UNIVERSITY OF COPENHAGEN
CENTRE FOR TEXTILE RESEARCH

CTR TexLab: Interdisciplinary hub for the study of past cloth cultures

Report 2021

Introduction

In 2021, Centre for Textile Research (CTR) at the University of Copenhagen (UCPH) initiated the building of a new hub for integrated research in cloth cultures, named CTR TexLab. TexLab's activities are based on the expertise of a multi-disciplinary network of experts, spanning the fields of archaeology, textile and animal skin research, history, art history, terminology, museology, conservation as well as digital and natural sciences. The aim of the CTR TexLab is to generate new and more integrated research results by creating a collaborative platform for the combined study of cloth cultures and digital and natural sciences; merging resources and expertise into both shared research programmes and research outputs. Additionally, CTR TexLab is also an integrated part of the Danish infrastructure E-RIHS.dk.

Figure 1: Copies of Viking Age textile tools to utilize when conducting experiments in Fashioning the Viking Age project.

Due to Covid-19 restrictions, the work in the CTR TexLab has faced challenges. This was especially the case during the spring semester when the university was closed, resulting in the planned meetings, workshops and teaching activities being cancelled. However, since the

reopening of the university, several projects have been initiated and started. The ongoing projects are listed in this report. Furthermore, CTR TexLab is now fully equipped with both microscopes and reconstructions of Viking Age textile tools to utilize when conducting experiments.

August workshop

In August, we arranged a training workshop. The invited participants were the advisory board and CTR members. The aim was to introduce and share different methods and techniques, and this was followed by a discussion on how to integrate the results into general research questions and future grant applications. We visited the board member's labs and finished at CTR TexLab with a general discussion how to collaborate and use each other's facilities.

Figure 2: Pictures from the workshop, where research methods were shown as well as discussed by the advisory board members and CTR members.

New participants

In the autumn semester Anne Kilgour Viuf and Sofie Grue Husted Andersen, both MA students in archaeology, joined CTR and participated with their own subprojects in the *Practises of practise* (PoP) project and intern Line Maria Mørch joined the Fashioning the Viking Age (ViV) project. Furthermore, Anine Aakjær Lundgaard Jensen started as a student assistant to help with digital task/activities in TexLab.

Ongoing projects

Fashioning the Viking Age (ViV) part 1

Participants: Ida Demant, Marie Wallenberg, Signe Vind, Irene Skals, Eva Andersson Strand, Ulla Mannering, Charlotte Rimstad and Line Maria Mørch.

The aim of the project *Fashioning the Viking Age* is to create new as well as archaeologically well-founded and documented interpretations and reconstructions of the Viking Age dress. The project is a cooperation between the National Museum of Denmark (NatMus), Centre for Textile Research at UCPH, and Lejre Land of Legends.

The aim of the first part of the project was to make Viking Age textile production visible and tactile. This part had its starting point in analyses' of known archaeological finds of textile tools, textiles, skins and fibers, from graves and settlements. By working with controlled samples of fiber, sorting, spinning and weaving experiments, the team was able to create a selection of textile samples (measuring 60 x 60 cm) that convey very similar if not identical tactile and visual components to Viking Age cloth.

Figure 3: Ida Demant recording threads on sample III using a Dino-Lite digital microscope.

During winter 2020-21, sample III was woven in TexLab by Ida Demant. The reconstruction was based on analyses of textile fragment 39AB from the Viking Age site Hedeby harbor; a diamond twill with an irregular pattern repeat, interpreted as part of a pair of trousers (Hägg 1984, 28, 140). Time registrations of as many elements as possible was made during the process. The combing and spinning times were recorded, and the different elements of the weaving process

was documented using a time-lapse camera. Single elements were documented on real-time film. The results will be published in a report later in 2022.

