

Report of the first 16 months

1st of September 2018 – 31st of December 2019

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, Department for Ancient Cultures of Denmark and the Mediterranean (NM). The project is a collaboration between NM and Centre for Textile Research, University of Copenhagen (CTR) and Land of Legends, Lejre (LL). The general aim of the three-year research and outreach project is to create new and archaeologically well-founded interpretations and reconstructions of Viking Age textiles and clothing.

The main participants:

- Ulla Mannering (UM), Project Leader, NM
- Charlotte Rimstad (CR), Project Coordinator, NM
- Eva Andersson Strand (EAS), Director of CTR, UCHP
- Ida Demant (ID), Leader of the Textile Workshop, LL
- Irene Skals, Conservator (IS), NM

Other participants:

- Anne Batzer, Textile Dyer: Dyeing of textiles
- Anne Lisbeth Schmidt, Conservator, National Museum of Denmark: Microscopy of skin and fur
- Arne Jouttijarvi, Materials Scientist, Heimdal-archaeometry: Analysis of iron and gold objects
- Carsten Gundlach, Physicist, Technical University of Denmark: CT scanning
- Fria Gemynte, Textile Technician, Land of Legends: Embroidery
- Henriette Lyngstrøm, Archaeologist, SAXO-Institute, University of Copenhagen: Analysis of iron
- Ina Vanden Berghe, Scientist at KIK-IRPA, Brussels: Dye analysis
- Inger Heebøll, Ceramist, Land of Legends: Production of spindle whorls and loom weights.
- Irene Skals, Conservator, Emerita: Fiber analysis
- Jens Barnkob: Production of spindles
- Lise Ræder Knudsen, Conservator, Vejle Conservation Centre: Analysis and production of tablet weaves
- Lone Brøns-Pedersen, Clothing Constructor in LL: Construction patterns for the skin garments.
- Luise Ørsted Brandt, Archaeologist, National Museum of Denmark: Species identification of skin and fur
- Mads Dengsø Jessen, Archaeologist: Model for the male outfit.
- Maria Lind Heel, Textile Craftswoman: Needlebinding
- Marie Wallenberg, Weaver: Weaving of tabletwoven bands.
- Mette Stener Hoe, Sheep Breeder: Provider of Spelsau wool
- Signe Nygaard, Conservator, National Museum of Denmark: X-ray
- Signe Vind, University of Copenhagen: Student and spinner
- Sigrid Mannering, Student: Model for the female outfit
- Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorp: Textile samples from Hedeby
- Søren Ravn, Craftsman, Land of Legends: Production of “Mästermyr” chest and wood tools.

- Theresa Emmerich Kamper, Archaeologist, University of Exeter: Analysis of tanning methods and sewing of skin garments
- Torben Sode, Conservator, Glass Bead Trading: Production of bead replicas
- Ulla Lund Hansen, Archaeologist, emerita: Analysis of beads
- Vivi Lena Andersen, Archaeologist, Museum of Copenhagen: Analysis of shoes
- Åse Eriksen, Weaver, Bergen: Production of samite and silk tabby weaves

Status of the sub-projects

The project consists of three parts that are interlinked and produce knowledge to each other.

Part 1: Viking Age Textile Production

The aim of the first part of the project is to make Viking Age textile production visible and tactile. This part has its starting point in analyses of known archaeological finds of textile tools, textiles, skins and fibres from graves and settlements. By using controlled fibre sorting, spinning and weaving experiments, we recreate a selection of textile samples that convey tactile and visual aspects of the Viking Age cloth culture.

ID and EAS are responsible for Part 1. In spite of the employment at the National Museum of Denmark, ID is working at Land of Legends in Lejre with whom a formal collaboration agreement was signed.

Reconstructing textiles from Hedeby

In order to decide which textiles, we wanted to base the reconstructions on, we visited Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorp in Schleswig in September 2018 where a formal collaboration agreement was signed. Here we saw a selection of the Hedeby textiles and took out samples for fibre and dye analyses. The Hedeby textiles are 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 parts of known garment types, made for everyday use.

