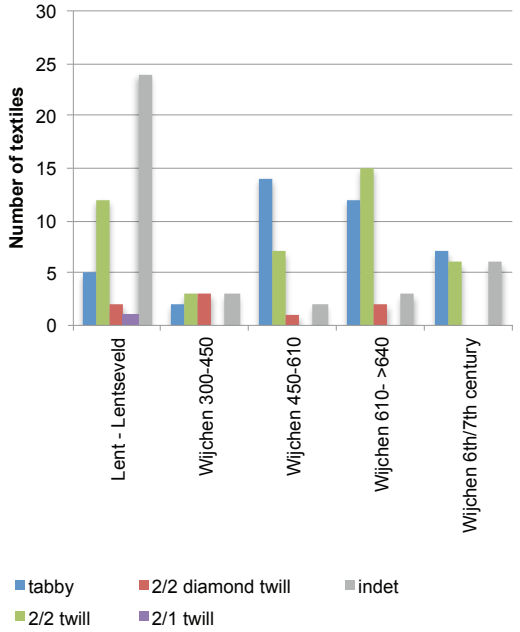


Fig. 5.5 Distribution of the fabrics in Lent-Lentseveld and Wijchen in the period before Lent-Lentseveld was in use (350-450), contemporary to Lent-Lentseveld (450-610), after (610- >640) and unknown (sixth/seventh century).

257. Find number 763.TX1.

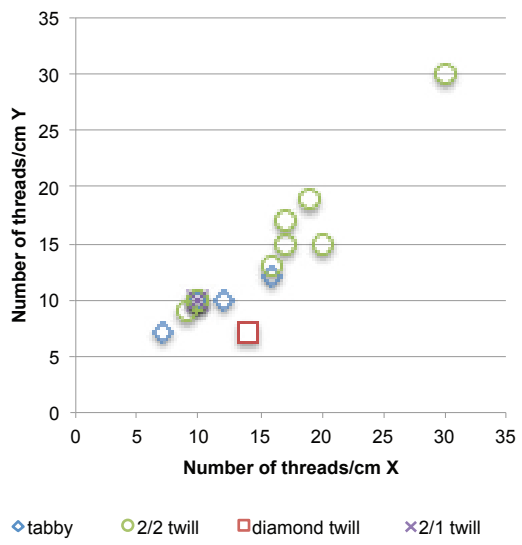


Fig. 5.6 The quality of the textiles from Lent-Lentseveld measured in threads/cm.

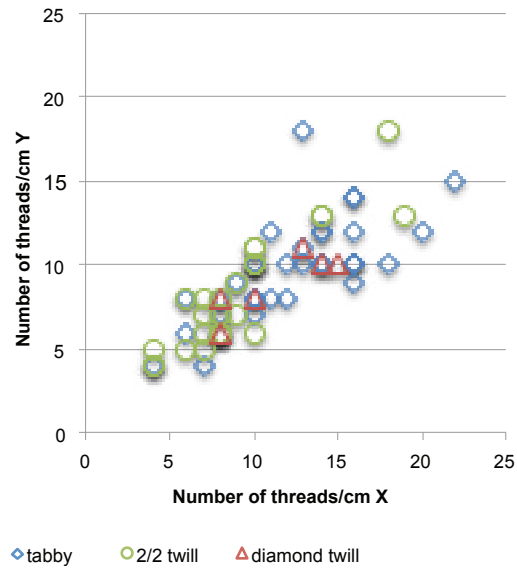


Fig. 5.7 The quality of the textiles from Wijchen measured in threads/cm.

The textiles from Wijchen show a different pattern and are in general coarser that those from Lent-Lentseveld (fig. 5.7). Here there are significantly more fabrics with a thread count below 10 threads/cm than in Lent-Lentseveld. Moreover, the tabbies in Wijchen are finer than the twills, which is the opposite situation compared to Lent-Lentseveld. There are no differences in thread count of the textiles from Wijchen in the period before, during and after the cemetery of Lent-Lentseveld was in use (fig. 5.8).

5.5.2.2 Quality of textiles based on texture

In the case of Lent-Lentseveld the fabrics are generally balanced: most yarns have been spun regularly and the threads are evenly spaced in both warp and weft. In other words there are no fabrics where thread thickness or spacing between the threads cause a special effect on the texture of the cloth. This cannot be ascertained of the indeterminate fragments found in the springs of brooches, but here the thread thickness varies from fine (with threads thinner than 0.4 mm) to coarser (0.5-1mm) making it logical to assume that these fabrics vary in quality as well.

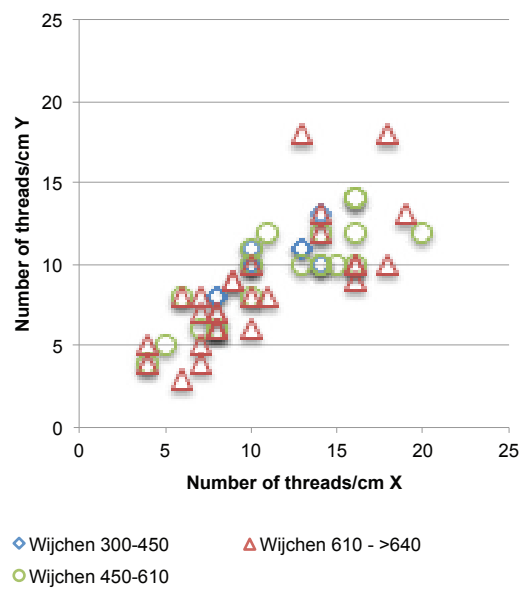


Fig. 5.8 The thread count of the textiles from Wijchen in the period before Lent-Lentseveld was in use (350-450), contemporary to Lent-Lentseveld (450-610), after (610- >640).

In Wijchen the threads have general been spun and woven regularly as well but here we see several fabrics that have a rather open structure.[258] These textiles were made out of thin threads (0.2mm) and were woven in a low thread count. This results in delicate and open fabrics that may have been used for different purposes than the usual dense fabrics.

Apart from tabby, plain twill and diamond twills no special weaves such as tablet weave, or patterns such as rippenköper have been observed in Lent and Wijchen. Although diamond twill creates a visual effect, this fabric is a very common weave in this period in the Netherlands and is known in both coarse and fine qualities.[259] The fact that it only occurs a few times among the cemeteries around Nijmegen is no indication for its rarity. Due to the small size of the remaining textiles in cemeteries this weave is often hard to discern from plain 2/2 twill so many more examples may be present in this cemetery that cannot be identified as such.

The only other examples of woven patterns that change the texture of fabrics are the spin-patterns observed in a tabby and two twills from Wijchen and a twill from Lent-Lentseveld. Two of the spin-patterned fabrics were excavated in the same grave (grave 180, a woman's grave from the period 610->640).

5.5.3 The use of the textiles in the burial

The textiles that have been preserved in the corrosion of the metal objects in the graves are generally considered to be the remains of the clothes in which the dead were buried and of other grave textiles such as shrouds, mattress covers etc. These textiles are a very small representation of the original amount present in the graves. Consequently, it would be optimistic to assume that it is possible to fully reconstruct the use of textiles in the graves and the shape and fit of the actual garments on the basis of the small surviving fragments. Nonetheless, the dataset allows some conclusions regarding the use of the fabrics because the position of the textiles on the metal objects and the position of the objects on the body are often known. Using this information we can attempt to reconstruct which types of fabrics were used on specific areas of the body and which types of textiles were worn over or under each other. In the following section three areas of the body will be elaborated: the waist, where textiles have been associated with belt parts such as buckles, belt plates etc. (by far the largest amount of textiles), the lower body where pieces of textile have been attached to strap ends and lastly the upper body where textiles associated with brooches will be discussed. Here small sidesteps to the waist/hip area are made as well since some of the brooches were positioned on that part of the body. After this overview an attempt will be made to reconstruct the attire of two individuals excavated in the cemetery of Wijchen: the man from grave 183 and the woman buried in grave 235. These graves were the only graves in which the amount and quality of the textiles enables us to make such a reconstruction on the level of the individual. For this reconstruction the position of the metal dress accessories on the body and the stratigraphy of the textiles on these objects have been used to reconstruct which fabric types were worn on specific body parts and in relation to each other.

5.5.3.1 Textiles associated with the belt

There are several groups of objects associated with textiles. Belt parts such as buckles, buckle plates and belt plates are by far the largest group. When preserved on the back of a belt part one can assume that the fabric originally was worn under the belt. Textiles are often present on the front side of the belts as well. These fabrics can be interpreted as the remains of a garment worn over the belt such as a cloak or an outer tunic, but this may not always be the case. It is also possible that the garment was worn beneath but partly folded over the belt.

258. Find numbers 01.155.TX1, 04.076.TX1, 05.072.TX1, 07.019.TX1, 13.017.TX1 & 20.032.TX2.
259.Brandenburgh 2010a, 60, table 8, in early medieval settlements in the north of the Netherlands only 6% of all fabrics are woven in tabby with 50% of diamond twills and another 35% of other types of 2/2 twills.

Lastly: fabrics found on the front side of buckles and other belt parts do not necessarily represent a garment. These can also be the remains of shrouds (when present on the front of the body) or mattress covers or coffin lining (when present on the back of the body). Knives and other utensils hanging from the belt show remains of textiles as well. It is often difficult to determine the function of these textiles. When more than one layer of textile is present, these could be different garments (or a garment and a shroud), but the object could also be lying in the folds of one single garment. Lastly, this type of object may also have been encased in a pouch (hanging from the belt).

Lent-Lentseveld

In the cemetery of Lent-Lentseveld four buckles and one belt plate with textile remains were found. In all cases the textiles were adhered to the front of the object. The objects were found in graves of three men, one women and a child. Without exception the fabrics were densely woven 2/2 twills (one was a diamond twill). The fabrics were of medium fine quality with thread counts ranging between 10x10 and 17x17 threads/cm and thread diameters of 0.3-1mm.

Associated with belts are also seven knives, a fire steel and a pair of shears, which showed remains of textiles. Four of these objects were found in graves of children. The others were excavated in the graves of three men and one woman. The textiles were either tabbies z/s or 2/2 twills z/s of varying quality ranging from coarse in the graves of the children (7x7 threads/cm) to fine in the adult graves (20x15 threads/cm). Worth mentioning is the firesteel found in grave 14, the burial of a four-year-old child. This object was found together with a small buckle and the fabric (a coarse tabby z/s of 10x10 threads/cm) covered both objects. The small buckle was probably part of a pouch hanging from the belt and since the same fabric covered both fire steel and buckle we can assume that the pouch was made of this coarse tabby. In the same grave another buckle was present which was covered by a piece of fine woollen diamond or chevron twill (16x13 threads/cm). This fabric may have been part of the garment worn over (or - as explained above - under) the belt.

Wijchen

In the cemetery of Wijchen a large amount of buckles has been documented with textile fragments attached. This gives ample opportunity to investigate fabrics of the garments worn under and over the belt. Among a total of 22 belt buckles eight had textiles on the front or edge of the buckle, the other 14 buckles were evidently worn over the textile. Three of these buckles had two layers of different textile adhered to the back giving insight in the different layers of garments worn under the belt. Starting with the fabrics found under the belt there seems to be some variation in both fabric type (equal amounts of tabbies and twills) and quality. Most fabrics were made out of wool and of varying quality. Six fabrics were fine with thread counts ranging between 14-16 threads/cm. Eight textiles were however coarser, with 10 threads/cm or less. The fabrics found on the front of the buckles were mostly twills and all were coarser than 10 threads/cm.

In grave 81 (a woman's grave from 570-610 AD) two fabrics were found under the belt. These were part of two garments, both made out of woollen tabbies z/z. The first layer was a dense and fine fabric made out of 0.2mm thin threads (16-17x12 threads/cm). The selvedge described earlier was documented in this fragment. Over this garment another tabby was worn which was a much more open weave, made out of the same thin threads but fewer threads/cm (14x10 threads/cm). This fabric covered the entire back of the buckle and was partly folded over the front as well. Grave 180 is a similar situation with two fabrics on the back of the same buckle. The lower garment here is made of a fine, smooth and regular but slightly loose spin-patterned woollen twill, made out of thin threads (219x13 threads/cm). Over this garment another garment was worn which was coarser than the first garment. It was made out thicker threads but due to the bad state of preservation identification

of fibre and weave was not possible. In grave 235 a buckle was found with two layers of tabby attached to the back. The garment directly below the buckle was a coarse tabby z/z (10x8 threads/cm), worn over another finer woollen and open tabby z/z (16x10 threads/cm).

Another group of interesting objects are the ones associated with or hanging from the belt. Wijchen has yielded 20 of these objects consisting of several knives, belt rings, chains and other tools such as a toilet set and a purse ring. The textile types attached to these objects are tabbies and twills in equal amounts and in varying qualities ranging from very coarse (4x4 threads/cm) to fine (20x12 threads/cm). On some of the objects several pieces of textile were present. One of the knives (from grave 183) had six different fabrics attached and this object will be discussed in more detail below.

A ring belonging to a sword belt from grave 38 (a man's grave) was originally lying in between two different garments. One of these was made out of a coarse 2/2/ twill of 8x6 threads/cm, on the other side was a somewhat finer twill made out of 10x10 threads/cm. In grave 199 (possible juvenile?) a chain was found with two layers of textile attached. Directly against the chain is a fine and open tabby (12x8 threads/cm), which is covered by (or lying on) a much coarser fabric of 8x8 threads/cm. The function of these textiles is not clear due to the fact that we do not know whether the chain was lying on top of the fabrics or was covered by them.

5.5.3.2 Textiles associated with the lower body

Strap ends and the textiles attached to these objects give information about the garments that were worn between the belt and the knee, since the strap end was hanging down from the belt. There are two examples of strap ends found in Wijchen, both of them from the period 570-610 AD. In none of them the gender of the deceased could be established. No strap ends with textile remains were present in Lent-Lentseveld.

On the back of the strap end from grave 25, 3 or 4 layers of folded textile woven in 2/2 twill were present. It was a fine fabric made out of thin threads. Unfortunately the fabric was very badly preserved, therefore thread count and fibre identification was not possible. The other strap end from grave 286 was lying on a much coarser fabric made out of 2/2 twill of 7x6 threads/cm. In the first example it is clear that the strap end was lying on the folds of an undergarment or tunic that reached below the hip. This garment was evidently made out of a fine fabric. The interpretation of the other textile is not so straightforward. Since only one layer of textile is present it is not clear whether we are looking at an undergarment/tunic or perhaps a hose or trousers.

5.5.3.3 Textiles associated with brooches

In Lent nine textiles were found that were attached to the back (or spring) of brooches. These have been found in six graves, all of them women's graves. We can distinguish brooches that were positioned in the area of the chest and those that were found just below the pelvis. The general idea is that brooches in the area of the hip were used to fasten or close an open outer garment or cloak, whereas brooches in the area of the chest may have had the same function or were used to close the head aperture of a garment or fasten a veil or shawl onto another garment. The finds described below will illustrate that it is difficult to make generalized assumptions such as these.

The woman in grave 20 was dressed in the so-called *Vierfibeltracht*, which is characterised by the occurrence of four brooches in a more or less vertical line on the body.[260] The upper two were a pair of small round brooches, whereas the lower two were a set of larger bow brooches. The *Vierfibeltracht* is generally ascribed to the fifth and early sixth century, which would fit into the chronology of Lent since the burial is dated in the period 475-600. On one of the disc brooches several s-twisted threads were found of rather large diameter (0.75 mm), indicating that it was attached to a rather coarse fabric.

260. Strauβ 1992, Siegmund 1998.

One of the bow brooches that were found between the legs directly under the area of the pelvis had several z-twisted threads of a much smaller diameter (0.2 mm) attached, indicating a delicate or thin fabric. The first we can gather from these finds is that the two sets of brooches were not used to fasten the same garment. If used as described in the model of the *Vierfibeltracht* the gown or undergarment to which the disc brooches were attached was made out of a coarse fabric while the cloak worn over the gown was made out of a much finer fabric. This seems contradictory with the aforesaid character of the fabrics worn over the belt, that were all made out of thicker threads than those found adhered to this bow brooch.

The textiles from grave 16 give a similar picture. Here a pair of bow brooches was found under the hands of the buried woman, directly under the area of the pelvis. The brooches were positioned above each other. In the spring of one of the brooches several z-twisted threads and a piece of leather were documented, whereas in the spring of the other brooch several s-twisted threads were present. Both types of threads were thinly spun (0.2-0.3 mm) and may have belonged to the same fabric that, judging from the thin threads, must have been rather fine and not really befitting an outer garment or cloak such as found covering the different belt parts in this cemetery. The occurrence of leather on one of the brooches may imply that the garment to which the brooch was fastened had a leather edge or that a leather strap was attached by the brooch onto the fabric.

In grave 34 a pair of bow brooches was found. One of these brooches was positioned besides the body while the other was positioned between the legs, just under the area of the pelvis. On the spring of this last brooch several 0.5 mm thick z-twisted threads were present. Another brooch in the shape of an animal was found in the area of the neck. This brooch was attached to a fine and densely woven 2/2 twill z/s and was made out of 0.3-0.75 mm thick threads.

The pair of bow brooches in grave 35 was found on the pelvis of the buried woman. On the spring of the lower brooch a few fibres were found, but no fibre or fabric identification was possible.

The S-shaped brooch from woman's grave 2 was attached to a fabric made out of 0.2mm thin threads. This brooch was found in the area of the neck. In grave 42 a pair of s-shaped brooches was found in the area of the upper chest. On the spring of one of these brooches a few fibres were documented but fibre or fabric identification was not possible.

In Wijchen several brooches were found with textile remains attached. These brooches have been found in four graves and one was a stray find.

Woman's grave 65 (570-610) yielded one disc brooch on the centre of the chest area, with textile remains on the back and front. The brooch was attached to three layers (or folds) of a rather coarse woollen tabby. Because of the folds the thread count could not be ascertained (10x? threads/cm). On the front side of the brooch was a fragile and open tabby made out of thin threads (0.2 mm). Due to the presence of a thick layer of paraloid on top of the brooch the thread count could not be discerned properly (approximately 15 threads/cm).

Woman's grave 156 (610-640) yielded a single disc brooch, which was found in the area of the chest. The brooch was attached to a rather coarse twill which was badly preserved and consequently could not be analysed properly.

Woman's grave 226 (530-555) yielded a single bow brooch, which was found in the area of the hip. This brooch was attached to several folds of a fine and dense woollen tabby (14x16 threads/cm) woven out of thin and regularly spun threads. This fabric was worn over a garment made out of a more open woollen tabby (13x10 threads/cm).

Woman's grave 235 yielded a pair of bow brooches more or less above each other in the area of the hip. The lower brooch was attached to a tabby (14x12 threads/cm, 0.3-0.5 mm thick threads), which in turn covered a garment made out of a coarser tabby (6x8 threads/cm, ca. 1 mm thick threads). The brooch was used to fasten the outer garment but was probably not attached to the garment underneath.

The textiles described above allow some general remarks on the way brooches were used in the sixth century women's graves in Wijchen. In the area of the pelvis the brooch was fastened to a garment made out of densely woven woollen tabby. Since no borders have been documented it is not possible to confirm that this outer garment was a cloak or open outer garment, which was held together either under the chin or in the area of the hip. Underneath this garment was an undergarment or gown, generally made out of a coarser or more open tabby than the outer garment. In the area of the upper chest the brooches were attached to a coarser fabric. This could just be a reflection of differences within the cemetery, but could also point to a different function of the garments. Were the coarse fabrics perhaps shawls that covered the shoulders and were held together by a single brooch on the chest? Or was the single brooch used to close the head aperture of a gown? In grave 65 the brooch under the chin was covered by a fragile and open tabby, which may have been used as a veil.

The quality of the fabrics attached by the brooches is not the same as observed on the front of the belt parts. In Wijchen the textiles on the front of the belt were all coarser than 10 threads/cm while those attached to the brooches were finer than 10 threads/cm. In Lent the textiles on the front of the buckles were finer than in Wijchen, but the fabrics attached to the brooches were woven out of thinner threads and therefore must have been of a different character (or quality) than those present on the front of the buckles. The question arises whether these two types of fabrics represent different garments.

5.5.3.4 Textiles associated with weapons

Weapons were either positioned on the body or placed separately in the grave. Textiles found adhered to these weapons may either be remains of clothing, a shroud or pieces of cloth in which the weapons were wrapped.

Lent

Two swords and a seax from Lent-Lentseveld yielded pieces of textile. One of the swords contained fragments of the same fabric on both sides: a tabby of 10x10 threads/cm. This could mean that the sword was lying in the folds of an outer garment but the weapon may also have been wrapped in a separate piece of fabric before or during the burial. A twill of equal quality was attached to one side of the seax. The textile on the other sword was damaged and could not be analysed. One of these fabrics was made out of wool. Fibre analysis was not possible for the other two textiles.

Wijchen

The textiles adhered to the weapons from the cemetery of Wijchen do not differ from those of Lent-Lentseveld. Here two lance heads, an arrowhead, an axe and a seax were found, all covered on one side with a rather coarse fabric. Lastly grave 299 yielded a hacking blade, which was covered on one side with two layers of the same fabric. These fabrics were generally 2/2 twills, only one example of tabby was found associated with the weapons from Wijchen, and most of these were made out of wool using thick threads of 0.75 mm or more. Again, the tabby is the exception: here thin (0.3 mm) threads were used in one system and thicker threads (0.75 mm) in the other system resulting in a rather fine weave of 14x10 threads/cm. A shield grip was found associated with a woollen diamond twill.

A preliminary conclusion is that the textiles associated with weapons are in general rather coarse fabrics. It is not possible to determine the function of these textiles: were the weapons wrapped in these textiles or were they merely covered with a shroud? It even remains possible that these textiles belonged

to the outer garments of the deceased but this seems less likely when we compare them to the ones found on the front of the buckles. The fabrics associated with buckles may represent these outer garments and these are generally finer than the fabrics found on the weapons.

5.5.3.5 Reconstructing men's dress in the period 300-350; Wijchen grave 183

In grave 183 several objects were found with one or more fragments of textile attached. Most informative here is a knife[261] in a leather sheath on which probably six different textiles were visible (fig. 1.2). This illustrates the fact that in most graves only a very limited part of the original textiles have survived and it should encourage us to be careful in our attempts to reconstruct the way people were dressed upon burial, solely on the basis of small numbers of surviving textiles.

The knife was sheathed in a scabbard of which the outer layer consisted of leather, which covered a layer of textile. The textile used in the scabbard was a fine woollen diamond twill z/z (12-14x10-12 threads/cm). The scabbard was lying on two layers of textile. From this we can conclude that the man was wearing an undergarment made of a woollen diamond twill z/s (14x10 threads/cm), covered by another garment made out of a coarser tabby (8x8 threads/cm). On top of the knife and scabbard were another two or maybe even three textiles. Directly on top of the scabbard was a tabby z/z made out of thin threads (13x11 threads/cm). On another part of the scabbard a large piece of damaged textile was present but here only thin z-twisted threads were discernible so it is not certain whether this is the same fabric as the tabby. Both pieces of fabric were covered by another textile made out of very thick threads (1mm). This textile was very damaged as well so weave and fibre could not be identified.

Also present in the grave was a buckle of a sword belt and a large piece (2 layers) of non-mineralized textile that was not attached to the buckle but was exactly the same size as the back of this object. Therefore it is assumed that this fabric was originally on the back of the buckle. It is a regularly woven 2/2 plain twill woven out of woollen threads (13-15x12-15 treads/cm). There is no resemblance to the fabrics found below the knife so it must be assumed that this fabric was either part of the belt or another garment worn under the belt.

Lastly there were an axe and three lance heads in the grave that were all covered with or lying on the same fabric: a coarse woollen 2/2 twill (6-10x7-8 threads/cm). This textile was either a cloth lying on the bottom of the coffin or a shroud covering all the objects in the grave. The thread thickness of this textile resembles the topmost textile on the knife, but it is not certain that these textiles are the same. Summing up: even in this grave - with so many surviving textiles - it is not possible to reconstruct the way the deceased was dressed. However we do get a good picture of the stratigraphy of textiles on the body: two or three under garments and one or two outer garments (or one outer garment and a coarsely woven shroud covering the body and the weapons in the grave).

5.5.3.6 Reconstructing women's dress in the period 450-555; Wijchen grave 235

Grave 235 yielded a pair of brooches with two types of textile attached (fig. 5.9). Also present in the grave were a buckle with two types of textile and a ring with one layer of textile. Together these objects enable us to partly reconstruct the garments of the 15-25-year-old woman buried here.

In the grave a buckle was found with two layers of tabby attached to the back. The garment directly below the buckle was a coarse tabby z/z (10x8 threads/cm, 0.75mm thick threads), worn over another but finer and somewhat open woollen tabby z/z (16x10 threads/cm, 0.2mm thick threads). The grave also yielded a pair of bow brooches more or less above each other in the area of the hip. The lower brooch was attached to a tabby (14x12 threads/cm, 0.3-0.5mm thick threads), which in turn covered a garment made out of a coarser tabby (6x8 threads/cm, ca. 1mm thick threads). This last tabby

261. Find number 13.017.

is probably the same as the fabric lying directly under the buckle. The brooch was used to fasten the outer garment but was probably not attached to the garment underneath. Lastly a bronze ring was found together with several beads and small layer of textile on one side. This fabric was very stretched and only a few threads/cm remained. The thread thickness of this fabric is similar to the fabric fastened by the bow brooch but it is impossible to tell whether it is the same fabric.

We can conclude that the young woman buried in grave 235 was dressed in an undergarment made out of a fine woollen tabby, covered by another woollen dress or garment made out of a coarser tabby. This dress or garment was fastened at the hip with a belt. Lastly the woman wore an open garment or cloak made out of a fine tabby, which was closed at the hip by two bow brooches.

5.5.4 Textiles associated with men, women and children

Figure 5.3 shows the amounts of textiles that can be associated with men, women and children in the cemeteries of Lent-Lentseveld and Wijchen. As stated before: the textiles from Lent-Lentseveld have positively been associated as such based on the skeletal remains in the graves. In Wijchen this has been based on the gender-association of the objects in the graves. Although the amount of textiles is not very high, there are some preliminary conclusions regarding the use of textile types and textile quality among men and women. The textiles from children's graves are unfortunately too limited a number to make any assumptions regarding the use of fabrics in the burials.

Figure 5.10 shows the distribution of the textile types among the women, men and children in Lent-Lentseveld. The tabby weave does not occur often in this cemetery, which is remarkable to start with because in other cemeteries, including Wijchen, the tabby weave is one of the most numerous fabric types. This fabric is completely lacking in women's graves and only occurs in graves of men and children. Women in Lent-Lentseveld seem to have been buried solely in twills. Note however the large amount of indeterminate fragments of textiles in women's burials that may have influenced this distribution pattern. In men's graves there is a more or less equal distribution of twills and tabbies.

When we look at figure 5.11 it becomes obvious that the use of textiles in Wijchen in the period 450-600 AD is different. Here women are buried mostly in tabbies, men in twills with small amounts of tabbies. In the period prior to 450 AD and after 640 AD however, much more variation is observed in graves of both and men and women.

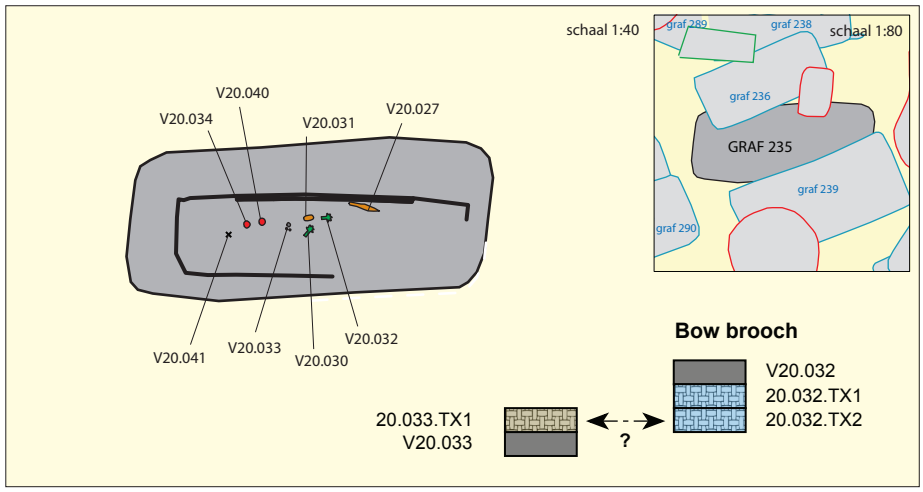
There are also differences between men and women regarding the quality of textiles. As is shown in figure 5.12 the textiles in women's graves from Lent-Lentseveld are finer than those in graves of men and children. This trend is – although less pronounced – also visible in the cemetery of Wijchen (fig. 5.13). This difference can be partly explained by the fact that men's graves contain weapons and these objects were wrapped in or covered by coarse fabrics. Particularly women's graves 23 and 35 from Lent-Lentseveld stand out by their higher quality textiles. The other graves from both cemeteries however show a mixture of fine and coarse textiles making it impossible to discern groups of graves within the cemeteries based on textile quality.

5.6 DISCUSSION

This chapter set out to answer several questions regarding the character, quality and use of the textiles from Lent-Lentseveld and Wijchen. These questions will be covered in the following paragraph.

The textiles found in Lent-Lentseveld and Wijchen are a rather uniform body of textiles with only a few basic fabric types and no special or fine weaves. In this respect they are comparable to other rural cemeteries excavated in the southern part of the Netherlands such as Bergeijk and Posterholt.[262]

262. The textiles of these cemeteries have been published in Brandenburgh 2012a & 2013.


schaal 1:40
V20.040
V20.034
V20.031
V20.027
V20.041
V20.033
V20.030
V20.032
schaal 1:80
graf 289
graf 238
graf 236
GRAF 235
graf 239
graf 290
Bow brooch
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20.032.TX2
20.033.TX1
V20.033
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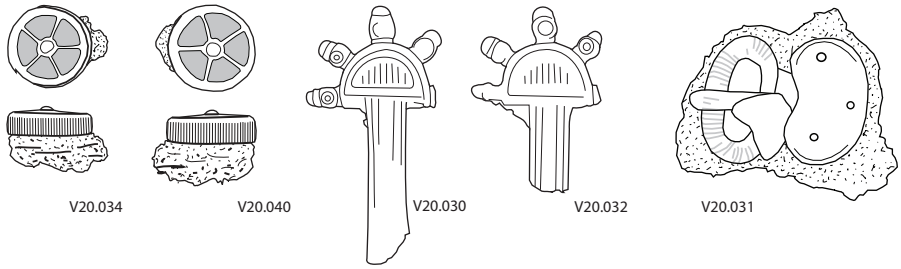
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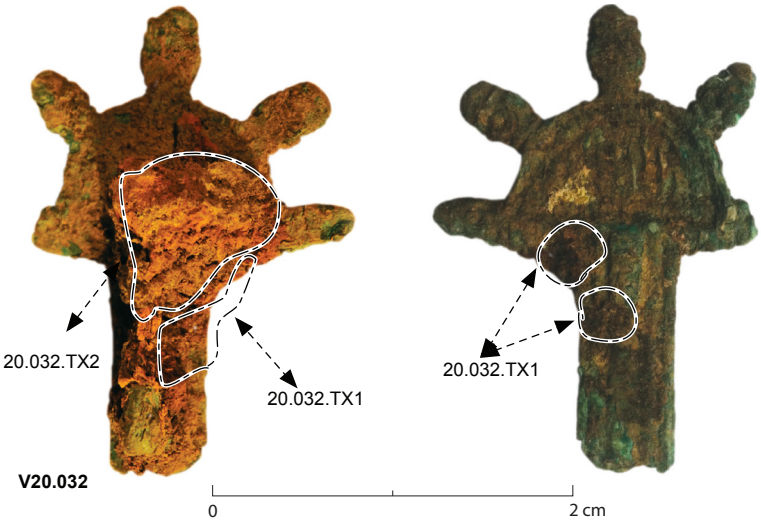
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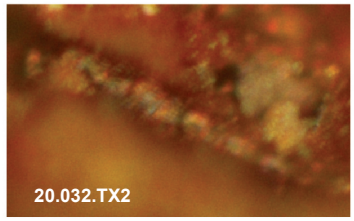
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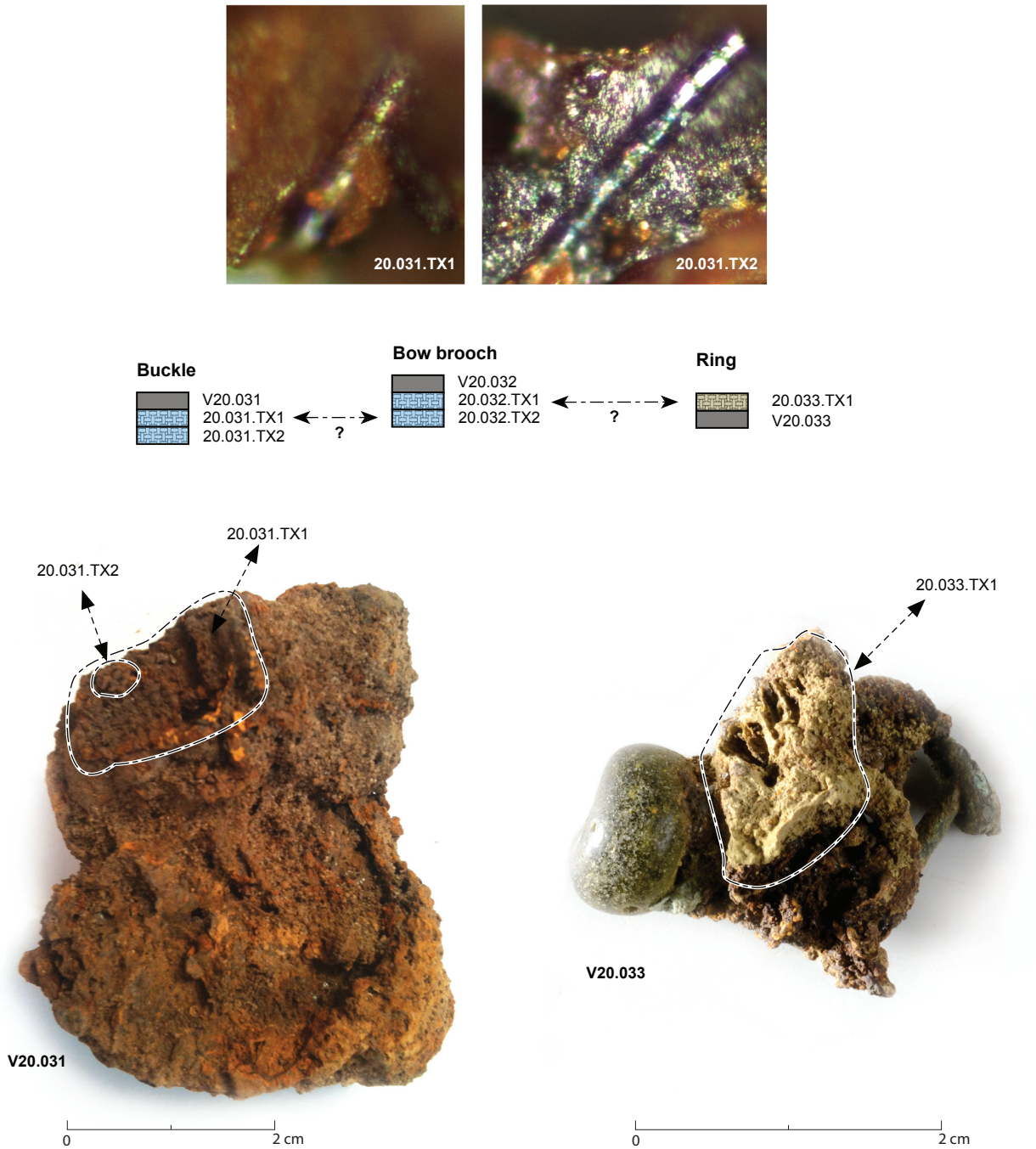

Fig. 5.9 The textiles that were attached to the various objects in woman's grave 235 in Wijchen.

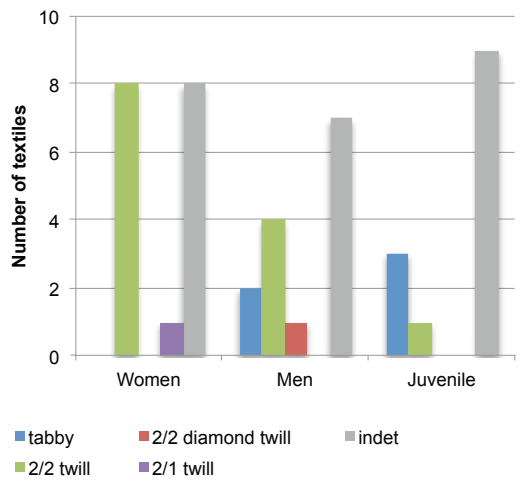

Fig. 5.10 Distribution of the fabric types among graves of women, men and children in Lent-Lentseveld.

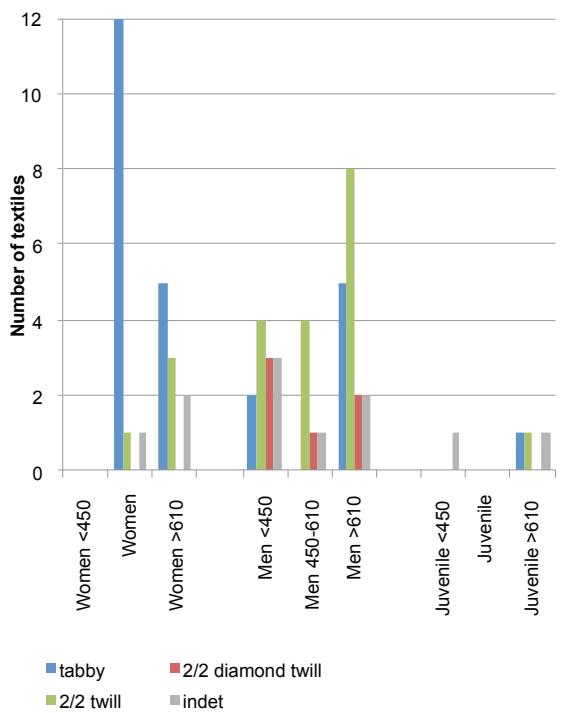

Fig. 5.11 Distribution of the fabric types among women, men and children in Wijchen. The period 450-610 is contemporary to the textiles from Lent-Lentseveld in figure 5.10. Textiles from graves where the gender could not be discerned have been left out of this graph.

The textiles from Lent-Lentseveld and Wijchen show little variation in fabric types and textile quality. There are however differences between the sites and within the sites. In Lent-Lentseveld the most popular textile type is 2/2 twill whereas Wijchen shows equal numbers of twills and tabbies. Noteworthy here are the differences between men and women in both cemeteries: in Lent the women were buried in twills and in Wijchen the women seem to have had a preference for tabbies. Men in both cemeteries were generally buried in twills with small quantities of tabbies. Women generally wore clothes made out of finer fabrics than men. This difference can partly be explained by the fact that the weapons in men's graves were covered by or wrapped in coarse textiles. The local variation between men and women that can be observed needs further elaboration. Looking solely at the fabrics, both cemeteries seem to have a rather homogeneous population. There are no graves or groups of graves that contain textiles of exceptional quality. Only women's graves 23 and 35 from Lent-Lentseveld stand out by their higher quality. The other graves from both cemeteries however show a mixture of fine and coarser textiles. In general the fabrics from Lent-Lentseveld are finer than those from Wijchen. The majority of the textiles from Lent-Lentseveld is medium fine to fine (10-20 threads/cm), a small number is coarser and only one fragment is very fine (30x30 threads/cm). In Wijchen there are significantly more fabrics with a thread count below 10 threads/cm than in Lent-Lentseveld.

Many textiles were adhered to dress accessories enabling us to create a generalised picture of the way people were dressed upon burial. In many cases there is evidence for an under garment over which another garment (tunic or dress?) was worn. The undergarment is generally a fine fabric and can be either densely woven or slightly open. The garment worn above is coarser, made out of thicker threads and is generally a more open fabric. There is not enough information to ascertain the length of these garments. Only two strap ends were found with textiles attached indicating that these types of fabric were present in the area below the hip. Over the belt both men and women probably wore another garment made out of a medium fine and densely woven fabric. In the case of the women's graves

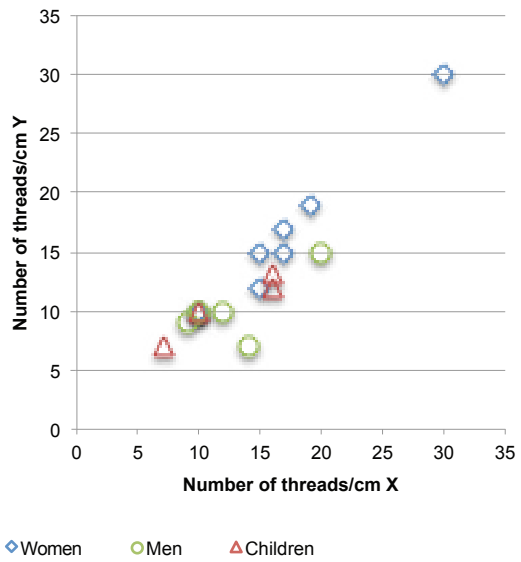

Fig. 5.12 Quality of the textiles associated with women, men and children in the cemetery of Lent-Lentseveld.

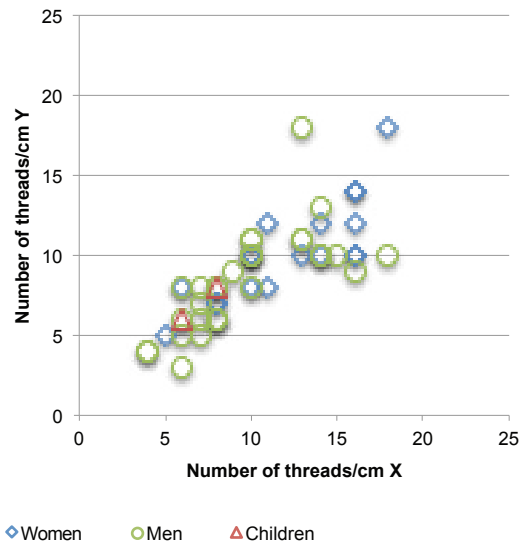

Fig. 5.13 Quality of the textiles associated with women, men and children in the cemetery of Wijchen.

this garment was open and fastened at the front with one or more brooches, either under the chin or at the hip. There is no evidence for hems or tablet woven borders in the graves so we do not know how the edges of the garments were reinforced. Utensils and knives were hanging from the belt or – according to several objects from Wijchen – may have been stored in a pouch made out of coarse fabric. In one grave there may be evidence for the presence of a veil or shawl hanging over the shoulders and covering the brooch that fastened the outermost garment. This fabric was a fragile and open tabby woven out of thin threads.

There is no information to be gathered regarding the cut and finish of the different garments, nor do we know anything about the way the lower body was dressed. No garter buckles were found, nor can textile remains be located in this area of the body.

Although there is no conclusive evidence yet, there may have been shrouds present in the graves. The textiles associated with weapons are in general rather coarse fabrics. It is not possible to determine the function of these textiles: were the weapons wrapped in these textiles or were they merely covered with a shroud? Since this type of very coarse fabric is also present covering all the other textiles in men's grave 183 in Wijchen it may be possible that the entire content of the grave was covered with a shroud.

Much research is still needed to complement the results presented above. Dye analysis may provide valuable information about the appearance of the textiles in the graves. Moreover, having analysed the variability in the use of fabrics is only the beginning of understanding what these differences mean. In this respect the results presented above are merely stepping stones towards a better understanding of Merovingian burial practice that need further elaboration.

6. Early medieval textile remains from settlements in the Netherlands

An evaluation of textile production

Previously published as:
Brandenburgh, C.R. 2010: Early medieval textile remains from settlements in the Netherlands. An evaluation of textile production, Journal of Archaeology in the Low Countries, Vol 2.1 (2010), 41-79.

This article was in fact the first to be published for this PhD-thesis. It discusses the textiles that were found in settlements in the Netherlands, mainly from the north of the country. The finds from these settlements are numerous but not narrowly dated. It may be assumed that some textiles are contemporary but many are younger than those found in the cemeteries, which makes it difficult to compare them. The analysis of this large body of textiles has resulted in information about the way textiles were produced and sewn into garments. Moreover, it enabled an analysis of the degree of specialisation needed to produce these textiles.

6.1 INTRODUCTION AND RESEARCH PROBLEM

The last few decades saw an increase in research on early medieval textiles. After preliminary inventories and several publications on single sites,[263] the enormous survey of European textiles by Bender Jørgensen provided an insight into the development of cloth-production in this period for Northern Europe, including the Netherlands.[264] Still many questions remain relating to the technical and social aspects of the production and use of textiles and clothes in the Netherlands in this period. It is not clear how people were dressed and how social or economic differences were reflected in clothing. Neither do we know how textile production was organised within and between different types of settlements.

The aim of this research is to achieve a better understanding at a practical and theoretical level of the production, function and use of clothing throughout the early Middle Ages in the area now called the Netherlands. Looking beyond the practical function of clothing it can be seen that there are many social aspects to the way people make and wear clothes. The organisation of textile production is closely related to the way society was organized. By studying the way production took place it is possible to gain an insight into the social position of the craftspeople, ranging from domestic production for personal consumption to specialists supplying their goods to others. Clothes themselves are social markers as well. The identity of a person or a group of people is often reflected in the way they dress. Diversity and changes in clothing can therefore be related to the social structure of society and to changes that may have occurred in that society over time. This chapter aims to provide some answers to the problem of textile production by the analysis of the large number of textiles found in early medieval settlements in the Netherlands.

263. Schlabow 1974 (textiles from the northern provinces); Zimmerman 2005 (Ulrum); Comis in prep. (Anjum); Miedema 1980 (Dorestad); Leene 1964 (Middelburg); Vons-Comis 1988, Van Es & Ypey 1977 (Zweelo).
264. Bender Jørgensen 1992.

6.2 RESEARCH QUESTION, DATA AND METHODS

6.2.1 Research question

The main purpose of this chapter is to consider textile production in relation to the society in which it took place. How and where were textiles and clothes made and by whom? Was cloth production already specialized and related to an extensive trade network or was it a craft that mainly took place at the level of the household? To do so, it is necessary to reconstruct how textiles and clothes were made. It may be possible to identify indications for production other than for domestic consumption in early medieval society by the assessment of the degree of specialization in textile production.

There are several approaches considering textile production and questions relating to this subject. First of all, it is possible to study the textiles themselves. The analysis of the products of textile craftspeople may show us how the cloth was made. One can moreover ascertain the degree of specialisation needed to produce the textiles and the way these textiles would have been valued by the people using them. Another approach is to study the tools used to produce textiles, their development and distribution within a settlement, which may point to locations where different parts of the production process took place. A comparison of different settlements might even give information about the relative importance of textile production at these sites. Lastly, an evaluation of the access to the raw materials for textile production, like wool and dyestuffs, and indications for overproduction may give a view on the role of a settlement in any trading of textiles. This type of information may be acquired with a landscape-centred approach where well-documented bone spectra from different sites are available. The focus of this chapter is however, the textiles themselves.

6.2.2 Data

6.2.2.1 Quality

The textiles discussed in this chapter have all been found in settlements in the Netherlands. Most of these finds were uncovered in the dwelling-mounds (or *terpen*) of a predominantly rural society in the north of the country. These sites have yielded very few remains of burials, therefore the textiles are likely to have been deposited in settlements. A small percentage was found in major centres of a quite different character, such as Dorestad and Middelburg. Geographically and culturally the *terpen* differ from the towns of Middelburg and Dorestad. The *terpen* are considered to have more ties to Scandinavia, Northern Germany and Anglo-Saxon England. Dorestad and Middelburg, situated on the edge of the Merovingian and Carolingian empire, are likely to have been more influenced by the regions in the south.

The textiles uncovered in these settlements have properties that make them worth treating as a separate find category among the body of textile finds from the Netherlands, in contrast to the textile fragments that have survived in cemeteries through the corrosion of metal artefacts. Although the cemeteries offer much better information for a chronological framework for textiles in use and for reconstruction of clothes, they do not lend themselves easily to the examination of the entire process of production and use of textiles. Textiles found in settlements, on the other hand, contain information not only about how a fabric was spun, dyed and woven. They also give information about finishing processes and about how a fabric was put together, sewn, used and repaired. It is possible to cover a wide range of questions about the process of textile production on the basis of the often very large pieces of textile from the settlements.

Besides these advantages there are considerable disadvantages to deal with as well. Firstly, the textiles from the settlements are often poorly dated. This is related to the way many of these textiles have been recovered. The habitation of the earliest *terpen* dates back to c. 600 BC. After the third century AD a decline in population commenced, followed by a phase of scarce occupation. Population increased only after the fifth century and the *terpen* have been gradually raised up to their present heights. At the end of the 19th century the soil that had accumulated for centuries had been discovered as a valuable fertilizer and therefore groups of diggers methodically dug away large parts of the mounds. These people sometimes had an eye for antiquities but as they dug straight from the top down, they could collect objects dating over 1000 years apart in one single day.[265] As a result there may be textiles in the dataset spanning approximately the period from 500 BC to 1500 AD. Excavated sites on the other hand do not have this dating problem. Dorestad is among these, as well as Middelburg and a few of the old terp excavations like Ezinge, Leens and Westeremden (table 6.1, *). In some cases textiles are assigned to a period of several centuries, based on the fact that most other finds from these sites date from that period (table 6.1, **). There are however also textiles that theoretically can be dated anywhere within the long period of habitation of a site. This makes it impossible to use this dataset as a whole to create a chronological framework for textiles in the early Middle Ages.

A second disadvantage is that there are only woollen textiles in the dataset. During the Middle Ages people wore clothes of animal fibres, such as wool and of fibres made of plants, like linen. Degradation of these fibres is caused by micro-organisms, oxidization and other chemical processes in the soil. Linen fibres break apart by a process of hydrolysis, which occurs under acid conditions. Wool on the other hand, like leather and fur, may dissolve completely in alkaline conditions and is much better preserved in acid soil.[266] These circumstances clearly do not mix, so generally only one of the two types is preserved at any one site. In every settlement that has been examined, soil conditions were acid, which means that the preserved textiles are made of wool. Information about linen could come from the cemeteries, which will be published in the next few years.

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265. Knol et al. 2005.
266. Huisman 2009.

Site	Habitation period of site	Textiles are assigned to period:	N textile-fragments	N individual woven textiles	N individual cords, ropes and braids
Beetgum	350-900	350-500**	4	1	0
Blija	600 BC-900 AD	350-550**	2	1	1
Cornwerd	475-725	475-725**	7	0	2
Wetzens	350-900	500-900**	5	0	5
Jouwswier	350-900	500-900**	1	0	1
Kloosterwijtwerd	0-900	500-900**	5	4	0
Aalsum	300-900	500-700 and 750-900**	9	6	0
Dokkum, Berg Sion	500-900	Hat is dated between 568-651 cal AD; many textiles are associated with this find.	121	77	2
Westeremden	500-1000	500-1000**	44	26	1
Ulrum		600-800*	1	1	0
Leens		600-900*	94	42	10
Dorestad, Wijk bij Duurstede	600-900	600-900*	7	3	3
Oostrum, Mellemastate	500-900	700-900**	7	4	0
Oosterwijtwerd	350-900	700-900**	2	2	0
Anjum	700-1400	700-900*	1	1	0
Cornjum Dekema-/ stoomterp	400 BC-900 AD	775-900**	6	3	1
Rasquert hat	350-900	Hat is dated between 800-900*	1	1	0
Middelburg	875-1600	875-1000*	28	12	0
Leeuwarden hoogterp	350-900		15	7	2
Ferwerd Burmaniaterp	200 BC-900 AD		20	12	3
Ferwerd Burmaniaterp II	400 BC-900 AD		1	1	0
Foswerd	350-900		6	4	0
Holwerd, dorpsterp	350-900		1	0	1
Menaldum	unknown		3	1	2
Kimswerd	300-900		2	1	0
Rasquert other finds	350-900		8	4	0
Sellingen/Zuidveld	350-900		3	2	0
Wijnaldum	100-1000		12	5	3
unknown, prov. Groningen	unknown		8	1	0
Teerns	200 BC-900 AD		2	1	1
Hoogebeintum	350-900		13	5	1
Wierhuizen	250 BC - 1300 AD		1	1	0
Total			440	229	37

Table 6.1 Early medieval sites in the Netherlands yielding textiles. The second column lists the entire habitation period of the site (after Taayke 1996; Knol 1993). The third column contains the period to which the textiles may be assigned. This is based on either excavation evidence (*) or to the fact that the majority of finds from a site is dated in this period (**).

Fig. 6.1 The textiles from Cornjum (objectnr. FM 120-411) were still in their package dating from the early 1900´s.

Lastly, it must be considered that the textiles found in refuse layers in settlements are literally refuse. The fragments are generally heavily worn, re-used and finally discarded as rags, which makes it difficult to ascertain their original function.

6.2.2.2 Dataset

The dataset consists of 440 fragments of 265 different textiles, from 31 sites (table 6.1). Of these textiles, 80 have been published before in more or less detail.[267] The others had until now not been analysed. Some of these were even in their original wrapped up state of the early 1900's (fig. 6.1), or were still adhering to the clay from which they had been recovered. As a consequence, these textiles had to be cleaned with demineralised water and dried flat before analysis could take place.

267. Schlabow 1974 (part of the finds from Leens, Westeremden, and a few other textiles from the northern provinces); Bender Jørgensen 1992 (part of the finds from Dokkum, Berg Sion); Zimmerman 2005/2006 (Ulrum); Comis in prep. (Anjum); Miedema 1980 (Dorestad); Leene 1964 (Middelburg); Zimmerman 2009 (hats of Rasquert and Leens).

The textiles may be divided into woven fabrics (226) and others like ropes, cords, braids and felt (39). The finds vary in size from small scraps of a few square centimetres to large pieces of approximately 40 x 35 cm in size. The textiles are probably not only the remains of clothes of the people inhabiting the settlements, but may also have been used for household needs such as bedding or sacking (see 6.4 for more information about the function of the textiles).

A group of 78% of the textiles can be assigned to a period of several centuries within the early Middle Ages. These finds will be presented in the following text, tables and graphs grouped per site in chronological order. The other 22% will be treated as a separate group as it is not certain whether they are early medieval or older.

6.2.3 Methods

6.2.3.1 Some central concepts: skill and quality

In the following paragraphs the concepts skill and quality are mentioned several times.

The Oxford English dictionary gives the following description for the noun skill: 1 the ability to do something well; expertise or dexterity. 2 a particular ability. Production of textiles was commonplace in early medieval society. Manufacture for daily clothes, household furniture, and sailing clothes must have taken up a considerable share of everyday life. From a study of working time, conducted in 1760, it is known that up until the 18th century women in South Sweden worked at least eight months a year on textile production for domestic needs only.[268] The techniques to make textiles were therefore widespread and imbedded in the entire society. Skill in early medieval textile production must be conceived as the ability to make textiles of a higher level, using refined techniques or expertise. Skill does not necessarily lead to finer textiles: there are many other reasons for which a textile may be

268. Andersson 2003.

1. Household production • Production covers the household's needs • Household members possess the skills and knowledge needed • Raw material is commonly accessible • Knowledge of manufacturing process is widespread.	2. Household industry • Seasonal part-time production • Production scale beyond the needs of the household • Organised at household level • Surplus used for trade, exchange or tax • Production when spare time is available.
3. Tethered specialisation: • A craftsman is linked to a patron and produces solely for him • Production by specialist • Work is a full time occupation • Specialist skills are enhanced by full time occupation. • Better quality products • High quality products are used by the patron as desirable gifts • Control of the skilled specialist adds to the power of the patron	4. Workshop industry: • A financially independent craftsman • production for a market • this type of production requires large demands and a higher degree of social complexity • Products are made efficiently and standardized: the time and costs are reduced to a minimum • Full time production by a specialized craftsman

Table 6.2 Characteristics of the different modes of flint production defined by Olausson (1997) and applied on archaeological textiles by Andersson (2003).

valued. The quality of a textile – and with that the way it was valued – depends on its properties in relation to the use of the textile. It is often a combination of several properties, which makes a fabric suitable for a specific use. In cases of clothing it is obvious that a fine and technically complex fabric is very suitable and valuable. Sailing clothes on the other hand would need completely other properties. A suitable sail cloth may very much resemble a fabric that in terms of clothing would be seen as of average quality.[269] The appearance of a textile may also be of significance because it can be just as important in signalling social status as the form or shape of a garment.[270] These properties are generally not easy to measure using standard analytical methods for archaeological textiles, for these methods may describe textiles as technically similar while the naked eye conceives differences.[271]

269. Cooke e.a. 2002.
270. Hammarlund e.a. 2008.
271. Hammarlund 2005.

6.2.3.2 Chaîne opératoire

An important question is: how can one discern home craftsmanship from production for a textile market by studying the textiles themselves?

A useful tool to analyse textile production and specialization is the concept of *chaîne opératoire,* or operational sequence, which considers a production process as a sequence of (interrelated) actions, influenced by technical possibilities and personal and cultural choices.[272] This implies a study of the individual steps in the process of textile production, which makes it possible to evaluate every action and to discern the general mode of production. In each step one can ask whether producers had access to the same materials, skills and tools in the making of the final product. Although this is a somewhat technical approach, it is useful for possibly distinguishing ordinary textiles from specialized products made by people with specific skills or tools.

272. Skibo & Schiffer 2008.

6.2.3.3 Production relating to society

Olausson has pointed out that it may be possible to gain greater insight into social complexity by studying how production was organised.[273] Her model, developed for Neolithic Scandinavia, has previously been successfully applied on textile production by Andersson.[274] Regarding specialisation, Olausson recognises five levels of production. Table 6.2 shows the characteristics of the first four levels.

Household production can be present in any kind of society but if it is possible to identify the product of a specialist, this should indicate a higher level of social complexity. The products of these types of specialised production must surely have different characteristics. A craftsman, producing for his patron, will make a product that will heighten the status of this patron. His products therefore, will have to show the time and effort the craftsman has put into it. An independent craftsman would not have the time to elaborate on his work in the same way. He would have to be efficient to make his money, suggesting that his products could therefore be characterised as efficient and standardised, requiring a minimum of production time and there should be little evidence of errors.[275]

Following this model an assessment of the textiles is needed regarding how they were made and whether there are indications of a specific type of production or specialization as pointed out in table 6.2. This is reflected in the details of the process of textile production, from producing yarns (collecting fibres and the fineness of the spinning), through the careful weaving, to the way the cloth was sewn into a garment. It is also useful to consider whether the quality of the different steps in the process is the same or not. Has for example the same level of craftsmanship been applied at each stage of the entire process of making textiles, or has part or parts of the process been of different levels? Lastly it is important to analyse how textiles were used after production and how they were possibly valued by the person or people using them: what were they used for, how were they sewn and how much effort was put into repairing them, until they were finally discarded? It can be argued as to whether this is part of textile production, but in trying to understand textile production, it should also be considered how a fabric was used and repaired to aid understanding of its value.

6.2.3.4 Theory turned into practice

The textiles in the dataset are analysed to ascertain the degree of specialisation in the production process. To do so, every step of the production process has been considered. Analyses of spinning, weaving and needlework have been conducted by the author. These analyses involved describing the techniques used and the quality or craftsmanship visible in the thread, weave or stitching. In the following sections 6.3 and 6.4 the variables used in measuring this quality are presented. Fibre and dye analyses of several samples were done by P. Walton Rogers, The Anglo-Saxon Laboratory. The structure of section 6.3 and 6.4 will follow the results of the analyses, resulting in paragraphs dedicated to fibre processing, spinning, dyeing, weaving, finishing processes, sewing and repairing.

6.3 TEXTILE PRODUCTION

6.3.1 Fleece processing

The end product of a woven fabric is determined from the start of the production process by selecting the proper fibres from a fleece. Analysis of the fibres in archaeological textiles provides information about the natural colour, type and fineness of the wool selected for specific types of textiles. The earlier fleece type analyses were conducted using a chronological model of fleece evolution from hairy to fine and evenly distributed fleeces.[276] Modern critics have argued that this approach is not useful for archaeological textiles. Ryders model does not take into account that the fleece of one single sheep varies greatly at different parts of its body. It also assumes that wool was used straight from a sheep

273. Olausson 1997.
274. Andersson 2003 & 2007.
275. Olausson 1997.
276. Ryder 1964.

Fig. 6.2 Hat found in Oostrum (objectnr. FM 35B-48). The hat was made from naturally white wool which was dyed a light red. The decorative stitching was made in a darker red yarn.

while it is more likely that it was prepared, sorted and selected to create a better yarn.[277] Fleece analysis therefore will not provide chronological information but it may give evidence for the preparation of the fibre before it was spun into threads.

Recently the 'fleece type' of several Dutch samples has been analysed in order to compare these textiles to those in Northern Germany,[278] Norway and Denmark,[279] and Anglo-Saxon England.[280] Samples of 28 early medieval textiles were selected for a quick scan of animal coat and natural pigmentation (table 6.3; analysis by P. Walton Rogers, The Anglo-Saxon Laboratory). All except two textiles proved to be made from sheep's wool. A textile from Beetgum was almost certainly made from the undercoat of goat. Only four textiles were made from white fleeces. Among these were unusual fabric-types, not necessarily locally produced (a felt from Ferwerd and a gauze-like textile, or *Schleiergewebe*, from Leens).[281] The hat found at Oostrum (fig. 6.2) was also made from naturally white wool. Dark brown or black was the most common colour for twills and diamond twills. Several fabrics were woven in a colour-pattern. For these patterns threads of different colours were used, creating stripes or blocks within the fabric. To the naked eye this technique has only been observed in five textiles, but it must have been applied more frequently. Fibre analyses has pointed out that six out of 28 textiles (21%) were woven with naturally dark wool in one thread-system and originally light wool in the other thread-system.[282] Among these were four textiles that had not been recognised as such macroscopically.