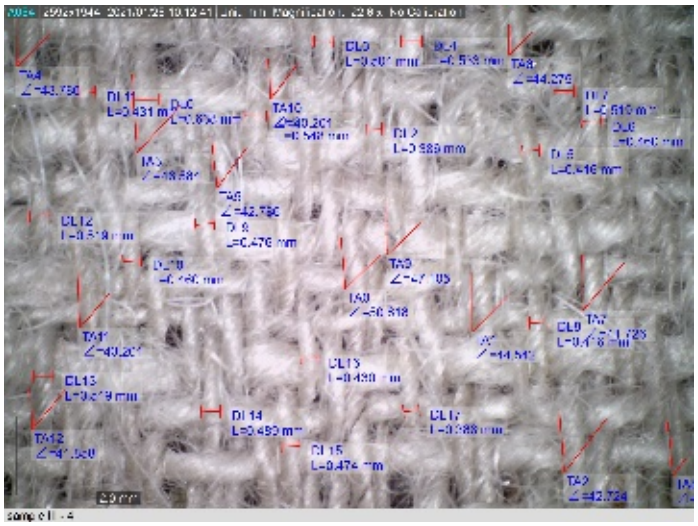

Figure 4: Digital recording of threads on sample III from a Dino-Lite digital microscope, areas of interest are marked with red and blue notes.

In the same period, Marie Wallenberg produced a legal unit of *Vaðmál* based on another fragment from Hedeby Harbour. *Vaðmál* is the common name for wool fabrics which have been used for items such as clothing, sails, tents, and furnishings, as well as currency.

Figure 5: A legal unit of Vaðmá, as recreated by Marie Wallenberg based on another fragment from Hedeby Harbour.

Standards for production and trade are known from Icelandic medieval law codes and according to texts, a weaver should produce no less than 22-25 *ells* a week. From Early

Medieval texts, it is well-known that thousands and thousands of *ells* were produced and traded from Iceland, Norway, and other locations. The aim of this project was therefore to get a better understanding of what is needed in order to weave one legal *ell*, and how much time this would take. Another aim was to better visualize the tactile feeling of a larger Viking Age textile. The fragment is described as a Klappenrock (kaftan) (Hägg 1984) woven in a 2/2 twill and stitched together from several pieces. The piece chosen is a 2/2 twill with a darker z-spun warp, a light s-spun weft, 15-19 threads per cm in the warp and 5-6 in the weft. Because of the limited time, machine spun wool yarn from Henrichsens Uldspinderi was used for warp and as weft "klassiskt förgarn" from Filtmakeriet was used. The setup and weaving were documented using video, time-lapse camera, and ordinary photos. This work will be published in ATR 2022.

Subproject Weaving swords and loom weights

A new weaving experiment was made regarding weaving swords and loom weights in September-October. The aim of the experiment was to investigate the relation between the weight of the weaving sword and the weight and size of the loom weights, in order to get a better understanding of how these factors play into the weaving. A new set-up, based on the analyses of fragment H39, was made by Marie Wallenberg.

Practices of practices **(PoP)**

Participants 2021: Marie Wallenberg, Ulrikka Mokdad, Mark Schram Christensen, Anne Kilgour Viuf, Sofie Louise Grue Husted Andersen, Signe Vind, Carolina Larsson, Stefan Lindgren, Eva Andersson Strand

Subproject SB 1: The past in motion, by Sofie Louise Grue Husted Andersen
Subproject SB 2: Weaving creativity, by Anne Kilgour Viuf

The aim with the project is to illuminate how the body, mind and environment are involved in the production processes behind ancient technology and the creation of textiles. This is done by developing the use of experimental archaeology, motion capture, cognitive motor neuroscience, 3D modelling and scanning, acoustic analysis for recording and understanding textiles, the textile craft processes, and the impact of knowledge and movement in the textile production.

Previous tests with hand spinning have been performed (Andersson Strand et al. 2016, 2018 and forthcoming). In 2021, we decided to test weaving with two different weaving techniques and types of looms. The research question are as follows:

- How does weaving techniques and choice of looms affect the body (SB1)?
- How are our cognitive senses used when weaving (SB2)?
- Are there any differences (cognitive and or in terms of movements) between the two techniques and, if so, which and how do they affect the outcome (SB1 and SB2)?
- Are there any visible parameters which can be applicable on the interpretation of archaeological materials and contexts?

