

Fashioning the Viking Age

Final Project Report

1st of September 2018 – 30th of April 2023

Introduction

The 1st of September 2018, the *Fashioning the Viking Age* project, funded by THE VELUX FOUNDATIONS, was launched at the National Museum of Denmark (NM), Department for Ancient Cultures of Denmark and the Mediterranean. The project was a collaboration between NM and Centre for Textile Research, University of Copenhagen (CTR, UCPH) and Land of Legends, Lejre (LL). The general aim of the research and outreach project was to create new and archaeologically well-founded interpretations and reconstructions of Viking Age textiles and clothing.

The main participants in the project were:

- Ulla Mannering (UM), Project Leader, NM, working 80% for the whole period, funded with six months by VELUX and the rest by NM
- Charlotte Rimstad (CR), Project Coordinator, NM, working full-time for 45 months for the whole period funded by VELUX (excluding maternity leave).
- Eva Andersson Strand (EAS), Director of CTR, UCHP, working 30% for the whole period, funded with six months by VELUX and the rest by UCPH
- Ida Demant (ID), Leader of the Textile Workshop, LL, working full-time for 21 months funded by VELUX
- Irene Skals (IS), Conservator, NM, working part-time for the whole period funded with two months by VELUX and the rest of the time as Emerita
- Mads Lou Bendtsen (MLB), Curator, NM, working full-time for ten months funded by VELUX

The beginning of the project was officially celebrated the 30th of November 2018 with a lecture at the SAXO Institute at UCPH (EAS, CR, ID, IS) and a follow-up lecture was held at the same location the 25th of September 2019. Due to a delay because of the COVID-19 pandemic, the project was extended to 30th of April 2023. Generally, the COVID pandemic generated large periods of lock-down (2020-2022), causing most planned workshops and conferences during this period to be cancelled. Therefore, it was not until the final celebration of the project, the 14th of April 2023 in the King's Hall in LL, that all the project participants had the chance to see their work in its final stage and to meet the other participants for the first time. Around 80 guests, invites from the VELUX FOUNDATIONS, host and collaborating institutions, project participants from Denmark and abroad, family and project friends attended the event where tools, textile samples, the two outfits and publications were presented. The day underlined the fruitful collaboration between the three involved institutions that has characterised the project.



Project participants in the celebration on the 14th of April 2023. From the left to the right, back: Ulla Lund Hansen, Torben Sode, Kathrine Sode Vest, Mads Dengsø Jessen, Inger Heebøll, Mads Lou Bendtsen, Ida Demant, Jens Barnkob, Birgitte Kjelstrup, Søren Ravn, Lone Brøns-Pedersen, Åse Eriksen, Lise Ræder Knudsen, Luise Ørsted Brandt, Anne Batzer, Vivi Lena Andersen, Irene Skals, Anne Lisbeth Schmidt. Front row: Ulla Mannering, Charlotte Rimstad, Sigrid Mannering, Jakob Maarbjerg Toft-Hansen, Eva Andersson Strand, Arne Jouttijärvi (Photo: Ole Malling).

Project results

The *Fashioning the Viking Age* project consisted of three parts that were interlinked and produced knowledge to one another.

As many archaeological textiles are often small, poorly preserved and visually far from their original appearance, they can be hard for non-textile experts to understand and decode. The aim of **Project Part 1, Viking Age Textile Production** was therefore to make Viking Age textiles and textile production visible and tactile for a modern audience. This part took its starting point in analyses of known archaeological finds of textile tools and three textiles from the Viking Age settlement Hedeby in North Germany. In order to decide which three Hedeby textiles to reconstruct, we visited Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorf in Schleswig in September 2018. The Hedeby textiles are especially suitable for reconstruction purposes as they represent a great variety of textile techniques and types, and further a large part of them have been identified as fragments of known garment types, made for everyday use.

A formal collaboration agreement was signed with the museum and samples for fibre and dye analyses were taken from altogether 16 of the Hedeby textiles and felt items and the following three textiles were chosen for reconstruction:

- Sample I: H14, fragment of a dress in tabby
- Sample II: H2, fragment of a hose in 2/2 twill
- Sample III: H39AB, fragment of trousers in diamond twill/ herringbone twill