Seventeen samples from seven different textiles were selected for further analysis of fleece type (table 6.4). Warp, weft and any sewing thread or pile yarns were treated separately. In order to identify the fleece type, 100 fibres were measured and the results plotted as a histogram. According to the range, mode, mean and degree of skew of the measurements, the samples were allocated to one of seven fleece-type categories: Hairy (H), Hairy Medium (HM), Medium (M), Generalised Medium (GM), Fine (F), Semi-Fine (SF; previously called Shortwool) and Fine/Generalised Medium (F/GM). Eleven of the samples were HM, one was GM, two M and three samples (all from the same textile, Beetgum 46-95) were goat fibre.

Only two textiles show evidence for special preparation of wool. The white wools in warp and weft of the gauze-like tabby, or *Schleiergewebe*[283] have been allocated to the M category because of their symmetrical spread of the fibre diameters and their means between 30 and 40 microns, although the maximum diameter for the M type should be 60 microns and both yarns include a single fibre thicker than 60 microns in diameter (table 6.4). The wool in a similar textile from Hessens in North Germany (He33a, and possibly also in He31c), was similarly difficult to categorise and it was suggested that it

277. Christiansen 2004, Rast-Eicher 2008.
278. Walton Rogers 1995.
279. Bender Jørgensen & Walton 1986; Walton 1988.
280. Walton Rogers 2007, 10-14, 62-64.
281. Ferwerd 101-703, Leens 1939-IV.13A/7.
282. Ferwerd 101-883, Teerns 16D-98/2, Wijnaldum 77A-102B, Dokkum a1913/11.223/2, Leens 1939-IV.23.
283. Leens 1939-IV.3A/7.

Site name	Object code	Pigmentation	Original fleece colour
Ferwerd	101-883	dark: mod.on all light: none	dark: mid brown light: white
Ferwerd	101-703	mostly none, occasional moderate	white
Teerns	16D-98/2	dark: mod. & dense all light: 10% dense	dark: dark brown light: pale grey/off-white
Ferwerd	101-470/3	dense on all	brown/black
Ferwerd	101-470/6	mod.& dense on all	dark brown
Oostrum	35B-147/2	mostly dense, some mod.	black
Leens	1939-IV.13A/5	mod.& dense on all	brown/black
Leens	1939-IV.13A/7	none	white
Unknown	G2008-1.8	most none, occasional mod	white
Leens	1939-IV.37/2	dark Z: mod.& dense on all lighter S: light & dense	Z = dark brown S = variable within yarn – mottled effect
Oostrum	35B-48/1	Z: 3% mod. S: 3% mod. Stch: 24% mod.	Z: white S: white Stch: fawn
Beetgum	46-95	Z&S: mod.&dense all Stch: dense&mod.	Z&S: dark brown Stch: brown/black
Aalsum	33-373	Z&S&loose S: mod.& dense in uneven proportions	uneven brown and brown/black
Leens	1939-IV.18/1	tight Z2S: mod.&dense all Soft Z & S mixed non, mod. & dense	tight Z2S: dark brown Soft Z&S: mottled white/brown/black
Westeremden	1930/2a	dark: mod.all light: light	dark: mid brown light: light brown
Westeremden	1930/4	mod-dense all	brown/black
Westeremden	1930/5a	mod-dense all	brown/black
Westeremden	1926/IX.29b	mod.all	mid brown
Kloosterwijtwerd	1910/I.195/3b	light-mod-dense	mottled brown
Sellingen/Zuidveld	Z.n.1	variable 5%-30% mod	mottled off-white
Leens	Xx	plied: none mid stch: light dark stch: mod.& dense	plied: white mid stch: fawn dark stch: dark brown
Westeremden	1921/I / 2	(a) none (b) light-mod	(a) white (b) fawn
Berg Sion	A1913/11.223 packet 1	dark: dense all light: 6% black	dark: black light: white
Berg Sion	A1913/11.223 packet 2: 'warp Z+S'	Z&S: mod all	Z&S: mid brown
Berg Sion	A1913/12.5B	warp: mod & dense all weft: 40% mod	warp: dark brown weft: mottled brown/white
Berg Sion	A1913/12.5 zn2	all three: mod & dense all	dark brown throughout
Berg Sion	A1913/11.224	light Z: none & some light dark S: mod & dense	light Z: off-white dark S: dark brown
Berg Sion	A1913/11.223D	all three: mod & dense on all	dark brown

Table 6.3 Textiles analyzed for fibre and natural pigmentation.
mod. = moderate; stch = stitching. Analysis by P. Walton Rogers, The Anglo-Saxon Laboratory.

Sample	Structure/ Yarn	Range	Mode(s)	Mean±S.D.	Pearson Coeff. of skew, distribution	Medullas	Pigment	Fleece type
Beetgum								
46-95	2/2 twill: Z	12-67	16	22.9±11.1	+1.01, skewed positive	obscured (≥20%)	100% dense	Goat underwool
46-95	2/2 twill: S	11-73	16	22.5±10.4	+0.81, skewed positive	obscured (≥15%)	100% moderate & dense	Goat underwool
46-95	stitching	10-58	17	20.8±8.7	+1.05, skewed positive	obscured (≥10%)	100% moderate & dense	Goat underwool
Dokkum, Berg Sion								
Hat A1913/11.223D	2/2 diam: Z	16-70	27	34.3±11.0	+0.56, skewed positive	obscured (≥10%)	100% dense	Hairy Medium
Hat A1913/11.223D	2/2 diam: S	14-86	25	35.3±13.9	+0.77, skewed positive	obscured (≥5%)	100% dense	Hairy Medium
Hat A1913/11.223D	stitching	10-55	24, 25	32.5±10.8	+0.56, skewed positive	obscured (≥5%)	93% dense	Hairy Medium
A1913/11.224	fine tabby: Z	12-55, 98	24, 25	29.0±11.9	+0.90, skewed positive	3% (1 kemp)	0	Hairy Medium
A1913/11.224	fine tabby: S	15-74, 94	19	25.6±10.1	+0.72, skewed positive	obscured	100% dense	Hairy Medium
Aalsum								
Hat 33-373	2/2 diam: Z	12-62	20, 27	30.1±11.3	+0.65, skewed positive	obscured	100% moderate & dense	Hairy Medium
Hat 33-373	2/2 diam: S	15-80	26, 27	38.8±13.9	+0.81, skewed positive	obscured	100% moderate & dense	Hairy Medium
Oostrum								
35B-147/2:	2/2 diam: Z	15-68	25	32.0±11.4	+1.00, skewed positive	obscured (≥1%)	100% dense	Hairy Medium
35B-147/2:	2/2 diam: S	21155	24	30.7±10.5	+0.43, symm/ skewed	obscured	100% dense	Generalised Medium
Hat 35B-48/1:	2/2 diam: Z	14-67, 88	20, 27	30.8±12.5	+0.82, skewed positive	1% (1 kemp)	4% moderate	Hairy Medium
Hat 35B-48/1:	2/2 diam: S	15-68	25	28.2±9.8	+0.87, skewed positive	3%	3% moderate	Hairy Medium
Hat 35B-48/1:	stitching: S-ply	16-80	27	32.1±13.4	+0.96, skewed positive	c.6%	24% moderate	Hairy Medium
Leens								
1939-IV.3A/7	veil-weave: Z	20-52, 75	32	36.1±9.5	+0.22, symmetrical	2%	0	Medium
1939-IV.3A/7	veil-weave: Z	17-52, 65	30	34.6±9.0	+0.03, symmetrical	1%	0	Medium

Table 6.4 Fleece types in textiles from early medieval Netherlands. Statistics for each sample are based on the measurement of the diameters of 100 fibres
Measurements in microns (1 micron = 0.001 mm. 2/2 diam = 2/2 diamond twill.
Analyses conducted by P. Walton Rogers, the Anglo-Saxon Laboratory

may represent an HM fleece from which the hairs had been stripped out. The same may be true of the Leens example (Walton Rogers unpublished). These textiles are also found in Anglo-Saxon England and in Viking Age Denmark, Britain and Ireland, and it is possible that they represent trade goods produced in a specialist workshop.[284]

The textile from Beetgum is made from goat fibres. The outer coat hairs are absent in this case, which may indicate that the underwool was combed directly from the animal during its spring moult.

The Dutch textiles resemble those from Northern Germany. Previous research on 27 samples from mainly seventh-nineth century sites in Northern Germany shows that the textiles were made from fleeces that are categorized as Hairy or Hairy Medium. Similar results were obtained from samples of raw wool found at the same settlements. This may indicate that the wool was processed in the settlement, making the woven textiles a local product. Many fibres were originally of a brown or mottled brown colour. White fleeces were only observed in 22% of the threads. In contrast to the Dutch textiles, all textiles were woven with wool, which was originally the same colour in both warp and weft.[285] Some of the same fabrics and pigmented fleece types are to be found in Anglo-Saxon England, although the English material has a larger share of white wool and a wider range of fleeces. The *terpen* evidence contrasts with the material from Norway, which shows a much more precise method of selecting and processing wool. The raw materials from the textiles from the *terpen* show a wider range of fleece types and a lack of carefully sorting which brings them closer related to the textile types excavated in southern Scandinavia that are termed 'Hessens-Elisenhof type', because of their structural similarity to textiles from the North German and Dutch settlements.[286]

Site	Single threads	Plied yarn
Beetgum	1	0
Blija	0	1
Kloosterwijtwerd	4	0
Aalsum	6	0
Dokkum	77	0
Westeremden	26	0
Ulrum	1	0
Leens	41	1
Dorestad	3	0
Oostrum	4	0
Oosterwijtwerd	1	1
Anjum	1	0
Cornjum	1	2
Middelburg	12	0
Leeuwarden	7	0
Ferwerd Burmaniaterp	12	0
Ferwerd Burmaniaterp II	1	0
Foswerd	4	0
Menaldum	0	1
Kimswerd	1	0
Rasquert	5	0
Sellingen/Zuidveld	2	0
Wijnaldum	5	0
unknown, prov. Groningen	0	1
Teerns	0	1
Hoogebeintum	5	0
Wierhuizen	1	0

Table 6.5 Textiles woven with single twisted threads or plied threads.

6.3.2 Spinning

To spin yarns from fibres one needs a spindle (whorl) and a distaff. Depending on the direction the spindle (whorl) rotates, the threads are twisted either clockwise or anticlockwise resulting in z- or s-spun thread. Right-handed spinners generally spin clockwise (z-spun treads), but accomplished spinners

284. Walton Rogers 2007, 68-69.
285. Walton Rogers 1995, table 3.
286. Walton 1988, 153; Bender Jørgensen 1984, 130-1, Walton Rogers unpublished.

Site	<0.5mm	0.5-0.75mm	0.75-1.5mm	>1.5mm
Beetgum	0	0	2	0
Blija	1	0	1	0
Kloosterwijtwerd	2	1	3	0
Aalsum	0	3	6	3
Dokkum	35	40	64	11
Westeremden	10	13	29	2
Ulrum	0	0	0	0
Leens	12	14	25	21
Dorestad	1	0	0	1
Oostrum	2	6	0	0
Oosterwijtwerd	0	0	2	0
Anjum	0	0	0	0
Cornjum	0	0	5	1
Middelburg	9	7	7	1
Leeuwarden	0	6	6	0
Ferwerd Burmaniaterp	5	11	8	0
Ferwerd Burmaniaterp II	2	0	0	0
Foswerd	0	1	6	1
Menaldum	0	0	2	0
Kimswerd	0	0	2	0
Rasquert	0	2	6	0
Sellingen/Zuidveld	1	1	2	0
Wijnaldum	0	1	7	2
unknown	0	2	0	0
Teerns	0	0	2	0
Hoogebeintum	3	2	3	0
Wierhuizen	0	2	0	0

Table 6.6 Thickness of spun threads per site and per group of sites.

can change the direction of spin when needed. In order to make an even stronger yarn several threads may be twisted together, resulting in plied yarn (for example a 2zS-yarn is made out of 2 z-spun threads, plied S-wise). Among the woven textiles single twisted threads are most common. Plied yarn has been used only in a few cases (table 6.5). This small share of plied yarns is a great contrast to the (Roman) Iron Age when plied threads were used in the majority of textiles.[287]

6.3.2.1 Quality of spinning

The quality of spinning can be ascertained by studying the thickness of the threads and the degree of regularity of the spinning. Presumably every woman in the early Middle Ages could spin with a considerable degree of skill. Recent spinning experiments have pointed out that even nowadays one can, with a little practice, easily spin quite regular thin threads of about 0.5 mm with practically any

287. Bender Jørgensen 1992, 49.

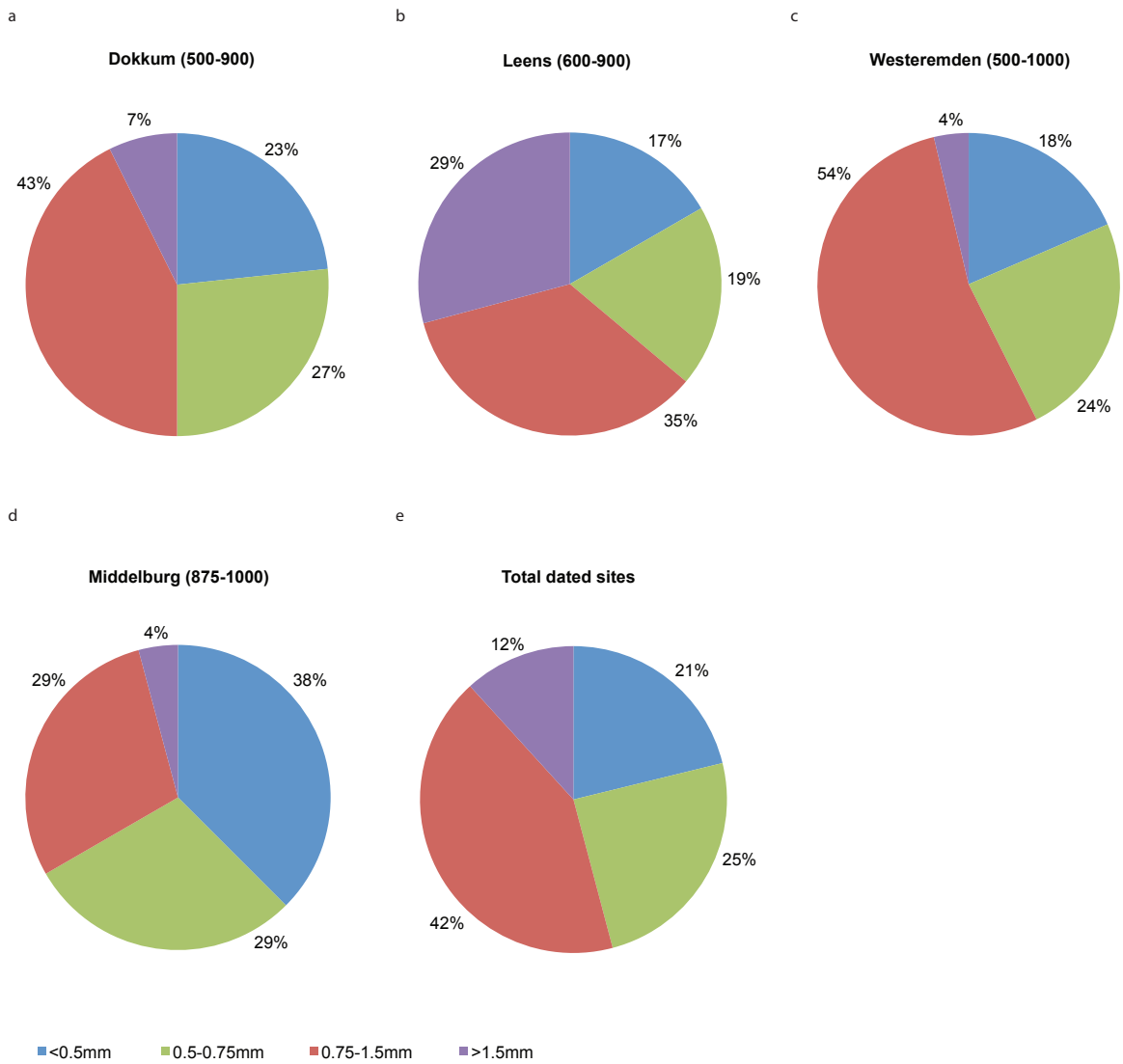

Table 6.6 Distribution of thread thickness of the major textile sites.

type or size of spindle whorl.[288] We should however take into account that the breeds of sheep kept in the early medieval period had fleeces that were not as ideally suitable for spinning thin yarns as those bred nowadays. Thickness of threads has therefore been divided into 4 classes: <0.5 mm, 0.5-0.75 mm, 0.75-1.5 mm and >1.5 mm. The first category consists of very fine threads that needed careful spinning, but also needed more time to be woven into fabrics. The second category 0.5-0.75 mm may be regarded as the thickness that could easily be spun by any experienced spinner. The third and fourth categories are coarser or thicker yarns.

Wild and others stressed the great advantages of digitally analysing the degree of twist in yarns, because it enabled researchers to distinguish the hand of individual spinners in a dataset and also the degree of experience of the spinner.[289] Unfortunately

288. Spinning experiment at the Textilforum held in September 2009 in Eindhoven, the Netherlands.

289. Cork et al. 1996, Wild et al 1998.

this method was not available for this dataset. Therefore the degree of twist has been classified as low, medium or high or – in case of irregularly spun threads – as a combination of these. The finer threads (up to 0.5 mm) are generally spun medium to high regularity, making a very strong yarn. The 0.5-1.5 mm thick threads show a wide range of twist, from low to very high. The very thick yarns are often barely spun, making a very soft thread.

Table 6.6 shows that most fabrics at the well-dated sites were woven with threads of 0.75-1.5 mm thickness. The finest, <0.5 mm and 0.5-0.75 mm are both equally represented, while the group of >1.5 mm is represented only in small numbers. There are some differences between the three major textile sites, Dokkum, Westeremden and Leens. In Dokkum there is slightly more fine spinning, whereas Westeremden has a larger share of the 0.75-1.5 class. Leens shows significantly less fine threads and much more very coarse yarns of the >1.5 mm class. Middelburg shows a completely different pattern with a dominance of fine spinning: 37% in the <0.5 mm, and 29% in the 0.5-0.75 mm class.

As stated before we may assume that it was possible to produce threads as thin as 0.5 mm despite the lower quality of the wool. Therefore there is no doubt that it would technically be possible to spin even finer threads. But spinning and weaving these fine threads into equally fine fabrics would take much more time, as compared to coarser threads and fabrics. These textiles consequently must have been more valuable than the coarser fabrics. The fact that more than 20% of the yarns are of this fine and time-consuming quality, indicates that the people in these settlements did to some degree have the means to afford these products: either the available time to produce this quality textile, or sufficient wealth to purchase it, which may imply a certain level of craft specialization.

The majority of the spinning though is of a much coarser quality. Instead of considering the technical limitations of the craftspeople, there may be other ways to explain this distribution. One very practical assumption may be that the settlements have yielded not only remains of clothes but also a large proportion of furniture or household textiles, which were not required to be of a very fine quality. Many pieces in the coarse section of the dataset however show traces of sewing and may have been primarily used as clothing. It may therefore be assumed that time was an important factor in the choice of a certain quality of thread as well. As stated earlier, spinning and weaving fine threads takes a considerable time. This time had to be found against competition with many other tasks. Therefore an overrepresentation of rather coarse fabrics may indicate that the people involved generally did not have the time to put more effort into textile production. Neither, it would suggest, did they have the means to let others do this work for them. Comparing the sites, Dokkum may perhaps be seen as an exception where there is an even distribution of threads up to 0.75 mm and thicker ones. Middelburg seems to be an important exception, but in reality it is not. The examples of fine spinning in the textiles from this settlement are in most cases present in the warp only. These fabrics have been made with a very thin and strong warp, but very often with a much thicker weft. The textiles thus created are no more time consuming than the other rather coarse fabrics in the dataset.

6.3.3 Dyeing

In early historic times many dyes were used. A red colour was obtained by dying the wool with dyestuff extracted from different species of dyer's madder. Archaeological evidence for the cultivation of *Rubia Tinctorum L.* in The Netherlands is not available until the 17th century. There is historical evidence that dyer's madder did occur in the terpen area in the northern part of the Netherlands in the early Middle Ages.[290] Wild madder *(Rubia Peregrina L.)* is known in the southern part of Great-Britain and in the Mediterranean. Dyers woodruff and bedstraw were also used to produce red colours as far back as the fifth century AD.[291] Red could also be obtained from the insect Kermes creating a very strong and colourfast dye. This precious dye was produced in the Mediterranean and valued greatly in north-western

290. Van Haaster 2001.
291. Cardon, 2003 120-128.

Site name	Object code	Structure	Original fleece colour	Results of dye tests
Ferwerd	101-703	felt	white	yellow stain/dye
Leens	1939-IV.13A/7	tabby	white	no dye detected
Oostrum	35B-48/1	2/2 diamond twill	Z: white S: white Stch: fawn	hat: purpurin-rich madder stch: same but much stronger
Beetgum	46-95	2/2 twill	Z&S: dark brown Stch: brown/black	brown stain/dye
Aalsum	33-373	diamond twill	uneven brown and brown/black	no dye detected
Dokkum	A1913/11.223D	2/2 diamond twill	dark brown	hat: brown tannin-based dye stch: no dye detected
Sellingen/ Zuidveld	Z.N.1	2/2 twill	mottled off-white	no dye detected
Dokkum	A1913/11.224	Tabby	light Z: off-white dark S: dark brown	no dye detected

Table 6.7 Results of dye-analyses (mod. = moderate; stch = stitching).

Europe as a symbol for kings.[292] Lastly shades of crimson could be obtained using a dye extracted from the insect of the Porphyrophora species. Evidence of this dye has been found in a sixth century context in Germany.

Blue colours were obtained from woad (Isatis tinctoria L.). Woad has been known in the Netherlands since the Iron Age.[293] Yellow dyes were extracted from weld (Reseda luteola L.), which was widespread in western Europe.[294] Remains of this plant have been found in Roman forts in the Netherlands, illustrating its presence.[295] Another source for yellow dyestuffs is the plant Dyer's broom, which has been identified in ninth century find from York.[296] Purple was obtained from lichens of the genera Ochrolechia and Umbilicaria. This dye has been identified in ninth-tenth century finds from York, Dublin, London and Scandinavia.[297] Purple could also be extracted from marine molluscs, which was a very expensive way of dying. In Late Roman period purple was associated with imperial majesty and in later period it remained the colour for kings and synonymous for wealth. The prestige of the colour purple increased with its scarcity. The dyestuff was not locally available and had to be traded from the Mediterranean or Brittany (France).[298] Different hues of brown would have been obtained using natural dyestuffs from bark and nuts that were readily available in any wooded area.

Only the wealthy could afford to wear certain colours, for these colours were expensive to produce. To wear them was thus a social signal to the wearer's contemporaries, that they could afford this level of luxury.[299] Analysing textiles for dyestuffs may therefore result in an indication of the wealth of the original wearer. There are, however, a few hurdles to overcome in relation to dye analysis. Natural dyestuffs deteriorate over time and will very often have disappeared entirely during the period the textile was buried. Consequently a negative result in dye analyses does not necessarily mean that a fabric was not originally dyed. Many dyes that were locally available, like the brown colours from nuts and bark, would be hard to detect as well. It is generally very hard to discern the chemicals from these dyes from those naturally present in the soil because of

292. Ibidem, 618
293. Cappers 1994.
294. Cardon 2007, 170.
295. Pals 1997, 35.
296. Cardon 2007, 177.
297. Ibidem, 501.
298. Ibidem, 574.
299. Hedeager Krag 1993.

	Tabby		Repp-effect	2/1 twill z/s	2/2 twill		Herringbone /chevron		Lozenge twill z/s	Cross twill z/s	Diamond twill		Diamond Twill Pattern Repeat			
Site	z/z	z/s	z/s	z/s	z/z	z/s	z/z	z/s	z/s	z/s	z/z	z/s	10 /8	10 /14	10 /16	12 /10
Beetgum						1										
Blija				1												
Kloosterwijtwerd						1						3				
Aalsum					1	1						4				
Dokkum	1	5	1	4	2	29	1					33	1	1	1	
Westeremden		1				3		1				21				
Ulrum									1							
Leens	3					16					2	15				
Dorestad						1		2								
Oostrum												4				
Oosterwijtwerd	1															
Anjum						1										
Cornjum						1						2				
Middelburg										6		6				5
Leeuwarden												5				
Ferwerd Burmaniaterp						1						1				
Ferwerd Burmaniaterp II																
Foswerd				1		2										
Menaldum																
Kimswerd																
Rasquert						1		1				3				
Sellingen/Zuidveld												2				
Wijnaldum						1										
unknown, prov. Groningen						1										
Teerns						1										
Hoogebeintum						1						3				
Wierhuizen												1				
Total	5	6	1	6		62	1	4	1	6	2	103	1	1	1	5

Table 6.8 Distribution of the weave types per site.

	Diamond Twill Pattern Repeat																	
Site	12 /18	14 /10	16 /10	16 /18	18 /24	20 /18	20 /22	22 /18	22 /24	24 /18	28 /18	20 /26	28 /26	30 /20	30 /28	32 /18	32 /30	40 /28
Beetgum																		
Blija																		
Kloosterwijtwerd	3																	
Aalsum						1				1				1	1			
Dokkum	3		1	1		1	1	1	1	1						1		1
Westeremden		1		1		10				2	2	1					1	
Ulrum																		
Leens	4			2		3											1	
Dorestad																		
Oostrum	1					1												
Oosterwijtwerd																		
Anjum																		
Cornjum													1					
Middelburg																		
Leeuwarden					1					1								
Ferwerd Burmaniaterp								1										
Ferwerd Burmaniaterp II																		
Foswerd																		
Menaldum																		
Kimswerd																		
Rasquert										2								
Sellingen/Zuidveld						2												
Wijnaldum																		
unknown, prov. Groningen																		
Teerns																		
Hoogebeintum								2										
Wierhuizen																		
Total	11	1	1	4	1	18	1	4	1	7	2	1	1	1	1	1	2	1

their similarity to material found in the natural environment. It is difficult therefore, to know exactly how colourful early medieval clothes actually were. Recently, seven textiles have been selected for dye analysis (table 6.7). The chemical signature of dye could be identified in the hat from Oostrum (fig. 6.2), which had been made from a white fleece for the main body of the hat, with decorative stitching in fawn wool. The same madder type dye was present in both the textile and the sewing thread, but it was much more concentrated in the stitching, making it likely that the ground fabric was light red, salmon or peach and the needlework a deep dull red. Chemically, the dye was dominated by purpurin, but there was a trace of alizarin, which suggests that the dye came from the roots of *Rubia tinctorum* L.[300] There appeared to be a tannin-based brown or black colorant in the headdress or hat from the site Berg Sion.[301] This is fairly exceptional, since the headdress was made out of naturally brown wool, which would in most cases not have been dyed. No dye was detected in the Leens *Schleiergewebe-tabby*. This does not mean that the textile was not dyed. Other textiles of this type have proved to be dyed black, blue or purple.[302]

Previous research on Anglo-Saxon textiles has pointed out that naturally white wools were often dyed. Analyses of naturally brown or black samples nearly always had a negative result, which leads to the idea that these textiles were in most cases not dyed at all. The textiles from the Netherlands and Germany[303] are very similar in this respect. Chemical signatures of dyes have been detected in only a few textiles. Those fabrics that had certainly been dyed come from hats that had been sewn with great care (see section 6.4.2 Needlework) and must have been valued for their appearance. The rest of the textiles were probably either originally (mottled) brown or black.

300. Walton Rogers unpublished.
301. Objectno. a1913/11.223D.
302. Walton Rogers 2007, 69.
303. Walton Rogers 1995.

6.3.4 Weaving

6.3.4.1 Looms and their characteristics

The process of weaving large pieces of cloth was generally conducted on a warp-weighted loom. These loom weights can be found in abundance at Dutch sites. Another type of loom known from the countries surrounding the Netherlands, is the two-beam vertical loom. From the tenth century onwards historical texts mention a third loom type: the horizontal treadle loom.[304] In the beginning the width of the cloths produced on this loom was not very large. When weaving cloths of more than 1 meter width one needed two weavers to operate this loom and it was only later that this became custom. Where the warp-weighted loom was very suitable for weaving broad cloths up to a length of 10 m, the horizontal loom was most effective when weaving narrow fabrics longer than 10 m.[305] The warp-weighted loom has no reed or batten which may have affected the regularity of the thread systems. This irregularity is visible in the woven fabric in variable spacing of the threads and curving lines.[306]

No research has been conducted so far into the specific weaving tools that are associated with the various loom types, therefore the distribution of weaves as presented below cannot yet be related to a type of loom.

6.3.4.2 The fabrics from Dutch settlements

Before shifting focus to signs of specialization in weaving, a brief overview is required of the characteristics of the textiles from the Dutch settlements. The focus of this survey will be the different techniques observed and the distribution of these techniques, among the sites and through time. Among the well-dated sites, 50% of the textiles were woven in a diamond twill (fig. 6.3). 2/2 Plain twills are also present as a large group, followed by tabby, 2/1 twill, cross twill, herringbone or chevron twill and repp-effect tabby in small quantities. There

304. Cardon 1999, 412.
305. Ibidem, 415.
306. Hammarlund e.a. 2008

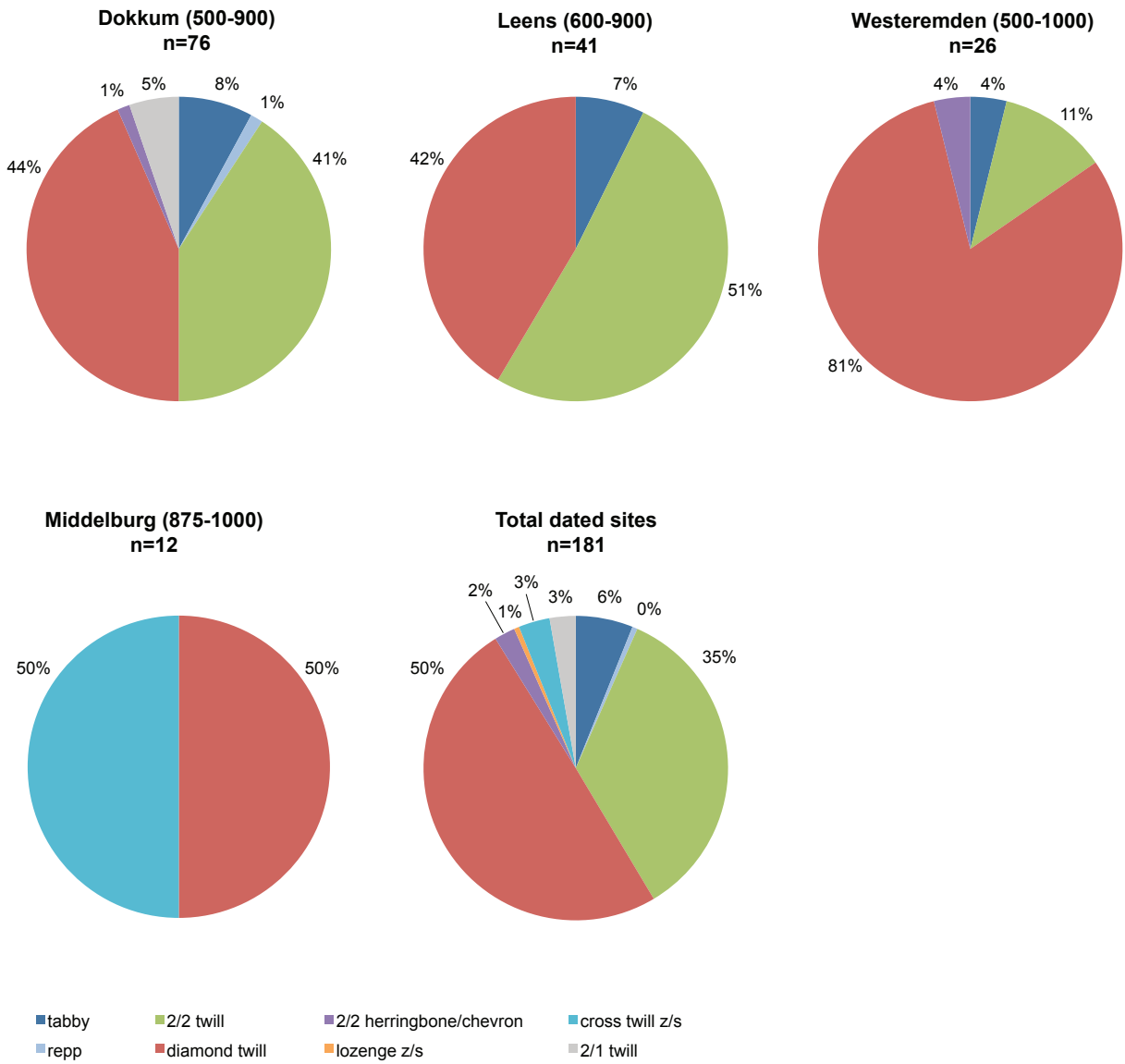

Fig. 6.3 Graphic representation of distribution of the weaves per site and per group of sites.

are considerable differences between the major textile sites of Dokkum, Leens, Westeremden and Middelburg (fig. 6.3). Dokkum shows the largest variation of weaves, which is not remarkable since this site has yielded nearly twice as many textiles as Leens and three times as many as Westeremden. Dokkum has an equal number of diamond twills and 2/2 plain twills. Westeremden gives a very different picture with a large majority of diamond twills and very few 2/2 plain twills. In contrast, Leens shows considerably more 2/2 plain twills than diamond twills. Among the textiles from Middelburg (12 in total) we see only diamond twill and cross twill.[307] These different ratios among the sites may point to preferences for specific fabrics that were not necessary or required in every site to the same extent. There are considerably more 2/2 plain twills in many sites than previously documented by Bender Jørgensen.[308]

307. Middelburg is the only site where cross twill is observed.
308. Bender Jørgensen 1992, 48, fig. 58.

Site	Objectnr.	Type borders
Ferwerd Burmaniaterp	101-883	not reinforced
Ferwerd Burmaniaterp	101-890	tabletweave (4 tablets)
Ferwerd Burmaniaterp	101-470/6	tabletweave (6 tablets)
Hoogebeintum	28-321/3	tabletweave (4 tablets)
Wijnaldum	77A-102B	tubular selvedge
Dokkum	a1913/12.5 z.n.1	tabletweave (3 tablets)
Dokkum	a1913/12.5 z.n.2/1	tubular selvedge
Dokkum	a1913/11.226	not reinforced
Dokkum	a1913/11.236a	Starting border, not reinforced
Dokkum	a1913/11.223m/1	tubular selvedge
Dorestad	WD375.3.1	not reinforced
Kimswerd	a1913/11.233	tubular selvedge
Kloosterwijtwerd	1910/I.195/3b	tabletweave (5 tablets)
Leens	1939-IV.27/9	tabletweave (3 tablets)
Leens	1939-IV.23	tabletweave (4 tablets)
Leens	1939-IV.13/5	not reinforced
Middelburg	00049-2	not reinforced
Middelburg	00049-3, -4 & -5	not reinforced
Middelburg	00049-7 & -8	not reinforced
Sellingen/ Zuidveld	Z.n.2	tabletweave (3 tablets)
Westeremden	1921/I.76b	tubular selvedge
Westeremden	1930/I	tubular selvedge
Westeremden	1930/3a	tabletweave (3 tablets)
Westeremden	1930/8a	tubular selvedge

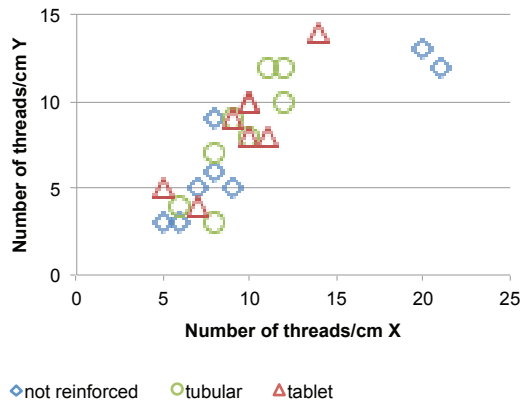

Table 6.9 The types of borders present (left) and the distribution in relation to the thread-count of the main weave (above).

Diamond twills can be woven in various patterns (table 6.8). Some sites, like Dokkum, show a considerable variation of pattern repeats. In Westeremden on the other hand, a large majority of diamond twills are woven in pattern repeat 20/18, which points to a certain preference for this pattern there. This preference is also present in settlements across the border, such as Elisenhof and Hessens.[309]

Several fabrics are woven in a spin-pattern. These patterns are created using both z- and s-twisted threads in warp or weft. This pattern is present in 10 textiles.[310] All these textiles are rather coarse, the finest being spun in 10 x 8 threads per cm, but most are below 7 threads/cm. The pattern is present in diamond twills, 2/2 and 2/1 twill and tabby.

Borders or selvedges are observed in 25 textiles (table 6.9). Many of these borders are not reinforced at all, but are created by weaving the weft-thread immediately back into the fabric. This technique is, not surprisingly, mostly observed in rather coarse fabrics, but it is also present in a few of the finer textiles. Reinforced borders are present in 15 cases.

309. Tidow 1995, 359.
310. Westeremden 1930/2a, Kimswerd a1913/11.233, Leens 1939-IV.37/2 & 1939-IV.37/5, Dokkum a1913/11.223, a1913/12.5b, a1913/11.223e, a1913/11.223r, a1913/11.223y/2 & a1913/11.223ff.

These borders are made in tablet weave creating either a tablet woven band of three to six tablets or a tubular border (fig. 6.4). Hoogebeintum shows an example of a starting border in tablet weave.[311]

6.3.4.3 Signs of specialization in weaving

There are several ways to identify possible specialization in the weaving process. One is the estimation of the time and effort spent. A common way of estimating this is by comparing the thread-counts of the weaves. Weaving a fine fabric with a large number of threads per centimetre takes more time than weaving a coarse fabric, with only a few threads per centimetre. It is therefore useful to divide the dataset into groups ranging from coarse to fine. However, a focus on thread-count alone would not do justice to many of the textiles. A cloth does not necessarily have to be of a high thread-count to be valued. A coarse but regularly spun and woven fabric may be very pretty and equally valued for its craftsmanship. So besides this quantitative approach one can consider the regularity of the weaving. Relevant variables might be whether or not faults are visible and whether the appearance of the fabric is regular or not. This is a subjective way of classifying the textiles, but nevertheless gives an impression of the skill of the weaving. Lastly, there are fabrics that needed special skills or specific tools to produce. These most likely are the products of specialized workers and must have been valuable goods.

The fabrics may be divided by thread-counts into five groups, ranging from very coarse to fine (fig. 6.5). The majority of the textiles have thread-counts below 12 threads/cm. Only a small group may be considered as fine quality, but there are no fabrics finer than 28 threads/cm. There are slight differences between the sites (fig. 6.6). Leens shows more coarse fabrics, which may point to an overrepresentation of household textiles. In Westeremden and Middelburg this coarse group is missing altogether and both sites yielded considerable quantities of finer fabrics.

311. Objectno. 28-321/3..

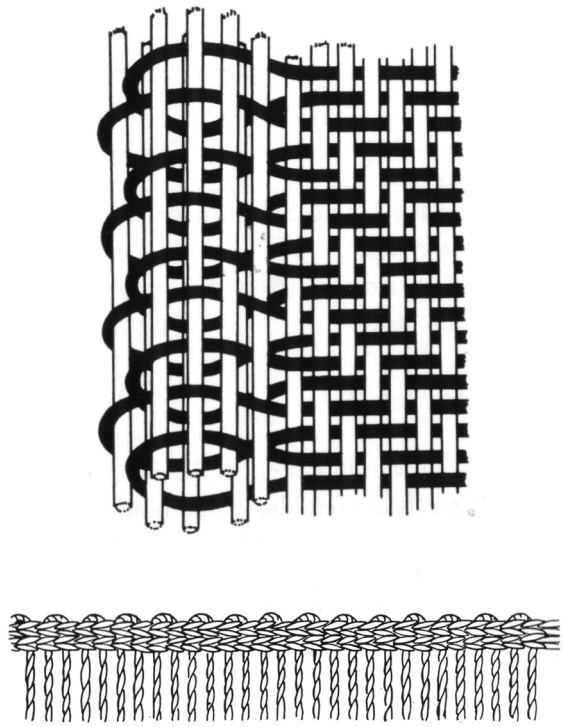

Fig. 6.4 Selvedges made in tablet weave: a tablet woven band and a tubular selvedge (after Schlabow 1976).

There are two examples of very fine spinning and weaving in the dataset. Firstly, the so-called *Schleiergewebe* or veil weave found in Leens (fig. 6.7).[312] This is a very fragile and open tabby, woven with z-spun threads of 0.2 mm and approximately 10 threads/cm. The fabric was woven out of naturally white wool[313] and was possibly used as headdress. The finest textile is another tabby (repp-effect) found in Dokkum. This fabric is a very dense cloth woven with 28 x 15 threads/cm.[314] Two colours of wool were used: white for the warp and dark brown for the weft. It is not clear whether the fabric was also dyed, since no dyes have been detected on the textile. Both these fabrics must have taken considerable time to produce.

312. Object no. 1939-IV.13A/7 & 1939-IV.13/1.
313. No dyes were detected during dye-analyses.
314. Objectno. a1913/11.224.

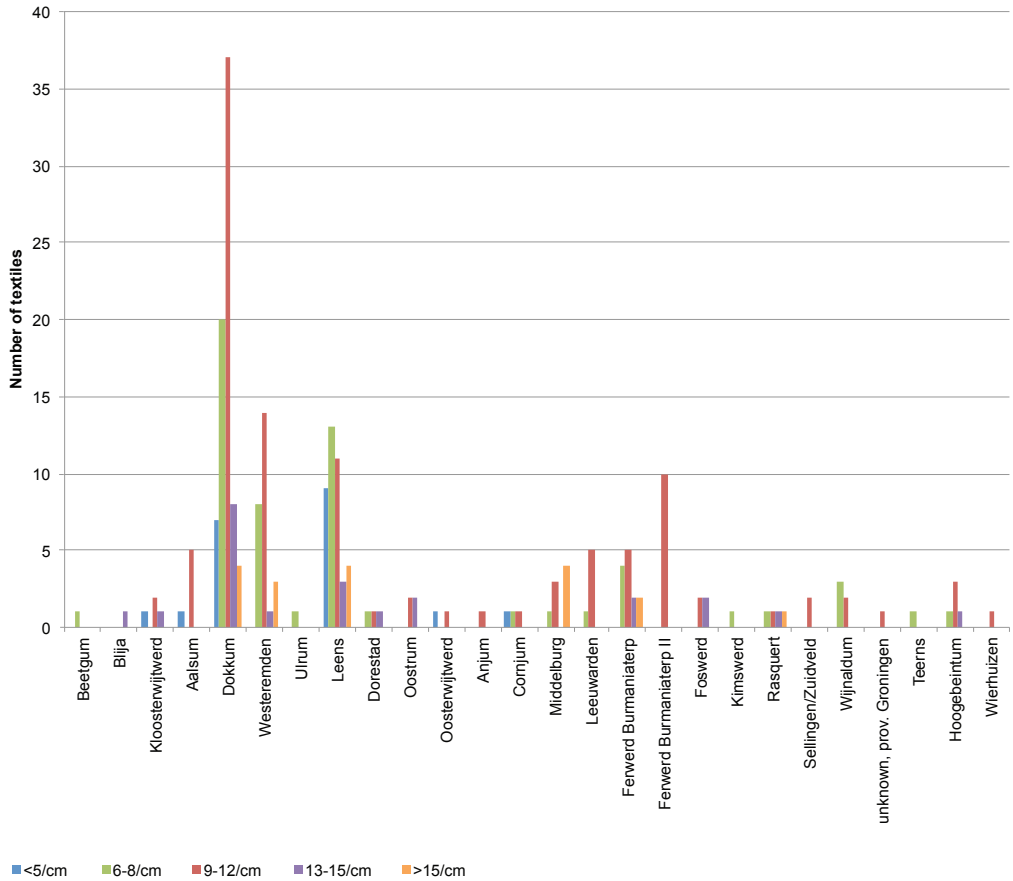

Fig. 6.5 Distribution of the different groups or qualities of weaving by site.

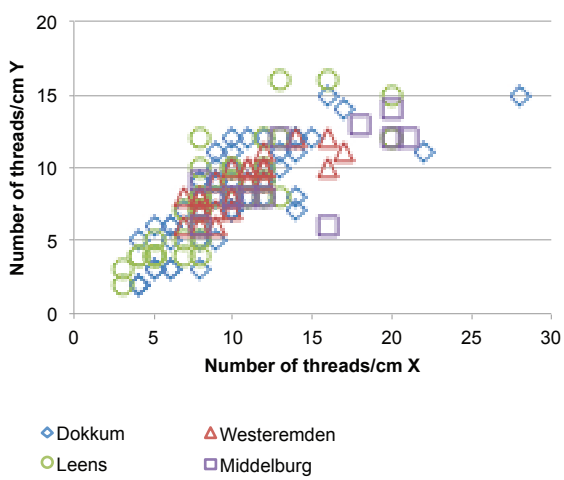

Fig. 6.6 Comparison of the quality of weaving between the sites of Dokkum, Leens, Westeremden and Middelburg.

Comparing thread-count and the regularity of the weave gives further information about the quality of the fabrics. The finer fabrics are often of a high and regular quality, as may have been expected, but this is also the case for most of the textiles in the middle group. This group, woven with approximately 10 threads per cm, was perhaps not necessarily of high value, but it may reflect the quality of work an accomplished weaver could achieve in normal circumstances. Using Olausson's model for production it may also be possible to classify these textiles as the products of an independent specialist, as they are characterised as efficient and standardised, requiring a minimum of production time and with little evidence of errors.

Another pattern emerges when the different weaves and their thread-count are compared (fig. 6.8). 2/2 twills generally are coarser than their counterparts,

Fig. 6.7 Veil-like fabric or *Schleiergewebe* found in Leens (objectnr. 1939-IV.13A/7 & 1939-IV.13/1). Photo: M. Schouten.

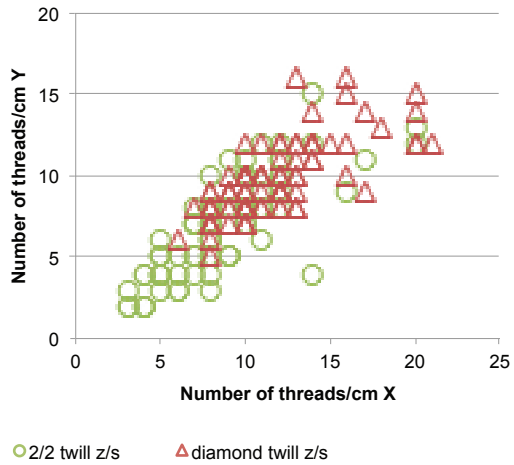

Fig. 6.8 Comparison of the quality of weaving between 2/2 plain twills and diamond twills. The diamond twills generally are woven with more threads/cm.

2/2 diamond twills. Technically, 2/2 twills are easier to weave than diamond twills and the fact that this bind is most often produced in low thread-counts affirms its function as bulk product, which generally must have been used for general household needs. Diamond twills, on the other hand, were not made in coarse fabrics. The decorative pattern of this twill, in combination with the higher thread-counts and the technical difficulty, may point to a different value and use of this cloth type.

Finally there is one type of fabric that required extra technical skill to produce, piled weave. Piled fabrics are sparsely represented in the Netherlands. Examples were found only in Leens and Dokkum (figs. 6.9 and 6.10).[315] These weaves are rather coarse, very thick and densely felted z/s 2/2 twills, with long strands of s-spun thread worked into the fabric and hanging from the surface. These threads had the same function as fur, causing water to drip down the threads instead of drenching the woven cloth beneath. This fabric was very suitable for cloaks, which has been confirmed by finds in England. There, this fabric has been found mainly in men's graves as a cloak or body cover. In some cases piled fabrics had been dyed[316] and the quality of the wool suggests that they were luxury goods.[317] The production site of piled fabrics in fifth-seventh century (presumably contemporary to the Dokkum textile) is unclear. From the eighth century onward (contemporary to Leens) piled fabrics were traded from Ireland and Iceland, but the Frisians seem to have had a share in this trade as well. Texts mention that they were trading in a cloth called villosa that may have been used for this type of cloak.[318]

In summary, it is possible to conclude that the coarser weaves were generally made in z/s 2/2 plain twills. These twills were quick and easy to make and were used for household needs, bedding, sacks, etc. The largest group of textiles consists of regularly woven 2/2 twills or diamond twills that could have been produced by any able weaver, so presumably production took place on a domestic level. Applying Olausson's model, the regularity and efficient production of these textiles may however also be interpreted as characteristic for the work of independent specialists. Only a small group of mainly z/s diamond twills are of a finer quality, which took more time to weave. It is not clear whether this production took place at the household level or at a specialist workshop. One can merely conclude that people did occasionally take the time to make these

315. Dokkum a1913/12.5 z.n.2/1, Leens 1939-IV.18/1, 1939-IV.37/2, 1939-IV.37/4b, 1939-IV.37/6.
316. Walton 1989, 336; Geijer 1938, 132.
317. Walton Rogers 2007, 85.
318. Ibidem, 85-86.

Fig. 6.9 Piled weaves found in Leens (above, objectnr. 1939-IV.18/1) and Dokkum (below, objectnr. a1913/12.5 z.n.2/1). Photo: M. Schouten.

textiles or pay somebody else to spend their time in weaving the cloth. The veil weave found in Leens and the two piled weaves from Leens and Dokkum are rare examples of textiles that were almost certainly objects of trade.

6.3.5 Felting

Felting is a process that takes place after weaving a fabric. It involves soaking the woven fabric in water and a fulling substance like soap or mud, and then beating or treading it. The aim of this process is to make the fabric thicker, more dense and therefore warmer and waterproof. It is, however, not so easy to recognise whether or not a fabric has been felted deliberately, because a garment can get the same matted and felted surface when it is used in normal life through the friction of one piece of cloth onto another. On the other hand, the absence of a felted surface does not necessarily mean that a fabric was not felted. The matted surface can easily break away during excavation and finds processing, leaving a clean and unfelted appearance.

There are only a few textiles that show a felted surface. Several of these seem to have been primarily felted. The piled weaves, which had probably been used as cloaks, must have been felted. These thick and dense fabrics were clearly meant to be waterproof and a felted fabric would greatly enhance the function of this garment. The mitten found in Dorestad (fig. 6.15), a thick mantle-like fabric from Dokkum and two pieces from Middelburg are also likely to have been felted.[319] In the case of the Middelburg textiles, it has been suggested that they have a raised nap.[320] The technique of raising a nap involved roughening up the surface of the fabric with teasels and afterwards shearing the surface back with large iron shears. This technique had been in use since the Roman period,[321] and is considered a specialist activity in the early Middle Ages.

6.4 FUNCTION AND USE OF TEXTILES

The way in which the textiles were used may reflect how they were valued. Using a textile involves first sewing it into shape for its primary use, then wear and repair, eventually followed by secondary use, until it was finally discarded as waste. It would be expected that a valuable textile had been sewn with great care and, if necessary, repaired with equal care to maintain its function as long as possible. It is often difficult to ascertain the primary function of the textiles involved, because of their fragmentary state. Nevertheless, a few semi-complete garments are present and a very large number of pieces with seams, hems and other stitching, making it possible to consider the overall quality of the needlework.

319. Dorestad WD375.3.1, Dokkum a1913/11.226, Middelburg 00049-9, -11.
320. Leene 1964.
321. Wild 1970.

6.4.1 The function of the textiles

Several pieces of garments could be recognized, among which were hats, mittens and parts of sleeves. Gussets were also present, indicating the presence of tunic-like garments. These garments must be considered in detail, because they illustrate a broad variety of sewing techniques and may relate to the function of the textiles.

Six hats are known from early medieval settlements. These hats are all woven in diamond twills in a range of qualities.

The hat from Aalsum[322] (fig. 6.11) is made out of scraps of four different fabrics, with a thread-count of approximately 10 x 8 threads/cm. It is sewn roughly with whipstitches (fig. 6.20 1a) and running stitches (fig. 6.20 6c), using 1-2 mm thick plied sewing thread. The hem at the back has been edged with blanket stitches (fig. 6.20 4a), while the hem at the front was folded back and attached with small whipstitches. The hat has undergone high quality repairs, using small (5 mm) stitches and thin (0.7 mm) red thread.

The settlement at Leens has yielded two hats. Well known is the hat illustrated in figure 6.12.[323] This hat was constructed with three pieces of different fabrics, with thread-counts ranging from 8 x 7 to 12 x 9. The crown is attached to the sides with 5 mm wide (whip) stitches. Seam allowances are secured on the inside with 5 mm wide stitches. The hem is folded twice and coarsely secured with whipstitches, more than 1 cm apart. The thread that has been used is a double z-twisted thread.[324]

Another hat is present in the collection of the National Museum of Antiquities (fig. 7.1).[325] This so-called pillbox-cap bears great resemblance to

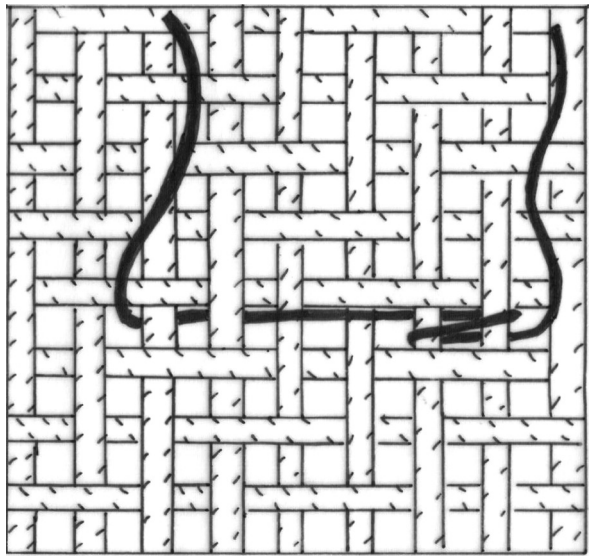

Fig. 6.10 Piled weave of Dokkum. The pile has been partially woven into the fabric.

Fig. 6.11 Hat found in Aalsum (objectnr. FM 33-373).

322. Objectno. 33-373. The hat from Aalsum is dated between 700-900 AD. It must be stressed however that this date may not be correct since it is not based on radiocarbon but on associated finds.
323. Objectno. GM1939/IV:13/1. This hat is dated between 700-1000 AD.
324. Zimmerman, 2009.
325. Objectno. b1930/12.34/1.

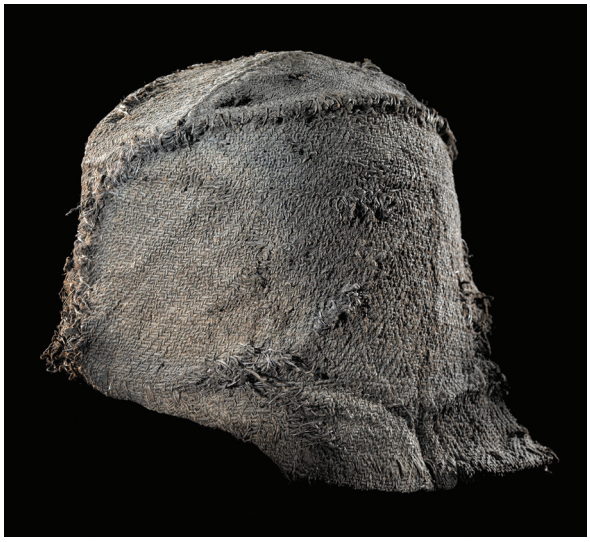

Fig 6.12 Hat found in Leens (objectnr. GM1939/IV:13/1). Photo: J. Stoel, courtesy of the Groninger Museum.

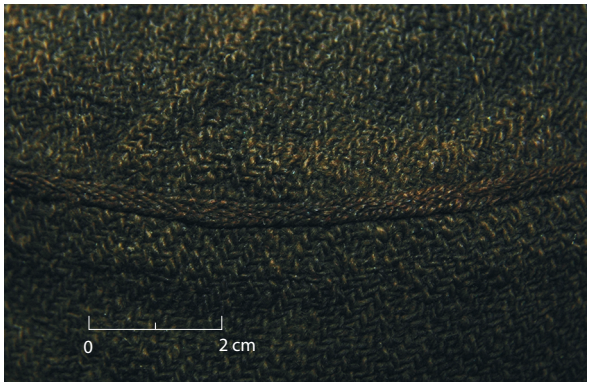

Fig. 6.13 Decorative stitch applied at the hat of Oostrum, Leens and Dokkum.

Fig. 6.14 Cap found in Rasquert (objectnr. GM1928/VIII:1). Photo: M. de Leeuw, courtesy of the Groninger Museum.

examples from the 12th-15th century found in Greenland.[326] The hat was constructed from several pieces of the same diamond twill (thread-count 13 x 12), woven with fine threads, but with many faults in the diamond pattern. It seems that the edges of the different parts of the hat were firstly folded double and secured with blanket stitches to prevent fraying. Subsequently, the parts were sewn together, using a decorative stitch (fig. 6.21a). The hem of the hat is decoratively stitched through with a row of running stitches. The hat is damaged but shows no trace of repair.[327]

The hat from Oostrum was made out of what was originally white wool, which was dyed to a pale red shade (fig. 6.2).[328] The fabric is of good quality (0.5-0.7 mm threads, 14 x 12 threads/cm) and the hat was sewn with great care, using the same decorative stitch as the pillbox-cap from Leens (fig. 6.13 and 6.21a). This decorative stitch was probably of a deeper red colour, making it a contrasting and attractive decoration. The hem of the hat was secured with very small running stitches that were hardly visible from the outside. The hat was heavily used and repaired in many places. These repairs seem to be the result of one action because the same technique and same type of thread were used for all the repairs. The repairs are firm, but rough, although the repairer tried to use fabric of equal quality to the original to patch up the hat.

The cap from Rasquert (fig. 6.14) is made out of a fine diamond twill (17 x 9 threads/cm).[329] The crown and peak are attached with decorative stitches in s-twisted red yarn (fig. 6.21d). The seam was sewn with simple whipstitches and a decorative effect was obtained by drawing two threads through these whipstitches.[330]

326. Østergård 2004, 219-220.
327. Brandenburgh 2012c.
328. Objectno. 35B-48 from Oostrum is dated between 700-900 AD. It must be stressed however that this date may not be correct since it is not based on radiocarbon but on associated finds.
329. Objectno. GM1928/VIII:1.
330. Zimmerman 2009.

Fig. 6.15 Mitten found in Dorestand (objectnr. WD375.3.1). Photo: National Museum of Antiquities, Leiden, Netherlands.

Fig. 6.16 Mitten from Aalsum (objectnr. FM 33-374). Photo: National Museum of Antiquities, Leiden, Netherlands.

Fig. 6.17 Fragment of a sleeve found in Middelburg (objectnr. 00049-1). Photo: H. Hendrikse.

Fig. 6.18 Remnant of a sleeve found in Middelburg (objectnr. 00049-2). Photo: H. Hendrikse.

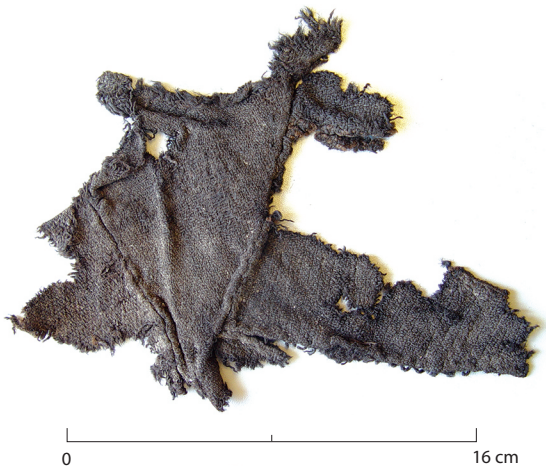

Fig. 6.19 Remnants of a garment including a gusset, sewn together found in Middelburg (objectnr. 00049-2). Photo: H. Hendrikse.