In the autumn 2018, IS made fibre analyses of all the Hedeby textile samples, comparing the wool qualities to samples from modern sheep breeds that we collected on a study trip to the Swedish farm, Bonderup in Scania. In general, the sampled Viking Age wool proved to be much coarser than the wool earlier recorded from the Danish Bronze and Early Iron Ages. It has a fibre quality that matches a modern Spelsau fleece, among other fleeces. ID searched for suitable fleeces for the reconstructions and ended with a Spelsau fleece from a sheep farmer, Mette Stener Hoe, in Western Zealand.

The following Hedeby textiles were chosen for reconstruction:

- Sample 1: H14, fragment of a dress in tabby
- Sample 2: H2, fragment of a hose in 2/2 twill
- Sample 3: H39AB, fragment of trousers in diamond twill/ herringbone twill

Several different replicas of textile tools were needed to make the reconstructed textile samples. Wool combs were produced by craftsman Søren Ravn Stadsholt from Land of Legends, based on a Norwegian find of wool comb iron teeth. Eight spindles were produced by craftsman Jens Barnkob, and spindle whorls and loom weights of clay were produced by ceramicist Inger Heebøll, also from Land of Legends. She created seven different sizes of spindle whorls, weighing from 5-48 grams as well as 76 doughnut-shaped weight looms of 200 g, 56 of 400 g and 48 of 600 g.

From mid-November to mid-December 2018 the warp for Sample 1 was spun on a drop spindle with a 20 g whorl on a 19 cm and 21 cm spindles. The weft was spun from 3rd to 6th January with a 15 g whorl/19 cm

spindle. The warping of the warp-weighted loom and the weaving was done in January and the weaving speed was about 3 cm/hour. Especially the changing of the shed was time consuming. Sample 1 was taken off the loom the 12th of March 2019 during a project meeting. At that time, the weave was more open than the original textile H14 from Hedeby, but it is estimated that after washing, the textile will shrink to the desired density. In November 2018, ID was assisted by intern Julia Hopkin (JH) from Exeter University, who is doing a MA in experimental archaeology. JH helped separating and combing wool for the warp of sample H14. In January, February and March ID was assisted by intern Mia Lohse (ML). ML helped washing, sorting and combing the wool for sample H2, and she wove an extra piece of sample H14 using up the last of the warp. During their internship both JH and ML also helped creating costumes in LL. In autumn 2019, Ida was assisted by weaver Marie Wallenberg (MW) from University of Gothenburg, who provided new knowledge and good ideas in weaving matters. Especially, MW introduced the use of glue on the warp threads. The glue prevents too much friction between the warp and weft in the weaving process. Until the month of May 2019, ID continued the spinning and weaving processes with Sample 2. In this spinning process, a distaff was introduced. Sample 2 was taken off the loom the 15th of November 2019.

The Textile Tool Box

Søren Ravn Stadsholt from Land of Legends has been working on a wooden chest in 2019, the so-called "Textile & Tool Box". This will contain textile samples as well as the used tools and different fibre samples. The chest is based on the chest from Mästermyr, Gotland in Sweden, and it was finished in December 2019. Søren also produced some of the tools for the chest, such as weaving swords, a wooden club and a scutching sword. 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.

Part 2: Viking Age Male and Female Clothing

The aim of the second part of the project is to reconstruct a male and a female outfit, based on textiles from two Danish inhumation graves. The male grave is from Mammen, near Viborg in Jutland, dated to AD 970-971 and the female grave is from Hvilehøj, near Randers in Jutland, dated to the late 900s. The textiles in both graves are fragmented, but still much larger than in preserved average Viking Age graves in Denmark. UM and CR are responsible of Part 2.

Analyses

The analyses of the textile fragments began in September 2018 in the Conservation Department, NM in Brede. First, we created an overview of all objects from the graves, not only the textiles, but also accessories and tools as well as preserved feather/down layers. All objects were photographed by Roberto Fortuna and Jenny Sundby from NM. They used a high resolution camera to take standard object photos as well as photos with light from beneath which revealed an until now unrecognized world of stitch holes in the textile fragments, representing degraded and now lost sewing and embroidery.