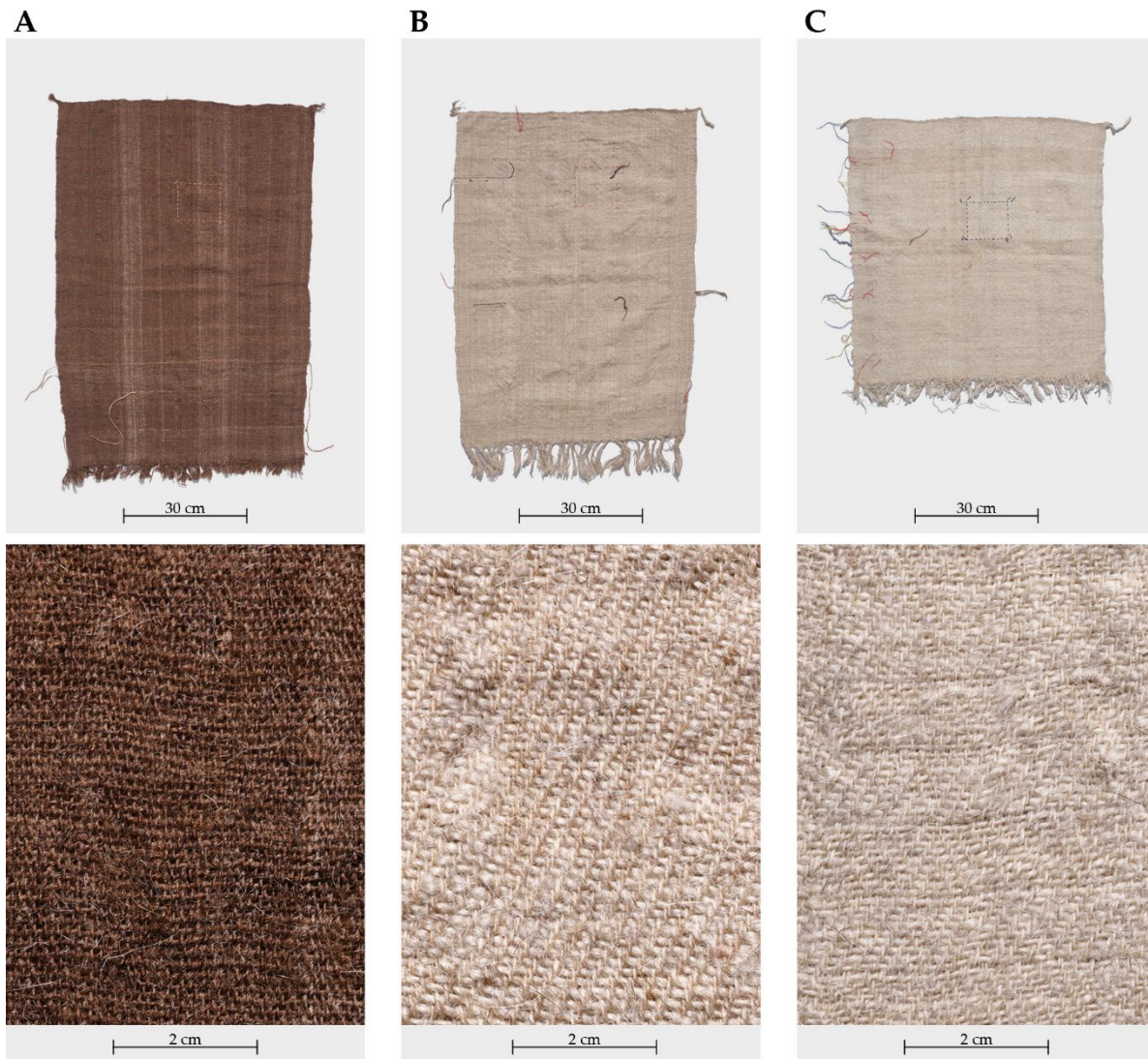
The three Hedeby textiles chosen for reconstruction (Photos: Charlotte Rimstad).

An important part of the project was to come as close to the original as possible. This was obtained via analyses of the archaeological textiles and by using fibres as close to the originals as possible. The fibre analyses showed in a comparison with wool qualities from nine modern primitive sheep breeds that the sampled Hedeby Viking Age wool textiles primarily have a fibre quality matching a modern Spelsau fleece.

Furthermore, it was essential to use tools reconstructed as precise copies of tools from a Viking Age context. Therefore, a substantial part of the project funding was allocated to producing the tools as well as to finding the best and most similar fibre material. By using controlled fibre sorting, spinning and weaving experiments, three textile samples measuring 60 x 60 cm were created that convey the tactile and visual appearance linked to the Viking Age cloth culture. Because of wear and tear, the three originals may have had a smoother surface that would give the textiles a slightly different texture and tactile effect. However, the conclusion is still that we are close to the touch and feel of the originals in their present state.

The project resulted in three samples, which all come very close to the originals that demonstrate the crucial importance of working with fibres and tools similar to those of the period and geographical area. One conclusion was that it would have been possible to produce these textiles in Hedeby with the tools from the site. Additionally, the making of the textiles has revealed the complexity of the production process, and further, shown that even if the same techniques are used, each type of fabric demands its own solutions.

Most of the work in Project Part 1 was documented with photographs supplemented with time-lapse camera for some of the work processes, this data can be used in future teaching and outreach projects.



The three finished textiles with close-ups of the weaves (Photos: Roberto Fortuna).

All tools produced and used are now stored in a chest and contains not just tools for spinning and weaving but also tools for other textile techniques such as tablet weaving, cutting and sewing. This is also an important result of the project. Together with the new textile samples the *Textile & Tool Box* will in the future be used for outreach purposes at universities and museums in order to give a “hands-on” feeling of Viking Age textiles and textile production. The *Textile & Tool Box* is now based in the CTR TexLab at University of Copenhagen.

Furthermore, this unique material and data will be used for future experiments and tests, and to some extent, this has already happened. Two further textiles have already been produced after specific archaeological textile finds from Hedeby. One test was set up to produce a legal unit of *vadmal* to get a better understanding of the weaving of a larger cloth. In another experiment, different weaving beaters were tested in relation to different weights of the loom weights. This was done to get a better understanding of the tool’s function and efficiency when weaving.

ID and EAS were responsible for Part 1 and worked on the project in the period 2018-2021. In the first two winter seasons ID, together with a range of helpers, worked in the Textile Workshop, LL, while the last part took place in the then newly established (autumn 2020) Textile Laboratory at CTR. The results from Project Part 1 were published in a book made by the project: Andersson Strand, E. & Demant, I. 2023. *Fibres, Tools & Textiles*. Fashioning the Viking Age 1. The National Museum of Denmark.



The finished Textile & Tool Box with some of its content such as wool combs, several spindle whorls and loom weights, a weaving sword, a wooden club, a scutching sword, a distaff, a wool winder, a pair of scissors, needles, and a fabric smoother (Photo: Roberto Fortuna).

The aim of **Project Part 2, Viking Age Male and Female Clothing** was to reconstruct two complete Viking Age outfits, based on textiles from the male grave from Bjerringhøj (also known as the Mammen grave) near Viborg in Jutland dated to AD 970-971, and the female grave from Hvilehøj near Randers in Jutland dated to the late 900s AD. Although the textiles from these two graves are fragmented, they are still larger and more well-preserved than what is the case in most Danish Viking Age graves.