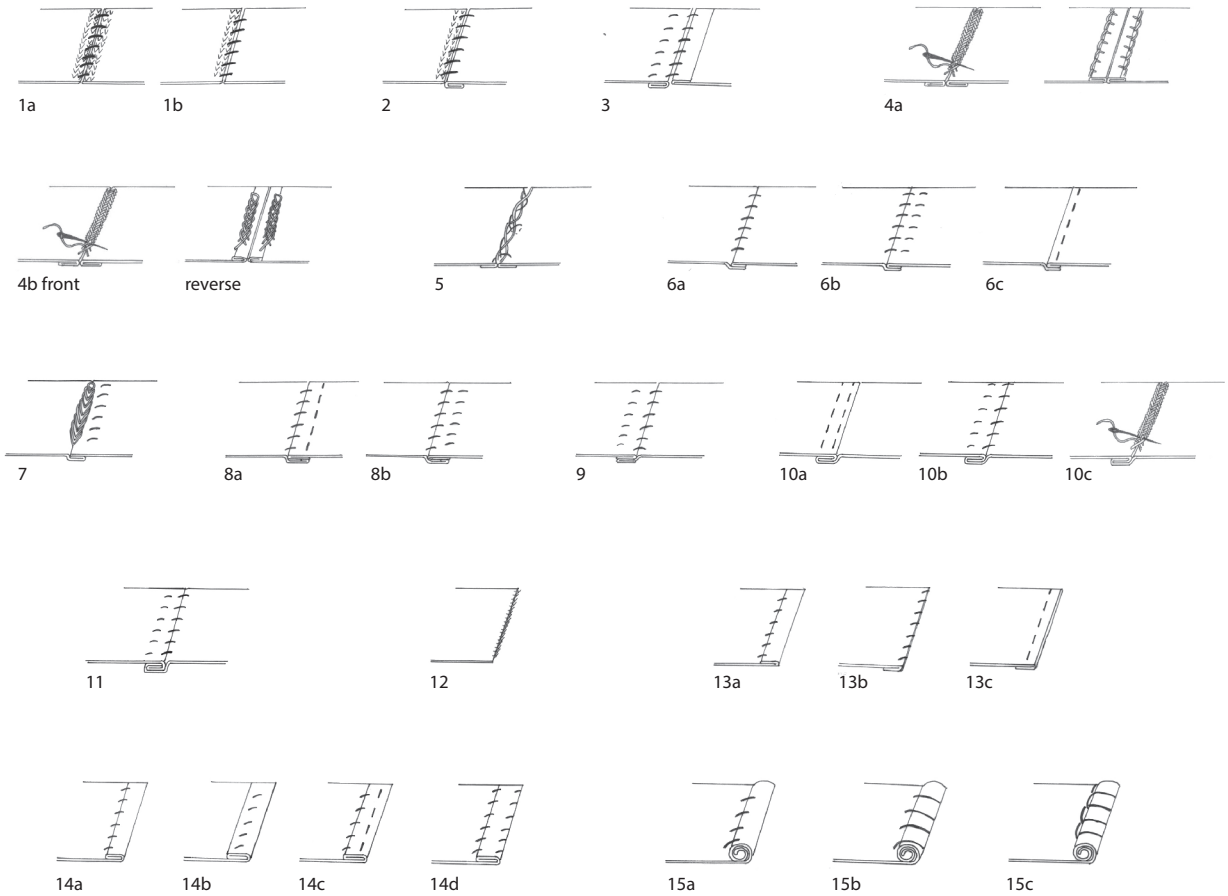

Fig. 6.20 Types of seams and hems present among the textiles from the settlements.

The headdress from Dokkum (fig. 7.4) is made out of a rectangular piece of cloth, with two side panels, woven in a diamond twill (14 x 11 threads/cm). The sewing has been carried out with great care. Seam allowances were first secured with either blanket stitches or raised chain stitches. The seams were afterwards sewn, using the same decorative stitch as in the hats from Leens and Oostrum. Dye analyses has pointed out that the headdress was dyed a deep brown, whereas the sewing-thread was probably not dyed. This decorative band would have contrasted with the fabric, like in the Oostrum hat described above.

Mittens are present in two sites, Dorestad and Aalsum (figs. 6.15 and 6.16).[331] In both cases coarse, thick fabrics have been used, made of thin warp thick weft threads, woven with only a few threads per centimetre. The Dorestad mitten seems to have been primarily felted, which would have greatly enhanced its practicality. Both mittens were sewn very roughly with threads up to 2 mm in width.

331. Objectno. WD375.3.1 (Dorestad) and 33-374 (Aalsum). The mitten of Aalsum is dated between 700/900 AD. This date is based on associated finds.

Three pieces of fabric have been sewn into a tubular shape, presumably a sleeve of a tunic or similar garment.[332] A sleeve from Leens is woven in a plain 2/2 twill with 8 x 5 threads/cm. The narrow part of the sleeve has a diameter of 24 cm with a length of 21 cm remaining. The hem and seam are sewn with 1.5 mm thick plied yarn.[333] Two parts of sleeves were found in Middelburg (fig. 6.17 & 6.18). One is woven in diamond twill with 12 x 12 threads/cm. The diameter at the hem is 22 cm with a remaining length of 35 cm. The sewing uses irregular whipstitches, and single and plied yarn. Another garment fragment consists of a sleeve and two side-panels with a gusset sewn between (fig. 6.19). This garment was made out of a fine diamond twill with 21 x 12 threads/cm. The remaining length of the sleeve is 20 cm with a diameter of 26 cm. The sewing was conducted with fine running stitches using plied yarn.[334]

Among the many textiles found in Dokkum one more is worth discussing. A large fragment 55 cm in length, consists of two rectangular pieces with a gusset (27 cm length) sewn between them.[335] Again the fabric is a diamond twill of approximately 12 x 12 threads/cm. Both rectangular pieces have selvedges, making a strong seam at the side of the body, where the gusset is sewn in. The sewing is done using small stitches with a rather thin thread. Considerable wear and tear had occurred, making it necessary to repair the garment just above the gusset. Along the bottom of the garment the hem is present.

Some fabrics were certainly not used for clothing. Two examples have been found in association with feathers.[336] These textiles were probably used as mattresses or cushions. They were made in a plain 2/2 twill with 5-7 threads/cm. One fragment was woven with z-spun threads in both warp and weft, the other in spin pattern. In addition to these two pieces many more textiles presumably served as household-textiles at a certain moment in its life cycle: soft-finishing's like curtains, wall hangings, coverlets and cushions were present in every house. Other textiles may have functioned as sail cloth. In Scandinavia, and probably in The Netherlands as well, sailcloth was produced in large quantities. It was an important part of textile production and sailcloth was used as a form of currency and means of taxation. Archaeological evidence of woollen sail cloth has pointed out that in later times they were made in a 2/1 twill with 8-9 highly twisted z-spun warp yarns and 4-6 low twisted s-spun weft yarns per cm. The thus achieved fabric was impregnated with a resinous material making it stiff and reducing airflow.[337] Fabrics of similar thread counts, thin warp threads and thick weft threads are present in the Dutch textile record. Being rather coarse to be used as clothing material, they might have been used as sail cloths.

6.4.2 Needlework

126 Fragments have remains of hems, seams or other types of stitching. This makes it possible to identify a number of different seam and hem types (fig. 20 and appendix V) and ascertain the general quality of sewing in the dataset.

A study of the complete garments makes it possible to discern the order in which sewing was carried out. Among the hats, the edges of the different pieces were secured first, to prevent further fraying and that these pieces were next sewn together. Most seams and hems show rather coarse sewing. The most popular stitch used by far is the whipstitch, which was often applied in big stitches, more than 1 cm apart. Often sewing occurred using a 2zS plied yarn of 1 to 2 mm thickness or double threads, creating a strong join. Some of the textiles show more subtle needlework, as described above. In those cases thin sewing threads were used, as well as smaller stitches. Several decorative stitches have been observed (fig. 21). An example of a heavy chain stitch (fig. 21b) was present on a fine diamond twill from Leens (20 x 15 threads/cm).[338] Two fabrics showed lines of running stitches that seem to have been decorative as well as functional.[339]

332. Leens 1939-IV.27/3, Middelburg 00049-1 and 00049-2.
333. Schlabow 1976
334. Leene 1964.
335. Objectno. a1913/11.223m.
336. Leens 1939-IV.37/2 & 1939-IV.27/9.
337. Cooke e.a. 2002.
338. Leens 1927/VI.2/1.
339. Leens objectno xx and G2008-1.8 (from an unknown site from Groningen).

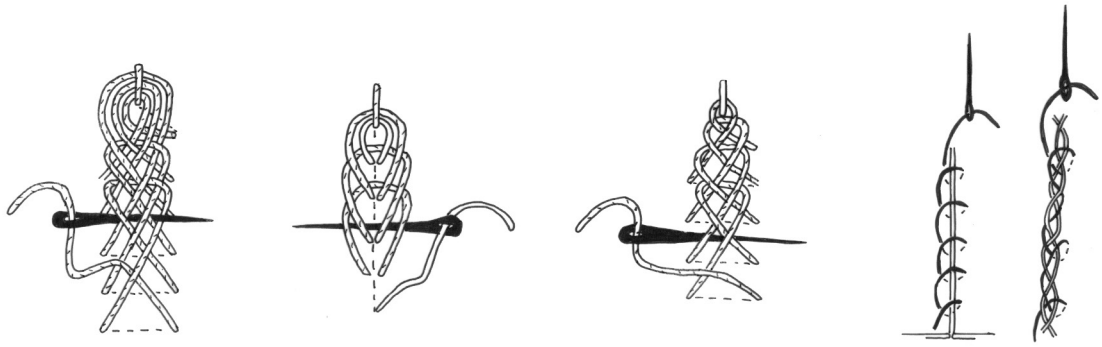

Fig. 6.21 Decorative stitches.
A. Raised plait stitch present on the hat from Oostrum, the pillbox-cap from Leens and the headdress from Dokkum.
B. Heavy chain stitch, present on a textile from Leens (objectnr. GM1927/VI.2/1).
C. Plait stitch used to secure the seam-allowance on the inside of the headdress from Dokkum.
D. Decorative stitch present on the cap from Rasquert (after Zimmerman 2009).

The hats from Oostrum and Leens, as well as the headdress and garment from Dokkum and the garment from Middelburg, were especially carefully sewn. Both the inside and outside of the hats were sewn using decorative stitches (fig. 21c). Moreover, the use of the same type of decorative stitching (fig. 21a) at the outside of the hats in a contrasting coloured yarn, gives the impression of standardisation in making these hats. Somewhat simpler versions of this stitch have also been observed on a pillow cover from the ship burial of Sutton Hoo (Mound 1) in Suffolk, in York and presumably also on a cushion from the tenth century princely burial at Mammen in Denmark.[340] All these embroidered textiles may be considered as being of Anglo-Saxon origin.[341] The use of decorative stitching is self-evidently more than simply functional and may have been an indicator of wealth or status. The Dutch garments sewn using this technique were clearly of a superior status, as opposed to the majority of the textiles and were therefore probably valued for their colour, decoration and craftsmanship.

Wear and repair is a common aspect of the textiles from the settlements, which indicates that textiles in general (not only the fine textiles) were considered valuable objects. Pieces have been added onto the original fabric in 65 cases. Textiles were used, repaired and reused for different purposes until they were completely worn out. Often only a seam or a worn out and patched area remains, suggesting that the remaining pieces of the garment were cut off and reused. Repairs were in most cases sewn firmly, but often very roughly, leaving frayed edges visible. There seems to be no relation between the quality of the fabric and the way repairs were carried out. The hat from Aalsum, in contrast, which is probably the coarsest woven and sewn hat, was repaired in a very careful manner using small stitches and (probably) red sewing-thread. This may indicate that the wearers of the garments were possibly not the same persons as the people making them.

340. Crowfoot 1983; Walton Rogers 2007, 101; Coatsworth 2005, 6.
341. Coatsworth 2005, 24.

6.5 CRAFT SPECIALISATION IN TEXTILES

The textiles found in settlements from the Netherlands are in only a few cases made using special skills, tools or requiring much time. It has been possible to distinguish the general way in which the textiles were produced and used in these settlements by analysing the different steps in the production process. Fibres were, in most cases, selected for spinning without careful sorting. The resulting yarns and fabrics were often coarser than expected, although a considerable regularity of spinning and weaving was observed as well. This distribution may be caused by an overrepresentation of household textiles, but it may also reflect the time available for making the textiles. These fabrics are likely to have been produced at a household level, where the producer did not have time to take considerable care, often resulting in a rather coarse product.

The examples of fine craftsmanship indicate that not all textile production took place at this level. Considerable quantities of fine spinning, weaving, and needlework have been observed, indicating that the higher quality work did not often end up as refuse in the settlements, but may very well be present in larger numbers in the cemeteries. These products, like the finer fabrics, the fine needlework on the hats, the fabrics with a raised nap from Middelburg, as well as the veil-like garment and piled weaves may be considered as the work of textile specialists. Having recognized a certain degree of specialisation in the production of the textiles, the following step is to look into the way this specialised production functioned within society. Applying Olausson's model for craft specialisation it may be possible to differentiate between these specialists. During the early Middle Ages the tethered and workshop types (types 3 and 4) are most likely to be represented. Unfortunately, there is only a small dataset of specialized products to deal with and these finds have characteristics of either levels of specialisation. The veil-like tabby from Leens can be assigned to both types, whereas the hats clearly show craftsmanship (type 3), but also standardisation (type 4) and (in a few cases) errors. The fact that these products are not only found in the Netherlands, but also in other countries, suggests either a large area of production or a considerable network of trade, which points to production organised in workshops rather that at a patron related level. The regularly woven, but rather coarse twills found in abundance in the settlements may be interpreted as household production, but they also show the efficient and standardized production characteristic of workshop industry.

The research problems described in the introduction of this chapter need further elaboration. More research needs to be conducted into the means and social organisation of textile production in the Netherlands: textile tools, raw materials and their distribution in and between a number of settlements. Furthermore, an analysis of several well-documented cemeteries should be conducted, addressing questions relating to the chronological development of textiles and their use as clothing among different groups in early medieval society.

7. Old Finds Rediscovered: Two Early Medieval Headdresses from the National Museum of Antiquities, Leiden, the Netherlands

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The two headdresses discussed in this article provide detailed information about the construction and sewing techniques used to make such items in the sixth to ninth centuries. The two garments show remarkable resemblance in decorative sewing techniques, which have also been documented in other high status burials around the North Sea. The widespread use of these techniques needs further attention for it may shed light on either the way craft knowledge spread across these countries or the way international trade networks allowed such items to be distributed.

7.1 INTRODUCTION

In the early years of the twentieth century, the National Museum of Antiquities in Leiden, the Netherlands, obtained several textile finds from early medieval settlements in the north of the country. Among these finds were two items of headwear: a pillbox cap from Leens, which dates to between 600 and 900, and a headdress from Dokkum–Berg Sion, which recently has been radiocarbon-dated to the period 568–651. The hat from Leens was put on display for a while, was recorded,[342] and afterward disappeared in the organic storage of the museum. The headdress from Dokkum–Berg Sion was never recognized as such and spent its days in the storage of the museum as well. Recently both artifacts were rediscovered and analyzed by the author.

Because no restoration had been conducted on the finds and no linings had been fixed in them, it was possible to analyze the objects in detail, from both the outside as well as the inside. Sewing techniques and the order in which the pieces were put together could be reconstructed and will be presented in this chapter. The results shed light on a range of questions concerning the production and use of the headdresses: How were they made? What techniques were used? How were they worn and by whom? And lastly, how can we relate these items to other finds from the sixth to ninth centuries?

7.1.1 The Frisians and their settlements in the northern coastal area of the Netherlands

The northern coastal area of the Netherlands has been inhabited since the early Iron Age, which in this region started around 750 BC. The lives of the people living on the marshlands near the coast were strongly influenced by the changing landscape. The rising sea level caused the water to flood the open land several times, depositing layers of clay. This made the land fertile, but also wet and unstable. People protected themselves against the water by building their settlements on raised mounds, known as *terpen* (singular terp) or *wierden*. Leens (province of Groningen) and Dokkum–Berg Sion (province of Friesland), where the headdresses were found, are examples of such raised settlements. The area became densely populated from the fifth century. The inhabitants-generally known as Friezen or Frisians-were mainly farmers who worked the land and kept livestock. Craftspeople were present as well: evidence for the production of bone, metal, amber, and glass artifacts, as well as textiles and pottery, is found in many settlements. Written sources mention the existence of a large Frisian kingdom, which is probably not a correct description of the way society was organized. It is more likely that the area was divided into several smaller territories, led by local leaders, who were in turn affiliated with one or more strong kings. Many prestigious objects from the area indicate that a part of society was indeed well off.[343] From the eighth century, the political power of the Frisians diminished. Frankish troops conquered the ruling Frisian kings, and the area was slowly Christianized. Still, the economic position of the Frisians was by no means lost. They are known in written sources for their activities in trade, and from the eighth century, they became part of an international trade network.[344] Many rich finds from the eighth to tenth centuries indicate that the area was still wealthy.

7.1.2 Archaeological research in the terpen-area

Archaeological research in the area of the *terpen* has known a long history, starting at the end of the nineteenth century. The soil of the *terpen* that had accumulated for centuries had become a valuable fertilizer, and therefore groups of diggers methodically dug away large parts of the mounds. These commercial excavations uncovered many artifacts, which drew the attention of local historians. By the beginning of the twentieth century, a broad network had developed of people monitoring the commercial excavations. These local historians could not conduct systematic research, but their efforts nevertheless produced a vast collection of artifacts, photographs, and documentation.

342. The hat is mentioned in Bender Jørgensen 1992, 220, cat. NL IV:3 s.

343. Knol e.a. 2005, 187–92.

344. Lebecq 1983.

Meanwhile, archaeologists and historians had recognized the rich history of the area and started to conduct research into the *terpen* and their inhabitants. A key figure in the research of the area was Professor Albert van Giffen. Van Giffen started his career in the north of the country, but was employed by the National Museum of Antiquities in Leiden from 1911 to 1916. In 1916 he started working for the Groninger Museum in Groningen. Throughout his career Van Giffen visited the excavations several times, documenting sections and collecting artifacts. In later years he conducted the first systematic archaeological excavations in the *terpen*. Many of the diggers had an eye for antiquities as well; they often collected archaeological finds and offered them to museums. Most finds came into the possession of the museums in the north of the country, but from 1911 to 1916, during Van Giffen's tenure, the National Museum of Antiquities in Leiden also started to collect artifacts from the northern provinces. As a result the museum now has a considerable collection of early medieval textiles from Dokkum–Berg Sion[345] and several other settlements in the provinces of Friesland and Groningen.

Many of the finds from the *terpen* are poorly dated. This reflects the way the objects were unearthed. Laborers generally excavated sections out of a mound, digging straight from the top down. This meant that they might collect objects dating from a span of more than a thousand years in a single day, making it difficult nowadays to affix a narrow date to the objects.

7.2 EXCAVATIONS AND HABITATION OF THE SETTLEMENT IN LEENS

The western Tuinster *wierde* near Leens was one of the first mounds to be excavated in detail by Van Giffen. During the commercial excavations in 1925 a section through the *terp* was documented, followed by a second section in 1926 and a third in 1930.[346] On these occasions only Carolingian artifacts were found. The central part of the *terp* was excavated in 1938 by Van Giffen. The three-meter-high mound was excavated in seven different levels, during which the remains of several houses and many artifacts were found. The chronology of houses and finds gives evidence of continuous habitation from 600 to 900.[347]

The hat from Leens was presented to the National Museum of Antiquities in Leiden in December 1930. However, it is unlikely that the hat was found by Van Giffen during his work on the site in that year. At that time Van Giffen was employed by the Groninger Museum, which logically would have received his finds rather than the National Museum in Leiden. Presumably the hat was found by laborers and sold to the museum in Leiden. This makes it difficult to assign a specific date to the object based on stratigraphy or associated finds. Without radiocarbon dating, the hat can only be assigned to the period 600 to 900, which is the entire period of habitation of the settlement.

7.3 THE PILLBOX CAP FROM LEENS

The hat from Leens (fig. 7.1) is very well preserved. It has not undergone restorations, and it was stored on a specially constructed base. Most of the hem has disappeared, but the hat is complete enough to reconstruct all of its measurements and characteristics. The hat is a so-called pillbox cap with a circumference of 51 centimeters. It is made from wool and consists of an oval crown and a more or less rectangular side panel. The hat is damaged but shows no traces of contemporary repair.

7.3.1 Fabric

The fabric used for the crown is a Z/S broken diamond twill with 13–14 warp threads per centimeter and 11–13 weft threads per centimeter. The warp is irregularly spun (low-to-medium twist) and 0.5–0.75 millimeter thick. The weft is low-to-medium twist and 0.5 millimeter thick. The broken diamond twill is irregularly woven. Many faults in the pattern are visible, showing some variation in the pattern repeat. In most cases the diamond pattern repeats after 12 weft threads and 18 warp threads.

345. 121 fragments of 77 individual weaves.
346. Van Giffen 1928–31, 23 and fig. 13.
347. Van Giffen 1935–40, 26–115; Knol 1993.

Fig. 7.1 Pillbox cap from Leens, Netherlands, ca. 600–900. Photo: National Museum of Antiquities, Leiden, Netherlands. For measurements, see fig. 7.2.

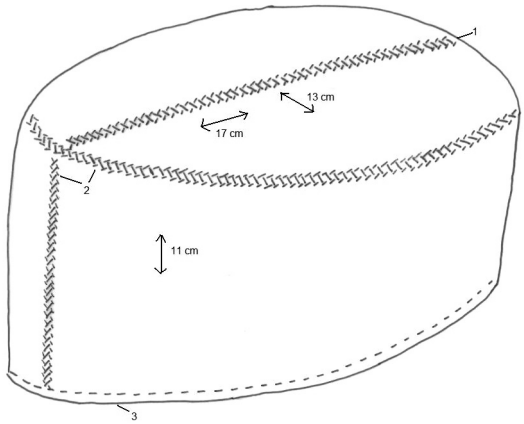


Fig. 7.2 Reconstruction drawing of the pillbox cap from Leens. Drawing: C. Brandenburgh.

The side panel is made out of a similar fabric, also a Z/S broken diamond twill with 12–13 warp and weft threads per centimeter. There are, however, small differences compared with the fabric used for the crown. The weft threads are more regularly spun: medium twist and 0.5–0.75 millimeter thick. Moreover, no faults are visible in the diamond pattern: the pattern repeat of 12 weft and 18 warp threads is consistent throughout the fabric. Nevertheless, both fabrics may be parts of the same original piece of cloth, since warp, fineness, and pattern repeat are consistent. The differences observed may be the result of inattentiveness of the weaver and the use of different batches of weft threads.

7.3.2 Construction

The construction of the hat (figs. 7.2 and 7.3) and the order in which the different parts of the hat were sewn could be analysed in detail because of the lack of modern interference and because the item was sufficiently flexible to be turned inside out during analysis.

The oval crown of the hat was made out of two similarly shaped halves stitched together. It seems that the oval edges of these two parts were first secured to prevent the pieces from fraying. These edges (8 millimetres when finished) were folded double and secured with a row of blanket stitches 4–5 millimetres long. After this the straight edges of the two halves were folded into each other and secured on the inside with blanket stitches 6–7 millimetres long, not visible from the outside (fig. 2.3, seam 1). The sewing thread used to secure all the seam allowances of the crown is a single Z-twisted thread, 0.5 millimetre thick. On the outside, the two parts of the crown were sewn using a decorative raised plait stitch (fig. 7.3, seam 1 and A) resembling a braid 3–4 millimetres wide. The stitch length here is 5–7 millimetres. The sewing thread used is a 2SZ medium-plied thread, 0.5–0.75 millimetre thick.

After this, the edges of the side panel were secured to prevent them from fraying. As with the crown, the edges (8 millimetres when finished) were folded double and secured with blanket stitches

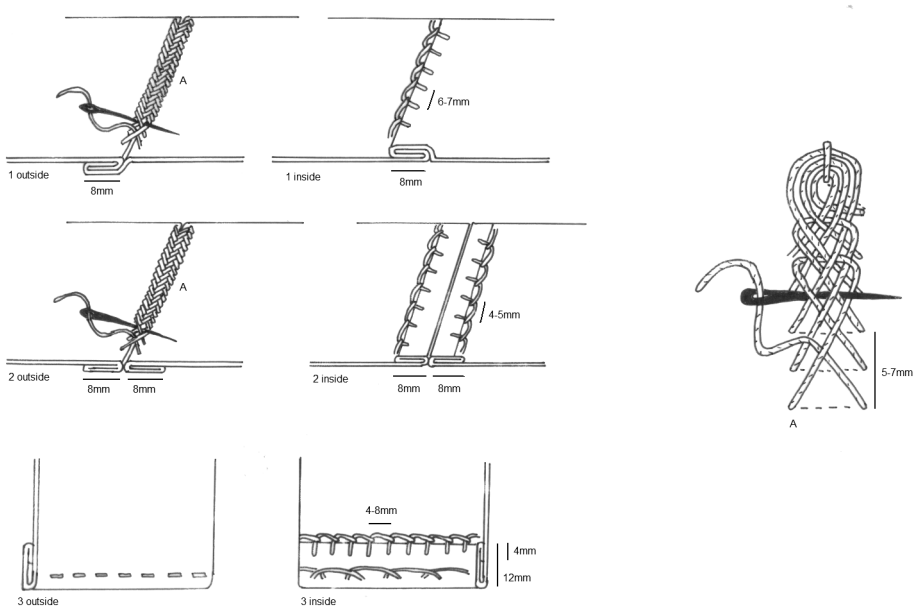


Fig. 7.3 Seams and stitching used in the pillbox cap from Leens. Drawing: C. Brandenburgh.

4–5 millimetres long (fig. 7.3, seam 2). The hem of the hat seems to have been sewn at this point as well, because the same sewing thread was used. To create the hem, the lower edge of the side panel was folded double and attached on the inside with blanket stitches 4–8 millimetres long (fig. 7.3, seam 3). The hem was furthermore stitched through with a row of running stitches, 4 millimetres from the edge. The sewing thread for all these edges as well as for the running stitch on the hem has the same characteristics as the thread used in the decorative stitch in the crown (2SZ thread, 0.5–0.75 millimetre thick, with a low twist and tightly plied).

Lastly, the side panel was closed (fig. 7.3, seam 2) and the upper edge of the side panel was attached to the crown, both with the same decorative stitch as used on the crown (stitch length 5–6 millimetres). The sewing thread for these seams is a 2ZS[348] medium-plied thread, 0.75 millimetre thick.

348. 2SZ indicates a two-ply thread, consisting of two S-spun threads twisted together in Z direction.

7.3.3 Colors

No dye analysis has been conducted on the fabric and the sewing thread. The thread used to stitch through the hem seems to be of a lighter color than the weave.

7.4 THE RESEARCH AND HABITATION OF DOKKUM-BERG SION

In the early twentieth century, the *terp* of Dokkum–Berg Sion was partly excavated by laborers. Professor Van Giffen visited the excavation several times. In 1909 he supervised documentation of a large section through the *terp*, which covers an area of about six thousand square meters.[349] This section uncovered the remains of several houses with sod walls. On the southern side of the mound a cemetery

349. Van Giffen 1910, 278 and plate V.

was found with 18 to 28 graves, both cremations and inhumations.[350] Van Giffen documented another section in 1925.[351] In 1928 the *terp* was completely excavated.

Finds from the *terp* give evidence of habitation starting in the Roman period. The settlement and cemetery documented by Van Giffen are most probably of Merovingian origin. The excavated houses, however, are of a type that continued to be constructed until the thirteenth century. During the later periods of the Middle Ages, a chapel of St. Mary and several other new buildings arose on the *terp,* housing a group of nuns who were allied to the nearby abbey of Dokkum. These buildings were demolished in 1580.[352]

The headdress from Dokkum–Berg Sion was offered to the National Museum of Antiquities in November 1913, together with a large quantity of other textiles. A month later the museum received another large group of textiles. Unfortunately these finds cannot be related to one of the excavations of Van Giffen, but were most probably found by laborers. The headdress has recently been radiocarbon-dated to the late sixth century or the first half of the seventh.[353] It is not certain whether the other textiles from Dokkum–Berg Sion are of the same date, but since they were stuck together in clay when offered to the museum, it is likely that they had been found near or on top of each other.

Fig. 7.4 Headdress from Dokkum–Berg Sion, dated to 568–651. Photo: National Museum of Antiquities, Leiden, Netherlands.

7.5 THE HEADDRESS FROM DOKKUM-BERG SION

The headdress from Dokkum–Berg Sion (fig. 7.4) is made out of one main panel with two side panels. The item is rather poorly preserved. Large parts of the main panel and the side panels have disappeared. This poor state of preservation poses problems in defining the shape of the headdress. Stitch holes in the main panel clearly show where the side panels were attached and where not, but this still leaves ample room for different reconstructions and hypotheses about the way in which the headdress may have been worn.

7.5.1 Fabric

The fabric used for the entire headdress is a Z/S broken diamond twill with 12–16 warp threads per centimetre and 11 weft threads per centimetre. The warp is regularly spun (medium-to-high twist) and 0.5–0.75 millimetre thick. The weft is low-to-medium twist and 0.75 millimetre thick. Both warp and weft are spun from naturally brown wool. The broken diamond twill is densely and regularly woven. The diamond pattern repeats after every 22 warp threads and 18 weft threads.

350. Van Giffen 1911.
351. Van Giffen, 1928-1931, 20–22 and afb. 3.
352. Ufkes & Schoneveld 1998, 13.
353. GrA-43945; 1445 ± 30 BP. Radiocarbon dating measures the age of organic objects in radiocarbon years before present (BP). Such raw ages need to be calibrated to give calendar dates, because the level of atmospheric 14C has not been strictly constant during the span of time that can be radiocarbon-dated. The reliability of this calibration is statistically defined as 1σ (68%) or 2σ (about 95.5%). When calibrating with a reliability of 1σ (68%), the hat dates between AD 599–644; when calibrating with a reliability of 2σ (about 95.5%), the hat can be dated between AD 568–651.

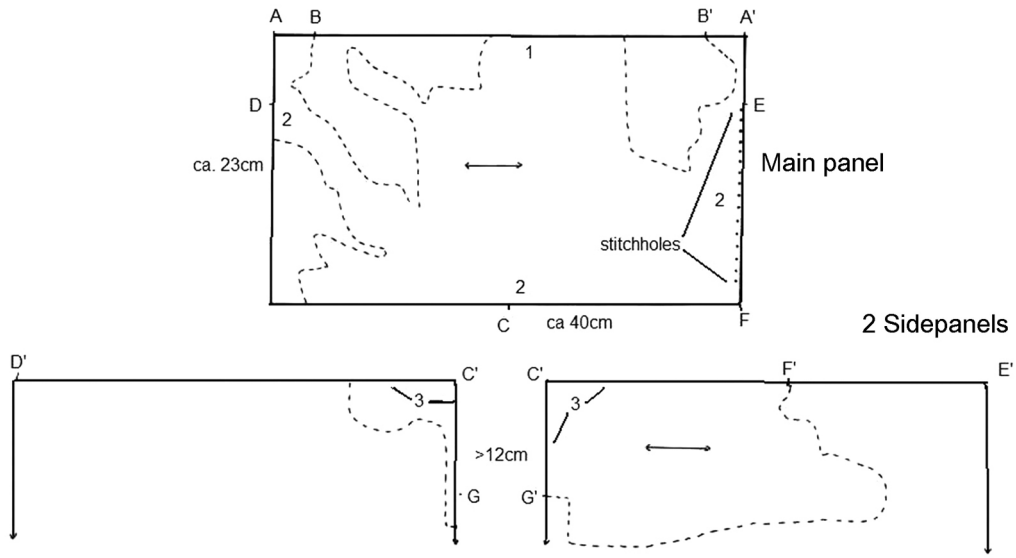


Fig. 7.5 Reconstruction drawing of the headdress from Dokkum–Berg Sion. Dotted lines indicate the actual remains. Drawing: C. Brandenburgh.

7.5.2 Construction

The headdress was made out of three rectangular pieces of fabric (fig. 7.5). The main panel measures approximately 40 x 23 centimetres. Although the side panels are poorly preserved, the stitch holes on the main panel suggest that the side panels would have measured about 40 centimetres. The width of the side panels could not be ascertained. The remaining width is 12 centimetres, but the original width was evidently larger since the hem is missing.

The edges (6 millimetres when finished) of the two short sides and one long side of the main panel were folded double and secured with blanket stitches 3–4 millimetres long, using a 2ZS sewing thread, 0.5 millimetre thick, with high twist and ply (fig. 7.6, seam 2). The other long side of this panel—the edge that would remain free, not joined to the side panels—was treated differently. This edge (10 millimetres when finished) was folded once and secured with a row of whip stitches 9 millimetres long, which are visible on the outside as well (fig. 7.6, seam 1). The sewing thread here is a Z-twisted double thread. Subsequently, the main panel was folded in half and sewn partly together into an open tube (fig. 7.6, seam A-B) using whip stitches in the same sewing thread. This seam is very badly preserved, leaving only 3 centimetres of stitching (3 stitches), which makes it impossible to reconstruct how long the seam originally was.

The edges (10 millimetres when finished) of the side panels were folded double and secured with a decorative stitch with a length of 4–5 millimetres (fig. 7.6, seam 3). The sewing thread here is a 2ZS thread, 0.75 millimetre thick, with low twist and medium ply. This thread is differently spun and plied from the one used to secure the edges of the main panel.

The side panels were joined together end-to-end and sewn onto the main panel using the same decorative stitch used in the hat found in Leens (fig. 7.6, seam C-D). The stitching resulted in a braid of 2.5 millimeters in width, with a stitch length of 6–7 millimeters. The sewing thread used is a 2ZS light-brown, medium-plied thread, 0.75 millimeter thick.

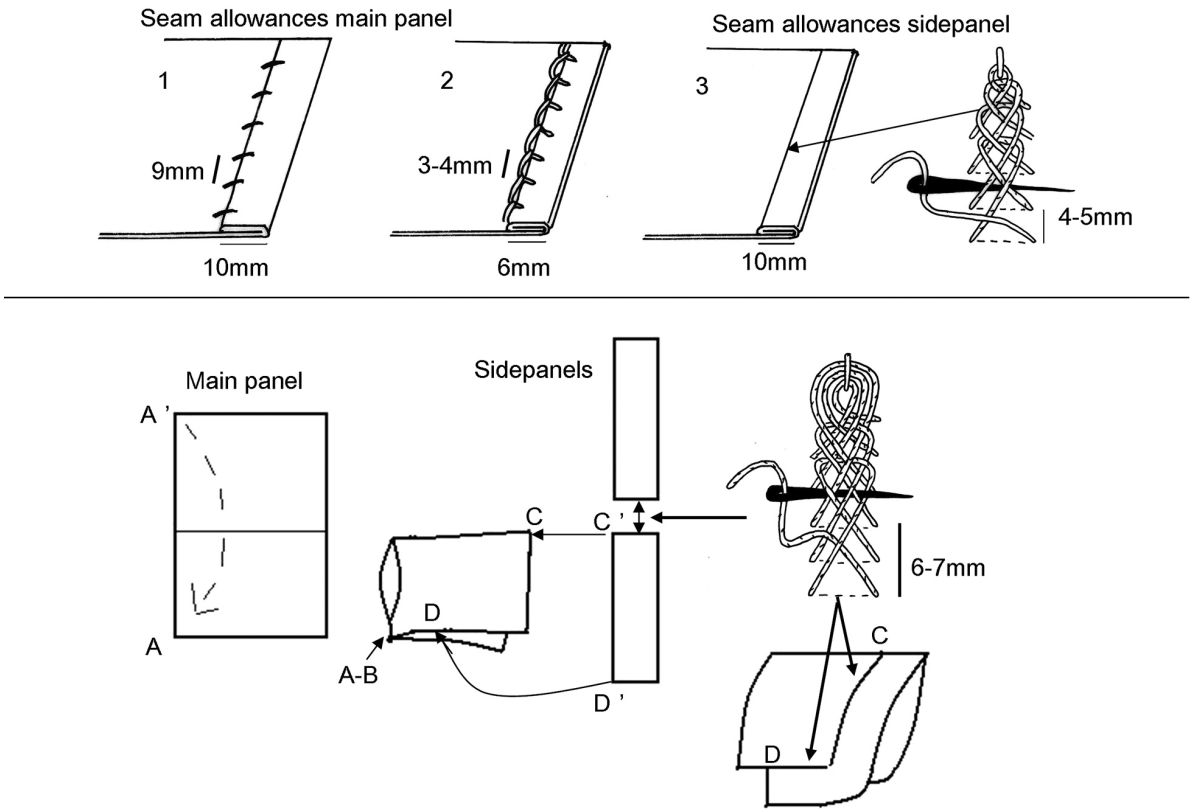


Fig. 7.6 Seams and stitching used in the headdress from Dokkum–Berg Sion. Drawing: C. Brandenburgh.

7.5.3 Colors

Dye analysis of the fabric and decorative stitching was conducted by Penelope Walton Rogers of the Anglo-Saxon Laboratory.[354] The headdress, which was originally of brown wool, was dyed with a tannin-based brown or black colorant. Tannins are widely distributed in nature, especially in material from trees, and it is not always possible to recognize tannins deliberately applied as dye. In this case, however, the colorant was detected in the main fabric of the hat but not in the needlework, which suggests that the tannins were present in a dye applied to give a solid black to the already naturally dark color of the fabric. The sewing thread was probably not dyed, and this decorative band would have contrasted with the dark fabric.

7.5.4 Ways to wear the headdress

When one attempts to construct a replica of the Dokkum–Berg Sion headdress, the result is a somewhat strange but also practical article, which could have been worn in different ways. The decorative stitching on the seams attaching the side panels to the main panel is clearly in contrast to the rather rough whip stitching on the other edge of the main panel. This suggests that the lavishly sewn seams were visible when wearing the headdress, and the other edge was perhaps partly out of sight. When one wears the decorative bands in the front, the other side falls at the back and is partly covered by the hair, which can be drawn into a plait or ponytail and placed through the tube formed by the main panel. Figure 7.7 shows three of the possible ways in which the headdress may have been worn. Furthermore, the decorative stitching used to secure the seam

354. Walton Rogers 2009

Fig. 7.7 Reconstruction of three different ways the headdress from Dokkum–Berg Sion may have been worn. Photos: A. Tamboer and G. Harteveld.

allowances on the inside of the side panels suggests that this edge may also have been visible while wearing the headdress. The third image in figure 7.7 shows the headdress with the edges folded back and the decorative stitching in contrasting thread clearly visible. A headdress of this kind is both decorative and practical since it would have enabled the wearer to protect his or her hair while working or cooking above a fire.

7.6 HISTORICAL CONTEXT

Several aspects relating to the hat from Leens and the headdress from Dokkum–Berg Sion need to be further elaborated. These concern these artifacts' wearers, their manufacturers, and their place within the existing knowledge of headgear in this period. Following the reconstruction presented above, it seems likely that the headdress from Dokkum–Berg Sion was worn by a woman or at least a person with long hair. The hat from Leens, however, is not so easily assigned to a specific person or gender. The following discussion of the development of European headgear throughout prehistory and the early Middle Ages offers clues as to how these items were worn and who may have worn them.

Archaeological finds and contemporary art give an impression of the developments in hats and headdresses throughout history. Several hats, caps, and hairnets have been found on bog bodies from the Bronze Age and Iron Age.[355] More evidence is available for the Roman period. John-Peter Wild, in his study of representation of clothing on tombstones in the northern provinces of the Roman empire, concluded that the hoods on capes were the most commonly used headgear for men in this period.[356] In some cases other headdresses have been observed.[357]

Roman soldiers frequently wore pillbox-shaped Pannonian hats (*pileus pannonicus*). In pictorial evidence these hats are depicted with a either a

355. The earliest find of headgear in the Netherlands is a fur cap found on a male body from the bog of Emmer-Erfscheidenveen (ca. thirteenth century BC). Groenman-Van Waateringe 1990; Comis 2003. In Denmark, hairnets and woolen caps made in sprang technique are the form of head-dress most often found in female graves. Danish burials also show that conical woolen hats with piled, furry surfaces were customary among men during the Bronze Age. Iron Age male bog bodies were found wearing tight-fitting leather caps. Broholm & Hald 1939, 60–62 and fig. 11; Hald 1980.
356. Wild 1968a, 186.
357. Several types of hats known in the Roman period, such as the tight-fitting conical hat, the wide-brimmed Petasos, and the Phrygian hat, are not further elaborated here since they are not relevant to discussion of the Dutch hats.

smooth or a rough surface, suggesting they could be variously made of leather, felt, or a woven fabric.[358] A very well-preserved example of this type of hat has been found in Egypt, at the site Mons Claudianus.[359] This hat, which can be dated to the years 100 to 120, was made out of felt, dyed green. Its oval crown measured 19.5 x 13 centimetres, making it only slightly larger than the example from Leens. In late Roman art these hats are worn high on the head, covering only part of the hair.[360] At Mons Claudianus another example of a nearly complete Roman hat has been found, featuring a round crown, earmuffs, and neck protector. This hat was very colorful. It was sewn out of 15 triangular pieces of red, green, and yellow fabric.[361]

Women in the Roman provinces are sometimes depicted wearing a closely fitting bonnet which covers the hair completely. A woman from Neumagen is represented wearing such a bonnet, and a female statue from Ingelheim shows the same type of headgear, covering braids of hair and a bun at the neck. Wild concluded from the way the headdresses are depicted that they must have been made from a very light material, suggesting a gauze-like weave or a hairnet covering the bonnet.[362] Veils were in use in this period as well, hanging loose or attached with a fillet. Several funerary reliefs show women in matron's attire. It is not certain whether the deceased actually wore these clothes, but the effigies all clearly depict a specific type of headgear. The matronal bonnet is very high and large, covering two plaits. This bonnet is held in place by a net of cords.[363]

A sandstone head found in the Roman fort of Birrens in Dumfries, Scotland, shows a headdress different from the ones described above. The sculpture is considered of Roman date, although a medieval origin was originally also debated.[364] The headdress closely fits the head, while the front edge is folded back, showing a bit of hair. The side flaps beside the head are folded outward, giving the impression of a Dutch bonnet. Several incised lines are visible across the headdress that might be interpreted as stitching (possibly decorative) or seams. The side flaps as well as the incised lines show a resemblance to the headdress found in Dokkum–Berg Sion.

Only very few examples of headgear from the fifth to sixth centuries are known, and evidence from art is sparse as well. Remains of veils are recognized in several Anglo-Saxon graves. Several Byzantine mosaics at Ravenna (fifth to sixth centuries) depict women wearing veils and coifs.[365] One of the female heads on the scepter from the Sutton Hoo ship burial shows a woman with parted hair drawn away from the face.[366] The (probably male) figure on the Spong Hill pot lid wears a pillbox cap at the back of the head, comparable to the way this type of hat was worn in Roman times.[367]

Archaeological and pictorial evidence from the seventh to ninth centuries is more abundant. The Netherlands have yielded several hats and headdresses from this period. Besides the two headdresses described above, four others have been found, as has been discussed in section 6.4.[368] These are the hat from Leens, which dates to the period 600 to 900 (fig. 6.12);[369] The cap of Rasquert, which may be dated to the period 800 to 900 (fig. 6.14);[370] a hat Aalsum from the period 700 to 900 (fig. 6.11)[371] and hat from Oostrum, dated to the period 700 to 900 as well (fig. 6.2).[372]

358. Walton Rogers 2007, 209, fig. 5.58.
359. Mannering 2006, 153–54 and fig. 2.
360. Sumner 2009, 163.
361. Mannering 2006, 155–56 and fig. 6.
362. Wild 1968a, 199, fig. 20.
363. Ibidem 211.
364. Toynbee 1952, 63–65 and plate IX.
365. Walton Rogers 2007, 162–63.
366. Owen-Crocker 2004, 78, fig. 57.
367. Walton Rogers 2007, 209, fig. 5.58; Owen-Crocker 2004, 20, fig. 3; also discussion at 79.
368. A detailed publication on these four hats is being prepared by Hanna Zimmerman.
369. Groninger Museum, Groningen, Netherlands, object no. GM1939/IV:13/1.
370. Groninger Museum, Groningen, Netherlands, object no. GM1928/VIII:1.
371. Fries Museum, Leeuwarden, Netherlands, object no. 33-373. It must be stressed, however, that this date may not be correct, since it is based not on radiocarbon but on associated finds.
372. Fries Museum, Leeuwarden, Netherlands, object no. 35B-48. As with the hat from Aalsum, this date may not be correct, since it is based not on radiocarbon but on associated finds.

This last hat was sewn with great care, using the same decorative stitch as the pillbox cap from Leens and the headdress from Dokkum–Berg Sion (fig. 6.13). This decorative stitch was probably of a deeper red color, making it a contrasting and attractive decoration.

There are few contemporary finds of male or female hats or headdresses from elsewhere in Europe, which is remarkable since pictorial evidence shows that it became customary for women and girls to cover their heads after the conversion to Christianity. Historical sources suggest that in the seventh century, the hair on the forehead was still visible, but from the eighth century onward, female hair was covered completely by a headdress.[373] In Leens, several fragments of a textile that might have been used for such headdresses have been found: known as *Schleiergewebe,* this is a very fine and open tabby, woven out of naturally white wool. Comparable weaves have been found in England,[374] Germany,[375] and Denmark.[376]

In Toornwerd (province of Drenthe), remains have been found of a netlike hair-covering made in a loose tabby weave from plied horsehair with a wool repp starting border.[377] This fragment, however, cannot be assigned to a specific period in the early Middle Ages.

Tenth- to eleventh-century art depicts women with covered heads and necks, with either a veil or a shawl wrapped around the head and neck. A coif or fillet is also depicted in combination with a veil. Archaeological finds indicate that Viking women in Britain frequently covered their heads. In York, remains of three silk caps have been found. These Viking-age caps resemble coifs with seams on the outside.[378] Comparable silk finds are known from Lincoln and London.[379]

In Dublin, the remains of 13 headdresses made out of wool or silk have been found, as well as the remains of 14 rectangular scarves with fringes. These scarves may have been used as headdresses as well.[380]

Lastly, there are the excavations in Greenland, where several pillbox caps have been found dating from the twelfth to fifteenth centuries. These hats were found in graves of men and boys.[381]

Given the evidence from the Roman period and Middle Ages, the pillbox cap from Leens fits well in a long tradition. The hat is comparable to the Pannonian cap known in the Roman period. The fifth-century Spong Hill pot lid probably shows a similar hat as well, and even in the twelfth to fifteenth centuries, this type of hat was frequently worn by men and boys in Greenland. Nowadays the hat from Leens (51 centimetres in circumference) could only be worn by a boy, but sizes may have been smaller in antiquity.[382] If worn at the back of the head as in Roman times it may have fit a small man's head. Furthermore, the Leens hat is only slightly smaller than the one found in Mons Claudianus, which is most certainly a military context, making it likely that both hats were worn by grown men.

The headdress of Dokkum–Berg Sion seems more likely to have been worn by a woman. No distinct parallels are known so far, but the headdress bears resemblance to several headdresses mentioned above. When worn with the side flaps folded back, there is some resemblance to the stone head from Dumfries, Scotland. Tied closely around the head, as in the first example in figure 7.7, the headdress looks quite similar to a coif, which may have been worn independently or under a veil.

373. Owen-Crocker 2004, 159.
374. Walton Rogers 2007, 68.
375. Settlement of Hessens; see Tidow 1995, 367.
376. Mammen; see Hald 1980, 102–11 and fig. 97.
377. Bender Jørgensen 1992, 47 (fig. 57), 221.
378. Walton 1989, 360–67; Walton Rogers 2007, 165.
379. Pritchard 1982, 196–97.
380. Wincott Heckett, 44–75.
381. Østergård 2004, 132, 219–20.
382. Carol van Driel-Murray has pointed out that in the Roman period in the Netherlands and Germany, shoe sizes were smaller than nowadays. Sizes for most adult men varied from 37–40 (UK sizes 4–6½). Larger shoes up to size 43 (UK 9) have been found as well. Van Driel-Murray 2007, 360.

7.7 COLORS AND DECORATIVE STITCHES: A SIGN OF WEALTH?

Although very different in size and shape, the artifacts from Leens and Dokkum–Berg Sion share a distinctive decorative stitching. This same stitch appears in the hat from Oostrum.

Somewhat simpler versions of this stitch have also been documented on a pillow cover from the ship burial of Sutton Hoo (Mound 1) in Suffolk, in York, and on a presumed cushion from the tenth-century princely burial at Mammen in Denmark.[383] Dye analysis of the hat from Oostrum and the headdress of Dokkum–Berg Sion has made it clear that the decorative bands were sewn in contrasting dyed threads, making them stand out clearly from the fabric. No dye analysis has been done on the hat from Leens, but the sewing thread used in the hem of this hat is even nowadays of a lighter color than the fabric, making it likely that this hat was sewn with contrasting dyed thread as well.

Hats and headdresses seem often to have been dyed. As mentioned above, the pillbox cap from Mons Claudianus was dyed green, and the hat with crown and earmuffs from this same site was made out of pieces of red, green, and yellow fabric.[384] The Roman bonnet of the Neumagen sculpture is painted in yellow, and the lines of the hairnet covering the bonnet are painted red.[385] The lines on the sandstone head from Dumfries, Scotland, may be interpreted as seams that were clearly visible as well. This effect may have been obtained by using differently colored threads or decorative stitching, making the seam stand out against the texture of the fabric as in the headdress from Dokkum–Berg Sion and the hat from Oostrum. Several of the Viking Age caps were colorful as well: traces of madder and lichen purple have been found, suggesting a rich use of dyestuffs.

383. Hald 1980, 110, fig. 296, shows the raised fishbone stitch observed in the Mammen textile. In this case the stitch loops through the fabric twice, while in the Dutch examples the loop goes behind the braid but not through the fabric; Crowfoot 1983, 420–22; Coatsworth 2005, 6 and 14.
384. Mannering 2006, 155–56.
385. Wild 1968a, 220; Wild 1968b, 69.

The stitching present on the Dutch headdresses must clearly have been a popular way to sew and embellish garments. A reconstruction project of both artifacts has shown that it is a quick-to-learn and useful sewing technique, but also rather time-consuming. Seven hours were necessary to sew the headdress from Dokkum–Berg Sion, whereas with simpler needlework it would have taken less than half that time. The Dutch items that were dyed and sewn using this technique were clearly superior in quality compared with the majority of the textiles found in the *terpen* region. Therefore they are probably an indicator of wealth or status. The high-status burials in Sutton Hoo and Mammen fit this interpretation, suggesting that decorative needlework must have belonged to the higher spheres of society. However, one should not forget that many textiles found in the Dutch *terpen* probably functioned as household textiles, which did not need to be embellished and are inevitably of lower quality. However, the fact that three out of the six (known) headdresses in the Netherlands are sewn with the same decorative stitch may also be considered as a sign of standardization in making these objects. Because of this standardized and time-consuming production process, these headdresses might have been made by specialized craftspeople working in textile workshops.[386] It is clear that the similarities of the needlework on the various finds in the North Sea region reflect the intensive contact within this area. Did these contacts merely cause this popular sewing technique to spread in the region, or did they enhance trade in ready-made garments as well? With the data now available these questions can unfortunately not be answered.

7.8 CONCLUSION

The two headdresses discussed in this article provide detailed information about the construction and sewing techniques used to make such items in the sixth to ninth centuries. The hats were carefully sewn using small and often decorative stitches. Although the shape of the two items is very different, there are similarities in the way they have been constructed. In both cases the edges of the separate panels were first hemmed to prevent fraying, and after this the

386. Brandenburgh 2010a, 75.

panels were sewn together. Both headdresses showed decorative stitching in contrasting-colored thread, making the seams stand out against the fabric. This specific stitch has also been observed on another Dutch hat from this period as well as on textiles from the burials in Sutton Hoo and Mammen.

The pillbox cap from Leens was most probably worn by a man. The hat fits in a long tradition which goes back to at least the Roman period, where a similar hat style has been named the "Pannonian cap" by archaeologists. Finds from Greenland show that this type of hat stayed in use far into the Middle Ages. The headdress from Dokkum–Berg Sion probably belonged to a woman and may have been worn in any of several ways. The decorative stitching on the inside of the side panels suggests that these panels were folded outward, but the headdress could also be tied closely around the head. When worn that way, the headdress resembles a coif, which may have been worn under a veil.

Pictorial and archaeological evidence shows that hats and headdresses were often colorful. This is certainly true for the headdress from Dokkum–Berg Sion, which was dyed and sewn with contrasting-colored thread. Furthermore, the decorative stitching is of a quality not often found in the archaeological record. Since this specific stitch was also found in rich burials of Sutton Hoo and Mammen, it is likely that the colorful hats sewn in this technique were considered of superior quality by their owners as well. The similarities of these high-quality items, found in different countries around the North Sea, underlines the intensive contacts in this region. These contacts may have enabled specific sewing techniques to spread throughout the North Sea region. It is, however, also possible that the items themselves travelled, as opposed to the techniques to make them. This would imply an international trade of finished garments in the North Sea region.

8. Discussion

8.1 INTRODUCTION

The previous chapters have discussed the finds from individual cemeteries and settlements. In this last chapter the results of all these case studies will be discussed together. For reasons discussed in chapter 1, the finds from the cemeteries provided the most reliable dataset for reconstructing the use of textiles in the Merovingian period. Moreover, due to their often excellently documented context, these textiles are more suitable when trying to discern differences within sites, gender and age differentiation and chronological developments. Settlement textiles on the other hand are generally younger than the Merovingian period and are more suitable for establishing the cut and shape of garments and mode of production. Consequently, this final chapter focuses firstly on grave textiles and their use and the finds from the settlements are treated separately from those from the cemeteries.

The results of the textile analyses are presented as follows: technical aspects of the cemetery textiles are described in section 8.2, followed by an assessment of their quality (section 8.3). The use of the textiles in this period will be discussed, including a reconstruction of early medieval burial dress (8.4), the custom of covering objects in a grave with fabrics (8.5) and the use of other cemetery textiles (8.6). Differences in the use of fabrics become evident when comparing the graves of men, women and children (section 8.7). The finds from the settlements will be discussed in section 8.8, as well as a comparison between the cemetery textiles and those from settlements. This chapter ends with a discussion of the variation of (the use of) textiles observed in the Netherlands and the meaning we may attach to these trends.

8.2. TECHNICAL CHARACTERISTICS OF THE TEXTILES FROM THE CEMETERIES

8.2.1 Fibre types

Fibre identification of the textiles in the cemeteries resulted in a considerable number of identifications of woollen fabrics. Plant fibres have only sparsely been recognised in the dataset. However, no systematic fibre analyses were possible due to the often-poor condition of the textiles. Gold thread has been documented once in Maastricht-Sint-Servaas church and twice in Maastricht-Pandhof.[387] It also occurs in the sixth cemetery of Vlodrop, which has not been published yet.[388] The occurrence of gold thread is therefore evidently not reserved for the high status burials in Maastricht.

8.2.2 Dyes

As described in section 1.5.1, dye analysis could only be carried out on a small percentage of the textile fragments examined in this study. Although the analysis of dye materials as a result lies beyond the scope of this research, some general remarks can be made regarding the use of colour in the early medieval textiles examined in this study.

Several attempts have been made to analyse dyes from both settlements and cemeteries. A number of fragments from the cemetery of Rhenen were selected

387. For an overview of the way gold thread has been used in embroideries see Owen Crocker 2004, 308-315. The use of gold thread in woven bands (gold-brocading) is discussed by Walton Rogers 2007, 96-97. For a detailed description of the gold thread in Maastricht see chapter 4 (section 4.5.2) and Brandenburgh 2015, 42-45.
388. Personal comment J. Kempkens of Restaura restaura-tieatelier.

for dye analysis but no dyes could be identified in these samples. The same can be said regarding the mitten found in Dorestad.[389]

From the *terpen* area seven textile fragments were selected for dye analysis. The results cover a diversity of colours. Red dye could be identified in the hat from Oostrum (700-900 AD), which had been made from a white fleece for the main body of the hat, with decorative stitching in fawn wool. The same madder type dye was present in both the cloth and the sewing thread, but it was much more concentrated in the stitching, making it likely that the ground fabric was light red, salmon or peach and the needlework a deep dull red. In the hat from Berg Sion (568-651 cal AD), which was made out of naturally brown wool, the chemical signature of a tannin-based brown or black colorant was present. This was detected in the main fabric of the hat but not in the needlework, which suggests that the tannins were present in a dye applied to give a solid black to the already naturally dark fleece colour of the headdress.

8.2.3 The types of weaves used in the cemeteries in the Netherlands

8.2.3.1 Tabby weaves

The popularity of this fabric varies among the cemeteries: in some sites such as Bergeijk and Lent approximately 15% of the textiles were woven in tabby while in other sites more than 60% of the textiles were tabbies. Especially Maastricht - Sint-Servaas church, Maastricht-Vrijthof, Leusden and Posterholt show a predominance of tabbies. The majority of tabbies in all sites (except Lent) are woven out of z-spun yarns in both warp and weft (z/z). Small quantities were woven out of s-spun yarns in both systems (s/s) or z-spun yarns in one system and s-spun yarns in the other system (z/s). Several of the tabbies were woven in a spin-pattern. This pattern is created using both z- and s-twisted threads in one or both systems. The different direction of the twist of the yarns bestows a very subtle but clear striped pattern to the fabric. A number of 46 tabbies was woven out of woollen threads, whereas 21 were probably made out of plant fibres. Fibre identification however was not possible in nearly 200 fabrics, making it impossible to estimate the occurrence of these fibre types among the tabbies.
Most tabbies were rather balanced with approximately the same number of threads in both thread systems. Several fabrics however show a large difference between warp and weft with more than thrice as many threads in one system than in the other. This occurs only in the cemetery of Maastricht-Pandhof, Maastricht - Sint-Servaas church.[390] Normally a ratio of 2:1 or a difference of at least ten threads per cm is used to justify the use of the term repp.[391] When applying this to the textiles another four from Sint-Servaas church, a textile from Maastricht-Vrijthof and five textiles from Rhenen qualify as repp.[392]

8.2.3.2 2/2 twills

In most cases where the fabric was evidently woven in 2/2 twill, it was not possible to ascertain whether it was a 2/2 plain twill or a variety of this weave, such as diamond twill. Only where the fragments were large enough to cover part of a reversal in the pattern, the difference between the types of twill could be discerned. Consequently, most of the smaller fragments (< 1 cm) are assigned to the group of 2/2 plain twill, leading to a considerable overrepresentation of this group.[393] In many sites 2/2 twills are equally important as tabbies. There are however regional variations such as Bergeijk with twice as many 2/2 twills than tabbies, and Leusden, Maastricht – Sint-Servaas church and Maastricht-Vrijthof where the ratio tabby-2/2 twill is approximately 2:1. Local variation can also be observed regarding the preferences in the direction

389. Here traces of red and yellow were found but one could not tell whether these were derived from dyes or from the sediment in which the mitten had been excavated (analysis Instituut Collectie Nederland, 09-01-2009/1219).

390. Pandhof: find number 40.1.TX1; Sint-Servaas church: find numbers 17-02-07.1 (stray find) and 21-02-03.1 .
391. Bender Jørgensen 1991, 13.
392. Sint-Servaas church find numbers 03-06-01.1, 16-DD-01, 16-DD-03 & 23-03-01.1; Vrijthof find number 1419.1; Rhenen find numbers 31, 73, 82, 460 & 733.
393. 87 of the 2/2 twills were made out of wool, whereas it was not possible to identify the fibre type in the other 2/2 twills

of spin within the fabrics. Some sites show equal amounts of z/s and z/z in the 2/2 twills but there are also sites where z/z twills are completely lacking or sparse (again Leusden, Maastricht – Sint-Servaas church and Maastricht-Vrijthof).

Diamond twills are in small quantities present in practically all cemeteries. These fabrics are generally woven in z/s (22x), but small quantities of z/z (5x), s/s (4x) and spin pattern (1x) have been recognised as well. We may however assume that this fabric occurred more often. When we look at the fabric distribution among Dutch settlements (fig. 8.1) it becomes obvious that diamond twills were very popular and constituted 40% to 80% of the total body of fabrics.[394] Here we have to take into account that the settlements are generally located in the north of the country whereas the cemeteries are located in the centre and south of the country. Moreover the settlements have a broader lifespan making a comparison between settlements and cemeteries less reliable. We can however expect that patterned fabrics such as diamond twills are underrepresented in the diagrams of the cemeteries.

8.2.3.3 Other types of twill

Variations of twill such as 2/1 twill, 3/1 twill, 3/3 twill and Rippenköper are present in very small quantities and only in Lent, Rhenen and Maastricht-Sint-Servaas church. 2/1 twill has only been observed once in Lent and twice in Rhenen (in both z/s and z/z variations), while 3/1 and 3/3 twills made out of z/z-spun yarns have been documented solely in Rhenen. One fabric from Sint-Servaas church could be identified as a Rippenköper pattern.

8.2.3.4 Tablet weave

Tablet weave has only been documented twice, and both fragments were discovered in the cemetery of Rhenen.[395]

394. Brandenburgh 2010a, 60 (chapter 6).
395. Rhenen find number 470 & 714, Wagner & Ypey, 2012, 342 & 497.

8.2.3.5 Conclusions regarding the fabric types

There is very limited variation in the types of fabrics documented in Dutch cemeteries (fig. 8.2). This distribution pattern is undoubtedly influenced by the small size of the textile fragments that very often does not allow an establishment of variations of twills. In large find complexes such as Maastricht-Sint-Servaas church and Rhenen special weaves have been identified occasionally (<1%), therefore the chance of recognizing these special weaves in a smaller complex is very small. The fact that these weaves have not been found in the smaller cemeteries therefore does not automatically imply that they were totally absent.

We can nevertheless discern certain trends with clear preferences for certain groups of weave types in different cemeteries. When we look at figure 8.3a-i the cemeteries of Leusden, Maastricht - Sint-Servaas church and Maastricht-Vrijthof show a similar distribution of textiles with a preference for tabbies and twills occurring in smaller quantities. Posterholt also shows this preference but here the differences between the numbers of tabbies and twills are smaller. In other cemeteries such as Lent, Wijchen, Rhenen and Maastricht-Posterholt tabbies and twills are present in approximately equal numbers. Bergeijk is the only cemetery where twills seem to have been more popular than tabbies.