Figure 6: Here Ulrikka Mokdad is weaving tapestry on her tapestry frame while her brain activity is being measured with the aid of Motion capture and EEG.

In Fall of 2021 Marie Wallenberg had made a set-up on a warp-weighted loom (see Subproject Weaving swords and loom weights). During a weaving session; November 1st Marie's movements and brain activity were measured with the aid of Motion capture and EEG. November 15th the same methods were applied to Ulrikka Mokdad when she was weaving tapestry on her tapestry frame. The two weavers were also interviewed about their experience as weavers, knowledge and skills etc. All data from tests and interviews will be analysed and the results published in 2022.

Flax project (FP)

By Chiara Spinazzi-Lucchesi

The aim of the project is to understand how flax was processed for spinning in different areas and periods. Three methods of processing are known:

1. Retting
2. Dew retting
3. Decortification

The first one, retting, is the one still employed today. It consists in submerging the bundles of flax in pools or gently flowing through soft water stream for several days. Bacteria will cause the decomposition of the woody matter and cellular tissue surrounding the fibres. A second method, less known but still in use as well, is dew retting. It consists on layering the flax in thin layers flat on the grass. In this case, a fungus is responsible for the decomposition of the bark. A third method is decortification. By this method the fibres are directly extracted from the bark with a mechanical process, not employing any chemical action. The project intends to investigate how fibres look different using these three different methods, which are the advantages and disadvantages in using one method instead of another and which "marks" could be detected to discern which method has been employed on fibres.

Figure 7: Flax hanging in bundles, from a line under the roof of an open buildning in an outdoors facility at Lejre Land of Legends.

The first step of the project was to obtain flax which was not exposed to unknown treatments. Therefore, it has been decided to cultivate a small quantity of flax and to record each stage, from seeds to the final result. Harvesting time is also crucial, since the quality and characteristic of the fibre changes greatly, depending on the stage of ripening. The field was located in Lejre, Land of Legends (DK), it measured 20 m^2 and it was divided into four squares. Seeds were bought from a Swedish company that provides flax seeds specially made for spinning. Sowing was carried out on the 21st of May 2021 and harvesting on the 16th of September 2021. In this occasion, flax stems were pulled up, gathered in bundles, tied up and hung up do dry. The squares provided flax at different levels of ripening, which will allow a better understanding of whether decortification can work with ripened fibres. Unfortunately, the weather conditions did not allow to proceed for retting experiments already in Autumn, so this activity has been postponed to spring.

Ancient Egyptian wardrobe **(EW)**

By Elsa Yvanez and Anne Haslund Hansen (NatMus)

This project belongs to a larger project currently under development in partnership with the National Museum of Denmark, provisionnaly entitled *Life and death of Lady Di-Mut-shep-en-ankh, "leader of the chorus in Karnak"*. The whole project focusses on a pharaonic mummy belonging to the collections of the museum (inventory n°1038) and completely unwrapped in 1941. The museum possesses the human remains, its textile wrappings, and associated cartonnage. The goal would be to retrace the personal history of this Egyptian woman, through her life in Thebes during the 1st millennium BCE to her death and funeral, all the way to her archaeological rediscovery in modern times. The objectives are the following:

1. Conduct a forensic study of the mummy's remains to better understand the physical life of *Di-Mut-shep-en-ankh* (diet & health) and subsequent mummification.
2. Understand the social and working life of *Di-Mut-shep-en-ankh* through the translation and study of the hieroglyphic inscriptions and her title.
3. Conduct the first wardrobe study focusing on only one woman and individual from the past, reconstructing dress practices and body conception.
4. Analyze the mummy's wrappings (textiles and cartonnage) to assess the craft, artistic, religious, and economic efforts mobilized for her internment (production and reuse).
5. Retrace the collection history of the mummy, from its discovery in Egypt to its coming, studying, and exhibiting in Denmark.

Figure 8: Tunics from the mummy wrappings as exhibited in NatMus. Photo E.Y.