UM and CR were responsible for Part 2 and worked primarily on the project in the period 2018-2020. The analyses of the archaeological textiles took place in the NM Conservation Department, Brede. All textiles went through technical analyses under the microscope and were photographed with different high-resolution camera techniques by Roberto Fortuna, NM. The 64 textile fragments of the embroidered textile

from Bjerringhøj were digitally puzzled together using the computer program Adobe Photoshop. This method has given ways to new interpretations of the textile design, for example by revealing a secondary use of the high-status textiles. Further, specialist analyses were carried out on the many different materials and details preserved in the two graves, including the many tablet-woven bands and the samite silk textiles. Tannage analyses were performed in order to determine if the skin and fur fragments were vegetable or fat tanned and ZooMS and PFM analyses as well as light-microscopy analyses were used for species identification. This work also included analysis of down and feathers as well as of the shoes in the Hvilehøj grave. The results were published in two joint articles (Brandt & Mannering 2021; Brandt et al. 2022), and more articles are planned for the future. More than 75 samples were taken for dye analyses to be analysed by Ina Vanden Berge (IVB) from the KIK-IRPA in Brussels. The results of all dye analysis made within the project will be published in joint articles. The first article was published in May 2023 in *Journal of Archaeological Science Reports* (Vanden Berghe et al. 2023).

Although the two graves, Bjerringhøj and Hvilehøj, are dated respectively by dendrochronology and typologically by a coin, samples for 14C-dating were analysed at the Department of Physics and Astronomy at University of Aarhus. The results confirmed the dating of the Bjerringhøj grave to AD 971, and placed the dating of Hvilehøj grave in the late part of 10th century or the early part of the 11th century AD. The 14C-datings are imperative to have when making science articles.

During the analysis of the two grave finds several parallel finds were screened for comparisons. During this work it was discovered that the human bones placed in a box labelled “C9166 Slotsbjergby” actually derive from the Bjerringhøj grave. The preserved bones fully match an old inventory description from 1872. Further, it could be confirmed that some of the textile fragments, still adherent to the bones, match the known textiles preserved from Bjerringhøj. The bones were analysed by Marie Louise Schjellerup Jørkov and Chiara Villa, Department of Forensic Medicine, University of Copenhagen, and confirmed that they belong to an adult male. This discovery was published in an article in *Antiquity* in 2021 (Rimstad et al. 2021) and became a worldwide distributed news story that generated a wide range of media posts.

In this project part it was decided to focus is on garment shape and visual details, and if possible, to cut corners in the production processes. However, it quickly turned out that almost all fabric qualities had to be produced within the project. High match in fibres, colours and other materials used for the reconstructions were prioritised, whereas the production processes could be optimized using modern tools. When no dye results were available, the choice of colour was based on best match with the overall design, adjusted to what colours that could have been present under the specific preservation conditions.

The male outfit included the following items: A beaver fur caftan, a linen tunic, a wool kirtle, a belt in wool and silk, a wool belt, a pair of trousers, two silk wrist cuffs and leather boots. The female outfit included the following items: A linen dress, a red wool tabby dress with in-woven decorations, a marten fur cape with beaver fur edges and decorations in padded red tabby silk, red samite, a purple 3/1 twill band and a blue silk/silver/gold tablet-woven band, and goat skin shoes with the fur still on. The leather boots and the linen undergarments were not based on archaeological finds from these specific burials but were based on comparative material. They were primarily constructed to make the outfits more comfortable to wear.

The two size models were continuously called in for fitting sessions of the different garments. Intern at CTR, Line Maria Mørch, created a beautiful sample book containing samples of all the elements used in the two outfits. The sample book and the two outfits are now kept in NM to be used for outreach purposes by UM and NM in general.

The results from Project Part 2 were published in the book made by the project: Mannering, U. & Rimstad, C. 2023. *From analysis to reconstruction*. Fashioning the Viking Age 2. The National Museum of Denmark.



Sigrid Mannering and Jakob Maarbjerg Toft-Hansen, dressed in the two reconstructed Viking Age outfits in the Kings Hall in Land of Legends, Lejre (Photo: Ole Malling).

During the work in Project Part 1 and 2 it was soon realised how important the match of the fibres between the original find and the reconstruction is to create a successful visual match. Therefore, the emphasis placed on fibre analysis was upgraded and Irene Skals (IS) took on a great responsibility in managing this part of the project. Altogether more than 94 fibre samples from Bjerringhøj, Hvilehøj and other comparative archaeological finds and samples of modern sheep breeds have been made during the project period.

The results of the fibre analyses made in Project Part 1 and 2 were published in a book made by the project: Skals, I. 2023. *Viking Age Wool Fibres*. Fashioning the Viking Age 4. The National Museum of Denmark. The other fibre analysis made within the project will be published in joint articles and are also an important steppingstone for future collaborations. NM decided in 2022 to train two conservators, Anders Henk and Annemarie Juul, to be able to perform these analyses in the future.

The aim of **Project Part 3, Viking Age Clothing and Textile Catalogue**, was to create an overview of the many different sources linked to Viking Age clothing design and textile production. The preserved archaeological sources consist of preserved skin and textile finds, but also jewellery and other accessories, iconographic sources, such as gold foil figures, pendants and tapestries, contribute with important knowledge about visual appearance and clothing combinations. Further important sources that we have tried to include are contemporary and later written sources, such as the Icelandic Sagas, various travel descriptions and chronicles, which will be presented by Tarrin Wills (TW) from UCPH, editor of the Dictionary of Old Norse Prose. All these sources will be gathered and presented in an easily accessible manner in a publication aimed to show and disseminate the variation of the Viking Age cloth culture and to

avoid garment stereotypes. In 2022 a questionnaire was launched at the project Instagram profile where the followers were asked about their expectations and wishes for such a publication. 46 people answered the questionnaire, hereof 77% women, 21 % men and 2% other. In 2023, a scientific board, consisting of ID (LL), Lone Brøns-Pedersen (LL) and Maria Ojantakanen from the Viking Age Village in Albertslund, was constructed in order help fulfilling the outcome and expectations of the intended readers and users.

CR is the main editor and author of this Project Part and worked primarily on the project in the period 2022-2023. Project Part 3 will be published in a book made by the project: Rimstad, C. et al. 2023. *Sources for Viking Age Clothing and Textile Production*. Fashioning the Viking Age 3. The National Museum of Denmark.

Researchers and crafts people

More than 50 researchers, scientists and very skilled crafts peoples have participated in the projects. Some were already employed at NM, while others came from collaborating institutions such as UCPH, the Technical University of Denmark and Aarhus University, or were conducted by independent researchers in Denmark. Other work and analyses had to be done abroad in Sweden, Norway, Czech Republic, Belgium and Great Britain.