The textiles went through technical analyses where measurements of size, fibres, thread diameters, thread density, twist directions ect. were recorded separately for each grave. The analyses were done with an analogue as well as a digital microscope. Analyses of skin/fur, tanning methods, tablet weaves, silk samite, beads, iron objects, shoes and feathers/down are still ongoing and done by specialists (see list above).

Mammen – textiles, skin, feathers and bones

One of the textiles from Mammen has embroideries, but it consists today of 64 fragments that have not been reunited since the unprofessional excavation in 1868. In order to puzzle the pieces back together, CR transferred the photos of the fragments to Photoshop and marked all the embroidery pattern with color codes, giving each pattern its own colors. The photos were then printed and the fragments cut out. The puzzle will create the basis for the is still ongoing and it has already been possible to put several pieces together.

During the excavation in 1868, a lot of downs and feathers were also found, presumably from a mattress underneath the deceased. The blocks of feathers/downs are preserved at NM, some still with impressions of bones. A small box of feathers proved to contain tiny gold threads that have never been recorded before.

In 1986 the Mammen grave was re-excavated and more small textile fragments were found. These are kept at Viborg Museum today and a study trip to the museum enabled us to photograph the small fragments which were from the embroidered textiles. We also recorded the famous “Viborg shirt” of flax, dated to around 1000 AD which will probably be used as inspiration for our reconstructed shirt.

In august 2019, we discovered that the human bones in a box labelled “Slotsbjergby” actually derive from the Mammen grave. The bones match an old inventory description and some in situ textiles adherent to the bones are similar to the Mammen textiles. The bones were analyzed by Marie Louise Jørkov, who determined them as an adult, possible male. One of the arm bones (radius) was more gracile than the rest of the skeleton and may belong to a second and younger individual. The bones are currently being C-14 dated and have also been CT-scanned and X-rayed. The textiles on the bones add new information about the dead’s clothing which we can use in the reconstructions.

Hvilehøj textiles, skin and fur

The Hvilehøj fragments differ from the Mammen fragments in being much smaller and having more complicated micro stratigraphies. Each and every fragment was analyzed in order to establish a general stratigraphy for the textiles, fur and feathers in the grave. The fragments consist of many different components, such as tablet-woven bands, samite bands, silk tabby, fur, wool tabby, wool twill and feathers/downs. The grave finds also included a pair of shoes, a bead necklace, a large pair of scissors, two knives, a whetstone and a spindle whorl; all of which will be replicated.

Dye analyses

In October 2019, we received the report of dye analyses from Ina Vanden Berghe in Bruxelles. Unfortunately, no dye was preserved in the embroidered garment from Mammen. However, a surprising result was the detected kermes in a red tabby wool textile from Hvilehøj and the find of cochineal in a silk samite fragment from Mammen. It is the first time that these two dyes stuff are found in a Danish Viking Age context. The cochineal was imported from Poland or Armenia, whereas the kermes came from areas around the Mediterranean Sea. This proves the long-distance contacts that were prevailing in the Viking Age.

Reconstructions

The analyses of all the textiles are done and the reconstruction process has begun. We have engaged more than 20 craftspeople and specialist in order to produce reconstructions of as high quality as possible. The process of deciding patterns, designs and colours is still ongoing. We have chosen our two models, Sigrid

Mannering and Mads Dengsø Jessen, for whom the outfits will be made especially. However, we also plan to have customized mannequin dolls made for exhibition purposes.

Part 3: Viking Age Clothing and Textile Catalogue

The aim of the third part of the project is to create an overview of the many different sources linked to Viking Age clothing design. The archaeological sources consist of preserved skin and textiles, but also jewelry and other accessories. Iconographic sources, such as gold foil figures, pendants and tapestries contribute with knowledge about visual appearance and combinations of clothing items. Other important sources are contemporary and later written sources, such as the Icelandic Sagas, travel descriptions and chronicles. As many sources as possible are gathered in order to show the variation of Viking Age life and avoid garment stereotypes.

The product will be an online open-access catalogue that can provide a new and updated foundation for future interpretations and reconstructions of Viking Age clothing in different societal and status segments.