The methods needed are intrinsically interdisciplinary, requiring the collaboration of museum curators, historians, textile experts, forensic anthropologists, and specialists is diverse scientific analyses (aDNA (?), palaeopathology, lipid analyses, CT scanning). TexLab will host the textile part of the study, spearheaded by Elsa Yvanez. The textile research strategy will be deployed according to three themes:

- Textile craft: complete technical assessment of the textiles, including detailed observations on craft techniques (fibres processing, weaving, dying, and tailoring), microscopic observations (digital and optical microscopy, SEM, 3D scanning), photography, experimental archaeology testing
- Wardrobe study: i) create a 'catalogue' of all the clothing elements present in the wrappings, ii) conduct a fully detailed study of each garments tracking traces of production, use, repair (?) and reuse, iii) comparison with iconographical documents, iv) digital reconstructions (3D imaging) of the garments (by themselves and worn on the body/in space), v) study the correlation between these clothing items and the definition of identities (e.g. gender, life stages, status) matching the life-cycles of the garments through the lady's life.
- Archaeological & historical perspectives: i) reconstruct (from archival material and comparanda) how the textiles were arranged around the body to create the mummy, ii) cross-reference information coming from the textiles and the burial practices to assess the quantity of textiles (fibres, threads, woven fabrics) needed for this particular inhumation. iii) assess the economic impact of funerary rites on the textile industry of the time and assess the place of 'recycling strategies' into this network.

The main impacts of the textile study will be to 1/ form a benchmark study of textile production in the 25th dynasty, a period poorly documented in existing literature about Egyptian crafts, 2/ conduct the first wardrobe study focusing on only one woman and individual from the past, reconstructing dress practices and body conception; 3/ better understand the implications of mummification practices for the industrial and economic sectors of Egyptian society.

This project is currently in a development phase and still requires founding. 2022 should see a first meeting between prospective participants and preliminary assessment of the assemblage for budgeting analyses and work plan.

Organization of scientific workshops and meetings

Workshops and meetings	Date
Advisory board meeting	January 22, 2021
TexLab Workshop	August 16-20, 2021
Training in photogrammetry	September 7, 2021
Management meeting	November 11, 2021

Papers, lectures and presentations

Presentations at international and national conferences, workshops, and seminars

June
CTR anniversary conference 'Old Textiles – More Possibilities'
18 June, UCPH and Zoom
Elsa Yvanez
TexLab – a new hub for integrative textile research at CTR

September
EuroWeb Digital Workshop "Spinning, Weaving, Dyeing and Sewing: Interdisciplinary Perspectives on Historical Textiles in Portugal Digtal Conference.
15-16 September 15 September, Zoom
Eva Andersson Strand
Documentation and Preservation of Textile Heritage, Methods and Use

October
NatArk
6 October, UCPH SC
Eva Andersson Strand with Matthew Collins and Aniara Sistiaga
Presentation of ERIHS.dk and CTR TexLab

Expected publication of works in progress

Fashioning the Viking Age (ViV) study of the production of a legal unit of Vaðmál based on fragment from Hedeby Harbour and Medieval texts will be published in ATR 2022.

Fashioning the Viking Age (ViV) results from the analysis of sample III from the time registrations of weaving based on textile fragment 39AB from the Viking Age site Hedeby Harbor, will be published in a report later in 2022.

Practices of practices (PoP) All data from tests through the use of Motion capture and EEG, as well as interviews will be analysed and the results will be published later in 2022.

Supervision

Supervisor/mentor	Title of thesis/ dissertation	Student	Level
Eva Andersson Strand / Tim Flohr Sørensen	12 kasser med klude	Signe Vind	BA
Eva Andersson Strand	The past in motion	Sofie Louise Grue Husted Andersen	MA
Eva Andersson Strand	Project:Weaving creativity	Anne Kilgour Viuf	MA

Funding and awards

External funding applied for in 2021

Private Danish funds
Founding body: Carlsberg foundation
Purpose: A research infrastructure for innovative research in textile archaeology & heritage sciences
Applicant: Eva Andersson Strand et al.
Grant holder if successful: Eva Andersson Strand
Activity period: 2022-2025
Amount (DKK): 4 793 000
Applied for in 2021: x