Even to the non-textile-specialist it is easy to see that Viking Age skin and textile technology is exquisite and requires high degree of expertise. For the modern crafts peoples much experience was needed in order to produce similar quality item. Finding crafts people today with the same skills proved to be a challenge but was luckily not impossible. Further it is clear that the use of raw materials was valued over the use of working hours in the Viking Age. Fortunately, the generous budget granted for materials made it possible to hire experienced crafts people within the fields of spinning, weaving, dyeing, embroidering, braiding, pattern construction and pottery, wood and metal crafting, as well as experts in tablet weaving, needle binding, bead making, silk weaving, shoe making, fur tanning and sewing. We are grateful for the expertise and engagement of all the people participating in the project.

- Anders Henk, **Conservator**, National Museum of Denmark: fibre analysis
- Andreas Jæger Manøe Schäfler, **Student Assistant**, National Museum of Denmark: proof reading
- Anna Krog, **Student**, University of Copenhagen: intern at the National Museum of Denmark
- Anne Batzer, **Textile Dyer**, Denmark: dyeing of textiles
- Anne Drewsen, **Archaeologist**: intern at the National Museum of Denmark, proof reading
- Anne Lisbeth Schmidt, **Conservator**, National Museum of Denmark: microscopy of skin and fur
- Annemarie Juul, **Conservator**, National Museum of Denmark: handling of textile objects and fibre analysis
- Arne Jouttijarvi, **Materials Scientist**, Heimdal-archaeometry: analysis of iron and gold objects
- Bente Phillippsen, **Physicist**, National Museum of Denmark: sampling
- Bernard Gratuze, **Scientist**, University of Orléans, France: analysis of beads
- Birgitte Kjelstrup, **Seamstress**, Denmark: sewing of garments
- Carla Dove, **Zoologist**, Smithsonian National Museum of Natural History: analysis of feathers and down
- Carsten Gundlach, **Physicist**, Technical University of Denmark: CT/X-ray scanning
- Chiara Villa, **Forensic Anthropologist**, Department of Forensic Medicine University of Copenhagen: CT- scanning
- Claudia Baittinger, **Curator**, National Museum of Denmark: wood analyses
- Espen Kutschera, **Skin Craftsman**, Norway: shoe making
- Fria Gemynthe, **Textile Technician**, Land of Legends: embroidery

- Gerhard Stawinoga, **Conservator**, Schloss Gottorf, Germany: access to the Hedeby textiles
- Ida Demant, **Archaeologist** and **Leader of the Textile Workshop** in Land of Legends: weaving and pattern design
- Ida Rebekka Mikkelsen, **Student Assistant**, National Museum of Denmark: photo model for the female outfit
- Ina Vanden Berghe, **Scientist**, KIK-IRPA, Belgium: dye analysis
- Inger Heebøll, **Ceramicist**, Land of Legends: making of spindle whorls and loom weights
- Irene Skals, **Conservator**, Emerita, Denmark: fibre analysis and sewing of garments
- Jakob Maarbjerg Toft-Hansen, **Student**, University of Copenhagen: model at final event
- Jens Barnkob, **Wood Smith**: making of spindles
- Johan Zakarias Gårdsvoll, **Student Assistant**, National Museum of Denmark: proof reading
- Julia Hopkin, **Skin Craftswoman**, UK: and intern at LL and sewing of skin garments
- Katerina Krizova, **Textile Craftswoman**, Czech Republic: tablet weaving
- Kathrine Sode Vest, **Bead maker**: production of bead replica
- Line Maria Mørch, **Student**, University College Copenhagen: intern at CTR and illustrator
- Lise Ræder Knudsen, **Conservator**, Vejle Conservation Centre: analysis and production of tablet weaves
- Lone Bjørnskov-Bartholdy, **Textile Craftswoman**, Denmark: needle binding
- Lone Brøns-Pedersen, **Clothing Constructor**, Land of Legends: construction of patterns for the skin and textile garments
- Luise Ørsted Brandt, **Archaeologist**, Globe Institute, University of Copenhagen: species identification of skin and fur
- Mads Dengsø Jessen, **Archaeologist**, National Museum of Denmark: model for the male outfit
- Mads Lou Bendtsen, **Curator**, National Museum of Denmark: contributor to Project Part 3 and layout of publications
- Malene Lauritsen, **Skin Craftswoman**, UK: sewing of skin garments
- Maria Ojantakanen, **Textile and clothing specialist**, Vikingelandsbyen Albertslund: member of Scientific board for Project Part 3
- Marie Kanstrup, **Physicist**, Aarhus University: 14C-analyses
- Marie Louise Schjellerup Jørkov, **Forensic Anthropologist**, Department of Forensic Medicine University of Copenhagen: CT-scanning
- Marie Wallenberg, **Weaver**, Sweden: weaving of textiles and tablet-woven bands
- Martin N. Mortensen, **Senior Researcher**, National Museum of Denmark: GC-MS analysis
- Mary Harlow, **Textile specialist**, UK: language editing of project publications
- Mia Lohse, **Textile Craftswoman**, Denmark: wool-fibre preparation
- Michelle Taube, **Conservation Scientist**, National Museum of Denmark: XRF-analyses
- Pernille Højfeld Nielsen, **Student**, University of Copenhagen: intern at the National Museum of Denmark
- Rikke Søgaard, **Student Assistant**, National Museum of Denmark: proof reading
- Roberto Fortuna, **Photographer**, National Museum of Denmark: photo and documentation of objects
- Signe Nygaard, **Conservator**, National Museum of Denmark: X-ray
- Signe Vind, **Archaeology Student**, University of Copenhagen: spinning of wool yarn
- Sigrid Mannering, **Student**, University of Copenhagen: model for the female outfit
- Søren Ravn Stadsholt, **Smith**, Land of Legends: production of Textile Tool Box and wooden textile tools
- Tarrin Wills, **Editor** of Dictionary of Old Norse Prose, University of Copenhagen: author in Project Part 3