Though part 3 is scheduled to begin in the autumn of 2020, EAS and CR have already begun reading the Icelandic Sagas, extracting all words about textile, clothing, sails, general looks and hygiene. The words are entered into an Excel data sheet, but the future plan is to create a proper database for the terms that can easily be accessed.

Meetings and collaborations

We have project meetings approximately once a month, either at NM, UCPH or LL. Minutes are taken at all meetings. Further we have held many different meetings with our collaborators (see above) in Brede to show them the relevant archaeological objects.

At the Saxo Institute, UCPH, we announced a meeting for the students who wanted to be involved in the project. The meeting was held at NM the 11th of December 2018 and one student, Signe Vind, got involved in the project. Signe is a talented spinner and will be spinning the yarn for the reconstructed kirtle and dress in sub-project 2. We have furthermore made an agreement with Associate Professor Henriette Lyngstrøm, UCPH, that her students can use the project as starting point for their assignments about iron objects and experimental archaeology.

In September 2018 we had a meeting with Nanna Nielsen, a visual anthropologist who was interested in making a short movie (3 minutes) about the project. This is still an open offer and will cost about DKK 40.000.

A collaboration with Kopenhagen Fur was declined and it was decided to work with Theresa Emmerich Kamper, UK, instead for the production of the fur and skin garments. Theresa can provide the needed furs and skins, tanned in the correct way. Furthermore, she is an experienced skin maker and has sewn many skin garments before. Theresa has now provided the needed skins and furs and will be sewing the skin garments in spring 2020.

On the 12th of March 2019 we had a meeting in Land of Legends where archaeologist Stella Macheridis from University of Lund attended. Stella is working on a post doc about sheep breeding in the Late Germanic Iron and Viking Age and her research will be valuable to the project when it comes to mapping the evolution of the sheep breeds and wool types.

Photography, X-ray and CT scan

We have had five photography sessions with Roberto Fortuna and Jenny Sundby at NM in Brede. All the textiles and relevant other objects from Mammen and Hvilehøj were photographed, including the exhibited Mammen textiles in NM. The exhibited textiles were brought to the photo studio in Brede and back in one day. Also, the textiles, fibulae and bones from the graves of Slotsbjergby and Fløjstrup have been photographed.

Signe Nygaard from NM took X-ray photos of a selection of textile finds from Mammen and Hvilehøj with gold and silver threads included.

One of the textile fragments from Hvilehøj was CT scanned at the Technical University of Denmark (DTU), in order to observe a precise layer sequence. The data of the scanning has been processed at DTU and turned into a small video sequence for outreach purposes.

In December 2019, Chiara Villa and Marie Louise Jørkov from the Department of Forensic Medicine, University of Copenhagen, made CT-scans, X-ray and photogrammetry of the newly re-discovered human bones from Mammen as well as the feathers from Mammen and the leather shoes from Hvilehøj. Having a CT-scan of the bones can make it possible to print them in 3D if necessary in the future.

Study trips and workshops

We have been on four study trips to collect knowledge 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.
- 15th-17th of October 2018: Workshop at State Historical Museum in Stockholm and Sigtuna, Sweden. (UM, EAS, ID, CR). The workshop was arranged by our collaborative network *Cloth Cultures in and Beyond the Viking Age*, Amica Sundström, Historiska Museet Stockholm and Charlotte Hedenstierna-Jonson, University of Uppsala. The workshop included looking at textiles from Birka and Sigtuna as well as talks from different participants.
- 22nd -23rd of January 2019: Trip to Viborg Museum to look at textile fragments from Mammen 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. We thank leader of the centre, Bjarne Clement, for the warm welcome.
- 17th-18th of June 2019: Workshop at NM/Brede and in LL. Clothing workshop regarding the reconstructions of the Mammen and Hvilehøj garments.
- 14th of July 2019: , presenting the project on Trelleborg Viking Festival (UM, ID).
- 4th-9th of September 2019: Trip to Abegg-Stiftung, Riggisberg, Bern to see the textile collection.

Media and publications

Instagram

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 latest

being the 20th of December about samples for C-14 dating, resulting in 90+ likes. Our followers generally seem to like the profile and comments have only been positive.