It is very difficult to establish a chronology of textile types within the cemeteries. The graves are dated into overlapping phases, often resulting in a small number of fragments per phase. These numbers do not allow any statistical use of the textile data yet. Since one of the research questions relates to the differences between the fifth/sixth and seventh century an attempt has been made to compare the textile remnants from these periods. In Bergeijk only 2/2 twills z/s are present in the sixth century. In the seventh century different types of weaves come in use: first the diamond twills z/s, the 2/2 plain twills z/z and diamond twills z/z emerge and in the second half of the seventh century there are also tabbies present. We must however take into account that the sixth century is only represented by four fabrics

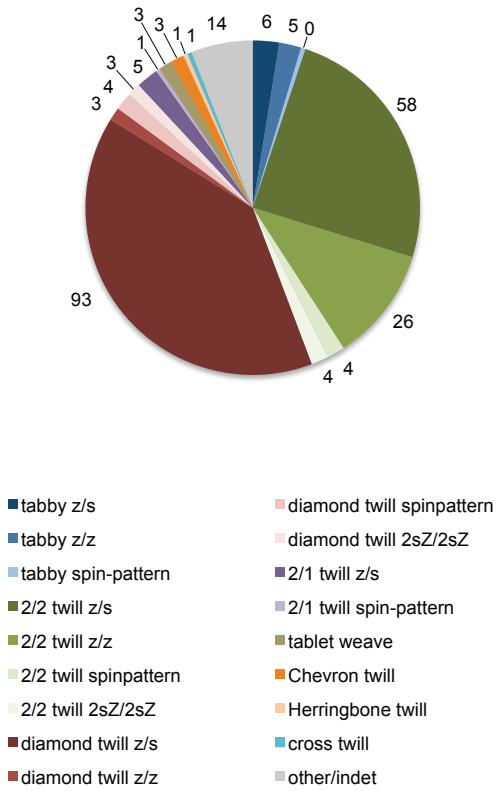


Fig. 8.1 Distribution of the fabric types in the settlements. N=235. These textile remains will be discussed in section 8.8.

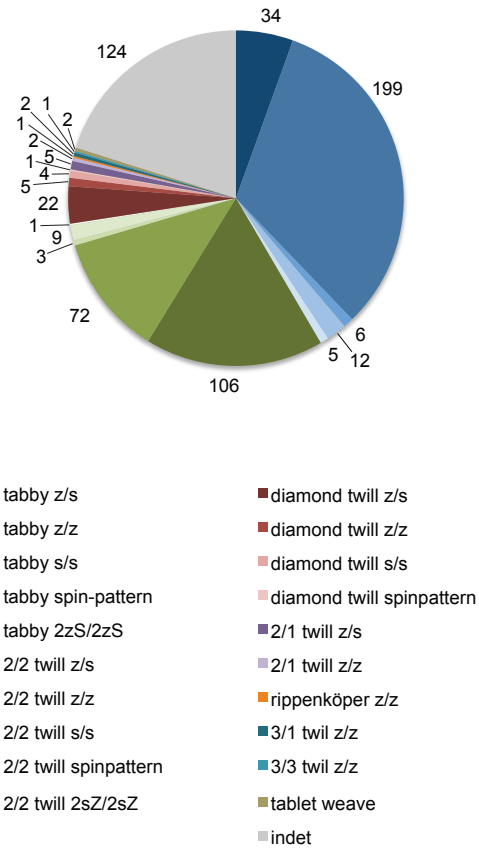


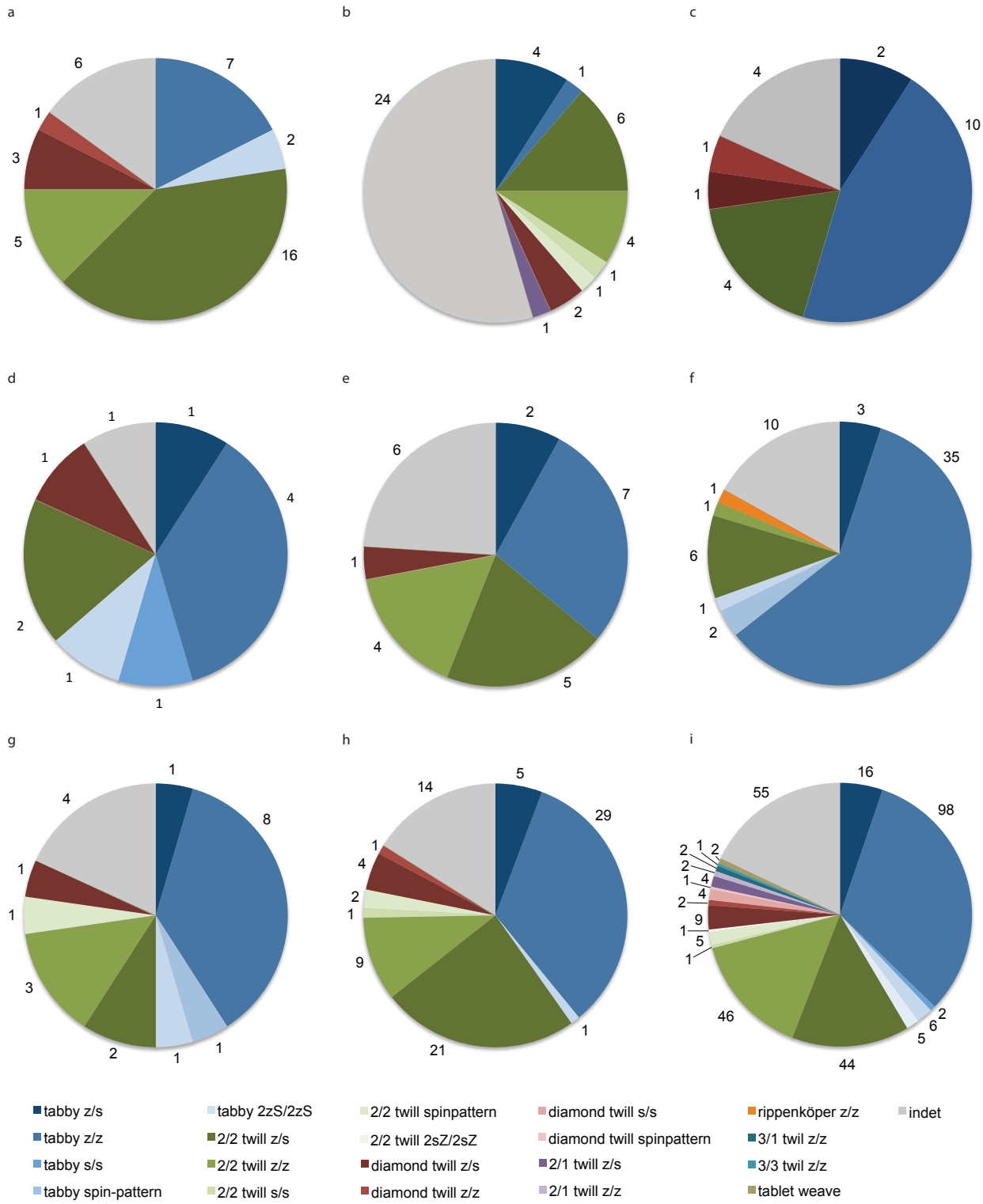
Fig. 8.2. Distribution of the fabric types in all cemeteries throughout the entire period.

in this cemetery.[396] The fabrics from Maastricht were also divided according to the different phases the cemeteries were in use, but no clear difference between the sixth and the seventh century could be observed in the three cemeteries from this city.[397] In the cemeteries of Posterholt and Lent-Lentseveld a comparison between the sixth and seventh century proved impossible as well: in Posterholt only one of the 15 graves containing textiles was ascribed to the sixth century,[398] while the textiles from Lent-Lentseveld were all from the fifth and sixth century.[399] The cemetery of Wijchen has the greatest potential for comparing the chronology of textiles within a single cemetery with 24 pieces of fabric from the fifth/sixth century and 32 textile fragments from the seventh century. Here it is remarkable that the predominant textile type in the fifth/sixth centuries is 2/2 twill (which is also observed in Bergeijk). In the seventh century 2/2 twills and tabbies become equally popular in this cemetery.[400]

Since the individual cemeteries do not provide enough datable fragments to analyse the development within the burial sites, the textiles from these cemeteries have been grouped together in order to discern crude trends and differences between the sixth and seventh century (fig. 8.4a-b). Of the 616 textiles that have been documented 94 could be firmly assigned to the fifth/sixth century, while 106 were dated to the

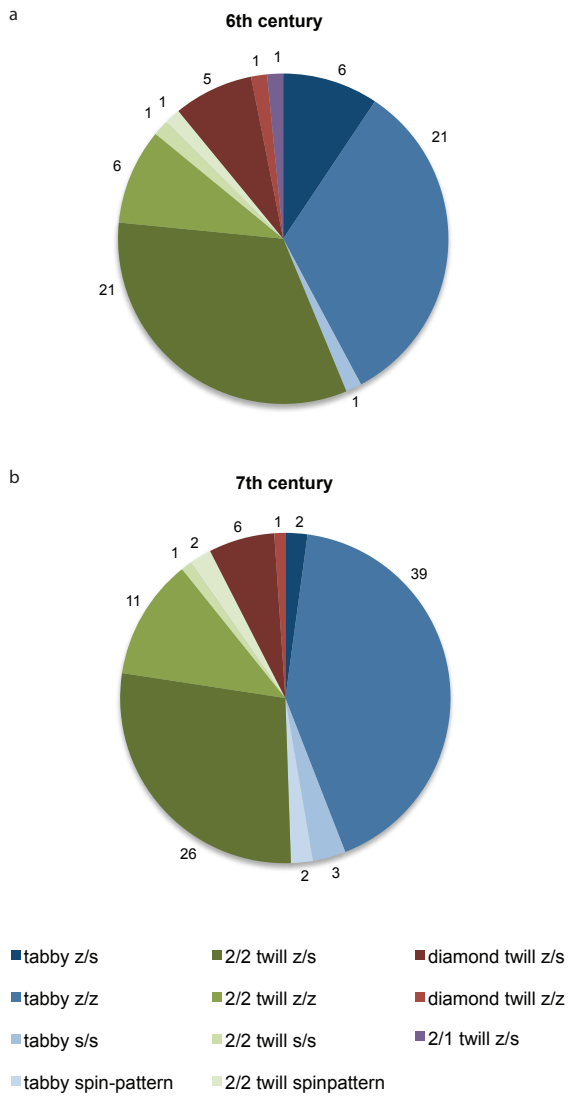
396. Brandenburgh 2012a, 132, fig. 7.8.
397. Brandenburgh 2015, 46 (chapter 4).
398. Brandenburgh 2013, 134.
399. Chapter 5, (section 5.4).

400. Chapter 5, (section 5.4).



tabby z/s	tabby 2zS/2zS	2/2 twill spinpattern	diamond twill s/s	rippenköper z/z	indet
tabby z/z	2/2 twill z/s	2/2 twill 2sZ/2sZ	diamond twill spinpattern	3/1 twil z/z	
tabby s/s	2/2 twill z/z	diamond twill z/s	2/1 twill z/s	3/3 twil z/z	
tabby spin-pattern	2/2 twill s/s	diamond twill z/z	2/1 twill z/z	tablet weave	

8.3a. Bergeijk (N = 40)
8.3b. Lent-Lentseveld (N = 44)
8.3c. Leusden (N = 22)
8.3d. Maastricht – Vrijthof (N = 11)
8.3e. Maastricht – Pandhof (N = 25)
8.3f. Maastricht – Sint- Servaas church (N = 59)
8.3g. Posterholt (N = 22)
8.3h. Wijchen (N = 87)
8.3i. Rhenen (N = 306)



tabby z/s | 2/2 twill z/s | diamond twill z/s
tabby z/z | 2/2 twill z/z | diamond twill z/z
tabby s/s | 2/2 twill s/s | 2/1 twill z/s
tabby spin-pattern | 2/2 twill spinpattern

Fig. 8.4a Distribution of the fabric types from the cemeteries of Bergeijk, Lent-Lentseveld, Leusden, Maastricht (Vrijthof, Pandhof & Sint-Servaas church), Posterholt and Wijchen in the fifth/sixth.
Fig. 8.4b. Distribution of the fabric types from the cemeteries of Bergeijk, Lent-Lentseveld, Leusden, Maastricht (Vrijthof, Pandhof & Sint-Servaas church), Posterholt and Wijchen in the seventh century.

seventh century.[401] A considerable number of these remains however were indeterminate fragments, leaving us with 64 fabrics from the fifth/sixth century and 93 fabrics from the seventh century. As is shown in figure 8.4a-b there are statistically no differences between both periods in terms of fabric types.

8.3 QUALITY OF THE TEXTILES FROM THE CEMETERIES

In this section two definitions of textile quality will be discussed, starting with the 'standard' thread count, followed by a discussion of aspects and factors that may be of importance in assessing textile quality.

8.3.1 Quality of textiles based on thread count

Comparing the textiles of the cemeteries in the Netherlands solely on the basis of thread count we can establish that there are differences between the sites (fig. 8.5a-j). The three cemeteries from Maastricht and Leusden contain textile fragments that are generally of higher quality than those from the other sites. Here, most of the remnants have thread counts in the range of medium-fine and fine quality (between 10 and 20 threads/cm). In the case of the three cemeteries from Maastricht there are many exceptions in the extra fine category with thread counts above 20 threads/cm. Other sites such as Bergeijk, Posterholt and Wijchen yielded coarser fabrics with thread counts between 5 and 15 threads/cm and a few exceptions up to 20 threads/cm. Rhenen and Lent-Lentseveld show a mixture of these two groups: here textiles are present in coarse qualities with 5 threads/cm and equal numbers of finer fabrics ranging up to 20 threads/cm. In nearly every cemetery the tabbies are generally of higher quality than the twills. The textiles from Lent-Lentseveld are an exception: here the twills are finer than the tabbies.

Within the group of tabbies the z/z variant is on average slightly finer than the other spin combinations (fig. 8.6). Spin patterned tabbies and tabby z/s are present in coarse fabrics but also make up for the finest of the tabbies. Figure 8.7 shows that the fibre type does not influence the quality of the tabbies: fabrics made out of wool are present in the same range of quality as those made of plant fibres. In the group of 2/2 twills and diamond twills there seem to be no differences in quality between the different spin-combinations

401. The graves from Rhenen have not been dated yet and the pieces from this site can therefore not be used for this purpose.

(fig. 8.10 & 8.8). Plant fibres have been identified only four times in 2/2 twills making a comparison between fibre types in 2/2 twills futile. The special fabric types all have thread counts between 5 and 17 threads/cm, underlining the notion that thread count is only one of many factors that can determine the value of a fabric (fig. 8.9).

8.3.2 Quality of textiles based on texture

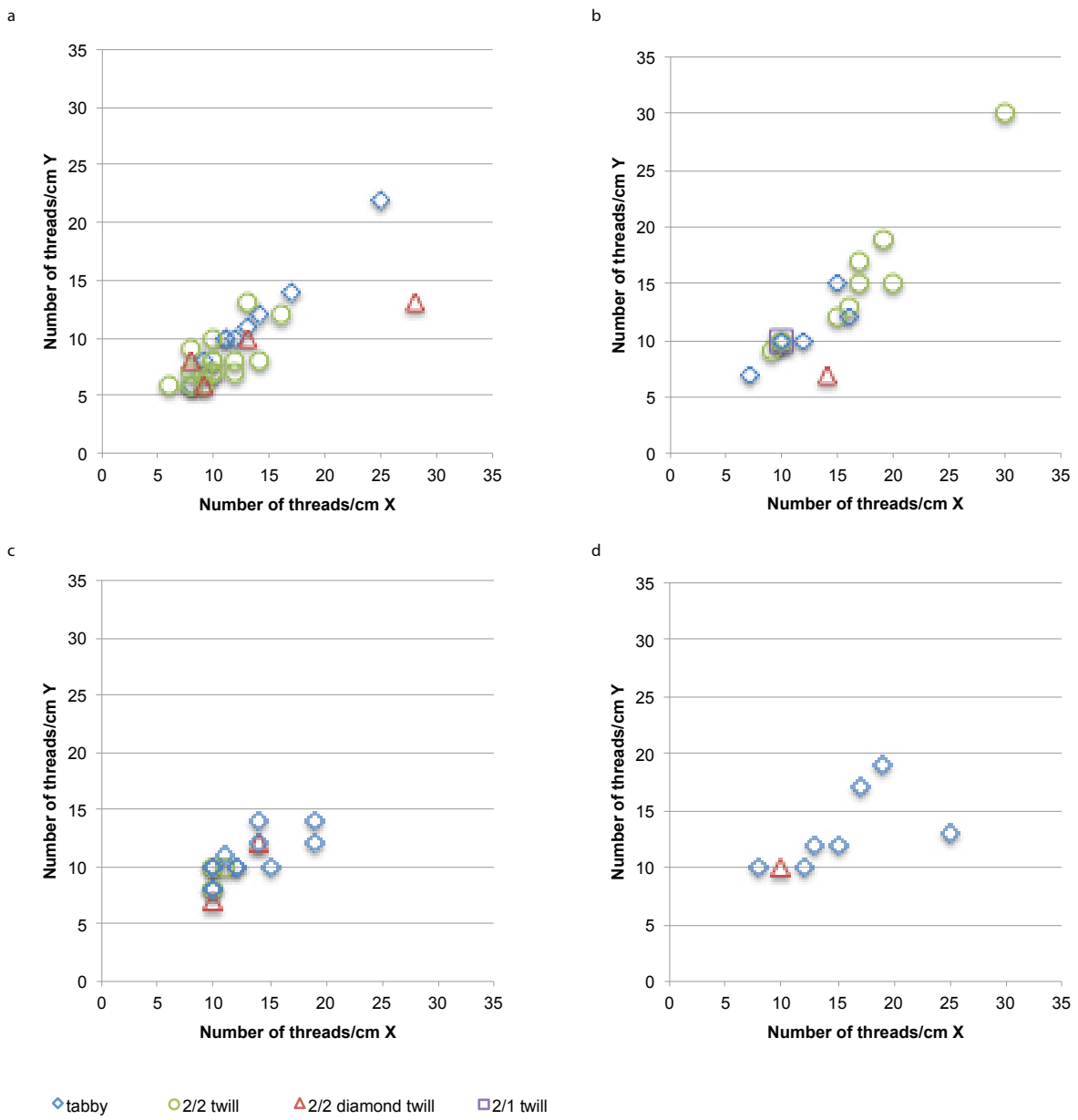
Texture is probably one of the most important characteristics of any object within a burial. The way the light reflects on a surface defines the way we perceive its texture. This is very important when discussing the role and quality of textiles: clothes consist of large surfaces that are appraised by the cut and shape of the garments, their colour and their texture. The patterns woven into the fabrics, the thread count, the thread thickness, regularity and degree of spin of the yarns and the density of the fabric (open spaces or not) determine the drape, functionality and texture of a fabric and may have played a role in the way textiles were valued. Several weave types may be mentioned here that will have caught the eye of any observer. Rippenköper, spin-patterned fabrics and repp (tabby) each create a pattern that is visible with the naked eye. Rippenköper has only been observed in Maastricht - Sint-Servaaschurch, repp is present in all three cemeteries of Maastricht and in Rhenen, while spin-patterned fabrics occur in nearly every cemetery (except Leusden and Maastricht-Pandhof). This is also the case with diamond twills. Due to the small sizes of the remaining fabrics in burials it is often difficult to recognize these patterns and therefore it is equally difficult tot assess the rarity of these fabric types in the cemeteries. Nevertheless diamond twills have been found in nearly every cemetery considered in this study.

Another angle of approach towards textile quality is to incorporate the degree of twist and thread thickness into the picture. Thick threads generally result in heavier fabrics that may have had a different function than fabrics woven out of thin threads. Thin threads may be woven into thin and pliant fabrics or -when using only few threads/cm - become fragile and veil-like fabrics. Examples of these fragile open fabrics have been found in Posterholt,[402] Maastricht-Pandhof[403] and Wijchen.[404] The degree of spin of the yarns greatly influences the appearance of a textile as well. When looking at the relation between degree of spin and the regularity of the fabric it becomes clear that fabrics that are perceived as regular generally have been made out of regularly spun yarns with a low to medium twist. Moreover, low and medium twisted yarns are nearly always used together in both thread systems. We seldom see a combination of low-medium spun threads in one thread system and medium-high spun threads in the other system. This makes the fabrics very balanced. Contrastingly: fabrics with an irregular and wobbly appearance are generally made out of irregularly spun threads with a medium to high twist. Textiles with an irregular appearance occur in much smaller quantities than regularly spun and woven textiles, therefore the overall quality of the cemetery textiles in terms of texture is high.[405]

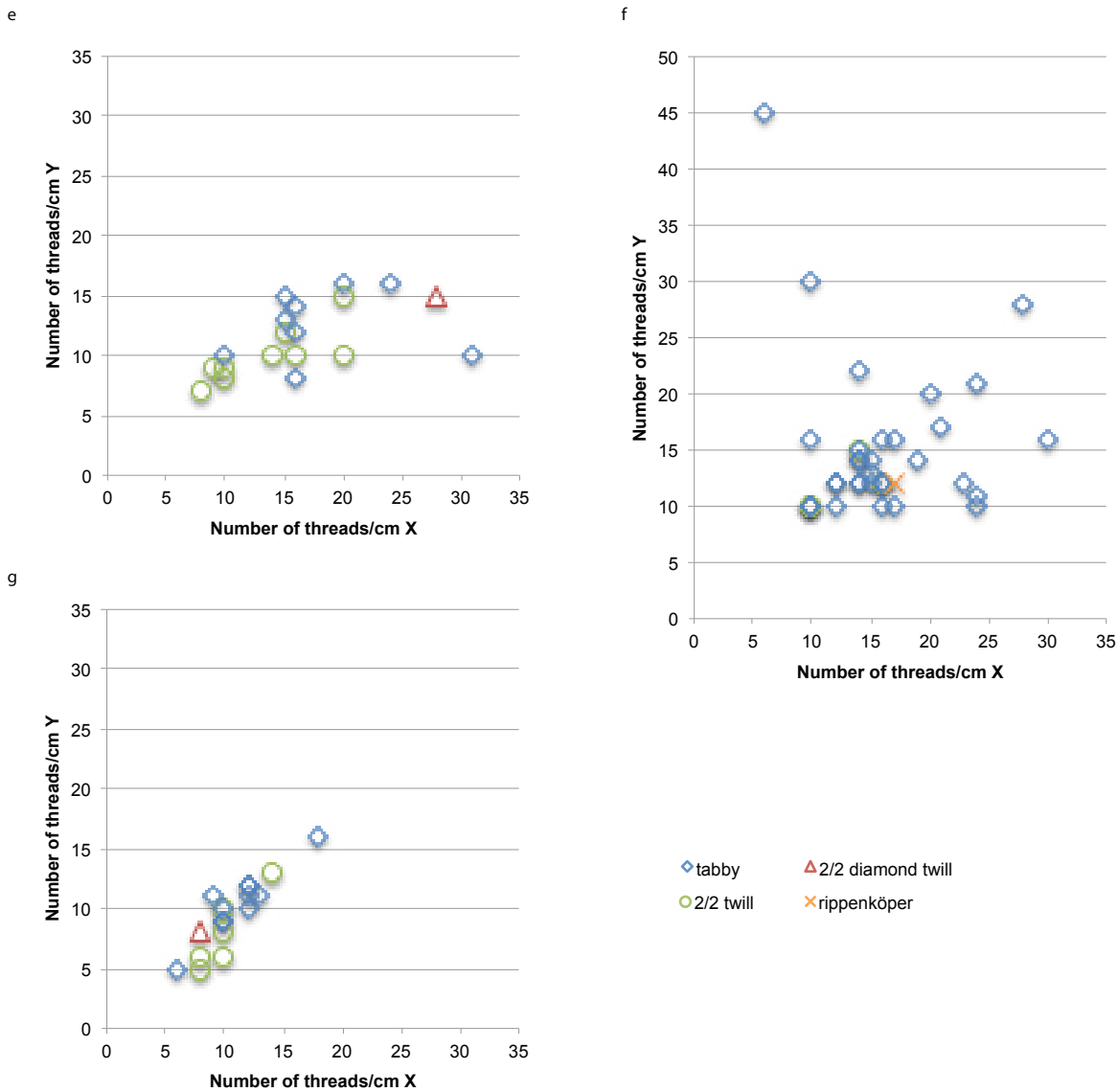
8.3.3 Quality of textiles: shining objects

Shiny objects, such as gold thread, used to embellish the clothing, attract attention as well. The place one would expect that gold thread was applied on clothes would be the area around the head, the torso (including the area of the belt), wrists and feet. These areas attracted by itself most attention and would have been the ideal place to add prestigious accessories and decorative embroideries with gold thread.[406] Concurrently Elisabeth Crowfoot and Sonia Hawkes (1967), examining gold-brocaded braids from the 5th -7th centuries, found that those deriving from female graves mostly were found on the head of the deceased, and suggested they might

402. Posterholt find number 52-III-2.
403. Maastricht-Pandhof findnumber 60.1, grave 10042.
404. Wijchen find number 04.076.TX1 (a very fragile and open fabric); less distinct examples are present in find numbers 01.155.TX1, 05.072.TX1, 07.019.TX1, 13.017.TX1 & 20.032.TX2.
405. These characteristics have not been documented consistently in all cemeteries and the boundary between 'regular' and 'irregular' is somewhat subjective, to say the least. Nevertheless it is noteworthy that regular textiles have been documented by the author far more often than irregular ones in all cemeteries.
406. Wells 2008, 68.

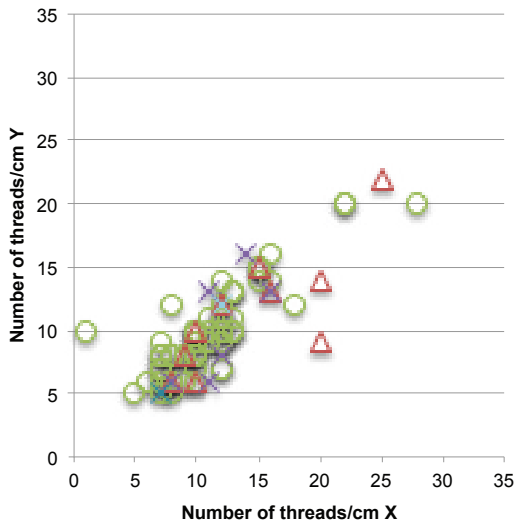


8.5a. Quality of textiles from Bergeijk, measured in threads/cm. Exceptionally fine textiles were found in women's graves 50 and 89.
8.5b. Quality of textiles from Lent-Lentseveld, measured in threads/cm. The fragment of exceptionally high thread count was found in women's grave 23.
8.5c. Quality of textiles from Leusden, measured in threads/cm.
8.5d. Quality of textiles from Maastricht – Vrijthof, measured in threads/cm. Women's grave 85 contained the finest textiles.



8.5e. Quality of textiles from Maastricht – Pandhof, measured in threads/cm. The finest textiles were found in graves 11341 and 10128.
8.5f. Quality of textiles from Maastricht – Sint-Servaas church, measured in threads/cm. Very fine textiles were found in graves 1, 26, 137 and 164 (sex unknown)
8.5g. Quality of textiles from Posterholt, measured in threads/cm.

h



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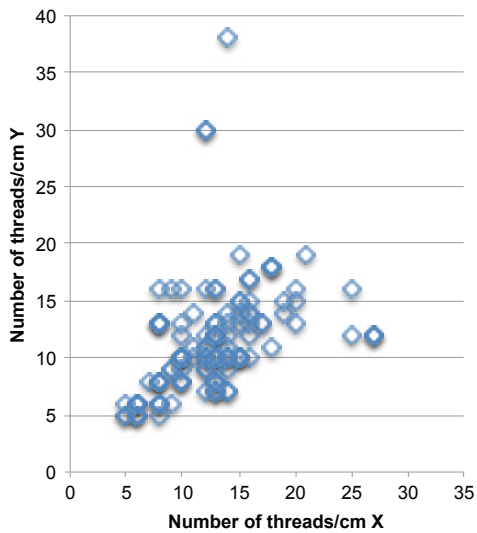

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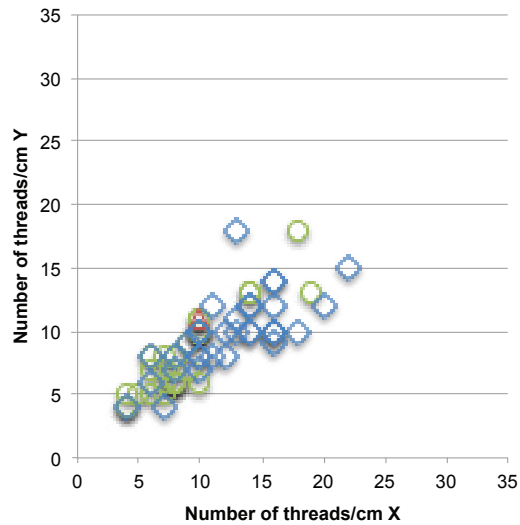


tabby 2/2 twill 2/2 diamond twill 2/1 twill 3/1 twill 3/3 twill

8.5h. Quality of the twills from Rhenen, measured in threads/cm. The finest textiles from Rhenen were found in graves 73 (F), 413 (F), 433 (F), 460 (M), 476 (M) and 733 (?).
8.5i. Quality of the tabbies from Rhenen, measured in threads/cm
8.5j. Quality of textiles Wijchen, measured in threads/cm.

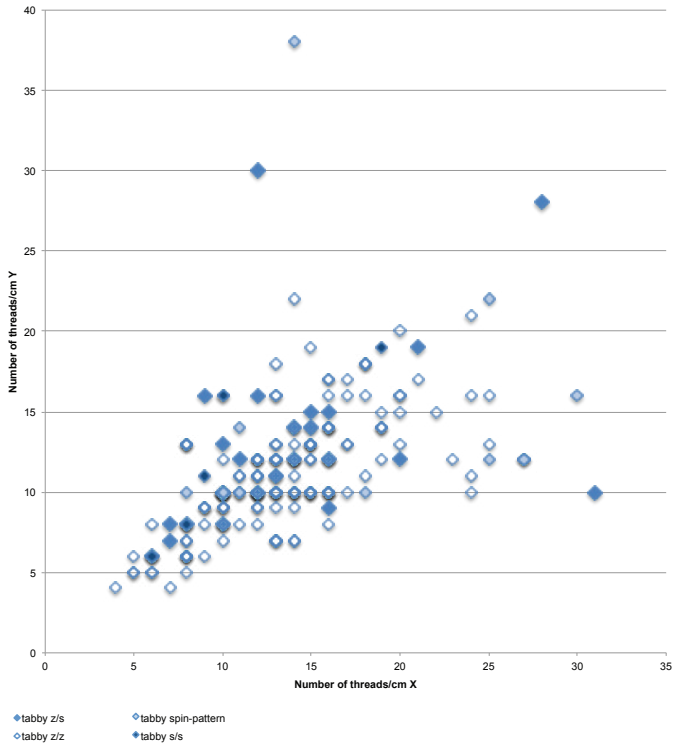


Fig. 8.6. Quality of the different types of tabby (from all cemeteries), measured in threads/cm.

be the *vittae* often mentioned in descriptions of highborn Frankish ladies. The occurrence of gold thread in a grave of Maastricht – Sint-Servaas church and two graves of Maastricht-Pandhof is therefore considered as a sign of high quality and wealth.[407]

8.3.4 Quality of textiles over time

The cemetery of Wijchen has the greatest potential for comparing the chronology of textiles within a single cemetery with 24 textiles from the fifth/sixth century and 32 textiles from the seventh century. The quality of these textiles has been projected in fig. 5.8. Here it becomes obvious that there are no differences regarding thread count between the sixth and seventh century. Since the other cemeteries do not provide enough datable fragments to analyse the development within the individual burial sites the textiles from these cemeteries have been grouped together again, but as we can see in fig. 8.11a-b no differences between both periods could be established.

8.3.5 Conclusions regarding textile quality

Some of the cemeteries contain textiles that are in general of a higher quality than others. The fragments from the three cemeteries from Maastricht and Leusden were woven in higher thread counts than those from the other sites. Moreover, the cemeteries of Maastricht contain gold thread and several types of special fabrics, making these sites stand out from the others in terms of textile quality. Rhenen also contains several special fabric types and the textiles from this site are of a relative high quality as well. The other cemeteries are rather homogeneous in terms of textile quality. Some, such as Posterholt and Wijchen contain special fabrics as well: here examples of veil-like fabrics have been found. Diamond twills occur in nearly all cemeteries and must have been far more regular than we can judge on the basis of cemetery textiles only.

407. Crowfoot & Chadwick Hawkes 1967, 48 & 65.

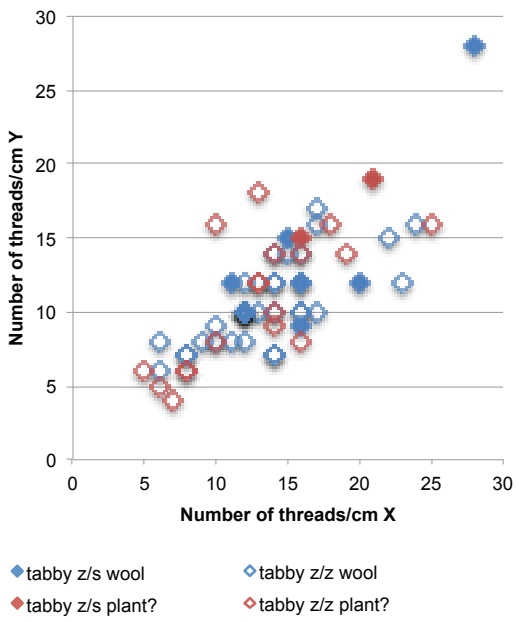


Fig. 8.7. Quality of the tabbies (from all cemeteries) made out of wool and plant fibres, measured in threads/cm.

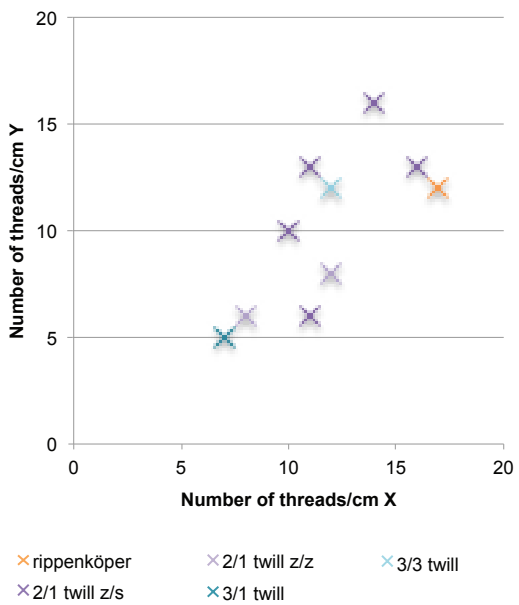


Fig. 8.9. Quality of the different types of broken diamond twill (from all cemeteries), measured in threads/cm.

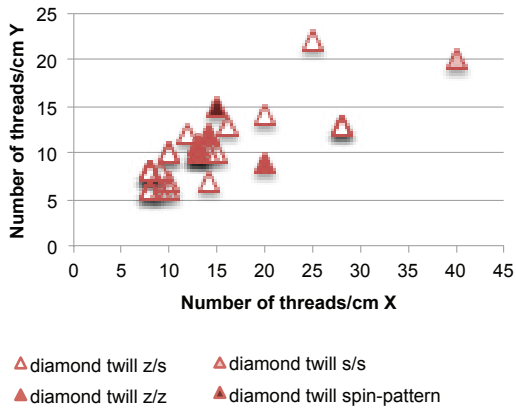


Fig. 8.8. Quality of the different types of 2/2 twill (from all cemeteries), measured in threads/cm.

8.4 RECONSTRUCTING BURIAL GARMENTS

The textile fragments that have been preserved in the corrosion of the metal objects in the graves are generally considered to be the remains of the clothes in which the dead were buried and of other grave textiles such as shrouds, mattress covers, etc.

Several archaeologists have attempted to reconstruct the clothing of the dead using the dress accessories and textiles found in burials. This resulted – as will be discussed below – in various reconstructions of early medieval dress. Geijer was one of the first to attempt a reconstruction of women's dress in the Swedish town of Birka in her publication of 1938. Her reconstructions were partly based on the analyses of (a selection of) the textiles from this site but she also relied on the evidence derived from contemporary metal figurines and the rather conservative national costume tradition of the area. From this she gathered that women were dressed in a pleated undershirt, a pinafore dress and a mantle.[408] Inga Hägg took a somewhat different approach. She chose to focus on the archaeological evidence the textiles could provide and did not use historical sources as much as Geijer did. While she analysed all of the (over 4000)

408. Geijer 1938, 134-156.

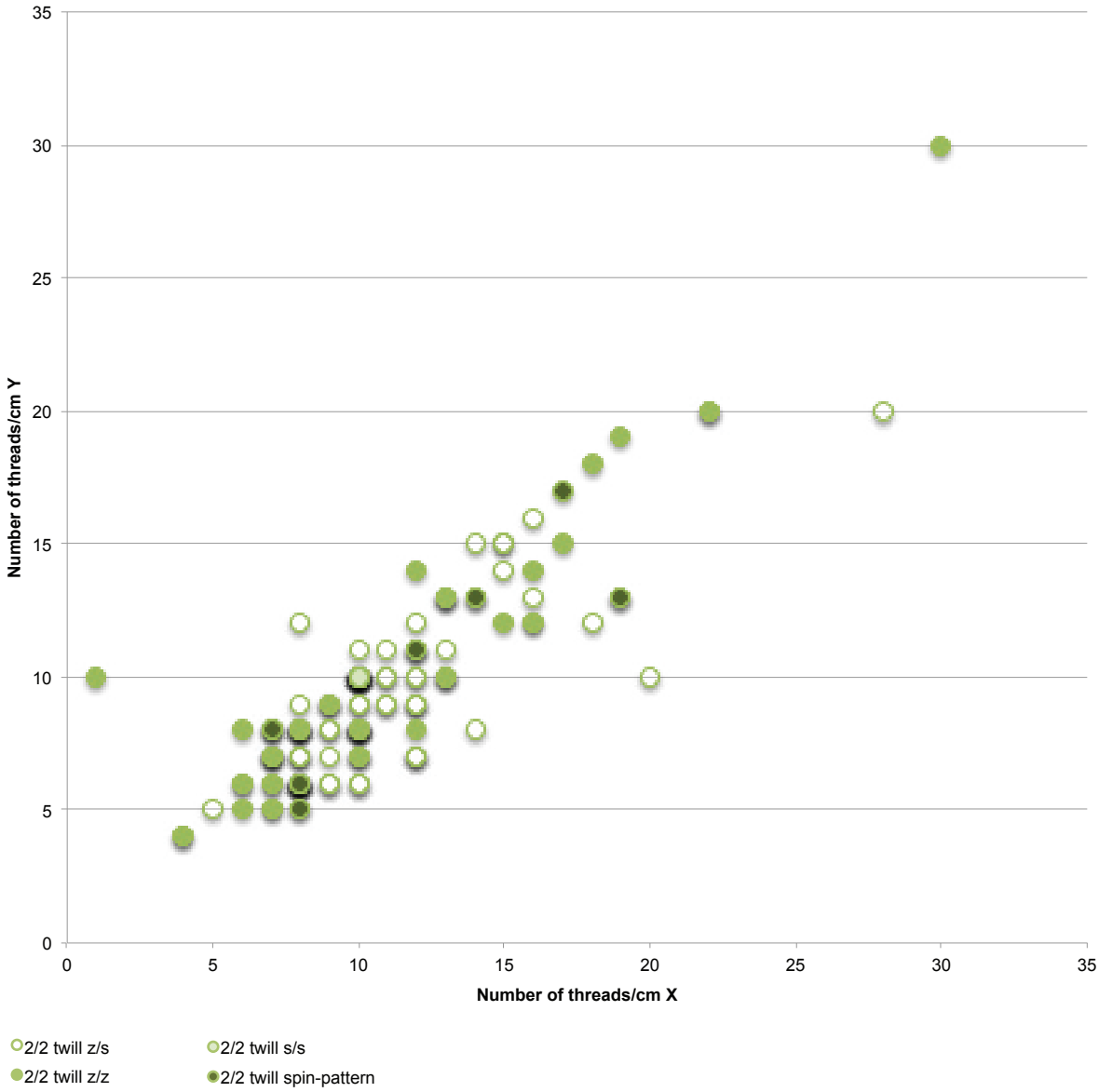


Fig. 8.10. Quality of the different special fabrics, measured in threads/cm

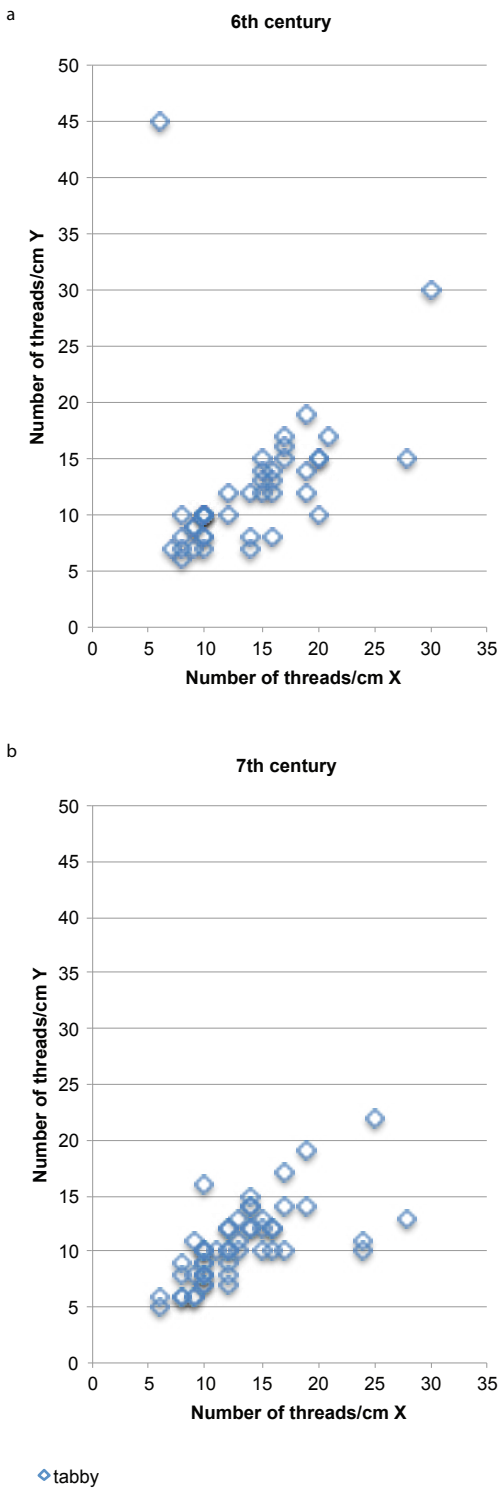


Fig. 8.11. Quality of the sixth century (a) and seventh century (b) textiles from the cemeteries of Bergeijk, Lent-Lentseveld, Leusden, Posterholt, Maastricht-Vrijthof, Maastricht-Pandhof and Maastricht - Sint-Servaas church, measured in threads/cm.

pieces of textiles from this site, Hägg took great care to document both the technical characteristics of the textiles, but also the position of the metal objects in the grave as well as the stratigraphy of the textiles in relation to the objects they were attached to, making schematic drawings of this stratigraphy. This systematic approach resulted in new ideas regarding Birka women's dress. From this Hägg concluded that there were other garments present in the cemetery as well: women would have worn a linen tunic under their pinafore dress and a sleeved caftan which was often decorated with bands of silk and silver thread and was closed at the front by an oval brooch.[409]

Looking back, Hägg may be considered one of the precursors of a systematic approach towards textile archaeology, which uses an object-based approach focussing on both the textiles as well as the objects they were attached to. Parallel to this way of carrying out textile research, another object-based approach has been practiced for several decades. This approach fits in a tradition wherein typologies, chronological schemes and distribution maps are a means to distinguish large-scale developments through time and space. Using the chronology of brooches and the position of these brooches on the body, scholars have reconstructed the way people may have been dressed in different regions and different periods. The outcome of these analyses has often been described in terms of *Tracht* or *Fibeltracht* but in fact no systematic textile analyses have contributed to the outcome of these studies. Many examples of this approach have been published in German literature by - among others - Vierck, Martin, Muller & Steuer, Siegmund and Strauβ.[410] Some of these were purely object-based, while others – such as Martin – also incorporated contemporary historical depictions of dress. Problematic in this type of publications is – as pointed out by Siegmund - that there often is no attention for the fact that objects may have been moved during or after burial or that objects may have been removed from the burial altogether.[411] Furthermore, Martin stressed the fact

409. Hägg 1983, 334.
410. Vierck 1979a-c; Martin 1991, 1994; Müller & Steuer 1994; Strauβ, E.G., 1992; Siegmund, F., 1998.
411. Siegmund 1998, 55.

that one can make many interpretations of dress based on the same set of dress accessories.[412] Even when adding textile data to the picture sketched by the dress accessories there is still room for variation. The burial of queen Arnegunde is a good example of such different interpretations. Where previous reconstructions, based mainly on the configuration of the dress accessories and a cursory analysis of some of the textiles, depicted this woman in a knee-length dress showing decorated garters beneath[413] (fig. 8.12), current interpretations are completely different. These are based on a systematic re-analysis of the technical characteristics of the fabrics and a reconstruction of the position of the textiles on the dress accessories and on the body (which information was gleaned from the sparse surviving excavation documentation and the presence of textiles on skeletal remains) by Desrosiers and Rast-Eicher, something that had previously not been done. This new reconstruction shows a woman dressed in an ankle-length robe with embroidered sleeves that is open at the front and completely covers the decorated garters. The front opening of the garment was decorated with wide silken tablet woven bands and the cloak was fastened under the chin with a single brooch and around the waist with an elaborately decorated belt. Under this gown the queen wore two garments, one made out of wool and underneath probably a linen undergarment. On her head and shoulders was a veil.[414]

Current textile research more or less combines the above-described two object-based approaches. These modern studies integrate a systematic technical documentation of the textiles, including their stratigraphic relation with the metal dress accessories they are adhered to. Furthermore they use information about the location of the dress accessories on the body. It is however important to keep in mind that we deal with funeral attires, and that the placement of garments and dress accessories do not necessarily reflect how the clothing was worn. Furthermore there is evidence from a number of burials that

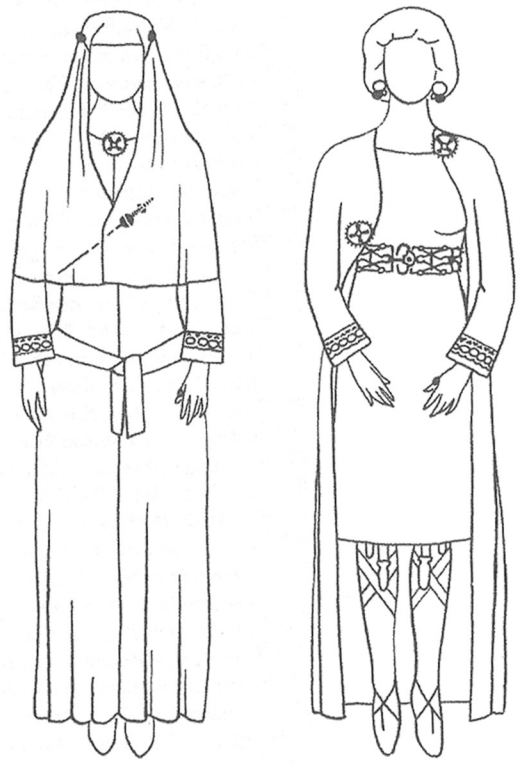


Fig. 8.12. Early reconstruction of the garments of queen Arnegunde (Martin 1991).

fibulas were placed in cases and were not used as dress accessories for the burial garments.[415] After all data has been acquired and a picture emerges of the stratigraphy of fabrics that have clothed the body and the positions where dress accessories were present to fixate these garments, they refer to historical sources such as sculptures, illuminations and mosaics to determine the possible ways in which the garments may have been worn. For details such as these we need to look into historical documents concerning or mentioning early medieval garments and dress code. For the earliest phases after the Roman period we may also rely on some continuation of the dress as is seen on Roman sculptures and described by Roman historians. Written sources from the early Middle Ages include an enumerable amount of descriptions of clothes and their context in (everyday) life but

412. Martin 1991, 652-654.
413. Martin 1991, 639.
414. Desrosiers, S. & A. Rast-Eicher, 2012, 6-7; Périn et.al. 2012.

415. Bartel 2003.

these should be used in a critical way. Literary texts for example may mention pieces of clothing that are fictional or are described in such a way as to meet the needs of the author, story, audience etc.[416] Other types of texts, such as hagiographical genres, however include very useful descriptions of pieces of clothing: how, when and by whom they were worn, not only of the upper classes of society, but also of the lower. For the eighth century onwards several manuscripts are available – such as the Stuttgart Psalter – containing illuminations, which depict clothing from both the working classes and the nobility. From these manuscripts we gather information about the drape of clothes: for instance that they were not loose garments but rather tight fitting and fastened at the waist with a cord or belt. Together these historical texts provide us with the general picture of early medieval dress and it's social context. Ideally a study of the material remains of these garments involves the available historical sources. Good examples of this have been published by Walton Roger, who is critical of the different sources she uses, allows for differentiation between gender and age groups and often provides several alternatives to reconstruct the cloths in a single burial.[417]

In this study the textile remnants from the Dutch burials were subjected to a similar approach. The simple fact that textiles are only preserved in connection to metal objects means that only a meagre sample of the original abundance of cloth and clothing in a burial remains. Therefore it would be optimistic to assume that it is possible to fully reconstruct the use of fabric in graves or the shape and fit of the actual garments. Nonetheless, the dataset does allow conclusions based on the stratigraphic position of certain textile fragments on the body and in relation to the dress accessories. Using this information it has been attempted to reconstruct which types of fabrics were used on specific areas of the body and which types of textiles were worn over or under each other. This research provides us with information on the look and feel of the fabrics out of which the clothes were made. A full study of literary sources goes far beyond the scope of this project and since a lot of research has already been done regarding dress in historical sources, I will refrain from repeating this and will briefly summarize what has been published on this subject in section 8.4.1. In section 8.4.2 the evidence from graves from the Netherlands will be presented, which is followed by a discussion of both sources in section 8.4.3.

8.4.1 Reconstruction of early medieval dress based on previous research

8.4.1.1 Women's clothing

In the earliest centuries after the Roman period (fourth/fifth century) women in the areas around the Netherlands generally would have worn garments made out of a wide tubular or rectangular cloth, loosely wrapped around the body and fastened at the shoulders or the upper torso by two brooches. This type of garment had already been in use for centuries and is called a peplos-gown –derived from the Greek word πεπλος, denoting a similarly constructed garment worn by women in antiquity. Complete examples of this garment have been found in Iron Age Denmark in Huldremose (210-30 BC) and one unknown location (400-200 BC).[418] The peplos continued to be used in northern Europe in the Roman period as is testified by numerous Roman sculptures (among which the column of Marcus Aurelius) depicting Germanic women. The occurrence of pairs of fibulae on the shoulders in women's graves is common throughout northern Europe up until the fourth century and this is considered proof of the widespread and continued use of this type of garment in this period.[419] Roman sculptures provide us with more information on the shape and drape of this garment. The peplos was often secured around the waist by a belt and the fabric probably partly pouched over the belt. Hanging from the belt were all sorts of utensils, either hanging loosely from the belt or in a pouch suspended from the belt. Most sculptures show that the peplos was generally worn

416. See for a detailed description of this phenomenon Coon 1997.
417. Walton Rogers 2007. Other examples have been recently published by Owen-Crocker 2004, Rast-Eicher 2010, 2012.
418. Hald 1980, 54, 76, 358-360; see Mannering e.a. 2010, 263-266 for the most recent dates of these finds.
419. Owen-Crocker 2004, 42-54.

long (ankle-length) but it may also have been worn somewhat shorter (calve-length or even shorter), perhaps showing the lower part of the undergarment. The shoulders and arms would have been left bare and it is assumed that women wore an undergarment under the peplos to cover the arms and provide extra warmth. Not many details are known regarding undergarments because they were for the most part covered by the peplos and are only partially visible on sculptures. They seem to have had rather tight fitting sleeves and in some regions such as England and Scandinavia they were fastened at the wrists with one or more wrist clasps.[420] Finds from Anglo-Saxon England show us that the edges of both the peplos and the undergarment were often decorated or reinforced with tablet woven braids or the starting borders of the fabric were made in tablet weave.[421] This was not only decorative, but also functional, because these braids are much stronger than normal fabrics and would have reinforced the areas attached to the brooches significantly. There is not much known about what type of garment was used to cover the legs, or whether they were covered at all. A long peplos, combined with one (or more) long undergarment(s), would have been quite warm by itself but we cannot be certain if women wore socks, hose, leg bindings or trousers as well. Lastly, there is evidence for the use of cloaks over the peplos-gown. These could be fastened on the chest, at one shoulder or tucked into the belt. An example of the occurrence of these garments has been observed by Vons-Comis in the grave of the so-called Princess of Zweeloo. This grave from the middle of the fifth century was excavated in 1952 in the north of the Netherlands and quickly received the epithet of a princely grave due to the rich grave assembly. Since then many more graves have been uncovered and we now know that the grave goods in this woman's grave are not extraordinarily rich at all and that the grave is not likely a princely burial. Nevertheless great attention has been given to the attire of the buried woman.[422] The woman was dressed in a peplos-gown, made out of a linen fabric woven in diamond twill. This gown was fastened at the shoulders by two disc brooches. Over the gown she wore a woollen cloak or shawl fastened by another brooch (fig. 8.13).

Fig. 8.13 Reconstruction of the peplos-gown of the "princess of Zweeloo" (Vons-Comis 1988).

From the end of the fifth century regional differences start to become visible in the archaeological record. Walton Rogers concluded that most of Anglo-Saxon England continued wearing the peplos gown for at least a century.[423] The dress of Frankish women on the continent (and of women in the east of Kent) is dominated by a different fashion. Here the paired shoulder brooches cease to occur which leads to the conclusion that the peplos-gown disappeared and was replaced by a different set of clothing. The configuraton of dress accessories in this period is by many authors characterised as the so-called

420. Many examples of wrist clasps have been found in England and Scandinavia. Owen-Crocker 2004, 56-57.
421. Owen-Crocker 2004, 52, 56-57. No evidence for this has been documented in the Netherlands yet.
422. Van Es & Ypey, 1977; Vons-Comis 1988.

423. Walton Rogers 2007, 151.

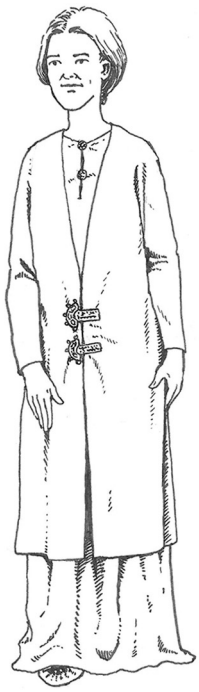


Fig. 8.14 Reconstruction of the *Vierfibeltracht*. Drawing: C. van Hees.

Vierfibeltracht: the occurrence of four brooches in a more or less vertical line on the body. The upper two brooches were generally a pair of small round brooches, whereas the lower two were a set of larger bow brooches.[424] Brooch configuration alone however will not explain how women were actually dressed because several variations are possible using the same brooch-configuration and even using the same stratigraphy of textiles. Current day publications – such as Walton Rogers - give room for these different possibilities. Based on the textile finds associated with the brooches it is likely that the lower set of brooches was used to fasten a cloak and that the upper had the same function or were used to close the head aperture of the gown beneath the cloak (fig. 8.14).[425] This model has been taken as a reference in this thesis and it has been checked whether the textiles that were attached to the brooches in the Dutch graves fit this model or not. From the middle of the sixth century onwards the two brooches at the chest are slowly replaced by one larger brooch and at the end of the sixth century the two lower bow brooches have disappeared as well.[426] From pictorial sources it becomes evident that women wore a gown (or long tunic) with sleeves. This gown could be ankle-length or somewhat shorter, reaching to the calves. The gown was secured at the waist by a belt, from which women could hang one or more utensils. Archaeological finds show us that under the gown one usually wore an undergarment made out of linen.[427] Socks or hose that were held in place by garters often covered the legs of the women in France and Germany. In these countries many garter fittings from the sixth and seventh century have been found.[428] Over the gown women could wear a sleeved cloak or outer gown, or a sleeve-less mantle (as is shown on mosaics and illuminated manuscripts). This outer garment is generally assumed to be open at the front and fastened at the chest or hip with one or more brooches.

The latest reconstruction of the burial textiles of queen Arnegunde's grave paints a vivid picture of how (high ranking) women from this region could have been dressed at the end of the sixth century. Cloaks

424. See the various contributions by Viercke 1979; Martin 1991 & 1994; Strauβ 1992; Siegmund 1998.
425. See for example Walton Rogers 2007, 190, fig 5.44 for various reconstructions of the dress associated with the *Vierfibeltracht*.

426. Strauβ 1992, 79 and Siegmund 1998, 55-56 have summarized the chronology of the configuration of brooches in Frankish burials. Siegmund states that the pared brooches at the shoulders, associated with the peplos gown, are characteristic for the period 400-440. In the middle of the fifth century the Vierfibeltracht occurs for the first time but is still scarce. From the end of the fifth century to the middle of the sixth century the *Vierfibeltrach*t is dominant with two small brooches at the chest and two large bow brooches at the waist. From 555-585 the two brooches at the chest are slowly reduced to one brooch. In this same period the two bow brooches that were previously positioned at the waist are now present lower on the body: on the upper leg. Also present in this is a dress type with only two small brooches at the chest. From the end of the sixth century the pair of bow brooches at the hip disappear and now we only see one large filigree disc brooch at the chest.
427. Undergarments are not visible on the images from this period but are mentioned in several contemporary literary sources and have frequently been found in the archaeological record.
428. Owen-Crocker 2004, 162.

or sleeve-less mantles have previously been subject of regional analysis in Switzerland and southern Germany. Rast-Eicher shows that in Switzerland these (in this region sleeve-less) garments were generally made out of fine and dense tabbies (15-28 threads/cm). They occur in wool, linen, silk and mixed fabrics of wool and linen. Moreover the cloaks were lined with narrow tablet woven selvedges. In Germany more variation is observed with diamond twills and plain twills as well. Here remains of sleeves have been documented, providing evidence for the use of sleeved cloaks.[429]

Women in Scandinavian countries had a different way of dressing themselves. In the late Iron Age women wore an ankle-length dress and often a cloak, which could be closed at the front.[430] In the Viking Age (800-1000) women's dress consisted of a tunic under a pinafore dress, fastened by two brooches.[431] Furthermore they could have worn a sleeved caftan, which was closed at the front by an oval brooch.[432]

8.4.1.2 Men's clothing

In the fifth and sixth century men probably wore short tunics with long sleeves or without sleeves. Several examples of these garments have been found in bogs in North Germany and these have been summarised and compared recently by Möller-Wiering. Tunics have been found in Thorsberger Moor (sleeves, third century), Obenaltendorf (sleeveless, 260-380AD), Marx-Etzel (sleeveless, 45-125AD), Reepsholt (sleeves, Roman Iron Age), Bernuthsfeld (sleeves, seventh century) and Liebenau and at Högom in Sweden (sleeved, 500 AD).[433] The most recent find of a nearly complete tunic is from 2011, when a sleeved tunic dated 230-390 AD melted out of the Lendbreen glacier in Norway (fig. 8.15).[434] Tunics would have been gathered at the waist by a belt. Underneath the tunic one may have worn one or more undergarment(s). Men generally also wore trousers, with or without sewn on socks and fastened at the waist by a belt. Two complete examples of such trousers were found in Thorsberg Moor (fig. 8.16) and other finds are known from the German sites of Damendorf (135—335AD), Dätzen, Marx-Etzel (knee-length) and Obenaltendorf.[435] The lower part of the legs may have been covered with hose and furthermore with leg-wrappings (as suggested by Möller-Wiering and Schlabow), to keep the hose or trousers in place. On the continent we also see leggings with garters: a rectangular piece of fabric that was fastened with straps and buckles just below the knee and around the ankle. Also common on the continent were cross-garters wrapped around stockings. Cloaks have been found in Thorsberg and various sites in Germany and Scandinavia[436] and are depicted often on Roman sculptures as well. These could be short or long reaching to the hip or knee and were made out a rectangular piece of fabric, fastened at one shoulder with a brooch.[437] In Scandinavia and England wrap-over coats have been identified on decorated bronze plaques and sheets of gold, while archaeological evidence for this kimono-style cloak was found in a grave in Cologne and in several graves in England.[438] Many of the archaeological finds of cloaks have been decorated with tablet woven borders. Cloaks could be made out of woven fabrics (smooth or coarse, shaggy fabrics) or fur.[439] Crowfoot has pointed out that the similarity

429. Rast-Eicher 2003, 113-114.
430. Mannering 2008, 62.
431. Geijer 1938.
432. Hägg 1983, 334.
433. Möller-Wiering 2011, 40-48, 109-111; For Germany see Schlabow 1976, 69-76, Farke 1998, For Sweden see Nockert 1991. C14-dates by Van der Plicht 2004 and Van der Sanden 1996, 192.
434. Vedeler, & Bender Jørgensen 2013.
435. Möller-Wiering 2011, 48-53, 113-114; Schlabow 1976, 76-80.
436. Möller-Wiering 2011, 54-57, 117-120, table 1.5; Schlabow 1976, 50-69.
437. Shorter cloaks became popular from the ninth century onwards
438. Mannering 2008, 64; Owen-Crocker 2004, 180-181.
439. Historical sources state that fur was a sign of wealth/luxury (Owen Crocker 2004, 182)

Fig. 8.15 The tunic from Lendbreen, Norway front (left) and back (right). Photo: M. Vedeler.

between the garments from the third century and those depicted on much later illuminations and on the Bayeux tapestry suggests that men's clothes changed little during the early Middle Ages.[440]

8.4.1.3 Headwear for men and women

There is quite some evidence available for how people have covered their heads throughout history.[441] For the fifth and sixth century however only very few examples of headgear are known, and evidence from art is sparse as well. Remains of veils are recognized in several Anglo-Saxon graves and Byzantine mosaics at Ravenna (fifth to sixth centuries) depict women wearing veils and coifs.[442] One of the female heads on the scepter from the Sutton Hoo ship burial shows a woman with parted hair drawn away from the face, which suggests that the head wasn't necessarily covered.[443] The (probably male) figure on the Spong Hill pot lid wears a pillbox cap at the back of the head.[444] In the Netherlands one headdress was found that has been radiocarbon-dated to the period 568–651.[445] Owen-Crocker pointed out that archaeological and pictorial evidence from the seventh to ninth centuries is more abundant.[446] Historical sources give testimony of the fact that after Christianisation it was custom for women to cover their heads: in the seventh century the front locks of hair were still allowed to be visible but by the eight century women covered their hair completely with a headdress. The Netherlands has yielded six hats and headdresses from this period,[447] but there are hardly any contemporary finds of headwear available in Europe.[448] We may however assume that women generally wore veils, often in combination with a headband (called a choif or fillet) to keep it in place. Small scraps of these have often been found on the dress accessories in graves in France and England. There is ample variation in the appearance of the veil in these burials. Veils could be made out of different types of fibres (wool, silk, linen). Their fabrics can be

440. Crowfoot 1983, 415.
441. See for a summary of the history of relevant head coverings Brandenburgh 2012c, 36-45 (chapter 7).
442. Walton Rogers 2007, 162-63.
443. Owen-Crocker 2004, 78, fig. 57.
444. Walton Rogers 2007, 209, fig. 5.58; Owen-Crocker 2004, 20, fig. 3; also discussion at 79.
445. Brandenburgh 2012, 32-36.
446. Owen-Crocker 2004, 157-159.
447. Brandenburgh 2012c (chapter 7).
448. Owen-Crocker 2004, 159.