- Theresa Emmerich Kamper, **Archaeologist**, University of Exeter: Analysis and production of skin garments
- Tilde Yding Abrahamsen, **Student Assistant**, National Museum of Denmark: proof reading
- Torben Sode, **Conservator**: production of gold pendant and bead replica
- Ulla Lund Hansen, **Archaeologist**, emerita, Denmark: analysis of beads
- Ulrikka Mokdad, **Art Historian and Hand Weaver**, University of Copenhagen: weaving assistance
- Vivi Lena Andersen, **Archaeologist**, Museum of Copenhagen: analysis of shoes
- Volker Hilberg, **Direktor**, Schloss Gottorf, Germany: access to the Hedeby textiles
- Åse Eriksen, **Hand Weaver**, Norway: production of silk samite and silk tabby weaves

Study trips

We have been on the following study trips to collect data and samples:

- 30th of August 2018: visit at Den Gamla Skolan, Bonderup, Scania to look at wool from modern, primitive sheep breeds (UM, EAS, CR, ID). We thank Inger Sommarin for the warm welcome
- 13th-14th of September 2018: trip to Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorp, Germany to look at the textiles from Hedeby and take samples for fibre and dye analyses. We thank Dr. Volker Hilberg and Conservator Gerhard Stawinoga for the warm welcome
- 19th of September 2018: visit to Birkemosehus, Sorø to look for wool fibres to be used in project part 1 (ID). We thank Anne Hjelm Jensen, breeder of Gotland sheep for the warm welcome
- 15th-17th of October 2018: visit at the State Historical Museum in Stockholm and Sigtuna, Sweden (UM, EAS, ID, CR). Part of the network *Cloth Cultures in and Beyond the Viking Age*. We thank Amica Sundström and Charlotte Hedenstierna-Jonson for their warm welcome
- 19th of October: visit to Sultenkrogen Fåreavl, Jyderup to look for wool fibres to be used in project part 1 (ID). We thank Mette Hoe, breeder of Norwegian Spelsau sheep for the warm welcome and donation of the fleeces used in Project Part 1
- 22nd -23rd of January 2019: trip to Viborg Museum to look at textile fragments from Bjerringhøj and the Viborg shirt (UM, CR). We thank Margit Petersen for her kind help and sharing her great expertise
- 3rd-5th of May 2019: trip to Ribe VikingCenter, presenting the project on Ribe International Viking Market (UM, CR, EAS). We thank the then-leader of the centre, Bjarne Clement, for the warm welcome
- 4th-9th of September 2019: trip to the 25th European Association of Archaeologists (EAA) conference in Bern including a trip to Abegg-Stiftung, Riggisberg to see their textile collections (UM, CR, EAS, ID)
- 8th-9th of July 2020: fur curing workshop in Jyderup, Denmark with Theresa Emmerich Kamper (UM, CR)
- 4th-8th of April 2022: trip to Iceland, creating new collaboration options with our Icelandic colleagues (UM, CR, EAS). Financed by NM and Krogagerfonden
- 31st of August-3rd of September 2022: trip to the 28th European Association of Archaeologists (EAA) conference in Budapest (UM). Visit to museums
- 18th-23rd of September 2022: trip to Iceland, textile analyses at the National Museum of Iceland (UM, CR). Financed by NM and National Museum of Iceland
- 12th-13th of January 2023: trip to Moesgaard Museum (UM, CR). Analysis of the Fregerslev grave find (UM, CR). Financed by Museum Skanderborg, Denmark

Exhibitions

The two outfits created within Project Part 2, which were finished in the autumn of 2020, were at first planned to be exhibited at the Museum of Cultural History in Oslo, Norway from December 2020 to March 2021. Unfortunately, the exhibition was cancelled due to the COVID-19 pandemic and the closing of the museum for the public. Instead, the museum showed the outfits in an online exhibition on their webpage in the beginning of 2021: *Fersk forskning om vikingdrakt – en nettutstilling*, UiO Kulturhistorisk museum, 11th of January to 31st of March 2021. The online exhibition had more than 25.000 unique visits.

In the spring 2021, the two outfits were included in the Viking Age exhibition *Togtet/The Raid* at the National Museum of Denmark. The exhibition has received excellent reviews and especially the two outfits have been applauded as a new and original addition to the understanding and visualization of the Viking Age. For this exhibition UM, CR and EAS also contributed with textile object lists, production of exhibition texts, films, drawings, hands-on items, and updated texts for the NM webpage. On the 24th of June 2021 the exhibition was opened by Queen Margrethe II and UM got the opportunity to present the project and the outfits for the Queen. Already in November 2020, the outfits were presented for the first time to the Queen at a private visit to the museum. *Togtet/The Raid* will close in the autumn of 2023, but the outfits are planned to continue in the follow-up exhibition, *Völven/The Volva* which will open in June 2024.

Media activities

Our Instagram profile, @fashioningthevikingage, was created the 13th of September 2018, with 39 likes for the first post. On the 31st of December 2019, the project had about 700 followers and 69 posts. The last post was from the 18th of April 2023 about the reception in the King's Hall in LL. This post got 266 likes and the profile had by then close to 2700 followers.

From the start of the project in 2018 until 31st of December 2019, we posted nine feeds on the Facebook site of DMO/NM. The latest being a post about a podcast from the 7th of October 2019, resulting in 119 likes. Shortly afterwards the Facebook site was shut down due to internal communication strategies at NM.

The general high media interest in the project has resulted in various articles and radio interviews in different media in Denmark and internationally. Especially the article in *Antiquity* about the relocated human bones from the Bjerringhøj burial reached unexpected international media attention partly due to the very competent media strategy from the journal and their publishing company.