Facebook

The project has posted nine new feeds on the Facebook site of DMO, NM until 31st of December 2019, the latest being a post about a podcast from the 7th of October 2019, resulting in 119 likes.

Media

The general high interest in the project has resulted in a number of articles and radio interviews in different media.

- 15th of August 2018: Article in *Historie-online*, <http://www.historie-online.dk/nyheder-og-aktiviteter-2-2/vikingetiden-bliver-klædt-paa>
- 10th of October 2018: Article on Natnet about the new project: *Velklædt i Vikingtiden*
- 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: Lærke Flindt Mathiesen. Forskere vil lave online videnskatalog med alle kilder til vikingernes klædedragt. *Science Report*, 10th of December 2018
- January 2019: Mette Stener Hoe. Spælsau I vikingetiden? *Spælsau Nyt 1/19*
- March 2019: Tine Bonde Christensen (Communication Officer at NM). Fra tenvægt til vikingetidsdragt. *Fund & Fortid*, no. 1, 2019, pp. 21-22.
- 28th of May 2019: Article in *Bjerringbro Avis*, p. 22 about the missing textile fragments from the Mammen grave
- 2nd of October 2019: Podcast by Dorthe Chakravarty: <https://soundcloud.com/dorthechakravarty/velklaedt-i-vikingetiden>

Lectures

A number of different lectures have been given in 2018 and 2019.

- 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 *Introduction to Viking Age Household textiles* (EAS)
- 30th of November 2018: Celebrating the beginning of the project at UCPH (EAS, CR, ID, IS)
- 12th -14th of December 2018: Lecture about *Fabrics of War* at 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 colleagues at NM (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 at Trelleborg, Slagelse (UM)
- 2nd of May 2019: Lecture about Clothing and Nature in the Viking Age at Vin og Videnskab, Geologisk Museum (UM)
- 16th of May 2019: Presentation of ViV at ODM meeting (UM, EAS, ID)
- 5th of September 2019: several lectures in session 155 about "Household textiles in and Beyond the Viking Age", EAA, Bern, Switzerland (EAS, ID, UM, CR)
- 18th of September 2019: Lecture about pillows and mattresses in Viking Age graves at Dragtpuljens annual meeting and seminar, Copenhagen (CR)
- 25th of September 2019: Lecture about Fashioning the Viking Age – One year later at SAXO Institute, UCHP (EAS, ID, UM, CR, IS)

- 28th of September 2019: Lecture about the Fashioning the Viking Age project at the annual meeting for Archaeological Leather Group (ALG), Copenhagen (CR)
- 1st of November 2019: Presentation of ViV at Speed dating workshop at NM (UM, CR)

Publications

Two articles have been published in 2018 and 2019.

- Mannering, U. (2018) Fashioning the Viking Age, *Archaeological Textiles Review* 60, 114-117.
- Rimstad, C. (2019) En komfortabel, evig søvn. *SKALK* no. 5, 12-15.

Preliminary results and future goals

Especially the fibre analyses have proven to be very important for the understanding and visualizing of Viking Age textile appearance, high-lighting the differences of the fleece types and the variations of the Viking Age textile qualities. The quality of the reconstructed textiles will therefore always depend deeply on the chosen wool types.

The project is working with archaeological finds that were excavated many years ago and which have thus been analyzed and interpreted several times before. By using new methods, such as high resolution photography with light from beneath, digital microscopy, Photoshop, CT scanning, fibre analyses and C-14-dating, it has been possible to extract new information about production, use and original appearance of the textiles. The project thus demonstrates that old finds may contain new knowledge when the right research methods are used.

We have now paused Part 1 with two finished samples. The third textile sample can be added in late 2019. The textile tool box and the tools are almost finished. Part 2 is in the reconstruction phase which will culminate in spring 2020 with the finished outfits. In 2020 we expect to have more outreach days at the National Museum of Denmark in Copenhagen and Trelleborg where craft techniques will be demonstrated and finished products will be shown to the public.

You can follow us on Instagram @fashioningthevikingage

30th of December 2019/ Charlotte Rimstad