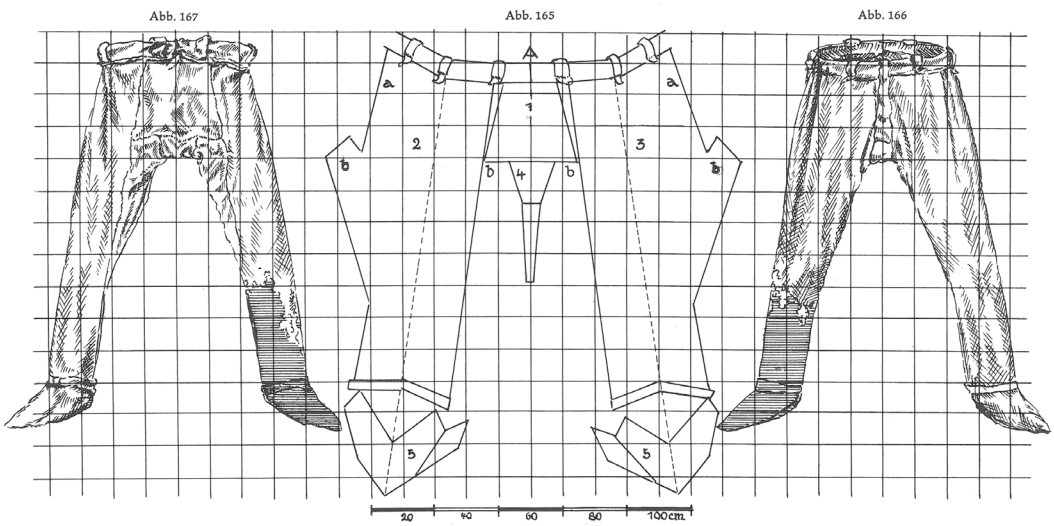


Fig. 8.16 The best preserved Thorsberg trousers F.S. 3684 (Schlabow 1976, fig. 165-167) .

fine, open and delicate or heavy and densely woven and they can be made in the natural colour of the raw fibre or dyed in bright colours, decorated with embroidery or strips or braids of gold, worn in pleats and folds, short or long, reaching to the shoulders, chest or even as far as the knees.[449] The enormous variation in appearance of the veil may be attributed to regional variety, personal choice and perhaps also the (marital) status of the wearer.[450] In the Netherlands remains of a very fine and open fabric woven in tabby have been found in the site Leens. This fabric has been described as *Schleiergewebe* and may have been used as a veil.[451] Comparable weaves have been found in England,[452] Germany[453] and Denmark.[454] Other types of headwear may have been common in this region as well, as is shown by the different shapes of the six nearly complete hats found in the north of the Netherlands.[455]

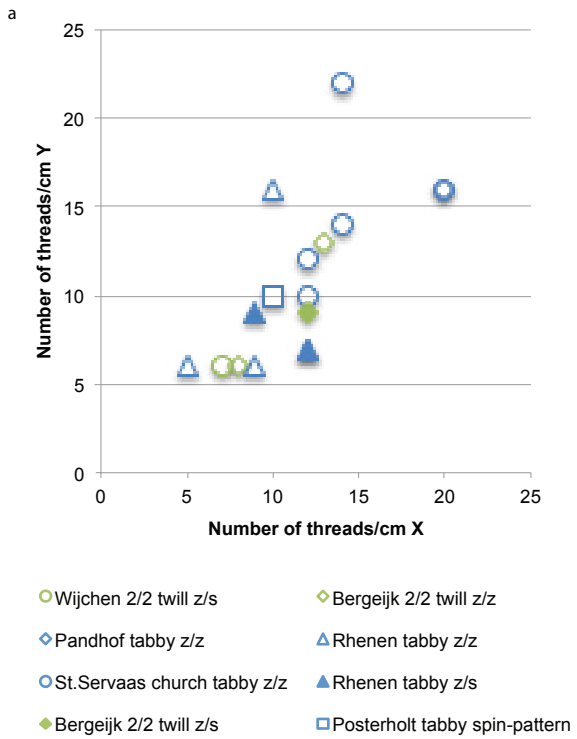
449. Magoula 2008, 99-100.
450. Magoula 2008, 136-137.
451. Brandenburgh 2010, 63.
452. Walton Rogers 2007, 68.
453. Settlement of Hessens; see Tidow 1995, 367; Haithabu see Hägg 1991, 164-165.
454. Mammen; see Hald 1980, 102–11 and fig. 97;.
455. Brandenburgh 2010, 66-70; Brandenburgh 2012.

8.4.2 Evidence of early medieval dress in the burials in the Netherlands

8.4.2.1 Textiles associated with the lower body (of both men and women)[456]

In Maastricht - Sint-Servaas church a set of garter buckles was found on which several types of fabric were present.[457] The textiles show that the legs were clad in roughly woven hose or leg windings, which were tightened by a strap or garter with small buckles.[458] Over the lower legs a long undergarment woven in tabby (z/z, 16x10 threads/cm) was worn, which was covered by another garment of approximately equal length woven in twill.[459] Another strap end, also belonging to leg or shoe wear, was found in the cemetery of Bergeijk.[460] This object had

456. Since gender or sex of the individual could often not be established the paragraphs below give a generalised overview of the textiles associated with specific parts of the body of both men and women. Where possible individual cases of men or women are mentioned.s
457. Findnumber 29-03-07, dated to the period 460/80-725 AD, sexe unknown.
458. A 2/2 twill z/s 10x10 threads/cm.
459. The twill has been removed during restoration, no details regarding the twill were documented.
460. Bergeijk woman's grave 77, find number 77.q4; 610/20-670/80.



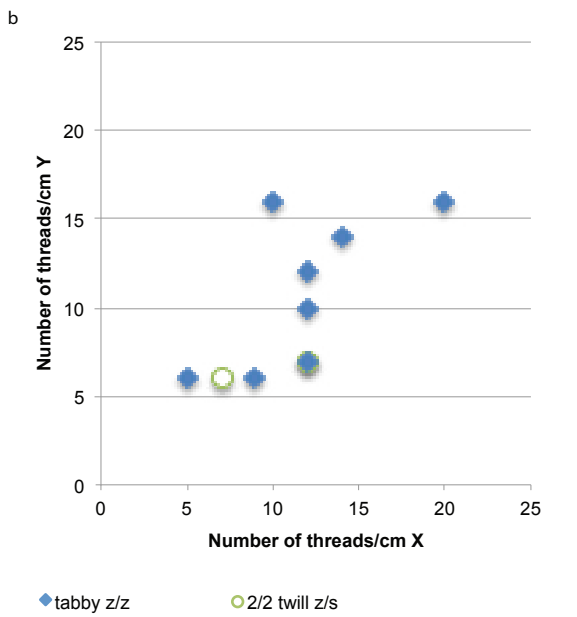


Fig. 8.17a. The quality of the different types of textiles associated with strap ends, measured in threads/cm.
Fig. 8.17b. Quality of the fabrics found on the back of the strap ends, measured in threads/cm.

been covered by a coarse and rather open woollen 2/2 twill z/z (8x6 threads/cm), which may have been part of a long garment or a shroud covering the body.

Garments of the lower body are often also preserved on the strap ends of belts. When present on the back of a strap end or folded around the object we can assume that the fabric belonged to the garment worn under the belt. Textiles that are present on the front of strap ends may be the remains of outer garments but may also be a fold of an undergarment. Fig 8.17a shows the quality of the fabrics found in association with strap ends, while fig. 8.17b shows the quality of the fabrics that were evidently worn under the strap end (thus under the belt). From both graphs it becomes evident that in most cemeteries tabbies z/z were present under or on top of the strap end, ranging in quality from 5-15 threads/cm with a few exceptions of higher quality.

One object will be discussed in more detail here. On strap end 23-04-00 from Maastricht – Sint-Servaas church a stratigraphy of several organic layers was preserved. From this we can reconstruct that the strap end was lying between two different garments. The person buried in this grave was dressed in a garment made out of fine and open tabby (20x16threads/cm, z/z), which was worn directly on the body and held in place by a belt. Over this garment, he or she wore another garment made out of 2/2 twill. Both garments reached the thigh but may have been longer.[461]

8.4.2.2 Textiles associated with the belt

In Dutch graves textile remnants are often found attached to belt parts such as buckles, buckle plates and belt plates. As stated in the previous chapters (for example section 4.5.5.1) these textiles can be remains of

a. garments worn under the belt, such as a tunic or gown (when preserved on the back of a belt part, or folded over the front);
b. garments worn over the belt such as a cloak or an outer tunic (when preserved on the front of a belt part);

461. Brandenburgh 2015 (chapter 4, section 4.5.5.2).

c. remains of shrouds (when present on the front of the body), mattress covers or coffin lining (when present on the back of the body).

In Sint-Servaas church there is in general a distinct preference for tabbies and this is reflected in the garments worn under as well as over the belt. The qualities of these fabrics vary between 14x15 up to 24x22 threads/cm. Only occasionally a garment woven in twill is present on the front of back of the belt.

One example of Rippenköper was documented on the front side of a back plate. This back plate was originally positioned at the back of the body leading to the assumption that the person was lying on top of this fabric, which may have been a mattress cover or an outer garment or cloak. Rippenköper is a rather rare fabric in Dutch cemeteries. In men's graves in southern Germany and Switzerland it is far more common and here Banck Burgess has interpreted the fragments as remnants of wide cloaks.[462] Rast-Eicher however states that this fabric type is used in women's graves as garments, while in men's graves it is used to cover the body.[463] It is therefore more likely that this fabric was part of a garment than a mattress. Unfortunately the back plate is a stray find of which neither context nor sex of the individual is known.[464] Attached to the fabric was straw, which suggests that the body was lying directly in straw on the bottom of the coffin.

Unlike Sint-Servaas church, the cemetery of Pandhof shows an almost equal amount of tabbies and twills worn under and over the belt. These fabrics are generally dense, but several exceptions of more open fabrics have been documented as well. In two graves a stratigraphy of two fabrics was documented on belt parts. This has been observed in a sixth century grave (grave 10332) where the belt was covered by a fine 2/2 twill (20x10 threads/cm) over which lay another garment woven in an even finer diamond twill (28x15 threads/cm).[465] In grave 10042 a medium tabby was worn under the belt (10x10 threads/cm) and a rather thin, open tabby worn over the belt.[466] The function of this fine, open tabby is not clear. It may have been part of veil or an outer garment – although this fabric is rather different from the fabrics that have until now been recognised as outer garments.

In the Vrijthof cemetery only a small number of textile fragments has been found that can be associated with belt parts. These consisted of two garments made out of twills that were evidently worn under the belt. One grave (105) showed a stratigraphy of several fabrics.[467] An undergarment made out of a fine twill was worn under the belt and was covered by another garment, also made out of a fine fabric (weave unknown). On the front side of the buckle there was also a fragment of a fine, dense but also very thin tabby (20 threads/cm) present. This garment, which was worn over the belt, was of a similar high quality as the undergarments and may have been a thin cloak or a shawl or veil.

In the cemetery of Lent-Lentseveld four buckles and one belt plate with textile remains were found. In all cases the textile was adhered to the front of the object. The objects were found in graves of three men, one woman and a child. Without exception the textiles were densely woven 2/2 twills (one was a diamond twill). The fabrics were of medium fine quality with thread counts ranging between 10x10 and 17x17 threads/cm.

In the cemetery of Wijchen 22 buckle-parts with attached textile fragments have been documented. In eight cases the fragments were present on the front

462. Findnumber 01-04-03.TX1, an undated stray find. Banck-Burgess summarises the use and distribution of rippenköper in burials in Switzerland and southern Germany. She shows that in men's graves the fabric is often present on the outside of belt parts and (based on the many folds in the surviving textiles) concludes that these fabrics represent wide mantles (Banck-Burgess 2003).
463. Rast-Eicher 2010, 171.
464. Sint-Servaas-church; find number 01-04-03.TX1.
465. Findnumber 556.1, grave 10332, sex unknown, 565-580/90 AD. It is possible that the first textile was worn under the belt and partly folded over it.
466. Findnumber 60.1, grave 10042, sex unknown, 565-640/50 AD. The outer fabric was rather open, made out of 0.2mm thin threads,16x12 threads/cm. The sex of the person in this grave could not be identified.
467. Findnumber 1473, grave 105, sex unknown, 610/20-670/80 AD.

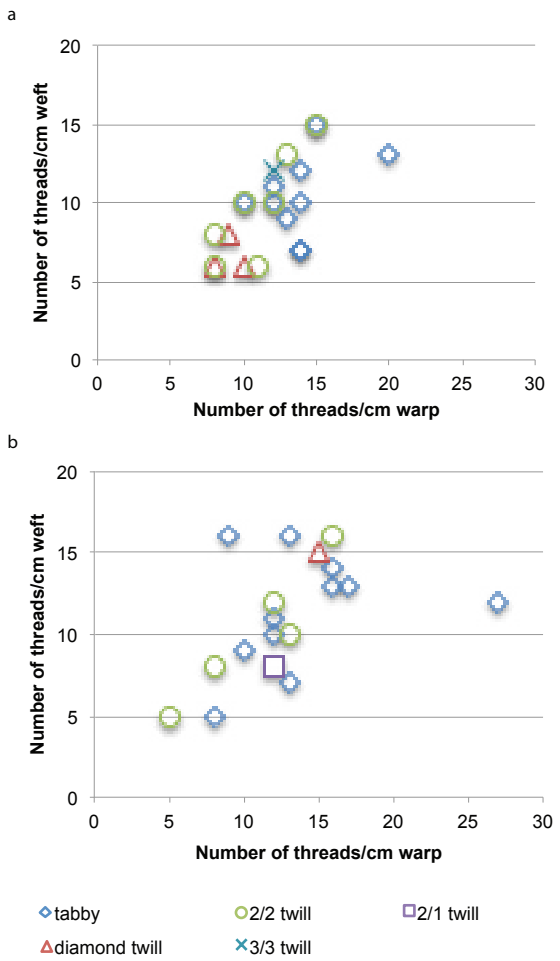


Fig.8.18a. Textiles present on the back of belt parts (worn under the belt) from the cemetery of Rhenen.
Fig.8.18b. Textiles present on the front of belt parts (worn over or under the belt) from the cemetery of Rhenen.

or edge of the buckle, the other 14 buckles were evidently worn over the textile. On the backside of three buckles a stratigraphy of two layers of textile was present which enables a reconstruction of the different garments under the belt.[468] In all these cases the fabrics worn directly on the body were dense and thin woollen tabbies or twills. Remarkable is the fact that one undergarment was made out of a spin-patterned tabby. These undergarments were each covered by another garment made out of a coarser and sometimes more openly woven fabric. The fabrics found on the front of the buckles were mostly twills and all were coarser than 10 threads/cm.

Textiles associated with belt parts were found in Bergeijk, Posterholt and Leusden as well. Here the fabrics were generally found on the front of the buckles and different fabric types and varying qualities were observed ranging from rather coarse twills (7x7 threads/cm) to a very fine tabby (25x22 threads/cm). Rhenen yielded many textiles associated with belt parts as well (fig. 8.18a-b). When comparing the textiles worn under and over the belt there are no distinct trends to be observed. The textiles found under the belt are a mixture of different fabric types and qualities. The fabrics found on the front of the belt parts show a slightly larger range of qualities.

Knives and other utensils, which were attached to or hanging from the belt, give us an additional view on the type of textile worn near the hip area. Textile remnants have been documented on finds from graves of men and women in nearly all cemeteries. The fabrics attached to these objects may be the remains of garments or a shroud, but it is also possible that the objects were encased in a pouch (hanging from the belt). The textiles associated with these objects are in general similar to those found on the back and front of belt parts.

Several examples will be briefly discussed here, starting with a foldable knife, found in Sint-Servaas church, which was covered on both sides with a medium fine tabby. This object may have been worn in a pouch hanging from the belt, in which case the remains of the pouch have been documented.[469] However it is also possible that the foldable knife was hanging from the belt on its own suspension cord and the remaining fabric is a fold of a garment worn under or over the belt.

A needle case found in this same cemetery was completely wrapped in a regularly woven tabby, of 16x12 threads/cm. Covering the first textile

468. Woman's grave 81 (570-610 AD); grave 180 (sex unknown, 610- >640) and woman's grave 235 ((450)500-555).

469. Findnumber 30-03-06.2, sex unknown, dated in the period 580/90-725 AD.

was another, finer and more open tabby which was wrapped around the entire object as well. Different interpretations are possible here: the first fabric may have been part of a pouch and the second (outer) fabric would then belong to the folds of a garment worn under or over the belt. It is however also possible that the needle case was firstly wrapped in a piece of cloth and afterwards put into a pouch, in which case the second fabric is not a garment but part of the pouch.

The fire steel found in child's grave 14 from the cemetery of Lent-Lentseveld was recovered in association with a small buckle, and both objects were covered by a coarse tabby (z/s of 10x10 threads/cm). It is likely that the small buckle was part of a pouch hanging from the belt and that the fire steel was in this pouch. Since the same fabric covered both fire steel and buckle it is possible that the pouch was made of this coarse tabby.

8.4.2.3 Textiles associated with brooches

Textile remnants have also been found attached to the back (or spring) of brooches. Since brooches are generally considered gender-related dress accessories that fit the picture of female dress, these graves have often been identified as women's graves, although in many cases no human remains were present to confirm this.[470] Brooches are generally found in the area of the chest or just below the pelvis. As described above, it is assumed that brooches in the area of the hip were used to fasten or close an open outer garment or cloak (see fig. 8.14). Brooches worn on the chest may have had the same function or may have been used to close the head aperture of a garment or fasten a veil or shawl onto another garment. Using several examples from the cemeteries it is argued that it is difficult to reconstruct women's dress in such detail.

In Lent-Lentseveld textiles associated with brooches have been found in six woman's graves.[471] From this we can gather that the brooches in the area of the hip were used to fasten a different garment than those found in the area of the upper chest. The bow brooches in the area of the pelvis are without exception associated with fabrics made out of thin (0.2mm) threads indicating a fine garment. Due to the fact that only single threads have been preserved we can only guess whether these fabrics were densely woven or open. The disc brooches found in the area of the upper chest were associated with thicker threads (up to 0.75mm), indicating that it was attached to a coarser fabric. The S-shaped brooch from woman's grave 2 is an exception to this trend. This brooch was attached to a fabric made out of 0.2mm thin threads. If used as described in the model of the *Vierfibeltracht* the gown or undergarment to which the disc brooches were attached was generally made out of a coarser fabric while the outer garment worn over the gown was made out of a much finer fabric. Noteworthy here is the fact that this fabric was made out of thinner threads than the fabrics found on the front of the belt parts (that were all made out of thicker threads). This situation is not easily explained. Were there two garments present, covering the belt? Or was the garment that was made out of the coarser fabric not worn over the belt but under it, pouching over it and thus explaining the presence on the front of the buckles? As will be further elaborated below, both options are possible and we need to keep in mind that there was probably room for variation in how garments were worn over each other and secured by brooches and belts.

Also in Wijchen several brooches with textile remains were found in sixth and seventh century women's graves. Two graves contained only a single disc brooch in the centre of the chest. These were attached to (several layers of) a rather coarse woollen tabby or twill. Because of the folds the thread count

470. The identification of 'women's graves' in the following footnotes has only in the case of Lent-Lentseveld been based on human remains. In all other cases we are dealing with a 'female' gender-related configuration of grave goods and dress accessories. In a small amount of burials the type and configuration of grave goods did not fit this pattern resulting in the definition 'sex unknown'.

471. For a detailed description of the textiles associated with the brooches from Lent-Lentseveld and Wijchen see chapter 5 (section 5.5.3.3).

could not be ascertained (10x? threads/cm). One grave contained a single bow brooch, which was found in the area of the hip, with two types of fabric attached. The brooch was attached to several folds of a dense woollen tabby (14x16 threads/cm). This garment was worn over another garment made out of a more open woollen tabby (13x10 threads/cm). In woman's grave 235 a pair of bow brooches was found more or less above each other in the area of the hip. The lower brooch was fastened to a garment made out of tabby (14x12 threads/cm, 0.3-0.5mm thick threads), which was worn over a garment made out of a coarser tabby (6x8 threads/cm, ca. 1mm thick threads). Noteworthy again is the difference in textile quality between the brooches found in the area of the pelvis (attached to dense and fine fabrics) and those found on the chest that were attached to rather coarse fabrics. This situation is similar to what we've seen in Lent-Lentseveld. Again we may ask ourselves whether we are merely looking at a reflection of the variation of fabrics present within the cemetery or whether the brooches were attached to different types of garments. Was the single brooch at the chest used to close the head aperture of a gown? This would fit the pattern seen in Lent-Lentseveld nicely because there the gown was made out of a coarser fabric as well. Using this model the bow brooches at the hip would then again have been used to close an open garment, which was worn over the gown and was made out of a finer fabric than the gown. However, considering the many folds of fabric observed in the single round brooches on the chest another option would seem more likely. The disc brooch at the chest may have been used to close or fasten an open garment, cloak or shawl.

Several of the brooches found in Maastricht-Pandhof and Maastricht-Vrijthof contained textile remnants. In the Maastricht-Pandhof cemetery three brooches from the sixth century were found with textile remains attached to the back of the objects.[472] The use of these brooches however may differ since they were found on different places on the body.[473] However, contrary to what we've seen in Wijchen and Lent-Lentseveld, these fabrics were made out of very thin threads (0.2 mm), of similar quality and rather open. It seems unlikely that these fabrics were part of outer garments, gowns or tunics because remains of these have been documented on belt parts and these were without exception made out of coarser and denser fabrics. This raises the question what the function of the fabrics on the brooches was. Can they be considered as veils of varying length that were attached to the outer garment by a brooch? The open character and thin threads of these fabrics would certainly fit this function, although they are not as fine and delicate as the so-called *Schleiergewebe* from the seventh-nineth century found in the terpen area in the north of the country.[474] Another explanation for the occurrence of this delicate fabric is possible as well. Inga Hägg suggested that the *Schleiergewebe* found in graves in Haithabu could have belonged to special death-shirts in which the dead were dressed up upon burial, or to shrouds, which covered the dead and the objects in the graves.[475] Since in the Dutch graves the Schleiergewebe was found under the brooches, it is unlikely that they belonged to shrouds here. However, it is possible that the buried women wore some sort of fine death-shirt, which was held in place by one or more brooches. In the cemetery of Maastricht-Vrijthof another fine and - unlike the Maastricht-Pandhof examples - densely woven tabby was found on the back of a brooch.[476] This brooch was found in a women's grave on the left shoulder, which is an unusual place for a brooch in this period. Again, the function of the fabric is not clear: it may have been a cloak or a veil, fastened onto another garment.

472. Findnumber 466.7 from grave 11342 (woman, 510/25-610/20 AD); findnumber 375 from grave 11220 (woman, 510/20-580/90 AD) and findnumber 418 from grave 11321 (indet sexe, 510/20-580/90 AD).

473. The brooch from grave 11220 is one of a pair of bow-brooches, found in the area of the hip. The brooch from grave 11321 is one of a pair of small round brooches worn on the chest. Brooch 466 is a single brooch in grave 11342 whose location in the grave is not clear.

474. Schleiergewebe is found in the terp-settlement of Leens, dating in the period 600-900 AD. These are woven with equally thin threads but even fewer threads/cm (Brandenburgh 2010a, 63).

475. Hägg 1991, 272.

476. Findnumber 1419-1 from grave 85;, woman 510/20-640/50. This fabric is woven out of 0.2mm thick threads with 25x13 threads/cm.

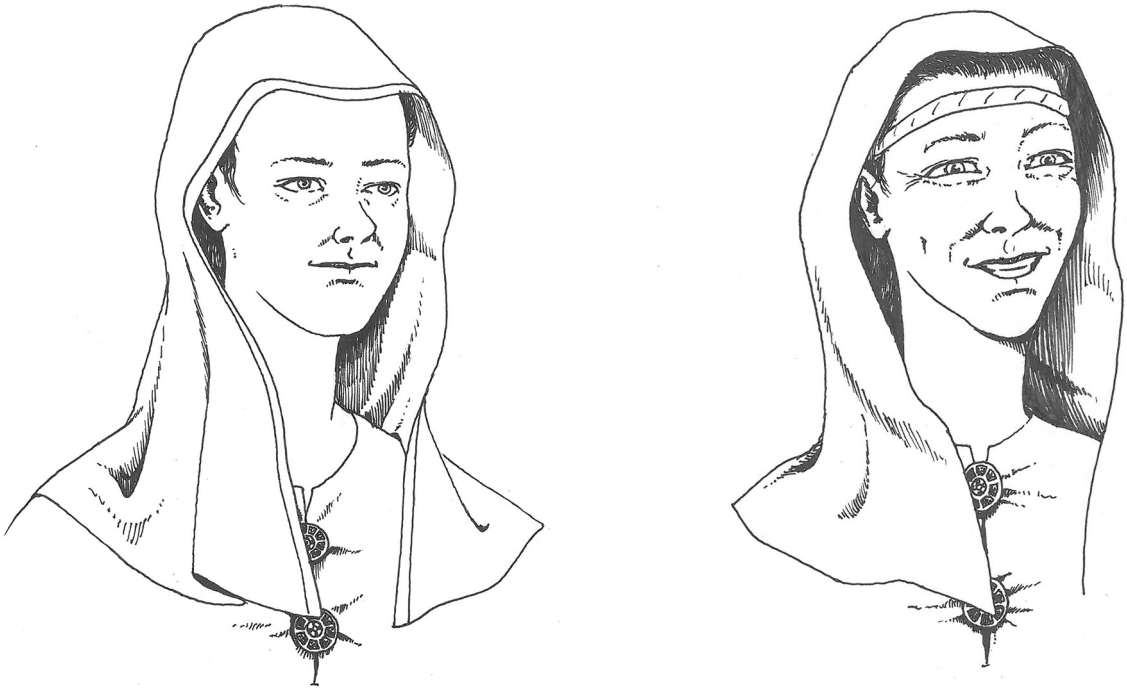


Fig. 8.19 Reconstructions of veils decorated with a golden band (left) or in combination with a gold-braided *vitta* (right). Drawings: C. van Hees.

8.4.2.4 Textiles associated with women's headwear

Several graves have yielded textiles that are associated with headwear. The most striking example is a sixth century woman's grave from Maastricht where a fragment of gold thread was found in the area of the skull. It is assumed that the gold thread was part of a golden *vitta* or a decorative band on a veil (fig. 8.19).[477]

Other textiles *may* have been used as shawls or veils but this assumption is merely based on the thin and open character of the fabrics (see the above discussion of the fabrics associated with brooches). In Wijchen woman's grave 65 (570-610) yielded one disc brooch on the centre of the chest area, with textile remains on the back and front. The brooch was attached to three layers (or folds) of a woollen tabby. On the front side of the brooch was a fragile and open tabby made out of thin threads (0.2mm). This fabric may also be considered to be a fragment of a veil or shawl.

8.4.3 Conclusions regarding dress in the Merovingian graves

Having summarised the current reconstruction methods and ideas regarding dress in the early medieval period and having assessed the textile finds associated with different dress accessories it is tempting to try to reconstruct the way people were dressed in early medieval cemeteries in the Netherlands. A possible reconstruction is however hampered because the most obvious conclusion the data allows is that there is room for variability (see also discussion) between the sites and any attempt to generalize this information will lead to a sketchy image that would not resemble the way people saw themselves in early medieval times. Although the data are obviously bound to the limitations mentioned in

477. Findnumber 418-6 in grave 11321, sex unknown, 510/20-580/90, documented in Magoula 2008, appendix 1, 12.

Fig. 8.20 Women's dress with or without neck aperture (middle) alternative reconstruction of women's dress with four brooches (right); reconstruction of women's dress with single brooch at the chest (left). Drawings: C. van Hees.

section 1.4.3, the following paragraph will summarize the general trends observed in the Dutch cemeteries. The focus will be particularly on the distinction between male and female cloths and clothing. Due to the limited data on chronology, differences occurring over time will not be incorporated in the discussion.
It may be stated that in general men as well as women wore an undergarment covered with another garment such as a tunic or dress. These garments could be long, covering the legs, or shorter, reaching to the knee or higher. The undergarment was generally a thin and fine woollen fabric and was either densely woven or slightly open. The garment worn above was often coarser, made out of thicker threads and generally of a more open fabric. It is possible that women used one or more disc brooches to close the head aperture of this outer garment (fig. 8.20), but these brooches may also have been used for another purpose. The outer garment was held in place by a belt. Utensils and knives were hanging from the belt or – according to several objects from Maastricht and Wijchen – may have been stored in a belt pouch made out of coarse fabric. The results further demonstrate that the legs were either covered in roughly woven hoses or leg windings, which were tightened by a strap or garter with small buckles.

Over the belt both men and women wore another garment or cloak. It is assumed that the brooches found in women's graves in the area of the hip were used to close this outer garment (see fig. 8.14). However, as has been described above, the fabrics associated with these brooches were often made out of thinner threads than the fabrics found on the front of the buckles and this poses some problems in our interpretation of these garments. There may be several explanations for this: 1. the belt is covered by two garments, 2. the 'coarser' fabrics present on the front of the belt parts were in fact worn under but pouched over the belt, or 3. the observed differences are the result of the variation within the sites. If the first option is true, then we are looking

at a densely woven outer garment or cloak that covered the belt. The fine fabric attached to the bow brooches in women's graves may have belonged to another garment, long shawl or veil that was closed or fastened by the brooches in the area of the hip (fig. 8.20 right). The second option is plausible as well. It is evident that the thickness of the threads associated with the round brooches on the chest resembles that of the garment found on the belts, so it is possible that this garment was worn under the belt, pouched over it and closed at the chest with these small round brooches. This garment was then covered by an open outer garment or cloak, which was made out of a finer fabric and fastened at the hip by the bow brooches. Other variations are possible as well. Some graves contain only single round brooches at the chest, which could have been used to fasten a cloak or shawl that covered the shoulders (fig. 8.20 left). Evidence for decorated tablet woven borders along the edges of the outer garments is very sparse.[478] Indications for veils or shawls made out of thin and open tabbies (0.2mm thick threads) are present on the front of several brooches. Veils or head coverings were in rare occasions decorated with gold-brocaded bands (fig. 8.19). These gold-brocaded bands were also used as *vittae* but are very rare in the Netherlands.

8.5 COVERING OBJECTS IN THE GRAVES

There is ample evidence from the Iron Age onwards that grave objects such as weapons were wrapped in or covered by pieces of textile. An often-quoted example of the way textiles were used to cover the body and objects in graves is the princely burial of Hochdorf (540-520 BC). In her publication of these textiles Banck-Burgess gives an overview of the burials from the Late Hallstatt and early La-Tène-period that provided evidence for the use of shrouds and the custom of covering objects in the grave. This even included the covering of entire wagons and bronze cauldrons.[479] In her description of a sword scabbard that was lined with cloth[480] one can however read a warning that not every piece of textile 'wrapped' around a sword or knife has a ceremonial nature. There is similar evidence for a textile-lined knife sheath in the Dutch cemetery of Wijchen[481] and consequently some of the textiles found on these objects may simply be the remains of such linings. From a somewhat different find context are the third to fourth century AD weapon deposits found in bogs in northern Germany and Denmark. Here weapons were ceremonially interred (or sacrificed) after battle and textile evidence shows us that the objects were wrapped individually in rather fine fabrics.[482] The custom of covering grave objects continued in the early Middle Ages. The rich Sutton Hoo ship burial for example shows us how different weapons were separately wrapped in pieces of textile.[483] Furthermore, evidence from south-German burials from this period shows how the dead received objects in their graves that were sometimes either wrapped in textiles or encased in specially made covers composed of leather or cloth.[484] It is not clear whether these wrapped objects were visible at all during the burial ritual, but Banck-Burgess and Wells have argued that the act of wrapping weapons and other objects may very well have been a ceremonial act conducted during the burial process.[485] By doing so these objects were removed from the sight of the mourners at a certain stage of the funeral. This ensured that the objects and the funeral had a long-lasting impression on the spectators.[486] Williams goes even further by stating that the real importance of these objects in the graves is not so much the fact that they are there and visible, but from the fact that they are viewed for only a short time before being taken out of sight.[487]

478. Only the cemetery of Rhenen yielded two pieces of tablet woven band. One of these was attached to a leather strap while the other was attached to chain links that were probably hanging from the belt. The tablet woven border may represent a reinforced hem of a cloak.

479. Banck-Burgess 1999, 18-23.
480. Banck-Burgess 1999, 24-25.
481. Wijchen findnumber 13.017, a fine woollen diamond twill z/z (12-14x10-12 threads/cm).
482. Möller-Wiering 2011, 127-128.
483. Crowfoot 1983, 411; Evans 1994, 39.
484. Bartel 2003.
485. Banck-Burgess 2012, 142; Wells 2008, 92.
486. Wells 2008, 92 & 97.
487. Williams 2005, 209.

Site	Tabby z/s or other	Tabby z/z	2/2 twill z/s	2/2 twill z/z	2/2 twill spinpattern	Diamond twill	2/1 twill z/s	2/1 twill z/z	3/1 twil z/z	indet
Bergeijk	-	-	1	-	-	-	-	-	-	1
Lent	1	-	1	-	-	-	1	-	-	1
Leusden	-	-	1	-	-	-	-	-	-	-
Maastricht	-	2	-	-	-	-	-	-	-	3
Posterholt	-	-	1	-	-	-	-	-	-	-
Rhenen	10	7	10	15	2	1	1	1	2	2
Wijchen	-	1	2	2	-	1	-	-	-	1
Total	11	10	16	17	2	2	2	1	2	8

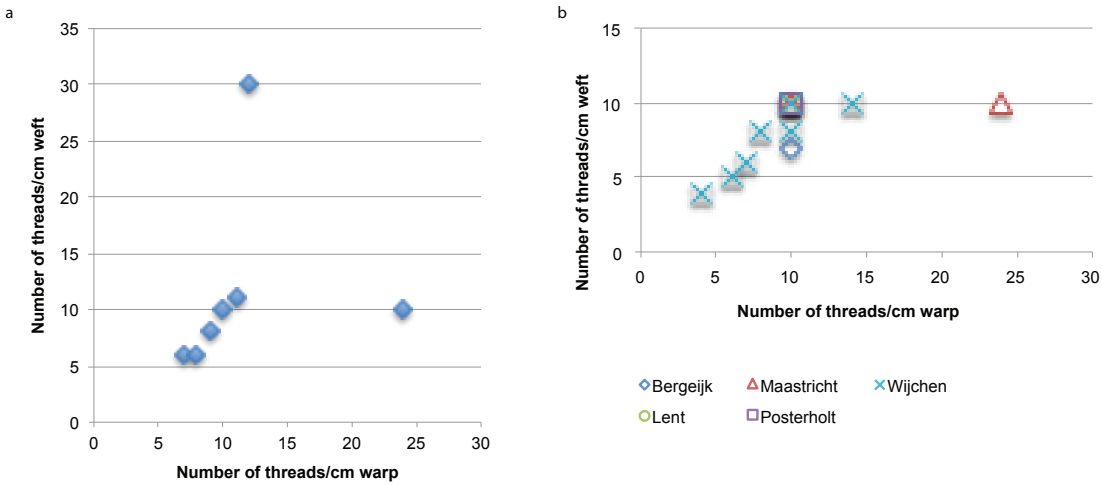
Table 8.1 Textiles types associated with weapons.

In the cemetery of Dunum (north Germany) Siegmüller found evidence for the use of shrouds in burials from the period around 800 AD. These shrouds have been used to cover the fully clothed bodies of the deceased and the other objects placed in the graves. She poses the possibility that the occurrence of shrouds in these furnished graves is part of the process of Christianisation.[488] The question however is whether a similar explanation may apply for the textile remains found in the burials from the Merovingian period. Since the tradition of covering objects (and probably also the body) during the burial ritual goes back to al least the Iron Age, as has been pointed out by Möller-Wiering and Banck-Burgess,[489] this is not naturally a sign or result of Christianisation.

In the Dutch cemeteries 70 textiles were documented attached to weapons and (in one grave from Rhenen) a bucket. Weapons were either positioned on the body or placed separately in the grave. Textile remnants attached to these objects may therefore be the remains of outer garments, coffin linings, shrouds or wrappings. The bucket was obviously placed beside the body and fabric adhered to the outside of this object will not have been part of a garment. Most of the textile fragments were found on one side of the object, only seven cases showed the same textile on both sides indicating that these objects were either wrapped in or lying in the folds of a piece of fabric. Table 8.1 shows the types of fabrics associated with weapons whereas figures 8.21a-c show the quality of these textiles in terms of thread count. In most graves the fabrics associated with weapons were tabbies or twills, following the same distribution as the other textiles in these cemeteries. Among these textiles there is no preference regarding the spin of the yarns: z/z & z/s are present in equal amounts and even spin-patterned textiles are present.

When looking at the quality of the fabrics several topics are noteworthy. The quality of the textiles associated with weapons from the cemeteries of Bergeijk, Lent-Lentseveld, Maastricht, Posterholt and Wijchen is generally coarse (10 threads/cm or less, fig. 8.21b). The textiles found in Rhenen are on average finer and range up to 15 threads/cm (fig. 8.21c). A few exceptions of very fine fabrics are observed in the cemeteries of Maastricht and Rhenen. When looking at the seven textiles that were obviously wrapped around the objects (fig. 8.21a) we can see that most of these textiles have thread counts of approximately 10 threads/cm and again a few were wrapped in very fine textiles. From this we can gather that most textiles used to cover or wrap objects were coarse fabrics but that fine fabrics were occasionally used for this purpose as well.

488. Siegmüller 2011, 244.
489. Möller-Wiering 2011; Banck-Burgess 2012.



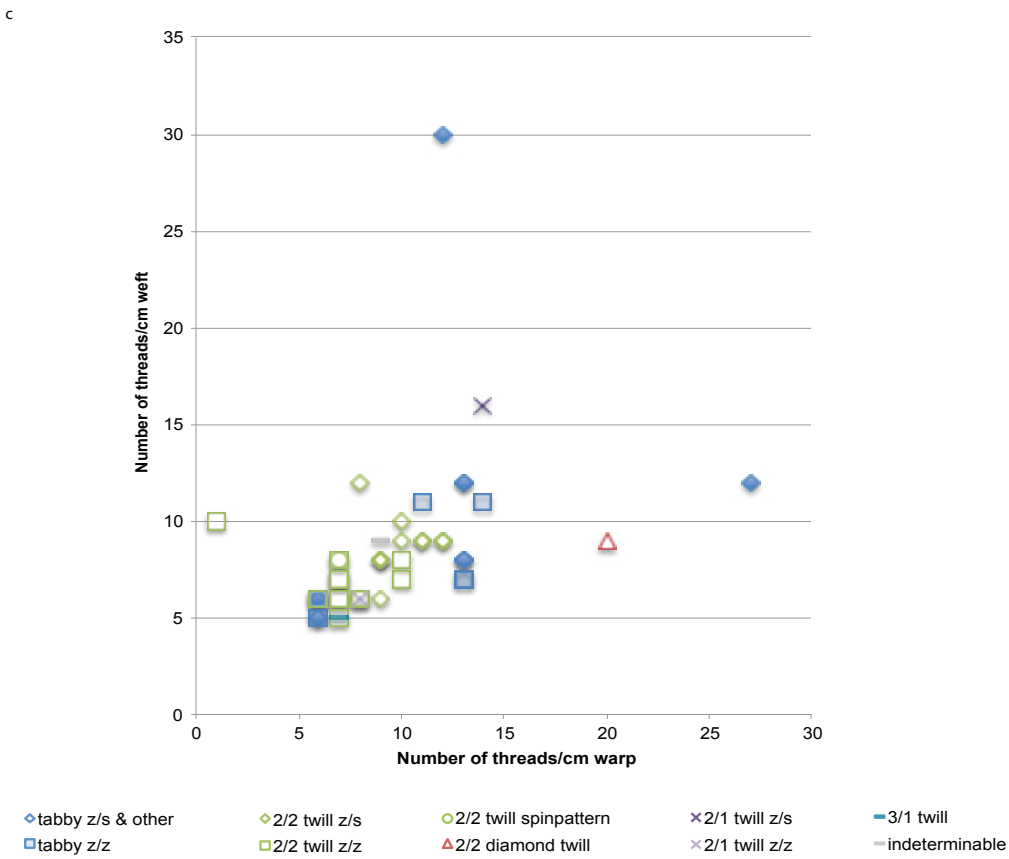


Fig. 8.21a. The quality of the seven textiles that were evidently wrapped around objects, measured in threads/cm.
Fig. 8.21b. The quality of the fabrics associated with weapons found in Bergeijk, Lent-Lentseveld, Maastricht, Posterholt and Wijchen, measured in threads/cm. Since the variation of quality is small, no discrimination has been made regarding fabric type.
Fig. 8.21c. The quality of the different fabric types associated with weapons from the cemetery of Rhenen, measured in threads/cm.

8.6 MATTRESSES, PILLOWS AND OTHER MATERIALS ON THE BOTTOM OF THE GRAVE

The occurrence of feathers (and to a lesser degree) straw provides us with information about the presence of mattresses or pillows in the graves. There are remarkable differences regarding the occurrence of feathers in grave assemblages in the countries surrounding the Netherlands. Siegmüller has pointed out that several graves in Scandinavia have held mattresses or pillows filled with feathers, such as the Oseberg ship burial,[490] Mammen[491] and Birka.[492] In Haithabu evidence has been found for feather-filled pillows made out of textile or leather in several graves and many graves contained feathers at the bottom.[493] In the south of Germany however no evidence for pillows or mattresses has been found but, but instead it was found in both graves with and without rich objects, that a layer of feathers covered the body.[494] In England two examples of feather-filled mattresses have been found.[495] These mattresses were made out of coarse fabrics made out of plant fibres. Several pillows filled with feathers were found in graves as well.

In Dutch cemeteries no remains of feathers have been documented yet. In several cases however pieces of straw were observed on textile fragments.[496] These were found in two graves in Bergeijk, a grave in Posterholt and two disturbed contexts in Maastricht - Sint-Servaas church.[497] The textiles vary in fabric type and quality, which is understandable since the function of these textiles is probably not the same everywhere. Straw may have been used as filling for mattresses or may have covered the bottom of the coffin or grave chamber. In most cases however it is not possible to discern whether the textiles to which the straw is attached are part of garments, mattresses or blankets lying on the bottom of the grave. An exception is the case of grave 58 from Posterholt. The belt in this men's grave was probably not worn on the body but originally placed beside the deceased. The remnants of a coarse fabric (tabby z/?; 7x5 threads/cm) were attached to the belt plate, and on top of that were some remains of straw.[498] This suggests that the belt was wrapped in a piece of tabby and deposited in a layer of straw at the bottom of the grave. It is also possible that the grave was covered with a straw-filled mattress or a layer of straw and a sheet or blanket woven in tabby. The occurrence of straw on the front of buckles poses some interpretative problems. Was the body covered with straw? Or were the belts not positioned on the body but lying beside the body in a layer of straw? Due to the poor documentation of several sites we will probably never find out, but all these finds indicate that in some cases straw was present in the graves: either in the form of mattresses or covering the bottom of the coffin. A reanalysis of all the grave objects regarding the presence of straw and feathers (also on objects where no textiles are present) will however improve our knowledge on this subject.

The textiles from the Dutch settlements provide us with some information on the use of pillows or mattresses as well. In the site of Leens two textile fragments have been found in association with feathers.[499] These textiles were probably used for mattresses or cushions. They were made in a plain 2/2 twill with 5-7 threads/cm. One fragment was woven with z-spun threads in both warp and weft, the other in spin pattern.[500]

490. Ingstad 2006, 208.
491. Østergård 1991; Hald 1980, 102.
492. Geijer 1938, 133.
493. Hägg 1991, 191-195, 271.
494. Siegmüller 2011, 247.
495. Walton Rogers 2007, 225-226.
496. The presence of straw (and feathers) on objects has only been documented where textiles were present. The author did not methodically analyse all cemetery finds in order to document straw. The results presented here are therefore to be considered anecdotal.
497. Bergeijk grave 24 findnumber 24.q3 & 24.gg1; Bergeijk grave 89 find number 89.k2; Posterholt grave 58, find number 58-III-7, 58-III-9 & 58-III-16; Maastricht – Sint-Servaas church disturbed features find numbers 01-04-03 & 23-04-00.
498. Brandenburgh 2013, 136.
499. Leens 1939-IV.37/2 & 1939-IV.27/9.
500. Brandenburgh 2010a, 72.

8.7 GENDER AND AGE DIFFERENTIATION IN BURIAL TEXTILES[501]

In most sites textiles have been assigned to gender groups using the gender-associated objects in the graves as a reference point, because skeletal remains have survived sparsely. Only in the cemeteries of Lent-Lentseveld and Maastricht skeletal remains have survived enabling a positive identification of men and women in the graves. The textiles from Leusden have not been assigned to gender because this information was not available yet.

There are differences between the cemeteries regarding the fabric types used by men and women. This has been observed in other regions as well. Hägg has previously called attention to the fact that in Scandinavian and German cemeteries in the North Sea region women's graves tend to contain equal amounts of plain twills and diamond twills, whereas diamond twills are practically absent in men's graves.[502] The distribution of gender related textiles in Dutch cemeteries does however not follow the same pattern described by Hägg. In Rhenen for example the roles have been reversed. Here women preferably were buried in tabbies, with only very small amounts of twills. The men in Rhenen show more variability in textiles with a preference for twills but also a large share of tabbies (fig. 8.22). A similar distribution pattern is visible in the cemetery of Wijchen. Here women are buried mostly in tabbies, and men in twills with small amounts of tabbies (fig. 5.11). Maastricht-Vrijthof may have a similar preference, but since textiles have been recovered solely in women's graves we can merely say that women in this cemetery were generally buried in tabbies as well.

In other cemeteries we see a different picture. In Maastricht-Sint-Servaas church tabby is the predominant fabric type in graves of both men and women. In Lent-Lentseveld the tabby is completely lacking in women's graves and it only occurs in graves of men and children. Women in Lent-Lentseveld seem to have been buried solely in twills (fig. 5.10).

Only in Bergeijk and Maastricht-Pandhof do the women's graves show more variability in textiles than the graves of men: here men were buried in twills and women in equal amounts of tabbies and twills.

When we compare the quality of the textiles from graves of men and women another interesting pattern emerges. In several cemeteries women's graves have yielded considerably finer textiles than men's graves. Again, this becomes most obvious when we look at the textiles from Rhenen (fig. 8.23a-b). Here many of the textiles from women's graves are coarser than 15 threads/cm but an almost equal amount is finer as well. The textiles from men's graves on the other hand are seldom finer than 15 threads/cm. We can therefore safely conclude that the textiles applied in women's burials in Rhenen were of a different quality than those in men's graves. This situation is however not unique: in Birka for instance women's graves showed more variability in textile quality than men's graves as well.[503] The textiles in women's graves from Lent-Lentseveld are also finer than those in graves of men and children (fig. 5.12). This trend is – although less pronounced – also visible in the cemetery of Wijchen (fig. 5.13). In Posterholt the textiles from women's graves are only slightly finer than those from men's graves. In the cemeteries from Maastricht and Bergeijk there seems to be no difference in textile quality between men and women.

501. This paragraph is based on the different sections discussed in several articles: Brandenburgh 2012a, 131-134; Brandenburgh in press; Brandenburgh 2013, 135-136; Brandenburgh 2015. See also the different case-studies in this volume. Differentiation within cemeteries based on quality could not be discerned within this dataset. Because of the fact that only a small percentage of the textiles has survived and most graves contained only one or two fragments of textiles it proved futile to attempt to search for high status burials within the cemetery by looking for graves that stand out by the high quality of their textiles. In the cemetery of Wijchen such an attempt has been made and here one can only conclude that graves with rich grave goods do not always have rich textiles, and vice versa: there are many graves with rich textiles that do not have rich grave goods (Brandenburgh 2010b, 127).

502. Hägg 1993, 86-89.

503. Hägg 1993, 86-89.

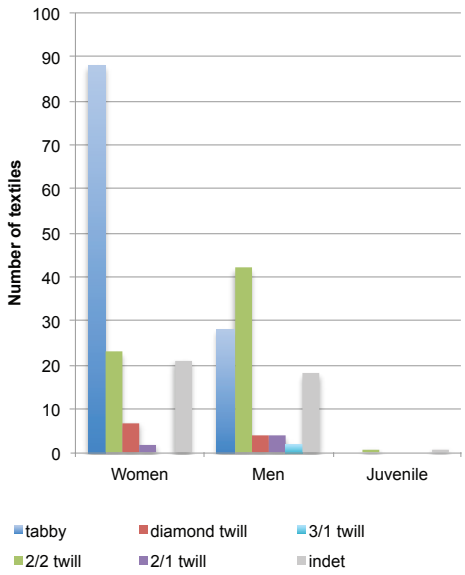


Fig. 8.22 Distribution of the fabric types among graves of women, men and children in Rhenen.

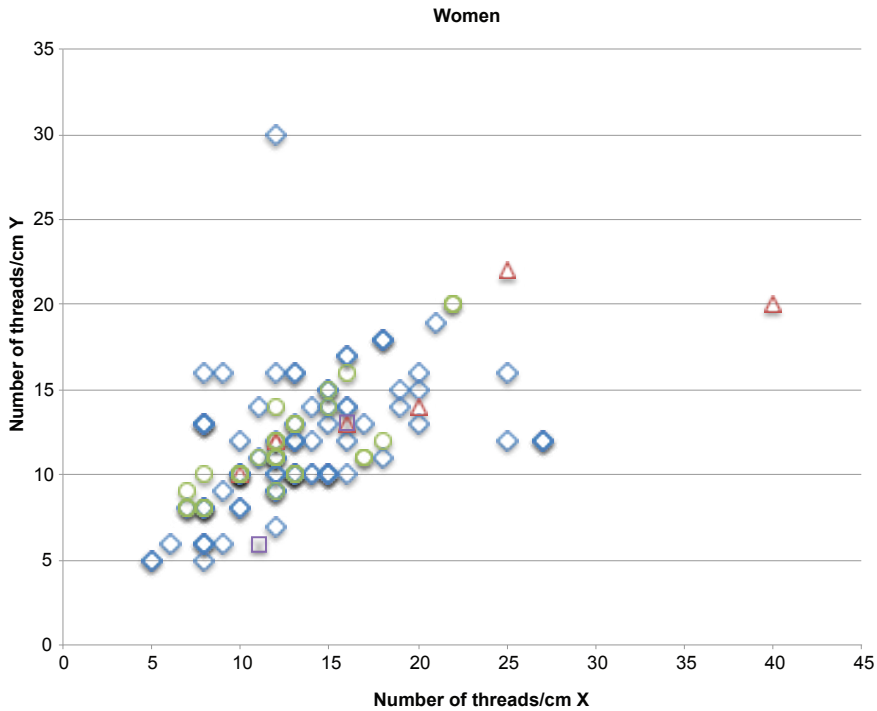
But how to explain these differences? Certainly the observed variability in textile quality is not caused by the occurrence of specific fabrics, since the fabric types are evenly distributed over the textile qualities in graves of both men and women. Is it the result of differences in chronology? That is hard to say for the chronology of the graves is not very detailed yet. Were women's garments in certain regions made out of finer fabrics than men's clothes? Or do we merely see regional differences in dress in the burials? This is a possibility we can explore because the cemeteries where we observe differences in textile quality (Rhenen, Lent-Lentseveld and Wijchen) are all situated in the middle of the Netherlands. The further we go south, the differentiation in textile quality between men and women disappears. We can also partly explain this phenomenon by the fact that men's graves contain weapons and these objects were wrapped in or covered by coarser fabrics. This does however not explain the preferences for certain fabric types among men and women.

Again we could be merely looking at different regional preferences regarding the use of specific fabric types for specific gender-related garments, but then there is much more local variability than previously assumed. Another line of approach is to look for explanations in the social, symbolic or ideological meaning of the textiles. Is the preference for tabbies in Maastricht – Sint-Servaas church a first sign of Christianisation reflected in the burial rite? That seems plausible considering the early Christian predecessor of this church. The use of tabbies as death-clothes in combination with the dress accessories of every-day life in graves of both men and women can then perhaps be considered a transition towards the later modest use of death shirts and shrouds. This early use of sober death clothes was not uncommon, judged by the accounts of the death of Saint Gertrudis from the abbey of Nijvel, who died in 659 AD and was buried on her specific request in a sober death shirt.

Previous research has pointed out that there are considerable differences in grave goods when comparing different age groups.[504] This might imply that infants and juveniles, but also older people were dressed differently upon burial. In Dutch cemeteries analysing the use of textiles among different age groups is however complicated due to the lack of skeletal remains. Even a distinction between adults and juvenile/children is problematic. Juvenile graves are not often recognised as such or contain only few metal objects, which diminishes the chance of recovering textile remains from these burials. In Rhenen only two textile fragments can be assigned to children, one of these was a coarse 2/2 twilll, the other an indeterminate fragment. The cemetery of Lent-Lentseveld seemed a promising site to analyse the differences between adults and children: here 17 of the 50 burials were identified as young child's graves, but unfortunately many of the textiles from these graves proved indeterminable fragments. The textiles that have been assigned to children's burials are generally rather coarse (fig. 5.12 & 5.13: five are coarser than 10 threads/cm, two are approximately 15 threads/cm) but a single example from Posterholt

504. Gutsmiedl-Schümann 2014.

a



b

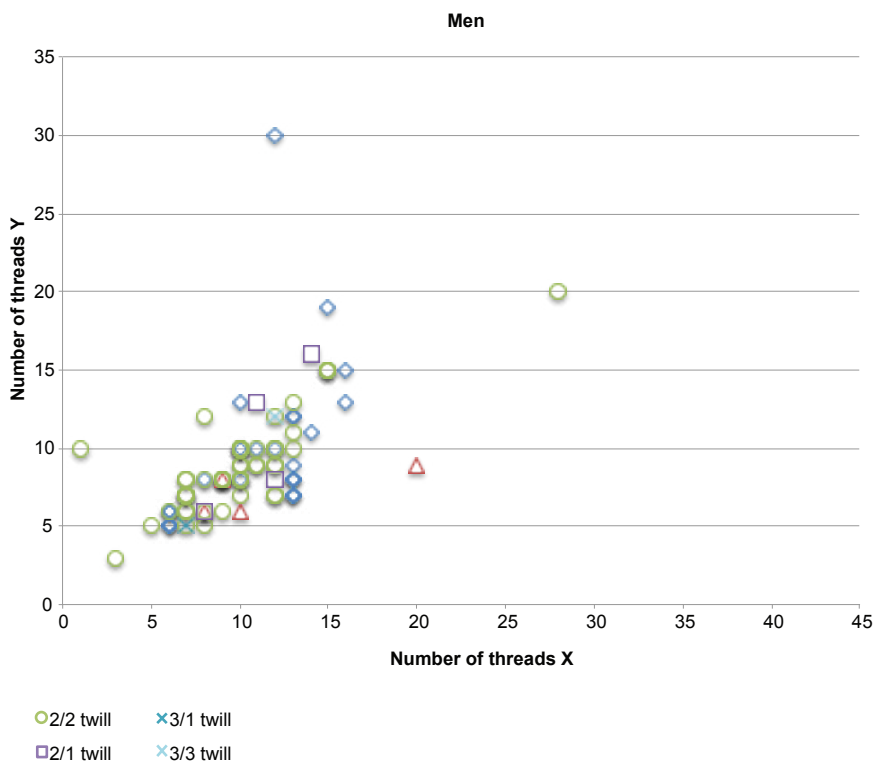


Fig. 8.23a. Quality of the textiles associated with women in the cemetery of Rhenen, measured in threads/cm.
Fig. 8.23b. Quality of the textiles associated with men in the cemetery of Rhenen, measured in threads/cm.

shows us that more data is needed to allow any conclusions regarding textiles in children's burials. Grave 23 from Posterholt yielded a tabby, which was by far the finest textile in the entire cemetery. This shows that there were circumstances where a child could be buried in fine textiles.[505]

8.8 TEXTILES FROM THE SETTLEMENTS

Settlement textiles have proven a valuable source for information concerning the way fabrics were processed into garments. Where cemetery finds lack information regarding the cut and shape of a garment, settlement finds survived in larger pieces and contained remains of seams, hems and decorative needlework.[506]

The textiles found in the cemeteries are different from those excavated in the settlements. Figure 8.1 and 8.2 show completely different distribution patterns of the fabric types present in both types of contexts. Problematic in this comparison is the fact that the settlement finds are very poorly dated - at best we can allocate them to a period of several centuries - and most textiles from the settlements are younger than those from the cemeteries. Nevertheless, the differences are remarkable. In cemeteries tabbies are by far the most popular fabric type and at best tabbies and twills are equally divided. In the settlements however we see a very small amount of tabbies and a predominance of plain twills and diamond twills.
Moreover, the textiles from the cemeteries are finer than those found in the settlements.[507] Bender Jørgensen earlier noticed the difference in quality of the textiles in Dutch cemeteries and settlements. She explains these differences by stating that cemetery textiles were practically all remains of clothing (mainly from the upper class), whereas settlement textiles derive from rags, household textiles and worn down clothes.[508] A similar difference in textile quality and textile types has been noticed in Haithabu. Hägg stresses that Haithabu had a mixed population and that the textiles from the graves are not representative for this population because textiles were in general found attached to oval brooches, the dress type of the Scandinavian part of Haithabu's population. These objects occur in only a small percentage of the graves. Moreover she states that the burial ritual must have influenced the difference in textiles between settlement/harbour and the graves. She notices that the delicate fabric-type described as *Schleiergewebe* occurs regularly in graves and suggests that these belonged to death-shirts that were worn for the occasion of the burial or to shrouds, which covered the dead and the objects in the grave.[509]

Bender Jørgensen's model may partly explain the situation in the Dutch graves but there are drawbacks to this model as well. Firstly, it was not only the upper class of society that was buried in the Dutch cemeteries: rural cemeteries such as Bergeijk, Posterholt and Lent-Lentseveld must have been the burial ground for a local non-elite population. And secondly: the graves do not only contain clothes but a considerable amount of textiles that were used to cover the bottom of the grave or for covering or wrapping objects such as weapons. Sure enough, the differences between the settlements and cemeteries may partly have been caused by the fact that settlements have yielded not only pieces of clothing but also remains of bedding, soft furnishings and other household textiles, sacking, tarpaulins, sails and animal trappings such as saddlecloth that didn't require the same quality of weaving as clothes, but this is not an altogether satisfying explanation. This becomes clear when we compare the textile remains that have positively been identified as garments from both the cemeteries and the settlements. Settlement sites have yielded a total of six hats, two mittens and three pieces of sleeves. These garments were made out of varying qualities of fabrics, ranging from 8x5 threads/cm to 21x5 threads/cm, but most are coarser than 12 threads/cm, while the cemetery-finds are generally finer.[510] Another explanation can be sought

505. Brandenburgh 2013, 136.
506. Brandenburgh 2010a, 72-74.
507. In settlements textiles are generally coarser than 12 threads/cm. Brandenburgh 2010a, 62-63.
508. Bender Jørgensen 1992, 49.
509. Hägg 1991, 272.
510. Brandenburgh 2010a, 66-72.

in the chronology and distribution of the finds: settlements are generally younger than the cemetery-finds and have mostly been excavated in the north of the country whereas the cemeteries are located in the middle or south of the country. It may be possible that we are comparing textile assemblages from altogether different periods or textile traditions. It is however most likely that the higher quality textiles in the cemeteries were a part of the burial ritual and had a symbolic function. Was it customary to dress up the dead in their finest clothes? And if so, what message about the social position of the dead or their relatives did this transmit to those that were present at the burial?