The following is a list of all the media activities during the project period:

- 15th of August 2018: article in *Historie-online*, <http://www.historie-online.dk/nyheder-og-aktiviteter-2-2/vikingetiden-bliver-klaedt-paa>
- 10th of October 2018: article on NatNet about the new project: *Velklædt i Vikingetiden*
- 3rd of December 2018: CR on the radio in *Kulturen på P1*, <https://www.dr.dk/radio/p1/kulturen-pa-p1/kulturen-pa-p1-2018-12-03#!01:15:26>
- 10th of December 2018: article by Lærke Flindt Mathiesen in *Science Report*, 10th of December 2018. Forskere vil lave online videnskatalog med alle kilder til vikingernes klædedragt
- January 2019: article by Mette Stener Hoe in *Spælsau Nyt* 1/19. Spælsau i vikingetiden?
- March 2019: article by Tine Bonde Christensen (Communication Officer at NM) in *Fund & Fortid*, no. 1, 2019, page 21-22. Fra tenvægt til vikingetidsdragt
- 28th of May 2019: article in *Bjerringbro Avis*, page 22 about the missing textile fragments from the Bjerringhøj grave

- 2nd of October 2019: podcast by Dorthe Chakravarty:
<https://soundcloud.com/dorthechakravarty/velklaedt-i-vikingetiden>
- 11th of October 2020: Mentioning of the project by Rane Willerslev in “Go’ Morgen Danmark”. Pictures of some of the replicas were shown
- 4th of January 2021: article by Josephine Schnohr in *Kristeligt Dagblad*, page 2. I mindste detalje har forskere genskabt tøj fra 900-tallet
- 27th of March 2021: article by Molly Glick in *Discover Magazine*, US. What Real Vikings Wore, According to Archaeologists
- 4th of May 2021: article in *Videnskab.dk*. Knogler fra magtfuld viking dukker op igen efter 100 år på Nationalmuseet
- 4th of May 2021: CR on the radio in P1 about the rediscovered human bones from Bjerringhøj
- May 2021: article by Rasmus P. Columbus in *Hemslöjd. Spinning og konsekvens* no. 3, Sweden, page 64-65. Vacker Viking
- May 2021: article by Amy Brunskill about Lost and found: Viking age human bones and textiles from Bjerringhøj, Denmark in *Current World Archaeology*, UK
- May 2021: article by Mindy Weisberger about Lost and found: Viking age human bones and textiles from Bjerringhøj, Denmark in *Live Science*, New York, US
- May 2021: article by Michael Marshall about Lost and found: Viking age human bones and textiles from Bjerringhøj, Denmark in *New Scientist*, UK
- May 2021: article by Aria Bendix about Lost and found: Viking age human bones and textiles from Bjerringhøj, Denmark in *Insider*, New York, US
- September/October 2022: article in *Discover Magazine* vol. 43 no. 5, pp. 30-32. Science that matters: The lowdown on Viking garb
- 27th of April 2023: article in *Dagbladet*: Sådan så moden ud for den velklædte viking – af højeste byrd
- 26th of April 2023: article in *Lejre Magasinet*: Velklædt I Vikingetiden

Lectures and presentations

The following lectures have been given from 2018 to 2023:

- 16th of October 2018: workshop on Household Textiles, Sigtuna, Sweden (UM, EAS, CR, ID, IS) invited through the network Cloth Cultures in and Beyond the Viking Age. Lecture about *Introduction to Viking Age Household textiles* (EAS). Several of the contributions will be published in a book made during the project period (Andersson Strand et al. forthcoming)
- 30th of November 2018: celebrating the beginning of the project, UCPH (EAS, CR, ID, IS)
- 12th-14th of December 2018: lecture about *Fabrics of War*, conference on *Weaving War: New perspectives on violence and society in the Viking Age*, University of Oslo (EAS)
- 20th of December 2018: presentation of the project to the DMO/NM colleagues (UM, CR)
- 15th of March 2019: lecture about *Late Iron Age iconography and clothing*, SAXO Institute, UCHP (UM)
- 23rd of March 2019: lecture about *Fashioning the Viking Age*, Trelleborg, Slagelse/NM (UM)
- 2nd of May 2019: lecture about *Clothing and Nature in the Viking Age*, Vin og Videnskab, Geologisk Museum (UM)
- 16th of May 2019: presentation of *Fashioning the Viking Age*, meeting organised by Organisationen Danske Museer (ODM) and VELUX FONDEN, Roskilde (UM, EAS, ID)

- 17th-18th of June 2019: clothing workshop regarding the design of reconstructions made within Project Part 2, National Museum of Denmark, Brede and Land of Legends (UM, CR, EAS, ID, IS, LRK, LØB, Fria Gemynthe, Marianne Vedeler, Amica Sundström)
- 14th of July 2019: presenting the project on Trelleborg Viking Festival (UM, ID)
- 5th of September 2019: several lectures in Session 155: *Household textiles in and Beyond the Viking Age*, 25th EAA, Bern, Switzerland (EAS, ID, UM, CR). Several of the contributions will be published in a book made during the project period (Andersson Strand et al. forthcoming)
- 18th of September 2019: lecture about *Pillows and mattresses in Viking Age graves*, Dragtpuljens Annual Meeting and Seminar, Copenhagen (CR)
- 25th of September 2019: lecture about *Fashioning the Viking Age – One year later*, SAXO Institute, UCHP (EAS, ID, UM, CR, IS)
- 28th of September 2019: lecture about *Fashioning the Viking Age project*, Annual meeting for Archaeological Leather Group (ALG), Copenhagen (CR)
- 1st of November 2019: presentation of the *Fashioning the Viking Age project*, Speed dating workshop, NM (UM, CR)
- 17th of June 2020: presenting the project online, hosted by CTR at Zooms (CR)
- 6th of September 2020: presenting the project for member of “Tenen”, Land of Legends (ID)
- 24th of September 2020, Viking Age Fashion Quiz, National Museum of Denmark for the general public (UM, CR)
- 17th of October 2020: presenting the project, Trelleborg (UM, EAS & MW)
- 30th of October 2020: presenting Project Part 1 & 2 for the board members of the VELUX FOUNDATION, National Museum of Denmark (EAS, ID, UM, CR, MW)
- 25th of November 2020: Presenting the project for Her Majesty Queen Margrethe II, National Museum of Denmark (private visit) (EAS, ID, UM, CR, MW)
- 4th of December 2020: presenting the project online for SAXO students, University of Copenhagen (CR)
- 3rd of February 2021: online-lecture about of *Velklædt i Vikingetiden*, Foreningen af Fagarkæologer (FaF) (UM)
- 1st of March 2021: presentation of *Velklædt i Vikingetiden*, NM NatNyt (UM)
- 22nd of June 2021: lecture about *Velklædt i Vikingetiden – nyt om de fyrstelige dragter i mandsgraven fra Mammen og kvindegraven fra Hvilehøj*, Oldskriftselskabet, NM (UM)
- 24th of August 2021: online-lectures about *Fashioning the Viking Age*, North European Symposium for Archaeological Textiles (NESAT) (UM, ID)
- 1st of September 2021: lecture about *Mandsdragt i vikingetiden*, ODMs Dragtpuljemøde, Copenhagen (UM)
- 18th of September 2021: lecture about *Mode hos vikingerne*, Antikkens Venner, KUA (UM)
- 1st of October 2021: lectures about *Fashioning the Viking Age*, 38th Interdisciplinary Viking Symposium, NM (UM, EAS, ID)
- 15th of October 2021: lecture about *Den velklædte viking*, Kulturnatten på NM (UM)
- 27th of October 2021: lecture about *Organic textile remains in Viking Age graves*, CTR workshop (UM)
- 4th of November 2021: lecture about *Tekstil og broderi i graven fra Bjerringhøj*, Ladby Dragtgruppe, NM (UM)
- 10th of November 2021: lecture about *Tekstil og broderi i graven fra Bjerringhøj*, Lejre Dragtgruppe, NM (UM)
- 17th of November 2021: lecture about *Velklædt i Vikingetiden*, ODM's Faglige Årsmøde, Vejle (UM)
- 20th of November 2021: lecture about *Velklædt i Vikingetiden*, Salon Tekstiler Timer, University College Copenhagen, Campus Carlsberg (UM)