Funding and award received

In 2021 and beginning of 2022, three of TexLab members have received prestigious grants and awards:

Christina Margariti was awarded the European Cultural Heritage Award/Europa Nostra Award and the Grand Prix in the category Research. It was given to the program FIBRANET (FIBres in ANcient European Textiles), initiated as a Marie Skłodowska-Curie Action and hosted at the Centre for Textile Research/University of Copenhagen (CTR/UCPH) under the supervision of Prof. Marie-Louise Nosch. FIBRANET studied the fibres used in Europe in Antiquity to make textiles, and its main focus was fibre identification. It led to the creation of an open access database available at

https://netlearning.gr/fibranet/index.php/component/users/?view=reset&Itemid=101

Amaia Arranz Otaegui was awarded an ERC Starting Grant for the project PalaeOrigins. Tracing the Epipalaeolithic origins of plant management in southwest Asia (host institution: University of the Basque Country).

Elsa Yvanez was awarded an ERC Starting Grant for the project Fashioning Sudan. Archaeology of dress practices along the Middle Nile (host institution: CTR-UCPH).

We are looking forward to seeing new results and collaborations!

Management

NAME	TITLE
Eva Andersson Strand	PI
Elsa Yvanez	Project coordinator
Chiara Spinazzi-Lucchesi	Project coordinator
Signe Vind	Student assistant
Anine Aakjær Lundgaard Jensen	Student assistant

Project participants

NAME	AFFILIATION	PROJECT
Eva Andersson Strand	Centre for Textile Research, UCPH	ViV, FP, PoP
Chiara Spinazzi-Lucchesi	Centre for Textile Research	FP
Elsa Yvanez	Centre for Textile Research	FP, EW
Signe Vind	Centre for Textile Research	ViV, FP
Ida Demant	Land of Legends Lejre	ViV, PoP, FP
Marie Wallenberg	Centre for Textile Research	ViV, PoP, FP
Ulla Mannering	National Museum of Denmark	ViV
Irene Skals	Centre for Textile Research	ViV
Line Maria Mørch	Centre for Textile Research	ViV
Charlotte Rimstad	National Museum of Denmark	ViV
Mark Schram Christensen	Department for Neuroscience, Panum institute, University of Copenhagen	PoP
Carolina Larsson	Lund University Humanities Lab, Sweden	PoP
Stefan Lindgren	Lund University Humanities Lab, Sweden	PoP
Magdalena Öhrman	University of Wales Trinity Saint David	PoP
Sofie Louise Grue Husted Andersen	HUM/Centre for Textile Research	PoP SP1
Anne Kilgour Viuf	HUM/Centre for Textile Research	PoP SP2

Advisory board

NAME	AFFILIATION
Eva Andersson Strand	HUM/Centre for Textile Research
Elsa Yvanez	HUM/Centre for Textile Research
Chiara Spinazzi-Lucchesi	Centre for Textile Research
Signe Vind	HUM/Centre for Textile Research
Ida Demant	Land of Legends Lejre
Helene Forum Winther	HUM/Saxo Institute/ The Prehistoric Archaeology Council, UCPH
Marie Wallenberg	HUM/Centre for Textile Research
Susanne Lervad	HUM/Centre for Textile Research
Christina Margariti	HUM/Centre for Textile Research
Laura Viñas Caron	HUM-SUND/CTR and Globe
Matthew Collins	SUND/Globe Institute
Luise Ørsted Brand	SUND/Globe Institute
Chiara Villa	SUND/Department of Forensic Medicine
Amalie Skovmøller	HUM/Saxo Institute
Tim Flohr Sørensen	HUM/Saxo Institute
Amaia Arranz Otaegui	HUM/ToRS
Ulla Mannering	National Museum of Denmark
Carsten Gundlach	DTU - the 3D Imaging Center
Vivi Lena Andersen	Museum of Copenhagen
Annemette Bruselius Scharff	School of Conservation
Mikkel Scharff	School of Conservation