8.9 DISCUSSION

The textiles discussed have been found in different types of sites. Among the cemeteries we can discern three urban cemeteries of which the high status of the buried population has been confirmed, several rural cemeteries of which the role and status of the population is unknown[511] and a large number of settlements. Based on the textile remains we may group these sites into several clusters. The cemeteries of Leusden, Maastricht-Sint-Servaas church and Maastricht-Vrijthof show a similar distribution of textile types with a preference for tabbies and with twills occurring in smaller quantities. Posterholt also shows this preference but here the differences between the numbers of tabbies and twills are smaller. In other cemeteries such as Lent-Lentseveld, Wijchen, Rhenen and Maastricht-Pandhof tabbies and twills are present in approximately equal numbers. Bergeijk is the only cemetery where twills seem to have been more popular than tabbies and this distribution pattern corresponds with the majority of settlements excavated in the north of the country.

Some of the cemeteries contain remnants of textiles that are generally of a higher quality than those found in other sites. The textiles from the three cemeteries from Maastricht and Leusden are made in higher thread counts than those from the other sites. Moreover, the cemeteries of Maastricht contain gold thread and several types of special fabrics, making these sites stand out from the others in terms of textile quality. Rhenen also contains several special fabric types and the textiles from this site are of a relative high quality as well. The other cemeteries are rather homogeneous in terms of textile quality. Some, such as Posterholt and Wijchen do contain special fabrics: here examples of veil-like fabrics have been found, but the number of special finds is relatively limited. Based on this evidence we may conclude that the urban cemeteries of Maastricht-Sint Servaas church and Maastricht-Vrijthof and the cemetery of Leusden can be grouped together in both textile types and qualities. Here it must be clear that the occurrence of gold thread in Maastricht makes this site more luxurious in terms of textile quality than Leusden. Posterholt fits into the same textile 'tradition' in terms of textiles types but is clearly a more sober site with textiles of lower quality. Rhenen shows rather fine textiles as well, but this cemetery seems to have a different focus in textile tradition than observed in Maastricht and Leusden, showing a preference for different fabric types. Rhenen and Wijchen are quite similar in terms of textile types and the distribution of fabrics among men and women, whereas Lent-Lentseveld may at first glance seem similar but has a different distribution pattern among men and women. So how do we explain these differences? In order to do so we may first need to look at the distribution pattern observed in the regions surrounding the Netherlands. Having ascertained the variability between the sites makes it more difficult to simply compare the Dutch sites with those from the surrounding countries. Moreover, the chronology of the textile finds is still in need of refinement, as the following example will clarify. Bender Jørgensen has pointed out that throughout the Merovingian period Britain and the northern parts of Germany are reasonably comparable regarding the use of cloth types with an equal distribution of tabbies and twills and small percentages of special weaves such as Rippenköper.[512] Walton Rogers however refined the

511. In general we can consider the people buried in these cemeteries as the members of a rural population whose social and cultural horizon may have extended beyond the region. Theuws 2014, 6.

512. Bender Jørgensen 1991, fig 2, 3 & 5; 1992, fig.16-29 for different parts of Britain, fig. 82 for north Germany.

chronology for the textiles from Britain considerably, resulting in a detailed and deviating distribution pattern with a predominance of tabbies only in the seventh century onwards.[513] This shows us that without knowing the exact chronology of the sites and the distribution of the textiles in the site it is not easy to compare regions or explain the similarities or differences observed.[514]

Bender Jørgensen previously distinguished several regional groups of textiles. These are Scandinavia/northern Germany, a group she defines as the English Channel group (consisting of Kent, Normandy, Belgium and the lower Rhine area and lastly the group of textiles from south/central Germany.[515] When we compare the distribution of the textile types among the cemeteries (fig. 8.2 & 8.3) with those published by Bender Jørgensen (1991), the sites of Rhenen, Wijchen and Lent-Lentseveld fit the pattern observed in the northern parts of Germany.[516] Maastricht and Leusden (and to a lesser degree Posterholt) are more comparable to Central Germany, Belgium and Normandy, which dominate in tabbies and also eastern Austrasia (Rhine valley and Westphalia) shows considerably more tabbies than other cloth types.[517] The southern parts of Germany yielded a more even distribution of cloth types, again with a larger share of special weaves than the northern areas, although recent analysis of the textiles from Lauchheim shows us that here the predominant fabric type is tabby as well.[518] The sites from the settlements in the north of the Netherlands resemble the distribution observed in the settlements in Northern Germany.[519] From this we can gather that the differences observed between the Dutch sites fit in regional textile traditions that extend far beyond the borders of the research area. Does this mean that the people buried in these cemeteries actually had ties to these regions, either in terms of trade networks or in terms of relationships? Both possibilities can be further explored when provenance studies are more incorporated into the research of this period.

Another approach towards the variability in textiles is possible as well. Variability is not only present in textiles but has been observed in many other aspects of the burial ritual, such as grave construction and the types of pottery interred in the graves. From this we can gather that there probably was no simple set of rules that applied to every grave within a cemetery, but that there was room for variation depending on the needs of those involved in the burial ritual. Here again we touch upon the idea that the grave probably played a role in the construction of the image or position of the people involved, leaving ample room to choose the layout of the grave and it's inventory. Considering the differences between textiles found in settlements and cemeteries it seems plausible that people were dressed up in special clothes for the burial. This implies that these clothes and the use of specific fabrics and fabric qualities propagate a message about the position of the dead or his/her relatives to those witnessing the burial. If so, how do we decode that message? The high quality of fabrics may be a statement of wealth and perhaps we have to view the wealthy fabric from the juvenile burial in Posterholt in this light. The occurrence of specific fabric types in different sites and in graves of men and women are not so easily explained. It is therefore specifically remarkable that the differences between men and women disappear in Maastricht. Here the striking dominance of tabbies – which may be considered a transition towards more sober fabrics or clothes in the burial ritual - can be an early reflection of Christianity in this city, where heathen burial

513. Walton Rogers pointed out that in Britain there is a development from the fifth to the seventh century, starting with a predominance of 2/2 twills z/z in the fifth century and ending with an increase of tabbies (linen, z/z) in the seventh century. Tabby became the most popular fabric type in this later phase (50%) whereas twills (z/s in this phase) constituted only 37%. Walton Rogers 2007, 104-105.
514. Walton Rogers explains the detailed chronology in Britain as a result of three separate phenomena: a disappearance of twill z/s at the end of the Roman period and a reintroduction of this fabric at the end of the sixth century, an increase in the use of linen fabrics (that tend to have been made in tabby z/z) and a trend towards using wool predominantly in z/s twills. These are all aspects of textile production that are not easily explained in terms of one textile tradition.
515. Bender Jørgensen 1991, 23.
516. Bender Jørgensen 1991, fig 2d.
517. Bender Jørgensen 1992, fig. 83-84.
518. Gauβ, Peek & Scheschkewitz, 2013, 141.
519. Bender Jørgensen 1992, fig. 101; Tidow 1995, Siegmüller, A., 2010, 188.

customs, incorporating dress accessories and grave goods, may have been mixed with the use of special death-clothes woven in tabby. Is the preference of tabbies in other cemeteries an equal expression of Christianisation? That is hard to say, for it is equally plausible that men's clothes were made out of different fabrics than women's clothes.

When comparing the quality of textiles found in the Netherlands and the surrounding countries, it becomes clear that although Maastricht has by far the finest textiles found in the Netherlands it is quite average compared to sites in Merovingian Germany.[520] For instance, silks are lacking and gold thread occurs only sparsely in Maastricht whereas these are present in far larger quantities in other high status burial sites in the surrounding countries. This implicates that the people buried in Maastricht did generally not have access to these high status textiles. Moreover, the fact that the finds in Maastricht are more luxurious than in the rest of the Netherlands implies that the people living in the rural settlements did not have access to the same quality of fabrics observed in Maastricht.

Although this thesis has resulted in a considerable dataset it has raised more questions than it has provided answers. Ascertaining trends in the distribution and use of specific types of textile does not automatically lead to an understanding of the social processes behind these trends and differences. Achieving such understanding will demand further research. Moreover, the trends that have been observed might become more (or less) pronounced when more data is added to the current data set. This will improve the chronological framework of textile remnants and enable a better understanding of the development of textiles throughout the early middle ages. Additionally, it will make the information regarding Dutch textiles more comparable to those from the surrounding countries. Furthermore, systematic and detailed fibre analyses will provide insight in the way fibres were selected, processed and applied in specific situations.

Another interesting topic to further explore is the relation between (type and qualities of the) textiles and other objects in the grave. This relation could not be taken into account in this study since the contextual information of the grave objects has not been fully published yet. Relevant questions would be: do 'rich' grave assemblages correlate with luxurious textiles or are there apparent 'mismatches'? Can we establish the role that textiles played in the burial ritual?

Textile production and textile trade have been touched upon in chapter 6. The textiles found in the settlements were generally made on a household level, but several examples have been observed that were probably made by textile specialists. Some of these, such as the hats with standardised decorative sewing or the *Schleiergewebes* and piled weaves are even likely to have been products of trade. This is most likely also the case with the textiles from the cemeteries, which were in general of a higher quality than those from the settlements. There is however much ground to cover for future research. The wide area in which specific textiles and production techniques occur opens up a whole range of questions relating to textile trade, which has only been dealt with superficially in chapter 6. Where were textiles made and by whom? Which textiles were traded and which were made locally? And what is the role of specific groups of people in early medieval society in this process? Questions such as these ask for an interdisciplinary approach incorporating the analyses of textiles, textile production tools, provenance studies and zoological studies of the distribution of sheep bones.

Lastly, the differences between men and women observed in the textiles pose an interesting topic to explore further. Women were buried in different textiles than men and it is equally likely that people wore different clothes in different phases of their lives. When assuming that 'image' is used to construct and reflect the role of a person, a further analysis of clothing (a fundamental part of image) may contribute to our understanding of the roles people fulfilled in different stages of their lives.

520. Bender Jørgensen 1992, fig. 87, 90, 92, 94 for Merovingian Germany.

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Summary

Textiles that are occasionally found in excavations are the scarce remains of garments, household fabrics, sails, sacking etc. Although several authors have published textile finds from the Netherlands in the past, systematic research of these finds has not been conducted yet. Where the surrounding countries have witnessed a development in which textile archaeology has become a fundamental part of archaeological research, a similar development has been lacking in the Netherlands. As a result our knowledge of the production and use of textiles is mainly derived from the surrounding countries, where more research has been carried out. This is the more lamentable because no objects are more closely related to the people from the past than cloth and clothing. Dress is not only functional, but it often expresses the identity or social position of its wearer. Moreover it can be used to confirm or create an identity. This is also the case in early medieval burials where people were buried fully dressed and where grave objects and clothing may have been selected to display the social status, age or gender of the deceased and as such were used to confirm or create his or her position. Therefore it is not only useful to reconstruct the way textiles were used, but also to establish differences in the archaeological textile record which may point towards social differences in early medieval society.

This study has focused on the use of cloth and clothing in the area now defined as the Netherlands, in the period between 400 and 1000 AD. For this purpose textile remains from both settlements and cemeteries have been analysed from different parts of the country: ranging from rural settlements in the north of the Netherlands to urban cemeteries in the south and rural cemeteries in both the centre as well as the south of the country. This geographical distribution, the large timespan of the dataset as well as the obvious differences in site context result in a very varied picture of the use of fabrics in this period.

In burials from the Merovingian period fabrics are often preserved in the corrosion of metal dress accessories. These textile fragments are generally considered to be the remains of the clothes in which the dead were buried and of other grave fabrics such as shrouds, mattress covers, pillows etc. The fine chronology of the metal objects to which these textiles are attached offers the possibility of creating a detailed typology of fabrics throughout the Merovingian period in different areas of the country. Furthermore the sex or gender (and sometimes) age of the deceased and the position of the textiles in the grave and in relation to the body are often known. Using the textile remains from the Dutch cemeteries and evidence from studies from the surrounding countries it was possible to reconstruct, in a broad sense, the way people were dressed when buried.

Men as well as women wore an undergarment covered by another garment such as a tunic or dress. These garments could be long, covering the legs, or shorter, reaching to the knee or higher. The undergarment was generally a thin and fine woollen fabric and was either densely woven or slightly open. The garment worn above was often coarser, made out of thicker threads and generally of a more open fabric. This outer garment was held in place by a belt. The legs were either covered in roughly woven hoses or leg windings, which were tightened by a strap or garter with small buckles.

Over the belt both men and women wore another garment or cloak. It is assumed that the brooches found in women's graves in the area of the hip were used to close this outer garment. Indications for veils or shawls made out of thin and open tabbies are present on the front of several brooches. Veils or head coverings were in rare occasions decorated with gold-brocaded bands.

Pictorial evidence and archaeological finds from the surrounding countries show that men and women wore different types of garments. However, men and women did not only distinguish themselves by the shape of their clothes. It has become clear in this study that women wore clothes that were made from different fabric types than men and that the fabrics they used were often of a higher quality than those worn by men. There is however much local variability in these gender-related preferences. In Rhenen and Wijchen women generally were buried in tabbies, with only very small amounts of twills. The men in Rhenen show more variability in textiles with a preference for twills but also a large share of tabbies. In Lent-Lentseveld on the contrary the tabby is completely lacking in women's graves and it only occurs in graves of men and children. Women in Lent-Lentseveld seem to have been buried solely in twills. Only in Bergeijk and Maastricht-Pandhof do the women's graves show more variability in textiles than the graves of men: here men were buried in twills and women in equal amounts of tabbies and twills. In the (early-Christian) cemeteries in Maastricht-St. Servaas church and Vrijthof differences between men and women were not observed. In Maastricht men and women were dressed uniformly in the same fabric type (tabby), which may be seen as a precursor of the use of death clothes and shrouds in (early) Christian burials.

A substantial amount of the textile finds was not used as clothing but had a different function in the graves. There is ample evidence in these burials for the custom of wrapping objects before or during the burial ceremony. Weapons were covered by or completely wrapped in pieces of – often rather coarse – fabrics and were then positioned in the grave. This custom may have been part of the burial ceremony and, while the objects may have been there to impress the bystanders, the fact that they were deliberately removed from sight ensured that both these items and the funeral ceremony had a long-lasting impression on the spectators. Other textiles may have been used to cover the bottom of the grave, or were part of pillows or mattresses. There is no irrefutable evidence for the presence of shrouds, although several fabrics may have been used for this purpose.

There are considerable differences between the cemeteries in terms of textile types, textile quality and the preference of men and women for specific fabric types. The cemeteries of Leusden, Maastricht-Sint-Servaas church and Maastricht-Vrijthof show a similar distribution of textile types with a preference for tabbies and with twills occurring in smaller quantities. Posterholt also shows this preference but here the differences between the numbers of tabbies and twills are smaller. In other cemeteries such as Lent-Lentseveld, Wijchen, Rhenen and Maastricht-Pandhof tabbies and twills are present in approximately equal numbers. Bergeijk is the only cemetery where twills seem to have been more popular than tabbies and this distribution pattern corresponds with the majority of settlements excavated in the north of the country.

Some of the cemeteries, such as Maastricht and Leusden contain remnants of fabrics that are generally of a higher quality than those found in other sites. However, when comparing the quality of textiles found in the Netherlands and the surrounding countries, it becomes clear that although Maastricht has by far the finest remains found in the Netherlands it is 'quite average' compared to sites in Merovingian Germany.

The differences observed between the Dutch sites fit in regional textile traditions that extend far beyond the borders of the research area. The sites of Rhenen, Wijchen and Lent-Lentseveld fit the pattern observed in the northern parts of Germany. Maastricht and Leusden (and to a lesser degree Posterholt) are more comparable to Central Germany, Belgium and Normandy. Bergeijk does not fit any pattern but resembles the distribution of the younger settlement sites in the north of the country. It is yet unclear whether the observed patterns are the result of regional group affiliation that extended over larger areas in which people shared their textile preferences and production traditions or the result of being connected to specific trade networks.

The settlements in the north of the country have yielded a completely different set of fabric types and fabric qualities as opposed to the cemeteries. There may be many reasons for this: settlements

are removed from the cemeteries in time (they are younger) and space (north of the country as opposed to the burials in the central and southern areas) so we may be looking at completely different textile traditions. Moreover, there is a difference in the use of the textiles: settlements may have yielded larger shares of household textiles and everyday clothes as opposed to burial garments found in the cemeteries. It is however most likely that the higher quality textiles in the cemeteries were a part of the burial ritual and had a symbolic function.

The knowledge regarding the use of textiles in the early Middle Ages in the Netherlands has increased with this study. It is obvious that this topic deserves more attention in Dutch archaeology than was hitherto received. Even though textiles may have decayed considerably, it is still possible to reconstruct to a certain extent the way they were used which leads to an understanding of the variability in early medieval cloth and clothing in this period. The picture that emerges from this study is however far from complete and many questions relating textiles, such as production, trade and use among social groups in this period have not been touched upon. Therefore this study should be considered as a first overview, which further research can use as a starting point and continue to expand.

Samenvatting

De resten van textiel die af en toe bij opgravingen gevonden worden zijn de zeldzame overblijfselen van kleding, huishoudelijk textiel, zeilen, verpakkingsmaterialen etc. Alhoewel meerdere auteurs in het verleden gepubliceerd hebben over individuele of kleine assemblages van textielvondsten uit Nederland, is er nog nooit een systematisch onderzoek verricht naar deze vondstcategorie. In het buitenland is het onderzoek naar textielresten de afgelopen decennia sterk ontwikkeld en is het een onmisbare specialisatie geworden binnen het archeologisch vakgebied. Een vergelijkbare ontwikkeling is in Nederland nog niet op gang gekomen, waardoor onze kennis van de productie en het gebruik van textiel in het algemeen en weefsels in het bijzonder voornamelijk is afgeleid van wat er uit de ons omringende landen bekend is. Dit is jammer want er zijn naast kleding bijna geen andere objecten te bedenken die nauwer verwant zijn met de mensen wiens verleden archeologen proberen te ontrafelen. Kleding is namelijk niet alleen functioneel, maar geeft vaak uitdrukking aan de identiteit of sociale positie van degene die de kleding draagt. Bovendien kan kleding gebruikt worden om een identiteit te bevestigen of te creëren. Dit zien we terug in vroegmiddeleeuwse graven waar mensen volledig gekleed werden begraven en grafgiften mee kregen. Zowel kleding als grafgiften werden voor deze gelegenheid zorgvuldig geselecteerd om de sociale status, leeftijd of het geslacht van de overledene weer te geven, te bevestigen of te versterken. Daarom is het niet alleen nuttig om het gebruik van textiel te reconstrueren, maar ook de variabiliteit die kan wijzen op sociale verschillen in de vroegmiddeleeuwse samenleving.

In deze studie is onderzoek gedaan naar het gebruik van textiel en kleding in het gebied dat we nu definiëren als Nederland in de periode van 400 tot 1000 AD. Hiervoor zijn textielresten geanalyseerd die afkomstig zijn van zowel nederzettingen als grafvelden uit verschillende delen van het land: variërend van rurale nederzettingen in het noorden van Nederland tot urbane grafvelden in het zuiden en rurale grafvelden in zowel het zuiden als het midden van het land. Deze geografische verspreiding, de lange tijdspanne van de dataset en de verschillen in vondstcontext resulteren in een zeer gevarieerd beeld van het gebruik van textiel in deze periode.

Textiel is in Merovingische graven vaak bewaard gebleven in de corrosielaag op metalen kledingaccessoires. Deze fragmenten worden doorgaans beschouwd als de restanten van de kleding waarin de dode begraven is, maar ook van lijkwades, matrassen, kussens etc. Doordat de metalen kledingaccessoires vrij nauwkeurig te dateren zijn, is het in theorie mogelijk om de ontwikkeling van textiel vast te stellen gedurende de Merovingische periode. Bovendien zijn het geslacht en soms ook de leeftijd van de begravenen bekend en weten we vaak vrij nauwkeurig waar de textilia in het graf en ten opzichte van het lichaam hebben gelegen. Op basis van al deze informatie was het mogelijk om in grote lijnen te reconstrueren hoe de mensen in het graf gekleed waren. Zowel mannen als vrouwen droegen een onderkleed met daarover een tweede kledingstuk zoals een tuniek of een jurk. Deze kledingstukken konden lang zijn en de benen geheel bedekken, of korter waarbij ze tot de knie of hoger reikten. Het onderkleed was in het algemeen gemaakt van een dun wollen weefsel dat dicht of enigszins los geweven was. Het kledingstuk dat daarover heen gedragen werd was doorgaans van een grovere stof gemaakt die geweven werd van dikkere draden en vaak een open structuur had. Dit kledingstuk werd om de middel vastgezet met een riem. Aan de benen droeg men hosen of beenwindsels van grof geweven stoffen, die met smalle gespen werden vastgemaakt. Mannen en vrouwen droegen over de riem vaak nog een derde kledingstuk of mantel. Aangenomen wordt dat de fibulae die in vrouwengraven op de heup worden gevonden, gebruikt werden om dit overkleed te sluiten. Op de voorzijde van diverse fibulae

zijn daarnaast resten van sluiers of omslagdoeken gevonden die gemaakt waren van dunne, open weefsels in linnenbinding. Sluiers of andersoortige hoofddoeken werden in zeldzame gevallen versierd met smalle bandjes van goudbrokaat.

Uit pictografische bronnen en archeologische vondsten uit de omringende landen is bekend dat mannen en vrouwen verschillende soorten kleding droegen. Dit onderscheid is er echter niet alleen in de snit van de kleding. In dit onderzoek is duidelijk geworden dat vrouwenkleding van andere soorten stoffen werd gemaakt dan mannenkleding en dat de stoffen die door vrouwen werden gebruikt gemiddeld van een hogere kwaliteit waren dan die van mannen. Er is echter ook veel lokale variatie in de gender-gerelateerde voorkeuren binnen het studiegebied. In Rhenen en Wijchen werden vrouwen doorgaans begraven in weefsels van linnenbinding en slechts in een paar gevallen in kepers. De mannenkleding in Rhenen vertoont veer meel variatie met een voorkeur voor kepers, maar ook een aanzienlijk aandeel linnenbinding. In Lent-Lentseveld daarentegen ontbreekt de linnenbinding volledig in vrouwengraven en deze komt alleen voor in graven van mannen en kinderen. Vrouwen werden in dit grafveld alleen begraven in kepers. Alleen in Bergeijk en
Maastricht-Pandhof vertonen de vrouwengraven meer variabiliteit in termen van textiel dan mannengraven. In beide grafvelden werden mannen in kepers begraven en vrouwen in gelijke aantallen linnenbinding en kepers. In de vroegchristelijke grafvelden van Maastricht-St. Servaas kerk en Maastricht-Vrijthof zijn er geen verschillen tussen mannen en vrouwen. In deze grafvelden waren alle individuen in hetzelfde type weefsel begraven: de linnenbinding, die beschouwd mag worden als een een voorloper op het gebruik van eenvoudige dodengewaden en lijkwades in (vroege) Christelijke graven.

Een aantal textilia uit graven is niet gebruikt als kleding, maar had een andere functie in het graf. Grafgiften, zoals wapens, werden bedekt met of in stukken textiel gewikkeld voordat ze in het graf werden gedeponeerd. Voor dit doeleinde gebruikte men vaak grove weefsels. Deze handeling kan voorafgaand aan of tijdens het grafritueel hebben plaatsgevonden en zorgde ervoor dat de grafgiften, die op zichzelf al een indrukwekkend gezicht geweest moeten zijn, een blijvende herinnering achterlieten bij de toeschouwers van de begrafenis juist vanwege het feit dat ze door het inpakken of bedekken bewust uit het zicht werden gehaald. Andere textilia werden gebruikt om de bodem van de grafkist te bedekken of waren de overblijfselen van kussens of matrassen. Er is geen onweerlegbaar bewijs voor het gebruik van lijkwades, alhoewel sommige weefsels wel voor dit doel gebruikt kunnen zijn geweest.

Er zijn verschillen tussen de onderzochte grafvelden, zowel wat betreft de typen textiel die gebruikt werden alsook de kwaliteit van de weefsels en de voorkeuren die mannen en vrouwen hadden voor bepaalde stoffen. De grafvelden van Leusden, Maastricht-St. Servaas kerk en Maastricht-Vrijthof vertonen gelijke verhoudingen in weefseltypen met een voorkeur voor linnenbinding en kleine aantallen kepers. Een vergelijkbare situatie zien we in Posterholt, alhoewel de verdeling hier minder geprononceerd is. In andere grafvelden zoals Lent-Lentseveld, Wijchen, Rhenen en Maastricht-Pandhof zijn de kepers en linnenbinding ongeveer in gelijke verhoudingen aangetroffen. Bergeijk is het enige grafveld waar kepers populairder waren dan linnenbinding, een situatie die vergelijkbaar is met die in de nederzettingen in het noorden van het land. In sommige grafvelden, zoals die van Maastricht en Leusden, zijn de weefsels in het algemeen van een hogere kwaliteit dan in andere grafvelden, wat duidt op een zekere mate van welvaart. Desalniettemin blijken zelfs de rijkste Nederlandse sites redelijk gemiddeld wanneer ze vergeleken worden met contemporaine vindplaatsen in bijvoorbeeld Duitsland.

De verschillen die waargenomen zijn binnen de grafvelden kunnen in een bredere regionale context geplaatst worden die de grenzen van Nederland ver overschrijden. De grafvelden van Rhenen, Wijchen en Lent-Lentseveld sluiten aan bij een textieltraditie die in de noordelijke delen van Duitsland is waargenomen. Maastricht en Leusden (en in mindere mate Posterholt) zijn meer vergelijkbaar met het midden van Duitsland, België en Normandië.

Bergeijk is moeilijk te vergelijken met andere grafvelden, maar sluit qua textilia het meeste aan bij wat in de nederzettingen in het noorden van Nederland voorkomt. Het is vooralsnog niet duidelijk of deze regionale patronen overeenkomen met de geografische verspreiding van bevolkingsgroepen die hun voorkeuren voor het gebruik en de productie van textiel onderling deelden, of dat we hier de neerslag zien van bepaalde handelsnetwerken waarop de verschillende sites toegang hadden.

De nederzettingen in het noorden van het land geven ten opzichte van de grafvelden een volledig ander beeld van het gebruik van textiel. Hier zijn andere weefsels populair (voornamelijk kepers) en de kwaliteit van de weefsels is aanzienlijk lager dan in de grafvelden is te zien. Er zijn meerdere verklaringen denkbaar voor dit verschijnsel: nederzettingen verschillen van de grafvelden in tijd (ze zijn jonger) en ruimte (ze liggen in het noorden van het land, terwijl de grafvelden in het midden en zuiden zijn gevonden) waardoor feitelijk twee textieltradities met elkaar vergeleken worden. Bovendien is er een verschil in het gebruik van de textilia in beide typen sites. In nederzettingen zijn waarschijnlijk grotere hoeveelheden huishoudelijk textiel en dagelijkse kleding opgegraven. De fijnere weefsels die in graven zijn gevonden vormden daarentegen een onderdeel van het grafritueel, zijn hier waarschijnlijk speciaal voor geselecteerd en hadden een meer symbolische functie.

Uit bovenstaande blijkt dat dit boek een eerste overzicht geeft van het gebruik van weefsels in de vroege middeleeuwen in Nederland. De meerwaarde van het onderzoeken van deze tot nu toe onderbelichte vondstcategorie is evident. Zelfs wanneer textiel grotendeels verdwenen of slecht geconserveerd is, is het vaak mogelijk om te reconstrueren hoe het in het verleden is gebruikt en krijgen we een eerste indruk van de grote variatie die er in vroegmiddeleeuwse kleding bestond. Het beeld dat uit het onderzoek naar voren komt is echter zeker niet compleet en er blijven nog veel vragen ten aanzien van de productie, het gebruik en de handel in textilia open staan. In die zin is dit boek een vertrekpunt, waarop toekomstig onderzoek kan voortbouwen.

About the author

Chrystel Brandenburgh was born on the 16th of August 1975 in Boxtel. After receiving her VWO diploma at the Newton College in Breda she successfully completed her propaedeutic degree in History at the University of Amsterdam in 1994. Chrystel continued to study at the Faculty of Archaeology of Leiden University where she obtained a degree in the archaeology of Prehistory of North-western Europe in 1997.

For several years she worked as an archaeologist in the municipality of Breda. From 2003 she became the municipality archaeologist of Leiden, the city where she has been living since her studies.

In 2008 Chrystel registered at the Faculty of Archaeology at Leiden University as a PhD extramural student under supervision of Prof. Willem Willems. During subsequent years she combined her job in Leiden with her PhD-research on early medieval textiles from the Netherlands. Besides her involvement in heritage management and interdisciplinary research regarding the history of Leiden, she has participated in international conferences on the subject of her PhD research and has written several articles on this topic.

Appendix I - Bergeijk

Find number	Date	Gender/ Age	Fibre	Weave	Thread Count	Spin	Pattern	Comments
10.h3	FAG 5-10 (7th century)	?	Wool	2/2 twill	10-11x10	z/s	?	2 loose fragments of wool textile
24.q3	FAG 6-7 (580/90-640/50)	M	Wool	2/2 twill	16x12	z/z		two indeterminate fragments iron with textile and straw attached to both.
24.x1	FAG 6-7 (580/90-640/50)	M	Wool ?	2/? twill	12x8-10	z/s	?	remains of textile on front side of strap end. Textile is heavily abbrased, making weave poorly visible.
24.ee1.1	FAG 6-7 (580/90-640/50)	M	Wool	none		2sZ	cord 5mm thick	On front side of plate buckle two strands (5mm thick) of possibly twined cord have been documented. Perhaps not twined but untwisted bundle of fibres because tist and twine is very low and in some places not noticable.
24.ee1.2	FAG 6-7 (580/90-640/50)	M	Wool	2/2 twill	10x7	z/s	?	On backside of plate buckle three frgamenst of same coarse woollen textile are present.
24.gg1	FAG 6-7 (580/90-640/50)	M	Wool	2/2 diamond twill	12-15x9-12	z/z	diamond twill, pattern repeat not visible	3 fragments of indeterminate iron and 1 fragment of plate, 1 plate buckle and 1 belt plate with fabric and pieces of straw attached. Weave and spinning are on some fragments somewhat irregularly carried out. TX on outside of plate buckle 24.ffc1
24.aa4	FAG 6-7 (580/90-640/50)	M	??	??	??	z/s		small fragment of fe with negative cast of a few threads (z&s twisted)
26.d1	?	M	?? (resembles linen, no fibre identification possible)	tabby	11-12x10	z/z		
26.e1	?	M	??	??	??	s/?		Very worn down
29.e1	FAG 5-10 (7th century)	?	??	tabby (?)	16-18x14	z/z		Textile is present on 1 side of the knife. Textile is very worn down hence weave not 100% sure. No fibre identification possible.
33.f1	FAG 6 (580/90-610/20)	M	??	??	??			Very worn down, textile on 1 side of rivet. No identification possible.
33.d2	FAG 6 (580/90-610/20)	M	Plant	none		s		33d1 is a rolled up sheet of lead with piece of rope inside. Rope is s-twisted. Fibres very damaged.
33.b1	FAG 6 (580/90-610/20)	M	Wool	2/2 twill	8x6-7	z/s		FE buckle and several indeterminate fragments of iron. TX on one side of two fragments. Same as 33.e1 and 33.i2!
33.e1	FAG 6 (580/90-610/20)	M	Wool	2/2 twill	8-10x6-8	z/s		Two fragments of a semicircular iron buckle plate. On both pieces textile remains are present on the frontside. On the back remains of leather of belt are still present. Same as 33.b1 and 33.i2!

Find number	Quality weave	Quality spinning	Measurements (cm)	Twist X	Twist Y	Thread thickness X (mm)	Thread thickness Y (mm)	N fragments
10.h3			1,5x1,5cm & 0,5x1cm	medium	medium	0.75-1	0.5-0.7	2
24.q3	fine & regular		2x1cm (x2)	medium	medium- high	0.4-0.8	0.4-0.8	2
24.x1			2x2.5	low	low	0.75	0.75-1	1
24.ee1.1								
24.ee1.2	coarse fabric	regular	0.6x1.5; 0.5x0.5	medium	medium	0.7-1	1	3
24.gg1	irregular, dense	irregular	0.5x0.5; 3x2; 3x3	medium-high	medium-high	0.3-0.7	0.75-1	6
24.aa4				medium	medium	0.5-0.7	0.5-0.7	1
26.d1	dense	smoothly spun		medium	medium	0.6	0.7-1	1
26.e1						0.5-1		1
29.e1	Fine	good	1x0.5	medium	low	0.2-0.3	0.5	1
33.f1			0.4x0.3					
33.d2			Ø 3mm, 1,3 cm long			3mm		1
33.b1			1x1	low-medium	low	0.75-1	0.75-1	2
33.e1			2x0.6	medium	medium	1	0.75	2

Find number	Date:	Gender/ Age	Fibre	Weave	Thread Count	Spin	Pattern	Comments
33.i2	FAG 6 (580/90-610/20)	M	Wool	2/2 twill	10x8	z/s		Several fragments of indeterminate iron. On two fragments tx-remains are present. Same as 33.b1 and 33.e1!
44.2	FAG 5-6 (565-610/20)	M	Wool	2/2 twill	14x8	z/s		
44.g1	FAG 5-6 (565-610/20)	M	Wool	2/2 twill	10x8-9	z/s		weave very stretched, either diamond or chevron twill. Too frgamented to make positive identification of pattern.
44.q1	FAG 5-6 (565-610/20)	M	Wool ?	2/? twill	?x6	z/s		very worn down. No fibre identification possible.
49.2	FAG 8 (640/50-670/80)	M	Wool	tabby	9x8	z/z		fabric is folded double, rather thick threads, barely spun, dense weave.
50.g2	Fag 8 (640/50-670/80)	F	Wool	2/2 diamond twill	28x13-14	z/s	Diamond twill, pattern repeat 20/14 ? Pattern is hard to count.	5 fragments of non-mineralized textile with leather and copper adherred to two pieces. Pieces found in area of waist. 2 fragments associated with copper rivet.
50.h2	Fag 8 (640/50-670/80)	F	Wool	2/2 twill	8x7-8	z/s		Non-mineralized textile
52.a2	FAG (7)-8 (640/650-670/80)	M	Wool ?	2/2 twill	9-10x6-7	z/s		2 fragments of textile, not associated with object. 1 fragment is adhered to piece of wood.
52.a2	FAG 7-8 (610/20-670/80)	M	Wool?	2/? twill	7-8 x ?	z/z		Fabric is wrapped around the shaft of the object. Weave is distorted (warp/weft at oblique angles). Big gaps between the threads. Badly preserved.
56.1	FAG 5-10 (7th century)	?	Wool	2/2 twill	6-7x6	z/s		Open weave, distorted (warp and weft pulled oblique).
56.d1	FAG 5-10 (7th century)	?	Wool	2/2 twill	8x9-10	z/s		Open, distorted (warp/weft pulled at oblique angles). Finer fabric than 56.1
56.f1	FAG 5-10 (7th century)	?	Wool	tabby	14x12	z/z		Fine weave. A bit distorted (warp/weft a bit oblique).
56.h1	FAG 5-10 (7th century)	?	Plant?	tabby	8x6	z/z		On 56.h1: 2 layers of same fabric on top of each other. A bit open tabby. On 56.i1 only 1 layer.
57.5	FAG 5-10 (7th century)	?	Wool	tabby	12x10-11	z/z		20 indeterminate fragments of iron together part of a large fe ring. TX on one side of one fragment. Fine, dense weave. Threads are smoothly spun.

Find number	Quality weave	Quality spinning	Measurements (cm)	Twist X	Twist Y	Thread thickness X (mm)	Thread thickness Y (mm)	N fragments
33.i2		a bit irregular		medium-high	medium	0.75-1	1-1.2	2
44.2	dense		0.8x0.3	medium-high	low	0.5-0.75	0.5	1
44.g1		regular	2.5x2	low-medium	medium	0.5	0.5	1
44.q1				medium	medium	0.75	0.75	1
49.2	dense		2.5x2	low	low	1-1.2	1-1.2	1
50.g2	fine	good	1x2; 2x2; 1.5x3; 0.5x0.8	medium	low-medium	0.2-0.4	0.2-0.4	5
50.h2	coarse	regular	0.8x1.3	medium	low	0.75-1	1-1.2	1
52.a2			0.5x0.5; 1.5x2; 1x1	medium	low-medium	0.75	0.75	3
52.a2	coarse	regular		low	low	0.75	0.75	1
56.1	open		1.5x1.5	medium-high	medium	0.75-1	0.5-0.75	1
56.d1	open	irregular	1x1	medium-high	medium	0.75-1	0.75	1
56.f1	fine	regular	2x2	medium	medium-high	0.4-0.6	0.4	1
56.h1	a bit open, regular	regular	2x2	medium	medium	1	1	2
57.5	Fine, dense	regular	0.5x0.5	medium	medium	0.5	0.5	1

Find number	Date:	Gender/ Age	Fibre	Weave	Thread Count	Spin	Pattern	Comments
62.g1	FAG 6-7 (580/90-640/50)	?	wool	2/2 diamond twill	9-10x6-7	z/s	diamond twill. Very large pattern, pattern repeat falls beyond this fragment.	Indeterminate fragment of iron with leather and tx. Fe is covered completely with textile.
62.s	FAG 6-7 (580/90-640/50)	?	Wool	2/2 twill	12x7	z/s		Very regular fabric. Large piece of textile attached to piece of fe.
63.d1	?	?	Wool	tabby	11-12x10	z&s/z	Spinpattern in warp (z-s-z-s)	fe rivet with piece of fabric folded three times on the head of the rivet. A bit open tabby.
64.abc1	FAG 5-6 (565-610/20)	M	Wool	2/2 twill	10x7-8	z/s	plan twill	Large fragment of tx on head of the umbo. Thin warp, thicker weft. A bit open weave.
77.w	FAG 7-8 (610/20-670/80)	F	Wool	2/2 diamond twill	7-10x7-9	z/s	diamond twill	5 fragments of non-mineralized tx found in association with 2 copper belt plates. Thick, compact weave, 1.5mm thick.
77.r1	FAG 7-8 (610/20-670/80)	F	wool	?		z/s		tx on 1 side of strap end. Very decayed: bind not visible any more. Threads seem thicker than those in fabric on belt plates.
77.q4	FAG 7-8 (610/20-670/80)	F	wool	2/2	8x6	z/z		coarse 2/2 twill on edge of fe strap end. A bit open weave.
89.b1	Fag 9 (670/80-710)	F	? Fibre was too much damaged. On surface it appeared like wool (curly)	tabby	13-14x11	z/z		2 layers of same fabric on front side of the buckle loop. Irregular threadthickness.
89.k2	Fag 9 (670/80-710)	F	??	2/2(?) twill	13x13	z/z		fine weave, smoothly spun and woven. Tx is found on one side of strap end. On same side straw has been found.
89.h1.1	Fag 9 (670/80-710)	F	wool	tabby	25x22	z&s/s	spinpattern in warp …4z-4s-4z-4s…	Very fine tabby, found on front of belt fitting and wrapped around the edge toward the back.
89.h1.1	Fag 9 (670/80-710)	F	?? Too little sample to make positive identification. Surfce looked like wool.	2/2 twill	12x8	z/z		very damaged. Irregularly spun, open weave. TX on backside of belt fitting.
19h2	FAG 5-7 (565-640/50)	F	Wool?	2/2 twill		z/s		Very decayed and fallen apart. Probably a very open weave. Textile not in association with object.

Find number	Quality weave	Quality spinning	Measurements (cm)	Twist X	Twist Y	Thread thickness X (mm)	Thread thickness Y (mm)	N fragments
62.g1	very regular	regular	2.5x2.5	medium-high	medium	1	1-1.5	1
62.s	regular	regular	2x2	medium	medium	0.75	0.75	1
63.d1	a bit open	regular		medium	medium	0.5-0.75	0.75	1
64.abc1	a bit open	regular	5x10	medium	medium	0.2	1	1
77.w	regular	a bit irregular	1.4x1; 1x0.5; 2x2	medium	medium	0.75-1	0.75-1	3
77.r1				medium	medium	0.5-0.75	0.75	1
77.q4	a bit open		2.5x1	medium	medium	1	1	1
89.b1	irregular	irregular	3x2	low-medium	low	0.2-0.7	0.2-0.7	1
89.k2	fine	smooth	1x0.75	low	low	0.5	0.5	1
89.h1.1	fine, dense	fine	3x4mm - 2.5x1cm	medium	medium	0.2	0.2	8
89.h1.1	open	irregular	2.5x1	low-medium	medium	0.5-1	0.2-0.3	1
19h2	open	irregular	1x1	medium	medium	0.5-1	0.5-1	1

Appendix II - Posterholt

Find number	Date	Gender/ Age	Fibre	Weave	Thread Count	Spin	Pattern	Comments
23-IV-34	ND	?, 10-20	Linnen?	tabby	18x16	z/z		buckle with leather on back side. Folded over front side is this fine, smooth tabby.
21-III-15	ND	F, 12-40	?	tabby	12x12	z/z		FE buckle with leather on bakc. Tx on front of buckle (on pin)
21-III-23	ND	F, 12-40	?	tabby	13-14x 11-12	z/s		Knife in scabbard of leather on wood. TX on leather of scabbard.
22-IV-115	II-III (580/90-640/50)	F	?	tabby	10x9	z/z		tx folded around ring, thin threads, open weave
62-II-18	IV (670/80 - <750)	M	Wool?	tabby	10x9	z/z		
62-II-13	IV (670/80 - <750)	M	Linnen?	tabby	10x10	z&s/s	1z-2s-1z-2s	a bit open weave
61-II-7	ND	?	Wool	tabby	12-13x 10	z/z		fe pin (pin of fibula?) with 3 layers of same tx on both sides. Oblique and open weave
52-III-2	II-III (610/20-670/80)	?	Wool?	tabby	12x12	z/z		very open weave with thin threads. Oblique. Fe plate on leather belt with bronze niet. Tx on plate and niet
70-III-5	II-IV (610/20-710)	M	Wool?	2/2 twill	10x8	z/s	probably plain twill	4 fragments of mineralized textile, not associated with metal object. Fibre could not be sampled.
90-III-15	II-III (610/20-670/80)	M	?	2/2 twill		z/s		bronze plate on tx on leather on wood. Tx was only visible on edge, therefore threadcount coul dnot be ascertained. Coarse weave, thick threads.
81-II-1	NF	?	Wool	2/2 plain twill	10x6-7	z/z	plain twill	
84-III-15	ND	?	Wool?	2/2 twill	8x5-6	z/z&s		
73-III-7	I (510/20-580/90)	M	Wool	2/2 diamond twill	8x8	z/s	diamond twill	textile was wrapped or folded around object
72-III-17	I-II (565)-580/90-640/50)	?	?	??	ca. 10x10	z/z		very corroded, weave and fibre damaged.
49-II-5	ND	F	?	tabby	12x11	z/z		
49-II-1	ND	F	Wool?	2/2 twill	14x12-14	z/z		2x fe niet with t on one side
34-IV-5	ND	?	Linnen?	2/2 twill	8-9x6-7	z/z		2 fragments fe with fragments of same textile. Coarse, a bit open weave.
58-III-11	II (610/20-640/50)	M	Linnen?	tabby	6x5	z/z		
58-III-9	II (610/20-640/50)	M	?	tabby	7-8x5	z/?		Bronze plate on leather belt with straw and tx. Same belt as 58-III-1, weave is probably same as 58-III-11, but fragment is too small to be sure. TX is covered in lacque, difficult to see weave and spin.
58-III-7	II (610/20-640/50)	M	?	?		z/?		buckle with tx and straw on same side. Only few threads visible. Weave not visible.
58-III-16	II (610/20-640/50)	M	wool?	2/? twill	ca 10x10	z/s		wood/leather with straw and tx on same side
85-III-48	II-IV (580/90-<750)	F	wool	tabby	9x11	s/s		
85-III-37	II-IV (580/90-<750)	F	?	?		z/z		fragment fe with tx folded around. Weave and threadcount not visible
85-III-34	II-IV (580/90-<750)	F	?					indet, tx wrapped around object
85-II-17	II-IV (580/90-<750)	F	?			2zS		2 fe plate (85-II-17 and 85-III-39. On both sides 2zS thread, wrapped around? No second threadsystem visible, tehrefore probably thread wrapped around object.

Find number	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
23-IV-34	fine	smoothly spun	3x2	low	low	0.2-0.4	0.2-0.4	1
21-III-15	open	regular	1x0.8	medium	low	0.3-0.5	0.5-0.75	1
21-III-23	open	smoothly spun	2x0.8	medium	medium	0.2-0.5	0.2	1
22-IV-115	open	regular	1x2	medium	medium	0.4-0.5	0.4-0.5	1
62-II-18		regular	1x1.5	medium	low	0.75-1	0.75-1	1
62-II-13		smoothly spun	0.8x0.5	low	low	0.7	0.5-0.7	1
61-II-7	open		1x2	medium-high	low-medium	0.3-0.6	0.5	1
52-III-2	open	regular	2x2	medium	medium	0.2-0.3	0.2-0.3	1
70-III-5		regular	1x1; 0.5x0.5; 1x2.5	medium	medium	0.6-0.7	0.7-1	4
90-III-15	coarse	regular		medium	medium	1	1	2
81-II-1	regular, bit open	regular	2.5x2; 1.5x1	medium-high	medium-high	0.75-1	1	2
84-III-15	coarse	irregular	0.8x1	medium	medium	0.4-0.75	1-1.2	1
73-III-7	dense, regular	regular	3x3	medium	low-medium	0.6-0.7	1	1
72-III-17		regular	0.5x1	medium	medium	0.8	0.7-0.8	1
49-II-5	fine weave, bit open	regular	0.5x0.5	medium	medium	0.3-0.5	0.5	1
49-II-1	regular	regular	0.5x0.5	medium	medium	0.4-0.5	0.5	2
34-IV-5			2x2; 1x1	medium	medium	1	1-1.25	2
58-III-11	open, coarse		2.5x2	medium	low	0.75-1	1	1
58-III-9			0.5x0.5	low	?	1	1	1
58-III-7				medium		0.3-0.5		1
58-III-16		regular		medium	low	0.5	0.5	1
85-III-48	dense	regular	1x2.5	low	low	0.5-0.75	0.75-1	1
85-III-37			1x1	medium		0.4		
85-III-34								
85-II-17						0.5		2

Find number	Date	Gender/ Age	Fibre	Weave	Thread Count	Spin	Pattern	Comments
85-II-17	II-IV (580/90-<750)	F	?			2zS		2 fe plate (85-II-17 and 85-III-39. On both sides 2zS thread, wrapped around? No second threadsystem visible, tehrefore probably thread wrapped around object.

Find number	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
85-II-17						0.5		2

Appendix III - Maastricht

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
01-04-03.TX1	0	stray find				Maastricht Servaaskerk	?	1/2 rippenkoper	17-18x12	z/z	Pattern repeat 6/6
03-TT-00.2.TX1	0	stray find				Maastricht Servaaskerk	?	indet		z/s	
16-03-00.1.TX1	0	stray find				Maastricht Servaaskerk	?	Tabby		z/z	
17-02-07.1.TX1	0	stray find				Maastricht Servaaskerk	?	Tabby (rips)	10x30	s/z	
30-01-05.1.TX1	0	stray find				Maastricht Servaaskerk	?	Tabby	16x16	z/z	
30-01-05.3.TX1	0	stray find				Maastricht Servaaskerk	?	Tabby	16x12	z/z	
30-01-05.3.TX2	0	stray find				Maastricht Servaaskerk	?	Tabby	14x12	z/z	
01-02-01.1.TX1	1	inhumation	754-784		43-49 years	Maastricht Servaaskerk	wool?	Tabby	ca 28x28	z/s	
03-06-01.1.TX1	26	inhumation	580/90-640/50		31-40 years	Maastricht Servaaskerk	?	Tabby	24x11	z/z	
03-06-02.TX1	27	inhumation	460/80-610/20		juvenile 0-2 years	Maastricht Servaaskerk	?	Tabby	?x?	?/?	
05-11-03.TX1	68	inhumation	580/90-610/20			Maastricht Servaaskerk	?	?			
11-08-03.2.TX1	86	inhumation	460/80-670/80			Maastricht Servaaskerk	?	indet			

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
01-04-03.TX1	1 layer of TX, covered with straw. TX on back of body, lying in straw. Fabric is a bit stretched	fine, regular	regular	2x1	medium	medium	0.4-0.5	0.4-0.5	1
03-TT-00.2.TX1	Badly preserved textile, removed during restauration. Fabric was stretched and a bit open. Description incomplete and based on documentation P.A.Rossel	open		1x1,5					1
16-03-00.1.TX1	Textile removed during restauration. Description incomplete and based on documentation P.A.Rossel				low	low			
17-02-07.1.TX1	According to P.A. Rossel this fabric was also present on fire steel 17-02-07.1, but this has been removed during restauration.	very dense		5x1,5; 1x0,5; 1,5x1	medium	high	0.2	0.5	
30-01-05.1.TX1	2 layers. Textile was folded on top of fire steel. Could be same fabric as 30-05-01.3.TX1	dense	regular	1,5x1	low	low	0.5-0.7	0.5-0.7	1
30-01-05.3.TX1	layer of textile wrapped directly around needle-case. Covered by 30-01-05.3.TX2. Same weave, but thicker threads than 30-01-05.3.TX2.	dense	regular		low	low	0.4-0.6	0.3-0.6	1
30-01-05.3.TX2	Fabric lies on top of 30-01-05.3.TX1. Has thinner threads and is more open than underlying fabric.	open	irregular		low-medium	low-medium	0.2-0.4	0.2-0.4	1
01-02-01.1.TX1	On top of 2 fe mounts large fragments of textile, folded on top of objects. Regular and dense fabric. Curly fibres so probably wool.	regular	regular	1x4 (x2)	low-medium	low	0.2-0.3	0.2-0.3	2
03-06-01.1.TX1	2 layers of tx; dense fabric.	dense	regular	1,5x1	low	low	0.3-0.5	0.5	1
03-06-02.TX1	object not present any more. Description incomplete and based on documentation P.A.Rossel.								1
05-11-03.TX1	2 layers of coars, open fabric lying on upper right leg of skeletton . Axe was positioned on top of this fabric. Axe is cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.	open, coarse							1
11-08-03.2.TX1	small fragment of badly preserved textile on one side of indeterminate fragment fe.								

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
11-08-09.1.TX1	88	inhumation	580/90-610/20			Maastricht Servaaskerk		Tabby		z/z	
11-EE-04.1.TX1	89	inhumation	580/90-640/50			Maastricht Servaaskerk		indet			
11-GG-10.1.TX1	93	inhumation	610/20-640/50			Maastricht Servaaskerk		Tabby		z/z	
12-03-01.1.TX1	112	inhumation	640/50-670/80			Maastricht Servaaskerk	wool?	2/2 twill	14x15	z/s	broken diamond twill ?
16-DD-01.TX1	137	inhumation	610/20-725			Maastricht Servaaskerk	wool?	Tabby	22-24x12	z/z	
16-DD-03.TX1	137	inhumation	610/20-725			Maastricht Servaaskerk		tabby	30x16	z&s/ z&s	spinpattern in warp and weft: warp: …2z-2s-4z…; weft: …2s-3z-3s…
16-AA-04.2.TX1	140	inhumation	640/50-670/80			Maastricht Servaaskerk		Tabby	14x12	z/z	
23-03-01.1.TX1	158	inhumation	610/20-670/80			Maastricht Servaaskerk		Tabby	24x10	z/z	
21-02-01.TX1	164	inhumation	510/25-610/20			Maastricht Servaaskerk	gold thread				
21-02-03.1.TX1	164	inhumation	510/25-610/20			Maastricht Servaaskerk		Tabby	6xca. 45	?/z	Ripp
21-02-03.1.TX2	164	inhumation	510/25-610/20			Maastricht Servaaskerk		Tabby	8x?	?/z	
21-02-07.TX1	164	inhumation	510/25-610/20			Maastricht Servaaskerk		Tabby	20-22x16-18	z/z	
21-02-06.1.TX1	165	inhumation	640/50-670/80			Maastricht Servaaskerk		Tabby	ca. 12x12	z/z	

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
11-08-09.1.TX1		dense, regular	regular						
11-EE-04.1.TX1	small fragment of badly preserved textile.								
11-GG-10.1.TX1	Small fragment of badly preserved textile. Description incomplete and based on documentation P.A.Rossel.								
12-03-01.1.TX1	Textile removed during restauration. Description incomplete and based on documentation P.A.Rossel						0.5-0.6	0.5	
16-DD-01.TX1	2 layers of same frabric wrapped around object. Object is largely cleaned during restoration.	fine, a bit open	regular	3x1,5	medium-high	medium	0.2-0.4	0.3--0.6	1
16-DD-03.TX1	crucific/pendant with small fragment of tx on one side. Object not present. Description incomplete and based on documentation P.A.Rossel.	regular	regular						1
16-AA-04.2.TX1		dense	regular	3x3	0.5	0.3-0.5			1
23-03-01.1.TX1	fabric is in most placed removed during restoration. According to P.A.Rossel fabric was held in place by threads twisted in z or s-irection. These threads have been removed during restoration.		regular		low	low	0.3-0.5	0.5-0.7	
21-02-01.TX1	3 blocks of loam with goldthread in situ. Thread was made out of 0.2mm wide strips of gold leaf wrapped around a core. Core is not present any more. Thread was sewn into 0.5cm wide bands.								
21-02-03.1.TX1				1x0,5	?	medium	1	0.1-0.2	1
21-02-03.1.TX2	Much coarse fabric than 21-02-03.TX1; badly preserved								
21-02-07.TX1	fabric is partly covered by a layer of loose fibres which may indicate the object was indirectly lying on a fur.	fine, dense	regular	3x1,2	low	low	0.2-0.3	0.5	2
21-02-06.1.TX1	3 layers of same fabric on back of strap end.	dense, regular	regular, smooth threads	1,5x1; 0,5x1; 3x0,5	low	low	0.5-0.6	0.5-0.6	3

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
28-02-09.TX1	191	possible grave	640/50-670/80			Maastricht Servaaskerk		Tabby	10x16	s/s	
30-03-10.TX1	252	possible grave	510/25-640/50			Maastricht Servaaskerk		indet			
29-03-07.TX1	255	possible grave	460/80-725			Maastricht Servaaskerk	Wool?	2/2 twill	10x10	z/s	Plain twill?
29-03-07.TX2	255	possible grave	460/80-725			Maastricht Servaaskerk		Tabby	16x10	z/z	
29-03-07.TX3	255	possible grave	460/80-725			Maastricht Servaaskerk		2/2 twill			
28-03-00.1.TX1	256	possible grave	610/20-640/50			Maastricht Servaaskerk	Wool?	2/2 twill	ca. 16x12	z/z	There is a change in direction: may be chevron or diamond twill
25-03-00.2.TX1	257	possible grave	640/50-670/80			Maastricht Servaaskerk	Wool?	Tabby	ca. 14x14	z/z	
23-04-00.TX1	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		Tabby		z/z	
23-04-00.TX2	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		n.v.t.		2zS	
23-04-00.TX3	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk	Wool?	Tabby	12x10	z/z	
23-04-00.TX4	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		Tabby	14-16x12-14	z/z	
23-04-00.TX4	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		Tabby	14-16x12-14	z/z	
23-04-00.TX4	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		Tabby	14-16x12-14	z/z	
23-04-00.TX5	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk	wool?	Tabby		z/z	

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
28-02-09.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.	dense	regular	1x1,3			0.6	0.6	
30-03-10.TX1	Badly preserved fragment TX								
29-03-07.TX1	Tx is present on back of pair (2) of buckles (for legwinding). Buckle lies on leather which covered this textile.			1,5x0,5; 1x1,5	medium	low	0.75	0.75	2
29-03-07.TX2	On front of both leg winding buckles 2 layers of same fabric	dense	regular	1,5x1; 0,7x0,5	medium	medium	0.5-0.7	0.5-0.7	2
29-03-07.TX3	On front of second leg winding buckle. This fabric has been remoced during restoration. Description incomplete and based on documentation P.A.Rossel.								
28-03-00.1.TX1	small fragment on edge of buckle plate.	regular	regular	1x0,5	medium	medium	.70.5-07	0.5-0.7	1
25-03-00.2.TX1	Object was originally covered on both sides with this fabric but most has been removed during restoration. Strap end probably lay in de the folds of a garment.	regular, dense	slightly irregular	0,5x0,5	low-medium	low-medium	0.4-0.8	0.5-0.7	1
23-04-00.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.			0,3x0,5					
23-04-00.TX2	3 2zS twined threads have been used to attach buckle plate to leather belt.								
23-04-00.TX3	Object was originally covered on both sides with several layers of same fabric. Now only small part has been spared from restoration. Straw remains on fabric present.	dense	regular		medium	medium	0.7	0.5-0.7	2
23-04-00.TX4	TX on one side of buckle loop. A bit irregular with thin and thick threads.		a bit irregular	4x1	medium	low-medium	0.2-0.4	0.2-0.5	1
23-04-00.TX4	TX on one side of buckle loop. A bit irregular with thin and thick threads.		a bit irregular	4x1	medium	low-medium	0.2-0.4	0.2-0.5	1
23-04-00.TX4	TX on one side of buckle loop. A bit irregular with thin and thick threads.		a bit irregular	4x1	medium	low-medium	0.2-0.4	0.2-0.5	1
23-04-00.TX5	2nd buckle loop in grave with TX on one side. Is different fabric than 23-04-00.TX4. Dense fabric, thicker threads.	dense	irregular	2x1	medium-high	medium	0.2-0.5	0.7	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
23-04-00.TX6	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk			20x16	z/z	
23-04-00.TX7	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		2/2 twill		z/s	
23-04-00.TX8	259	cultivated soil	610/20-640/50			Maastricht Servaaskerk		indet			
30-03-06.2.TX1	269	possible grave	580/90-725			Maastricht Servaaskerk	Wool?	Tabby	17x10	z/z	
28-02-10.3.TX1	272	possible grave	?			Maastricht Servaaskerk		2/2 twill	ca. 10x10	z/s	
28-02-10.3.TX2	272	possible grave	?			Maastricht Servaaskerk		Tabby	c. 14x14	?/?	
19-01-11.1.TX1	277	possible grave	580/90-640/50			Maastricht Servaaskerk		indet			
19-01-09.1.TX1	278	possible grave	510/25-565			Maastricht Servaaskerk		2/2 twill		z/s	
18-AA-02.3.TX1	279	possible grave	610/20-725			Maastricht Servaaskerk		Tabby	14-16x12	z/z	
18-AA-02.7.TX1	279	possible grave	610/20-725			Maastricht Servaaskerk		Tabby		s/s	

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
23-04-00.TX6	Stratigraphy: skin - 23-04-00. TX6 - strap end - 23-04-00. TX7 - leather. Stitching: running stitch 5mm length on wrong side of fabric. Stitch would have been invisible from front because stitchlenght on front only covers 2 threads of fabric.	a bit open	regular		medium	low-medium	0.2	0.2	1
23-04-00.TX7	Stratigraphy: skin - 23-04-00. TX6 - strap end - 23-04-00. TX7 - leather. Fabric has been removed during restoration. Description incomplete and based on documentation P.A.Rossel.								1
23-04-00.TX8	Sveral s-twisted theads on back of buckle. Rather thick fabric with 1.2mm thick threads.						1.2		
30-03-06.2.TX1	Object was originally covered on both sides with this fabric but most has been removed during restoration. Knife probably lay in de the folds of a garment.	open		1x1,5	medium-high	medium-high	0.3-0.5	0.3-0.5	1
28-02-10.3.TX1	Layer of TX directly against leather sheath. This fabirc is covered by 28-02-10.3.TX2 and was only partly visible. Thick and coarse fabric, ca. 1mm thick.	coarse, thick					0.75	0.75	1
28-02-10.3.TX2	Fabric covers 28-02-10.3.TX1. Only visible on side of textile, therefore no full identification possible. Thinner textile than underlying fabric.						0.4-0.5	0.4-0.5	
19-01-11.1.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
19-01-09.1.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
18-AA-02.3.TX1		irregular	smooth, but irregular	0.7x0.5; 0.4x0.5	low-medium	low	0.3-0.8	0.3-0.5	2
18-AA-02.7.TX1	Objects have been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
18-AA-02.TX2	279	possible grave	610/20-725			Maastricht Servaaskerk		Tabby		z/z	
16-03-15.8.TX1	281	possible grave	?			Maastricht Servaaskerk		Tabby	14x22	z/z	
12-04-04.1.TX1	283	possible grave	?			Maastricht Servaaskerk		Tabby	ca. 20x20	z/z	
11-FF-05.1.TX1	288	possible grave	610/20-640/50			Maastricht Servaaskerk		Tabby		z/z	
11-FF-05.1.TX2	288	possible grave	610/20-640/50			Maastricht Servaaskerk		Tabby		z/s	
20-02-01.TX1	359	possible grave	510/20-580/90			Maastricht Servaaskerk		Tabby	18-20x14	z/z	
23-03-03.2.TX1	363	possible grave	565-610/20			Maastricht Servaaskerk	Wool?	Tabby	15x14	z/z	
27-03-02.TX1	380	inhumation	460/80-580/90			Maastricht Servaaskerk		Tabby			
41-03-03.TX1	415	inhumation	400-460/80			Maastricht Servaaskerk		Tabby	12x12	z/z	
41-03-06.TX1	415	inhumation	400-460/80			Maastricht Servaaskerk	Wool?	Tabby	16-18x16	z/z	
01-01-13.1.TX1	419	?	?			Maastricht Servaaskerk		Tabby	24x20-22	z/z	
41-BB-02.TX1	444	possible grave	610/20-640/50			Maastricht Servaaskerk	indet	indet			
49.2.TX1	10012	inhumation	D-E (510/20-580/90)	M		Maastricht-Pandhof	Wool	2/2 plain twill	20x15	z/s	
49.4.TX1	10012	inhumation	D-E (510/20-580/90)	M		Maastricht-Pandhof	indet	indet		z/?	
110.1.TX1	10032	inhumation	D-G (510/25-640/50)	F		Maastricht-Pandhof	Wool	Tabby	15/16x 15	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
18-AA-02.TX2	Object was lying on top of fabrc which was lying on bottom of grave (wood on textile present). Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
16-03-15.8.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
12-04-04.1.TX1	Knife in leather sheath, wrapped in textile or lying in folds of garment.	regular	smooth		low-medium	low	0.3-0.4	0.5	2
11-FF-05.1.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel. Location textile on object is not clear.	coarse							
11-FF-05.1.TX2	Finer textile than 11-FF-05.TX1.								
20-02-01.TX1	buckle loop wrapped in textile. Fabric seems to have been fastened by or worn under buckle.	dense, regular	regular, smooth		medium	low-medium	0.3-0.8	0.4-0.8	1
23-03-03.2.TX1		a bit open	regular	1,5x1	medium-high	low-medium	0.2-0.4	0.3-0.7	1
27-03-02.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
41-03-03.TX1	2 layers of same fabric on edge of buckle loop. Irregularly spun making the fabric uneven.	irregular	irregular	0,5x0,5	low	low	0.3-0.7	0.3-0.7	2
41-03-06.TX1	Fabric is fastened by pin and folded over front of buckle. Regular and dense fabric.	dense, regular	regular		low	low	0.3	0.3	2
01-01-13.1.TX1				max. 3x0,8	low	low-medium	0.2	0.2-0.4	4
41-BB-02.TX1	Object has been cleaned during restoration. Description incomplete and based on documentation P.A.Rossel.								
49.2.TX1	Very fine and regular plain twill. Dense fabric.	dense, fine	regular	1,5x1,5	medium	medium	0.3	0.5	1
49.4.TX1	fabric is twisted around pin.			0.8x0.4	low-medium		0.5-0.7		1
110.1.TX1	badly preserved, mostly only negative cast present. Fine dense weave	fine, dense	regular	4x3,5	medium	medium	0.3-0.4	0.2-0.3	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
60.1.TX1	10042	inhumation	E-G (565-640/50)	?		Maastricht-Pandhof	indet	Tabby	16x12	z/z	
60.1.TX2	10042	inhumation	E-G (565-640/50)	?		Maastricht-Pandhof	indet	tabby	10x10	z/z	
48.1.TX1	10061	inhumation	E-I (565-725)	F		Maastricht-Pandhof	Wool	indet			
22.1.TX1	10094	inhumation	B-D (400-565)	?		Maastricht-Pandhof	plant?	Tabby	16x8	z/z	
45.TX1	10097	inhumation	E (565-580/90)	?		Maastricht-Pandhof	Wool	2/2 plain twill	8x7	z/z	
40.1.TX1	10128	inhumation	D-H (510/25 - 670/80)	?		Maastricht-Pandhof	indet	Tabby	30-32x10	z/s	
520.8.TX1	10168	inhumation	E (565-580/90)	?		Maastricht-Pandhof	Wool	2/2 twill	9-10x9-10	z/s	
324.6.TX1	10248	inhumation	E-H (565-670/80)	?		Maastricht-Pandhof	indet	2/2 twill	ca. 15xca. 12	z/z	
330.1.TX1	10256	inhumation	?	?		Maastricht-Pandhof	Wool	2/2 twill	ca. 10x8	z/z	
572.1.TX1	10307	inhumation	D-F (510/25-610/20)	?		Maastricht-Pandhof	Plant?	indet		z/?	
556.1.TX1	10332	inhumation	E (565-580/90)	?		Maastricht-Pandhof	indet	2/2 twill	20x10	z/s	
556.1.TX2	10332	inhumation	E (565-580/90)	?		Maastricht-Pandhof	indet	diamond twill	28x15	z/s	pattern repeat could not be distinguished
561.1.TX1	10336	inhumation	E-F (565-610/20)	M		Maastricht-Pandhof	Wool	2/2 twill?	14x10	z/s	
575.1.TX1	10360	inhumation	E-H (565-670/80)	?		Maastricht-Pandhof	Wool	2/? Twill	16x10	z/z	
555.TX1	10370	inhumation	F-H (580/90-670/80)	?		Maastricht-Pandhof	?	indet			
142.6.TX1	10796	inhumation	C-G (460/80-640/50)	?		Maastricht-Pandhof	indet	indet			
139.1.TX1	10885	inhumation	E-F (565-610/20)	F		Maastricht-Pandhof	Wool	2/? Twill	10x9	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
60.1.TX1	open tabby, thin threads.	open	regular	0.5x0.5	low	low	0.2	0.2	1
60.1.TX2	Fabric is present on bakc and front of buckle. Probably worn under belt and partly folded over.		regular	1x0.5; 0.5x0.5	low	low	0.3-0.5	0.3-0.5	2
48.1.TX1	Badly worn down textile on front of buckle. Fabric was fastened by pin of buckle.			1,5x1					
22.1.TX1	front + side + back of buckle partly covered by this textile. Probably garment worn under belt + partly folded over buckle.	dense	smooth, regular	1x1	low	low	0.6-0.7	0.7-0.8	1
45.TX1		coarse	regular	1,5x4	medium	medium	1	1	1
40.1.TX1	very fine and regular tabby on one side of comb	regular, fine	regular	2x1; 1,5x0,5	low-medium	low	0.1-0.2	0.3-0.5	2
520.8.TX1	One side of knife is partly covered with remains of fabric. Badly preserved, often only negative cast still present.		regular	2x4	low	low	0.75-1	0.75-1	1
324.6.TX1		regular	regular	1x0,5	medium	medium	0.3-0.4	0.3	1
330.1.TX1		coarse	irregular	2x2; 1x1,5	medium-high	low	1	1	2
572.1.TX1	fragment of TX around pin of buckle.				low				1
556.1.TX1	fragment lies directly on buckle and is partly covered by 556.1.TX2	regular, dense	regular	2x2	medium	medium	0.4-0.5	1	1
556.1.TX2	Small fragment on front of buckle. Fabric is worn over 556.1.TX1	regular, dense	regular	0.8x0.8	medium	medium	0.2-0.3	0.2-0.3	1
561.1.TX1	Fabric is partly decayed fabric identification difficult. Very regularly spun fabric.	regular, dense	regular	3x4	medium	medium	0.5	0.5	1
575.1.TX1	well preserved, but covered during conservation therefore fibre identificatio/photo is difficult	a bit open	regular	1x2	medium	medium	0.3-0.4	0.3-0.4	1
555.TX1				0,5x0,8					
142.6.TX1	1 very worn down thread						1		
139.1.TX1	badly preserved, worn down	regular	regular	2x4	medium	low	0.7	0.7	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
341.2.TX1	11217	inhumation	D-G (510/25-640/50)	?		Maastricht-Pandhof	indet	Tabby	20x16	z/z	
375.TX1	11220	inhumation	D-E (510/20-580/90)	F		Maastricht-Pandhof	plant?	tabby	16x14	z/z	
418.TX1	11321	inhumation	D-E (510/20-580/90)	?		Maastricht-Pandhof	indet	Tabby	ca. 15 x 12-14	z/z	
407.1.TX1	11341	inhumation	E-H (565-670/80)	?		Maastricht-Pandhof	Wool	Tabby	24x16	z/z	
466.7.TX1	11342	inhumation	D-F (510/25-610/20)	M		Maastricht-Pandhof	Wool	indet	ca.16x?	z/?	
1687-3.TX1	0	stray find	?			Maastricht-Vrijthof	Wool?	2/2 diamond twill	10x10	z/s	diamond twill, pattern repeat not visible
1419-1.TX1	85	inhumation	D-G (510/25-640/50)	F		Maastricht-Vrijthof	indet	tabby	25x13	z/z	
1483-1.TX1	95	inhumation	F-H (580/90-670/80)	F		Maastricht-Vrijthof	wool?	twill ?/?	?x?	z/s	
1483-1.TX2	95	inhumation	F-H (580/90-670/80)	F		Maastricht-Vrijthof	wool?	tabby	17-18x17-18	z/z	
1434-20.TX1	100	inhumation	E-H (565-670/80)	?		Maastricht-Vrijthof	Linnen?	Tabby	13-14x12-13	z/z	
1435.TX1	100	inhumation	E-H (565-670/80)	?		Maastricht-Vrijthof	wool?	tabby	12x10-11	z/s	
1473-1.TX1	105	inhumation	G-H (610/20-670/80)	?		Maastricht-Vrijthof		Tabby	18-20x18-20	s/s	
1473-1.TX2	105	inhumation	G-H (610/20-670/80)	?		Maastricht-Vrijthof		2/? Twill	?x?	z/s	
1628-4.TX1	110	inhumation	E-G (565-640/50)	F		Maastricht-Vrijthof		Tabby	15x12-13	z/z	
1614-1.TX1	115	inhumation	D-E (510/20-580/90)	F		Maastricht-Vrijthof			ca. 10x10	z/z?	
1614.TX2	115	inhumation	D-E (510/20-580/90)	F		Maastricht-Vrijthof		Tabby	8x10	z/z &s	spinpatern in one system: 2s - 6z - 2s.