- 22nd of November 2021: lecture about *Var man virkelig velklædt i vikingetiden?*, Videnskabernes Selskab (UM), https://www.royalacademy.dk/da/Foredrag/2021_11_22_Ulla-Mannering
- 23rd of November 2021: lecture about *Var man virkelig velklædt i vikingetiden?*, Tingbjerg Bibliotek (UM)
- 7th of March 2022: webinar about *Experimental archaeology*, SAXO Institute (CR)
- 25th of March 2022: webinar about *Fashioning the Viking Age*, Historiske Værksteder, Zoom (online)(CR)
- 4th of April 2022: streamed lectures about *Fashioning the Viking Age*, National Museum of Iceland (UM, CR, EAS)
- 19th of August 2022: lecture about *The Danish prehistoric band and cord tradition*, BRAIDS conference, Svendborg (UM, CR)
- 3rd of September 2022: lecture in Session 195: Silk: A Catalyst for Interconnection in the Sixth to Tenth Centuries AD/CE, about *Silk, Silver and Gold Textiles in Danish Viking Age Graves*, 28th EAA, Budapest, Hungary (UM)
- 28th of September 2022: lecture about *Fashioning the Viking Age*, Rotary Christianshavn (CR)
- 17th of Maj 2023: the two outfits were presented to their Majesties Queen Margrethe II of Denmark, King Harald and Queen Sonja of Norway in connection with to their visit to the Kings Hall in Land of Legends, Lejre (ID)

Publications

A detailed publication plan has existed right from the beginning of the project and it further developed and expanded during the project period. We have in the project been very much aware of making both high-impact articles in A-rated journals reaching an academic audience, and to share our results with the public in popular outreach articles in Danish and English.

The following articles have been published from 2018 to 2023:

- Mannering, U. 2018. Fashioning the Viking Age, *Archaeological Textiles Review* 60, 114-117. <https://www.atnfriends.com/>
- Rimstad, C. 2019. En komfortabel, evig søvn. *SKALK* 5, 12-15.
- Brandt, L.Ø. & Mannering, U. 2020. Taxonomic identification of Danish Viking Age shoes and skin objects by ZooMS (Zooarchaeology by mass spectrometry). *Journal of Proteomics* 231, 104038. <https://doi.org/10.1016/j.jprot.2020.104038>
- Andersson Strand, E. & Mannering, U. 2021. Skibets sejl – et gigantisk fælles arbejde. In J. Varberg & P. Pentz (red). *Togtet. På rejse i vikingernes verden*. Udstillingskatalog. The National Museum, 29-44.
- Andersson Strand, E. & Mannering, U. 2021. The sail – A Gigantic Collective Undertaking. In J. Varberg & P. Pentz (eds). *The Raid. Join the Vikings*. Exhibition catalogue. The National Museum of Denmark, 29-44.
- Mannering, U. 2021. Fashioning the Viking Age: status after the first three years. *Archaeological Textiles Review* 63, 139-144. <https://www.atnfriends.com/>
- Mannering, U. & Rimstad, C. 2021. At rekonstruere de velklædte vikinger. *SKALK* 2, 10-17.
- Rimstad, C., Mannering, U. Jørkov, M.L.S. & Kanstrup M. 2021. Lost and found: Viking age human bones and textiles from Bjerringhøj, Denmark. *Antiquity*, 1-18. <https://doi.org/10.15184/aqy.2020.189>
- Andersson Strand, E. & Mannering, U. 2022. Vikingskibets sejl – et gigantisk fælles projekt. *SKALK* 6, 25-29.