Find number	Comments	Quality weave	Quality spinning	Measurements	Twist X	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
341.2.TX1		fine, dense	regular	0,5x1	medium	medium	0.2-0.3	0.2-0.3	1
375.TX1		regular, dense	irregular	0,3x0,3 - 1x1	medium	medium	0.1-0.4	0.3	4
418.TX1	several layers of same fabric fastened by pin. A bit open weave	a bit open	regular	0,5x0,5-1	medium	medium	0.2	0.2	1
407.1.TX1	Very fine and dense fabric on back of belt plate. Well preserved.	fine, dense	regular		medium	medium	0.2	0.2-0.5	4
466.7.TX1					low		0.2		1
1687-3.TX1	fabric was very worn down. Stretched and a bit open.		regular		medium	low	0.5	0.75	1
1419-1.TX1	Weave was fastened by pin of fibula. Very fine and regular, dense fabric.	fine, regular, dense	regular	0.4x0.8	medium	low-medium	0.2-0.3	0.3	1
1483-1.TX1	Poor preservation, only small part is positive cast, rest is negative cast.	dense	regular	1x1	medium	low	0.5	0.5	1
1483-1.TX2	2 layers of one fabric, folded double	dense	regular	2x1.5 & 1x0.5	low-medium	low-medium	0.5	0.5	1
1434-20.TX1	Large fragment of textile, fine weave, irregularly spun	fine	irregular	3x2.5	medium	medium	0.2-0.75	0.3-0.75	1
1435.TX1	large fragment of textile but very much worn down during restauration.	dense	regular	3x2.5	medium	low	0.75	0.75	1
1473-1.TX1	very thin and dense weave on side/front of buckle	fine	regular		low	low	0.2-0.3	0.2-0.3	1
1473-1.TX2	TX on back side of plate buckle. Only negative cast remained.				medium	low	0.2	0.3-0.4	1
1628-4.TX1	Bronze ring with small fragment of tx on one side	dense	regular	0.5x0.5	medium	medium	0.5	0.5	1
1614-1.TX1	Badly preserved textile, negative cast. Twist and weave could not be ascertained.	open		1x1			0.2-0.4	0.2-0.4	2
1614.TX2	2 fragments of one object (fresh break). Textile was wrapped or folded around both sides of object.	open	irregular	2x4.5 & 0.5x4	medium	low-medium	0.5-0.75	0.3-0.75	1

Appendix IV - Nijmegen

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
6.TX1	1	inhumation		?		Lent	indet	2/2 twill	18-20x 18-20	z/z	
15.TX1	2	inhumation		?		Lent	indet	indet		z/?	
107.TX1	3	inhumation		?		Lent	Wool	2/2 diamond twill	14x7	z/s	diamond twill
14.TX1	3	inhumation		?		Lent	Wool	2/? Twill		z/s	
4.TX1	3	inhumation		?		Lent	indet	indet			
98.TX1	6	inhumation		M		Lent	indet	tabby	ca. 10x10	z/s	
111.TX1	7	inhumation		M		Lent	indet	indet			
151.TX1	7	inhumation		M		Lent	Wool	2/2? Twill	ca 20x ca 15	z/s	
151.TX2	7	inhumation		M		Lent	indet	2/2 twill	9x9	z/z	plain twill?
151.TX3	7	inhumation		M		Lent	Wool?	Tabby	12-13x10	z/z	
151.TX4	7	inhumation		M		Lent	indet	indet			

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
6.TX1				0.4x0.5	medium	medium-high	0.3-0.4	0.3-0.4	1
15.TX1	several fibres in spring/spiral of brooch. Not further documented				medium		0.2		
107.TX1		dense	regular	1,5x1	medium	medium	0.6-0.7	1	1
14.TX1	Badly preserved fabric. Threadcoutn could not be discerned. TX covers leather sheath of knife. Possibly same textile as 107.TX1		regular		low-medium	low	0,75	1	3
4.TX1	badly preserved textile on one side of fe object. No fibre or fabric identification possible due to bad condition of textile.								
98.TX1	badly preserved textile, warp only negative cast, weft positive cast present. Fabric and fibre identification not possible. Fabric is present on both sides of object. Object was wrapped in textile or lying in folds of garment			3x2	low	low	0,75	0,75-1	1
111.TX1	very small badly preserved fragment of textile. No fibre or fabric identification possible.								
151.TX1		fine	regular	2x2; 2x2	low	low	0.3	0.3-0.5	2
151.TX2	fe plate completely covered with textile		regular	3x2	low	low	0.75	0.75	1
151.TX3	fe plate completely covered with textile.		regular	3x2,5	low	low	0.5	0.5	1
151.TX4	3 indeterminate fragments fe with badly corroded textile. Fibre and fabric identification not possible.								

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
305.TX1	8	inhumation		M		Lent	indet	indet			
255.TX1	9	inhumation		F		Lent	Wool	2/1 twill	10x10	z/s	
273.TX1	9	inhumation		F		Lent	indet	2/2 twill	16-18x16-18	z&s/z&s	spinpattern
421.TX1	10	inhumation		M		Lent	indet	indet			
421.TX1	10	inhumation		M		Lent	indet	indet			
573.TX1	13	inhumation		?	juvenile 5-6 years	Lent	indet	indet			
575.TX1	13	inhumation		?	juvenile 5-6 years	Lent	Wool	Tabby	16x12	z/s	
575.TX2	13	inhumation		?	juvenile 5-6 years	Lent	indet	indet			
575.TX3	13	inhumation		?	juvenile 5-6 years	Lent	indet	indet			
575.TX4	13	inhumation		?	juvenile 5-6 years	Lent	indet	indet			
529.TX1	14	inhumation		?	juvenile 4 years	Lent	Wool	2/2 twill	16x13	z/s	diamond or chevron
529.TX2	14	inhumation		?	juvenile 4 years	Lent	indet			s	
530.TX1	14	inhumation		?	juvenile 4 years	Lent	indet	Tabby	10x10	z/s	
544.TX1	14	inhumation		?	juvenile 4 years	Lent	indet	indet			
664.TX1	16	inhumation		F		Lent	indet	indet		z	
665.TX1	16	inhumation		F		Lent	indet	indet		s	
834.TX1	20	inhumation		F		Lent	indet	indet		s	
844.TX1	20	inhumation		F		Lent	indet	indet		z	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
305.TX1	Badly corroded textile on front of buckle. Fibre and fabric identification not possible.								
255.TX1	a bit open fabric	bit open		1,5x1,5; 1x1	medium	medium	0.6-0.8	0.8-1	3
273.TX1		dense	regular	0,5x0,5	low	low	0.3-0.5	0.3-0.5	1
421.TX1	coarse fabric, badly preserved.								2
421.TX1	coarse fabric, badly preserved.								2
573.TX1				0.2x0.4					
575.TX1	a bit open fabric, very regulary spun. Fabric present on one side of cu/a ring.	regular	regular	0.4x0.7	medium	medium	0.3-0.4	0.3-0.4	1
575.TX2	indet textile present on one side of cu/a ring								
575.TX3				0,5x1					
575.TX4	Fabric is probably same as 575.TX3								
529.TX1	well preserved fragment of tx on front of buckle (on pin)	regular	regular	1x1,2	medium	low	0.5	0.5	1
529.TX2	several threads on back of hook s-twisted 0.4mm thick				medium		0.4		1
530.TX1	Large pieces of textile covering buckle and fire steel. Rather coarse fabric. Badly preserved.	coarse	regular		low	low	1	1	
544.TX1	neg. Cast of several strands of untwisted fibres 1-1.5mm thick. Fibres present on leather covering fe pin.						1-1.5		
664.TX1	several threads and piece of leather in catch of brooch.				low-medium		0.2		1
665.TX1	several threads in spring of brooch				medium		0.2-0.3		1
834.TX1	several threads in spring of brooch				medium		0.75		1
844.TX1	several threads in spring of brooch				medium		0.2		1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
723.TX1	22	inhumation		?	juvenile 4-5 years	Lent	indet	Tabby	7x7	z/s	
730.TX1	23	inhumation		F		Lent	Wool	twill?	ca. 15x15	z/s	
763.TX1	23	inhumation		F		Lent	Wool	2/2 twill	ca. 30x30	z/z	
763.TX2	23	inhumation		F		Lent	indet	2/2 twill	ca. 10x10	z/s	
869.TX1	26	inhumation		?	juvenile 5-6 years	Lent	wool	indet		z&s/z	
879.TX1	26	inhumation		?	juvenile 5-6 years	Lent	indet				
1002.TX1	27	inhumation		?	juvenile 4-5 years	Lent	Indet	indet		z/?	
1164.TX1	33	inhumation		M		Lent	indet	2/2 twill	10x10	s/s	
1133.TX1	34	inhumation		F		Lent	indet			z	
1325.TX1	34	inhumation		F		Lent	silk?	2/2 twill	16x?	z/s	
1191.TX1	35	inhumation		F		Lent	indet				
1196.TX1	35	inhumation		F		Lent	Wool	2/? Twill	15x12	z/s	
1196.TX2	35	inhumation		F		Lent	indet	2/2 twill	17-18x15	z/z	
1483.TX1	42	inhumation		F		Lent	indet				
1798.TX1	49	inhumation		M		Lent	indet	indet			
08.032.TX1	4	inhumation	555-640	F		Wijchen-Centrum	wool?	indet	?	z/s	
01.155.TX1	9	inhumation	610-640	F		Wijchen-Centrum	?	tabby	16x10	z/z	
08.066.TX1	14	inhumation	610-640	M		Wijchen-Centrum	Wool?	Twill 2/?	?x?	z/z	
01.169.TX1	19	inhumation	570->640	M	adult	Wijchen-Centrum		Tabby	6x6	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
723.TX1	coarse fabric on one side of knife. Thick threads.	coarse	regular	2,5x1,5	low-medium	low	1.2-1.5	1.2	1
730.TX1	badly preserved (mainly negative cast present) textile. Fabric seems to be wrapped around object.		regular		medium	medium	0.3-0.4	0.3-0.4	5
763.TX1		fine	regular	0.4x0.3	low	low	0.2	0.2	1
763.TX2			regular		medium	low	1	1	2
869.TX1	Badly preserved textile.			0,5x1; 1,5x1	low-medium	low-medium	1	1	2
879.TX1									
1002.TX1	Piece of very badly preserved textile on both sides of knife. Only negative cast of several z-twisted threads discernible.								
1164.TX1	badly preserved textile	dense	regular	1,5x3	low	low	1	1	1
1133.TX1	3 z-twisted threads on spring of brooch						0.5		
1325.TX1		very fine	regular		medium	low (hardly twisted)	0.3	0.5-0.75	1
1191.TX1	a few fibres on spring of brooch. No fibre or fabric identification possible.								
1196.TX1	badly preserved textile		regular	0.7x0.7	medium	low	0.3	0.5	1
1196.TX2	badly preserved		regular	2x1, 2.5x1.5	medium	medium	0.4-0.5	0.4-0.5	2
1483.TX1	a few fibres on spring of brooch. No fibre or fabric identification possible.								
1798.TX1	small fragment of indeterminate textile on both sides of pin. Badly preserved.								
08.032.TX1	4 framents of indet fe.			1x1 - 3x3			0.75	0.75	4
01.155.TX1	fine but bit open fabric	fine, bit open		4x2,5	medium	medium	0.2	0.3-0.5	1
08.066.TX1				3x3	low	low	1	1	1
01.169.TX1	very thick fabric (2mm)	regular, open	regular		medium	medium	1	1	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
01.031.TX1	22	inhumation	610-640	?		Wijchen-Centrum		2/2 twill	8x6	z/s	
01.133.TX1	22	inhumation	610-640	?		Wijchen-Centrum	Wool	Tabby	16x10	z/z	
01.135.TX1	25	inhumation	570-610	?	adult?	Wijchen-Centrum	Wool	2/2 twill		z/s	
01.162.TX1	27	inhumation	450-530	M		Wijchen-Centrum	??	tabby	14x10	z/z	
03.120.TX1	35	inhumation	570-610	?		Wijchen-Centrum	Wool	Tabby	20x12	z/s	
03.095.TX1	38	inhumation	570-610	M		Wijchen-Centrum	wool	2/2 twill	8x6-7	z/s	
03.095.TX2	38	inhumation	570-610	M		Wijchen-Centrum	wool?	2/2 twill	10x10	z/s	
03.059.TX1	42	inhumation	(450) 500-570	M		Wijchen-Centrum	??	2/2 twill	4x4	z/z	
05.024.TX1	44	inhumation	530->640	F		Wijchen-Centrum	?	tabby	10x10	z/z	
03.118.TX1	48	inhumation	>570	?	juvenile?	Wijchen-Centrum	?	2/2 twill	8x8	z/s	
04.083.TX1	53	inhumation	610->640	M		Wijchen-Centrum	Wool	diamond twill	10x8	z/s	diamond twill, pattern repeat not identified

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
01.031.TX1	piece of TX in side of potterysherd. Probably no relation with graveinventory since imprint was made durin baking proces of pottery	regular but coarse	regular	1,5x1,5 cm	medium	medium	1	1	1
01.133.TX1	2 layers of (probably) same fabric on back of leather belt decorated with cu/a plate.	dense, regular	regular	5x5	medium	medium	0.3-0.5	0.5	1
01.135.TX1	3 or 4 layers folded textile on back of strap end. Very fine fabric made out of thin thread. Fabric is very badly preserved tehrefore thread count and fibre identification was not possible.		regular	1,5x3	medium	medium	0.2-0.3	0.2-0.3	1
01.162.TX1		dense	regular		medium	low	0,2-0,3	0,75	2
03.120.TX1	2 layers of same fabric on edge + flat side of knife. No fibre identification possible due to bad preservation of fibres.	regular	regular	5x1	medium	medium	0.2	0.2	1
03.095.TX1	a bit coarse fabric on one side of ring (part of sword belt). On other side of ring is a finer fabric (03.095. TX2)	coarse but regular	regular	1x1,5	low-medium	low	1	1	1
03.095.TX2	Appearance of fabric resembles wool, but fibres are completely smooth…no fibre identification possible.	regular	regular		medium	medium	0.5-0.75	0.5-0.75	1
03.059.TX1		open	regular	1x1.5	medium	medium	1-1.5	1-1.5	1
05.024.TX1				1x1,5	medium	medium	0,75	0,75	1
03.118.TX1		coarse weave	irregular	5x2; 4x2	low-medium	low-medium	1	1	2
04.083.TX1		regular	regular	6x3	medium - high	medium	0.75-1	1	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
04.048.TX1	56	inhumation	555->640	?		Wijchen-Centrum	Wool	Tabby	10x8		
04.026.TX1	57	inhumation	530-610	M		Wijchen-Centrum	wool?	2/2 diamond twill	15x10	z/s	diamond twill, pattern repeat not identified due to corrosion
04.055.TX1	58	inhumation	610->640	F		Wijchen-Centrum	wool	Tabby	8x7-8	z/z	
04.055.TX1	58	inhumation	610->640	F		Wijchen-Centrum	wool	Tabby	8x7-8	z/z	
04.056.TX1	58	inhumation	610->640	F		Wijchen-Centrum	Wool	Tabby	11x8	z/z	
04.065.TX1	65	inhumation	570-610	F		Wijchen-Centrum	Wool?	Tabby	11x12	z/s	
04.076.TX1	65	inhumation	570-610	F		Wijchen-Centrum		Tabby	ca. 16x14	z/z	
04.076.TX2	65	inhumation	570-610	F		Wijchen-Centrum	Wool	Tabby	10x?	z/z	
05.071.TX1	68	inhumation	610-640	M		Wijchen-Centrum	Wool	?	ca. 6x3	z/s	
05.072.TX1	68	inhumation	610-640	M		Wijchen-Centrum	wool	2/2 twill	8-10x8-10	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
04.048.TX1	large piece of TX around purse ring. Twice directly above eachother a double weft --> weavefault?	a bit open, weave fault?	regular	6x5	medium	medium	0.5-0.75	0.75	1
04.026.TX1	1 layer of regular woven and spun fabric covers the entire backside of buckle. No fibre sample could be taken because object is permanently on display.	regular	regular	4x3	medium	medium	0.5	0.5	1
04.055.TX1	Fabric is not fastened by buckle, but lies on and under buckle. Rather coarse and open fabric.	coarse, open	regular	2,5x2,5	medium	medium	0.5-0.75	0.5-0.75	1
04.055.TX1	Fabric is not fastened by buckle, but lies on and under buckle. Rather coarse and open fabric.	coarse, open	regular	2,5x2,5	medium	medium	0.5-0.75	0.5-0.75	1
04.056.TX1	Fabric seems to be folded around chain.	bit open	irregular		low-medium	low-medium	0.75-1	0.75-1	
04.065.TX1	badly preserved textile, covering the entire object on both sides. Remains of a leather thread visible on object (1mm thick). Fibres too corroded to make positive fibre identification.	open weave	regular	2x2	medium	medium	0.3-0.5	0.3-0.5	1
04.076.TX1	Very open and fragile fabric with very thin threads.Badly preserved. Weave & fibre determination difficult/not possible due to preservation with thick layer of paraloid.	open, fragile		1,5x1,5	low-medium	low-medium	0.2-0.3	0.2-0.3	1
04.076.TX2	Fabric lies on pin and is fastened by brooch. 3 layers of same fabric folded on back of brooch.		regular		low-medium	low-medium	0.5-0.75	0.5-0.75	1
05.071.TX1		coarse	irregular		medium	medium	1-1.5	1.5-2	1
05.072.TX1	Very fine/fragile fabric with thin threads. Fabric worn under belt.	open, fragile	irregular	2x2,5	low-medium	low-medium	0.2	0.2	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
06.106.TX1	81	inhumation	570-610	F		Wijchen-Centrum	Wool	Tabby	14x10	z/z	
06.106.TX2	81	inhumation	570-610	F		Wijchen-Centrum	Wool	Tabby	16-17x12	z/z	
07.035.TX1	89	inhumation	570->640	?		Wijchen-Centrum				z/z	
07.019.TX1	90	inhumation	610->640	?		Wijchen-Centrum		Tabby	14x12	z/z	
07.019.TX2	90	inhumation	610->640	?		Wijchen-Centrum		Tabby	8-10x8-10	z/z	
08.087.TX1	96	inhumation	>570	?		Wijchen-Centrum	Wool	2/2 Twill	8x6	z/s	
08.034.TX1	99	inhumation	>570	M		Wijchen-Centrum	?	?	7x6	2zS/2zS	
09.027.TX1	115	inhumation	610-640	?		Wijchen-Centrum	?	2/? Twill	4x5-6	z/s	
09.125.TX1	115	inhumation	610-640	?		Wijchen-Centrum	Wool	2/2 twill	10x6	z/s	
09.125.TX2	115	inhumation	610-640	?		Wijchen-Centrum	Wool	??		z/s	
09.130.TX1	115	inhumation	610-640	?		Wijchen-Centrum	lin-nen?	tabby	7x4-5	z/z	
09.138.TX1	123	inhumation	530-555	M		Wijchen-Centrum	Wool	2/2 twill	10-11	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
06.106.TX1	Open weave, stretched. Fabric covers the entire back of buckle, worn under belt and over 06.106.TX2. Small fr on front of buckle is same textile.		regular	4x3; 0.4x0.7	medium	medium	0.2	0.2	1
06.106.TX2	Dense fabric, worn under 06.106.TX1	faults in weave	regular	0.5x1	medium	medium	0.2	0.2	1
07.035.TX1	Fabric badly decayed. Indetification of weave and fibre not possible.						0.3-0.5	0.3-0.5	
07.019.TX1	open and fine fabric, folded around knife. Lies directly on knife and is covered by 07.019.TX2. Mostly 1 layer, on some places 2 layers of this fabric present.	open, fine	regular		medium	medium	0.2	0.2	
07.019.TX2	dense and coarser weave than 07.019. TX1. Fabric lies on 07.019.TX1.	dense	regular		medium	medium	1	1	
08.087.TX1	open, but regular fabric. Buckle /belt lies on top of fabric.	regular	regular	1x1	medium	medium	0.75	0.75	1
08.034.TX1	Fabric very worn down, weave and fibre determination impossible						1	1	1
09.027.TX1	Coarse twill on back of beltplate.	coarse	regular	1x0,5; 0,5x0,5	medium	medium	1,5	1-1,5	2
09.125.TX1	3 fragments on the back of the buckle, 1 small on front of buckle (9.125.tx2) may be same fabric although weave was not well visible. Threads are thicker. Fabric is probably worn under the belt and slightly folded around front.	coarse, a bit open	regular	zxz; 2x2	medium	low-medium	0.75	1	4
09.125.TX2				1x1	low	low	1-1,5	1-1,5	1
09.130.TX1		regular	regular/ smooth	1,5x1,5	low-medium	low	1-1,25	1-1,5	1
09.138.TX1		bit open	regular	2x1,5	medium	medium	0,75	0,75	1

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
10.067.TX1	156	inhumation	610-640	F		Wijchen-Centrum	Wool	2/? Twill		s/s	
11.040.TX1	162	inhumation	570->640	?		Wijchen-Centrum	wool	tabby	12x10	z/z	
13.025.TX1	180	inhumation	610->640	?		Wijchen-Centrum		2/2 twill	14x13/14	z&s/z	
13.026.TX1	180	inhumation	610->640	?		Wijchen-Centrum	Wool	2/2 twill	18-20x12-14	z&s/z	
13.026.TX1	180	inhumation	610->640	?		Wijchen-Centrum	Wool	2/2 twill	18-20x12-14	z&s/z	
13.026.TX2	180	inhumation	610->640	?		Wijchen-Centrum					
13.014.TX1	183	inhumation	300-450	M		Wijchen-Centrum	wool	2/2 Twill	6-10x7-8	z/s	possibly diamond twill?
13.014.TX1	183	inhumation	300-450	M		Wijchen-Centrum	wool	2/2 Twill	6-10x7-8	z/s	possibly diamond twill?
13.014.TX1	183	inhumation	300-450	M		Wijchen-Centrum	wool	2/2 Twill	6-10x7-8	z/s	possibly diamond twill?
13.017.TX1	183	inhumation	300-450	M		Wijchen-Centrum	?	Tabby	13x11	z/z	
13.017.TX2	183	inhumation	300-450	M		Wijchen-Centrum	Wool	2/2 diamond twill	12-14x10-12	z/z	diamond twill
13.017.TX3	183	inhumation	300-450	M		Wijchen-Centrum	indet	?	?x?	z/?	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
10.067.TX1	Very small fragment. Thick threads, therefore it must be a rather coarse fabric with low thread count.				medium	medium	1,5	1,5	1
11.040.TX1		open, but regular	regular	3x2	medium	medium	0,3-0,5	0,3-0,5	1
13.025.TX1	thicker threads than 13.026.TX1				medium	medium	0.5	0.5	2
13.026.TX1	2 layers of TX on back of buckle. 13.026.TX1 lies directly under buckle, 13.026. TX2 lies beneath 13.026.TX2. Fine, smoothe and regular fabric, bit open. Thin threads.	fine, regular, bit open	regular, smooth	1x1,5	medium	medium	0.2	0.2	4
13.026.TX1	2 layers of TX on back of buckle. 13.026.TX1 lies directly under buckle, 13.026. TX2 lies beneath 13.026.TX2. Fine, smoothe and regular fabric, bit open. Thin threads.	fine, regular, bit open	regular, smooth	1x1,5	medium	medium	0.2	0.2	4
13.026.TX2	Fabric is coarser than 13.026.TX1. Thicker threads. Very damaged/decayed, identification of fibre and weave not possible.								
13.014.TX1	Stretched fabric, worn down/damaged			4x3; 2x3; 4x1.5; 3x2;	medium	medium	0.75-1	0.75-1	2
13.014.TX1	Stretched fabric, worn down/damaged			4x3; 2x3; 4x1.5; 3x2;	medium	medium	0.75-1	0.75-1	2
13.014.TX1	Stretched fabric, worn down/damaged			4x3; 2x3; 4x1.5; 3x2;	medium	medium	0.75-1	0.75-1	2
13.017.TX1		open structure, regular	regular	3x3	low-medium	low-medium	0.3	0.3	1
13.017.TX2			regular		medium-high	medium-high	0.5	0.5	1
13.017.TX3	worn down, identification not possible. Only several z-twisted threads remaining.			0.8x0.8	medium		1		

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
13.017.TX4	183	inhumation	300-450	M		Wijchen-Centrum	Wool	??	?x?	z/z	
13.017.TX5	183	inhumation	300-450	M		Wijchen-Centrum	Wool	2/2 diamond twill	14x10	z/s	diamond twill
13.017.TX6	183	inhumation	300-450	M		Wijchen-Centrum	Indet Plant?	tabby	8x8	z/z	
13.017.TX7	183	inhumation	300-450	M	no human remains	Wijchen-Centrum	indet, wool?	2/2 plain twill	13-15x12-15	z/s	Plain twill
13.034.TX1	185	inhumation	300-450	M	adult	Wijchen-Centrum	wool?	2/? Twill	10x10-12	z/s	
13.034.TX2	185	inhumation	300-450	M	adult	Wijchen-Centrum	Wool?	2/? Twill	10x10	z/s	
13.037.TX1	185	inhumation	300-450	M	adult	Wijchen-Centrum	Wool	2/2 twill	ca.10 x10	z/s	
16.002.TX1	194	inhumation	610-640	F		Wijchen-Centrum	indet	tabby	10x10	z/z	
16.002.TX2	194	inhumation	610-640	F		Wijchen-Centrum	indet	2/2 twill	18x18	z/z	
16.005.TX1	198	inhumation	530-555	M	adult	Wijchen-Centrum	wool	??	??	z/s	
16.012.TX1	199	inhumation	555->640	?	juvenile?	Wijchen-Centrum	Wool	Tabby	12x8	z/z	
16.012.TX2	199	inhumation	555->640	?	juvenile?	Wijchen-Centrum	Wool	?	ca. 6x6	z/z	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
13.017.TX4	Very worn down. Fibre wool, very fine fibres. Fabric seems to be folded towards back side of knife						0.5	0.5	
13.017.TX5	No positove fibre identification, but fabric has macroscopical characteristic of wool. Fabric is very stretched.				medium	medium	0.5-0.75	0.5-0.75	1
13.017.TX6	fibre identification difficult. Very frayed fabric	coarse			low	low	1	1	
13.017.TX7	fabric stretched, 2 layers of non-mineralized TX + several smaller fragments. Probably from back of buckle (one fragment is exactly same size as buckle). Very fine and regular fabric	fine, regular	regular	2x4; 0.5x0.5; 1x1; 4.5	medium	medium	0.3-0.5	0.3-0.5	5
13.034.TX1	a bit open weave. Textile on back of leather (onback of buckle). Textile is very worn down. No fibre identification possible.	open	regular	4x3	medium	low-medium	0.5-0.75	0.5	1
13.034.TX2	textile lis beneath 13.034.TX1. Denser and thicker weave. Thicker threads. Possibly same fabric as 13.037.	regular	regular	3x2	medium	low	0.75-1	0.75-1	1
13.037.TX1	worn down, possibly same fabric as 13.034.TX2		regular	0.8x1	medium	medium	0.75	0.75	1
16.002.TX1				1x1	medium	medium	0.3-0.5	0.3-0.5	1
16.002.TX2		fine			medium	medium	0.3	0.3	1
16.005.TX1	fabric very worn down, indet			0,5x0,5	low-medium	low-medium			1
16.012.TX1	Pieces of fe chain with TX on one side. This fabric lies directly on/under chain and is covered by 16.012.TX2.	open fabric	regular, smooth	1,5x1 - 5x5	medium	medium	0.5	0.5	
16.012.TX2	fabric lies on 16.012. TX2		regular	1,5x1,5	medium	medium	1	1	

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
17.008.TX1	213	inhumation	300->450	?	juvenile?	Wijchen-Centrum	Wool	?		z	
19.010.TX1	226	inhumation	530-555	F		Wijchen-Centrum	Wool	Tabby	13x10	z/z	
19.010.TX2	226	inhumation	530-555	F		Wijchen-Centrum	Wool	Tabby	16x14	z/z	
19.010.TX3	226	inhumation	530-555	F		Wijchen-Centrum	Wool	?		z/?	
19.011.TX1	226	inhumation	530-555	F		Wijchen-Centrum	Wool?	Twill 2/?	5x5	z/s	2/?
20.001.TX1	233	inhumation	570->640	M	no human remains	Wijchen-Centrum	Wool	2/2 twill	6-7x5	z/z	
20.031.TX1	235	inhumation	(450) 500-555	F	17-25 years	Wijchen-Centrum	Wool	Tabby	10x8	z/z	
20.031.TX2	235	inhumation	(450) 500-555	F	17-25 years	Wijchen-Centrum	Wool	Tabby	16-17x ca.10	z/z	
20.032.TX1	235	inhumation	(450) 500-555	F	17-25 years	Wijchen-Centrum	Wool?	Tabby	13-14x12	z/z	
20.032.TX2	235	inhumation	(450) 500-555	F	17-25 years	Wijchen-Centrum	Wool	Tabby	6x8	z/z	
20.033.TX1	235	inhumation	(450) 500-555	F	17-25 years	Wijchen-Centrum	??	Tabby	?x?	z/z	
20.048.TX1	239	inhumation	570->640	F		Wijchen-Centrum				z	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
17.008.TX1	several loose threads on the point of the knife.				medium		1		1
19.010.TX1	1 fragment, folded double on back of fibula. Relation to 19.010.TX2 is unclear.	coarse, a bit open	regular	2x2	medium	medium	0,75	0,75	1
19.010.TX2	Pin of fibula goes through fabric, fabric is fastened by fibula.	dense, regular	smooth, regular	2x1 cm	medium	medium	0,3-0,5	0,3-0,5	1
19.010.TX3	1 thread visible, rest of fabric is eroded.				medium		0,5		
19.011.TX1	TX badly decayed.			1x1	medium	medium	1,5	2	1
20.001.TX1	open fabric, good conservation. Date of grave in publication is phase 2-4 (450-640). This is too early. Grave is phase 4 or younger (570-ca. 700).	open	regular	1-2x4	medium	medium	0.75	0.5-0.75	1
20.031.TX1		dense	regular	1x2	medium	medium	0.75	0.75	1
20.031.TX2	20.031.TX2 lies on 20.031.TX1	open	regular, fine	0.4x0.4	medium	medium	0.2	0.2	1
20.032.TX1	Fabric is fastened by pin of brooch.	dense	regular		medium	medium	0.3-0.5	0.3-0.5	1
20.032.TX2	Under 20.032.TX1. Fabric is not fastened by pin	coarse	irregular		low-medium	low-medium	1-1.25	0.75	1
20.033.TX1	Very few threads/cm. Fabric stretched apart. Same thread thickness as 20.031.TX2 & 20.032.TX1. Difficult to tell whether it is the same fabric.			0.3x0.6			0.3	0.3	1
20.048.TX1	on one side of fe ring a few threads were visible. No weave of fibre identification possible.				low		0.75		

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
21.061.TX1	247	inhumation	610-640	M		Wijchen-Centrum	Wool	2/2 twill	6-8x8	z/s	
21.074.TX1	263	inhumation	570-640	?		Wijchen-Centrum				z/?	
25.028.TX1	265	inhumation	610-640	M		Wijchen-Centrum		Tabby	4x4-5	z/z	
25.028.TX2	265	inhumation	610-640	M		Wijchen-Centrum		2/2 twill	6x8	z/z	
25.039.TX1	286	inhumation	570-610	?		Wijchen-Centrum	wool?	2/? Twill	7-8x6	z/s	
26.037.TX1	299	inhumation		?		Wijchen-Centrum	Wool	2/2 plain twill	9x7	z/z	plain twill
16.013.TX1		stray find				Wijchen-Centrum	Wool	2/2 Twill	4x4	z/z	
16.013.TX2		stray find				Wijchen-Centrum		Tabby	10x7-8	z/z	
25.022.TX1		stray find				Wijchen-Centrum		twill?	6x7-8	z/z	
10-70-68	?	inhumation				Wijchen-Centrum	Wool	Tabby	22x15	z/z	
10.108.TX1	146a	inhumation	610-640	M		Wijchen-Centrum	Plant	Tabby	12-14x18	z/z	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
21.061.TX1	Fabric is preset on back of buckle ande buckle plate and also on back of 3 pieces of plate belonging to a sword belt. Probably same garment lying underneath the belt. Rather coarse and somewhat open fabric.	coarse	irregular	1x1 - 2x4	medium	low-high	0.75-1.25	0.5-0.75	4
21.074.TX1	Only a few trheads remain of this fabric. Fabric is very corroded, fabric and fibre identification is not possible				medium		0.5		
25.028.TX1	Badly preserved, no fibre identification possible	coarse, slightly open	regular	1x1; 1,5x1,5	medium	medium	1,5	1,5	2
25.028.TX2	Badly preserved, no fibre identification possible	regular	regular	1x1; 1x1,5	medium	medium	1	1	2
25.039.TX1		coarse		1,5x2,5	medium	low	0.75	1	1
26.037.TX1	2 layers of same fabric on one side of shovel blade.	regular	smooth, regular	7x5; 3x2	medium	medium	0.75-1	0.75-1	1
16.013.TX1		dense, regular	regular, smooth	1x0,8	medium	medium	1,5	1,2	1
16.013.TX2	4 layers of probably same fabric	a bit open	regular	1,5x3	medium	medium	0,75	0,75	1
25.022.TX1	Badly corroded fragment fe; fabric badly preserved. No positive fibre and fabric identification possible.			1x1	low-medium	low	0.75-1	0.75	1
10-70-68		regular	regular	0.5x0.5	medium	medium	0.3	0.3	1
10.108.TX1	fine and very regular, dense fabric. 2 loose framents of textile: 2 layers of different fabric on top of eachother. 10.108.TX1 against 10.108.TX2 and is worn under garment 10.108.TX2 underbelt 10.108.	fine, very regular, dense	regular	1,5x2; 2x2	low-medium	low-medium	0.3-0.4	0.3-0.5	2

Find number	Context	Context Type	Date	Gender	Age	Site	Fibre	Weave	Thread Count	Spin	Pattern Description
10.108.TX2	146a	inhumation	610-640	M		Wijchen-Centrum	Wool	2/2 diamond twill	8x6-7	z/s	diamond twill (pattern repeat ?)
10.108.TX2	146a	inhumation	610-640	M		Wijchen-Centrum	Wool	2/2 diamond twill	8x6-7	z/s	diamond twill (pattern repeat ?)
10.109a.TX1	146a	inhumation	610-640	M		Wijchen-Centrum	Wool	2/2 twill	7x5	z/s	
10.109d.TX1	146a	inhumation	610-640	M		Wijchen-Centrum	Plant?	2/2 twill	7x7	z/z	
10.110.TX1	146a	inhumation	610-640	M		Wijchen-Centrum	Wool?	2/2 twill	8x6-7	z/s	
10.110.TX2	146a	inhumation	610-640	M		Wijchen-Centrum	Wool	Tabby	16x9	z/s	
10.110.TX3	146a	inhumation	610-640	M		Wijchen-Centrum	?	Tabby	18x10	z&s/z	
10.113.TX1	146b	inhumation	610-640	F		Wijchen-Centrum	?	2/2 twill	8-9x6-8	z/s	
10.113.TX1	146b	inhumation	610-640	F		Wijchen-Centrum	?	2/2 twill	8-9x6-8	z/s	

Find number	Comments	Quality weave	Quality spinning	Measurements (cm)	TwistX	Twist Y	Thread thickness X	Thread thickness Y	Number of fragments
10.108.TX2	Fabric is visible on 2 locations on back of belt plate. Also present as 2 loose fragments covered by 10.108.TX1. This (10.108.TX2) fabric was worn directly under belt 10.108 and covered garment made out of 10.108. TX1.		regular, thin warp, thick weft	2x2 (2x); 2x1,5 (2x)	medium	medium	1-1,5	1-1,5	4
10.108.TX2	Fabric is visible on 2 locations on back of belt plate. Also present as 2 loose fragments covered by 10.108.TX1. This (10.108.TX2) fabric was worn directly under belt 10.108 and covered garment made out of 10.108. TX1.		regular, thin warp, thick weft	2x2 (2x); 2x1,5 (2x)	medium	medium	1-1,5	1-1,5	4
10.109a.TX1	open and stretched fabric. Thin threads causing very open fabric.		regular	3x5	low-medium	low	0.5-0.75	0.5-0.75	1
10.109d.TX1			regular	2x1,5	low	low	1-1.5	1-1.5	1
10.110.TX1	Fabric may be similar as 10.108. TX2 & 10.109b. TX1. Open and bit coarse stretched 2/2 twill. Probably wool, but no fibre identification possible.	open	regular	3x3; 1,5x1	medium	low	1	1	2
10.110.TX2	Loose fragment of TX. Same as 10.110. TX3?			0.5x0.5	low	medium	0.5	0.2	1
10.110.TX3	Loose fragment of textile. Same as 10.110.TX2?	regular	smooth	0.3x0.5	low-med	low-med	0.2-0.3	0.2-0.3	1
10.113.TX1	Thin warp, thick weft	coarse, ir-regular	regular	2x5	low	low-medium	0.75-1.2	1-1.5	1
10.113.TX1	Thin warp, thick weft	coarse, ir-regular	regular	2x5	low	low-medium	0.75-1.2	1-1.5	1

Appendix V

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
101-1171	101 Ferwerd Burmaniaterp	Wool	2/2 diamond twill	10x8-9	z/s	Diamond twill pattern repeat 22/18			many faults	regular	dark brown, trace of red	24x14
101-714	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	8x7	z/z				dense, bit irregular	irregular	dark brown-black	38x7.5
101-883	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	20-21x13	z/z	Color pattern in weft: alternating 1 light and 1 dark thread creating a fine blockpattern	All fragments have selvedge of 3 warp threads		fine, regular	regular	Warp: reddish, weft: alternating light and dark brown	2.5x41; 2.5x28; 2x35
101-823	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	8-9x6	z/z				open, irregular, thin and thick threads	irregular	dark brown, a trace of yellow and red	5x3; 11x6
101-932	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	12x11	z/z				regular, dense, a few faults	regular	dark brown-black	28x12
101-890	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	10-11x10	z/s		selvedge in tablet weave of 4 tablets.		regular, dense, but many faults	regular	brown	10x76
101-470/1	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	7x8	z/z				a bit irregular, open	regular	dark brown, trace of red	10x24; 4x3
101-470/2	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	16x9-10	z/z				irregular	regular	dark brown-black	17x45
101-470/3	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	14x12	z/z				dense, fine weave, few faults	regular	dark brown	22x42
101-470/4	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	7x7	z/z				regular, dense	regular	brown	???
101-470/5	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	9x8	z/z		very distorted (oblique angles)		regular	regular	brown	5x22
101-470/6	101 Ferwerd Burmaniaterp	Wool	2/2 plain twill	12x12	z/z		Second piece has a selvedge of 6 tablets, weft threads looped back into card weave but not into main weave.		a bit irregular	regular	dark brown	37x19

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
101-1171	low-medium	medium	1	0.75	1				
101-714	medium -high	medium	0.75-1.5	1-1.5	1	Hem	Hem along short side: 14c. Hem along long side: 15a.	14c: width 1.3 cm. Sewing thread: light brown, 2zS, 1mm, wool (?); 15a: width 5mm, sewing thread 2zS, 1-1.2 mm, wool (?).	
101-883	medium - high	medium	0.3-0.4	0.3-0.5	3				
101-823	medium	medium	0.5-1	0.5-1.5	2				
101-932	medium	medium	0.75	0.75	1	Hem	14a	Width 0.8cm; Whipstitches every 1-1.5cm; Sewing thread: z (not twined), 1mm.	
101-890	medium	medium	0.3-0.5	0.5	1				Long fragment. Fabric is damaged, part of the threads have decayed.
101-470/1	medium	medium	1.25	0.75	2				Badly preserved, fabric is falling apart, frayed.
101-470/2	medium - high	medium	0.5	0.5-0.75	1				Fabric is stretched open in some places
101-470/3	medium	medium	0.5-0.75	0.5-0.75	1	Hem	Small remnant of hem in weft-direction: 15(?). Hem in warp-direction: 15a	15(?): no remnants of sewing threads left. 15a: width 6mm, whipstitches every 5mm. Sewing thread: 2zS 1mm wool.	Large main fabric with 2 pieces of coarser weave sewn onto or attached to it (see 101-470/4&5).
101-470/4	medium	medium	1	1	1	Seam	3	Width 8mm, whipstitches every 5mm. Sewingthread: 2zS, 2mm, wool.	
101-470/5	medium	medium	0.75	0.75	1	Attach -ment		Fabric is attached with running stitches (4mm above, 10mm under fabric). Sewing thread: 2zS, 1mm, wool	Frayed and distorted (oblique angles). Fabric is sewn onto 101-470/3.
101-470/6	medium	medium	0.75	0.5-0.75	2	Seam & hem	13a; 15a;	13a: width 1-2.5cm, whip stitches every 0.7cm. Sewing thread 2zS, 1,5mm, wool. 15a: width 7mm, whipstitches every 7mm. Sewing thread 2zS, 1.5mm. 2: sewing thread 2zS, 2mm.	Strip sewn onto main fabric 101-470/3 in direction of the weft.

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
101bis-1809	101bis Ferwerd Burmaniaterp II	Wool	2/2 plain twill	10x10-11	z/z				regular, a bit open	regular but over twisted	dark brown	9x8
120-348	120 Cornjum Dekema-/ stoomterp	Wool	2/2 diamond twill	12x10	2zS/ 2zS	Diamond twill, pattern repeat 28/26			regular, dense	regular	warp: dark-redbrown, weft: lightbrown	42x15
120-411/1	120 Cornjum Dekema-/ stoomterp	Wool	2/2 diamond twill	8x8	2zS/ 2zS	fabric is too decayed to analyse the pattern repeat			regular	regular	brown	5x5
120-411/2	120 Cornjum Dekema-/ stoomterp	Wool	2/2 plain twill	4-5x2.5	z/s				coarse	irregular	brown	9x10; 14x15; 13x12
145-301/1	145 Foswerd	Wool	2/2 plain twill	9x5	z/s					regular	red brown	9x7
145-301/2	145 Foswerd	Wool	2/2 plain twill	14x4	z/s				dense, regular, thin warp, thick weft	regular	dark brown-black	2.5x4.5; 3x3
145-301/3	145 Foswerd	Wool	2/1 twill	14x8	z/s				regular, dense	regular	red brown	2x6
145-301	145 Foswerd	Wool	2/2 plain twill	12x10-12	z/z				regular	regular	black	4x6; 6x7
14J-612/1	14J Hoogterp Leeuwarden	Wool	2/2 diamond twill	10x10	z/s	Diamond twill pattern repeat 24/18			regular, dense	thick regular threads	dark brown	19x18
14J-612/2	14J Hoogterp Leeuwarden	Wool	2/2 diamond twill	13x10	z/s	pattern repeat not counted					dark brown	9x10
14J-612/3	14J Hoogterp Leeuwarden	Wool	2/2 diamond twill	11x10	z/s	diamond twill, pattern repeat was not visible				regular	dark brown	4x6
14J-612/4	14J Hoogterp Leeuwarden	Wool	2/2 diamond twill	13 x 9-10	z/s	diamond twill, pattern repeat was not visible				irregular	dark brown	9x9
14J-612/5	14J Hoogterp Leeuwarden	Wool	2/2 diamond twill	10x8-9	z/s	diamond twill, pattern repeat 18/24. Every 1, 2 or 3 sheds there is a double weft thread. No regular pattern and no color differences between single or double weft threads.				regular	dark brown	23x18
14J-611	14J Hoogterp Leeuwarden	Wool	??	?x?	z/?						light brown	14x5x1.3; 6x4 (2x)

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
101bis-1809	high (over twist)	high (over)	0.3-0.5	0.3-0.5	1	Hem	14b	Width 1 cm, whipstitches every 1.5 cm, 0.6 cm long. Sewng thread linen(?), only imprint of stitch remains.	
120-348	low twist and twine	low twist, medium twine	1mm	1mm	1	Hem	13b	Width 1 cm; Sewing thread z-twisted (not twined), 1mm, wool.	
120-411/1	low twist, medium twine	low twist, medium twine	1	1	1				
120-411/2	medium	low (barely spun)	1-1.5	3-4	3				Badly preserved, falling apart
145-301/1	medium -high	medium	1	1.5	1				Originally one piece but fallen apart into 3 fragments
145-301/2	medium	medium	1	2	2				1 fragment, heavily felted on both sides, cut angular
145-301/3	medium	medium	0.7	1	1				
145-301	high (over twist)	medium -high	0.75-1	0.75-1	2				Heavily felted
14J-612/1	low-medium	medium	1	1	1	Hem	2 hems: 13a	13a: Width 1cm; whip stitches (6mm). Sewing thread 2zS, 2mm.	
14J-612/2	medium	medium	0.75-1	0.75-1	1	Attach-ment		Edges are folded back (2cm) and it has been sewn on with running stitches (5mm) 1-2mm from the edge. Sewing thread wool 2zS 0.75-1mm. Beginning of thread has a small knot.	14J-612/2 is sewn onto this piece. The edges underneath this repair-piece are frayed, it was either damaged or worn with age.
14J-612/3	medium	medium	0.75	0.75	1				
14J-612/4	low-medium	low-medium	0.75	0.75	1				
14J-612/5	medium	medium	0.75	0.75	1	Hem	Hem along left side of fabric: 13a	13a: width 1 cm, whip stitch every 0.6 cm. Sewing thread: dark brown-black wool, 1.5 mm 2zS	
14J-611					3				

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
14J-603	14J Hoogterp Leeuwarden	Wool	2/2 plain twill	8x6	z/z	irregular variation in direction of twill, creating a stripe pattern. At one place the direction of twill is not changed but pattern is broken.			regular, dense	irregular	brown	14x19
16D-98/2	16D Teerns	Wool	2/2 plain twill	8x5-6	z/2 zS	2/2 twill with woven stripe/ block-pattern. Weft consists of stripes of brown and black threads. Warp is brown (or red) creating a block-pattern.			regular	irregular	brown, black (weft) and redbrown (warp)	21x20
28-596W 170	28 Hoog-ebeintum	Wool	2/2 plain twill	10x10	z/z				open, regular	regular	dark brown-black	ca. 6x7
28-597W 171/1	28 Hooge-beintum	Wool	2/2 diamond twill	13x8	z/s	Diamond twill, pattern repeat 22/18			regular, dense	regular	dark brown-black	11x12; 4x3
28-597W1 71/2	28 Hooge-beintum	Wool	2/2 plain twill	8x8	z/s				open	regular	brown	11x5
28-321/1	28 Hooge-beintum	Wool	2/2 diamond twill	12x9-10	z/s	diamond twill, pattern repeat 22/18			dense, bit irregular	regular	brown	
28-321/3	28 Hoog-ebeintum	Wool	2/2 diamond twill	10x8	z/s	pattern repeat not visible because of felted surface	all fragments have a starting border in tablet weave (4 cards).					
28B-45	28B Blija	Wool	2/2 plain twill	14-15x6	z/2 zS				faults in weave	regular	dark brown	12x15
33-373/1	33 Aalsum	Wool	2/2 diamond twill	9-10x8	z/s	diamond twill, pattern repeat 30/20			regular	regular	dark brown, warp lighter than weft	ø 16-17

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
14J-603	low-medium	medium	101.5	1.5	1				Heavily felted on both sides, fabric is still attached to piece of wood. Very fragile, falls apart at touch. At some places a z-twisted thread is visible. Weave not visible. Thick: several layers?
16D-98/2	medium	low twist and twine	1-1.5	1-1.5	1	Hem	12	Edge is finished with tablet weave (2 tablets): weft thread of tablet weave consists of whip stitches, sewn onto the edge of the fabric.	Change in direction of twill after irregular amount of weft threads: ...10; 10; 7; 7; 5; 7; 3; 4// 3; 7; 8; 6; 12; 5… //=Break in twill
28-596W 170	medium	medium	0.5	0.4	1				Fabric has been darned with very coarse thread 2zS, brown, 4 mm thick.
28-597W 171/1	medium	low	0.75	1.2	2				Frayed piece of textile still attached to clay, hence could not be measured completely.
28-597W1 71/2	medium	low	1	0.5	1				
28-321/1	medium	medium	0.75	1	4	Seam	8b	Sewing thread: wool, double z-twisted thread 1 mm	
28-321/3					4	Seam	1a, 1b	Sewing threads: light brown, s-twisted, 1.5mm or double thread z-twisted, 1mm.	
28B-45	medium	medium twist and twine	0.5	1.25	1	Various stitching			
33-373/1	medium -high	medium	0.5-1	1	1	Various stitching		Different parts of hat are stitched together with running stitch or whipstitches. Seams are folded open and attached with whip stitches. Sewing thread 2zS 1-2mm.	In direction of weft there are rows of running stitches (length ca. 1cm). Very irregular stitches and not in line, so probably not meant as decoration. At back of fabric there are a few coarse threads between fabric and stitches: perhaps remains of attachment.