- Brandt, L.Ø., Taurozzi, A.J., Mackie, M., Sinding, M.-H.S., Vieira, F.G., Schmidt, A.L., Rimstad, C., Collins, M.J. & Mannering, U. **2022**. Palaeoproteomics identifies beaver fur in Danish high-status Viking Age burials - direct evidence of fur trade. *PLoS ONE* 17(7), 1-14.
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0270040>
- Mannering, U. & Rimstad, C. **2022**. The Danish prehistoric band and cord tradition. In K. Johansen (ed.) *Nordic and World Braids and Bands*. Proceedings of the Fifth International Conference on Braiding, Braids 2022, Svendborg, Denmark, 16-24.
- Mannering, U. & Rimstad, C. **2022**. Fashioning the Viking Age. In K. Johansen (ed.) *Nordic and World Braids and Bands*. Proceedings of the Fifth International Conference on Braiding, Braids 2022, Svendborg, Denmark, 25-27.
- Mannering, U. & Rimstad, C. **2022**. Rekonstruktion af en mandsdragt fra vikingetiden. *Dragtjournalen. Tidsskrift for Dragtpuljen og Dragt.dk* Nr. 20, 10-24. <http://dragt.dk/assets/PDF-filer/Dragtjournalen-nr.-20.pdf>
- Mannering, U. & Rimstad, C. **2022**. En højstatus genbrugsdragt fra vikingetiden. In T. Svendrup (ed.) *Underholdning i antikken og middelalderen*. Antikkens Venner. Forlaget Ådalen. Aarhus, 75-94.
- Mannering, U., Rimstad, C. & Bendtsen, M.L. **2022**. Vikingetidens mandsdragt rekonstrueret. *Fund & Fortid* 1, 12-15.
- Andersson Strand, E. & Demant, I. **2023**. *Fibres, tools and textiles*. Fashioning the Viking Age 1. National Museum of Denmark.
- Mannering, U. & Rimstad, C. **2023**. *From Analysis to Reconstruction*. Fashioning the Viking Age 2. National Museum of Denmark.
- Mannering, U., Rimstad, C. & Bendtsen, M.L. **2023**. Kvinden i rødt – en rekonstrueret dragt fra vikingetiden. *Fund & Fortid* 1, 40-43.
- Skals, I. **2023**. *Viking Age wool fibres*. Fashioning the Viking Age 4. National Museum of Denmark.
- Vanden Berghe, I., Mannering, U. & Rimstad, C. **2023**. New dye analyses of Viking Age textiles from Bjerringhøj, Hvilehøj and Hedeby. *Journal of Archaeological Science Reports* 49. 103965.
<https://doi.org/10.1016/j.jasrep.2023.103965>
- Mannering, U. **2023**. Textile finds. In S. M. Sindbæk (ed.) *Northern Emporium II. Vol. 2. The networks of Viking-age Ribe*. Jutland Archaeological Society, Højbjerg, 379-383.
- Mannering, U. & Rimstad, C. **2023**. The Textiles from the Fyrkat 4 Grave. In L. Gardęła, S. Bønding & P. Pentz (eds) *The Norse Sorceress*, Oxbow Books, Oxford, 295-304.
- Rimstad, C., Mannering, U. & Andersson Strand, E. **Autumn 2023**. *Sources for Viking Age clothing and textile production*. Fashioning the Viking Age 3. National Museum of Denmark.
- Mannering, U., Demant, I., Rimstad, C. & Anderson Strand, E. **Autumn 2023**. Fashioning the Viking Age 2018 to 2023. NESAT XIV Proceedings. Monographs of the Archaeological Society of Finland, 73-88.
- Andersson Strand, E., Hedenstierna-Jonson, C., Mannering, U. & Vedeler, M. **Autumn 2023**. *Interior Textiles in the Viking Age*. University of Copenhagen.
- Demant, I. **Autumn 2023**. Textile production in the Viking Age, The reconstruction of three textiles from Hedeby. Paper presented at the 38. Interdisciplinary Viking Age symposium 30th of September 2021.

Final remarks

Although the project primarily was working with archaeological finds that were excavated many years ago, and thus have been analysed and interpreted several times before, we have shown how new methods, such as high-resolution photography, digital microscopy, advanced use of Adobe Photoshop, CT scanning, fibre analyses, advanced species identification, dye analyses and 14C-dating, have made it possible to extract new information about production, use and original appearance of textiles and fur objects. The project thus demonstrates that old finds can be used to create new knowledge when the right research methods are used.

In this project it has been possible to go all the way from tiny fragments to two whole, wearable outfits. As researchers, we have gained important experience in practical textile making and insight into the incredible skills that textile workers had in the Viking Age, and this will be an invaluable resource in future projects. The fact that we have been able to link so many skilled researchers and crafts people to the project has given the *Fashioning the Viking Age* a unique position and impact that goes beyond the project period. All the dialogues between researchers and craftspeople have been extremely rewarding. Altogether, the varied outcome of the project expresses the combined forces and skills of more than 50 minds and hands. Without the talent and enthusiasm of all participants, this project would not have been such a great success.

The *Fashioning the Viking Age* project set off to explore Viking Age textile qualities, textile tools and reconstructions. Four years later, many results and experiences have been achieved. In Project Part 1, we produced three different textile samples with different fibre and yarn qualities and various weaving techniques. Each sample demanded different solutions, different ways of sorting the fibres, different types of yarn spun with different types of spindles, different solutions for the set-up and weaving the fabric: a situation that would also have occurred in the Viking Age. This raises new questions about the skills and abilities of craftspeople to produce different types of yarn and fabric in the Viking Age. The samples all come very close to the originals, which demonstrates the crucial importance of working with fibres and tools similar to those of the period and geographical area. The work provides a unique possibility to experience what textiles would have felt like in the Viking Age.

In Project Part 2 we knew that the textiles from Bjerringhøj and Hvilehøj were some of the most well-preserved from Danish Viking Age burials. Even so, there is a scientific gap between the preserved archaeological finds and the finished outfits. The results of the total pool of analyses were a great help and guide for the different production processes and the final design - but also a challenge to our modern aesthetics and the current main-stream presentation of Viking Age clothing design in media and films. The project has been an eye-opener for the international media for presenting science-based Viking Age aesthetics and can hopefully be used in future research projects working in dept with these issues.

In the *Fashioning the Viking Age* Project, we have not only gained new knowledge about the production of Viking Age textiles and reconstructions, but also what makes a project successful. A strong core of researchers and crafts people set in a friendly, but high performing academic environment, has been essential for promoting collaborations, discussions and progressive ideas. With so many different tasks to be fulfilled, it was necessary for all group members to use their network in order to find people of the right skills to perform the specialist research and crafts needed.

Altogether, the project has given a whole new understanding of Viking Age textile production and craftsmanship.

14th August 2023

Ulla Mannering, Charlotte Rimstad, Eva Andersson Strand and Ida Demant