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
33-373/2	33 Aalsum	Wool	2/2 diamond twill	9x8	z/s	diamond twill, pattern repeat 24/18			some faults, dense weave	irregular	brown, warp lighter than weft	7 cm high, 10-14 cm wide
33-373/3	33 Aalsum	Wool	2/2 diamond twill	10x8	z/s	diamond twill, pattern repeat 30/28			a bit irregular	irregular weft	brown, warp lighter than weft	
33-373/4	33 Aalsum	Wool	2/2 diamond twill	10x9	z/s	diamond twill, pattern repeat 20/20			irregular, dense	irregular	brown, warp darker than weft	
33-373/5	33 Aalsum	Wool	2/2 plain twill	10-12x12	z/s					regular	red brown	variable
33-374	33 Aalsum	Wool	2/2 plain twill	3x2	z/z				coarse, irregular	regular	brown (warp dark, weft light)	16x20
35B-147/1	35B Oostrum, Mellemastate	Wool	2/2 diamond twill	10x10	z/s	pattern repeat not visible because of felted surface			regular, very dense	regular	brown	14x10
35B-147/2	35B Oostrum, Mellemastate	Wool	2/2 diamond twill	14x12	z/s	diamond twill, pattern repeat 20/18			regular, dense	regular	dark brown	
35B-48/1	35B Oostrum, Mellemastate	Wool	2/2 diamond twill	14x12	z/s	diamond twill, pattern repeat 12/18		purpu -rin, Rubia tincto-rum L.	regular, dense	a bit irregular weft	white wool, dyed red. Sewing thread dyed darker red	54 cm, front 6, back 24
35B-48/2	35B Oostrum, Mellemastate	Wool	2/2 diamond twill	11-12x10	z/s	pattern repeat not visible because of felted surface			regular	regular, fine	dark brown	
46-95	46 Beetgum	Wool	2/2 plain twill	8x8	z/s				regular	a bit irregular weft	dark brown-black	3x11; 10x19
77A-102B	77A Wijnaldum	Wool	2/2 plain twill	10x8	z/z	alternating light and dark threads in both warp and weft, creating a block pattern	Tubular selvedge		regular	regular	lightbrown and black	4x7
77A- 73B	77A Wijnaldum	Wool	2/2 plain twill	7-8x7-8	z/z				coarse	irregular	brown	4x6

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
33-373/2	medium -high	medium	0.75-1.5	1-1.5	1				Hat, made out of small pieces, cut on the straight but warp of different pieces is not all in same direction. Side panel is made of 1 large piece and (on one side) a small piece is attached to make it symmetrical. Hat is clearly made out of of scraps of fabric.
33-373/3	medium -high	medium	0.5-1	1-2	1	Various stitching			
33-373/4	medium -high	low-medium	0.5-0.75	1-1.5	1				Front panel of hat
33-373/5	medium -high	low	1	1	2				Side panel of hat
33-374	high	low (barely spun)	2-3	3-5	3	Seam	6a	Sewing thread 2zS (high twine), 2mm	Crown panel of hat
35B-147/1	medium -high	medium -high	0.75	0.75	1				Repair pieces of hat
35B-147/2	medium -high	low-medium	0.75	0.5-0.75	2	Various stitching	6c; 13a; 14a	6c: Sewing thread: d.brown wool, 2zS 2mm.; 13a & 14a: whip stitches every 8mm, sewing thread: double thread z-twisted 1mm.	
35B-48/1	medium	low-medium	0.5-0.7	0.5-0.75	2	Various stitching	4a; 13c	4a: Sewing thread 0.5mm s-twisted (red); 13c: sewing thread s-twisted. Stitch length: 1-3mm	1 side heavily felted, 1 side lightly felted.
35B-48/2	medium-high	low-medium	0.3-0.5	0.5	2	Various stitching			
46-95	medium	medium-high	1	1-1.5	4	Various stitching	12		Hat, size 54 cm. Good quality weave and sewn with great care. Heavily used and repaired in many places. Repairs seem the result of 1 action; use of same technique and same sewing threads. Repairs are firm, but rough. Although one used fine fabric (very fine threads) for repair pieces.
77A- 102B	medium-high (over twist)	medium-high	1-1.3	1	1				Repair pieces in hat
77A- 73B	medium	medium	1-1.5	0.75-1	1				1 fragment has a card weave edge sewn onto the edge

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
77A-73A/1	77A Wijnaldum	Wool	2/2 plain twill	8-10 x5-6	z/z				irregular with thin and thick threads	irregular	dark brown-black	6x14
77A-73A/2	77A Wijnaldum	Wool	2/2 plain twill	7-8x5	z/z				coarse	coarse	brown	2x2 - 15x8
77A-73A/3	77A Wijnaldum	Wool	2/2 plain twill	8x4	z/s				coarse	coarse	brown, warp a bit reddish	22x2.5
Anjum _vnr 303	Anjum	Wool	2/2 plain twill	11-12x6-7	z/s							13x9
a1913 /12.5d /1	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x10	z/s	diamond twill, piece too small too count pattern repeat			irregular	irregular	dark brown	2x2
a1913 /12.5d /2	Dokkum - Berg Sion	Wool	2/2 diamond twill	15x12	z/s	diamond twill, pattern repeat 12/16			irregular, dense	irregular	brown	6.5x17
a1913 /11.227	Dokkum - Berg Sion	Wool	tabby	14x7	z/s				open	irregular	light brown	24x7
a1913 /11.228 /1	Dokkum - Berg Sion	Wool	2/2 plain twill	5-6x3	z/z				coarse	irregular	brown	8x10
a1913 /11.228 /2	Dokkum - Berg Sion	Wool	2/2 plain twill	8x7	z/s				fine weave	irregular	brown	5x4
a1913 /11.223	Dokkum - Berg Sion	Wool	Tabby	4-5x5-6	z&s/ z&s	Spinpattern in warp and weft, colorpattern in weft. Warp: ...5z-4s-6z-2s-6z-2s-6z-4s-6z-2s-9z... Weft: l.brown:12z, 9s. After this s: alternating 9x(1 dark and 1 lightbrown). After this alternating 1-1, 1-2 or 2-1 (dark and lightbrown, irregular).			thick, a bit open		light and darkbrown	12x43

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
77A-73A/1	medium	medium	0.3-1	1	1				Color pattern: warp >7 l.brown, 14 black, 8 l.brown. Weft: 8 l.brown, 12 black, ? l.brown. Fabric is frayed
77A-73A/2	medium	medium	1-1.5	1-2	4				
77A-73A/3	medium-high	low	1.5-2	2	1		14a	14a: whip stitches every 1 cm. Sewing thread z, medium-high twisted, 2mm.	
Anjum _vnr 303	medium	low (barely spun)			1				
a1913 /12.5d /1	medium	low	1	0.5-1	1				
a1913 /12.5d /2	medium-high	low-high	0.5	0.75-1	1	Attach-ment		Sewing thread: 2zS, 2mm and single z-twisted thread 1mm.	Fibre analysis by S. Comis: Warp fibres average thicker than weft. Warp (combed wool?): 32 - 60 µm. Some fibres are very thin: (ca. 16 µm), some are extremely thick (80 µm). Weft is thinner (soft under wool): 24-48µm.
a1913 /11.227	medium-high	medium-high	0.5-1	1	1	Hem	14a	whip stitches every 1,5cm. Sewing thread 2zS (low spun, medium twine), 1.5mm, light brown.	2 pieces sewn onto each other. a1913/12.5d/1 is main fabric. a1913/12.5d/2 is sewn onto/ repair piece. a1913/12.5d/1 only remains in little frayes around the repair piece. See a1913/12.5d/2 for further details on stitching.
a1913 /11.228 /1	medium	medium-high	0.5-1.5	1.5-2	1				a1913/12.5d/2 is sewn onto a1913/12.5d/1 with a row of running stitches, every 4mm.
a1913 /11.228 /2	low-medium	medium	0.75-1	1-1.5	1				
a1913 /11.223	medium-high	low-medium	1-1.5	1-1.5	1				

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913 /12.5a	Dokkum - Berg Sion	Wool	2/2 diamond twill	9-10x 9-10	z/s	diamond twill, pattern repeat ?/14			regular, a bit open	regular, smooth	brown, a bit reddish	32x7
a1913 /12.5b	Dokkum - Berg Sion	Wool	2/1 twill	6x6-7	z&s/ z	spin pattern in warp: …2s-2z-1s-4z-1s-3z-8x(1s-2z)-5z-3x(1s-2z)…; alternating dark and light threads				irregular	brown, reddish, alternatin gdark and light threads	11x17, 6x5
a1913 /12.5c	Dokkum - Berg Sion	Wool	2/2 diamond twill	8-9x9-10	z/s	Pattern repeat not visible due to felted surface.				regular	dark brown	39x8
a1913 /12.5e	Dokkum - Berg Sion	Wool	2/2 diamond twill	9-10x9	z/s	diamond twill, pattern repeat 40/28			regular, dense	regular	dark brown	14x11
a1913 /12.5 z.n.1	Dokkum - Berg Sion	Wool	2/2 diamond twill	11x8	z/s	diamond twill, pattern repeat 20/18	Starting border in tablet weave using 3 tablets.		regular	irregular		4x9 - 30x10
a1913 /12.5 z.n.2/1	Dokkum - Berg Sion	Wool	2/2 twill, piled weave	8x3	z/s	piled weave, pile is max. 8 cm long.	tubular selvedge on 2 fragments		coarse	irregular, weft very low spin	brown	3x11 - 8x11, 5mm thick
a1913 /12.5 z.n.2/2	Dokkum - Berg Sion	Wool	2/2 plain twill	12x9-10	z/s				regular	regular	brown	6x11
a1912 /3.23/1	Dokkum - Berg Sion	Wool	2/2 plain twill	5-7x3	z/s				irregular	irregular		7x7
a1912 /3.23/2	Dokkum - Berg Sion	Wool	2/2 plain twill	10x8-9	z/s				regular, dense	regular	brown	16x13
a1913 /11.224	Dokkum - Berg Sion	Wool	Tabby	28-29x15	z/s				very fine, dense	very fine	brown	18x25; 4x5
a1913/ 11.226	Dokkum - Berg Sion	Wool	2/2 plain twill	9-10 x5-6	z/s		Selvedge with warp-threads close together. Thick weft goes directly back into fabric , making the edge curl round.		thick fabric; thin warp, thick weft	regular	brown	13x16; 3mm thick
a1913 /11.232	Dokkum - Berg Sion	Wool	Tabby	14x12	z/z	Schleiergewebe			regular	regular	brown	19x57
a1913 /11 .236a	Dokkum - Berg Sion	Wool	2/2 plain twill	5x3	z/s		Starting border or selvedge.		coarse	irregular	brown	8x2 - 23x3

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913 /12.5a	medium	medium	0.5	0.5	1				
a1913 /12.5b	medium-high	medium-high	0.75-1.5	0.75-1	2				Some double weft threads present. Light brown threads seem coarser fibres. Z-spun threads: dark brown, light brown and reddish. S-spun threads: dark brown.
a1913 /12.5c	medium-high	low-medium	1	0.75	1				Very frayed, strip cut on the bias
a1913 /12.5e	medium-high	low	1	1	1				
a1913 /12.5 z.n.1	medium-high	low-medium	1	0.75	8		2	Whip stitches every 1cm. Sewing thread: double thread z-twisted	
a1913 /12.5 z.n.2/1	medium	low (barely spun)	1-2	3-5	4				
a1913 /12.5 z.n.2/2	medium	medium	0.75	0.75	1	Hem	14a	Whip stitches every 5mm. Sewing thread 2zS 1mm d.brown	
a1912 /3.23/1	medium-high	low (barely spun)	1-1.5	3	1	Attach- ment	6a?	No sewing thread left along the edge, only imprints and needle punctures every 8mm.	Thick densely felted fabric with long threads worked through and around warp. Pile-thread: s1-1.5mm, medium spun
a1912 /3.23/2	medium-high	high	0.75-1	1	1	Attach-ment			
a1913 /11.224	medium-high	low	0.2	0.2	2				Main fabric with a1912/3.23/2 sewn onto it.
a1913/ 11.226	medium-high	medium-high	1	2	1				See a1912/3.23/1 for details on sewing
a1913 /11.232	medium	medium	0.2-0.3	0.2	1				
a1913 /11 .236a	medium-high	low	1.5-2	3-4	7		13a; 15a;	Whip stitches every 1 cm. Sewing thread: z 2.5mm, medium spun.	Thick, compact and felted mantle fabric, cut angular

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913 /11 .236b	Dokkum - Berg Sion	Wool	2/2 plain twill	6x3	z/s				coarse	irregular		
a1913/ 11 .236c	Dokkum - Berg Sion	Wool	2/2 plain twill	4x2-3	z/s				coarse	thick regular threads	brown	16x3; 18x3
a1913/ 11.236d	Dokkum - Berg Sion	Wool	2/2 plain twill	4x2	z/?				coarse	irregular	brown	45x2.5; 55x3
a1913/ 11.230/1	Dokkum - Berg Sion	Wool	2/1 twill	20-24x11	z/s				regular, very dense	regular	brown	
a1913/ 11.230/2	Dokkum - Berg Sion	Wool	2/1 twill	12x8	z/s	Every 3rd weft floats on the back of the fabric.			regular	regular	brown	5x9
a1913/ 11.230/3	Dokkum - Berg Sion	Wool	2/2 diamond twill	16-18x14	z/s	Pattern repeat not visible (fabric too frayed)				regular	brown	19x14
a1913 / 11.223/2	Dokkum - Berg Sion	Wool	2/1 twill	4-6x3	z/s	colorpattern in warp/ weft: warp: darkbrown, weft brown.			coarse	regular	darkbrown warp, brown weft	24x11
a1913/ 11.223a	Dokkum - Berg Sion	Wool	2/2 diamond twill	12-13x10	z/s	Diamond twill. Many faults in diamond-pattern.			faults in weave	regular	dark brown, trace of red	40x37
a1913/ 11.223/1	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x7-8	z/s	Pattern repeat not visible (fabric too frayed)			irregular	irregular	dark brown	4x4 - 13x20
a1913/ 11.223b	Dokkum - Berg Sion	Wool	2/2 plain twill	8-10 x8-9	z/s				regular	regular	dark brown-black	30x32
a1913/ 11.223c	Dokkum - Berg Sion	Wool	2/2 plain twill	9-10 x11	z/s				irregular	irregular	dark brown	26x15
a1913/ 11.223d	Dokkum - Berg Sion	Wool	2/2 diamond twill	12-16x11	z/s	diamond twill, pattern repeat 22/18			a bit irregular	a bit irregular	brown	
a1913/ 11.223e	Dokkum - Berg Sion	Wool	2/2 plain twill	6x5	z& s/s	Spinpatern in warp: repeat z-z-s			regular	regular	brown, reddish in z-spun threads	18x23

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913 /11 .236b	medium-high (over twist)	medium-high	1-1.5	2-2.5	1	Hem	14a	Sewing thread: z, 1-1.5mm, medium spun.	Very open en fragile fabric
a1913/ 11 .236c	medium-high	low (barely spun)	1.5	2.5	2	Hem	14a	Hem 2 cm wide; Sewing thread: z, 2mm, medium spun.	6 Long strips, torn along the border.
a1913/ 11.236d	medium	medium			2	Hem	15?		Piece consists of only a hem: 1-2 cm folded back double, attached with whip stitches. Piece is looped around a stick of wood and threaded through hole in fabric. No threads have been cut to make the hole: threads just below the hem have merely been pushed aside.
a1913/ 11.230/1	medium	medium	0.5	0.5	1	Various stitching	3; 14a	3: whip stitches every 8mm. Sewing thread 2zS, 0.75, 1 & 1.5mm or double thread z 0.5mm. 14a: whip stitches every 1cm, double thread z, 0.5mm	
a1913/ 11.230/2	medium-high	medium	0.3-0.5	0.5	2	Seam			Hem in direction of weft. Hem is rolled up very compact twice. Sewing thread not visible.
a1913/ 11.230/3	medium	medium	0.5	0.5	1				Main fabric. Seam with a1913/11.230/2 , a1913/11.230/3 is repair piece, sewn onto a1913/11.230/1.
a1913 / 11.223/2	medium-high	low (barely spun)	1	3	1				
a1913/ 11.223a	medium-high	medium-high	0.75-1	0.75-1	1				
a1913/ 11.223/1	low-medium	medium	0.5-1	1	10	Hem	14a	whip stitches every 6-7mm, sewing thread double thread z, brown, 0.5mm medium-spun.	Thick, coarse weave, frayed. Thin warp, thick weft.
a1913/ 11.223b	medium	low	0.5-0.75	0.75	1				
a1913/ 11.223c	low-high	low-medium	0.75-1.25	0.75-1	1				
a1913/ 11.223d	medium-high	low-medium	0.5-0.75	0.75	1	Embroidery	4a, 4b, 13a	Sewing thread: 2zS, 0.75mm, light brown.	
a1913/ 11.223e	medium	medium-high	1-1.5	1-1.5	1				

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913/ 11.223f	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x9-10	z/s	diamond twill, pattern repeat 24/18			regular	regular	dark brown	8x28
a1913/ 11.223g	Dokkum - Berg Sion	Wool	2/2 diamond twill	12x9-10	z/s	diamond twill, pattern repeat 32/18			regular	regular	dark brown	10x16
a1913/ 11.223h/ 1	Dokkum - Berg Sion	Wool	2/2 plain twill	10x11-12	z/s				coarse, dense	irregular	brown	27x33
a1913/ 11.223h/ 2	Dokkum - Berg Sion	Wool	2/2 diamond twill	8-9x9	z/s	diamond twill, pattern repeat 10/8 (?)			irregular	irregular	dark brown	27x22
a1913/ 11.223h/ 3	Dokkum - Berg Sion	Wool	2/2 diamond twill	9-10 x10	z/s	fabric is badly damaged. Pattern repeat not visible			regular	regular	dark brown	10x5
a1913/ 11.223h /4	Dokkum - Berg Sion	Wool	2/2 plain twill	8x8	z/s				open	regular	dark brown	8x6
a1913/ 11.223i	Dokkum - Berg Sion	Wool	2/2 diamond twill	12x12	z/s	Pattern repeat not visible (fabric too frayed)			regular	regular	dark brown	46x3
a1913 /11.223j	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x10	z/s	Pattern repeat not visible (fabric too frayed)			regular	regular	dark brown	18x5
a1913/ 11.223k	Dokkum - Berg Sion	Wool	2/2 plain twill	12x10	z/s				regular	regular	dark brown	17x18
a1913/ 11.223L	Dokkum - Berg Sion	Wool	2/2 plain twill	10x8	z/s				coarse, dense	regular (warp smooth, weft curly)	dark brown	12x13
a1913/ 11.223n /1	Dokkum - Berg Sion	Wool	2/2 plain twill	7-8x7-8	z/s				regular	regular	dark brown	15x2

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913/ 11.223f	medium	low-medium	0.75-1	1	2	Seam	8b	Whip stitches every 7mm. Sewing thread 2zS 1mm.	Hat made out of a rectangular piece of cloth with 2 side panels. Seams made in decorative stitch. Seam allowances also secured with very fine (sometimes) decorative stitches.
a1913/ 11.223g	medium	low	0.75	0.75	1	Seam			
a1913/ 11.223h/ 1	low-high	medium-high	0.5-1	0.5-0.75	1	Various stitching			
a1913/ 11.223h/ 2	low-high	low-high	0.5-1	0.5-1	1	Various stitching			Pieces was originally joined with other piece in warp-direction. Edge is folded double and secured with whip stitches every 1cm. Sewing thread 2zS 2mm. Along edge needle holes are visible where join with other piece was made.
a1913/ 11.223h/ 3	low-medium	low	0.5-0.75	0.75	1	Various stitching			Main fabric with 3 pieces attached to it 1913/11.223h/2 is sewn onto 1913/11.223h/1 with running stitches 2mm from the edge, stitches 5mm length. Double thread z, 0.75mm. ../3 is sewn onto ../1 and ../2 in the same way. ../4 is sewn behind ../1. Edges of both pieces are folded inwards and secured.
a1913/ 11.223h /4	low-medium	medium	0.5	0.5	1				See 1913/11.223h/1 for further details
a1913/ 11.223i	medium	medium	0.3-0.5	0.5	1				See 1913/11.223h/1 for further details
a1913 /11.223j	medium	medium	0.5	0.5	1				See 1913/11.223h/1 for further details.
a1913/ 11.223k	medium	medium	0.75	0.75	1				
a1913/ 11.223L	medium-high	medium	0.75-1	1	1	Hem	14a	Whip stitches every 1 cm. Sewing thread: double thread z.	
a1913/ 11.223n /1	low	low	1	1	1	Seam			

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913/ 11.223n/ 2	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x7-8	z/s	diamond is larger than fragment, pattern repeat not counted			regular	irregular	brown	15x2
a1913/ 11.223m/ 1	Dokkum - Berg Sion	Wool	2/2 diamond twill	11-12x12	z/s	Diamond twill, pattern repeat 12/18	Selvedge on both pieces: tubular selvedge		regular	regular	brown	ca. 5x54
a1913/ 11.223m/ 2	Dokkum - Berg Sion	Wool	2/2 diamond twill	12-14x10	z/s	diamond twill, pattern repeat 12/16			regular	regular	brown	27x10
a1913/ 11.223m /3	Dokkum - Berg Sion	Wool	Tabby	8x5	z/s				coarse	irregular	brown	13x10
a1913/ 11.223o	Dokkum - Berg Sion	Wool	2/2 plain twill	?x?	z/s					regular	black	20x3
a1913/ 11.223p	Dokkum - Berg Sion	Wool	2/2 plain twill	8x8	z/s				regular	regular	brown	1x9
a1913/ 11.223q	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x10	z/s	fragment too small to count pattern repeat.			regular	regular	brown	3x10
a1913/ 11.223r	Dokkum - Berg Sion	Wool	2/2 diamond twill	8x7	z/z &s	spin-pattern repeat s-s-z			regular	regular	brown	5x4
a1913/ 11.223s, w &x	Dokkum - Berg Sion	Wool	Tabby	9x8	z/s				regular	regular	dark brown	2.5x4.5; 8x12; 12x7
a1913/ 11.223t	Dokkum - Berg Sion	Wool	2/2 diamond twill	14x12	z/s	Diamond twill, pattern repeat 10/14			fine, regular	regular	dark brown	23x5
a1913 /11.223u	Dokkum - Berg Sion	Wool	2/2 diamond twill	12x9	z/s	Diamond twill, pattern repeat 16/10			regular	irregular	dark brown	15x8
a1913/ 11.223v	Dokkum - Berg Sion	Wool	2/2 plain twill	11-12x8	z/s				regular	regular	dark brown	9x7
a1913/ 11.223y /1	Dokkum - Berg Sion	Wool	2/2 plain twill	10x10	z/s				regular	regular	brown	2x6
a1913/ 11.223y /2	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x7	z/z&s	Diamond twill, pattern repeat 16/18. spin pattern: no obvious pattern, alternating 1, 2 or 3 z's or s's.			irregular	regular	brown	13x12
a1913/ 11.223y /3	Dokkum - Berg Sion	Wool	2/2 diamond twill	8x6	z/s	Very irregular weave. Fabric is badly damaged. No pattern repeat counted.			irregular	irregular	brown	10x10

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913/ 11.223n/ 2	high (over twist)	medium	1-2	1	1	Seam			Warp smoothly spun, weft curly.
a1913/ 11.223m/ 1	high	medium	1	1	2	Various stitching	1a, 6a	1a & 6a: whip stitches every 4mm, double thread z, 0.75mm.	
a1913/ 11.223m/ 2	medium	medium-high	0.5-1	0.5	1	Various stitching			
a1913/ 11.223m /3	medium-high (over twist)	medium	1	1-1.5	1	Attachment		Whip stitches every 5mm. Sewing thread double threads-twisted, 0.5mm, black	Piece of clothing, consisting of 2 long strips with a gusset in between. Might be part of a tunic or hose. Wear and damage just above and below gusset.
a1913/ 11.223o	low-medium	medium	0.3-0.5	0.5	1				Gusset. See a1913/11.223m/1 for further details.
a1913/ 11.223p	medium-high	medium-high	1	1	1	Hem	14a	Whip stitches every 5mm. Sewing thread 2zS 1mm.	Repair piece sewn behind top of gusset.
a1913/ 11.223q	medium	medium-high	1	0.75	1				Fabric decayed. Many threads are missing. Not possible to count threads/cm.
a1913/ 11.223r	medium	medium	1-1.5	1	1				
a1913/ 11.223s, w &x	high	medium	0.75	0.75-1	3				
a1913/ 11.223t	medium	low	0.5	0.5	1				
a1913 /11.223u	low-high	medium-high	0.3-0.5	0.5	1				
a1913/ 11.223v	medium-high	medium	0.5-0.75	0.75	2				
a1913/ 11.223y /1	high	medium	0.5	0.5	1	Various stitching	3	3: whip stitches every 1 cm. Sewing thread 2zS 2mm.	
a1913/ 11.223y /2	medium	medium	1	1	1	Various stitching			
a1913/ 11.223y /3	medium-high	medium	0.5-1	1-2	1	Attach- ment			a1913/11.223y/1 is sewn together with ../2. ../3 is sewn onto 0 ../2.

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913/ 11.223y /4	Dokkum - Berg Sion	Wool	2/2 plain twill	10x7	z/s				regular	regular	brown	4x3
a1913/ 11.223z /1	Dokkum - Berg Sion	Wool	2/2 plain twill	10x7	z/s				fine, regular	regular	dark brown	31x20
a1913/ 11.223z /2	Dokkum - Berg Sion	Wool	2/2 plain twill	8x8	z/s				a bit irregular	regular	dark brown	11x6
a1913/ 11.223z/ 3	Dokkum - Berg Sion	Wool	2/2 diamond twill	8x5	z/s	diamond twill. Pattern repeat not visible due to felted surface				a bit irregular	dark brown	11x9
a1913/ 11.223aa	Dokkum - Berg Sion	Wool	2/2 herringbone/ chevron twill	10x10	z/z	change of direction after 60 weft threads.			very dense	regular	brown	29x12
a1913/ 11.223cc	Dokkum - Berg Sion	Wool	2/2 diamond twill	10x10	z/s	diamond twill, pattern repeat 22/24			regular	regular	dark brown	12x10
a1913/ 11.223dd	Dokkum - Berg Sion	Wool	??	?x?	z/s					regular	dark brown	7x14
a1913/ 11.223ff	Dokkum - Berg Sion	Wool	2/2 diamond twill	6x6	z&s/z	spin-pattern in warp: very irregular alternation of z's and s's (2-4). S possibly lighter than z.			irregular	irregular	dark brown	11x8
a1913/ 11.223gg	Dokkum - Berg Sion	Wool	2/2 plain twill	11x9	z/s				coarse, irregular	irregular	brown	9x14
a1913/ 11.223hh	Dokkum - Berg Sion	Wool	2/2 diamond twill	12-14x11-12	z/s	diamond twill, pattern repeat 20/22			fine, regular	regular, smooth	brown	
a1913/ 11.223ii	Dokkum - Berg Sion	Wool	2/2 diamond twill	10-11x12	z/s	pattern repeat not visible			regular	regular	dark brown, trace of red	
a1913/ 11.223bb	Dokkum - Berg Sion	Wool	2/2 plain twill	10x8	z/s				regular	regular	brown	31x25
a1913/ 11.223ee /1	Dokkum - Berg Sion	Wool	2/2 diamond twill	8x7	z/s	diamond twill, pattern repeat 20/?			regular	regular	black	14x20
a1913/ 11.223ee /2	Dokkum - Berg Sion	Wool	2/2 diamond twill	12x9	z/s	diamond twill, pattern repeat 10/16			regular	regular	brown	10x>10
a1913/ 11.223ee /3	Dokkum - Berg Sion	Wool	2/2 plain twill	8-9x8	z/s				regular	regular	brown	>5x12
a1913/ 11.229/1	Dokkum - Berg Sion	Wool	Tabby	14x8	z/s				open	regular	brown	ca. 10x10
a1913/ 11.229/2	Dokkum - Berg Sion	Wool	2/2 plain twill	9-10x8	z/s				regular	regular	brown	

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913/ 11.223y /4	medium-high	low	0.5-1	0.5	1				
a1913/ 11.223z /1	medium	medium	1	0.75	1	Various stitching	8b	Sewing thread 2zS, 1mm.	Repair piece. See a1913/11.223y/1.
a1913/ 11.223z /2	medium	medium	0.75	0.75	1				
a1913/ 11.223z/ 3	high	high	1	1-2	1				Main weave with seam to 2nd piece and 1 repair piece sewn onto it.
a1913/ 11.223aa	medium	medium	1	0.75-1	1				../2 is coarser and more irregular than ../1.
a1913/ 11.223cc	medium	medium	1	1	1				Repair piece
a1913/ 11.223dd	medium	medium	0.75	0.75	1				
a1913/ 11.223ff	medium-high	low-medium	1	1-1.5	1	Hem	13a	Whip stitches every 5mm. Sewing thread: double thread z.	
a1913/ 11.223gg	medium-high (overtwist)	medium-high (overtwist)	1	0.75	2	Various stitching	3, 13a	Sewing thread: double thread s, 0.75mm.	Fabric is badly decayed. Pattern and thread count not visible.
a1913/ 11.223hh	medium	medium	0.75-1	0.3-0.5	2	Seam	8	one side sewn in whip stiches, other side decorative backstitch. Sewing thread: double thread s, black, 0.75mm.	
a1913/ 11.223ii	medium-high	medium	0.3-0.5	0.3-0.5	2	Seam	6a	Whip stitches every 1.4cm. Double thread z 0.3mm	
a1913/ 11.223bb	medium	medium	0.5	0.75	5				
a1913/ 11.223ee /1	medium	medium	1-1.5	1	1	Various stitching	6c	Sewing thread: double thread z, 0.5mm	
a1913/ 11.223ee /2	medium-high	medium	0.75	0.75	1	Attach-ment			
a1913/ 11.223ee /3	medium	low-medium	0.5-1	1	1	Attach- ment			Main weave with 2 pieces sewn onto it. See memo for further details
a1913/ 11.229/1	medium	medium	0.3--0.5	0.5	1				See a1913/11.223ee/1 for further details
a1913/ 11.229/2	medium	medium	0.75	0.75	1				See a1913/11.223ee/1 for further details

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
a1913/ 11.231	Dokkum - Berg Sion	Wool	2/2 diamond twill	16x15	z/s	irregular pattern repeat						30x26
a1912/ 3.34	Dokkum - Berg Sion	Wool	2/1 or 2/2 twill	4x2	z/s							
WD 375.3.1	Dorestad	Wool	2/2 herringbone/ chevron twill	6x3	z/s		selvedge, pattern goes up to the edge.	red and yellow, (probably dyes from environ- ment)	irregular with thin and thick threads	irregular weft	dark brown	
fabric 2	Dorestad	Wool	2/2 plain twill	12x11	z/s					thin warp, thick weft	brown	17,5x15,5
Fabric 3	Dorestad	Wool	2/2 herringbone/ chevron twill	13x12	z/s					thin warp, thick weft		21x19
a1913/ 11.233	Kimswerd	Wool	2/2 plain twill	6x4-5	z&s/z	Spin pattern in warp: using z- and s-spun threads in irregular pattern. Also double z-threads used in warp. No regular pattern.	tubular selvedge on 1 fragment		irregular	regular	brown	16x20
1910/I .195/1	Klooster- wijtwerd	Wool	2/2 plain twill	5x5	z/s							
1910/I. 195/3a	Klooster- wijtwerd	Wool	2/2 diamond twill	12x9	z/s	diamond twill, pattern repeat 12/18			open	regular	Brown (originally brown wool)	13x12
1910/I. 195/3b	Klooster- wijtwerd	Wool	2/2 diamond twill	13- 14x12- 14	z/s	diamond twill, pattern repeat 12x18	starting border of tablet weave (5 tablets)		fine, regular	regular, fine	brown	
1910/I. 195/4	Klooster- wijtwerd	Wool	2/2 diamond twill	10- 11x8-9	z/s	diamond twill, pattern repeat 12/18			regular	irregular	Brown (originally brown wool)	17x25
1939-IV. 13A/5	Leens	Wool	2/2 plain twill	8x6	z/s				coarse, dense	regular	dark brown	35x5
1939-IV. 13A/6	Leens	Wool	2/2 plain twill	12x10	z/s				a bit irregular	regular	dark brown	4x5
1939-IV. 13A/7	Leens	wool	tabby	10x9	z/z				fine weave	very fine	light brown	2x2-10x10
1939- IV.27/8	Leens	Wool	2/2 diamond twill	9x8	z/z	diamond twill, pattern repeat 18/18			regular	regular	dark brown- black	30x11

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
a1913/ 11.231					1				Textile still attached to clay.
a1912/ 3.34					1				Textile still attached to clay.
WD 375.3.1	medium	low-medium	0.5	1-3	2			Sewing thread: 2zS, 1.5-2mm; rough irregular whip stitches 4-8mm.	
fabric 2					1				
Fabric 3					1	Various stitching			
a1913/ 11.233	medium	high	1	1	2	Seam	2	Whip stitches every 1.5 cm. Sewing thread 2zS, 2mm.	
1910/I .195/1					1	Various stitching			
1910/I. 195/3a	medium	medium	1	1	2	Various stitching	8b	Sewing thread: 2zS, 1mm.	
1910/I. 195/3b	high	medium	0.4	0.5	1	Attach- ment		Edges are folded inwards and attached with whip stitches every 7mm. Sewing thread: double thread z-twisted, 1mm (each).	Fabric is rolled up to a ribbon of 1.5cm wide and sewn together. Used as a carrying-rope for a basket (?).
1910/I. 195/4	high	high	0.5-0.75	0.75-1	1				
1939-IV. 13A/5	medium-high	medium	1	1.25	1	Hem	14d	Sewing thread: double thread z-twisted 0.5mm wool.	Piece is sewn onto 1910/I.195/3a.
1939-IV. 13A/6	low-medium	low	0.5	1	1				
1939-IV. 13A/7	medium	medium	0.2-0.3	0.2-0.3	10				
1939-IV.27/8	medium-high	medium	0.75	0.75	1	Hem	14a	Whip stitches every 1cm. Sewing thread D.br.-bl. wool, 2zS, 1mm.	

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
1939-IV.27/9	Leens	Wool	2/2 plain twill	4-6x4-6	z/z		2 fragments have border (sel vedge?) of tablet weave (3 cards). Warp of border is Z-twined threads, diameter 2mm, light brown. Irregular card weave		coarse, irregular	irregular: thick and thin threads	dark brown	
1939-IV.186	Leens	Wool	2/2 plain twill	3x2	z/s				very coarse	irregular	brown	24x3
1939-IV.23	Leens	Wool	2/2 plain twill	7x4.5	z/s	warp black, weft brown, creating a woven pattern	Both fragments have a border of 4 tablets, black threads, z-twisted (medium-high), fine threads of 1mm		regular	regular	brown and black	3x15
1939/ IV.37-1	Leens	Wool	2/2 plain twill	8x8	z/z				regular, dense	regular	dark brown, trace of red	46x29
1939-IV.37/2	Leens	Wool	2/2 plain twill	7-8x7-8	z&s/z	spin pattern in warp: 2z, 2s, 2z, 2s etc.			regular	irregular	brown	11x10
1939-IV.13/1	Leens	Wool	Tabby	8-9x 12-13	z/z				regular	regular	brown	10x8; 6x2
1939-IV.13/4	Leens	Wool	2/2 diamond twill	20x12	z/s	diamond twill, pattern repeat 12/18			many faults		black	
1939-IV.13/5	Leens	Wool	2/2 plain twill	7-8x5	z/s		Selvedge is partly preser-ved: not different from rest of weave: 2/2 twill goes right up to the edge of fabric. Selvedge is not re-inforced.		irregular	irregular		20x14
1939-IV.13/6	Leens	Wool	2/2 diamond twill	10x10	z/s	pattern repeat not visible			regular, dense	regular	brown	6x6
1939-IV.13/8a	Leens	Wool	2/2 diamond twill	16x16	z/s	fragment too small to count pattern repeat.			regular, dense	regular	Brown	3x2

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
1939-IV.27/9	medium	medium	1-2	2	13	Seam	2	Sewing thread: 2zS and double thread 0.3-0.5mm.	Very open, gauzelike weave frayed, badly preserved, fragile
1939-IV.186	medium-high	low	1.5-3	3	1				
1939-IV.23	medium-high	medium-high	1.5	2	2				Some pieces were folded double. In between folds were feathers.
1939/IV.37-1	medium-high	medium-high	0.75-1	0.75-1	1	Seam	3	Sewing thread: l.br. 1-2mm, z-twisted.	
1939-IV.37/2	medium-high	medium-high	1-1.5	0.75-1.5	2	Various stitching			Pottery with ear, strips of fabric looped through ear.
1939-IV.13/1	medium	medium	0.3	0.3	2				Fragment is sewn together with 1939-IV.37/2.
1939-IV.13/4					1				
1939-IV.13/5	medium	medium	0.75-1.5	1.5	1	Hem	14a	Whip stitches every 1.5 cm. Sewing thread: single thread z-spun, 1mm.	Very open gauzelike weave
1939-IV.13/6	medium	medium	0.75	0.75	1				
1939-IV.13/8a	medium-high	medium-high	0.5	0.5	1	Various stitching			

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
1939-IV.13/8b	Leens	Wool	2/2 plain twill	20x12	z/s						Brown	5x3
1939-I V.13/8c	Leens	Wool	2/2 plain twill	8x10	z/s						Brown	4x3
1939-IV.13/9	Leens	Wool, fine and soft.	2/2 diamond twill	12-13x8	z/s	diamond twill, pattern repeat 16/18					Brown	5x10
1939-IV.13/10	Leens	Wool, fine and soft with some hard fibres (Schla-bow: Bergs-chaf-wolle)	??	?x?	z/s				coarse		Brown	
1939-IV.18/1	Leens	Wool (Schla-bow 1976: Bergs-chaf-wolle)	2/2 plain twill	5x4-5	z/s			dyed black or darkgray		regular	black	18x11
1939-IV.18/2	Leens	Wool (Schla-bow 1976: Bergs-chaf-wolle)	2/2 plain twill	4-5x4	z/s				coarse	irregular	Brown	19x3
1939-IV.27/1a	Leens	Wool	2/2 plain twill	3-4x3-4	z/z				coarse	Coarse	Brown	9x11
1939-IV.27/2	Leens	Wool	2/2 diamond twill	13-14x16	z/s	Diamond twill, pattern repeat 20/18			fine, regular	??	brown	9x11
1939-IV.27/3	Leens	Wool, Hairy Med-ium, original-ly black (with a bit of white)	2/2 plain twill	8x5	z/z			no detected	coarse, but regular	regular	brown	21 cm long, Ø 24cm
1939-IV.27/4	Leens	Wool	2/2 diamond twill	8x7-8	z/z	diamond twill, pattern repeat 32/30			open, regular	regular	brown	15x4

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
1939-IV.13/8b	low	low-medium	0.3	0.75	1				
1939-I V.13/8c	medium	medium	0.3	0.75	1				
1939-IV.13/9	medium-high	low-medium	0.75-1	0.75-1	1	Various stitching			Weft much thicker than warp. Fragment is very frayed.
1939-IV.13/10	medium	low	2-3	2-3	1				Open weave. Fragment is very frayed.
1939-IV.18/1	medium	medium	2-3	2-3	1	Various stitching			Remnant of sewing thread: d.brown-black; 2mm 2zS
1939-IV.18/2	medium	low	1-6	3	1	Hem	13a		Very coarse weave, bind not visible.
1939-IV.27/1a	high	high	2	1.5-2	1	Various stitching		Sewing thread: 2mm, dark brown, 2zS.	Thick piled fabric. Long threads have been sewn onto the surface of fabric. Threads are 25 cm long and 1-1.5mm thick, S-twisted (over-twisted).
1939-IV.27/2					1	Various stitching			
1939-IV.27/3	medium	medium	1	1	1	Various stitching	14a	Sewing thread 1.5mm, 2zS.	A tablet weave has been sewn onto the edge of the fabric. See Leens-IV.27/1b.
1939-IV.27/4	low-medium	low-medium	0.75-1	0.75-1	1	Hem	13a	Whip stitches every 8mm. Sewing thread 1mm 2zS.	2 sides have been folded back and sewn with twined black thread.

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
1939-IV.27/5	Leens	Wool	2/2 plain twill	4-5x4	z/z					irregular	Brown	15x3
1939-IV.27/6	Leens	Wool	2/2 plain twill	8-9x8	z/s				open	regular	Brown	
1939-IV.27/7	Leens	Wool	tabby	8x4-5	z/z				irregular, open, full of faults.	irregular	black	12x18
1939-IV.37/1	Leens	Wool	2/2 diamond twill	13x8-9	z/s	diamond twill, pattern repeat 20/18			regular, dense	regular	dark brown-black	20x4
1939-IV.37/2	Leens	Wool	2/2 plain twill	5x4-5	z/s					regular	black	20x10
1939-IV.37/3	Leens	Wool	2/2 diamond twill	?x?	z/s	pattern repeat not visible due to bad preservation			coarse, irregular	irregular	dark brown	5x5
1939-IV.37/4a	Leens	Wool	2/2 plain twill	11x8	z/s				regular	regular	black	10x3
1939-IV.37/4b	Leens	Wool	2/2 plain twill	5x4-5	z/s					regular	black	5x6
1939-IV.37/5	Leens	Wool	2/2 plain twill	8x7	z&s/z	Warp alternating z & s: 2z, 2s, 2z, 2s, etc.			irregular, dense	regular	dark brown	6x6
1939-IV.37/6	Leens	Wool	2/2 plain twill	5x4-5	z/s					regular	black	5x4
1939-IV.37/7	Leens	Wool	2/2 diamond twill	11x8	z/s	diamond twill, pattern repeat 20/18					black	8x4
1927/VI.2/1	Leens	Wool, hairy/hairy medium, original-ly black	2/2 diamond twill	20x15	z/s	diamond twill, pattern repeat 12/18		no dye detected	regular, dense	very fine		14x35; 7x24

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
1939-IV.27/5	high	low-medium	1-2	1-2	1	Hem	13a	Hem 1.5 cm wide. Whip stitches every 1.2 cm. Sewing thread black, 2mm, 2zS	Piece is sewn into a tubular shape which becomes narrow at the end. Sleeve or bag?
1939-IV.27/6	medium	medium	1	1	1	Various stitching	13a	13a: whip stitches every 1 cm. Sewing thread 2zS, 1.5mm.	Open weave.
1939-IV.27/7	low-high	low-high	0.5-1	0.5-1	1	Seam			
1939-IV.37/1	medium-high	medium	0.75-1	1	1	Various stitching	13a	Whip stitches every 5mm. Sewing thread: 2zS 1.5mm (low twist, medium twine).	Garment has been repaired on a few places: edges have been folded inwards and repair pieces are placed on inside and attached with whip stitches every 1-1.5 cm. Sewing thread: 2mm thick, 2zS. Repair pieces are not visible for analyses due to the fact that piece is attached to frame.
1939-IV.37/2	medium	medium	2-3	2-3	1				Sewing thread not visible.
1939-IV.37/3	medium	low-medium	0.75-1	1-1.5	1				Along edge some sewing thread but piece is attached to cardboard so not possible to examine. Probably remnant of seam, not hem.
1939-IV.37/4a	low-medium	low-medium	0.75	0.75	1	Seam			Same fabric as 1939-IV.18/1! Thick fabric, heavily felted. Long threads have been sewn onto the surface of fabric. Threads are 25 cm long and 1-1.5mm thick, S-twisted (over twisted). Threads are folded double and sewn onto fabric.
1939-IV.37/4b	medium	medium	2-3	2-3	1				Very badly preserved, thread count not to be measured.
1939-IV.37/5	z:medium-high; s: low-medium	medium-high	0.75-1	1	1				Piece is remnant of seam, folded double and sewn together.
1939-IV.37/6	medium	medium	2-3	2-3	1				Same fabric as 1939-IV.18/1!
1939-IV.37/7					1	Hem			
1927/VI.2/1	high	medium	0.4	0.2-0.3	2	Emb-roidery	7	Sewing thread: 2zS, 1mm.	Same fabric as 1939-IV.18/1! Very badly preserved

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
xx	Leens	Wool	2/2 diamond twill	10x8-10	2zS/ 2zS	Diamond twill, pattern repeat not visible due to decay of threads				regular	brown	14x12
b1930/ 12.34/1	Leens	Wool	2/2 diamond twill	13-14x11-13	z/s	diamond twill, pattern repeat varies: 12/18, 14/18, 12/16. very irregular weave			irregular	fine	brown	17x13, oval
b1930/ 12.34/2	Leens	Wool	2/2 diamond twill	12-13x12-13	z/s	diamond twill, pattern repeat 12/18			regular	regular	brown	51x11
GM1939 /IV:13/1	Leens	Wool	2/2 diamond twill	12x9	z/s							
GM1939 /IV:13/2	Leens	Wool	2/2 diamond twill	8x7	z/s							
1939/ IV:13/3	Leens	Wool	2/2 diamond twill	10x10	z/s							
a1934/ 11.7	Menaldum	Wool	??	?x?	2zS/ 2zS					regular	light brown	1x2 - 7x2
00049-1	Middelburg	Wool	2/2 diamond twill	13x12	z/s	diamond twill, pattern repeat 12/10			regular, dense	regular	black	length 32.5; 22 cm diamtr

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
xx	low twist, medium twine	low twist, medium twine	1-1.5	1-1.5	1	Stitching			Piece was not available for research.
b1930/ 12.34/1	low-medium	low-medium	0.5-0.75	0.5	2	Emb-roidery	10c, 4a, 14	4a & 10c: blanket stitches every 5mm, Sewing thread 2zS, 0.75 (red?). Decorative stitch: 2zS 1mm. 14: hem secured with blanket stitches every 4-5mm and row of back stitches every 3mm.	Embroidery: heavy braid chain stitch.
b1930/ 12.34/2	medium	medium	0.5-0.75	0.5-0.75	1	Embr-oidery			Stripes have been stitched on every 1.5 cm (roughly interspaced). Stitches: whip stitches 3-5mm. Sewing thread:2zS, 1.5mm. Fabric looks like Ezinge-fabrics. Find circumstances are not certain!
GM1939 / IV:13/1					1	Various stitching			Pillbox-cap or -hat. This SFnr. is the upper part of the hat, consists of 2 equal parts. B1930/12.34/2 is side panel of same hat. Upper part of hat consists of 2 equal parts, length 17 cm, total width of upper part 13 cm.
GM1939 / IV:13/2					1				See b1930/12.34/1, weave is much more regular than b1930/12.34/1, different fabric.
1939/ IV:13/3					3				Cap: consist of 2 parts sewn together at the front and back. Crown is attached to sides with 5mm wide (whip) stitches. Seam allowances are secured on inside with 5mm wide stitches. Bottom seam is folded twice and coarsely secured with whip stitches
a1934/ 11.7	(low)low-medium	(low)low-medium	1.5	1.5	2				2nd side of hat, see 939/IV:13/1 for further details
00049-1	medium	low	0.5	0.5-0.75	1	Various stitching	14d	Whip stitches every 8-10mm, sewing thread z 1mm	Crown of hat, consists of 3 strips. See 939/IV:13/1 for further details.

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
00049-2	Middelburg	Wool	2/2 diamond twill	20-22x12	z/s	Diamond twill, pattern repeat 12/10	selvedge on 4 fragm- ents. Along 1 selvedge a thick s-twined thread is worked ir-regularly into the fabric. The other selvedges are made of 5 weftth reads l.brown 2zS, 1mm. Weft goes directly back into the weave.				black	17x20
00049-3, -4 & -5	Middelburg	Wool	2/2 cross twill (Kreuzköper)	8x6	z/s	cross twill (Kreuzköper), Pattern repeat 4/4	00049-3 has a selvedge: weft goes directly back into fabric, no re-inforced selvedge.		thick, dense fabric	a bit irregular weft	brown	15.5x17, 13.5x6, 11x8
00049-6	Middelburg	Wool	2/2 cross twill (Kreuzköper)	11x8	z/s	cross twill (Kreuzköper), pattern repeat 4/4			regular	a bit irregular	brown	12x23
00049-7 & -8	Middelburg	Wool	2/2 cross twill (Kreuzköper)	8x9	z/s	cross twill (Kreuzköper), pattern repeat 4/4	1 selvedge: not re-inforced, weft goes directly back into fabric.		regular	regular	brown	8x9; 13x13
00049-9	Middelburg	Wool	2/2 cross twill (Kreuzköper)	12x?	z/s	cross twill (Kreuzköper), pattern repeat 4/4			regular	irregular	brown	6.5x17
00049-10	Middelburg	Wool	2/2 cross twill (Kreuzköper)	16x6	z/s	cross twill (Kreuzköper), pattern repeat 4/4			regular, dense	regular	brown	16x10
00049-11	Middelburg	Wool	2/2 cross twill (Kreuzköper)	12x8	z/s	2/2 cross twill (pattern repeat 4/4			regular	regular	light brown	12x39
00049-12	Middelburg	Wool	2/2 diamond twill	10x8	z/s	diamond twill, pattern repeat not visible due to rips in fabric				regular	light brown	7x7

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
00049-2	medium	low-medium	0.3-0.5	0.75	8	Various stitching		running stitches, length 4mm. Sewing thread 2zS, black.	Fabric is nearly fallen apart, weave could not be analysed. Fabric seems similar to Ezinge-fabrics.
00049-3, -4 & -5	medium	low	1	1-3	3	Seam	13a, 14a	13a: whip stitches every 1cm. Sewing thread z 1.5mm.; 14a: whipstitches every 1cm. Sewing thread double thread z, 0.75-1mm.	Part of sleeve.
00049-6	low-medium	low	0.5	1-1.5	3	Seam	3	sewing thread: 3 threads z-spun 0.75mm	6 small fragments sewn together. 2 fragments sewn together in tube. All pieces remains of sleeve. 6 fragments consist of 2 side panels and 1 gusset sewn in between. One of the side panels consists of several pieces sewn together. After that gusset was sewn.
00049-7 & -8	medium	low	0.5-0.75	1	2	Various stitching			
00049-9	medium-high	medium-high	0.75	1-1.25	1	Hem	14a	whip stitches every 8mm. Sewing thread: 2zS.	3 fragments sewn together: middle fragment is gusset.
00049-10	medium	high	0.5-0.75	1	1			Sewing thread double thread z, 0.5mm.	Remains of sewing thread 2zS (1,5mm) in long running stitches along warp.
00049-11	medium	low-medium	0.5	1.25	1				
00049-12	medium	medium-high	0.5-0.75	1	1	Various stitching			

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
00049-13	Middelburg	Wool	2/2 diamond twill	20x12	z/s	diamond twill, pattern repeat 12/10			very fine and regular	regular	dark brown	3x9
00049-14	Middelburg	Wool	2/2 diamond twill	20x14	z/s	diamond twill, pattern repeat 12/10			very fine and regular	regular	brown	11x4 - 18x18
00049-15	Middelburg	Wool	2/2 diamond twill	18x13-14	z/s	diamond twill, pattern repeat 12/10			a bit irregular	a bit irregular	dark brown	32x12
V. Giffen, nr.784	Ooster-wijtwerd	Wool (fine)	2/2 plain twill	5x5-6	2zS/ 2zS				regular	regular	light brown	24x27
b1913/ 11.233	Ooster-wijtwerd	Horse hair	Tabby	10x8	z/z							
Rasquert _z.n.4	Rasquert	wool	2/2 herringbone/ chevron twill	7x7	z/s	chevron twill, pattern repeat 52			regular	regular		16x11
Rasquert _z.n.1	Rasquert	Wool	2/2 diamond twill	12-13x8	z/s	diamond twill, pattern repeat 24/18			regular	regular	dark brown	10x16
Rasquert _z.n.2	Rasquert	Wool	2/2 diamond twill	14x11	z/s	Diamond twill, pattern repeat 24/18			regular	regular	dark brown	10x10 - 16x10
Rasquert _z.n.3	Rasquert	Wool	2/2 plain twill	?x?	z/s				dense	regular	dark brown	
GM1928 /VIII:1	Rasquert	Wool	2/2 diamond twill	17x9	z/s	diamond twill						
Z.n.1	Sellingen/ Zuidveld	Wool	2/2 diamond twill	10-11x10	z/z	diamond twill, pattern repeat 20/18			irregular	irregular	red brown	15x15
Z.n.2	Sellingen/ Zuidveld	Wool	2/2 diamond twill	9-10x 8-10	z/z	diamond twill, pattern repeat 20/18	Selvedge in table tweave (3 tablets). Weft threads have been knotted together outside table tweave and not sewn back into the fabric.		regular	regular	redbrown (originally white)	9x14; 24x33
Ulrum	Ulrum	wool	2/2 lozenge twill	6x6	z/s				regular	regular	light brown	

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
00049-13	medium	medium	0.5	0.5	1				
00049-14	medium	medium	0.5	0.5-0.75	5	Hem	13a	small whip stitches that are not visible on the outside. Sewing thread 3 single threads z 0.5mm.	Remains of black sewing thread along 1side = remains of seam or hem. Sewing thread 2zS 1.5-2mm.
00049-15	medium-high	low-medium	0.5	0.5	1				
V. Giffen, nr.784	low twist, medium twine	low twist, medium twine	1.5	1.5	1				
b1913/ 11.233					1				Has same properties as 00049-14 but is less regularly made.
Rasquert _z.n.4	medium-high	medium	1.5	1.5	1				Very frayed and decayed. Weave looks similar to Ezinge-weaves.
Rasquert _z.n.1	medium	medium	0.75	0.5-0.75	1	Various stitching	14a	Whip stitches every 1.5cm. Sewing thread: 2zS, 2mm.	Schleiergewebe; threads plied from 2 hairs. Fabric not in collection RMO any more
Rasquert _z.n.2	medium	medium	1	1	5	Seam	10a, 10b	Stitch length 5mm; Sewing thread: 2zS, 1mm.	
Rasquert _z.n.3	medium	low	1	1	1	Seam			Fabric is sewn together with Rasquert z.n.3. Description seam: see z.n.3
GM1928 / VIII:1					1	Various stitching	5		
Z.n.1	medium-high	medium-high	0.3-0.5	0.5-1	1				
Z.n.2	medium-high (overtwist)	medium-high (overtwist)	0.75-1	0.75-1	2	Attachment			Cap consists of crown (2 parts) and a peak at the front. Bottom seam: 8mm seam allowance folded back and sewn on the inside with whip stitches. Seam is further stitched down with a row of back stitches at 2 mm from the bottom of the seam. Crown and peak are attached with decorative stitches in red yarn, S-twined.
Ulrum					1	Seam			Z.n.2 is sewn onto this pieces

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
G2008-1.8	unknown, prov. Groningen	wool	2/2 plain twill	12x8	2zS/ 2zS				regular	regular	brown	2x2 - 10x15
1921/I.75	Westeremden	Wool	2/2 diamond twill	14-15x12	z/s	diamond twill, pattern repeat 20/18			fine, regular	regular	brown	16x25
1921/ I.76a	Westeremden	Wool	2/2 diamond twill	12x10	z/s	diamond twill, pattern repeat 16/18			irregular	irregular	brown	13x14
1921/ I.76b	Westeremden	Wool	2/2 diamond twill	12-13x10	z/s	diaond twill, pattern repeat 20/26	Tubular selvedge		fine, regular	a bit irregular	Brown	8x13
1921/ I.76c	Westeremden	Wool	2/2 plain twill	8x6	z/s				coarse, but regular	regular	Brown	2.5x13
1921/I.77	Westeremden	Wool	2/2 diamond twill	9x7	z/s	diamond twill, pattern repeat 24/18			irregular, dense	irregular	Brown	9x9
1930/I	Westeremden	Wool	2/2 diamond twill	8x7-8	z/s	diamond twill, pattern repeat 20/18. Warp and weft have different color which makes the diamond pattern very clearly visible.	Tubular selvedge (12 threads).		regular	irregular	brown	6x8; 5x12
1930/2a	Westeremden	Wool	2/2 diamond twill	10x8	z&s/s	Diamond twill, pattern repeat 20/18 Spin pattern in warp: .. 4s-3z-2s-2z-4s-2z-2s-2z-4s-2z-36s…			dense	regular	brown	12x11 (2x)
1930/2b	Westeremden	Wool	2/2 diamond twill	16x12	z/s	diamond twill, pattern repeat not visible.		dyed brown (Schlabow 1976)	fine weave	regular	brown	2x3

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
G2008-1.8	low twist, medium-high twine	low twist, medium-high twine	0.7	0.7	8	Stitching			Piece is attached onto z.n.1. Edges are roughly folded back and attached with small but widely spaced whip stitches (every 1.4cm). Sewing thread: single z-spun, 1mm, red brown. On top of this piece an oval fragment (4x6) has been sewn (which is now nearly gone). Only whipstitches and a few threads remain. Sewing thread: light brown 2zS, 1.5mm. Whip stitches every 7-8mm
1921/I.75	medium-high	low-medium	0.5	0.5	2	Seam	6a	Sewing thread: 2zS, 1.5 mm.	Remnant of seam: edge is folded 3 times. Sewing thread nearly all disappeared. Very badly preserved, fragile.
1921/ I.76a	medium-high	medium	1-1.5	1	1	hem	14a	Whip stitches every 1cm. Sewing thread 1mm 2zS, wool.	Every 1.5 cm a decorative row of stitches is applied with 2zS thread 2mm wool. Frayed and decayed.
1921/ I.76b	medium-high	medium	0.75	0.75	1	Attach-ment		Whip stitches every 7mm. Sewing thread: wool, 1.5mm, 2zS.	2 pieces of same fabric sewn together. Both pieces have warp and weft in same direction: fabrics are sewn on the straight.
1921/ I.76c	medium-high	medium	1	1	1	Seam	9	Whip stitches every 8-9mm. Sewing thread: wool, 2zS, 1.5mm.	
1921/I.77	medium	low	1.5	1-1.5	1				Piece is sewn onto 1921/I76a (repair piece)
1930/I	medium-high	low-high	1	1	2				
1930/2a	medium-high	medium-high	0.5	0.5	2	Various stitching	13a	Whip stitches every 0.7cm. Sewing thread 2zS (high twine), 1mm, wool.	
1930/2b	medium	medium	0.3	0.75	1	Attach- ment			

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
1930/2c	Westeremden	Wool	2/2 diamond twill	8x8	z/s	diamond twill, pattern repeat not visible. Warp and weft have different colors.			regular, dense	regular	warp: lightbrown, weft: darkbrown.	6x4; 9x4
1930/2d	Westeremden	Wool	2/2 diamond twill	8x8-9	z/s	diamond twill, pattern repeat 20/18			regular	a bit irregular	dark brown	13x21
1930/3a	Westeremden	Wool	2/2 diamond twill	10x10	z/s	diamond twill, pattern repeat 28/18	Starting border in tablet weave (3 cards)			regular	brown (originally light wool)	3x3 - 10x20
1930/3b	Westeremden	Wool	2/2 diamond twill	10x7-8	z/s	diamond twill, pattern repeat 20/18			fine, regular	regular	black	
1930/3c	Westeremden	Wool	2/2 diamond twill	7x8-9	z/s	diamond twill, pattern repeat 28/18. Pattern very well visible due to difference in color in warp and weft.				regular	Warp: light, weft: darkbrown	
1930/4	Westeremden	Wool	2/2 plain twill	17-18x11-12	z/s				fine, regular	regular	dark brown-black	5x6; 6x4
1930/5a	Westeremden	Wool	2/2 diamond twill	16x10-12	z/s	diamond twill, pattern repeat 20/18			fine, regular	regular	dark brown	12x15; 15x10
1930/5b	Westeremden	Wool	2/2 plain twill	10x8	z/s				regular	regular	brown (originally light wool)	9x5
1930/6a	Westeremden	Wool	2/2 diamond twill	8x7	z/s	diamond twill, pattern repeat 20/18			regular, dense	irregular	brown (originally light wool)	11x8
1930/6b	Westeremden	Wool	2/2 diamond twill	8x8	z/s	diamond twill, pattern repeat 20/18			regular	irregular	brown	10x2
1930/7	Westeremden	Wool	2/2 diamond twill	12-13x11	z/s	diamond twill, pattern repeat 20/18			regular	regular	brown	20.5x23.5

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
1930/2c	high	low	1	1	2	Attachment			1930/2b & c are sewn onto this piece.
1930/2d	medium	medium	0.75-1	0.75	1	Hem	14a	Sewing threads not visible because fabric is mounted on cardboard.	Small repair piece, sewn onto 1930/2a with whip stitches. Fragment is not sewn on the straight but at a 45º angle. Sewing thread: double thread 1mm, s-twisted (low).
1930/3a	medium	medium	1	1	8	Various stitching	6b, 14a	6b: sewing thread 2zS, 1mm. 14a: sewing thread double thread s-twisted, 1mm.	Pieces are sewn onto 1930/2a. Edge of 1.5 cm is folded outward and pieces are sewn onto main fabric with running stitches of 4mm. Sewing thread is same as hem of 1930/2a.
1930/3b	high	low-medium	0.5	0.75	1	Attachment			
1930/3c	medium	low-medium	1	1	1	Hem	15c		
1930/4	medium	medium	0.5	0.5	2	Seam	10b	Stitches every 5mm, sewingthread: 2zS, 1mm.	Piece is sewn onto 1930/3a. Edges are folded inward and piece is attached with whip stitches every 8mm. Sewing thread: 2zS, 1.5mm wool.
1930/5a	medium-high	medium	0.5-0.75	0.75-1	2	Various stitching	15a	small whip stitches every 5mm. Sewing thread 2zS (high twine), 1-1.25mm.	
1930/5b	medium	medium	1	1	1	Attachment			
1930/6a	medium-high	low-medium	0.75-1.5	0.75-1.5	1				Edge is tightly rolled inward, creating a very narrow hem of 6mm.
1930/6b	medium	medium	0.5-1.25	0.75	1	Hem	13a	Hem 0.5cm wide. Whip stitches every 0.5-0.8cm. Sewing thread: 2zS, dark brown, coarse fibres. Low twist and twine, 2mm thick.	Piece is sewn onto 1930/5a
1930/7	medium	medium	0.5	0.5	1	Attachment			

SF No	Site	Fibre	Weave	Thread Count	Spin	Pattern	Borders	Dye	Quality weave	Quality spinning	Color	Measure -ments (cm)
1930/8a	Westeremden	Wool	2/2 diamond twill	9x8-10	z/s	diamond twill, pattern repeat 32/30	Tubular selvedge (10 threads).		many faults, dense	regular	dark brown-black	21x16
1930/8b	Westeremden	Wool, hairy, orig-inally black	2/2 diamond twill	12x9	z/s	diamond twill, pattern repeat not visible due to bad preservation of fabric		no dye detected	a bit irregular	regular	black	
1930/9	Westeremden	Wool	2/2 diamond twill	11x10	z/s	diamond twill, pattern repeat 24/18			regular, dense	a bit irregular		24x30
1930/10	Westeremden	Wool	2/2 diamond twill	11x9	z/s	diamond twill, pattern repeat 20/18			regular, dense	irregular	dark brown	21x15
1926/ IX.29a	Westeremden	Wool	2/2 herringbone/ chevron twill	7-8x6-7	z/s	Chevrontwill, pattern repeat 52			irregular	irregular	brown	17x18; 13x18
1926/ IX.29b	Westeremden	Wool	2/2 diamond twill	11-12x10	z/s	diamond twill, pattern repeat 14/10 (?)			irregular, dense	irregular	brown	5x5 - 9x10
z.n.	Westeremden	Wool	Tabby	8-10x6	z/s				coarse, irregular	irregular	dark brown	19x9
1909/VII	Wierhuizen	Wool	2/2 diamond twill	10x8	z/s	fragment is too decayed to analyse the pattern repeat.			fine weave	bit irregular, thick and thin threads	black	10x10

SF No	Twist X	Twist Y	Thickness X (mm)	Thickness Y (mm)	N fragm.	Stitching	Type seam/hem	Details sewing	Comments
1930/8a	medium-high	medium	0.75-1	1	1	Attachment			
1930/8b	medium	medium	0.75-1	0.5-0.75	2	Various stitching			See 1930/8b
1930/9	medium-high (overtwist)	low	0.5-0.75	0.5-1	1				See 1930/8b
1930/10	low-high	low-medium	0.5-1	0.5-1	1	Hem	13a	hem 1.5 cm wide. Sewing thread not visible	1930/8b is main fabric but repaired several times. Pieces are attached with a row of whip stitches
1926/ IX.29a	medium-high (overtwist)	low-medium	1-2	1-2	2	Hem	14a	Whip stitches every 1-1.5cm. Sewing thread double thread, s-twisted, low twist, 0.5mm.	
1926/ IX.29b	medium-high (overtwist)	low-medium	1-1.5	0.75-1	3	Seam	8a	Whip stitches every 5mm, running stitches (length 3-4mm). Sewing threads: 2zS, 1.5mm and double thread s-twisted, 0.75mm.	
z.n.	low-medium	low-medium	1-1.5	1.5	1				
1909/VII	medium-high	medium-high	0.5-1	0.5-1	1				